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REPTILIA and AMPHIBIA.

VOL. II.—SAURIA.

BY

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CONTENTS.

Frontispiece: Map of the Indian and Indo-Chinese Sub-regions. Plate

Author's Preface v

Systematic Index ix

Introduction:

Structure 1

Evolution and Devolution 7

Geographical Distribution 15

Economics 16

Preservation and Examination of Specimens. . 17

Sauria 20

Alphabetical Index 409

Glossary and General Index 423

Bibliography 425

Map of the Indian and Indo-Chinese Hill Districts.

Plate I.

AUTHOR'S PREFACE.

THE present volume contains descriptions of 297 species of Lizards, 248 of which occur in the Indian Empire. Mr. Boulenger's volume (1890) for that area, after eliminating a few that were included upon incorrect data or have since been placed as synonyms, contained 209 species.

The general plan and scope of this volume are the same as in the previous one, and an account of the regions dealt with, the geographical divisions, the methods of describing, etc., will be found in the Preface and Introductory Chapter to that volume.

Most of the new text-figures have been drawn by Miss Joyce Townend; figs. 5, 22, 35, 56, 58, 69, 70, 80, 86, and the Plate are by Miss E. C. Humphreys; figs. 20, 59, and 61 are by Miss B. Hopkins. I have also borrowed many illustrations from Mr. Boulenger's work of 1890.

The remarks on evolution which are given in the Introduction, pages 7 to 15, are the outcome of the study of the structure of the Indian and Indo-Chinese species. The problems which started with them, however, had to be carried much further afield, and a study of the whole group was usually necessary

before they could be completed. Only a summary of the results is given here; a fuller account will be published elsewhere. It need hardly be said that upon lines similar to those suggested in my remarks an immense amount of investigation is still to be done. The evolution of the structure of reptiles has hardly yet been touched.

The work in connection with this volume has been done mainly in the British Museum (Natural History), and I must first of all thank Mr. H. W. Parker, Assistant Keeper of Zoology, for giving me free access to the Collection in his charge. Dr. Baini Prashad, Director of the Indian Museum, and Mr. S. H. Prater of the Bombay Natural History Society have sent me for examination the entire collections of Lizards in their Institutions. I wish also to express my gratitude to Dr. E. Ahl, Zoological Museum, Berlin; M. F. Angel, Museum of Natural History, Paris; Prof. Ariangeli, Museum of Zoology, Turin; Mr. E. Banks, Sarawak Museum; Dr. L. D. Brongersma, Museum of Natural History, Leiden; Mr. F. N. Chasen, Raffles Museum; Miss Doris Cochran, United States National Museum; Mr. P. E. P. Deraniyagala, Colombo Museum; Dr. G. A. C. Herklots, Hongkong University; Mr. Arthur Loveridge, Museum of Comparative Zoology, Harvard; Dr. R. Mell; Dr. R. Mertens, Senckenberg Museum; Mr. C. H. Pope, American Museum of Natural History; Dr. Jean Roux, Museum of Natural History, Basel; Mr. K. P. Schmidt, Field Museum of Natural History; Mr. E. H. Taylor, Kansas University; Prof. D. Vinciguerra, Museum of Natural History, Genoa; and Dr. Otto Wettstein, Natural History Museum, Vienna. Their co-operation has enabled me to examine much valuable material. With a few exceptions, which have been mentioned in the text, I have examined the types of all the species included in this work, both valid and invalid, which are still in existence. To Dr. Leonhard

Stejneger I am indebted for help on several problems of nomenclature, and to Mr. N. B. Kinnear for information on many and various points connected with India.

Finally, I have to thank the Editor, Lt.-Col. R. B. S. Sewell, for his careful scrutiny of the text and general help in the production of the whole volume.

MALCOLM SMITH.

December 1934.

SYSTEMATIC INDEX.

	Page
Order SQUAMATA	20
Suborder SAURIA	20
Fam. 1. **Gekkonidæ**	21
Gen. 1. Teratoscincus *Strauch*	30
1. scincus (*Schlegel*)	30
2. microlepis *Nikolski*....	32
Gen. 2. Stenodactylus *Fitzinger*	32
3. orientalis *Blanford*....	33
4. lumsdeni *Boulenger* ..	34
5. maynardi *Smith*	35
Gen. 3. Alsophylax *Fitzinger*	36
6. tuberculatus (*Blanford*)	36
Gen. 4. Gymnodactylus *Spix*	37
7. fedtschenkoi *Strauch* ..	41
8. montium-salsorum *Annandale*	42
9. scaber (*Heyden*).....	42
10. kachhensis kachhensis *Stoliczka*	43
10*a*. k. watsoni *Murray* ..	44
11. intermedius *Smith*	44
12. fea *Boulenger*	45
13. fasciolatus (*Blyth*)	45
14. chitralensis *Smith*....	46
15. consobrinoides *Annandale*	47
16. variegatus (*Blyth*)	48
17. frenatus *Günther* ...	49
18. condorensis *Smith*	49
19. oldhami *Theobald*	50
20. peguensis *Boulenger* ..	50
21. irregularis *Smith*... ..	51
22. angularis *Smith*	52
23. khasiensis (*Jerdon*)	53
24. gubernatoris *Annandale*	54
25. rubidus (*Blyth*)	54
26. brevipalmatus *Smith* ..	55
27. triedrus *Günther*.....	55
28. nebulosus *Beddome* ..	56
29. collegalensis *Beddome* .	56
30. stoliczkai *Steindachner* .	57
31. lawderanus *Stoliczka* ..	58
32. dekkanensis *Günther* ..	59
33. albofasciatus *Boulenger*.	60
34. jeyporensis *Beddome* ..	60
Gen. 5. Agamura *Blanford* .	61
35. persica (*Duméril*)	61
36. femoralis *Smith*	63
Gen. 6. Pristurus *Rüppell* ..	64
37. rupestris *Blanford*	64
Gen. 7. Cnemaspis *Strauch* .	65
38. indica (*Gray*).....	68
39. wynadensis (*Beddome*) .	69
40. sisparensis (*Theobald*) .	69
41. ornata (*Beddome*)	70
42. beddomei (*Theobald*) ..	71
43. siamensis (*Smith*)	71
44. mysoriensis (*Jerdon*) ..	72
45. khandiana (*Kelaart*) ..	73
46. gracilis (*Beddome*)....	74
47. jerdoni (*Theobald*)	74
48. boiei (*Gray*)	75
49. littoralis (*Jerdon*)	76
50. boulengeri *Strauch*....	76
Gen. 8. Calodactylodes *Strauch*	77
51. aureus (*Beddome*)	78
Gen. 9. Ptyodactylus *Gray* .	79
52. homolepis *Blanford* ..	79

	Page
Gen. 10. Phyllodactylus *Gray*	80
53. siamensis *Boulenger*	81
Gen. 11. Cravidogecko *Smith*	82
54. anamallensis (*Günther*)	32
Gen. 12. Hemidactylus *Oken*	83
55. maculatus *Dum. & Bibr.*	85
56. turcicus (*Linnæus*)	86
57. persicus *Anderson*	87
58. triedrus (*Daudin*)	83
59. subtriedrus *Jerdon*	89
60. brooki *Gray*	89
61. depressus *Gray*	91
62. prashadi *Smith*	92
63. gracilis *Blanford*	94
64. reticulatus *Beddome*	94
65. frenatus *Schlegel*	95
66. leschenaulti *Dum. & Bibr.*	97
67. flaviviridis *Rüppell*	98
68. giganteus *Stoliczka*	99
69. fowringi (*Gray*)	99
70. garnoti *Dum. & Bibr.*	100
71. karenorum (*Theobald*)	102
Gen. 13. Platyurus *Oken*	102
72. platyurus (*Schneider*)	102
Gen. 14. Gehyra *Gray*	104
73. mutilata (*Wiegmann*)	105
Gen. 15. Hemiphyllodactylus *Bleeker*	106
74. typus typus *Bleeker*	107
74*a*. typus aurantiacus (*Beddome*)	108
75. yunnanensis (*Boulenger*)	109
Gen. 16. Gekko *Laurenti*	109
76. gecko (*Linnæus*)	111
77. smithi *Gray*	112
78. chinensis *Gray*	114
79. palmatus *Boulenger*	114
Gen. 17. Lepidodactylus *Fitzinger*	115
80. lugubris (*Dum. & Bibr.*)	115
Gen. 18. Ptychozoon *Kuhl*	117
81. kuhli *Stejneger*	117
82. lionotum *Annandale*	118
Gen. 19. Phelsuma *Gray*	120
83. andamanense *Blyth*	121
Gen. 20. Teratolepis *Günther*	122
84. fasciata (*Blyth*)	123
Gen. 21. Lophopholis *Smith & Deraniyagala*	124
85. scabriceps (*Annandale*)	124
Gen. 22. Eublepharis *Gray*	125
86. hardwickii *Gray*	126
87. macularius (*Blyth*)	127
88. lichtenfelderi *Mocquard*	129

	Page
Fam. 2 **Agamidæ**	130
Gen. 23. Draco *Linnæus*	135
89. maculatus (*Gray*)	138
90. tæniopterus *Günther*	140
91. indochinensis *Smith*	141
92. blanfordi *Boulenger*	141
93. norvilli *Alcock*	142
94. dussumieri *Dum. & Bibr.*	143
Gen. 24. Sitana *Cuvier*	144
95. ponticeriana *Cuvier*	144
Gen. 25. Otocryptis *Wagler*	146
96. wiegmanni *Wagler*	146
97. beddomii *Boulenger*	147
Gen. 26. Ptyctolæmus *Peters*	149
98. gularis *Peters*	149
Gen. 27. Cophotis *Peters*	150
99. ceylanica *Peters*	150
Gen. 28. Ceratophora *Gray*	151
100. stoddarti *Gray*	152
101. tennenti *Günther*	153
102. aspera *Günther*	154
Gen. 29. Lyriocephalus *Merrem*	155
103. scutatus (*Linnæus*)	155
Gen. 30. Goniocephalus *Kaup*	157
104. armatus armatus (*Gray*)	158
104*a*. armatus crucigerus (*Boulenger*)	160
105. lepidogaster (*Cuvier*)	161
106. capra (*Günther*)	162
107. subcristatus (*Blyth*)	163
Gen. 31. Mictopholis *Smith*	164
108. austeniana (*Annandale*)	165
Gen. 32. Oriocalotes *Günther.*	166
109. paulus *Smith*	166
Gen. 33. Japalura *Gray*	167
110. tricarinata (*Blyth*)	169
111. planidorsata *Jerdon*	170
112. major (*Jerdon*)	171
113. kumaonensis (*Annandale*)	171
114. dymondi (*Boulenger*)	172
115. varcoæ (*Boulenger*)	172
116. andersoniana *Annandale*	173
117. variegata *Gray*	173
118. yunnanensis *Anderson*	175
119. hamptoni *Smith*	175
120. fasciata *Mertens*	176
121. flaviceps *Barbour & Dunn*	176
Gen. 34. Salea *Gray*	177
122. horsfieldi *Gray*	177
123. anamallayana (*Beddome*)	179

Page

Gen. 35. Calotes *Cuvier*.. 183
124. cristatellus (*Kuhl*) 184
125. smaragdinus (*Günther*). 185
126. jubatus (*Dum. & Bibr.*) 185
127. floweri *Boulenger* 186
128. microlepis *Boulenger* .. 187
129. fruhstorferi (*Werner*).. 186
130. kakhienensis (*Anderson*) 188
131. versicolor (*Daudin*) .. 189
132. maria *Gray* 193
133. jerdoni *Günther* 194
134. emma *Gray* 195
135. mystaceus *Dum. & Bibr.* 197
136. nemoricola *Jerdon* 199
137. grandisquamis *Günther*. 200
138. calotes (*Linnæus*) 201
139. ceylonensis *Müller* 202
140. liolepis *Boulenger* 203
141. liocephalus *Günther* .. 204
142. kingdon-wardi *Smith*.. 204
143. andamanensis *Boulenger* 205
144. nigrilabris *Peters* 206
145. rouxi *Dum. & Bibr.* .. 206
146. elliotti *Günther* 207
Gen. 36. Psammophilus *Fitzinger* 208
147. dorsalis (*Gray*) 209
148. blanfordanus (*Stoliczka*) 210
Gen. 37. Agama *Daudin* 211
149. himalayana (*Steindachner*) 213
h. sacra *Smith* 214
150. tuberculata *Gray* 214
151. agrorensis (*Stoliczka*).. 216
152. melanura (*Blyth*) .. 218
153. nupta *de Filippi* 219
154. caucasica (*Eichwald*) .. 220
155. agilis *Olivier* 221
156. ruderata *balrezhiana Smith*..... 223
157. rubrigularis (*Blanford*). 224
158. megalonyx (*Günther*).. 224
159. minor *Hardwicke & Gray* 225
Gen. 38. Phrynocephalus *Kaup* 227
160. scutellatus (*Olivier*) .. 229
161. theobaldi *Blyth* 230
162. reticulatus *Eichwald* .. 231
163. ornatus *Boulenger* 232
164. maculatus *Anderson* . 233
165. euptilopus *Alcock & Finn* 234
166. luteoguttatus *Boulenger* 235
Gen. 39. Physignathus *Cuvier* 236
167. cocincinus *Cuvier* 236

Page

Gen. 40. Leiolepis *Cuvier*.... 238
168. belliana belliana (*Gray*) 238
168a. b. guttata *Cuvier* 240
Gen. 41. Uromastix *Merrem* . 242
169. hardwickii *Gray* 244
170. asmussi (*Strauch*) 247

Fam. 3. **Chamæleonidæ** 249

Gen. 42. Chamæleon *Gronovius* 251
171. zeylanicus *Laurenti* .. 251

Fam. 4. **Scincidæ** 254

Gen. 43. Mabuya *Fitzinger* .. 257
172. bibroni (*Gray*) 260
173. novemcarinata (*Anderson*) 261
174. dissimilis (*Hallowell*) .. 261
175. aurata (*Linnæus*) 262
176. innotata (*Blanford*) .. 263
177. macularia (*Blyth*) 264
178. carinata (*Schneider*) .. 266
179. multifasciata multifasciata (*Kuhl*) 268
180. tytleri (*Theobald*) 270
181. longicaudata (*Hallowell*) 270
182. andamanensis *Smith* .. 271
183. rugifera (*Stoliczka*) .. 273
184. quadricarinata *Boulenger* 273
185. beddomii (*Jerdon*) 274
186. trivittata (*Hardwicke & Gray* 275
Gen. 44. Dasia *Gray*..... 276
187. olivacea *Gray* 277
188. subcærulea (*Boulenger*). 277
189. haliana (*Haly & Nevill*) 278
Gen. 45. Lygosoma *Hardwicke & Gray* 279
190. indicum indicum (*Gray*) 281
191. boulengeri (*Van Denburgh*) 282
192. helenæ (*Cochran*, ... 283
193. tersum *Smith* 284
194. stellatum *Boulenger* .. 284
195. maculatum (*Blyth*).... 285
196. dussumieri *Dum. & Bibr.* 286
197. taprobanense (*Kelaart*) 287
198. striatopunctatum *Ahl*.. 288
199. fallax *Peters*..... 288
200. megalops *Annandale* .. 289
201. coureyanum *Annandale*. 289
202. quadrupes (*Linnæus*) .. 290

Page

Gen. 46. Ateuchosaurus *Gray* 291
203. chinensis *Gray* 292
Gen. 47. Leiolopisma *Dum. & Bibr.* 293
204. reevesi reevesi (*Gray*) 295
204 *a*. r. melanostictum (*Boulenger*) 296
205. rupicola (*Smith*) 297
206. punctatolineatum (*Boulenger*) 297
207. tavesæ *Smith* 298
formosum (*Blyth*) 298
208. himalayanum (*Günther*) 299
209. ladacense (*Günther*) .. 300
210. sikkimense (*Blyth*) 301
211. doriæ (*Boulenger*) 302
212. modestum (*Günther*) .. 303
213. macrotis (*Steindachner*) 303
214. travancoricum (*Beddome*) 304
215. palnicum (*Boettger*) .. 305
216. beddomei (*Boulenger*).. 305
217. laterimaculatum (*Boulenger*) 305
218. bilineatum (*Gray*) 306
219. vittigerum vittigerum (*Boulenger*) 306
219 *a*. v. microcercum (*Boettger*) 308
220. macrotympanum (*Stoliczka*) 308
Gen. 48. Ablepharus *Fitzinger* 309
221. pannonicus *Fitzinger* .. 310
222. grayanus (*Stoliczka*) .. 311
Gen. 49. Riopa *Gray* 312
223. corpulenta (*Smith*).... 313
224. koratense (*Smith*) 314
225. bowringi (*Günther*) .. 315
226. albopunctata *Gray* 316
227. herberti (*Smith*) 317
228. isodactyla (*Günther*) .. 317
229. punctata (*Gmelin*) 318
230. guentheri (*Peters*) 319
231. lineolata *Stoliczka* 320
232. anguina *Theobald* 321
233. lineata (*Gray*)..... 321
234. vosmaeri (*Gray*)..... 322
Gen. 50. Tropidophorus *Dum & Bibr.* 322
235. berdmorei (*Blyth*) 325
236. laotus *Smith* 325
237. robinsoni *Smith* 326
238. hainanus *Smith* 326
239. assamensis *Annandale* . 327
240. sinicus *Boettger* 327

Page

241. thai *Smith* 328
242. microlepis *Günther*.... 328
243. cocincinensis *Dum. & Bibr.* 329
Gen. 51. Ristella *Gray*..... 329
244. rurki *Gray* 331
245. travancorica (*Beddome*) 331
246. guentheri *Boulenger* .. 332
247. beddomii *Boulenger* .. 332
Gen. 52. Ophioscincus *Peters*. 333
248. anguinoides (*Boulenger*) 334
249. roulei (*Angel*) 335
250. gyldenstolpei (*Lönnberg*) 335
Gen. 53. Eumeces *Wiegmann*. 337
251. chinensis (*Gray*)..... 338
252. quadrilineatus (*Blyth*) . 339
253. blythianus (*Anderson*) . 340
254. schneideri (*Daudin*) .. 341
255. tæniolatus (*Blyth*) 342
Gen. 54. Scincus *Gronovius* .. 343
256. mitranus *Anderson* 344
Gen. 55. Ophiomorus *Dum. & Bibr.* 345
257. tridactylus (*Blyth*).... 346
258. blanfordi *Boulenger* .. 347
259. brevipes (*Blanford*) ... 348
Gen. 56. Chalcides *Laurenti* . 349
260. ocellatus ocellatus (*Forskål*) 349
261. pentadactylus (*Beddome*)..... 350
Gen. 57. Barkudia *Annandale* 352
262. insularis *Annandale* .. 352
Gen. 58. Sepsophis *Beddome* . 353
263. punctatus *Beddome*... 353
Gen. 59. Chalcidoseps *Boulenger*..... 354
264. thwaitesi (*Günther*) .. 355
Gen. 60. Nessia *Gray* 356
265. burtoni *Gray* 357
266. didactyla (*Deraniyagala*) 358
267. monodactyla (*Gray*) .. 358
268. bipes *Smith*..... 359
269. layardi (*Kelaart*)..... 359
270. sarasinorum (*Müller*).. 360

Fam. 5. **Dibamidæ** 360
Gen. 61. Dibamus *Dum. & Bibr.* 361
271. novæ-guineæ *Dum. & Bibr.* 362
272. montanus *Smith* 363

	Page
Fam. 6. **Lacertidæ**	363
Gen. 62. Takydromus *Daudin*	365
272. sexlineatus sexlineatus *Daudin*	366
273 *a*. s. ocellatus *Guérin*	368
273 *b*. s. khasiensis *Boulenger*	369
274. haughtonianus *Jerdon*	369
Gen. 63. Acanthodactylus *Wiegmann*	370
275. cantoris cantoris *Günther*	371
276 *a*. c. blanfordi *Boulenger*	372
276. micropholis *Blanford*	373
Gen. 64. Cabrita *Gray*	374
277. leschenaulti (*Milne-Edwards*)	374
278. jerdoni *Beddome*	375
Gen. 65. Ophisops *Ménétries*	376
279. jerdoni *Blyth*	377
280. beddomei (*Jerdon*)	378
281. elegans elegans *Ménétries*	379
282. microlepis *Blanford*	380
Gen. 66. Eremias *Wiegmann*	381
283. velox persica *Blanford*	383
284. fasciata *Blaxford*	386
285. scripta (*Strauch*)	386
286. acutirostris (*Boulenger*)	387
287. aporosceles (*Alcock & Finn*)	388
288. guttulata watsonana (*Stoliczka*)	389
289. brevirostris (*Blanford*)	390
Fam. 7. **Anguidæ**	391
Gen. 67. Ophisaurus *Daudin*	392
290. gracilis (*Gray*)	393
291. charti *Boulenger*	394
apodus *Pallas*	395
Fam. 8. **Varanidæ**	397
Gen. 68. Varanus *Merrem*	398
292. griseus (*Daudin*)	400
293. monitor (*Linnæus*)	402
294. nebulosus (*Gray*)	403
295. flavescens (*Gray*)	404
296. dumerili (*Schlegel*)	405
297. salvator (*Laurenti*)	406

INTRODUCTION.

THE Sauria, or Lizards, may be defined as Reptiles with movable quadrate bones, with the right and left halves of the mandible united by suture, a transverse anal opening with paired copulatory organs, a cloacal bladder, a pectoral and pelvic arch, or at least vestiges of them, and with the anterior end of the brain-case never completely closed. The majority have the body covered with horny epidermal scales, possess well-developed limbs, and have eyes with movable eyelids.

But some lizards have lost their limbs, have acquired an elongated body, and in general have a remarkably snake-like appearance. They can be distinguished from snakes by the following characters. There are exceptions, but the combination will always serve. In snakes the mandibular rami are connected by ligament, there is no trace of a pectoral arch, the eye is covered with an immovable transparent disc, the tongue is comparatively long, bifid, and sheathed at its base, and the anterior end of the brain-case is completely closed.

About 2,500 species of lizards are known.

Structure.

Our knowledge of the anatomy of the Lizards is still very incomplete, and a text-book dealing comprehensively with the subject is much needed. The following general remarks on structure have particular reference to the Indian and Indo-Chinese species; other, and more specialized, points are also dealt with when discussing the families.

In their modifications in structure lizards exhibit greater variation than any other group of reptiles. The majority are terrestrial, but there are many exceptions. The Chameleons and the Flying Lizards (*Draco*), each in their own particular way, are modified for an entirely arboreal existence; *Dibamus* and many of the Skinks, which have undergone degeneration of the limbs, lead an almost entirely subterranean existence; the Geckoes have developed adhesive pads to their digits, by which they are able to climb trees,

rocks, and dwellings. Generally speaking, it may be said that a terrestrial existence has led to, or is associated with, a depressed form of body, an arboreal existence to a compressed one, and a subterranean life to an elongated and cylindrical one. Some of the Agamidæ (*Physignathus, Otocryptis, Calotes*) when running fast over the ground adopt a bipedal action, the fore-limbs being held back along the sides of the body.

The Skin.—The skin is normally covered with scales, the horny epidermal coating of which is periodically shed. In the majority of lizards it comes off in flakes, but in those

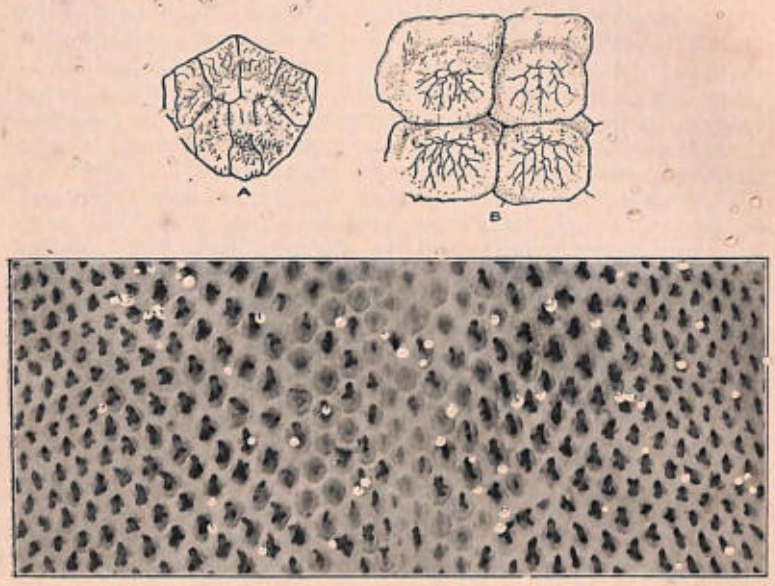


Fig. 1.—A. One osteoderm of *Mabuya multifasciata*.
B. Four osteoderms of *Ophisaurus gracilis*.
C. Osteoderms of *Varanus salvator*.

which have a much elongated body it may be shed in one piece as in snakes. The scales usually have a free posterior border and more or less overlap one another, but in the Chameleons and in most Geckoes the true scale-like structure is replaced by tubercles or granules. In the Monitors each dorsal scale is surrounded by a ring of small granules. Ossifications of the cutis in the form of small bony plates, the osteoderms, are present in all the scales of the Anguidæ

and Scincidæ. In the Lacertidæ they are confined to the scales of the head, those which come into contact with the underlying bones being more or less firmly united with them; in addition, they roof over the supra-temporal fossa and sometimes the whole temporal region.

In the Anguidæ and Scincidæ each osteoderm is provided with a system of fine "circulatory" channels, each family having a definite and easily recognizable pattern of its own. In the Scincidæ they usually consist of a transverse channel anastomosing with several longitudinal ones; and they more or less separate the component parts of each plate. In the Anguidæ the channels form radiating or arborescent figures, grooving the external surface of the plate only.

As occasional structures osteoderms are found also in many other lizards. They are present in *Varanus salvator*, but not in any other Asiatic member of the genus that I have examined. In that species they are confined chiefly to the scales of the neck, belly, anterior aspects of the limbs, and base of the tail. They are quite different to the osteoderms of the Anguidæ and Scincidæ, being elongated nodules of bone, slightly curved or branched in shape. They are not present in the very young, but appear later, and increase in size with age. The photograph (fig. 2) shows a piece of the skin of the neck, the osteoderms having been stained with alizarin.

Hewitt (1929) has claimed that for some of the Scincid genera the pattern has a taxonomic value, but the Oriental material examined by me does not support his contention.

Teeth.—Teeth are always present on the premaxillary, maxillary, and dentary bones. They are present also on the palate in many of the Anguidæ, Scincidæ, and Lacertidæ. The teeth are of two types, namely, pleurodont, fixed to the inner side of the jaw-bone, and acrodont, fixed to the parapet of the jaw-bone. The latter are found only in the Agamidæ and Chamæleonidæ among the Lizards. In the Agamidæ they are usually divided into incisors, canines, and molars; the incisors and canines may be renewed, but the molars are not replaced during life.

Salivary Glands.—Lizards have no proper salivary glands, but labial glands opening on the lips are present. The only poisonous lizard known is the Mexican Heloderm, although some species in India and Indo-China have, amongst the ignorant, the reputation of being so.

The Tongue.—The tongue is extremely variable in shape and structure, and affords excellent taxonomic characters for the division of the Sauria into families. The chief variations are shown on p. 18. The organ is always furnished with numerous tactile or with gustatory corpuscles, and in the Lizards, as in the Snakes, is a valuable instrument of touch.

Recent work * has shown that the chief function of the snake's tongue is to convey olfactory impressions to Jacobson's organ, and with lizards it is probably the same, although, perhaps, not to the same extent.

Noble and Mason (1933) have shown that *Eumeces* can distinguish her own eggs from those of other lizards closely resembling them in size and shape. The rejection of the eggs was always made after touching them with the tongue, and the conclusion was formed that the discrimination was made by touch and not by sight.

The Cloaca.—The cloaca of the Lizards is as follows:—The coprodæum is constricted into several chambers and is completely shut off from the urodæum, into which it opens, by a strong sphincter. The urodæum receives the urinary secretion, and into it also open the oviducts in the female and the vasa deferentia in the male. The proctodæum or outermost cloacal chamber is shallow and its external opening is transverse. This is to provide for the extrusion of the copulatory organs, which are paired structures, one lying on either side, and at the posterior corner, of the cloaca, but outside it. Each organ consists of a tube of erectile tissue, which can be everted like the finger of a glove. Only one organ is inserted, but which one is immaterial, and depends upon the side the male happens to be at the time of copulation. How far the form of the organ bears upon phylogeny and classification is still in doubt, and much patient work is needed before this can be satisfactorily determined. When at rest and withdrawn the penes form small rounded or longitudinal swellings on either side of the base of the tail. These, however, are seldom very distinct, and the sexing of a lizard from its external appearance is not to be relied upon. A longitudinal incision through the skin over the seat of the swelling should be made and the penis exposed. It must not be confused with the female organ, which is much smaller. There is still much to be learned with regard to sexual dimorphism in lizards, and it is important, therefore, to be able to sex a specimen accurately.

Femoral Glands or Organs.—These are present in the Gekkonidæ, Agamidæ, Lacertidæ, Varanidæ, and Dibamidæ. They are not present in all the genera. They may be restricted to the males, as in the Gekkonidæ, or both sexes may have them, as in the Lacertidæ. They are not true glands, but tubular invaginations of the epithelium, the opening of which, termed the pore, may perforate a scale or lie between two or more scales. The callose or hypertrophied preanal

* Baumann, 1929, and Kaumann, 1932.

and abdominal scales of the Agamas are homologous, but less specialized, structures.

The femoral pores are arranged in a single row along the under surface of the thigh; the preanal pores may form an angle, the apex forwards, or be arranged in a cluster. The number of pores is subject to individual variation, and their value for specific determination has been much overestimated. A reduction in the number of femoral pores usually takes place from the distal end; in some Geckoes, which have normally only a few pores, they may be absent altogether (*Cnemaspis siamensis*). The secretion or excretion of the glands consists chiefly of epidermal scales, and is without apparent odour. In the Lacertidæ it may be seen as small heaped-up concretions of a reddish or yellowish colour at the mouth of each gland; in the Gekkonidæ it is not so marked. The amount is increased during the breeding season, but is usually present, to a more or less extent, at other times of the year. The function of these structures is not yet understood. Many ingenious theories have been proposed to account for their presence, but none is very convincing. A good summary of what is known of the mating behaviour of lizards has been given by Noble and Bradley (1933). The males of most lizards fight freely during the breeding season, usually in defence of definite territories which they seek to hold.

Eggs.—Most lizards lay eggs, but some produce their young alive, and the number of species in which this is known to occur is steadily increasing. In the Geckoes and in *Dibamus* the shell contains a calcareous deposit and is brittle, but in the others the envelope is parchment-like and contains only a small amount of lime, as in the Snakes. Owing to the absorption of moisture and growth of the embryo, a slight but distinct increase in size take place in the egg during the incubation period.

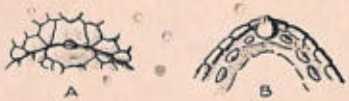


Fig. 2.—Egg-tooth of *Uromastix hardwickii*.
A. As seen projecting from the closed mouth.
B. Upper jaw, viewed from below.

For the rupture of the shell the embryo is provided with a sharp calcareous egg-tooth at the extreme tip of the snout. This is shed shortly after birth. In the Geckoes the tooth is double, but in all other lizards, so far as is known, it is single. Annandale (1912) has suggested that, in some cases, the rupture of the shell is effected by means of the claws.

His view is supported by the knowledge that in some Chelonians rupture of the shell by the claws and not by the egg-tooth is definitely known to occur. True viviparity, in which there is some form of placentation, is known in the European *Chalcides* and in some of the Australian Skinks (Weekes, 1929, 1930). Careful research will probably show that it occurs also in some of the Oriental species.

Oviparity and viviparity have no taxonomic value; closely allied species may produce young by either method, for example, *Mabuya carinata* and *M. multifasciata*, or *M. dissimilis* and *M. aurata*. Still more remarkable is the recent discovery by Lantz in the Pyrenees, and Kerville in the Haute Garonne, that the Common Viviparous Lizard when living at high altitudes lays eggs.

Colour and Colour-pattern.—As a general rule the young of lizards are more brilliantly coloured than the adults. In some species also their colour-pattern is strikingly different, as in *Eumeces chinensis*, *E. quadrilineatus*, *Dasia olivacea*, *Leiolepis belliana*, and many of the Lacertidæ. With the exception of *D. olivacea*, which has transverse markings, all those mentioned are longitudinally striped at birth. The manner in which the stripes disappear varies in different species. In *Eumeces* and the Indian Lacertids they fade gradually, generally during the second year of life, but in others, e. g., *Mabuya beddomei* and *M. aurata*, the disappearance begins at the tail and advances gradually up the body; in *Leiolepis* they become broken into spots (fig. 61). A fourth type of change, not well marked in any Indian lizard, is for the spots to coalesce and form cross-bars; or the young are spotted at birth and in later life the spots unite and form longitudinal streaks. The young of *Eumeces quadrilineatus*, *Leiolopisma laterimaculatum*, and *L. bilineatum* have bright blue tails, that of *Leiolepis* has a bright red one. The juvenile coloration of many of the species included in this volume is not yet known.

The brilliant colours which are assumed by many lizards in the breeding season, the Agamids in particular, are of quite a different nature. They may be developed in both sexes, but are always much more vivid in the males. That these colours act in any way by attracting the female, and so governing her choice of a mate, has been disproved by all recent observations. Not only does she appear quite indifferent to them, but there are times when she is definitely repelled by them. Hingston (1933) has elaborated the theory that their purpose is to "bluff" or to frighten away other males. A more reasonable explanation seems to me to be the following. The colour-changes are dependent largely upon a psychological or psycho-physiological stimulus, and

moments of intense excitement may sweep over the creature like a wave. The sight of an adversary can call forth a more brilliant colouring than the sight of a mate; and I have seen it produced, perhaps by fear, in the presence of a snake. One would expect to find, therefore, that the most passionate and courageous males are also the gaudiest, and these would win, not because they are more attractive, but because they are the most virile.

Fragility of Tail.—That many lizards have the power of breaking the tail is well known. Among the Oriental species it is possessed by the Geckoes, Lacertids, Skinks, and *Ophisaurus*. The break occurs not between two vertebræ, but across the body of a vertebra, at a transverse septum of cartilage which develops during the ossification of the bone. The cells of this septum retain their embryonic character throughout life and, when the tail is broken off, are able to reproduce a new one. It is not, however, a complete organ. The vertebræ are not reproduced, but in their place a non-segmented rod grows; new muscles are acquired, but the scales which cover the new tail seldom exactly resemble the old ones. Boulenger has expressed the view that the new or aberrant scaling is sometimes a reversion to an ancestral form.

It is important in the Gekkonidæ, in which the tail often serves as a diagnostic character, to be able to distinguish an original tail from a reproduced one; this can usually be done if the part is examined carefully. A tail that is injured but not completely broken off may grow a second or even two new tails at the seat of injury. Geckoes appear more prone to this deformity than other lizards.

Evolution and Devolution.

Lizards, more than any other group of reptiles, are in the process of undergoing changes of structure. By this is meant that the evolution from a primitive organ to a more specialized one, or, alternatively, from a functioning organ to one that is losing its power (degeneration or devolution), is taking place in species that are living to-day. The changes cannot, of course, be demonstrated in any one species, and sometimes not even in one genus, but by selecting one's material, every step, or almost every step, in the process can be found. When all are pieced together an almost complete picture of the stages through which the structure has passed can be shown. The same type of evolution is not confined to a particular genus or family, but may be happening independently, in different parts of the world, in species that are not directly related to one another.

The Oriental species take their full share in these changes, the most remarkable of which are:—

1. The evolution of the adhesive digital pad (Gekkonidæ, Scincidæ).
2. The evolution of the external coverings of the eye (Gekkonidæ, Scincidæ, Lacertidæ).
3. Degeneration of the eye and its ultimate disappearance beneath the scales of the head (Scincidæ, Dibamidæ).
4. Degeneration of the ear (Agamidæ, Scincidæ).
5. Degeneration of the limbs, usually accompanied, in a greater or less degree, by elongation of the body (Scincidæ).

The Adhesive Digital Pad.—The adhesive digital pad, which most of the Geckoes possess to-day, is a highly specialized structure. It has arisen from the cylindrical form of digit, such as the Ground Geckoes have, by expansion and modification of the plates or lamellæ upon its under surface. The many designs which have been evolved in this process form excellent taxonomic characters for generic division. In its most highly developed form, as in *Hemidactylus* and *Gekko*, in which the plates are in transverse series, or in *Ptyodactylus*,

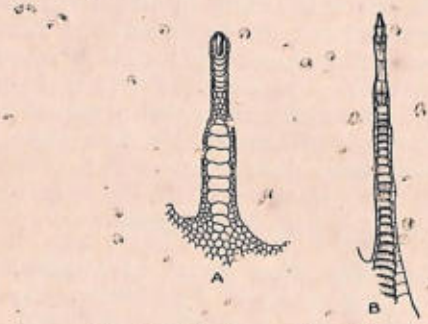


Fig. 3.—Under surface of fourth toe of (A) *Gymnodactylus frenatus*, (B) *Leiolopisma vittigerum*.

in which they are arranged fan-wise, the expansion consists of a series of slightly overlapping lamellæ, which are covered with a dense pile of infinitely fine hair-like processes or greatly elongated papillæ. The earliest stage in the evolution of the pad can be seen in some species of *Gymnodactylus* and *Cnemaspis* (e. g., *G. frenatus* and *G. brevipalmatus*) and in some of the Skinks (*Leiolopisma vittigerum*), all of which show slight broadening and differentiation of the plates of the basal phalanges of the digits. The change in structure

is invariably correlated with arboreal or subarboreal habits. The lamellæ at this stage have no hair-like processes, but are covered instead with heaped-up, sometimes pigmented, epithelium. This stage of cell-proliferation is the first one, and it appears to be the forerunner of the formation of the hair-like structures. In *Cnemaspis littoralis* these have definitely formed; they are still extremely short, but can be seen with a good binocular microscope. To study the proliferative epithelial stage, properly cut sections are needed.

That many of the Skinks are also developing adhesive pads has not hitherto been recognized. In the Oriental Region it has occurred only in the members of the genus *Dasia* and in *Leiolopisma vittigerum*, but among the Papuasian and Polynesian species of *Leiolopisma* and *Emoia* it is more widely spread, and the lamellar structures are more highly developed. What power of adhesion the pads at this stage of their evolution possess can be studied only on the living creature. It is probably not sufficient to be of real service, and, until it has reached a more advanced stage, the creature depends when climbing upon its claws.

The Eye.—The simplest form of eye-covering is to be found in the Geckoes. It consists of a large, fixed, transparent disc, beneath which the eye can be moved. It is provided with a lachrymal apparatus. The eyelid in most species is represented by a projecting rim of tissue which is immovable. The eyelids of the Eublepharids appear to be an extension or growing forwards of this rim of tissue, and the conversion of the rim into an upper and lower eyelid has been finally achieved by a lateral folding of the upper and lower halves. That this simple explanation of the process is the correct one there can be hardly any doubt, for by opening widely the eyelids of *Eublepharis* the lateral folds or creases, which represent the inner and outer canthi, can be made to disappear entirely, and the rim appears then as it is in *Phelsuma*, except that it projects more strongly. The final sequence of events is the disappearance of the immovable transparent disc, its function as a covering for the eye being now undertaken by the eyelids. Whether it becomes thinned and so disappears, or whether it becomes united with the cornea, I am unable to say.

The re-covering of the eye by the formation of another transparent disc, such as exists in *Ophisops* among the Lacertidæ and in *Ablepharus* among the Skinks, has been brought about in an entirely different manner. It is due to the development of a transparent plate in the centre of the lower eyelid, then a gradual increase in the size of the plate, and with it of the lower eyelid, takes place, and finally, when the lid completely covers the eye, it unites with the upper

eyelid and the palpebral fissure disappears. The upper eyelid takes no part in the covering-up process. In all reptiles the lower lid is the movable one. Closure of the eye is effected by movement upwards of the lower lid; the upper lid is immovable, or its power of movement is very restricted.

Normally the lower eyelid is covered with small scales (fig. 4, A). The gradual development of the transparent "window" can be followed in the Skinks (*Leiolopisma*, some forms of *Mabuya* and *Riopa*, and *Ablepharus*). In *Leiolopisma travancoricum* and *L. himalayanum* it occupies more than half the lower lid; in *Ablepharus* it completely covers the eye, and either union of the two lids has taken place or the palpebral fissure, much reduced in size, is hidden beneath the supraciliary margin. The upper lid may or may not disappear. When the process is complete the eye looks

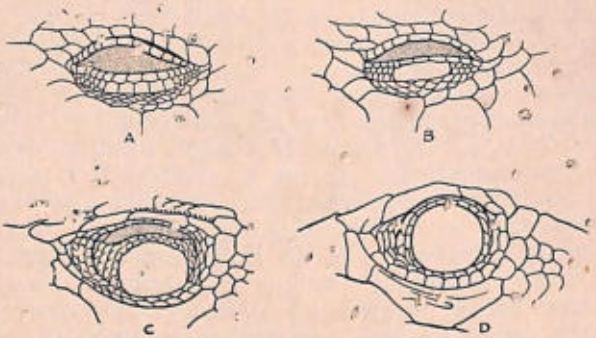


Fig. 4.—Eye, showing progressive development of the transparent disc of the lower lid.

A. *Mabuya multifasciata*.
B. *Leiolopisma travancoricum*.
C. *Cabrita jerdoni*.
D. *Ophisops elegans*.

through a large transparent "window" which is surrounded by small scales, and unless one knew the stages which had led up to its formation it would be difficult to explain its development, so completely have the original structures disappeared.

This type of eye-covering has been evolved many times among the Lizards. The Indian *Ophisops* has reached it through *Cabrita* in the Lacertidæ, and *Ablepharus* through *Leiolopisma* in the Scincidæ; it has occurred in the American Xantusidæ and Gerrhosauridæ, and, presumably, in the Australian Pygopodidæ. It has occurred under all sorts of conditions as regards climate and surroundings, and can in no sense be regarded as an adaptation to environment. A similar type of eye-covering is to be found in the

Snakes, but whether they have attained it by the same process of evolution we do not know, for only the final stage can now be seen. No snake that I have examined shows any ring of small scales within the orbital margin, the last recognizable vestige of the lower eyelid, such as can be seen in *Ablepharus*, *Ophisops*, and the Pygopodidæ.

Degeneration of the eye occurs only in burrowing forms. The eye becomes smaller and the lower eyelid thickened and less movable, as in *Scincus*, *Ophiomorus*, *Sepsophis*, *Barkudia*, and *Ophioscincus*. In *Ophioscincus gyldenstalpei* and *O. roulei* the eye appears closed, although the palpebral fissure persists; in *Dibamus* it is covered by the scales of the head, through which it appears as a black spot.

The Degeneration of the Ear.—To understand the degenerative changes that have taken place in the ear of the Agamids some knowledge of its anatomy is necessary.

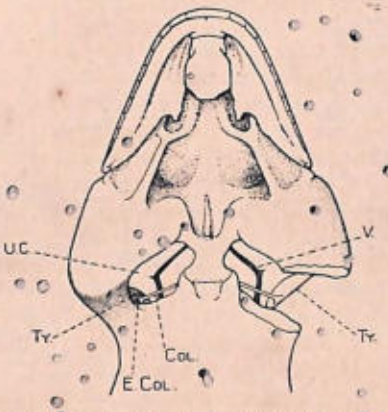


Fig. 5.—Roof of mouth and pharynx of *Gekko gecko*. On the right side the structures which conceal the outer part of the Eustachian cavity have been removed.

UC. Eustachian cavity. *E.Col*. Extra-columellar cartilage.
Ty. Tympanum. *V*. Vein.
Col. Columella auris.

The early (fossil) reptiles had a rod of bone, the stapes (columella auris), extending from the fenestra ovalis to the quadrate. Not many fossil skulls show it, either because it has not been exposed, owing to its comparative depth within the skull, or because it has been overlooked and lost in the process of preparing the skull. The extreme slenderness of this bone in all the recent lizards, and the delicacy of its attachment at the fenestra ovalis, the distal end being more or less free, has also resulted in its disappearance from most Museum preparations.

The middle ear of a lizard is easily examined, and without much disturbance of the specimen. By reflecting the skin and structures on the floor of the mouth and throat, the whole of the roof of the mouth and upper part of the pharynx are exposed. The cavity can then be seen, in direct and open communication with the pharynx. It is particularly large in the Geckoes, and in large species, such as *Gekko gecko*, which open the mouth widely when caught, and will keep it open for a long time, it is possible to see the chief structures whilst the creature is alive.

Across the upper part of the cavity, and bound to it only by a few strands of tissue, passes the bony columella auris, to be attached by means of its extra-columellar cartilaginous

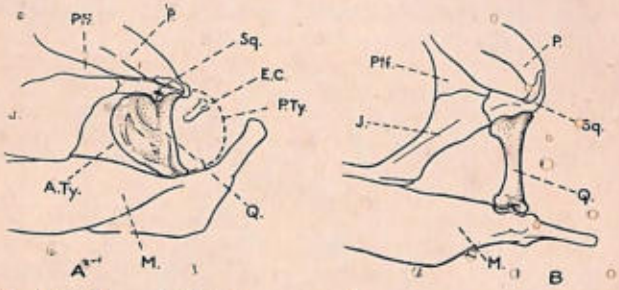


Fig. 6.—Plan of ear of (A) *Calotes versicolor*; (B) *Lyriocephalus scutatus*.

A.Ty. Anterior attachment of tympanum.
E.C. Extra-columella.
J. Jugal.
M. Mandible.
P. Parietal.
Ptf. Postfrontal.
P.Ty. Posterior attachment of tympanum.
Q. Quadrate.
Sq. Squamosal.

portion to the tympanum. The outer end of the extra-columella is embedded in the tympanic membrane and shows externally as a wedge-shaped piece of tissue. In the other families of the Sauria the cavity is not so completely exposed, and the columella auris, in addition to its extra-columellar attachment, is bound to the quadrate by two more or less well-developed membranous processes, an anterior and a posterior. For the attachment of the tympanum in front the quadrate bone is furnished with a cup-shaped wing or flange upon its external or antero-external border—the auditory cup—to the rim of which it is bound; posteriorly the membrane is held in place by connective tissue (fig. 6, A). The size of the cup varies, and its degree of development is, as a rule, a rough measure of the degree of development of the ear in general. It serves, no doubt, to amplify sound.

The anatomy of the middle ear of the Lizards is now well known. Versluys (1898) has given a detailed account of it in 32 species selected from 13 families. He did not, however, examine the ear of any of those species, *Chamæleon* excepted, in which the tympanum is covered or absent, and it is through these that we are able to trace the successive steps in degeneration that are now taking place. Some of the Agamids—*Otocryptis*, *Ptyctolæmus*, *Phrynocephalus*, and some species of *Draco* and *Japalura*—have no visible tympanum, the membrane being covered with skin. Its position, however, is usually indicated by a depression, and on stripping the skin away the tympanum can be seen together with the attached extra-columellar cartilage. The cavity of the middle ear, when viewed from the pharynx, is comparatively large, and the columella which crosses it may be exposed, but never very completely.

A still later stage in the degenerative process is to be found in *Lyriocephalus*, *Cophotis*, and *Ceratophora*. In these genera the tympanum has gone, and the place that it occupied is covered by a muscle, the depressor mandibularis; the extra-columella has gone, or is reduced to a vestige, and the auditory cap is small or is entirely absent (fig. 6, B); the anterior and posterior processes previously referred to are converted into bone, and unite the columella auris firmly to the quadrate. On looking into the pharynx we find that the cavity of the middle ear is much reduced in size—in *Ceratophora* it is a mere depression or may be entirely absent—and the columella auris is entirely covered and can no longer be seen.

The sequence of events, therefore, appears to be as follows:—First the covering of the tympanum by the growth of the surrounding skin, then the disappearance of the extra-columella structures which are attached to it, and, finally, the union of the columella auris to the quadrate and the obliteration of the cavity of the middle ear.

In the Chameleons the middle ear is shut off from the pharynx, except for a small aperture, by a vertical partition; there is no tympanum, and the attachment of the columella to the quadrate is slightly different. This type of ear-structure, that is, the columella attached to the quadrate, is to be found in all the Snakes.

Closure of the ear-opening and degeneration of the auditory apparatus has occurred also in many Skinks which lead a more or less subterranean existence. The ear-opening is gradually covered by the scales which surround it, chiefly those on its anterior border. In *Scincus* the ear-opening has shifted from the usual position to below the level of the mouth, and the external auditory meatus is in consequence greatly lengthened (fig. 77). When the ear-

opening is completely covered over, the tympanum and extra-columellar structures disappear; the columella auris remains, and is attached by a rod or tube of tissue to the skin. Its position is usually shown externally by a depression.

Limbs.—Degeneration of the limbs is widely spread among the Skinks. It is almost invariably accompanied by elongation of the body and by an increase in the number of vertebræ. The normal number of body vertebræ varies from 18 to 25; *Lygosoma quadrupes* has 50 and *Ophioscincus gyldenstolpei* about 68. *Dibamus novæ-guineæ*, not a Skink, but, perhaps, derived from some skink-like ancestor, has 116. There is no order in which the reduction of the limbs or digits takes place. The outer or inner toes may be lost, leaving the three median ones of the normal length; or all the toes may be reduced equally in size as in *Lygosoma quadrupes* and most species of *Riopa*; or the digits may disappear, the limbs being represented by bud-like extremities as in *Nessia*;

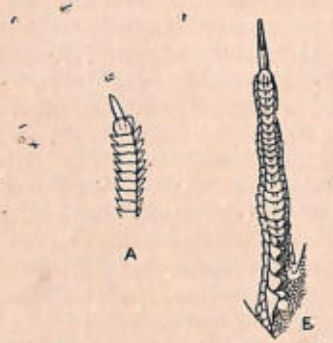


Fig. 7.—A. Under surface of toe of *Scincus mitranus*.
B. Under surface of third toe of *Leiolepis belliana*.

finally, as in *Barkudia*, *Ophioscincus*, and *Dibamus*, all traces of external limbs have disappeared. Reduction of the limbs or digits is almost unknown among the Agamidæ, but *Sitana* has lost the outer toe.

Digital Characters.—The digital characters of lizards are in need of further study, particularly in relation to their habits. The purpose of the lateral digital fringe or denticulation has never yet been satisfactorily explained. A well-marked fringe is present in *Teratoscincus* and *Stenodactylus* (Gekkonidæ), *Phrynocephalus* (Agamidæ), *Acanthodactylus* (Lacertidæ), and *Scincus* (Scincidæ), all species which live in more or less desert surroundings. The usual explanation given for its presence is that it helps to prevent the creature from sinking when running over loose sand. It is difficult to believe, however, that a creature weighing so little—

an adult specimen of *Phrynocephalus euptilopus*, a species in which the denticulations are strongly marked, weighs in spirit 8 grammes, or about a quarter of an ounce—should need assistance of this nature; nor has it yet been shown that other species of *Phrynocephalus*, that have no lateral fringes, are less fitted for running over sand than those that have them. As a matter of fact, the lateral fringe, whether it is denticulated or not, is a character which is widely spread among the Lizards, and in species of very varying habits. When slightly developed it is usually found upon the third and fourth toes only, and is more marked upon the outer sides than upon the inner. The East Indian Agamid *Lophura amboinensis* has a strong lateral fringe on both sides of the toes, the scales being united to each other so that the breadth of each toe is considerably increased; its habits are arboreal. The fringe may be formed in different ways. In *Phrynocephalus*, *Acanthodactylus*, and *Teratoscincus* it is formed by an expansion of the small lateral scales of the digit, but in *Scincus* it has been produced by expansions from the upper and lower plates, those above forming the outer fringe, those below the inner (fig. 7, A). In some Agamids the subdigital lamellæ have developed sharp spur-like projections. These are best marked, and in many species are found only, upon the inner side of the third toe. In *Leiolepis* the spurs are confined to the base of the digit, but in *Physignathus* they form a strong ridge extending nearly the whole length of the toe. Many species of *Goniocephalus* (e. g., *G. subcristatus*), of *Agama* (*A. agrorensis*), and *Calotes* show similar developments, but in them it is less marked. Had this spur-like ridge been found in *Leiolepis* only we should at once associate it with its fossorial habits, but *Phrynocephalus* is no great digger, and *G. subcristatus* lives almost entirely on trees. *Phrynocephalus theobaldi* on the other hand, which lives under much the same conditions as *Leiolepis*, shows no trace whatever of spurs.

Geographical Distribution.

The close affinity which certain Indo-Chinese and Malayan lizards have with others that inhabit Southern India—the northern part of the Indian Peninsula being without them—raises an interesting point in zoological distribution. The resemblance which *Dasia olivacea* bears to *D. subcæruleum*, *Lygosoma maculatum* to *L. dussumieri*, and *Riopa bowringi* to *R. elbopunctata*, is so close that one feels convinced that if one has not been derived from the other they must surely have had a common ancestor. The genus *Draco* has a similar distribution; *Varanus salvator* occurs in Ceylon

and in Indo-China, but is absent from the whole of the Indian Peninsula; and there are similar parallels in distribution among the mammals, birds, fishes, and insects. Why are they absent from Northern India? Have they died out in that area, or was there at one time a more southern route across the Indian Ocean by which they could travel?

Economics.

The skins of reptiles, chiefly of Snakes and Lizards, are now extensively used for the production of leather, not only as fancy articles for apparel and household use, but also as the upper leather for high-priced shoes. The increased demand began about 1926, when manufacturers, finding no profit in animal leather owing to trade depression, turned to other fields as a source of revenue. Reptile skins also offered other advantages, namely, that their wearing quality was greater than that of most animal leathers, and that there was an infinite variety of pattern and texture designed by nature all ready to hand. Moreover, it could be finished off in any colour.

The annual slaughter of reptiles for trade purposes is now enormous, and, unless measures are taken to control it, certain species are in great danger of being exterminated. It has been estimated that in 1932 about 12,000,000 were killed for the sake of their hides. The Report by the Advisory Committee on Hides and Skins, Imperial Institute, London, which embodies also suggestions for the control and conservation of the industry, lists 24 species of lizards and 38 of snakes which are at present used by the trade, and suggests other species that could have a commercial value.

In 1932 India exported about two and a half million reptile skins, in 1933 about two and three-quarter million. In September 1932 over 600,000 skins, chiefly of lizards, were shipped from Calcutta alone; most of them were Monitor (*Varanus*) skins. The only other Indian lizards on the list just mentioned are the species of *Uromastix*. Of these *U. hardwickii* does not appear to be in great demand, and *U. asmussi* is too rare in Indian territory to be reckoned with; it is a common species in Persia, and huge numbers of its hides are exported from Baghdad. As an ornamental leather it ranks high.

The entry of trade hunters into fields that were before only touched by the zoologist has shown that some species of reptiles previously considered rare are really quite common. This confirms what field naturalists have long known, namely, that many species are common enough if you know just where to look for them.

Reptile skins are graded not only by their quality as leather, but also by their colour-pattern, scale-design, and texture. Distinct varieties—one might term them commercial subspecies—are now recognized, each with its own trade name. *Varanus salvator* has nine different trade names, each one representing a different area of country. Some of the variations can be associated with geographical areas, others may depend upon selection by the manufacturer, those with strongly keeled scales being placed in one group, those with smoother scales in another. The skins of *Varanus monitor* from the Bengal area command a higher market value than those from other parts of its range, owing to the fact that in the former the scales are smaller, narrower, and more raised. The result, noticeable, perhaps, more in the tanned skin than in the living specimen, is a distinctly more ornamental article.

Preservation and Examination of Specimens.

Whenever it is possible alcohol should be used for the preservation of specimens. Methylated spirit, as sold in shops varies from 90–95 per cent. alcoholic strength, and this, diluted with 25 per cent. its bulk of water, makes an excellent preservative. Formalin is much used nowadays owing to the convenience with which it can be carried, but unless employed very carefully, never in more than 3 per cent. strength, it hardens the specimen and destroys certain colours. Greens in particular suffer, and will in time become black. One has only to compare two specimens, one preserved in alcohol, the other in formalin, to see how infinitely superior the former is. In any case, when formalin is used the specimen should be transferred to alcohol as soon as possible. A large lizard, such as *Varanus*, may be skinned, leaving the head, feet, and end of the tail untouched. It can then be rolled up and put into the preservative. Smaller lizards should always have a good incision made in the belly to allow the preservative to penetrate. Dried skins are not satisfactory objects for examination.

The coloration of the living creature should always be noted. Certain colours, such as reds and yellows, fade completely after a time; blacks and browns remain.

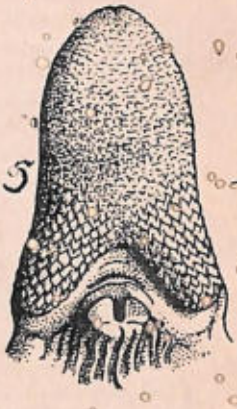
The importance of giving the exact locality where the specimen has been collected cannot be too strongly emphasized. When the locality is not likely to be found on the map, its position with regard to the nearest town of note should be given, or its approximate position in longitude and latitude can be stated. Strong paper labels written with pencil will keep in spirit or formalin if not chafed. Chinese

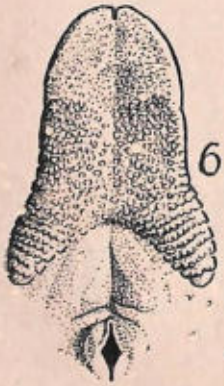

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or Indian ink is better, but must be allowed to dry for 12 hours before being immersed.

Measurements.—The measurements given for the species described are the largest examined or of which there is an authentic record. Gigantism, however, that is to say, individuals that considerably exceed what appears to be the normal size, is sometimes met with, and where this is suspected mention is made of the fact. It appears to be more common in females than in males.

The diameter of the ear is the greatest diameter that can be found; the diameter of the eye is taken in the horizontal plane.

The scales round the body are counted exactly in the middle, mid-way between the fore- and hind-limbs. This is important to remember; a count anterior to the middle will often mean an increase of two or three in the number given.

In considering leg-lengths it should not be forgotten that in most young the limbs are comparatively longer than in the adult.

To kill lizards without damaging them is not always easy. The head in particular must be kept intact. Drowning them in spirit is usually a slow process, but is often the only way. Geckoes and many Agamids that have a comparatively soft skin can be pithed. Large lizards I have usually killed by cutting through the cervical vertebræ with a pair of scissors inserted into the mouth. Failing that, the back must be broken by a blow at the neck.

Tongues of Sauria (see opposite).

1. *Mabuya carinata*. 2. *Varanus monitor*. 3. *Tachydromus sexlineatus*. 4. *Ophisaurus harti*. 5. *Calotes versicolor*. 6. *Gekko gecko*. 7. *Nessia monodactyla*. 8. *Dibamus novæ-guineæ*.

Order SQUAMATA.

The order Squamata contains two suborders, namely, the Sauria or Lizards, and the Serpentes or Snakes.

Suborder SAURIA.

Lacertæ Batsch, Anleit. Kenntn. Thier. Min. i, 1788, pp. 437, 454; Wagler, Nat. Syst. Amphib. 1830, p. 141.
Sauria Macartney, in Ross's transl. Cuvier's Lect. Comp. Anat. ii, 1803, tab. iii.; Günther, Rept. Brit. Ind. 1864, p. 56; Cope, Rep. U.S. Nat. Mus. 1900, p. 182; Stejneger, Herp. Japan, 1907, p. 162; Camp, Bull. Amer. Mus. Nat. Hist. xlviii, 1923, p. 296.—*Sauri*, Daudin, 1803.—*Saurii*, Oppel, 1811.—*Sauri*, Gray, 1825, and *Saura*, 1845.—*Sauræ*, Wagler, 1828.
Lacertilia Owen, Rep. Brit. Ass. Adv. Sci. 1841 (1842), p. 144; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 1, and Fauna Brit. Ind. 1890, p. 52; Versluys, Zool. Jahrb. Anat. xii, 1898, p. 161 (ear); Richter, Jena Z. Naturw. lxvi, 1933, p. 395 (hyoid).

Sauria (*σαύρα*—a lizard) is not the oldest name available, but it, or some emendation of it, has been in fairly general use ever since it was first proposed by Macartney. Under it he included the Crocodiles and Lizards, and in that sense it was used by various writers up to the time of Günther (1864). The Lacertæ of Batsch covered the Crocodiles, Lizards, and Tailed Amphibians; with the exception of Wagler (1830) it has had no followers.

Synopsis of the Indian and Indo-Chinese Families.

Tongue rather broad and short, covered with villose papillæ; skin soft, with granules, rarely imbricate scales, above; no symmetrical shields on the top of the head; eyes usually without movable lids; pleurodont ..... **Gekkonidæ**, p. 21.

Tongue rather broad and short, smooth or covered with villose papillæ; dorsal scales mostly imbricate; no symmetrical shields on the top of the head; eyes with movable eyelids; acrodont ..... **Agamidæ**, p. 130.

Tongue club-shaped at the tip and extremely extensile; skin covered with flattened or rounded tubercles or granules; hands and feet modified to form clasping-organs, the digits, in bundles of two and three, being opposed to one another; acrodont ..... **Chamæleonidæ**, [p. 249.

Tongue covered with imbricate scale-like papillæ, feebly nicked anteriorly; body covered with cycloid, imbricate scales, with osteodermal plates, each provided with a regular system of channels (a transverse one anastomosing with longitudinal ones); head with symmetrical shields above; no femoral or preanal pores; pleurodont ..... **Scincidæ**, p. 254.

Tongue short, broad, covered with smooth transverse lamellæ; body vermiform, with uniform cycloid, imbricate scales; eyes concealed under the skin; fore-limbs absent, hind-limbs vestigial; preanal pores. **Dibamidæ**, p. 360.

Tongue covered with imbricate papillæ, or transverse plicæ, forked anteriorly; dorsal scales much differentiated from those on the belly; no osteodermal plates on body; head with symmetrical shields above; pleurodont; femoral pores usually present ..... **Lacertidæ**, p. 363.

Anterior part of the tongue retractile into the posterior part; head and body with osteodermal plates, each provided with a system of irregularly arranged arborescent or radiating channels; head with symmetrical shields above; pleurodont ..... **Anguidæ**, p. 391.

Tongue smooth, very long and slender, bifid, retractile into a sheath at the base as in snakes; back covered with rounded scales; top of head with small scales; pleurodont.. **Varanidæ**, p. 397.

Family GEKKONIDÆ.

Ascalabotes Cuvier, Règne Anim. ii, 1817, p. 44.—*Ascalabotæ*, Merrem, Tent. Syst. Amphib. 1820, p. 39.—*Ascalabotoidea*, Fitzinger, Neue Class. Rept. 1926, p. 13.

Geckotidæ Gray, Ann. Phil. (2) x, 1825, p. 198.—*Geckonidæ*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 3, and Fauna Brit. Ind. 1890, p. 54; Gadow, Amphib & Rept. 1901, pp. 502, 507; Noble, Amer. Mus. Nov. no. 4, 1921; Hora, J. & P. Asiat. Soc. Beng. (n. s.), xix, 1924, p. 137; Williston, Osteol. Rept. 1925, pp. 212, 266; Smith, Rec. Ind. Mus. xxxv, 1933, p. 9.—*Gekkota*, Camp, Bull. Amer. Mus. Nat. Hist. xlviii, 1923, p. 304.

Platyglossæ Wagler, Syst. Amphib. 1830, p. 141.

Eublepharidæ Boulenger, Ann. Mag. Nat. Hist. (5) xii, 1883, p. 308, and Cat. Liz. Brit. Mus. i, 1885, p. 229, and Fauna Brit. Ind. 1890, p. 107; Stejneger, N. Amer. Fauna, no. 7, (2) 1893, p. 132; Werner, Das Tierreich, 33. Lief. 1912, p. 2.—*Eublepharinæ*, Gadow, Amphib. & Rept. 1901, p. 512.

Uroplatidæ Boulenger, Ann. Mag. Nat. Hist. (5) xiv, 1884, pp. 119, 120; Werner, Das Tierreich, 33. Lief. 1912, p. 11; Angel, Mem. Acad. Malg. fasc. ix, 1926, p. 10.

Vertebræ amphicœlous, notochordal, with persistent intercentra, or (secondarily) procœlous without intercentra; skull without bony temporal or postorbital arches; mandible composed of five bones; clavicle usually dilated, thinned, and perforated at the sternal end. Teeth cylindrical, pleurodont; eyes usually covered with a transparent membrane, without

movable lids; tongue moderately elongate and broad, covered with villose papillæ, protrusible. Skin soft, with tubercles, rarely imbricate scales above, with imbricate scales below; no regular osteoderms; no symmetrical shields on the crown. Tail fragile.

Range. The hotter parts of the world. They are most numerous in the Australian and Oriental Regions. A single family, the Eublepharidæ and Uroplatidæ being now united with the Gekkonidæ (Smith, 1932). More than 70 genera are recognized.

It is usual to regard the Geckoes as an ancient group, and in some respects they are. The amphicœlous vertebræ, the persistence and life-long growth of the chorda dorsalis, and in some respects the hyoid apparatus, are all primitive characters. Their world-wide distribution also indicates considerable antiquity. No other family of the Lizards, except the Scincidæ, ranges so widely. The skull on the other hand, with its reduced and thinned elements, is not primitive. Moreover, many members of the family are highly specialized as regards their digits, and they are still a vigorous and plastic group, capable of producing new forms. Certainly they are a very independent family. They have no near relatives, and no fossil Geckoes have yet been found. *Ardeosaurus* from the Jurassic has been regarded by some as ancestral to the family, but its position among the Sauria is not yet definitely established.

All the bones of the skull are thinned. There is a complete absence of bone covering the temporal fossa and at the posterior part of the orbit, the jugal being vestigial; the premaxillary is single; the nasals are distinct; the pterygoids are separated and bear no teeth; the parietals are paired or fused into a single bone; there is no parietal foramen; there is an epipterygoid; the tympanum is always more or less exposed. The mandible is composed of five bones only. The teeth are small, numerous, and closely set, with cylindrical shafts and obtuse points; the new teeth hollow out the bases of the old ones.

The limbs are always well developed and pentadactyle. In some genera, e.g., *Hemiphyllodactylus*, the innermost digit is much reduced in size. The typical Geckonid pectoral girdle is as figured in *G. gecko* (fig. 9), with the clavicle dilated, thinned, and perforated at its sternal end, and the interclavicle large and cruciform. This condition obtains in all the Oriental genera (*Teratolepis*, *Lophopholis*, and *Dravidogecko* not examined) with the exception of some species of *Cnemaspis*, in which the clavicles are less strongly dilated and are not perforated. The ribs are single-headed, three or four articulating with the sternum.

The tongue is moderately broad and elongate and nicked anteriorly; it is covered with short papillæ and is protrusible (p. 18, fig. 6).

The eye is usually large and is covered with a transparent membrane, beneath which it is movable. The eyelid in most

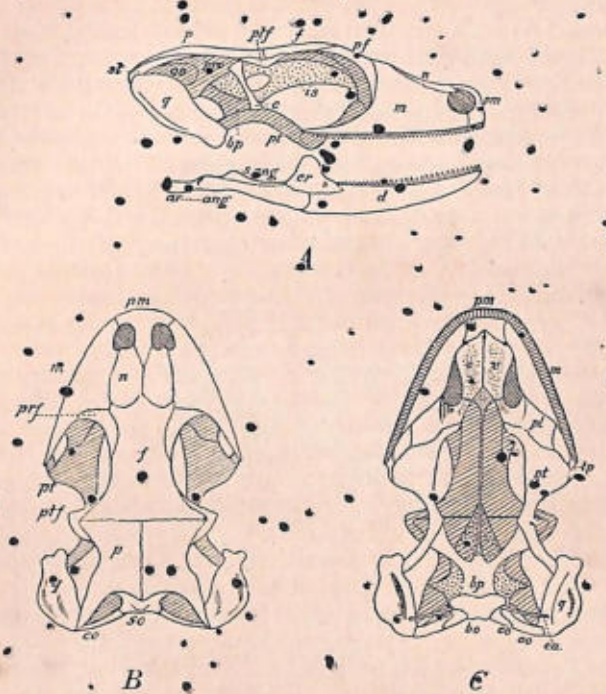


Fig. 8.—Skull of *Gekko gecko*. (After Boulenger.)

A. Side view. B. Upper view. C. Lower view.

ang. Angular.
ar. Articular.
bo. Basioccipital.
bp. Basisphenoid.
c. Epipterygoid.
c.a. Columella auris.
cr. Coronoid.
d. Dentary.
eo. Exoccipital.
f. Frontal.
is. Interorbital septum.
m. Maxillary.
n. Nasal.
oo. Opisthotic.
p. Parietal.
pl. Palatine.
pm. Premaxillary.
prf., pf. Prefrontal.
pro. Prootic.
pt. Pterygoid.
ptf. Postfrontal.
q. Quadrate.
s.ang. Supra-angular.
so. Supraoccipital.
st. Supratemporal.
tp. Ectopterygoid.
v. Vomer.

species is represented by an immovable rim of tissue; in most of the oriental genera it is absent in the lower part of the eye, but *Phelsuma*, *Pristurus*, and *Cnemaspis* have it developed all round; *Teratoscincus* has a well-developed upper eyelid. In *Eublepharis* both lids are well developed and movable

and the eyeball has lost the fixed membranous covering. The pupil is usually vertical, and forms a more or less denticulated slit; in some species it can be so strongly contracted that only a series of pin-point openings remain. In *Pristurus*, *Cnemaspis*, and *Phelsuma* among the oriental genera the pupil is round.

The skin is soft, with granules or tubercles on the upper parts, rarely with imbricate scales (*Lophopholis*, *Teratolepis*, *Teratoscincus*); the lower parts of the body and limbs are usually covered with rounded or hexagonal imbricate scales. Osteoderms occasionally occur on the dorsal region, but they have no regular distribution. A distinct fold of skin along each side of the body is present in many Geckoes; in some preserved specimens this appears to be caused by shrinkage in spirit, but in others a definite thickening of the skin can

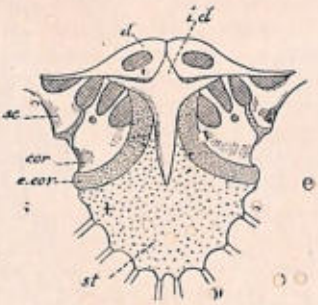


Fig. 9.—Pectoral arch of *Gekko gecko*. (After Boulenger.)

cl. Clavicle. *i.cl.* Interclavicle. *e.cor.* Epicoracoid.
cor. Coracoid. *st.* Sternum. *sc.* Scapula.

be found at that point, and the scales along it may be enlarged. No doubt it is a forerunner of the proper dermal fringe which is found in *Platyurus* and *Ptychozoon*.

The tail presents the greatest diversity of form. It is usually more or less cylindrical and tapers to a point, but there are many exceptions. It may be leaf-shaped, or short and small and terminating in a globular knob, as in the Australian *Phyllurus* and *Nephurus*; slender and rat-like as in *Agamura*; compressed and more or less crested as in *Pristurus*. In *Eublepharis* it is comparatively short and fat, and this condition is foreshadowed in many other oriental Geckoes, the tail being constricted at its base and then suddenly swollen (figs. 15 and 36). A lateral dermal fringe, which occurs in *Platyurus* and *Ptychozoon*, is always accompanied by a depressed tail. In some forms the tail is slightly prehensile.

Except in *Agamura* it is extremely fragile and easily reproduced; the new part, however, can be usually recognized by a simpler form of scaling, and often also lacks the coloration of the original tail. The reproduced part is often abnormal in shape, and bifid, even trifid, tails are not rare.

The digits vary greatly and afford excellent and usually sound taxonomic characters; the value of these, however, has at times been over-estimated. *Gehyra* and *Hemiphyllodactylus*, derived from *Hemidactylus*, are probably genera of convenience rather than of true phylogeny, and *Phyllodactylus* may be the same. The close resemblance of *Dravidogecko* to the New Zealand *Hoplodactylus* is no doubt due to parallel evolution. On the other hand, the widely spread *Gymnodactylus* appears to be a natural group. The majority of Geckoes have the digits more or less dilated. The variations in the arrangement of the expansions which are to be found in the oriental genera are set forth in the Key. The Stone-Geckoes (*Teratoscincus*, *Stenodactylus*, *Alsophylax*), the Ground-Geckoes (*Gymnodactylus*, *Cnemaspis*), and *Agamura*, *Pristurus*, and *Eublepharis* have the primitive, non-dilated form of digit. All the other genera mentioned in this work have adhesive expansions by means of which they are able to ascend vertical walls and even to run, back downwards, upon the smooth surface of a ceiling. The evolution of the pad has already been discussed in the Introduction (p. 8).

Femoral and preanal pores are usually present. They are found normally in the males, but have been met with occasionally in what appear to be otherwise normal females. They may vary considerably in number within the species; a diminution in the number of femoral pores, when it occurs, takes place at the distal end of the series, and not from the middle. Similarly in certain species (e. g., *Stenodactylus orientalis*, *Cnemaspis siamensis*) which have only a few preanal pores they are occasionally absent altogether. The pores have no taxonomic value, and may be present or absent in different species in the same genus. Most females have enlarged, sometimes pitted, scales, corresponding to the position of the pores of the males.

Postanal bones and sacs are peculiar to the Gekkonidæ. They are paired structures, lying on each side of the base of the tail just behind the vent. The sac is present in both sexes, but the bone only in the male; in those species in which the sac is absent the bone also is absent. The bone is short, and curved or angular in shape in all Indian and Indo-Chinese species; it lies free just underneath the skin. It can be easily recognized, after a little experience, without dissection by inserting the point of a needle into the opening

of the sac and lifting the bone upwards. It is a simple method of determining the sex without dissection; for the swellings at the base of the tail formed by the hemipenes are not always a reliable guide. The opening of the sac lies within the curve of the bone; it varies from an elongated and conspicuous slit to a minute aperture hardly visible to the naked eye. Its position with regard to the vent varies; in some species it is much closer to that opening than in others. The sac itself runs backwards and outwards. It is lined with squamous epithelium, and is loosely attached to the surrounding tissue. In life in large species it can be partly evaginated. It appears to have neither secretion nor excretion;

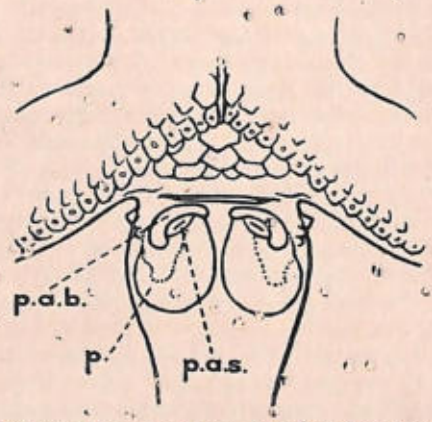


Fig. 10.—Postanal bones and sacs of *Gymnodactylus pulchellus*.
p. Penis. *p.a.b* Postanal bone. *p.a.s.* Opening of postanal sac. The outline of the sac itself is shown as a dotted line.
(After Smith. By kind permission of the Indian Museum.)

its function is unknown. It is possibly homologous with the sex or scent-gland of crocodiles and snakes. Postanal bones and sacs are found in all the Indian and Indo-Chinese Geckoes with the exception of *Pristurus*. On each side of the tail at its base in most Geckoes are one or more enlarged, more or less conical, tubercles; they do not appear to have any connection with the postanal bones or sacs.

Another peculiarity of Geckoes, but not confined to them, are the endolymphatic glands. These lie on either side of the neck, immediately behind the ear, and have a chalky secretion, fluid in life, but hardening on exposure to air or in preservative fluid. The secretion is much larger in amount in some species than in others. One view of the function

of the gland is that it is an auxiliary to the auditory apparatus. Ruth (1908) suggests that one of its purposes is to supply calcium for the eggs, for he states that there is increased functional activity of the gland in the pregnant females, and that after the eggs are laid it is markedly diminished.

With the exception of the New Zealand *Hoplodactylus* and *Naultinus*, which are viviparous, all the Geckoes are oviparous. The eggs are round or slightly oval and are covered with a thin, white, calcareous shell. When first laid they are soft and covered with an adhesive glutinous substance which causes them to stick to any surface as well as to each other; on exposure to the air they quickly harden. Two eggs appear to be the usual number which are laid at a time. Where more have been recorded more than one parent is responsible for them. This habit of laying the eggs collectively appears to be not uncommon among the Geckoes. Six or eight together have been often found, but Mell (1929) records finding 186 eggs of *Gekko japonicus* on a single window-shutter of a convent near Canton. Gadow states that two clutches may be laid in a season. The eggs are deposited under stones or logs or in crevices in wood; House-Geckoes frequently lay them in small boxes or in the drawers of furniture. Having laid them, the parent appears to take no further interest in them. The period of incubation is not generally known. It is said to be six months in *Ptychozoon*, and the period of gestation in the viviparous *Naultinus* occupies nearly the same time. The first act of the young Gecko on leaving the egg is to cast and often to eat its skin.

Geckoes are found almost everywhere; in the desert, in open country, in wooded country, although seldom in thick jungle, and domiciled with man. The House-Geckoes are frequently transported in the cargo of ships, and the wide distribution of certain species of *Hemidactylus*, *Gehyra*, *Hemiphyllodactylus*, *Lepidodactylus*, *Platyurus*, and *Gekko* is no doubt due to this cause. Their ability to survive long periods without food is of great assistance to them in this respect. The desert forms hide by day under stones or in the crevices of rocks, the arboreal species under bark or in holes or cracks in trees, the house species will take cover in any convenient dark spot. The vast majority of species inhabit the plains or the hills at low altitudes.

Their chief food is insects, but the larger species will devour anything that they can overcome. Some of the House-Geckoes will take grains of rice, and they also appreciate sugar. Water is taken by lapping it up with the tongue, and they are said to consume large quantities when they can get it. House-Geckoes can be readily tamed and will learn

to come to the table and take food from the hand. Most of them are nocturnal in their habits, but their activities are not confined to the darkness; on dull days or in shady places most of them are prepared to feed at any time. The species with round pupils are said to be diurnal in their habits. This is true of *Pristurus* and *Phelsuma*, but certainly not of some species of *Cnemaspis*. The Malayan *Cnemaspis affinis* is known to enter water *, but most Geckoes have a strong aversion to doing so.

All the Geckoes have a voice. Usually it is a soft chirruping or clucking sound such as we can make with our tongue, but some of the larger forms, such as *Gekko gecko*, have a loud cry that can be heard a considerable distance away; many of them squawk when captured.

The smaller species usually make no attempt to bite, or, if they do, their jaws are too feeble to do any injury. On the other hand *Gekko gecko* has extremely powerful jaws, and once it has got hold of anything is not easily detached.

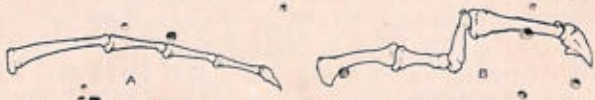


Fig. 11.—Bones of fourth toe of (A) *Teratoscincus scincus* and (B) *Gymnodactylus pulchellus*. Drawn from preparations stained with alizarin.

All Geckoes cast their skins at intervals. This may be done in one piece, when it is often swallowed, or it may come away in flakes.

Most of them have some power of changing their colour from light to dark and *vice versa*. Among the Oriental species this is particularly marked in *Peropus* and *Phelsuma*.

Key to the Genera.

1. Eyelids immovable.
   A. Digits not or but slightly dilated, all clawed.
      a. Digits straight, not angularly bent at any of the articulations (fig. 11, A).
         1. Digits with a lateral fringe of pointed scales.

Digits with small granules below; dorsal scales large, uniform, imbricate ..... TERATOSCINCUS, p. 30.

Digits with transverse plates below; dorsal scales small, juxtaposed, intermixed (in Indian species) with larger rounded tubercles ..... STENODACTYLUS, p. 33.

         2. Digits without lateral fringe of pointed scales.

* Annandale, Ann. Mag. Nat. Hist. (7) xv, 1905, p. 28.

Digits with transverse plates below; dorsal scales small, juxtaposed, intermixed with larger rounded tubercles ... ALSOPHYLAX, p. 36.

b. Digits angularly bent, thus composed of a basal and a terminal portion (fig. 11, B).

1. Pupil vertical. [p. 37.

Tail not markedly slender, fragile ... GYMNODACTYLUS.

Tail very slender, diminishing suddenly in size at the base, not fragile ... AGAMURA, p. 61.

2. Pupil round.

Tail compressed, more or less crested ... PRISTURUS, p. 64.

Tail round, not crested ... CNEMASPIS, p. 65.

B. Digits with strong dilatations.

a. Dorsal scales granular or tubercular; no cutaneous expansion along the side of the body; pupil vertical ..

1. Digits dilated at the apex only, terminating in a subtriangular expansion divided in two by a longitudinal groove, into which the claw is retractile.

Each digit with two pairs of plate-like expansions, except the innermost digit, which has only one ... [p. 77. CALODACTYLODES?

Each digit with a single expansion, which is furnished beneath with fine lamellæ ... PTYODACTYLUS, p. 79.

Each digit with a single expansion, which is smooth beneath ... [p. 80. PHYLLODACTYLUS,

2. Digits more or less dilated at the base, with transverse or oblique lamellæ beneath; terminal phalanges compressed, free or united with the expanded portion.

α. Terminal phalanges of outer four digits free, arising angularly from the expanded portion.

Inner digit well developed, with free, clawed, terminal phalange; subdigital lamellæ single ... DRAVIDOGECKO, p. 82.

Inner digit well developed, with free, clawed, terminal phalange; subdigital lamellæ divided ... HEMIDACTYLUS, p. 83.

Inner digit well developed, without free terminal phalange, the claw minute, often concealed; subdigital lamellæ divided or single ... GEHYRA, p. 104.

Inner digit vestigial, without free terminal phalange, clawless or with a minute claw; subdigital lamellæ divided or single ... [p. 106. HEMIPHYLLODACTYLUS,

β. Terminal phalanges of outer four digits united with the expanded portion; inner digit clawless.

Subdigital lamellæ undivided ... GEKKO, p. 109.

Subdigital lamellæ divided ... LEPIDODACTYLUS, [p. 115.

b. Dorsal scales granular or tubercular; a cutaneous expansion along the side of the body; pupil vertical.

All the digits clawed; subdigital lamellæ divided ..... PLATYURUS, p. 102.
Inner digit clawless; subdigital lamellæ undivided ..... PTYCHOZOON, p. 117.
c. Dorsal scales granular or tubercular; digits clawless; pupil round..... PHELSUMA, p. 120.
d. Dorsal scales imbricate; digits clawed; pupil vertical.
Subdigital lamellæ undivided; top of head with large polygonal scales ..... TERATOLEPIS, p. 122.
Subdigital lamellæ divided; top of head with small granules ..... LOPHOPHOLIS, p. 124.

II. Eyelids movable, convivent.
Digits not dilated, clawed ..... EUBLEPHARIS, p. 125.

Genus TERATOSCINCUS.

Teratoscincus Strauch, Bull. Acad. Sc. St. Pétersb. vi, 1863, p. 480, and Zool. Rec. 1864, Rept. p. 111, and Mél. Biol. St. Petersb. vi, 1867 p. 553 (type *keyserlingii*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 12; Gadow, Amphib. & Rept., 1901, p. 507; Bedriaga, Ann. Mus. Zool. St. Pétersb. x, 1905, p. 159.

Digits straight, not angularly bent at any of the articulations, not dilated, clawed, with a lateral fringe of long, pointed scales and minute granular scales below. Body covered with uniform cycloid, imbricate scales; tail with large transverse plates above. Pupil vertical. Males without preanal or femoral pores.

Range. From Persia and Transcaspia to Central Asia (S. Mongolia and W. China) and N.W. India (Baluchistan).

A deserticolous genus. According to Gadow "the large nail-like plates upon the upper surface of the tail when rubbed upon each other produce a shrill, cricket-like noise, perhaps in order to attract grasshoppers." Bedriaga (1905) recognizes six species. Two are included in the present work.

Key to the Species.

Cycloid scales on the back strongly imbricate, extending on to the hinder part of the head; 28–34 scales round the middle of the body.. *scincus*, p. 30.
Cycloid scales on the back feebly imbricate, not extending beyond the shoulders; about 100 scales round the middle of the body... *microlepis*, p. 32.

1. Teratoscincus scincus.

Stenodactylus scincus Schlegel, Handl. Dierk. ii, 1858, p. 16 (type loc. Ili River, Turkestan; Leiden).—*Teratoscincus scincus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 12, pl. 2, fig. 3, and Trans. Linn. Soc., Zool. (2) v, 1889, p. 94, pl. 8, col. fig. 1, and Proc. Zool. Soc. London, 1891, p. 629; Boettger, Zool. Jahrb. Jena, iii, 1888, p. 878; Alcock & Finn, J. Asiat. Soc. Beng. lxv, 1896, p. 553.

Head large, high, broad behind; snout obtusely pointed,

as long as the distance between the eye and the ear-opening, the greatest diameter of which is about that of the eye. Nostril between the rostral, an internasal and two or three large postnasals; rostral quadrangular, with median cleft above. Ten to twelve upper and as many lower labials; mental subquadrangular, larger than the adjacent labials; no regular postmentals. Head covered above with small granules; a prominent upper eyelid. Body rather stout, depressed, covered all over with large, more or less uniform, cycloid, imbricate scales, those on the back extending forwards

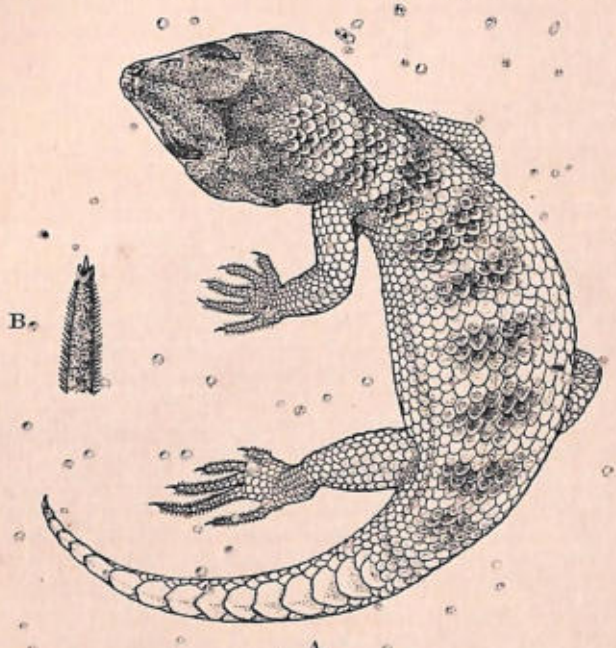


Fig. 12.—*Teratoscincus scincus.*

A. Dorsal view. B. Lower surface of toe.

on to the occiput; from 28 to 34 scales round the middle of the body. Limbs strong, covered with scales like those on the body, except on the inner aspect of the upper arm and posterior part of thigh, which have small granular scales. Tail covered below and on the sides with scales like those on the body; above, except at the base, with a series of large transverse plates.

Cream-coloured, with broad, ill-defined, dark brown transverse bars upon the back, or with four reddish or brown

longitudinal stripes. Head with brown markings and dips with vertical bars, most distinct in the young.

Head and body 110; tail 85 mm.

Range. Persia, Transcaspia, Turkestan to the western border of Baluchistan.

Dr. Maynard (in Alcock & Finn) writes:—"One was caught by Captain McMahon at 2.30 A.M., on a moonlight night, in the desert between Drana Koh and Zeh, elevation 3,000 feet. It ran in spurts from bush to bush, and was difficult to catch. . . . Skin very delicate."

2. Teratoscincus microlepis.

Teratoscincus microlepis Nikolski, Ann. Mus. Zool. St. Pétersb. iv, 1899, pp. 145 & 376 (type loc: Dûz-Abad, E. Kerman, Persia; Leningrad).

Ceramodactylus affinis (not of Murray), Alcock & Finn, J. Asiat. Soc. Beng. lxv, 1896, p. 554.

Head moderate, high, snout obtusely pointed, as long as the distance between the eye and the ear-opening, the greatest diameter of which is less than that of the eye. Nostril between the rostral, an internasal, and two or three large postnasals; rostral quadrangular with median cleft above. Ten to twelve upper and as many lower labials; mental subquadrangular, much larger than the adjacent labials; no postmentals. Head covered with small granules, largest on the snout; a prominent upper eyelid. Body depressed, covered with uniform cycloid, imbricate scales, merging gradually, at the level of the shoulders, into the granular scales of the head and neck; about 100 scales round the middle of the body. Limbs moderate, covered with imbricate scales, except on the inner part of the upper arm and posterior part of the thigh, which have small granular scales. Tail covered below and on the sides with scales like those on the body, but larger; above, except at the base, with large, transverse plates.

Cream-coloured, with dark brown, oblique or V-shaped bars upon the back, which become less distinct with age and may disappear; a dark U-shaped mark upon the back of the head; tail with dark transverse bars.

Head and body 67; tail 42 mm.

Range. Eastern Persia; Baluchistan. Seven specimens were collected by Capt. Daukes at Kharan, N.W. Baluchistan. Alcock and Finn caught three examples on the bank of a small stream south of Malik-do-Khand, on the Afghan-Baluchistan border.

Genus STENODACTYLUS.

Stenodactylus Fitzinger, Neue Class. Rept. 1826, pp. 13, 14, and Syst. Rept. 1843, pp. 18 & 89 (type *elegans* = *Stenodactylus stenodactylus* Lichtenstein, 1823); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 16, and Fauna Brit. Ind. 1890, p. 56.
Tolarenta Gray, Zool. Misc. 1831, p. 58 (type *wilkinsonii*).

Digits straight, not dilated nor angularly bent at any of the articulations, clawed, furnished with a lateral fringe or denticulation of pointed scales, and transverse lamellæ beneath. Dorsal scales juxtaposed or subimbricate, uniform or (in Indian species) intermixed with larger rounded tubercles. Pupil vertical. Males with or without preanal pores.

Range. The desert regions of north-western India, south-western Asia, and northern Africa.

Five species, three of which are included in the present work.

Key to the Species.

Back with dark cross-bars; the hind-limb reaches to the axilla; ventral scales keeled; male with 0 to 4 preanal pores ..... *orientalis*, p. 33.
Back with dark cross-bars; the hind-limb reaches to beyond the axilla; ventral scales smooth; male unknown ..... *lumsdeni*, p. 34.
Back with longitudinal stripes; the hind-limb reaches to the axilla; ventral scales keeled; male with 0 preanal pores ..... *maynardi*, p. 35.

3. Stenodactylus orientalis.

Stenodactylus orientalis Blanford, J. Asiat. Soc. Beng. xlv, 1876, p. 21, pl. 1, fig. 2; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 16, pl. 3, fig. 1, and Fauna Brit. Ind. 1890, p. 57, fig. foot (type loc. Rohri and Shikarpur district, Upper Sind; London and Calcutta).
Stenodactylus dunstervillei Murray, Zool. Sind, 1884, p. 363, and erratum (type loc. Hala, Sind; London).

Head moderate, depressed; snout about as long as the distance between the eye and the ear-opening, the diameter of which is about half that of the eye. Nostril between the rostral, first labial, and three nasals; rostral quadrangular, with median cleft above; 11 to 13 upper and 9 to 11 lower labials; mental narrowed behind, with curved posterior margin, about twice as large as the adjacent labials, not or but only slightly projecting beyond them posteriorly; no postmentals. Head covered above with small, fairly uniform, flat or feebly keeled scales. Body depressed; back with scales like those upon the head, intermingled with larger, rounded, feebly keeled tubercles; belly with small, rounded, keeled scales. Limbs above with subimbricate keeled scales; the hind-limb reaches to the axilla. Toes

long, with well-marked lateral denticulations, the transverse lamellæ with several keels. Tail with small keeled scales arranged in rings. Male with from one to four preanal pores, sometimes absent.

Pale sandy coloured above, with indistinct darker transverse bars; a dark line from the eye along the side of the body; enlarged tubercles upon the back dark brown; below whitish. Head and body 49; tail 50 mm.

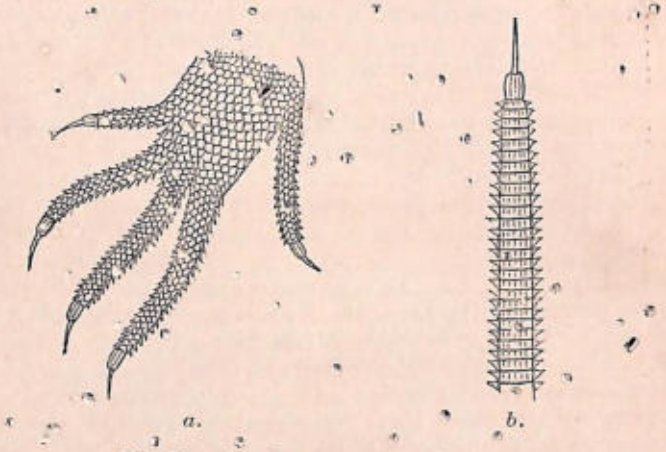


Fig. 13.—*Stenodactylus orientalis.*

a. Foot. *b*. Lower surface of toe. (After Boulenger.)

Range. Sind. I have examined five specimens which I refer without doubt to this species. The variation in the number of preanal pores is as follows:—

	Locality.	*No. of pores.*	*Sex.*
Brit. Mus.	Rohri.	1	♂
,,	Hala.	0	♀
Ind. Mus.	Khairpur Mir.	4	♀
,,	Larkhana Hills.	3	♀

Blanford remarks:—"It is evidently a nocturnal species, and probably burrows in the sand."

4. Stenodactylus lumsdeni.

Stenodactylus lumsdenii Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 479, and Trans. Linn. Soc., Zool. v, 1889, p. 94, pl. 9, fig. 1, and Fauna Brit. Ind. 1890, p. 58 (type loc. North Baluchistan, in the sandy desert between Nushki and Helmand; London).

Differs from *orientalis* in the longer snout, the length of which is distinctly greater than the distance between

the eye and the ear-opening; the longer limbs, the hind limb reaching to beyond the axilla; the more numerous dorsal tubercles and more irregular scales upon the top of the head; the smooth ventral shields; and in colour-pattern, the back being marked with seven distinct cross-bars.

Head and body 33; tail 40 mm.

The type and only known specimen is a female; the preanal scales suggest that the male may have a group of four preanal pores.

5. Stenodactylus maynardi.

Stenodactylus orientalis (not of Blanf.), Alcock & Finn, J. Asiat. Soc. Beng. lxv, 1896, p. 554.
Stenodactylus maynardi Smith, Rec. Ind. Mus. xxxv, 1933, p. 18.

Types, male and female (Brit. Mus. 1931.6.14.1, ♀, and Ind. Mus. no. 13944, ♂).

Head moderate, depressed; snout longer than the distance between the eye and the ear-opening, the diameter of which is half that of the eye. Nostril between the rostral, first labial, and three or four smaller shields; rostral quadrangular; 13 to 15 upper and 12 to 13 lower labials; mental much larger than the adjacent labials, its curved posterior margin projecting well beyond them; no postmentals. Head covered above with small granular scales, largest upon the snout. Body depressed, the back covered with small granular scales, intermixed with numerous larger keeled tubercles; belly with small, rounded, keeled scales. Limbs above with subimbricate keeled scales; the hinder one reaches to the axilla. Toes long, with well-marked lateral denticulations, the transverse lamellæ with several keels. Tail with rows of small keeled scales. Male with 9 very distinct preanal pores transversely arranged; female with 9 enlarged pitted scales.

The specimens, which are now somewhat faded, are of a light yellowish-brown colour above, with four longitudinal dark brown streaks, the two lateral ones being distinct and unbroken, the two vertebral ones broken up into a series of spots. Dr. Maynard states of their colour in life: "Three irregular yellow longitudinal bands, with brownish-black stripes intervening from top of head to tail; under surface of body and limbs delicate pinkish."

Head and body, ♂ 45, ♀ 50; tail, ♂ 70, ♀ 75 mm.

The types and only known specimens were collected by Dr. Maynard in Baluchistan near the Afghan frontier.

Genus ALSOPHYLAX.

Alsophylax Fitzinger, Syst. Rept. 1843, pp. 18 & 90 (type *pipiens*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 19, and Fauna Brit. Ind. 1890, p. 38.
Bunopus Blanford, Ann. Mag. Nat. Hist. (4) xiii, 1874, p. 454 (type *tuberculatus*).

Digits straight, not dilated nor angularly bent at any of the articulations, clawed, furnished with transverse lamellæ beneath, but without a lateral fringe or denticulation of pointed scales. Dorsum with small juxtaposed scales, intermixed with enlarged tubercles. Pupil vertical. Males with preanal pores.

Range. North Africa; S.W. Asia; N.W. India; Tibet.

Twelve or more species, one of which is included in the present work.

6. Alsophylax tuberculatus.

Bunopus tuberculatus Blanford, Ann. Mag. Nat. Hist. (4) xiii, 1874, p. 454, and Zool. E. Persia, ii, 1876, p. 348, pl. 22, fig. 4 (type loc. Baluchistan; London); Nikolski, Ann. Mus. St. Pétersb. 1899, p. 387, and 1905, p. 261.—*Alsophylax tuberculatus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 20, and Fauna Brit. Ind. 1890, p. 59.

Head moderate, depressed; snout as long as or a little longer than the distance between the eye and the ear-opening, the diameter of which is not more than half that of the eye. Nostril between the rostral, the first labial, and three smaller scales;



Fig. 14.—Under surface of toe of *Alsophylax tuberculatus*.

rostral quadrangular, with median cleft above; 11 to 13 upper and 9 to 11 lower labials; mental broader than long, about twice as large as the adjacent labials; no postmentals. Head covered above with small rounded scales intermixed with larger keeled ones; a series of small scales above the eye. Body depressed, back with small flat scales, intermixed with numerous, much larger, subtrihedral tubercles forming

from 12 to 14 irregular longitudinal series; belly with small, rounded, subimbricate, smooth scales. Limbs above with larger and smaller keeled imbricate scales.

Toes moderately long, the transverse lamellæ below furnished with minute tubercles; the hind-limb reaches to the axilla or not so far. Tail cylindrical, covered above with small flat scales and regular series of much larger keeled tubercles; below with subquadrangular flat or feebly keeled scales. Male with a transverse series of 7 to 9 preanal pores.

Sandy coloured above, with dark brown spots usually arranged to form cross-bars on the back and tail; a curved marked on the nape more or less distinct; lower parts whitish.

Head and body 52; tail 60 mm.

Range. From eastern Arabia to Afghanistan, Baluchistan, and Sind.

According to Blanford (1876) it abounds in parts of Baluchistan under 3,000 feet of elevation, being found in houses and under stones on hill-sides.

Genus **GYMNODACTYLUS.**

Gymnodactylus Spix, Spec. Nov. Lacert. Bras. 1825, p. 17, pl. 17, fig. 1 (type *geckoides*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 22, and Fauna Brit. Ind. 1890, p. 59; Annandale, Rec. Ind. Mus. ix, 1913, p. 309; Hora, Rec. Ind. Mus. xxviii, 1926, p. 187.
Phyllurus Fitzinger, Neue Class. Rept. 1826, pp. 13 & 47 (type *marmoratus*).
Goniodactylus Kuhl, Isis, 1827, p. 290 (type *marmoratus*).
Cyrtodactylus Gray, Phil. Mag. (2) ii, 1827, p. 55 (type *pulchellus*).
Dasyderma Fitzinger, Syst. Rept. 1843, p. 30 (type *geckoides*).
Anomalurus Fitzinger, Syst. Rept. 1843, pp. 18 & 90 (type *miliusii*).
Cyrtopodion Fitzinger, Syst. Rept. 1843, pp. 18 & 93 (type *Stenodactylus scaber* Rüppell).
Cubina Gray, Cat. Liz. Brit. Mus. 1845, p. 175 (type *fasciatus*).
Puellula Blyth, J. Asiat. Soc. Beng. xxix, 1860, p. 109 (type *rubida*).
Geckoella Gray, Proc. Zool. Soc. 1867, p. 98 (type *punctata*).
Quedenfeldtia Boettger, Abh. Senck. Ges. xiii, 1883, p. 125 (type *trachyblepharus*).

Digits not dilated, clawed, cylindrical; the two or three distal phalanges more or less compressed, forming an angle with the basal portion of the digits; the claw between two enlarged scales, the lower of which is more or less deeply notched under the claw; digits inferiorly with a row of more or less distinct transverse plates. Body variously scaled. Pupil vertical. Males with or without preanal or femoral pores.

Unless stated otherwise, the following characters are common to all the species mentioned in this work:—

Head and body depressed. Rostral broader than high, with median cleft above; nostril between the rostral, first labial, an internasal, and several small scales. Head covered above with small granular scales, largest on the snout, intermixed posteriorly with larger rounded tubercles. Mental large, subtriangular; two or three pairs of postmentals, the first pair much the largest and in contact with one another behind the mental.

The variations in the degree of development of the subdigital lamellæ refer to those on the basal portion of the digits.

Range. Southern Asia; the East Indies; Australia; the Pacific Islands; borders of the Mediterranean. More than 80 species are known. Common throughout the oriental region except in the extreme east. No species of *Gymnodactylus* has yet been found in southern China, Yunnan, or in French Indo-China north of the Langbian Plateau. Three species occur in Ceylon, two of which are peculiar to the island.

To construct a workable key for the species of this genus is not easy. Given a male, with tail undamaged, its determination should not be difficult; unfortunately such individuals are not always available. Considerable help will be obtained by referring to the distribution of a species, for the range of each one is comparatively limited. Certain groups which appear to be natural ones can be defined, but within each group the arrangement of the species is largely artificial. The following groups are defined.

Group I. Type *scaber*.

Small species, their coloration being more or less greyish and always indefinite. Their most striking character is the regular longitudinal series of large and prominent subtrihedral tubercles upon the back. The tail is longer than the head and body and is more or less depressed. The range of this group is essentially Palæarctic, and, as far as this work is concerned, its species are confined to the desert area of north-west India.

Species :—*fedtschenkoi, montium-salsorum, scaber, kachhensis.*

Group II. Type *pulchellus*.

Largish species, variously coloured, but in most cases conspicuously and handsomely marked in life. The dorsal pholidosis is composed of small granular scales intermixed with larger keeled tubercles. The digits are more or less elongate, the tail is cylindrical and longer than the head and body.

Species :—*intermedius, fæ, fasciolatus, chitralensis, consobrinoides, variegatus, frenatus, condorensis, oldhami, peguensis, irregularis, angularis, khasiensis, gubernatoris, rubidus.*

Group III. Type *brevipalmatus.*

A monotypic offshoot from Group II., characterized by webbed toes and a lateral denticulation along the tail.

Group IV. Type *nebulosus.*

Smallish, stoutly built species, conspicuously and handsomely marked in life. The dorsal pholidosis is as in Group II. The toes are short, the tail is shorter than the head and body, and is more or less swollen in the basal part.

Species :—*triedrus, collegalensis, nebulosus.*

Group V. Type *stoliczkai.*

Small species of inconspicuous coloration. The dorsal pholidosis is as in Group II. or mixed. The toes are rather long, the tail is shorter than the head and body, and more or less swollen in the basal part.

Species :—*stoliczkai, lawderanus.*

Group VI. Type *dekkanensis.*

Moderately large species of conspicuous and handsome coloration. They differ from all the previous groups in their dorsal scalation, which is composed for the most part of shields or plates which are much larger than the ventral scales. The tail is cylindrical, and feebly swollen in the basal part.

Species :—*dekkanensis, albofasciatus, jeyporensis.*

Key to the Species.

I. Back with large trihedral tubercles forming straight series (fig. 15).

a. Male with a continuous series of preanal and femoral pores.

Enlarged dorsal tubercles separated from one another by small scales; 28 to 30 scales across the belly ..... *feltschenkoi*, p. 41.

Enlarged dorsal tubercles more or less in contact with one another; 18 to 20 scales across the belly ..... *montium-salsorum*, [p. 42.

b. Male with 4 to 7 preanal pores.

Enlarged dorsal tubercles separated from one another by small scales; 30 to 40 scales across the belly ..... *kachhensis*, p. 43.

Enlarged dorsal tubercles more or less in contact with one another; about 20 scales across the belly ..... *scaber*, p. 42.

II. Enlarged dorsal tubercles, if present, not forming straight series.

A. Enlarged dorsal tubercles always present; tail longer than the head and body, not swollen; a lateral fold (absent in *consobrinoides* and sometimes in *peguensis*); males usually with pores.

a. A series of transversely enlarged subcaudal plates (absent in the basal part of the tail in *oldhami* and *peguensis*).

Four dark dorsal cross-bars; 40 to 50 scales across the belly; male with an angular series of 8 to 10 preanal pores ..... *intermedius*, p. 44.

Four dark dorsal cross-bars; 35 scales across the belly; male unknown ..... *feæ*, p. 45.

Back with 6 or 7 dark sinuous cross-bars, broader than their interspaces; 28 to 34 scales across the belly; male with preanal and femoral pores (?) ..... *fasciolatus*, p. 45.

Back with 7 or 8 irregular cross-bars; 38 to 40 scales across the belly; male with preanal pores only ..... *chitralensis*, p. 46.

Back with 6 or 7 dark cross-bars or transverse markings, narrower than their interspaces; 24 to 30 scales across the belly; male with 4 preanal pores ..... *consobrinoides*, p. 47.

Back with irregular dark spots; 22 scales across the belly; male with preanal and femoral pores ..... *variegatus*, p. 48.

Back with dark **W**-shaped marks; 35 scales across the belly; male with an angular series of 4 to 6 preanal pores ..... *fenatus*, p. 49.

Back with dark irregular spots; 35 to 40 scales across the belly; male with a group of 4 to 7 preanal pores ..... *condorensis*, p. 49.

Back with white spots; 34 to 38 scales across the belly; male with 0 to 4 preanal pores. *oldhami*, p. 50.

Back with dark paired spots, sometimes confluent; 34 to 38 scales across the belly; male with an angular series of 7 to 8 preanal pores ..... *peguensis*, p. 50.

b. No transversely enlarged subcaudal plates.

Back with numerous dark angular spots; 42 to 46 scales across the belly; male with an angular series of 5 to 7 preanal pores ..... *irregularis*, p. 51.

Back with 4 large dark **W** shaped spots; 34 to 40 scales across the belly; male with an angular series of 6 pitted or perforated preanal scales ..... *angularis*, p. 52.

Back with dark regular markings; 34 to 40 scales across the belly; male with an angular series of (8 to 10) 12 to 14 preanal pores ..... *khasiensis*, p. 52.

Back with dark markings; 33 scales across the belly; male with preanal and femoral pores ..... *gubernatoris*, p. 54.

A longitudinal pubic groove, containing pores in the male ..... *rubidus*, p. 54.

Toes webbed at the base; a lateral denticulation along the tail; male with preanal and femoral pores ..... *brevipalmatus*, p. 55.

B. Tail shorter than the head and body, more or less swollen (fig. 18), without transversely enlarged subcaudal plates; no lateral fold (feebly distinct in *stoliczkai* and *lawderanus*); males usually without pores.

a. Dorsal scales smaller than ventrals.

Back with white spots, rarely absent; enlarged dorsal tubercles present; male with 3 or 4 preanal pores ..... *triedrus*, p. 55.

Back with dark, paired, sinuous spots; enlarged dorsal tubercles present; male without pores ..... *nebulosus*, p. 56.

Back with dark, paired, rounded spots or cross-bands; enlarged dorsal tubercles absent or few in number; male without pores ..... *collegalensis*, p. 56.

Back grey, with darker wavy cross-bars; lateral fold indistinct or absent; enlarged dorsal tubercles present; male without pores ..... *stoliczkai*, p. 57.

Back grey, with darker variegations; enlarged dorsal tubercles intermixed with unequal scales; lateral fold indistinct or absent; male with preanal pores ..... *lawderanus*, p. 58.

b. Dorsal scales larger than ventrals; no lateral fold; males without pores.

Back with white transverse bands ..... *dekkanensis*, p. 59. *albofasciatus*, p. 60.

Back with brown spots ..... *jeyporensis*, p. 60.

7. Gymnodactylus fedtschenkoi.

Gymnodactylus fedtschenkoi Strauch, Mem. Acad. St. Pétersb. xxxv, 1887, p. 46 (type loc. Samarkand, Turkestan; Leningrad); Nikolski, in Fedschenko's Reise in Turkestan (Herpet. Turanica), 1899, p. 13, pl. i, fig. 1; Boettger, Zool. Jahrb. Jena, Syst. iii, 1888, p. 884; Hora & Chopra, Rec. Ind. Mus. xxv, 1923, p. 372; Cernov, C. R. Acad. Sc. Leningrad, No. 2, 1931, p. 59, text fig.

Gymnodactylus microlepis Lantz, Proc. Zool. Soc. 1918, p. 11, pl. i, fig. 1 (type loc. R. Tajan, Transcaspia; Moscow).

Head moderate, snout about as long as the distance between the eye and the ear-opening, the greatest diameter of which is half, or less than half, that of the eye; 12 or 13 upper and 11 or 12 lower labials. Head covered above with irregular rounded scales, intermixed posteriorly with larger rounded tubercles. Back with 12 regular longitudinal series of large subtrihedral tubercles, which are usually separated from one another by from 1 to 3 small scales; an indistinct lateral fold; belly with rounded imbricate scales, from 28 to 36 across the middle. Limbs above with keeled, imbricate

scales; the hind limb reaches to beyond the axilla; toes elongate, subdigital lamellæ well developed, those on the basal phalanges being nearly as broad as the digits. Tail feebly depressed, with small scales and rows of large, spinose, trihedral tubercles above, with a median series of enlarged plates below. Male with a continuous series of from 28 to 36 preano-femoral pores.

Greyish above, with indistinct darker cross-bands; whitish below.

Head and body 50; tail 65 mm.

Range. Baluchistan; Bokhara; Southern Turkestan; Transcaspia.

8. Gymnodactylus montium-salsorum.

Gymnodactylus geckoides (not of Spix, 1825), Blyth, J. Asiat. Soc. Beng. xxii, 1853, p. 410.

Gymnodactylus caspius (not of Eichwald, 1841), Stoliczka, P. Asiat. Soc. Beng. 1872, p. 80.

Gymnodactylus fedtschenkoi (not of Strauch, 1887), Boulenger, Fauna Brit. Ind. 1890, p. 61; Annandale, Ann. Mag. Nat. Hist. (7) xv, 1905, p. 26.

Gymnodactylus montium-salsorum Annandale, Rec. Ind. Mus. ix, 1913, p. 313, pl. 17, fig. 1 (type loc. Salt Range, Punjab; Calcutta and London); Hora, ibid. xxv, 1923, p. 372.

Differs from *G. fedtschenkoi* in the following particulars:—Subtrihedral dorsal tubercles larger and more or less in contact with one another; 18 to 20 scales across the middle of the belly.

Only four specimens are known. They are now of a dull greenish-brown colour, without other markings, but Blyth, who first examined them, stated that they were "of a greyish colour, spotted rather than banded above with blotches of a darker hue, variegated by some of the tubercles being of a whitish colour."

They were collected by Theobald during the Punjab Salt Range Survey. One of the specimens is in the British Museum collection.

Head and body 47; tail 60 mm.

9. Gymnodactylus scaber.

Stenodactylus scaber Heyden, in Rüppell, Atlas N. Afr., Rept. 1827, p. 15, pl. 4, fig. 2 (type loc. Arabia; Frankfurt).—*Gonyodactylus (Crytopodion) scaber*, Fitzinger, Syst. Rept. 1843, p. 93.—*Gymnodactylus scaber*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 27, and Fauna Brit. Ind. 1890, p. 62; Anderson, Zool. Eygpt, Rept. 1898, p. 54, pl. 5, fig. 1; Hora, Rec. Ind. Mus. xxv, 1923, p. 371; Procter, J. Bombay Nat. Hist. Soc. xxix, 1923, p. 121.

Head moderate, snout longer than the distance between the eye and the ear-opening, the greatest diameter of which is half, or more than half, that of the eye; 12 or 13 upper and

10 or 12 lower labials. Head covered above with moderately small scales, which are intermixed posteriorly with larger, rounded, keeled tubercles. Back with 10 or 12 regular longitudinal series of large subtrihedral tubercles, the largest broader than long, narrowly separated from one another by small scales or touching one another; an indistinct lateral fold; belly with rounded imbricate scales, about 20 across the middle. Limbs above with keeled imbricate scales; the hind-limb reaches to beyond the axilla; toes elongate, subdigital lamellæ well developed, more than half the breadth of the digit. Tail as in *fedtschenkoi*, but the enlarged scales more strongly keeled, sometimes mucronate. Male with from 4 to 7 preanal pores in a transverse series.

Sandy coloured above, with brown spots regularly arranged; a more or less distinct curved mark upon the nape present or absent; tail banded with dark brown; whitish below.

From snout to vent 50; tail 67 mm.

Range. From Egypt to N.W. India. Recorded within Indian limits from the N.W. Frontier Province (Waziristan); Baluchistan; the Salt Range in the Punjab, and Sind.

Ingoldby (in Procter, 1923) states: "A common desert Gecko throughout the tract. A House-Gecko in Tank."

Gymnodactylus kachhensis.

Two races, which differ from one another in the number of ventral scales and in the dorsal scalation:—

[p. 43.

About 30 scales across mid-belly ..... *kachhensis kachhensis*,
About 40 scales across mid-belly ..... *kachhensis watsoni*,

[p. 44.

10. Gymnodactylus kachhensis kachhensis.

Gymnodactylus kachhensis Stoliczka, P. Asiat. Soc. Beng. 1872, p. 79 (type loc. Cutch; Calcutta); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 29; Annandale (in part), Rec. Ind. Mus. ix, 1913, p. 315; Hora, Rec. Ind. Mus. xxv, 1923, p. 371.

Gymnodactylus petrensis Murray, Zool. Sind, 1884, p. 362, pl. —, fig. 1 (type loc. Sind; London).

Closely allied to *G. scaber*, from which it differs in the following characters:—10 to 12 upper and 8 to 10 lower labials; subtrihedral tubercles upon the back smaller, separated from one another by from one to three small scales; about 30 scales across the belly between the lateral folds; no regular series of subcaudal plates. Dark spots on the back not so regularly arranged.

From snout to vent 40; tail 40 mm.

Range. Sind; Cutch; Baluchistan (Las Bela State).

Common throughout Cutch, mostly in crevices of rocks, and very rarely seen in houses (*Stoliczka*).

G. brevipes Blanford, Ann. Mag. Nat. Hist. (4) xiii. 1874, p. 453, is closely related to this species; it appears to differ only in the shorter limbs. It was included by Boulenger in the fauna of India (p. 63), but, as pointed out since by Annandale (Rec. Ind. Mus. ix. 1913, p. 315), the type and only known specimen is from Aptan, near Bampur, in E. Persia. It is not, therefore, included in this work.



Fig. 15.—*Gymnodactylus kachhensis.*

10 *a*. Gymnodactylus kachhensis watsoni.

Gymnodactylus watsoni Murray, Zool. Beluch. & S. Afghan. 1892, p. 68 (type loc. Quetta).

Gymnodactylus ingoldbyi Procter, J. Bombay Nat. Hist. Soc. xxix. 1923, p. 121, text-fig. (type loc. Ladha, N.W.F.P.; London).

Differs from *k. kachhensis* in having about 40 scales across the middle of the belly, and in the dorsal scalation. In *k. kachhensis* the enlarged trihedral tubercles are separated by small granular scales; in *k. watsoni* the small scales are intermixed with larger keeled scales. Intermediate forms, however, connect the two.

The range of true *k. watsoni* appears to be restricted to the N.W. Frontier Province.

11. Gymnodactylus intermedius. (Plate I, fig. F.)

Gymnodactylus intermedius Smith, J. Nat. Hist. Soc. Siam, ii, 1917, p. 221, pl. —, fig. 2 (type loc. Khao Sebab, Chantabun, S.E. Siam; London).

Head moderate, snout longer than the distance between the eye and the ear-opening, the greatest diameter of which is less than half that of the eye; 11 or 12 upper and 9 or 10 lower labials.

Body and limbs covered above with small granular scales, intermixed with larger, rounded, subtrihedral tubercles; a lateral fold of slightly enlarged scales; belly with rounded imbricate scales, 40 to 50 between the lateral folds. The hind-limb extends to the axilla; subdigital lamellæ well developed, nearly as broad as the digit. Tail covered above with small flat scales and rows of enlarged tubercles; below with transversely enlarged plates. Male with 8 or 10 preanal pores in a wide-angled series; a group of enlarged preanal scales, and a series of from 6 to 10 enlarged femoral scales.

Greyish-brown above, with four brown light-edged (yellow in life) cross-bars upon the back and another across the nape extending forwards along the sides of the head to the eyes; tail with alternate light and dark bands; top of head uniform brownish.

Head and body 85; tail 110 mm.

Range. The hills of S.E. Siam; the Kamchay Mountains, Cambodia; Koh Chang, Gulf of Siam.

Resembling the Malayan *G. pulchellus* in general form and colour-pattern, but differing entirely in the arrangement of the male pores.

12. Gymnodactylus feæ.

Gymnodactylus feæ Boulenger, Ann. Mus. Civ. Genova, (2) xiii, 1893, p. 313, pl. vii, fig. 1 (Karenni Hills, Burma; Genoa).

Differs from *G. intermedius* in the following particulars:—A lateral fold of distinctly enlarged scales; about 35 scales between the folds; a continuous series of enlarged preanal and femoral scales, some of which are pitted but not perforated. Top of the head with large brown spots edged with white; lower parts dark brown.

From snout to vent 45; tail 50 mm.

I have examined the type and only known specimen, which is a female.

As shown by De Rooij (Rept. Indo-Austr. Archipel. i, 1915, p. 22), the specimens referred by Annandale to *G. feæ* from Sinkep Island are *G. consobrinus* (see Annandale, Rec. Ind. Mus. ix, 1913, p. 322).

13. Gymnodactylus fasciolatus.

Naultinus fasciolatus Blyth, J. Asiat. Soc. Beng. xxix, 1860, p. 114 (type loc. Subathu, Simla dist.; Calcutta).—*Gymnodactylus fasciolatus*, Theobald, Cat. Rept. Brit. Ind. 1876, p. 92; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 44, and Fauna Brit. Ind. 1890, p. 71; Annandale, Rec. Ind. Mus. ix, 1913, p. 325, pl. xvi, fig. 3.

Head moderate; snout longer than the distance between the eye and the ear-opening, the diameter of which is about

half that of the eye; 10 to 13 upper and 9 to 10 lower labials. Occiput with minute granules, mixed with larger tubercles; body and limbs above with small granular scales, intermixed with much larger subtrihedral tubercles; a lateral fold of slightly enlarged scales; belly with rounded imbricate scales, 28 to 34 between the lateral folds. The hind-limb extends to the axilla or not quite so far; subdigital lamellæ well developed, nearly as broad as the digit. Tail above with small, flat, squarish scales and, at the base, series of enlarged flat tubercles; below with a series of transversely enlarged plates. Female with a continuous series of enlarged preanal and femoral scales, 15 or 16 on each side, some of which are pitted. Male unknown.

Greyish above, with 6 or 7 dark brown dorsal cross-bars, the hinder margins of which are of sinuous or W-shaped outline, and of darker colour than the central portions; a dark curved mark across the nape extending to the eyes; top of head with brown spots; tail above with alternate light and dark bars; whitish below.

Head and body 82; tail 110 mm.

Range. The Western Himalayas (Simla district; Almora, Kumaon, 5000 feet).

I know of six specimens, all of which I have examined.

14. **Gymnodactylus chitralensis**, sp. nov. (Plate I, fig. E.)

Head and body depressed. Head moderate; snout longer than the distance between the eye and the ear-opening the diameter of which is about half that of the eye; 11 or 12 upper and 9 or 10 lower labials; rostral broader than high, with median cleft above; nostril between the rostral, first labial, and several small scales; head covered above with flat granular scales and, larger polyhedral ones upon the snout; mental large, subtriangular, twice as long as the adjacent labials; two well-developed pairs of postmentals, the inner pair larger than the outer and in contact with one another behind the mental; behind the postmentals are smaller scales which merge gradually into the small flat scales of the gular region; back with small granular scales intermixed with fairly regular rows of much larger, rounded, keeled tubercles, 12 rows across the middle of the back; belly with rounded imbricate scales; a more or less distinct lateral fold, 38 to 40 scales across the middle of the belly between the folds. The hind-limb reaches to the axilla. Digits elongate; subdigital lamellæ well developed, as broad as the digit. Tail feebly depressed, oval in section, covered above with small, pointed, imbricate scales and regular series

of large keeled tubercles, six in a row; below with a median series of transversely enlarged plates, which, except at the base, are nearly as broad as the tail. Male with 4 preanal pores. No enlarged femoral scales.

Greyish above, with irregular dark cross-bars, which are darker behind than in front and about as broad as their interspaces. The first is upon the occiput, and extends forwards along the side of the head to the eyes; there are 7 or 8 upon the back. Tail dark, with bars of the same colour. Lower parts greyish-white.

From snout to vent 52; tail 75 mm.

Most nearly related to *G. fasciolatus*, from which it differs in the coarser granules upon the top of the head, number of scales across the belly, character of the gular scales, scalation of the tail, in the male having preanal pores only, and in coloration.

Described from two specimens (♂ and ♀) obtained by the Chitral Survey, the male at Karakal, in the Bumboet Valley. The types are in the British Museum (♀) and Indian Museum (♂). The female is probably, the male certainly, immature.

15. Gymnodactylus consobrinoides.

Gymnodactylus pulchellus (not of Gray, 1828), Boulenger, Ann. Mus. Civ. Genova, xxv, 1888, p. 475.

Gymnodactylus consobrinoides Annandale, J. Asiat. Soc. Beng. (n.s.) i, 1905, p. 82, and Rec. Ind. Mus. ix, 1913, p. 324, pl. xvi. fig. 1 (type loc. Tavoy dist., Tenasserim; Calcutta and London).

Head moderate; snout about as long as the distance between the eye and the ear-opening, the diameter of which is less than half that of the eye; 10 or 11 upper and 9 or 10 lower labials. Back and limbs above with small granular scales, intermixed with larger, rounded, keeled tubercles. A feebly distinct lateral fold; belly with rounded imbricate scales, about 24 to 30 across the middle. The hind-limb extends to the axilla or not quite so far; subdigital lamellæ well developed, nearly as broad as the digit. Tail covered above with small flat scales and rows of enlarged tubercles; below with a series of enlarged plates. Male with 4 preanal pores in an angular series and a continuous series of enlarged femoral scales.

Light brown, with 7 narrow dark brown, white-edged dorsal cross-bars or transverse markings, narrower than their interspaces; a dark, curved mark across the nape extending to the eyes; top of head with brown spots, tail above with alternate light and dark bars; pale brown below.

Head and body 48; tail 62 mm.

Of the two types one is a juvenile and the other probably not yet fully grown. Two more specimens, both juvenile, were collected by Fea in Tenasserim, at Pla-pu, west of Mt. Muleyit, and Moulmein respectively. They have been recorded by Boulenger under *G. pulchellus*. The one from Pla-pu agrees well with the types except that the dorsal bars are more irregular in shape and somewhat broken up. The other, from Moulmein, I refer provisionally to *G. consobrinoides*. It differs in the smaller ventral scales, more than 40 in transverse series, and in the broader, transverse, subcaudal plates, which occupy almost the whole width of the tail. It has 6 transverse bars upon the back. Both specimens are in the Civic Museum, Genoa.

16. Gymnodactylus variegatus.

Naultinus variegatus Blyth, J. Asiat. Soc. Beng. xxviii, 1859, p. 279 (type loc. mountains of the interior from Moulmein; Calcutta).—*Gymnodactylus variegatus*, Anderson, Proc. Zool. Soc. London, 1871, p. 161; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 43, and Fauna Brit. Ind. 1890, p. 70; Annandale, Rec. Ind. Mus. ix, 1913, p. 326, pl. xvi, fig. 2.

Head moderate; snout as long as the distance between the eye and the ear-opening, the diameter of which is less than half that of the eye, 10 to 11 upper and 10 lower labials. Body and limbs above with small granular scales, intermixed with much larger subtrihedral tubercles; a lateral fold of enlarged scales; belly with imbricate leaf-like scales, 22 between the lateral folds.

The hind-limb extends to the axilla; subdigital lamellæ well developed, nearly as broad as the digit. Tail covered above with small flat scales and whorls of enlarged tubercles; below with a series of enlarged plates. Male with a continuous series of 32 preanal and femoral pores.

"Grey above, beautifully spotted and marbled with black, set off with subdued white. On the back the markings appear as irregular bands, paler internally, and blackish on their zigzag borders. Head spotted above; a broad dark streak bordered with whitish behind each eye and continued irregularly round the occiput; lower parts whitish, freckled on the tail with black, the terminal third being almost wholly blackish; above, the tail is irregularly banded" (*Blyth*).

Head and body 71: tail 95.

Range. The second and only other known specimen (juvenile) is also in the Indian Museum; it is from the Dawna Hills, Amherst district, between Thingannyinaung and Sukli. In coloration it agrees well with Blyth's description. His type is now much bleached.

17. Gymnodactylus frenatus.

Gymnodactylus frenatus Günther, Rept. Brit. Ind. 1864, p. 113, pl. xii, fig. D (type loc. Ceylon; London); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 42, and Faun. Brit. Ind. 1890, p. 68; Henry, Ceylon J. Sci., B, xiv, 1928, p. 339; Deraniyagala, ibid. xvi, 1932, p. 295, pl. lxi.

Head rather large and broad; snout slightly longer than the distance between the eye and the ear-opening, the diameter of which is less than half that of the eye; 10 to 11 upper and 8 to 10 lower labials. Body and limbs above with small granular scales intermixed with larger rounded tubercles; a lateral fold, some of the scales of which are enlarged; belly with rounded imbricate scales, about 35 between the lateral folds. The hind-limb reaches to the axilla; subdigital lamellæ strongly developed, as broad as the digit (fig. 3, A). Tail covered above with small flat scales, without any distinct series of enlarged scales; below with transversely enlarged imbricate plates. Male with 4 or 6 preanal pores in a wide-angled series; a group of enlarged preanal and a series of enlarged femoral scales.

Olive-brown or yellowish-brown above, with 4 or 5 large W-shaped dorsal marks in the young, which become indistinct in the adult. A dark band from each eye meeting a W-shaped mark upon the nape, and continued along the neck to the first mark upon the shoulders; head speckled with dark brown; tail with alternate light and dark bars; pale brown below.

Head and body 100; tail 120 mm.

Range. Ceylon. On trees and rocks.

Eggs large, 15×17 mm. (*Henry*, 1928).

18. Gymnodactylus condorensis.

Gymnodactylus condorensis M. A. Smith, J. Nat. Hist. Soc. Siam, iv, 1920, p. 94, pl. —, fig. 1 (type loc. Pulo Condore, S. China Sea; London).

Head moderate; snout longer than the distance between the eye and the ear-opening, the diameter of which is less than half that of the eye; 10 or 11 upper and 8 or 9 lower labials. Body and limbs above with small granular scales, intermixed with much larger subtrihedral tubercles; a distinct lateral fold of slightly enlarged scales; belly with rounded imbricate scales, 35 to 40 across the middle. The hind-limb reaches to the axilla; subdigital lamellæ well developed, nearly as broad as the digit. Tail above with small flat scales and rows of enlarged tubercles; below with a series of enlarged plates. Male with a group of 4 to 7 preanal pores and a series of enlarged femoral scales.

Greyish-brown above, with large dark spots variously arranged; a dark streak on each side of the head starting from behind the eye and meeting its fellow on the nape; top of head with brown spots; tail with dark bars; light brownish below.

Head and body 80; tail 100 mm.

Range. Pulo Condore, off the coast of Cochin-China.

19. **Gymnodactylus oldhami.** (Plate I, fig. C.)

Gymnodactylus oldhami Theobald, Cat. Rept. Brit. Ind. 1876, p. 81 (type loc. unknown; Calcutta); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 38, and Fauna Brit. Ind. 1890, p. 67; Annandale, J. & P. Asiat. Soc. Beng. (n. s.) i, 1905, p. 82, and Rec. Ind. Mus. ix, 1913, p. 320, pl. xvii, fig. 2; Smith, J. Nat. Hist. Soc. Siam, ii, 1916, p. 150.

Head moderate; snout as long as the distance between the eye and the ear-opening, the diameter of which is about half that of the eye; 12 or 13 upper and 9 to 11 lower labials. Body and limbs above with small granular scales, intermixed with much larger subtrihedral tubercles; an indistinct lateral fold, sometimes absent; belly with rounded imbricate scales, 34 to 38 between the lateral folds. The hind-limb reaches to the axilla or not so far; subdigital lamellæ moderately developed, not more than half as broad as the digit. Tail above with small flat scales and paired series of enlarged tubercles; below with a median row of transversely enlarged plates except at the basal part. Male with an angular series of from 0 to 4 preanal pores and an enlarged series of femoral scales.

Brown above, with whitish, elongated or rounded, dark-edged spots arranged in four longitudinal lines; a dark curved band across the nape extending to the eyes, edged in front and behind with white; top of head uniform brown; tail with white bars; whitish below.

Head and body 65; tail 75 mm.

Range. Tenasserim (Tavoy district); Peninsular Siam (Patiyu district and Nakon Sritamarat Mts.).

20. **Gymnodactylus peguensis.**

Gymnodactylus peguensis Boulenger, Ann. Mus. Civ. Genova, (2) xiii, 1893, p. 314, pl. vii, fig. 2 (type loc. Palon, Pegu; London and Genoa), and Fauna Malay Penin. 1912, p. 136; Laidlaw, Proc. Zool. Soc. 1901, p. 304; Annandale, Rec. Ind. Mus. vii, 1912, p. 91, and ix, 1913, p. 323; Smith, J. Nat. Hist. Soc. Siam, ii, 1916, p. 150, and Proc. Zool. Soc. 1921, p. 427, text-fig. 1, A.

Head rather large; snout longer than the distance between the eye and the ear-opening, the diameter of which is about half that of the eye; 10 to 12 upper and 9 or 10 lower labials.

Body and limbs above with small granular scales, intermixed with much larger conical or subtrihedral tubercles; lateral fold feebly distinct or absent; belly with rounded imbricate scales, 34 to 38 across the middle. The hind-limb does not reach to the axilla; subdigital lamellæ moderately developed, not more than half the breadth of the digit. Tail covered above with small flat scales; below with a median series of narrow transverse plates except at the basal part. Male with an angular series of 7 or 8 preanal pores and a series of slightly enlarged femoral scales.

Light brown above, with paired vertebral series of dark brown black-edged spots, which may be confluent transversely; other less regularly placed spots are upon the flanks, and sometimes the spots are edged with white; a dark curved mark across the nape extending to the eyes, sometimes broken up into spots; top of head with brown spots; tail with dark bands; whitish below.

Head and body 80; tail 95 mm.

Range. From Pegu in Burma to Patelung in Peninsular Siam. Found in the hills, but at no great altitude.

21. Gymnodactylus irregularis.

Gymnodactylus peguensis var. *irregularis* M. A. Smith, Proc. Zool. Soc. 1923, p. 428, text-fig. 1, B (type loc. Camly, 3,500 feet, Langbian Plateau; London).

Head rather large; snout longer than the distance between the eye and the ear-opening, the diameter of which is about half that of the eye; 11 upper and 9 lower labials. Body and limbs above with small granular scales intermixed with much larger conical or subtrihedral tubercles; a lateral fold of distinctly enlarged scales. Belly with rounded imbricate scales, 41 to 46 between the lateral folds. The hind-limb reaches to the axilla; subdigital lamellæ well developed, nearly as broad as the digit. Scalation of tail not known. Male with an angular series of 5 to 7 preanal pores, a group of enlarged preanal scales, and a series of 7 or 8 much enlarged femoral scales, which are separated from the preanal scales by smaller ones; the femoral scales are pitted, and in one specimen one scale is perforated.

Greyish-brown above, with dark brown, white-edged, angular spots; a curved band across the nape from eye to eye; top of head with angular spots; whitish below.

Head and body 79 mm.

Range. The Langbian Plateau, S. Annam.

Known from two male specimens only. The tail is, unfortunately, wanting in both examples, and their exact position in the Key therefore remains unknown.

A third specimen, ♂ immature, also from the Langbian Plateau (Brit. Mus. 1931.6.12.3, Sai Kat, 3,000 feet alt.), I refer provisionally to this species. It differs from the types in the following particulars :—33 ventral scales; colour-pattern not so distinct, the dark markings duller and more confluent; the dark nuchal band is broken in the middle. The tail in this example is complete and is covered with small, flat, juxtaposed scales and series of enlarged tubercles above, with larger imbricate scales below, those on the median line being larger than the others.

22. Gymnodactylus angularis.

Gymnodactylus peguensis var. *angularis* M. A. Smith, Proc. Zool. Soc. 1921, p. 427, text-fig. 1, A (type loc. Dong Paya Fai Mts., E. Siam; London).

Head rather large; snout longer than the distance between the eye and the ear-opening, the diameter of which is about half that of the eye; 10 to 12 upper and the same number of lower labials. Body and limbs above with small granular scales, intermixed with much larger conical or subtrihedral tubercles; a lateral fold of enlarged scales; belly with rounded imbricate scales, 34 to 40 between the lateral folds. The hind-limb reaches to the axilla; subdigital lamellæ small, not more than half as broad as the digit. Tail covered with small flat scales and whorls of enlarged tubercles above; below, the median plates are somewhat larger than those on the sides. Male with an angular series of 6 pitted or just perforated preanal scales and a series of slightly enlarged conical femoral scales, which are continuous with the preanal.

Greyish-brown above, with 4 large dark brown, black-edged, W-shaped marks; a dark band across the nape extending forwards at a right angle to the eyes and edged in front with white; head with brown spots in the young, disappearing in the adult; tail with dark and light annuli.

Head and body 66; tail 80 mm.

Range. The Dong Paya Fai Mts. (not Dong Rek Mts. as originally stated), Eastern Siam. Known from three specimens collected at Pak Jong, Hin Lap, and Lat Bua Kao, S.W. of Korat.

23. Gymnodactylus khasiensis.

Pentactylus khasiensis Jerdon, P. Asiat. Soc. Beng. 1870, p. 75 (type loc. Khasi Hills, Assam; Calcutta).—*Gymnodactylus khasiensis*, Anderson, Proc. Zool. Soc. 1871, p. 162; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 44; Annandale, Rec. Ind. Mus. viii, 1912, p. 39, and ix, 1913, p. 319; Hora, Rec. Ind. Mus. xxviii, 1926, p. 189, pl. vii, figs. 4–6.

Gymnodactylus himalayicus Annandale, J. Asiat. Soc. Beng. (n.s.) ii, 1906, p. 287 (type loc. Kurseong, Darjeeling dist.; Calcutta), and Rec. Ind. Mus. i, 1907, pl. vi, fig. 1 (no text), and ix, 1913, p. 319.

Head moderate; snout longer than the distance between the eye and the ear-opening, the diameter of which is half that of the eye; 10 to 12 upper and the same number of lower labials. Body and limbs above with small granular scales, intermixed with much larger rounded keeled tubercles; a lateral fold of enlarged scales; belly with rounded imbricate scales, 30 to 40 across the middle. The hind-limb reaches to the axilla; subdigital lamellæ well developed, nearly as broad as the digit. Tail covered with small flat scales, those on the median line below being larger than the others; a dorsal series of enlarged tubercles on the basal part. Male with an angular series of (8 to 10) 12 to 14 preanal pores; no enlarged femoral scales.

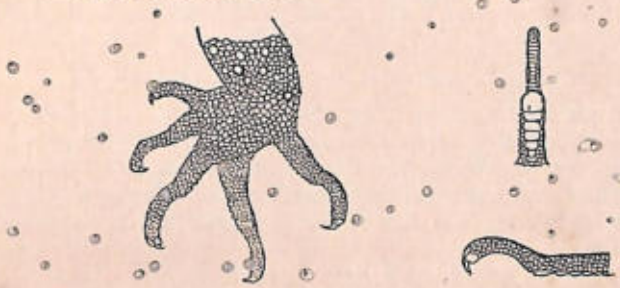


Fig. 16.—*Gymnodactylus khasiensis.*
Foot and lower side views of toe. (After Boulenger.)

Light brown or grey-brown above, with dark spots or markings more or less regularly arranged; an indistinct curved mark across the nape extending to the eyes, sometimes absent; top of head with brown spots; tail with brown bands; belly whitish.

Head and body 85; tail 100 mm.

Range. Assam (Khasi Hills); Abor country; Darjeeling district; Upper Burma (Mogok).

G. himalayicus Annandale I refer to this species. The type is a juvenile male and somewhat shrivelled, so that the lateral fold has become almost obliterated. It has only 10 preanal pores. A female in the Indian Museum from the same district (Gopaldhara, no. 19546) has 10 pitted scales.

An immature male from Mogok, Upper Burma (Brit. Mus. 1900.9.20.1) has only 8 preanal pores, but in other respects agrees with *khasiensis*.

24. Gymnodactylus gubernatoris.

Gymnodactylus gubernatoris Annandale, Rec. Ind. Mus. ix, 1913, p. 316, pl. xvii, fig. 3 (type loc. Darjiling dist., 1,000–3,000 feet; Calcutta).

Differs from *khasiensis* in having an angular series of 7 preanal pores, and, widely separated from them by small scales, 6 femoral pores on either side; 33 scales across the belly; the hind-limb does not reach to the axilla.

Head and body 53; tail 65 mm.

Known only from the type-specimens, a male in good condition and a juvenile in a bad state of preservation.

25. Gymnodactylus rubidus.

Puellula rubida Blyth, J. Asiat. Soc. Beng. xxix, 1860, p. 109 (type loc. Andaman Is.; Calcutta).—*Cyrtodactylus rubidus*, Stoliczka, J. Asiat. Soc. Beng. xxxix, 1870, p. 165.—*Gymnodactylus rubidus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 45, and Fauna Brit. Ind. 1890, p. 69; Annandale, J. Asiat. Soc. Beng. lxxiii, 1904, Suppl. p. 13, and Rec. Ind. Mus. ix, 1913, p. 318.

Gecko tigris Tytler, J. Asiat. Soc. Beng. xxxiii, 1864, p. 546.

Differs from *khasiensis* in that the male has a well-marked longitudinal preanal groove containing usually 6 pores; the female also has a groove, but it is not so distinct. Colour as in *khasiensis*, but the markings often united to form irregular transverse bars. In life the ground-colour has a distinct reddish tinge.

Head and body 75; tail 90 mm.

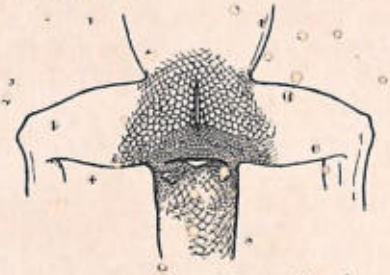


Fig. 17.—Preanal groove of *Gymnodactylus rubidus*.

Range. The Andaman Islands, in the woods of which it appears to be common. Found upon trees as well as on the ground. According to Tytler the tail is held stiffly up when running.

The preanal groove is not found in any other species of Indian or Indo-Chinese Gecko, but it occurs in the Malayan *Gymnodactylus marmoratus* and *G. pulchellus*, in *G. fumosus* from Celebes, and in *G. philippinicus*.

26. Gymnodactylus brevipalmatus.

Gymnodactylus brevipalmatus M. A. Smith, J. Nat. Hist. Soc. Siam, vi, 1923, p. 48, pl. v, fig. 1 (type loc. Khao Luang, Nakon Sritamarat Mts., Peninsular Siam; London).

Head moderate; snout longer than the distance between the eye and the ear-opening, the diameter of which is less than half that of the eye; 12 or 13 upper and 10 or 11 lower labials; body and limbs above with small scales, intermixed with much larger rounded keeled tubercles; a lateral fold, some of the scales of which are enlarged; belly with rounded imbricate scales, 40 to 44 across the middle. The hind-limb does not reach to the axilla; subdigital lamellæ strongly developed and as broad as the digit; fingers feebly, toes distinctly, webbed, the membrane on the latter extending about half way up the basal phalanges. Tail above with small scales and rows of enlarged tubercles; a well-marked denticulated lateral fringe; below with small scales, the median series of which are larger than the others.

Male with an angular series of 9 preanal pores, and, separated from them by small scales, 6 femoral pores on either side.

Brown above, with a series of large dark brown, W-shaped, dorsal marks in the young, which may disappear in the adult; the paratype is uniform brown above, with many of the enlarged dorsal tubercles coloured black; tail with alternating bars of lighter and darker brown; whitish below.

Head and body 72; tail 80 mm.

Range. The Nakon Sritamarat Mts., Peninsular Siam, and hills near Raheng (Ban Pa Che), Northern Siam.

Known from four specimens, caught at 2,000–2,500 feet altitude. The types were found beneath dead bark.

27. Gymnodactylus triedrus.

Gymnodactylus triedrus Günther, Rept. Brit. Ind. 1864, p. 113 (type loc. Ceylon; London); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 38, and Fauna Brit. Ind. 1890, p. 67; Annandale, Rec. Ind. Mus. ix, 1913, p. 320; Deraniyagala, Ceylon J. Sci., B, xvi, 1932, p. 295, pl. lxi.

Geckoella punctata Gray, Proc. Zool. Soc. 1867, p. 99, pl. ix (type loc. Ceylon; London).

Head moderate; snout about as long as the distance between the eye and the ear-opening, the diameter of which is one-third that of the eye; 12 or 13 upper and 10 or 11 lower labials. Body and limbs above with small granular scales, intermixed with much larger rounded, keeled, or subtrihedral tubercles; no lateral fold; belly with rounded imbricate scales, about 35 across the middle. The hind limb does not reach to the axilla; toes short, subdigital lamellæ moderately developed, about half as broad as the digit. Tail shorter

than the head and body, swollen at the base, tapering to a point, covered with small, rounded, imbricate scales above, with much larger rounded imbricate scales below. Male with 3 or 4 preanal pores; no enlarged femoral scales.

Brown above, with small white spots margined with dark brown; rarely the spots are absent; light brown below.

Head and body 62; tail 56 mm.

Range. The hills of Ceylon. According to Annandale it is found only at low altitudes. Deraniyagala states that it is found in mountain forests.

28. Gymnodactylus nebulosus. (Plate I. fig. D.)

Gymnodactylus nebulosus Beddome, Madras Month. J. Med. Sc. ii, 1870, p. 174 (type loc. Golconda Hills, near Vizagapatam; London); (in part) Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 34, and Fauna Brit. Ind. 1890, p. 64.

Head moderate; snout longer than the distance between the eye and the ear-opening, the greatest diameter of which is less than half that of the eye; 10 to 12 upper and the same number of lower labials. Back with small granular scales, intermixed with numerous larger, rounded, keeled tubercles; no lateral fold; belly with rounded imbricate scales, about 40 across the middle; the hind-limb does not reach to the axilla; toes short, subdigital lamellæ moderately developed, not more than half the breadth of the digit. Tail shorter than the head and body, swollen at the base, tapering to a point, covered above with small, rounded, imbricate scales, below with larger imbricate ones. Male without pores or enlarged scales.

Light brown or greyish above, with dark brown, paired, transversely placed black-edged spots of sinuous outline which are continued on to the tail; a curved mark on the nape present or absent; head above, lips, and throat, spotted or marbled with brown; light brown below.

Head and body 52; tail 42 mm.

Range. Golconda Hills; Gorge Hill, Godavery; Russelconda and Nelamba in the Madras Presidency.

The types were collected under stones at 2,000–3,500 feet altitude.

29. Gymnodactylus collegalensis. (Plate I, figs. B 1, B 2.)

Gymnodactylus collegalensis Beddome, Madras Month. J. Med. Sc. ii, 1870, p. 173 (type loc. Balarangums, near Yelandur, State of Mysore; London).

Gymnodactylus speciosus Beddome, l.c.s. p. 173 (type loc. Erodé, Madras Presidency; London).

Gymnodactylus frenatus (not of Günther, 1864) Günther, Ann. Mag. Nat. Hist. (4) ix, 1872, p. 86.

Gymnodactylus nebulosus (in part), Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 34, pl. iv, fig. 1 (*collegalensis*), fig. 1 *a* (*speciosus*), and Fauna Brit. Ind. 1890, p. 64; Méhely, Termés. Füz. Budapest, xx, 1897, p. 56; Chabanaud in Miss. Babault Résult. Sc. 1922, p. 2, pl. i, fig. 2; Annandale, Rec. Ind. Mus. ix, 1913, pp. 311, 321; Deraniyagala, Ceylon J. Sci., B, xvi, 1932, p. 293, pl. ix.

Very closely allied to *G. nebulosus*, from which it differs in the complete, or almost complete, absence of enlarged dorsal tubercles and in colour-pattern. Two colour-forms can be defined which are completely connected to one another by intermediate ones.

1. (*speciosus*.) Three dark brown, black-edged cross-bands, broader than the interspaces between them, one behind the shoulders, one across the middle of the back, and the third at the base of the tail; a fourth is across the nape and extends forwards to the eyes; head as in *nebulosus*.

2. (*collegalensis*.) Light brown or greyish above, with large, rounded or oval black-edged paired spots upon the back and tail and much smaller spots irregularly arranged. Head as in *nebulosus*.

Range. Hills of Southern India at low elevations; Ceylon. All the specimens that I have examined are from south of lat. 13° N.

Deraniyagala remarks: "A forest form found under bark of dead trees."

30. Gymnodactylus stoliczkai.

Gymnodactylus stoliczkai Steindachner, Reise Novara, Rept. 1869, p. 15, pl. 2, fig. 2 (type loc. near Karoo, north of Dras, Kashmir; Vienna).—*G. stoliczkæ*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 31, and Fauna Brit. Ind. 1890, p. 63; Blanford, Res. 2nd Yarkand Miss., Calcutta, 1878, p. 12; Annandale, Rec. Ind. Mus. ix, 1913, pp. 310, 316; Wall, J. Bombay Nat. Hist. Soc. xxi, 1911, p. 132; Zugmayer, Zool. Jahrb. Jena, Syst. 1909, p. 489.

Cyrtodactylus yarkandensis Anderson, Proc. Zool. Soc. 1872, p. 381, fig. (type loc. probably Ladak, see Blanford, 1878, l.c.s.; London).

Gymnodactylus walli Ingoldby, J. Bombay Nat. Hist. Soc. xxviii, 1922, p. 1051 (type loc. Chitral; London).

Head moderate; snout equal to, or a little longer than, the distance between the eye and the ear-opening, which is rounded and small, its greatest diameter being about one-quarter that of the eye; 9 to 11 upper and 8 or 9 lower labials. Head covered above with small, rounded, irregular scales, with or without larger rounded tubercles. Body and limbs above with small rounded scales intermixed with larger rounded, feebly keeled tubercles; an indistinct lateral fold, often absent. Belly with rounded imbricate scales, 30 to 35 across the middle. The hind-limb extends to the axilla;

subdigital lamellæ well developed, nearly as broad as the digit. Tail usually shorter than the head and body, depressed, swollen at the base, tapering to a point, covered with small flat scales, largest below, and series of enlarged tubercles in rows of 3 or 4 on each side above; in the adult it is often segmented as shown in Steindachner's figure. Male without femoral or preanal pores.

Grey above, with dark brown more or less distinct wavy cross-bars; greyish-white below.

Head and body 55; tail 50 mm.

The swelling of the tail is variable; it is more marked in some individuals that in others; it appears to be most marked in the rejuvenated tail.

Range. Kashmir and the North-West Frontier Province; common in Chitral and Ladak. Wall (1911) writes: "By no means uncommon in Chitral. I encountered it several times in the Fort at Drosh, among old packing-cases or in rubbish by day and in the open after nightfall. I came across others on the verandah floors at night. It is fairly agile."

31. Gymnodactylus lawderanus.

Gymnodactylus lawderanus Stoliczka, P. Asiat. Soc. Beng. 1871, p. 194; and J. Asiat. Soc. Beng. xli, 1872, p. 105, pl. 2, fig. 4 (type loc. Almora, Kumaon; Calcutta); Boulenger, Fauna Brit. Ind. 1890, p. 64; Loveridge, Proc. Zool. Soc. London, 1925, p. 1431; Annandale, Rec. Ind. Mus. ix, 1913, pp. 311, 319; Schmidt, Pub. Field Mus. Nat. Hist. xii, 1926, p. 168.

Alsophylax himalayensis Annandale, Rec. Ind. Mus. ix, 1913, p. 305, pl. 15 (type loc. Dharampur, Simla dist.; Calcutta).

Closely allied to *G. stoliczkai*, from which it differs in the following characters:—Enlarged dorsal tubercles fewer in number and not so clearly differentiated from the smaller



Fig. 18.—*Gymnodactylus lawderanus.*

scales, which are variable in size; scales on the top of the head smaller; subdigital lamellæ narrower; tail more cylindrical, less swollen at the base, not segmented. Male with an angular series of 4 or 5 preanal pores. Colour-pattern more broken up than in *stoliczkai*.

Range. The Western Himalayas; Simla district, Kulu Valley, Almora, Garhwal, Ambala.

Schmidt (1926) has correctly assigned *Alsophylax himalayensis* to this species. I have examined the type and can confirm his opinion.

32. Gymnodactylus deccanensis.

Gymnodactylus dekkanensis Günther, Rept. Brit. Ind. 1864, p. 115, pl. xii, fig. E (type loc. Deccan, Bombay Presidency; London).—*Gymnodactylus deccanensis*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 36, and Fauna Brit. Ind. 1890, p. 66; Annandale, Rec. Ind. Mus. ix, 1913, p. 321; Hora, Rec. Ind. Mus. xxviii, 1926, p. 188, text-fig.

Head rather large; snout longer than the distance between the eye and the ear-opening, the diameter of which is half that of the eye; 10 to 12 upper and 9 to 11 lower labials, which are separated from the small gular scales by series of larger scales. Head covered above with moderately small rounded scales which become larger and conical in shape upon the nape; back with larger, more or less quadrangular, juxtaposed scales arranged in fairly regular transverse series, intermixed with occasional much smaller ones; belly with rounded imbricate scales much smaller than the dorsal scales, about 33 across the middle; no lateral fold. The hind-limb reaches to the axilla; subdigital lamellæ small, the median series being not much larger than the adjacent tubercles. Tail feebly swollen at the base, tapering to a point, covered above with transverse series of small, squarish, juxtaposed scales and rows of enlarged tubercles, below with less regularly placed slightly larger scales.

Male without pores, but with a group of enlarged preanal and series of femoral scales, the outer of which may be conical in shape.

Reddish-brown above, with narrow, white, brown-edged, transverse bars upon the back and tail; a curved mark upon the nape extending to the eyes; whitish below.

Head and body 63; tail 53 mm.

A tail-less specimen in the British Museum collection is 80 mm. from snout to vent.

Range. The northern part of the Western Ghats (Matheran, Koyna Valley, Vihar Lake near Bombay).

33. Gymnodactylus albofasciatus. (Plate I, fig. A.)

Gymnodactylus albofasciatus Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 37, pl. iv, fig. 3 (type loc. S. Kanara; London), and Fauna Brit. Ind. 1890, p. 66; Annandale, Rec. Ind. Mus. ix, 1913, p. 322; Hora, Rec. Ind. Mus. xxviii, 1926, p. 188, text-fig.
Gymnodactylus deccanensis (not of Günth.) Beddome, Madras Month. J. Med. Sci. ii, 1870, p. 176.

Very closely allied to *dekkanensis*, from which it differs in the following particulars:—Dorsal pholidosis less uniform, being composed of irregular small scales intermixed with numerous larger, rounded, keeled or subtrihedral tubercles; ventral scales sometimes keeled; subdigital lamellæ broader.

Range. North and South Kanara districts, in the Western Ghats. Most of the specimens known are from Castle Rock in N. Kanara. According to Beddome it is found in the plains and in the hills up to 5,000 feet altitude. He mentions also that the white cross-bars are brilliant yellow in life.

34. Gymnodactylus jeyporensis.

Gymnodactylus jeyporensis Beddome, Proc. Zool. Soc. London, 1877, p. 685 (type loc. Patinghe Hill, Jeypore, Madras Pres.; London); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 36, pl. 4, fig. 2, and Fauna Brit. Ind. 1890, p. 65.

Head moderate; snout as long as the distance between the eye and the ear-opening, the diameter of which is about half that of the eye; 9 upper and 7 lower labials, the latter being separated from the small gular scales by two or three rows of enlarged scales. Head covered above with largish rounded scales, largest on the occiput; back with large, squarish, juxtaposed scales arranged in regular transverse series, much larger than the rounded imbricate scales of the belly, of which there are about 27 across the middle; no lateral fold; scales on the limbs much smaller than those on the back. The hind limb reaches to the axilla; toes short, subdigital lamellæ moderately developed, being about half the breadth of the digit. Tail shorter than the head and body, feebly swollen at the base, tapering to a point, covered above with squarish scales, below with rounded imbricate ones. Male without preanal or femoral pores or series of enlarged scales.

Light greyish above, with large, paired, reddish-brown, black-edged spots down the middle of the back and other smaller spots on the flanks and upon the tail; a curved mark upon the nape; top of head with brown spots; brownish-white below.

Head and body, 53; tail 40 mm.

Known only from the type-specimen, a male which was caught in a wood on the top of Patinghe Hill at 4,200 feet altitude.

Genus AGAMURA.

Agamura Blanford, Ann. Mag. Nat. Hist. (4) xiii, 1874, p. 455, and Zool. E. Persia, 1876, p. 355 (type *persica*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 50, and Fauna Brit. Ind. 1890, p. 71.

Limbs slender; digits slender, clawed, cylindrical at the base, with transverse plates beneath, the distal phalanges feebly compressed, forming an angle with the basal portion of the digits, the claw between two enlarged scales; back covered with small granules intermixed with larger keeled tubercles; tail cylindrical, slender, diminishing suddenly in size after the basal portion; not fragile. Pupil vertical. Males with or without preanal pores.

In defining the tail as not fragile I have followed Boulenger, but I am not satisfied that the statement is strictly correct, for I have examined many specimens in which the tail has been broken off. Certainly it is not fragile as it is in most of the Geckoes. Blanford (1876) states that he has not examined a single specimen of *Agamura* which showed signs of the tail having been reproduced.

Range. Baluchistan, Persia. Two species.

Key to the Species.

No postmental shields; tip of tail blunt; male with 0 to 2 preanal pores, no enlarged femoral scales ..... *persica*, p. 61.

Postmentals well developed; tip of tail pointed; male with 6 preanal pores and a series of greatly enlarged femoral scales ..... *femoralis*, p. 63.

35. Agamura persica.

Gymnodactylus persicus Duméril, Arch. Mus. Hist. Nat. Paris, viii, p. 481 (type loc. Persia; Paris).—*Agamura persica*, Blanford, Zool. E. Persia, 1876, p. 358, pl. xxiii, fig. 4, *a*, *b*; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 51, and ii, 1887, p. 481, and Trans. Linn. Soc., Zool. v, 3, 1889, p. 95, pl. ix, fig. 2; Alcock & Finn, J. Asiat. Soc. Beng. lxv, 1896, p. 554; Procter, J. Bombay Nat. Hist. Soc. xxix, 1923, p. 122; Hora, Rec. Ind. Mus. xxviii, 1926, p. 190, figs.

Agamura cruralis Blanford, Ann. Mag. Nat. Hist. (4) xiii, 1874, p. 455, and Zool. E. Persia, 1876, p. 353, pl. xxiii, fig. 3 (type loc. Bahu Kalat and Askan, Baluchistan); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 50, and Fauna Brit. Ind. 1890, p. 71, fig.; Alcock & Finn, J. Asiat. Soc. Beng. lxv, 1896, p. 554.

Head rather high, short, about one and a half times as long as broad; snout broad, rounded, as long as or a little longer than the distance between the eye and the ear-opening, the diameter of which is about one-third that of the eye; eye large, with well-developed upper eyelid. Rostral broader

than high, sometimes divided vertically. Nostril between the rostral, first labial, and three rather swollen nasals; 13 or 14 upper and 10 or 11 lower labials; mental elongate, not pointed behind, scarcely longer than the adjacent labials; no postmentals; head covered above with small rounded scales intermixed posteriorly with larger tubercles. Body feebly depressed; back with small juxtaposed scales intermixed with numerous larger, rounded, keeled tubercles; belly with small, rounded, subimbricate scales. Limbs long and slender, the hind-limb reaches to the eye, or sometimes only to the ear. Tail cylindrical, thick at the extreme base, becoming suddenly much smaller and of nearly the same thickness to the end; segmented, with small scales above, four or five to each segment in longitudinal series, with a median series of large plates below, two to each segment. Males usually with two preanal pores, which are sometimes absent.

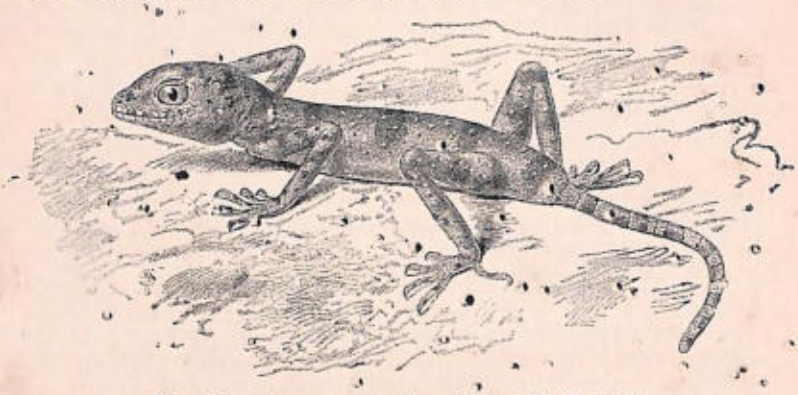


Fig. 19.—*Agamura persica*. (After Boulenger.)

Greyish or fawn-coloured above, with darker cross-bands upon the back and tail; sides and head both above and below speckled with grey or brown; limbs above with dark cross-bars; belly whitish.

Head and body 65; tail 65 mm.

Range. S. Waziristan (Wana); Baluchistan; Persia; occurring in the hills up to an altitude of 5,000 feet.

As pointed out by Procter, this species shows considerable variation in the proportions of the head, in dorsal pholidosis, and in the length of the limbs. I cannot agree with Hora that the leg is longer in the male than in the female.

Blanford (1876) writes:—"The first of these peculiar Geckoes which I met with I found in the middle of the day on the open, barren, stony plain which forms the flat top, 2,000 feet above the sea, of the promontory known as Rás

Malán. I at first took it for an Agamoid lizard, and it was only on carefully examining it subsequently that I saw it was a Gecko. I afterwards found several specimens in barren stony plains and on hill-sides, usually in the evening, and from the vertical pupil I should judge this species to be usually nocturnal. I met with it here and there up to an elevation of about 3,000 feet, but not higher; it was never common, and I found no specimens about houses. Its mode of progression is by no means fast, and somewhat resembles that of a chamæleon, although it is not so slow. It is usually easily captured, although on level ground it can run quickly for a short distance, but its motions have but little of the usual activity of Geckoes."

36. Agamura femoralis.

Agamura femoralis Smith, Rec. Ind. Mus. xxxv, 1933, p. 17, text-fig. 7 (type loc. Kharan, Baluchistan; London).

Head somewhat depressed, about twice as long as broad; snout longer than the distance between the eye and the ear-opening, the diameter of which is less than half that of the eye; eye moderate, with well-developed upper eyelid. Rostral pentagonal, as broad as high; nostril between the first labial and three rather swollen nasals; 12 upper and 11 lower labials; mental considerably longer than the adjacent labials, pointed behind; a pair of well-developed postmentals followed by a smaller pair outside; gular region with small flat granules.

Head covered above with small rounded scales, largest on the snout, intermixed posteriorly with larger tubercles. Body depressed, back with small, rather irregular scales, intermixed with numerous larger, rounded, keeled tubercles; belly with flat, rounded, feebly imbricate scales. Limbs shorter than in *persica*, the hind-limb reaching only to the neck; a series of much enlarged scales along the under surface of each thigh. Tail cylindrical, becoming suddenly smaller after the basal part, but not so markedly as in *persica*, tapering to a point; segmented, with small scales above, 4 or 5 in longitudinal series to each segment, below with larger irregular scales, usually three to each segment. Male with 6 preanal pores in a transverse series and a series of greatly enlarged femoral scales.

Greyish above, with indistinct darker cross-bands upon the back and tail; whitish below.

Head and body 50; tail 55 mm.

The type and only known specimen (Brit. Mus. 1912.3.26.12) was collected by Capt. C. Daukes in 1912.

This species connects *Agamura* with *Gymnodactylus*.

Genus PRISTURUS.

Pristurus Rüppell, Neue Wirbelth. Abyss. Rept. 1835, p. 16 (type *flavipunctatus*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 52, and Fauna Brit. Ind. 1890, p. 72.

Digits slender, clawed, cylindrical at the base, with transverse plates beneath, the distal phalanges feebly compressed, forming an angle with the basal portion of the digits; the claw between two enlarged scales. Body not depressed, back covered with uniform granular scales. Tail compressed, keeled. Pupil circular; eyelid distinct all round the eye. No preanal or femoral pores.

Range. North-east Africa to North-west India.

A genus of diurnal Geckoes. Seven or eight species are known, one of which inhabits the Indian Region.

37. Pristurus rupestris.

Pristurus rupestris, Blanford, Ann. Mag. Nat. Hist. (4) xiii, 1874, p. 451 (type loc. Muscat, Arabia, and I. of Kharág, Persian Gulf; London), and Zool. E. Persia, 1876, p. 350, pl. xxiii, figs. 1, 1 *a*; Murray, Zool. Sind, 1884, p. 365, pl. —, fig. 1; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 53, and Fauna Brit. Ind. 1890, p. 72.

Head rather high; snout subacuminate, distinctly longer than the distance between the eye and the ear-opening, about twice as long as the eye; ear-opening one-third the diameter of the eye; rostral much broader than high; nostril

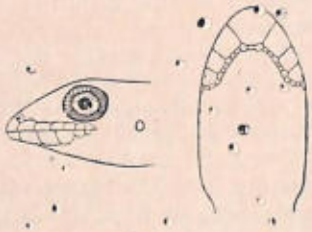


Fig. 20.—*Pristurus rupestris.*

between the rostral and two or three nasals; 6 to 8 upper and 5 or 6 lower labials, the first three of the latter being much larger than the others; mental very large, broader than the rostral, not pointed behind; no postmentals.

Snout covered with moderately large polygonal scales; rest of head, back, and limbs above, with small granular scales; scales on the belly smooth, rounded, subimbricate; anterior aspect of thigh and lower aspect of tibia covered with large imbricate scales; the hind limb reaches to the ear or not quite so far. Tail strongly compressed in the adult male, with a

crest or denticulated keel both above and below, the upper one the stronger, not extending on to the back; in the female the tail is less compressed and the crests are less distinct.

Greyish-olive or brown above, speckled or marbled with darker; a pale vertebral stripe (reddish in life) usually distinct, and a series of pale (reddish) spots down each side of the body; a dark streak through the eye; throat speckled with brown; belly whitish.

Head and body 32; tail 53 mm.

Range. North-west India (Karachi); Persia and islands of the Persian Gulf; Arabia; Socotra. Very closely allied to, possibly only an eastern form of, *P. flavipunctatus*.

Blanford obtained his specimens on limestone rocks and in houses. He writes (1876):—"These Geckoes appeared to be quite diurnal; I found them out on the surface of the rocks at 10 or 11 o'clock in the morning, and they only took refuge in the crevices when approached. Owing to the numerous cracks and fissures in the limestone it was difficult to capture specimens, for these little Geckoes were very active."

Genus **CNEMASPIS** *.

Goniodactylus (not of Kuhl, 1826), Gray, Zool. Misc. 1842, p. 58 (type *boiei*).

Cnemaspis Strauch, Mem. Acad. St. Pétersb. xxxv, 1887, p. 41 (type *boulengeri*); Smith, Rec. Ind. Mus. xxxv, 1933, p. 10.

Paragonatodes Noble, Amer. Mus. Nov. no. 4, 1921, p. 14 (type *Gonatodes dickersoni*).

Gonatodes Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 56, and Fauna Brit. Ind. 1890, p. 731 (in part).

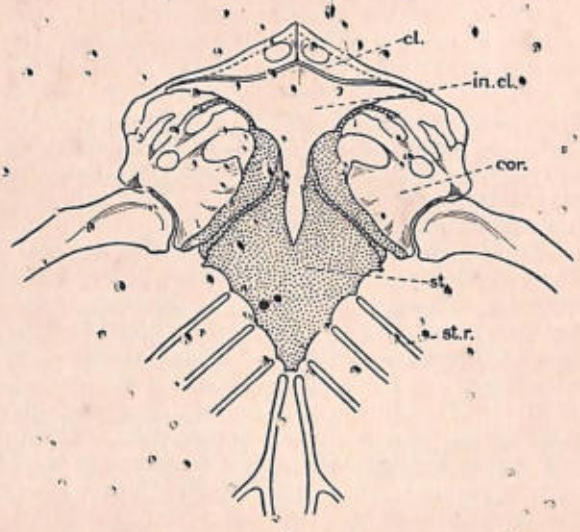
Digits slender, clawed, not dilated (except in *littoralis*), the two distal phalanges compressed, forming an angle with the basal portion of the digits, the lower surface of which has a row of plates. Body more or less depressed, granular or tubercular above. Tail more or less cylindrical. Pupil round; eyelid distinct all round the eye. Males with or without preanal or femoral pores.

Range. India; Indo-China; the East Indian Archipelago; Africa.

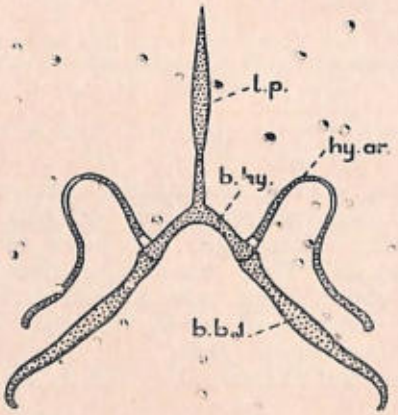
As shown by Noble (1921) and Smith (1933), the American *Gonatodes* are generically distinct from those that inhabit the Old World. For these latter Strauch's *Cnemaspis* is available.

Some twenty species are known, thirteen of which are included in the present work. Of these, eleven are restricted to the hilly regions of Southern India and Ceylon, the remaining two are Indo-Chinese.

* κνημη—tibia, and ἀσπις—shield.



A.



B.

Fig. 21.—A. Sternal apparatus of *Cnemaspis boulengeri*.

cl. Clavicle; *cor.* Coracoid; *in.cl.* Interclavicle; *st.* Sternum; *st.r.* Sternal ribs.

B. Hyoid of *Cnemaspis mysoriensis*.

*b.b.*1. Basi-branchial 1; *b.hy.* Body of hyoid; *hy.ar.* Hyoid arch; *l.p.* Lingual process.

(After Smith. By kind permission of the Indian Museum.)

It is generally said that the species of this genus are of diurnal habits, an assumption based, no doubt, upon the shape of the pupil. With the exception of *C. littoralis* I do not know of any observations to show that this statement is correct. The Malayan and Indo-Chinese species that I am acquainted with hide by day under stones and logs, issuing forth at dusk in search of food. *C. littoralis*, and possibly the species related to it, have slight scansorial powers; the others are to be found upon the ground.

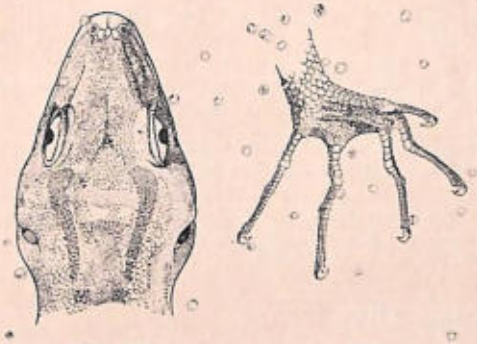


Fig. 22.—*Cnemaspis sisparensis*. Head and under surface of foot.

Gymnodactylus malabaricus Jerdon, J. Asiat. Soc. Beng. 1853, p. 463, type loc. Malabar forest, is not sufficiently described to be recognizable, and the type is lost. The shape of the pupil is not recorded, but the size and coloration suggest a *Cnemaspis*.

Key to the Species.

I. Flanks without spine-like projecting tubercles.	
a. Males with femoral pores, without preanal pores.	
Back with small, uniform, keeled granules; 4 or 5 pores on each side	*indica*, p. 68.
Back with large, rounded, pointed or keeled tubercles, uniform or mixed with smaller scales; 4 to 6 pores on each side.....	*wynadensis*, p. 69.
Back as in *wynadensis*; 7 or 8 pores on each side.	*sisparensis*, p. 69.
b. Males with preanal pores (sometimes absent in *siamensis*), without femoral pores.	
Back with small granules, intermixed with much larger pointed or keeled tubercles; ventral scales smooth; 6 to 9 pores	*ornata*, p. 70.
Back with small granules, intermixed with not much larger keeled tubercles; ventral scales keeled; 6 to 9 pores	*beddomei*, p. 71.

Back with small granules, intermixed with much larger keeled tubercles; ventral scales keeled; 0 to 8 pores ..... *siamensis*, p. 71.

c. Males with preanal and femoral pores.

Back with small keeled granules and larger tubercles which are conical upon the flanks; 2 or 3 preanal and, on each side, 3 or 4 femoral pores ..... *mysoriensis*, p. 72.

d. Males without preanal or femoral pores.

An enlarged series of subtibial scales ..... *boulengeri*, p. 76.

II. Flanks with small spine-like projecting tubercles.

a. Digits not or but moderately dilated at the base.

Scales under the neck keeled; 2 to 4 preanal and, on each side, 3 to 6 femoral pores .... *kandiana*, p. 73.

Scales under the neck smooth; pores as in *kandiana* ..... *gracilis*, p. 74.

No enlarged tubercles on the back; scales under the neck smooth; 5 to 15 femoral pores on each side ..... *jerdoni*, p. 74.

Similar to *jerdoni*, but male without pores..... *boiei*, p. 75.

b. Digits strongly dilated at the base; 14 to 18 femoral pores on each side ..... *littoralis*, p. 76.

38. Cnemaspis indica.

Gonatodactylus indicus Gray, Ann. Mag. Nat. Hist. xviii, 1846, p. 429 (type loc. Madras Pres.; London).—*Gymnodactylus indicus*, Günther, Rept. Brit. Ind. 1864, p. 115; Jerdon, J. Asiat. Soc, Beng. xxii, 1853, p. 468.—*Gonatodes indicus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 64, pl. vi, fig. 1, and Fauna Brit. Ind. 1890, p. 74.

Snout obtusely pointed, a little longer than the distance between the eye and the ear-opening; 7 or 8 upper and 5 or 6 lower labials; mental large, broader than the rostral, subtriangular, with truncate posterior border; two or three pairs of small postmentals, the first pair separated from one another by a median scale. Head covered above with small, granular, keeled scales, largest on the snout; back with small, uniform, keeled scales; ventral scales much larger, imbricate, smooth. Digits elongate, the lamellæ beneath the basal portion being well developed; the hind-limb reaches to the axilla or not quite so far. Tail cylindrical, covered above with small keeled scales, uniform or with regular series of larger tubercles; below with much larger, smooth, imbricate scales, those of the median series being bigger than the others.

Males with 4 or 5 femoral pores on each side.

Brown above, marbled or spotted with lighter and darker, the markings often transversely arranged; sometimes a light vertebral line, brownish-white beneath, the throat frequently dark brown. Jerdon describes the colours in life as "mottled brown or greenish-brown, with a row of orange-yellowish

spots along the back, edged darker, and a line of similarly coloured spots on each side."

From snout to vent 38 ; tail 41 mm.

Range. The Nilgiri Hills, Travancore. Jerdon says that he found it in Coorg.

39. Cnemaspis wynadensis.

Gymnodactylus wynadensis Beddome, Madras Month. J. Med. Sci. i, 1870, p. 32 (type loc. Wynaad ; London).—*Goniodactylus wynadensis*, Günther, Proc. Zool. Soc. 1875, p. 226.—*Gonatodes wynadensis*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 65, pl. vi, figs. 2, 2 *a*, and Fauna Brit. Ind. 1890, p. 75 ; Hora, Rec. Ind. Mus. xxviii, 1926, p. 191.

Snout obtusely pointed, as long as or longer than the distance between the eye and the ear-opening ; 6 to 8 upper and as many lower labials ; mental large, broader than the rostral, subtriangular ; postmentals small, the first pair separated from one another by one or two scales. Head covered above with small, granular, keeled scales, largest upon the snout ; back with much larger, rounded, pointed or keeled tubercles, uniform or mixed with smaller ones ; ventral scales as large as or larger than the largest dorsals, smooth. Digits elongate, the lamellæ beneath the basal portion usually broken up except for two or three larger plates at the articulation ; the hind-limb reaches to the axilla or not so far. Tail cylindrical, suddenly constricted near the base of the tail, covered above with small, more or less keeled scales, below with much larger smooth ones, those of the median series being the largest.

Males with 4 to 6 femoral pores on each side.

Brown above, marbled with lighter and darker ; sometimes a broad, light, vertebral stripe, particularly in young individuals ; below pale brownish, the throat darker and speckled with white ; tail variegated with lighter and darker markings.

From snout to vent 40 ; tail 44 mm.

Range. Wynaad and hill-ranges farther south. In moist forests, up to 3,200 feet. "Found under stones in the day-time" (*Beddome*).

40. Cnemaspis sisparensis.

Gymnodactylus maculatus (not of Stoliczka, 1867) Beddome, Madras Month. J. Med. Sci. ii, 1870, p. 173 (type loc. Sholakal, at the foot of the Sispara Ghat, Nilgiri Hills ; London).

Gymnodactylus sisparensis Theobald, Cat. Rept. Brit. Ind. 1876, p. 86.—*Gonatodes sisparensis*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 66, and Fauna Brit. Ind. 1890, p. 75.

Gonatodes bireticulatus Annandale, Rec. Ind. Mus. xi, 1915, p. 344, text-figs (type loc. Kavalai, 1,300–3,000 feet, Cochin State ; Calcutta).

Very closely allied to *wynadensis*, from which it differs in the slightly longer digits, in the male having 7 or 8 femoral pores on each side, in coloration, and in size.

The type is brown above, many of the enlarged tubercles being white, so that it presents a somewhat grizzled appearance, and with a series of dark brown oblong spots arranged in three longitudinal lines down the back; a dark streak through the eye, bordered above and below with white; throat marbled with brown and white; tail above with alternating bars of lighter and darker.

Annandale's *C. bireticulatus* agrees in all particulars with the type of *sisparensis*. In a third specimen without data of locality (Brit. Mus. 84.5.8.1) the grizzled appearance is strongly marked and the oblong spots are less conspicuous. The variation in the dorsal pholidosis in these three specimens is the same as in *wynadensis*.

From snout to vent 62, tail (incomplete) 50 mm.

Range. Known from the three specimens mentioned. The one of unknown origin was collected by Col. Beddome. Annandale states that his *bireticulatus* was taken in company with *wynadensis*.

41. Cnemaspis ornata.

Gymnodactylus ornatus Beddome, Madras Month. J. Med. Sci. i, 1870, p. 32 (type loc. Tinnevelly; London).—*Gonatodes ornatus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 66, pl. vi, fig. 3, and Fauna Brit. Ind. 1890, p. 75.

Snout obtusely pointed, a little longer than the distance between the eye and the ear-opening; 6 to 8 upper and as many lower labials; mental large, broader than the rostral, subtriangular, with truncate posterior border; two or three pairs of postmentals, the first pair separated from one another by a median scale. Head covered above with small, granular, conical scales, largest on the snout; back with small, more or less conical scales, intermixed with much larger conical or strongly keeled pointed tubercles, in about 16 fairly regular longitudinal rows; ventral scales smooth, rounded, not as large as the largest dorsals. The hind-limb reaches to the shoulder or the neck; digits rather elongate, the lamellæ beneath the basal phalanges being usually small or broken up, except for one very large plate under the articulation. Tail cylindrical, covered above with small, subimbricate scales and series of larger pointed tubercles, below with larger smooth scales, the median series being not much larger than the others.

Male with 5 to 9 preanal pores forming an obtuse angle.

Brown above, with blackish and whitish markings; head with light and dark longitudinal streaks converging on the

nape, or merely mottled; a light transverse bar on the shoulders edged with black almost constant; light, dark-edged ocelli down the vertebral line or on the shoulders often present; tail with light and dark annuli; a dark streak on the throat parallel with the mandible; belly pale brownish.

From snout to vent 52; tail 65 mm.

Range. Hills of Southern India (Tinnevelly, Anaimalai Hills, Malabar, Travancore); up to 4,700 feet. Beddome found it under rocks, in dry jungles.

42. Cnemaspis beddomei.

Gymnodactylus marmoratus (not of Dum. & Bibr.), Beddome, Madras Month. J. Med. Sci. i, 1870, p. 31 (type loc. Travancore; London).—*Gonatodes marmoratus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 67, pl. vi, fig. 4, and Fauna Brit. Ind. 1890, p. 76.
Gymnodactylus beddomei Theobald, Cat. Rept. Brit. Ind. 1876, p. 88.

Differs from *C. ornata* in the following characters:—Head usually shorter; enlarged dorsal tubercles smaller, feebly keeled, not regularly arranged nor so clearly differentiated from the small scales; ventral scales keeled; postmentals small, often only one pair; tail thicker at the base, the enlarged tubercles being less conspicuous.

Brown above, clouded or spotted with lighter and darker markings; lower lip edged with dark brown and another streak, parallel with it, on the throat; tail with light and dark annuli; belly pale brownish.

From snout to vent 50; tail 52 mm.

Range. Hills of Southern India (Tinnevelly, Travancore, Wynaad). Beddome found it "in the South Tinnevelly, and in the Travancore Hills, under stones, at between 3,000 and 5,000 feet" altitude. The British Museum has a specimen collected by Ferguson at Devicolam, Travancore, at 7,000 feet.

43. Cnemaspis siamensis.

Gonatodes siamensis Smith, J. Sarawak Mus. iii, 1925, p. 21, and Bull. Raffles Mus. no. 3, 1930, p. 16 (type loc. Mapri, Patiyu, Peninsular Siam; London).

Snout broad, rounded at the tip, longer than the distance between the eye and the ear-opening; 9 to 11 upper and 8 to 10 lower labials; mental large, broader than the rostral, subtriangular; a single pair of postmentals, separated from one another by a median scale. Head covered above with small, granular, keeled scales, largest on the snout; back with small granular scales, intermixed with much larger, conical, uni- or multikeeled tubercles in 12 or 14 fairly regular longitudinal rows; ventral scales considerably smaller than the dorsal tubercles, uni- or multikeeled. Digits

elongate, with well-developed plates beneath the basal phalanges; the hind-limb reaches to the axilla or beyond; tail cylindrical, covered above with small granular scales and whorls of much larger, pointed, multi-keeled tubercles; below with imbricate, pointed, multi-keeled scales, the median series being larger than the others. Males with an angular series of from 2 to 8 preanal pores, which are sometimes absent altogether.

Brownish-green above, mottled and speckled with lighter and darker shades.

From snout to vent 42; tail 53 mm.

Range. Southern Tenasserim and Peninsular Siam (Tasan, Mamok, and Pak Chan, near the Isthmus of Kra; the Nakon Sritamarat Mountains); South-eastern Siam (Chantabun).

Found in hilly country at low altitudes.

Closely allied to the Malayan *C. kendalli*, in which also preanal pores (4 to 6) are occasionally present.

44. Cnemaspis mysoriensis.

Gymnodactylus mysoriensis Jerdon, J. Asiat. Soc. Beng. xxii, 1853, p. 469 (type loc. Bangalore; type lost).—*Gonatodes mysoriensis*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 68, and Fauna Brit. Ind. 1890, p. 77.

Snout obtusely pointed, a little longer than the distance between the eye and the ear-opening; 6 or 7 upper and as many lower labials; mental large, broader than the rostral, subtriangular, with truncate posterior border; two or three pairs of small postmentals, the first pair separated from one another by a median scale. Head covered above with small, granular, keeled scales, largest on the snout; back with small, granular, keeled scales intermixed with a few larger ones, which, upon the flanks, may be conical in shape; ventral scales imbricate, smooth, larger than the largest dorsal scales. Digits elongate, with well-developed plates beneath the basal phalanges; the hind-limb reaches to the axilla. Tail cylindrical, covered above with small keeled scales and whorls of larger, pointed tubercles, below with much larger, flat, imbricate scales, the median series of which are largest.

Male with 2 or 3 preanal and, on each side, 3 or 4 femoral pores.

Brown above, frequently with a light vertebral band and regular dark brown spots on the back; digits with conspicuous dark bars; below brownish-white, the throat often spotted with brown. In life "chin, throat, and anterior portion of palpebræ bright yellow" (*Jerdon*).

From snout to vent 26; tail 38 mm.

Range. Hills of Southern India as far north as lat. 13°; up to 3,000 feet.

45. Cnemaspis kandiana.

Gymnodactylus kandianus Kelaart, Prod. Fauna Zeyl. 1852, p. 186 (type loc. hills round Kandy, Ceylon; London).—*Gonatodes kandianus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 68, and Fauna Brit. Ind. 1890, p. 77; De Rooij, Rept. Indo-Austral. Archipel. i, 1915, p. 23, figs.; Hora, Rec. Ind. Mus. xxviii, 1926, p. 192, fig.; Deraniyagala, Ceylon J. Sci. B, xvi, 1932, p. 296, fig.

Gonatodes kandianus tropidogaster Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 70, and Fauna Brit. Ind. 1890, p. 78; Deraniyagala, l. c. s. p. 298.

Gymnodactylus wicksii Stoliczka, J. Asiat. Soc. Beng. xlii, (2) 1873, p. 165 (type loc. Preparis I., Andaman Is.; Calcutta and London).

? *Gymnodactylus himei* Theobald, Cat. Rept. Brit. Ind. 1876, p. 89, (type loc. Kandy, Ceylon; type lost.)

Gonatodes andersoni Annandale, J. Asiat. Soc. Beng. lxxiii, 1904, (2) p. 21, and J. & P. Asiat. Soc. Beng. (n. s.), i, 1905, p. 83, pl. ii, fig. 3 (type loc. Narcondam I., Andamans; Calcutta).

Snout obtusely pointed, longer than the distance between the eye and the ear-opening; 7 or 8 upper and as many lower labials; mental large, broader than the rostral, subtriangular, truncate posteriorly; postmentals small, the first pair separated from one another behind the mental by a median scale. Head covered above with small, granular, keeled scales, largest on the snout; back with small, granular, more or less keeled scales, intermixed with larger rounded tubercles; flanks with small, widely separated, spine-like tubercles. Ventral scales imbricate, those under the neck keeled, those on belly smooth (or keeled, var. *tropidogaster*). Digits elongate, the plates beneath the basal phalanges being usually large and few (3 to 5) in number; the hind-limb reaches to the axilla or just beyond. Tail cylindrical, covered above with small keeled scales and whorls of larger tubercles, below with large, imbricate, feebly keeled scales, the median series of which may be bigger than the others.

Males with 2 to 4 preanal and, on each side, 3 to 5 femoral pores.

Brown above, variegated with lighter and darker, the variegations generally arranged transversely; sometimes a light vertebral band, which may be broken into spots; spine-like tubercles on the flanks white; below pale brownish, the throat often darker.

From snout to vent 40; tail 44 mm.

Range. Ceylon and hills of Southern India as far north as lat. 12°; Jog, North Kanara dist., where Dr. Rao collected a single specimen in 1928; the Andaman Is.; islands west of Sumatra.

Common in the hills in the neighbourhood of Kandy, frequenting houses as well as the forest. It has been found

also in the plains; perhaps introduced by man's agency into the Andaman Islands and the Malay Archipelago.

Deraniyagala has placed *tropidogaster* and *gracilis* as subspecies of *kandianus*. He states that *tropidogaster* is the commonest form of the plains and rarely found in mountain localities, which yield the typical form and *gracilis*. If this is so, then *tropidogaster* can be recognized as a lowland form of *kandianus*, and given a trinomial should one care to do so. But if *gracilis* and the typical form occur in the same mountain areas, then *gracilis* cannot be regarded as a geographical race of *kandianus*.

46. Cnemaspis gracilis.

Gymnodactylus gracilis Beddome, Madras Month. J. Med. Sci. i, 1870, p. 32 (type loc. Palghat Hills, Madras Presidency; London).—*Gonatodes gracilis*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 70, pl. vi, fig. 5, and Fauna Brit. Ind. 1890, p. 78; Hora, Rec. Ind. Mus. xxviii, 1926, p. 192, fig.; Roux, Rev. Suisse Zool. xxxv, 1928, p. 449; *Gonatodes kandianus* var. *gracilis*, Deraniyagala, Ceylon J. Sci., B, xvi, 1932, p. 297.

Differs from *C. kandianus* in the following points:—Gular scales larger, flat, smooth, as also are the ventral scales; the mental shield is usually pointed posteriorly and the first pair of postmenta's are usually in contact with one another behind it; subdigital lamellæ smaller.

Grey-brown above, with lighter and darker spots; nape often with two or three jet-black vertebral spots and usually a series of light vertebral spots down the back; tail with conspicuous dark bands above.

Doubtfully distinct from *kandianus*; perhaps only a varietal form, not correlated with geographical distribution.

Range. Hills of Ceylon and South-western India as far north as lat. 12°. Found in forests.

47. Cnemaspis jerdoni.

Gymnodactylus jerdoni Theobald, Cat. Rept. Asiat. Soc. Mus. 1868, p. 31 (type loc. unknown; Calcutta).—*Gonatodes jerdoni*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 71, and Fauna Brit. Ind. 1890, p. 78, Boettger, Ber. Ofl. Ver. Nat. 1892, p. 67; Hora, Rec. Ind. Mus. xxviii, 1926, p. 192; Roux, Rev. Suisse Zool. xxxv. 1928, p. 450; Deraniyagala, Ceylon J. Sci., B, xvi, 1932, p. 298 fig.

Gymnodactylus scalpensis Ferguson, Rept. Fauna Ceylon, 1877, p. 13 (type loc. Ceylon; type lost.)

Snout obtusely pointed, longer than the distance between the eye and the ear-opening; 8 to 10 upper and 7 or 8 lower

labials; mental large, broader than the rostral, subtriangular; postmentals small, the first pair in contact with one another or separated by a median scale. Head covered above with small granular scales, largest on the snout; back with small uniform scales, intermixed on the flanks with a few spine-like tubercles; ventral scales rather large, imbricate, smooth. Digits moderately elongate, the plates beneath the basal phalanges being large and few (3 to 5) in number; the hind-limb reaches to the axilla or just beyond. Tail cylindrical, covered above with small imbricate scales and regular series of slightly larger pointed tubercles; below with much larger, smooth, imbricate scales, the median series of which are larger than the others.

Male with from 5 to 15 femoral pores on each side.

Greyish-brown above, clouded with darker; the small, lateral spines white; sometimes a black spot on the nape; dirty white beneath.

From snout to vent 40; tail 44 mm.

Range. Ceylon, Southern India (Nilgiri, Anaimalai, Palni, and Sivagiri Hills; Lamparis Peak, 5,000 feet).

The type-specimens are now in fragments and quite unrecognizable.

48. Cnemaspis boiei.

Goniodactylus boiei Gray, Zool. Misc. 1842, p. 58 (type loc. India; London).—*Gonatodes boiei*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 72.

Closely allied to *C. jerdoni*, but differing in the following particulars:—A single pair of postmentals, which are smaller and always in contact with one another; no regular series of enlarged tubercles on the tail; males without preanal or femoral pores.

From snout to vent 34; tail 45 mm.

The type-specimens, two males, one female, and one half-grown, are now much discoloured, being of a blackish-grey hue, but their scale-characters can still be made out, while the absence of both preanal and femoral pores in the males prevents their being confused with any other Indian species. Boulenger (1885) remarked of them: "In too bad state to be described; doubtless a *Gonatodes* distinct from the other Indian species, and apparently allied to *G. jerdoni*?" In view of the large variation in the number of femoral pores that is now known to occur in *jerdoni*, it is possible that they are aberrant forms of that species. For the present I leave them distinct. They were collected by General Hardwicke, but no precise data of their origin is available.

49. Cnemaspis littoralis.

Gymnodactylus littoralis Jerdon, J. Asiat. Soc. Beng. xxii, 1853, p. 469, and P. Asiat. Soc. Beng. 1870, p. 75 (type loc. sea coast of Malabar; type lost).—*Gonatodes littoralis*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 71, pl. vi, fig. 6, and Fauna Brit. Ind. 1890, p. 79.

Gymnodactylus planipes Beddome, Madras Month. J. Med. Sci. iv, 1871, p. 403 (type loc. near Nellakota, below the Nilgiris on the western side; London).

Habit slender; snout obtusely pointed, distinctly longer than the distance between the eye and the ear-opening; 8 to 10 upper and 7 to 8 lower labials; mental large, subtriangular; two or three pairs of postmentals, the first pair in contact with one another or separated by a median shield. Head covered above with small granular scales, largest on the snout; back with small, uniform, granular scales, intermixed on the flanks with a few small, subconical tubercles; ventral scales smooth. Digits elongate, the subdigital lamellæ on the basal phalanges being very large, subquadrangular, 3 to 5 in number, the distal plate being much the largest and projecting so that the compressed distal phalange rises from the middle of it; the hind-limb reaches to the axilla. Tail cylindrical, covered above with small scales, uniform or with series of somewhat larger tubercles; below with a median series of transversely enlarged plates. Male with 14 to 18 femoral pores on each side.

Greyish-brown above, generally with a vertebral series of light dark-edged spots and a black spot on the nape; generally a dark streak along the side of the head and a black one bordering the lower lip and extending as far as the ear; below dirty white.

From snout to vent 30; tail 35 mm.

Range. Nilambur and Nellakota, on the west side of the Nilgiris. Jerdon's type, from Malabar, was found in a warehouse, and was probably an imported individual. With the exception of this specimen all the other known examples were obtained by Beddome, who remarks of them (1871): "I have only met with this curious little species in the dry teak forest near Nellakota, where it is found on trees in the daytime. Its peculiar feet almost inclined me to constitute a new genus for it."

Similarly developed subdigital plates, however, but not so large, are to be found in *jerdoni*, *boiei*, and *kandianus*.

50. Cnemaspis boulengeri.

Cnemaspis boulengeri Strauch, Mem. Acad. St. Pétersb. xxxv, (7) 1887 p. 42, pl. —, figs. 7, 8, 9 (type loc. Pulo Condore, South China Sea; Leningrad).

Gonatodes glaucus Smith, J. Nat. Hist. Soc. Siam, iv. 1920, p. 95, pl. —, fig. 3 (type loc. Pulo Condor; London).

Snout broad, spatulate, rounded at the tip, considerably longer than the distance between the eye and the ear-opening; 8 to 10 upper and 7 or 8 lower labials; mental large, broader than the rostral, subtriangular; usually two pairs of postmental shields, the first pair much the largest, and separated from one another by a small median shield. Head covered above with small granules, largest on the snout; dorsum with small granular scales, intermixed with larger, rounded, keeled tubercles arranged in 8 or 10 fairly regular, longitudinal rows upon the back and in two oblique series on the nape; ventral scales smooth. Digits long, with well-developed plates beneath the basal phalanges; hinder aspect of tibia with 6 to 8 transversely enlarged shields; limbs long, the hind one reaching to the neck. Tail cylindrical, suddenly constricted near the base of the tail, covered above with small scales and regular series of one or two pairs of enlarged tubercles; below with a series of much enlarged transverse plates.

Males without pores, but both sexes have a long series of enlarged femoral scales.

Grey above, with large black spots on the neck and shoulders and sometimes a few, less distinct ones, on the back; the enlarged series of tubercles on the neck and body whitish; below greyish-white.

From snout to vent 64; tail 72 mm.

Range. Pulo Condor, off the coast of Cochin-China, where it is common.

I have no hesitation in referring my *Gonatodes glaucus* to Strauch's *Cnemaspis boulengeri*, the description of which I was not aware of when I wrote my own. At the same time I do not concur with Strauch's view that the enlarged tibial scales are sufficient to warrant generic separation.

Genus **CALODACTYLODES.**

Calodactylus (not of Blanchard, 1850) Beddome, Madras Month. J. Med. Sci. i, 1870, p. 30 (type *aureus*).—Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 108, and Fauna Brit. Ind. 1890, p. 80.

Calodactylodes Strand. Arch. Nat. Berlin, xcii, 1926 (1928), A. 8, p. 54.

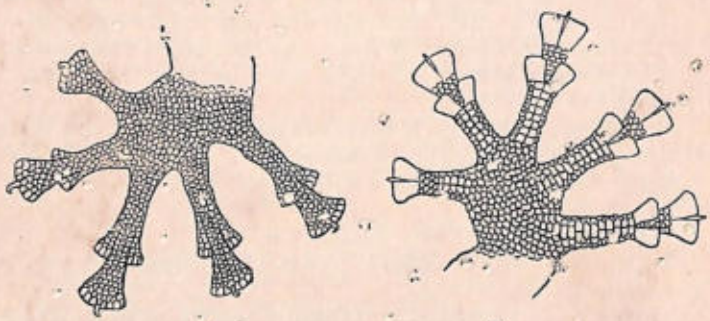
Digits slender at the base, with squarish scales beneath, with two large trapezoidal expansions, one at the base, the other at the free extremity, of the terminal phalanx, the lower surface of each expansion covered by two large plates separated by a longitudinal groove; all the digits clawed, the claw retractile between the distal plates; inner digit with a distal expansion only. Body covered above with

small granular scales, intermixed with larger tubercles; abdominal scales squarish, juxtaposed. Pupil vertical. Males without preanal or femoral pores. A single species.

51. Calodactylodes aureus.

Calodactylus aureus Beddome, Madras Month. J. Med. Sci. i, 1870, p. 31, pl. ii (type loc. Tiruppatur Hills, Eastern Ghats; London); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 108, pl. iii, fig. 3, and Fauna Brit. Ind. 1890, p. 80.
Calodactylodes aureus Strand, Arch. Nat. Berlin, xcii, 1926 (1928), A. 8, p. 54.

Head large; snout broad, rounded, distinctly longer than the distance between the eye and the ear-opening, which is an oblique slit, its length about half that of the eye; a prominent rounded canthal ridge; 12 or 13 upper and as many lower labials; mental usually smaller than the adjacent



A. B.

Fig. 23.—Foot of *Calodactylodes aureus*. (After Boulenger.)
A. Upper surface. B. Lower surface.

labials; no proper postmental shields, but small polygonal scales which pass gradually into the small granular scales upon the gular region; rostral twice as broad as high, touching the nostril; a pair of internasals. Head covered above with small granular scales, largest upon the canthal ridges; back with small granular scales intermixed with numerous larger rounded tubercles; ventral scales large, flat, smooth, squarish, juxtaposed, arranged like the bricks of a wall. Limbs rather slender, the hind one reaching to the axilla; the width of the digital expansion equals about half the diameter of the eye. Tail depressed, oval in section, tapering to a point, more or less segmented, covered above with small squarish scales; below with large, squarish, juxtaposed scales.

Brownish-white above (golden in life), dotted or vermiculate with brown; whitish below.

Head and body 85 ; tail 100 mm.

The types, two in number, were collected in the Tiruppatur (Tirupati) Hills ; I have examined eight other specimens, all collected by Beddome and labelled "N. Arcot." Beddome's types were found among rocks in dark shady ravines ; he describes them as being of a brilliant golden colour in life, flecked with brown over the whole of the upper surface.

Genus **PTYODACTYLUS.**

Ptyodactylus Gray, Ann. Phil. (2) x, 1825, p. 138 (type *lobatus*) ; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 109, and Fauna Brit. Ind. 1890, p. 81.

Digits slender at the base, with transverse plates beneath, the extremity with a large fan-shaped expansion, the lower surface of which is covered with two diverging series of lamellæ ; all the digits clawed, the claw retractile through a notch at the distal end of the expansion. Body covered above with small scales, uniform or mixed with larger tubercles ; below with subimbricate scales. Pupil vertical. No preanal or femoral pores.

Range. Northern Africa ; S.W. Asia ; Sind.

Two species. The one included in this work inhabits Sind, the other, *P. hasselquisti=lobatus*, is widely distributed over the arid districts of Persia, Arabia, and N. Africa.

52. **Ptyodactylus homolepis.**

Ptyodactylus homolepis Blanford, J. Asiat. Soc. Beng. xlv, 1876, p. 19, pl. ii (type loc. Shikarpur dist., Sind ; London and Calcutta) ; Murray, Zool. Sind, 1884, p. 358 ; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 111, and Fauna Brit. Ind. 1890, p. 81.

Head large, very distinct from the neck ; snout rather broad and rounded, longer than the distance between the eye and the ear-opening, which is an oblique slit, the length of which is more than half that of the eye ; an indistinct canthal ridge ; 13 to 15 upper and as many lower labials ; mental small, about as large as the adjacent labials ; a row of small postmental shields ; rostral broader than high, not reaching the nostril ; nostril surrounded by three protuberant scales.

Head covered above with small granular scales, largest on the snout ; back with small, uniform, granular scales ; ventral scales larger, flat, rounded, subimbricate. Limbs rather slender, the hinder one reaching to the shoulder ; the width of the digital expansion at least equals the diameter of the eye. Tail feebly depressed, oval in section, tapering to a fine point, covered above with small uniform scales, below with much larger ones.

Light brownish-grey above with broad, transverse, wavy bands of lighter and darker shades; white beneath.

Head and body 105; tail 85 mm.

Range. Sind. Blanford writes: "A few specimens were brought to me near the Maki Nai in the lower portion of the



Fig. 24.—Foot of *Ptyodactylus homolepis*, lower surface. (After Boulenger.)

Khirthar Range. The types were obtained "in the Mehar division of the Shikapur district." There is a specimen in the Indian Museum from the hills west of Mehar.

Genus PHYLLODACTYLUS.

Phyllodactylus Gray, Spicil. Zool. 1828, p. 3 (type *pulcher*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 76.
Euleptes Fitzinger, Syst. Rept. 1843, pp. 18 & 95 (type *Phyllodactylus europæus* Gené).
Discodactylus Fitzinger, ibid. pp. 18 & 95 (type *Phyllodactylus tuberculosus* Wiegmann).
Paradura Günther, Ann. Mag. Nat. Hist. (5) iii, 1879, p. 218 (type *sancti-johannis*).

Digits slender at the base, free, with transverse plates or tubercles beneath, the extremity dilated, furnished beneath with two subtriangular plates separated from one another by a longitudinal groove into which the claw is retractile; all the digits clawed. Body covered above with small scales, uniform or mixed with larger tubercles. Pupil vertical. Males usually without preanal or femoral pores.

Range. Tropical America; Australia; Africa; islands of the Mediterranean; Asia.

Some 45 species are known. Three occur in Asia, two inhabiting Persia and one Indo-China.

It is doubtful if *Phyllodactylus* is generically distinct from *Diplodactylus* Gray, 1832 (type *vittatus*). The distinction lies in the scalation of the upper surface of the digital expansion—*Phyllodactylus* having one or two large scales above,

Diplodactylus having many small ones. In the genotypes the difference is quite clear, but in other species of the two genera it is not so evident and there are some species which cannot clearly be assigned to either genus.

53. Phyllodactylus siamensis.

Phyllodactylus siamensis Boulenger, Proc. Zool. Soc. 1898, p. 918, pl. lv, figs. 1, 1*a* (type loc. Dong Paya Fai Mts., E. Siam; London); Flower, ibid. 1899, p. 627; Smith, Bull. Raffles Mus. no. 3, 1930, p. 20; Cochran, Proc. U.S. Nat. Mus. lxxvii, 11, 1930, p. 10.
Phyllodactylus pavici Mocquard, Miss. Pavie Indo-Chine, 1904, p. 486, pl. xxiii, fig. 3 (type loc. "Natana," Siam; Paris).
Phyllodactylus burmanicus Annandale, Ann. Mag. Nat. Hist. (7) xv, 1905, p. 28 (type loc. Tavoy; Calcutta), and J. & P. Asiat. Soc. Beng. (n. s.) i, 1905, p. 83.

Snout rounded, as long as or longer than the distance between the eye and the ear-opening, the length of which is not more than half the diameter of the eye; 7 or 8 upper and 6 or 7 lower labials; mentals subtriangular, about as

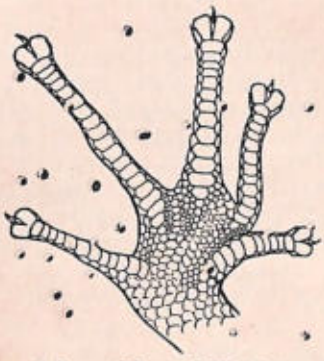


Fig. 25.—Lower surface of foot of *Phyllodactylus siamensis*.

broad as the rostral; a pair of large postmentals followed by one or two smaller pairs; rostral twice as broad as high, touching the nostril. Head covered above with small scales, largest on the snout, usually intermixed on the occiput with rounded keeled tubercles; back with small scales and much larger keeled or subtrihedral tubercles, forming 10 to 12 regular longitudinal rows; ventral scales large, smooth, imbricate, from 20 to 25 across the middle.

Digits rather long, with transverse lamellæ below; the hind-limb reaches to the axilla or not quite so far. Tail cylindrical, covered above with irregular imbricate scales, most of which are keeled, below with smooth scales, the median

series of which are transversely enlarged. Males with 6 or 7 preanal pores in a wide-angled series.

Pale grey or greyish-brown above, uniform, or with irregular blackish spots or blotches which may have whitish centres; whitish below. Intergradation between the two colour-forms is rare.

From snout to vent 50; tail 58 mm.

Range. Tenasserim (Tavoy); Siam; Annam (Tourcham and Daban, at the foot of the Langbian Plateau). Found throughout Siam in suitable localities at low altitudes, up to 500 metres. Common in the neighbourhood of Pre, N. Siam, hiding by day under logs and stones; also in Peninsular Siam along the railway-line as far south as Langsuan, lat. 10° N., frequenting the timber-stacks in the station-yards, or hiding beneath the sleepers on the open line. Cochran records it from Koh Tao, in the Gulf of Siam (lat. 10° N.).

Genus DRAVIDOGECKO.

Hoplodactylus (in part), Boulenger, Fauna Brit. Ind. 1890, p. 100.
Dravidogecko Smith, Rec. Ind. Mus. xxxv, 1933, p. 14 (type *anamallensis*).

Digits free, moderately dilated, with undivided transverse lamellæ beneath; terminal phalanges free, slender, compressed, rising angularly from the dilated portion; all the digits clawed. Dorsal scales small, granular. Pupil vertical. Males with preanal and femoral pores. A single species.

It is now definitely established that *Hoplodactylus duvaucelii* is an inhabitant of New Zealand and not of Bengal, as was originally believed. The genus *Hoplodactylus* is restricted to New Zealand and the adjacent islands (Smith, Rec. Ind. Mus, xxxv, 1933, p. 277).

54. Dravidogecko anamallensis.

Gecko anamallensis Günther, Proc. Zool. Soc. 1875, p. 226 (type loc. Anaimalai Hills, S. India; London).—*Hoplodactylus anamallensis*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 173, pl. xiv, fig. 2, and Fauna Brit. Ind. 1890, p. 101; Boettger, Kat. Rept. Mus. Senck. 1893, p. 51.—*Dravidogecko anamallensis*, Smith, Rec. Ind. Mus. xxxv, 1933, p. 14.

Head depressed, snout obtusely pointed, longer than the distance between the eye and the ear-opening, which is very small, its diameter being about a quarter that of the eye; 8 to 10 upper and 7 or 8 lower labials; mental subtriangular, as broad as the rostral, scarcely longer than the adjacent labials; two, sometimes three, pairs of elongate postmentals; rostral much broader than high; nostril between the rostral, first labial, and three small nasals. Head covered above

with minute granular scales, largest upon the snout; back with small, uniform, granular scales; belly with larger imbricate smooth scales. Toes moderately long, with a rudiment of a web at the base; 6 to 8 lamellæ under the fourth toe; the hind limb reaches to about half-way between the axilla and the middle of the body. Tail cylindrical, ? swollen at the base in the adult, covered above with very small scales, below with much larger ones and a median series of transversely enlarged plates. Male with a continuous series of preano-femoral pores, 40 to 44 in number altogether.



A. B.

Fig. 26.—Foot of *Dravidogecko anamallensis*. (After Boulenger.)
A. Upper surface. B. Lower surface.

Greyish-brown above, spotted or marbled with darker; scattered light dots may be present; brownish-white below. From snout to vent 45; tail 50 mm.

Range. Hills of S. India (Anaimalai, Palni, and Tinnevelly). Only a few specimens are known.

Genus HEMIDACTYLUS.

Hemidactylus Oken, Isis, 1817, p. 1183 (based on Cuvier's Hemidactyle, Règne Anim. ii, 1817, p. 47(type *Gecko tuberculosus* Daudin=*mabouia*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 113, and Fauna Brit. Ind. 1890, p. 82.
Boltalia Gray, Zool. Misc. 1842, p. 58 (type *sublævis*).
Hoplopodion Fitzinger, Syst. Rept. 1843, pp. 19 & 103 (type *H. coctæi*).
Microdactylus Fitzinger, ibid. pp. 19 & 104 (type *H. peruvianus*).
Onychopus Fitzinger, ibid. pp. 19 & 104 (type *H. garnoti*).
Tachybates Fitzinger, ibid. pp. 19 & 105 (type *H. mabouia*).
Pnoëpus Fitzinger, ibid. pp. 19 & 106 (type *H. javanicus*).
Velernesia Gray, Cat. Liz. Brit. Mus. 1845, p. 156 (type *richardsonii*).
Doryura Gray, ibid. p. 156 (type *bowringii*).
Leiurus Gray, ibid. p. 157 (type *ornatus*).
Nubilia Gray, ibid. p. 273 (type *argentii*).

Digits free or partly webbed, more or less strongly dilated, with a double series of lamellæ beneath; terminal phalanges long, slender, clawed, free, rising angularly from within the

expansion. Dorsal scales (in all Oriental species) granular, uniform, or intermixed with larger tubercles. Pupil vertical. Males with preanal and (or) femoral pores.



A. B.

Fig. 27.—Foot of *Hemidactylus leschenaulti*. (After Boulenger.)
A. Upper surface. B. Lower surface.

Range. Southern Europe; Southern Asia; Africa; tropical America; Polynesia.

More than 60 species are known.

Key to the Species.

I. Enlarged dorsal tubercles numerous, strongly keeled, arranged in more or less regular longitudinal series.

a. Free distal phalanx of inner digit at least half as long as the dilated portion.

α. Subdigital lamellæ in straight, transverse series, 11 to 13 under the fourth toe.

Males with 19 to 25 femoral pores on each side.. *maculatus*, p. 85.

β. Subdigital lamellæ in oblique series, 7 to 14 under the fourth toe.

1. Males with preanal pores only.

8 to 11 lamellæ under the fourth toe ..... *turcicus*, p. 86.

12 to 14 lamellæ under the fourth toe..... *persicus*, p. 87.

2. Males with præano-femoral pores, usually separated mesially.

Dorsal tubercles very large *; digits free, 7 to 10 lamellæ under the fourth toe; back with dark cross-bars ..... *triedrus*, p. 88.

As in *triedrus*, but 12 lamellæ under the fourth toe..... *subtriedrus*, p. 89.

Dorsal tubercles large *; digits free, 8 to 10 lamellæ under the fourth toe; back with dark spots ..... *brooki*, p. 89.

Dorsal tubercles moderate *; digits distinctly webbed at the base; tail with angular lateral edge; young with dark cross-bars .. *depressus*, p. 91.

Dorsal tubercles moderate *; digits distinctly webbed at the base; tail with angular lateral edge; young with white cross-bars.. *prashadi*, p. 92.

* See description.

b. Free distal phalanx of inner digit not half as long as the dilated portion; males with preanal pores only.

Dorsal granules mixed with oval tubercles; back with quadrangular spots ..... *gracilis*, p. 94.

Dorsal granules mixed with erect conical tubercles; back with dark reticulations .. *reticulatus*, p. 94.

II. Enlarged dorsal tubercles, if present, rounded, smooth, or feebly keeled, not regularly arranged.

a. Tail without denticulated lateral edge.

α. Free distal phalanx of inner digit not half as long as the dilated portion; inner toe not half the length of the second; male with a continuous series of preano-femoral pores ..... *frenatus*, p. 95.

β. Free distal phalanx of inner digit at least half as long as the dilated portion; inner toe well developed, more than half the length of the second; males with femoral pores only.

1. Tail more or less swollen at the base in the adult, verticillate; femoral pores separated by at least 6 scales.

Tail with enlarged tubercles above; 9 to 11 lamellæ under the fourth toe; 10 to 17 pores on each side ..... *leschenaulti*, p. 97.

Tail with enlarged tubercles above; 11 to 14 lamellæ under the fourth toe; 5 to 7 pores on each side ..... *flaviviridis*, p. 98.

Tail with uniform small scales above; 13 to 15 lamellæ under the fourth toe; 18 to 22 pores on each side ..... *giganteus*, p. 99.

2. Tail not swollen at the base, not or but feebly verticillate; femoral pores separated by 2 to 4 scales.

9 to 11 lamellæ under the fourth toe; 12 to 15 pores on each side ..... *bowringii*, p. 99.

b. Tail strongly depressed, with sharp denticulated lateral edge and uniform small scales above.

Back with uniform small granules; outer pair of postmentals normally not in contact with the infralabials ..... *garnoti*, p. 100.

Back with small granules and numerous larger rounded tubercles; outer pair of postmentals in contact with the infralabials.... *karenorum*, p. 102.

55. Hemidactylus maculatus.

Hemidactylus maculatus (in part) Dum. & Bibr., Erp. Gen. iii, 1836, p. 358 (type loc. India (Bombay); Paris); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 132, and Fauna Brit. Ind. 1890, p. 88.

Hemidactylus sykesii Günther, Rept. Brit. Ind. 1864, p. 108, pl. xii, fig. C (type loc. Deccan; London).

Head rather large, snout obtusely pointed, as long as or longer than the distance between the eye and the ear-opening,

the diameter of which is half that of the eye; canthus rostralis swollen; 10 to 12 upper and 9 or 10 lower labials; mental subtriangular, broader than the rostral, longer than the adjacent labials; two well-developed pairs of postmentals, the inner pair elongate and larger than the outer; gular region with minute granules; rostral quadrangular, broader than high; nostril between the rostral, first labial, and several small shields; a pair of internasals. Snout covered with smallish convex scales; hinder part of head with small granular ones, intermixed with larger conical tubercles. Back with small juxtaposed scales and large trihedral tubercles, arranged in about 20 fairly regular longitudinal rows; belly with smooth, rounded, imbricate scales. Digits free, moderately dilated, with almost perfectly straight transverse lamellæ, 9 or 10 under the inner toe, 11 to 13 under the fourth; the hind-limb reaches to the axilla. Tail slightly depressed, oval in section, verticillate, covered above with small, irregular, more or less pointed, keeled scales, and series of 6 or 8 large trihedral tubercles; below with a median series of transversely enlarged scales. Males with from 19 to 25 femoral pores on each side.

Brown above, with darker spots, often confluent into transverse undulating bars on the back; two more or less distinct dark streaks on each side of the head; below dirty whitish. Young with very distinct dark brown, undulating, dorsal cross-bars, the first on the nape, connected with the dark streaks on the sides of the head, followed by four more; tail alternately banded with light and dark brown.

From snout to vent 115; tail 130 mm. One of the largest of the Indian Hemidactyles.

Range. Bombay district; Malabar; Tinnevelly, S. India; Salem, near Madras.

56. Hemidactylus turcicus.

Lacerta turcica Linn., Syst. Nat. ed. x, 1758, p. 202 ("Habitat in Oriente").—*Hemidactylus turcicus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 126, and Fauna Brit. Ind. 1890, p. 87; Anderson, Zool. Egypt, Rept. 1898, p. 80, pl. v, fig. 3, with further synonymy.

Hemidactylus karachiensis Murray, Zool. Sind, 1884, p. 361, pl. ix, fig. 2 (type loc. Sind; London, as typical of the species.)

Head moderate, snout obtusely pointed, about as long as the distance between the eye and the ear-opening, which is oval, oblique, its diameter about half that of the eye; 7 to 10 upper and 6 to 9 lower labials; mental triangular, as broad as the rostral, longer than the adjacent labials; two well-developed pairs of postmentals, the inner pair elongate and larger than the outer; gular region with small granules;

rostral not much broader than high; nostril between the rostral, first labial, and two or three small scales; snout covered with rounded convex scales, largest over the canthal region; back of head with minute granules intermixed with larger tubercles; back with small granules intermixed with large, rounded, keeled, or subtrihedral tubercles arranged in from 14 to 16 fairly regular longitudinal series; belly with smooth, rounded, imbricate scales. Digits free, moderately dilated, with slightly oblique curved lamellæ, 5 to 8 under the inner, 8 to 11 under the fourth toe; the hind-limb does not reach to the axilla. Tail subcylindrical in section, covered above with small, irregular, more or less pointed scales and series of 6 or 8 large pointed tubercles, below with imbricate scales and a median series of transversely enlarged plates. Male with from 4 to 10 (rarely 2) preanal pores.

Light brown or greyish above, with darker spots, sometimes arranged transversely; a dark streak on the side of the head usually present; below dirty whitish.

From snout to vent 57; tail 60 mm.

Range. From Sind through South-western Asia to the countries bordering the Red Sea and the Mediterranean.

Common, according to Murray, at Karachi; found during the day under stones that have lain on the ground, and associated with a species of beetle that lives in the same situation in small holes; found also in houses.

57. Hemidactylus persicus.

Hemidactylus persicus Anderson, Proc. Zool. Soc. 1872, p. 378, fig. 3 (type loc. Shiraz, Persia; Calcutta); Blanford, Zool. E. Persia, ii, 1876, p. 342, and J. Asiat. Soc. Beng. xlv, 1876, p. 18; Boulenger, Cat. Liz. Brit. Mus. ii, 1885, p. 131, and Fauna Brit. Ind. 1890, p. 88, and Zool. Record, Rept. 1894, p. 21; Procter, J. Bombay Nat. Hist. Soc. xxviii, 1921, p. 251, and ibid. xxix, 1923, p. 122.

Hemidactylus bornmuelleri Werner, Verh. zool.-bot. Ges. Wien, xlv, 1895, p. 14, pl. 3 (type loc. Bagdad; Vienna).

Very closely allied to *turcicus*, from which it differs in the following particulars:—More labials, 10 to 12 upper and 8 to 10 lower; 8 to 10 lamellæ under the first toe, 12 to 14 under the fourth; 9 to 13 preanal pores; larger size.

From snout to vent 66; tail 82 mm.

Range. Sind; Waziristan; Persia; Mesopotamia; Arabia.

According to Blanford (1876) the type was probably obtained near Bushire, in Persia. Mr. W. D. Cumming, who collected specimens at Fao, at the head of the Persian Gulf, stated that they were plentiful about the buildings.

In spite of the overlap in the number of labials, of subdigital lamellæ, and of preanal pores, the two forms as found at Karachi appear to be quite distinct specifically.

58. Hemidactylus triedrus.

Gecko triedrus Daudin, Hist. Nat. Rept. iv, 1802, p. 55 (type loc. unknown; Paris).—*Hemidactylus triedrus*, Lesson, in Bélang., Voy. Ind. Or. 1832, p. 311, pl. v, fig. 1; Dum. & Bibr., Erp. Gén. iii, 1836, pl. xxviii, fig. 8 (toe); Kelaart, Prod. Faun. Zeyl. 1852, p. 157; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 133, and Fauna Brit. Ind., 1890, p. 89; Méhely, Termes. Füzet. xx, 1897, p. 57; Annandale, J. & P. Asiat. Soc. Beng. (n. s.) i, 1905, p. 84, pl. ii, fig. 2, and Mem. Asiat. Soc. Beng. i, 1906, p. 186; Deraniyagala, Ceylon J. Sci., B, xvi, 1932, p. 302, pl. lxiv.

Head rather large, snout obtusely pointed, about as long as the distance between the eye and the ear-opening, which is oval, its greatest diameter half that of the eye; 8 to 10 upper and 7 or 8 lower labials. Mental large, subtriangular, about twice as long as the adjacent labials; two well-developed pairs of postmentals, the inner elongate and much larger than the outer; gular region with small granular scales. Rostral not much broader than high; nostril between the rostral and several small scales, usually separated from the first labial; two or three internasals. Snout covered with convex or keeled scales, largest over the canthal region, which is somewhat swollen; back of head with minute granules intermixed with larger, more or less keeled tubercles; back with small, rather irregular scales and very large trihedral tubercles arranged in from 16 to 18 fairly regular longitudinal rows; the distance between two tubercles in longitudinal series usually distinctly less than the length of a tubercle; belly with large, smooth, rounded, imbricate scales. Digits free, moderately dilated, with slightly oblique lamellæ; 6 or 7 lamellæ under the first digit; 7 to 10 under the fourth, the base of that digit being covered with small scales; the hind-limb reaches nearly to the axilla. Tail slightly depressed, oval in section, covered above with small, irregular, more or less pointed scales and series of 4 or 6 large, keeled, pointed tubercles; below with imbricate scales and a median series of transversely enlarged plates. Males with preano-femoral pores, 6 to 14 on each side, briefly interrupted mesially, sometimes by a single scale only.

The young are light brown in colour above with regular dark brown cross-bars bordered with whitish, four between the head and the hind-limbs; these markings occasionally persist into adult life, but usually the central part of the bar grows pale and the adult is of a light pinkish-brown above, with whitish cross-bars edged with dark brown or rows of white tubercles surrounded by brown; usually a broad dark brown stripe, bordered with white along the side of the head; lower parts whitish.

From snout to vent 80; tail 90 mm.

Of its colours in life Annandale (1906) writes that it has a beautiful but subdued coloration, which rapidly disappears after death. Ventral surface pinkish-white; dorsal surface buff with a greenish tinge, with scattered white tubercles; three pale olive-green cross-bars, each edged with white; supraocular region leaf-green.

Range. Karachi; Bombay district; Madras district; Ajmer; Poona; Indore; Sivagiri and Nilgiri Hills; Mysore; Madura district, Trivandrum; Ceylon.

Found up to 4,000 feet, in houses as well as in the jungle. Deraniyagala records a pair dug up in a termite hillock near Colombo, and states that termites appear to be its favourite food.

59. Hemidactylus subtriedrus.

Hemidactylus subtriedrus Jerdon, J. Asiat. Soc. Beng. xxii, 1853, p. 467 (type loc. Nellore district; Calcutta); Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 93, pl. ii, fig. 1; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 134, and Fauna Brit. Ind. 1890, p. 90; Annandale, J. & P. Asiat. Soc. Beng. (n. s.) i, 1905, p. 84, pl. ii, fig. 2.

Doubtfully distinct from *H. triedrus*, from which it differs in the following particulars:—10 to 12 upper and 10 lower labials; 8 lamellæ under the first digit, 12 under the fourth. Colour as in juvenile *triedrus*.

Range. Nellore and Ellore districts in the northern part of the Madras Presidency.

Jerdon says that it is found chiefly among rocks, seldom entering houses.

60. Hemidactylus brooki.

Hemidactylus brookii Gray, Cat. Liz. Brit. Mus. 1845, p. 153 (type loc. Borneo; London); Günther, Zool. Erebus and Terror, ii, 1874–5, p. 16, pl. xv, fig. 2; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 128, and Ann. Mag. Nat. Hist. (7) i, 1898, p. 123, and Fauna Malay Pen. 1912, p. 42, fig. 14; Annandale, Mem. Asiat. Soc. Beng. i, 1906, p. 183; de Rooij, Rept. Indo-Austral. Archipel. i, 1915, p. 32, fig. 20; Deraniyagala, Ceylon J. Sci., B, xvi, 1932, p. 300.

Hemidactylus cyanodactylus (not of Rafin.) Girard, U.S. Explor. Exp., Herpet. 1858, p. 254, pl. xxxv, figs. 17–24 (type loc. Cape Verde Is.).

Hemidactylus affinis Steindachner, Sitz. Akad. Wiss. Wien, lxii, (1) 1870, p. 328 (type loc. Senegambia; Vienna).

Hemidactylus guineensis (not of Peters) Bocage, J. Sci., Lisboa, iv, 1873, p. 209.

? *Gecko tytleri* Tytler, J. Asiat. Soc. Beng. xxxiii, 1864, p. 547 (type loc. Moulmein).

Hemidactylus gleadowi Murray, Zool. Sind, 1884, p. 360, pl. ix, fig. 3 (type loc. Sind; London, as typical of the species).—*H. gleadowii*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 129, and Fauna Brit. Ind. 1890, p. 86.

Hemidactylus maculatus (not of Dum. & Bibr.), Stoliczka, J. Asiat. Soc. Beng. xxxix, (2), 1870, p. 164; Blanford, ibid. p. 361; Anderson, Zool. Res. W. Yunnan, 1878–9, p. 800.
Hemidactylus kushmorensis Murray, Ann. Mag. Nat. Hist. (5) xiv, 1884, p. 109 (type loc. Bhaner, Upper Sind; London, as typical of the species); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 135.
Hemidactylus murrayi Gleadow, J. Bombay Nat. Hist. Soc. ii, 1887, p. 49 (type loc. Pimpri and Garvi, near Surat).
Hemidactylus tenkatei Lidth de Jeude, Notes Leyden Mus. xvi, 1895, p. 121 (type loc. Rotti, E. Ind. Archipel.; Leiden).
Hemidactylus subtriedroides Annandale, Ann. Mag. Nat. Hist. (7) xv, 1905, p. 29, and J. & P. Asiat. Soc. Beng. (n. s.) i, 1905, pl. ii, fig. 1 (type loc. Tsagain, Burma; London and Calcutta).

Head moderate or large, snout obtusely pointed, about as long as the distance between the eye and the ear-opening, which is oval, its diameter about half that of the eye; 8 to 10

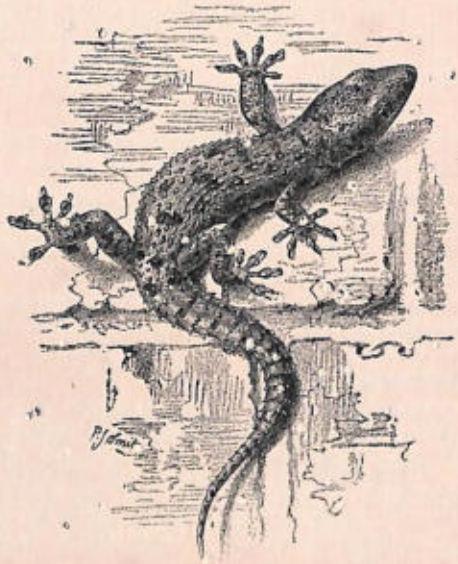


Fig. 28.—*Hemidactylus brooki*. (After Boulenger.)

upper and 7 to 9 lower labials; mental subtriangular, usually twice as long as the adjacent labials; two pairs of postmentals, the inner elongate and larger than the outer; sometimes a small third pair; gular region with small flat granules; rostral quadrangular, not much broader than high; nostril between the rostral, first labial, and two or three small shields. Snout covered with small, convex, or keeled scales; hinder part of head with small granules and larger rounded tubercles. Back with small granular scales and conical, keeled, or sub-

trihedral tubercles arranged in from 16 to 20 more or less regular longitudinal rows; the distance between two tubercles in longitudinal series being equal to or less than the length of a tubercle, but there is considerable variation in size in specimens from different localities; belly with smooth, rounded, imbricate scales. Digits free, moderately dilated, with oblique lamellæ, 5 or 6 under the first digit, 7 to 10, rarely 6, under the fourth; the hind-limb does not reach to the axilla. Tail considerably depressed, verticillate, often swollen at the base, covered above with small scales and series of 6 or 8 long, pointed, keeled tubercles; below with imbricate scales and a median series of transversely enlarged plates. Male with from 7 to 12 (16) preano-femoral pores on each side, usually interrupted mesially.

Light brown or greyish above, with dark brown spots, usually more or less regularly arranged; a dark streak along the side of the head; dirty whitish below.

From snout to vent 58; tail 75 mm.

The above description is drawn up from specimens obtained in the Indian Empire, but even within these limits there is considerable variation in the size and proportions of the head and snout, in the size and character of the dorsal tubercles, and in the number and size of the postmental shields.

Range. The whole of India and Ceylon; apparently common also in Pegu, but rare farther north in Burma; there are two specimens from Sadiya, N.E. Assam, one in the British Museum, the other in Bombay; not yet known from Siam, French Indo-China, or the Malay Peninsula except Singapore; there are two specimens in the British Museum said to have come from China, both were obtained more than 80 years ago; the East Indian Archipelago; widely distributed in the northern half of Africa; the West Indies, where it appears to have been recently introduced.

The commonest House-Gecko in India; but found also quite as often away from buildings.

61. Hemidactylus depressus.

Hemidactylus depressus Gray, Zool. Misc. 1842, p. 58 (type loc. unknown; London), and Cat. Liz. Brit. Mus. 1845, p. 153; Günther, Zool. Erebus & Terror, ii, 1874–75, p. 16, pl. xv, fig. 1 (type); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 154, and Fauna Brit. Ind. 1890, p. 90; Mobely, Termes. Füz. xx, 1897, p. 57; Deraniyagala, Ceylon J. Sci., B, xvi, 1932, p. 302, pl. lviii.

Nubilia argentii Gray, Cat. Liz. Brit. Mus. 1845, p. 273 (type loc. "Singapore"; London).

Hemidactylus piersii Kelaart, Prod. Faun. Zeyl. 1852, p. 159 (type loc. Kandy); Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 94 (in part).

Head moderately large, snout obtusely pointed, a little longer than the distance between the eye and the ear-opening,

which is oval, its diameter not more than half that of the eye; 10 to 12 upper and 8 to 10 lower labials; mental subtriangular, as broad as the rostral, longer than the adjacent labials; two well-developed pairs of postmentals, the inner pair elongate and a little larger than the outer; gular region with small granular scales. Rostral not much broader than high; nostril between the rostral and several small scales, usually not in contact with the first labial; two or three internasals. Head above covered with small granules, largest on the snout, intermixed on the occiput with rounded tubercles; back with small scales and 16 or 18 more or less regular longitudinal series of subtrihedral tubercles; the distance between two tubercles in longitudinal series greater than the length of a tubercle; a more or less distinct lateral fold; belly with smooth, rounded, imbricate scales, 36 to 40 across the middle. Digits distinctly webbed at the base, moderately dilated, with oblique lamellæ, 6 to 8 under the first, 10 or 11 under the fourth toe; the hind-limb reaches to the axilla or not quite so far. Tail considerably depressed, verticillate, flat beneath, with angular, sometimes serrated lateral edge, covered above with small, pointed scales, and series of 6 or 8 large, pointed tubercles; below with pointed, strongly imbricate scales and a median series of transversely enlarged plates, the breadth of which is about one-third that of the tail. Male with a long series of femoral pores, 16 to 19 on each side.

Light brown above, with four or five dark transverse, angular or branched markings upon the back; a dark stripe along the side of the head, with a white one above it; top of head with or without dark spots; tail with dark cross-bars; below greyish-white. The young are marked with broad, dark, transverse bars, which may or may not enclose pale spots; in many old individuals the markings are very irregular and often indistinct.

From snout to vent 80; tail 90 mm.

Range. Ceylon. Found in houses and on trees.

62. **Hemidactylus prashadi,** sp. nov.

Head and body depressed. Head moderately large; snout obtusely pointed, a little longer than the distance between the eye and the ear-opening, the diameter of which is half that of the eye; 11 or 12 upper and 9 to 11 lower labials; rostral broader than high, with median cleft above; nostril between the rostral, first labial, and several small scales; head covered above with small granules, snout with larger ones; upon the occiput the small granules are mixed with larger granules and rounded tubercles; mental large,

subtriangular, twice as long as the adjacent labials; two pairs of postmentals, the inner pair larger than the outer and in contact with one another behind the mental; back with small granular scales intermixed with much larger, subtrihedral tubercles, which are arranged in more or less regular longitudinal series, the distance between the tubercles in longitudinal series being equal to or greater than the length of a tubercle; belly with rounded imbricate scales; a more or less distinct lateral fold; 36 to 38 scales across the middle of the belly between the folds. The hind limb reaches to the axilla or not quite so far. Digits distinctly webbed at the base, moderately dilated, with oblique lamellæ, 8 under the first toe, 10 under the fourth. Tail feebly swollen at the base, considerably depressed, verticillate, with indistinct angular lateral edge, covered above with small scales and regular series of large keeled tubercles, four in a row; below with a median series of transversely enlarged plates, which are nearly as broad as the tail. Male with from 17 to 20 preano-femoral pores, separated mesially by three scales.

Brownish-grey above, with indistinct traces of narrow whitish cross-bars upon the back.

From snout to vent 82; tail 97 mm., tip lost.

The above description is from the types, two males, one in the British Museum, the other in the Indian Museum. Twelve specimens of this new Gecko were collected by Drs. Prashad and Rao in November 1928, in the neighbourhood of Jog, N. Kanara district, Bombay Presidency. I have pleasure in naming it after Dr. Baini Prashad, the senior collector, and now Director of the Indian Museum.

The other specimens do not differ from the description except in the coloration of the young. These are marked with narrow, whitish, dark-edged cross-bars or series of spots, which are much narrower than their interspaces. The first mark is curved and upon the occiput, and extends forward through the eyes on to the snout. There is a second curved mark upon the nape and five or six, more or less straight ones, upon the back. Tail with black and white annuli; lower parts greyish-white. In the adults the white marks have almost or entirely disappeared, and the creature is of a uniform greyish-brown coloration above. The largest specimen measures 95 mm. from snout to vent, tail 120. The ventral scales vary from 35 to 46 across the belly.

Hemidactylus prashadi is most closely related to *H. depressus* from Ceylon. It differs in having the tail more rounded, the lateral edge being blunter and without any serration, and in the transverse plates below the tail being broader. It also grows to a larger size. The coloration of the young is entirely different.

63. Hemidactylus gracilis.

Hemidactylus gracilis Blanford, J. Asiat. Soc. Beng. xxxix, 1870, p. 362, pl. xvi, figs. 4–6 (type loc. S.E. Berar and Raipur, Cent. Prov.; London and Calcutta); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 119, and Fauna Brit. Ind. 1890, p. 84.

Hemidactylus platyceps Annandale, Rec. Ind. Mus. viii, 1912, p. 56 (type loc. Bilimora, Bombay Pres.; Calcutta).

Head narrow, twice as long as broad, snout obtusely pointed, longer than the distance between the eye and the ear-opening, which is small, subcircular, its diameter less than half that of the eye; 9 or 10 upper and 7 lower labials; mental large, triangular, twice as long as the adjacent labials; four large postmentals, the inner pair not much larger than the outer; gular region with small, flat, round scales; rostral distinctly broader than high; nostril between the rostral and several small scales. Top of head covered with small juxtaposed scales, largest, and keeled or rugose, upon the snout; back with small irregular scales and 10 or 12 longitudinal series of more or less oval strongly keeled tubercles; belly with large, flat, rounded, imbricate scales. Body slender. Digits free, moderately dilated, 5 lamellæ under the first toe, 8 or 9 under the fourth, only the anterior ones divided; free distal phalange of innermost digit very short; the hind-limb does not reach to the axilla. The tail is wanting in three of the specimens that I have examined; in the fourth, the one referred to by Blanford as tail "smooth" (? reproduced), it has a median series of transversely enlarged plates. Male with an angular series of six preanal pores.

Grey above, with dark brown squarish spots arranged in two longitudinal rows on either side of a thin dark vertebral line; another and better-defined line along the side of the head and body; whitish below, with or without dark longitudinal lines.

From snout to vent 37; tail 43 mm.

Range. S.E. Berar and Raipur, Central Provinces; Bombay Presidency.

The type of *H. platyceps* Annandale is a female. Its head is somewhat broader and the enlarged dorsal tubercles are less regularly oval in shape than in the types of *H. gracilis*, but I have no hesitation in referring it to that species.

64. Hemidactylus reticulatus.

Hemidactylus reticulatus Beddome, Madras Month. J. Med. Sci. i, 1870, p. 32 (type loc. Kollegal, Mysore State; London); Boulenger, Cat. Liz. Brit. Mus. i, 1885, pp. 118 & 413, pl. xi, fig. 2, and Fauna Brit. Ind. 1890, p. 84.

Head rather short and high, snout broadly rounded, as long as or longer than the distance between the eye and the ear-opening, which is small, subcircular, its diameter not half

that of the eye; 9 or 10 upper and 7 or 8 lower labials; mental subtriangular, twice as long as the adjacent labials; two, rarely three, well-developed pairs of postmentals, the inner pair the largest. Rostral not much broader than high; nostril between the rostral, first labial, and several small scales. Head covered above with small granules, those upon the snout being largest and conical or keeled; back with small, more or less erect, keeled granules, intermixed with larger, pointed, keeled tubercles; belly with smooth, rounded, imbricate scales. Digits short, free, moderately dilated, 4 to 6 lamellæ under the first toe, 8 to 10 under the fourth; free distal phalange of innermost digit very short; the hind-limb reaches nearly to the axilla. Tail round in section, verticillate, covered above with small, pointed scales and series of 6 or 8 long, pointed tubercles; below with subequal, pointed, imbricate scales. Male with an angular series of from 6 to 12 preanal pores.

Brown above, with a network of darker lines; many of the tubercles whitish; whitish below, the throat sometimes streaked with brown.

From snout to vent 40; tail 40 mm.

Range. Mysore State; Madura; Shevaroy and Palkonda Hills. The types were found under stones on rocky ground.

65. Hemidactylus frenatus.

Hemidactylus frenatus Schlegel, in Dum. & Bibr., Erp. Gen. iii, 1836, p. 366 (type loc. Java; Leyden); Kelaart, Prod. Faun. Zeyl. 1852, p. 161; Stoliczka, J. Asiat. Soc. Beng. xxxix, (ii) 1870, p. 164, and xli, (ii) 1872, p. 96; Anderson, Zool. Res. W. Yunnan, 1878–9, p. 801; Boulenger, Cat. Liz. Brit. Mus. i. 1885, p. 120, and Fauna Brit. Ind. 1890, p. 85; Flower, Proc. Zool. Soc. 1899, p. 628; Annandale, Mem. Asiat. Soc. Beng. i, 1906, p. 185; Stejneger, Herpet. Japan, 1907, p. 172, figs. (head); Mell, Arch. f. Naturg. lxxxviii, 1922, p. 110; Schmidt, Bull. Amer. Mus. N.H. New York, liv, 1927, p. 409, figs. (postmentals); Deraniyagala, Ceylon J. Sci., B, xvi, 1932, p. 299, pl. lxii.

? *Hemidactylus punctatus* Jerdon, J. Asiat. Soc. Beng. xxii, 1854, p. 467 (type loc. Tellicherry, Malabar; type lost).

Hemidactylus inornatus Hallowell, Proc. Acad. Philad. 1860, p. 492 (type loc. Riu Kiu Is.; Washington).

Hemidactylus pumilus Hallowell, l. c. s. p. 502 (type loc. Hongkong; Washington).

Gecko chaus Tytler, J. Asiat. Soc. Beng. xxxiii, (2) 1864, p. 547 (type loc. Moulmein and Rangoon).

Gecko caracal Tytler, ibid. p. 547 (type loc. Rangoon).

Hemidactylus longiceps Cope, Proc. Acad. Philad. 1868, p. 380 (type loc. Manila).

Hemidactylus vittatus Günther, Zool. Erebus & Terror, 1874–5, p. 17, pl. xv, fig. 5 (type loc. Borneo and Port Essington; London).

Head rather large, snout obtusely pointed, longer than the distance between the eye and the ear-opening, the greatest diameter of which is less than half that of the eye; 10 to 12

upper and 8 to 10 lower labials; mental large, subtriangular; two well-developed pairs of postmentals, the outer pair often quite as large as the inner; sometimes a third, much smaller pair; gular region with small granular scales; rostral distinctly broader than high; nostril between the rostral, first labial, and three or four small scales. Hinder part of head covered with small granules, snout with larger ones; back with small granules usually intermixed with scattered, rounded, feebly keeled, or conical tubercles; belly with smooth, rounded, imbricate scales. Digits free, the first small, not half the length of the second, moderately dilated, with oblique lamellæ 4 or 5 under the first toe, 9 or 10 under the fourth; the hind-limb does not reach to the axilla. Tail feebly depressed, oval in section, verticillate, covered above with small scales and series of six enlarged pointed tubercles; below with a median series of transversely enlarged scales. Male with a continuous series of preano-femoral pores, 26 to 36 altogether.

Greyish- or pinkish-brown, sometimes quite dark above, uniform or with indistinct darker markings sometimes arranged

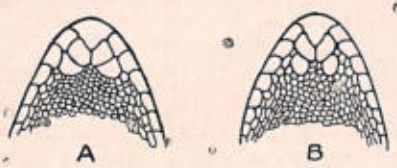


Fig. 29.—A. Chin-shields of *Hemidactylus frenatus*.
B. Chin-shields of *Hemidactylus garnoti*.

as longitudinal stripes; a dark line along the side of the head and a light one above it usually constant; all the markings more distinct in the young; whitish (yellow in life) below; tail sometimes coral-red.

Variation. The enlarged dorsal tubercles vary considerably in number; rarely they are absent altogether; sometimes they are to be found only on the posterior part of the body; at other times they are confined to the sides. The second pair of postmentals also varies considerably in size; this variation is well shown in Schmidt's figure.

From snout to vent 60; tail 65 mm.

Range. Southern India; Ceylon; Bengal; Indo-China; Hainan; Yunnan; Hong-kong; southern China; the Malay Peninsula; the East Indian Archipelago and islands of the Indian Ocean; tropical Australian region; East Africa; St. Helena.

A common House-Gecko in southern India, Ceylon, and southern Indo-China: Annandale (1906) states that it is common in Eastern but rare in Lower Bengal.

66. Hemidactylus leschenaulti.

Hemidactylus leschenaulti Dum. & Bibr., Erp. Gen. iii, 1836, p. 364 (type loc. Ceylon; Paris); Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 97; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 136, and Fauna Brit. Ind. 1890, p. 91; Annandale, Mem. Asiat. Soc. Beng. i, 1906, p. 186; Hora, Rec. Ind. Mus. xxv, 1923, p. 373; Roux, Rev. Suisse Zool. xxxv, 1928, p. 451; Deraniyagala, Ceylon J. Sci., B, xvi, 1932, p. 301, pl. lxiii.

Hemidactylus bellii Gray, Cat. Liz. Brit. Mus. 1845, p. 155 (type loc. unknown; London).

Hemidactylus coctæi (not of Dum. & Bibr.), Kelaart, Prod. Faun. Zeyl. 1852, p. 160.

Hemidactylus pustulosus Lichtenstein, Nomencl. Rept. Mus. Berol. 1856, p. 5 (type loc. Ceylon; Berlin).

Hemidactylus kelaartii Theobald, Cat. Rept. Asiat. Soc. Mus. 1868, p. 29 (type loc. Ceylon; Calcutta).

Hemidactylus marmoratus (not of Hallowell), Blanford, J. Asiat. Soc. Beng. xxxix, (2) 1870, p. 363, pl. xvi, figs. 1–3 (type loc. near Nellore, Madras Pres.; Calcutta).

Head rather large, snout broad, obtusely pointed, longer than the distance between the eye and the ear-opening, the diameter of which is about half that of the eye; 10 to 12 upper and 8 to 10 lower labials; mental large, subtriangular; inner pair of postmentals larger than the outer; gular region with small flat granules. Rostral broader than high; nostril between the rostral, first labial, and two or three smaller scales. Hinder part of head covered with small granules, snout with larger ones; back with small granules, intermixed with larger, rounded, feebly keeled tubercles, usually few in number, sometimes absent; belly with smooth, rounded, imbricate scales. Digits free, moderately dilated, with slightly oblique lamellæ, the inner digit well developed, more than half the length of the second, 6 or 7 lamellæ under the first toe, 9 to 11 under the fourth; the hind-limb reaches to the axilla or not quite so far. Tail strongly depressed, swollen at the base in the adult, flat beneath, verticillate, covered above with small scales and series of 6 enlarged pointed tubercles; below with imbricate scales and a median series of transversely enlarged plates. Males with from 10 to 17 femoral pores on each side, separated by a distinct interval.

Grey above, with more or less, distinct handsome dark brown markings forming undulating cross-bars or rhomboidal spots along the middle of the back; a dark streak from behind the eye sometimes extending on to the flank; whitish below.

From snout to vent 83; tail 83 mm.

Range. Ceylon; India (Anaimalai Hills, Ramnad, Malabar, Nilgiris, Palkonda Hills, Madras district, Godavari Valley, Belgaum district, Surat, Nagpur, Ellore, Calcutta, Khandesh and Dangs near Bombay, south of Jaisalmer in Rajputana).

Annandale (1906) states that it is abundant in all parts of Ramnad (S. India), but not in houses. Its favourite

situation is the trunk of a Tamarind or other tree which has a greyish bark, where its marbled grey back and sides render it most inconspicuous. In Calcutta he has seen it on the walls of outhouses, but never inside a human dwelling. Kelaart also says that it is rarely seen in houses, more frequently on trees. According to Deraniyagala it is common in the dry zone of Ceylon. Cantor's specimens of this species and the following one, said to have come from Penang, are no doubt incorrectly labelled as regards locality.

67. Hemidactylus flaviviridis.

Hemidactylus flaviviridis Rüppell, Neue Wirb. Faun. Abyss. 1835, p. 18, pl. vi, fig. 2 (type loc. Massaua I., Eritrea; Frankfurt); Anderson, Proc. Zool. Soc. 1895, p. 642, and Zool. Egypt, 1898, p. 77, pl. v, fig. 5; Boulenger, Faun. Malay Pen. 1912, p. 44; Hora, Rec. Ind. Mus. xxv, 1923, p. 372.

Hemidactylus coctæi Dum. & Bibr., Erp. Gen. iii, 1836, p. 365 (type loc. Bengal and Bombay; Paris); Murray, Zool. Sind, 1884 p. 359; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 137, and Faun. Brit. Ind. 1890, p. 92; Stoliczka, J. Asiat. Soc. Beng. xli, (2) 1872, p. 98; Blanford, Proc. Zool. Soc. 1876, p. 636.

Boltalia sublævis Gray, Zool. Misc. 1842, p. 58 (type loc. India; London).

Hemidactylus bengaliensis Anderson, J. Asiat. Soc. Beng. (2) xl, 1871, p. 14 (type loc. Bengal; London and Calcutta).

The northern representative of *H. leschenaulti*, from which it differs in the following particulars:—12 to 15 upper and 10 to 12 lower labials; 7 to 10 lamellæ under the first toe, 11 to 14 under the fourth; back with fewer enlarged tubercles, more often absent altogether; tail more swollen at the base; males with from 5 to 7 femoral pores on each side.

Greyish above, with indistinct darker transverse bands. Stoliczka describes the colours in life as follows:—Greenish-grey, with five transverse, broad, undulating, greenish-brown bands, the first on the neck, the fifth on the loin, and all edged with white posteriorly; the tail is similarly banded above, and the white edgings are often more conspicuous; a pale band through the eye on the side of the head, margined with dark above and below, and generally becoming obsolete on the neck. The animal changes its coloration very rapidly during life, sometimes the transverse bands turn almost to blackish-brown, and at another time they become quite obsolete. In spirit the brown tints in time entirely fade. Below white, most of the scales minutely speckled with black.

From snout to vent 90; tail 90 mm.

Range. Northern India and westwards through Persia and Arabia to the shores of the Red Sea. It does not occur east of Bengal, nor, with the exception of the individuals recorded from Bombay, south of lat. 20°.

68. Hemidactylus giganteus.

Hemidactylus giganteus Stoliczka, P. Asiat. Soc. Beng. 1871, p. 193, and J. Asiat. Soc. Beng. xli, (2) 1872, p. 99, pl. ii, fig. 2 (type loc. near Badrachalam, Godavari Valley; London and Calcutta): Blanford, Proc. Zool. Soc. 1876, p. 636; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 138, and Fauna Brit. Ind. 1890, p. 92.

Head rather large, snout obtusely pointed, as long as or longer than the distance between the eye and the ear-opening, the diameter of which is more than half that of the eye; 12 to 15 upper and 10 to 12 lower labials; mental large, subtriangular; inner pair of postmentals considerably larger than the outer; gular region with small, flat, granular scales. Rostral broader than high; nostril between the rostral and several small scales, usually separated from the first labial. Hinder part of head covered with small granules, snout with larger scales; back with more or less uniform small granules, no enlarged tubercles; belly with smooth, rounded, imbricate scales. Digits free, with almost straight transverse lamellæ, moderately dilated; the inner digit well developed, 10 or 11 lamellæ under the first toe, 13 to 15 under the fourth; the hind-limb reaches to the axilla or not quite so far. Tail strongly depressed, swollen at the base in the adult, flat beneath, verticillate, covered above with uniform small scales, below with imbricate scales and a median series of transversely enlarged plates. Male with from 18 to 22 femoral pores separated by a distinct interval.

Greyish above, with large pale-edged W-shaped marks or undulating cross-bars; whitish below.

From snout to vent 115; tail 120 mm.

Variation. Three female specimens from the Palkonda Hills differ from the above description in having the dorsal scales much more irregular in size and shape.

Range. Godavari Valley; Malabar; Lingsugur, Hyderabad State; Palkonda Hills (Guvvalacheruvu). Found on trees; only a few specimens are known.

69. Hemidactylus bowringi.

Doryura bowringii Gray, Cat. Liz. Brit. Mus. 1845, p. 156 (type loc. Hong-kong or neighbourhood; London).—*Hemidactylus bowringii*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 139, pl. xii, fig. 2, and Fauna Brit. Ind. 1890, p. 93, and Ann. Mus. Civ. Genova, (2) xiii, 1893, p. 315; Mell, Arch. f. Naturg. Berlin, lxxxviii, 1922, p. 110; Werner, Denk. Akad. Wiss. Wien, xcix, 1924, p. 40; Pope, Bull. Amer. Mus. Nat. Hist. lviii, 1929, p. 369.

Leiurus berdmorei Blyth, J. Asiat. Soc. Beng. xxii, (2) 1853, p. 646 (type loc. Mergui; type lost).—*Hemidactylus (Doryura) berdmorei*, Stoliczka, J. Asiat. Soc. Beng. xli, (2) 1872, p. 100, pl. ii, fig. 3; Blanford, Proc. Zool. Soc. 1873, p. 637.

Head rather large, snout obtusely pointed, longer than

the distance between the eye and the ear-opening, which is small, subcircular, its diameter less than half that of the eye; 9 to 11 upper and 7 to 9 lower labials; mental large, subtriangular; two pairs of postmentals, the inner usually much larger than the outer. Rostral broader than high; nostril between the rostral, first labial, and several small scales. Hinder part of head covered with small granules, snout with larger ones; back with small, more or less uniform granules, no enlarged tubercles; belly with smooth, rounded, imbricate scales. Digits free, moderately dilated, the inner one well developed, with oblique lamellæ, 5 or 6 under the first toe, 9 to 11 under the fourth; the hind-limb reaches nearly to the axilla. Tail depressed, suboval in section, not or but very faintly segmented, covered above with small uniform scales, below with a median series of transversely enlarged plates. Male with from 12 to 15 femoral pores on each side, briefly interrupted mesially.

Light brown above, usually with darker spots, which may be arranged to form four longitudinal streaks down the back; small whitish spots also often present; a dark streak along the side of the head; tail with dark chevron-shaped spots; whitish below.

From snout to vent 50; tail 55 mm.

Range. India (Godavari Valley, Sikkim, Darjeeling, Chittagong); Burma (Myitkyina district, Thayetmyo, Minhla, Pegu); Yunnan-fu; Hong-kong; S. China. Not yet recorded from Siam or French Indo-China.

According to Theobald common in houses in Rangoon and Pegu.

70. Hemidactylus garnoti.

Hemidactylus garnotii Dum. & Bibr., Erp. Gen. iii, 1836, p. 368 (type loc. Tahiti; Paris); Boulenger, Proc. Zool. Soc. 1883, p. 118, pl. xxii, fig. 1 (foot), and Cat. Liz. Brit. Mus. i, 1885, p. 141, and Fauna Brit. Ind. 1890, p. 94, and Ann. Mus. Civ. Genova, (2) xiii, 1893, p. 315; Stejneger, Proc. U.S. Nat. Mus. xxi, 1899, p. 792, fig. (head); Annandale, Ann. Mag. Nat. Hist. (7) xv, 1905, p. 30; De Rooij, Rept. Ind. Austral. Archipel. i, 1915, p. 33, figs.; Smith, J. Nat. Hist. Soc. Siam, vi, 1923, p. 197.

Doryura vulpecula Girard, Proc. Acad. Philad. 1857, p. 197 (type loc. Sandwich Is.).

Hemidactylus ludekingii Bleeker, Nat. Tijds. Ned.-Ind. xvi, 1859, p. 27 (type loc. Agam, Sumatra; Leiden).

Doryura gaudama Theobald, J. Linn. Soc., Zool. x, 1868, p. 30 (type loc. Toungoo, Sittaung Valley, Pegu; type lost), and Cat. Rept. Brit. Ind. 1876, Add. p. ix.

Hemidactylus (*Doryura*) *mandellianus* Stoliczka, P. Asiat. Soc. Beng. 1871, p. 193, and J. Asiat. Soc. Beng. xli, (2) 1872, p. 101, pl. 3, figs. 1–2 (type loc. Pankabaree and Teesta Valley, Lower Sikkim; London and Calcutta).

Hemidactylus blanfordi Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 141 (type loc. Darjeeling; London), and Fauna Brit. Ind. 1890, p. 95.

? *Hemidactylus mortoni* Theobald, J. Linn. Soc., Zool. x, 1868, p. 32 (type loc. Teikgyi, Rangoon); Boulenger, Fauna Brit. Ind. 1890, p. 95.

Head rather large, snout obtusely pointed, longer than the distance between the eye and the ear-opening, which is small, subcircular, its diameter not more than half that of the eye; 11 to 13 upper and 9 to 12 lower labials; mental subtriangular, twice as long as the adjacent labials; two pairs of postmentals (fig. 29), the outer pair smaller than the inner, lying posterior to them and usually separated from the infralabials by small scales; gular region with small flat granules. Rostral nearly as high as broad; nostril between the rostral, first labial, and several small scales. Hinder part of head covered with minute granules, snout with larger ones; back with small, uniform, granular scales except along the sides, where they may form a single line of larger rounded tubercles*; belly with smooth, rounded, imbricate scales. Digits free or with a rudiment of a web, moderately dilated, with oblique lamellæ, the first digit not half the length of the second; 5 or 6 lamellæ under the first toe, 11 to 13 under the fourth; a fold of skin along the hinder border of the thigh; the hind-limb reaches to the axilla or not quite so far. Tail strongly depressed, with sharp, denticulated, lateral edge, feebly segmented above, where it is covered with very small uniform scales, flat beneath, with larger imbricate scales and a median series of transversely enlarged plates. Male unknown.

I have examined more than 100 examples of this Gecko, but have so far failed to see a male. Many females have a series of enlarged and pitted femoral scales, about 15 to 20 in number on each side, and one may expect to find the male pores in that position. It may be that *H. karenorum* should be united with this species. The male pores, presumably, have a similar distribution, and the presence of tubercles intermixed with the dorsal granules is not a very good specific character. The male of *garnoti* recorded by Boulenger (1888) is a female with pitted scales.

Greyish-brown above, speckled or indistinctly marbled with darker; small white spots commonly present; a dark streak along the side of the head; whitish below.

From snout to vent 65; tail 70 mm.

Range. Oceania; the East Indies; recorded within the limits of this work from Sikkim; Darjeeling; Assam (Sibsagar); Burma (Toungoo, Yé coast); Tongking; Hainan; N. Siam (Bân Piping and Chieng Dao). Apparently rare on the continent of Asia.

* One example from Chieng Dao, N. Siam, has numerous tubercles along each side.

71. Hemidactylus karenorum.

Doryura karenorum Theobald, J. Linn. Soc., Zool. x, 1868, p. 30, and Cat. Rept. Brit. Ind. 1876, Add. p. ix (type loc. Karenchoung, near Toungoo, Burma; type lost).—*Hemidactylus karenorum*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 140, and Fauna Brit. Ind. 1890, p. 93; Annandale, J. & P. Asiat. Soc. Beng. i, 1905, p. 84.

Very closely allied to *H. garnoti*, from which it differs in the following particulars:—10 to 12 upper and 8 to 10 lower labials; outer pair of postmentals nearly as large as the inner, in contact with the infralabials; back with numerous rounded conical tubercles intermixed with the smaller granules. Male with 18 to 20 femoral pores on each side, interrupted mesially.

Greyish-brown above, with more or less distinct darker longitudinal streaks or spots; whitish below.

From snout to vent 57; tail 70 mm.

Range. Burma (Pegu and Toungoo districts); Cachar in Assam. The *H. karenorum* recorded by De Rooij from Borneo (Rept. Indo-Austr. Arch. i. 1915, p. 31) does not appear to be this species, but I have not seen the specimen.

Genus PLATYURUS.

Platyurus Oken, Allgem. Naturgesch. vi, 1836, p. 641 (type *Hemidactylus marginatus*).
Cosymbotus Fitzinger, Syst. Rept. 1843, pp. 19 & 104 (type *Hemidactylus platyurus*); Smith, Bull. Raffles Mus. no. 3, 1930, p. 18.
Nycteridium Günther, Rept. Brit. Ind. 1864, p. 111 (type *schneideri*).
Mimetozoon Boulenger, Proc. Zool. Soc. 1896, p. 767 (type *floweri*).
Hemidactylus (in part), Boulenger, Fauna Brit. Ind. 1890, p. 82.

Digits webbed, strongly dilated, with divided lamellæ beneath; terminal phalanges long, slender, clawed, free, rising angularly from within the expanded portion. Dorsal scales small, granular, uniform or intermixed with larger tubercles; a cutaneous expansion along the side of the body. Pupil vertical. Males with preanal and femoral pores.

Two species, one of which is included in the present work. The other, *P. craspedotus*, inhabits the Malay Peninsula and Borneo.

72. Platyurus platyurus.

Stellio platyurus Schneider, Amphib. Physiol. ii, 1792, p. 30 (no type loc. given), and Denkschr. Akad. Munich, iii, 1811, p. 62, pl. i, fig. 3.—*Nycteridium platyurus*, Stoliczka, P. Asiat. Soc. Beng. 1871, p. 194, and J. Asiat. Soc. Beng. xli, (2) 1872, p. 103.—*Hemidactylus platyurus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 143, and Fauna Brit. Ind. 1890, p. 95; Flower, Proc. Zool. Soc. 1899, p. 629; De Rooij, Rept. Indo-Austral. Archipel. i, 1915, p. 34, text-figs.—*Cosymbotus platyurus*, Taylor, Liz. Philipp. Is. 1922, p. 59; Deraniyagala, Ceylon J. Sci., B, xvi, 1932, p. 306.

Lacerta schneideriana Shaw, Gen. Zool. iii, 1802, p. 278 (based on Schneider's description).
Gecko marginatus Cuvier, Règne Anim. ii, 1829, p. 54 (type loc. Bengal).—*Hemidactylus marginatus*, Dum. & Bibr., Erp. Gen. iii, 1836, p. 370, pl. xxx, fig. 2.
Nycteridium schneideri Günther, Rept. Brit. Ind. 1864, p. 111.
Hemidactylus nepalensis Annandale, Rec. Ind. Mus. i, 1907, p. 151, pl. 6 (type loc. Katmandu, Nepal; Calcutta).

Head moderate, snout obtusely pointed, distinctly longer than the distance between the eye and the ear-opening, the diameter of which is about half that of the eye; 9 to 11 upper and 8 or 9 lower labials; mental large, as broad as the rostal, twice as long as the adjacent labials; two pairs of postmentals, the inner pair largest. Rostral broader than high; nostril between the rostral, first labial, and two or three small scales; a pair of internasals usually with a small scale between them. Head covered above with minute granular scales, largest upon the snout; back with uniform small granular scales; belly with large, smooth, rounded, imbricate scales; a well-marked dermal fringe along the side of the body from the axilla to the groin, covered above with small scales not differentiated from those upon the back. Digits one-fourth to one-third webbed; 5 to 8 pairs of lamellæ under the fourth toe; the hind-limb reaches to the axilla or not quite so far; it is bordered posteriorly by a cutaneous expansion. Tail very strongly depressed, with broad, sharply denticulated lateral margin, covered above with small scales, below with larger ones and a series of transversely enlarged plates. Males with a continuous series of preanal and femoral pores meeting at an angle in the mid-line, from 13 to 20 on each side.

Variation. Many specimens from Assam differ from the above description in having the outer pair of postmentals much smaller than the inner pair, or the outer shield may be divided into two; in some of them also there is a dorso-lateral series of enlarged tubercles, particularly on the hinder part of the body. In *Hemidactylus nepalensis* Annandale, the preano-femoral pores have an interval of four scales in the mid-line, but in other respects it agrees with *P. platyurus*.

Grey or greyish-brown above, marbled and spotted with darker, often very handsomely; a vertebral series of large, dark, paired spots often present, continued on to the tail as dark cross-bars; a dark streak from behind the eye continued along the side of the body often present; yellow or dirty white below, the tail sometimes red.

From snout to vent 60; tail 65 mm.

Range. Ceylon; N. India (Nepal, Sikkim, Darjeeling district); Indo-China; Hong-kong; Formosa; the East Indian Archipelago.

Common in houses and gardens in Indo-China, particularly in the south.

71. Hemidactylus karenorum.

Doryura karenorum Theobald, J. Linn. Soc., Zool. x, 1868, p. 30, and Cat. Rept. Brit. Ind. 1876, Add. p. ix (type loc. Karenchoung, near Toungoo, Burma; type lost).—*Hemidactylus karenorum*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 140, and Fauna Brit. Ind. 1890, p. 93; Annandale, J. & P. Asiat. Soc. Beng. i, 1905, p. 84.

Very closely allied to *H. garnoti*, from which it differs in the following particulars:—10 to 12 upper and 8 to 10 lower labials; outer pair of postmentals nearly as large as the inner, in contact with the infralabials; back with numerous rounded conical tubercles intermixed with the smaller granules. Male with 18 to 20 femoral pores on each side, interrupted mesially.

Greyish-brown above, with more or less distinct darker longitudinal streaks or spots; whitish below.

From snout to vent 57; tail 70 mm.

Range, Burma (Pegu and Toungoo districts); Cachar in Assam. The *H. karenorum* recorded by De Rooij from Borneo (Rept. Indo-Austr. Arch. i. 1915, p. 31) does not appear to be this species, but I have not seen the specimen.

Genus **PLATYURUS.**

Platyurus Oken, Allgem. Naturgesch. vi, 1836, p. 641 (type *Hemidactylus marginatus*).

Cosymbotus Fitzinger, Syst. Rept. 1843, pp. 18 & 104 (type *Hemidactylus platyurus*); Smith, Bull. Raffles Mus. no. 3, 1930, p. 13.

Nycteridium Günther, Rept. Brit. Ind. 1864, p. 111 (type *schneideri*).

Mimetozoon Boulenger, Proc. Zool. Soc. 1896, p. 767 (type *floweri*).

Hemidactylus (in part), Boulenger, Fauna Brit. Ind. 1890, p. 82.

Digits webbed, strongly dilated, with divided lamellæ beneath; terminal phalanges long, slender, clawed, free, rising angularly from within the expanded portion. Dorsal scales small, granular, uniform or intermixed with larger tubercles; a cutaneous expansion along the side of the body. Pupil vertical. Males with preanal and femoral pores.

Two species, one of which is included in the present work. The other, *P. craspedotus*, inhabits the Malay Peninsula and Borneo.

72. Platyurus platyurus.

Stellio platyurus Schneider, Amphib. Physiol. ii, 1792, p. 30 (no type loc. given), and Denkschr. Akad. Munich, iii, 1811, p. 62, pl. i, fig. 3.—*Nycteridium platyurus*, Stoliczka, P. Asiat. Soc. Beng. 1871, p. 194, and J. Asiat. Soc. Beng. xli, (2) 1872, p. 103.—*Hemidactylus platyurus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 143, and Fauna Brit. Ind. 1890, p. 95; Flower, Proc. Zool. Soc. 1899, p. 629; De Rooij, Rept. Indo-Austral. Archipel. i, 1915, p. 34, text-figs.—*Cosymbotus platyurus*, Taylor, Liz. Philipp. Is. 1922, p. 59; Deraniyagala, Ceylon J. Sci., B, xvi, 1932, p. 306.

Lacerta schneideriana Shaw, Gen. Zool. iii, 1802, p. 278 (based on Schneider's description).
Gecko marginatus Cuvier, Règne Anim. ii, 1829, p. 54 (type loc. Bengal).—*Hemidactylus marginatus*, Dum. & Bibr., Erp. Gen. iii, 1836, p. 370, pl. xxx, fig. 2.
Nycteridium schneideri Günther, Rept., Brit. Ind. 1864, p. 111.
Hemidactylus nepalensis Annandale, Rec. Ind. Mus. i, 1907, p. 151, pl. 6 (type loc. Katmandu, Nepal; Calcutta).

Head moderate, snout obtusely pointed, distinctly longer than the distance between the eye and the ear-opening, the diameter of which is about half that of the eye; 9 to 11 upper and 8 or 9 lower labials; mental large, as broad as the rostal, twice as long as the adjacent labials; two pairs of postmentals, the inner pair largest. Rostral broader than high; nostril between the rostral, first labial, and two or three small scales; a pair of internasals usually with a small scale between them. Head covered above with minute granular scales, largest upon the snout; back with uniform small granular scales; belly with large, smooth, rounded, imbricate scales; a well-marked dermal fringe along the side of the body from the axilla to the groin, covered above with small scales not differentiated from those upon the back. Digits one-fourth to one-third webbed; 5 to 8 pairs of lamellæ under the fourth toe; the hind-limb reaches to the axilla or not quite so far; it is bordered posteriorly by a cutaneous expansion. Tail very strongly depressed, with broad, sharply denticulated lateral margin, covered above with small scales, below with larger ones and a series of transversely enlarged plates. Males with a continuous series of preanal and femoral pores meeting at an angle in the mid-line, from 13 to 20 on each side.

Variation. Many specimens from Assam differ from the above description in having the outer pair of postmentals much smaller than the inner pair, or the outer shield may be divided into two; in some of them also there is a dorso-lateral series of enlarged tubercles, particularly on the hinder part of the body. In *Hemidactylus nepalensis* Annandale, the preano-femoral pores have an interval of four scales in the mid-line, but in other respects it agrees with *P. platyurus*.

Grey or greyish-brown above, marbled and spotted with darker, often very handsomely; a vertebral series of large, dark, paired spots often present, continued on to the tail as dark cross-bars; a dark streak from behind the eye continued along the side of the body often present; yellow or dirty white below, the tail sometimes red.

From snout to vent 60; tail 65 mm.

Range. Ceylon; N. India (Nepal, Sikkim, Darjeeling district); Indo-China; Hong-kong; Formosa; the East Indian Archipelago.

Common in houses and gardens in Indo-China, particularly in the south.

Genus GEHYRA.

Gehyra (in part) Gray, Proc. Zool. Soc. 1834, p. 100, and Zool. Misc. 1842, p. 57 (type *pacifica* = *Gecko oceanicus* Lesson, 1830, and Cat. Liz. Brit. Mus. 1845, p. 163; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 147, and Fauna Brit. Ind. 1890, p. 96 (in part); Smith, Rec. Ind. Mus. xxxv, 1933, p. 12.
Peropus Wiegmann, Nova Acta Acad. Leop.-Carol. xvii, 1835, p. 238 (type *mutilatus*).
Perodactylus Fitzinger, Syst. Rept. 1843, pp. 19, 103 (type *Hemidactylus oualensis*).
Dactyloperus Fitzinger, ibid. (type *Hemidactylus variegatus*).
Peripia Gray, Cat. Liz. Brit. Mus. 1845, p. 158 (type *peronii*).
Chalinocnemis Dugès, La Naturaleza, vi, 1883, p. 312.
Spasmocnemis Dugès, ibid. p. 312.

Digits free or webbed at the base, strongly dilated, with undivided or mesially divided lamellæ beneath; terminal phalanges of outer four toes long, slender, clawed, free, rising angularly from within the expanded portion; inner digit well

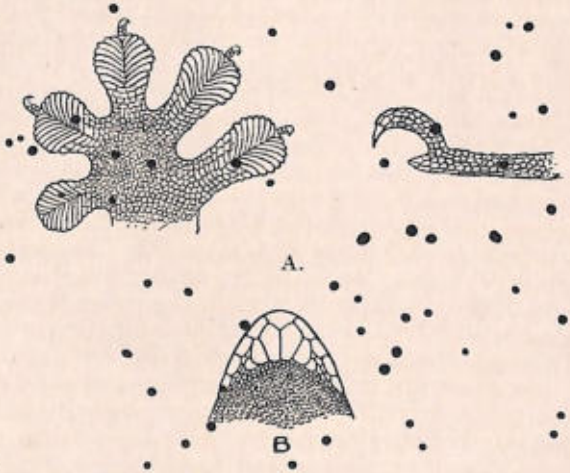


Fig. 30.—A. Foot of *Gehyra mutilata*, lower surface, and side view of toe. (After Boulenger.)
B. Chin-shields of same.

developed, without free distal phalanx, the claw minute and often concealed. Dorsal scales small, granular. Pupil vertical. Males with preanal and femoral pores.

Range. Mascarene Islands; Seychelles; the Oriental and Tropical Australian Regions; Polynesia; Mexico.

Some 12 or 14 species are recognized, one of which is included in the present work.

73. Gehyra mutilata.

Hemidactylus (*Peropus*, *mutilatus* Wiegmann, Nova Acta Acad. Leop.-Carol. xvii, 1835, p. 258 (type loc. Manila).—*Gehyra mutilata*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 148, and Fauna Brit. Ind. 1890, p. 96, fig. (foot); Flower, Proc. Zool. Soc. 1899, p. 630.—*Hemidactylus* (*Peripia*) *mutilatus*, Anderson, Zool. Res. W. Yunnan, 1879, p. 799.—*Peropus mutilatus*, Stejneger, Proc. U.S. Nat. Mus. xxi, 1899, p. 796, fig. (head), and Herpet. Japan, 1907, p. 180, figs.; Taylor, Liz. Philipp. Is. 1922, p. 62, figs.; Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 412; Deraniyagala, Ceylon J. Sci., B, xvi, 1932, p. 305, pl. lviii.

Dactyloperus insulensis Girard, Proc. Philad. Acad. 1857, p. 197, and extra, p. 5 (type loc. Sandwich Islands; Washington).

Hemidactylus peronii Dum. & Bibr., Erp. Gen. iii, 1836, p. 352, pl. 30, fig. 1 (type loc. Mauritius; Paris).

Gecko pardus Tytler, J. Asiat. Soc. Beng. xxxiii, 1864, p. 547 (type loc. Moulmein).

? *Gecko harrietiæ* Tytler, ibid. (type loc. Andamans).

Peropus packardi Cope, Proc. Philad. Acad. 1868, p. 319 (type loc. Penang; Harvard).

Hemidactylus platurus Bleeker, Nat. Tijdschr. Ned.-Ind. xvi, 1858, p. 30 (type loc. Java).

Hemidactylus navarri Dugès, La Naturaleza, vi, 1883, p. 309, pl. 7, (type loc. Mexico).

Gehyra beccei Annandale, Rec. Ind. Mus. ix, 1913, p. 306 (type loc. Sarawak, Borneo; Calcutta).

Head moderate, snout obtusely pointed, longer than the distance between the eye and the ear-opening, which is oval, oblique, its diameter half or less than half that of the eye; 9 or 10 upper and 8 or 9 lower labials; mental subtriangular, as broad as the rostral, longer than the adjacent labials; two well-developed pairs of postmentals, both elongate, the outer pair smaller than the inner, not extending beyond them posteriorly. Rostral broader than high; nostril between the rostral, first labial, and two or three small scales; a pair of internasals. Head covered above with small granules, a little larger on the snout; back with uniform small granules; belly with much larger, rounded, imbricate scales; an indistinct fold or thickening of the skin along the flank often present. Digits webbed at the base; 7 to 9 strongly oblique pairs of lamellæ under the fourth toe; hind limb short, reaching to beyond mid-way between the axilla and groin; a fold of skin along its posterior margin. Tail strongly depressed, abruptly swollen at the base, with sharp, more or less denticulated lateral edge, covered above with very small scales, below with much larger flat ones, the median series of which are strongly enlarged transversely. Males with a continuous series of preanal and femoral pores, 25 to 41 in number, meeting at an angle in the mid-line.

Pale greyish or buff, sometimes pinkish above, uniform or variegated and spotted with darker; often with light

spots ringed with darker; a dark streak behind the eye often present; below dirty white.

From snout to vent 60; tail 60 mm.

Range. Ceylon; Southern Burma; Siam; French Indo-China; Hainan; the islands of the Indian Ocean; the East Indian Archipelago and Oceania. The only authentic record that I know of from the Indian Peninsula is a specimen from Cochin in the Indian Museum. Common in houses in Ceylon, Southern Burma, and Siam.

This Gecko has the power of changing colour from light to dark with considerable rapidity.

Genus **HEMIPHYLLODACTYLUS.**

Hemiphyllodactylus Bleeker, Nat. Tijdschr. Ned.-Ind. xx, 1860, p. 327 (type *typus*); Stejneger, Proc. U.S. Nat. Mus. xxi, 1899, p. 799; Smith, Rec. Ind. Mus. xxv, 1933, p. 15.

Spathodactylus (not of Pictet, 1858) Günther, Proc. Zool. Soc. 1872, p. 594 (type *mutilatus*).

Spathoscalabotes Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 156.

Cainodactylus Barbour, Occ. Pap. Boston Soc. Nat. Hist. v, 1924, p. 133 (type *Gehyra yunnanensis*).

Lepidodactylus (in part), Boulenger, Fauna Brit. Ind. 1890, p. 97.

Gehyra (in part), Boulenger, Fauna Malay Pen. 1912, p. 46.

Digits free, subcylindrical at the base, the penultimate joint bearing a strong expansion furnished beneath with lamellæ, which are more or less divided in two by a median fissure; terminal phalanges of outer four digits short, com-

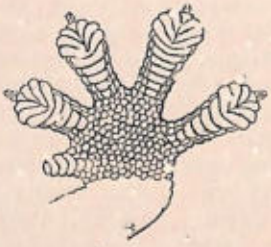


Fig. 31.—Lower surface of foot of *Hemiphyllodactylus typus aurantiacus*. (After Boulenger.)

pressed, clawed, free, rising angularly from within the expansion; inner digit vestigial, without free distal phalanx, sometimes with a minute claw. Dorsal scales small, granular. Pupil vertical. Males with preanal and femoral pores.

Range. Ceylon; S. India; Indo-China; the East Indian Archipelago and islands of Oceania. Three species are known; two are included in the present work.

Key to the Species and Subspecies.

I. Hind limb not reaching to more than half way between the axilla and groin; no distinct postmentals; males with preanal and femoral pores.
4 to 6 lamellæ under the fourth toe ..... *typus typus*, p. 107.
2 or 3 lamellæ under the fourth toe ..... *typus aurantiacus*, p. 108.

II. Hind limb reaching to more than half way between the axilla and groin; postmentals distinct; males with preanal pores only ..... *yunnanensis*, p. 109.

74. Hemiphyllodactylus typus typus.

Hemiphyllodactylus typus Bleeker, Nat. Tijdschr. Ned.-Ind. xx, 1860, p. 327 (type loc. Gunong Pasing, Java; Leiden); De Rooij, Rept. Indo-Austral. Archipel. i, 1915, p. 47, fig.; Brongersma, Zool. Med. Leiden, xiv, 1932, p. 211; Deraniyagala, Ceylon J. Sci., B, xvi, 1932, p. 308; Smith, Rec. Ind. Mus. xxxv, 1933, p. 16.

Platydactylus crepuscularis Bavay, Mém. Soc. Linn. Normandie, xv, 1869, p. 8 (type loc. New Caledonia); Boulenger, Proc. Zool. Soc. 1883, p. 122, pl. xxii, fig. 5.

Spathodactylus mutilatus Günther, Proc. Zool. Soc. 1872, p. 594, fig. (type loc. Agam, Sumatra; London).—*Spathoscalabotes mutilatus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 157, pl. xiii, fig. 1.

Lepidodactylus ceylonensis Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 164, pl. xiii, fig. 3, and Fauna Brit. Ind. 1890, p. 98, and Ann. Mus. Civ. Genova, (2) xiii (xxxiii), 1893, p. 316; Annandale, J. & P. Asiat. Soc. Beng. (n. s.) i, 1905, p. 84, and Spol. Zeyl. viii, 1912, p. 134; Smith & Kloss, J. Nat. Hist. Soc. Siam, i, 1915, p. 239.

Hemiphyllodactylus leucostictus Stejneger, Proc. U.S. Nat. Mus. xxi, 1899, p. 800, text-fig. (type loc. Kauai, Hawaii Is.; Washington).

Hemiphyllodactylus insularis Taylor, Philipp. J. Sci. xiii, D, 1918, p. 237, text-fig. and pl. i, figs. 6, 7 (type loc. Mindoro).

Hemiphyllodactylus margarethæ Brongersma, Mem. Mus. R. Hist. Nat. Belge, v, (2) 1931, p. 11 (type loc. Forte de Kock, Sumatra; Amsterdam).

Head moderate, snout obtusely pointed, as long as the distance between the eye and the ear-opening, which is small, subcircular, its diameter about one-fourth that of the eye; 10 to 12 upper and as many lower labials; mental narrower than the rostral, as large as the adjacent labials, subtriangular; usually no distinct postmentals, but a number of polygonal scales which merge gradually into the small granules of the gular region. Rostral broader than high; nostril between the rostral, first labial, and two or three small scales; head covered above with small granules, largest upon the snout; back with uniform small granules; belly with smooth, rounded, imbricate scales, not much larger than the dorsal scales. Digits free; 4 to 6 strongly oblique lamellæ under the fourth toe; limbs short, the hinder one reaching to

about half-way between the axilla and groin. Tail slightly depressed, oval in section, covered with small, more or less rounded scales, those on the lower surface being a little larger than those on the upper. Male with an angular series of from 10 to 12 preanal pores and, usually separated from them by a distinct interval, 8 to 10 femoral pores.

Brown above, spotted or marbled with darker; a dark streak along the side of the head on to the shoulder; usually a dorso-lateral series of small whitish (reddish in life) spots, commencing behind the eye; tail with lighter and darker markings, a large, whitish, black-edged spot at the base always present; whitish below, thickly speckled with dark brown.

From snout to vent 60; tail 60 mm.

Range. Ceylon; S. Burma (Pegu, Tavoy, hills between Burma and Siam); S.E. Siam (Klong Menao); Singapore; the East Indian Archipelago; islands of Oceania.

Found at sea-level and in the hills, but at no great altitude. According to Annandale (1912) the tail is prehensile.

In a form so widely distributed it is only to be expected that small morphological differences, such as the number of labials, the size of the postmental shields and of the digital expansions, and the number of preanal and femoral pores, should be found. According to Brongersma the type has a continuous series of preanal and femoral pores, and in a female from Engano Island in the British Museum I find a continuous series of enlarged pitted scales.

H. insularis Taylor, to judge by his description and figure showing the preanal and femoral pores, is a typical example of *typus*; a topotype presented by him to the British Museum has an almost continuous series of pores, the preanal being separated from the femoral by a single scale only on each side.

74 *a*. **Hemiphyllodactylus typus aurantiacus.**

Hemidactylus aurantiacus Beddome, Madras Month. J. Med. Sci. i, 1870, p. 33 (type loc. Shevaroy Hills, S. India; London).—*Lepidodactylus aurantiacus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 164, pl. xiii, fig. 4, and Fauna Brit. Ind. 1890, p. 98, fig.; Roux, Rev. Suisse Zool. xxxv, 1928, p. 451.

Differs from *H. typus typus* in the following characters:—Head shorter and less depressed; fewer oblique lamellæ beneath the fourth toe (2 or 3); fewer preanal (7 to 9) and femoral (5 to 7) pores.

From snout to vent 36; tail 34 mm.

Range. Southern India (Nilgiri, Shevaroy, Anaimalai Hills). The types were found "under stones about Yercaud and elsewhere at an elevation of 4,000 feet" (*Beddome*).

75. Hemiphyllodactylus yunnanensis.

Gehyra yunnanensis Boulenger, Ann. Mag. Nat. Hist. (7) xii, 1903, p. 429 (type loc. Yunnan-fu ; London).—*Cainodactylus yunnanensis*, Barbour, Occ. Pap. Boston Soc. Nat. Hist. v, 1924, p. 134, fig. (foot) ; Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 479.

Head moderate, snout obtusely pointed, as long as or longer than the distance between the eye and the ear-opening, which is small, subcircular, its diameter about one-fourth that of the eye ; 10 to 12 upper and 9 to 11 lower labials ; mental as broad as the rostral, as long as the adjacent labials ; one or two pairs of postmentals, the inner pair larger than the outer and usually elongate. Rostral broader than high ; nostril between the rostral, first labial, and two or three small scales ; head covered above with small granules, largest upon the snout ; back with uniform, small, granular scales ; belly with smooth, rounded, imbricate scales, much larger than the dorsal. Digits free or webbed at the base ; 4 or 5 strongly oblique lamellæ under the fourth toe ; the hind limb reaches to beyond half-way between the axilla and groin. Tail slightly depressed, slightly oval in section, covered above with small feebly imbricate scales, below with larger ones. Male with from 12 to 22 preanal pores in a slightly angular series.

Brown above, with darker markings transversely arranged and usually edged with lighter behind ; tail with dark light-edged cross-bars or chevron-shaped marks ; below pale brownish, speckled with dark brown.

From snout to vent 41 ; tail 37 mm.

Range. Yunnan (Yunnan-fu ; Tong-chuan-fu) ; N. Laos (Phong Sali) ; Upper Burma (Lashio).

Eggs large ; two females examined by me contained eggs which measure approximately 7 × 5 mm. in size.

Very closely allied to, perhaps the northern representative of, the Malayan *Hemiphyllodactylus larutensis* (Boulenger), the male of which has a continuous series of preanal and femoral pores.

Genus GEKKO.

Gekko Laurenti, Syn. Rept. 1768, p. 43 (type *verticillotus*).—*Cecko*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 182, and Fauna Brit. Ind. 1890, p. 101.
Platydactylus Goldfuss, Handb. Zool. i, 1820, p. 157 (type *guttatus*).
Lomatodactylus Van der Hoeven, Handb. Dierk. ii, 1833, p. 342 (type *vittatus*).
Scelotretus Fitzinger, Syn. Rept. 1843, pp. 99, 101 (type *Platydactylus vittatus*).

Digits free or partly webbed, moderately dilated, with undivided transverse lamellæ beneath ; terminal phalanges

of outer four digits slender, compressed, clawed, attached to the dilated portion; inner digit well developed, clawless. Dorsal scales small, uniform or intermixed with larger tubercles. Pupil vertical. Males with preanal and femoral pores.

Range. India; Indo-China, S. China; Japan; the East Indies; tropical Australian Region.

Ten or eleven species are recognized.

Gekko monarchus is not included. The evidence for its occurrence in the Indian fauna rests upon a single specimen presented to the British Museum by Dr. Kelaart and said to have come from Ceylon. It has not been obtained there since, and it is unlikely that so large a creature could have

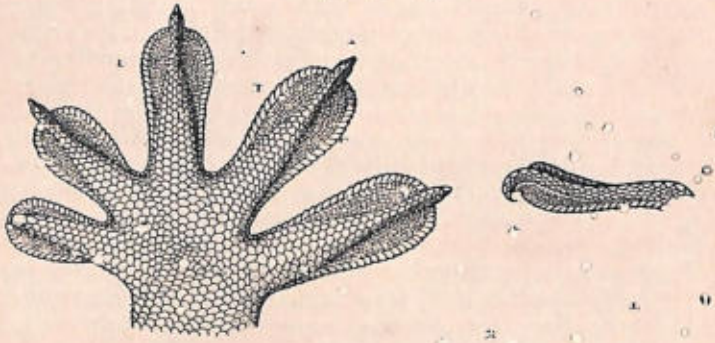


Fig. 32.—Foot of *Gekko gecko*, upper surface, and side view of toe.

escaped notice did it occur on the island. As pointed out by Deraniyagala (Ceylon J. Sci., B, xvi. 1952, p. 309), it is known that some of Kelaart's specimens said to have come from Ceylon were never obtained there.

Key to the Species.

I. Rostral not touching the nostril.

3 to 5 small scales between the dorsal tubercles:
6 or 6 scales in each annulus of the tail ..... *gecko*, p. 111.

5 to 8 small scales between the dorsal tubercles:
10 or 11 scales in each annulus of the tail ... *smithi*, p. 113.

II. Rostral touching the nostril.

Toes ¼ to ⅓ webbed; male with 17 to 23 preanal pores ..... *chinensis*, p. 114.

Toes ½ webbed; male unknown ..... *palmatus*, p. 114.

76. Gekko gecko.

Lacerta gecko Linnæus, Syst. Nat. ed. 10, 1758, p. 205 ("habitat in Indiis"); Andersson, Bihang Sven. Vet.-Akad. xxvi, 4, 1, 1900, p. 13.

Gecko verticillatus Laurenti, Syn. Rept. 1768, p. 44 (based on Seba's Illus. i, pl. 108, figs. 2, 6 (type loc. "India"); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 153, and Fauna Brit. Ind. 1890, p. 102; Flower, Proc. Zool. Soc. 1899, p. 631; De Rooij, Rept. Indo-Austr. Archip. i, 1915, p. 52, figs. 33, 34, 35; Curran, J. Bombay N.H. Soc. xxxv, 1932, p. 901.

Gekko teres Laurenti, l. c. s. (based on Seba, i, pl. 108, figs. 1, 3).

Gecko guttatus Daudin, Hist. Nat. Rept. iv, 1802, p. 122, pl. xlix (type loc. unknown; Paris).

? *Gecko verus* Merrem, Tent. Syst. Amphib. 1820, p. 42 (type loc. Archipelago Indico).

? *Gecko annulatus* Kuhl, Beitr. Zool. Vergl. Anat. 1820, p. 132.

Gecko reevesii Gray, in Griff. Anim. King. ix, 1831, Syn. p. 48 (type loc. China; London).

Gekko indicus Girard, U.S. Explor. Exped., Herp. 1858, p. 290, col. pl. xvi, figs. 9–16 (type loc. island in Balabao Str. China Sea).

Head rather large, snout obtusely pointed, as long as or longer than the distance between the eye and the ear-opening, the diameter of which is at least half that of the eye; 12 to 14 upper labials, the first touching the nostril, and 10 to 12 lower; mental usually narrower than the rostral, not larger than the adjacent labials; 4 or 5 pairs of small postmentals; gular region with small flat granules; rostral broader than high, not touching the nostril; 2 or 3 large internasals. Head covered above with small polygonal scales, not larger upon the snout than upon the occiput; back with small juxtaposed flat scales, intermixed with larger subconical tubercles arranged in about 12 longitudinal series; 3 to 5 small scales between two tubercles in longitudinal series; belly with large, rounded, imbricate scales. Digits free or with a rudiment of a web; 20 to 23 lamellæ under the fourth toe; the hind limb does not reach to the axilla. Tail slightly depressed, oval in section, annulate, covered above with subquadrangular smooth scales and regular rows of large conical tubercles, 5 or 6 small scales in longitudinal series in each annulus; below with large, flat, smooth scales, the median ones of which are larger than the others. Males with a wide-angled series of preanal pores, from 10 to 24 altogether.

Grey, blue-grey or violet-grey above, profusely spotted all over with brick-red and whitish grey; on the back the whitish spots are arranged in 7 or 8 narrow transverse series or coalesced as bands, this pattern always in the young and sometimes persisting, but much less distinctly, in the adult; tail (in the young) with alternating bands of dark blue and almost white, the dark bands being broader than the light

ones; in the adult the annuli are olive and pale grey; below whitish, usually with small pinkish spots.

From snout to vent 170; tail 170 mm.

Range. North-eastern India (Bengal, Bihar); Indo-China; southern China; the Malay Peninsula and East Indian Archipelago; the Andamans. Widely distributed in the Indo-Chinese Subregion.

The Tokay, Tuk-kaa or Tuck-too is well known to the inhabitants of the towns of southern Indo-China. Most houses of any size accommodate one or more of these large lizards, which hide in holes or crevices, generally near the ceiling, during the day, and come out and run about on the walls in search of food as soon as the sun goes down. Each individual usually has its own particular hiding place and also its own beat, upon which others are not allowed to encroach. Its popular name is derived from its call, which is remarkably loud and clear and can be heard, if the surrounding conditions are quiet, at least 100 yards away. Each call consists of a preliminary cackle, then the sound "tūk-kaa" repeated deliberately and distinctly several times, finally capped by a low gurgle. The calling is not continued throughout the whole year. It commences about the middle of the cool weather (December), becomes more frequent as the hot weather approaches, and is at its maximum during March, April, and May. During these months they can be heard calling frequently, sometimes all through the night, one lizard after another taking up the cry from house to house. After these months they call less frequently, and during the autumn are usually silent.

They feed chiefly upon insects, but are prepared to tackle anything that they can overcome. The smaller House-Geckoes, mice, small birds and snakes, all fall victims at times to this voracious creature. Flower (1899) records two instances, and I know two more, of a long-drawn-out contest between a full grown *Chrysopelea ornata*, a common house-snake in Bangkok, and *Gekko gecko*, but in these instances the snake was presumably the attacker, and was the victor. The fight lasted between one and two hours, each animal holding the other firmly in its jaws. Curran records a fight between this lizard and a Rat-Snake which lasted for three hours, and would not have terminated then had not the opponents been disturbed. I have seen this Gecko, when cornered, stand at bay with its mouth widely open, and finally rush at the person and seize him. Its jaws are extremely powerful, and when once it has taken hold is not easily detached.

77. **Gekko smithii**

Gecko smithii Gray, Zool. Misc. 1842, p. 57 (type loc. Prince of Wales' Island (Penang); type originally in Mus. Fort Pitt, Chatham; now lost).

Platydactylus stentor Cantor, Cat. Rept. Malay Pen. 1847, p. 18 (type loc. Penang; London).—*Gecko stentor*, Günther, Rept. Brit. Ind. 1864, p. 102, pl. xi, fig. A; Stoliczka, J. Asiat. Soc. Beng. xxxix, 2, 1870, p. 160; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 184, and Fauna Brit. Ind. 1890, p. 193, and Proc. Zool. Soc. 1889, p. 143; De Rooij, Rept. Indo-Austral. Archipel. i, 1915, p. 52, fig.

Platydactylus albomaculatus Giebel, Zeitschr. Ges. Naturw. xvii, 1861, p. 59 (type loc. Banka I.).

Gecko verreauxi Tytler, J. Asiat. Soc. Beng. xxxiii, 1865, p. 546 (type loc. Andaman Is.).

Gecko albofasciatus Günther, Ann. Mag. Nat. Hist. (3) xx, 1867, p. 50 (type loc. unknown, probably Malay Archipelago; London).

Resembling *G. gecko* in size and general configuration, but differing in the following particulars:—Body often more elongate; scales on the occiput smaller, smaller than those upon the snout and intermixed with larger conical tubercles; gular scales smaller; scales on the back smaller, from 5 to 8 between two tubercles in longitudinal series; tail more depressed, more oval in section, the scales on the upper parts smaller, 10 or 11 in each annulus in longitudinal series; the transverse scales below larger, often forming two symmetrical series with a groove or depression between them. Males with from 10 to 16 preanal pores.

The head in both species varies in proportion with age, becoming relatively broader as age advances.

Brown or brownish-grey above, with ill-defined darker markings, particularly about the back of the head; the young have usually transverse series of small white spots, the first two series forming curved or V-shaped marks upon the nape; with age the spots may or may not disappear; whitish below, dotted or variegated with grey; tail alternately banded with dark brown or white in the young or brownish with white spots.

From snout to vent 155; tail 150 mm.

Range. The Andaman Islands, where it is not uncommon; the Malay Peninsula as far north as Patani; the Malay Archipelago. I do not know of any specimens to prove that this Gecko inhabits Burma, as has been stated.

G. smithi is found usually upon large trees, in jungle; it rarely enters houses. According to Tytler its cry is a loud "tuk, tuk, tuk," repeated five or six times.

Gray's description of *Gekko smithi*, brief though it is, cannot well apply to any other Gecko coming from Penang; I therefore reinstate his name, which has priority over *stentor*.

78. Gekko chinensis.

Gecko chinensis Gray, Zool. Misc. 1842, p. 57 (type loc. China; London); Stejneger, Proc. U.S. Nat. Mus. lxxxii, 1932, p. 6.
Gecko japonicus Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 188 (in part); Boettger, Ber. Offenb. Ver. Nat. 1885, 24/25, p. 117, and 1888, 26/28, p. 60; Mell, Arch. f. Nat. Berlin, lxxxviii, A, 1922, p. 110.
Gecko similignum Smith, J. Nat. Hist. Soc. Siam, vi, 1923, p. 198, fig. (type loc. near Five Finger Mountain, Hainan; London).

Head moderate, snout obtusely pointed, longer than the distance between the eye and the ear-opening, the diameter of which is half or less than half that of the eye; 10 to 13 upper and 9 to 11 lower labials; mental subtriangular, narrower than the rostral, not longer than the adjacent labials; two or three pairs of postmentals, the inner pair the largest, elongate, when entire much longer than broad. Rostral much broader than high; nostril between the rostral, first labial, and two or three nasals. Head covered above with small scales, those upon the occiput minute, granular, those on the snout larger; back covered with small granular scales intermixed with numerous subconical tubercles; belly with smooth, rounded, imbricate scales. A short but distinct web between the toes, deepest between the third and fourth; the amount variable, but not more than one-third; 12 to 16 slightly curved lamellæ under the fourth toe; the hind limb reaches to the axilla or not quite so far. Tail depressed, oval in section, covered above with small squarish scales, rarely intermixed with larger tubercles; below with large, flat, imbricate scales, the median series of which are transversely enlarged. Male with from 17 to 23 preano-femoral pores.

Greyish-brown above, indistinctly variegated with darker, the markings sometimes arranged as more or less wavy cross-bars or dark spots; pale grey or dirty white below.

From snout to vent 69; tail 75 mm.

Range. Definitely known only from Kwangtung and Fukien Provinces and the island of Hainan. The exact origin of the type, which was sent to Gray by Reeves, is not known, but one may infer, as Reeves was resident in Hongkong and the species is not uncommon there now, that it came from that island.

79. Gekko palmatus.

Gecko palmatus Boulenger, Ann. Mag. Nat. Hist. (7) xix, 1907, p. 487 (type loc. Man-son Mts., Tonking; London).

Possibly only a racial form of *G. chinensis*, from which it differs in the more extensive web to the toes (half-webbed) and the larger size. The type and only known specimen is a female; it measures from snout to vent 77; tail 70 mm.

Genus LEPIDODACTYLUS.

Lepidodactylus Fitzinger, Syst. Rept., 1843, pp. 19, 98 (type *Platydactylus lugubris*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 162, and Fauna Brit. Ind. 1890, p. 97 (in part).
Amydosaurus Gray, Cat. Liz. Brit. Mus. 1845, p. 162 (type *P. lugubris*).

Digits free or partly webbed, strongly dilated, with transverse or oblique lamellæ beneath divided in two by a median groove, at least the anterior ones; terminal phalanges of outer four digits slender, compressed, clawed, united with the dilated portion; inner digit well developed, clawless. Dorsal scales small, granular. Pupil vertical. Males with preanal and femoral pores.

Range. The islands of Oceania; the East Indies; Ceylon.

80. Lepidodactylus lugubris.

Platydactylus lugubris Dum. & Bibr., Erp. Gen. iii, 1836, p. 304 (type loc. Tahiti; Paris).—*Lepidodactylus lugubris*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 165, and Fauna Brit. Ind. 1890, p. 99; De Rooij, Rept. Indo-Austr. Archipel. i, 1915, p. 49; Deraniyagala, Ceylon J. Sci., B, xv, 1929, p. 157, pl. 33, and xvi, 1932, p. 307, fig.
Peropus neglectus Girard, Proc. Philad. Acad. 1857, p. 197 (type loc. unknown; type lost).
Hemidactylus meijeri Bleeker, Natuurk. Tijds. Ned.-Ind. xvi, 1859, (8) p. 47 (type loc. Bintang, Rhio Archipelago; London).
Peripia cantoris Günther, Rept. Brit. Ind. 1864, p. 110, fig. (type loc. Penang; London).
Gecko mœstus Peters, Monatsb. Akad. Berlin, 1867, p. 13 (type loc. Pelew I.; Berlin).
Gymnodactylus candeloti, Bavay, Mém. Soc. Linn. Normandie, xv, 1869, p. 13 (type loc. N. Caledonia).
Peripia mysorensis Meyer, Monatsb. Akad. Berlin, 1874, p. 129 (type loc. Mysore, Schouten Is.; Berlin).
Lepidodactylus aurolineatus Taylor, Philippine J. Sc., D, x, 1915, p. 97 (type loc. Agusan Prov., Mindanao).
Lepidodactylus divergens Taylor, l. c. s. D, xiii, 1918, p 242, pl. 1, figs. 1–3 (type loc. Little Govenen I.; Sulu Archipelago).

Head moderate, snout obtusely pointed, longer than the distance between the eye and the ear-opening, which is small, subcircular, its diameter about one-quarter that of the eye; 11 to 13 upper and 9 to 12 lower labials; mental smaller than the adjacent labials; no distinct postmentals, but in their place several more or less regular rows of polygonal scales; scales of the gular region granular. Rostral much broader than high; nostril between the rostral, first labial, and two or three small scales; head covered above with small granules, largest upon the snout; back with uniform small granules; belly with flat, more or less rounded imbricate scales; digits webbed at the base; 12 to 14 lamellæ under

the fourth toe, the anterior ones strongly oblique; the hind-limb reaches to about two-thirds of the distance between the axilla and the groin. Tail slightly swollen at the base, with sharp, sometimes denticulated lateral edge, covered above with small subimbricate scales, below with larger imbricate ones. Males with a continuous series of preanal and femoral pores, forming a slight angle in the middle, from 25 to 30 altogether.

Light pinkish-grey or brownish above, generally with a vertebral series of small, paired, blackish spots, sometimes arranged as transverse sinuous markings; a dark streak from the tip of the snout to the ear passing through the eye. Young often with one or more dark lateral stripes; lower surfaces whitish, uniform or speckled with brown.

From snout to vent 42; tail 40 mm.

Range. Widely distributed and apparently common in the islands of the S.W. Pacific Ocean; widely distributed, but rarer in the East Indian Archipelago and Malay

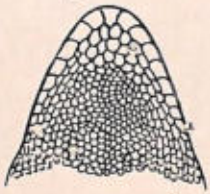


Fig. 33.—Chin-shields of *Lepidodactylus lugubris*.

Peninsula; Boulenger records it from Burma, the Andamans, and Nicobars, but I cannot trace the specimens to prove it. The only authentic records of its occurrence in the area included in this work are those by Deraniyagala from Ceylon, where it is evidently rare.

The reproduced tail may be subcylindrical or very strongly depressed, and this variation appears to have been responsible for the erection of several new species. Females are much more common than males. Otoliths in this species frequently occur.

I have examined specimens of *L. aurolineatus* Taylor and *L. divergens* Taylor identified by the author, but cannot find any good character by which to separate them from *lugubris*.

Genus PTYCHOZOON.

Ptychozoon Kuhl, Isis, i, 1822, p. 475 (*nom. nud.*); Fitzinger, Neue Class. Rept. 1826, p. 13 (type *homalocephalum*).
Pteropleura Grey, Phil. Mag. (n. s.) ii, 1827, p. 56 (type *horsfieldii*).

Digits webbed, strongly dilated, with undivided transverse lamellæ beneath; terminal phalanges of outer four digits slender, clawed, more or less attached to the expanded portion; inner digit without free terminal phalange, clawless. Dorsal scales small, intermixed with enlarged tubercles; a cutaneous expansion along the side of the body and tail. Pupil vertical. Males with preanal and femoral pores.

Range. Southern Indo-China; the Nicobar Is.; the Malayan Subregion; the Philippine Is.; ? the Riu Kiu Archipelago.

Five species.

81. Ptychozoon kuhli.

Lacerta homalocephala (not of Suchow, 1798) Creveldt, Mag. Ges. Naturf. f. Berlin, iii, 1809, p. 267, pl. 8.—*Ptychozoon homalocephalum*, Cantor, J. Asiat. Soc. Beng. xvi, 1847, p. 626 (in part); Stoliczka, J. Asiat. Soc. Beng. 1870, p. 158; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 190, and Fauna Brit. Ind. 1890, p. 104 (in part), and Fascic. Malay., Zool. i, 1903, p. 150, and J. Fed. Mal. St. Mus. iii, 1908, p. 64; Bauer, Proc. Zool. Soc. 1885, p. 718; De Rooij, Rept. Ind. Austr. Archipel. i, 1915, p. 58, text-fig.; Mert. & Senfft., Nat. und Mus. Frankfurt a. M. lix, 1929, p. 218 (skiagraph).
Ptychozoon kuhli Stejneger, Proc. Biol. Soc. Washington, xv, 1902, p. 37.

Head large, depressed, snout obtusely pointed, about as long as the distance between the eye and the ear-opening, the diameter of which is more than half that of the eye; 11 to 15 upper and 10 to 12 lower labials; mental subtriangular, narrower than the rostral, shorter than the adjacent labials; postmentals irregular, usually three or four on either side, the inner pair elongate. Rostral broader than high; nostril between the rostral, first labial, and two or three nasals; a pair of internasals. Occiput covered with minute granules, sometimes intermixed with larger rounded tubercles; snout with irregular, polygonal, small scales; back with small, juxtaposed, polygonal scales intermixed with much larger subconical tubercles arranged in more or less regular longitudinal rows, very variable in number; belly with smooth, rounded, imbricate scales. Digits fully webbed, with strongly curved lamellæ beneath the dilatations; the hind-limb reaches to the axilla or not quite so far. Sides of the head, body, and limbs with a much developed membranous expansion, that on the body covered above with large, squarish, subimbricate scales arranged like the bricks of a wall; the largest scales on the head-flap

are as large as or larger than the ventral scales. Tail strongly depressed, with scalloped lateral membrane, terminating in a broad flap, distinctly annulate, furnished above with small irregular scales and regular series of conical tubercles, below with large, flat, squarish scales. Males with from 20 to 25 preanal pores.

Greyish or brownish above, with darker markings. Typical Malayan specimens are usually handsomely marked with wavy dark brown transverse bands; yellowish or brownish below.

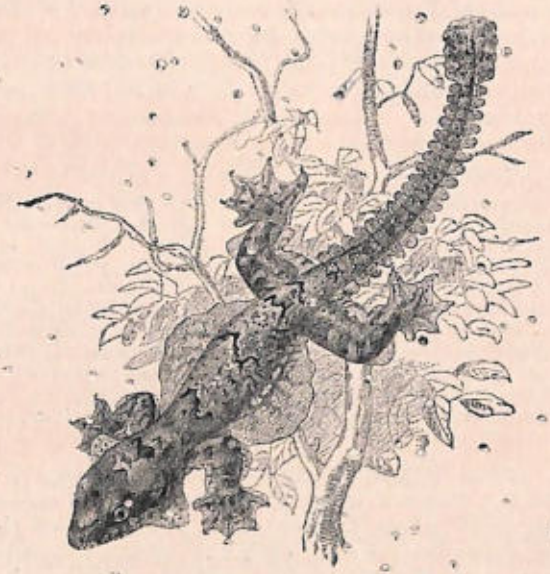


Fig. 34.—*Ptychozoon kuhli*. (After Boulenger.)

Stoliczka collected two specimens in the Nicobars, and writes of their colours in life (1870): "pale purplish brown, all over mottled and marbled with darker brown, partially with indistinct cross-bands; the flaps are purplish fleshy, with bluish, rather fine marblings."

From snout to vent 95; tail 95 mm.

Range. See table.

82. Ptychozoon lionotum.

Ptychozoon homalocephalum Cantor, J. Asiat. Soc. Beng. xvi, 1847, p. 626 (in part); Boulenger, Ann. Mus. Civ. Genova, (2) xiii, 1893, p. 316.

Ptychozoon homalocephalum var. *lionotum* Annandale, Ann. Mag. Nat. Hist. (7) xv, 1905, p. 30 (type loc. Pegu; Calcutta).

Very closely allied to *P. kuhli*, as shown in the following table. I have examined seven specimens, including the types.

The preanal pores vary from 16 to 25 in number. The coloration is variable and much as in *P. kuhli*.

Four forms of *Ptychozoon*, all closely allied to one another, have been described. *P. horsfieldi*, which has almost the same range as *kuhli*, is specifically distinct; the other two are not so readily placed. For the present, until more material is available for comparison, they may be regarded as species, the differential characters of which are set forth as follows:—

1. Tail not tapering, the terminal flap usually broader than the part of the tail immediately preceding it; lobes of the tail wide, set at right angles to the central axis; dorsal tubercles present*; males with preanal pores.
   Range. The Malay Peninsula as far north as Patani; Sumatra; Borneo; Java; Nicobar Is. .. *kuhli*.
2. Tail tapering gradually to the tip, the lobes much narrower than in *kuhli* and directed more or less backwards; no dorsal tubercles; males with preanal and femoral pores.
   Range. The Malay Peninsula, as far north as Penang; Sumatra; Borneo; ? the Riu Kiu Archipelago .. .. *horsfieldi*.
3. Tail not tapering, but the lobes narrower and directed backwards as in *horsfieldi*; no dorsal tubercles; males with preanal pores.
   Range. S. Burma (Pegu); Ramri I.; Siam (Chantaburi and Sriracha in the south-east, the Dong Paya Fai Mountains, the Me Wang and Chiengrai districts in the north) ..... *lionotum*.
4. Tail as in *lionotum*; dorsal tubercles present or absent; male with 10 preanal and 12 to 14 femoral pores.
   Range? The Philippine Islands ..... *intermedia*.

Stejneger expresses a doubt that the specimens of *P. horsfieldi* said to have come from the Riu Kiu Islands were actually obtained there, and in this he is probably correct.

I have placed under *P. lionotum* the specimen recorded by Cantor (1847) obtained on the island of Ramri, off the coast of Arakan, in the act of being devoured by a snake. It cannot now be found.

The function of the "parachute" has been debated. According to Cantor (1847), when the creature is at rest the membranous expansions along the sides of the head and body are kept in close contact with these parts, but, in leaping, those of the body are somewhat stretched out, and all the expansions together then act as a sort of parachute.

This view was confirmed by Robinson, who records a specimen (Boulenger, 1908) "caught by a native in the act of flight from one tree trunk to another." Annandale (1903) thought

* Absent in a specimen from Baram district, Borneo (Brit. Mus. coll.).

otherwise, for he states: "I have never seen an adult living specimen of *Ptychozoon*; but a young one, in which the lateral fold was perfectly developed, was kept under observation by Mr. H. C. Robinson and myself for a fortnight. We never saw it stretch out the fold, which lay curved round the side, so as to be practically invisible. I have not the slightest doubt that the use of the structure is not to support the lizard in the air, but to assist it in concealing itself by causing it to fit better into its surroundings and be less conspicuous than it would if its body cast a distinct shadow immediately beneath it. The dorsal surface has a very close resemblance to lichen-covered bark, and this resemblance is much increased by the lappet-like outgrowths on the tail and head. *Hemidactylus platyurus* is certainly less conspicuous on a stone wall when its lateral fold is spread out on each side, as it commonly is. The same is probably the case with *Mimetozoon*."

I am not convinced by Annandale's argument, for if the membrane is tightly apposed to the body it can serve no useful purpose in helping to make the creature less conspicuous; nor is there any muscular power by which it can be moved and spread out. In *Platyurus platyurus* the lateral membrane is a mere fringe, but in *Ptychozoon* it is so strongly developed that the two sides of it meet, or even overlap, on the mid-line of the belly. It is not attached to the limbs, and cannot, therefore, be extended by them when they are stretched out, but it is conceivable that in "flight" it would be raised by wind resistance and so function as a support.

The period of incubation in *Ptychozoon* appears to be long. Bauer, writing of the species in Java, states that two eggs laid in November did not hatch out until the middle of the following May.

Genus **PHELSUMA.**

Phelsuma Gray, Ann. Phil. xxvi. 1825, p. 199 (type *cepedianus*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 209, and Fauna Brit. Ind. 1890, p. 105.

Anoplopus Wagler, Nat. Syst. Amphib. 1830, p. 142 (type *cepedianus*).

Digits not webbed, more or less strongly dilated, with undivided transverse lamellæ beneath; without free terminal phalanges, clawless or with a minute claw*; inner digit vestigial. Dorsal scales small, granular, uniform. Eye with a well-developed lid all round; pupil circular. Males with preanal and femoral pores.

Range. Madagascar; the Comoro, Seychelles and Mascarene Is.; the Andaman Is.

* Under a good lens the vestigial claw can often be seen.

Some 15 species have been described, one of which is included in the present work. The occurrence of *Phelsuma* in the Indian Region is of particular interest, for its allies are Malagasy and not Oriental. The genus appears to be a natural one, easily distinguished by several characters from the other Geckonids, and composed of species that are closely related to one another.

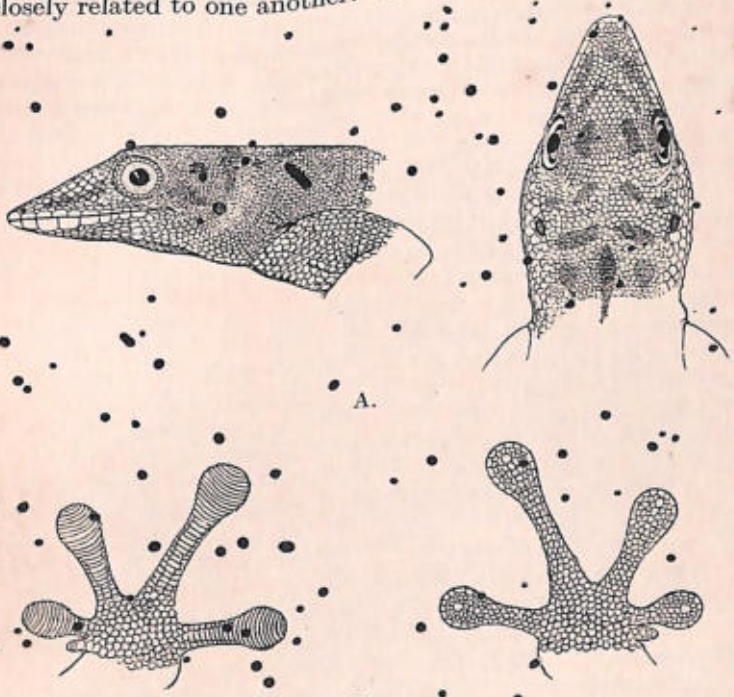


Fig. 35.—*Phelsuma andamanense*.

A. Upper and side views of head.
B. Lower and upper surfaces of foot.

83. Phelsuma andamanense.

Phelsuma andamanense Blyth, J. Asiat. Soc. Beng. xxix, 1860, p. 108 (type loc. Andaman Is.; Calcutta); Stoliczka, J. Asiat. Soc. Beng. xlii, 1873, p. 163; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 212, and Fauna Brit. Ind. 1890, p. 106; Annandale, J. Asiat. Soc. Beng. lxxiii, 1904, Suppl. p. 14.
Gecko chameleon Tytler, J. Asiat. Soc. Beng. xxxiii, 1864, p. 548.

Snout long, as long as broad, nearly twice as long as the distance between the eye and the ear-opening, the tip more or

less pointed; ear-opening subcircular, about half the diameter of the eye; 8 to 10 upper and 6 to 8 lower labials; mental subtriangular, as large as the adjacent labials; postmentals small, irregular, grading into the small flat scales of the gular region. Rostral twice as broad as high; nostril more or less lateral, between the rostral, first labial, and several small scales. Snout covered above with small polygonal scales; back of head and dorsum with small, uniform, granular scales; ventral scales large, smooth, rounded, imbricate. Digits free, narrowed in the basal half, expanded in the distal, the fourth too much longer than the others, with about 16 lamellæ beneath the dilatation. Tail depressed, oval in section, thick at the base, tapering to a point, feebly segmented, covered above with small uniform scales, below with larger scales and a median series of transversely enlarged plates, two narrow ones alternating with a broader one. Males with a curved series of usually 15 pores on each side, meeting at an angle in the middle.

Green above, with red or orange spots and markings, except upon the tail; a red streak along the side of the head and one or two longitudinal ones upon the neck; sometimes the markings are absent. Of its colour in life Tytler writes: "In the sun or strong light, rich emerald green, with blue or green tail; under portion bright yellow; red marks on head and back in most individuals; in dark places or in a subdued light the colour is perfectly dark, nearly black; the markings slightly visible and the yellow usual on the under portions entirely disappears. Tongue bright red."

From snout to vent 63; tail 73 mm.

Range. The Andaman Islands, where it is common, particularly in the vicinity of Port Blair. Of diurnal and arboreal habits, but found also sometimes in houses. Stoliczka (1873) states that it generally hides under the bark of trees, but also often feeds on the ground.

Genus **TERATOLEPIS.**

Teratolepis Günther, Proc. Zool. Soc. 1869, p. 504 (type *fasciata*); Boulenger, Fauna Brit. Ind. 1890, p. 96.

Digits free, moderately dilated, with transverse lamellæ beneath, the anterior ones mesially notched; terminal phalanges slender, clawed, free, rising angularly from within the expansion. Dorsal scales imbricate, large, pointed, much larger than the ventral scales; tail covered with extremely large imbricate scales. Pupil vertical.

A single species.

84. Teratolepis fasciata.

Homonota fasciata Blyth, J. Asiat. Soc. Beng. xxii, 1853, p. 468 (type loc. unknown; Calcutta). — *Teratolepis fasciata* Günther, Proc. Zool. Soc. 1869, p. 505; Theobald, Cat. Rept. Brit. Ind. 1876, p. 95; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 145, and Fauna Brit. Ind. 1890, p. 96.

Head rather large, snout obtusely pointed, longer than the distance between the eye and the ear-opening, the diameter of which is one-third that of the eye; 8 to 10 upper and 7 or 8 lower labials; mental large, twice as long as the adjacent labials, triangular; three pairs of postmentals, the inner pair



Fig. 36.—*Teratolepis fasciata*.
Dorsal view (Brit. Mus. 1933.7.8.37) and under surface of toe.

largest; gular scales small, flat, granular. Rostral broader than high; nostril between the rostral, first labial, and two or three small shields. Head covered above with largish, flat, polygonal scales; neck and back with large, imbricate, pointed scales, at least twice as large as the ventral scales, which are similarly shaped; the scales on the neck are distinctly keeled, those on the back feebly or not at all, the ventral scales are quite smooth. Limbs covered with strongly imbricate scales; digits elongate; 7 lamellæ under the first toe, 8 or 9 under the fourth. Tail depressed, oval in section, constricted at base, then suddenly swollen, tapering

to a fine point, covered with large, imbricate, leaf-like scales, some of those above being extremely large. Male with 6 preanal pores.

Light greyish-brown above, with five longitudinal dark brown dorsal stripes, crossed at regular intervals by six rows of large whitish spots; a whitish transverse band on the occiput, and another curved, the convexity forwards, in front of it; tail brown, with whitish cross-bands; below whitish speckled with brown.

From snout to vent 40; tail 27 mm.

This remarkable Gecko was collected by Jerdon and was in the Asiatic Society's Museum for many years before Blyth discovered and described it (1853). Its origin was unknown to him, but according to Theobald (1876) it came from Jalna (Jaulna), Hyderabad Province; the specimen is now almost wholly disintegrated, but pieces of the skin of the head and limbs still remain.

Günther's *Teratolepis* is based on a second and somewhat dried-up specimen collected by Dr. Leith in Sind; and although Blyth's description is very incomplete, and his specimen lacked the tail, there can be little doubt that Günther was correct in his identification.

A third and perfect specimen has been recently collected by Mr. R. Hodgart, Collector to the Indian Museum, at Shillong in the Khasi Hills, Assam. It was found on the ground beneath a stone.

If the above localities are correct, this lizard has a remarkable distribution not only in point of range, but also of climate.

Genus LOPHOPHOLIS*.

Teratolepis Annandale, Mem. Asiat. Soc. Beng. i, 1906, p. 187.
Lophopholis Smith & Deraniyagala, Ceylon J. Sc., B, xviii, 1934, p. 235 (type *Teratolepis scabriceps* Annandale).

Digits free, moderately dilated, with a double series of lamellæ beneath; terminal phalanges long, slender, clawed, free, rising angularly from within the expansion. Dorsal scales imbricate, not much larger than the ventral scales; caudal scales uniform with the body scales. Pupil vertical. Male with preanal pores. A single species.

85. Lophopholis scabriceps.

Teratolepis scabriceps Annandale, Mem. Asiat. Soc. Beng. i, 1906, p. 187, pl. ix, fig. 1, *a*–*c* (type loc. Ramnad, Madura dist.; Calcutta and London).—*Lophopholis scabriceps*, Smith & Deraniyagala, l. c. s. p. 235, text-figs.

Head moderate, snout obtusely pointed, as long as the distance between the eye and ear-opening, which is sub-

* λοφος, a ridge, and φολις, a scale.

circular, its diameter about one-third that of the eye; 7 or 8 upper and 6 or 7 lower labials. Mental large, broader than the rostral, twice as long as the adjacent labials, triangular; two pairs of postmentals, the inner pair largest, and in contact with one another behind the mental; a series of small scales succeeding the second pair; gular scales minute, granular; rostral broader than high; nostril between the rostral, first labial, and several small scales; two or three internasals. Top of head covered with small granules, those on the snout being largest and more or less keeled; back with uniform, imbricate, slightly elongated, striated, and feebly keeled scales, a little larger than those on the belly, which are quite smooth; digits short; 5 to 7 pairs of lamellæ under the fourth toe; limbs short, the hind limb does not reach to much beyond mid-way between the axilla and groin. Tail round in section, tapering to a fine point, covered with uniform imbricate scales, the ventral ones being a little larger than the dorsal.



Fig. 37.—Under surface of toe of *Lophopholis scabriceps*.

Male with 6 preanal pores (3 on each side separated by a median scale) in a wide-angled series.

Greyish-brown above, with dark brown markings, those on the dorsum being arranged as transverse bars; below dirty whitish.

From snout to vent 45; tail 50 mm.

Range: S. India (Adiyar, near Madras; Ramnad); Ceylon (Mariccukattf, N.P.).

Genus EUBLEPHARIS.

Eublepharis Gray, Phil. Mag. (2) ii, 1827, p. 56, and Zool. Journ. iii, 1828, p. 223 (type *hardwickii*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 230, and Fauna Brit. Ind. 1890, p. 107; Werner, Das Tierreich, xxxiii, 1912, p. 5; Smith, Rec. Ind. Mus. xxxv, 1933, p. 46.

Goniurosaurus Barbour, Bull. Mus. Comp. Zool. Harvard, li, 1908, p. 316 (type *hainanensis*).

Digits short, cylindrical, with transverse lamellæ beneath, clawed, the claw partly concealed between two lateral scales

and an upper scale. Both eyelids well developed, movable. Back with small juxtaposed scales and larger tubercles. Pupil vertical. Male with preanal pores. Tail shorter than the head and body; much swollen at the base in the adult.

As shown elsewhere (Smith, 1933) the Eublepharids differ from the typical Geckonids in having opisthocœlous vertebræ, united parietal bones, and connivent eyelids.

Four species are known, three of which are included in this work. The fourth, which has recently been described (Maki, Annot. Zool. Japon. xiii, 1930, p. 9, pl. i), is from the Riu Kiu Islands. The description and figure show that it is very closely allied to *E. macularius*.

Key to the Species.

I. Males with from 9 to 18 preanal pores.	
Enlarged dorsal tubercles larger than their interspaces	*hardwickii*, p. 126.
Enlarged dorsal tubercles equal to or smaller than their interspaces	*macularius*, p. 127.
II. Males with 28 to 30 preanal pores.	
Enlarged dorsal tubercles narrower than their interspaces	*lichtenfelderi*, p. 129.

86. Eublepharis hardwickii.

Eublepharis hardwickii Gray, Phil. Mag. (2) ii, 1827, p. 56, and Zool. Journ. iii, 1828, p. 223 (type loc. "Chittagong, Penang"; London); Günther, Rept. Brit. Ind. 1864, p. 119, pl. xi, fig. B; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 231, and Fauna Brit. Ind. 1890, p. 107; Annandale, J. & P. Asiat. Soc. Beng. (n. s.) i, 1905, p. 85; Oniál, J. Bombay N.H. Soc. xxxv, 1932, p. 903.

Gymnodactylus lunatus Blyth, in Cantor, Cat. Malay. Rept. 1847, p. 27; Blyth, J. Asiat. Soc. Beng. xxiii, 1854, p. 210 (type loc. Chaibassa; Calcutta).

Head large and rather high, neck very distinct; snout obtusely pointed, as long as or shorter than the distance between the eye and the ear-opening, the diameter of which is more than half that of the orbit. Rostral broader than high, not in contact with the nostril; three or four internasals; 9 or 10 upper and as many lower labials; mental subtriangular or pentagonal, twice as broad as the adjacent labials; a pair of large postmentals usually present and in contact with one another, with smaller irregular scales behind which pass gradually into the flat rounded scales of the gular region. Head covered above with irregular polygonal scales; body stout, the back with small, irregular, juxtaposed scales intermixed with larger rounded or oval subconical or keeled tubercles; these tubercles larger than the spaces between them; belly with rounded imbricate scales. Limbs short,

digits short. Tail shorter than the head and body, cylindrical, much swollen at the base (not in the young), tapering to a point, segmented, covered above with flat irregular scales and rows of larger tubercles, below with subquadrangular scales. Males with an angular series of from 13 to 18 preanal pores.

Reddish-brown to very dark brown above, with broad cream-coloured transverse markings. The first is U-shaped and across the nape, extending forwards along the upper lip to the tip of the snout; the second, twice as broad as the first, is across the middle of the body; the tail has four or five complete bands, the first being at the base; below whitish. All the markings are very pronounced in the young.

From snout to vent 110; tail 85 mm.

Range. It seems that the distribution of this species is considerably more circumscribed than is generally recorded. It is definitely known from Chota Nagpur and Orissa and the adjacent districts of Bengal, the Madras Presidency, the Central and United Provinces; but I am doubtful of all records outside that area. The one from Chittagong is probably, that from Quetta certainly, incorrect. Beddome's specimens from the Anaimalais were purchased many years ago, and the species has never been obtained there since.

Nothing has been recorded of its habits. There are several coloured sketches of *E. hardwickii* in the Hardwicke collection of drawings (Brit. Mus. Library, Zool. nos. 101, 102, and 103).

87. Eublepharis macularius.

Cyrtodactylus macularius Blyth, J. Asiat. Soc. Beng. xxiii, 1854, pp. 737, 738 (type loc. Salt Range, Punjab; Calcutta).—*Eublepharis macularius*, Anderson, Proc. Zool. Soc. 1871, p. 163; Theobald, Cat. Rept. Brit. Ind. 1876, p. 94; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 232, and Fauna Brit. Ind. 1890, p. 108, fig., and J. Bombay N. H. Soc. xxvii, 1920, p. 351, and Ann. Mag. Nat. Hist. (6) vi, 1890, p. 352; Murray, Zool. Sind, 1884, p. 366; Prater, J. Bombay N. H. Soc. xxviii, 1922, p. 811; Procter, ibid. xxix, 1923, p. 122; Hora, Rec. Ind. Mus. xxv, 1923, p. 373.

Eublepharis hardwickii (not of Gray), Murray, Zool. Sind, 1884, p. 366.

Eublepharis fasciatus Günther, Ann. Mag. Nat. Hist. (3) xiv, 1864, p. 429 (type loc. Hyderabad, Sind; London).

Closely allied to *E. hardwickii*, differing in the following particulars:—Enlarged dorsal tubercles smaller, as broad as or smaller than their interspaces; male with from 9 to 14 preanal pores.

The young are light brown or yellowish or pinkish above, with broad dark brown cross-bars, and sometimes intervening dark brown spots. The first is upon the neck, the next two

on the body, the fourth over the sacrum. The top of the head is brown, and the tail is alternately marked with light and dark rings.

With age the markings become broken up and less distinct. The top of the head becomes spotted, with sometimes a U-shaped mark across the nape; the centres of the dorsal bands fade, leaving only their edges or a series of spots corresponding to them; rarely the spots are arranged in longitudinal series. In a well-grown specimen from the Khandesh district, Bombay Presidency, the first and second and the third and fourth dorsal bars have coalesced, leaving a broad, pale, median interspace.

From snout to vent 120; tail 90 mm. According to Theobald it grows to nearly 300 mm. in total length.

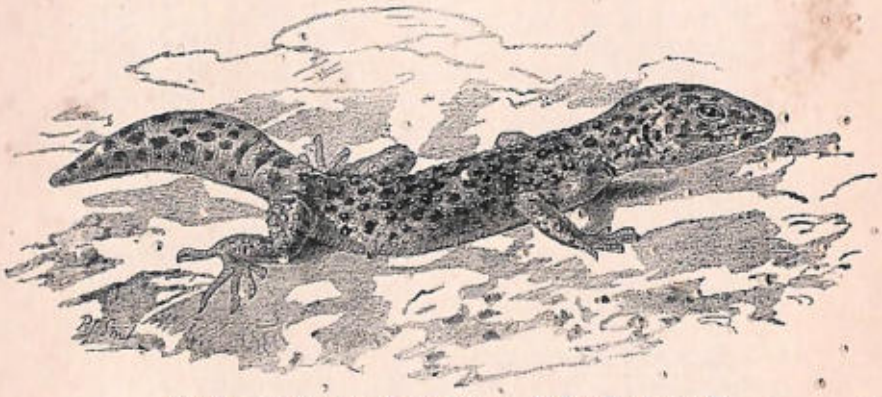


Fig. 38.—*Eublepharis macularius.* (After Boulenger.)

A Persian specimen in the British Museum measures 165 mm. from snout to vent, the tail being damaged.

Range. N.W. India to S. Transcaspia and Mesopotamia. Known in India from the N.W. Frontier Province, Baluchistan, Sind, the Punjab, Rajputana, and the northern part of the Bombay Presidency.

The Fat-tailed Lizard, as it is sometimes called, is a desert species, thoroughly nocturnal in its habits, hiding by day beneath stones or rocks. It has a voracious appetite, living upon insects, chiefly crickets, spiders, and scorpions. Prater states that it will devour other lizards and is quite indifferent to the stings of scorpions. Ingoldby (in Procter) remarks: "Not uncommon on the patches of flat ground raised high above the river bed near Ladha, and on the Wana plain (Waziristan). I only found two below 2,000 feet. It is difficult to understand how a relatively slow-moving creature,

showing itself in captivity so thirsty, and wasting rapidly if deprived of water, thrives on a desert at a distance of over a mile from the nearest available water."

It is often regarded by the natives as highly poisonous.

88. Eublepharis lichtenfelderi.

Eublepharis lichtenfelderi Mocquard, Bull. Mus. Hist. nat. Paris, 1897, p. 213 (type loc. Iles de Norway, Gulf of Tonking; Paris).—*Gonyurosaurus lichtenfelderi*, Barb. & Lov., Bull. Mus. Comp. Zool. Harvard, lxix, 1929, p. 270.

Goniurosaurus hainanensis Barbour, Bull. Mus. Comp. Zool. Harvard, li, 1908, p. 316, and Proc. New Engl. Zool. Club, iv, 1909, p. 61, pl. vii, fig. 7 (type loc. Mt. Wuchi, Hainan; Harvard).

Head large, neck very distinct; snout obtusely pointed, as long as the distance between the eye and the ear-opening; rostral large, broader than high, not in contact with the nostril; a pair of internasals; 8 to 10 supralabials and the same number of infralabials; mental large, subtriangular; no distinct postmentals. Head covered above with small rounded granules, largest on the snout, intermixed posteriorly with larger tubercles; body moderately stout, covered above with small scales and larger, rounded, conical tubercles, which are narrower than the spaces between them; on the flanks the tubercles are more numerous and closer together than on the back. Belly with rather large, hexagonal, imbricate scales; limbs weak, digits short; the hind-limb reaches to the axilla. Tail shorter than the head and body, cylindrical, swollen at the base, but not strongly as in the two preceding species, tapering to a point, segmented, covered above with small granules and, at the base, with rows of conical tubercles, one row to each segment. Males with from 28 to 30 preanal pores in an angular series.

Very dark brown above, with narrow white, transverse, black-edged cross-bars, the first, upon the nape, curved (in the Hainan specimen extending forwards to the eyes), the second behind the shoulders, the third behind the middle of the body; tail with five or six narrow white annuli; below pale greyish.

From snout to vent 83; tail 70 mm.

Range. Iles de Norway; Hainan. The types were found among dry rocks.

Family AGAMIDÆ.

**Stellionidæ* Gray, Ann. Phil. (2) x, 1825, p. 196 (in part).
Agamidæ Gray, Phil. Mag. (2) ii, 1827, p. 57; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 250, and Fauna Brit. Ind. 1890, p. 109; Gadow, Amphib. & Rept. 1901, p. 515; Camp, Bull. Amer. Mus. Nat. Hist. xlviii, 1923, p. 296 *et seq.*
Uromasticidæ Theobald, J. Linn. Soc., Zool. x, 1868, p. 34.

The Agamidæ inhabit Asia, a few species extending their range into S.E. Europe, Africa, but not Madagascar, Australia and the New Guinea Archipelago, but not New Zealand. They are most numerous, both in genera and species, in the Oriental Region. In external as well as in internal characters they closely resemble the Iguanidæ, from which, as a family, they can be distinguished only by their dentition. They agree also in having ornamental appendages, such as crests, gular sacs, etc., and both exhibit similar forms of colour display and habits of courtship. The distribution of these two families, so nearly related to one another, is, therefore, of interest. The Agamids inhabit the Old World and their distribution is a continuous one; the Iguanids, on the other hand, have a markedly discontinuous distribution. Their chief home is the New World, but they occur also in Madagascar and in the Fiji (?) and Friendly Islands in Polynesia †.

Fossil Iguanids, however, have been found in the Eocene of Europe, and the species which exist today are the survivors of a group that at one time had a much wider distribution. In no part of the world do the two families co-exist today.

The Agamidæ can be distinguished from all the other Oriental lizards, the Chameleons excepted, by their dentition. This is both acrodont and heterodont. The teeth are usually divided into three kinds, namely, incisors, canines, and molars. The latter are compressed laterally and are more or less solidly united to one another at their bases, so that they form an uninterrupted row along the jaw; the canine teeth are usually distinct, and four or five incisors are present in each jaw. In *Uromastix*, however, the incisors are replaced as the creature grows up by large cutting-teeth, one in the upper and two in the lower jaw.

* This name is not available, *Stellio* Laurenti, type *saxatilis*, being unrecognizable. See Stejneger, in Smith, J. Bombay N.H. Soc. xxxv, 1932, p. 618.

† The record of the Agamid *Gonicephalus godeffroyi* in the Fiji Islands needs confirmation. It is based on three specimens presented by Col. Beddome to the British Museum.

The skull of the Agamidæ is strongly ossified; the orbit is completely surrounded by bone, and the temporal fossa is bridged over by an arch, which is formed chiefly of the squamosal and a well-developed jugal. In *Lyriocephalus*, and sometimes in the adult of *Goniocephalus*, a supraorbital arch is developed. The premaxillary is single; the nasals are paired; the frontal and parietal are single.

The eye of the Agamids is provided with complete lids and has always a round pupil. Some species of *Calotes* have the power of moving in a slight degree each eye independently,

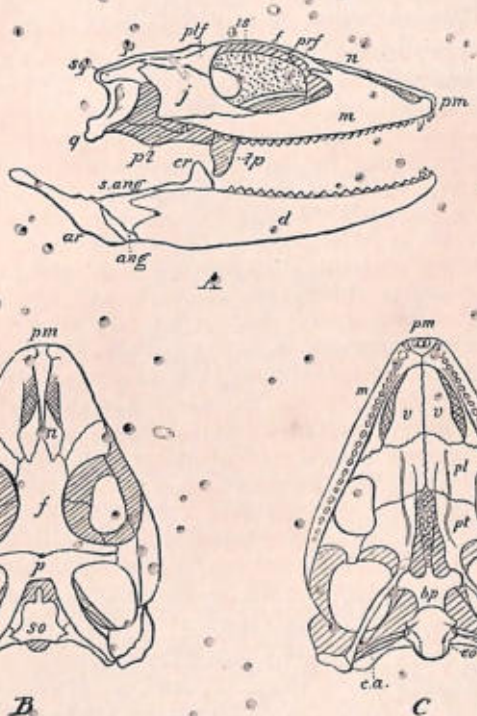


Fig. 39.—Skull of *Calotes jubatus*. (After Boulenger.)

A. Side view. B. Upper view. C. Lower view.

ang. Angular.
ar. Articular.
bp. Basisphenoid.
cr. Coronoid.
d. Dentary.
eo. Exoccipital.
f. Frontal.
is. Interorbital septum.
j. Jugal.
m. Maxillary.
n. Nasal.
p. Parietal.
pl. Palatine.
pm. Premaxillary.
prf. Prefrontal.
pt. Pterygoid.
ptf. Postfrontal.
q. Quadrate.
s.ang. Supra-angular.
so. Supraoccipital.
sq. Squamosal.
st. Supratemporal.
tp. Ectopterygoid.
v. Vomer.

a faculty which is carried to a high degree of perfection in the Chameleons. No doubt other Agamids, if watched carefully, will be found to have this ability.

The skin is devoid of ostecderms, and there are never large symmetrical plates on the head or belly. The scalation and shape of the body vary considerably, according to genera, and in adaptation to modes of life. In general those species which lead an entirely terrestrial existence have the body depressed; the arboreal species have it compressed. The tail is usually long and not fragile, but when broken it may be reproduced. In *Cophotis* the tail is prehensile; some species of *Phrynocephalus* have the habit of curling the tip of the tail upwards.

Femoral glands or organs are absent in all the Oriental genera except *Physignathus*, *Leiolepis*, and *Uromastix*. The callose

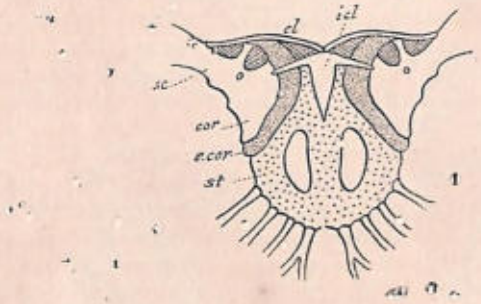


Fig. 40.—Pectoral arch of *Calotes jubatus*. (After Boulenger.)

cl. Clavicle.
cor. Coracoid.
icl. Interclavicle.
st. Sternum.
e.cor. Epicoracoid.
sc. Scapula.

preanal and abdominal scales of the Agamas are no doubt homologous, but less specialized, structures; sometimes the scale is merely thickened, in others there is a heaped-up mass of epithelial tissue, which on removal leaves a cup-shaped depression in the scale. As in the species with proper femoral glands, this product is an excretion and not a secretion, and it is more abundant during the breeding season than at other times of the year. Callose scales are absent altogether in the young; they appear when the creature reaches sexual maturity.

Most of the Agamids are exclusively insectivorous; *Lyriocephalus*, *Agama*, *Phrynocephalus*, and *Leiolepis* are also herbivorous; *Uromastix* is said to be entirely herbivorous.

The family contains some 280 species. A few of the genera are strongly characterized, and their recognition

presents no difficulty. The majority, however, pass gradually into one another in different directions, and a sharp generic division and a serial arrangement of their affinities is extremely difficult. It is to be hoped that the classification adopted in this work expresses more accurately the phylogenetic relationships of some of the species than that employed by previous authors.

As already pointed out in the Introduction, the auditory apparatus of some of the Agamidæ is undergoing a process of devolution. From a taxonomic point of view its degree of development is of no great value. Species that have no tympanum can be distinguished generically from those that have one, but they are not necessarily distant relatives. As pointed out by Boulenger (Fauna Brit. Ind. p. 115), the nearest relative *Sitana*, which has the tympanum exposed, is *Otocryptis*, which has the tympanum hidden. The mere covering of the tympanum with scales is not always of specific value, as in *Oriocalotes* and some species of *Draco*. In *Japalura* also, as I now conceive it, the tympanum may be exposed or covered. Bearing that in mind I have transferred to *Japalura* several of the species placed by Boulenger under *Acanthosaura*. The resemblance of *Japalura major* and *J. dymondi*, which have the tympanum exposed, to *J. yunnanensis*, *J. flaviceps*, and *J. hamptoni*, which have it covered, is too close to be disregarded. *J. tricarinata* and *J. planidorsata* stand in a similar relation to one another.

The genus *Goniocephalus* presents the greatest difficulty, but as the majority of the species included under it inhabit regions outside the scope of this work, no attempt has been made here to deal with it completely. At the same time I have had no hesitation in referring to *Goniocephalus* some of the species at present placed under *Acanthosaura* by other authors. Starting from *Goniocephalus chamæleontinus*, the type of the genus, an orthogenetic series can be arranged through *doriæ*, *kuhli*, *borneensis*, and *harveyii* to *armatus*, *crucigerus*, *lepidogaster*, and *capra*, the four last-named being usually referred to *Acanthosaura*. All agree in having a short, more or less triangular head with large orbit and steeply sloping forehead and occipital regions, as well as in general body form and scalation. The four species of *Acanthosaura* differ from the others in having a postorbital spine, but this alone cannot be regarded as of generic significance. *Goniocephalus subcristatus*, with its long and narrow head, does not rightly belong to this group (γωνία, an angle), but to the one represented by such species as *G. grandis*, *robinsoni*, and *spinipes*. The difference between them, however, is one of proportions rather than of clear-cut characters.

A near relative of *G. chamæleontinus* from Borneo is the Sinhalese *Lyriocephalus*, the bony supraorbital arch of the latter being only a further stage in the ossification of the strongly projecting supraciliary crest of the former. In fact, in the adult male of *chamæleontinus* the arch is actually complete, as in adult *Lyriocephalus*, and the resemblance of the two to one another is increased by the fact that the female of *chamæleontinus* has a protuberance at the end of her nose.

I have examined the type and only known specimen of *Goniocephalus belli* (Dum. & Bibr., 1837); and regard it as conspecific with the *borneensis* of Schlegel, 1848. The range of *borneensis* is restricted to Malaysia, and there can be no doubt that the type-locality of Bengal, as given by Duméril and Bibron, is an error.

The measurements of the head which are used in the descriptions of the Agamidæ are taken as follows:—The width of the head is taken just behind the orbits; the length is taken from the posterior border of the tympanum straight forwards to an imaginary line drawn across the tip of the snout; the snout is measured along the same line.

Key to the Genera.

I. No femoral pores.
- A. Ribs much prolonged, supporting a wing-like expansion ..... DRACO, p. 135.
- B. No wing-like expansion.
  - *a*. Body not depressed.
    - α. Four toes only ..... SITANA, p. 144.
    - β. Five toes.
      1. Tympanum absent or, if present, covered with skin.
         - Fifth toe not longer than first ..... OTOCRYPTIS, p. 146.
         - Three parallel longitudinal folds on each side of the middle of the throat, curved and converging backwards into a U-shaped figure ..... PTYCTOLÆMUS, p. 149.
         - Dorsal scales very large, unequal, irregular; tail prehensile; a dorsal crest ..... COPHOTIS, p. 150.
         - Dorsal scales unequal; a rostral appendage, at least in the male; no dorsal crest .... CERATOPHORA, p. 151.
         - A bony supraorbital arch; a globular protuberance on the nose (in the adult)..... LYRIOCEPHALUS, [p. 155.
      2. Tympanum present, exposed or covered with skin; tail rounded, the scales below not longer than broad; dorsal crest a mere denticulation.
         - Dorsal scales unequal, not heterogeneous, regularly arranged; a postorbital spine. ORIOCALOTES, p. 166.
         - Dorsal scales unequal, heterogeneous, no postorbital spine ..... JAPALURA, p. 167.

3. Tympanum exposed.

Dorsal scales unequal, heterogeneous; tail compressed, the scales below longer than broad; a postorbital spine, except in *subcristatus* (fig. 49).	GONIOCEPHALUS, p. 157.
Dorsal scales very unequal, irregular; ventral scales unequal	MICROPHOLIS, p. 164.
Dorsal scales large, unequal, not heterogeneous, strongly imbricate; a dorsal crest; tail of male strongly compressed, crested above	SALEA, p. 177.
Dorsal scales equal-sized (except in *fruhstoiferi* and *kakhienensis*), regularly arranged	CALOTES, p. 180.

b. Body more or less depressed.

Tympanum exposed; male without callose preanal scales	PSAMMOPHILUS, p. 208.
Tympanum exposed; male with callose preanal scales	AGAMA, p. 211.
Tympanum concealed or absent	PHRYNOCEPHALUS, 227.

II. Femoral pores present.

Tail strongly compressed, more or less crested above	PHYSIGNATHUS, p. 236.
Tail rounded, covered with small equal scales	LEIOLEPIS, p. 238.
Tail with whorls of large spinose scales	UROMASTIX, p. 242.

Genus **DRACO**.

Flying Lizard; Flying Dragon.

Draco Linnæus, Syst. Nat. 1758, p. 199 (type *volans*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 253, and Fauna Brit. Ind. 1890, p. 111; Lafrentz, Zool. Jahrb. Jena, 1914, p. 594 (development); Wandolleck, Abh. Ber. Mus. Dresden, ix, 1900, no. 3, p. 1; Opin. 75, Inter. Comm. Zool. Nomen.
Draconus Rafinesque, Analyse Nat. 1815, p. 77 (emend.).
Draconculus Wiegmann, Herp. Mex. 1834, p. 14 (type *lineatus*).
Rhacodracon Fitzinger, Syst. Rept. 1843, p. 50 (type *fimbriatus*).
Pterosaurus Fitzinger, l. c. s. p. 51 (type *dussumieri*).
Pleuropterus Fitzinger, l. c. s. p. 51 (type *hæmatopogon*).
Dracontoidis Fitzinger, l. c. s. p. 51 (type *lineatus*).
Dracosella Gray, Cat. Liz. Brit. Mus. 1845, p. 234 (type *dussumieri*).

Body with a large, lateral, wing-like membrane supported by the last five, six, or seven ribs, which are much produced. A gular appendage and a lateral flap or wattle on either side of the throat. Tympanum distinct or covered with scales. Tail long. No femoral or preanal pores.

Range. India; Indo-China; the East Indies.

The wing-like expansions or patagia, when the creature is at rest or is climbing about the trees in search of food, are folded back along the sides of the body and are hardly distinguishable from it. They are expanded when the creature glides or planes from tree to tree. The number of patagial ribs within the species is fairly constant, but those with normally five pairs may have six, and those with six, seven.

The gular pouch is usually much larger in the male than in the female. Both it and the wattles are distensible, or erectile, and are utilized by the male during courtship. Into each pouch extends a branch of the hyoid, the wattle on each side being supplied by one of the first basi-branchials (cornu hyale), the posterior or second pair of basi-branchials entering

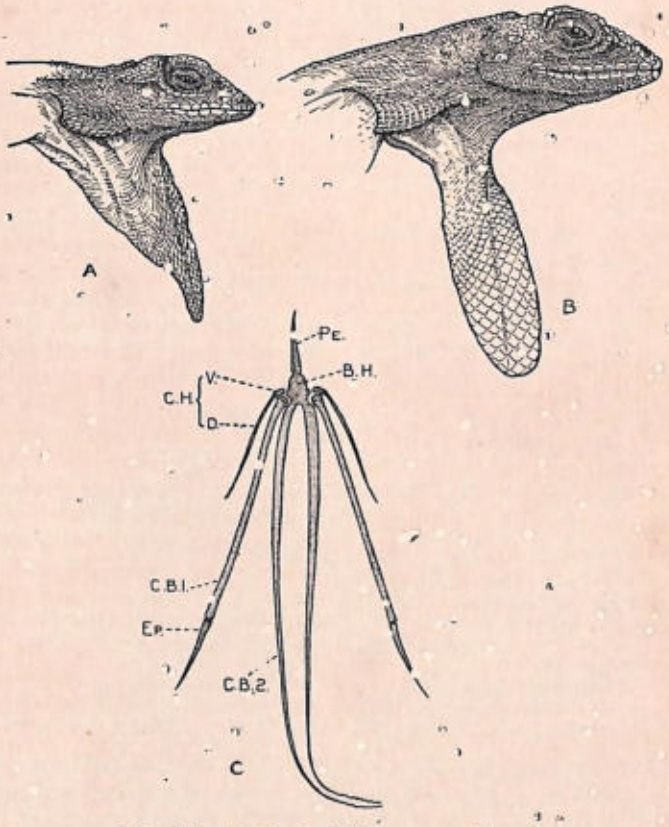


Fig. 41.—A. Head of *Draco maculatus*, ♂.
B. Head of *Draco blanfordi*, ♂.
C. Hyoid of *Draco volans*.

Pe. Processus entoglossus.
B.H. Body of hyoid.
C.H. Cornu hyale.
V. Ventral leg; *D.* Dorsal leg.
*C.B.*1. Cornu branchiale I.
*C.B.*2. Cornu branchiale II.
Ep. Epiphyse.

the gular pouch (fig. 41, C). Mr. K. G. Gairdner, who has observed *D. maculatus* in Siam, informs me that its gular pouch when fully distended projects forwards beyond the front of the head.

The following account, also of *D. maculatus*, was sent me by Mr. G. F. W. Elwes, of the Bombay Burma Trading Corporation, many years ago :—"While on my way across from Raheng (Siam) I saw two lizards fighting near the top of a tree. Before the gun arrived I had seen one or other loose its hold two or three times and fall some way through the air, with its membranes spread, before turning back and getting on the trunk of the tree to hunt up its adversary and renew the fight. There was a third lizard, on the opposite side of the trunk, occasionally putting its head round the corner to see how the fight progressed, which I took to be the female; but unfortunately she disappeared after the shot which brought down the two males." Having once paired I believe that the male and female remain together throughout that season. Whilst living on Mt. Bonthain in Celebes during February 1924 I had ample opportunity for observing *Draco beccarii*, which was common there. They were always to be seen in pairs, and hunting about in close company with one another. Mr. Karl P. Schmidt, of the Field Museum of Natural History, Chicago, informs me that in North Celebes he has observed the male *Draco* spreading and folding the parachute, presumably in order to display the colours during courtship.

Flying Lizards are entirely arboreal in their habits, seldom descending voluntarily to the ground. They feed upon insects, grubs, etc. In many species the wing-membranes are adorned with beautiful colours, which may be different in the two sexes. The colour-pattern is more or less constant, and is a valuable aid in identification. The young are produced from eggs, from two to five being laid at a time. These are buried in the ground.

About forty species of Draco are known. They are distributed over the Indo-Chinese Region, the East Indian Archipelago, and the Philippine Islands. One species is found in Southern India.

Draco, therefore, affords a good example of discontinuous distribution. Between the South Indian species (*D. dussumieri*) and the Indo-Chinese forms, which do not range west of Assam, there is a gap of at least 1,000 miles in which no species has yet been obtained.

Key to the Species.

I. Nostril lateral, directed more or less outwards; tympanum scaly *; patagium spotted ..... *maculatus*, p. 138.

II. Nostril directed more or less straight upwards.

* The character of the tympanum cannot always be relied upon in this genus.

1. Snout at least as long as the orbit; a dorso-lateral series of widely separated, enlarged, trihedral scales (Indo-Chinese species).
Tympanum naked*; patagium with five black transverse bands; inside of wattle red .. *tæniopterus*, p. 140.
Tympanum naked; patagium with four or five black transverse bands; a black band across the throat extending inside the wattle ..... *indochinensis*, p. 141.
Tympanum naked; patagium marbled with brown, usually with fine, whitish, longitudinal lines; inside of wattle red ..... *blanfordi*, p. 141.
Tympanum scaly; patagium with three red, or black and red, transverse bands; inside of wattle red ..... *norvilli*, p. 142.

2. Snout shorter than the orbit; a dorso-lateral series of small tubercles composed of several scales (Indian sp.).. *dussumieri*, p. 143.

89. Draco maculatus.

Dracunculus maculatus Gray, Cat. Liz. Brit. Mus. 1845, p. 262 (type loc. "Penang"; London).—*Draco maculatus*, Günther, Rept. Brit. Ind. 1864, p. 125, pl. xiii; Anderson, Zool. Res. W. Yunnan, 1878–79, p. 802; Boulenger, Fauna Brit. Ind. 1890, p. 112; Annandale, Rec. Ind. Mus. viii, 1912, p. 40; Smith, Bull. Raffles Mus. no. 3, 1930, p. 21.

Draco haasei Boettger, Zool. Anz. Leipzig, 1893, p. 429 (type loc. Chantabun, Siam; Frankfurt-a.-M.).—*Draco maculatus haasei*, Smith & Kloss, J. Nat. Hist. Soc. Siam, i, 1915, p. 239, and Smith, ibid. iv, 1920, p. 93.

Draco whiteheadi Boulenger, Proc. Zool. Soc. 1899, p. 956, pl. lxvi (type loc. Five-finger Mountain, Hainan; London); Smith, J. Nat. Hist. Soc. Siam, vi, 1923, p. 199; Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 413.

Normally 5 patagial ribs. Snout as long as or a little longer than the orbit; nostrils lateral, directed more or less outwards; tympanum covered with small scales. Upper head-scales unequal, strongly keeled, compressed and more or less erect over the canthal region and anterior part of the orbit; 7 to 11 supralabials. Gular appendage of male (fig. 41) much longer than the head, with obtusely pointed extremity, covered with moderately large scales which are about as large as the ventrals; appendage of female usually not half the length of the head. Dorsal scales unequal, smooth or feebly keeled, the largest as large as or larger than the ventrals, which are strongly keeled; on each side of the back a series of widely separated, enlarged, strongly keeled scales. The fore-limb extends to beyond the snout, the hind-limb to the axilla or not quite so far. Males with a slight nuchal fold; no caudal crest.

Greyish or bronze above, with darker markings; a black interorbital spot and two on the nape usually present.

Wing-membranes above orange, reddish-brown, yellowish or greenish, with scattered black spots which are very variable both in size and number, and often arranged in longitudinal lines; pale yellow below (in life), immaculate or with irregular

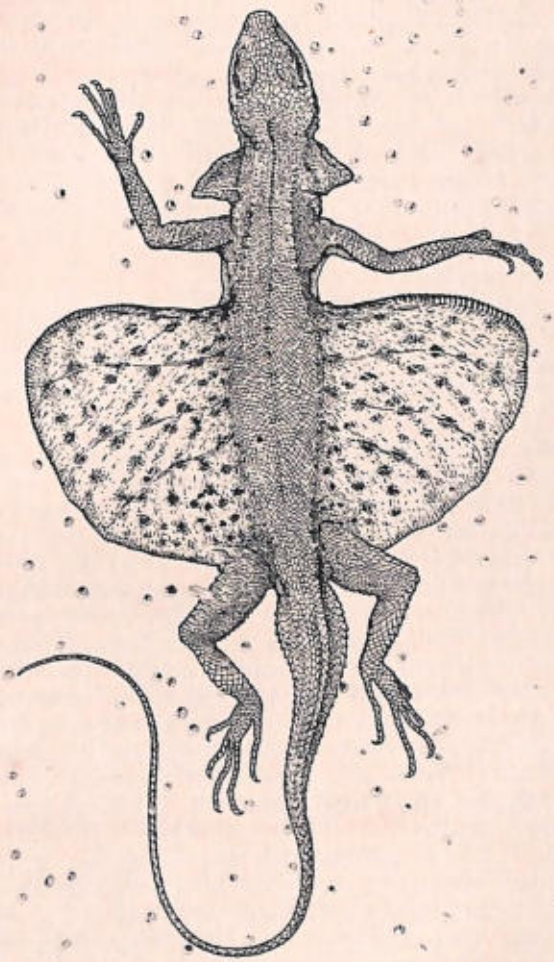


Fig. 42.—*Draco maculatus*, nat. size.

black spots. Inside of wattles reddish-brown or yellow; gular pouch pale yellowish or brownish, with a blue spot at the base and sometimes at the tip. Examples from the Dong Paya Fai Hills, from S.E. Siam, Cambodia, and Pulo Condore usually lack the blue spot at the base of the pouch (*D. haasei*),

while specimens from northern Siam, Tonking, and Hainan have the gular pouch nearly entirely blue (*D. whiteheadi*).

From snout to vent 82; tail 125 mm.

Range. The whole of the Indo-Chinese Peninsula from Assam (Naga Hills and the Abor country) to Hainan and the Man-son Mts., Tonking, extending south to the Nakon Sritamaret Mts. (lat. 8° N.) in Peninsular Siam; its occurrence south of this area is very doubtful.

Variation. Most of the specimens from the extreme north of Assam have the dorsal scales distinctly larger than those from the other parts of Indo-China. *D. maculatus* is the commonest Flying Lizard of the Indo-Chinese Region. It inhabits the lowlands and hills up to 1,000 metres altitude.

90. **Draco tæniopterus.**

Draco tæniopterus Günther, Proc. Zool. Soc. 1861, p. 187, and Rept. Brit. Ind. 1864, p. 126, pl. xiii (type loc. Chantabun, Siam; London); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 269, and Fauna Brit. Ind. 1890, p. 113; Flower, Proc. Zool. Soc. 1899, p. 637: Smith, J. Nat. Hist. Soc. Siam, i, 1915, p. 239, and Bull. Raffles Mus. no. 3, 1930, p. 22.

Normally 5 patagial ribs. Snout as long as the diameter of the orbit; nostrils directed vertically upwards; tympanum naked. Upper head-scales unequal, keeled; a more or less distinct Λ-shaped series of enlarged scales on the forehead; a prominent tubercle at the posterior end of the orbit; 7 to 9 supralabials. Gular appendage of male longer than the head, translucent, the tip rounded, covered with large scales, larger than the ventrals; appendage of female less than half the length of the head. Dorsal scales subequal, smooth or feebly keeled, about as large as the ventrals, which are strongly keeled; on each side of the back a series of widely separated, enlarged, strongly keeled scales. Adult male usually with a feeble nuchal fold; no caudal crest. The fore-limb reaches to beyond the snout, the hind-limb to the axilla or just beyond.

Greyish or bronze above, with metallic gloss; wing-membranes above with four, rarely five, curved transverse black bands, which bifurcate as they approach the body; beneath immaculate. Throat pale green in life, inside of wattles light or dark red; hind margin of patagium usually with a broad band of maroon in life.

From snout to vent 75; tail 150 mm.

Two specimens from the Nakon Sritamarat Mountains are unusually large, measuring 100 mm. from snout to vent; tail 180.

Range. Tenasserim and the Mergui Archipelago; Siam as far north as lat. 18°, east to the Cambodian frontier and

south to the Isthmus of Kra. Usually fairly common wherever found. De Rooij (Rept. Indo-Austral. Archipel.' i, 1915, p. 85) records it from Borneo, but does not back the statement with any reference; she may have confused it with the closely allied *D. formosus*.

91. Draco indochinensis.

Draco læniopterus (not of Günther, 1861), Morice, Coup d'œil Fauna Cochin-Chine, 1875, p. 55.
Draco indochinensis M. A. Smith, Ann. Mag. Nat. Hist. (10) ii, 1928, p. 248 (type loc. Kamchay Mts., Cambodia; London).

Normally 5 patagial ribs. Head moderate; snout longer than the diameter of the orbit; nostrils directed almost straight upwards; tympanum naked. Upper head-shields unequal, strongly keeled, compressed and more or less erect over the canthus rostralis; no Λ-shaped series of enlarged scales on the forehead; 9 supralabials. Gular appendage (of female) two-thirds the length of the head, covered with small scales. Dorsal scales unequal, smooth, mostly smaller than the ventral scales, which are strongly keeled; on each side of the back a series of widely separated, enlarged, strongly keeled scales. The fore-limb reaches to beyond the snout, the hind-limb nearly to the axilla.

Greyish or bronze above, with numerous small black spots; wing-membranes reddish-brown above, with four curved transverse black bands which bifurcate as they approach the body; lemon-yellow (in life) below, with a black stripe along the outer margin; chin spotted with black; throat blue, with a broad, black, transverse bar extending on to the inner sides of the wattles.

From snout to vent 105; tail 183 mm.

Known from four specimens, three females and one juvenile. The paratype is from Kontum in Annam, lat. 14° 50′ N. The specimen recorded by Morice came from Tay-ninh, Cochin-China, and is in the Museum at Lyons. There is a juvenile from Nha Trang, Annam, in Paris.

92. Draco blanfordi.

Draco major (not of Laurenti), Blanford, J. Asiat. Soc. Beng. xlvii, 1878, p. 125, and xlviii, 1879, p. 128 (type loc. forest E. of Tavoy; London).
Draco blanfordi Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 267, pl. xx (head), and Fauna Brit. Ind 1890, p. 112; Smith, J. Nat. Hist. Soc. Siam, ii, 1916, p. 153.

Normally 5 patagial ribs. Head moderate; snout as long as, or a little longer than, the diameter of the orbit; nostrils directed straight or almost straight upwards; tympanum naked. Upper head-shields unequal, strongly keeled; a more

or less distinct Λ-shaped series of enlarged scales on the forehead; a compressed tubercle at the posterior part of the orbit; 9 or 10 supralabials. Gular appendage of male much longer than the head, translucent, the tip rounded, covered with very large scales, much larger than the ventrals (fig. 41); of the female less than half the length of the head. Dorsal scales subequal, smooth or feebly keeled; ventrals larger, strongly keeled; on each side of the back a series of widely separated, enlarged, strongly keeled scales. Adult male with a slight nuchal fold and a low but distinct caudal crest. The fore-limb reaches to beyond the snout, the hind-limb to the axilla, or not quite so far.

Greyish above, with small black spots, often arranged in pairs upon the back. Wing-membranes above more or less mottled with dark brown or olive, usually with fine white lines longitudinally arranged; posterior part of membrane terra cotta or rich brown in life; whitish or grey below (lemon-yellow in life), uniform. Throat bluish or almost black; inside of wattles scarlet. In some individuals indistinct dark transverse bars upon the patagia are present.

From snout to vent 130; tail 240 mm. Females are smaller.

Range. Western Siam; Southern Burma; the Malay Peninsula. I have seen a specimen from the Chieng Rai district in Siam, lat. 20° N., and it probably occurs in Burma in the same latitude; at present it is only known in Tenasserim, as far north as the Dawna Hills.

93. **Draco norvilli.**

Draco norvillii Alcock, J. Asiat. Soc. Beng. lxiv, 1895, pt. ii, p. 14, col. pl. 3 (type loc. Dum Dooma, N.E. Assam; Calcutta); Smith, Rec. Ind. Mus. xxxi, 1929, p. 79.

Head moderate; snout about as long as the diameter of the orbit; nostrils directed vertically upwards; tympanum covered with small scales. Upper head-shields unequal, strongly keeled; 9 or 10 supralabials. Gular appendage of the male a little longer than the head, covered with large scales, of the female less than half the length of the head. Dorsal scales unequal, smooth or feebly keeled, the largest about as large as the ventrals, which are strongly keeled; on each side of the back a series of widely separated, enlarged, subtrihedral scales. The fore-limb extends to well beyond the tip of the snout, the hind-limb to the axilla. Male with a slight nuchal fold; no caudal crest.

Greyish or bronzy above, with metallic tints and darker spots; a more or less distinct light transverse bar across the middle of the back. Patagium of the male with three dull red (scarlet in life) transverse bands above, which bifurcate as they approach the body. In the female the first

band and inner parts of the second and third bands are dark brown. Belly immaculate, throat mottled with grey. Gular appendage pale lemon in life; inside of wattles red.

From snout to vent 108; tail 190 mm. (type).

Range. Upper Assam. Only two specimens are known, the type, a male, and a female from the Naga Hills. Both specimens are in the Indian Museum. The type is now much faded, and the colours of the patagium are hardly distinguishable.

An almost colourless and much dilapidated specimen in the Indian Museum (no. 6249) from Goalpara is, perhaps, referable to this species. It is the most westerly record of *Draco* in the Indo-Chinese Subregion.

94. Draco dussumieri.

Draco dussumieri Dum. & Bibr., Erp. Gen. iv, 1837, p. 456 (type loc. Malabar; Paris); Jerdon, J. Asiat. Soc. Beng. xxii, 1853, p. 475; Günther, Rept. Brit. Ind. 1864, p. 125, pl. xiii (head) Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 268, and Fauna Brit. Ind. 1890, p. 113; Annandale, Rec. Ind. Mus. iii, 1909, p. 254; Ferreira, J. Sci. Lisbon, (2) iv, 1897, p. 218.

Normally 6 patagial ribs. Head moderate; snout usually shorter than the diameter of the orbit; nostrils directed vertically upwards; tympanum naked. Upper head-shields unequal, strongly keeled, compressed and erect upon the canthus rostralis and anterior part of orbit; a conical scale at the posterior part of the orbit; 10 to 12 supralabials; gular appendage of male considerably longer than the head, the tip obtusely pointed, covered with scales which are about as large as the ventrals; appendage of female less than half the length of the head. Dorsal scales unequal, smooth or feebly keeled, the largest as large as the ventrals, which are strongly keeled; on each side of the back a series of tubercles each composed of several small scales. The fore-limb extends to beyond the snout, the hind-limb to the axilla, or not quite so far. Male with a slight nuchal fold and a low but distinct caudal crest.

Greyish-brown above, with darker markings; sometimes a series of dark circles on the back. Wing-membranes above purplish-black, with light, rounded spots, or marbled with black and light (colour in life not described); grey below, with a series of large black marginal spots; throat dark blue with black spots.

From snout to vent 95; tail 135 mm.

Range. Southern India (Madras, Travancore, Cochin, Malabar, Coorg, Karwar, Goa). Annandale records it "common about ten miles north of Trivandrum, but apparently very local." Often found in coconut and betel-nut plantations.

Genus SITANA.

Sitana Cuvier, Règne Anim. 2nd ed. ii, 1829, p. 43 (type *ponticeriana*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 270, and Fauna Brit. Ind. 1890, p. 114.
Semiophorus Wagler, Syst. Amphib. 1830, p. 152 (same type).

Body compressed, covered with regular keeled scales, smallest on the flanks; no dorsal crest; limbs long, five fingers, fifth toe absent. Male with a large folding gular appendage extending backwards on to the belly. Tympanum naked. No preanal or femoral pores.

Range. India; Ceylon. A single species.

95. Sitana ponticeriana.

Sitana ponticeriana Cuvier, l. c. s. (type loc. Pondicherry; Paris); Guérin, Icon. Règ. Anim., Rept. 1844, pl. x, fig. 2; Duvernoy, Règ. Anim., Rept. 1846 pl. xvi, fig. 2; Jacquemont, Voy. dans l'Inde, Zool., Atlas, ii, 1844, pl. x; Jerdon, J. Asiat. Soc. Beng. xxii, 1853, p. 473 and P. Asiat. Soc. Beng. 1870, p. 76; Blanford, J. Asiat. Soc. Beng. xxxix, 1870, p. 365; Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 108; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 270, and Fauna Brit. Ind. 1890, p. 114; Annandale, Mem. Asiat. Soc. Beng. i, 1906, p. 187; Gnanamuthu, Rec. Ind. Mus. xxxii, 1930, p. 149, figs.; Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 141.
Sitana minor Günther, Rept. Brit. Ind. 1864, p. 135, pl. xiv, fig. A (type loc. Madras dist.; London); Anderson, Proc. Zool. Soc. 1871, p. 166.
Sitana deccanensis Jerdon, P. Asiat. Soc. Beng. 1870, p. 76 (type loc. Deccan; type lost).

Length of head not quite one and a half times its breadth; snout a little longer than the orbit. Upper head-scales unequal, strongly keeled; canthus rostralis and supraciliary edge sharp; diameter of the tympanum half that of the orbit; upper dorsal scales largest, with strong keels; laterals smallest, uniform or mixed with larger scales, the upper and anterior ones pointing upwards and backwards. Limbs above with uniform strongly keeled scales; fourth toe extending well beyond third, fifth toe absent; the hind-limb reaches to the front of the eye or to beyond the snout. Tail round, slender, covered with equal keeled scales. Male with a low nuchal crest and a very large folding gular appendage, which extends backwards to about the middle of the belly; it is covered with very large scales. Female without any trace of appendage.

Light or dark brown above, with a series of dark brown, black-edged, rhomboidal spots along the middle of the back; a more or less distinct light line along each side of the spots, and sometimes a light vertebral line dividing them; flanks, top of head, and upper surfaces of limbs with or without dark markings; whitish below.

Two forms can be defined, but intermediates, which cannot definitely be assigned to either, are not uncommon :—

(1) A larger form. From snout to vent 70–80 mm. ; tail once and a half to twice the length of the head and body ; hind-limb not reaching to beyond the snout ; lateral scales not intermixed with larger ones ; no enlarged scales on the occiput. This form appears to be confined to the district around Bombay.

(2) A smaller form. From snout to vent 40–50 mm. ; tail two to three times the length of the head and body ; hind-limb reaching to beyond the tip of the snout ; lateral and occipital scales intermixed with larger ones. This form ranges over the rest of India and Ceylon.

The typical form is from Pondicherry, and Günther's *minor*, from Madras, is, therefore, a synonym of it. For the larger



Fig. 43.—Foot of *Sitana ponticeriana*. (After Boulenger.)

form, if two geographical races can be proved, Jerdon's *deccanensis* is available.

Range. The whole of India up to the Himalayan foot-hills ; not recorded from Sind, or Bengal east of the Ganges ; Ceylon.

Sitana ponticeriana is a common lizard in many districts throughout India, preferably in dry and more or less open country. It can run with considerable speed, and on the approach of danger dashes away, with tail-tip erect, until it finds refuge in some hole or crack in the ground or in bush. When running quickly it often adopts a bi-pedal method of locomotion. Annandale (1906) found it very common throughout Ramnad, both on the sea-shore immediately above high-water level and inland. Deraniyagala (1931) states that it "comes out to bask on the sand, which is unbearably heated by the mid-day sun, and runs with great celerity over short distances. When excited it unfolds and folds its gular appendage very rapidly several times in succession, producing the appearance of flickering sparks of light."

The brilliant coloration of this appendage is assumed only in the breeding season. Within certain limits the colours are subject to variation. The anterior portion is blue or bluish-grey, the central portion deep blue-black, and the posterior part pink or red, but the depth and extent of the colour and, apparently, even the colours themselves are subject to variation. Whether this variation can be associated with geographical areas has yet to be shown. During courtship the male stands with its fore-quarters well raised from the ground and the hind-quarters pressed on the base of the tail, the end of which is raised in the air, alternately folding and unfolding his gular appendage. The female, or females, remain concealed near at hand. Six to eight eggs are laid, and are buried in the soil. Annandale observed courtship in S. India in the latter half of August. Deraniyagala records numerous newly-hatched young at Trincomali on Oct. 14th.

Genus **OTOCRYPTIS.**

Otocryptis Wagler, Syst. Amphib. 1830 (type *wiegmanni*); Wiegmann, Isis, 1831, p. 291 (type *bivittata*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 271, and Fauna Brit. Ind. 1890, p. 115.

Body compressed; dorsal scales unequal, keeled; no dorsal crest; limbs long and slender; fifth toe very short, not longer than the first. Male with a low nuchal crest and with or without a large folding gular appendage extending backwards on to the belly. Tympanum hidden. No preanal or femoral pores.

Range. S. India and Ceylon. Two species.

Key to the Species.

No pit in front of the shoulder; male with a gular appendage	*wiegmanni*, p. 146.
A pit in front of the shoulder; male without a gular appendage	*beddomii*, p. 147.

96. Otocryptis wiegmanni.

Otocryptis wiegmanni Wagler, Syst. Amphib. 1830, p. 150 (type loc. "America", Berlin).

Otocryptis bivittata Wiegmann, Isis, 1831, p. 291 (type loc. unknown); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 271, and Fauna Brit. Ind. 1890, p. 115; Green, J. Bombay Nat. Hist. Soc. xiv, 1903, p. 817; Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 142.

Length of head scarcely one and a half times its breadth; snout longer than the orbit. Upper head-scales unequal, strongly keeled, those above the eye large and arranged in longitudinal series, the inner row extending forwards and

forming a ʌ shaped figure on the snout; a series of 4 or 5 small scales across the interorbital region; canthus rostralis and supraciliary edge sharp; 9 to 11 upper and as many lower labials. Dorsal scales keeled, intermixed with larger ones, the upper and anterior pointing backwards and upwards; the lower and posterior more or less backwards and downwards; ventral scales largest, strongly keeled. Limbs very long and slender, with very large, strongly keeled scales; fourth toe extending well beyond third; the hind-limb reaches to far beyond the tip of the snout. Tail round, slender, covered with subequal keeled scales. Male with a low nuchal fold and a very large gular appendage, which extends backwards to about the middle of the belly; it is covered with very large scales. Female without any trace of appendage.

Brownish above with darker markings; a dark cross-bar between the eyes and usually dark bars across the back, best marked in the young; generally a light band from the eye to the angle of the mouth; males often with a light stripe along each side of the back, light brownish below; throat of female sometimes dark bluish.

Deraniyagala (1931) writes of the colours in life:—"Green, interchangeable with chocolate; males darker than females; gular appendage green, marked with a red blotch having a black centre."

From snout to vent 70; tail 180 mm.

Range. Ceylon. Common at Peradeniya. A ground-lizard preferring the neighbourhood of shady forest streams. Found in the lowlands and in the hills. When running fast its action is bi-pedal.

Eggs three or four in number. According to Deraniyagala there appears to be no definite breeding season.

Wiegmann's description of his genus and species in 'Isis' is dated May 1830, when it was presumably submitted for publication; but it did not appear until 1831. It is evident that in the meantime Wagler appropriated Wiegmann's generic name and substituted his own specific name *wiegmanni* for Wiegmann's *bivittata*.

97. Otocryptis beddomii.

Otocryptis beddomii Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 272, pl. xxiii, fig. 1, and Fauna Brit. Ind. 1890, p. 116 (type loc. Sivagiri Ghat, S. India; London and Calcutta).

Length of head scarcely one and a half times its breadth; snout a little longer than the orbit; upper head-scales rather large, unequal, strongly keeled, those on the interorbital

region scarcely smaller than the others, 2 or 3 only in transverse series between the orbits; canthus rostralis and supraciliary edge sharp; 9 to 11 upper and as many lower labials; dorsal scales keeled, intermixed with larger ones which point backwards and upwards and are usually arranged in regular chevrons; scales on the lower parts of the flank pointing backwards and downwards; ventral scales about as large as the enlarged dorsals, strongly keeled. Limbs long and slender, covered above with large, subequal, keeled scales. The hind-limb reaches to well beyond the snout in the male, to just beyond in the female. Tail round, slender, covered with subequal keeled scales. A short but distinct pit in front of the shoulder; gular sac in the male indicated by a slight longitudinal fold; no gular appendage.

Light brown above, the vertebral region paler than the flanks, and with or without a series of brown transverse vertebral spots, corresponding in position to the chevrons



Fig. 44.—Foot of *Otocryptis beddomii*.
(After Boulenger.)

of enlarged scales upon the back. A dark bar on the forehead and dark bars on the limbs.

From snout to vent 45; tail 80 mm.

The types are five in number, two females and three juveniles. They were collected by Colonel Beddome on grass at Sivagiri Ghat, Cardamom Hills, S. India, at 4,300 feet elevation.

The measurements given above are from the largest female. The other specimen (Ind. Mus. no. 15733), which is not quite so large, contains three eggs. One may assume, therefore, that the largest female is fully or almost fully grown. Ferguson obtained two more specimens in Travancore. One of these is a male measuring 40 mm. from snout to vent. It shows no trace of a gular appendage. In the juvenile *O. wiegmanni*, even at birth, the appendage of the male, although not developed, is clearly shown by the different scalation.

Genus PTYCTOLÆMUS.

Otocryptis (*Ptyctolæmus*) Peters, Mon. Akad. Berlin, 1864, p. 386 (type *gularis*).—*Ptyctolæmus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 273, and Fauna Brit. Ind. 1890, p. 117.

Body compressed; dorsal scales unequal, keeled; a low nuchal fold; no dorsal crest. Throat with three parallel longitudinal folds on each side of the middle, curved, and converging posteriorly to form a U-shaped figure. Tympanum hidden. No preanal or femoral pores.

A single species.

98. Ptyctolæmus gularis.

Otocryptis (*Ptyctolæmus*) *gularis* Peters, Mon. Akad. Berlin, 1864, p. 386 (type loc. "Calcutta"; Berlin).—*Ptyctolæmus gularis*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 273, and Fauna Brit. Ind. 1890, p. 117; Annandale, J. & P. Asiat. Soc. Beng. (n. s.) i, 1905, p. 85, and Rec. Ind. Mus. viii, 1914, p. 41; Wall, J. Bombay Nat. Hist. Soc. xviii, 1908, p. 505; Hora, Rec. Ind. Mus. xxviii, 1926, p. 215, pl. xii, figs. 1–3.

Head rather long and narrow, its length nearly twice its breadth; snout longer than the orbit; upper head-scales



Fig. 45.—Throat and foot of *Ptyctolæmus gularis*. (After Boulenger.)

unequal, rather large, strongly keeled; canthus rostralis and supraciliary edge sharp. Dorsal scales unequal, the smaller feebly, the larger strongly keeled, the upper few rows pointing backwards and upwards or straight backwards, the lower backwards and downwards; ventrals as large as the large dorsals, strongly keeled and mucronate. Limbs moderate; third and fourth fingers equal; fourth toe much longer than third; the hind-limb reaches to the ear or the eye. Tail rounded, slender, covered with subequal keeled scales. Male with a low nuchal fold. The gular

pouch is longer and better developed in the male than in the female, and is evidently capable of considerable distention.

Olive-brown above, with darker transverse bars or spots; two curved dark brown cross-bars, separated by a light one, between the eyes; a dark stripe from below the eye to the angle of the mouth; limbs and tail above with dark cross-bars; yellowish-white below. Throat sometimes blue; the folds always very dark blue.

From snout to vent 80; tail 170 mm.

Range. Assam, south of the Brahmaputra. Found in the hills; Wall records it common round about Shillong in the Khasi Hills at 4,500 feet.

Genus **COPHOTIS.**

Cophotis Peters, Mon. Akad. Berlin, 1861, p. 1103 (type *ceylanica*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 275, and Fauna Brit. Ind. 1890, p. 117; Smith, Bull. Raffles Mus. no. 3, 1930, p. 26.

Body compressed; dorsal scales very large, unequal, irregularly disposed; a nuchal and a dorsal crest; a small gular sac. Tail prehensile. No tympanum. No preanal or femoral pores.

Range. Two species are known, one inhabiting Ceylon, the other Sumatra and Java.

99. **Cophotis ceylanica.**

Cophotis ceylanica Peters, Mon. Akad. Berlin, 1861, p. 1103 (type loc. Ceylon; Berlin); Günther, Rept. Brit. Ind. 1864, p. 132, pl. xiii, fig. H; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 275, and Fauna Brit. Ind. 1890, p. 118; Willey, Spol. Zeyl. iii, 1906, p. 235, pl. — and text-fig.; Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 148, pl. xxxiv.

Head long and narrow, its length twice its breadth; snout obtusely pointed, distinctly longer than the orbit; upper head-scales large, unequal, tubercular, a tubercle on the tip of the snout; two in front of the eyes, four on the occiput and others on the side of the head being distinct, these tubercles formed by bony prominences of the skull; 8 to 10 upper and as many lower labials. Dorsal scales very large, unequal, irregularly disposed, smooth or shortly keeled, strongly imbricate, pointing backwards and downwards; ventral scales smaller, strongly keeled, mucronate. Limbs above with large keeled scales; digits rather short, fourth toe scarcely longer than third; the hind-limb reaches to the axilla or not so far. Tail rather short, feebly compressed, covered with keeled scales, those below being much narrower

than those above. Nuchal crest of male composed of three or four lanceolate spines, the longest of which equals the length of the orbit; dorsal crest usually not continuous with the nuchal, composed of 12 to 15 similar spines separated from one another; crest of female much lower. A small gular sac, largest in the male.

Olive-green above, with lighter and darker markings. A reddish-brown or cream-coloured stripe along the upper lip extending on to the shoulder always present; a light spot on the nape, a broad light stripe across the fore-part of the back and body and one in front of the eyes frequently present; throat of male usually with a dark streak along each side of the lower jaw, and dark longitudinal lines in

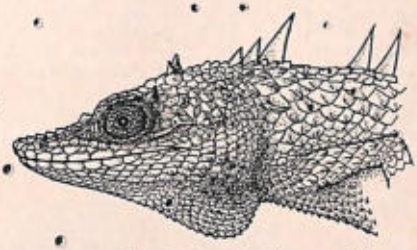


Fig. 46.—*Cophotis ceylanica*. ×1½.

between; rest of lower parts whitish; tail with alternating light and dark annuli.

From snout to vent 60; tail 85 mm.

Deraniyagala describes it as a slow-moving arboreal form found about the moss-covered bases of tree-trunks in mountain districts. Found up to 7,000 feet altitude.

Cophotis ceylanica is viviparous, a condition, except in *Phrynocephalus*, unknown amongst the Agamidæ. Willey has given an interesting account of his discovery of this phenomenon.

Genus CERATOPHORA.

Ceratophora Gray, Ill. Ind. Zool. ii, 1834, pl. lxviii, fig. 2 (type *stoddartii*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 277, and Fauna Brit. Ind. 1890, p. 118.
Lyriocephalus (in part) Theobald, Cat. Rep. Brit. Ind. 1876, p. 99.

Body compressed; dorsal scales unequal; a low nuchal fold or crest, no dorsal crest; no gular sac; a rostral appendage, large in the male. No tympanum. No preanal or femoral pores.

Range. The mountainous districts of Ceylon.

Key to the Species.

Gular scales larger than the ventrals, smooth or feebly keeled; lateral scales large, very unequal; rostral appendage smooth, pointed. *stoddarti*, p. 152.

Gular scales larger than the ventrals, keeled; lateral scales large, nearly equal; rostral appendage scaly, suboval ..... *tennenti*, p. 153.

Gular scales smaller than the ventrals; rostral appendage scaly, pointed ..... *aspera*, p. 154.

100. Ceratophora stoddarti.

Ceratophora stoddartii Gray, Ill. Ind. Zool. ii, 1834, pl. 68, fig. 2 (type loc. Ceylon; London); Kelaart, Prod. Faunæ Zeyl. 1852, p. 165; Günther, Rept. Brit Ind. 1864, p. 129, pl. xiii, figs. F; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 277, and Fauna Brit. Ind. 1890, p. 119; Boettger, Ber. Offenb. Ver. Nat. 29–32, 1892, p. 69; Willey, Spol. Zeyl. iii, 1906, p. 236; Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 144.

Length of head once and a half to twice its breadth; snout longer than the orbit; upper head-scales large,

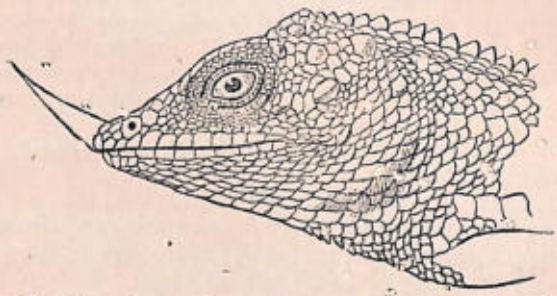


Fig. 47.—*Ceratophora stoddarti*. (After Boulenger.)

irregular, the supraorbital ones keeled; canthus rostralis sharp; occiput with regular tubercles; 9 to 11 upper and as many lower labials. Dorsal scales very unequal, smooth or feebly keeled, pointing backwards and upwards; gular scales large, subquadrangular, smooth or feebly keeled, forming regular longitudinal rows, those on the median line smaller; ventral scales smaller than the gular, smooth or feebly keeled. Limbs moderate; fourth toe extending well beyond third; the hind-limb reaches to the eye, or not quite so far. Tail slightly compressed, slender, covered with subequal keeled scales. A low denticulated nuchal fold. Rostral appendage smooth, pointed, flexible, about as long as the snout in the male, shorter, occasionally reduced to a mere tubercle, in the female.

Olive-green above, with more or less distinct brown cross-bars on the back, sides, and limbs; frequently a white mark behind the eye and another on the side of the neck. Rostral appendage white, and often the upper lip and throat also; belly usually greyish; tail with light and dark annuli. Deraniyagala states of the colours in life: "A broad vertebral band of cinnamon replaceable by green; lower row of lateral scales sometimes yellow; a yellow ring at elbow and knee." A specimen from Pattipola (Ind. Mus. no. 16619) has a light dorso-lateral line, formed by a row of enlarged scales.

From snout (excluding rostral appendage) to vent 85; tail 175 mm.

Range. The mountains of Ceylon at high altitudes.

The two specimens in the Indian Museum, said to have come from the Garo Hills, are no doubt incorrectly labelled as regards locality.

Willey states that the eggs are laid in small holes in the ground. He writes:—"I came across such a hole containing four freshly laid, soft-shelled eggs in the Hakgala jungle (5,500 feet) in January and disturbed the female, who was apparently attending to it. *C. stoddarti* is usually found clinging to the trunks of trees or the stems of shrubs and saplings in a vertical attitude, with the rostral appendage directed upwards. This appears to be its normal resting attitude, and it remains motionless for hours together. Its food consists in large part of earthworms, to obtain which it descends to the ground. The female descends to the ground also for the purpose of egg-laying, the mating taking place on the stem of a young or small tree."

101. Ceratophora tennenti.

Ceratophora tennenti, Günther, in Tennent's Nat. Hist. Ceylon, 1861, p. 281, fig., and Rept. Brit. Ind. 1864, p. 130 (type loc. Ceylon; London); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 278, and Fauna Brit. Ind. 1890, p. 120; Deraniyagala, Ceylon J. Sci. B, xvi, 1931, p. 145.

Differs from *C. stoddarti* in the following particulars:—Lateral scales large, more equal-sized and more regularly disposed, smooth or feebly keeled; gular and ventral scales always keeled, the latter strongly; scales of limbs and tail more strongly keeled; the hind-limb reaches to the eye or beyond. Rostral appendage large in both sexes, fleshy, compressed, suboval, covered with small scales, its length shorter than that of the snout.

Olivaceous or greyish, with a series of dark brown dorsal spots; a dark brown mark on the snout and an angular bar across the eyes; a white streak from the eye to the

angle of the jaw; limbs and tail with dark bars; all the markings most distinct in the young, in which sometimes they are arranged to form longitudinal streaks down the back.

From snout to vent (excluding the rostral appendage) 70; tail 135 mm.

Range. The mountainous regions of Ceylon above 3,000 feet. It feeds on insects and earth-worms; to find which it often descends to the ground. Its movements are rather slow.

102. Ceratophora aspera.

Ceratophora aspera Günther, Rept. Brit. Ind. 1864, p. 131, pl. iii, fig. G (type loc. Ceylon; London); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 278, and Fauna Brit. Ind. 1890, p. 120; Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 146.

Size much smaller than the two preceding. Upper head-shields irregular, strongly, often spinously, keeled; inter-orbital region deeply concave; occiput with prominent, symmetrical tubercles and a Λ-shaped ridge in the middle of it; upper and lower labials strongly keeled. Dorsal and lateral scales moderate, strongly keeled, intermixed with larger, very strongly keeled, often spinously produced scales; gular scales not larger than the ventral, uniform, strongly keeled; ventrals very strongly keeled, the end of the keel often spinously produced. Scales of limbs, digits, and tail very strongly keeled; the hind-limb reaches to the occiput. No nuchal crest; rostral appendage in the male cylindrical, elongate, covered with small, strongly keeled scales and terminating in a pointed tubercle, its length more than half that of the head; appendage of the female much shorter, similarly scaled except for the terminal tubercle.

Brownish above, with lighter and darker markings or longitudinal lines; females sometimes with a dorsal series of dark brown spots or V-shaped markings; generally a rhombic mark on the sacral region; males often with a large white spot across the throat and white spots on the limbs. Rest of underparts brown. Deraniyagala states that the throat and upper lip are orange in life, and that there is a vertebral stripe of bluish-grey (♀) or greenish-brown (♂).

From snout to vent (excluding rostral appendage) 37; tail 45 mm.

Range. Ceylon. A mountain form, essentially a ground-dweller; slow-moving, and found among fallen leaves in jungle (*Deraniyagala*). The name *aspera* for this lizard is a most appropriate one.

Genus LYRIOCEPHALUS.

Lyriocephalus Merrem, Tent. Syst. Amphib. 1820, p. 49 (type *margaritaceus*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 281, and Fauna Brit. Ind, 1890, p. 121.

Body compressed; dorsal scales unequal, small ones intermixed with much larger ones. A nucho-dorsal crest. A prominent bony supraorbital arch in the adult formed by prolongations of the pre- and postfrontal bones, thus forming a supraorbital vacuity. Tympanum absent; a V-shaped gular fold. A globular protuberance on the nose in the adult. No preanal or femoral pores.

Range. Ceylon. A single species.

103. Lyriocephalus scutatus.

Lacerta scutata Linn., Syst. Nat. ed. x, 1758, p. 201 (based on Seba, i, p. 173, pl. 109, fig. 3; type loc. "Amboyna").—*Lyriocephalus scutatus*, Kelaart, Prod. Faun. Zeyl. 1852, p. 166; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 281, and Fauna Brit. Ind. 1890, p. 121; Gadow, Amphib. and Rept. 1901, p. 517, text-fig.; Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 147, pl. 33, and xvii, 1932, p. 46.

Iguana plamosa Laurenti, Syn. Rept. 1768, p. 49 (based on Seba, l. c. s.).

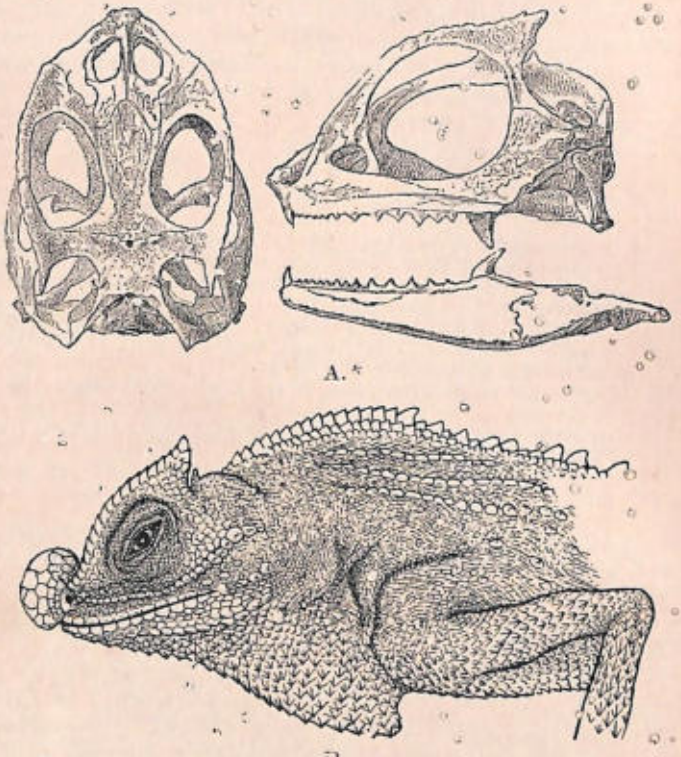
Lyriocephalus margaritaceus Merrem, Tent. Syst. Amphib. 1820, p. 49 (based on Seba, l. c. s.).

Lyriocephalus macgregorii Gray, Ill. Ind. Zool. ii, 1834, pl. lxviii, fig. 1.

Upper head-scales very unequal, keeled; a prominent crest over each eye, extending forwards nearly to the nostril, terminating posteriorly in a triangular compressed spine; a pair of small spines on the occiput; a series of 20 to 25 enlarged keeled scales on each side of the head starting from near the nostril, passing below the eye and terminating on the temple, the last two or three very large; 12 to 15 upper and as many lower labials. Body strongly compressed; dorsal scales small, smooth, pointing upwards and backwards, intermixed with much larger scales; on the nape and upper parts of the back these form regular longitudinal series, lower down they are more scattered and are very strongly keeled. Gular scales large, shortly keeled, arranged in regular rows; ventral scales smaller, strongly keeled. Limbs above with unequal keeled scales; fourth toe extending well beyond third; the hind limb reaches to the neck. A low nuchal crest formed of a cutaneous fold, with closely set triangular scales above; dorsal crest continuous with it, composed of triangular scales which are separated from one another. Tail rather short, strongly compressed, with blunt tip, crested above, covered on the sides and below with large, strongly

keeled scales, the latter being much longer than broad. Gular pouch well developed in both sexes, larger in the male than in the female. A globular hump on the end of the snout in the adult, absent in the young. It is composed of dense spongy tissue within, and is covered with large smooth scales.

Leaf-green above, whitish below. Gular sac and antehumeral fold yellow in life, the enlarged scales of the sac



A. B.

Fig. 48.—*Lyriocephalus scutatus.*
A. Skull. (After Boulenger.)
B. Head of adult male, nat. size.

green; belly sometimes bluish. The young are brown in colour.

From snout to vent 170; tail 170 mm.

Range. Ceylon; the hilly districts. Very common, according to Kelaart, in the neighbourhood of Kandy. It feeds chiefly on insects, but will also take fruit and other vegetable matter; in captivity it will eat boiled rice. An active creature, of both arboreal and terrestrial habits. Gadow's statement

that the pollex and fifth toe are strongly opposed to the other digits, and his figure showing the lizard grasping a branch are not correct. Neither the hand nor foot have any grasping power in the sense that the Chameleon has it. Deraniyagala (1932) states that four eggs are laid. They are buried in the soil and measure 24 by 15 mm. in size.

Genus GONIOCEPHALUS.

Gonocephalus Kaup, Isis, 1825, p. 590, corrected to *Goniocephalus*, 1827, pp. 610 & 614 (type *tigrinus* = *chamæleontinus*).—*Gonyocephalus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 282, and Fauna Brit. Ind. 1890, p. 122; De Rooij, Rept. Indo-Austr. Archipel. i, 1915, p. 99.

Lophyrus (not of Poli, 1791) Fitzinger, Class. Rept. 1826, p. 49 (type *kuhli*).

Acanthosaura Gray, in Griffith's Anim. King. ix, 1831, Suppl. p. 5 (type *armata*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 299, and Fauna Brit. Ind. 1890, p. 124, and later authors (in part).

Tiaris (not of Swainson, 1827) Dum. & Bibr., Erp. Gen. iv, 1837, p. 419, and Atlas, pl. 46 (type *dilophus*).

Lophosaurus Fitzinger, Syst. Rept. 1843, pp. 15 & 45 (subst. name for *Tiaris*).

Dilophyrus Gray, Cat. Liz. Brit. Mus. 1845, p. 238 (type *grandis*).

Coryphophylax Fitzinger, S.B. Akad. Wiss. Wien, xl, 1861, pp. 387, 399 (*nom. nud.*).—*Coryphophylax* (Fitzinger), Steindachner, Reise Novara, Rept. 1867, p. 30 (type *maximiliani*).

Hypsilurus Peters, Mon. Akad. Berlin, 1867, p. 707 (type *godeffroyi*).

Arua Doria, Ann. Mus. Civ. Genova, vi, 1874, p. 345 (type *inornatus*).

Lophosteus Peters & Doria, Ann. Mus. Civ. Genova, xiii, 1878, p. 377 (type *albertisii*).

Body usually strongly compressed; dorsal scales unequal, heterogeneous; a dorsal crest; a gular pouch usually present; a strong fold in front of the shoulder usually extending across the throat; tympanum naked. Tail compressed, the scales below strongly keeled and longer than broad (fig. 49); no swelling or alteration of the scales at the base of the tail. No preanal or femoral pores.

Range. Indo-China; the Malayan Subregion and Indo-Australian Archipelago; the Philippine Islands.

Key to the Indo-Chinese Species.

1. A spine behind the orbit and one on the side of the neck.
   - Postorbital and nuchal spines nearly or quite as long as the orbit; no gular pouch ..... *a. armatus*, p. 158.
   - Postorbital and nuchal spines variable in length; a gular pouch ..... *a. crucigerus*, p. 160.
   - Postorbital and nuchal spines not half as long as the orbit; no gular pouch ..... *lepidogaster*, p. 161.
2. A postorbital spine; none on the neck ..... *caprø*, p. 162.
3. No spine on head or neck ..... *subcristatus*, p. 163.

Goniocephalus subcristatus is an entrant from the Malayan Subregion and rightly belongs to that fauna. Of the others *G. capra* appears to be distinct, but the precise status of the remaining three is not so clear. The extremes of each, when adult, are easily recognized, but there are individuals, apparently almost fully grown, from S. Burma and Siam to which it is difficult to give a name.

The characters upon which recognition depends, namely, the degree of development of the spines of the head and the nucho-dorsal crest, and the presence or absence of a gular pouch, are, unfortunately, adult characters, and the age at which these develop appears to be variable.

I have not yet seen adult specimens of *armatus* except from the extreme south of the Indo-Chinese Subregion—just north of the Isthmus of Kra. Between this region and that occupied by its northern representative, *lepidogaster*, there is an area in which, so far, only *crucigerus* has been met with. The types of the latter are from Tavoy, and the gular sac in individuals from that area, as in those from the northern part of the Malay Peninsula and Northern Siam, is never very large. Its maximum development is attained in the eastern part of its range, namely, S.E. Siam and southern Indo-China.

In their habits all three forms are terrestrial and subarboreal; when disturbed in undergrowth they take to the ground rather than to the trees, and, as they are not particularly fast, can be caught without much difficulty. They prefer dense jungle, and where they occur are generally common. Pope found them (*lepidogaster*) in rocky country among heavy undergrowth; when chased they disappeared into crevices in the rocks. Their food consists of insects, grubs, and worms. They have considerable power of changing colour. Ten or twelve eggs, about 12 by 20 mm. in size, are laid at a time.

104. Goniocephalus armatus armatus.

Agama armata Gray, Zool. Journ. iii, 1827, p. 216 (type loc. Singapore; London).—*Acanthosaura armata*, Gray, Cat. Liz. Brit. Mus. 1845, p. 240; Günther, Rept. Brit. Ind. 1864, p. 148 (in part); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 301, pl. xxii, fig. 1, and Fauna Brit. Ind. 1890, p. 125 (in part); S. Flower, Proc. Zool. Soc. 1899, p. 638 (in part); Smith, J. Nat. Hist. Soc. Siam, ii, 1916, p. 154 (in part).

Length of head less than one and a half times its breadth; snout shorter than the orbit; forehead deeply concave; upper head-scales unequal, obtusely keeled, those on the back of the head sometimes much smaller; canthus rostralis and supraciliary edge strongly projecting; a long spine, nearly or quite as long as the orbit, at the end of the supercilium; another similar one on the back of the head, mid-way

between the tympanum and the nuchal crest, usually with smaller spines or enlarged scales at the base; tympanum one-third to one-half the diameter of the orbit; 10 to 13 upper and as many lower labials. Dorsal scales very small, keeled, intermixed with much larger, strongly keeled ones; the upper scales point almost directly upwards, the lateral backwards and upwards, sometimes downwards; ventrals as large as the largest dorsal, strongly keeled; no gular sac; gular scales strongly keeled, smaller than the ventrals; a strong oblique fold in front of the shoulder, almost extending across the throat. Nuchal crest composed of long, narrow,

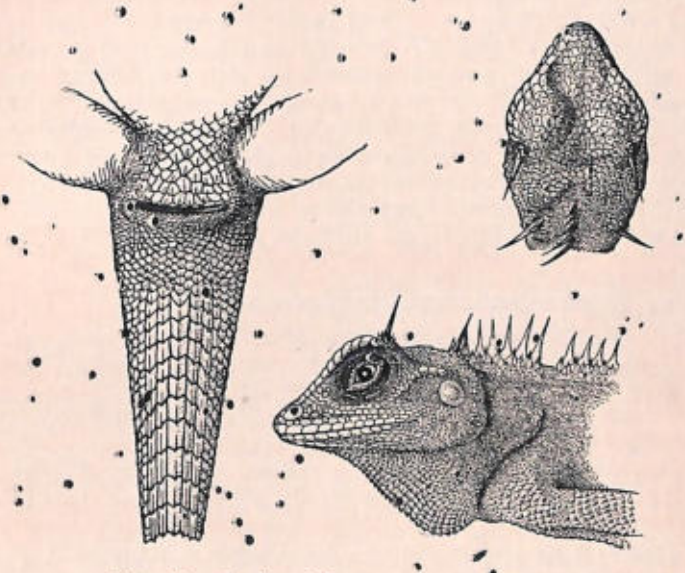


Fig. 49.—*Goniocephalus armatus crucigerus.*

Upper and side views of head and under surface of base of tail.

compressed spines, with two or three rows of shorter ones at the base; the longest spine may exceed the diameter of the orbit in the fully grown; dorsal crest not continuous with the nuchal, almost as high at its commencement, diminishing in size until it becomes a low ridge over the sacrum and on the base of the tail. Limbs moderate; third and fourth fingers equal or nearly so, fourth toe distinctly longer than third; the hind-limb reaches to the ear or the eye. Tail feebly compressed, subtriangular at the base, covered with equal keeled scales above, strongly keeled and elongated scales below.

Colour very variable; olive, grey, brown or blackish, with light and dark marblings in the sides; a large dark diamond-shaped patch on the neck and a triangular one on the side of the head enclosing the eye often present, the rest of the head being light green or yellow; crown of head with or without dark cross-bars; dark lines sometimes radiating from the eyes; a strong tinge of red upon the dorsum often present; belly whitish, uniform or spotted with black; tail alternately barred with light and dark.

From snout to vent 155; tail 160 mm.

Range. Sumatra and the Malay Peninsula to just north of the Isthmus of Kra.

Variation. There is considerable variation in the proportions of the head, the breadth and amount of concavity of the forehead, and the extent to which the large scales upon the top of the head extend backwards and replace the small scales upon the occiput; the enlarged scales upon the sides of the body may be single or in small groups; occasionally the nuchal crest is continuous with the dorsal.

There are coloured illustrations by Hardwicke (no. 75 of his collection) of this lizard obtained in Singapore.

104 *a*. Goniocephalus armatus crucigerus.

Acanthosaura armata Blanford, J. Asiat. Soc. Beng. xlviii, 1879, p. 130, and (in part) Günther, Boulenger, Flower, and Smith, as in synonymy of *armatus*).

Acanthosaura crucigera Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 302, pl. xxii, fig. 2 (type loc. Tavoy, Tenasserim; London), and Fauna Brit. Ind. 1890, p. 125.

Acanthosaura horrescens Lönnberg, Kungl. Sv. Vet.-Akad. Handl. Bd. 55, no. 4, 1916, p. 5 (type loc. Doi Nga Chang, north of Pre, N. Siam; Stockholm).

Differs from *armatus* in the following characters:—A more or less distinct gular sac; spines of the nuchal and dorsal crests usually broader at the base; spine on the neck very variable in length, in some as long as the orbit, in others very short; size larger.

From snout to vent 140; tail 240 mm.

Range. Peninsular Siam (Patani, Isthmus of Kra); Tenasserim and the adjacent hills in Siam; hills north of Pre and Dong Paya Fai Mountains in N. Siam; S.E. Siam (Chantaburi district, Koh Chang) and the adjacent territory in Cambodia. Delacour and Lowe obtained one specimen at Dak-to in Annam (lat. 15° N.). This individual (Brit. Mus. 1927.5.20.33) has no occipital spines and was first identified as *capra*; the enlarged scales at the base of the long spine are present, however, and I therefore regard it as *crucigerus*.

This view is supported by an undoubted specimen of *crucigerus* from Cambodia (Brit. Mus. 1921.2.1.111–7) in which the occipital spines are extremely short.

I found this lizard fairly common round Bokor (alt. 3,000 feet) in the Kamchay Mountains, Cambodia. As already pointed out (p. 158), the gular sac is smaller in specimens from the western part of its range than in those from the eastern part.

105. Goniocephalus lepidogaster.

Calotes lepidogaster Cuvier, Règne Anim. 2nd ed. ii, 1829, p. 39 (type loc. Cochin-China; Paris).

Lophyrus tropidogaster Dum. & Bibr., Erp. Gen. iv, 1837, p. 413, emendation for *lepidogaster* Cuvier.

Acanthosaura coronata Günther, Proc. Zool. Soc. 1861, p. 187 (type loc. Cambodia; London) and Rept. Brit. Ind. 1864, p. 149, pl. xiv, fig. E; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 303.

Acanthosaura lamnidentata Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 302, pl. xxii, fig. 3, and Fauna Brit. Ind. 1890, p. 126 (type loc. Pegu, Tenasserim; London), and Ann. Mus. Civ. Genova, (2) xiii, 1893, p. 316, and Proc. Zool. Soc. 1899, p. 160; Annandale, J. Asiat. Soc. Beng. (2) i, 1905, p. 85 (in part); Parker, Ann. Mag. Nat. Hist. (9) xv, 1925, pp. 302, 304; Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 480; Pope, ibid. lviii, 1929, p. 370.

Acanthosaura hainanensis Boulenger, Proc. Zool. Soc. 1899, p. 957, pl. lxvi, fig. 2 (type loc. Five Finger Mt., Hainan; London); Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 414.

Acanthosaura braueri Vogt, Sitz. Gesell. Nat. Fr. Berlin, 1914, p. 97 (type loc. S. China; Berlin); Mell, Arch. f. Nat. Berlin, lxxxviii, 1922, p. 112.

Differs from *armatus* in the following characters:—Body less compressed, particularly in specimens from the eastern part of its range; postorbital and occipital spines shorter, not more than half the diameter of the orbit; nuchal crest shorter, the spines broader and more triangular in shape; dorsal crest a prominent ridge, composed of broad, triangular scales; hind-limb longer, often extending to the tip of the snout or even beyond.

Boulenger in his Catalogue (1885) regarded Günther's *coronata*, in which the nuchal and dorsal crests are continuous, as distinct from his *lamnidentata*, in which the nuchal and dorsal crests are separated. Examination of large series of this lizard, however, show that this distinction is not a sound one. In individuals in which the crests are continuous the line of demarcation between the two is always clear, the commencement of the dorsal crest being indicated by very short spines. In some examples these short spines are absent and the crests would then be regarded as discontinuous. Except for this distinction I can find nothing to separate *lamnidentata* from *coronata*.

As a rule *G. lepidogaster* does not grow as large as *armatus*, the majority of individuals being from 10 to 15 mm. shorter in length of head and body.

Range. Hills of S. Burma (Pegu district and Karen Hills); N. Siam; Cambodia; the Langbian Plateau, S. Annam and French Indo-China north of that region; Hainan; S. China.

An examination of Cuvier's types in Paris leaves no doubt as to the correct name of this form.

106. Goniocephalus capra.

Acanthosaura capra Günther, Proc. Zool. Soc. 1861, p. 188 (type loc. Cambodia; London), and Rept. Brit. Ind. 1864, pl. xiv, fig. F; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 300.

Length of head less than one and a half times its breadth; snout shorter than the orbit; forehead concave; upper head-scales unequal, obtusely keeled, those on the back of the head much smaller; canthus rostralis and supraciliary edge strongly projecting; a long spine at the posterior end of the supercilium; no spine or group of enlarged scales on the back of the head; diameter of tympanum one-third that of the orbit; 10 to 12 upper and as many lower labials. Dorsal scales very small, intermixed with larger scattered ones, which are strongly keeled; the upper scales point almost directly upwards, the lateral backwards and upwards; ventrals as large as the largest dorsals, strongly keeled; a small gular sac, the scales covering it strongly keeled, smaller than the ventrals; a strong oblique fold in front of the shoulder. Nuchal crest composed of broad lanciform spines, with two or three rows of shorter ones at the base; the longest spine exceeds the diameter of the orbit; dorsal crest not continuous with the nuchal, lower than the nuchal at its commencement, gradually diminishing in size until it becomes a mere ridge over the sacrum and on the base of the tail. Limbs moderate; third and fourth fingers equal, fourth toe distinctly longer than third; the hind-limb reaches to the ear or the posterior border of the orbit. Tail feebly compressed, covered with equal keeled scales above, strongly keeled elongated scales below.

Olivaceous or greyish on the back, with indistinct lighter spots; top of head dark olive, back of head dark brown, cheeks pale; nuchal and dorsal spines whitish; belly greenish-white.

From snout to vent 130; tail 175 mm.

Range. The types, adult skin and juvenile, were collected by Mouhot in Cambodia. I obtained a third specimen in dense jungle at Trang Bom, near Saigon, Cochin-China. There is a fourth specimen in Paris from Laos.

107. Goniocephalus subcristatus.

Tiaris subcristata Blyth, J. Asiat. Soc. Beng. xxix, 1860, p 109 (type loc. Port Blair, Andaman Is.; type lost); Stoliczka, J. Asiat. Soc. Beng. xxxix, 1870, p. 180, and xli, 1872, p. 116.—*Gonyocephalus subcristatus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 292, and Fauna Brit. Ind. 1890, p. 122; Annandale, J. Asiat. Soc. Beng. lxxiii, 1904, p. 28; Hora, Rec. Ind. Mus. xxviii, 1926, p. 217, pl. xii, fig. 4, and text-figs.

Coryphophylax maximiliani (Fitz.) Steindachner, Reise Novara, Rept. 1867, p. 30, pl. ii, fig. 6 (type loc. Nicobar Is.; Vienna). *Tiaris humei* Stoliczka, J. Asiat. Soc. Beng. xlii, 1873, p. 167 (type loc. Tillingchang I., Nicobars; Calcutta).—*Gonyocephalus humii*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 293, and Fauna Brit. Ind. 1890, p. 123.

Length of head once and a half to nearly twice its breadth; snout distinctly longer than the orbit; forehead concave; cheeks swollen in the adult male; upper head-scales unequal, strongly keeled, with a more or less distinct Λ-shaped series of enlarged scales; canthus rostralis and supraciliary edge sharp; back of the head with regularly disposed enlarged conical scales; tympanum half the diameter of the orbit; 7 to 9 upper and as many lower labials. Dorsal scales very small, keeled, with a few larger and more strongly keeled ones, all pointing backwards and upwards; ventral scales nearly as large as the large dorsals, strongly keeled and mucronate; 85 to 100 scales round the middle of the body; gular sac small, absent in the female; gular scales feebly keeled, smaller than the ventrals; a strong oblique fold in front of the shoulder sometimes extending across the throat. Nuchal crest in the adult male composed of from 16 to 20 compressed pointed scales set on a projecting fold of skin, its greatest height equal to half the diameter of the orbit; dorsal crest a serrated ridge, usually not continuous with the nuchal; crests of female much lower. Limbs rather slender; third and fourth fingers subequal; fourth toe much longer than third; the hind-limb reaches to near the tip of the snout or just beyond. Tail compressed, with two rows of elongated strongly keeled scales below and a median series of enlarged scales above forming a serrated ridge.

Brownish or olive above, uniform or spotted or reticulated with black on the sides; sometimes a light dark-edged stripe on each side of the neck; light brown below.

From snout to vent 100; tail 270 mm. (male). All the females that I have seen are considerably smaller, but they may not be fully grown. In collections they are comparatively rare compared with males.

Variation. This species shows considerable variation in morphological characters and in coloration. It varies also in accordance with age. In the fully grown male the head is

always comparatively longer than in the immature, the canthus rostralis and supercilium project more strongly, the occipital tubercles are disposed in groups rather than in single series, and the nuchal crest is more strongly developed. As pointed out by Hora, it was upon two exceptionally large individuals that Stoliczka established his *T. humei*. The enlarged dorsal scales may be scattered irregularly, or disposed in longitudinal series.

Of the colours in life Stoliczka writes (1870) :—"Young specimens have the head greenish ashy brown with dark brown spots and cross-bars above. Other young specimens and females are more uniform greenish. Males are variously reticulated and obliquely striped with dark brown on the sides, the interspaces being yellow or red; sometimes the back along the centre is purplish red and the gular sac of the male is reticulated with yellow, red and black."

Of its habits he says :—"A true arboreal lizard, tolerably common at the Andamans and very common at the Nicobars. I found the jungles on Nancowry and Camorta swarming with specimens. They were extremely quick, and almost within a moment would ascend 20 or 30 feet up a tree; when followed they would leap from one tree to another. Without shooting them it was scarcely possible to secure a specimen. I obtained more than 100 specimens from the Nicobars alone, thinking that it might be possible to find some distinctive character between it and the Andaman form which was described by Blyth from Port Blair."

The tail of this lizard appears to break easily. In more than half the specimens that I have examined some part of the end is missing, and as there is no sign of healing of the stump the injury was, presumably, done at the time of capture. The break or tear occurs between two caudal vertebræ; it is not a fracture of the body of the bone such as occurs in the Geckoes and Lacertidæ.

One individual in the British Museum collection has a good regenerated tail 69 mm. in length. Deraniyagala (Ceylon J. Sci., B, xvi. 1931) records regeneration of the tail in *Sitana* and *Otocryptis*, but in his cases the growth is not so complete, the new tail resembling a "tuber-like bulb, covered with scales."

MICTOPHOLIS*, gen. nov.

Body compressed; dorsal scales very unequal, irregular; ventral scales unequal; a nuchal and ? a dorsal crest; a strong fold in front of the shoulder; a gular sac; tympanum exposed. No preanal or femoral pores.

Type, *Salea austeniana* (Annandale).

* μικ-ός—mixed, and φολις—scale.

108. Mictopholis austeniana.

Salea horsfieldi (not of Gray), Annandale, J. & P. Asiat. Soc. Beng. (n. s.) i, 1905, p. 86.

Salea austeniana Annandale, Rec. Ind. Mus. ii, 1908, p. 97 (type loc. near Harmatti, Dafla Hills, Assam; Calcutta).

Length of head one and a half times its breadth; snout longer than the orbit; forehead concave; upper head-scales large, unequal, obtusely keeled; canthus rostralis and supraciliary edge prominent, angular; 6 upper and 7 lower labials; tympanum half the diameter of the orbit; a row of four enlarged, keeled scales from the eye to above the ear. Body compressed; dorsal scales very unequal, irregularly shaped, smooth or keeled, the upper ones pointing backwards and upwards, the lower more or less straight backwards; ventral

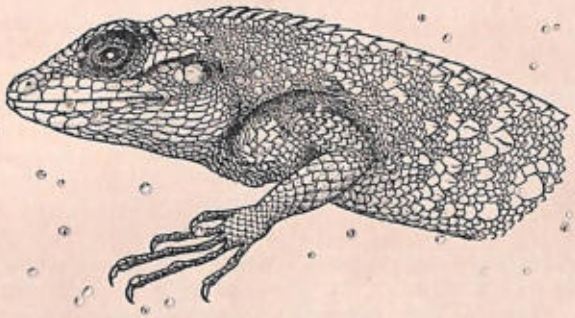


Fig. 50.—*Mictopholis austeniana.*
(From the type, nat. size.)

scales unequal, mostly broader than long, smooth, smaller than the largest dorsals. A small gular fold; scales of the gular region, except those in the mid-line, large, subquadrangular in shape, all quite smooth. A low nuchal crest composed of separated falciform spines; dorsal crest, continuous with the nuchal, a serrated ridge. Limbs moderate; third and fourth fingers equal, fourth toe distinctly longer than third; the hind-limb reaches to the posterior border of the eye. Tail compressed, covered with subequal keeled scales.

Olive-green above, the enlarged scales paler; head lighter green with dark green lines; neck with dark vermiculations; below pale green.

The type and only known specimen is a female; it is now probably somewhat faded, but is otherwise in excellent preservation. It was obtained by Colonel Godwin-Austen on the Dafla Expedition.

Genus ORIOCALOTES.

Oriocalotes Günther, Rept. Brit. Ind. 1864, p. 146 (type *Calotes minor* Gray).
Acanthosaura, Boulenger, Fauna Brit. Ind. 1890, p. 129 (in part).

Body feebly compressed or not at all; dorsal scales unequal, not heterogeneous, regularly arranged; dorsal crest a mere denticulation; no gular sac; no transverse gular fold; tympanum naked or covered with scales; tail rounded, not swollen basally in the adult male. No preanal or femoral pores.

A single species.

A dwarfed *Calotes*, differing from that genus in the unequal dorsal scalation, sometimes covered tympanum, and absence of any basal swelling to the tail. The reasons for changing the specific name have been given under *Agama minor* (p. 226).

109. **Oriocalotes paulus**, nom. nov.

Calotes minor Gray, Cat. Liz. Brit. Mus. 1845, p. 244 (type loc. Khasi Hills; London).—*Oriocalotes minor*, Günther, Rept. Brit. Ind. 1864, p. 147.—*Acanthosaura minor*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 304, pl. xxiii, fig. 2, and Fauna Brit. Ind. 1890, p. 127.

Head rather large; snout a little longer than the orbit; upper head-scales large, unequal, strongly keeled, granulate; canthus rostralis and supraciliary edge sharp; a postorbital spine and two more above the ear, the upper and anterior one midway between the nuchal crest and the tympanum, the diameter of which is not one-third that of the orbit; in some examples the tympanum is concealed, either by a single large scale or several small scales; 7 to 9 upper and as many lower labials. Body scarcely or not compressed; dorsal scales rather large, strongly keeled, unequal, the larger ones mostly confined to the sides, not markedly differentiated from the smaller ones; the upper scales point backwards and upwards, the lower straight backwards; ventral scales smaller than the dorsals, strongly keeled and mucronate. No trace of a gular pouch; gular scales a little smaller than the ventrals; a more or less distinct fold in front of the shoulder covered with small granular scales. Nuchal crest composed of 8 or 10 short separated spines; dorsal crest a mere denticulation. Limbs moderate; fourth finger longer than third; fourth toe longer than third; the hind-limb reaches to the ear or not so far. Tail rounded, not swollen at the base, covered with subequal keeled scales, those below as broad as or broader than long.

Pale brownish-olive above, with dark brown spots or marblings, often forming irregular cross-bars; usually dark bars on the forehead, and one from the eye to the angle of the mouth; light brown below, the throat with dark transverse streaks.

From snout to vent 70; tail 130 mm.

Range. The Khasi Hills; ? Sikkim.

Genus **JAPALURA.**

Japalura Gray, Ann. Mag. Nat. Hist. (2) xii, 1853, p. 387 (type *variegata*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 307, and Fauna Brit. Ind., 1890, p. 121; Werner, Denk. Akad. Wiss. Wien, lxxix, 1924, p. 43 (in part).

Biancia Gray, loc. s. p. 387 (type *niger*).

Diploderma Hallowell, Proc. Acad. Philad. 1860, p. 490 (type *polygonatum*).

Oriotiaris Günther, Rept. Brit. Ind. 1864, p. 150 (type *Tiaris elliotti* Günther, 1860).

Pelturagonia Mocquard, Le Natur. 1890, p. 144 (type *cephalum*).

Acanthosaura, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 299, and Fauna Brit. Ind. 1890, p. 124, and later authors (in part).

Body compressed or not at all; dorsal scales unequal, heterogeneous; a low nuchal crest present or absent; dorsal crest a mere denticulation or absent; gular sac small or absent; an oblique fold in front of the shoulder covered with small scales, sometimes extending across the throat; tympanum concealed or naked. Tail long and slender; in the adult male it may be swollen and rounded at the base, the scales on that part of it being enlarged and thickened. No preanal or femoral pores.

Range. The Himalayan and Trans-Himalayan Regions; S.W. and Central China; Formosa; the Riu Kiu Islands; Borneo, Sumatra, and the Natunas.

A mountain genus, frequently ascending to high altitudes. As now reconstructed it contains some 15 or 16 species, all of which, with the exception of the Malayan *J. nigrilabris* and *J. robinsoni*, inhabit the Himalayan and Trans-Himalayan Regions. *J. ornata* from Borneo I regard as an *Aphaniotis*.

Unless otherwise stated the following characters are common to all the species dealt with in this work:—

Length of head one and a half times its breadth; snout a little longer than the orbit; forehead concave; canthus rostralis and supraciliary edge sharp; upper head-scales unequal, multi-keeled or tuberculate; 7 to 9 upper and as many lower labials.

The separation of many of the species from one another is not easy, and is dependent upon a combination of small morphological characters, which are not always constant, and colour-pattern.

Key to the Species.

I. Tympanum naked.

A. A prominent crest of 3 or 5 conical scales on each side of the back of the head .. *tricarinata*, p. 169.

B. No prominent crest.

Enlarged scales on the back not arranged in longitudinal series; a transverse gular fold covered with small scales, fourth toe as long as tibia; the hind-limb reaches to the ear or the eye; back with dark triangular markings ..... *major*, p. 171.

A row of enlarged scales on the nape and fore-part of the body parallel with the median dorsal row; no transverse gular fold, the scales on the throat being nearly as large as the ventrals; fourth toe as long as tibia; the hind limb reaches to the ear or the eye; back with dark triangular markings ..... *kumaonensis*, p. 171.

Enlarged scales on the back arranged in more or less regular longitudinal series; a transverse gular fold covered with small scales; fourth toe shorter than tibia; the hind-limb reaches to the ear or the eye; back usually with two parallel light dorso-lateral stripes..... *dymondi*, p. 172.

Two distinct rows of enlarged scales on each side of the median dorsal row; no transverse gular fold, the scales on the throat nearly as large as the ventrals; the hind-limb reaches to the neck or the ear; back with dark triangular markings ..... *varcoæ*, p. 172.

II. Tympanum concealed.

A. Body subquadrangular, the back bordered on each side by a ridge of scales. *planidorsata*, p. 170.

B. Body not quadrangular.

a. Enlarged dorsal scales not in regular longitudinal rows.

The leg reaches to the tip of the snout or beyond; back with distinct chevrons of enlarged scales; nuchal crest of male set on a fold of skin ..... *andersoniana*, p. 173.

The leg reaches to the eye or beyond; scales of gular sac very small; nuchal crest of male set on a fold of skin; usually a black spot on the throat..... *variegata*, p. 173.

The leg reaches to the ear or the eye; scales of gular sac not much smaller than ventrals; a dark streak from the eye to the angle of the jaw; back with dark spots or cross-bars, narrowest in front and bordered on each side by an irregular stripe of white ..... *yunnanensis*, p. 175.

The leg reaches to the eye; head (of adult male) large; a prominent oblique white stripe on the anterior half of each flank ..... *hamptoni*, p. 175.

The leg reaches to between the ear and the eye; a more or less distinct transverse gular fold covered with small scales; back with a conspicuous white cross-bar ..... *fasciata*, p. 176.

b. A row of enlarged scales on each side of the median dorsal row.

The leg reaches to the ear or the eye; a transverse gular fold covered with small scales .. *flaviceps*, p. 176.

116. Japalura tricarinata.

Calotes tricarinatus Blyth, J. Asiat. Soc. Beng. xxii, 1854, p. 650 (type loc. Sikkim; Calcutta).—*Oriotiaris tricarinata*, Anderson, Proc. Zool. Soc. 1871, p. 167.—*Charasia* (*Oriotiaris*) *tricarinata*, Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 112.—*Acanthosaura tricarinata*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 306, and Fauna Brit. Ind. 1890, p. 129; Annandale, Rec. Ind. Mus. i, 1907, p. 153; Hora, Rec. Ind. Mus. xxviii, 1926, p. 218.

Tiaris ellioti Günther, Proc. Zool. Soc. 1860, p. 151, pl. xxv, fig. B (type loc. Sikkim, 9,200 feet; London).—*Oriotiaris ellioti* Günther, Rept. Brit. Ind. 1864, p. 150; Jerdon, P. Asiat. Soc. Beng. 1870, p. 77.

Upper head-scales large, unequal; a small tubercle at the posterior end of the supercilium; a curved ridge of spinose, multi-keeled scales, usually 6 or 8 in number, on each side of the back of the head; diameter of the tympanum half that of the orbit; 5 to 7 upper and as many lower labials. Body not compressed; dorsal scales very unequal, the larger



Fig. 51.—Head of *Japalura tricarinata*. ×1½.
From one of the types of *Oriotiaris ellioti*.

ones strongly keeled; upon the neck and shoulders, and sometimes also upon the loins, these form parallel rows, one on either side of the vertebral row; upon the rest of the body they are arranged in more or less angular series; the upper scales point backwards and upwards, the lower backwards and downwards; ventral scales keeled, nearly as large as the large dorsals. No trace of a gular pouch; gular scales feebly keeled, smaller than the ventrals; no fold across the throat; an indistinct fold in front of the shoulder. No nuchal or dorsal crest, but the vertebral row of scales distinctly enlarged and keeled, forming a denticulation down the back. Limbs rather slender, with patches of enlarged and strongly keeled scales; fourth toe much longer than third; the hind-limb reaches to the eye or the nostril. Tail round, covered with keeled scales, those below broader than those above.

Pale brownish above, uniform or with dark brown V-shaped markings upon the back and tail; the enlarged tubercles on the head, body, and limbs often green; below dirty whitish, uniform or with small black dots. Stoliczka (1872) describes

the colours in life as "bright grass green above with the angular series of large scales often chocolate-brown, the lateral keels on the neck yellowish. Always some light yellow or whitish spots on the labials and generally a yellowish streak at the base of the neck on each side. Below yellowish white."

From snout to vent 50; tail 120 mm.

Variation. There is considerable variation in the number and arrangement of the enlarged scales upon the neck and body. The prominent curved crest of post-occipital scales that is so characteristic of the species may be reduced to 3 or 4 scales only; usually there are other spinose scales scattered around the tympanum; the enlarged scales upon the sides of the body may be reduced to a few scattered ones only, as shown in Günther's figure of *Tiaris dollioti*.

Range. Sikkim, E. Nepal and Darjeeling district, between 3,000 and 9,000 feet altitude. A terrestrial species. Stoliczka found it generally about large stones in sunny places. Its occurrence in the United Provinces, as shown by Hora, is extremely doubtful.

111. **Japalura planidorsata.**

Japalura planidorsata Jerdon, P. Asiat. Soc. Beng. 1870, p. 76 (type loc. Khasi Hills; London); Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 138; Theobald, Cat. Rept. Brit. Ind. 1876, p. 102; Anderson, Zool. Res. W. Yunnan, 1878–9, p. 804; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 311, pl. xxiv, fig. 2, and Fauna Brit. Ind. 1890, p. 130; Hora, Rec. Ind. Mus. xxviii, 1926, p. 219.

Occiput with numerous spinose tubercles; tympanum hidden. Body subquadrangular, the back flattened, bordered on each side by a ridge of enlarged keeled scales and crossed at intervals by 6 or 7 V-shaped series of similar scales or subtrihedral tubercles; flanks with numerous enlarged, scattered, strongly keeled scales; ventral scales as large as the largest dorsals, strongly keeled. No gular pouch; a short fold in front of the shoulder; no transverse gular fold, the scales on the throat nearly as large as the ventrals. Limbs rather slender; the hind-limb reaches to the ear or the nostril. Tail compressed, covered with keeled scales, those above intermixed with larger ones.

Yellowish-brown or brown above, lighter below; a more or less distinct series of dark streaks across the back, corresponding in position to the angular series of scales; upper lip light yellowish, the stripe often extending on to the neck; sometimes a light dorso-lateral stripe.

From snout to vent 50; tail 90 mm.

Range. Assam (Khasi and Garo Hills, Cachar, N. Chin Hills).

112. Japalura major.

Oriocalotes major Jerdon, P. Asiat. Soc. Beng. 1870, p. 77 (type loc. near Kotgarh, W. Himalayas; London).—*Acanthosaura major*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 306, pl. xxiii, fig. 3, and Fauna Brit. Ind. 1890, p. 128; Annandale, Rec. Ind. Mus. i, 1907, p. 152, and ibid. x, 1914, p. 320; Hora, Rec. Ind. Mus. xxviii, 1926, p. 218.

Occiput with some spinose scales, their number and position rather variable, never a curved series as in *tricarinata*; diameter of the tympanum half that of the orbit. Body feebly compressed; dorsal scales very unequal, the larger ones numerous and, upon the sides of the body, often disposed in vertical series; the upper scales point backwards and upwards, the lower mostly straight backwards; ventral scales strongly keeled, smaller than the largest dorsals. Gular pouch indicated by a longitudinal fold; a transverse gular fold covered with small scales; an indistinct fold in front of the shoulder; nuchal and dorsal crests a mere denticulation. Limbs rather weak; fourth toe longer than third, as long as the tibia; the hind-limb reaches to the ear or the eye. Tail feebly compressed, covered with keeled scales.

Greyish-brown, with dark brown triangular or V-shaped markings upon the back and base of the tail; flanks with dark reticulations; top of head with dark cross-bars; a dark streak between the eye and the ear; young sometimes with a light dorso-lateral stripe; dirty whitish below, with or without dark spots or streaks.

From snout to vent 85; tail 155 mm.

Range. The Western Himalayas (Simla and Garhwal districts, Chamba State); up to 8,500 feet altitude.

113. Japalura kumaonensis.

Acanthosaura kumaonensis Annandale, Rec. Ind. Mus. i, 1907, p. 152 (type loc. Naini Tal, W. Himalayas; London and Calcutta).

Acanthosaura major (not of Jerdon), Annandale, Rec. Ind. Mus. x, 1914, p. 320.

The differences between *J. kumaonensis* and *J. major* are set forth in the Key. In coloration the two are alike, but *kumaonensis* does not attain so large a size. Six upper labials.

From snout to vent 60; tail 125 mm.

Range. The Western Himalayas (Almorah, Naini Tal, Kumaon district).

I have revived Annandale's species, which he himself sunk in 1914. The characters which separate it from *major* are small but distinct; they are quite as clear as the characters which distinguish the species of the *yunnanensis* group.

114. Japalura dymondi.

Acanthosaura dymondi (in part) Boulenger, Ann. Mag. Nat. Hist. (7) xvii, 1906, p. 567 (type loc. Tong-chuan-fu, Yunnan; London); Werner, Denk. Akad. Wiss. Wien, xcix, 1924, p. 40; Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 479.

In general form and scalation resembling *J. major*, but differing in the following particulars:—Occipital spines fewer and less prominent; enlarged dorsal scales more strongly keeled, more numerous, those on the neck and back arranged in more or less regular longitudinal rows; all the dorsal scales pointing more or less straight backwards or the upper ones slightly upwards; fourth toe shorter than the tibia. Tail feebly compressed, feebly swollen at the base in the adult male, covered with strongly keeled scales, the median row above slightly enlarged and forming a denticulated ridge.

Olivaceous or brownish above, with two light dorso-lateral stripes enclosing a dark vertebral one; sides of body with small white spots; head and limbs above with or without dark cross-bars; below dirty whitish.

The type (♂) and one other specimen in the British Museum, also from Tong-chuan-fu, have the light dorso-lateral stripes less distinctly marked and the intervening dark vertebral area occupied with a series (5 or 6) of dark triangular spots, their points directed backwards.

From snout to vent 78; tail 185 mm.

Range. Western Yunnan (Tong-chuan-fu, Wu-ting-chou).

Boulenger's original description of *dymondi* included four specimens. Of these only one can be referred to that species, the remaining three being the species which he later described as *varcoæ*.

115. Japalura varcoæ.

Acanthosaura dymondi (in part) Boulenger, Ann. Mag. Nat. Hist. (7) xvii, 1906, p. 567.

Acanthosaura varcoæ Boulenger, Ann. Mag. Nat. Hist. (9) ii, 1918, p. 162 (type loc. Yunnan-fu and Wu-ting-chou, Yunnan; London); Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 480.

In general appearance like some specimens of *dymondi*, but always smaller. The differences between the two as regards scale-characters are set forth in the Key. Of the two distinct rows of enlarged scales upon the back, the outer one is always the more prominent; the scales which form the nuchal and dorsal crests are broader and less spine-like; limbs weaker.

Light brown above, with a series (5 or 6) of dark brown, triangular, vertebral spots, complete or with their halves alternating; outer row of enlarged scales whitish; flanks

with dark brown spots or variegations; upper lip whitish, the colour abruptly terminated by a dark oblique streak from the eye to the angle of the jaw; limbs and tail above with dark cross-bars; whitish below.

From snout to vent 70; tail 115 mm.

Range. Western Yunnan (Yunnan-fu, Wu-ting-chou, Tong-chuan-fu, Li-kiang).

116. Japalura andersoniana.

Japalura andersoniana Annandale, J. Asiat. Soc. Beng. (n. s.) i, 1905, p. 85, pl. ii, fig. 4 (type-loc. Dafla Hills, Assam–Bhutan border; London and Calcutta), and Rec. Ind. Mus. viii, 1914, p. 357.

Body compressed; tympanum concealed; dorsal scales small, feebly keeled, with much larger strongly keeled ones arranged in five chevron-shaped series upon the back and base of the tail; a series on each side of the neck parallel with the nuchal crest may be present; the upper scales point backwards and upwards, the lower backwards and downwards; ventral scales as large as the largest dorsals, strongly keeled. Gular sac indicated by a fold; gular scales feebly keeled, smaller than the ventrals; an indistinct fold in front of the shoulder; a transverse gular fold; nuchal crest set upon a sinuous fold of skin, its height equal to half the diameter of the orbit; dorsal crest a serrated ridge. Limbs slender; fourth toe much longer than third; the hind limb reaches to the tip of the snout or beyond. Tail compressed, covered with keeled scales, those below of uniform size, about as large as the ventrals.

Dark brown, obscurely marked with a paler shade; throat dark blue or green, with a median yellow spot (in the male).

From snout to vent 55; tail 160 mm.

Range. The types, two in number, were collected by Col. Godwin-Austen in the Dafla Hills; a third has been obtained in the Abor country at about 4,000 feet altitude.

117. Japalura variegata.

Japalura variegata Gray, Ann. Mag. Nat. Hist. (2) xii, 1853, p. 388 (type loc. Sikkim; London); Günther, Rept. Brit. Ind. 1864, p. 133; Anderson, Proc. Zool. Soc. 1871, p. 164 (in part), and Zool. Res. W. Yunnan, 1878–9, p. 804; Stoliczka, J. Asiat. Soc. Beng. xli, p. 106; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 308, pl. xxiv, fig. 1, and Fauna Brit. Ind. 1890, p. 130; Hora, Rec. Ind. Mus. xxviii, 1926, p. 219.

Biancia niger Gray, Ann. Mag. Nat. Hist. (2) xii, 1853, p. 387 (type loc. Sikkim; London).

Japalura microlepis Jerdon, P. Asiat. Soc. Beng. 1870, p. 76 (type loc. Sikkim; London).

Japalura yunnanensis (not of Anderson), Annandale, J. & P. Asiat. Soc. Beng. ii, 1906, p. 238.
Japalura bengalensis Annandale, Rec. Ind. Mus. viii, 1912, p. 57, pl. v, fig. 4 (type loc. Buxa, Jalpaiguri district, Bengal-Bhutan frontier; Calcutta).

Upper head-scales sharply keeled; back of head with scattered conical tubercles, 2 to 4 on each side near the commencement of the nuchal crest being most distinct; tympanum covered with small scales. Body compressed; dorsal scales small, unequal, keeled, intermixed with larger, more strongly keeled ones, the latter often arranged in oblique series on each side of the back, all the scales with their points directed backwards and upwards except the lowermost; ventral scales as large as or larger than the largest dorsals, strongly keeled. A small gular pouch (? best developed in the breeding season), the scales covering it and on either side of it very small, much smaller than the ventrals; a slight fold in front of the shoulder; nuchal crest low, in the male set upon a sinuous fold of skin; dorsal crest a serrated ridge. Limbs well developed; fourth toe much longer than third; the hind-limb reaches to the eye or beyond. Tail above covered with keeled scales intermixed with larger ones, below with uniform strongly keeled ones.

Olive-brown or green above (irridescent in life), with lighter and darker markings (browns, reds, and yellows in life); usually a series of light chevron-shaped stripes along the back corresponding to the enlarged scales, and a white stripe along the side of the neck; upper lip white; top of head sometimes with light and dark cross-bars; tail with light and dark annuli; lower part greenish-white; gular pouch usually with a large dark blue spot. One example from Darjeeling (Brit. Mus. 91.9.11.5–6) has a broad buff-coloured stripe covering the whole of the back and extending on to the tail.

From snout to vent 110; tail 205 mm.

Range. The Eastern Himalayas (Sikkim; Darjeeling; Jalpaiguri district). Anderson (1878) suggested that the specimens he procured in the Botanical Gardens, Calcutta, may have been accidentally introduced. As no specimens have been procured there since, he is probably correct in this assumption.

Stoliczka found this lizard very common in Sikkim from elevations of 1,000 up to 9,000 feet. It appeared to be commoner at high elevations, and those living above 5,000 feet appeared to attain a greater size than those living at lower altitudes. Its habits were chiefly terrestrial. It has considerable power of changing its colour.

I am unable to find any good character by which to separate *J. bengalensis* from this species.

118. Japalura yunnanensis.

Japalura yunnanensis Anderson, Zool. Res. W. Yunnan, 1878–9, p. 803, pl. lxxvi, fig. 2 (type loc. near Teng-yueh (Momein), W. Yunnan; types lost); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 310 (in part); Barbour & Dunn, Proc. New Engl. Zool. Club, vii, 1919, p. 19; Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 482.

A tubercle on each side of the back of the head between the orbit and the commencement of the nuchal crest; tympanum concealed. Body compressed; back covered with small keeled scales intermixed with larger and more strongly keeled ones, which are arranged in more or less vertical series; the upper scales point backwards and upwards; ventral scales smaller than the largest dorsals, strongly keeled; gular sac small, the scales covering it a little smaller than the ventrals; an indistinct fold in front of the shoulder. A low nuchal crest composed of separated triangular spines; dorsal crest a serrated ridge. Limbs moderately strong; fourth toe distinctly longer than third; the hind-limb reaches to the ear or the eye. Tail compressed, covered with strongly keeled subequal scales.

Light olive-green or yellowish above with dark green markings, usually arranged to form broad, ill-defined cross-bars upon the back; these are narrowest anteriorly, and are bounded on each side by a more or less distinct irregular light stripe; top of head with dark bars; a dark streak from the eye to the corner of the mouth, bordered by a lighter one, nearly always present; tail with light and dark annuli; lower parts greenish-white.

From snout to vent 75; tail 165 mm.

Range. Teng-yueh and Homushu Pass, S.W. Yunnan.

Japalura splendida, a very closely allied species, occurs in S.E. Tibet (Salween Valley) and the adjacent districts in China.

119. Japalura hamptoni, sp. nov.

Head large, one and a half times as long as broad, forehead concave; snout a little longer than the orbit; upper head-scales unequal, rugose; canthus rostralis and supraciliary edge sharp; some spinose scales on the back of the head; 8 upper and 8 lower labials; tympanum concealed; cheeks somewhat swollen. Body compressed; dorsal scales small, keeled, intermixed with larger, scattered, more strongly keeled scales; the upper scales point backwards and upwards, the lower more or less straight backwards; ventral scales half as large as the largest dorsals, strongly keeled; gular sac very small, the scales covering it about half as large as

the ventrals, not smaller than those on the sides of the throat; a feeble fold in front of the shoulders, extending nearly across the throat, covered with small scales; nuchal crest low, composed of six separated triangular spines; dorsal crest a serrated ridge. Limbs moderately strong; third and fourth fingers subequal; fourth toe a little longer than third; the hind-limb reaches to the posterior border of the eye. Tail feebly swollen at the base, covered with subequal keeled scales, those of the upper median row being much larger, and more strongly keeled than the others.

Upper part of head green, marbled with black; a broad conspicuous white stripe on the side of the anterior half of the body, starting from above the shoulder and running obliquely backwards and downwards, the intervening area of the back and flanks below it dark brown; rest of body, limbs, and tail above olive-greyish, speckled with black; lower parts greyish-white, the throat with some black streaks.

From snout to vent 75; tail 165 mm.

The type and only known specimen, a male, was collected by Mr. H. Hampton at Mogok, Upper Burma, in 1908.

Most nearly related to *Japalura yunnanensis*, from which it differs in the large head and distinctive coloration.

120. Japalura fasciata.

Japalura fasciata Mertens, Senckenb. viii, (3–4) 1926, p. 146 (type loc. Tongking; Frankfurt-a.-M.).

Closely allied to *yunnanensis* and *hamptoni*. A fold in front of the shoulder and a more or less distinct transverse gular fold covered with small scales; the hind-limb reaches to between the ear and the eye. No dark streak from the eye to the angle of the mouth; back with a broad conspicuous white cross-bar and a dark one on either side of it; head green with dark variegations. Known only from the type-specimen. (Not seen by me).

121. Japalura flaviceps.

Japalura flaviceps Barbour & Dunn, Proc. New Engl. Zool. Club, vii, 1919, p. 16 (type loc. Tung River, W. Szechuan; Harvard); Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 480.

Japalura yunnanensis, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 310 (in part).

Differs from *yunnanensis* in the following characters:—Snout shorter; top of head flatter, the canthus rostralis and supraciliary edge blunter; no prominent tubercle on the back of the head between the orbit and the nuchal crest; body more depressed; one, sometimes two, rows of enlarged scales extending down the back, parallel with the median dorsal

row; the enlarged scales may be in a continuous series or alternating with smaller ones, the inner row is constantly present, the outer less distinct; the upper dorsal scales point slightly upwards, those on the flanks backwards or backwards and downwards; a more or less distinct transverse gular fold covered with small scales continuous with the fold in front of the shoulder. Limbs rather weak, the hind one usually not reaching to the eye.

Light greenish-yellow above, with more or less distinct dark green cross-bars on the head and back; dark lines radiating from the eye; sometimes a light dorso-lateral stripe; greenish-white below, the throat with or without dark streaks.

From snout to vent 75; tail 140 mm.

Range. W. Szechuan and W. Yunnan. There are 16 specimens in the British Museum, collected by J. W. Gregory during his expedition to Yunnan; they are without exact data of locality, but in the course of his journey he visited Li-kiang, whence came some of the typical material.

Genus **SALEA.**

Salea Gray, Cat. Liz. Brit. Mus. 1845, p. 242 (type *horsfieldi*); Günther, Rept. Brit. Ind. 1864, p. 145; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 312, and Fauna Brit. Ind. 1890, p. 131.

Mecolepis Duméril, Cat. Méth. Coll. Rept. 1851, p. 87 (type *trispinosus*).

Lophosalea Beddome, Proc. Zool. Soc. 1878, p. 153 (type *anamallayana*).

Body compressed; dorsal scales large, unequal, not heterogeneous, strongly imbricate; male with a nuchal and dorsal crest and gular sac. Tail strongly compressed, crested above in the male. Tympanum exposed. No preanal or femoral pores.

Range. S. India. Two species.

Key to the Species.

No fold in front of the shoulder; dorsal scales mostly uniform in size ..... *horsfieldi*, p. 177.

A strong fold in front of the shoulder; dorsal scales very unequal ..... *anamallayana*, [p. 179.

122. **Salea horsfieldi.**

Salea horsfieldii Gray, Cat. Liz. Brit. Mus. 1845, p. 242 (type loc. India; London); Günther, Rept. Brit. Ind. 1864, p. 145; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 312, and Fauna Brit. Ind. 1890, p. 131; Annandale, Rec. Ind. Mus. ii, 1908, p. 38; Wall, J. Bombay, N.H. Soc. xxviii, 1922, p. 494; Roux, Rev. Suisse Zool. xxxv, 1928, p. 452.

Salea jerdonii Gray, Ann. Mag. Nat. Hist. xviii, 1846, p. 429 (type loc. Nilgiri Hills; London); Jerdon, J. Asiat. Soc. Beng. xxii, 1853, p. 473.
Mecolepis trispinosus Duméril, Cat. Méth. Coll. Rept. 1851, p. 88, and Arch. Mus. Hist. nat. Paris, viii, 1856, p. 564, pl. xxiv, fig. 1 (type loc. Nilgiri Hills; Paris).
Mecolepis hirsutus Duméril, l. c. s. pp. 88 & 566, pl. xxiv, fig. 2 (type loc. "Bengal"; Paris).
Mecolepis sulcatus Duméril, l. c. s. pp. 89 & 567, pl. xxiv, fig. 3 (type loc. Nilgiri Hills; Paris).

Length of head once and a half to nearly twice its breadth; snout a little longer than the orbit; canthus rostralis and supraciliary edge sharp; upper head-scales unequal, rugose; diameter of the tympanum half that of the orbit; 7 to 9 upper and as many lower labials. Dorsal scales strongly imbricate and keeled, mostly uniform, with occasional larger

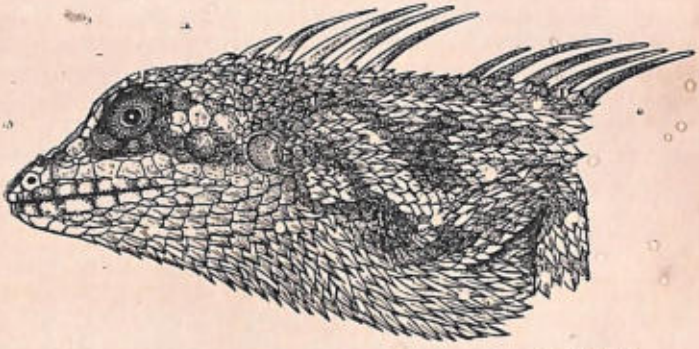


Fig. 52.—*Salea horsfieldi*, nat. size (Brit. Mus. 88.1.27.2).

ones upon the flanks, the upper directed straight backwards or backwards and upwards, the lower backwards and downwards; gular and ventral scales very strongly imbricate and keeled, mucronate; all the scales of the body more strongly imbricate in the male than in the female. No fold in front of the shoulder. Limbs moderately strong; fourth toe a little longer than third; the hind-limb reaches to the shoulder or the ear. Nuchal crest in the male composed of 5 or 6 lanceolate spines directed backwards, the longest equal to the length of the snout, with smaller spines at the base; dorsal crest not continuous with nuchal, composed of similar but shorter spines; nuchal crest of female a double row of short, alternating, oblique spines, no dorsal crest. Male with a very small gular sac extending on to the chest; in the female it is indicated by a fold. Tail compressed in the male, with a low upper crest on its basal part, less compressed and

without the crest in the female; covered with subequal strongly keeled scales.

Yellowish-brown (green in life), with reddish or dark brown markings; a series of dorsal spots or irregular dark cross-bars on the back and sides, sometimes broken up by a light dorso-lateral stripe; enlarged scales on the flanks usually whitish; a blackish band, edged above and below with whitish, from the eye to the shoulder; a short, light, dark-edged stripe along the hinder part of the thigh and adjacent part of the tail; tail usually with light and dark annuli; belly whitish, sometimes spotted with brown.

From snout to vent, ♂ 95, ♀ 75; tail, ♂ 250, ♀ 155 mm.

Range. The Nilgiri and Palni Hills in Southern India, up to 8,000 feet altitude.

Found in bushes, hedges, and gardens. Very common, according to Wall, below Coonoor (6,200 feet) in the Nilgiris. He states that under excitement the male is an extremely beautiful object, being of an intensely brilliant verdant green dorsally, merging to yellow on the head. The gular pouch is brilliant yellow and the belly pearly white.

Eggs oval, 3 or 4 in number, 17 by 9 mm. in size.

123. Salea anamallayana.

Lophosalea anamallayana Beddome, Proc. Zool. Soc. 1878, p. 153, pl. xiv (type loc. Anaimalai Hills, 6,000 feet; London).—*Salea anamallayana*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 313, and Fauna Brit. Ind. 1890, p. 132; Hora, Rec. Ind. Mus. xxviii. 1928, p. 219.

Salea anamallayana triangularis Roux, Rev. Suisse Zool. xxxv, 1928, p. 452 (type loc. Mariyanshola, Palni Hills; Basel).

Length of head at least twice its breadth; snout distinctly longer than the orbit; canthus rostralis and supraciliary edge sharp; upper head-scales unequal, smooth or keeled, sometimes rugose; an enlarged tubercle behind the supraciliary edge and two more on the back of the head on each side of the nuchal crest; a row of enlarged scales from the orbit to above the tympanum, the diameter of which is half that of the orbit; 7 to 10 upper and as many lower labials. Dorsal scales very unequal, strongly imbricate and keeled, the upper with their points directed upwards and backwards, those on the flanks directed backwards or backwards and downwards; in the female many of these are quite smooth. Gular and ventral scales very strongly imbricate and keeled, mucronate; all the scales more strongly imbricate in the male than in the female. A strong curved fold covered with small scales in front of the shoulder. Limbs moderate; third and fourth fingers equal, fourth toe a little longer than

third ; the hind-limb reaches to the neck. Nuchal and dorsal crests in the male continuous, composed of large lanceolate spines of nearly equal length, the longest about as long as the orbit ; nuchal crest of female composed of 6 or 8 short spines, continued on to the back as a serrated ridge. Adult male with a fairly large gular sac extending on to the chest ; in the female it is a short fold. Tail strongly compressed in the male, with a well-developed upper crest on its basal half, less compressed and without a crest in the female ; covered with subequal, strongly keeled scales.

Top of head light or dark brown with whitish spots ; back with four broad, triangular, or V-shaped dark brown marks, the first continuous with the dark coloration of the head, the others separated from each other by narrow, whitish interspaces ; upper lip white, the stripe extending on to the shoulder ; limbs and tail with light and dark cross-bands or annuli ; a short light stripe on the hinder part of the thigh and adjacent part of the tail more or less distinct ; belly white.

From snout to vent, ♂ 110, ♀ 85 ; tail, ♂ 200, ♀ 165 mm.

Range. Southern India (Anaimalai and Palni Hills ; Travancore ; up to 7,000 feet altitude.

Roux's description of *Salea anamallayana triangularis* agrees well with female specimens of the typical form from Travancore in the British Museum.

Genus **CALOTES.**

Calotes Rafinesque, Anal. Nat. 1815, p. 75 (nom. nud.).
Calotes Cuvier, Règne Anim. ii, 1817, p. 35 (type *Lacerta calotes* Linn.) ; Boulenger, Cat. Liz. Brit. Mus. i, 1885. p. 314, and Fauna Brit. Ind. 1890 p. 132 ; de Rooij, Rept. Indo-Austral. Archipel. i, 1915, p. 120.
Bronchocela Kaup, Isis, 1827, p. 619 (type *Agama cristatella* Kuhl).
Lophodeira Fitzinger, Syst. Rept. 1843, pp. 15 & 46 (type *Bronchocela cristatellus* Kaup).
Pseudocalotes Fitzinger, l. c. s. pp. 15 & 46 (type *Bronchocela tympanistriga*).
Goniocephalus and *Acanthosaura* (in part), Boulenger, Cat. and Fauna, l. c. s.

Body compressed ; dorsal scales regular, uniform (except in *fruhstorferi* and *kakhienensis*) ; a dorsal crest more or less developed ; gular sac usually present ; an oblique fold or pit in front of the shoulder present or absent ; tympanum naked. Tail long and slender ; in the adult male it is usually swollen and rounded at the base, the scales on that part of it being enlarged and thickened (fig. 53). No preanal or femoral pores.

Range. The Oriental Region and East Indian Archipelago, west of New Guinea. About 27 species are known.

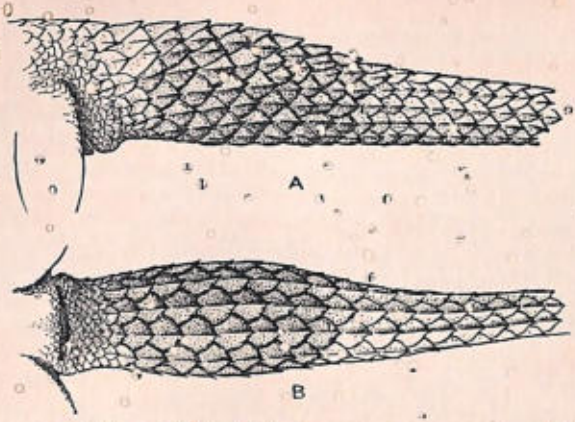


Fig. 53.—Tail of *Calotes liolepis*, to show the basal scalation.
A. Lateral view. B. Ventral view.

Key to the Indian and Indo-Chinese Species.

I. Scales on the sides of the body pointing backwards and downwards; no oblique fold or pit in front of the shoulder (except sometimes in *fruhstorferi*).

A. The hind-limb reaches at least to the eye; ventral scales larger than dorsal; colour green.

Fourth finger as long as fifth toe; 6 to 10 upper dorsal scale-rows pointing backwards and upwards ..... *cristatellus*, p. 184.

Fourth finger as long as fifth toe; only the upper 2 to 4 dorsal scale-rows pointing backwards and upwards ..... *jubatus*, p. 185.

Fourth finger much longer than fifth toe; only the upper 2 to 4 dorsal scale-rows pointing backwards and upwards ..... *smaragdinus*, p. 185.

B. The hind-limb reaches to the shoulder or not so far; ventral scales not larger than the dorsal; colour brownish.

48 to 56 scales round the body ..... *floweri*, p. 186.

65 to 72 scales round the body ..... *microlepis*, p. 187.

73 to 80 scales round the body; dorsal scales with or without larger ones mixed with them. *fruhstorferi*, p. 188.

II. Scales on the sides of the body pointing backwards and upwards.

A. No fold or pit in front of the shoulder.

Two separated spines above the tympanum; 35 to 52 scales round the body; colour brown. *versicolor*, p. 189.

Two parallel rows of compressed scales above the tympanum; 53 to 63 scales round the body; colour green ..... *maria*, p. 193.

B. An oblique fold or triangular pit in front of the shoulder covered with small granular scales.

a. Dorsal scales unequal	*kakhienensis*, p. 188.
b. Dorsal scales equal:	
1. Dorsal scales larger than the ventrals.	
Two parallel rows of compressed scales above the tympanum; colour green	*jerdoni*, p. 194.
A postorbital spine: 49 to 65 keeled scales round the body; colour brown	*emma*, p. 195.
No postorbital spine; fourth toe distinctly longer than third; 48 to 58 keeled scales round the body	*mystaceus*, p. 197.
Fourth toe scarcely longer than third; 36 to 43 scales round the body, laterals smooth	*nemoricola*, p. 199.
Fourth toe scarcely longer than third; 27 to 35 scales round the body, laterals smooth	[p. 200. *grandisquamis*,
2. Dorsal scales not larger than the ventrals.	
A row of 8 or 9 compressed spines above the tympanum	*calotes*, p. 201.
III. Scales on the sides of the body pointing backwards or backwards and downwards; an oblique fold or pit in front of the shoulder.	
Two separated spines above the tympanum; lateral scales pointing straight backwards; no dorsal crest	*ceylonensis*, p. 202.
Two separated spines above the tympanum; lateral scales pointing backwards and downwards; a dorsal crest	*liolepis*, p. 203.
No spines on the head; ventral scales as large as the laterals; 43 to 50 scales round the body	*liocephalus*, p. 204.
No spines on the head; ventral scales smaller than the dorsal; 45 scales round the body	[p. 204. *kinguon-wardi*,
No spines on the head; ventral scales as large as the dorsal; 67 scales round the body	[p. 205. *andamanensis*,
A row of spines above and posterior to the tympanum; ventral scales larger than the dorsal	*nigrilabris*, p. 206.
IV. A long fold in front of the shoulder, extending across the throat or nearly so; two slender spines on each side of the back of the head.	
No spine behind the supercilium; no white spot below the eye	*rouxi*, p. 206.
A spine behind the supercilium; a white spot below the eye	*elliotti*, p. 207.

The species may be grouped as follows:—

I. *Calotes cristatellus* group. Long-headed, slender-limbed, long-tailed species. No oblique fold in front of the shoulder, but a horizontal projecting fold of skin extending from behind the lower jaw to above the shoulder. Cheeks not swollen. The scales on the sides of the body point backwards and downwards. In the adult male the base of the tail is not markedly swollen nor are the scales which cover that part

of it differentiated from the others. Species: *cristatellus, smaragdinus, jubatus.*

II. *Calotes microlepis* group. Long-headed, weak-limbed, shorter-tailed species. The dorsal scales point backwards and dowawards; they also lack the uniformity and regularity which characterize the scales of other species in the genus, individual scales here and there being larger than the others and not regularly disposed. The tail of the adult male is swollen at the base, the scales covering that part of it being thickened, those of the upper median row broadest and forming a more or less distinct ridge. Species: *microlepis, floweri, frubstorferi.*

To this group also belong the Malayan *C. tympanistriga* and *flavigula* and, perhaps derived from it, the aberrant *C. kakhienensis.*

III. *Calotes versicolor* group. A not very homogeneous group, but possessing certain characters in common. The scales on the sides of the body point backwards and upwards and the head is comparatively short. *C. versicolor* and *maria* have no fold in front of the shoulder, the others have it more or less strongly developed. In *C. maria* and *jerdoni* the tail of the male is not swollen; in the other species it is distinctly swollen at the base, the scales which cover that part of it being larger, thicker, and more strongly keeled than the rest. *C. nemoricola* and *C. grandisquamis* are two closely related species, remarkable for having very large dorsal scales. Species: *versicolor, maria, jerdoni, emma, mystaceus, nemoricola, grandisquamis, calotes.*

IV. *Calotes liocephalus* group. The scales on the sides of the body point backwards or backwards and downwards. The head is comparatively short and the cheeks of the adult are always swollen. There is a triangular pit or curved fold in front of the shoulder. The tail in the fully grown male is strongly swollen at the base, the scales on that part of it being thickened, those of the upper median row forming a ridge. Species: *liocephalus, liolepis, ceylonensis, nigrilabris, andamanensis.*

C. kingdon-wardi, known from a juvenile, cannot yet be definitely assigned to any group.

C. rouxi and *C. elliotti* are two dwarfed species, characterized by a more or less complete fold extending across the throat.

Salea gularis Blyth, J. Asiat. Soc. Beng. xxii, 1853, p. 134, from Mirzapur (?), may belong to this genus, but is not recognizable from the description.

124. Calotes cristatellus.

Agama cristatella Kuhl, Beitr. Zool? vergl. Anat. i, 1820, p. 108 (type loc. unknown).—*Bronchocela cristatella*, Kaup, Isis, 1827, p. 615; Dum. & Bibr., Erp. Gen. iv, 1837, p. 395 (East Indies).—*Calotes cristatellus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 316, and Ann. Mus. Civ. Genova, (2) vi, 1888, p. 318, and Fauna Brit. Ind. 1890, p. 134, and Fauna Malay Pen. 1912, p. 70; S. Flower, Proc. Zool. Soc. 1896, p. 871, and ibid. 1899, p. 639; Smith. J. Nat. Hist. Soc. Siam, i, 1915, p. 154, and ii, 1916, p. 155; De Rooij, Rept. Indo-Austral. Arch. 1915, p. 121, fig.

Agama guttuvosa Merrem, Tent. Syst. Amphib. 1820, p. 51 (type loc. "America"! based on Seba, i, pl. 89, figs. 1 & 2).

Agama moluccana Lesson, Voy. Coquille, Rept. 1830, pl. i, fig. 2.

Bronchocela burmana Blanford, J. Asiat. Soc. Beng. xlviii, 1878, p. 127 (type loc. Tavoy; type lost).

? *Pseudocalotes archiducissæ* Fitzinger, Sitz. Akad. Wiss. Wien, Bd. 42, 1861 (nom. nud.); Steindachner, Reise Nov. Rept. 1867, p. 27 (type loc. Nicobars; type lost).

Length of head one and three-quarter times its breadth; snout distinctly longer than the orbit; forehead concave; upper head-scales unequal, strongly keeled; canthus rostralis and supraciliary edge sharp; 4 or 5 compressed scales on the temple behind the superciliuin usually present; 8 to 10 upper and as many lower labials; diameter of tympanum about half that of the orbit. Body strongly compressed; dorsal scales small, keeled, the upper 6 to 10 rows pointing backwards and upwards, those on the flanks backwards and downwards; ventral scales three to five times larger than the dorsals, strongly keeled, mucronate; from 60 to 100 scales round the middle of the body. Gular pouch reduced to a slight fold; gular scales much smaller than the ventrals; a projecting fold of skin from behind the jaw to above the shoulder. Nuchal crest composed of about ten erect compressed spines, the longest not equalling the diameter of the orbit; dorsal crest a serrated ridge. Limbs long and slender; third and fourth fingers subequal, the third finger not twice the length of the second finger, as long as the fifth toe; fourth toe longer than third toe; the hind-limb reaches to the eye or the tip of the snout. Tail rounded, subtriangular at the base, covered with regular keeled scales, those below largest.

Green, uniform or with reddish or chocolate markings, a large one along the side of the body and another on the snout being usually present; sometimes indistinct dark dorsal cross-bars; greenish-white below; tympanum brown.

From snout to vent 130; tail 440 mm.

Range. Tenasserim; S.W. and Peninsular Siam; the Nicobar Is.; the Malay Peninsula; the East Indian Archipelago except New Guinea. A Malayan species that just extends its range into the Indo-Chinese Subregion. Common in Patani and the Malay Peninsula, but extremely rare farther

north. I have seen one example from each of the following localities: Puket; Klong Bang Lai, Patiyu, lat. 10° 50′ N.; Sai Yok, S.W. Siam, lat. 14° 50′ N.; Tavoy (Ind. Mus. no. 5337); and the specimen recorded by Boulenger (1888) from Mali-oun, near Victoria Point, in Tenasserim. There is a specimen from Great Nicobar Island in the Zoological Museum, Copenhagen.

Good series of this lizard from different parts of its range will probably show that each area has its variation in the number of scale-rows round the middle of the body. Twelve specimens from the Malay Peninsula (Patani to Singapore) vary from 75 to 100; 10 from N. Borneo from 70 to 94; 12 from Amboyna from 60 to 70; the specimens from Mali-oun, Patiyu, Sai Yok, and Tavoy have 67, 60, 62, and 64 scales respectively. Sex does not influence the number of scales round the body.

Eggs oval, 30 by 11 mm. in size.

This lizard has the power of changing colour to yellow, grey, or brownish very rapidly; when chased and exhausted it becomes almost black.

125. Calotes smaragdinus.

Bronchocela smaragdina Günther, Rept. Brit. Ind. 1864, p. 138 (type loc. Cambodia; London).—*Calotes smaragdinus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 319.

Differs from *C. cristatellus* in the following characters:—No enlarged scales behind the supercilium; the upper 2 to 4 dorsal scale-rows only pointing backwards and upwards or straight backwards; 50 to 53 scales round the middle of the body; gular scales larger; third and fourth fingers subequal, twice as long as the second finger, much longer than the fifth toe.

Green above, greenish-white below; a white line along the side of the body starting from the axilla and terminating on the base of the tail.

From snout to vent 95; tail 300 mm.

Three specimens are known. The types (♀♀) were obtained by Mouhot in Cambodia; I obtained a third specimen at Dalat, Langbian Plateau, S. Annam, altitude 5,000 feet.

126. Calotes jubatus.

Bronchocela jubata Dum. & Bibr., Erp. Gen. iv, 1837, p. 397 (type loc. Java; Paris); Stoliczka, J. Asiat. Soc. Beng. xxxix, 1870, p. 179; Theobald, Cat. Rept. Brit. Ind. 1876, p. 104.—*Calotes jubatus*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 318, and Fauna Brit. Ind. 1890, p. 135; Annandale, J. Asiat. Soc. Beng. lxxiii, 1904, p. 18.

Length of head one and three-quarter times its breadth; snout distinctly longer than the orbit; forehead concave;

upper head-scales unequal, strongly keeled, a well-marked λ-shaped series on the crown; canthus rostralis and supraciliary edge sharp; 4 or 5 compressed scales on the temple behind the supercilium; 8 to 10 upper and as many lower labials; diameter of the tympanum about half that of the orbit. Body strongly compressed, much higher anteriorly than posteriorly; dorsal scales moderate, keeled, the upper 2 to 4 rows pointing backwards and upwards, those on the flanks backwards and downwards; ventral scales two to three times as large as the laterals, strongly keeled, mucronate; from 45 to 55 scales round the middle of the body. Gular pouch small; gular scales a little smaller than the ventrals; a projecting fold of skin from behind the jaw to above the shoulder. Nuchal crest composed of closely-set falciform spines, with shorter ones at the base, the longest spines equal the diameter of the orbit; dorsal crest continuous with it, gradually diminishing in size as it proceeds backwards, over the sacrum being a mere ridge. Limbs long and slender; third and fourth fingers subequal; fourth toe distinctly longer than third toe; the hind-limb reaches to between the eye and the tip of the snout. Tail very long and slender, subtriangular at the base, covered with regular keeled scales, those below largest.

Green above, with large pale (yellow or red in life) spots or elongated markings or vertical stripes, chiefly on the anterior part of the body; sometimes large chocolate blotches on the flanks or throat; lips often chocolate-coloured; pale greenish below.

From snout to vent 150; tail 450 mm.

Range. The Nicobar Islands; Java; the Philippine Islands.

The eggs of this species are spindle-shaped.

127. Calotes floweri.

Calotes microlepis (not of Blgr.) Boulenger, J. Fed. Malay St. Mus. iii, 1908, p. 66.

Calotes floweri Boulenger, Fauna Malay Pen. 1912, p. 70 (type loc. Chantabun, S.E. Siam, and Gunong Tahan, Malay Peninsula; London); Smith, J. Fed. Malay St. Mus. x, 1922, p. 269.

Head rather large, its length twice or nearly twice its breadth; snout one and a half times as long as the orbit; forehead nearly flat; upper head-scales unequal, keeled, a series of enlarged ones forming a λ-shaped figure on the forehead; canthus rostralis and supraciliary edge moderately sharp; 8 to 10 upper and as many lower labials; diameter of tympanum not more than half that of the orbit. Body strongly compressed; dorsal scales smooth or feebly keeled, all pointing backwards and downwards, larger than the

median ventrals, which are strongly keeled; 48 to 56 scales round the middle of the body. Gular pouch very small in the male; gular scales as large as or smaller than the ventrals, keeled. Nuchal crest composed of 6 to 9 erect compressed spines; dorsal crest a serrated ridge, absent in the female. Limbs weak, third and fourth fingers subequal in length, third and fourth toes the same or nearly so; the hind limb reaches to the axilla. Tail compressed, covered with keeled scales; in the adult male the basal part is swollen and the scales covering it are thickened, those of the upper median row being enlarged and forming a serrated ridge.

Light brown above, with indistinct dark brown spots and variegations; top of head usually dark brown; two or three ill-defined dark brown or chocolate spots or bars across the back; some dark streaks radiating from the eye; brownish-white below, speckled and streaked with brown. Posterior half of gular pouch in the male chocolate.

From snout to vent 95; tail 175 mm.

Range. S.E. Siam (Chantabun, 1,500 feet); Cambodia (Bockôr, Elephant Mts., 3,000 feet); the Malay Peninsula (Guhong Tahan, Gunong Gedong, 6,000–7,000 feet).

Eggs oval, four in number, 16 by 11 mm. in size.

The examples from the Malay Peninsula have a slightly broader head and shorter snout than those from Indo-China, but in other respects agree with the above description.

128. Calotes microlepis.

Calotes microlepis Boulenger, Ann. Mus. Civ. Genova, (2) v, 1887, p. 476, pl. vi, fig. 1, and Fauna Brit. Ind. 1890, p. 134 (type loc. Pla-pu (1,200 metres), W. of Mt. Muleyit, N. Tenasserim; London and Genoa); Annandale, J. & P. Asiat. Soc. Beng. (n. s.) i, 1905, p. 96; Smith Proc. Zool. Soc. 1921, p. 428.

Differs from *C. floweri* in the following particulars:—65 to 72 scales round the middle of the body, the upper 2 or 3 dorsal rows pointing straight backwards; the hind-limb reaches to the axilla or the shoulder.

The types (2 ♀♀, 1 ♂) collected by Fea are of a light golden-brown colour with black specks, and some black lines radiating from the eye; the gular pouch of the male is chocolate. The specimens are sexually mature, although possibly not fully grown; they measure, from snout to vent, 65–67, tail 150 mm. A gravid female obtained by me on the Langbian Plateau, S. Annam, which I also refer to this species, is of a dark brown colour with lighter variegations. It measures, from snout to vent, 85, tail 185 mm.

Range. Tenasserim (Mt. Muleyit); Annam (Langbian Plateau); ? Assam (Manipur).

The specimen recorded by Annandale (1905) from Manipur cannot now be found. Perhaps it should be referred to the next species.

129. Calotes fruhstorferi.

Acanthosaura fruhstorferi Werner, Zool. Anz. xxvii, 1904, p. 461 (type loc. Manson Mts., Tonking, 3,000–4,000 ft.; London).
Calotes brevipes Werner, Zool. Anz. xxvii, 1904, p. 462 (type loc. Tonking; Vienna and Paris).

Closely allied to *C. floweri* and *C. microlepis*, from which it differs in the following particulars:—Head larger, its length one and three-quarter times its breadth; two very small, separated, spinous scales above the tympanum, one behind the other; diameter of the tympanum one-third that of the orbit; 73 to 80 scales round the middle of the body, the small dorsals with or without larger ones intermixed with them, all pointing downwards and backwards except the upper two or three rows, which point straight backwards; a feebly distinct fold in front of the shoulder present or absent; no dorsal crest; the hind limb reaches to the axilla or not so far; tail as in *floweri*.

Olivaceous brown or greyish, with darker shades and small black spots; a light spot at each elbow and knee; throat of male with a large chocolate spot. In one specimen, a male, the dorsum is rusty red.

From snout to vent 78; tail 178 mm.

Range. Tonking.

130. Calotes kakhienensis.

Oriocalotes kakhienensis Anderson, Zool. Res. W. Yunnan, 1878–9, p. 806, pl. lxxvi, fig. 1 (type loc. Ponsee, W. Yunnan; type lost).—*Acanthosaura kakhienensis*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 305, and Fauna Brit. Ind. 1890, p. 127, and Ann. Mus. Civ. Genova, (2) xiii, 1893, p. 317; Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 479.
Calotes feæ Boulenger, Ann. Mus. Civ. Genova, (2) v, 1887, p. 477, pl. vi, fig. 2, and Fauna Brit. Ind. 1890, p. 143 (type loc. Pla-pu, W. of Mt. Muleyit, Tenasserim; Genoa).

Head large, its length one and two-thirds to one and a half times its breadth; snout distinctly longer than the orbit; cheeks swollen in the adult male; upper head-scales unequal, obtusely keeled; canthus rostralis and supraciliary edge moderately sharp; one, two, or three separated spinous scales between the nuchal crest and the ear; diameter of the tympanum at least half that of the orbit; 7 to 9 upper and as many lower labials. Body compressed; dorsal scales moderate, intermixed with a few larger ones, disposed singly or in patches and mostly on the sides of the body, all keeled;

the upper scales point backwards and upwards, the lower backwards and downwards; ventral scales strongly keeled, as large as the small dorsals; from 56 to 66 scales round the middle of the body. No gular pouch; gular scales smooth or feebly keeled; median gular scales smaller than the ventrals, much smaller than those on the cheeks, which are subquadrangular in shape; a large triangular pit in front of the shoulder covered with small scales. Nuchal crest composed of 7 to 9 separated spines, the longest, in the male, nearly as long as the orbit; dorsal crest a mere denticulation, none in the female. Limbs moderate; third and fourth fingers subequal; fourth toe a little longer than third; the hind-limb reaches to the neck or the axilla. Tail compressed, covered with subequal keeled scales; in the adult male it is markedly swollen at the base and covered with large thickened scales, those of the upper median row forming a serrated ridge.

Pale greenish-olive above, irregularly variegated with light and dark brown, these colours being arranged as broad transverse markings upon the body; lower parts whitish (green in life), more or less speckled or streaked with dark brown; lips with dark vertical bars; a dark stripe from the eye to the ear.

From snout to vent 125; tail 255 mm.

Range. The mountainous regions of Burma east of the Irrawadi, and Western Yunnan. Its habits are arboreal.

131. Calotes versicolor.

Agama versicolor Daudin, Hist. Nat., Rept. iii, 1802, p. 395, pl. xliv, (type loc. India; Paris); Kuhl, Beitr. Zool. Vergl. Anat. 1820, p. 114 (Pondicherry).—*Calotes versicolor*, Jerdon, J. Asiat. Soc. Beng. xxii, 1853, p. 470; Blyth, ibid. p. 649; Günther, Rept. Brit. Ind. 1864, p. 140; Anderson, Proc. Zool. Soc. 1872, p. 381; Blanford, Zool. E. Persia, 1876, p. 313; Anderson, Zool. Res. W. Yunnan, 1878–9, p. 805; Murray, Zool. Sind, 1884, p. 367; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 321, and Fauna Brit. Ind. 1890, p. 135, fig., and Fauna Malay Pen. 1912, p. 71; Flower, Proc. Zool. Soc. 1899, p. 639; Annandale, ibid. 1900, p. 858, and J. Asiat. Soc. Beng. lxxiii, Suppl. 1904, p. 18, and ibid. (2) i, 1905, p. 87, and Rec. Ind. Mus. i, 1907, p. 153, and ibid. iii, 1909, p. 254; Smith & Gaird., J. Nat. Hist. Soc. Siam, i, 1915, p. 154; Mell, Arch. f. Naturg. Berlin, lxxxviii, 1922, p. 112; Chabanaud, Mission Baluchistan, Result. Sci. Miss. Occ. 1922, pl. i; Procter, J. Bombay N.H. Soc. xxix, 1923, p. 123; Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 415; Jouguet, J. Bombay N.H. Soc. xxxiii, 1929, p. 452; Lowsley, ibid. xxxiv. 1930, p. 248; Asana, ibid. xxxiv, 1931, p. 1041; Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 150; Brongersma, Mém. Mus. R. Hist. Nat. Belg. v, 1931, p. 19.

Agama tiedmanni Kuhl, Beitr. Zool. Vergl. Anat. i, 1820, p. 109 (type loc. Pondicherry).—*Ciotes tiedemanni*, Kaup, Isis, 1827, p. 619, pl. viii.

Agama vultuosa Harlan, J. Acad. Philad. iv, 1825, p. 296, pl. xix (type loc. Calcutta).
Agama indica Gray, Zool. Journ. iii, 1827, p. 217 (type loc. Dum-Dum, Calcutta).
Calotes cristatus Jacquemont, Voy. dans l'Inde, Zool. Atlas, ii, 1844, Descript. des Collections, pl. xi.
? *Calotes viridis* Gray, Ann. Mag. Nat. Hist. xviii, 1846, p. 429 (type loc. Madras; type lost); Theobald, Cat. Rept. Brit. Ind. 1876, p. 120.
Calotes gigas Blyth, J. Asiat. Soc. Beng. xii, 1853, p. 648 (type loc. unknown; Calcutta); Annandale, J. & P. Asiat. Soc. Beng. (n. s.) i, 1905, p. 87, and Mem. Asiat. Soc. Beng. i, 1906, p. 189, pl. ix, fig. 2, and Rec. Ind. Mus. vii, 1912, p. 46.
Calotes versicolor major Annandale *, Rec. Ind. Mus. xxii, 1921, p. 331; Hora, Rec. Ind. Mus. xxv, 1923, p. 374.

Length of head once and a half to nearly twice its breadth; snout a little longer than the orbit; forehead concave; cheeks swollen in the adult male; upper head-scales unequal, smooth or feebly keeled; two well-separated spines on each side of the back of the head above the ear; canthus rostralis and supraciliary edge sharp; 9 to 11 upper and as many lower labials; diameter of tympanum half or less than half that of the orbit. Body compressed; dorsal scales rather large, more or less distinctly keeled, sometimes mucronate in the adult male, all pointing backwards and upwards, larger than the ventral scales, which are always strongly keeled and mucronate; 35 to 52 scales round the middle of the body. No gular pouch, except in the male during the breeding season, when a small one develops; gular scales as large as or larger than the ventrals, strongly keeled and mucronate in the adult male. No fold or groove in front of the shoulder. Nuchal and dorsal crests continuous, well developed in the male, composed of lanciform or falciform spines gradually decreasing in size towards the posterior part of the back. Limbs moderate; third and fourth fingers nearly equal, fourth toe longer than third; the hind limb reaches to the temple or the eye. Tail rounded or feebly compressed, covered with subequal, keeled scales.

Light brown or greyish above, uniform or with more or less distinct dark brown transverse spots or bars upon the back and sides; or variegated with dark brown; dark streaks radiating from the eye; young and females often with two light (yellow) dorso-lateral stripes; tail with light and dark annuli. Dirty whitish below, often streaked with dark brown or black. Fully-grown males are usually more or less uniform in colour and have sometimes a greenish tinge; the throat may have a black transverse bar.

Variation. Except for the difference in size I am unable to correlate the variation in this lizard with geographical

* Annandale credits Blyth with the name *major*, but I do not know the reference.

distribution. The Indo-Chinese form is considerably smaller than that from the Indian Peninsula. Annandale came to much the same conclusion in 1909, when he wrote that "the race which inhabits the drier parts of India at low altitudes exhibits a much greater sexual variation than is the case

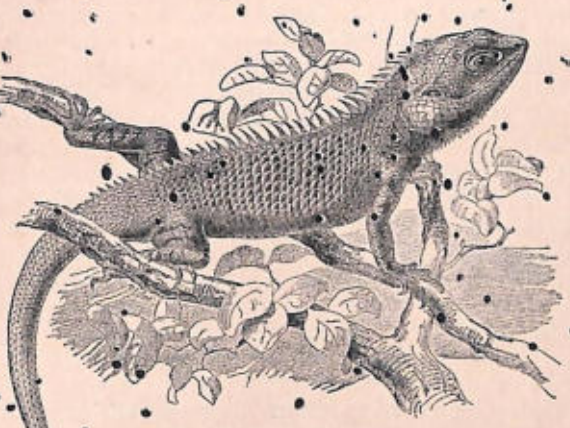


Fig. 54.—*Calotes versicolor*.
(After Boulenger.)

of the race which occurs in Lower Bengal, the Himalayas, and Indo-China." Examples from the Indo-Chinese Subregion—which includes the Eastern Himalayas (Introduction, vol. i, p. 17)—do not exceed 95 mm. from snout to vent, tail 290, the females being from 10 to 15 mm. less in body-length. Specimens from the Indian Peninsula (males) range from 120 to 140 mm. in body-length, with a tail of 300 to 330 mm. The increase in size does not appear to be confined to certain localities, but may occur in any part of the Peninsula.

The variation in the number of scales round the middle of the body is as follows (the number in brackets refers to the number of specimens examined):—Indo-China, 40 to 50 (25); Hainan and S. China, 40 to 47 (15); Ceylon and S. India, 35 to 45 (16); Benares, 42 to 52 (4); Karachi, 36 to 43 (6); Afghanistan and Himalayas, 42 to 48 (6).

Range. The whole of the Indian and Indo-Chinese Subregions; Afghanistan; Ceylon; the Andaman Islands; Pulo Condore; Hainan; Hong-kong; S. China; the northern

part of the Malay Peninsula, but absent in the southern part of it; Sumatra. Kuhl was the first author to identify the species with a locality, and Pondicherry, named by him, may therefore be accepted as the *terra typica*.

Common throughout India, Ceylon, and Indo-China in the plains and in the hills. Annandale (1909) records it as common in Darjeeling district, Nepal, and Kumaon up to 6,000 feet, but not above 7,000 feet; it does not penetrate far into the Himalayas from the plains. On the Langbian Plateau in S. Annam I did not meet with it above 3,000 feet altitude.

Writing of its extreme north-western range, Blanford (1876) remarks:—"I was somewhat surprised at finding this Indian tree-lizard in Baluchistan. I only met with it twice, and on both occasions it was found on date-palms. As the plantations of these palms are few in number, and many miles intervene between them, it is difficult to account for the appearance of these lizards unless we suppose them to have inhabited the country at a time when it was more covered with wood than is the case at present. I cannot conceive a *Calotes* crossing the desert plains and barren rocky hills of Sind and Baluchistan to reach patches of date cultivation. Geologists have shown, however, the probability of a more moist climate having existed in Persia and Baluchistan, and it is reasonable to suppose that this lizard migrated into the country whilst this was the case. Many of the date-groves are probably of very high antiquity, and the *Calotes* may have inhabited them for ages."

Ingoldby obtained it in S. Waziristan."

C. versicolor is often, but erroneously, called the Chameleon by the European residents of Indo-China; in India it is known as the Bloodsucker. It is common in gardens and in open jungle, being found chiefly on bushes and hedges. It feeds largely on insects and their larvæ, spiders, etc., but has been known to devour young birds in the nest (*Lowsley*). During the breeding season the male assumes a brilliant crimson or scarlet colour. This may be confined to the head and shoulders, but sometimes extends over most of the body; black patches may appear upon the neck, cheeks, or throat and the dorsal spots become intensified. Annandale (1900) has given an account of the courtship of this lizard. He says that the males are very pugnacious and change colour as they fight. At the time of courtship a curious performance is gone through by the male, the female remaining concealed in the foliage hard by. He chooses some convenient and conspicuous station and advances slowly towards the female. His colour then is pale yellowish flesh-colour, with a conspicuous dark spot on the gular pouch, which is extended to its utmost. He stands upright, raising the fore-part of the

body as high as possible and nodding his head solemnly up and down. As he does so, the mouth is rapidly and repeatedly opened and shut. When he is driven away, caught or killed, the dark spot disappears entirely from the neck. If one male is captured, another takes his place in a few hours.

Asana has given a full account of the breeding habits of this lizard. His observations refer to it in the neighbourhood of Ahmadabad, Bombay Presidency. During the cold weather from the middle of November to the end of February they are much less active than at other times of the year, and are only rarely met with. This statement is confirmed by McCann, who states that in Rajputana they are very common during the hot and rainy weather but are conspicuously absent in the winter, during which months they may be found hiding in sheltered spots. The breeding season starts early in May and ends in September. The eggs are usually laid in June, July, and August. They are deposited in soft earth 6 or 7 inches deep. As many as 23 eggs may be laid in one hole, but they are probably not all laid at one time. Asana states that, in two or three lizards opened, there were in each oviduct 10 to 11 eggs in a row antero-posteriorly. All of them were large, fully developed, and ready to be laid, looking about the same as freshly laid eggs. He gives the size of the eggs as 10–11 by 5–4 mm. These observations are not in accordance with my own, made in Indo-China, or with those of Deraniyagala made in Ceylon. I have never known them to be buried more than a couple of inches below the earth, and the number deposited may vary from 4 to 12. They vary in size from 14–15 mm. long by 8–9 broad. A specimen in the British Museum collection from Afghanistan contains eggs approximately 14 by 8 mm. in size. As with other reptiles, however, the age and size of the parent are important factors in egg-production. A large and fully grown female will produce more than does one not fully mature.

132. Calotes maria.

Calotes maria (in part) Gray, Cat. Liz. Brit. Mus. 1845, p. 243 (type loc. "Afghanistan" and Khasi Hills; London); Jerdon, P. Asiat. Soc. Beng. 1870, p. 77; Günther, Proc. Zool. Soc. 1870, p. 778, pl. xlv, fig. 2; Anderson, Proc. Zool. Soc. 1872, p. 382; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 322, and Fauna Brit. Ind. 1890, p. 136.

Calotes platyceps Blyth, J. Asiat. Soc. Beng. xxi, 1852, p. 354, and in Kelaart, Prod. Faun. Zeyl. App. p. 46 (type loc. Cherra Punji).

Length of head one and a half times its breadth; snout broad, a little longer than the orbit; forehead slightly concave; upper head-scales unequal, keeled or tuberculate; canthus

rostralis and supraciliary edge sharp; two parallel ridges of compressed, more or less spinous scales above the tympanum, the upper continuous with the supraciliary edge, the lower separated from the tympanum by 4 or 5 small scales; 9 to 11 upper and as many lower labials; tympanum one-third the diameter of the orbit. Body compressed; dorsal scales rather large, more or less distinctly keeled, pointing backwards and upwards, larger than the ventrals, which are always strongly keeled and mucronate; 53 to 63 scales round the middle of the body. No gular pouch; gular scales like the ventrals, but larger. Nuchal and dorsal crests moderately developed in both sexes, composed anteriorly of lanceolate spines, gradually decreasing in size and reduced to a mere ridge on the posterior part of the back. Limbs moderate; third and fourth fingers nearly equal; fourth toe longer than third; the hind limb reaches to the eye or a little farther. Tail rounded or feebly compressed, covered with subequal keeled scales.

Green, with pale (red) streaks and spots. Usually several oblique stripes upon the flanks, and elongated or rounded spots upon the limbs and upper aspect of the tail; greenish-white below. According to Günther the head of the male assumes a bright red colour in the breeding season (see coloured plate).

From snout to vent 120; tail 370 mm.

Range. Assam (Khasi Hills).

133. Calotes jerdoni.

Calotes maria (in part) Gray, Cat. Liz. Brit. Mus. 1845, p. 243; Günther, Rept. Brit. Ind. 1864, p. 144.—*C. maria*, (not of Gray), Anderson, Zool. Res. W. Yunnan, 1878–9, p. 806.

Calotes platyceps (not of Blyth), Jerdon, P. Asiat. Soc. Beng. March 1870, p. 77.

Calotes jerdonii Günther, Proc. Zool. Soc. Nov. 1870, p. 778, pl. xlv, fig. A; (type loc. Khasi Hills; London); Anderson, Proc. Zool. Soc. 1872, p. 382; Boulenger, Cat. Liz. Brit., Mus. i, 1885, p. 323, and Fauna Brit. Ind. 1890, p. 137; Wall, J. Bombay N.H. Soc. xviii, 1908, p. 505; Venning, ibid. xxi, 1912, p. 690.

Calotes yunnanensis Annandale, J. Asiat. Soc. Beng. (n. s.) i, 1905, p. 87 (type loc. Teng-yueh (Momein), W. Yunnan; Calcutta).

Differs from *C. maria* in the following characters:—Parallel ridges above the tympanum not spinous, the lower one longer, starting from just behind the eye, separated from the tympanum by two or three scales only; 45 to 57 scales round the body; gular scales larger, much larger than the ventrals; an oblique curved fold covered with small granular scales in front of the shoulder. Nuchal crest less strongly developed; the hind limb reaches to the eye or not quite so far.

Green above with light markings (yellow, orange, or brown in life). A light dark-edged dorso-lateral stripe sometimes present, or light vertical bars; light spots upon the limbs at the elbow, knee, and ankle; tail above sometimes with dark spots upon a light ground; sometimes small golden spots on the lower parts of the flanks and belly; dark streaks radiating from the eye; fold in front of the shoulder blackish.

Two hatchlings obtained by Wall at Maymyo, Burma, are handsomely decorated with pale green black-edged bars upon the top of the head and back.

From snout to vent 100; tail 285 mm.

Range. Assam (Khasi Hills); Burma (Chin Hills and Maymyo); W. Yunnan (Teng-yueh). The record from the W. Himalayas is no doubt incorrect. Wall found it common about Shillong, usually among foliage, generally in low bushes or bracken. A pair were caught by him *in copula* on Aug. 25th. Venning discovered 12 eggs near Haka, in the Chin Hills (6,200 feet), on Aug. 11th. They were scattered irregularly over an area of about 3 feet by 6 inches and were lying under moss. He describes the cutting through of the shell by the young with its egg-tooth, and observes that they could run rapidly and had the power of changing colour from the moment of birth.

Annandale (J. Bombay Nat. Hist. Soc. xxi, 1912, p. 1099) doubts if the egg-tooth is used for rupturing the shell. He states that he could not find any trace of a tooth in his specimens (of *nigrilabris*), and that it is hard to see how a structure of that nature could produce oblique slits and a triangular flap. He believes the slits to be made by the claws of the fore-foot, and considers that the manner in which the embryo is packed in the egg and the nature of the cuts strongly favour that view.

134. Calotes emma.

Calotes emma Gray, Cat. Liz. Brit. Mus. 1845, p. 244 (type loc. "Afghanistan"; London); Blyth, J. Asiat. Soc. Beng. xxii, 1853, pp. 413 & 647 (Mergui); Günther, Rept. Brit. Ind. 1864, p. 144; Anderson, Zool. Res. W. Yunnan, 1878–9, p. 506; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 324, pl. xxv, fig. 1, and Fauna Brit. Ind. 1890, p. 137, and Fascic. Malay. Zool. i, 1903, p. 155, and Fauna Malay. Pen. 1912, p. 43; S. Flower, Proc. Zool. Soc. 1899, p. 641; Mell, Arch. f. Naturg. Berlin, lxxxviii, 1922, p. 112.

Calotes alticristatus Schmidt, Amer. Mus. Nov. no. 176, 1925, p. 2, and Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 482, fig. (type loc. Yunnan-fu, New York).

Length of head one and a half times its breadth; snout a little longer than the orbit; forehead concave; cheeks swollen in the adult male; upper head-scales unequal, keeled

or tuberculate; canthus rostralis and supraciliary edge sharp; a spine at the end of the supraciliary edge, and two more on the occiput, between the tympanum and the nuchal crest, the posterior one situated just above the ear, all very variable in length: a row of 4 or 5 enlarged, keeled scales between the eye and the tympanum, the diameter of which is half that of the orbit; 9 to 12 upper and as many lower labials. Body compressed; dorsal scales rather large, keeled, pointing backwards and upwards, except those upon the flanks, which may point backwards or backwards and downwards, larger than the ventrals, which are strongly keeled and mucronate; 49 to 65 (45 to 55 in Malayan specimens) scale-rows round the middle of the body. No gular pouch, except during the breeding season, when the male develops a small one; gular scales similar to and as large as, or a little larger than, the ventrals. An oblique curved fold

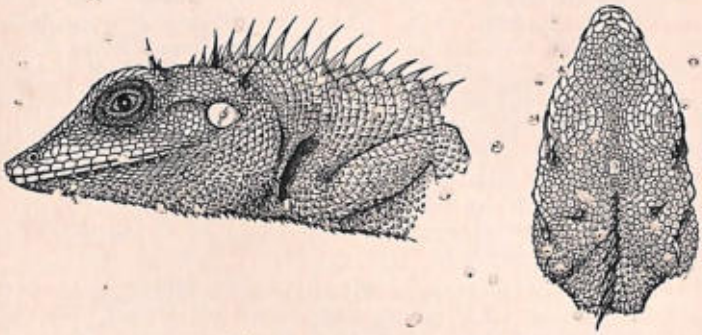


Fig. 55.—*Calotes emma*. Upper and side views of head.

in front of the shoulder covered with small granular scales. Nuchal and dorsal crests continuous, well developed in both sexes anteriorly, composed of long lanceolate spines gradually decreasing in size and reduced to a feeble crest on the posterior part of the back. Limbs moderate; third and fourth fingers nearly equal; fourth toe distinctly longer than third toe; the hind limb reaches to the eye or not quite so far. Tail feebly compressed, covered with subequal scales.

Light olive-brownish above, with dark brown dorsal bars, or spots transversely arranged; dark lines radiating from the eye, and usually a dark streak from the eye to above the tympanum; fold in front of the shoulder black; a more or less distinct light (yellowish) dorso-lateral stripe, sometimes quite broad, not present in any female that I have examined; interstitial skin of gular pouch of male dark purple or black; dirty whitish below.

From snout to vent 115 ; tail 290 mm.

Range. Assam, as far west as Goalpara and the Garo Hills ; Burma ; Siam ; French Indo-China ; Yunnan ; Peninsular Siam and the Malay Peninsula as far south as Perak ; Pulo Condore (S. China Sea).

Inhabits chiefly open jungle country ; not met with above 3,000 feet altitude. From 4 to 12 oval eggs are laid, 17 by 11 mm. in size.

When the creature is excited the whole of the throat and gular region, as well as the streak along the side of the head through the eye, become black ; the upper lip and rest of the head turn pale pink.

Calotes alaicristatus, as Schmidt has pointed out, has shorter head-spines and a longer and stronger nuchal crest than is usual for *emma* ; those characters, however, do not seem sufficient to separate it specifically from that species. His specimen, an adult female, considerably extends the range of *emma* in the north.

135. Calotes mystaceus.

Calotes mystaceus Dum. & Bibr., Erp. Gen. iv, 1837, p. 408 (type loc. Burma ; Paris); Blyth, J. Asiat. Soc. Beng. xxi, 1852, p. 354, and ? xv, 1846, p. 376 ; Theobald, Cat. Rept. Brit. Ind. 1876, p. 106 ; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 325, and Fauna Brit. Ind. 1890, p. 138 ; Annandale, J. Asiat. Soc. Beng. lxxiii, 1904, (2) Suppl. p. 18 ; Smith, J. Nat. Hist. Soc. Siam, i, 1915, p. 256, and Proc. Zool. Soc. 1921, p. 429.

Length of head one and a half times its breadth ; snout distinctly longer than the orbit ; forehead feebly concave ; cheeks swollen in the adult male ; upper head-scales unequal, smooth or keeled ; canthus rostralis and supraciliary edge sharp ; no postorbital spine ; two short, separated spines or groups of 2 or 3 spines on each side of the back of the head, the lower and posterior one being separated from the tympanum by 4 or 5 scales ; a row of 3 or 4 enlarged scales between the eye and the tympanum, the diameter of which is half that of the orbit ; 9 to 11 upper and as many lower labials. Body compressed ; dorsal scales more or less strongly keeled, pointing backwards and upwards, nearly or quite twice as large as the ventrals, which are strongly keeled ; 48 to 58 scales round the middle of the body. Gular pouch small, larger in the male during the breeding season ; gular scales feebly or strongly keeled, sometimes mucronate, larger than the ventrals. An oblique fold in front of the shoulder, covered with small granular scales. Nuchal and dorsal crests continuous, well developed in the male, composed of long falciform scales, directed backwards, the longest equalling the length of the orbit, gradually decreasing in

height and reduced to a low crest over the sacrum and base of the tail. Limbs moderate: third and fourth fingers equal or nearly so; fourth toe distinctly longer than third toe; the hind limb reaches to the neck or the posterior border of the orbit. Tail feebly compressed, covered with subequal, keeled scales.

Brownish-grey or olivaceous above, with indistinct darker spots and markings; dark lines radiating from the eye and one from the eye to the tympanum; three or five large rusty-red or chocolate-coloured spots on each flank usually present; upper lip white or yellow, the stripe broad and extending to the shoulder; fold in front of the shoulder usually not coloured; below dirty whitish.

All the examples that I have seen from west of the Mekong River (Saigon, the Langbian Plateau, and Kontum in Annam) are more uniformly coloured. They lack the red spots upon the flanks and dark lines upon the head, but in other respects agree with specimens from Burma and Siam.

From snout to vent 140; tail 280 mm. Females are smaller.

Range. Burma and Siam, as far north as Lake Indawgyi, Myitkyina district, and south to lat. 12° N.; Cambodia, Cochin-China, Annam; the Andaman and Nicobar * Islands. Common in open jungle in many parts of southern Indo-China, both at sea-level and in the hills. On the Langbian Plateau in southern Annam I found it up to 5,000 feet altitude.

The male during the breeding season assumes strikingly handsome colours. The female is similarly coloured, but much less strongly.

A pair of these lizards kept by me in Siam bred in captivity and afforded an opportunity of observing their habits during that period. Like other species of *Calotes* in confinement, they were extremely wild and shy, and would never allow themselves to be handled. They fed, however, freely on insects of all sorts. They were caught in January, and for the first six weeks of their captivity did not show any special colour-changes, being a mixture of dull greys and browns of varying shades.

The courtship, which continued until the eggs were laid, was much the same as that described for *C. versicolor*, and consisted for the most part of absurd bowings and noddings of the head. This was commenced by the male, and usually, after a short time, responded to by the female. The pair faced each other on these occasions, arching their backs and puffing out their throats to the full extent. The vivid hues assumed by the male (and slightly so by the female) during this performance transformed him into a truly

* Not seen by me.

gorgeous creature. The head and fore-part of the body became of a light electric blue, sometimes green, colour, the gular pouch dark purple, whilst the pale stripe which borders the upper lip and passes on to the shoulder turned almost white and stood out in strong contrast to the other colours.

Copulation was first observed on May 9th, and after that they were frequently seen together. On June 21st I observed the female busy with the earth in the flower-pot in the cage. She objected to being watched, but by hiding I was enabled to see the remainder of the proceedings. The eggs had already been laid, and she was then engaged in covering them up, raking the earth over them with her fore-paws and hammering it down with her nose. The male, perched on a branch above, watched the performance with great interest, and I was surprised to see him, in the midst of it all, suddenly race down to his mate and engage her. She finally completed her task, smoothing the earth over at the spot so that no trace was left to show that anything had been done there. I never saw her near the spot again, and she appeared to take no further interest in her progeny. The eggs were buried about two inches deep in the earth. They were seven in number, 15–18 by 11–10 mm. in size. The first young one appeared on Aug. 20th; it measured 72 mm. in total length, the head and body being 26 mm.

The colour-changes in these lizards could be produced by other emotions as well as by sexual excitement. A snake put into the cage would have the same effect. Their attitude then was that of being fascinated and unable to escape. They invariably faced the snake, bowing to it and nodding their heads exactly as when courting. The crest was strongly erected, the pouch fully distended, and the colours became gradually more vivid until they were almost as intense as during sexual excitement.

136. Calotes nemoricola.

Calotes nemoricola Jerdon, J. Asiat. Soc. Beng. xxii, 1853, p. 471 (type loc. Coonoor Ghat, Nilgiri Hills; Calcutta), and P. Asiat. Soc. Beng. 1870, p. 78; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 326, and Fauna Brit. Ind. 1890, p. 139.

Length of head one and a half times its breadth; snout distinctly longer than the orbit; forehead concave; upper head-scales unequal, smooth or feebly keeled; canthus rostralis and supraciliary edge sharp; a row of 3 or 4 compressed spines above the posterior part of the tympanum, the diameter of which is less than half that of the orbit; 9 or 10 upper and as many lower labials. Body compressed;

height and reduced to a low crest over the sacrum and base of the tail. Limbs moderate; third and fourth fingers equal or nearly so; fourth toe distinctly longer than third toe; the hind limb reaches to the neck or the posterior border of the orbit. Tail feebly compressed, covered with subequal, keeled scales.

Brownish-grey or olivaceous above, with indistinct darker spots and markings; dark lines radiating from the eye and one from the eye to the tympanum; three or five large rusty-red or chocolate-coloured spots on each flank usually present; upper lip white or yellow, the stripe broad and extending to the shoulder; fold in front of the shoulder usually not coloured; below dirty whitish.

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From snout to vent 140; tail 280 mm. Females are smaller.

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The courtship, which continued until the eggs were laid, was much the same as that described for *C. versicolor*, and consisted for the most part of absurd bowings and noddings of the head. This was commenced by the male, and usually, after a short time, responded to by the female. The pair faced each other on these occasions, arching their backs and puffing out their throats to the full extent. The vivid hues assumed by the male (and slightly so by the female) during this performance transformed him into a truly

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gorgeous creature. The head and fore-part of the body became of a light electric blue, sometimes green, colour, the gular pouch dark purple, whilst the pale stripe which borders the upper lip and passes on to the shoulder turned almost white and stood out in strong contrast to the other colours.

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Length of head one and a half times its breadth; snout distinctly longer than the orbit; forehead concave; upper head-scales unequal, smooth or feebly keeled; canthus rostralis and supraciliary edge sharp; a row of 3 or 4 compressed spines above the posterior part of the tympanum, the diameter of which is less than half that of the orbit; 9 or 10 upper and as many lower labials. Body compressed;

dorsal scales very large, about three times as large as the median ventrals, smooth, pointing backwards and upwards; ventrals strongly keeled; 36 to 43 scales round the middle of the body. Gular sac small; scales on either side of the lower jaw feebly keeled, larger than the ventrals, those on the gular pouch smaller, more strongly keeled, about as large as the ventrals. A short oblique fold or pit in front of the shoulder covered with small granular scales. Nuchal and dorsal crests continuous, the former well developed, composed of about 12 lanceolate spines, the longest of which is nearly as long as the orbit; on the back the crest is much lower. Limbs moderate; third and fourth fingers nearly equal; fourth toe a little longer than the third; the hind limb reaches to the tympanum or not quite so far. Tail feebly compressed, covered with subequal, keeled scales; in the fully grown male the base is swollen and the scales on that part of it are thickened.

Green or brownish above, with indistinct darker markings; a black streak from the eye to above the tympanum; throat with black streaks; belly dirty white; gular pouch pink (in life).

From snout to vent 145; tail 330 mm.

Range. The Nilgiri Hills.

Jerdon's type, a much mutilated male, agrees well with his brief description and with two other specimens collected by Beddome somewhere in Malabar and now in the British Museum. A topotypical specimen is in the Museum of the Bombay Natural History Society.

137. Calotes grandisquamis.

Calotes grandisquamis Günther, Proc. Zool. Soc. 1875, p. 226, pl. xxx (type loc. foot of Cancot Ghat, near Manantoddy, Bramagherry Hills; London); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 325, and Fauna Brit. Ind. 1890, p. 138.

Closely allied to *C. nemoricola*, differing in the following characters:—Head a little longer, its breadth about one and three-quarter times its length; dorsal and ventral scales larger, 27 to 35 round the middle of the body; scales on each side of the lower jaw larger, smooth; nucho-dorsal crest better developed, at least in the male; the longest nuchal spine equals the diameter of the orbit, and the upper median row of scales on the base of the tail form a serrated ridge, which is continuous with the dorsal crest; the hind-limb reaches to the tympanum or a little further.

Green above, uniform or with broad black, transverse, bars; an orange spot may be present in the centre of each black scale; lower parts pale green.

Size the same.

Range. Anaimalai and Bramagherry Hills; Ponnudi (Travancore).

Eggs oval, 6 to 12 in number.

138. Calotes calotes.

Lacerta calotes Linnæus, Syst. Nat. 10th ed. 1758, p. 207 (type loc. Ceylon; Stockholm).—*Iguana calotes*, Laurenti, Syn. Rept. 1768, p. 49.—*Agama calotes*, Daudin, Hist. Nat. Rept. iii, 1802, p. 361, pl. xlii.—*Calotes calotes*, Lönnberg, Bih. Svensk. Vet.-Akad. Stockholm, xxii, 1896, p. 15.

Agama ophiomachus Merrem, Tent. Syst. Amphib. 1820, p. 51.—*Calotes ophiomachus*, Blyth, J. Asiat. Soc. Beng. xv, 1846, p. 376; Kelaart, Prodr. Faun. Zeyl. 1852, p. 169; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 327, and Fauna Brit. Ind. 1890, p. 140; Annandale, Spol. Zeyl. iii, 1906, p. 190, and Rec. Ind. Mus. iii, 1909, p. 255; Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 153.

Agama lineata Kuhl, Beitr. Zool. Vergl. Anat. 1820, p. 108.

Length of head one and a half times its breadth; snout a little longer than the orbit; forehead concave; cheeks swollen; upper head-scales unequal, smooth; canthus rostralis and supraciliary edge sharp; a row of 8 or 9 compressed spines, divided into two groups, above the tympanum, the diameter of which is less than half that of the orbit; 9 to 11 upper and as many lower labials. Body compressed; dorsal scales large, feebly keeled, sometimes smooth, pointing backwards and upwards, as large as or a little smaller than the ventrals, which are strongly keeled and mucronate; 30 to 35 scales round the middle of the body. Gular pouch not developed; gular scales feebly keeled, nearly or quite as large as the ventrals. A short oblique fold in front of the shoulder covered with small granular scales. Nuchal and dorsal crests continuous, composed of closely-set lanceolate spines with smaller ones at the base; in the adult male the height of the crest on the neck equals or exceeds the diameter of the orbit; on the back it gradually diminishes in size. Limbs moderate; third and fourth fingers nearly equal; fourth toe distinctly longer than third toe; the hind-limb reaches to the front of the eye or beyond. Tail very long and slender.

Bright green dorsally, usually with 5 or 6 whitish or dark green transverse stripes, often continued on to the tail; head yellowish- or brownish-green; throat (in life) red; belly pale green; tail light brown. Young and immature sometimes with a whitish dorso-lateral stripe. A half-grown example in the British Museum, no. 74.4.29.836, has a broad vertebral stripe of buff with elongated dark brown spots.

From snout to vent 130; tail 500 mm.

Range. Ceylon; S. India (Travancore; Shevaroy Hills); Nicobar Is. (Ind. Mus. no. 6543). Found throughout Ceylon, but commoner in the hills than in the low country.

Eggs 18 by 12 mm.; 6 to 12 at a time (*Deraniyagala*).

139. Calotes ceylonensis.

Calotes mystaceus, var. *ceylonensis* F. Müller, Verh. Naturf. Ges. Basel viii, 1887, p. 292, pl. iii (type loc. Kumbukan-aar, S.W. Ceylon; Basel).—*Calotes ceylonensis*, Boulenger, Fauna Brit. Ind. 1890, p. 139; Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 151.

Calotes kelaartii Nevill, Taprobanian, i., Oct. 1887, p. 134 (type loc. N.W. Provinces, Ceylon; based on Haly's description, ibid. p. 133).

Calotes salcoides Werner, Verh. zool.-bot. Ges. Wien, xlvi, 1896, p. 7 (type loc. Ceylon; Vienna).

Length of head one and a half times its breadth; snout a little longer than the orbit; forehead concave; cheeks swollen in the adult male; upper head-scales unequal, smooth; canthus rostralis and supraciliary edge sharp; two well-separated spines above the tympanum, the upper and anterior one mid-way between it and the nuchal crest; diameter of the tympanum half that of the orbit; 10 to 12 upper and as many lower labials. Body compressed; dorsal scales rather small, smooth or faintly keeled, the anterior and upper ones pointing backwards and upwards, the others straight backwards, larger than the ventrals, which are strongly keeled and mucronate; 54 to 60 scales round the body. No trace of a gular sac; gular scales strongly keeled, as large as the ventrals; an oblique fold in front of the shoulder covered with small granular scales. Nuchal crest formed of 10 or 12 small spines; no dorsal crest. Limbs moderate; third and fourth fingers subequal; fourth toe distinctly longer than third; the hind-limb reaches to the tympanum or just beyond. Tail long and slender; in the adult male it is markedly swollen at the base, with large, thick, keeled scales, those of the upper median row forming a slight serrated ridge.

Olivaceous or brownish above; back of head and anterior part of back pale brownish (reddish in life), divided into more or less distinct spots by dark transverse bars; hinder part of back and tail with dark cross-bars; upper lip with a pale (pink) strongly defined stripe, which extends to beyond the ear; sides of neck and chest black or with black reticulations; gular region greyish or blackish; belly pale brown with more or less distinct angular bands.

From snout to vent 70; tail 165 mm.

Range. Ceylon. Recorded by Deraniyagala from the northern, eastern, and central parts of the island. Not

uncommon, according to Haly, in the forests in the N.W. Provinces.

The exact date of Müller's description is not available, but it appears to have been published before that of Nevill.

140. Calotes liolepis.

Calotes nemoricola (not of Jerdon), Günther, Proc. Zool. Soc. 1869, p. 507.

Calotes liolepis Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 326, pl. xxv, fig. 2 (type loc. Ceylon; London), and Fauna Brit. Ind. 1890, p. 140; Nevill, Taprobanian, ii, 1887, p. 133; Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 152.

Length of head one and a half times its breadth; snout a little longer than the orbit; forehead concave; cheeks swollen in the male; upper head-scales unequal, smooth; canthus rostralis and supraciliary edge sharp; two well-separated spines or groups of 2 or 3 spines above the tympanum, the upper and anterior one mid-way between it and the nuchal crest; diameter of the tympanum half or less than half that of the orbit; 10 to 12 upper and as many lower labials. Body compressed; dorsal scales large, smooth, pointing backwards and downwards, except sometimes the upper one or two rows, which point backwards; two to three times as large as the ventrals, which are strongly keeled and mucronate; 33 to 39 scales round the middle of the body. Gular sac not developed, or just a fold in the male; gular scales feebly keeled, about as large as the ventrals; a short oblique fold in front of the shoulder covered with small granular scales. Nuchal crest well developed in the male, composed of narrow, separated, lanceolate spines, the longest of which equals the diameter of the orbit; dorsal crest continuous with it, the spines lower, posteriorly forming a serrated ridge; in the female the whole crest is lower. Limbs moderate; third and fourth fingers equal; fourth toe a little longer than third toe; the hind-limb reaches to the tympanum or a little farther. Tail as in *ceylonensis* (fig. 53).

Male. Green above with whitish markings, namely, a spot below the eye, a streak behind the ear, and three transverse bars upon the body; base of tail greenish-brown; below whitish or greenish; sometimes dark brown patches on the head and body. Deraniyagala states that the gular fold in life is red with white blotches.

Female. Olivaceous or brown above, with irregular and very variable dark brown markings.

From snout to vent 85; tail 210 mm.; females are a little smaller.

Range. The hills of Ceylon. Recorded from Punduluova, Kandy, and Gammaduwa.

141. Calotes liocephalus.

Calotes liocephalus Günther, Ann. Mag. Nat. Hist. (4) ix, 1872, p. 86 (type loc. Peradeniya district, Ceylon; London); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 329, pl. xxvi, and Fauna Brit. Ind. 1890, p. 141; F. Müller, Verh. Nat. Ges. Basel, viii, 1889, p. 698; Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 154.

Differs from *C. liolepis* in the following characters:—No spines on the head; dorsal scales smaller, feebly keeled, about as large as the ventrals; gular scales as large as or larger than the ventrals; 43 to 50 scales round the middle of the body; the hind-limb reaches to the eye or nearly as far. In the fully grown male the head is larger and the base of the tail more swollen.

Male. Green or bluish-green or olivaceous above, with 5 or 6 angular reddish-brown cross-bars; upper lip and cheeks with a brown streak or spotted with brown; sometimes dark cross-bars on the top of the head; base of tail light olive-brown, the rest of it alternately banded with light and dark; below greenish-white.

The only two female specimens that I have examined are of a uniform green colour, except for some black markings on the snout and flanks.

From snout to vent 90; tail 250 mm. Female a little smaller.

Range. Ceylon (Gammaduwa, Agrapatnas, Punduluoya in in the Central Provinces).

142. Calotes kingdon-wardi, sp. nov.

Type, Brit. Mus. 1932.6.8.8.

Length of head one and a half times its breadth; snout a little longer than the orbit; forehead concave; upper head-scales large, unequal, strongly keeled; no spines behind the eye or on the back of the head; canthus rostralis and supraciliary edge sharp; 7 upper and 7 lower labials; tympanum distinct, one-third the diameter of the orbit. Body compressed; dorsal scales rather large, strongly keeled, all pointing backwards and downwards except the upper two or three rows, which point slightly upwards; ventral scales strongly keeled, smaller than the dorsals; 45 scales round the middle of the body. A gular sac; gular scales keeled, about as large as the ventrals; a long curved fold in front of the shoulder. A nucho-dorsal crest. Limbs rather short; third and fourth fingers equal; fourth toe a little longer than third; the hind-limb reaches to the shoulder. Tail feebly compressed, covered with subequal keeled scales.

Greyish-brown above with dark brown markings, some small

longitudinal ones on the neck and four angular and larger ones upon the back; top of head dark brown; a dark streak between the eye and the ear; limbs with dark cross-bars; tail with alternate light and dark bars; some pale (pinkish) marks upon the nape and base of the tail. Below greyish-white with small dark spots. (Formalin specimen.)

From snout to vent 49; tail 80 mm.

Described from a single male individual collected by Captain Kingdon-Ward in the Adung Valley, altitude 7,000 feet, on the Burma-Tibetan border. The specimen is, unfortunately, juvenile, but is in an excellent state of preservation. It appears to have no near relative in the region from which it comes. The direction of the dorsal scales—pointing backwards and downwards—places it amongst the Cingalese species in the Key.

143. Calotes andamanensis.

Calotes andamanensis Boulenger, Ann. Mag. Nat. Hist. (6) viii, 1891, p. 288 (type loc. Andaman Is.; Copenhagen).

Length of head one and three-quarter times its breadth; snout distinctly longer than the orbit; forehead concave; upper head-scales rather large, subequal, obtusely keeled; canthus rostralis and supraciliary edge sharp; diameter of the tympanum half that of the orbit; an enlarged conical scale on the back of the head between the ear and the nuchal crest and two more on the side of the head behind the eye; 10 upper and 10 or 11 lower labials. Body strongly compressed; dorsal scales small, smooth, the upper four or five rows pointing backwards and upwards, those on the sides of the body backwards and downwards, as large as the ventrals, which are strongly keeled; 67 scales round the middle of the body; gular scales feebly keeled, half as large as the ventrals. Gular sac small; a slight fold in front of the shoulder. Nuchal crest composed of 15 compressed separated spines set upon a fold of skin; the longest spine is not half the diameter of the orbit; dorsal crest a serrated ridge except quite anteriorly, where there is a slight fold of skin. Limbs moderate; third and fourth fingers subequal; fourth toe distinctly longer than third; the hind-limb reaches to between the eye and the ear. Tail long and slender, feebly swollen at the base, the scales covering that part being a little larger and thicker than the others.

Green above, with whitish spots on the body; top of head yellowish; greenish-white below; tail with dark annuli.

From snout to vent 85; tail (incomplete) 165 mm.

Described from the type and only known specimen, which is a male.

144. Calotes nigrilabris.

Calotes rouxii (not of Dum. & Bibr.), Blyth, J. Asiat. Soc. Beng. xxii, 1853, p. 647.

Calotes (*Bronchocele*) *nigrilabris* Peters, Mon. Akad. Berlin, 1860, p. 183 (type loc. Neyerelia, Ceylon; Berlin); Günther, Rept. Brit. Ind. 1864, p. 143, pl. xiv, fig. D; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 328, and Fauna Brit. Ind. 1890, p. 141; F. Müller, Verh. Nat. Ges. Basel, viii, 1889, p. 698; Annandale, J. Bombay Nat. Hist. Soc. xxi, 1912, p. 1099, and Spol. Zeyl. viii, 1912, p. 136; Deraniyagala, Ceylon J. Sci. B, xvi, 1931, p. 153.

Length of head one and a half times its breadth; snout a little longer than the orbit; forehead concave; cheeks swollen in the adult male; upper head-scales unequal, smooth; canthus rostralis and supraciliary edge sharp; a row of from 5 to 9 compressed spines starting from above the tympanum and extending posteriorly beyond it; diameter of tympanum about half that of the orbit; 10 to 12 upper and as many lower labials. Body compressed; dorsal scales more or less distinctly keeled, pointing backwards and downwards, except the upper two or three rows, which point straight backwards, much smaller than the ventrals, which are strongly keeled and mucronate; 42 to 50 scales round the middle of the body. Gular sac not developed; gular scales keeled, as large as the ventrals; a short oblique pit or fold in front of the shoulder covered with small granular scales. Nuchal and dorsal crests continuous, moderately developed, composed of lanceolate spines gradually diminishing in size; the longest spines on the neck do not equal the diameter of the orbit; female with a lower crest and a mere ridge posteriorly. Limbs moderate; third and fourth fingers equal; fourth toe distinctly longer than third; the hind-limb reaches to the orbit or the temple. Tail as in *ceylonensis*.

Greenish above, uniform or with angular whitish, black-edged, transverse bars or ocelli; head variegated with black; upper lip and cheeks usually with a black streak or separated from the eye by a white one; sometimes a brown vertebral stripe; below greenish-white, throat light or dark greenish-blue; base of tail dark olive or brown.

From snout to vent 105; tail 310 mm. Females a little smaller.

Range. Ceylon. In the hills at high altitudes.

145. Calotes rouxi.

Calotes rouxii Dum. & Bibr., Erp. Gen. iv, 1837, p. 407 (type loc. India; Paris); Günther, Rept. Brit. Ind. 1864, p. 142; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 330, and Fauna Brit. Ind. 1890, p. 142; Annandale, J. & P. Asiat. Soc. Beng. (n. s.) i, 1905, p. 88.

Calotes elliotti (not of Günther), Stoliczka, J. Asiat. Soc. Beng. (2) xli, 1872, p. 113.

Length of head one and a half times its breadth; snout a little longer than the orbit; forehead concave; cheeks swollen in the adult male; upper head-scales unequal, strongly keeled; canthus rostralis and supraciliary edge sharp; two small separated spines on the back of the head, the anterior mid-way between the nuchal crest and the tympanum, the posterior just above the ear; diameter of the tympanum half that of the orbit; 9 or 10 upper and as many lower labials. Dorsal scales keeled, the upper rows pointing backwards and upwards, the lower backwards and downwards, about as large as the ventrals, which are strongly keeled and mucronate; 50 to 60 scales round the middle of the body; gular sac very small, absent in the female, gular scales smaller than the ventrals; a long, oblique, curved fold in front of the shoulder extending nearly across the throat, covered with small granular scales. Nuchal crest composed of a few slender erect spines, the longest of which is half the diameter of the orbit; dorsal crest a mere denticulation; in the female it is absent. Limbs moderate, slender; fourth finger a little longer than third; fourth toe distinctly longer than third; the hind limb reaches to the temple. Tail feebly compressed; in the fully grown male it is considerably swollen at the base, the scales which cover that part being enlarged and thickened, the median row above largest and forming a serrated ridge.

Olive-brown above, the top of the head and vertebral region rather light; a dark band along the side of the head on to the neck; ante-humeral fold black; dark lines radiating from the eye; below light brownish. In life the upper part of the head, nape, and gular pouch may be brick-red.

From snout to vent 77; tail 170 mm.

Range. Bombay Presidency (Matheran, Khandala, Kanara, Jog); Travancore. Its habits are terrestrial and arboreal.

146. Calotes elliotti.

Calotes rouxii (not of Dum. & Bibr., 1837), Jerdon, J. Asiat. Soc. Beng. xxii, 1853, p. 471.

Calotes elliotti Günther, Rept. Brit. Ind. 1864, p. 142 (type loc. Malabar; based on Jerdon's remarks, p. 471, and a drawing); Jerdon, P. Asiat. Soc. Beng. 1870, p. 77; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 330, pl. xxv, fig. 3, and Fauna Brit. Ind. 1890, p. 142.

Bronchocela indica Theobald, Cat. Rept. Brit. Ind. 1876, p. 165 (type loc. S. India).

Length of head one and a half times its breadth; snout a little longer than the orbit; forehead concave; upper head-scales unequal, keeled; canthus rostralis and supraciliary edge sharp, with compressed scales; a spine at the posterior corner of the orbit; two spines on the back of the

head as in *C. rouxi*; tympanum half the diameter of the orbit; 9 or 10 upper and as many lower labials. Dorsal scales keeled, the upper two or three rows pointing straight backwards, the remainder backwards and downwards, as large as or a little larger than the ventrals, which are strongly keeled and mucronate; 53 to 60 scales round the middle of the body; gular sac very small, absent in the female; gular scales smaller than the ventrals; a long fold in front of the shoulder usually extending right across the throat, covered with small granular scales. Nuchal crest composed of a few slender erect spines, the longest of which is two-thirds the diameter of the orbit; dorsal crest a mere denticulation. Limbs moderate, slender; fourth finger a little longer than third; fourth toe distinctly longer than third; the hind limb reaches to the eye or the nostril. Tail feebly compressed, slightly swollen at the base in the fully grown male, the scales covering that part not markedly enlarged or thickened.

Olive above, with more or less distinct angular dark brown cross-bars on the body; an angular black mark on each side of the neck; a white spot below the eye; dark lines radiating from the eye; ante-humeral fold black; whitish below.

From snout to vent 70; tail 170 mm.

Range. Southern India (Anaimalai, Tinnevelly and Sivagiri Hills; Malabar). Found in the hills up to 6,000 feet.

Genus **PSAMMOPHILUS***.

Psammophilus Fitzinger, Syst. Rept. 1843, pp. 17 & 79 (type *Agama dorsalis* Gray).

Charasia Gray, Cat. Liz. Brit. Mus. 1845, p. 246 (type *dorsalis*); Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 109; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 332, and Fauna Brit. Ind. 1890, p. 144.

Body depressed, covered with uniform keeled scales, regularly arranged; no proper dorsal crest; a deep fold or recess on either side of the neck in front of the shoulder connected across the throat by a transverse fold; no gular sac; tail long and slender; tympanum distinct. No preanal or femoral pores.

Range. India. Two species.

Key to the Species.

115 to 150 scales round the middle of the body. *dorsalis*, p. 209.
90 to 100 scales round the middle of the body. *blanfordianus*, p. 210.

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* The *Psammophila* of Brown, 1827, and of Dahlbom, 1842, do not render *Psammophilus* invalid. Rules of Nomenclature, see Art. 36.

147. **Psammophilus dorsalis.**

Agama dorsalis Gray, in Griffith's Anim. King. ix, 1831, Syn. p. 56 (type loc. India; London); Jerdon, J. Asiat. Soc. Beng. xxii, 1853, p. 475.—*Charasia dorsalis*, Gray, Cat. Liz. Brit. Mus. 1845, p. 246; Theobald, Cat. Rept. Brit. Ind. 1876, p. 114; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 332, and Fauna Brit. Ind. 1890, p. 144; Boettger, Ber. Offenb. Ver. Nat. 1892, p. 71; Wall, J. Bombay Nat. Hist. Soc. xxviii, 1922, p. 493; Jouguet, ibid. xxxiii, 1929, p. 452; Ramanujan, ibid. xxxiv, 1931, p. 1086.

Head rather large, elongate, depressed, the cheeks swollen in the adult male; snout longer than the orbit; upper head-scales unequal, smooth or obtusely keeled, larger upon the sinciput than on the occiput; canthus rostralis and supraciliary edges sharp; two small separated spines or groups of spines above the ear present or absent; diameter of the tympanum half or a little more than half that of the orbit; 10 to 13 upper and as many lower labials. Body feebly depressed; dorsal scales small, uniform, smooth or feebly keeled in the adult, strongly in the young, all pointing backwards and upwards; dorsal crest reduced to a ridge of enlarged scales; ventral scales as large as the dorsals, smooth (keeled in the young); from 115 to 150 scales round the middle of the body; gular scales a little smaller than the ventrals; 4 or 5 enlarged scales on the chin parallel with the anterior labials, separated from them by two rows of scales; a strong transverse fold covered with small scales across the throat; nuchal and dorsal crests a mere denticulation. Limbs strong, covered with uniform keeled scales; the hind-limb reaches to the ear or the posterior border of the orbit, sometimes a little farther in the young. Tail feebly compressed, covered with keeled scales which are larger below than above. In the adult male it is distinctly swollen at the base, the scales on that part of it thickened, those of the upper median row enlarged.

Young olive-brown, spotted, speckled or marbled with dark brown, and with a series of white elongated spots along each side of the back; this coloration more or less distinctly retained by the female. Male pale brownish on the top of the head and back; lips yellowish-brown, the stripe extending to beyond the ear; a dark brown or black lateral stripe commencing from behind the eye and broadening to cover the whole of the lower half of the flank; yellowish below, the throat usually variegated with grey.

From snout to vent 135; tail 290 mm. Females are smaller.

Range. Southern India south of about lat. 16° (Malabar, Mysore, Nilgiris, S. Arcot, Nallamalai Hills); found only in the hills at considerable altitudes. Very common in some parts of the Nilgiris and in Mysore State, especially near

Bangalore. In the Nilgiris it ascends to a height of 6,000 feet.

C. dorsalis frequents bare rocks only, with which its colour harmonises well. It is an extremely active creature and is very shy, disappearing into any convenient crack or crevice at the least sign of danger. It lives upon insects. The male in the breeding season assumes brilliant colours, the upper parts being of a fine vermilion-red or yellow, the lip-stripe sometimes pink; the under surfaces, limbs, and tail are black.

148. **Psammophilus blanfordanus.**

Charasia dorsalis (not of Gray), Blanford, J. Asiat. Soc. Beng. xxxix, 1870, p. 368; Anderson, Proc. Zool. Soc. 1872, p. 382.
Charasia blanfordana Stoliczka, P. Asiat. Soc. Beng. 1871, p. 194, and J. Asiat. Soc. Beng. xli, 1872, p. 110, pl. iii, fig. 5 (type loc. Central India).—*Charasia blanfordiana*, Theobald, Cat. Rept. Brit. Ind. 1876, p. 115; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 333, and Fauna Brit. Ind. 1890, p. 145; Boettger, Ber. Offenb. Ver. Nat. xxix–xxxii 1892, p. 71; Annandale, Rec. Ind. Mus. iii, 1909, p. 255, and vii, 1912, p. 46.

Closely allied to *dorsalis*, from which it differs in the following particulars:—Ante-humeral fold deeper; scales on body a little larger, from 80 to 100 round the middle, the dorsals always distinctly keeled and imbricate; the hind-limb reaches to the orbit or a little beyond; frequently a small spine behind the supraciliary edge, and a few scattered, slightly enlarged scales on the flanks; size smaller.

Young, olive-brown above, spotted or marbled with brown, and usually with a series of large, lozenge-shaped, dark brown spots with pale centres on the back and tail; the markings persist more or less in the female, but disappear in the male; the adult male is coloured much like *dorsalis*. In the breeding season (May) the head and anterior part of the body of the male become scarlet or red, the posterior parts nearly black.

From snout to vent 100; tail 200 mm. Females are smaller.

Range. Bihar and Orissa; Central Provinces; the Eastern Ghats; Travancore as far south as Trivandrum.

Common on many of the hills in Chota Nagpur, ascending Parasnath Hill to 4,500 feet, according to Annandale; common also in the Godavari district, in the hills south of Madras and Salem district, and Travancore. Ferguson collected it at Talayar in Travancore at 7,000 feet.

Like *dorsalis*, it is found only on rocks, but Annandale says that it occasionally enters dwellings. He states that the breeding season is in April and May, when the head and fore-parts of the male assume a brilliant red colour. He displays himself to the female, who remains concealed, by slowly walking along in some conspicuous place, alternately raising and nodding his head in a very solemn manner.

Genus AGAMA.

Agama (in part) Daudin, Hist. Nat. Rept. iii, 1802, p. 333 (type *Lacerta agama* Linn.).
Trapelus Cuvier, Règne Anim. ii, 1829, p. 37 (type *ægyptius*).
Tapaya Fitzinger, Neue Class. Rept. 1826, pp. 17 & 49 (type *orbicularis*).
Phrynopsis Fitzinger, Syst. Rept. 1843, pp. 17 & 79 (type *Agama atra* Daudin).
Podorrhoa Ftizinger, l. c. s. 1843, pp. 18 & 80 (type *colonorum* Daudin).
Pseudotrapelus Fitzinger, l. c. s. 1843, pp. 18 & 81 (type *sinaita* Heyd.).
Planodes Fitzinger, l. c. s. 1843, pp. 18 & 81 (type *agilis* Oliv.).
Trapeloides Fitzinger, l. c. s. 1843, pp. 18 & 81 (type *Lacerta sanguinolenta* Pall.).
Psammorrhoa Fitzinger, l. c. s. 1843, pp. 18 & 82 (type *Agama aculeata* Merr.).
Eremioplanis Fitzinger, l. c. s. 1843, pp. 18 & 82 (type *Trapelus ægyptius* Cuv.).
Acanthocercus Fitzinger, l. c. s. 1843, pp. 18 & 84 (type *Stellio cyanogaster* Rüpp.).
Laudakia Gray, Cat. Liz. Brit. Mus. 1845, p. 254 (type *tuberculata*).
Plocederma Blyth, J. Asiat. Soc. Beng. xxiii, 1854, p. 738 (type *melanura*).
Baryccphalus Günther, Proc. Zool. Soc. 1860, p. 150 (type *sykesii*).
Brachysaura Blyth, J. Asiat. Soc. Beng. xxv, 1856, p. 448 (type *ornata*).

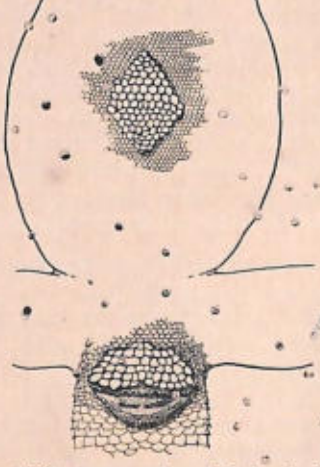


Fig. 56.—Callose preanal and abdominal scales of *Agama melanura*.

Body more or less depressed; dorsal crest absent or feebly developed (absent in all Indian species); gular sac present

or absent; a fold in front of the shoulder usually connecting with a transverse gular fold; dorsal scales uniform or intermixed with larger ones. Tail rounded, depressed or compressed. Tympanum naked. Males with callose preanal and sometimes abdominal scales (fig. 56), except *Agama minor*, which has none.

Range. South-western Asia; S.E. Europe; the whole of Africa. In Indian territory found only in the north-western area, except *A. minor* which extends into Central India. Between 50 and 60 species are known, with numerous subspecies.

The Agamas are lizards of diurnal habits, living chiefly upon rocks or in rocky country; by night they retreat into the crevices of the rocks or under stones. During the cold months of the year they hibernate. They feed upon vegetable matter and insects.

The Indian species, as shown in the Key, fall naturally into two groups; with occasional exceptions the characters which distinguish them will also be found to hold good for the other Asiatic and North African species of the genus not mentioned in this work.

Group A (fig. 57, B).—Head depressed and more elongate; tympanum large, its diameter at least half that of the orbit, more or less superficial; toes longer, compressed; fifth toe extending beyond first; caudal scales forming more or less distinct annuli; males with callose preanal and usually also abdominal scales. Species: *himalayana*, *tuberculata*, *agrorensis*, *melanura*, *nupta*, *caucasica*.

Group B (fig. 58).—Head rather high and short; tympanum small, its diameter less than half that of the orbit, more or less deeply sunk; toes shorter, not compressed; fifth toe not extending as far as the first; caudal scales not forming annuli; males with callose preanal scales only. Species: *agilis*, *rubrigularis*, *megalonyx*, *ruderata*. *Agama minor*, an aberrant form, may be derived from this group.

Key to the Indian Species.

I. Tail longer than the head and body.
  A. Caudal scales forming more or less distinct annuli; tympanum large, more or less superficial.
    a. The caudal segments composed of more than two whorls of scales.
      1. Caudal scales smaller; 30 to 50 round the base of the tail.

Enlarged dorsal scales smooth or nearly so; usually no enlarged scales on the flanks. . . . *himalayana*, p. 213.

Enlarged dorsals about as large as the ventrals, keeled; flanks with a few enlarged scales. . *tuberculata*, p. 214.

Enlarged dorsals distinctly larger than the ventrals, keeled; flanks with numerous enlarged scales . . . . . *agrorensis*, p. 216.

2. Caudal scales larger; 25 to 35 round the base of the tail; median dorsal scales broader than long.
Median dorsal scales in straight longitudinal series, 8 to 10 across the middle of the back. *melanura*, p. 218.
Dorsal scales in oblique longitudinal series; 16 to 20 across the middle of the back..... *nupta*, p. 219.
b. Each caudal segment composed of two whorls of scales..... *caucasica*, p. 220.

B. Caudal scales not forming annuli; tympanum small, more or less deeply sunk.
1. Dorsal scales equal..... *agilis*, p. 221.
2. Dorsal scales unequal, the small ones intermixed with larger ones:
The enlarged dorsal scales numerous, irregularly arranged, strongly keeled and pointed..... *ruderata baluchiana*, [p. 223.
The enlarged dorsal scales few in number, more or less transversely arranged, usually broader than long, the tip only keeled; back with numerous small yellow spots..... *rubrigularis*, p. 224.
Small dorsals unequal, with groups of larger ones; a vertebral series of pale ocelli..... *megalonyx*, p. 224.

II. Tail not longer than the head and body.. *minor*, p. 225.

149. Agama himalayana.

Stellio himalayanus Steindachner, Reise Novara, Rept. 1867, p. 22, pl. i, fig. 8 (type loc. Ladakh Prov., Kashmir; Vienna); Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 113; Blanford, Sci. Res. 2nd Yark. Miss. 1878, p. 3; Nikolski, in Fedschenko's Reise, Zool. ii, 1899, pt. vii, p. 19, pl. vi, fig. 2.—*Agama himalayana*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 362, and Fauna Brit. Ind. 1890, p. 149; Nikolski, Mem. Acad. Sci. St. Pétersb. xvii, 1905, p. 50; Bedriaga, Sci. Results Przewalski's Exp. C. Asia, iii, (2) 1907, p. 118, pl. 2, fig. 1; Zugmayer, Zool. Jahrb. 1909, p. 456; Wall, J. Bombay Nat. Hist. Soc. xxi, 1911, p. 132; Chabanaud, Bull. Mus. Hist. Nat. Paris, xxv, 1919, p. 453, and Res. Miss. Sci. Occ. 1922, pl. i, p. 4; Schmidt, Pub. Field Mus. Nat. Hist. xii, 1926, p. 169.
Agama isozona Werner, Zool. Anz. xxii, 1899, p. 479 (type loc. Margelan, Turkestan).

Nostril situated below the canthus rostralis, directed outwards. Upper head-scales unequal, convex, smooth or keeled, largest on the snout; 10 to 12 upper labials; sides of the head behind and sides of the neck with small spinose scales, those round the ear arranged in series, those on the neck in groups, the rest of the scales of the neck being very small. Median dorsal scales subequal, roundish-hexagonal, imbricate, smooth or feebly keeled; from 8 to 14 across the middle of the back; scales on the flanks much smaller, no enlarged scales intermixed with them, except sometimes in adult males which may have a patch in the middle of the flank; ventral scales smooth, smaller than the median dorsals; gular scales smaller than the ventrals; no gular sac; skin of the neck and sides

of the body loose. Limbs moderately strong; the hind-limb reaches to the ear or the eye. Tail depressed at the base, oval in section, covered with strongly keeled subequal scales, more than 40 round the thickest part. Male with 2 or 3 rows of callose preanal scales; no abdominal patch.

Olive above, marbled with black, and generally with light round spots on the back, producing a network; sometimes a series of black spots on each side of the vertebral line, or the spots linked together in sinuous groups; tail with dark bars; greenish-white below, the throat in the male spotted or marbled with dark grey.

From snout to vent 95; tail 150 mm. Females are smaller.

Range. Kashmir and the adjacent country in Eastern Turkestan and Western Tibet; the North-West Frontier Province (Chitral district). Common in Ladakh Province. Wall found it common about Madaglasht (Chitral) up to 11,000 feet among the rocks, coming out to bask in the sun.

Agama hifnalayana sacra, subsp. nov.

I take this opportunity of describing a new race of *himalayana*, which was obtained by the Tibet Frontier Commission in 1904. It differs from the typical form in its much larger size, from snout to vent 140, tail 250 mm., and in that the male has a large patch, sometimes two patches, of callose abdominal scales in addition to the preanal patch. Type-locality near Lhasa. Types, two adults and one juvenile (Brit. Mus. 1904.12.28.1–4). The fourth specimen obtained by the Expedition is in the Indian Museum.

150. **Agama tuberculata.**

Agama tuberculata Gray, Zool. Journ. iii, 1827, pp. 218, and Ill. Ind. Zool. ii, 1830–35, pl. lxxiii (type loc. "Bengal"; London); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 361, and Fauna Brit. Ind. 1890, p. 148; Annandale, Rec. Ind. Mus. i, 1907, p. 154; Zugmayer, Zool. Jahrb. 1909, p. 496; Dodsworth, J. Bombay N.H. Soc. xxii, 1915, p. 404.—*Stellio tuberculatus*, Günther, Rept. Brit. Ind. 1864, p. 157; Steindachner, Reise Novara, 1867, p. 22; Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 115, pl. iii, fig. 3.

Stellio indicus Blyth, J. Asiat. Soc. Beng. xxii. 1853, p. 646 (type loc. Upper Hindustan).

Barycephalus sykesii Günther, Proc. Zool. Soc. 1860, p. 150, pl. xxv, fig. A (type loc. Simla; London.).

Stellio dayanus Stoliczka, P. Asiat. Soc. Beng. 1871, p. 194, and J. Asiat. Soc. Beng. xli, May 1872, p. 113, pl. 3, fig. 4 (type loc. Hardwar, U.P.; London and Calcutta).—*Agama dayana*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 362, and Fauna Brit. Ind. 1890, p. 148.

Nostril pierced on or just below the canthus rostralis, pointing more or less outwards; upper head-scales unequal,

convex, smooth or keeled: 10 to 12 upper labials; sides of the head behind and sides of the neck with small spinose scales, those round the ear arranged in series, those on the neck in groups, sometimes absent, the rest of the scales of the neck being very small; median dorsal scales subequal, roundish-hexagonal, imbricate, keeled, from 10 to 15 across the middle of the back; scales on the flanks much smaller, with a few scattered, separated, enlarged, keeled scales; ventral scales smooth, about as large as the large dorsals; gular scales much smaller than the ventrals; no gular sac; skin of the neck loose. Limbs moderately strong; the hind-limb reaches to the ear or the eye. Tail depressed, oval in section, covered with strongly keeled subequal scales, more than 40 round the thickest part. Male with a patch of callose preanal scales (6 or 7 rows) and another elongated patch on the middle of the belly.

Dark olive-brown, with numerous dark spots in the young, usually arranged on either side of a lighter vertebral line; in the adult the dark spots tend to become broken and replaced by a speckled mixture of dark brown and yellowish; top of head usually paler; whitish or brown below, the throat, and sometimes also the chest, heavily marked with dark blue.

In life the shoulders, breast, and flanks have bright yellow or orange spots. In adult males the whole of the under-parts become bluish-black, brightest and tinged with purple on the throat, sides of the neck, shoulders, and belly. An adult male is really a gorgeously coloured lizard (*Stolickza*, 1872).

From snout to vent 140; tail 250 mm. An adult male with a complete tail is rare; most of the specimens that I have examined have the end of it reproduced.

Range. The Western Himalayas from Kashmir to Katmandu district in Nepal; the Alpine Punjab; Afghanistan (Kabul). Common in Simla, Garhwal, and Kumaon districts and about Murree in N.W. Punjab.

Agama dayana from Hardwar, in the extreme north of the United Provinces, where the Ganges leaves the hills for the plains, differs from *tuberculata* in having more numerous enlarged scales upon the flanks and in that the median dorsal scale-rows are continued, though smaller, up to the occiput. I have, however, seen almost the same condition in specimens of *A. tuberculata* from Simla, and it does not, therefore, appear to be sufficiently differentiated to deserve racial distinction.

Both *dayana* and *agrorensis* have no doubt been derived from the more widely distributed *tuberculata*, and both have progressed along the same lines. *A. agrorensis* appears to be confined to a small area of country in the extreme north-west of the Punjab and the adjacent hills in Kashmir. Whether it occupies that area to the exclusion of *tuberculata* I do not know.

According to Dodsworth (1913), *A. tuberculata* is common

in the neighbourhood of Simla, and is usually to be seen singly or in pairs. It lives in holes and crevices in rocks and stone walls, crawling about them with great facility. Its diet consists of ants, butterflies, and other insects, but he has been told that it has been seen nipping the petals off flowers.

In the cold weather it hibernates, but a few are occasionally to be seen basking in the sun on bright days. In the summer months it is abundant. It breeds from May to July and, perhaps, a part of August. A female killed in May contained seven eggs ready for expulsion; another killed in June had nine eggs. During the breeding season the males are very pugnacious, and can often be seen fighting and chasing each other. Individuals with mutilated tails, probably due to these fights, are often to be seen.

Hardwicke's original coloured sketch of *A. tuberculata*, which is reproduced in Illus. Ind. Zool., is in the British Museum; it is no. 84 of the collection.

151. Agama agrorensis.

Stellio agrorensis Stoliczka, P. Asiat. Soc. Beng. July 1872, p. 128 (type loc. Sussei Pass, at the entrance to the Agror Valley, 6,000 feet, Hazara district, N.W. Punjab; Calcutta and London); Blanford, Sci. Res. 2nd Yark. Miss. 1878, p. 3, pl. i, fig. 3.—*Agama agrorensis*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 363, and Fauna Brit. Ind. 1890, p. 149.

Closely allied to *A. tuberculata* but differing in the following characters:—Upper head-scales always keeled; the spinose scales upon the sides of the head and neck more numerous and more prominent; median dorsal scales distinctly larger than, sometimes twice as large as, the ventrals, more strongly keeled; they are arranged in from 8 to 12 longitudinal rows, and may be divided by a vertebral series of small scales; they are sometimes continued, though by smaller scales, up to the occiput; flanks with numerous enlarged strongly keeled scales, a large oblong patch on the middle of the flank always present; hind-limb a little longer, reaching to the eye or the tip of the snout; 30 to 40 scales round the base of the tail. Callose preanal scales as in *tuberculata*, but the abdominal ones less often present.

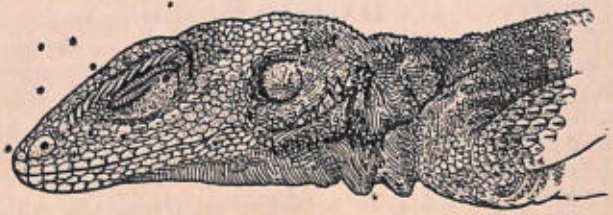
Young olive above, variegated and spotted with black and pale yellow; or with three yellow longitudinal stripes, the middle one continuing to the tail; throat with dark reticulations, the rest of the underparts being whitish. Adults, dark olive above, with darker spots and reticulations, sometimes arranged in longitudinal lines; head paler; whitish below, uniform or with the throat and chest heavily marked with dark blue.

From snout to vent 110; tail 250 mm.

Range. Punjab (Agror or Oghi, Valley); Kashmir (Jhelum Valley, Chilas); Chitral (Arandu).



A.



B.

Fig. 57.—*Agama agrœnsis.*
A. Dorsal view. B. Side view of head.

152. Agama melanura.

Laudakia (Plocederma) melanura Blyth, J. Asiat. Soc. Beng. xxiii, 1854, p. 738 (type loc. ? Salt Range, Punjab; London).—*Stellio melanurus*, Anderson, P. Asiat. Soc. Beng. 1871, p. 189; Stoliczka, ibid. 1872, p. 129; Blanford, J. Asiat. Soc. Beng. xlv. 1876, p. 25.—*Agama melanura*, Boulenger, Cat. Liz. Brit. Mus. i. 1885, p. 363, and Fauna Brit. Ind. 1890, p. 150; Hora & Chopra, Rec. Ind. Mus. xxv, 1923, p. 374; Hora, ibid. xxviii, 1926, p. 219.

Stellio liratus Blanford, Ann. Mag. Nat. Hist. (4) xiii, 1874, p. 453, and Zool. E. Persia, 1876, p. 320, pl. xx, fig. 2 (type loc. Saman, Dasht Province, Baluchistan; Calcutta).—*Agama lirata*, Boulenger, Cat. Liz. Brit. Mus. i. 1885, p. 364, and Fauna Brit. Ind. 1890, p. 150; Annandale, J. & P. Asiat. Soc. Beng. (n. s.) i, 1905, p. 88; Procter, J. Bombay N.H. Soc. xxix, 1923 p. 124.

Head subtriangular in shape when viewed from above; nostril pierced on the canthus rostralis, pointing upwards and outwards; upper head-scales rather large, subequal, smooth or obtusely keeled; 12 to 16 upper labials; sides of the head behind with groups of short spines; scales on the neck minute, except those on the median line above, where they form a low crest. Median dorsal scales distinctly broader than long, smooth or keeled, sometimes mucronate, in straight longitudinal series, from 8 to 10 across the middle of the back; lateral dorsals much smaller, pointing backwards and downwards; no enlarged scales on the flanks; ventral scales not half as large as the median dorsals, smooth; gular scales smaller than the ventrals; no gular sac. Limbs strong; the hind limb reaches to the ear or the eye. Tail depressed, oval in section at the base, covered with large subequal scales, those above and on the sides strongly mucronate, those below flat. Male with a large patch (4 or 5 rows) of callose preanal scales and another patch on the middle of the belly.

Variation. The enlarged dorsal scales may be equal in size or slightly unequal; usually they are equal in size in longitudinal series but not in transverse. Specimens from the northern part of its range have the dorsal scales quite smooth and less imbricate and the tail more depressed; in the southern part of its range the dorsal scales are always more or less keeled and the tail more rounded at the base.

Head and neck light yellowish-brown, the rest of the body above darker, uniform or with small yellow spots; belly, limbs, and tail below pale brownish; a black spot on the antehumeral fold present in all specimens; sometimes another in front of it. Five specimens collected at Ladha, in Waziristan, by Capt. Ingoldby are dark brown all over above, with small yellow spots.

Stoliczka states of the colours in life:—"The young is olive above, yellowish-white below; entire head, including the chin and front breast, reticulated with black; neck, body, limbs

and base of tail above with numerous small black and interspersed yellow spots; eyelids and supraciliary ridge yellow; tail dusky black towards the tip. The adults are more brownish-olive, with the dark reticulations on the upper head less distinct, the black spots on the body small and more or less confluent, but the yellow spots more brightly coloured and of much larger size; tail pale yellowish at the base, but for the greater part of its length entirely black."

"In the spring the males are usually more or less jet-black, especially on the tail and hinder part of back" (*Blanford*, 1876).

From snout to vent 140; tail 500 mm.

Range. Baluchistan and the adjacent country in Sind; Waziristan; N.W. Punjab.

Found among rocks and upon shrubs. According to Stoliczka the type probably came from the Salt Range, whence Hora and Chopra have since obtained specimens. Common, according to Blanford (1876), in the Khirthar Range between Sind and Kelat. Ingoldby (in Procter, 1923), found it on wooded rocky hillsides in the neighbourhood of Ladha and Kanigurum in Waziristan. The stomachs of the specimens examined contained vegetable matter only.

153. Agama nupta.

Agama nupta de Filippi, Giorn. Ist. Lomb. e Bib. Ital. vi, 1843, p. 407 (type loc. Persepolis; Milan); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 365, and Fauna Brit. Ind. 1890, p. 151; Alcock & Finn, J. Asiat. Soc. Beng. lxv, 1896, p. 555; Annandale & J. & P. Asiat. Soc. Beng. (n. s.) i, 1905, p. 89; Boulenger, J. Bombay N.H. Soc. xxvii, 1920, p. 351; Procter, ibid. xxix, 1923, p. 123.—*Stellio nuptus*, Blanford, Zool. E. Persia, 1876, p. 317, pl. xix, fig. 1; Murray, Zool. Sind, 1884, p. 369.

Stellio carinatus Duméril, Cat. Méth. Rept. 1851, p. 107 (type loc. Persia; Paris).

Stellio nuptus var. *fuscus* Blanford, Zool. E. Persia, ii, 1876, p. 319 (type loc. Kalagan and near Jalk, Baluchistan).

Head subtriangular in shape when viewed from above; nostril pierced on the canthus rostralis, pointing outwards and slightly upwards; upper head-scales subequal, smooth or obtusely keeled; 14 to 18 upper labials; sides of the head behind and sides of the neck with numerous groups of long spines, the rest of the scales on the back of the neck being very small with the exception of those on the median line, where they form a low crest. Median dorsal scales equal, imbricate, broader than long, keeled, mucronate, in oblique series converging towards the vertebral line, from 16 to 20 across the middle of the back; sharply defined from the outer dorsals, which are very small and point downwards and backwards; no enlarged scales on the flanks; ventral scales considerably smaller than the dorsal, smooth; gular scales

smaller than the ventrals; no gular sac. Limbs strong; the hind-limb reaches to the ear or the eye. Tail depressed, oval in section, covered with large subequal scales, those above and on the sides strongly mucronate, those below flat. Male with 3 or 4 rows of callose preanal scales and another patch in the middle of the belly.

Olivaceous above, thickly speckled or mottled on the back and limbs with yellow; tail of the same colour, or uniform brownish, or banded with black, or with the posterior half all black; flanks often marbled with grey and yellow; pale yellowish-brown below, the throat with large dark (blue) spots, that colour sometimes extending on to the chest. The variety *fusca* appears to be based on specimens that are black or nearly black all over; all the black specimens that I have seen were adult males, and probably, as in the preceding species, it is a seasonal coloration. Very young examples have alternate cross-bars of light and dark olive-brown upon the back and tail.

From snout to vent 160; tail 300 mm.

Variation. The degree of obliquity of the dorsal scales is variable; usually it is well marked, but in a young example from Wana, Waziristan (Brit. Mus. Coll.), they are in almost straight, and in another from Kuretu, Perso-Mesopotamian frontier (Brit. Mus. 1921.3.30.5), in quite straight longitudinal rows.

Range. Upper Sind; Waziristan; Baluchistan; Afghanistan; Persia; Mesopotamia.

Abundant in the highlands of Baluchistan, between 3,000 and 4,000 feet above sea-level, and in Southern Persia. Often very common about towns and villages on the walls and tombs built of earth, but equally common on rocky hills far from dwelling places. It lives upon insects and vegetable food.

154. Agama caucasica.

Stellio caucasicus Eichwald, Zool. Spec. iii, 1831, p. 187, and Faun. Casp.-Cauc. p. 80, pl. xiii, figs. 1–8 (osteology) (type loc. Tiflis and Baku, Caucasus); Blanford, Zool. E. Persia, 1876, p. 322, pl. xx, fig. 1.—*Agama caucasica*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 367, and Fauna Brit. Ind. 1890, p. 151; Procter, J. Bombay N.H. Soc. xxix, 1923, p. 124.

Stellio persicus Anderson, Proc. Zool. Soc. 1872, p. 382, fig (type loc. Teheran, Persia; type lost).

Nostril situated below the canthus rostralis, pointing more or less outwards; upper head-scales unequal, smallest upon the upper eyelid; 12 to 16 upper labials; sides of the head behind and sides of the neck with numerous groups of large spinose tubercles, the rest of the scales upon the neck being very small. Median dorsal scales more or less hexagonal in shape, imbricate, smooth or obtusely keeled; from 6 to 10

across the middle of the back, fairly abruptly separated from the outer dorsals, which are very small; these are intermixed with larger squarish spinose scales, a large patch of which usually occurs upon the middle of the flank; ventral scales smooth, smaller than the median dorsals; gular scales smaller than the ventrals; no gular sac. Limbs strong; the hind limb reaches to the ear or the eye. Tail depressed at the base, oval in section, covered with rather large spinose scales arranged in rings, two rings to a segment. Male with 4 or 5 rows of callose preanal scales and another elongated patch on the middle of the belly.

Olivaceous or yellowish-brown above, with yellow and black markings; back sometimes with regularly arranged pale yellowish spots margined with black, or the yellow spots may coalesce to form cross-bars, these best marked upon the anterior part of the body; head yellow, uniform or spotted with black. Tail yellowish or olivaceous, with or without dark annuli; yellowish below, the throat often heavily marbled with dark blue or black; sometimes the whole belly and under surfaces of the limbs dark bluish.

Young, greyish or olivaceous above with jet-black spots upon the back, which may coalesce to form narrow cross-bars.

From snout to vent 140; tail 200 mm.

Range. From the Caucasus to Baluchistan and the N.W. Frontier Province. Found within Indian limits at Kalat and the Bolan Pass near Quetta, at Ladha in Waziristan, and on the frontier between Baluchistan and Afghanistan. Abundant, but very local, in the neighbourhood of Ladha, Waziristan.

Blanford found it common in the mountain ranges of Northern Persia up to 9,000 feet altitude. It is insectivorous and herbivorous.

155. **Agama agilis.**

Agama agilis Olivier, Voy. Emp. Otho. iv, 1807, p. 394, and Atlas (12), pl. xxix, fig. 3 (type loc. neighbourhood of Baghdad; Paris); Blanford, Zool. E. Persia, 1876, p. 314, and J. Asiat. Soc. Beng. xlv, 1876, p. 22, and ibid. xlvii, 1879, p. 129, and Proc. Zool. Soc. 1881, p. 672; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 341.

Trapelus sp. Jerdon, P. Asiat. Soc. Beng. 1870, p. 78.

Trapelus megalonyx (not of Günther) Stoliczka, P. Asiat. Soc. Beng. 1872, p. 158.

Agama isolepis Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 342, and Tr. Linn. Soc., Zool. (2) v, 1889, p. 96, pl. x, and Fauna Brit. Ind. 1890, p. 147, fig.; Alcock & Finn, J. Asiat. Soc. Beng. lxv, 1896, p. 555; Procter, J. Bombay N.H. Soc. xxix, 1923, p. 123; Hora, Rec. Ind. Mus. xxviii, 1926, p. 219.

Nostril situated on the canthus rostralis or slightly above it: snout short, strongly curved in profile; upper head-scales unequal, convex, smooth or keeled, largest on the snout;

some short spines on the sides of the occiput present or absent; 15 to 18 upper labials, their free margin forming a denticulation. Dorsal scales equal, rhomboidal, imbricate, keeled, often mucronate, the median rows pointing more or less straight backwards, larger than the laterals which point backwards and downwards; ventral scales as large as the laterals, smooth or feebly keeled; gular scales a little smaller than the ventrals; male with a very short gular sac. Limbs rather weak; the hind-limb reaches to the ear or the middle of the eye. Tail rounded, covered with subequal keeled scales. Male with one or two, rarely three, rows of callose preanal scales.

Sandy or greyish above, with small white spots or with more or less distinct dark cross-bars which may be broken up by light vertebral and dorso-lateral lines into subquadranglar or oval spots; limbs and tail above with dark cross-bars; cream-coloured below, the throat and belly often heavily streaked

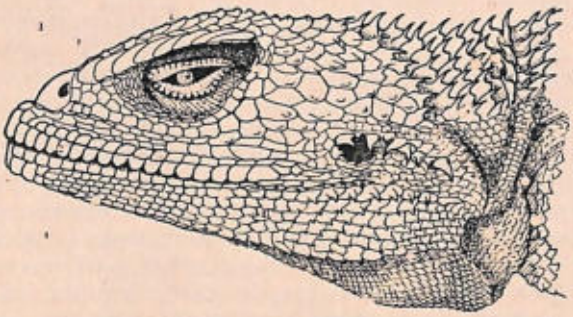


Fig. 58.—*Agama agilis.*

or mottled with dark blue; shoulder-fold blackish. Young sometimes with a vertebral and two dorso-lateral series of light oval spots enclosed within the dark cross-bar.

Of the colours in life Blanford writes:—"Upper parts dark sandy, with a bluish tinge on the scales of the back; sides of body dull cobalt blue speckled with sandy; throat pale blue. In spring the blue coloration becomes richer and darker, the chin, throat, and sides of belly dark ultramarine, more or less mottled with white. Some specimens have claret-coloured spots on the back."

From snout to vent 105; tail 160 mm.

Variation. The extent of keeling of the dorsal scales is variable; in some individuals, especially old males, they are very strongly keeled. The transition from the larger median dorsal scales—10 or 12 rows—to the smaller lateral ones may be abrupt or gradual.

Range. Sind; Baluchistan, Western Punjab; Waziristan; Afghanistan; Persia.

Hora found it in the Salt Range, Punjab, and it is not uncommon in Waziristan near the foothills on the Wana Plain; Blanford found it very common in the hills west of the Indus and in Baluchistan. Common and widely spread in Persia, being found both on rocky hills and in the open plains. It has been found at sea-level and up to an altitude of 6,000 feet. It is an active creature, running with considerable speed. Although mainly terrestrial in its habits, it sometimes ascends low bushes. Aitchison (in Boulenger, 1889), who found it common in the neighbourhood of Nushki, Baluchistan, states that it was usually seen at the very end of a dry branch, near the ground, basking in the sun. It attracted insects towards it by the changes it produced in the coloration of its head and neck, the rest of the body resembling in colour the branch to which it clung. On the other hand Blanford states that it never leaves the ground.

After examining the specimens upon which Boulenger based his *isolepis*, and comparing them with those which he regarded as *agilis*, I find myself unable to agree with his conclusions. Olivier's illustration of *agilis* leaves much to be desired, but Audouin's figure of *agilis* in Descr. Egypte, pl. i, which Boulenger regarded as his *isolepis*, is no better. Boulenger's own figure of *isolepis* in Trans. Linn. Soc. is an excellent one.

156. **Agama ruderata baluchiana,** subsp. nov.

Type adult female collected in the Quetta district, Baluchistan; Brit. Mus. 1934.3.3.1.

Nostril situated in the canthus rostralis, snout short, slightly curved in profile; upper head-shields unequal, convex, more or less strongly keeled, some of those at the back of the head shortly spinous; 19 supralabials, their lower margin forming a denticulation. Dorsal scales unequal, rhomboidal, imbricate, the larger ones numerous, irregularly arranged, strongly keeled and pointed, sometimes partly erect, all pointing more or less straight backwards; on the flanks the scales are smaller and point more or less backwards and downwards; ventral scales about as large as the lateral, smooth or feebly keeled; gular scales about as large as the ventrals. No trace of a gular sac. Limbs moderate, the hind-limb reaching to the neck; no strongly differentiated scales on the hind leg as in the typical form. Tail rounded, covered with subequal, strongly keeled scales.

Greyish-brown above, paler below. An indistinct series of paired dark brown spots on each side of the vertebral line.

From snout to vent 75; tail 90 mm.

Differs from the typical form in the dorsal scalation, the enlarged scales being less differentiated, less nail-like, more

like those of *A. persica*, in the shorter limb, and in the coloration, there being no white streak along the back of the thigh. Only a single specimen is known.

The typical form occurs in Persia and westwards to Asia Minor. Murray's record of it from Karachi (Zool. Sind, p. 371) cannot be relied on.

157. Agama rubrigularis.

Trapelus rubrigularis Blanford, P. Asiat. Soc. Beng. 1875, p. 233, and J. Asiat. Soc. Beng. xlv. 1876, p. 23, pl. i. fig. 1 (type loc. foot of the Khirthar Hills, W. Sind; London).—*Agama rubrigularis*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 346, and Fauna Brit. Ind. 1890, p. 147; Procter, J. Bombay N.H. Soc. xxix. 1923, p. 123.

Nostril pierced above the canthus rostralis, pointing upwards and outwards; snout short, strongly sloped in profile. Upper head-scales unequal, keeled or granulate, largest on the snout; 16 to 18 upper labials, which are more or less denticulated along their free margin; no spines on the occiput. Dorsal scales rhomboidal, imbricate, subequal, feebly keeled, intermixed with separated, much larger, more strongly keeled scales, these latter arranged in more or less regular transverse series; gular and ventral scales as large as the small dorsals, smooth; gular pouch just indicated in the male. Limbs rather weak; the hind limb reaches to the back of the head or the ear. Tail feebly depressed, oval in section, covered with subequal keeled scales, the tip rather blunt. Male with one or two rows of callose preanal scales.

Olive or greyish above, with small yellow or golden spots, the centre of each spot being usually one of the enlarged dorsal scales; young with paired series of black spots (3 to 5) down the back, these sometimes persisting into adult life; a dark streak on each side of the nape; whitish below. A large red spot on the throat in life in both sexes.

From snout to vent 85; tail 100 mm. In the very young the tail is not longer than the head and body.

Range. Sind (Khirthar Hills, Kotei, Lehri near Jacocabad); Waziristan (Kaur Bridge, Manzai); Baluchistan.

Ingoldby (in Procter) states: "Found along the narrow foothills up to about 1,500 feet. It is most commonly seen about sunset. I have never met with it in the hot weather during the heat of the day."

158. Agama megalonyx.

Trapelus megalonyx, Günther, Rept. Brit. Ind. 1864, p. 159, pl. xiv, fig. C (type loc. ? Afghanistan; London).—*Agama megalonyx*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 347; Annandale, P. Asiat. Soc. Beng. (n. s.) i. 1905, p. 88.

Differs from *A. rubrigularis* in having the dorsal scales very

unequal, the largest ones being often arranged in groups, some smooth, others feebly or strongly keeled or with a raised mucro, more strongly imbricate and less regularly rhomboidal; ventrals as large as the small dorsals, feebly keeled.

Olive-brown above, with lighter and darker markings more or less transversely arranged, and a vertebral series of six large, light, black-edged spots; a dark streak along each side of the nape; fold in front of the shoulder black; whitish below.

From snout to vent 65; tail 75 mm.

Range. The type, a female, probably came from Baluchistan. I have examined a second example (juvenile) from near Quetta. Annandale records two more from the Perso-Baluchistan border.

Male not known to me.

159. Agama minor.

Agama minor Hardwicke & Gray, Zool. Journ. iii, 1827, p. 218 (type loc. "Chittagong"; based on Hardwicke's sketch, no. 82; London).

Brachysaura ornata Blyth, J. Asiat. Soc. Beng. xxv, 1856, p. 448 (type loc. Saugor, C. India; type lost); Stoliczka, P. Asiat. Soc. Beng. 1872, p. 77; Cockburn, J. Asiat. Soc. Beng. li, 1882, p. 50; Günther, Rept. Brit. Ind. 1864, p. 161.—*Otocryptis ornata*, Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 334, and Fauna Brit. Ind. 1890, p. 145; Annandale, Rec. Ind. Mus. vii, 1912, p. 46.

Habit stout; head rather large, not elongate, not depressed; nostril situated below the canthus rostralis; snout as long as or a little longer than the orbit; upper head-scales

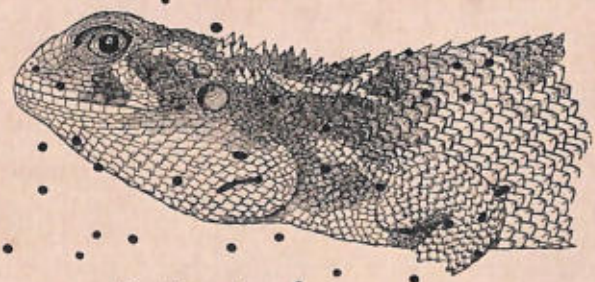


Fig. 59.—*Agama minor* (nat. size).

rather large, unequal, strongly keeled or tubercular; canthus rostralis and supraciliary edges sharp; two separated spines or groups of spines above the ear; diameter of the tympanum

not more than half that of the orbit; 11 to 15 upper and as many lower labials. Body feebly depressed, dorsal scales rather large, strongly imbricate and keeled, often mucronate, pointing backwards and upwards; ventrals smaller than the dorsals, more or less keeled; 48 to 58 scales round the middle of the body; gular scales as large as or larger than the ventrals; a short oblique fold in front of the shoulder, not extending across the throat; nuchal and dorsal crests a mere denticulation, the former best marked. Limbs short, digits short; the hind limb reaches to the back of the head or not quite so far. Tail short, rounded or feebly compressed, covered with subequal keeled scales. In the adult male it is feebly swollen at the base, the scales covering that part of it slightly thickened.

Yellowish-brown (in life olive) above, with three rows of dark brown light-edged spots on the back and base of the tail, the median row most distinct and formed of rhomboidal spots; a white streak on each side of the nape bifurcating behind and an oblique one from the eye to the angle of the mouth; limbs with dark cross-bars; yellowish-white below, the throat speckled with grey.

According to Stoliczka the young in life are pinkish-brown and the dark spots are edged with light pink.

From snout to vent 90 mm. The tail may be as long as but is usually shorter than the head and body.

Range. Central Provinces and Central India to the Ganges Valley in the United Provinces and westwards as far as Sind. (Saugor district, Ratlam, Allahabad, Cutch, Kathiawar.)

Common, according to Cockburn, at Banda, Saugor district; of crepuscular and nocturnal habits, and sluggish in its movements, often not attempting to escape when approached. It lives in holes in the ground but does not dig its own burrow; it feeds upon insects and is easily kept in captivity. When caught it emits a short squeak. The females, he states, are larger than the males and are more brilliantly coloured; under sexual excitement they (the females) become crimson in colour with the exception of the back, which is dusky olive, and the gular fold, which is deep black.

Hardwicke and Gray's *Agama minor* of 1827 was based upon an unpublished coloured sketch of Hardwicke's (Brit. Mus. Coll., no. 82), and the description which they give is in accordance with the figure. Later (Cat. Liz. 1845, p. 244) Gray referred to the same species under the name of *Calotes minor*, an entirely different lizard, the *Oriocalotes* of this volume. An examination of Hardwicke's sketch leaves no doubt whatever that the lizard figured by him is conspecific with the species which Blyth in 1856 described as *Brachysaura ornata*. The short tail, the regular scalation, the coloration of the

body, in particular the light <-shaped mark upon the side of the neck, are all characteristic of Blyth's *ornata*, and not of the *Calotes minor* of Gray, 1845.

Gray's name *minor* of 1827, therefore, has priority over Blyth's *ornata* of 1856, and a new name must be found for the *Calotes minor* of 1845 (p. 166).

In general habit, scalation, and colour-pattern this curious lizard is nearer to *Agama* than to *Charasia*. The absence of callose preanal scales should not deter one from placing it under *Agama*, for in several species in that genus—*sinaita*, *mutabilis*, *inermis*—the number of callose scales is reduced to as few as 4 or 6.

Genus **PHRYNOCEPHALUS.**

Phrynocephalus Kaup, Isis, 1825, p. 591 (type *guttatus*); Boulenger, Cat. Liz. Brit. Mus. i. 1885, p. 369, and Fauna Brit. Ind. 1890, p. 152; Bedriaga, Result. Przewalski's Exped. C. Asia, iii, Abt. 1, (2) 1907, p. 134; Tsarevski, C. R. Acad. Sci. U.R.S.S. 1929, p. 415, figs. (skull).

Megalochilus Eichwald, Zool. Spec. iii, 1801, p. 185 (type *auritus*).

Saccostoma Fitzinger, Syst. Rept. 1843, pp. 18 & 87 (type *auritus*).

Helioscopus Fitzinger, ibid. pp. 18 & 88 (type *P. helioscopus*).

Phrynosaurys Fitzinger, ibid. pp. 18 & 88 (type *P. olivieri*).

Body depressed; no dorsal crest; no gular sac; a transverse gular fold; dorsal scales uniform or intermixed with larger ones; tympanum rudimentary or absent, when present concealed under the skin; tail rounded, depressed at the base; no preanal or femoral pores.

Range. Central Asia, from the borders of the Caspian Sea to China; in the Indian Region found in Baluchistan and the Western Himalayas.

More than 40 species are recognized, with many subspecies. The lizards of this genus have special modifications to fit them for a life in the desert. The eye opening is small; the eyelids are thick, strongly projecting, and beset with a fringe of pointed scales. When the eyes are tightly closed the two apposing surfaces of the lids are in broad contact with one another and form an effective barrier to the entrance of sand. In some species also the strongly projecting supraciliary ridge almost forms a roof over the eye. Mosauer (1932) has recorded the same modification of the eyelids in some desert Iguanids (*Uma*, *Callisaurus*). It occurs also, but less developed, in some of the Agamas. The nostrils can be closed.

The tympanic area is covered with thick skin; an ill-developed tympanic membrane may be present, and there is

an extra-columella cartilage. The columella auris is unusually stout. The digital fringes have already been discussed on p. 15.

In spite of their apparently weak limbs, these lizards can run with great speed and can bury themselves with remarkable swiftness in loose sand by means of lateral movements of the body. Their food consists of insects, particularly beetles and ants, and vegetable matter. *P. theobaldi* appears to differ from the other Indian species in two noteworthy respects. It is cuniculine and monogamous in its habits, a pair usually occupying a shallow burrow in the earth, the mouth of which is concealed by a stone or tuft of grass. The burrow is some 8 or 16 inches long and 4 or 5 inches below the surface of the ground. It is also said to be viviparous. Embryos, usually

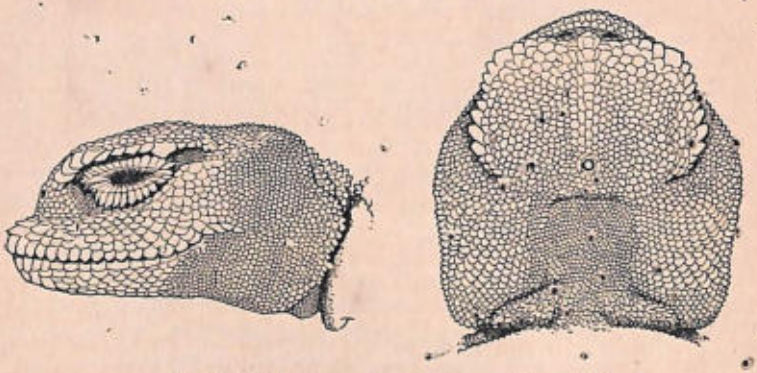


Fig. 60.—Upper and side views of head of *Phrynocephalus maculatus*. (× 2.)

two in number, in a well-advanced stage of development, can be found in the females, but always in conjunction with a large yolk-sac. How far development proceeds before the young are born is not yet known.

The following characters are common to all the species described in this work:—Rostral not larger than the other labials; 12 to 15 upper labials, their free margins denticulated; head rather high, the crown more or less flat; snout very short, with protruding labial border; nostrils close together; eyelids well developed, with fringed margins; supraciliary edge strongly projecting, forming a fringe over the eye; limbs weak; claws very long.

Key to the Indian Species.

I. Dorsal scales unequal.
Enlarged dorsal scales nail-like, with free posterior border; sides of back of head and neck without long spinous scales ..... *scutellatus*, p. 229.
Enlarged dorsal scales without free posterior border; sides of back of head and neck with long spinous scales ..... *luteoguttatus*, [p. 235.

II. Dorsal scales subequal, homogeneous.
a. No spinous scales upon the neck or back of the head.
Nasal shields separated by three or more scales; the hind-limb does not extend beyond the region of the ear ..... *theobaldi*, p. 230.
Nasal shields separated by three or more scales; the hind-limb reaches to the eye ..... *reticulatus*, p. 231.
Nasal shields in contact or partly separated; the hind-limb reaches to the tip of the snout or beyond ..... *ornatus*, p. 232.
Nasals separated by 1 or 2 scales; the hind-limb reaches to the eye ..... *maculatus*, p. 233.

b. Neck and back of head with long spinous scales.
Nasal shields in contact with one another; digital denticulations very long ..... *euptilopus*, p. 234.

160. Phrynocephalus scutellatus.

Agama scutellata Olivier, Voy. Emp. Otho. iii, p. 110 (4th ed.), and v, p. 196 (8th ed.), and Atlas, 1807, pl. xlii, fig. 1 (type loc. near Ispahan, Persia; Paris); Mocquard, Bull. Mus. Hist. Nat. Paris, 1910, p. 13.

Phrynocephalus olivieri Dum. & Bibr., Erp. Gen. iv, 1837, p. 517 (based on Olivier's specimen); Anderson, Proc. Zool. Soc. 1872, p. 386; Blanford, Zool. E. Persia, 1876, p. 327; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 370, and Tr. Linn. Soc. (2) v, 1889, p. 92, pl. viii, fig. 2, and Fauna Brit. Ind. 1890, p. 153; Alcock & Finn, J. Asiat. Soc. Beng. lxv, 1896, p. 555.

Phrynocephalus tickelii Gray, Cat. Liz. Brit. Mus. 1845, p. 260 (type loc. Afghanistan; London).

Nasal shields large, in contact with one another, in rare cases separated by several scales; snout almost vertical; nostrils directed more or less straight forwards; upper head-scales large, very unequal; always a patch of large ones on the mid-occipital region; a curved bony ridge on the back of the head extending between the posterior extremities of the orbit, the part of the head behind the ridge being at a distinctly lower level than the crown of the head; some short spinous scales on the back of the head, frequently absent in the female; folds of the skin of the neck with groups of enlarged scales. Dorsal scales unequal, smooth, juxtaposed or slightly imbricate, with scattered larger nail-like ones; these enlarged scales usually larger and more numerous in

the male than in the female; flanks with small granular scales and scattered tubercles; gular and ventral scales perfectly smooth; from 2 to 4 rows of enlarged scales parallel with the infralabials, in contact anteriorly with the mental, which is larger than the adjacent labials. Toes elongate, with multi-keeled lamellæ below; outer borders of third and fourth toes denticulate, the length of the denticulations about equalling the breadth of the toe; the hind-limb reaches to about the level of the eye. Tail feebly depressed, covered with smooth or feebly keeled scales, those above intermixed with larger ones, some of the lateral ones at the base of the tail being pointed.

Greyish or brownish above, with lighter and darker markings; frequently a large pale area in the middle of the back surrounded by dark grey; two black irregular cross-bars in front of it and two more behind; limbs above with two broad black cross-bars; tail with black or brown annuli, this colour being particularly intense and always present below the tail; body and limbs below whitish. Some examples are a speckled mixture of black and grey, or grey with small white spots, or brownish, all over the upper parts of the head and body. The males are usually brownish or reddish in coloration, the females greyish, but this sexual dichromatism is not constant.

From snout to vent 50; tail 70 mm.

Range. Baluchistan; Afghanistan; Persia; at between 2,000 and 7,000 feet altitude. Common near Quetta and along the Afghan-Baluchistan border.

Blanford (1876) found it inhabiting gravelly and stony plains. He records that its food consisted chiefly of ants.

161. Phrynocephalus theobaldi.

Phrynocephalus olivieri (not of Dum. & Bibr.) Theobald, J. Asiat. Soc. Beng. xxxi, 1862, p. 518.

Phrynocephalus theobaldi Blyth, J. Asiat. Soc. Beng. xxxii, 1863, p. 90 (type loc. Lake Tsho-marari, Rupshu Province, Tibet; type lost); Blanford, J. Asiat. Soc. Beng. xliv, 1875, p. 192, and Sci. Res. 2nd Yarkand Miss. 1878, p. 6; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 373; and Fauna Brit. Ind. 1890, p. 153, and Ann. Mag. Nat. Hist. (7) xv, 1905, p. 379; Nikolski, in Fedtschenko's Reise, ii, 1899, p. 23; Bedriaga, Sci. Result. Przewalski's Exped. C. Asia, iii, (1) 2, 1907, pl. iv, figs. 12 & 12 *a*; Zugmayer, Zool. Jahrb. 1909, p. 502; Chabanaud, Bull. Mus. Hist. Nat. Paris, 1919, p. 453, and Res. Sci. Miss. Occ. 1922, p. 5, pl. i; Woolaston, in Mount Everest, the Reconnaissance, 1921, 1922, p. 293; Hingston, in Norton's The Fight for Everest, 1925, pp. 266, 283; Schmidt, Pub. Field Mus. Nat. Hist. xii, 1926, p. 169.

Phrynocephalus caudivolvulus, Anderson, Proc. Zool. Soc. 1872, p. 387.

Phrynocephalus stoliczkai Steindachner, Reise Novara, Rept. 1867, p. 23, pl. i, figs. 6 & 7.

Nasal shields large, separated from one another by three scales, rarely only one; snout declivous; upper head-scales unequal, largest upon the snout and upon the vertex, smallest upon the back of the head; no spinous tubercles upon the back of the head or the neck. Dorsal scales subequal, homogeneous, small, smooth; usually a little larger and flatter upon the vertebral region than they are upon the flanks, subimbricate; ventrals quite smooth; from 2 to 4 rows of enlarged scales parallel with the infralabials, in contact anteriorly with the mental, which is larger than the adjacent labials; gulars distinctly smaller than the ventrals. Toes rather short, with keeled lamellæ below; outer sides of third and fourth toes feebly denticulate; the hind-limb reaches to the axilla or the region of the ear. Tail rounded, the tip rather blunt, covered with small subequal scales.

Greyish above, speckled with black and white and brown; often a series of largish paired black spots down the back; or with two ill-defined dorso-lateral stripes of series of spots; or the back ornamented with white or yellow ocelli; limbs and tail above with black spots or cross-bars; whitish below, the throat sometimes spotted with black; an elongated black patch in the middle of the belly in adults; this varies considerably both in size and depth of colour and may be only seasonal, as it is sometimes absent altogether; tip of tail below intense black in the male, grey in the female. The coloration as shown by more than fifty specimens collected in Tibet on the Mount Everest Expedition of 1925 shews considerable variation.

From snout to vent 54; tail 58 mm. The length of the tail as compared with the length of the head and body is variable: it may be a little shorter or longer.

Range. Kashmir; Southern Tibet; E. Turkestan.

Where found usually common and living in colonies, generally in sandy places. Woolaston states that it ascends to a height of 17,000 feet. Its habits have already been remarked upon (p. 228).

162. **Phrynocephalus reticulatus.**

Phrynocephalus reticulatus Eichwald, Zool. Spec. 1831, p. 186 (type loc. banks of the Oxus).—*Phrynocephalus caudivolvulus* var. *reticillatus*, Bedriaga, Sci. Result. Przewalski's Exped. C. Asia, iii, (1) 3, 1909, p. 367.

Phrynocephalus caudivolvulus, (in part) Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 375, and Fauna Brit. Ind. 1890, p. 154.

Nasals separated by from 3 to 5 small scales; snout declivous, the nostrils pointing forwards and upwards; upper head-scales unequal, largest upon the snout and the mid-occipital region, keeled; no spinous scales on the back of the head

er neck ; dorsal scales subequal, imbricate, those on the flanks smaller than those upon the middle of the back ; gular scales smooth, smaller than the ventrals, which may be keeled and mucronate ; 3 or 4 rows of enlarged scales parallel with the infralabials, in contact anteriorly with the mental, which is larger than the adjacent labials. The hind-limb reaches to the eye ; toes elongate, with keeled lamellæ below, with well-developed lateral denticulations, the length of those upon the outer side of the fourth toe equal to its breadth. Tail depressed, oval in section, tapering to a point, covered with subequal keeled scales, ? prehensile.

Greyish above, finely speckled or vermiculated with brown, or with a series of paired brown vertebral spots ; whitish below, the tail with broad black cross-bars ; sometimes the tip of the tail entirely black.

From snout to vent 45 ; tail 60 mm.

Range. This species is included in the fauna of the Indian Empire on the strength of a single specimen in the British Museum, collected by the Schlagintweit brothers and said to have come from Ladak, Kashmir. Unfortunately the localities given by these collectors cannot be relied on. Elsewhere the species is known from Turkestan and westwards to the shores of the Caspian Sea. That it is distinct from the true *caudivolvulus* of Pallas, 1811 (=*guttatus* Gmelin, 1789) I have no doubt, and the range of the two species, at any rate in Western Asia, appears to be identical. Bedriaga, who has had access to more material than is available to me, has named it *reticulatus*, and that appears to be a better choice than *ocellatus*, under which Boulenger provisionally placed it (Cat. p. 376).

163. Phrynocephalus ornatus.

Phrynocephalus ornatus Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 493 (type loc. between Nushki and Helmand River, Afghan-Baluchistan frontier ; London), and Trs. Linn. Soc. (2) v, 1889, p. 97, pl. viii, fig. 3, and Fauna Brit. Ind. 1890, p. 154 ; Alcock & Finn, J. Asiat. Soc. Beng. lxv, 1896, p. 555 ; Nikolski, Ann. Mus. Zool. St. Pétersb. ii, 1897, p. 324, and ibid. iv, 1899, p. 393.

Nasal shields large, in contact with one another or partly separated ; snout declivous, nostrils directed upwards and forwards ; upper head-scales moderately large, unequal, keeled ; no spinous scales on the back of the head or neck ; folds of the skin of the neck with groups of slightly enlarged scales ; dorsal scales subequal, feebly imbricate, those on the flanks a little smaller than those on the back. Gular and ventral scales perfectly smooth, the latter mucronate ; 3 or 4 rows of enlarged scales parallel with the infralabials, in

contact anteriorly with the mental, which is larger than the adjacent labials. The hind-limb reaches to the nostril or beyond; toes elongate, with keeled lamellæ below; outer borders of third and fourth toes denticulated, the length of the denticulations about equalling the breadth of the toe. Tail depressed, oval in section, tapering to a point, covered with subequal keeled scales.

Greyish above, speckled with black and white; back sometimes with black spots or ocelli, regularly arranged; flanks sometimes with a light longitudinal band edged above and below with black, or with a dark festooned band. Limbs with or without dark spots; a dark band along the hinder side of the thigh often present. Lower parts whitish, the tail constantly with 4 or 5 jet-black transverse bars. In life a very beautifully coloured lizard.

From snout to vent 38; tail 52 mm.

Range. Baluchistan and Southern Afghanistan (Las Bela State, Kharan, Western Baluchistan); Persia. "Very common between Nushki and the River Helmand and along the river on the gravel plains; always near bushes, to the roots of which it ran for shelter; very difficult to catch" (J. E. T. A., in Boulenger, 1889).

Variation. In the one example examined by me from Las Bela State the leg reaches only to the eye.

164. Phrynocephalus maculatus.

Phrynocephalus maculatus Anderson, Proc. Zool. Soc. 1872, p. 389, fig. (type loc. Awada, Shiraz, Persia); Blanford, Zool. E. Persia, 1876, p. 331; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 377, and iii, 1887, p. 497, and Tr. Linn. Soc. (2) v, 1889, p. 97, pl. ix, fig. 3, and Fauna Brit. Ind. 1890, p. 155; Alcock & Finn, J. Asiat. Soc. Beng. lxv, 1896, p. 555; Boulenger, J. Bombay Nat. Hist. Soc. xxvii, 1920, p. 351; Parker, Ann. Mag. Nat. Hist. (10) vi, 1930, p. 594.

Nasal shields separated by 1 or 2 scales; snout almost vertical; nostrils directed more or less straight forwards; upper head-scales rather large, not very unequal, convex, smooth; no spinous scales on the back of the head or neck; dorsal scales subequal, subimbricate, those on the flanks smaller than those on the back; gular and ventral scales quite smooth, the latter mucronate; 3 or 4 rows of enlarged scales parallel with the infralabials, in contact anteriorly with the mental, which is much larger than the adjacent labials. The hind-limb reaches to the eye or to the tip of the snout; toes elongate, with multi-keeled lamellæ below; outer borders of third and fourth toes feebly denticulated. Tail feebly depressed, oval in section, the tip bluntly pointed, ? prehensile, covered with subequal keeled scales.

Greyish above, speckled with black and white, sometimes with black spots, which may unite to form cross-bars upon the back and upper surfaces of the limbs; whitish below. Tail with dark cross-bars or with the entire tip dark grey.

From snout to vent 73; tail 120 mm.

Range. The borders of Afghanistan and Baluchistan (Kharan and between Nushki and Helmand); Persia; Arabia; Mesopotamia.

Blanford found it in Persia in open plains, very locally distributed and apparently keeping to more barren and sandy parts of the country than other species. He did not observe it above 3,000 feet altitude. He caught one specimen on an utterly barren salt swamp. He also remarks: "*P. maculatus* has a habit of coiling the end of its tail upwards, or in the reverse direction to that in which a chameleon coils it. I cannot form any idea of the use to which this animal puts its tail as a prehensile organ. The places it inhabits are as a rule destitute even of bushes, so that the tail can scarcely be employed even for climbing."

Aitchison, in Boulenger (1899), confirms Blanford's remarks about the habits of this species. He met with it on the great gravel plains between Nushki and Helmand, on the more exposed parts where there were neither bushes nor stones. They hid themselves by lying flat, pressed upon the sand, hoping by their coloration to evade detection.

165. Phrynocephalus euptilopus.

Phrynocephalus euptilopus Alcock & Finn, J. Asiat. Soc. Beng. lxv, 1896, p. 556 (type loc. Darband, 3,000 feet, Baluchistan; London and Calcutta).

Nasal shields in contact with one another, or partly separated; snout almost vertical, nostrils directed more or less straight forwards; upper head-scales rather small, subequal; sides of the back of the head and sides of the neck with long spinous tubercles; dorsal scales subequal, feebly imbricate, keeled, those on the flanks a little smaller than those on the back; gular and ventral scales smooth, mucronate; two rows of enlarged scales separated from one another by smaller ones, parallel with the infralabials, these in their turn separated by small granular scales from the much larger scales which cover the middle of the gular region; mental very small, not larger than the adjacent labials. The hind-limb reaches to the eye; digits long, with smooth or feebly keeled lamellæ beneath, and well-developed lateral denticulations, the length of the denticulations being greater than the breadth of the digit. Tail depressed, oval in section, the tip bluntly pointed, ? prehensile; covered with subequal keeled scales.

Sandy above or greyish, thickly speckled with black; top of head with irregular black blotches; nape and shoulders with five large rounded spots, the one on the nape single, the others paired; whitish below; tip of tail black.

From snout to vent 60; tail 65 mm.

Range.—Western Baluchistan and the Afghan-Baluchistan frontier. Known only from the type specimens, six in number.

The types were caught by Dr. Maynard in a small hollow in the sandy desert where there were a couple of wells, the only water for 80 miles. On being approached they wriggled into the sand with such rapidity that they could only be followed with difficulty. Before burrowing, one would sometimes sit up and look, gently waving its tail in the air like a cat about to spring. In life the back was of a rich golden-brown colour, with the jet-black spots standing out like velvet; the throat in one was lavender, in others salmon-pink; the belly was a beautiful silvery white. The upper surface of the limbs presented a lovely golden sheen; the top of the head was metallic green; the distal half of the tail was black.

166. Phrynocephalus luteoguttatus.

Phrynocephalus luteoguttatus Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 497 (type loc. between Nushki and the Helmand River, Afghan-Baluchistan border; London), and Tr. Linn. Soc. (2) v, 1889, p. 98, pl. viii, fig. 4, and Fauna Brit. Ind. 1890, p. 155; Alcock & Finn, J. Asiat. Soc. Beng. lxv, 1896, p. 557.

Nasal shields in contact with one another or partly separated; snout almost vertical; nostrils directed more or less straight forwards; upper head-scales rather small, subequal, keeled; a series of enlarged scales bordering the front of the crown of the head; sides of the back of the head and sides of the neck with spinous tubercles; dorsal scales unequal, subimbricate, small ones mixed with numerous scattered larger ones, all more or less strongly keeled; scales on the flanks smaller than those on the back; gular and ventral scales smooth, mucronate; two rows of enlarged scales, separated from one another by smaller ones, parallel with the infralabials; these in their turn are more or less separated by smaller scales from the larger ones which cover the middle of the gular region; mental very small, not larger than the adjacent labials. The hind-limbs reach to the eye; digits elongate, with smooth or keeled lamellæ below and well-marked lateral denticulations, the length of the longest denticulation equalling the breadth of the toe. Tail strongly depressed, oval in section, the tip pointed, covered with subequal keeled scales.

Yellowish-brown or pale buff above, with black dots and pale yellow or golden spots; the sides sometimes blackish; frequently a blackish streak along the outer side of the leg; lower surfaces whitish (belly pink in life). Tip of tail with black cross-bars or the whole tip black.

From snout to vent 40; tail 40 mm.

Range. Baluchistan (Nushki and Chagai districts; Las Bela State); Afghanistan (Helmand River district.)

Genus **PHYSIGNATHUS.**

Physignathus Cuvier, Régne Anim. 2nd ed. ii, 1829, p. 41 (type *cocincinus*); Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 395.
Lophognathus Gray, Zool. Misc. (3) App. 1842, p. 53 (type *gilberti*).
Redtenbacheria Steindachner, Reise Novara, Rept. 1869, p. 31 (type *fasciata*).

Body more or less compressed. Dorsal scales small, uniform or intermixed with larger ones. A nuchal and a dorsal crest; no gular sac, a strong tranverse gular fold. Tympanum distinct. Tail rounded or more or less compressed. Femoral pores present, at least in the male.

Range. North Australia and Papuasia; Siam and French Indo-China.

Eight or nine species are known; one occurs in Indo-China.

167. Physignathus cocincinus.

Physignathus cocincinus Cuvier, Régne Anim. 2nd ed. ii, 1829, p. 41 (type loc. Cochin China; Paris); Smith, J. Nat. Hist. Soc. Siam, vi, 1923, p. 50.—*Istiurus cochinsinensis*, Guérin, Icon. Règ. Anim. ? 1832, Atlas, Rept. pl. ix, fig. 2.—*Physignathus cochinchinensis*, Günther, Rept. Brit. Ind. 1864, p. 153; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 399; Angel, Bull. Mus. Hist. Nat. Paris, 1928, p. 446; Schmidt, Copeia, 1928, p. 78.
Lophura cuvieri Gray, in Griff.-Cuv. Anim. King. ix, 1831, Syn. p. 60 (type loc. Cochin China; Paris).
Istiurus physignathus Dum. & Bibr., Erp. Gen. iv, 1837, p. 387 (subst. name for *cocincinus*).
Dilophyrus mentager Günther, Proc. Zool. Soc. 1861, p. 188 (type loc. Chantabun district, S.E. Siam; London).—*Physignathus mentager*, Günther, Rept. Brit. Ind. 1864, p. 153, pl. xv; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 400; Tirant, Rept. & Batr. Cochinchine, 1885, p. 93; Flower, Proc. Zool. Soc. 1899, p. 641; Smith & Kloss, J. Nat. Hist. Soc. Siam, i, 1915, p. 241; Mell, Arch. f. Naturg. Berlin, lxxxviii, 1922, p. 142.
Physignathus caudicinctus Barbour, Proc. Biol. Soc. Washington, xxv, 1912, p. 191 (type loc. Lao-kay, Tonking; Harvard).

Length of head one and a half times its breadth; snout longer than the orbit; interorbital region concave; cheeks swollen in the adult male; upper head-scales very small, subequal, obtusely keeled; canthus rostralis and supraciliary edge moderately sharp; no enlarged scales on the back of the

head; 12 to 14 upper and 10 to 12 lower labials. Body strongly compressed; dorsal scales very small, equal, obtusely keeled, pointed, the upper ones are directed almost straight upwards, those on the flank upwards and backwards, ventral scales much larger, smooth. Gular region covered with oval scales; these are small and juxtaposed anteriorly, larger and intermixed with smaller ones posteriorly; on each cheek there are 3 or 4 long pointed tubercles; a row of from (7) 9 to 14 large scales on either side of the jaw parallel with the lower labials; a strong fold in front of the shoulder extending across the throat. Nuchal and dorsal crests continuous, the former set on a fold of skin, well developed in the adult male, composed of long, separated, lanciform or falciform spines, as long as or longer than the orbit; an equally high crest, more or less separated from the dorsal crest on the basal part of the tail; all the crests much lower in the female. Limbs strong, rather slender; toes with a well-developed lateral denticulation; the hind-limb reaches to the eye or the tip of the snout. Tail strongly compressed, covered with small keeled scales above, with much larger, more strongly keeled ones below. From 4 to 8 femoral pores on each side.

Green above, darker on the top of the head and upper aspects of limbs; body with 3, 4 or 5 narrow oblique light stripes on each side; lower parts pale greenish; tail alternately banded with buff and dark brown, or the posterior half all brown. In fully grown individuals the light stripes on the body are indistinct or absent. Of the colours in life I have the following notes:—Light stripes on the body bluish-green; underside of body, tail, and fore-limbs white, with patches of bright blue; chest, patches on sides, and under surface of legs bright emerald-green; labials and enlarged scales on either side of lower jaw rose-pink; throat reddish-yellow.

From snout to vent 250; tail 650 mm. The largest female that I have seen measures 200 mm. from snout to vent.

Range. Eastern Siam and French Indo-China. Mell records a specimen from Nam-gong, near the West River, S. China. Found in the plains and in the foothills.

I kept a nearly full-grown individual for some months in captivity. It was a very sluggish creature, sitting about on the ground or in a tree for the greater part of the day. It never attempted to bite when handled. It would not feed of its own accord, but could be made to open its mouth, when it would swallow fish, meat, worms, and insects. Its main food in the wild state appears to be insects. Its power of changing colour was slight, and varied only from light to dark. When running fast over ground its action was bipedal, the fore-limbs being folded back along the sides of the body.

Tirant (1885) states that it frequents particularly forests in sandy places, and lives in holes dug in the soft soil and in other hollows. It abounds at Binh-thuan, and its flesh is much esteemed. It swims with ease.

Genus LEIOLEPIS.

Leiolepis Cuvier, Règne Anim. 2nd ed. ii, 1829, p. 37 (type *guttatus*): Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 403, and Fauna Brit. Ind. 1890, p. 155.
Cynosaura Schlegel, Gray, in Griff.-Cuv. Anim. King. 1831, Syn. p. 62 (type *punctatus*).

Body depressed; no crest; dorsal scales minute, granular, uniform; no gular pouch; a strong transverse gular fold; tympanum distinct. Tail long, rounded, feebly depressed, covered with uniform scales. Femoral pores present.

A single species with two races.

Key to the Subspecies.

7 to 13 scales across the middle of the tibia in front; ventral scales as broad as 3 or 4 dorsals; flanks with black and orange bars ..... *b. belliana*, p. 238.

14 to 24 scales across tibia; ventrals about as broad as two dorsals; flanks with black and white bars ..... *b. guttata*, p. 240.

168. Leiolepis belliana belliana.

Uromastyx belliana Gray, Zool. Journ. iii, 1827, p. 220 (type loc. Penang; based on Hardwicke's drawing), and Ill. Ind. Zool. ii, 1834, pl. lxxii.—*Leiolepis bellii*, Gray, Cat. Liz. Brit. Mus. 1845, p. 263.—*Liolepis bellii*, Cantor, Cat. Rept. Mal. Pen. 1847, p. 41; Swinhoe, Proc. Zool. Soc. 1870, p. 240; Sanders, Proc. Zool. Soc. 1872, p. 154 (myology) text-figs.; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 403, and Fasc. Mal., Zool. i, 1903, p. 155, pl. x, fig. 2 (young), and Ann. Mus. Civ. Genova, (2) v, 1887, p. 477; S. Flower, Proc. Zool. Soc. 1899, p. 642.—*Liolepis belliana*, Boulenger, Fauna Brit. Ind. 1890, p. 156; Annandale, Proc. Zool. Soc. 1900, p. 858, and Rec. Ind. Mus. vii, 1912, p. 90; Laidlaw, Proc. Zool. Soc. 1901, p. 308; Smith & Kloss, J. Nat. Hist. Soc. Siam, i, 1915, p. 242; de Rooij, Rept. Indo-Austral. Arch. i, 1915, p. 136, fig.; Mell, Arch. f. Naturg. Berlin, lxxxviii, 1922, p. 112; Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 416, and Copeia, 1928, p. 80.
Uromastyx reevesii Gray, in Griff.-Cuv. Anim. King. ix, 1831, Syn. p. 62 (type loc. China; London).—*Leiolepis reevesii*, Theobald, J. Linn. Soc. x, 1868, p. 34.
Uromastyx maculatus Gray, in Griff.-Cuv. Anim. King. 1831, p. 62.
Cynosaura punctatus Schlegel, Gray, in Griff.-Cuv. Anim. King. 1831, Syn. p. 62 (type lost).

Head rather small, its length one and a half times its breadth; snout longer than the orbit, with strongly curved profile;

nostril large; tympanum vertically oval, its diameter more than half that of the orbit. Upper head-scales small, keeled, largest upon the snout and between the eyes, minutely granular upon the upper eyelids and back of the head; canthus rostrālis blunt. Dorsal scales minute, granular, keeled; ventrals larger, as broad as 3 or 4 dorsals, smooth. Gular region covered with rounded juxtaposed scales, not as large as the ventrals; a series of enlarged scales on each side of the jaw, parallel with the infralabials, separated from them by 2 or 3 rows of smaller scales. A strong fold across

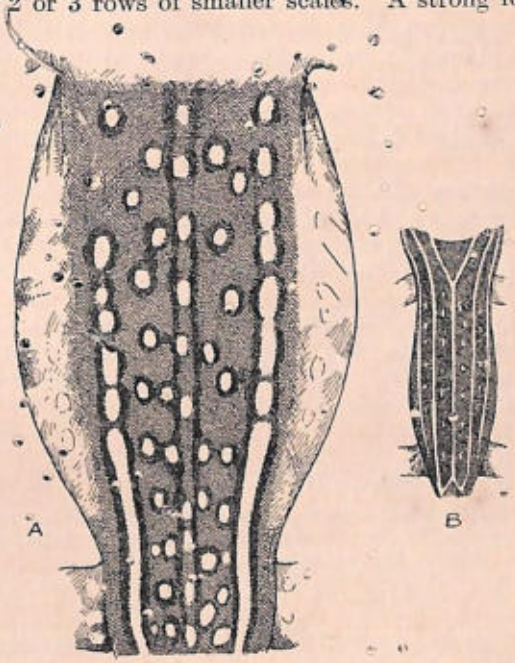


Fig. 61.—Dorsum of *Leiolepis belliana*, to show the change in colour-pattern.

A. Adult. B. Juvenile.

the throat covered with small granular scales, and usually a second one, less strongly marked, anterior to it. Sides of the neck plicate; skin on the flanks very lax. Limbs strong, moderate, claws very long; the hind-limb reaches to the neck or the ear; scales on the front of the tibia distinctly larger than those on the front of the thigh, from 7 to 13 (usually 8 to 10) across the middle of the tibia; at the base of the fifth toe the subdigital lamellæ are modified to form from 3 to 5 strong triangular spurs along the inner side of the toe (fig. 7,

p. 14). Tail thick at the base, oval in section, depressed, tapering to a fine point, covered with small, equal, keeled scales, largest below. From 13 to 20 femoral pores on each side.

Colour of adult. Greyish, olive or blackish above, with pale (yellow) black-edged spots and usually three more or less complete longitudinal stripes, a median and two lateral; sides of body with bluish-black and white (orange in life) vertical bars; top of head dark olive-brown; tail paler, with small spots which are confined to a median stripe; whitish or yellowish below, uniform or variegated or barred with dark blue. The female is less brilliantly coloured and the belly more uniform.

Young, blackish above, with five light (yellow) longitudinal stripes, the median bifurcating on the neck; tail bright brick-red.

Specimens from Hainan and S. China have the dorsal spots always numerous and closely set, and the longitudinal dorsal stripes tend to disappear completely in adult life (*reevesi*).

From snout to vent 150; tail 300 mm. Females are smaller.

Range. Southern Burma, as far north as lat. 18° N.; Siam, French Indo-China; Hainan; S. China; the Malay Peninsula; Sumatra. In southern Annam its place is taken by the following race.

168 *a*. **Leiolepis belliana guttata.**

Leiolepis guttatus Cuvier, Règne Anim. 2nd ed. ii, 1829, p. 37 (type loc. Cochin China; Paris); Dum. & Bibr., Erp. Gen. iv, 1837, p. 466, pl. xliii.
Liolepis belliana var. *annamensis* Smith, Proc. Zool. Soc. 1921, p. 29 (type loc. Tour Cham, S. Annam; London).

Differs from the typical form in having the scales on the upper surface of the head, body, and limbs larger. The scales of the gular region are more granular in appearance; the width of a ventral scale equals about two dorsal scales, and there are from 14 to 24 scales across the middle of the tibia in front. Femoral pores 19 to 26 on each side.

In coloration the back is paler and the ocelli are less conspicuous, often pink in colour; a pale light dorso-lateral stripe is always present; the orange bars upon the flanks are white; the throat and belly are more heavily marked with blue. Males taken by me in early April had the nape and hind-limbs strongly tinged with red. This was absent in the females, which were altogether less strongly marked. Young not known.

From snout to vent 145; tail 290 mm.

Cuvier's types of *guttatus*, which are undoubtedly the same as my *annamensis*, are much larger His biggest specimen measures 600 mm. in total length, the tail forming 400 mm.

Range. I do not know of any definite locality for this race except Tour Cham. There is a specimen in Paris said to have come from Tonking, but Schmidt has recorded the typical form from Quangtri, near Hué, 250 miles north of Tour Cham (Copeia, 1928). The two specimens that I recorded from Cap St. Jacques in my original type series, I now refer to the typical form.

Leiolepis belliana inhabits sandy country, and in many places, particularly in stretches of country near the sea, is extremely common. They are shy creatures, and bolt off at great speed on the approach of danger; when caught they scratch and bite vigorously, but are unable to do much damage. Their burrows, which they dig with their feet and snout, are some three or four feet in length and about one foot below the surface of the soil; they seldom go straight into the ground, and often have a decided twist about half-way down. Each lizard has its own burrow, to which it retreats in time of danger. In the breeding season, however, it appears to share it with its mate. Annandale (in Boulenger, 1903) states: "I am now certain that it is monogamous, a single pair inhabiting a burrow which is shared by several young ones, probably hatched in March or April, at least for some weeks." They lay large oval-shaped eggs. They are both herbi- and insectivorous. Mason (1882) found them "feeding on the crocus-like flower (*Kaempferia candida*) which springs up at the commencement of the hot weather in March." Cantor found seeds in the stomach, and in captivity fed them upon soft fruit and boiled rice. I have found numbers of Coleopterous larvæ in their stomachs, and it is evident that they must dig in search of these unless, perhaps, they find them in their burrows. On the other hand, the stomach-contents of six examples of *L. b. guttata* examined by me consisted entirely of vegetable matter.

The loose skin upon the flanks enables this lizard to distend its body laterally to a considerable extent. This is accomplished by means of the anterior ribs, which are elongated and movable. When fighting, the males flatten the body, and thus incidentally display the brilliant coloration of the sides; sudden fear will also cause a momentary expansion.

Cantor's statement that they use the "parachute" in leaping from branch to branch is certainly incorrect, but Swinhoe's remarks with regard to the flattening of the body are worthy of note. I have never seen anything like it myself, nor is it recorded by any other observer, yet, coming from

so experienced a naturalist as Swinhoe, it certainly deserves verification. He writes: "If surprised far from their holes they spring into the air while running, and, expanding the loose red skin of their sides, skim along the surface of the sand for a considerable distance (say, often twenty yards at a time), and thus reach their retreats at greater speed. Their flight is not continued by flaps, but seems to be merely a long sustained leap, the body being made buoyant by the expanded side skin, and is analogous to the flight of the Flying-fish. They have a peculiar smell about them which affects the taste of their flesh, and they are in consequence not eaten by the Chinese except when in great distress for food."

Swinhoe's remark with regard to their flesh is not borne out by my experience. Both in Siam and Annam these lizards are eaten by the people of the districts in which they are found. The Siamese trap them by means of a cleverly constructed spring noose placed at the entrance to the burrow. The youths of the village also hunt for them with long sticks, killing them, if possible, as they dash away, or digging them out if they fail, using the stick to discover the direction of the burrow.

Hardwicke's original drawings, upon which the species is based, are in the British Museum; they are nos. 86, 87, 88 of the collection. A drawing of Reeves's (*L. reevesi*) is in the same book, no. 85.

Genus **UROMASTIX.**

Uromastyx Merrem, Tent. Syst. Amphib. 1820, p. 56 (type *spinipes*).—*Uromastix*, Boulenger, Cat. Liz. Brit. Mus. i. 1885, p. 405, and Fauna Brit. Ind. 1890, p. 157.
Mastigura Fleming, Phil. Zool. ii, 1822, p. 277 (type *spinipes*).
Centrocercus (not of Swainson, 1801), Fitzinger, Syst. Rept. 1843, pp. 18 & 86 (type *griseus*).
Saara Gray, Cat. Rept. Brit. Mus. 1845, p. 262 (type *hardwickii*).
Centrotrachelus Strauch, Bull. Acad. Sci. St. Pétersb. vi, 1863, p. 479, and Zool. Rec. 1864, Rept. p. 115 (type *asmussi*).

Body depressed, without crest; dorsal scales small, uniform or intermixed with larger ones; no gular sac; tympanum distinct. Tail short, depressed, covered with whorls of spinose scales; preanal and femoral pores present. Incisor teeth united in the adult into large cutting-teeth.

Range. The arid tracts of S.W. Asia and N. Africa. Eleven species are known. All are of terrestrial and cuniculine habits; they are said to live entirely upon vegetable food.

The young at birth have four incisor teeth in each upper and lower jaw. As growth progresses the two central upper incisors are replaced by a single large cutting "tooth," a

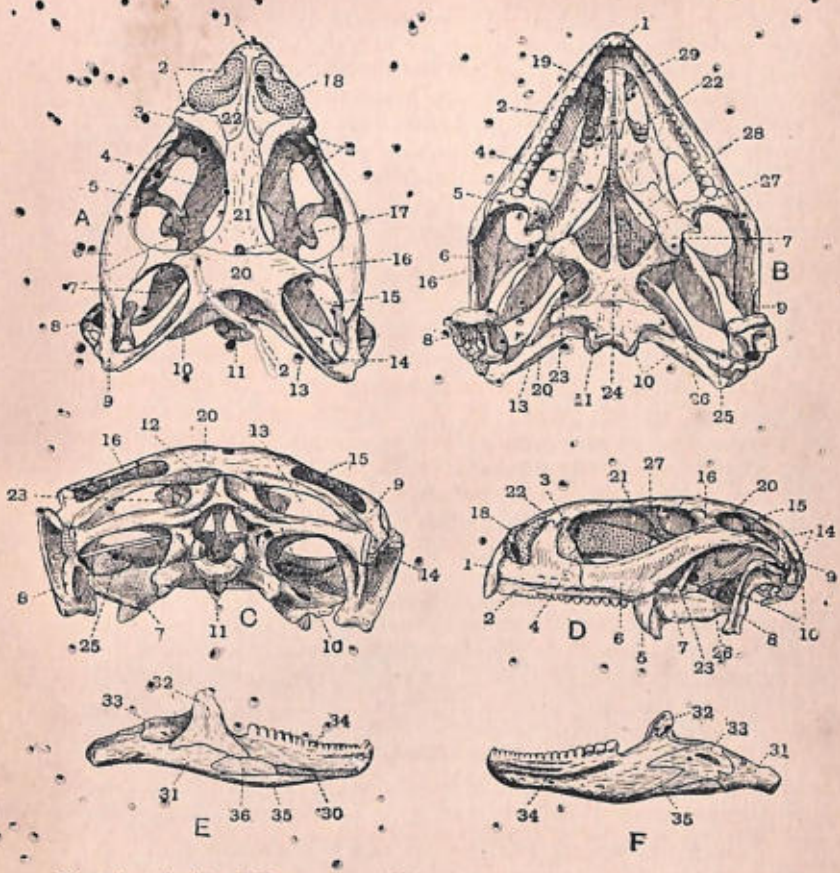


Fig. 62.—Skull of *Uromastix*. (From the 'Students' Text-Book of Zoology,' ii. By kind permission of Messrs. Allen & Unwin.)

A. Dorsal. B. Ventral. C. Posterior. D. Side view. E & F. Lower jaw.

1. Premaxilla. 2. Maxilla. 3. Prefrontal. 4. Palatine. 5. Transpalatine or ectopterygoid. 6. Jugal. 7. Pterygoid. 8. Quadrate. 9. Squamosal. 10. Exoccipital and opisthotic. 11. Basioccipital. 12. Supraoccipital. 13. Post-temporal opening. 14. Supratemporal bone. 15. Supratemporal opening. 16. Postfrontal. 17. Pineal foramen. 18. Olfactory capsule. 19. Vomer. 20. Parietal. 21. Frontal. 22. Nasal. 23. Columella cranii or epipterygoid. 24. Basisphenoid, with which a basitemporal ossification has united. 25. Columella auris. 26. Pro-otic. 27. Alisphenoid cartilage. 28. Parasphenoid. 29. Septomaxillary. 30. Meckel's cartilage. 31. Articular. 32. Coronoid. 33. Supra-angular. 34. Dentary. 35. Angular. 36. Splenial.

downward prolongation of the pre-maxillary bone; the lateral incisors remain, intimately attached to the central "tooth," but may disappear in later life. In the lower jaw the incisors of each mandible unite and form two cutting surfaces. There are no proper canines, and the anterior molars are usually worn down and show a more or less toothless gap.

In *Uromastyx* each preanal and femoral pore is surrounded by a complete ring of small scales; in *Leiolepis* and *Physignathus* the opening of the pore is within, or at the margin of, a single large scale.

Key to the Indian Species.

Back without greatly enlarged pointed tubercles; caudal spines small, 20 to 24 in a cross series at the base of the tail ..... *hardwickii*, p. 244.

Back with cross-series of large pointed tubercles; caudal spines large, 8 to 10 in a cross series at the base of the tail ..... *asmussi*, p. 247.

169. Uromastix hardwickii.

Uromastix hardwickii Gray, Zool. Journ. iii, 1827, p. 219 (type loc. Kanauj district, U.P.; London), and Ill. Ind. Zool. ii, 1834, p. 71; Theobald, Cat. Rept. Asiat. Soc. 1868, p. 39, and Cat. Rept. Brit. Ind. 1876, p. 119; Anderson, Proc. Zool. Soc. 1871, p. 167; Murray, Zool. Sind, 1884, p. 372; Boulenger Cat. Liz. Brit. Mus. i, 1885, p. 408, and Fauna Brit. Ind. 1890, p. 157; Purves, J. Bombay Nat. Hist. Soc. xxiii, 1915, p. 784; Parshad, ibid. xxiii, 1914, p. 370; Procter, ibid. xxix, 1923, p. 124; Hora, Rec. Ind. Mus. xxv, 1923, p. 374; Bhatia, J. Morph. Philad. xlviii, 1929, p. 281, and Zool. Anz. lxxxv, 1929, p. 15 (circulation).

Uromastix reticulatus Cuvier, Règne Anim. 2nd ed. ii, 1829, p. 34; (type loc. Bengal; Paris); Guérin, Icon. Règne Anim. pl. vii, fig. 4.

Uromastix griseus Cuvier, l. c. s. (type loc. "New Holland"; Paris).

Head rather small, broad behind, as broad as or broader than long; snout short, strongly curved in profile; nostril large; tympanum large, vertically oval, deeply sunk; anterior border of ear-opening feebly denticulate. Upper head-scales unequal, smooth or obtusely keeled, large on the snout, small over the outer part of the upper eyelid; cheeks with oval scales; 12 to 14 upper labials, more or less denticulated along their free margin; canthus rostralis rounded. Dorsal scales very small, subequal, mostly smooth, with or without scattered larger ones upon the back; these are sometimes numerous and arranged in irregular cross series; ventrals subquadrangular in shape, smooth, as large as or larger than the largest dorsals; gular scales rounded, much smaller than the ventrals; a series of enlarged scales on each side of the

jaw parallel with the infralabials, separated from them by from 3 to 8 rows of small scales ; skin of the neck and sides of the body very loose ; a more or less distinct transverse fold across the throat. Limbs strong, short ; outer side of femur and tibia with large spinose tubercles ; the hind-limb, stretched forward, reaches to about three-quarters of the way to the axilla. Tail thick at the base, oval in section, strongly depressed, covered above with cross series of enlarged, squarish, juxtaposed, spinose scales, largest on the sides ; these rows of spines separated from one another by from 4 to 6 rows of keeled scales, those anterior being very small ; lower surface of tail with squarish scales about as large as the ventrals ; the posterior part of the tail below is segmented, the segments corresponding with those of the upper surface,



Fig. 63.—*Uromastix hardwickii*. (After Boulenger.)

anteriorly the segments show only on the sides. From 12 to 18 preano-femoral pores on each side.

Yellowish-brown above, uniform or with dark spots or vermiculations ; the young usually with a dorsal series of small blackish spots in regular series ; whitish below ; a large blackish spot on the front of the thigh ; throat often with black spots.

From snout to vent 175 ; tail 130 mm.

Range. North-western India as far east as the United Provinces. Specimens from Sind and Kathiawar differ slightly from those in other parts of its range, but the variation is not sufficient to warrant racial distinction. The enlarged dorsal scales arranged in cross series are always present, and they attain a larger size, reaching a total length of 350 mm. One

specimen in the British Museum, from Karachi, measures 250 mm. from snout to vent, tail 200, but this size appears to be unusual.

There are five sketches of *U. hardwickii* in the Hardwicke collection, nos. 89 to 93. The specimen reproduced in Ill. Ind. Zool. is not the type, but represents a fully grown example of the species. The actual type specimen is figured in sketches 92 and 93; the back of the lizard has been broken and there is a considerable hump at the seat of injury; this has been faithfully reproduced by the artist.

The Spiny-tailed Lizard is widely distributed over the area in which it occurs, and in many places is common. It inhabits sandy tracts where the vegetation is scanty, usually associating in small communities; it feeds upon grass, flowers, and fruit. Each one lives in its own burrow. These go down four or five feet into the soil and are eight or nine feet in length; they always have one or more turns in them. In the northern parts of its range, at any rate, it does not leave the burrow until the sun is up and, having fed, returns to it again during the heat of the day, to reappear once more in the evening. At sunset, or earlier if the temperature is cold, it retires for the night, carefully closing the entrance to the burrow. In the winter months it hibernates. In the spring the lizards meet, pair, and separate. The eggs are large, measuring some 20 by 30 mm. in size; as many as fifteen are said to be laid by one female.

This lizard is of a placid and gentle disposition, and in captivity is soon tamed; its movements are rather slow. With certain castes of Hindoos it is a regular article of diet, and the meat is said to be excellent and sweet, like chicken. They either dig it out of its burrow or, if water is obtainable, pour some in until the lizard is forced to come out. Another method is to catch the creature as it lies at the entrance after feeding by smashing in the tunnel behind it with a mallet, and so preventing its escape. Alcock and Finn also mention this method of capture for *U. asmussi*.

Purves gives an interesting account of the method employed by this lizard to defend itself from snakes. When it hears the rustle of a snake it turns round and keeps three or four inches of its tail outside the mouth of its hole, shaking it violently. The snake attacks, but is hurt by the horny spines on the sides of the tail, and finally forced to retreat. If the snake can get into the hole before the lizard can get its tail outside the latter is defenceless, for it can be seized by the head and eaten. The Indians who have observed this method of defence by the lizard have profited by their knowledge: In the rainy season, when snakes are plentiful,

they take a small broom made of twigs and, approaching the hole, make a rustling noise with it on the ground. The lizard, mistaking it for a snake, turns and protrudes its tail, which is at once seized. The lizard is then levered out from the the head end by inserting a stick into the burrow. If the tail is pulled it is apt to break, for the creature can hold on with great strength. The head and feet are not eaten, but the tail is considered a great delicacy. The fat of the body is boiled down and the resulting oil is used as an embrocation and also as a cure for impotence.

Hora says that the shepherd boys in the Salt Range, when they see one in the open, place a foot on the nearest hole. They then alarm the lizard, which runs to its hole and, being unable to enter, dances about at the entrance and is easily captured.

170. Uromastix asmussi.

Centrotrachelus asmussi Strauch, Bull. Acad. Sci. St. Pétersb. vi, 1863, p. 479 (type loc. Sar-i-tschah, Persia; Leningrad); Blanford, Zool. E. Persia, 1876, p. 337, pl. xxi.—*Uromastix asmussi*, Alcock & Finn, J. Asiat. Soc. Beng. lxv, 1896, p. 557; Boulenger, Cat. Liz. Brit. Mus. i, 1885, p. 409.

Head rather small, broad behind, as broad as or broader than long; snout short, strongly curved in profile; nostril large; tympanum large, vertically oval, deeply sunk; anterior border of ear-opening denticulated. Upper head-scales unequal, mostly large and obtusely keeled, except upon the upper eyelid, where they are small; 16 to 22 upper and as many lower labials, the upper more or less denticulated along their free margin; canthus rostralis rounded; a series of enlarged scales from below the eye to above the ear; nape with small granular scales and numerous spinose tubercles, longer in the male than in the female. Dorsal scales small, subequal, keeled, with numerous equidistant cross series of large pointed tubercles; ventrals smooth, rhomboidal, larger than in *hardwickii*, larger in the male than in the female, 20 to 30 transverse rows on the middle of the belly on a space corresponding to the length of the head; gular scales small, tuberculate, much smaller than the ventrals; 2 or 3 rows of enlarged scales on each side of the jaw parallel with the infralabials, separated from them by smaller scales; skin of the throat and sides of the neck loose; a more or less distinct transverse fold across the throat. Limbs strong, short; some large spinose tubercles on the outer side of the hind-limb, which, extended forward, reaches nearly to the axilla. Tail thick at the base, oval in section, strongly depressed, covered above with cross series of very large,

subequal, spinose tubercles which are rounded at the base; the cross series are separated from one another by 3 or 4 rows of keeled scales, the anterior of which are much the smallest; lower surface of tail with subequal scales which are larger than the ventrals, segmented as in *hardwickii*. From 9 to 15 preano-femoral pores on each side.

Male. Back pale greenish-brown, the upper surfaces of the head, limbs, and tail much darker; dirty yellowish-brown below, heavily mottled, except on the belly, with dark olive. Blanford states that his specimens (males) in life had the head, limbs, and tail blackish above, the back and sides buff; the larger tubercles and many of the smaller ones upon the nape and shoulders scarlet. He adds that this coloration may be seasonal. Female dirty brownish above and below, uniform.

From snout to vent 260; tail 210 mm.

Range. S. Persia, and the borders of Baluchistan adjoining Persia and Afghanistan.

Blanford met this fine lizard five marches north-west of Bampur, in Baluchistan, where one was shot on a small stony rise at the edge of the plain. It was more common along the margin of the Namashir Desert, near Rigan, in a rather gravelly plain with scattered patches of low thin bush, chiefly barilla and tamarisk. It was heavy in its movements, but could run tolerably quickly. It lived in large holes resembling rabbit-holes, evidently dug by itself. One was extracted from its burrow. This extended some two feet underground and was about four feet in length; at about 18 inches from the surface it turned at right angles to its original direction. *U. asmussi* lives on leaves and stems of herbaceous plants, seeds, etc. Like *hardwickii*, it does not leave its burrow until the sun is well up, at all events in the cold season. It is of gentle disposition and does not attempt to bite when captured, but its tail is a formidable weapon, and is lashed out in defence.

Alcock and Finn mention two specimens caught at the foot of Kacho Koh, on the Afghan-Baluchistan border. In southern Persia it is common; it is caught there in huge numbers for the sake of its skin.

Family CHAMÆLEONIDÆ.

Cameleonidæ Gray, Ann. Phil. (2), x, 1825, p. 200.—*Chamæleonidæ*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 437, and Fauna Brit. Ind. 1890, p. 230; Camp, Bull. Amer. Mus. Nat. Hist. xlviii, 1923, p. 311.

In certain characters of the skull, in the modification of the hands and feet for clasping, and in the extraordinary development of the tongue the Chamæleonidæ are unique, and differ from all the other Sauria. Fragmentary remains, which have been referred to the Chamæleonidæ, but which might equally well have been placed under the Agamidæ, have been recorded from the Middle Eocene of Wyoming and the Eocene or Oligocene of France. *Palæochamæleo* is from the Permian of Saxony. There is nothing ancient, however, about the Chameleons of to-day. On the other hand, their whole structure is highly specialized, and modified for a completely arboreal existence.

The skull is strongly ossified, with more or less prominent crests or processes upon its upper aspect; posteriorly they form what is termed the casque. The orbit is surrounded by bone, its upper margin being formed by the union of the pre- and postfrontal bones, which may or may not form a complete roof over the cavity. The external nasal openings are, in most species, roofed over by prolongations from the prefrontal and maxillary bones, so that the bony aperture is a lateral one; the supranasal fontanelle is bordered by the nasal, the prefrontal, and the frontal, the latter bone being single; the premaxillary is small and bears two or three small teeth; the parietal is single and extends backwards far beyond the occiput; in the genus *Chamæleon* it is narrow and compressed, and meets at its hinder extremity a prolongation of the squamosal, the two bones, together with the postfrontal, enclosing a large supratemporal vacuity. The epipterygoid is vestigial or absent. The dentition is acrodont, the teeth being compressed, triangular, and more or less distinctly tricuspid; the palate is toothless.

The tympanic cavity is large and completely shut off from the pharynx, except for a small aperture at its upper and anterior part, by a vertical partition formed chiefly of the lining membrane of the pharynx. The columella auris is attached at right angles to an elongated rod of cartilage which is applied to the postero-inner aspect of the quadrate bone for the greater part of its length. There is no extra-columellar cartilage or tympanum.

The vertebræ are procœlous; abdominal ribs are present; the body is strongly compressed; the limbs are well developed, but there is neither interclavicle nor clavicle, or the latter bone, if present, is very small. The hands and feet are profoundly modified to form clasping organs, the digits, in bundles of two or three, being opposed to one another; in the hand there are two on the outer side and three on the inner; in the foot it is the reverse. The tail, except in a few degenerate Malagasy species, is long and is strongly prehensile by being rolled downwards. The skin is covered with flattened or rounded tubercles or granules instead of scales.

The eyes are large and, except for a small transverse slit for the pupil, are covered by a thick granular lid. Each one has a great range of movement, and can be moved independently of the other. When in search of food they are continually revolving in all directions, but as soon as prey is sighted the head is turned towards it, and both eyes are focussed upon the object. The power of independent movement of the eyes is possessed also, though to a much more limited extent, by some of the Agamidæ and Iguanidæ.

The tongue is cylindrical and extremely extensile, being composed very largely of elastic tissue. Its anterior end is club-shaped, more or less cupped at the tip, and provided with a viscid secretion; at the basal end the elastic fibres are arranged like the coils of a spring, the whole being mounted upon a much elongated piece of the hyoid apparatus. When fully extended it is as long as or longer than the head and body. Gnanamuthu states that a fully grown Indian Chameleon can extend its tongue 12 inches. It can be shot out with amazing speed and accuracy, and is most effective when allowed to travel to its full extent. With this marvellous weapon at its disposal the Chameleon has no need for rapidity of movement in obtaining its food; all its other actions are extremely slow and deliberate.

The power which Chameleons possess of changing their colour is proverbial; it is shared, but to a less extent, by some of the Agamids, in particular the genera *Calotes* and *Goniocephalus*.

Chameleons are voracious creatures; they feed chiefly upon insects and their larvæ. In captivity they do well if properly looked after and fed daily. They drink freely, licking the drops of water from leaves with their tongue or scooping up the moisture with their lips. Some species lay eggs; others produce their young alive.

The family is divided into four genera, and more than 80 species are recognized. The vast majority of these inhabit Madagascar and Africa: the common Chameleon of N. Africa is found also on some of the eastern islands of the Mediter-

ranean; two species occur in S. Arabia and Socotra; one inhabits the Indian Region.

Cope was the first to regard the Chameleons as related to the Agamidæ. Camp (1923, p. 311) has produced further evidence to support this view, and cites the characters which they have in common, together with certain Iguanids. His concluding remark, which I quote, but do not concur with, is as follows:—"There would seem few or no objections from morphological or distributional viewpoints against deriving the Chameleons from highly developed Agamids at the beginning of the Tertiary."

Genus CHAMÆLEON.

Chamæleon Gronovius, Zooph. Anim. i, 1763, p. 12 (type *Lacerta chamæleon* Linn.); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 437, and Fauna Brit. Ind. 1890, p. 230; Gadow, Amph. and Rept. 1901, p. 573.

Claws simple; scales on soles smooth. Tail at least as long as the head and body, prehensile.

171. Chamæleon zeylanicus.

Chamæleo zeylanicus Laurenti, Syn. Rept. 1768, p. 46 (based on Seba, i, pl. 82, fig. 3).—*Chamæleo zeylonicus*, Jerdon, J. Asiat. Soc. Beng. xxii, 1853, p. 466.—*Chameleo ceylonicus*, Stoliczka, P. Asiat. Soc. Beng. 1872, p. 81.

Chamæleo mexicanus Laurenti, l. c. s. p. 45 (based on Seba, i, pl. 82, fig. 1).

Chamæleo zebra Bory de St. Vincent, Dict. Hist. Nat. iii, 1823, p. 97, Atlas, pl. cxxi (type loc. India).

Chamæleon coromandelicus Fitzinger, Syst. Rept. 1843, p. 41 (type loc. India).

Chamæleo vulgaris (not of Daudin, 1802), Günther, Rept. Brit. Ind. 1864, p. 162; Theobald, Cat. Rept. Brit. Ind. 1876, p. 120; Jacquemont, Voy. dans l'Inde, 1844, Atlas, ii, pl. 12, no text.

Chamæleo vulgaris var. *marmoratus* Gray, Proc. Zool. Soc. London, 1864, p. 469 (type loc. Deccan (Dukhun); London); Stoliczka, P. Asiat. Soc. Beng. 1870, p. 1.

Chamæleo pumilus (not of Latreille, 1802), Jerdon, J. Asiat. Soc. Beng. xxii, 1851, p. 466.

Chamæleon calcaratus, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 445, pl. xxxix, fig. 2 (head), and Fauna Brit. Ind. 1890, p. 232, figs.; Werner, Zool. Jahrb. xv, 1902, p. 332; Annandale, Mem. Asiat. Soc. Beng. i, 1906, p. 191; Trench, J. Bombay Nat. Hist. Soc. xxi, 1912, p. 687; Gnanamuthu, Proc. Zool. Soc. London, 1930, p. 467; Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 156; Acharya, J. Bombay N.H. Soc. xxxvi, 1933, p. 513.

Casque much elevated posteriorly, with strong, curved, parietal crest; the distance between the commissure of the mouth and the extremity of the casque equals or nearly

equals the distance between the end of the snout and the hinder extremity of the mandible; a prominent canthal and supraorbital crest, the latter continued backwards as a ridge of enlarged tubercles along the side of the head and then curved upwards to meet, or not quite, the parietal crest; no rostral appendages; an indication of a dermal occipital lobe on each side; not reaching the parietal crest. Head and body covered with more or less uniform flat granules or tubercles, those upon the head larger and flatter than those upon the body; a low serrated dorsal crest; a series of conical tubercles forming a very distinct crest along the throat and belly. Male with a tarsal process or spur; in the female it is absent or just indicated.

The prevailing colour in life is green, varying in shade from very pale green to almost black; rarely it is yellow;

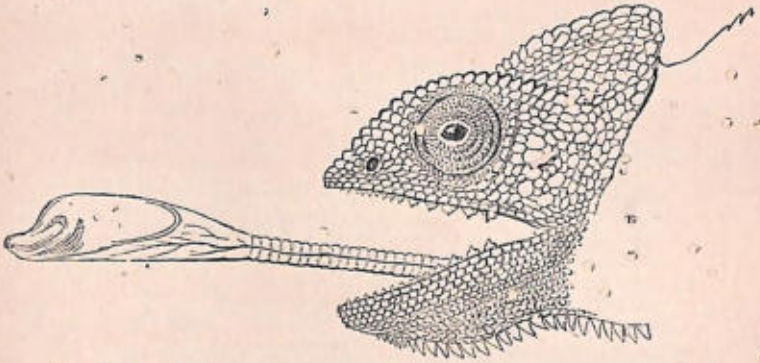


Fig. 64.—Head of *Chamæleon zeylanicus*, with projected tongue. (After Boulenger.)

under excitement the body may become mottled or marbled with transverse blotches or bands of yellow or blue or black; commissure of mouth and gular-ventral crest white or pale yellow; tail often banded.

From snout to vent 175; tail 200 mm.

Range. The wooded districts of Peninsular India south of the Gangetic Plain; Ceylon. Stoliczka (1870) records it from Cutch, but says that it is not common there owing to the scarcity of vegetation. Deraniyagala states that in Ceylon it is found especially in the dry zone.

A good account of the breeding habits of a pair of these lizards in captivity has been given by Trench.

Mating occurred on the 5th and 6th of October, and after that the female would not allow the male to go near her. "On the 9th of November the female descended to the ground

and began to make a hole, digging like a terrier, packing the loose earth with her fore-legs and kicking it out behind with her hind-legs. That night she roosted in a bush, but low down and not in her usual place. All next day, the 10th, she dug furiously in the loose mould and did not emerge at night. Next day, the 11th, a very attenuated Chameleon emerged at 2 P.M. and spent all afternoon in pulling the loose earth back with her fore-paws, ramming it well behind her with her hind-legs. Colour, first muddy, then vivid green and black. Next morning, 12th, she completed the filling up of her burrow." The eggs were buried about a foot below the surface of the ground. They numbered 31 and were of a perfect oval shape, measuring about 13 by 7 mm. in size. An adult female in the British Museum contains 13 eggs, measuring 19 by 12 mm.



Fig. 65.—Hand of *Chamæleon zeylanicus*. (After Boulenger.)

The oldest name available for the Indian Chameleon is Laurenti's *zeylanicus*, based upon Seba's figure (pl. 82, fig. 3), which represents a female, no tarsal spur being shown.* *C. mexicanus*, figured upon the same plate, is an excellent representation of a male, but might equally well stand for the male of *africanus*, so closely do the two species resemble one another.

Jerdon (1853) was the first author to recognize that the Indian Chameleon was distinct from the African. *C calcaratus* Merrem as shown by Flower (Proc. Zool. Soc. London, 1933, p. 783) is a synonym of *africanus* Laurenti. Merrem's brief description, "*C. calcari* prominulo. Habitat in Africa," clearly indicates that he had the African form in mind and not the Indian.

* There are five sketches of the Indian Chameleon in the Hardwicke Collection, made by native artists from the living creatures. In none is the tarsal spur shown.

Family SCINCIDÆ.

S(c)incidæ Gray, Ann. Phil. xxvi, 1825, p. 201 (in part), and Zool. Journ. iii, 1827, p. 130; Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 130, and Fauna Brit. Ind. 1890, p. 180; Siebenrock, Ann. Naturh. Mus. Wien, x, 1895, p. 17 (body skeleton); Gadow, Amphib. and Rept. 1901, p. 559; Camp, Bull. Amer. Mus. Nat. Hist. xlviii, 1925, p. 296 *et seq.*; Broom, Proc. Zool. Soc. London, 1925, p. 1 (evolution); Essex, ibid. 1927, p. 879 (degeneration); Richter, Jena Z. Naturw. lxvi, 1933, p. 305 (hyoid).
Ophiomoridæ Gray, Cat. Liz. Brit. Mus. 1845, p. 120.
Sepsidæ Gray, ibid. p. 121.
Acontiadæ Gray, ibid. p. 126.
Typhlinidæ Gray, ibid. p. 128 (in part).

Premaxillary double, or the bones united anteriorly; postorbital arch complete, except in degenerate forms; postfronto-squamosal arch complete. Skull with bony dermal plates roofing over the supratemporal opening, united with the cranial bones when overlying them.

Tongue moderately long, covered with imbricate scale-like papillæ, feebly nicked anteriorly. Dentition pleurodont, the teeth conical, sometimes hooked, or with spheroidal or compressed crowns; the new teeth usually hollow out the base of the old ones. Pterygoid teeth often present.

Limbs present or absent; in those species that have lost their limbs, pectoral and pelvic girdles or vestiges of them can always be found. Clavicle usually dilated at its proximal end and perforated. Abdominal or parasternal ribs are present chiefly among the burrowing forms. The body, limbs, and tail are protected by osteoderms (p. 2); the head is covered with symmetrical shields; the pupil is round. Femoral pores are absent. The tail is fragile, and when broken off is quickly reproduced.

The Scincidæ are cosmopolitan. They are most numerous in the Australian Region and islands of the western Pacific, the Oriental Region, and Africa; they are poorly represented in America. More than 600 species are known, distributed among some 40 genera. The vast majority are terrestrial in their habits and are usually extremely active in their movements; some have arboreal tendencies, but none show any marked adaptations for an arboreal existence. The evolution of the adhesive digital pad in the Scincidæ as an aid to climbing has been referred to on p. 8.

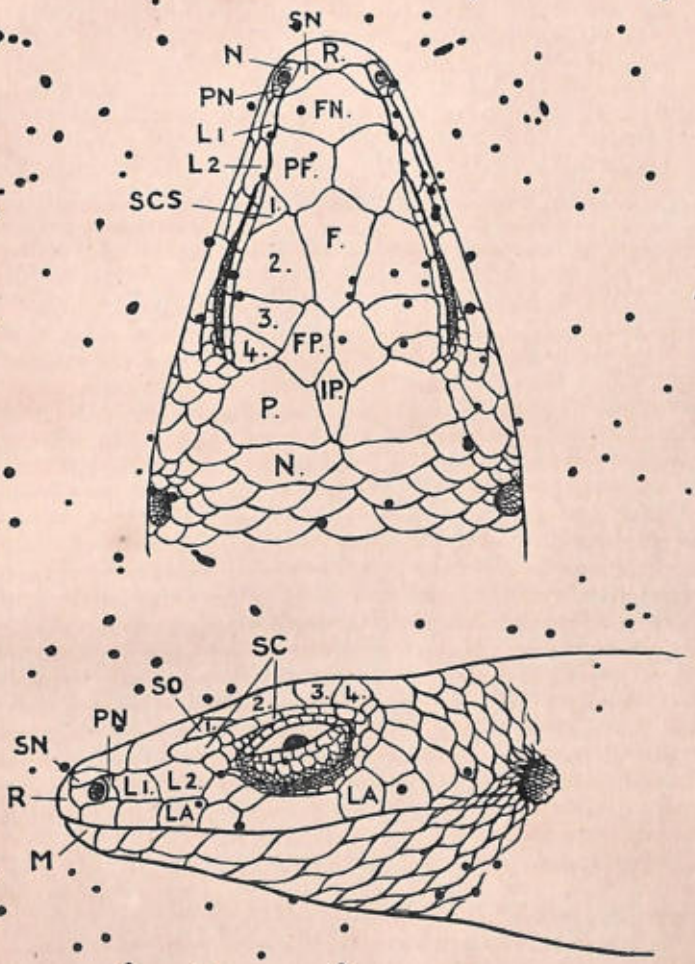


Fig. 66.—Head of *Mabuya multifasciata*, to explain the nomenclature of the head-shields.

F. Frontal.
FN. Fronto-nasal.
FP. Fronto-parietal.
IP. Interparietal.
L. Loreals.
LA. Upper labials.
M. Mental.
N. Nasal.
N. Nuchal.
P. Parietal.
PF. Prefrontal.
PN. Postnasal.
R. Rostral.
SC. Supraciliaries.
SN. Supranasal.
SO, SCS. Supraoculars.

The members of the genus *Tropidophorus* live beside streams and take freely to the water; *Mabuya bibroni* frequents the sea-shore. Burrowing forms are numerous, and the degeneration which is associated with this type of existence has already been discussed (p. 14). The terrestrial species are diurnal in their habits; those that lead a burrowing or semi-burrowing existence are crepuscular or nocturnal. Most of the Skinks are entirely insectivorous; some of the largest species will devour small vertebrates; a few are partly herbivorous.

Gadow states that "all the Scincidæ seem to be viviparous," but such is not the case. It is possibly true of the majority of the Australian species, but not of the Oriental. As far as is known, all the members of the genus *Tropidophorus* are viviparous; on the other hand, all of *Eumeces* are oviparous. Of the remaining species mentioned in this work, eleven are known to be oviparous and four viviparous.

The evolution of the transparent disc in the lower eyelid of lizards has already been discussed (p. 9); it occurs frequently among the Scincidæ. As a rule there is no difficulty in recognizing the disc, but in occasional species, in which the central scales of the lower lid are much enlarged and thinned they have been mistaken for the disc. Hora has figured such a condition in *Riopa albopunctata*. A close examination of the eyelid with a good glass, however, will reveal the true state of affairs.

Tiliqua pulchra Hardwicke & Gray, Ill. Ind. Zool. 1832, ii, pl. 75, is based on two coloured sketches (no. 77) in the Hardwicke collection of drawings. I cannot identify it with any particular Skink. The general structure and the colour-pattern shown could equally well apply to several species. No type-locality is given and there is no description.

Key to the Indian and Indo-Chinese Genera.

I. Palatine bones meeting on the middline of the palate.

A. Pterygoid bones separated from one another, the palatal notch extending forwards to the level of the centres of the eyes (fig. 67, *b*).

Supranasals present; limbs well developed ..... MABUYA, p. 257.

B. Pterygoid bones usually in contact anteriorly, the palatal notch not reaching to the level of the centres of the eyes (fig. 67, *c*).

a. Limbs present, usually well developed.

1. Tympanum, if distinct, more or less sunk.

Lower eyelid scaly; supranasals present ..... DASIA, p. 276.

Lower eyelid scaly; no supranasals ..... LYGOSOMA, p. 279.

No supranasals; no proper parietals; frontal very long, constricted or divided in the middle ..... [p. 291. ATEUCHOSAURUS.

Lower eyelid with a more or less transparent disc; no supranasals ..... [p. 293. LEIOLOPISMA,

Lower eyelid with a very large transparent disc, immovable and more or less completely united with the upper lid, the palpebral fissure, when present, being concealed ..... [p. 309. ABLEPHARUS,

Lower eyelid scaly; no supranasals; claws retractile into a sheath ..... RISTELLA, p. 329.

2. Tympanum exposed and superficial. [p. 322.

Lower eyelid scaly; no supranasals ..... TROPIDOPHORUS,

b. Limbs short, vestigial or absent; body stout or elongate.

Supranasals present; limbs short or vestigial; lower eyelid scaly or with a disc ..... RIOPA, p. 312.

No supranasals; no limbs; no ear-opening; body vermiform ..... [p. 333. OPHIOSCINCUS,

II. Palatine bones separated on the median line (fig. 67, *a*).

A. Nostril in the nasal, or between the nasal and supranasal.

Limbs pentadactyle, not denticulated ..... EUMECES, p. 337.

Limbs pentadactyle, denticulated laterally ..... SCINCUS, p. 343.

Limbs vestigial, with less than 5 toes, or absent .. OPHIOMORUS, [p. 345.

B. Nostril between the rostral and nasal, or between the rostral and first labial.

Nostril between the rostral and a nasal; limbs developed ..... CHALCIDES, p. 349.

Nostril between the rostral and a nasal; top of head with 3 large azygous shields; body very elongate; no limbs ..... BARKUDIA, p. 352.

Nasal-shield minute, between the rostral, first labial, and supranasal; top of head with 4 azygous shields; body very elongate; limbs vestigial ..... SEPSOPHIS, p. 353.

C. Nostril in the rostral. [p. 354.

Nostril close to the posterior border of the rostral.. CHALCIDOSEPS,

Nostril in the anterior part of a large rostral, connected with its posterior border by a horizontal suture ..... NESSIA, p. 356.

Genus **MABUYA**.

Mabuya Rafinesque, Anal. Nat. 1815, p. 76, n.n.
Mabuya Fitzinger, Class. Rept. 1826, pp. 23 & 52 (type *Lacertus mabouya* de la Cépede *).—*Mabuia*, Boulenger, Cat. Liz. Brit. Mus. iii. 1887, p. 150, and Fauna Brit. Ind. 1890, p. 183.

* Opinion 92 of the International Commission on Zoological Nomenclature states that the type of *Mabuya* is *Scincus Doanii* Daudin; but this cannot be, for Fitzinger does not mention that name in his list of the species on p. 52. The type of *Mabuya* by absolute tautonymy must be *Lacertus mabouya* de la Cépede, Hist. Nat. Quad. Ovip. i. 1788, p. 378, pl. xxiv, and Syn. Méth.; type loc. Antilles. Dr. Stejneger informs me that he is not responsible for the Official List of Generic Names published in Opinion 92.

Spondylurus Fitzinger, Class. Rept. 1826, p. 23 (type *Scincus sloanii* Daudin).
Euprepis Wagler, Syst. Amphib. 1830, pp. 132 & 161 (type *mabouia* Dum. & Bibr.).
Herinia Gray, Ann. Mag. Nat. Hist. ii, 1838, p. 332 (type *capensis*).
Trachylepis Fitzinger, Syst. Rept. 1843, p. 22 (type *Euprepes savignyi* Dum. & Bibr.).
Oxytropis Fitzinger, l. c. s. p. 22 (type *Euprepes merrelli*).
Eutropis Fitzinger, l. c. s. p. 22 (type *Euprepes sebæ* Dum. & Bibr.).
Xystrolepis Tschudi, Fauna Peru, 1845, p. 44 (type *punctata*).
Copeoglossum Tschudi, l. c. s. p. 45 (type *cinctum*).

Palatine bones in contact mesially ; palatal notch entirely separating the pterygoids, extending forward to between the centres of the eyes ; pterygoid teeth minute or absent. Maxillary teeth conical or bicuspid. Eyelids movable, the lower with or without a more or less transparent disc. Ear distinct, tympanum more or less deeply sunk. Nostril pierced in a single nasal; supranasals present ; † prefrontals present ;

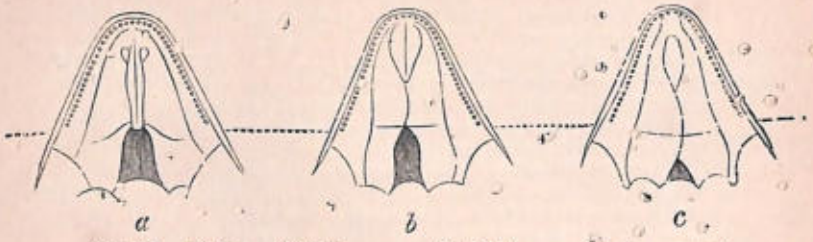


Fig. 67.—Palate of (a) *Eumeces* ; (b) *Mabuya* ; (c) *Lygosoma*. (After Boulenger.)

fronto-parietals sometimes united in a single shield ; interparietal sometimes united with the parietals. Limbs well developed, pentadactyle. Digits subcylindrical or compressed, with transverse lamellæ inferiorly.

Range. Africa and Madagascar ; Southern Asia ; the East Indies ; Central and South America and the West Indies.

More than 80 species are known.

Unless otherwise stated the following characters apply to all the species mentioned in this work :—Snout obtusely pointed, a little longer than the orbit ; frontal variable in length, but usually not longer than the fronto-parietals and interparietal together ; fronto-parietal(s) and interparietal well developed, the latter separating the parietals posteriorly ; fifth, rarely sixth, supralabial subocular, about twice as long as the preceding labials ; 4 supraoculars, the second the largest and in broad contact with the frontal ; the first and third in contact with or separated from the frontal ; 5 to 7

† Absent only in the Malayan *M. præsignis*.

supraciliaries, the first largest, but not greatly larger than the others; temporal scales small, similar to those upon the body. Preanal scales not or scarcely enlarged; median series of subcaudal scales not or scarcely enlarged. Palms of hands and soles of feet with flattish or subconical tubercles, the heels often with larger ones.

Key to the Species

I. Lower eyelid with an undivided, more or less transparent disc.

28 to 30 scales round middle of body, dorsals with 5 or 7 sharp keels ..... *bibroni*, p. 260.

32 to 34 scales round body, dorsals with 7 to 11 sharp keels; two of which are stronger than the others ..... *novem-carinata*, [p. 261.

34 to 38 scales round body, dorsals with 2 or 3 strong keels ..... *dissimilis*, p. 261.

34 to 38 scales round body, dorsals feebly tricarinate or smooth ..... *aurata*, p. 262.

32 to 34 scales round body, dorsals feebly quinquecarinate ..... *innotata*, p. 263.

II. Lower eyelid scaly.

28 to 30 (32, 34) scales round the body, dorsals with 5, 7, or 9 strong keels; 12 to 17 lamellæ under the fourth toe; the leg reaches to the wrist or the axilla ..... *maculoria*, p. 264.

30 to 34 scales round the body, dorsal with 3, 5, or 7 keels; 14 to 18 lamellæ under the fourth toe; the leg reaches to the wrist or the elbow; no postnasal ..... *carinata*, p. 266.

30 to 34 scales round the body, dorsals with 3 or 5 keels; 17 to 23 lamellæ under the fourth toe; the leg reaches to the wrist or the elbow; a postnasal ..... [p. 268. *m. multifasciata*,

24 to 26 scales round the body, dorsals with 3 obtuse keels; dorsal and lateral scales without striations ..... *tytleri*, p. 270.

26 to 30 scales round the body, dorsals with 2 or 3 feeble keels; dorsal and lateral scales with fine striations ..... [p. 270. *longicaudata*,

30 or 32 scales round body, dorsals with 5 or 7 keels; 27 to 29 lamellæ under the fourth toe; the leg reaches to the axilla; interparietal very small, not separating the parietals ..... [p. 271. *andamanensis*.

24 to 28 scales round the body, dorsals with 5 strong keels; interparietal very small, usually not separating the parietals ..... " *rugifera*, p. 273.

26 or 28 scales round the body, dorsals with 4 sharp keels ..... [p. 273. *quadricarinata*.

32 scales round the body, dorsals with 9 keels .... *[doriæ]*, p. 261.

30 to 32 scales round the body, dorsals with 3 or 5 feeble keels; subdigital lamellæ strongly keeled; back with 4 well-defined dark longitudinal stripes ..... *beddomii*, p. 274.

34 to 36 scales round the body, dorsals with 5 or 7 keels; back with 3 light black-edged, longitudinal stripes ..... *trivittata*, p. 275.

172. **Mabuya bibroni.**

Tiliqua bibronii Gray, Ann. Mag. Nat. Hist. ii, Dec. 1838, p. 290 (type loc. unknown; Paris).—*Euprepes bibronii*, Dum. & Bibr., Erp. Gen. v, 1839, p. 675.—*Mabuia bibronii*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 173, and Fauna Brit. Ind. 1890, p. 184; Annandale, Spol. Zeyl. iii, 1906, p. 190, and Mem. Asiat. Soc. Beng. i, 1906, p. 191, and Rec. Ind. Mus. vii, 1912, p. 90; Hora, Rec. Ind. Mus. xxix, 1927, p. 1, pl. i, fig. 4; Roux, Rev. Suisse Zool. 1928, p. 455; Deraniyagala, Ceylon J. Sci., B, xvi, 2, 1931, p. 164.

? *Euprepis trilineata* Gray, Ann. Mag. Nat. Hist. xviii, 1846, p. 430 (type loc. Madras; London); Jerdon, J. Asiat. Soc. Beng. xxii, 1853, p. 479.

Supranasals separated from or just touching one another; fronto-nasal a little broader than long; prefrontals separated from or just touching one another; parietals often transversely bisected; two pairs of multi-keeled nuchals. A post-nasal; anterior loreal squarish, about half the size of the posterior; lower eyelid with an undivided transparent disc; temporal scales keeled. Ear-opening oval, about as large as a lateral scale, with 2 or 3 long, pointed lobules anteriorly, the upper one the largest. Dorsal and lateral scales with from 5 to 7 sharp keels (sometimes only 3 in juveniles); 28 to 30 scales round the middle of the body, dorsals largest. Digits long, with smooth or feebly keeled lamellæ beneath; from 14 to 20 beneath the fourth toe; the leg reaches to the wrist or the elbow.

Olive-brown above; a light vertebral stripe broadly edged with black, commencing on the vertex, usually distinctly marked only on the anterior part of the body in the adult; a black dorso-lateral stripe, extending from the eye to the base of the tail, edged below, and sometimes above, with white; sometimes another white stripe extending from the axilla to the groin; whitish below.

From snout to vent 50; tail 65 mm.

Range. The Madras Presidency (Madura district, Ramnad, Rameswaram, Apa I., Kilakarai); north of Puri, on the coast of Orissa; Travancore (Rajakamangalam). Ceylon: Chundikulam, Mullaittivu (E.P.).

Although this species has been found inland, its chief habitat appears to be the sea-coast. Hora states that he never found it more than a few hundred yards from the sea-shore. Annandale (1906) found it extremely abundant, together with *Sitana ponticeriana*, on the sands of Ramnad.

Deraniyagala states that it lives "in burrows under low vegetation on sand dunes near sea."

Its range appears to be chiefly restricted to the eastern coast of the Peninsula.

173. **Mabuya novemcarinata.**

Euprepes novemcarinatus Anderson, J. Asiat. Soc. Beng. xl, 1871, p. 12 (type loc. Mandalay; Calcutta).—*Mabuya novemcarinata*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 179, and Fauna Brit. Ind. 1890, p. 187, and Fauna Malay Pen. 1912, p. 82; S. Flower, Proc. Zool. Soc. London, 1896, p. 873.

Mabuia doriæ Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 174, pl. x, fig. 4 (type loc. Minhla, Burma; London), and Fauna Brit. Ind. 1890, p. 184.

Supranasals usually in contact with one another behind the rostral; fronto-nasal a little broader than long; prefrontals separated from one another or just touching; a pair of nuchals. No postnasal; anterior loreal squarish, about half the size of the posterior; lower eyelid with an undivided transparent disc; temporal scales keeled; ear-opening oval or subcircular, about as large as a lateral scale, with 2 or 3 pointed lobules anteriorly. Dorsal and lateral scales with from 7 to 11 sharp keels, of which the median 2, sometimes 3, are stronger than the others; from 32 to 34 subequal scales round the middle of the body. Digits long, with obtusely keeled lamellæ beneath; from 18 to 21 lamellæ beneath the fourth toe; the leg reaches to the wrist.

Light brown above, with small dark brown spots arranged in longitudinal series. A broad dark brown or bronze stripe passing along the side of the head and the upper part of the flank, usually edged with white along its upper margin; upper lip and lower parts of flanks whitish, spotted with dark brown; whitish below (pale green in life).

From snout to vent 90; tail 105 mm.

Range. Burma (Minhla, Rangoon district, Mandalay); Penang Hill.

With some little hesitation I unite *M. doriæ* with *M. novemcarinata*. Except that the lower eyelid of the latter is said to be scaly, there is nothing in Anderson's description to separate *doriæ* from it. Flower, in 1896, recorded, under *novemcarinata*, a specimen obtained by him on Penang Hill (Brit. Mus. 96.6.25.20). The specimen has a very distinct transparent disc, and agrees entirely with the types of *doriæ*. Unfortunately the type of *novemcarinata* cannot now be found.

174. **Mabuya dissimilis.**

Euprepis dissimilis Hallowell, Trans. Amer. Phil. Soc. (2) xi, 1857, p. 78 (type loc. Bengal; Philadelphia).—*Mabuia dissimilis*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 175, and Fauna Brit. Ind. 1890, p. 185; Hora, Rec. Ind. Mus. xxv, 1923, p. 875; Procter, J. Bombay N.H. Soc. xxix, 1923, p. 125.

Euprepes monticola Günther, Rept. Brit. Ind. 1864, p. 80, pl. x, fig. C (type loc. "Sikkim"; London); Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 120; Theobald, Cat. Rept. Brit. Ind. 1876, p. 52.

Euprepes petersi Steindachner, Reise Novara, Rept. 1867, p. 43 (type loc. Chamba, Punjab); Theobald, l. c. s. p. 53.
Euprepes guentheri Blanford, J. Asiat. Soc. Beng. xlviii, 1879, p. 123 (nom. nov. for *monticola* Günther).
Euprepes (*Euprepis*) *warthii* Fischer, Jahrb. Wiss. Anst. Hamb. ii, 1885, p. 90 (type loc. Dehra Dun, United Provinces; Hamburg).
Mabuya hodgarti Hora, Rec. Ind. Mus. xxix, 1927, p. 92, pl. i, figs. 2 & 3 (type loc. Rawalpindi, Punjab; Calcutta).

Supranasals in contact with one another; fronto-nasal broader than long; prefrontals in contact with one another; no proper nuchals; no postnasal; anterior loreal usually higher than long, about half the size of the posterior; lower eyelid with an undivided transparent disc; temporal scales keeled. Ear-opening oval, about as large as a lateral scale, with 3 or 4 short, pointed lobules anteriorly. Dorsal and lateral scales subequal, the former with 2, sometimes 3, strong keels, the latter usually with 3; from 34 to 36 (38 in one specimen from Campbellpur) scales round the middle of the body. Digits short, with smooth lamellæ beneath, from 12 to 16 beneath the fourth toe; the leg reaches to the wrist or a little beyond.

Light brown above, with 3 or more less distinct greenish white stripes, a vertebral and 2 dorso-lateral; or the vertebral stripe may be absent and the lateral ones indistinct. The stripes may be edged with black or the black line may be broken into spots; sometimes the spots are arranged transversely; flanks with white spots edged with black; lower parts yellowish-white; a conspicuous white streak, edged with brown, along the posterior half of the upper lip; rims of eyelids bright yellow in life.

Range. Northern India. Waziristan; Sibi district (Baluchistan); near Shikarpur (Sind); Ajmer (Rajputana); Salt Range, Rawalpindi, Rajanpur, Bahawalpur, Chamba (Punjab); Jubbulpore (C.P.); Hazaribagh, S.W. of Rajmahal (Bihar); Karharbari, Sahibganj, Boogoolah (Bengal).

Commoner in the dry western districts of the country than in the eastern. Said to be common near Ajmer, where it lives under bushes on the hill-sides and in sand.

Oviparous, laying 6 or 7 eggs; they measure approximately 10 by 7 mm.

An unpublished coloured sketch in the Hardwicke Collection, no. 104, evidently represents this species.

175. **Mabuya aurata.**

Lacerta aurata (in part) Linn., Syst. Nat. ed. 10, 1758, p. 209.—*Mabuya aurata*, Andersson, Kungl. Sv. Vet.-Akad. Handl. Stockholm, xxvi, iv, 1, 1900, p. 14 (type in Stockholm).

Euprepis septemtæniatus Reuss, Mus. Senckenb. i, 1834, p. 47, pl. iii, fig. 1 (type loc. Abyssinia); Blanford, Zool. E. Persia, 1876, p. 388; Murray, Zool. Sind, 1884, p. 352.—*Mabuia septemtæniata*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 177, and Fauna Brit. Ind. 1890, p. 185.

Euprepes affinis de Filippi, Viag. in Persia, i, 1865, p. 354 (type loc. Kazvin, Persia; London and Genoa).

Very closely allied to *dissimilis*, differing in the following particulars:—Prefrontals separated from one another; dorsal scales feebly tricarinate or quite smooth; 34 to 38 scales round the middle of the body; toes longer, 16 to 22 lamellæ under the fourth toe.

Light brown above, with dark brown longitudinal stripes; four of these start from the occiput, are distinct upon the nape, and break up into spots or disappear entirely upon the hinder part of the back; a broader stripe, which starts from the eye and passes along the upper half of the flank, is spotted with white and has usually, both above and below it, a stripe of white; lower parts white. (Drawn up from specimens from Persia, Iraq, and Arabia in the British Museum.)

Size as in *dissimilis*.

Range. From Abyssinia through Asia Minor to Persia. Murray records it from Sind, but I have not seen the specimen.

This species is so closely related to *dissimilis* that one might feel inclined to regard the two as geographical races of one another. But while *dissimilis* is undoubtedly oviparous, *aurata* is viviparous. A female taken by Capt. C. R. Pitman in August at Basra, Mesopotamia, contains eight almost fully developed embryos.

As shown by Andersson, the *Lacerta aurata* of Linnæus is identical with the *septemtæniata* of Reuss and later authors.

176. **Mabuya innotata.**

Euprepes innotatus Blanford, J. Asiat. Soc. Beng. xxxix, 1870, p. 354, pl. xvi, fig. 9 (type loc. Pemganga Valley, S.E. Berar; London).—*Mabuia innotata*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 178, and Fauna Brit. Ind. 1890, p. 186.

Supranasals separated from one another; fronto-nasal a little broader than long; prefrontals separated from or just touching one another; a pair of nuchals. No post-nasal; anterior loreal squarish, about half the size of the posterior; lower eyelid with an undivided transparent disc; temporal scales smooth; ear-opening subcircular, about as large as a lateral scale, with 3 or 4 short, pointed lobules anteriorly; dorsal and lateral scales subequal, with 5 obtuse keels, sometimes only 3 on the scales of the neck; 32 or 34 scales round the middle of the body. Digits long, with feebly keeled lamellæ, 17 or 18 beneath the fourth toe; the leg reaches to the wrist.

Bronzy olive above, the sides dark brown; a light streak, edged above with black, passes along the supraciliary margin to the anterior half of the back; a second passes along the upper labials, below the ear, to the fore-arm, the area between these two streaks being dark brown; whitish below, the throat speckled with brown.

From snout to vent 55; tail 100 mm.

Range. S.E. Berar; Koba, Bilaspur, C.P. (Ind. Mus.). I have examined three specimens.

177. **Mabuya macularia.**

Euprepes sebæ (in part) Dum. & Bibr., Erp. Gen. v, 1839, p. 692.
Tiliqua rubriventris (not of Gray, 1829), Gray, Ann. Mag. Nat. Hist. xviii, 1846, p. 430.
Euprepes macularius Blyth, J. Asiat. Soc. Beng. xxii, 1853, p. 652 (type loc. ? Rangpur, Bengal; Calcutta); Anderson, Proc. Zool. Soc. London, 1871, p. 157.—*Euprepes* (*Tiliqua*) *macularius*, Blanford, J. Asiat. Soc. Beng. xxxix, 1870, p. 358, and ibid. xlviii, 1879, p. 112; Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 117.—*Mabuia macularia*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 182, and Ann. Mus. Civ. Genova, (2) v, 1887, p. 478, and Fauna Brit. Ind. 1890, p. 189, and Fauna Malay Pen. 1912, p. 83; Smith & Kloss, J. Nat. Hist. Soc. Siam, i, 1915, p. 242; Deraniyagala, Ceylon J. Sci., B, xvi, 2, 1931, p. 165.
Euprepes rufescens (not of Shaw), Günther, Rept. Brit. Ind. 1864, p. 79 (in part).
Euprepes brevis Günther, Proc. Zool. Soc. London, 1875, p. 225 (type loc. Travancore and Anaimalai Hills; London).—*Mabuia brevis*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 183, pl. xi, fig. 1.
Euprepes macularius var. *subunicolor* Blanford, J. Asiat. Soc. Beng. xlviii, 1879, p. 112 (type loc. Central Provinces).
Mabuia madaraszi Méhely, Termes Fuzetek, Budapest, xx, 1897, p. 59 (type loc. Ceylon; Budapest).
Lygosoma dawsoni Annandale, Rec. Ind. Mus. iii, 1909, p. 257 (type loc. Maddathoray, Travancore; Calcutta).
Mabuya allapallensis Schmidt, Pub. Field Mus. Nat. Hist., Zool., xii, 1926, p. 170 (type loc. Allapalli Forest, nr. Chanda, Central Provinces; Chicago).

Supranasals separated from one another; fronto-nasal about as long as broad; prefrontals narrowly separated from or just touching one another; a pair of nuchals present or absent. A postnasal present or absent; anterior loreal higher than long, usually higher than and about half as long as the posterior loreal; lower eyelid scaly; temporal scales keeled; ear-opening subcircular, smaller than a lateral scale, with a few indistinct lobules anteriorly. Dorsal and lateral scales subequal, or the laterals a little smaller, with 5, 7, or 9 keels; from 28 to 30 (32, 34) scales round the middle of the body. Digits moderately long, with obtusely keeled lamellæ, 12 to 17 beneath the fourth toe. Tail not twice the length of the head and body.

When good series of this lizard from different parts of its range are compared it will be seen that five more or less distinct geographical forms can be distinguished. Aberrant individuals—those that resemble forms from one area but occur in another area—are to be found, but on the whole the combination of colour-pattern and morphological characters can be relied upon. The form from the Deccan table-land is not very different from the one which inhabits N.W. India, but it is quite distinct from the one which occurs in southern India or in the north-east of the Peninsula. In general colour-pattern the south Indian form agrees best with the one that inhabits the greater part of Indo-China, and thus illustrates once more what has been already mentioned, namely, the affinities of the fauna of southern India with that of Indo-China (p. 15). The most distinctive form, when its colour-pattern is well marked, is that which inhabits north-eastern India and Assam; it also attains a larger size than any of the others. I distinguish the five forms as follows :—

1. 28 to 30 scales round the body, the dorsals and laterals with 5 or 7 strong keels. The leg reaches to the wrist or the elbow.

Dark bronze above, with or without small black spots longitudinally arranged. A light dorso-lateral stripe more or less distinct. Sides of neck and flank dark brown, usually with white spots. A light line starting from the upper lip extends backwards on to the anterior part of the flank.

From snout to vent 65 mm.

Range. India south of lat. 12° N., extending up the western side of the Peninsula as far north as lat. 16°. Recorded from Ceylon, but I have not seen specimens.

2. 28 to 30 scales round body, the dorsals and laterals with 5 or 7 feeble keels. The leg reaches to the wrist or the elbow.

Light brown above, usually uniform, the small black spots, if present, mostly on the hinder part of the back; flanks darker brown, with or without small white spots; light lateral stripes absent or very indistinct.

This form seldom exceeds 60 mm. in length from snout to vent.

Range. The Deccan table-land or, roughly, the Peninsula north of lat. 12°, but not including the dry area of the North-West or the country east of and including Bihar and Orissa.

Blyth's type of *macularius* belongs to this form.

3. Like the preceding, but still paler in coloration, and with the flanks often more thickly spotted with white.

Range. N.W. India. I have seen specimens from as far west as Karachi and north to Dehra Dun district (U.P.).

4. 28 to 30 scales round the body, the dorsals usually with 7, sometimes 9, more or less distinct keels; the limbs fail to meet, or the leg at most seldom extends beyond the wrist.

Brown above, with a broad dark brown vertebral stripe, edged on either side with blackish; or the stripe may be broken up into a series of elongated spots; flanks dark brown, usually spotted with white.

From snout to vent 75 mm.

Range. Bihar and Orissa, Bengal, Assam.

5. Like 1, but the leg longer, sometimes reaching to the axilla, and with the light lateral stripes more distinct; throat sometimes spotted with black.

Examples of this form from the islands of the Gulf of Siam (Koh Kut, Koh Phai) have 30, 32, or 34 scales round the body.

From snout to vent 65 mm.

Range. Burma, Siam, Cambodia, Southern Annam (Langbian Plateau), extending south to Kelantan in the northern part of the Malay Peninsula.

Variation. The fronto-parietals may be united into a single shield. I have seen seven examples with this abnormality, all from different parts of India. Schmidt's *allapallensis* was based on such a variation.

Mabuya macularia is oviparous, laying 3 or 4 eggs. A female kept by me in Siam laid 3 eggs in April, digging a hole in the earth to receive them, and afterwards covering them completely over so as to hide all trace of the spot. The eggs measured 11 mm. in length. Blanford (1879) states that in the Godavari district the breeding season is in May.

178. **Mabuya carinata.**

Scincus carinatus (in part) Schneider, Hist. Amphib. ii, 1801, p. 183 (no type-locality given).—*Tiliqua carinata*, Gray, Zool. Journ. iii, 1827, p. 227 (Dum-Dum, nr. Calcutta).—*Euprepis carinatus*, Peters, Mon. Akad. Berlin 1864, p. 50.—*Euprepes (Tiliqua) carinatus*, Blanford, J. Asiat. Soc. Beng. xxxix, 1879, p. 355, and ibid. xlvii, 1879, p. 113; Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 119.—*Mabuia carinata*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 181, and Fauna Brit. Ind. 1890, p. 188, fig.; Willey, Spol. Zeyl. iv, 1907, pp. 183, 188; Green, ibid. v, 1908, p. 104; Annandale, Rec. Ind. Mus. vii, 1912, p. 46; Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 167.

Tiliqua rubriventris Hardwicke & Gray, Ill. Ind. Zool. ii, 1829, pl. 75 (type loc. Dum-Dum, Calcutta); based on Hardwicke's sketch, no. 110).

Euprepes sebæ (in part) Dum. & Bibr., Erp. Gen. v, 1837, p. 692.

Euprepes rufescens (not of Shaw), Günther, Rept. Brit. Ind. 1864, p. 79, pl. x, fig. B (in part).

Supranasals separated from or just touching one another; fronto-nasal broader than long; prefrontals usually in contact with one another; a pair of nuchals. No postnasal; anterior

loreal higher than long, often higher than and about half as long as the posterior loreal; lower eyelid scaly, the two or three central scales sometimes much larger than the others; temporal scales keeled; ear-opening subcircular, smaller than a lateral scale, with short, pointed lobules anteriorly. Dorsal and lateral scales subequal, with 3 or 5 distinct keels, the three median keels are always strongly marked, the outer two are often absent in the young, but indications of them can always be found in the adult; specimens from Ceylon may have 7 keels; from 30 to 34 scales round the middle of the body. Digits moderately long, with smooth or obtusely keeled lamellæ, from 14 to 18, beneath the fourth toe; the hind-limb reaches to the wrist or the elbow.

Brown or olive or bronzy above, uniform or with dark brown or black spots, or longitudinal streaks along the lateral

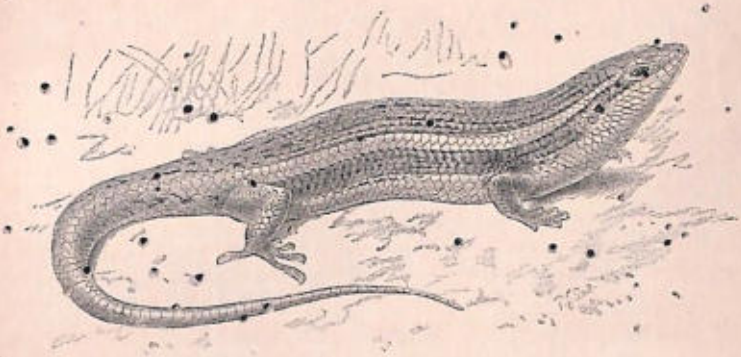


Fig. 68.—*Mabuya carinata*. (After Boulenger.)

margins of the scales; sides darker brown or chestnut, with or without light spots; a light dorso-lateral line starting from above the eye and continued to the base of the tail always more or less distinct; a second white line starting from the upper lip and passing along the side of the flank to the groin present or absent; lower parts whitish or yellow. Flanks of the male scarlet in the breeding season, the belly yellow.

From snout to vent 125; tail 165 mm.

Range. The Indian Peninsula except in the North-West Very rare, if it exists at all, north of a line drawn from Kathiawar to the western end of Nepal. There is a juvenile in the British Museum from Shillong, Assam, but I do not know of any other specimens east of the Brahmaputra, although it is common in many parts of Bengal. Found all over Ceylon.

Variation. The fronto-parietals are united into a single shield in the specimen from Shillong (Brit. Mus. 1934.1.3.3).

It is usually stated that this Skink is viviparous, but such is not the case. A female kept by Father Dreckmann in captivity laid 23 eggs; from another female he removed 22 eggs. All are of about the same size, approximately 13 by 8 mm.; none of those examined shows any trace of embryo. Both clutches are now in the British Museum. Blanford (1879) states that the breeding season in the Godavari district is during March.

The Hardwicke Collection contains three good coloured sketches of this lizard, nos. 107, 108, 110, the latter representing the breeding male.

179. **Mabuya multifasciata multifasciata.**

Scincus carinatus (in part) Schneider, Hist. Amphib. ii, 1801, p. 183.—*Euprepes carinatus*, Gravenhorst, Nov. Acta Acad. Leop.-Carol. xxiii, 1851, i, p. 338.
Euprepes rufescens, Günther, Rept. Brit. Ind. 1864, p. 79 (in part).
Scincus multifasciatus Kuhl, Beitr. Zool. Vergl. Anat. 1820, p. 126 (no type loc. given).—*Mabuya multifasciata*, Fitzinger, N. Class. Rept. 1826, p. 52 (Java); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 186, and Fauna Brit. Ind. 1890, p. 191, and Faun. Malay Pen. 1912, p. 84; S. Flower, Proc. Zool. Soc. London, 1899, p. 645; Annandale, J. Asiat. Soc. Beng. (2) ii, 1905, p. 141; Smith & Kloss, J. Nat. Hist. Soc. Siam, i, 1915, p. 242; de Rooij, Rept. Indo-Austral. Archipel. i, 1915, p. 162, fig.; Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 420; Pope, ibid. lviii, 1929, p. 377; Kopstein, Treubia, xi, 1930, p. 307; Weekes, P. Linn. Soc. N.S. Wales, lv, 1930, p. 360; Anderson, J. Linn. Soc. xxi, 1889, pp. 334, 344.
Euprepes sebæ Dum. & Bibr., Erp. Gen. v, 1839, p. 692.
Tropidolepisma macrurus Bleeker, Naturg. Tijdschr. Nederl. Ind. xx, 1860, p. 328.
Mabuia monticola, Annandale, J. Asiat. Soc. Beng. (2) i, 1905, p. 143.
Plestiodon sikkimensis Gray, Ann. Mag. Nat. Hist. (2) xii, 1853, p. 388 (type-loc. Sikkim; London).

Supranasals separated from or just touching one another; fronto-nasal broader than long; prefrontals usually in contact with one another; a pair of nuchals. A postnasal; anterior loreal variable in size and shape, more than half the size of, sometimes nearly as large as, the posterior loreal; lower eyelid scaly; temporal scales smooth or feebly keeled; ear-opening subcircular, smaller than a lateral scale, with small, pointed lobules anteriorly. Dorsal and lateral scales subequal, the former with 3, rarely 5, more or less strong keels, the latter sometimes quite smooth; from 30 to 34 scales round the middle of the body. Digits moderately long, with smooth or obtusely keeled lamellæ, from 17 to 23

beneath the fourth toe; the hind-limb reaches to the wrist or the elbow.

Brown or olive-brown above, uniform or with dark brown or black longitudinal spots or streaks along the lateral margins of the scales; flanks dark brown or black, at least in the upper parts, with or without white black-edged spots; a pale dorso-lateral line often present; upper head-scales often margined with black; whitish below.

From snout to vent 125; tail 180 mm.

The male in the breeding season has a large orange or rusty red patch behind the arm, sometimes extending along the whole of the flank.

Viviparous, producing from 5 to 7 young.

Range. The Indo-Chinese Subregion, extending in the north-west to Cachar, the Naga Hills, and Sibsagar (Assam); Yunnan; Tonking; Hainan; Pulo Condore; Nicobar Is.; the Malay Peninsula and East Indies as far south as New Guinea.

Common in gardens and open wooded places in many parts of southern Indo-China; not found in the hills at any great elevation.

Apparently not found in Borneo, where its place is taken by *M. m. rudis*, which can be distinguished from it by the longer leg (to the axilla or beyond), keeled subdigital lamellæ, more strongly carinate scales, and generally reddish-brown coloration devoid of other markings. This form occurs also in Sumatra and on the Mentawei Islands, but not to the exclusion of the typical form.

Theobald's specimens of *Euprepes monticola* described by Annandale (1905, p. 143) must be referred to *multifasciata*. The three adult examples have 30, 32, and 32 scales round the body respectively, not 34 to 36 as given by him.

The *Euprepes sebæ* of Duméril and Bibron, 1839, was based upon 23 specimens, and included four species. Sixteen of the specimens I refer to *Mabuya multifasciata* (Kuhl), 1820, five to *M. carinata* (Schneider), 1801, and one (no. 262–2834) to *M. macularia* (Blyth), 1853; the remaining individual (no. 2957–2838), which is somewhat shrivelled and damaged, is probably *M. rugifera* (Stoliczka), 1870. It is evident, after reading Duméril and Bibron's description, that they considered *sebæ* to be identical with Kuhl's *multifasciata*, but rejected that name as being inappropriate. The specimens of *macularia* and ? *rugifera* they regarded as juveniles of the same species. The name *sebæ*, therefore, should become a synonym of *multifasciata*, and, to avoid confusion in the future, I now select one of the specimens of *multifasciata* (no. 2956–2837), type-locality Batavia, to be the type of *sebæ*.

180. Mabuya tytleri.

Tiliqua rufescens (not of Shaw), Theobald, Cat. Rept. Asiat. Soc. Mus. 1868, p. 23 (in part).
Tiliqua casinata (in part), Stoliczka, J. Asiat. Soc. Beng. xxxix, 1870, p. 169.
Scincus tytleri Tytler MSS., Theobald, Cat. Rept. Asiat. Soc. Mus. 1868, p. 23.—*Mabuya tytleri*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 187 (type loc. Andaman Is.; Calcutta), and Fauna Brit. Ind. 1890, p. 191; Annandale, J. & P. Asiat. Soc. Beng. (2) i, 1905, p. 142.

Cheeks swollen in the adult; supranasals usually in contact with one another; fronto-nasal broader than long; prefrontals in contact with one another or just separated. A post-nasal; anterior loreal subquadrangular, nearly as large as the posterior; lower eyelid scaly; temporal scales smooth; ear-opening subcircular, distinctly smaller than a lateral scale, with 2 or 3 small, pointed lobules anteriorly; dorsal and lateral scales subequal, with 3 obtuse keels, the two lateral usually better marked than the median; 24, usually 26, scales round the middle of the body. Digits long, with smooth lamellæ, 27 to 30 beneath the fourth toe; the hind-limb reaches to the elbow or the axilla; palms of hands and soles of feet with flat tubercles, heel with larger ones.

Brown or bronzy above, uniform or indistinctly spotted; greenish-white below. Young with a dark lateral stripe.

From snout to vent 150; tail 300 mm. Stoliczka mentions a specimen which he states was 20 inches in length, the tail forming nearly 12. The largest of all the Indian Skinks.

Range. Peculiar to the Andaman Islands.

181. Mabuya longicaudata.

Euprepis longicaudata Hallowell, Trans. Amer. Philos. Soc. (2) xi, 1857, p. 77, pl. iv, fig. 1 (type loc. Siam; Philadelphia).—*Mabuia longicaudata*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 188; Steineger, Herp. Japan, 1907, p. 214, pl. xvi; Van Denburgh, Proc. Cal. Acad. Sci. 1912, p. 228.
Eumeces siamensis Günther, Rept. Brit. Ind. 1864, p. 91 (type loc. Siam; London).—*Mabuia siamensis*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 188, and Rept. Malay Pen. 1912, p. 84; S. Flower, Proc. Zool. Soc. London, 1899, p. 647.
Euprepes (*Tiliqua*) *ruhsarati* Fischer, Abh. Nat. Hamburg, ix, 1886, p. 7, pl. i, fig. 2 (type loc. S. Formosa; Oldenburg); Van Denburgh, l. c. s. p. 229.
Euprepes (*Tiliqua*) *bicarinatus* Peters, Mon. Akad. Berlin, 1867, p. 22 (type loc. Hong-kong; Berlin).

Supranasals usually in contact with one another; fronto-nasal broader than long; prefrontals in contact with one another or narrowly separated; a pair of nuchals. A post-nasal; anterior loreal subquadrangular or longer than high, not much shorter than the posterior loreal; lower eyelid scaly; temporal scales smooth; ear-opening oval, a little

smaller than a lateral scale, with or without a few small lobules anteriorly. Dorsal and lateral scales subequal, very finely striated, the former with 2, sometimes 3, obtuse keels, the latter often quite smooth; 26 to 30 scales round the middle of the body. Digits long, with smooth lamellæ, from 22 to 27 beneath the fourth toe; the hind-limb reaches to the elbow or not quite so far.

From snout to vent 115; tail 230 mm.

Brown or bronzy above, with a faint tinge of yellow or green, uniform or with narrow dark brown or black longitudinal lines along the lateral margins of the scales; a broad and usually well-defined rich brown or black stripe starting from the eye, passing along the upper part of the flank to the base of the tail, usually margined with whitish above and with or without white spots; labials and lower parts sulphur-yellow or greenish-yellow.

Variation. 28 scales round the body occur in 90 per cent. of the specimens that I have examined. In the young the scales are usually bicarinate, but indications of a third—the median keel—can be found in most adults; sometimes all three keels are of equal strength. In examples from Hainan, S. China (Kowloon, Hongkong), and Formosa, the third keel appears to be constantly absent (*ruhstrati*). The fine striations upon the scales can be seen with a good glass, and best when the scale is dry; juveniles show them more clearly than adults.

Range. The whole of Siam; Cochin-China (Cap St. Jacques); French Laos; Tonking; S. China and Hong-kong; Hainain; Formosa; the Malay Peninsula.

In Bangkok, where it is not uncommon, it is found in company with *multifasciata*, and its habits are the same.

Much like *multifasciata* in form, coloration, and size, but of more graceful proportions, softer coloration, and with a longer tail; in some half-grown individuals the tail is as much as two and a half times the length of the head and body. Juveniles (of *siamensis*) lack the dark dorsal streaks, and the stripe along the side of the body is always very conspicuous and well defined, a character which is usually retained in the adult.

182. **Mabuya andamanensis**, sp. nov.

Euprepes, carinatus, Steindachner, Reise Novara, Rept. 1869, p. 43; Stoliczka, J. Asiat. Soc. Beng. xlii, 1873, p. 163.
Mabuia multifasciata, Annandale, J. Asiat. Soc. Beng. lxxiii, 1904, p. 19.

Description of the cotypes, Brit. Mus. 1934.6.4.1 (14658); Coll. A. R. Anderson, and Ind. Mus. 15084, Coll. C. G. Rogers; type loc. Andaman Is.

Supranasals not touching one another; fronto-nasal as

broad as or broader than long; prefrontals separated from one another; interparietal small, not separating the parietals posteriorly; a pair of nuchals; a postnasal; anterior loreal higher than long, about half the size of the posterior loreal; lower eyelid scaly; temporal scales keeled; ear-opening subcircular, smaller than a lateral scale, with a few pointed lobules anteriorly. Dorsal and lateral scales subequal, with 5, 6, or 7 very distinct keels, the three central keels forming mucros; nuchals multi-keeled; 30 and 32 scales round the middle of the body. Digits rather long, with smooth lamellæ, 25 to 29 beneath the fourth toe; the hind-limb reaches to the axilla or just beyond.

Brown above, with two series of black spots, one on either side of the vertebral line, on the neck, and anterior half of the back; a broad dark stripe, more or less edged above and below with black spots, starting from behind the eye and extending along the neck and upper half of the flank and side of the tail; yellowish-white below.

From snout to vent 105; tail 150 mm.

Eleven more specimens, all from the Andaman Islands, differ from the cotypes as follows:—The vertebral series of spots may be reduced in size and number and may be absent altogether; in two individuals they are united to form a pair of stripes; the dark flank-band may be absent or, as in the two largest individuals, the whole of the flank is heavily spotted with dark brown and white. The largest of these specimens measures 132 mm. from snout to vent. Very young specimens have the scales tricarinate.

Stoliczka, who saw this lizard in life, writes of it as follows:—"The large Andaman form of *Euprepes carinatus* is not specifically distinct from the common type. I met with similarly large specimens on the Cocos Islands. Most of those I obtained there have 30 rows of scales round the body, and each scale has 7 keels, the three median ones being strong and distant from each other, the two laterals on either side short, thin, and sometimes scarcely traceable. The specimens were apparently in breeding dress. The whole sides of the head, neck, and belly were vermilion or bright cinnabar red; anterior extremities and the back were also strongly tinged with red. The entire side of the body, tail, and extremities had numerous large, irregular, white and black spots intermixed, giving the lizard quite a different appearance from the ordinary type. The white spots were most numerous along the edges of the back, but there is no white band present."

Five more specimens, three juvenile and two about one-third grown, from the Nicobar Islands, also belong to this new species. Two of them have the scales tricarinate only; all the juveniles have a more or less distinct light border, both above and below, to the dark flank-band.

183. Mabuya rugifera.

Tiliqua rugifera Stoliczka, J. Asiat. Soc. Beng. xxxix, 1870, p. 170, pl. x, fig. 3 (type loc. Camorta, Nicobars; Calcutta).—*Mabuia rugifera*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 184, and Fauna Brit. Ind. 1890, p. 190; S. Flower, Proc. Zool. Soc. London, 1899, p. 645; Smith, Ann. Mag. Nat. Hist. (9) xviii, 1926, p. 78.

Euprepes (Tiliqua) percarinatus Peters, Mon. Akad. Berlin, 1871, p. 571 (type loc. Malang, E. Java; Berlin).—*Euprepes percarinatus* var. *borneensis*, Peters, l. c., p. 572 (type loc. Sarawak, Borneo; Berlin).

Mabuia rubricollis E. Bartlett, Crocod. Liz. Borneo, 1895, p. 87 (type loc. Kuching, Borneo; London).

Mabuia quinquecarinata Werner, Verh. zool.-bot. Ges. Wien, xlvi, 1896, p. 12 (type loc. Sumatra; Berlin).

Supranasals separated from one another; fronto-nasal usually broader than long; prefrontals separated from one another; interparietal very small, the parietals usually being in contact with one another behind it; a pair of nuchals more or less distinct, these, as well as the hinder edges of the parietals, being keeled. A postnasal present or absent; anterior loreal twice as high as long, half as long as the posterior loreal; lower eyelid scaly; sixth, rarely fifth, labial subocular, at least three times as long as the preceding labial, sometimes divided in two by a vertical suture; ear-opening subcircular, about half as large as a lateral scale, with small, pointed lobules anteriorly. Dorsal and lateral scales subequal, the former with 5, the latter sometimes with 7, very strong keels; 24 to 28 (26 in the type) scales round the middle of the body. Digits with smooth lamellæ, 22 to 27 beneath the fourth toe; the hind-limb reaches to the axilla or not quite so far.

Very dark brown above, usually with 5 or 7 greenish-white longitudinal lines, or the white lines broken up into a series of spots; greenish-white below, the throat and chest sometimes heavily spotted with black.

From snout to vent 65; tail 130 mm.

Range. The Nicobar Is.; the Malay Peninsula; Sumatra; Java; Borneo.

184. Mabuya quadricarinata.

Euprepes longicaudata (not of Hallowell), Anderson, J. Asiat. Soc. Beng. (2) xl, 1871, p. 13.

Mabuya quadricarinata Boulenger, Ann. Mus. Civ. Genova, (2) iv, 1887, p. 618 (type loc. Bhamo and hills to the east; London and Genoa), and Fauna Brit. Ind. 1890, p. 192.

Mabuya anakular Annandale, J. & P. Asiat. Soc. Beng. i, 1905, p. 343 (type loc. Cachar; Calcutta, based on Anderson's specimen).

Supranasals separated from one another; fronto-nasal

broader than long; prefrontals in contact with one another; interparietal well developed; parietals in contact with one another behind it; a pair of nuchals. A postnasal; anterior loreal longer than high, about half as long as the posterior loreal; lower eyelid scaly; temporal scales keeled; ear-opening subcircular, not quite as large as a lateral scale, with two or three minute projecting lobules anteriorly. Dorsal and lateral scales subequal, strongly quadricarinate, the median pair much more strongly marked than the outer; nuchal scales mostly tri- or quinquecarinate; 26 or 28 scales round the middle of the body. Digits moderately long, with smooth lamellæ, 17 or 18 beneath the fourth toe; the hind limb reaches to the elbow.

Olive-brown above, uniform or with small black spots longitudinally arranged; flanks with or without dark longitudinal lines; a dark dorso-lateral line more or less distinct; upper lip and lower parts whitish.

From snout to vent 50; tail 90 mm.

Range. Bhamo district; Cachar.

The type of *M. anakular* agrees so completely with the types of *M. quadricarinata* that I have no hesitation in uniting the two. The specimen is of a uniform brown coloration without above darker markings.

185. Mabuya beddomii.

Euprepes beddomii Jerdon, P. Asiat. Soc. Beng. March 1870, p. 73 (type loc. Mysore; London); Günther, Proc. Zool. Soc. London, 1875, p. 225.—*Mabuia beddomii*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 179, and Fauna Brit. Ind. 1890, p. 187.

Euprepes (Tiliqua) septemlineatus Blanford, J. Asiat. Soc. Beng. xxxix, December 1870, p. 360, pl. xvi, figs. 7 & 8 (type loc. Penganga Valley, S.E. Berar).

Supranasals in contact with one another; fronto-nasal broader than long; prefrontals usually in contact with one another; a pair of nuchals usually present. No postnasal; anterior loreal higher than long, usually higher and about half as long as the posterior loreal; lower eyelid scaly; temporal scales smooth; ear-opening subcircular, about as large as a lateral scale, with 3 or 4 short, pointed lobules anteriorly. Dorsal and lateral scales subequal, almost smooth, or with 3, rarely 5, feeble keels; 30 to 32 scales round the body. Digits moderately long, from 12 to 15 strongly keeled lamellæ beneath the fourth toe; the hind-limb reaching to the wrist or not so far.

The young are brown above, with 4 dark brown longitudinal streaks which are continued on to the base of the tail; there is a broader band of the same colour passing along the side of the head and the upper part of the flank; it is

edged above and below with a white streak, the lower of which starts from the upper lip and passes through the ear; in its turn it is edged below by brown; top of the head with dark spots or longitudinal markings; whitish below. With age the dark longitudinal stripes may disappear, but indications of them are always to be found upon the neck and anterior part of the body. In some examples the space between the two vertebral stripes is whitish.

From snout to vent 55; tail 115 mm.

Range. Southern India (Berar; Salem; Tinnevelly; Malabar; Sivagherry Hills; Mysore; Anaimalai Hills). Ceylon, (Pundaloya).

186. Mabuya trivittata.

Tiliqua trivittata Hardwicke & Gray, Zool. Journ. iii, 1827, p. 227, and Ill. Ind. Zool. ii, 1829, pl. lxxvi (based on Hardwicke's sketch, no. 113; type loc. Dum-Dum, Bengal); Jerdon, J. Asiat. Soc. Beng. xxii, 1853, p. 478; Theobald, Cat. Rept. Asiat. Soc. Mus. 1868, p. 24.—*Euprepes trivittatus*, Blanford, J. Asiat. Soc. Beng. xxxix, 1870, p. 357.—*Eumeces trivittatus*, Anderson, Proc. Zool. Soc. London, 1871, p. 158.—*Euprepes (Tiliqua) trivittatus*, Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 119.

Mabuia vertebralis Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 186 (type loc. Belgaum, Bombay; London), and Fauna Brit. Ind. 1890, p. 188.

Supranasals in contact with one another; fronto-nasal broader than long; prefrontals in contact with one another; a pair of nuchals present or absent. No postnasal; anterior loreal higher than long, half as long as the posterior; lower eyelid scaly; ear-opening subcircular, smaller than a lateral scale, with a few short, pointed lobules anteriorly. Dorsal and lateral scales subequal, with 5, sometimes in the adult 7, strong keels; 34 or 36 scales round the middle of the body. Digits moderately long, with smooth lamellæ, 13 or 14 beneath the fourth toe; the hind-limb reaches to the wrist or the elbow. Palms of hands and soles of feet with enlarged subconical tubercles intermixed with much smaller ones.

Greyish-brown, with 5 broad, black-edged, white (yellow in life) longitudinal stripes extending the whole length of the body and on to the base of the tail. The vertebral and dorso-lateral stripes are clearly defined and occupy the adjacent halves of two scales. Lower parts white.

From snout to vent 80; tail 80 mm.

Range. Bombay district (Belgaum, Poona,* Nasik); Madras; Hyderabad (Jalna *); C.P. (Nagpur *); Bihar (Rajmahal); the type is said to have come from Dum-Dum, near Calcutta.

* Not seen by me.

Hardwicke and Gray's description and figure leave no doubt as regards the species which they called *trivittata*. None of the Indian herpetologists had any difficulty in identifying it, and, as the oldest name available, it must be used. The *Scincus trivittatus* of Cuvier (Règne Anim. 2nd ed. ii, 1829, p. 62; type loc. South Africa) is quite different. Gray himself recognized this, and he therefore renamed Cuvier's species *capensis* (Griffith's Anim. King. ix, 1830, Syn. p. 68, and Ann. Mag. Nat. Hist. ii, 1838, p. 290). The name for *M. trivittata*, (Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 195) will therefore be *capensis*.

Genus **DASIA**.

Dasia Gray, Ann. Mag. Nat. Hist. ii, 1839, p. 331 (type *olivacea*).
Lamprolepis Fitzinger, Syst. Nat. 1843, p. 22 (type *Scincus smaragdinus* Lesson).
Liotropis Fitzinger, l. c. s. 1843, p. 22 (type *Euprepes ernestii* Dum. & Bibr.).
Kenexeja Gray, Cat. Liz. Brit. Mus. 1845, p. 79 (type *Scincus smaragdinus* Lesson).
Apterygodon Ederling, Nat. Tijd. Ned.-Ind. xxvi, 1863, p. 483 (type *A. vittatum*).
Theconyx (not of Gray, 1845) Annandale, Spol. Zeyl. iii, 1906, p. 191 (type *halianus*).
Lygosoma, Boulenger, Fauna Brit. Ind. 1890, p. 192.

Palatine bones in contact mesially; pterygoid bones in contact anteriorly, the palatal notch not extending forwards to between the centres of the eyes (fig. 67); maxillary teeth conical; pterygoid teeth reduced to one or two or absent. Eyelids well developed, the lower scaly. Nostril in the nasal; supranasals present; prefrontals, fronto-parietals, and interparietal distinct; ear-opening small, tympanum deeply sunk; limbs well developed, pentadactyle.

A small genus of eight species. With the exception of the widely distributed *D. smaragdina* they inhabit the Malayan Subregion, southern Indo-China, the Philippines, Southern India, and Ceylon.

All the members of this genus are of more or less arboreal habits, and their digits show the earliest stage in the evolution of the adhesive digital pad. The inferior lamellæ upon the basal phalanges are more or less expanded transversely, and are shorter than those upon the terminal phalanx.

Key to the Species.

Back uniform or spotted; 28 to 30 scales round the body.	
Preanals not enlarged	*olivacea*, p. 277.
Preanals enlarged	*subcærulea*, p. 278.
Back with broad, black, transverse bars; 24 scales round the body	*haliana*, p. 278.

187. Dasia olivacea.

Dasia olivacea Gray, Ann. Mag. Nat. Hist. ii, 1838, p. 331 (type loc. Penang; type lost); Cochran, Proc. U.S. Nat. Mus. lxxvii, (2) 1930, p. 21.—*Euprepes olivaceus*, Günther, Rept. Brit. Ind. 1864, p. 80, pl. x, fig. D.—*Tiliqua olivacea*, Stoliczka, J. Asiat. Soc. Beng. xxxix, 1870, p. 172.—*Lygosoma olivaceum*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 251, and Fauna Brit. Ind. 1890, p. 187, and Fauna Malay Pen. 1912, p. 91 (in part); Smith, J. Nat. Hist. Soc. Siam, iv, 1920, p. 96.
Euprepes ernestii Dum. & Bibr., Erp. Gen. v, 1839, p. 696 (type loc Java; Paris).

Snout moderately pointed; the length of the palpebral fissure is less than the distance between the inner canthus and the nostril; supranasals separated from one another; fronto-nasal about as long as broad; prefrontals large, in contact with or separated from one another; frontal as long as or a little longer than the fronto-parietals and interparietal together, the latter completely separating the parietals; a pair of nuchals; 4 large supraoculars, second the largest, first two in contact with the frontal; 8 supraciliaries, first longer than the others; an anterior and a posterior loreal, both longer than high; no enlarged temporal scales; ear-opening small, about a quarter the size of the eye-opening, with crenate margin or one or two small projecting lobules; tympanum deeply sunk; 7 supralabials, fifth longest and below the eye; body-scales subequal, the dorsals with 3 or 5, rarely 7, keels; 28 to 30 scales round the body; preanals not enlarged. Tail tapering to a point, one and one-third times the length of the head and body, the median series of scales below transversedly enlarged. Limbs moderate; the leg reaches to the hand or nearly to the elbow; 17 to 22 lamellæ beneath the fourth toe; palms of hands and soles of feet with flat tubercles, the heel often with 2 or 3 much enlarged ones.

Colour somewhat variable. Greenish-brown above and on the sides, uniform or with black spots arranged in transverse series, many of the spots bearing a central spot or shaft of white; these markings may be present only on the flanks, and when tending to disappear on the back do so first on the posterior part of it. In rare examples the black markings are arranged longitudinally rather than transversely. Sometimes there is a broad pale stripe along the hind part of the flank and base of the tail. Back of head with black markings which are confined to the edges of the scales. Pale blue, green or yellowish below.

The young are black above, with narrow silvery or yellowish, rather irregular transverse bars, from 11 to 14 in number, on the neck and body.

From snout to vent 115 mm.

Variation. There is marked variation in the strength of the keels on the scales. Three strong keels appear to be

constant in all juveniles, adults may show 5 or 7, the additional keels being less strongly marked.

Range. Tenasserim; southern Siam and French Indo-China south of lat. 15° N.; Pulo Condore; the Andaman and Nicobar Is.; the Malay Peninsula; the Natunas; Sumatra and the Mentawei Is.; Borneo; Java. More than most Skinks *D. olivacea* appears to have a preference for small islands.

Arboreal and subarboreal in its habits. Oviparous, laying six eggs at a time.

Dasia grisea (Gray), Cat. Liz. Brit. Mus. 1845, p. 110 (type loc. Philippines; London) I regard as a distinct species. It differs in the larger head and shorter snout, the length of the palpebral fissure being equal to the distance between the inner canthus and the nostril, in the anterior loreal not being longer than high, and in having the supranasals in contact with one another; body more elongate, with 26 to 28 scales round the body; back of head with rounded spots or markings.

Range. Borneo (Kuching, Sarawak); Sinkip I., N.E of Sumatra; the Malay Peninsula (near Kuala Lumpur); the Philippine Is. (Based on specimens examined by me.)

188. **Dasia subcærulea.**

Lygosoma subcæruleum Boulenger, Ann. Mag. Nat. Hist. (6) viii, 1891, p. 289 (type loc. Bodanai-Kanur, Travancore; London).

Closely allied to *olivacea*, differing as follows:—Snout longer and more pointed; prefrontals in good contact with one another; frontal shorter than the fronto-parietals and interparietal together; 28 scales round the middle of the body, dorsals with 3 very indistinct keels; a pair of enlarged preanals. Toes apparently as in *olivacea*, but the digits are badly shrivelled and the lamellæ cannot be made out.

Greyish-brown, with irregular black and white spots, the black usually preceding the white; two black streaks down the neck, starting from the fronto-parietals; bluish below.

From snout to vent 57; tail 59 mm.

The single specimen known was obtained by Mr. H. S. Ferguson in May 1891. Its resemblance to the Indo-Chinese *olivacea* is remarkable.

189. **Dasia haliana.**

Euprepes halianus Haly & Nevill, Taprobanian, ii, 1887, p. 56 (type loc. Henaratgoda and Anuradhapura, Ceylon; Colombo); Boulenger, Fauna Brit. Ind. 1890, p. 213; Haly, Ceylon Admin. Report, 1893, p. 33.—*Theconyx halianus*, Annandale, Spol. Zeyl. iii, 1906, p. 191, figs. 1–4.—*Lygosoma* (*Kuneuxia*) *halianus*, Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 174, pl. xxxvii.

Snout pointed, longer than the orbit; supranasals not in contact with one another; fronto-nasal about as long as broad; prefrontals large, just separated from one another; frontal rather narrow, as long as or shorter than the fronto-parietals and interparietal together; interparietal very variable in size, when large separating the parietals; a pair of nuchals; 4 supraoculars, second largest, first and second in contact with the frontal; 7 or 8 supraciliaries, first longer than the others; an anterior and a posterior loreal, both longer than high; temporal scales a little larger than those on the sides of the neck; ear-opening not one-quarter the size of the eye-opening, with crenate margin; tympanum deeply sunk; dorsal scales with 3 or 5 obtuse keels, the two vertebral series of scales broader than the others; 24 scales round the body; preanals slightly enlarged. Tail tapering to a fine point, as long as or a little shorter than the head and body, the median series of scales below transversely enlarged. Limbs rather short; the adpressed limbs fail to meet or just overlap; toes moderately long, 17 or 18 lamellæ beneath the fourth toe; palms of hands and soles of feet with flattish tubercles, heel with larger ones, larger in the male than in the female.

Yellowish-olive above, with broad black cross-bars which are about as broad as their interspaces, 5 or 6 on the neck and body; a black mark upon the occiput, extending forward as two streaks on the top of the head and two lateral ones through the eye to the nostril; yellowish below. In the young the black bars are more conspicuous.

From snout to vent 80 mm.

Range. Ceylon. Dambulla (C.P.); Elahara, Horana, Anuradhapura (N.C.P.); Palutupana (S.P.); Gampaha (W.P.); Jaffna (N.P.) (*Deraniyagala*). According to Haly it lives on the tops of high trees.

Genus **LYGOSOMA**.

Lygosoma Hardwicke & Gray, Zool. Journ. iii, 1827, p. 228 (type *serpens=quadrupes*); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 209, and Fauna Brit. Ind. 1890, p. 192 (in part).

Siaphos Gray, in Griffith's Anim. King. ix, 1831, Syn. p. 72 (type *æqualis*).

Feromeles Wiegmann, Herp. Mex. 1834, p. 11 (type *æqualis*) (substitute name for *Siaphos* Gray).

Podophis Wiegmann, Herp. Mex. 1834, p. 11 (type *Anguis quadrupes* Linn.).

Eulamprus Fitzinger, Syst. Rept. 1843, p. 22 (type *Lygosoma quoyi* Dum. & Bibr.).

Sphenomorphus Fitzinger, l. c. s. p. 23 (type *Lygosoma melanopogon* Dum. & Bibr.).

Hinulia Gray, Cat. Liz. Brit. Mus. 1845, p. 74 (type *nævis=melanopogon*).

Elania (not of Sundevall, 1836) Gray, l. c. s. p. 80 (type *Scincus mülleri* Schlegel).
Anomalopus Duméril, Cat. Meth. Rept. 1851, p. 185 (type *Anomalopus verreauxii*).
Lissonota (not of Gravenhorst, 1829) Blyth, J. Asiat. Soc. Beng. xxii, 1853, p. 653 (type *Lissonota maculata*).
Coloscincus Peters, Mon. Akad. Berlin, 1876, p. 532 (type *Coloscincus truncatus*).

Palatine bones in contact mesially; pterygoid bones in contact anteriorly, the palatal notch not extending forwards to between the centres of the eyes (fig. 67); pterygoid teeth minute or absent; maxillary teeth conical. Eyelids usually well developed, the lower scaly. Nostril in the nasal; no supranasals; prefrontals, fronto-parietal(s), and interparietal distinct; ear-opening distinct*; limbs present, pentadactyle.*

Range. From Polynesia and Australia to Africa.

My reasons for placing the well-developed members of this genus, called by most authors *Sphenomorphus*, under *Lygosoma* will be given elsewhere (in preparation). It is sufficient to say here that, apart from the increase in the length of the body, with corresponding degeneration of the organs, I cannot find any morphological characters by which to generically separate *L. indicum* from *L. quadrupes*. As arranged in the Key they represent roughly a descending series in degeneration. Between *L. courcyanum* or *L. striatopunctatum* and *L. quadrupes* the gap is bridged by such species as *L. australe* Gray and *L. punctulatum* Peters (Australia). Beyond *L. quadrupes*, in the degenerative sense, are such forms as *L. æquale* Gray (Australia), *L. larutense* Boulenger (Malaya), *L. miodactylum* Boulenger (Malaya), and *L. verreauxi* Duméril (Australia). These species have no ear-opening and the aural apparatus has become modified; the body is even more elongate, and the digits are reduced in number.

Key to the Species.

I. Body not elongate, limbs well developed.
A. The adpressed limbs overlap.
a. Rostral convex.

30 to 38 scales round body; a more or less distinct dark stripe along the side of the head and flank	*L. indicum*, p. 281.
36 to 40 scales round body; a patch of enlarged scales on back of thigh	*boulengeri*, p. 282.
30 scales round body; 3 pairs of enlarged nuchals.	*helenæ*, p. 283.
34 to 36 scales round body; no dark stripe along the head and flank	*tersum*, p. 284.
24 scales round body, the two vertebral series much broader than the others	*stellatum*, p. 284.

* In all Indian and Indo-Chinese species.

b. Rostral flat or concave; 38 to 42 scales round body.

The leg reaches to the elbow or the axilla ..... *maculatum*, p. 285.
The leg reaches to the shoulder or beyond ..... *dussumieri*, p. 286.

B. The adpressed limbs do not, or only just, overlap; 24 to 28 subequal scales round body.

a. Ear-opening not more than half the size of the eye-opening; tympanum deeply sunk.

Two fronto-parietals; prefrontals usually in contact with one another ..... *taprobanense*, [p. 287.
Two fronto-parietals; prefrontals small and widely separated from one another ..... *striatopunctatum*, [p. 288.
A single fronto-parietal ..... *fallax*, p. 288.
Two fronto-parietals; ventrals keeled ..... *megalops*, p. 289.

b. Ear-opening more than half the size of the eye-opening; tympanum not deeply sunk ..... *courcyanum*, [p. 289.

II. Body very elongate, limbs very short, widely separated when adpressed; a single fronto-parietal ..... *quadrupes*, p. 290.

190. Lygosoma indicum indicum.

Hinulia indica Gray, Ann. Mag. Nat. Hist. (2) xii, 1853, p. 388 (type loc. Himalayas; London); Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 128, pl. iv, fig. 2.—*Eumeces indicus*, Anderson, Proc. Zool. Soc. London, 1871, p. 158.—*Lygosoma indicum*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 241, pl. xvi, fig. 1, and Fauna Brit. Ind. 1890, p. 195, and Ann. Mus. Civ. Genova, (2) xiii, 1893, p. 319; Wall, J. Bombay Nat. Hist. Soc. xviii, 1908, p. 505; Smith, Bull. Raffles Mus. no. 3, 1930, p. 33, and J. Nat. Hist. Soc. Siam, vi, 1923, p. 200; Hora, Rec. Ind. Mus. xxix, 1927, p. 4.—*Sphenomorphus indicus*, Schmidt, Copeia, 1928, p. 80; Pope, Bull. Amer. Mus. Nat. Hist. lviii, 1929, p. 380.

Lygosoma zebratum Boulenger, Ann. Mus. Civ. Genova, (2) v, 1887, p. 478, pl. vii, fig. 1, and Fauna Brit. Ind. 1890, p. 195 (type loc. Mt. Muleyit, Tenasserim; London).

Lygosoma cacharense Annandale, J. Asiat. Soc. Beng. (n. s.) i, 1905, p. 145 (type loc. Nemotha, Cachar; Calcutta).

Lygosoma bowringi (not of Günther), Mell, Arch. f. Nat. Berlin, lxxxviii, 1922, p. 113 (in part).

Distance between the end of the snout and the fore-limb contained one and a half to one and three-quarter times in the distance between the axilla and the groin; snout short, obtuse; rostral convex, in broad contact with the fronto-nasal, which is much broader than long; prefrontals always separated from one another; frontal as long as or longer than the fronto-parietals and interparietal together, the latter not separating the parietals posteriorly; no nuchals; 4 large supraoculars followed by 2 very small ones, the first and second larger than the others; 8 to 10 supraciliaries, the first largest. An anterior and a posterior loreal, subequal in size, or the former a little smaller; 2 large superposed temporal scales; ear-opening oval, as large as or a little

smaller than the eye-opening; no projecting lobules, but a few granules may be present on the anterior border; tympanum deeply sunk; 7 supralabials, the fifth and sixth below the eye, separated from it by small scales; scales of the body subequal in size, quite smooth, 30 to 38 round the middle; a pair of enlarged preanals. Tail tapering gradually to a point, covered with subequal scales, once and a half to twice as long as the head and body. Limbs moderate; the leg reaches to the hand or the elbow; digits long, compressed; 16 to 22 keeled lamellæ beneath the fourth toe; palmar and plantar surfaces of hands and feet covered with conical tubercles.

Brown above, uniform or with small brown or black spots usually arranged in longitudinal lines; a dark brown or black stripe along the side of the head, body, and tail, clearly defined above, where it is edged with whitish; the lower edge may be broken into spots, or indented as in *zebratum*; labials usually with dark vertical bars; lower parts whitish.

From snout to vent 90 mm.

Variation. The variation in the number of scales round the body is as follows (the figures in brackets indicate the number of specimens examined):—E. Himalayas, 34–38 (18); Assam, 34 (2); Sadiya Frontier Tract and Di Chu Valley, 36 (3); Tonking, 34 (1); Hainan, 36 (1); Upper Burma, 36 (4); N. Siam, 34–36 (11); Langbian Plateau, S. Annam, 30–34 (13); Plapoo, Tenasserim, 32 (1).

Range. The Eastern Himalayas (Darjeeling, Sikkim); S.E. Tibet; the whole of Indo-China; Hainan; S. China; the Malay Peninsula.

A common species in many mountainous districts throughout the whole of the Indo-Chinese Subregion.

Wall records finding a female at Shillong, Assam, containing nine fully developed embryos.

I cannot distinguish *L. cacharense* Annandale from *L. indicum*. The type is immature and somewhat faded, but agrees in every respect with typical *indicum*; it has 34 scales round the body, not 24 as in the description.

191. Lygosoma boulengeri.

Sphenomorphus boulengeri Van Denburgh, P. Calif. Acad. Sci. iii. 1912, p. 232 (type loc. Formosa; San Francisco); Pope, Bull. Amer. Mus. Nat. Hist. lviii, 1929, p. 378.

Sphenomorphus leveretti Schmidt, Amer. Mus. Nov. no. 157, 1925, pl. I, and Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 422, fig. head (type loc. Nodoa, Hainan; New York).

Very near to *L. indicum*, but said to differ in coloration and to have an enlarged patch of scales on the back of the thigh; 36 to 40 scales round the body.

Back more densely spotted with black, and the black stripe along the flank less clearly defined, more broken up; beneath it, starting from the upper lip and passing along the neck and flank, another stripe of dark spots, the interval between the two being whitish. This coloration resembles that of the Central and Northern Chinese form of *indicum*.

I have not seen specimens of *leveretti*, but according to Pope (1929) it is identical with *boulengeri*. He regards *indicum*, *boulengeri*, and *formosensis* as distinct species, readily distinguishable from each other by their coloration; *L. boulengeri*, he states, can also be separated from the other two by the enlarged scales on the back of the thigh. I find, however, these enlarged scales in specimens of *indicum* from the Himalayas. The specimen of *indicum indicum* obtained by me near the Five Finger Mountain, Hainan, agrees well with specimens from Darjeeling, as does also the one obtained by Mell at Ding-wu, in Kwang-tung Province.

192. Lygosoma helenæ.

Sphenomorphus helenæ Cochran, Proc. Biol. Soc. Washington, xl, 1927, p. 185 (type loc. Nontaburi, C. Siam; Washington), and Proc. U.S. Nat. Mus. lxxvii, 1930, p. 17, fig. head.

Differs from *indicum* as follows:—Three pairs of enlarged nuchals; limbs shorter, the adpressed limbs just overlap. 30 smooth scales round the body.

Coloration (in alcohol). "Above, yellowish-brown, with scattered dots of slightly darker color; a dark brown lateral band beginning on the tip of the snout and continuing along the side of the head and over the ear, widening considerably at the shoulder and margined above by a light area for its entire length; from the shoulder onwards the dark band is broken up by short transverse spots of the light ground-colour, until on the tail it appears as an irregular dark brown line, with invading areas above and below; a median dorsal stripe beginning on the neck, much narrower and less conspicuous than the lateral stripes, and breaking up into numerous irregular brown spots which are continued on to the tail; upper surfaces of arms and legs also brown- and yellow-spotted; labials and sides of head, body, and tail spotted with minute greyish dots; entire under surface immaculate white."

From snout to vent 28; tail (incomplete) 30 mm.

Known only from the type-specimen, which is immature. Not seen by me.

193. Lygosoma tersum.

Lygosoma tersum Smith, J. Nat. Hist. Soc. Siam, ii, 1916, p. 44, pl. —, fig. 1 (type loc. Khao Wang Hip, Nakon Sritamarat Mts., Peninsular Siam; London), and Bull. Raffles Mus. no. 3, 1930, p. 34.

Differs from *L. indicum* as follows:—Distance between the end of the snout and the fore-limb contained one and a quarter to one and a half times in the distance between the axilla and groin; ear-opening quite smooth all round; prefrontals in contact with or narrowly separated from one another; the leg reaches to the wrist or nearly to the axilla; 34 to 36 scales round the middle of the body.

Dark brown above, with more or less distinct small black spots longitudinally arranged; sides of body paler, with or without similar markings; top of head with black spots; lips with black bars; whitish below.

From snout to vent 92 mm.; tail 170

Range. The Nakor Sritamarat Mts. in Peninsular Siam and north to the Isthmus of Kra (Tasan).

The original figure of this lizard, showing the dark dorsal spots arranged in very definite transverse series, is not quite correct; transverse markings are just indicated in one of the types, but the general colour-pattern is as described above.

194. Lygosoma stellatum.

Lygosoma stellatum Boulenger, Ann. Mag. Nat. Hist. (7) vi, 1900, p. 192 (type loc. Perak; London), and Fauna Malay Pen. 1912, p. 87; Smith, Proc. Zool. Soc. London, 1921, p. 431.

Lygosoma annamiticum Boettger, Senckenbergiana, 1901, p. 47 (type loc. Phuc-Son, N. Annam; Frankfurt-am-Main).

Distance between the end of the snout and the fore-limb contained one and a quarter to one and a half times in the distance between the axilla and groin; snout obtusely pointed, as long as the orbit; rostral convex, in good contact with the fronto-nasal, which is broader than long; prefrontals in contact with or separated from one another; frontal longer than the fronto-parietals and interparietal together; parietals in good contact with one another behind the interparietal; 2 or 3 pairs of nuchals; 4 large supraoculars, almost equal in size; 7 or 8 supraciliaries; an anterior and a posterior loreal, subequal in size; 2 large superposed temporal scales; ear-opening oval, as large as or a little smaller than the eye-opening, without or with 1 or 2 short projecting lobules; tympanum deeply sunk; 7 supralabials, the fifth below the middle of the eye, separated from it by small scales; scales of the body smooth, finely striated, the two vertebral rows much broader than long, broader than the others; 24 scales round the body; a pair of large preanal scales. Tail tapering gradually to a point, one

and one-third times as long as the head and body, the median row of scales below a little broader than the others; limbs moderate, the hind-limb reaches to the wrist or the elbow; toes long, 20 to 23 obtusely keeled lamellæ beneath the fourth toe; palmar and plantar surfaces of hands and feet covered with flattened or conical tubercles, those bordering the heel being larger than the others.

Bronze-colour above, spotted all over with black and white, the spots squarish in shape, the black preceding the white, and more crowded upon the sides and the vertebral line; on the tail they are arranged in transverse series; labials edged with black; below greenish- or bluish-white.

From snout to vent 80 mm.

Range. Originally discovered in the Larut Hills, Perak, at 3,500 to 4,000 feet altitude. I obtained a single individual at Dalat, 5,000 feet, on the Langbian Plateau in S. Annam; Boettger's types of *annamiticum* are from N. Annam.

Dr. Mertens has compared my specimen from Dalat with the types of *annamiticum*, and has confirmed my suspicion that the two are identical.

195. Lygosoma maculatum.

Lissonota maculata Blyth, J. Asiat. Soc. Beng. xxii, 1853, p. 653 (type loc. Assam; type lost).—*Hinulia maculata*, Theobald, Cat. Rept. Asiat. Soc. Mus. 1868, p. 25; Stoliczka, J. Asiat. Soc. Beng. xxxix, 1870, p. 174, and xli, 1872, p. 123.—*Lygosoma maculatum*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 242, and Fauna Brit. Ind. 1890, p. 196, and Ann. Mus. Civ. Genova, (2) xiii, 1893, p. 319; Anderson, J. Linn. Soc. xxi, 1889, pp. 334, 344; Boettger, Kat. Rept. Frankfurt, 1893, p. 103; S. Flower, Proc. Zool. Soc. London, 1899, p. 648; Annandale, J. & P. Asiat. Soc. Beng. i, 1905, p. 144; Smith, J. Nat. Hist. Soc. Siam, ii, 1916, p. 156; Hora, Rec. Ind. Mus. xxix, 1927, p. 4.
Lygosoma mitahense Annandale, J. & P. Asiat. Soc. Beng. (2) i, 1905, p. 144 (type loc. Meetan, S. Burma; Calcutta).

Distance between the end of the snout and the fore-limb contained one and one-third to one and two-third times in the distance between the axilla and groin; snout short, obtuse; rostral flat or concave, in good contact with the fronto-nasal, which is much broader than long; prefrontals rather small, separated from one another; frontal as long as or longer than the fronto-parietals and interparietal together, the latter not separating the parietals behind; no nuchals; supraorbital region prominent; 5 supraoculars, first longest, fifth smallest; 10 to 12 supraciliaries; 2 loreals, both higher than long; 2 large superposed temporal scales; ear-opening nearly or quite as large as the eye-opening; no auricular lobules, the margin being quite smooth all round; tympanum not deeply sunk; 7 supralabials, the fifth and sixth below the eye, separated from it by small scales. Scales

of the body smooth, dorsals largest, laterals smallest; 38 to 42 round the body; a pair of large preanals. Tail tapering gradually to a point, twice or nearly twice as long as the head and body, the median series of scales below transversely enlarged.

Limbs moderate; the leg reaches to the elbow or the axilla or just beyond; digits long, compressed, 16 to 22 keeled lamellæ beneath the fourth toe; palms of hands covered with conical tubercles; on the soles of the feet they are confined to the inner and posterior part, extending as series of tubercles from the first, second, and fifth toes.

Bronzy or brown above, uniform or with small indistinct light (golden-green in life) spots, and two median series of small black spots; rarely only a single vertebral series is present; a dark brown or black lateral band, more or less spotted with white and usually edged below with white, extends from the nose to the tail; lower parts of flanks more or less thickly speckled with black and white; whitish below.

From spout to vent 62 mm.

Range. The Eastern Himalayas (Sikkim; Darjeeling district); N. Bengal (Parasnath Hill); Assam; S.W. Yunnan; Burma and Siam as far south as the Isthmus of Kra; Cambodia; S. Annam (Daban, Langbian Plateau); the Andaman and Nicobar Is.

Boulenger records it from the Malay Peninsula (Fauna Malay Pen. 1912, p. 90). The only specimen that I have seen from there (Larut Hills, Perak) is an undoubted *L. variegatum*, which species must now be included in the fauna of that region.

Lygosoma maculatum is common in many parts of Siam and Southern Burma, occuring both at sea-level and in the hills, but not at any great altitude. In Darjeeling it ascends to 7,000 or 8,000 feet (Stoliczka, 1872). Anderson (1889) states that it is common in the northern part of the Mergui Archipelago, but seemingly rare in the south. Oviparous, 4 or 5 eggs being laid at a time.

196. Lygosoma dussumieri.

Lygosoma dussumieri Dum. & Bibr., Erp. Gen. v, 1839, p. 725 (type loc. Malabar; Paris); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 243, and Fauna Brit. Ind. 1890, p. 197.—*Euneces dussumieri*, Beddome, Madras Month. J. Med. Sci. 1870, p. 175.—*Hinulia dussumieri*, Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 124, pl. i, fig. 3.—*Lygosoma* (*Sphenomorphus*) *dussumieri*, Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 169.

Lygosoma dussumieri var. *concolor* Annandale, J. Asiat. Soc. Beng. (2) i, 1905, p. 145 (type loc. Kanara; Calcutta), and Rec. Ind. Mus. iii, 1909, p. 256.

Differs from *L. maculatum* as follows:—Distance between the end of the snout and the fore-limb equal to or a little

less than the distance between the axilla and groin; prefrontals often in good contact with one another; 4 or 5 supraoculars, when only four due to fusion of the first and second shields; ear-opening smaller, with a few granules on its anterior margin; dorsal scales only a little larger than the lateral, 40 round the body, the dorsals very finely striated; the leg reaches to the shoulder or nearly to the tympanum; 20 to 25 lamellæ beneath the fourth toe.

Pale olive or bronzy green above, with a light dorso-lateral streak starting from above the eye and edged on its inner side with a dark brown streak spotted with white; a broad dark brown lateral stripe edged below with white, which in its turn is edged with brown; throat and belly white; tail yellowish-brown. Fully-grown individuals have the dorsal markings much less distinct, and may be of an almost uniform colour above, with or without small light spots. Annandale's *concolor* was based on such a specimen.

From snout to vent 60 mm.

Range. South-western India, from South Kanara to Trivandrum. Deraniyagala records a specimen from Peradeniya, Ceylon.

According to Annandale (1909) it is the commonest Skink in the plains of Travancore, both in open country and in jungle at the base of the hills. He states that the tail of the male is bright red in life, that of the female brownish.

197. Lygosoma taprobanense.

Eumeces taprobanensis Kelaart, Prodr. Faun. Zeyl. ii, ? 1852, p. 21 (type-loc. Nuwara Eliya, Ceylon; London); Günther, Rept. Brit. Ind. 1864, p. 89, pl. xiii, fig. B (in part.).—*Lygosoma taprobanense*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 319, and Fauna Brit. Ind. 1890, p. 206.—*Lygosoma* (*Sphenomorphus*) *taprobanensis*, Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 170.

Distance between the end of the snout and the fore-limb contained one and one-third to one and three-fifth times in the distance between the axilla and groin; snout short, obtuse; rostral convex, in good contact with the fronto-nasal, which is broader than long; prefrontals usually in contact with one another, sometimes narrowly separated; frontal as long as or a little shorter than the fronto-parietals and interparietal together, the latter not separating the parietals behind; no nuchals; 4 large supraoculars, followed by 2 small ones; second supraocular usually the largest, first and second in contact with the frontal; 9 or 10 supraciliaries, first largest; 2 subequal loreals; temporal scales larger than those on the neck; ear-opening half or less than half the size of the eye-opening, with 1 or 2 minute projecting lobules; tympanum deeply sunk; 7 supralabials, the fifth below the middle of the eye. Body-scales smooth,

24 or 26 round the middle; preanals not or but scarcely enlarged; tail rather thick at the base, tapering gradually to a point, once and a half to nearly twice as long as the body; subcaudal scales not transversely enlarged. Limbs rather short, not or just meeting when adpressed; digits moderate, 12 to 18 feebly keeled lamellæ beneath the fourth toe; palms of hands and soles of feet covered with conical tubercles.

Brown above, uniform or with dark longitudinal lines formed by a series of dots; upper half of flank and neck dark brown, the lower margin of colour usually not clearly defined; sides of neck with or without small white spots; below whitish, throat of adult male dark blue or purple, with white spots.

From snout to vent 58 mm.

Range. The hilly districts of Ceylon. Deraniyagala records it from many localities in the Central and Western Provinces.

198. Lygosoma striatopunctatum.

Lygosoma punctatolineatum (not of Boulenger, 1893) Boulenger, Spol. Zeyl. iv, 1907, p. 173 (type loc. Hakgalla, Ceylon; London).—*Lygosoma* (*Sphenomorphus*) *punctatolineatus*, Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 169.

Lygosoma striatopunctatum Ahl, Zool. Anz. lxv, 1925, 1/2, p. 20.

Differs from *L. taprobanense* as follows; perhaps not really distinct from it:—Prefrontals smaller and widely separated from one another; limbs shorter, more widely separated when adpressed; toes shorter, 10 or 12 lamellæ beneath the fourth toe; size smaller.

From snout to vent 40 mm.

Range. Ceylon. The types, adult and young, are from Hakgalla, altitude 5,000 feet; I have also seen specimens from Pattipola and Peradeniya.

199. Lygosoma fallax.

Lygosoma fallax Peters, Mon. Akad. Berlin, 1860, p. 184 (type loc. Ratnapura, Trincomali, Ceylon; Berlin); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 320, and Fauna Brit. Ind. 1890, p. 206.—*Lygosoma* (*Sphenomorphus*) *fallax*, Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 172.

Eumeces taprobanensis Günther, Rept. Brit. Ind. 1864, p. 89 (in part).

Closely allied to *L. taprobanense*, differing in the following particulars:—Frontal smaller, as long as or a little longer than the interparietal, which is large, undivided, and more or less heart-shaped; 24 or 26, somtimes 28, scales round the body; toes shorter, 13 to 16 lamellæ beneath the fourth toe. Size smaller.

From snout to vent 42 mm.

Range. The hilly districts of Ceylon. Deraniyagala records it from the Central, Eastern, and Western Provinces. At Punduloya it appears to be found in company with *taprobanense*. (Brit. Mus. 1905.3.25.32–41 and 90.11.8.10–12.)

200. Lygosoma megalops.

Lygosoma megalops Annandale, Spol. Zeyl. iii, 1906, p. 190 (type loc. Ceylon; types lost).

"Habit lacertiform; length from snout to fore-limb contained about one and a half times in the length from axilla to groin; limbs well developed, pentadactyle, overlapping when adpressed; snout short, obtusely pointed; eye large; diameter of orbit as great as length of snout; distance from orbit to ear-opening much longer than snout; ear-opening much smaller than eye, circular, without denticulations.

"Rostral much broader than deep, forming a straight suture with the fronto-nasal; no supranasals; nasal undivided. Frontal nearly as long as the fronto-parietals and interparietal together; interparietal completely separating the parietals; no distinct nuchals. Four large subequal supraoculars; seven or eight supraciliaries; six upper and five lower labials. Dorsals and laterals smooth, ventrals feebly keeled; body-scales subequal, imbricate, in 24 or 26 rows round the body; anals and caudals not enlarged; no enlarged scale on the heel; middle toe with twelve to fourteen subdigital plates. Colour almost uniform dark brown. Length of head and body, 2 inches; length of tail, $2\frac{3}{4}$ inches.

"*Localities.* One specimen from Puttalam; another from Kitulgala."

The above is Annandale's description in full. The types cannot now be found, and I have tentatively placed the species near *taprobanense*; by the author it was originally placed under *Dasia* (section).

201. Lygosoma courcyanum.

Lygosoma courcyanum Annandale, Rec. Ind. Mus. viii, 1912, p. 43, pl. v, fig. 5 (type loc. Rotung, N. Assam; Calcutta).

Distance between the end of the snout and the fore-limb contained a little more than one and a half times in the distance between the axilla and groin; snout short, obtuse; rostral convex, in good contact with the fronto-nasal, which is broader than long; prefrontals in good contact with one another; frontal shorter than the fronto-parietals and interparietal together; parietals in contact with one another behind the interparietal; no nuchals; 4 subequal supraoculars, the first and second in contact with the frontal; 8 or 9 supra-

ciliaries; 2 loreals, the posterior triangular in shape, its apex downwards; 2 superposed temporal scales larger than the others; 7 supralabials, fifth below the middle of the eye, sixth longest; ear-opening nearly as large as the eye-opening, with perfectly smooth border all round; tympanum scarcely sunk; body-scales smooth, dorsals and ventrals nearly equal, a little larger than the laterals; 26 scales round the body, 55 down the middle of the back; a pair of enlarged preanals; tail rather thick at the base. Limbs short, not quite meeting when adpressed; 12 or 13 lamellæ beneath the fourth toe; palms of hands and soles of feet with flattened tubercles.

Brown above, with darker spots; a dark brown dorso-lateral stripe edged above by a light one; flanks speckled with brown; whitish below.

From snout to vent 44; tail 57 mm.

The paratype from Upper Rotung has the body nearly cut in two. It differs from the type in having the prefrontals separated from one another and in having 28 scales round the body.

To this species I provisionally refer a third specimen from Dumpep, Khasi Hills, Assam. It differs from the type as follows:—Distance between the end of the snout and the fore-limb twice in the distance between the axilla and groin; prefrontals well separated from one another; 62 scales down the middle of the back; limbs shorter, well separated when adpressed; 11 lamellæ beneath the fourth toe.

202. Lygosoma quadrupes.

Anguis quadrupes Linn., Syst. Nat. 12th ed. 1766, p. 390 (type loc. Java).—*Lygosoma quadrupes*, Cochran, Proc. U.S. Nat. Mus. lxxvii, 1930, p. 16.

Lacerta serpens Bloch, Beschäft. Ges. Nat. Fr. Berlin, ii, 1776, p. 28, pl. ii.

Scincus brachypus Schneider, Hist. Amphib. ii, 1799, p. 192.

Seps pentadactylus Daudin, Hist. Nat., Rept. iv, 1802, p. 325.

Lygosoma abdominalis Gray, Ann. Mag. Nat. Hist. ii, 1839, p. 332 (type loc. India, Java; London).

Lygosoma brachypoda Dum. & Bibr., Erp. Gen. v, 1839, p. 721 (type loc. Java, Sumatra; Paris).

Lygosoma chalcides, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 340, and Fauna Malay Pen. 1912, p. 97; Mell, Arch. f. Naturg. Berlin, lxxxviii, 1922, p. 114.

Body very elongate; distance between the end of the snout and the fore-limb contained three and a half to four times in the distance between the axilla and groin. Snout short, rounded; rostral in contact with the fronto-nasal, which is broader than long; prefrontals widely separated from one another; frontal as long as or a little longer than the fronto-parietal, which is single; parietals in broad contact with one another behind the interparietal; 4 supraoculars,

the second largest, with strongly projecting angle on its inner margin; 6 supraciliaries; 2 loreals, the first shorter than the second; 2 superposed temporal scales larger than the others; 6 or 7 supralabials, the fifth below the middle of the eye; ear-opening punctiform, partly covered by scales; body-scales smooth, subequal; 24 or 26 round the middle of the body. Tail nearly as thick as the body for a considerable part of its length, tapering to a point, about as long as the head and body, covered with subequal scales. Limbs very short, the length of the fore-limb is contained twelve to fourteen times in the distance between the fore- and hind-limbs; digits very short, second, third, and fourth subequal, not much longer than the first and fifth; 5 lamellæ beneath the fourth toe.

Light brown above, with dark longitudinal lines along the edges of the scales. Whitish below.

From snout to vent 92 mm.

Range. French Indo-China; S. China; Hong-kong; Siam; the Malay Peninsula and Archipelago; the Philippine Islands.

Not uncommon in southern and central Siam and the southern parts of French Indo-China; hiding by day beneath logs and stones and issuing forth at dusk in search of food. The minute legs are used when crawling slowly about, but when moving rapidly they are folded back along the body, the action of which is then more or less serpentine.

A female kept by me in Bangkok laid three eggs on May 27th measuring 9 by 5 mm. in size. The young were born on June 28th and measured 43 mm. in total length, the head and body measuring 26 mm. Colour almost black, with fine longitudinal golden lines.

Genus **ATEUCHOSAURUS.**

Ateuchosaurus Gray, Cat. Liz. Brit. Mus. 1845, p. 107 (type *chinensis*).
Lygosaurus Hallowell, Proc. Acad. Philad. 1830, p. 496 (type *pellopleurus*); Stejneger, Herpet. Japan, 1907, p. 221.
Lygosoma, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 318.

Palatine bones in contact mesially; pterygoid bones in contact anteriorly, the palatal notch not extending forwards to between the centres of the eyes; maxillary teeth conical; no pterygoid teeth. Eyelids well developed, the lower scaly. Frontal shield very long, constricted in the middle or divided in two by a transverse suture; nostril in the nasal; no supranasals; prefrontals, fronto-parietals, and interparietal distinct; no proper parietals. Ear-opening distinct; limbs well developed, pentadactyle.

Two species.

Range. Tonking; S. China; the Riu-Kiu Islands.

203. Ateuchosaurus chinensis.

Ateuchosaurus chinensis Gray, Cat. Liz. Brit. Mus. 1845, p. 107 (type loc. China; London).—*Lygosoma chinense*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 318; Mell, Arch. f. Naturg. Berlin, lxxxviii, 1922, p. 114.

Lygosaurus sowerbyi Stejneger, Occ. Pap. Boston Nat. Hist. Soc. v, 1924, p. 120 (type loc. Futsing district, Fukien, China; Washington), and Proc. U.S. Nat. Mus. lxvi, (25) 1925, p. 53, fig. (head); Pope, Bull. Amer. Mus. Nat. Hist. lviii, 1929, p. 382.

Lygosaurus salsburyi Schmidt, Amer. Mus. Nov. no. 157, 1925, p. 2 (type loc. Nodoa, Hainan; New York) and Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 426, fig. (head).

Distance between the end of the snout and the fore-limb contained one and a half to one and three-quarter times in the distance between the axilla and groin; snout short, obtuse; fronto-nasal a little broader than long, in good contact with the rostral and frontal; prefrontals small,

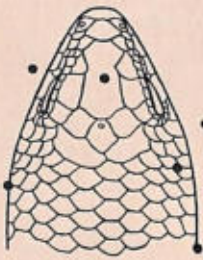


Fig. 69.—Upper surface of head of *Ateuchosaurus chinensis*.

widely separated from one another; frontal truncate anteriorly, about three times as long as its breadth at the middle, and twice as long as the fronto-parietals and interparietal together; fronto-parietals as large as or a little smaller than the interparietal, not in contact with one another; parietals replaced by 2 rather large irregular shields; no nuchals; 4 supraoculars, first and second in contact with the frontal, much larger than the third and fourth; 8 or 9 supraciliaries; anterior loreal higher and shorter than the posterior; no enlarged temporal scales. Ear-opening smaller than the eye-opening, without projecting lobules; tympanum deeply sunk; 6 supralabials, the fourth longest and below the eye; body-scales subequal, dorsals and laterals with 2, sometimes 3, obtuse keels, these scales also very finely striated; 28 to 30 scales round the body. Tail thick at the base, tapering to a fine point, not longer than the head and body; no enlarged subcaudals; no enlarged preanals. Limbs short; the adpressed limbs fail to meet by about the length of the hand; digits cylindrical, rather short; 16 or 17 smooth lamellæ

beneath the fourth toe; palms of hands and soles of feet with conical tubercles.

Brown above, each scale with a slightly darker central spot; sides paler, almost uniform or spotted with black and white, the black spot preceding the white. Sides of neck dark brown or black, with white spots; pale brown below.

From snout to vent 72 mm.

Range. S. China; Hong-kong; Tonking (Man-son Mts.). Not uncommon in Hong-kong.

Genus **LEIOLOPISMA** *.

Leiolopisma Dum. & Bibr., Erp. Gen. v, 1839, p. 742 (type *Scincus telfairii*).
Lampropholis Fitzinger, Syst. Rept., 1843, p. 22 (type *Lygosoma guichenoti* Dum. & Bibr.).
Eulepis Fitzinger, ibid. 1843, p. 22 (type *Lygosoma duperreyi* Dum. & Bibr.).
Lipinia Gray, Cat. Liz. Brit. Mus. 1845, p. 84 (type *pulchella*).
Mocoa Gray, l. c. s. 1845, p. 80 (type *guichenoti*).
Cyclodina Girard, Proc. Acad. Philad. 1857, p. 195 (type *ænea*).
Oligosoma Girard, l. c. s. 1857, p. 196 (type *Mocoa zelandica* Gray).
Lygosomella Girard, l. c. s. 1857, p. 196 (type *æstuosa*).
Hombronia Girard, l. c. s. 1857, p. 196 (type *fasciolaris*).
Lioscincus Bocage, J. Acad. Sci. Lisbon, iv, 1873, p. 228 (type *steindachneri*).
? *Tropidoscincus* Bocage, l. c. s. 1873, p. 230 (type *aubrianus*).
Sauroscincus Peters, Sitz. Ges. Nat. Fr. Berlin, 1879, p. 149 (type *braconnieri*).
Lygosoma, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 209, and Fauna Brit. Ind. 1890, p. 192.

Palatine bones in contact mesially; pterygoid bones in contact anteriorly, the palatal notch not extending forwards to between the centres of the eyes (fig. 67); pterygoid teeth minute or absent; maxillary teeth conical. Eyelids well developed, the lower with an undivided, more or less transparent disc. Nostril in the nasal; no supranasals; prefrontals, fronto-parietal(s), and interparietal distinct; ear-opening distinct †, limbs present, pentadactyle †?

Range. From Polynesia, New Zealand, and Tasmania to Africa and North America.

The determination of the species grouped under this genus is often extremely puzzling. Two forms that in one area seem quite distinct, in another area appear to intergrade. Comparison in such cases depends upon very trivial characters and morphological differences; colour-pattern, geographical distribution, and even habits have all to be taken into account. They are, perhaps, species in the making, and until we have a more exact conception of what a species is they will continue to confound us.

* Λειος—smooth, and λοπισμα—envelope.
† In all Indian and Indo-Chinese species.

Key to the Indian and Indo-Chinese Species.

I. Dorsal and lateral scales equal or dorsals a little larger; no enlarged nuchals; ear-opening larger than the palpebral disc, without projecting lobules.

A. The adpressed limbs nearly meet or overlap.

28 to 32 scales round body; back with small black dots ..... *r. reevesi*, p. 295.
34 to 38 scales round body; colour same ..... *r. melanostictum*, [p. 296.
34 to 36 scales round body; a vertebral series of large black spots ..... *rupicola*, p. 297.

B. Adpressed limbs widely separated; 24 to 28 scales round body.

Distance between end of snout and fore-limb twice in distance between axilla and groin; third and fourth toes equal ..... [p. 297. *punctatolineatum*,
Distance between end of snout and fore-limb 1¾ times in distance between axilla and groin; third toe shorter than fourth ..... *tavesæ*, p. 298.

II. Dorsal scales distinctly larger than laterals, 4 or 6 across the back; 3 to 6 pairs of nuchals.

A. Snout short, obtuse; no light vertebral stripe.

32 or 34 scales round body; preanals not or but feebly enlarged ..... [*formosum*], p. 298.

b. Ear with projecting lobules.

26 to 30 scales round body ..... [p. 299. *himalayanum*,
32 to 38 scales round body ..... *daddecense*, p. 300.
22 to 26 scales round body; preanals longer than broad; auricular lobules very small ..... *bilineatum*, p. 306.

2. Ear without projecting lobules, sometimes with small granules anteriorly.

a. Ear-opening smaller than palpebral disc.

22 to 24 scales round body ..... *sikkimense*, p. 301.

b. Ear-opening not smaller than palpebral disc.

a. Ear-opening much larger than disc; belly white.

28 to 32 scales round body; 16 to 18 lamellæ under fourth toe ..... *doriæ*, p. 302.
26 to 30 scales round body; 10 to 13 lamellæ under fourth toe ..... *modestum*, p. 303.
31 or 32 scales round body; the leg reaches nearly to the axilla ..... *macrotis*, p. 303.

β. Ear-opening not, or not much, larger than disc; belly grey.

22 to 26 scales round body; fronto-parietal single or partly divided ..... [p. 304. *travancoricum*,
28 to 30 scales round body; fronto-parietal single .. *palnicum*, p. 305.
20 to 24 scales round body; 2 fronto-parietals ..... *beddomei*, p. 305.
26 to 28 scales round body; 2 fronto-parietals ..... *laterimaculatum*, [p. 305.

B. Snout pointed; a light vertebral stripe.
Two fronto-parietals; ear-opening much smaller than palpebral disc; one light vertebral stripe ..... *v. vittigerum*, [p. 306.
Back with (3) 5 light longitudinal stripes ..... *v. microcercum*, [p. 306.
A single fronto-parietal; ear-opening larger than the palpebral disc ..... *macrotympanum*, [p. 308.

The following characters are common to all the species mentioned in this work unless otherwise stated :—

Snout short, obtuse; rostral in good contact with the fronto-nasal, which is broader than long; parietals in contact with one another behind the interparietal; 4 large supraoculars, followed by 3 or 2 much smaller ones, the first and second in contact with the frontal; 2 loreals, the anterior higher and shorter than the posterior; 2 superposed temporal shields, the upper much larger than the lower; 7 supralabials, the fifth or fifth and sixth below the eye, larger than the preceding labials; tail long, tapering gradually to a point; a pair of enlarged preanals; palms of hands and soles of feet covered with conical tubercles.

204. Leiolopisma reevesi reevesi.

Tiliqua reevesii Gray, Ann. Mag. Nat. Hist. ii, 1838, p. 292 (type loc. China; London).—*Leiolopisma reevesi*, Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 423.

Lygosoma nigropunctatum Bocourt, Ann. Sci. Nat. (6) viii, 1878, art. 16, and Miss. Sci. Mex., Rept. pl. xxii, F, fig. 2 (type loc. Whampoa, Canton Province; Paris).

Leiolopisma laterale, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 264 (in part); Smith, J. Nat. Hist. Soc. Siam, vi, 1923, p. 200; Mell, Arch. f. Naturg. Berlin, lxxxviii, 1922, p. 114.

Lygosoma kakhienense Boulenger, Ann. Mus. Civ. Genova, (2) iv, 1887, p. 621 (type loc. Kakhien Hills, N.E. of Bhamo; London), and Fauna Brit. Ind. 1890, p. 198.

Leiolopisma cunice Cochran, Proc. Biol. Soc. Washington, xl, 1927, p. 187 (type loc. Pak Jong, Dong Paya Fai Mts.; Washington), and Proc. U.S. Nat. Mus. lxxvii, (11) 1930, p. 18, fig. (head).

Distance between the end of the snout and the fore-limb contained once and a half to nearly twice in the distance between axilla and groin; prefrontals large, in contact with or just separated from one another; frontal as long as or shorter than the fronto-parietals and interparietal together; no nuchals, or rarely a single pair; 6 or 7 supraciliaries; ear-opening oval, nearly as large as the eye-opening; no projecting lobules; body-scales smooth, the dorsals not or only slightly larger than the laterals, 28 to 32 round the middle of the body, 8 across the back; tail once and a half to nearly twice as long as the head and body, the median series of scales below slightly enlarged transversely. Limbs

moderate, the adpressed limbs just fail to meet or the leg may reach as far as the wrist; digits long, compressed, 15 to 20 obtusely keeled lamellæ beneath the fourth toe.

Light or dark brown above, with small black spots, which may be collected to form a vertebral line; a black stripe along the upper half of the flank, starting from behind the eye, more or less thickly spotted with white. Lower parts of flanks with small black spots; whitish below.

From snout to vent 50 mm.

Range. The whole of French Indo-China; Burma (Bhamo district; Dawna Hills; Pegu Yomas); Siam except in the south-east (Chantabun district); Hainan; Hong-kong; China south of the West River.

Usually found in hilly country; on the Langbian Plateau I obtained it at all elevations up to 5,000 feet.

The variations in the number of scales round the body is as follows (the numbers in brackets indicate the number of specimens examined):—Hong-kong, Hainan, 30–32 (20); Kakhien Hills, N.E. Burma, 30 (1), type of *kakhienensis*; Pegu Yomas and Dawna Hills, 30–32 (3); N. Siam, 30–32 (8); Dong Paya Fai Mts., E. Siam, 30–32 (8, 30 in one only); Langbian Plateau, 28–32 (15).

204 *a*. **Leiolopisma reevesi melanostictum.**

Lygosoma melanostictum Boulenger, Ann. Mus. Civ. Genova, (2) v, 1887, p. 479, pl. vii, fig. 2 (type loc. Plapoo, N. Tenasserim; London and Genoa), and ibid. (2) xiii, 1893, p. 320, and Fauna Brit. Ind. 1890, p. 199; S. Flower (in part) Proc. Zool. Soc. London, 1899, p. 650; Schenkel, Verh. Ges. Basel, xiii, 1901, p. 190 (?); Smith, J. Nat. Hist. Soc. Siam, ii, 1916, p. 157.

Differs from the typical form only in the number of scale-rows, 34 to 38 round the middle of the body, and slightly in coloration. Specimens from Peninsular Siam (Nakon Sritamarat Mts.) have the back often more profusely dotted with black; those from the Chantabun district, S.E. Siam, are paler in colour, the back sometimes almost uniform and the dark lateral stripe much less distinct.

A specimen from the Nakon Sritamarat Mts. measures 58 mm. from snout to vent.

Range. Tenasserim; Peninsular Siam; S.E. Siam (Chantabun district).

Leiolopisma kohtaoensis Cochran, Proc. Biol. Soc. Washington, xl, 1927, p. 188 (type loc. Koh Tao, Gulf of Siam, just north of lat. 10°; Washington), and Proc. U.S. Nat. Mus. lxxvii, 1930, p. 20, fig. head (not seen by me), has 30 (32) scales round the middle of the body and slightly enlarged nuchals; in morphological characters and coloration it resembles

reevesi reevesi, which is not found in this area. To *kohtaoensis* I tentatively refer a specimen from the Nakon Sritamarat Mts. (Brit. Mus. 1933.12.1.2), which has 28 scales round the body.

205. Leiolopisma rupicola.

Lygosoma rupicola Smith, J. Nat. Hist. Soc. Siam, ii, 1916, p. 46 (type loc. Chong Kae, near Paknampo, C. Siam; London).

Closely related to *L. reevesi reevesi* differing as follows:— Body stouter; 34 to 36 scales round the body: 16 to 18 lamellæ under the fourth toe; the leg reaches to the hand or the axilla.

Colour-pattern quite different. Light brown above, with a vertebral series of largish black spots; a dark brown or black stripe along the upper half of the neck and side of the body, broken up at regular intervals by light vertical bars; lower parts of sides of neck and body, and below, brownish-white.

From snout to vent 53 mm.

Range. Central Siam, near Paknampo; Dong Paya Fai Mts., 2000 feet, E. Siam; Huey Sapan, N.E. Siam; Daban (foothills) Langbian Plateau, S. Annam.

206. Leiolopisma punctatolineatum.

Lygosoma punctatolineatum Boulenger, Ann. Mus. Civ. Genova, (2) xiii, 1893, p. 321 (type loc. Bia-po, Karin Hills, Burma; Genoa).

Distance between end of the snout and the fore-limb twice, or a little more, in the distance between the axilla and groin; prefrontals narrowly separated from one another; frontal shorter than the fronto-parietals and interparietal together; no enlarged nuchals; 6 or 7 supraciliaries; ear-opening very large, nearly as large as the eye-opening, quite smooth all round the margin; tympanum scarcely sunk. Body-scales smooth; dorsals a little larger than laterals; 24 or 26 scales round the body, 6 across the back; a pair of very large preanal shields; tail rather thick at the base, one and a half times as long as the head and body, the median series of scales below slightly enlarged transversely. Limbs short, widely separated when adpressed; third and fourth toes equal in length; 12 or 14 smooth lamellæ beneath the fourth toe.

Light brown above, with dark longitudinal streaks, one for each series of scales; a dark dorso-lateral stripe; flanks spotted with brown; lightish below.

From snout to vent 37 mm.

Known only from the two type-specimens.

207. **Leiolopisma tavesæ**, sp. nov.

Description of the type (Brit. Mus. no. 1933.12.1.1.) Distance between the end of the snout and the fore-limb contained one and three-fifth times in the distance between the axilla and groin; prefrontals narrowly separated from one another; frontal nearly as long as the fronto-parietals and interparietal together; no enlarged nuchals; 8 supraciliaries, first much the largest; anterior loreal longer than high, much larger than the posterior; ear-opening very large, nearly as large as the eye-opening, quite smooth all round the margin; tympanum scarcely sunk. Body-scales smooth, subequal, 26 round the middle of the body, 6 across the back; a pair of very large præanal shields; tail nearly twice as long as the head and body, the median series of scales below not transversely enlarged; limbs rather short, not meeting when adpressed by nearly the length of the fore-limb; fourth toe longer than third, 14 lamellæ beneath it.

Light brown above, with indistinct darker longitudinal lines; a dark dorso-lateral stripe; sides of the neck and flanks with dark longitudinal streaks; whitish below.

From snout to vent 38 mm.

The type, which is named after Miss Patricia Taves, was collected in the Bong Tee Valley, west of Kanburi, C. Siam, by Mr. K. G. Gairdner in 1914.

A second specimen, which I refer to this species, was obtained somewhere in Peninsular Siam, exact locality of origin unknown. It differs from the type in the following particulars:—Anterior and a posterior loreal subequal; ear-opening slightly smaller; 28 scales round the middle of the body.

Colour-pattern the same, but the dark markings much more distinct.

A third specimen, no. 19871, is in the Indian Museum. It was obtained by Mr. C. Rogers in the Paunglin Forest Reserve, Pegu district. The loreals are as in the second specimen, but in other respects it agrees with the type.

Leiolopisma formosum.

Mocoa formosa Blyth, J. Asiat. Soc. Beng. xxii, 1853, p. 651 (type loc: Mirzapur, N. W. P., and Wazirabad, Punjab; Calcutta); Theobald, Cat. Rept. Mus. Asiat. Soc. 1868, p. 26, and Cat. Rept. Brit. Ind. 1876, p. 58; Boulenger, Fauna Brit. Ind. 1890, p. 205.—*Lygosoma formosum*, Annandale, J. Asiat. Soc. Beng. (n. s.) i, 1905, p. 146.

Distance between the end of the snout and the fore-limb contained one and a half to one and three-quarter times in the distance between the axilla and groin; prefrontals narrowly separated from one another; frontal as long as the fronto-parietals and interparietal together; 4 or 5 pairs

of nuchals; 8 supraciliaries; ear-opening subcircular, nearly as large as the eye-opening; no projecting lobules; tympanum deeply sunk; 6 or 7 subequal supralabials, the fifth or fifth and sixth below the eye. Scales of the body smooth; dorsals and ventrals subequal, larger than the laterals; 32 and 34 scales round the middle of the body; marginal preanals very slightly enlarged. Tail as long as the head and body; the adpressed limbs do not quite meet or just overlap; digits long, not compressed, 18 to 22 smooth lamellæ beneath the fourth toe.

Olive-green in life above, with longitudinally arranged black spots, many of which have a central shaft of white; flanks thickly spotted with black; below greenish-plumbeous. From snout to vent 90 mm.

The above is a description of the types, the larger of the two being a female containing four eggs. Blyth is quite clear in his description as to where the specimens were procured and who collected them, and it is difficult to understand how any error could have arisen. I am unable, however, to find any character by which to separate these specimens from *L. nineo-ocellata* (Duméril) from New Zealand. It is noteworthy also that no further specimens of this large Skink have been met with since, although numerous collections have been made in the Punjab and N.W. Frontier Province.

208. Leiolopisma himalayanum.

Eumeces himalayanus Günther, Rept. Brit. Ind. 1864, p. 86, pl. x, fig. H (type loc. W. Himalayas; London).—*Mocoa himalayana*, Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 127; Theobald, Cat. Rept. Brit. Ind. 1876, p. 57; Blanford, Sci. Res. 2nd Yarkand Miss., Rept. 1878, p. 19.—*Lygosoma himalayanum*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 257, pl. xvii, fig. 2, and Fauna Brit. Ind. 1890, p. 200; Alcock, Report Nat. Hist. Pamir Boundary Comm. 1898, p. 36; Annandale, Rec. Ind. Mus. i, 1907, p. 155, pl. 6, fig. 3; Zugmayer, Zool. Jahrb. 1909, p. 488; Wall, J. Bombay N.H. Soc. xxi, 1911, p. 133; Schmidt, Pub. Field Mus. Nat. Hist. xii, 1926, p. 159; Hora, Rec. Ind. Mus. xxix, 1927, p. 4.

Euprepes blythi Steindachner, Reise Novara, Rept. 1869, p. 46 (type loc. Wangu Valley, Kashmir; Vienna).

Distance between the end of the snout and the fore-limb contained one and a half to one and three-quarter times in the distance between the axilla and groin; prefrontals usually separated from one another; frontal as long as the fronto-parietals and interparietal together; 3 or 4 pairs of nuchals; 6 to 8 supraciliaries, first largest; palpebral disc large, occupying more than half the lower lid; ear-opening oval, nearly as large as the eye-opening, with 2 or 3 short projecting lobules anteriorly; tympanum deeply sunk. Body-scales smooth, the four median series of dorsals nearly twice as large

as the laterals; 26 to 30 scales round the body; a pair of very large preanals; tail one and a half times as long as the head and body or a little more, with a series of transversely enlarged scales below; limbs rather short; the adpressed limbs fail to meet or just overlap; digits long, subcylindrical, 14 to 20 smooth or obtusely keeled lamellæ beneath the fourth toe.

Colour somewhat variable. Brownish-olive above, with small dark brown or blackish spots, sometimes collected into a vertebral series; sometimes numerous small golden spots; a light dorso-lateral stripe present or absent; along the upper part of the neck and flank a dark stripe, often edged below by a white stripe; greyish or plumbeous below, the scales edged with darker.

From snout to vent 65 mm.

Range. Kashmir; the Punjab (Simla and Garhwal districts, Allahabad); N.W.F.P. (Chitral); Mussooree, Naini Tal (U.P.); Nepal; S. Turkestan. Annandale states that in Little Nepal it occurs with *L. sikkimense*. Common in many districts, ascending to elevations of 12,000 feet.

Viviparous, producing 3 or 4 young at a time. Annandale (1907) states that females examined in Kumaon district in May contained eggs, but not those examined in September.

According to him it is by far the commonest Skink in Kumaon between 4,000 and 7,000 feet. It appears to avoid the sun and is often found in rather damp situations. It is very abundant on the banks of the lake at Naini Tal and in the gardens at Simla. Males taken in that district in April and May had a lateral stripe of orange or red along the body below the dark lateral stripe. This stripe was absent in females and in specimens of both sexes examined in Kumaon in the autumn.

The types of *blythi*, two in number, represent a form which is intermediate between *himalayanum* and *ladacence*, but, on the whole, nearer to the former. They have 30 and 32 scales round the body respectively, and the leg reaches to the wrist; the coloration is that of *himalayanum*.

209. Leiolopisma ladacense.

Eumeces ladacensis Günther, Rept. Brit. Ind. 1864, p. 88, pl. x, fig. 1 (type loc. Ladak, Kashmir; London).—*Lygosoma ladacense*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 258, pl. xvii, fig. 3, and Fauna Brit. Ind. 1890, p. 201; Schmidt, Pub. Field Mus. Nat. Hist. xii, 1926, p. 169.

Euprepes stoliczkai Steindachner, Reise Novara, Rept. 1869, p. 45 (type loc. Spiti River Valley; Vienna); Blanford, Sci. Res. 2nd Yarkand Miss. 1878, p. 20.

Euprepes kargilensis Steindachner, Reise Novara, Rept. 1869, p. 46 (type loc. Kargil, Kashmir; Vienna).

Closely related to *himalayanum*, differing as follows :—Distance between the end of the snout and the axilla contained one and one-third to one and a half times in the distance between the axilla and groin ; prefrontals in contact with or just separated from one another ; 32 to 38 scales round the body ; the leg reaches to the wrist or the elbow ; 20 to 24 lamellæ beneath the fourth toe.

Bronze or olive above, thickly speckled with black, some of the spots bearing a central shaft of white or gold ; a dark brown stripe along the upper half of the neck and flank, spotted with light brown or olive and bordered above with whitish ; lower parts of flanks with small dark spots ; belly bluish or greyish, the scales more or less margined with dark grey.

From snout to vent 50 mm.

Range. Ladakh and adjacent districts. Found up to 14,000 feet altitude.

219. Leiolopisma sikkimense.

Mocoa sikkimensis Blyth, J. Asiat. Soc. Beng. xxii, 1854, p. 652 (type loc. Sikkim) ; Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 128, pl. v, fig. 2.—*Lygosoma sikkimense*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 257, and Fauna Brit. Ind. 1890, p. 199 ; Annandale, Rec. Ind. Mus. i, 1907, p. 155, pl. vi, fig. 4, and ibid. v, 1910, p. 201, and ibid. vii, 1912, p. 46 ; Hora, Rec. Ind. Mus. xxix, 1927, p. 4.

Piliqua schlegelii Günther, Proc. Zool. Soc. London, 1860, p. 153, pl. xxv, fig. C (type loc. Sikkim ; London).—*Eumeces schlegelii*, Günther, Rept. Brit. Ind. 1864, p. 86.

Mocoa sacra Stoliczka, P. Asiat. Soc. Beng. 1871, p. 195, and J. Asiat. Soc. Beng. xli, 1872, p. 128, pl. iv, fig. 4 (type loc. Parasonath Hill, N.W. Bengal ; Calcutta) ; Annandale, Rec. Ind. Mus. v, 1910, p. 201.

Differs from *himalayanum* as follows :—Distance between the end of the snout and the fore-limb contained one and one-third to one and two-third times in the distance between the axillæ and groin ; ear-opening smaller, smaller than the palpebral disc ; no projecting lobules, but sometimes a few granules on the anterior margin ; dorsal scales twice as large as the laterals ; 22 to 24 scales round the body ; the adpressed limbs do not meet or the leg may reach to the wrist ; digits more compressed, 15 to 17 lamellæ beneath the fourth toe.

Bronze-brown above, with black, sometimes with small gold spots or short streaks arranged in longitudinal series ; a dark brown stripe along the upper part of the side of the head, neck, and body ; flanks with white spots ; sometimes a white lateral line ; pale bluish or whitish below.

From snout to vent 53 mm.

Range. The Eastern Himalayas (Darjeeling district; Sikkim; Nepal, Katmandu, Chitlong); N. Bengal (Rangpur district); Bihar (Parasnath Hill); S. Tibet.

Common in the Darjeeling district and in many parts of Sikkim and Eastern Nepal, between 3,000 and 10,000 feet altitude. Oviparous, laying 4 to 6 eggs.

Annandale (1910) remarks: "On several occasions during the Rains I have found small lizard's eggs hidden in little pockets in the damp moss on tree-trunks near Kurseong, without being able to assign them to any species. There can now be no doubt that their parent is *Lygosoma sikkimense*. Two clutches of 4 eggs each were found at an altitude of 4,700 feet in the last week of June. One clutch was brought to Calcutta and apparently lived for about a fortnight, without hatching. The eggs were dissected on July 12th and found to contain perfectly formed little lizards, dead but not decomposed. They had a stiff but not calcareous white shell and measured 10×6 mm., the ends being equally rounded. The young lizards had bright red tails and measured about 37 mm. when stretched out."

The types of *Mocoa sacra*, two in number, differ from the typical form in having a more slender build and paler coloration. They may as well be retained under *sikkimense*. Parasnath Hill, whence they came, is distant from the nearest Himalayan foot-hills by some 180 miles, and the occurrence of this strictly montane species south of the Gangetic Plain raises an interesting point in zoological distribution.

211. Leiolopisma doriæ.

Lygosoma doriæ Boulenger, Ann. Mus. Civ. Genova, (2) iv, 1887, p. 620 (type loc. hills W. of Bhamo, Burma; London and Genoa), and Fauna Brit. Ind. 1890, p. 201; Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 502.

Distance between the end of the snout and the fore-limb contained one and one-third to one and two-third times in the distance between the axilla and groin; prefrontals narrowly separated from or just touching one another; frontal nearly as long as the fronto-parietals and interparietal together; 3 or 4 pairs of nuchals; 7 or 8 supraciliaries; ear-opening much larger than the palpebral disc; no projecting lobules or granules. Body-scales smooth, dorsals not twice as large as the laterals; 28 to 32 scales * round the body, 6 across the back; a pair of large preanals; tail one and three-quarter times as long as the head and body, with a median series of transversely enlarged scales below; the adpressed limbs do not quite meet, or the leg may reach to the wrist. Digits long; 16 to 18 keeled lamellæ beneath the fourth toe.

* Boulenger's count for the types are 26, 28.

Bronze-brown or golden above, with numerous small black spots; a dark brown stripe along the upper half of the flank and neck much broken up by lighter spots; lower parts of flanks with small black spots; whitish below.

From snout to vent 58 mm.

Range. N. Burma (Kakhien Hills); Yunnan-fu. Two very young specimens from Doi Suthep, N. Siam, I refer provisionally to this species (Brit. Mus. 1933.12.1.3).

212. Leiolopisma modestum.

Eumeces modestus Günther, Rept. Brit. Ind. 1864, p. 87, pl. x, fig. 9 (type loc. Ningpo, China; London).—*Leiolopisma modestum*, Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 497; Pope, ibid. lviii, 1929, p. 384.

Lygosoma laterale, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 264 (in part).

? *Mocoa exigua* Anderson, Zool. Res. W. Yunnan, 1878–9, p. 797 (type loc. Momein, Yunnan; Calcutta).

Allied to *doriæ*, differing as follows:—26 to 30 scales round the middle of the body, the dorsals sometimes quite twice as large as the laterals; median subcaudals more enlarged transversely; toes shorter; 10 to 16 lamellæ beneath the fourth toe.

Colour as in *doriæ*, but the back less thickly spotted with black.

Size smaller. From snout to vent 41 mm.

Range. Central and Southern China; Hongkong; Yunnan. Three specimens from Hongkong have 26 scales each round the middle of the body.

Leiolopisma barbouri Stejneger, J. Washington Acad. Sci. xv, 7, 1925, p. 150 (type loc. Yunnan-fu; New York) may belong here. (Not seen by me).

I have placed *Mocoa exigua* in the synonymy of this species, but I am not satisfied that it really belongs there. The type is in too bad a state of preservation to be correctly identified. The palpebral disc appears to be larger than the ear-opening, and the colour-pattern—a broad dark brown vertebral stripe bordered on each side with an equally broad one of greenish-yellow—is different. I count 26 scales round the body; the hind-feet are missing.

213. Leiolopisma macrotis.

Euprepes macrotis Steindachner, Reise Novara, Rept. 1869, p. 48 (type loc. Nicobar Islands; Vienna).—*Lygosoma macrotis* Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 265, and Fauna Brit. Ind. 1890, p. 205.

Distance between the end of the snout and the fore-limb a little shorter than the distance between the axilla and groin;

prefrontals separated; frontal as long as the fronto-parietals and interparietal together; 2 pairs of nuchals; ear-opening nearly as large as the eye-opening, with perfectly smooth edge all round; tympanum scarcely sunk; 31 or 32 smooth scales round the body, the dorsals and ventrals larger than the laterals; a pair of large preanals. Tail a little longer than the head and body, with a median series of transversely enlarged scales below. The leg reaches nearly to the axilla.

Brown above, with a deep black lateral band; belly yellowish-white.

From snout to vent 24 mm.

The above description is drawn up partly from Steindachner's description, partly from the type, which is now quite colourless and much shrivelled, so that a proper examination is not possible.

214. Leiolopisma travancoricum.

Mocoa travancorica (in part) Beddome, Madras Month. J. Med. Sci. 1870, p. 34 (type loc. Travancore Hills; London).—*Lygosoma travancoricum*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 261, pl. xviii, fig. 4, and Fauna Brit. Ind. 1890, p. 204.

Distance between the end of the snout and the fore-limb contained one and one-third to one and two-third times in the distance between the axilla and groin; prefrontals separated from one another; frontal as long as or shorter than the fronto-parietal and interparietal together; fronto-parietal single or partially divided by a suture running forwards from the interparietal; 3 or 4 pairs of nuchals; 7 or 8 supraciliaries, first largest; second supraocular sometimes entering the supraciliary margin; ear-opening as large as or a little larger than the palpebral disc; no projecting lobules, but sometimes a few granules on the anterior margin; tympanum deeply sunk. Body-scales smooth, the dorsal nearly or quite twice as large as the lateral, nearly or quite twice as broad as long; 22 to 26 scales round the middle of the body, 4 across the back. Tail more than one and a half times as long as the head and body, the median series of scales below very strongly enlarged transversely; limbs rather short, the adpressed limbs do not quite meet or just overlap; digits long, subcylindrical; 18 to 24 lamellæ beneath the fourth toe.

Bronzy brown or greyish-brown above, uniform or with a few black spots which may form a vertebral line; a dark brown or black stripe along the side of the head, neck, and upper part of the flank, clearly defined above, where it is edged with a more or less distinct light brown or yellowish dorso-lateral streak; lower parts of neck and flank thickly

spotted with dark brown. Below dark grey, the scales edged with darker.

From snout to vent 53 mm.

Range. S. India; Travancore, Anaimalai and Palni Hills. Up to 5,000 feet altitude.

215. Leiolopisma palnicum.

Lygosoma (Leiolopisma) travancoricum var. *palnica* Boettger, Ber. Offenb. Ver. Nat. 29/32, 1892, p. 72 (type loc. Kodaikanal, Palni Hills, S. India; Frankfurt and London).

Differs from *travancoricum* as follows:—Fronto-parietal always entire; supraocular not entering the supraciliary margin; 28 to 30 scales round the body; the dorsals three or nearly three times as broad as long.

Colour the same, the light dorso-lateral stripe being very distinct, margined on its inner side with dark brown; greyish-white below.

Range. The Palni Hills, up to 7,000 feet; Coimbatore, Madras Presidency.

Variation. A topotypical specimen has the interparietal united with the parietal.

216. Leiolopisma beddomei.

Mocoa travancorica (in part) Beddome, Madras Month. J. Med. Sci. 1870, p. 34.

Lygosoma beddomei Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 261, pl. xviii, fig. 3 (type loc. Travancore Hills; London), and Fauna Brit. Ind. 1890, p. 203; Annandale, J. Asiat. Soc. Beng. (2) i, 1905, p. 146.

Perhaps only a varient of *travancoricum*, from which it differs as follows:—Fronto-parietals completely divided; 20 to 24 scales round the body; 17 to 18 lamellæ beneath the fourth toe.

Range. Travancore Hills; Nilgiris (Coonoor).

217. Leiolopisma laterimaculatum.

Lygosoma laterimaculatum Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 260, pl. xviii, fig. 2 (type loc. top of Sivagiri Ghat, Tinnevelly district; London), and Fauna Brit. Ind. 1890, p. 202.

Distance between the end of the snout and the fore-limb contained one and one-fifth to one and one-third times in the distance between the axilla and groin; prefrontals rather small, widely separated from one another; frontal shorter than the fronto-parietals and interparietal together; 3 or 4 pairs of nuchals; 7 or 8 supraciliaries; ear-opening larger than the palpebral disc; no projecting lobules, sometimes

a few granules on the anterior margin; body-scales smooth, or dorsals feebly multi-carinate; dorsals and ventrals a little larger than the laterals; 26 to 28 scales round the middle of the body, 6 across the back; a pair of enlarged preanals, which are broader than long. Tail about one and a half times as long as the head and body; median subcaudals very strongly enlarged transversely. The leg reaches to the wrist or the elbow; digits long, subcylindrical, 20 to 25 smooth lamellæ under the fourth toe.

Brown or bronze above, with a blackish stripe, light-edged above, along the side of the head and body; sides of neck and flanks below this thickly spotted with black; two fine black lines or series of dots down the back along the outer margins of the two vertebral series of scales. Lower parts greyish; tail blue in the young.

From snout to vent 36 mm.

Range. S. India (Tinnevelly district; Nilgiris; Travancore).

218. Leiolopisma bilineatum.

Mocoa bilineatum Gray, Ann. Mag. Nat. Hist. xviii, 1846, p. 430 (type loc. summit of Nilgiris; London); Jerdon, J. Asiat. Soc. Beng. xxii, 1853, p. 477.—*Lygosoma bilineatum*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 259, pl. xvii, fig. 1, and Fauna Brit. Ind. 1890, p. 202.

Closely allied to *laterimaculatum*, differing as follows:—Body longer; distance between the end of the snout and the fore-limb contained once and a half to twice in the distance between the axilla and groin; ear-opening with 2 or 3 very small projecting lobules; 22 to 26 scales round the middle of the body; 4 large preanals, longer than broad, pointed in the male; tail thicker at the base; the adpressed limbs fail to meet in the adult, just overlap in the young; 16 to 20 lamellæ under the fourth toe.

Colour the same, except that the sides are not spotted with black. Jerdon states that "in the young and half-grown animal the tail is of a beautiful smalt or violet colour."

From snout to vent 65 mm.

Range. The Nilgiri Hills in S. India.

219. Leiolopisma vittigerum vittigerum.

Lygosoma vittigerum Boulenger, Ann. Mus. Civ. Genova, (2) xiv, 1894, p. 615 (type loc. Sereinu, Mentawi Is.; Genoa), and Fauna Malay Pen. 1912, p. 94; Smith, J. Nat. Hist. Soc. Siam, i, 1915, p. 154.

Lygosoma pulchellum (not of Boulenger 1908), Annandale, J. & P. Asiat. Soc. Beng. (n. s.) i, 1905, p. 145.

Leiolopisma pranensis Cochran, Proc. U.S. Nat. Mus. lxxvii, 1930, p. 18, fig. (type loc. Prin, Siam, lat. 12° 40′ N; Washington).

Distance between the end of the snout and the fore-limb contained one and a quarter to one and one-fifth times in the distance between the axilla and groin; snout pointed, nearly twice as long as the eye; fronto-nasal nearly as long as broad; prefrontals usually in good contact with one another; frontal narrow behind, a little shorter than the fronto-parietals and interparietal together, in contact with two or three supraoculars; 2 to 4 pairs of nuchals; posterior loreal elongate, twice as long as the anterior; 9 or 10 supraciliaries; 2 large temporal shields border the parietal; ear-opening smaller than the palpebral disc, without projecting lobules; tympanum deeply sunk. Body-scales smooth, the 2 or 4 vertebral series broadest, much broader than the laterals; 28 to 30 scales round the middle of the body; a pair of large preanals. Tail a little longer than the head and body, the median series of scales below transversely enlarged. Limbs moderate, the leg reaching to the wrist or the elbow; digits long, subcylindrical or feebly depressed; 20 to 26 lamellæ beneath the fourth toe, those upon the basal phalanges being shorter and more erect than those upon the terminal phalanx (fig. 3, p. 8.)

Adult coloration. A broad white (green or golden in life) vertebral stripe starts from the snout and extends nearly to the tip of the tail; it is bordered on each side by a broad stripe of black which terminates on the base of the tail; the rest of the body above and on the sides is light brown, or greenish, speckled with black. A more or less distinct dark dorso-lateral stripe usually present, at least anteriorly; greenish-white below; tail light brown (orange in life).

Juvenile. In all the juveniles that I have examined from the north of Siam the dark dorso-lateral stripe is broad and well defined, so that the back is marked with three light longitudinal stripes. South of the Indo-Chinese Subregion the dark dorso-lateral stripe may be entirely absent; a juvenile from N. Siam, near Paklai, Upper Mekong, represents an intermediate between this form and the following.

Range. Tenasserim; Siam (Tasan, Isthmus of Kra; west of Kanburi; Pran; Chantaboon; Raheng district; Meh Lem, Meh Wang in N. Siam); the Malayan Subregion.

Widely distributed, but apparently nowhere common; found at sea-level and in the hills up to 5,000 feet. Its habits are chiefly arboreal, a fact which may explain its apparent rarity. Oviparous, the eggs very large, three in number.

x 2

219 *a*. Leiolopisma vittigerum microcercum.

Lygosoma (*Leiolopisma*) *microcercum* Boettger, Ber. Senckenb. Naturf. Ges. 1901, p. 49 (type loc. Phuc-son, N. Annam; Frankfurt).

Lygosoma vittigerum kronfanum Smith, J. Nat. Hist. Soc. Siam, iv, 1922, p. 208 (type loc. Daban, Langbian Plateau, S. Annam; London); Schmidt, Copeia, no. 168, 1928, p. 80.

Differs from the typical form in having (3) 5 light longitudinal stripes, the outer pair being on the flanks; the black edging below the outermost stripe is well defined in the young, but becomes less well defined, though always distinct, in the adult; 30 to 32 scales round the middle of the body; ear-opening a little larger.

Range. Annam (Langbian Plateau; Kontum, Col des Nuages, near Hué; Phuc-son in the north).

Dr. Mertens has compared my *kronfanum* with the type of *microcercum*, and has confirmed my suspicion that the two are identical.

220. Leiolopisma macrotympanum.

Mocoa macrotympanum Stoliczka, J. Asiat. Soc. Beng. xlii, 1873, p. 166 (type loc. S. Andamans; Calcutta).—*Lygosoma macrotympanum*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 265, and Fauna Brit. Ind. 1890, p. 204.

In general form like *vittigerum*, differing as follows:—Body longer, the distance between the snout and the fore-limb contained one and four-fifth times in the distance between the axilla and groin; prefrontals smaller, narrowly separated from one another; frontal much shorter than the fronto-parietals and interparietal together, in contact with two supra-oculars; fronto-parietal single; loreals subequal; ear-opening much larger than the palpebral disc, with a perfectly smooth edge all round; tympanum scarcely sunk; 22 scales round the middle of the body; limbs shorter, the adpressed limbs fail to meet; 15 lamellæ beneath the fourth toe.

The type is now considerably faded, and the following is from Stoliczka's description, taken in life:—Brown above, with three longitudinal white stripes, namely, a vertebral originating between the eyes, and two along the sides beginning on the supraciliary edges; they are continued on to the base of the tail. Lower part of sides and entire lower surface livid carneous, tinged with orange on the lower belly and tail, which is also carneous on its upper side.

From snout to vent 45; tail 50 mm.

Known from a single specimen, which was obtained on a sandy beach, MacPherson Straits, S. Andamans. It is a female with two large eggs.

Genus ABLEPHARUS.

Ablepharus Fitzinger, in Lichtenstein, Ver. Doub. Zool. Mus. Berlin, 1823, p. 103 (type *pannonicus=brandti*); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 344, and Fauna Brit. Ind. 1890, p. 213; Mertens & Müller, Zool. Anz. cxxxiv, 11/12, 1929, p. 299.
Lerista Bell, Proc. Zool. Soc. London, 1833, p. 99 (type *lineatus*).
Cryptoblepharus Wiegmann, Herp. Mex. 1834, p. 12, and Nov. Act. Acad. Leop.-Carol. xvii, 1835, p. 202 (type *poecilopleurus=boutoni*); Stejneger, Herp. Japan, 1907, p. 225.
Microblepharis Fitzinger, Syst. Rept. 1843, p. 23 (type *Ablepharus menestriesii* Dum. & Bibr.).
Ophiopsis Fitzinger, l. c. s. 1843, p. 23 (type *Lerista lineata* Bell).
Morethia Gray, Cat. Liz. Brit. Mus. 1845, p. 65 (type *anomalus*).
Menetia Gray, l. c. s. p. 65 (type *greyi*).
Miculia Gray, l. c. s. p. 66 (type *elegans*).
Panaspis Cope, Proc. Acad. Philad. 1868, p. 317 (type *aeneus*).
Blepharosteres Stoliczka, P. Asiat. Soc. Beng. 1872, p. 74 (type *grayanus*).
Phaneropus Fischer, Arch. f. Naturg. Berlin, 1881, p. 236 (type *muelleri*).

Palatine and pterygoid bones in contact mesially, the palatal notch not extending forwards to between the centres

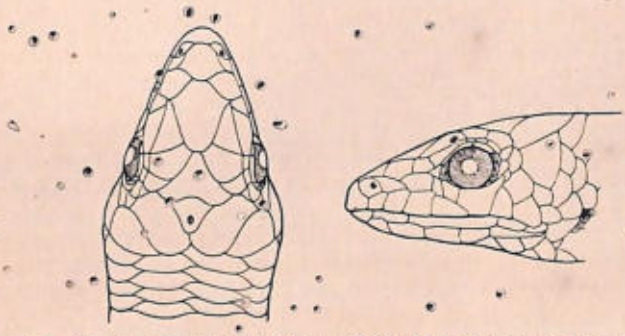


Fig. 70.—Upper and side views of head of *Ablepharus pannonicus*.

of the eyes; pterygoids toothless. Maxillary teeth conical. Lower eyelid with a large transparent disc, immovable, more or less completely united with the upper. Ear distinct or hidden. Nostril pierced in the nasal; supranasals present or absent. Scales smooth. Limbs more or less developed, digits 5, 5 or reduced in number.

Range. Australia and Polynesia; the East Indies; S.W. Asia to Europe, but not the Oriental Region proper; Africa; there is no recent evidence to show that it occurs in the New World.

Some 25 species are known.

The genus *Ablepharus* is clearly one of polyphyletic origin. It has been formed, not by the diversification of a single species, but by the independent evolution of the same

character, namely, the covering up of the eye by a transparent disc formed in the lower eyelid, in a number of species in different parts of the world. It is the final stage in the production of the "window" such as we see it in *Leiolopisma* and *Emoia*, and from these two genera it has no doubt been derived. As I have already shown, the fusion of the upper and lower lids in *Ablepharus* is not so complete as is usually believed. A close examination of those structures will show that in several species, *A. pannonicus* among them, a small palpebral fissure still persists, but, being hidden under the supercilium, or the vestige of the upper lid, has escaped observation. All the members of this assemblage exhibit degeneration in a more or less degree, as shown by the fusion and consequent reduction in number of head-shields, closure of the ear-opening, reduction in the size of limbs and in the number of digits, and elongation of the body. All are of small size. Whether they have been derived from *Leiolopisma* (without supranasal shields) or *Emoia* (with them) we cannot say, for in many species those shields have now been united. Most of the species (of *Ablepharus*) now lack supranasals; in others they appear to have united anteriorly with the nasal, as in some forms of *Riopa*; in *A. boutoni* from Mauritius they may be present or absent, or in the same individual present on one side and absent on the other (Brit. Mus. no. 55.12.26.327).

It does not matter much whence they came; for they are vanishing forms, the dying twigs of two separate branches; they may as well be grouped together, and for convenience of identification given a common name.

Key to the Indian Species.

Ear-opening small but distinct ..... *pannonicus*, p. 310.
Ear hidden ..... *grayanus*, p. 311.

221. Ablepharus pannonicus.

Ablepharus pannonicus Fitzinger, in Lichtenstein, in Eversmann's Reise nach Buchara, 1823, p. 145, and Ver. Doub. Zool. Mus. Berlin, 1823, p. 103 (type loc. Bokhara).

Ablepharus brandtii Strauch, Mél. Biol. Acad. St. Pétersb. vi, 1868, p. 565, and Bull. xii, p. 368 (type loc. Samarkand, Turkestan; Leningrad and London); Blanford, Zool. E. Persia, 1876, p. 391, pl. xxvii, fig. 1; Murray, Zool. Sind, 1884, p. 354; Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 351, and Fauna Brit. Ind. 1890, p. 213.

Aolepharus brandti var. *brevipes* Nikolski, Ann. Mus. St. Pétersb. x, 1905, p. 283 (type loc. Persia).

Blepharosteres agilis Stoliczka, P. Asiat. Soc. Beng. 1872, p. 126 (type loc. S.W. of Kalabagh, Punjab; Calcutta).

Ablepharus pusillus Blanford, Ann. Mag. Nat. Hist. (4) xiv, 1874, p. 33 (type loc. Basra (Bussora)? London).

Ablepharus grayanus (not of Stoliczka) Procter, J. Bombay N.H. Soc. xxix, 1923, p. 126.

Snout short, obtuse; no supranasals; fronto-nasal in contact with the rostral and frontal; 3 supraoculars, the first usually the largest, first and second in contact with the frontal; between the small postoculars and the temporals are three more shields, continued backwards and downwards from the supraoculars; 5 supraciliaries, the first and second largest; fronto-parietal single; interparietal distinct, the parietals in contact behind it; 2 or 3 pairs of nuchals; upper eyelid composed of 3 or 4 scales, hiding the upper margin of the lower, the two united, or with a minute palpebral fissure; 2 loreals; 2 superposed temporals, the upper the larger; fifth labial subocular, distinctly larger than the preceding labials; ear-opening small, partly hidden by scales; 20, rarely 22, scales round the middle of the body, dorsals largest; a pair of enlarged preanals; tail with transversely enlarged plates below. Limbs short, pentadactyle, not meeting when adpressed.

Olive or brownish above, with metallic gloss; a dark brown dorso-lateral stripe, edged above with whitish; flanks with less distinct dark longitudinal lines; upper lip whitish; sides of tail with small spots regularly arranged. Limbs above with light and dark longitudinal lines; whitish below.

From snout to vent 35; tail 60 mm.

Range. From Mesopotamia and Turkestan to N.W. India. Found in Indian territory at Kalabagh (Punjab); Karachi; Ladha (Waziristan); Helmand (Afghan-Baluchistan border).

Murray states that it is diurnal in its habits; he found it during the day in the verandah of the Karachi Museum running about after the red ants on which it evidently lives.

A female in the British Museum contains three large eggs, almost circular in shape, and without any trace of embryo.

222. Ablepharus grayanus.

Blepharosteres grayanus Stoliczka, P. Asiat. Soc. Beng. 1872, p. 74 (type loc. Waggur district, N.E. Cutch; Calcutta); Murray, Zool. Sind, 1884, p. 354.—*Ablepharus grayanus*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 352, and Fauna Brit. Ind. 1890, p. 214.

Differs from *pannonicus* in the following particulars:—Ear-opening absent, its position sometimes indicated by a depression; 18 or 20 scales round the middle of the body in specimens from Cutch and Sind, 20 or 22 in those from Baluchistan.

Pale olive-greenish above, with distinct metallic lustre. Sides a little darker, speckled or longitudinally streaked with dark brown. A light (silvery green in life) stripe from the supraciliary edge to the base of the tail, edged above and below with black; limbs above with light longitudinal lines; greenish-white below; tail with a pink tinge.

From snout to vent 30; tail 55 mm.

Range. Sind (Karachi); Cutch; Baluchistan (Quetta district, Las Bela State).

Murray collected specimens in the verandah of the Frere Hall, Karachi.

Genus **RIOPA.**

Riopa Gray, Ann. Mag. Nat. Hist. ii, Jan. 1839, p. 332 (type *Lygosoma punctata*).
Campsodactylus Cocteau, in Duméril, C.R. Acad. Sci. iv, 1837, p. 16 (nom. nud.); Dum. & Bibr., Erp. Gen. v, 1839, p. 761 (type *lamarrei*=*vosmaeri*).
Chiamela Gray, Ann. Mag. Nat. Hist. ii. 1839, p. 332 (type *C. lineatus*).
Hagria Gray, Ann. Mag. Nat. Hist. 1839, p. 333 (type *Scincus vosmaeri*).
Liosoma (not of Brandt, 1834) Fitzinger, Syst. Nat. 1843, p. 22 (type *Eumeces microlepis* Dum. & Bibr.).
Sphenosoma (not of Dejean, 1834) Fitzinger, Syst. Nat. 1843, p. 23, (type *Eumeces punctatus* Wiegmann).
Eugongylus Fitzinger, Syst. Nat. 1843, p. 23 (type *Eumeces oppelii*=*rufescens*).
Mochlus Günther, Proc. Zool. Soc. London, 1864, p. 308 (type *punctulata*).
Eumecia Bocage, J. Acad. Sci. Lisbon, iii, 1870, p. 67 (type *anchietæ*).
Sepacontias Günther, Ann. Mag. Nat. Hist. (5) vi, 1880, p. 235, (type *S. modestus*).

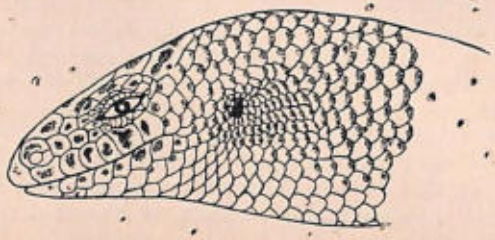


Fig. 71.—*Riopa koratense* (Brit. Mus. 1921.4.1.163, cotype).

Palatine bones in contact mesially; pterygoid bones in contact anteriorly, the palatal notch not extending forwards to between the centres of the eyes; pterygoid teeth absent or reduced to one or two; maxillary teeth conical. Eyelids well developed, the lower scaly or with a more or less transparent disc. Nostril in the nasal; supranasals present, entire, or united anteriorly with the nasal (fig. 71); prefrontals, fronto-parietal(s), and interparietal distinct; ear-opening distinct, tympanum deeply sunk; limbs short or vestigial.

Range. From Polynesia and Australia to Southern Asia and Africa.

Some 30 species are known, 12 of which are found in the Oriental Region, 12 in Africa. Their habits are terrestrial and subterrestrial.

Key to the Indian and Indo-Chinese Species.

I. Lower eyelid scaly.

A. Two fronto-parietals*; distance between snout and fore-limb not 3 times in the distance between axilla and groin.

36 to 38 scales round body; supranasals entire .. *corpulenta*, p. 313.

32 to 35 scales round body; supranasals united anteriorly with the nasal ..... *koratense*, p. 314.

26 to 32 smooth scales round body; 52 to 58 down middle of back †; flanks black-spotted .... *bowringi*, p. 315.

26 to 28 smooth scales round body; 63 to 72 down back †; flanks black-spotted ..... *albopunctata*, [p. 316.

26 to 28 scales round body; dorsals keeled; flanks not spotted with black ..... *herberti*, p. 317.

B. A single fronto-parietal; distance between snout and fore-limb more than 3 times in the distance between axilla and groin.

30 to 34 scales round body ..... *isodactyla*, p. 317.

II. Lower eyelid with an undivided transparent disc.

A. Five fingers and five toes.

24 to 28 scales round body; 62 to 76 down middle of back † ..... *punctata*, p. 318.

24 to 26 scales round body; 87 to 100 down middle of back † ..... *guentheri*, p. 319.

22 scales round body; third toe longer than sole of foot ..... *lineolata*, p. 320.

22 scales round body; third toe not longer than sole of foot ..... *anguina*, p. 321.

B. Four fingers and four toes ..... *linnata*, p. 321.

C. Five fingers and four toes ..... *vosmaeri*, p. 322.

The following characters are common to all the species mentioned in this work, unless otherwise stated:—Fronto-nasal broader than long; prefrontals well separated from one another; parietals large, in contact with one another behind the interparietal; 4 large supraoculars, the first two largest and in contact with the frontal; 6 to 8 supraciliaries, first and last largest; anterior loreal higher and shorter than posterior; palms of hands and soles of feet with conical tubercles; tail tapering to a point, covered with subequal scales.

223. Riopa corpulenta.

Lygosoma corpulentum Smith, Proc. Zool. Soc. London, 1921, p. 431 (type loc. Dalat, Langbian Plateau, S. Annam; London).

Distance between the end of the snout and the fore-limb two to two and one-fifth times in the distance between the axilla and groin; snout obtuse; lower eyelid scaly; supra-

* Rarely united in *bowringi*.

† Counted from the parietals to a line joining the hind-limbs.

nasals entire, in contact with one another; frontal longer than the fronto-parietals and interparietal together; no nuchals; no enlarged temporals; ear-opening subcircular, half as large as the eye-opening, without projecting lobules; 6 supralabials, the fifth below the middle of the eye. Body-scales smooth, dorsals a little larger than the laterals or ventrals, 36 to 38 round the middle; marginal preanals slightly enlarged. Limbs widely separated when adpressed, the distance between them being two to two and a half times the length of the fore-limb; toes cylindrical; 13 or 14 keeled lamellæ beneath the fourth toe, which is longer than the third. Tail very thick at the base.

Light yellowish-brown, thickly mottled on the back and sides with dark brown; lips, sides of neck, and throat yellow in life; labial shields edged with black.

From snout to vent 165; tail 150 mm.

The type was caught beneath fallen timber at 5,000 feet altitude. A second specimen, now in Paris, was found at Ban Ta Cheng, Pays du Khas, Annam.

224. Riopa koratense.

Lygosoma koratense Smith, J. Nat. Hist. Soc. Siam, ii, 1917, p. 222, pl. —, figs. 1, 1 *a*, 1 *b* (type loc. Lat Bua Kao, Dong Paya Fai Mts. E. Siam; London).

Distance between the end of the snout and the fore-limb contained twice or a little more in the distance between the axilla and groin; snout obtuse; lower eyelid scaly; supranasals united anteriorly with the nasal, in contact with one another behind the rostral; frontal longer than the fronto-parietals and interparietal together; interparietal smaller than the fronto-parietals; no nuchals; no enlarged temporals; ear-opening about half as large as the eye-opening, with two small projecting lobules anteriorly; normally 7 supralabials, the fifth below the middle of the eye; body-scales smooth, subequal, or dorsals a little larger than the laterals; 32 to 34 round the middle; preanals not enlarged. Limbs widely separated when adpressed, the distance between them being about one and a half times the length of the fore-limb; toes short, cylindrical; 13 to 14 lamellæ beneath the fourth toe, which is longer than the third. Tail very thick at the base, a little shorter than the head and body.

Reddish-brown above, each scale faintly edged with brown and with a dark brown spot at the base; flanks pale greenish-yellow, the scales marked like those on the back; below yellowish-white. Head-scales with one or more central black spots; lips yellowish, with black spots.

Head and body 105 mm.

Known only from the type-specimens, four in number.

225. Riopa Lowringi.

Eumeces bowringii Günther, Rept. Brit. Ind. 1864, p. 91 (type loc. Hongkong; London).—*Lygosoma bowringii*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 308, pl. xiii, fig. 3, and Ann. Mus. Civ. Genova, (2) xiii, 1893, p. 320; S. Flower, Proc. Zool. Soc. London, 1899, p. 650; Taylor, Liz. Philipp. Is., 1922, p. 231; de Rooij, Rept. Indo-Austral. Archipel. i, 1915, p. 264.

Euprepes (Riopa) punctatostriatus Peters, Mon. Akad. Berlin 1871, p. 31 (type loc. Philippine Is.).

Lygosoma comotti Boulenger, Ann. Mus. Civ. Genova, (2) iv, 1887, p. 622, and Fauna Brit. Ind. 1890, p. 207 (type loc. Minhla, Burma; Genoa).

Lygosoma whiteheadi Mocquard, Le Naturaliste, xii, 1890, p. 144 (type loc. N. Borneo; Paris).

Distance between the end of the snout and the fore-limb contained once and a half to twice in the distance between the maxilla and groin in the adult; snout obtuse; lower eyelid scaly; supranasals entire, in contact with one another; frontal as long as or a little longer than the fronto-parietals and interparietal together; a pair of nuchals usually present; temporal scales slightly enlarged, the largest one bordering the parietal; ear-opening subcircular, about half as large as the eye-opening, with one or two very small projecting lobules anteriorly; normally 7 supralabials, fifth longest and below the eye; body-scales smooth (or feebly keeled); dorsals and ventrals a little larger than the laterals; 26 to 32 (usually 28 to 30) round the body, 52 to 58 down the middle of the back; marginal preanals slightly enlarged. The adpressed limbs do not meet by about the length of the fore-limb; digits rather long, feebly compressed; 10 to 15 lamellæ beneath the fourth toe, which is longer than the third; tail moderately thick at the base, one and a quarter times as long as the head and body.

Brown above, each dorsal scale generally with a darker spot forming more or less continuous longitudinal lines; a dark brown or black dorso-lateral stripe of variable thickness, light-edged above; sides of the neck and body usually thickly spotted with black and white; yellow below; sides of neck, body, and tail often red in life.

From snout to vent 53 mm.

Variation. I have seen only one specimen with 26 scales round the body from Indo-China, but this count is not uncommon in individuals from the Malayan Region. Specimens from the islands in the Gulf of Siam (Koh Si Chang and Koh Phai) may have 32 scales round the body. One specimen from the Langbian Plateau, Annam, has the fronto-parietals united into a single shield. The type of *bowringi* is said to have come from Hong-kong, and it has the dorsals very feebly tri- or quinquecarinate. No other specimens

have been obtained on the island, although good collections have been made there in recent years. Another example, from Port Blair, Andaman Islands, Ind. Mus. no. 17911, has the dorsal scales distinctly tricarinate.

Range. Hong-kong; French Indo-China; Siam; Burma (Minhla); S. Tenasserim; Andaman Is.; the Malayan Subregion and Philippine Is.

Common in many parts of Central Siam, both in the plains and in the hills. In Annam it ascends to 5,000 feet altitude.

Oviparous, laying from 2 to 4 eggs.

I can find nothing in *Lygosoma comotti* Boulenger to distiguish it from *bowringi* except that it is a trifle larger, 56 mm. from snout to vent, and stouter than is usual for that species.

226. Riopa albopunctata.

Riopa albopunctata Gray, Ann. Mag. Nat. Hist. xviii, 1846, p. 430 (type loc. Madras; London); Jerdon, J. Asiat. Soc. Beng. xxii, 1853, p. 477; Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 132, pl. 7, fig. 6.—*Eumeces albopunctatus*, Anderson, Proc. Zool. Soc. London, 1871, p. 158.—*Lygosoma albopunctatum*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 309, and Fauna Brit. Ind. 1890, p. 208; Hora, Rec. Ind. Mus. xxix, 1927, p. 5, figs. (lower eyelid).

? *Eumeces* (*Riopa*) *fischerii* Bocourt, Ann. Sci. Nat. (6) vii, 1878, art. 16, and Miss. Sci. Mex. Rept. p. 416, pl. xxii, F, fig. 1 (type loc. "Puerto-Cabello"; Hamburg).

Very closely allied to *bowringi*, differing as follows:—Body more elongate, the distance between the end of the snout and the fore-limb contained two to two and one-third times in the distance between the axilla and groin in the adult; lower eyelid scaly, two or three of the central scales often much larger than the others; nuchals frequently indistinct; fifth supralabial scarcely longer than the other labials; body-scales subequal or the dorsals a little larger than the laterals, 26 or 28 round the middle; 63 to 72 down the middle of the back. The adpressed limbs do not meet by more than the length of the fore-limb; digits shorter; 12 to 15 lamellæ beneath the fourth toe. Tail thicker at the base.

Brown or reddish-brown above, each scale with a more or less distinct dark spot, forming longitudinal series; sides of neck and anterior part of body dark brown or black, thickly spotted with white; yellowish-white below.

From snout to vent 60 mm.

Range. Denkanikota Hills and near Ellore in the Godavari district; Bilaspur (C.P.); Chilka Lake, Purneah, Muzaffarpur (Bihar and Orissa); Calcutta; Mundiaghut (U.P.); Nepal; Dibrugarh, Kokilamukh (Assam). Annandale obtained a specimen in Travancore.

227. Riopa herberti.

Lygosoma herberti Smith, J. Nat. Hist. Soc. Siam, ii, 1916, p. 45 (type loc. Nakon Sritamarat Mts., P. Siam; London).—*Riopa herberti* Cochran, Proc. U.S. Nat. Mus. lxxvii, 1930, p. 18.
Sphenosoma hughi Cochran, Proc. Biol. Soc. Washington, xl, 1927, p. 185 (type loc. Koh Tao, Gulf of Siam; Washington).—*Riopa hughi*, Cochran, Proc. U.S. Nat. Mus. lxxvii, 1930, (11) p. 18, fig. (head).

Closely allied to *bowringi*, differing as follows:—Distance between the end of the snout and the fore-limb contained one and three-quarter times in the distance between the axilla and groin; prefrontals smaller, widely separated from one another; no nuchals; body-scales subequal or the dorsals a little larger than the laterals; 26 to 28 round the body, the dorsals and laterals more or less distinctly quinquecarinate; 55 or 56 down the middle of the back; 13 to 16 lamellæ beneath the fourth toe.

Brown above, each scale with a slightly darker tip; sides of neck and fore-part of flanks dark brown with white spots; light brown below.

Size larger and proportionately stouter.

From snout to vent 67 mm.

Range. Peninsular Siam, from the Isthmus of Kra south to Puket.

228. Riopa isodactyla.

Eumeces isodactylus Günther, Rept. Brit. Ind. 1864, p. 93, pl. xiii, fig. A (type loc. Cambodia; London).—*Lygosoma isodactylum*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 339; Smith, J. Nat. Hist. Soc. Siam, i, 1914, p. 127, fig., and ii, 1916, p. 56.

Distance between the end of the snout and the fore-limb contained three and one-fifth to three and a half times in the distance between the axilla and groin in the adult; snout obtuse; lower eyelid scaly; supranasals united anteriorly with the nasal, not in contact with one another; prefrontals small, widely separated from one another; frontal as long as or a little longer than the single fronto-parietal, which is very much larger than the interparietal; no nuchals; no enlarged temporals; ear-opening oblique, smaller than the eye-opening, partly covered by scales; 7 supralabials, first longest, fifth below the middle of the eye, not larger than the adjacent labials. Body elongate, 30 to 34 smooth subequal scales round the middle, 88 to 98 down the middle of the back; preanals not enlarged. The adpressed limbs fail to meet by about four times the length of the fore-limb; digits short, cylindrical, the three middle toes of almost equal length; 7 to 10 lamellæ under the fourth toe. Tail thick at the base, a little shorter than the head and body.

Dirty yellowish, the scales on the back heavily edged with dark brown or black, sometimes forming large dark patches; sides and lower surfaces thickly spotted with black; top of head mostly black; a dark patch descends from the nape to the ear, the area in front of and behind it being lighter in colour. The young are more heavily marked above with dark brown, but their flanks and lower surfaces are almost entirely unspotted.

From snout to vent 147 mm.

Range. Central Siam between Ayuthia and Paknam Po (Nakon Sawan).

R. isodactyla lives under fallen timber and in loose earth, into which it can burrow with considerable ease. When moving along the ground it has a sinuous snake-like action; the fore-limbs are used, but not the hind ones, which are pressed backwards along the sides of the body.

229. **Riopa punctata.**

Scincus punctatus Gmelin, Hist. Amphib. 1799, p. 197, based on Seba's fig. ii, pl. 12, fig. 6).—*Ripoa punctata*, Gray, Cat. Liz. Brit. Mus. 1845, p. 96.—*Lygosoma punctatum*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 310, and Fauna Brit. Ind. 1890, p. 208; Roux, Rev. Suisse Zool. 1928, p. 457.—*Lygosoma (Riopa) punctata*, Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 172.

Seps scincoides Cuvier, Régne Anim. 2nd ed. ii, 1829, p. 54.

Riopa hardwickii Gray, Cat. Liz. Brit. Mus. 1845, p. 96 (type loc. Madras; London); Jerdon, J. Asiat. Soc. Beng. xxii, 1853, p. 478; Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 132, pl. v, fig. 5.

Mabuya elegans Gray, Cat. Liz. Brit. Mus. 1845, p. 95 (type loc. India; London).

Distance between the end of snout and the fore-limb contained two to two and three-quarter times in the distance between the axilla and groin; snout obtuse; lower eyelid with an undivided semitransparent disc; supranasals entire, in contact with one another behind the rostral; frontal longer than the fronto-parietals and interparietal together; a pair of nuchals, rarely absent; an enlarged temporal scale borders the outer margin of the parietal; ear-opening about half as large as the eye-opening, with one or two minute lobules anteriorly; 7 supralabials, the fifth below the middle of the eye, longer than the adjacent labials; body covered with smooth subequal scales, 24 or 26, rarely 28, round the body; 62 to 76 down the middle of the back; marginal preanals slightly enlarged. The adpressed limbs fail to meet by nearly twice the length of the fore-limb; digits long, fourth toe distinctly longer than the third; 11 to 14 keeled lamellæ under the fourth toe. Tail thick at the base, a little longer than the head and body.

Brown above and on the sides, each scale with a dark basal

spot. In the young the spots are usually confluent into longitudinal lines, 4 or 6 down the back. A yellowish dorso-lateral streak beginning on the canthus rostralis, strongly marked in the young. Lower surfaces yellowish-white, uniform, or each scale with a black central dot; tail reddish in the young.

From snout to vent 85 mm.

Variation. 28 scales round the body are recorded by Roux. It also occurs in another specimen from Amarkantak, Rewa State; this individual, half grown, is without any light dorso-lateral lines.

Range. India and Ceylon. Widely distributed in India; found usually in hilly country, but at no great altitude. I have examined specimens from the Nellagiri, Anaimalai, Nilgiri, Sivagiri, and Shevaroy Hills, Nilambur, Coimbatore, Madura district, Cuddapah and Salem districts near Madras, Belgaum, Godavari district, Golconda, Jeypore Hills, Pass between Chaibassa and Chakradharpur, near Bilaspur (C.P.), Pharisama Hills (Rewa State), Hurklana, Allahabad, Hazara and Meerut (U.P.), Subathu (Simla Hills). There is a specimen in the British Museum said to have been collected in the Man-son Mountains, Tonking, by Fruhstorfer.

Duméril and Bibron, Erp. Gen. v, p. 634, have placed *Seps scincoides* Cuvier in the synonymy of *punctata*. There let it rest, for the specimen cannot now be found.

230. Riopa guentheri.

Lygosoma punctata Gray, in Griffith's Anim. King. 1831, App. p. 71.—*Riopa punctata*, Gray, Ann. Mag. Nat. Hist. ii, 1839, p. 332 (type loc. India; type lost), and Cat. Liz. Brit. Mus. 1845, p. 96; Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 134; Theobald, Cat. Rept. Brit. Ind. 1876, p. 64.

Eumeces guentheri Peters, Sitz. Ges. Nat. Berlin Fr. 1879, p. 36 (type loc. Ostindien; Berlin).—*Lygosoma guentheri*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 311, and Fauna Brit. Ind. 1890, p. 209.

Closely allied to *punctata*, differing as follows:—Distance between the end of the snout and the fore-limb contained three to three and a half times in the distance between the axilla and groin; frontal about as long as the fronto-parietals and interparietal together; ear-opening a little smaller, without projecting lobules; body more elongate; 87 to 100 scales down the middle of the back; the adpressed limbs fail to meet by three to four times the length of the fore-limb; digits shorter, fourth toe scarcely longer than the third.

Brown above and on the sides, each scale with a dark basal spot; in the young the spots are confluent into longitudinal lines; a light dorso-lateral streak, beginning on the canthus rostralis, distinct in the young, but indistinct

in the fully grown; yellowish-white below each scale, with a small dark brown basal dot.

From snout to vent 110 mm.

Range. Bombay Presidency (Matheran, Sholapur, Kurduwadi, Belgaum, N. Kanara); and, if Beddome's specimens are correctly labelled, Travancore.

231. Riopa lineolata.

Riopa anguina Theobald, J. Linn. Soc., Zool. x, 1868, p. 27 (in part); Anderson, Proc. Zool. Soc. London, 1871, p. 159 (in part).
Riopa lineolata Stoliczka, J. Asiat. Soc. Beng. xxxix, 1870, p. 175, pl. x, fig. 2 (type loc. Martaban, Burma; Calcutta).—*Lygosoma lineolatum*, Boulenger, Fauna Brit. Ind. 1890, p. 207; Annandale, J. & P. Asiat. Soc. Beng. i, 1905, p. 147.
Riopa cyanella Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 130, pl. v, fig. 3 (type loc. Pegu district; Calcutta); Theobald, Cat. Rept. Brit. Ind. 1876, p. 65.—*Lygosoma cyanellum*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 312, and Fauna Brit. Ind. 1890, p. 210, and Ann. Mus. Civ. Genova, (2) xiii, 1893, p. 320; Hora, Rec. Ind. Mus. xxix, 1927, p. 5.
Lygosoma fea Boulenger, Ann. Mus. Civ. Genova, (2) iv, 1887, p. 623 (type loc. Rangoon, Burma; London).
Lygosoma calamus Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 314, pl. xxv, fig. 1 (type loc. Minhla, Upper Burma; London), and Fauna Brit. Ind. 1890, p. 211; Hora, Rec. Ind. Mus. xxix, 1927, p. 6, pl. i.

Distance between the end of the snout and the fore-limb contained two and a half to three times in the distance between the axilla and groin; snout obtuse; lower eyelid with an undivided semitransparent disc; supranasals entire, in contact with one another behind the rostral; frontal as long as or shorter than the fronto-parietal(s) and interparietal together; fronto-parietal single, or partially or completely divided; a pair of nuchals; 3 enlarged temporal scales, the upper one elongate and bordering the parietal; ear-opening subcircular, not half as large as the eye-opening; 7 supralabials, fifth below the middle of the eye, not longer than the adjacent labials; 22 smooth equal scales round the body; 78 to 84 down the middle of the back; marginal preanals slightly enlarged. Limbs weak; the adpressed limbs fail to meet by three to four times the length of the fore-limb in the adult, by not much more than twice in half-grown specimens; digits moderately long, 8 to 10 lamellæ under the fourth toe, which is a little longer than the third; third toe distinctly longer than sole of foot. Tail at the base and for a considerable part of its length almost as thick as the body, as long as or a little longer than the head and body.

Brown above, with dark dots, often very indistinct, forming longitudinal lines; a light dark-edged dorso-lateral line, more or less distinct; sides of neck and anterior part of flank with or without white spots.

From snout to vent 63 mm.

Range. Burma (Pegu district; Moulmein; Martaban; Rangoon; Prome; Pyinmana; N. Chin Hills; Dawna Hills; Minhla.)

Stoliczka has described his *lineolata* as having a scaly lower eyelid, but an examination of the type shows that it has an undivided disc. The fronto-parietal is single and there are 22 (not 24 to 25 as quoted by him) scales round the body. In all respects, except that of the fronto-parietal, it agrees with his *cyanella*. The character of that shield, however, is variable and of no value for specific distinction; as shown by six specimens collected by Oates at Moulmien (Brit. Mus. 89.4.24.2–8), it may be single, or partly or completely divided. I have no hesitation, therefore, in uniting *cyanella*, *calamus*, and *fea* under *lineolata*.

232. **Riopa anguina.**

Riopa anguina (in part) Theobald, J. Linn. Soc. x, 1868, p. 27 (type loc. Pegu district; Calcutta); Anderson, Proc. Zool. Soc. London, 1871, p. 159 (in part); Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 130, pl. v, fig. 4; Theobald, Cat. Rept. Brit. Ind. 1876. p. 64.—*Lygosoma anguinum*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 313, and Fauna Brit. Ind. 1890, p. 211, and Ann. Mus. Civ. Genova, (2) xiii, 1893, p. 320; Annandale, J. & P. Asiat. Soc. Beng. (n. s.) i, 1905, p. 148.

Very closely allied to *lineolata*, differing as follows:—Limbs shorter; digits shorter, more cylindrical; fourth toe often not longer than third, with 6 to 9 lamellæ beneath it; third toe not or only a little longer than the sole of the foot.

Brown above, paler below; a dark brown dorso-lateral streak more or less distinct.

From snout to vent 55 mm.

Range. Burma (Pegu district).

Stolickza was the first to separate *cyanella* (=*lineolata*) from *anguina*; and in the material upon which he worked, four specimens of *cyanella* and three of *anguina*, the difference in toe-length is quite distinct. Such, however, is not always the case, for the length of the toes is subject to slight variation. More material may show that the two are not specifically distinct from one another.

233. **Riopa lineata.**

Chiamela lineata Gray, Ann. Mag. Nat. Hist. ii, 1839, p. 333 (type loc. India; London); Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 135.—*Lygosoma lineatum*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 376, pl. xxv, fig. 3, and Fauna Brit. Ind. 1890, p. 212; Hora, Rec. Ind. Mus. xxix, 1927, p. 6.

Like *lineolata* and *anguina*, but the body more elongate, and of smaller size; distance between the end of the snout

and the fore-limb contained three to four times in the distance between the axilla and groin; supranasals entire, just touching one another behind the rostral; frontal smaller than the fronto-parietal, which is single; 104 to 110 scales down the middle of the back. Limbs weaker, each one with four digits only, the outer toe being absent; third and fourth toes equal, about as long as the sole of the foot.

Golden brown above and on the sides, with darker dots, forming longitudinal lines; lighter below.

From snout to vent 53 mm.

Range. Bombay district between Poona and N. Kanara.

234. Riopa vosmaeri.

Hagria vosmaeri Gray, Ann. Mag. Nat. Hist. ii, 1839, p. 333 (type loc. "Java"; Paris), and Cat. Liz. Brit. Mus. 1845, p. 97 (Bengal); Theobald, Cat. Rept. Brit. Ind. 1876, p. 67.—*Lygosoma vosmaeri*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 315, pl. 25, fig. 2, and Fauna Brit. Ind. 1890, p. 212.

Campsodactylus lamarrei Dum. & Bibr., Erp. Gen. v, 1839, p. 762 (same type).

Similar to *lineata*, but with five fingers instead of four.

I see no reason to regard this specimen as an "apparently anomalous" example of *lineata*, as Boulenger has done. The loss of a digit is not uncommon among degenerate Skinks, and as a specific character it appears to be constant among them.

The type locality is said to be Bengal, not Java as first given by Gray. That no second specimen has yet been found may be due to the fact that it lives a more or less subterranean existence.

Genus **TROPIDOPHORUS.**

Tropidophorus Dum. & Bibr., Erp. Gen. v, 1839, p. 554 (type *cocincinensis*); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 359, and Fauna Brit. Ind. 1890, p. 217; Smith, Proc. Zool. Soc. London, 1923, p. 775.

Norbea Gray, Cat. Liz. Brit. Mus. 1845, p. 101 (type *brookei*).

Aspris Blyth, J. Asiat. Soc. Beng. xxii, 1853, p. 650 (type *berdmorei*).

Amphixestus Peters, Mon. Akad. Berlin, 1876, p. 573 (type *beccarii*).

Enoplosaurus Sauvage, Bull. Soc. Philom. (7) iii, 1879, p. 211 (type *insignis*).

Palatine bones in contact on the mid-line of the palate; pterygoids in contact anteriorly; pterygoid teeth absent or reduced to one or two; palatal notch not extending to the level of the centres of the eyes. Teeth conical. Tympanum large, superficial. Eyelids well developed, the lower scaly. Nostril pierced in a single nasal; no supranasals; prefrontals, fronto-parietals *, and interparietal distinct.

* United in one species from the Philippines.

Limbs well developed, pentadactyle; digits cylindrical, with transverse lamellæ below.

Range. The whole of the Indo-Chinese Region; Borneo; Celebes; Philippines; North Queensland.

Twenty species are recognized.

A genus of hill-lizards living in the vicinity of rocky streams, hiding by day beneath damp herbage or under stones, sometimes almost completely immersed in the water, to which they invariably take to avoid capture. At dusk they issue forth in search of their food, which consists of insects and small crustaceans.

They are not remarkably agile. In their general configuration and sombre coloration they all resemble one another pretty closely. Most of the species have a limited range of distribution, and, as far as I am aware, no two have yet been found in the same locality.

T. microlepis, *T. robinsoni*, and *T. sinicus* are known to be viviparous, producing from 6 to 9 young at a time.

Key to the Species.

I. Upper head-shields smooth; dorsal scales smooth or obtusely keeled.	
Fronto-nasal entire	*berdmorei*, p. 325.
Fronto-nasal divided	*laotus*, p. 325.
II. Upper head-shields rugose or striated; dorsal scales sharply keeled.	
a. Two preanal shields; fronto-nasal entire.	
Lateral scales pointing straight backwards; 2 loreals, one behind the other	*robinsoni*, p. 326.
Some of the scales of the vertebral row bicarinate, or, if unicarinate, smaller than the other dorsals; 4 loreals	*hainanus*, p. 326.
Lateral scales strongly oblique; no small scales between the loreals and supralabials	*assamensis*, p. 327.
Lateral scales strongly oblique; a series of small scales between the loreals and supralabials	[p. 329. *cocincinensis*,
b. Two preanal shields; fronto-nasal divided.	
Frontal entire; postmental divided	*sinicus*, p. 327.
Frontal divided; postmental entire	*thai*, p. 328.
c. Three preanal shields:	
Lateral scales strongly oblique	*microlepis*, p. 328.

Unless otherwise stated the following characters are common to all the species described in this work:—

Snout subacuminate, about as long as the orbit; prefrontals in contact with one another or just separated, or with a small azygous shield interposed between them; frontal long and narrow, as long as or longer than the fronto-parietals and interparietal together, broader in front than behind;

4 supraoculars, the first two in contact with the frontal, the fourth usually entering the supraciliary margin; 6 to 8 supraciliaries, the first not much larger than the second; fronto-parietals and interparietal well developed, the latter not separating the parietals behind; postmental followed by three pairs of submaxillary shields, the first pair in contact with one another, the second usually separated by a small scale, the third smaller and separated by several scales; tympanum two-thirds to quite as large as the eye-opening; tail cylindrical, as long as or a little longer than the head and body, with a median series of enlarged plates

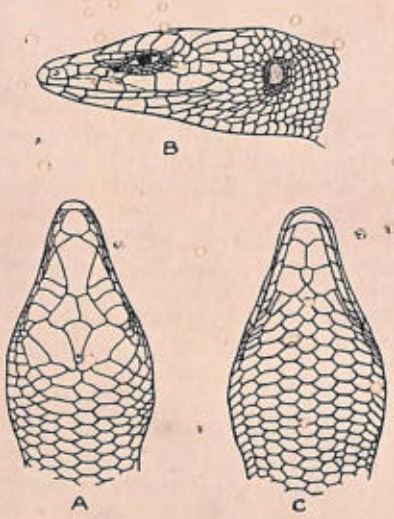


Fig. 72.—*Tropidophorus berdmorei*.
A. Upper view of head. B. Lateral view. C. Lower view.

below. In their character, regularity, and better differentiation from the other gular scales, the submaxillary shields of *Tropidophorus* approach the true submaxillary shields of the Lacertidæ.

The young at birth have always keeled scales. Those species which have smooth or obtusely keeled dorsal scales in adult life (section I. of the key) have them more strongly keeled when young; those which have sharply keeled dorsal scales in adult life (section II.) have the gular and ventral scales also keeled when young.

Adult males can be distinguished from females by the broader head and more strongly developed muscles of the temporal region.

235. Tropidophorus berdmorei.

Aspris berdmorei Blyth, J. Asiat. Soc. Beng. xxii, 1853, p. 651 (type loc. Mergui; Calcutta).—*Tropidophorus berdmorei*, Theobald, Cat. Rept. Brit. Ind. 1876, p. 48; Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 362, and Ann. Mus. Civ. Genova, (2) v, 1887, p. 480, and Fauna Brit. Ind. 1890, p. 217; Anderson, Zool. Res. W. Yunnan, 1878, p. 796, pl. lxxvi, fig. 3; Annandale, Rec. Ind. Mus. 1912, viii, p. 59; Smith, J. Nat. Hist. Soc. Siam, 1919, iii, p. 225, and Proc. Zool. Soc. London, 1923, p. 776.

Tropidophorus yunnanensis Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 362 (type loc. Hotha Valley, Yunnan; based on Anderson's description, l. c. s. 1878, p. 796); Smith, J. Nat. Hist. Soc. Siam, iii, 1919, p. 224; Boulenger, Fauna Brit. Ind. 1890, p. 217, and Ann. Mus. Civ. Genova, (2) xiii, 1893, p. 321.

Upper head-shields smooth; fronto-nasal entire, 2 or 3 scales border the parietals on each side; 2 loreal shields, the first often divided by a horizontal suture; 6 supralabials, the fourth below the middle of the eye; 32 to 40 scales round the middle of the body; dorsals and ventrals subequal, laterals smallest, directed straight backwards or with a slight obliquity upwards; dorsals and laterals keeled in the young, smooth or obtusely keeled in the adult; 2 large preanal plates. The leg reaches to the fore-limb or may extend as far as the wrist.

Dark brown above and on the sides, the back with light (reddish in life) black-edged spots or transverse or angular markings, the sides with small white spots; labials with white bars or spots; yellowish-white below, the throat and tail often spotted with dark brown.

From snout to vent 82 mm.

Variation. The number of scales round the body and the strength of the carination of the scales varies with each locality. Good series from any one district will usually show the variation in number to be from 2 to 4, but the figures bear no relation to geographical distribution, as the following list shows:—

Mergui, 32–36; Central Tenasserim, 36–40; N. Siam, 32–36; Pegu, 40; Bhamo, 32 (1 specimen); Yunnan, 32–34 (3 specimens). In most of the Burmese examples the loreal shields are undivided; in most of the Siamese the anterior one is horizontally divided into two.

236. Tropidophorus laotus.

Tropidophorus laotus Smith, Proc. Zool. Soc. London, 1923, p. 777 (type loc. Muang Liep, N. of Pak Lai, Upper Mekong, French Laos; London).

Closely resembling the smooth-scaled form of *berdmorei*; differing in the following particulars:—Fronto-nasal divided

by a longitudinal suture; prefrontals often smaller, usually with a small azygous scale between them; anterior loreal usually divided, the upper portion being longer than the lower; 30 to 34 scales round the middle of the body, the dorsals and laterals always quite smooth in the adult; lateral scales directed straight backwards.

Coloration like *berdmorei*.

From snout to vent 75 mm.

Range. The hills bordering the upper reaches of the Mekong in the Pak Lai district, French Laos.

Variation. Two examples out of 68 examined have the fronto-nasal undivided.

237. Tropidophorus robinsoni.

Tropidophorus robinsoni Smith, J. Nat. Hist. Soc. Siam, iii, 1919, p. 223 (type loc. Tasan, W. of Chumporn, P. Siam; London), and Proc. Zool. Soc. London, 1923, p. 778.

Differs from *berdmorei* in the following particulars:— General proportions more slender; upper head-shields rugose or feebly striated; prefrontals always in contact with one another; 2 loreal shields, the anterior not divided; 30 to 32 scales round the middle of the body, dorsals and laterals sharply keeled, not mucronate; limbs shorter, when adpressed they fail to meet or just overlap.

Brownish or blackish above, with light brown black-edged cross-bars or alternating spots, the first on the nape; sides of body and tail with scattered light spots; head blackish, labials white-spotted; yellowish-white below, the throat and tail more or less thickly spotted with black.

From snout to vent 75 mm. Females are larger than males.

Range. Hills between Chumporn and the Isthmus of Kra; Tavoy.

238. Tropidophorus hainanus.

Tropidophorus hainanus Smith, Proc. Zool. Soc. London, 1923, p. 779 (type loc. Ang Mao, near Five Finger Mt., Hainan; London).

Upper head-shields strongly striated; 4 scales along the outer border of the parietal; prefrontals separated from one another; 2 pairs of shields in the loreal region; 6 (or 7) supralabials, fourth (or fifth) largest and below the eye; 30 to 34 scales round the middle of the body, the dorsals and laterals sharply keeled, not or but feebly mucronate; some of the scales in the vertebral row bicarinate or, where unicarinate, smaller than the others; ventrals and dorsals subequal or the former larger; laterals smallest, and directed

backwards and slightly upwards; 2 large preanal plates. The leg reaches to the wrist or not so far.

Dark reddish-brown above, with indistinct light dark-edged cross-bars, the first two V-shaped; flanks with large whitish, dark-edged blotches; belly white, speckled with black; throat with dark longitudinal streaks.

From snout to vent 49 mm.

Range. The foot and lower slopes of the Five Finger Mountain, where I obtained six specimens. There is one more, in Paris, from Tam Dao, N.W. of Hanoi.

239. Tropidophorus assamensis.

Tropidophorus assamensis Annandale, Rec. Ind. Mus. viii, 1912, p. 58 (type loc. Harigaj Range, Sylhet Hills, Assam; Calcutta); Smith, Proc. Zool. Soc. London, 1923, p. 779.

Upper head-shields strongly striated; 3 scales border each parietal; prefrontals in broad contact with one anotner; an anterior and a posterior loreal; 6 supralabials, fourth largest and below the eye; 30 scales round the middle of the body, dorsals and laterals strongly keeled and mucronate, ventrals obtusely keeled; lateral smallest, directed very obliquely backwards and upwards; 2 large preanal plates. The leg reaches to the wrist.

Brown above, with lighter and darker markings. Two conspicuous, broad, yellowish, dorsal cross-bars, one at the level of the fore-limbs, the other at the base of the tail, margined in front and behind with dark brown; other narrower and less conspicuous bars on the back and tail; upper arm and thigh with a yellow mark; belly light brown, with darker longitudinal streaks.

From snout to vent 40 mm.

Known only from the type-specimen.

240. Tropidophorus sinicus.

Tropidophorus sinicus Boettger, Zool. Anz. ix, 1886, p. 519 (type loc. Deng-u-shan, Canton Province; Frankfurt-am-Main), and Ber. Senckenb. Ges. 26–28, 1888, p. 67, pl. ii, fig. 2; Mell, Arch. f. Naturg. Berlin, lxxxviii, 1922, p. 114; Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 362; Smith, Proc. Zool. Soc. London, 1923, p. 780.

Upper head-shields strongly striated; fronto-nasal and postmental divided by a longitudinal suture; 4 or 5 shields border the parietals on each side; 2 loreal shields, one behind the other; 6 supralabials, fourth largest and below the eye; 28 to 30 scales round the middle of the body, dorsals and laterals sharply keeled, sometimes mucronate; on the tail the

keels form strong ridges; dorsals and ventrals larger than the laterals, which are directed obliquely backwards and upwards; 2 large preanal plates; the adpressed limbs fail to meet or just overlap.

Dark brown above, with large pale yellowish spots or blotches transversely arranged; sides with smaller spots; labials with white spots; whitish below, the throat and tail thickly spotted with brown.

From snout to vent 65 mm.

Range. S. China (West River, Hong-kong); Tonking (Manson Mts.).

241. Tropidophorus thai.

Tropidophorus thai Smith, J. Nat. Hist. Soc. Siam, iii, 1919, p. 226, and Proc. Zool. Soc. London, 1923, p. 781 (type loc. Pa Meang, Me Wang district, N. Siam; London).

Differs from *T. sinicus* in the following particulars:—Anterior part of frontal divided into several pieces; prefrontals separated by one or two scales; the fronto-nasal is divided as in *sinicus*, but not the postmental; 2 pairs of shields in the loreal region; parietals in contact behind the interparietal or separated by it from one another; 38 scales round the middle of the body, the dorsals and laterals more strongly keeled.

Light brown above, with numerous pale yellowish, V-shaped, dark-edged markings upon the back; sides with light dark-edged spots; brownish-white below, the tail mottled with brown.

From snout to vent 80 mm.

Range. Known from three specimens.

242. Tropidophorus microlepis.

Tropidophorus microlepis Günther, Proc. Zool. Soc. London, 1861, p. 188, and Rept. Brit. Ind. 1864, p. 76, pl. x, fig. A (type loc. Khao Sebab, Chantabun, S.E. Siam; London); Smith, Proc. Zool. Soc. London, 1923, p. 781.

Tropidophorus cochinchinensis (in part) Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 363; Smith, J. Nat. Hist. Soc. Siam, iii, 1919, p. 227.

Upper head-shields strongly striated; prefrontals in good contact with one another or with a small azygous shield between them; 2 or 3 shields border the parietals on each side; an anterior and a posterior loreal and a series of small scales between them and the supralabials; 7 supralabials, fifth largest and below the eye; 28 to 32 scales round the middle of the body, dorsals and laterals strongly keeled and

mucronate; laterals smallest and directed very obliquely backwards and upwards; gulars keeled and mucronate; ventrals sometimes obtusely keeled; on the tail the dorsal keels form strong ridges; 3 enlarged preanal plates; the leg reaches to the hand.

Brown or reddish-brown above, with more or less distinct pale-black-edged spots or transverse markings; lips and flanks with white spots; brownish-white below.

From snout to vent 80 mm.

Range. S.E. Siam (Chantabun district); S. Annam (Langbian Plateau).

Not uncommon on Khao (=hill) Sebab, near Chantabun. Two females kept by me in captivity gave birth to 7 and 9 young respectively at the end of April. Total length at birth 56–60 mm., head and body 26–30. Light brown above, with indistinct darker markings; sides blackish, with small white spots; whitish below, throat thickly mottled with grey.

243. **Tropidophorus cocincinensis.**

Tropidophorus cocincinensis Dum. & Bibr., Erp. Gen. v, 1839, p. 556, pl. lvii, fig. 1 (type loc. unknown; Paris); Smith, Proc. Zool. Soc. London, 1923, p. 780.

Tropidophorus cochinchinensis (in part) Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 363.

Differs from *T. microlepis* in the following particulars:—Dorsal and lateral scales less strongly keeled; gulars not mucronate; 30 to 32 scales round the middle of the body; 2 preanal shields.

The types, three in number, are said to have come from Cochin-China. Messrs. Delacour and Low obtained a specimen at Dak-to, near Kon-tum, Annam, lat. 14° 23′ N.

Genus **RISTELLA.**

Ristella Gray, Ann. Mag. Nat. Hist. ii, 1839, p. 333 (type *rurki*), and Cat. Liz. Brit. Mus. 1845, p. 85; Beddome, Madras Month. J. Med. Sci. iv, 1871, p. 2; Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 129; Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 356, and Fauna Brit. Ind. 1890, p. 214.

Palatine and pterygoid bones in contact on the median line of the palate, which is toothless; palatal notch far back in the mouth; maxillary teeth conical; lower eyelid scaly. Nostril pierced in the centre of a large nasal; no supranasals; prefrontals small and separated, or coalesced; frontoparietals and interparietal distinct. Ear-opening distinct. Limbs small but well developed, the hand with 4, the foot with

5 digits; claws completely retractile into a large compressed sheath formed of one large scale cleft beneath.

Range. The hills of Southern India.

Key to the Species.

I. A pair of prefrontals, well separated from one another.	
Ear-opening much larger than the nostril; dorsal scales smooth or feebly keeled	*rurki*, p. 331.
Ear-opening not or but slightly larger than the nostril; dorsal scales sharply keeled	*travancorica*, [p. 331.
II. Prefrontals united into a large azygous shield.	
22 to 24 scales round the middle of the body	*guentheri*, p. 332.
23 to 28 scales round the middle of the body	*beddomii*, p. 332.

The following characters apply to all the species:—Snout short, obtusely pointed; fronto-nasal twice as broad as long,

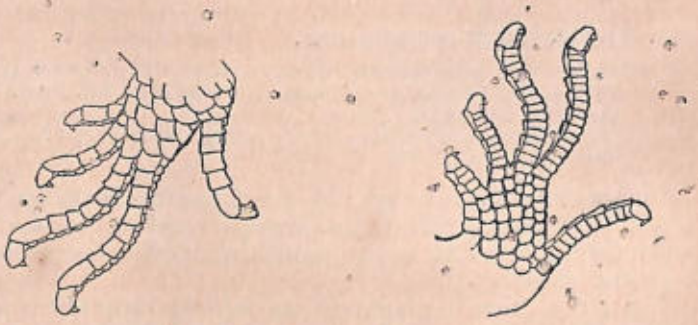


Fig. 73.—Foot of *Ristella rurki*.
A. Upper view. B. Lower view. (After Boulenger.)

in broad contact with the rostral; frontal shorter than the fronto-parietals and interparietal together; 5 supraoculars, the first two always, the third usually, in contact with the frontal; 8 to 10 supraciliaries; interparietal nearly or quite as large as a fronto-parietal; parietals large, in contact with one another behind the interparietal; no nuchals; fourth or fifth labial below the middle of the eye, not markedly longer than the preceding labials; a series of small scales between the supralabials and the eye; upper temporal large, elongate. Preanal scales not or but slightly enlarged. Tail cylindrical, rather thick at the base, the median series of scales below not transversely enlarged.

244. Ristella rurki.

Ristella rurkii Gray, Ann. Mag. Nat. Hist. ii. 1839, p. 333 (type loc. "N. India"; type lost), and Cat. Liz. Brit. Mus. 1845, p. 86; Günther, Proc. Zool. Soc. London, 1875, p. 225; Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 357, pl. xxix, fig. 1, and Fauna Brit. Ind. 1890, p. 215, fig.; Hora, Rec. Ind. Mus. xxix, 1927, p. 6.

Acuchosaurus travancoricus (in part) Beddome, Madras Month. J. Med. Sci. 1870, p. 33.—*Ristella travancorica*, (in part) Beddome, l. c. s. 1871, p. 402; Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 129, pl. iv, fig. 5.

Ristella malabarica Stoliczka, P. Asiat. Soc. Beng. 1871, p. 195, and J. Asiat. Soc. Beng. xli, 1872, p. 129 (type loc. S. India).

Fronto-nasal in contact with the frontal; prefrontals small, well separated from one another; posterior loreal usually divided into two shields; ear-opening much larger than the nostril, partly hidden by scales; 26 or 28 scales round the middle of the body, the laterals a little smaller than the dorsals and ventrals; dorsal scales more or less distinctly hexagonal in shape, feebly bi- or tricarinate, sometimes quite smooth. Limbs short, not meeting when adpressed.

Reddish-brown above, each dorsal scale with a small black spot or streak; these sometimes confluent and forming six longitudinal lines; sides dark brown or black, spotted with white; whitish below, the throat and tail spotted with brown.

From snout to vent 47; tail 80 mm.

Range. Anaimalai Hills, at between 4,000 and 5,000 feet altitude; Travancore and Palni Hills (6,900 feet).

Beddome, who under *travancorica* included also *rurki*, records the species as common throughout the moist jungles of the western chain of ghats in the Madras Presidency, at between 2,000 and 5,000 feet altitude.

245. Ristella travancorica.

Acuchosaurus travancoricus (in part) Beddome, Madras Month. J. Med. Sci. 1870, p. 33 (type loc. Western Ghats; London).—*Ristella travancorica*, Beddome, l. c. s. 1871, p. 402 (in part); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 358, pl. xxix, fig. 2, and Fauna Brit. Ind. 1890, p. 216.

Differs from *R. rurki* in the following particulars:—Posterior loreal usually not divided; ear-opening not or but slightly larger than the nostril; dorsal scales sharply bicarinate, sometimes tricarinate; 24, rarely 26 or 22, scales round the middle of the body.

Reddish-brown above and on the sides, the scales tipped or centrally spotted with dark brown; sometimes a dark stripe along the flanks, or with pale yellow spots; whitish

below, the throat and tail sometimes with a few brown spots.

From snout to vent 40 ; tail 60 mm.

Range. Western Ghats (see *rurki*) ; Tinnevelly Hills.

246. Ristella guentheri.

Ristella guentheri Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 358, pl. xxix, fig. 3, and Fauna Brit. Ind. 1890, p. 216 (type loc. Sirimallai Hills, Madura district ; London) ; Annandale, Rec. Ind. Mus. iii, 1909, p. 257.

A single azygous prefrontal, nearly or quite as long as the fronto-nasal ; loreals subequal or the posterior divided ; ear-opening distinctly larger than the nostril, partly concealed by scales ; 22 or 24 scales round the middle of the body, dorsals sharply bicarinate. Limbs short, separated, sometimes widely, when adpressed.

Reddish-brown above, the scales tipped or centrally spotted with dark brown ; the spots sometimes confluent and forming longitudinal lines ; flanks always with dark lines, sometimes with small yellow spots ; whitish below, the throat sometimes with small brown spots. Young with three light dark-edged stripes down the back and two more on the sides.

From snout to vent 40 ; tail 60 mm.

Variation. No. 17023, Ind. Mus., has the prefrontal divided to form two shields which are in broad contact with one another.

Range. Madura district ; Tenmalai, Travancore ; Anaimalai Hills (4,000 feet).

247. Ristella beddomii.

Ristella beddomii Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 359, pl. xxix, fig. 4, and Fauna Brit. Ind. 1890, p. 216 (type loc. S.W. India ; London) ; Annandale, Rec. Ind. Mus. iii, 1909, p. 257.

Differs from *guentheri* in the following particulars :—Anterior loreal usually much higher than long ; ear-opening a little larger. 26 or 28 scales round the middle of the body ; the adpressed limbs may fail to meet, but usually overlap.

Colour as in *guentheri*, but the dark lines less and the yellow spots usually more in evidence ; often a large black blotch above the fore-limb ; the light dorsal stripes of the young may persist.

Range. Southern India. The types were collected by Beddome ; their exact origin is not known. Tenmalai, Travancore ; Sharavati River, N. Kanara district ; Parambikulam (Cochin State).

Genus **OPHIOSCINCUS.**

Ophioscincus Peters, Mon. Akad. Berlin, 1873, p. 747 (type *australis*).
Isopachys Lönnberg, Kungl. Sv. Vet.-Akad. Handl. lv, 1916, no. 4, p. 10 (type *gyldenstolpei*).
Typhloseps Angel, Bull. Mus. Hist. nat. Paris, 1920, p. 4 (type *roulei*).
Lygosoma, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 209.

Palatine bones in contact mesially; pterygoid bones in contact anteriorly, the palatal notch far back in the mouth; maxillary teeth conical; no pterygoid teeth. Eye small, lower eyelid composed of one or two thickened scales, probably immovable; no upper lid. Nostril situated in the anterior part of a very large nasal; no supranasals; fronto-nasal present or absent; fronto-parietals distinct; no ear-opening. Body vermiform; no limbs; vestiges of pectoral and pelvic girdles.

Four species: three inhabit Indo-China, the fourth Australia. Degenerate dwarfed Skinks.

The four species placed under this genus form a series showing progressive degeneration and modification for a subterranean existence. Starting with *australis* and terminating with *gyldenstolpei* there is gradual enlargement and thickening of the rostral, nasal, and mental shields; combined with these changes are separation of the fronto-parietals, disappearance of the prefrontals, and finally, also, of the fronto-nasal.

Isopachys gyldenstolpei is rightly placed here. Lönnberg in his description states that the palatine bones are separated mesially, but this error is due to the fact that the head of the specimen is damaged.

O. anguinoides still retains vestiges of both pectoral and pelvic girdles; in *O. gyldenstolpei* "no shoulder-girdle can be seen, but a minute vestige of a pelvis appears to remain." This statement, however, is based upon what can be seen in a skiagraph, and it is highly probable that a stained skeleton would show more. In *O. gyldenstolpei* the osteoderms are greatly thinned, so much so that they offer no obstacle to the passage of Röntgen-rays. The skiagraph shows that it has 67 or 68 body-vertebræ.

The distribution of *Ophioscincus* as now conceived is closely paralleled by that of *Physignathus*.

Key to the Indo-Chinese Species.

A fronto-nasal; frontal broader than long.
Nasal shields separated from or just touching one another; 22 to 24 scales round body ... *anguinoides*, [p. 334.
Nasal shields in broad contact with one another; 18 scales round body ... *roulei*, p. 335.
No fronto-nasal; frontal longer than broad.
Nasal shields in broad contact with one another; 24 to 28 scales round body ... *gyldenstolpei*, [p. 335.

248. Ophioscincus anguinoides.

Lygosoma anguinoides Boulenger, J. Nat. Hist. Soc. Siam, i, 1914, p. 67 (type loc. Bangtaphan, Patiyu State, Peninsular Siam; London); Smith, J. Nat. Hist. Soc. Siam, ii, 1916, p. 157; Cochran, Proc. U.S. Nat. Mus. lxxvii, 1930, p. 16.

Snout obtuse, projecting beyond the lower jaw. Rostral large, its apex prolonged backwards on to the top of the snout; nasal shield in contact with its fellow or just separated from it by the apex of the rostral; fronto-nasal much broader than long; prefrontals small and widely separated from one another; frontal broader than long, not much larger than the fronto-nasal; fronto-parietals about as large as the interparietal, in contact with one another; parietals narrow, in contact with one another behind the interparietal,

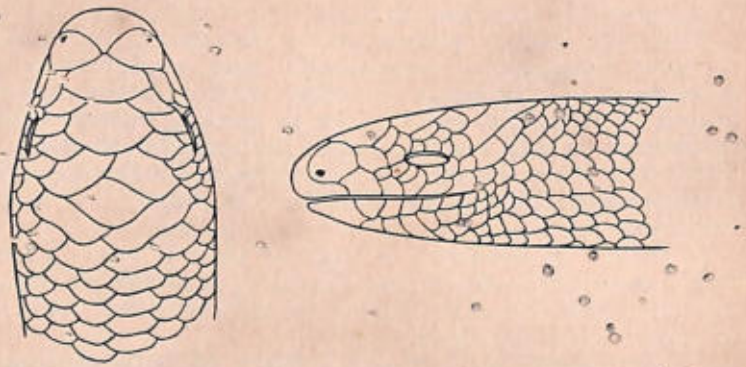


Fig. 74.—Upper and side views of head of *Ophioscincus anguinoides*.

sometimes succeeded by a pair of nuchals; 3 or 4 supraoculars, the second the largest, projecting inwards between the frontal and fronto-parietal; 4 supraciliaries; 1 loreal; 4 or 5 supralabials, first largest, third below the eye; 1 very large mental shield. Body elongate, with 22 or 24 equal, smooth scales round the middle; preanals enlarged. Tail as thick as the body at its base and for a considerable part of its length, terminating in a point, as long as or a little shorter than the head and body.

Pale greyish-brown, with a pair of dark brown streaks along the middle of the back and a broader dorso-lateral pair; below the latter and on the belly usually darker, with brown longitudinal lines between the scales; tail coloured like the body.

From snout to vent 70 mm.

Range. Peninsular Siam (Hat Sanuk, Bangtaphan, Maprit, Klong Bang Lai, localities between 10° 50′ and 12° N.

Found beneath rotting timber.

249. Ophioscincus roulei.

Typhloseps roulei Angel, Bull. Mus. Hist. nat. Paris, 1920, p. 4, figs. (type loc. Siam; Paris).

Snout obtusely pointed, slightly depressed, projecting beyond the lower jaw. Rostral very large, covering the whole of the end of the snout; nasal shields very large, in broad contact with one another; fronto-nasal much broader than long; prefrontals (?) very small, widely separated from one another, more or less in the position of a loreal; frontal broader than long, not much longer than the fronto-nasal; fronto-parietals a little smaller than the interparietal, separated from one another; parietals narrow, in contact with one another behind the interparietal; no nuchals; 3 subequal supraoculars; 4 supraciliaries; 4 supralabials, the third below the eye, the first as large as the other three together; mental very large, with on each side of it an enlarged infralabial, these three shields, like the rostral, nasals, and first supralabials, composed of thickened cuticle.

Body elongate, with 18 smooth scales round the middle; preanals slightly enlarged. Tail as thick as the body at its base and for a considerable part of its length, terminating in a blunt point (perhaps incomplete), not quite as long as the head and body.

Light fawn above, with two broad, dark bluish-brown, longitudinal stripes, one on each side of the vertebral line; brown below, the colour extending on to and forming a distinct stripe along the side of the body and tail; top of head mostly dark brown.

From snout to vent 95 mm.

Known from the two type specimens only. They were sent from Siam by Monsieur Harmand in 1883, but their exact origin of locality is not known.

250. Ophioscincus gyldenstolpei.

Isopachys gyldenstolpei Lönnberg, Kungl. Sven. Vet.-Akad. Handl. Stockholm, Bd. lv, 1916, no. 4, p. 10, text-figs. 2–6 (type loc. Koh Lak (Prachuap Kirikan), Peninsular Siam; Stockholm).

Snout broad, obtuse, somewhat depressed, with slightly angular lateral edge, projecting beyond the lower jaw. Rostral very large, covering the whole of the end of the snout, its posterior margin above being perfectly straight; nasal shields in broad contact with one another, diverging posteriorly to receive the tip of the frontal; frontal seven-sided,

a little longer than broad, truncate posteriorly; fronto-parietals long and narrow, obliquely placed, widely separated from one another; interparietal large; parietals large, in contact with one another behind the interparietal, bounded laterally by an elongated temporal shield and behind by a pair of nuchals; 3 supraoculars, the first elongate, the second projecting inwards between the frontal and fronto-parietal; 3 supraciliaries; 4 supralabials, first much the largest, second narrowest and below the eye; mental very large, with on each side of it an enlarged first infralabial, these three shields, like the rostral, nasal, and first supralabial, being composed of thickened cuticle. Preanals feebly enlarged. Body-scales quite smooth, subequal; 24 to 28 round the body. Tail nearly as thick as the body throughout, slightly swollen at the tip, much shorter than the head and body.

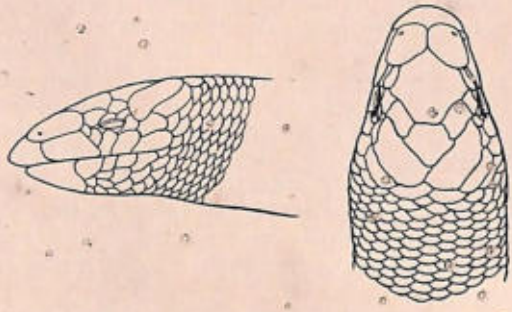


Fig. 75.—Upper and side views of head of *Ophioscincus gyldenstolpei*.

Light fawn above and on the sides, with two broad, dark, slate-blue longitudinal stripes, one on each side of the vertebral line; at the neck these are joined together, and also at the base of the tail, the upper surface of which is all dark brown with a series of light spots or indentations; in the young there are narrow light cross-bands. Belly and lower surface of tail pale brown, the colour terminating on the side in a clearly defined line.

From snout to vent 220; tail 65 mm.

Range. Koh Lak (Prachuap Kirikan) and Hua Hin, Peninsular Siam (lat. 12° N. approx.).

Found under fallen wood in sandy soil. Known from three specimens.

Genus EUMECES.

Eumeces (in part) Wiegmann, Herp. Mex. 1834, p. 36 (type *pavimentatus=schneideri*); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 365, and Fauna Brit. Ind. 1890, p. 218; Kingman, Bull. Univ. Kansas, xxxiii, 1932, p. 273.
Plestiodon Dum. & Bibr., Erp. Gen. v, 1839, p. 697 (type *aldrovandii=schneideri*).
Pariocela Fitzinger, Syst. Rept. 1843, p. 22 (type *Plestiodon laticeps*).
Lamprosaurus Hallowell, Proc. Acad. Phila. vi, 1852, p. 206 (type *guttulatus*).
Eurylepis Blyth, J. Asiat. Soc. Beng. xxiii, 1854, p. 739 (type *tæniolatus*).

Palatine bones not meeting on the mid-line of the palate; pterygoids toothed; lateral teeth conical or with spheroidal crowns; eyelids well developed, lower eyelid scaly. Tympanum distinct, deeply sunk. Nostril pierced in the nasal;

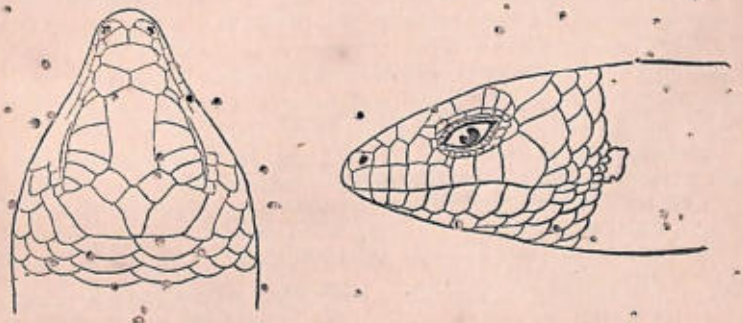


Fig. 76.—Upper and side views of head of *Eumeces tæniolatus*. (After Boulenger.)

supranasals, prefrontals, fronto-parietals, and interparietal distinct. Limbs well developed, pentadactyle; digits with transverse lamellæ beneath. Some 35 species are known.

Range. North and Central America; S.E. and S.W. Asia; North Africa.

E. elegans is included in the Key only. It occurs just north of the area included in this work.

Unless otherwise stated the following characters are common to all the species mentioned in this work:—Snout obtusely pointed, a little longer than the orbit; nasal shield more or less divided into an anterior and a posterior part; supranasals well developed, in contact with one another; fronto-nasal broader than long; prefrontals well developed, in contact with or separated from one another; 5 supraoculars, fifth small and descending behind the supraciliary margin, the first and second always in contact with the frontal,

the third may or may not be; 6 or 7 supraciliaries; 7 (or 8) supralabials, the four (or five) anterior to the eye smaller than the others, the seventh (or eighth) largest; a pair of superposed temporals; ear-opening oval, rather large, smaller than a lateral scale; scales quite smooth; a pair of preanal plates; tail with transversely enlarged scales below.

The dorsal scales in longitudinal series are counted between the parietal shields and the beginning of the tail.

All the members of this genus, both Asiatic and American, that we have knowledge of, guard their eggs during the incubation period.

Key to the Indian and Indo-Chinese Species.

I. Dorsal scales not broader than those on the flanks.

22 to 24 scales round the body; young with three light longitudinal stripes above ..... *chinensis*, p. 338.

26 scales round the body; young with five light longitudinal stripes above ..... [*elegans.*]

II. The two median rows of dorsal scales broader than those on the flanks. [p. 339.

A postnasal; 20 to 22 scales round the body .... *quadrilineatus*,

No postnasal; 28 to 30 scales round the body; one azygous postmental ..... *blythianus*, p. 340.

No postnasal; 26 to 30 scales round the body; two azygous postmentals ..... *schneideri*, p. 341.

III. The two median rows of dorsal scales united into a single broad one; a postnasal shield; body much elongated.

21 to 23 scales round the middle of the body .... *tæniolatus*, p. 342.

251. Eumeces chinensis.

Tiliqua chinensis Gray, Ann. Mag. Nat. Hist. ii, 1838, p. 289 (type loc. China; London).—*Mabouia chinensis* (in part), Günther, Rept. Brit. Ind. 1864, p. 83.—*Eumeces chinensis*, Boettger, Ber. Senckenb. Ges. 1894, p. 146; Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 375; Mell, Arch. f. Naturg. Berlin, lxxxviii, 1922, p. 114; Smith, J. Nat. Hist. Soc. Siam, vi, 1923, p. 200; Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 503; Pope, ibid. lviii, 1929, p. 384, fig.

Second supraocular distinctly larger than the first; fronto-parietals well developed, in contact with one another; inter-parietal usually smaller than a fronto-parietal, separating the parietals; 2 or 3 pairs of nuchals. Nasal shield small; no postnasal; anterior loreal higher than long, shorter than the posterior, in contact with the supranasal and internasal; first supralabial higher than second, in contact with the anterior loreal; ear-opening with 3 or 4 short lobules anteriorly; 2 azygous postmentals or the posterior rarely divided; body rather stout and elongate, 22 to 24 scales

round the middle, the dorsal scales not larger than those upon the flanks; 46 to 53 dorsal scales in longitudinal series. The limbs just overlap; in the adult they may fail to meet.

The very young have three light yellowish stripes upon a dark ground-colour, a vertebral and two dorso-lateral, which extend on to the back of the head. This pattern is soon lost, and half-grown and adults are of a uniform greyish-olive above, browner upon the top of the head; sometimes with dark markings upon the flanks; sides of neck and flanks in the adult with patches of rusty red or brown; whitish below.

From snout to vent 110; tail 140 mm.

Range. S. China; Hong-kong; Hainan.

Gray's type of *chinensis*, which was sent him by Reeves, is a three-quarter-grown individual. It agrees well with specimens from Hong-kong and Canton districts which have consistently 24 scales (22 in the one known from Hainan) round the middle of the body, and the coloration as described above. This form extends north as far as Fukien and Kiangsi Provinces, but north of this again it is replaced by one which has usually 26 scales round the body, and the back marked with more or less distinct dark longitudinal streaks (*elegans*).

Pope found this Skink common in the plains and plateaux of Fukien. It abounded along roads, paths, and terraces all through the open flat country. A female from Hong-kong contains 16 eggs.

There is an excellent coloured sketch of an adult *chinensis* in the Hardwicke Collection, no. 109, showing the red patches along the side of the body. It is a duplicate of one in the Reeves Collection.

252. **Eumeces quadrilineatus.**

Plestiodon quadrilineatus Blyth, J. Asiat. Soc. Beng. xxii, 1853, p. 652 (type loc. China, ? Hong-kong).—*Mabouia quadrilineata*, Günther, Rept. Brit. Ind. 1864, p. 82, pl. x, fig. E.—*Eumeces quadrilineatus*, Bocourt, Miss. Sci. Mex., Rept. 1870, p. 423, pl. xxii, fig. 5; Mell, Arch. f. Naturg. Berlin, lxxxviii, 1922, p. 114; Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 427; Smith, J. Nat. Hist. Soc. Siam, viii, 1929, p. 213.

Eumeces quadrivirgatus Hallowell, Proc. Acad. Philad. 1860, p. 502 (type loc. Hong-kong; Philadelphia).

Second supraocular larger than first; fronto-parietals well developed, in contact with one another; interparietal about as large as a fronto-parietal, usually not separating the parietals; 2 or 3 pairs of nuchals. Nasal shield small; a postnasal; anterior loreal higher than long, shorter than the posterior, in contact with the supranasal and internasal; first supralabial not higher than second, in contact with the postnasal;

ear-opening with a few very short lobules anteriorly; two azygous postmentals, or the posterior one sometimes divided; body slender, 20 or 22 scales round the middle, the two median dorsal rows broader than the laterals; 48 to 50 dorsal scales in longitudinal series. The hind-limb reaches to the wrist, or not quite so far.

The young are bluish-black above, with four light green longitudinal stripes; the dorso-lateral pair start from the tip of the nose and are continued well on to the tail; the outer pair start from the upper lip and pass along the side of the body to the groin or on to the base of the tail. Throat whitish, belly bluish-white; posterior half or third of tail blue. Adult light olive-green above, with the light stripes less clearly defined.

From snout to vent 77; tail 115 mm.

Range. Southern China (Hong-kong and West River); Hainan; Tonking (Man-son Mts.); Cambodia; Siam (Doi Angka; Dong Paya Fai Mts.).

Blyth's original type, which was collected by Bowring, appears to be lost; the British Museum has two other specimens, also collected by Bowring, one of which is labelled "Hong-kong."

253. Eumeces blythianus.

Mabouia blythiana Anderson, P. Asiat. Soc. Beng. 1871, p. 186 (type loc. unknown; Calcutta).—*Eumeces blythianus*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 385, and Fauna Brit. Ind. 1890, p. 220; Finn, P. Asiat. Soc. Beng. 1898, p. 139.

Second supraocular a little larger than the first; fronto-parietals well developed, in contact with one another; inter-parietal nearly twice as large as a fronto-parietal, entirely separating the parietals; 2 to 4 pairs of nuchals. Nasal shield rather large; no postnasal; anterior loreal a little shorter than the posterior loreal, in contact with the supra-nasal; first supralabial not higher than second, narrowly separated from the anterior loreal; ear-opening with 3 or 4 large lobules anteriorly; a single azygous postmental; body rather slender; 28 to 30 scales round the middle, the two median dorsal rows distinctly broader than the lateral scales; 58 to 60 dorsal scales in longitudinal series. The hind-limb reaches to the wrist.

Light olive-brown above with dark brown longitudinal stripes, three upon the back; a light lateral stripe starting from the upper lip, bordered above by a broad dark dorso-lateral stripe and below by a narrower one; whitish below.

From snout to vent 85; tail 150 mm.

Range. The locality from which Blyth's type came is not known; it was purchased from a Bokhara merchant, who said

that he obtained it at Amritzar (Punjab); a second specimen, now in the British Museum, was collected by Dr. C. R. M. Green in the Afridi country.

254. Eumeces schneideri.

Scincus schneideri Daudin, Hist. Nat., Rept. iv, 1802, p. 291 (no type loc. given).—*Eumeces schneideri*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 383, and Fauna Brit. Ind. 1890, p. 219, and J. Linn. Soc. xxvii, 1899, p. 379; Boettger, Zool. Jahrb. iii, 1888, p. 918; Anderson, Zool. Egypt, 1898, p. 196, col. pl. xxv; Procter, J. Bombay N.H. Soc. xxix, 1923, p. 126; Mertens, Senckenb. iv, 1924, p. 182, and Abh. Mus. Natk. Magdeb. iii, 1924, and Zool. Jahrb. Jena, lxi, 1931, p. 66.

Lacerta rufescens (in part) Shaw, Gen. Zool. iii, 1802, p. 285 (based on Aldrovani's figure in Quad. Ovip. 1637, p. 660).

Scincus pavimentatus Geoffroy de St. Hilaire, Descr. Egypte, 1827, p. 138, pl. iv, fig. 3 (type loc. Egypt).—*Eumeces pavimentatus*, Blanford, Zool. E. Persia, 1876, p. 387.

Second supraocular larger than first; fronto-parietals in contact with one another, much smaller than the interparietal, which completely separates the parietals; 3 to 5 pairs of nuchals. Nasal large; no postnasal; anterior loreal higher than long, smaller than the posterior loreal, in contact with the supranasal; first supralabial not higher than second, not or just touching the loreal; ear-opening with 3 or 4 large, pointed lobules anteriorly; 2 azygous postmentals; body stout and elongate, 26 to 30 scales round the middle, the two median dorsal rows distinctly broader than the laterals; 58 to 62 dorsal scales in longitudinal series. The hind-limb reaches to the wrist or the elbow in the young; in the fully grown the limbs fail to meet.

Young, olive-grey or brownish above, uniform, or with three more or less distinct dark longitudinal lines, or with golden spots or stripes; a golden lateral stripe bordered above by a light brown band; lower surfaces yellowish-white. The adult is lighter above; the dark longitudinal stripes have disappeared, but the golden spots may persist.

From snout to vent 170; tail 200 mm.

Range. Found within Indian limits at Omara and Mand on the Mekran coast, in North Baluchistan, and in Waziristan, N.W.F.P.

The typical form, with 26 or 28, 30 sometimes in Waziristan, scales round the middle of the body, and with the coloration as given above, extends through Persia and Arabia to Northern Africa. The species is also found in Asia Minor and Transcaspia.

Ingoldby (in Procter) found this Skink abundant on the plain of Wana, Waziristan, between 1,500 and 5,000 feet altitude. They lived in burrows. These were about 18 or

24 inches in length, were bent at a right angle a few inches after entering the ground, and commonly opened into the lip of a depression. At the time of his visit (February) the lizards were hibernating, and the burrow was often found to be occupied also by *Eremias velox* and *E. guttulata*.

255. Eumeces tæniolatus.

Eurylepis tæniolatus Blyth, J. Asiat. Soc. Beng. xxiii, 1854, p. 470 (type loc. Salt Range, Punjab; Calcutta).—*Eumeces tæniolatus*, Annandale, J. Asiat. Soc. Beng. i, 1905, p. 148.—*Mabouia tæniolata*, Anderson, P. Asiat. Soc. Beng. 1871, p. 184.—*Eumeces tæniolatus*, Stoliczka, P. Asiat. Soc. Beng. 1872, p. 75; Blanford, 2nd Yark. Miss. 1878, p. 19; Murray, Zool. Sind, 1884, p. 356. *Plestiodon scutatus* Theobald, Cat. Rept. Asiat. Soc. Mus. 1868, p. 25 (apparently based on Blyth's types of *tæniolatus*).—*Plestiodon* (*Eumeces*) *scutatus*, Jerdon, P. Asiat. Soc. Beng. 1870, p. 73.—*Eumeces scutatus*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 382, and Fauna Brit. Ind. 1890, p. 218, fig.; Annandale, J. & P. Asiat. Soc. Beng. i, 1905, p. 148; Procter, J. Bombay N.H. Soc. xxix, 1923, p. 126.

Second supraocular scarcely or not larger than first; frontoparietals rather small, separated from or just touching one another, considerably smaller than the interparietal, which entirely separates the parietals; 4 or 5 pairs of nuchals. Nasal shield large; a postnasal; anterior loreal higher than long, smaller than the posterior; first supralabial not higher than the second, just touching or separated from the postnasal; ear-opening with 3 or 4 projecting lobules anteriorly; 2 azygous postmentals; body elongate, not stout, 21 or 23 scales round the middle, the vertebral series four or five times as broad as long. These are formed by the fusion of the two median rows of dorsal scales, but only upon the back, the scales on the nape and near the base of the tail not being united; in occasional individuals (Brit. Mus. 1933.6.26.1–5) some of the dorsal scales also have failed to unite; 72 to 80 dorsal scales in longitudinal series. Limbs short; the adpressed limbs fail to meet by about the length of the hind-limb; in the young they are relatively longer.

Pale brown above, the young with three broad dark brown longitudinal stripes formed of closely connected spots; the vertebral one occupies the greater part of the vertebral series of scales, the two others are upon the upper half of the neck and flank; both are freely spotted with white; in later life the stripes, particularly the vertebral one, become more or less broken up into spots; lower parts white, deep saffron in life.

From snout to vent 120; tail 180 mm. An unusually large specimen from Chakoti, Kashmir, measures 150 mm. from snout to vent.

Range. From Transcaspia to N.W. India. Cutch, Sind, Rajputana, Punjab (Salt Range), Kashmir, North-West Frontier Province.

Ingoldby found this Skink abundant in Waziristan; it was usually obtained from the burrows of *Tatera indica**, in the sandy patches which occur round the roots of bushes on the otherwise stony plain bordering the foothills near the Afghan frontier. Murray states that it is commonly seen in Sind among hedges and in gardens during the hottest part of the day.

Boulenger's conception of *tæniolatus* (Cat. Liz. Brit. Mus. iii, 1887, p. 383, and Fauna Brit. Ind. 1890, p. 219) was based upon an error, Blyth's types not having been seen by him. The specimen in the British Museum (no. 83.8.17.6, purchased from Mr. Warwick, without other data, but thought to have come from India) upon which his description of *tæniolatus* was drawn up, has been shown by Taylor (in the press) to be identical with *E. managuæ* Dunn from Central America.

Genus **SCINCUS.**

Scincus Gronovius, Zooph. Anim. i, 1763, p. 11 (type *Lacerta scincus* Linn.); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 389, and Fauna Brit. Ind. 1890, p. 220; Anderson, Zool. Egypt, 1898, p. 204.

Pedorychus Wiegmann, Arch. f. Naturg. Berlin, 1837, (1) p. 128 (type *hemprichii*).

Otilepis Strauch, Bull. Acad. Sci. St. Pétersb. x, 1866, p. 459 (type *Cyclodus brandtii*).

Palatine bones not meeting on the mid-line of the palate; pterygoids toothed; premaxillary prolonged forwards into a tooth-like projection. Maxillary teeth conical or with obtuse tubercular crowns. Eyelids well developed, scaly. Ear-opening more or less completely hidden under scales. Snout depressed, cuneiform, mouth inferior; nostril between an upper and a lower nasal. Supranasals, prefrontals, frontoparietals, and interparietal distinct. Limbs well developed, pentadactyle; digits flattened, serrated laterally, with transverse lamellæ inferiorly; tail shorter than the body.

Range. North Africa to Sind. Seven species are recognized, all very closely allied to one another. One is found in India.

The lizards of this genus inhabit desert areas, and their modifications in structure are particularly adapted for living in sand. They burrow chiefly by means of the wedge-shaped snout, wriggling, almost diving, into the soil with extraordinary ease, the fore-limbs being folded back along the sides of the body and not used in progression. Their rapid

* A species of Gerbil.

movements in loose sand have earned for them the name of "Sand Fish" throughout their whole range.

The ear-opening is more or less completely covered by scales. It lies below and behind the angle of the mouth, its position, in those species in which it is completely hidden, being indicated by one or two scales with denticulated posterior margins. The tympanum is in the usual position, and the

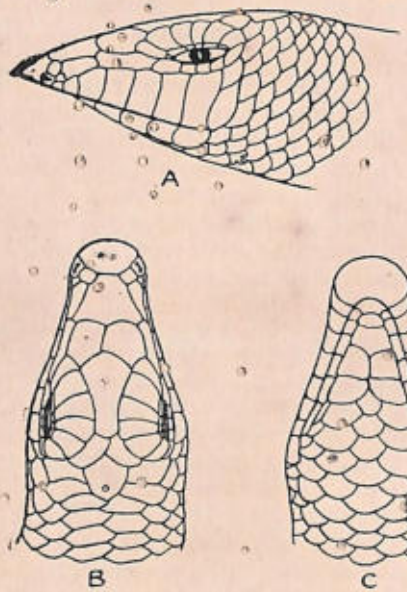


Fig. 77.—Head of *Scincus mitranus*.
A. Side view. B. Upper view. C. Lower view.

auditory meatus is in consequence greatly lengthened. The nostril is slit-like and can be completely closed. The digits are furnished with strong lateral denticulations, a character which is usually associated with species living in sandy places.

256. Scincus mitranus.

Scincus mitranus Anderson, P. Asiat. Soc. Beng. 1871, pp. 96 & 115 (type loc. probably Arabia; Calcutta); Boulenger, Cat. Liz. Brit. Mus. iii. 1887, p. 393; Annandale, J. & F. Asiat. Soc. Beng. i, 1905, p. 148; Parker, in B. Thomas's Arabia Felix, 1932, p. 344.

Scincus arenaria Murray, Zool. Sind, 1884, p. 353, pl. x, fig. 2 (type loc. Hubb Plains, Sind; London); Boulenger, Fauna Brit. Ind. 1890, p. 221.

Snout much longer than the orbit; rostral large, with depressed, strongly projecting edge; supranasals widely separated from one another; fronto-nasal as long as

broad; prefrontals in good contact with one another; frontal longer than the fronto-parietals and interparietal together; parietals small, shorter than the interparietal, followed by 3 or 4 pairs of nuchals; 5 supraoculars, the first three in contact with the frontal; 5 supraciliaries, the first very large, and occupying the front of the supra-orbital region; the second long and narrow. A postnasal; two elongate loreals; eye small; lower eyelid with a semi-transparent disc formed of several large scales; usually 8 supralabials, separated from the lower eyelid by smaller scales, the seventh below the middle of the eye; ear-opening fairly large, completely hidden by scales. Body stout, with angular latero-ventral edge; scales quite smooth, laterals smallest; 28 to 32 round the middle of the body; a pair of large preanal plates; tail short, thick at the base, terminating in a fine point, the median scales below transversely enlarged; a small, projecting, keeled, bony scale on each side of the base of the tail behind the vent. Limbs short; the adpressed limbs overlap; digits much flattened, with strong lateral denticulations, the outer series being formed by extensions of the upper, the inner by extensions of the lower, lamellæ; the two terminal lamellæ, which enclose the claw, together form an oval disc.

Cream-coloured above, each dorsal scale edged or tipped with brown, and with a whitish spot which may be divided into two; sides with from 7 to 10 deep reddish-brown vertical blotches; whitish below.

From snout to vent 115; tail 90 mm.

Range. Murray collected seven specimens on the plains of Hubb (Hab), Sind. The species is otherwise known from S. Arabia, but has not yet been met with in Persia. The type of *mitranus* was bought from a Kashmir merchant, and was said to have come from Arabia.

Genus **OPHIOMORUS**.

Ophiomorus Dum. & Bibr., Erp. Gen. v, 1839, p. 799 (type *miliaris* = *punctatissimus*); Bouenger, Cat. Liz. Brit. Mus. iii, 1887, p. 393, and Bull. Soc. Zool. France, xii, 1887, p. 519, and Fauna Brit. Ind. 1890, p. 221.

Sphenocephalus (not of Agassiz, 1838) Blyth, J. Asiat. Soc. Beng. xxii, 1853, p. 654 (type *tridactylus*).

Hemipodion Steindachner, Sitz. Akad. Wiss. Wien, lv, (1) 1867, p. 235 (type *persicum*).

Zygnopsis Blanford, Ann. Mag. Nat. Hist. (4) xiv, 1874, p. 33, and Zool. E. Persia, 1876, p. 396 (type *brevipes*).

Sphenoscincus Peters, Mon. Akad. Berlin, 1875, p. 553 (type *tridactylus*).

Zygnidopsis Blanford, J. Asiat. Soc. Beng. xlviii, 1879, p. 128 (correction for *Zygnopsis*).

Palatine bones not meeting on the mid-line of the palate; pterygoid teeth usually present. Teeth more or less conical;

Nostril situated in the suture between the nasal and supranasal, close to the rostral; prefrontals usually distinct; fronto-parietals and interparietal distinct. Eye small; lower

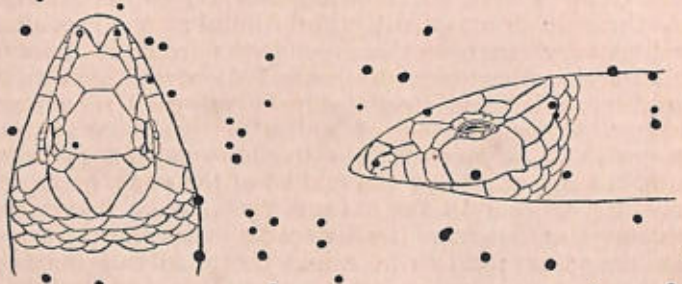


Fig. 78.—Upper and side views of head of *Ophiomorus tridactylus*. (After Boulenger.)

eyelid with an undivided transparent disc. Ear-opening minute, more or less hidden, or absent. Body elongate; limbs very small or absent.

Range. From S.E. Europe to N.W. India. Six species are recognized.

Key to the Indian Species.

Fingers and toes 3	*tridactylus*, p. 346.
Fingers 4, toes 3.	
20 scales round the middle of the body	*blanfordi*, p. 347.
22 scales round the middle of the body	*brevipes*, p. 348.

257. Ophiomorus tridactylus.

Sphenocephalus tridactylus Blyth, J. Asiat. Soc. Beng. xxii, 1855, p. 654 (type loc. Afghanistan); Jerdon, P. Asiat. Soc. Beng. 1870, p. 74; Stoliczka, ibid. 1872, p. 76; Blanford, Zool. E. Persia, 1876, p. 395, and J. Asiat. Soc. Beng. xlviii, 1879, p. 128.—*Sphenoscincus tridactylus*, Peters, Mon. Akad. Berlin, 1875, p. 553, pl. —, figs. 6–12.—*Ophiomorus tridactylus*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 394, and Bull. Soc. Zool. France, xii, 1887, p. 520, and Fauna Brit. Ind. 1890, p. 222; Alcock & Finn, J. Asiat. Soc. Beng. lxv, 1896, p. 561.

Snout cuneiform, with angular labial edge, rounded above, flat beneath, the mouth inferior; rostral large, triangular when viewed from above, the apex of the triangle partly separating the supranasals, which are in contact with one another behind it; fronto-nasal large, usually broader than long; prefrontals separated from one another, united with the second loreal; frontal large, nearly or quite as broad as long; 3 or 4 small supraoculars; no supraciliaries; fronto-parietals small, widely separated from one another, much smaller than the very large interparietal; parietals narrow, obliquely placed, not meeting behind the inter-

parietal; they are bordered by a large temporal shield on each side; a pair of nuchals. Nostril close to the rostral, a preocular; eye small; lower eyelid large, with a transparent disc (? immovable); upper lid vestigial; 6 supralabials, the fifth very large and below the eye, those anterior to it progressively reduced in size; no ear-opening: 2 azygous postmentals, the posterior much the larger. Body much elongated, with indistinct angular latero-ventral edge, the distance between the axilla and groin ten to twelve times greater than the length of the fore-limb in Indian examples, eight to ten in Persian; 22 smooth scales round the middle of the body, 20 only in one example from the Punjab, the two median ventral series narrower than the others; a pair of enlarged preanal scales; tail cylindrical, nearly as thick as the body at the base, shorter than the head and body, terminating in a point; anterior pair of limbs less developed than the posterior pair, fitting into a groove on the side of the body; each limb with three digits, the 4th and 5th being lost.

Cream or pale brown, uniform or with longitudinal series of brown dots on the back; a brown streak on the side of the head passing through the eye.

From snout to vent 105; tail 80 mm.

Range. Punjab; Cutch; Sind; Afghanistan; Baluchistan; E. Persia.

Common, according to Stoliczka (1870), in the desert and shady parts of southern and western Punjab. Alcock and Finn found it very common in Chaman district, north-west of Quetta, wherever there was sand. They were hard to catch, as they dived below the surface at the first sign of danger, working into the sand with the greatest ease. The natives fried them in a closed vessel, and thus obtained a nauseous oil which was believed to be of great value in impotence. In the Punjab it is known as Rig Mahi, *i. e.*, "Sand-Fish," a name which is also applied to the species of *Scincus*.

258. Ophiomorus blanfordi.

Zygnidopsis brevipes (not of Blanford, 1874), Blanford, J. Asiat. Soc. Beng. xlviii. 1879, p. 128 (type loc. Persia or Baluchistan; London).

Ophiomorus blanfordii Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 395, pl. xxxiii. fig. 1, and Bull. Soc. Zool. France, xii, 1887, p. 523, and Fauna Brit. Ind. 1890, p. 222.

Snout cuneiform, with angular labial edge, rounded above, flat beneath, the mouth inferior; rostral large, well visible from above, pointed behind; supranasals in good contact with one another; fronto-nasal rather small, broader than long; prefrontals elongate, well separated from one another; frontal

large, longer than broad; 3 small supraoculars, first largest, third reaching the supraciliary border; 3 supraciliaries, first largest and entering the supraorbital region; fronto-parietals very small, widely separated from one another, much smaller than the large interparietal, which is as long as broad; parietals narrow, obliquely placed, not meeting behind the interparietal; they are bordered by two shields on each side; a pair of nuchals present or absent. Nostril close to the rostral; anterior and posterior loreals subequal or the former the larger; eye small; lower eyelid with a transparent disc; upper eyelid vestigial; 7 supralabials, first smallest, fifth largest, fifth and sixth below the eye; no ear-opening; 2 azygous postmentals, the posterior much the larger; body much elongated, with indistinct angular latero-ventral edge. The distance between the axilla and groin seven or eight times greater than the length of the fore-limb; 20 subequal smooth scales round the middle of the body; a pair of enlarged preanals; tail cylindrical, nearly as thick as the body at the base, shorter than the head and body; anterior pair of limbs less developed than the posterior pair, fitting into a groove on the side of the body; fore-limb with 4 toes, hind-limb with 3.

Cream-coloured or very pale brown above, each scale of the eight median dorsal rows with a central brown dot. Dorso-laterally these form well-marked lines which extend forwards along the sides of the head. Top of head with or without a central streak.

From snout to vent 80; tail 75 mm.

The types of *blanfordi*, two in number, were collected by Major Mockler in 1879, somewhere in S. Persia or Baluchistan, probably near the coast.

259. **Ophiomorus brevipes.**

Zygnopsis brevipes Blanford, Ann. Mag. Nat. Hist. (4) xiv, 1874, p. 33, and Zool. E. Persia, 1876, p. 397, pl. xxvii, fig. 4 (type loc. Sáadatabád, S.W. of Karman, Persia; Calcutta).—*Ophiomorus brevipes*, Boulenger, Bull. Soc. Zool. France, xii, 1887, p. 525, and Cat. Liz. Brit. Mus. iii, 1887, p. 395, and Proc. Zool. Soc. London, 1891, p. 631; Nikolsky, Fedtschenko's Reise in Turkestan, ii, pt. vii, 1899, p. 44.

Differs from *blanfordi* as follows:—Snout less depressed, less cuneiform; interparietal broader than long; eye larger, 22 scales round the middle of the body.

Colour as in *blanfordi*, but the dark dorsal lines occupying 10 rows of dorsal scales and forming 3 very distinct stripes, a vertebral and two dorso-lateral.

From snout to vent 95; tail 85 mm.

Range. Persia to the Perso-Baluchistan frontier.

Genus **CHALCIDES.**

Chalcides (in part) Laurenti, Syn. Rept. 1768, p. 64 (type *tridactylus*); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 398, and Fauna Brit. Ind. 1890, p. 223; Anderson, Zool. Egypt, i, 1898, p. 208; E. G. Boulenger, Proc. Zool. Soc. London, 1920, p. 77.
Zygnis Oken, Lehrb. Naturg. iii, 1816, p. 284 (type *tridactylus*).
Sphenops Wagler, Nat. Syst. Amphib. 1830, p. 161 (type *capistrata*).
Gongylus (not of Thunberg, 1815), Wagler, Nat. Syst. Amphib. 1830, p. 162 (type *ocellatus*).
Heteromeles Dum. & Bibr., Erp. Gen. v, 1839, p. 772 (type *mauritanicus*).
Anisoterma A. Duméril, Rev. Mag. Zool. viii, 1856, p. 421 (type *sphenopsiforme*).
Allodactylus Lataste & Rochebrune, Journ. de Zool. v, 1876, p. 238 (type *delislei*).
Gongylosaps Boettger, Abh. Senck. Ges. xiii, 1883, p. 122 (type *miopecton*).

Palatine bones not meeting in the mid-line of the palate, which is toothless. Teeth subconical. Nostril between the nasal and the rostral, in an emargination of the latter; supranasals present; prefrontals and fronto-parietals absent. Lower eyelid with an undivided transparent disc. Body more or less elongate; limbs short or vestigial

Range. South Europe; North Africa; S.W. Asia.

Fifteen species are known.

Key to the Indian Species.

Ear-opening present, limbs moderate ..... *ocellatus*, p. 349.
No ear-opening, limbs very small ..... *pentadactylus*, p. 350.

260. **Chalcides ocellatus ocellatus.**

Lacerta ocellata Forskål, Descrip. Anim., etc., 1775, p. 13 (type loc. Egypt).—*Gongylus ocellatus*, Anderson, Proc. Zool. Soc. London, 1872, p. 377.—*Sepa* (*Gongylus*) *ocellatus*, Blanford, Zool. E. Persia, ii, 1876, p. 395; Murray, Zool. Sind, 1884, p. 357.—*Chalcides ocellatus*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 400, and Ann. Mag. Nat. Hist. (6) v, 1890, p. 444, and Fauna Brit. Ind. 1890, p. 224; Anderson, Herp. Arabia, 1896, p. 49, and Zool. Egypt, i, 1898, p. 210, pl. 28; Annandale, J. & P. Asiat. Soc. Beng. (n. s.) i, 1905, p. 148; E. G. Boulenger, Proc. Zool. Soc. London, 1920, p. 81.

Snout obtusely pointed, longer than the orbit, not projecting beyond the lower jaw; rostral emarginate laterally, receiving the greater part of the nostril; nasal small, crescentic; supranasals in contact with one another; fronto-nasal large, variable as regards length and breadth; frontal large, considerably longer than broad; interparietal very small; a pair of large parietals in contact with one another behind it; one or two pairs of nuchals; 4 supraoculars, the first three large and in contact with the frontal; 6 supraciliaries. A post-nasal; anterior loreal larger than the posterior, which is

divided into two or three shields; an elongated temporal borders the parietal; 7 or 8 supralabials, fifth and sixth below the eye; ear-opening subcircular, smaller than a lateral scale, without projecting lobules. Body slightly elongate, 28 to 32, usually 30, subequal, smooth scales round the middle of the body; preanals not enlarged; limbs short but well developed, pentadactyle, widely separated when adpressed; the distance between the axilla and groin is three to four times the length of the fore-limb; digits feebly compressed, with transverse lamellæ beneath; tail thick at the base, tapering to a fine point, as long as the head and body.

Light brown above, with black spots transversely arranged or confluent into irregular transverse bands, each black spot having a central white dot or longitudinal shaft, labials margined with black; sides of neck with black spots; whitish below.

From snout to vent 115 mm.

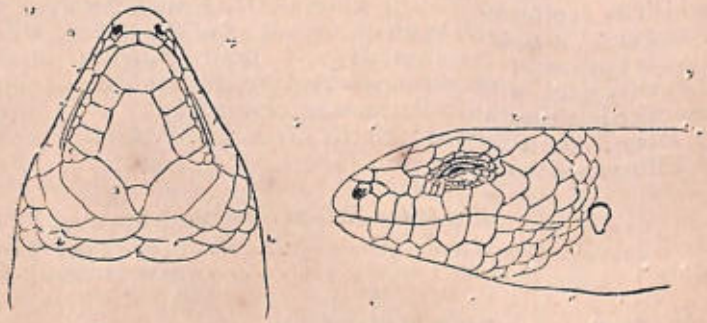


Fig. 79.—Upper and side views of head of *Chalcides ocellatus*. (After Boulenger.)

Range. The typical form ranges from North Africa to India. There is a specimen in the Indian Museum (no. 17089) collected by Dr. Zugmayer at Ormara in Baluchistan. Murray records it from Karachi, and there are four specimens to prove his statement. Unfortunately Murray's data as regards localities cannot always be relied upon. Annandale states: "There are a number of specimens (purchased) in the Museum said to have come from Haldibari, Cooch Behar; their true provenance is doubtful, but probably Indian."

261. Chalcides pentadactylus.

Sphenocephalus pentadactylus Beddome, Madras Month. J. Med. Sci. 1870, p. 30, pl. i (type loc. Beypore, Malabar district; type lost).—*Chalcides pentadactylus*, Boulenger, Faun. Brit. Ind. 1890, p. 224.

"The anterior legs minute and fitting into a groove, fingers five, the third slightly longer than the fourth, first and fifth

very small; posterior legs well formed, toes five, the fourth longer than the third, the fifth very small; form slender, four and a quarter inches long, as thick as a goose-quill, two-thirds cylindrical, flat, and laterally angled beneath as far as the vent; the body and tail covered with small smooth, lustrous, hexagonal scales, with a median row of broader subcaudals; upper lip covering the mouth, eyes minute, surrounded by small scales; no external trace of ears; nostrils in small single shields, let into the posterior side of the rostral, with a small post-nasal behind each, and two large shields in the loreal region between the post-nasal and the eye; rostral square behind, a single prefrontal narrow and a parallelogram in shape; post-frontal single, six-sided, vertical, broader behind; occipitals rounded behind, with a small shield between them, which is let into the posterior

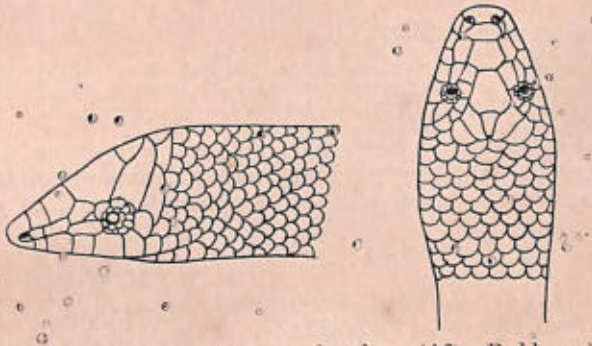


Fig. 80.—Head of *Chalcides pentadactylus*. (After Beddome.)

base of the vertical; five plates (some divided) over the eye, and between it and the vertical and post-frontal; upper-labials 8–9, the fourth and fifth below the eye, some large shields over the posterior ones; the distance between the axils of the fore and hind limbs is a little more than one and three-quarter inch; colour of a uniform dark brown; hind limbs a little more than half an inch long; fore limbs very slender, and not quite a quarter inch long.

"On the sandy banks of the Kuddle Poondy, a tidal river near Beypore. Described and figured from a unique specimen in the Madras Museum collected by Mr. Carter. It is very similar to Mr. Blyth's *Sphenocephalus tridactylus* from the Punjab, but as it has five fingers and toes instead of three, and the shields of the head differ considerably, it will probably have to be formed into a new genus. The eyes were injured, and I could not detect whether the lower eyelid was transparent or not."

The above is Beddome's description, quoted in full. The type and only known specimen cannot now be found, and the true status of this lizard must therefore await the examination of fresh material.

Genus **BARKUDIA.**

Barkudia Annandale, Rec. Ind. Mus. xiii, 1917, p. 20 (type *insularis*).

Palatine bones not meeting on the mid-line of the palate, which is toothless; nostril between the nasal and the rostral, in an emargination of the latter; supranasals present; prefrontals and fronto-parietals absent; body much elongate; no limbs.

A single species.

262. Barkudia insularis.

Barkudia insularis Annandale, Rec. Ind. Mus. xiii, 1917, p. 20, figs. (type loc. Barkuda I., Chilka Lake, Madras Pres.; Calcutta), and ibid. xxii, 1921, p. 332.

Snout depressed, obtusely pointed, projecting strongly beyond the labial margin; rostral large, emarginate laterally to receive the nasal shield; supranasals large, in contact

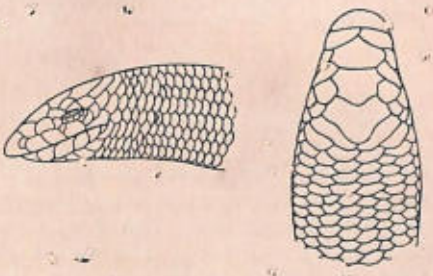


Fig. 81.—Upper and side views of head of *Barkudia insularis*.

with one another and with the first labial; fronto-nasal broader than long, larger than the frontal; interparietal much larger than the frontal; parietals narrow, obliquely placed, in contact with one another behind it; 3 supraoculars, the first entering the supraciliary margin, the first two in contact with the frontal; 1 large supraciliary in the angle formed by the 3 suboculars; nasal shield comparatively large, the nostril at its anterior extremity; 1 large loreal; a preocular; lower eyelid composed of 2 or 3 opaque scales; upper lid vestigial; 4 supralabials, the third below the eye;

ear-opening minute; a single azygous postmental; body very elongate, 140 ventral scales between the postmental and preanal plates; 20 smooth scales round the middle of the body. Tip of the tail blunt, not much narrower than the base of the tail.

Light brown above, each dorsal scale with a central dot; altogether these form 12 or 14 longitudinal lines down the back and along the tail. Lower parts whitish; top of head clouded with brown.

From snout to vent 115; tail 58 mm.

The type was dug up from loose earth at the root of a banyan tree. A second individual was seen in the same locality by Dr. Gravely in the rainy season of 1919. It burrowed with great rapidity into the earth.

Genus **SEPSOPHIS.**

Sepsophis Beddome, Madras Month. J. Med. Sci. ii, 1870, p. 172 (type *punctatus*).—*Sepophis*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 423, and Fauna Brit. Ind. 1890, p. 225.

Palatine bones not meeting on the mid-line of the palate, which is toothless; teeth conical; nasal shield reduced to a rim of tissue surrounding the nostril, which lies between the rostral, first labial, and supranasal; 2 azygous frontals; fronto-parietals and interparietal distinct; lower eyelid scaly. Body much elongate; limbs vestigial.

A single species.

263. **Sepsophis punctatus.**

Sepsophis punctatus Beddome, Madras Month. J. Med. Sci. 1870, p. 172 (type loc. Darakondah, Golconda Hills, Madras Pres.; London).—*Sepophis punctatus*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 423, pl. xxxvii, fig. 2, and Fauna Brit. Ind. 1890, p. 225.

Snout not cuneiform, bluntly pointed, scarcely projecting beyond the labial margin; rostral large, emarginate laterally to receive the nostril; supranasals large, in contact with one another and with the first and seconds labials; fronto-nasal broader than long, larger than the anterior frontal; 2 azygous frontal shields; 4 supraoculars, first two largest, the first in contact with both frontals, interposed at the suture between the two shields; 4 supraciliaries, first very large, entering the supraorbital region, third very small; fronto-parietals separated from one another, nearly as large as the interparietal; parietals narrow, obliquely placed, in contact with one another; one or two pairs of nuchals; anterior loreal larger than posterior; lower eyelid composed of 3 or 4 opaque scales; upper lid vestigial; 6 supralabials, the fourth below the eye; temporal

scales like those on the body; ear-opening minute, partly hidden by scales; a single azygous postmental; body much elongated, 117 to 122 ventral scales between the postmental and the preanal plates; 20 smooth scales round the middle of the body; fore-limbs reduced to bud-like projections situated at about the level of the 24th ventral scale; hind-limbs indicated by a minute spur, which may be absent; tail about as long as the head and body, terminating in a blunt point.

Light brown above, with two series of black spots which about the middle of the body are continued as lines; on the

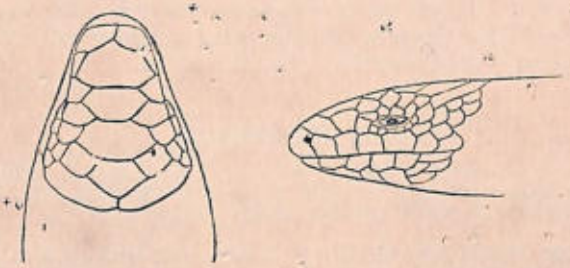


Fig. 82.—Upper and side views of head of *Sepsophis punctatus*. (After Boulenger.)

tail there are four lines. Sides of head and body black, whitish below, more or less thickly spotted with dark brown; tail below with dark longitudinal lines.

From snout to vent 110 mm.

The type was taken by Col. Beddome under a stone at 3,000 feet altitude. Two more specimens were later obtained by him in the Gorge Hills, Godavari Valley, at 2,000 feet altitude.

Genus **CHALCIDOSEPS.**

Chalcidoseps Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 423, and Fauna Brit. Ind. 1890, p. 226 (type *thwaitesi*).

Palatine bones not meeting on the mid-line of the palate, which is toothless; teeth conical. Nostril pierced in the rostral, close to its posterior border; supranasals present, widely separated; no prefrontals or fronto-parietals; lower eyelid scaly. Body very elongate; limbs very short, tetradactyle.

A single species.

Whether the shields which I have called the supranasals are correctly named is not too clear. Boulenger, in his definition of the genus, states "no supranasals," but he does not name the shields to which I refer. They are in the position

of an anterior loreal, and are followed by a second true loreal. Upon comparison with the head-shields of *Barkudia* and *Sepsophis* it will be seen that this "anterior loreal" could well be the outer portion of what is undoubtedly the supranasal in those species. In *Nessia* fusion has been carried further, and the loreals have united in a single long shield.

264. Chalcidoseps thwaitesi.

Nessia thwaitesii Günther, Ann. Mag. Nat. Hist. (4) ix, 1872, p. 86 (type loc. Ceylon; London).—*Chalcidoseps thwaitesi*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 423, pl. xxxviii, fig. 1, and Fauna Brit. Ind. 1890, p. 226, figs.; Deraniyagala, Ceylon J. Sci., B, xvi, (2) 1931, p. 176.

Snout not depressed, scarcely projecting beyond the labial margin; rostral moderately large; supranasals well separated from one another, perhaps fused with the anterior loreal;

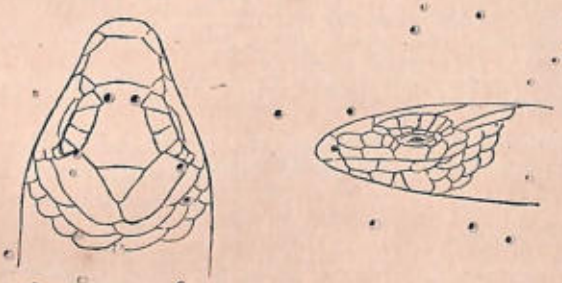


Fig. 83.—Upper and side views of head of *Chalcidoseps thwaitesi*. (After Boulenger.)

fronto-nasal very large, broader than long; frontal large, as long as broad; 4 supraoculars, the first notching the lateral margin of the frontal, the fourth sometimes divided, not touching the frontal; 6 or 7 supraciliaries, the first largest and entering the supraorbital region; parietals large, elongate, obliquely placed, in contact with one another behind the interparietal; they are bordered posteriorly by 4 elongated shields; a large loreal; 1 or 2 preoculars; lower eyelid scaly, upper vestigial; 5 supralabials, the third below the eye; the first two are longer than the others, and may be united into a single shield; ear-opening minute; a single azygous postmental; body very elongate; 24 smooth scales round the middle of the body; 70 to 75 ventral scales between the fore-limbs and the vent; preanals scarcely enlarged. Limbs very short, each with four short toes; the length of the fore-limb is contained about nine times in the distance between axilla and groin.

Dark brown above, lighter below, each scale with a dark centre; adults olive-brown, pinkish-yellow on the sides and below.

From snout to vent 75 mm.; tail cylindrical, as thick as the body at its base, a little shorter than the head and body.

Range. Ceylon (Mousakanda Group); Gammaduwa, C.P. Found among dead leaves and vegetation at between 4,000 and 5,200 feet altitude (*Deraniyagala*).

Genus **NESSIA.**

Nessia Gray, Ann. Mag. Nat. Hist. ii, 1839, p. 336 (type *burtoni*); Hewitt, Ann. Transv. Mus. xiii, 1929, p. 8.—*Acontias* (*Nessia*), Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 176.

Evesia Gray, l. c. s. p. 336 (type *monodactyla*); Deraniyagala, Ceylon J. Sci., B, xviii, 1934, p. 232.

Pseudodactylus Fitzinger, Syst. Rept. 1843, p. 23 (type *Evesia belli*).

Tetrapedos Jan, Arch. f. Naturg. Berlin, 1860, p. 69 (type *smithii*).

Acontias, (in part) Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 424, and Fauna Brit. Ind. 1890, p. 226; Essex, Proc. Zool. Soc. London, 1928, pp. 900, 942.

Anguiricephalus Deraniyagala, Ceylon J. Sci., B, xviii, 1934, p. 232 (type *layardi*).

Palatine bones not meeting on the mid-line of the palate which is toothless; pterygoid bones deeply emarginate on

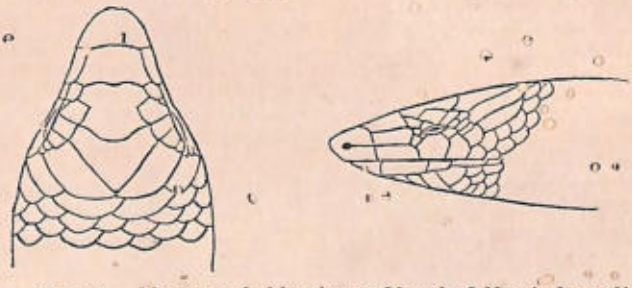


Fig. 84.—Upper and side views of head of *Nessia layardi*. (After Boulenger.)

their inner, posterior, borders; teeth more or less pointed and projecting backwards. Nostril pierced in the anterior part of a large rostral, connected with its posterior border by a horizontal suture; no supranasals, prefrontals, or frontoparietals; eye small; lower eyelid movable; ear-opening minute or absent. Body very elongate, limbs vestigial or absent.

Range. The hill districts of Ceylon, up to 4,000 feet. Degenerate Skinks living in earth or decaying vegetation or under stones, feeding chiefly upon worms; oviparous, the eggs being large, elongate, and two in number.

Hewitt (1929) has pointed out that the tubular system of the osteoderms of the Cingalese species of *Acontias*—as that genus was conceived by Boulenger—differ from those of the African species. There are also other characters, namely, the shape of the palate and of the head-shields, by which they should be separated. The pterygoid bone in *Nessia* is large, and forms a part of the infraorbital vacuity; in *Acontias* (*sensu stricto*) it is long and narrow, and does not enter into the infraorbital vacuity.

Essex (1928) writes: "I have some doubt as to whether Ceylon *Acontias* should be placed in the same genus as the South African ones, but, nevertheless, it is a closely related Skink and belongs to the same stock, and is progressing along the same evolutionary path. I think that it is more probable that the Ceylon species and the South African ones represent the ends of two divergent streams from an unknown centre."

Six species of *Nessia* are now known, differing from one another chiefly in the varying degree of reduction of the limbs. The least degenerate and most widely distributed form is *burtoni*, from which the others may have been derived.

Key to the Species.

I. Interparietal broader than frontal.	
Limbs present, tridactyle; 24 scales round middle of body	*burtoni*, p. 357.
Limbs present, didactyle; 24 scales round body	*didactyla*, p. 358.
Limbs present, bud-like; 24 to 26 scales round body	*monodactyla*, [p. 358.
Posterior limbs only, bud-like; 28 scales round body	*bipes*, p. 359.
No limbs; 22 to 24 scales round body; no ear-opening	*layardi*, p. 359.
II. Interparietal narrower than frontal.	
Posterior limbs only, bud-like; 22 scales round body	*sarasinorum*, [p. 360.

265. Nessia burtoni.

Nessia burtonii Gray, Ann. Mag. Nat. Hist. ii, 1839, p. 336 (type loc. unknown; type lost); Kelaart, Prodr. Faun. Zeyl. ii, 1853, p. 11; Günther, Rept. Brit. Ind. 1864, p. 97.—*Acontias burtonii*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 425, and Fauna Brit. Ind. 1890, p. 227.—*Acontias* (*Nessia*) *burtonii*, Deraniyagala, Ceylon J. Sci., B, xvi, (2) 1931, p. 177.

Snout subacuminate, at least twice as long as the orbit, strongly projecting beyond the lower jaw; rostral about two-fifths as long as the snout; fronto-nasal longer than the rostral, distinctly narrower in front than behind; frontal longer than the fronto-nasal, mesially notched on each side

by the first supraocular *; interparietal broader than the frontal; parietals narrow, obliquely placed, in contact behind the interparietal, bordered on each side by an elongated temporal shield; 4 supraoculars, the first two in contact with the frontal; 5 supraciliaries, the first much the largest; one long loreal, sometimes divided in the middle; a preocular; lower eyelid an opaque disc or partly divided into scales; upper lid vestigial; 4 supralabials, the first very long, the second below the eye; mental large, with an azygous shield behind it; ear-opening punctiform. Body very elongate; scales smooth, 26 to 28 round the fore-part of the body, 24 round the middle, dorsals largest; preanals not or but feebly enlarged; limbs very short, tridactyle, clawed; fore-limb originating at about the level of the 20th ventral scale, about as long as four scales, shorter than the hind-limb.

Light brown above, the scales tipped or edged with dark brown, the general appearance being almost uniform brown or reddish-brown; paler below.

From snout to vent 75 mm.; tail bluntly pointed, about three-quarters the length of the head and body.

Range. Central, Western, and Sabaragamuwa Provinces; "common in hilly country above 100 feet from sea-level" (*Deraniyagala*).

266. Nessia didactyla.

Acontias (*Nessia*) *didactylus* Deraniyagala, Ceylon J. Sci., B, xviii, 1934, p. 232 (type loc. Polgehavala, C.P.; London).

Differs from *burtoni* in the following particulars:—Snout broader and more obtuse; rostral larger; fronto-nasal broader and shorter. Limbs with two minute toes, or claws, the anterior limb originating at about the 24th ventral scale, not much longer than one scale, shorter than the posterior limb; 28 scales round the fore-part of the body, 24 round the middle.

From snout to vent 65 mm.

Range. Known from the two type specimens.

267. Nessia monodactyla.

Evesia monodactylus Gray, Ann. Mag. Nat. Hist. ii, 1839, p. 333 (type loc. unknown; Paris).—*Nessia monodactyla*, Günther, Rept. Brit. Ind. 1864, p. 97.—*Acontias monodactylus*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 425, and Fauna Brit. Ind. 1890, p. 228.—*Acontias* (*Nessia*) *monodactylus*, Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 178.

* Partial division of the frontal into an anterior and a posterior shield by a suture, starting from the inner edge of the first supraocular can be seen in some individuals, and foreshadows the complete division of the shield which occurs in *Sepsophis* and sometimes in *Ateuchosaurus*.

Evesia bellii Dum. & Bibr., Erp. Gen. v, 1839, p. 782 (substitute name for *monodactyla*; same type).
Tetrapedos smithii Jan, Arch. f. Naturg. Berlin, 1860, p. 69, pl. ii, figs. 4–12 (type loc. Ceylon).

Differs from *burtoni* in the following particulars:—Snout broader and more obtuse; rostral larger; fronto-nasal broader and shorter, as long as the rostral, not much narrower in front than behind; 3 supraoculars, the first notching the lateral border of the frontal; first supraciliary larger; limbs reduced to undivided bud-like appendages; 24 or 26 scales round the middle of the body.

From snout to vent 90 mm.

Range. Central and Uva Provinces (Ceylon).

268. **Nessia bipes,** nom. nov.

Acontias (Evesia) smithi Deraniyagala, Ceylon J. Sci., B, xviii, 1934, p. 232 (type loc. Gammaduva, C.P.; London).
Nessia bipes, nom. nov. for *A.* (*E.*) *smithi* Deraniyagala, preoccupied.

In head-scalation agrees with the preceding species; it differs in having a bud-like pair of posterior limbs only and in having 28 scales round the body both anteriorly and in the middle.

From snout to vent 80 mm.

Range. Known only from the type specimen.

269. **Nessia layardi.**

Acontias layardi Kelaart, Prodr. Faun. Zeyl. ii, 1853, p. 12 (type loc. ? Colombo); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 426, and Fauna Brit. Ind. 1890, p. 228.—*Acontias* (*Nessia*) *layardi*, Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 179, pl. xxxviii.
Acontias (*Anguinicephalus*) *layardi* Deraniyagala, Ceylon J. Sci., B, xviii, 1934, p. 231.

Differs from *burtoni* in the following particulars:—Fronto-nasal broader and shorter, shorter than the frontal; 3 supraoculars, the first only in contact with the frontal, notching its lateral margin; first supraciliary larger, entering the supraorbital region; a pair of nuchals often present; no ear-opening; 24 or 26 scales round the fore-part of the body, 22 or 24 round the middle; no limbs. On each side of the vent, in a depression of the body and more or less hidden by scales, a minute horny tubercle can be discovered with a good glass; it represents what is left of the hind-limb.

Range. Central Province.

The types were given to Kelaart by Mr. Layard, and were said to have come from the "soil of the Cinnamon Gardens of Colombo." Deraniyagala doubts this locality. Possibly they were imported with plants and soil from the hills.

270. Nessia sarasinorum.

Acontias sarasinorum F. Müller, Verh. Nat. Ges. Basel, viii, 1889, p. 702, pl. x (type loc. Inamalua, Ceylon; Basel); Boulenger, Fauna Brit. Ind. 1890 p. 228.—*Acontias* (*Nessia*) *sarasinorum*, Deraniyagala, Ceylon J. Sci., B, xvi (2) 1931, p. 178.

Differs from *burtoni* in the following particulars:—Snout shorter and broader; fronto-nasal broader and shorter than the frontal; interparietal narrower than the frontal; 2 loreals; 22 scales round the middle of the body; preanals distinctly enlarged; no anterior limbs; an undivided, bud-like, posterior pair.

The type was collected by Dr. Sarasin at Inamalua, a small village near Dambulla in the northern part of Central Province. A second specimen has been recently obtained by Deraniyagala near Batticaloa, Eastern Province.

I have examined the type. The supralabials are as described above, not as described and figured by Müller.

Family DIBAMIDÆ.

Dibamidæ Boulenger, Ann. Mag. Nat. Hist. (5) xiv, 1884, p. 120.

Tongue short, bifid behind, pointed and undivided in front, covered with transverse, slightly curved lamellæ or plicæ (p. 18, fig. 8). Teeth pointed, hooked; palate toothless.

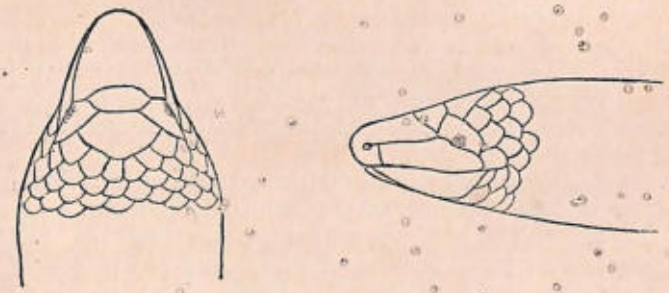


Fig. 85.—Upper and side views of head of *Dibamus novæ-guineæ*. (After Boulenger.)

Body vermiform, covered with cycloid imbricate scales; no osteoderms. Eyes concealed under the skin. Fore-limbs absent; the hind pair represented in the male by a pair of short, scaled, flipper-like appendages, lying in a deep groove in the body on either side of the vent. Preanal pores present.

Degraded burrowing lizards, of unknown origin. A single genus.

A beautifully stained skeleton of *D. novæ-guineæ* in the British Museum shows that the pectoral girdle, except for vestiges of the scapulo-coracoids and sternum, have disappeared, and the pelvis is reduced to an elongated ilium and enough of the ischium and pubis to form the acetabulum. These are firmly united with the ileum, a condition which is to be found in other degenerate Skinks. The vestigial hind-limb contains the united tibia and fibula and a fragment of the tarsus, the femur having been withdrawn into the body. There are no cranial arches; no epipterygoid; no infra-orbital foramen; the premaxillaries are united; the quadrate is greatly expanded antero-posteriorly. There are 116 vertebræ between the occiput and the sacrum; the tail

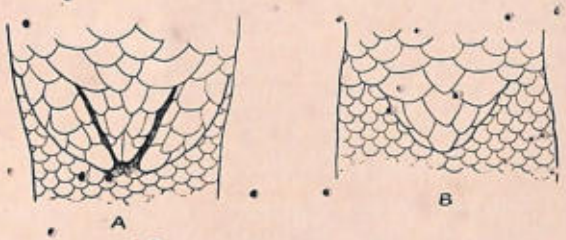


Fig. 86.—Anal region of *Dibamus novæ-guineæ*.
A. Male. B. Female.

has 22. Abdominal or parasternal ribs are present throughout, complete except in the posterior part of the body. A chain of tracheal rings extends more than half way down the body.

Genus **DIBAMUS**.

Dibamus Dum. & Bibr., Erp. Gen. v, 1839, p. 833 (type *novæ-guineæ*); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 435, and Fauna Brit. Ind. 1890, p. 229.
Typhloscincus Peters, Mon. Akad. Berlin, 1864, p. 271 (type *martensi*).
Rhinophidion Steindachner, Reise Novara, Rept. 1867, p. 53 (type *nicobaricum*).

Snout covered by a thickened shield which is more or less divided by sutures; nostril pierced in the anterior part of it, connected to the posterior border by a horizontal suture; four shields on the top of the head, namely, a frontal, an interparietal, and, on each side, an ocular; labials united into a long shield. No ear-opening. Tail short, obtuse.

Three species are known.

Range. From southern Indo-China and the Philippines to the New Guinea Archipelago.

Key to the Indo-Chinese Species.

Shield covering end of snout undivided above .. *novæ-guineæ*, p. 362.
Shield covering end of snout divided above by a longitudinal suture ..... *montanus*, p. 363.

271. Dibamus novæ-guineæ.

Dibamus novæ-guineæ Dum. & Bibr., Erp. Gen. v, 1839, p. 834 (type loc. New Guinea; Paris); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 435, and Fauna Brit. Ind. 1890, p. 230, fig., and Fauna Malay Pen. 1912, p. 99; de Rooij, Rept. Indo-Austral. Arch. i, 1915, p. 283, figs.

Acontias subcæcus Dum. & Bibr., Erp. Gen. v, 1839, p. 835 (*nom. manuscrip.*).

Rhinophidion nicobaricum Steindachner, Reise Novara, Rept. 1867, p. 53 (type loc. Nicobars; Vienna).—*Typhloscincus nicobaricus*, Steindachner, l. c. s. Appendix, p. 94, pl. iii, figs. 6–8.—*Dibamus nicobaricus*, Stoliczka, J. Asiat. Soc. Beng. xlii, 1873, p. 168; Theobald, Cat. Rept. Brit. Ind. 1876, p. 69.

Typhlina leucura Bleeker, Natur. Tijdschr. Ned.-Ind. xx, 1860, p. 328 (type loc. Agam, Sumatra; London).

Typhlina ludekingi Bleeker, l. c. s. xxi, 1860, p. 297.

Typhloscincus martensi Peters, Mon. Akad. Berlin, 1864, p. 271, pl. —, fig. 1 (type loc. Ternate; Berlin).

Snout conical, feebly depressed, obtusely pointed, projecting beyond the lower jaw; the shield covering it entire, except for the suture, which passes backwards from the nostril; interparietal larger than the frontal, both broader than longer; eye fairly distinct, beneath the outer part of the ocular shield or on its posterior margin, this shield being elongate and placed obliquely; hinder part of head covered with uniform cycloid scales; one long supralabial; behind it a smaller one, partly bordering the mouth; mental elongate, trapezoid; one long infralabial on each side. Scales equal, smooth, 22 to 26 round the body (22 to 24 in Nicobar specimens, two examined). Preanals slightly enlarged. On lifting up the elongated scale on each side of the base of the preanal triangle formed by the hind-limbs, a large preanal pore can be seen in the male, a smaller one in the female. Sometimes this pore can be seen as a dark spot through the scale. A male from the East Indies, exact origin unknown, and one from Waigou Island, have two pores on each side.

Uniform purplish-brown above, paler below.

From snout to vent 165; tail 20 mm.

Range. From the Nicobars, to New Guinea. An egg of this lizard containing a fully developed embryo was obtained by Annandale and Robinson in Patani, Malay Peninsula. It was found in a dead tree-trunk, was longer than broad, and had a brittle, highly calcareous shell.

272. **Dibamus montanus.**

Dibamus montanus Smith, Proc. Zool. Soc. London, 1921, p. 431, figs. (type loc. Le Bosquet, Langbian Plateau, S. Annam; London).

Closely allied to *novæ-guineæ*, differing in the following particulars:—Snout shorter, broader and more obtusely pointed, the shield covering it divided into three, namely, a rostral nearly twice as broad as high, and two large nasal or supranasal shields, the latter being formed by a long suture passing from the rostral to the frontal; 24 or 26 scales round the body. Male type with two preanal pores.

Light chocolate-brown above, paler below.

From snout to vent 122; tail 23 mm.

Range. Le Bosquet and Daban, 4,000 to 5,000 feet altitude, on the Langbian Plateau.

Known only from the type series. In the cotypes, male and female, which are adult, or nearly so, the divisions of the nasal shield are quite distinct; in five very young individuals (the paratypes) the sutures cannot be seen. *D. montanus*, in having this shield divided, represents, no doubt, the more primitive form.

Family LACERTIDÆ.

Lacertinidæ Gray, Ann. Philos. xxvi, 1825, p. 200.—*Lacertidæ*, Cope, Proc. Acad. Philad. 1864, p. 228 (in part); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 1, and Fauna Brit. Ind. 1890, p. 167, and Monogr. Lacertidæ, i, 1920, and ii, 1921; Gadow, Amphib. and Rept. 1901, p. 549; Camp, Bull. Amer. Mus. Nat. Hist. xlviii, 1923, p. 315 *et seq.*

Premaxillary bone single; nasal and frontal paired; parietal single; postorbital and post-fronto-squamosal arches complete; palatine and pterygoid bones just separated on the median line: bony dermal plates completely roofing over the supratemporal fossæ, and fused with the cranial bones when in contact with them; no dermal ossifications on the body. Dentition pleurodont, the teeth hollow at the base; the lateral teeth often bi- or tricuspid. Tongue moderately elongate, deeply notched anteriorly, covered with scale-like papillæ or transverse or V-shaped plicæ directed forwards (p. 18, fig. 3). Limbs always well developed. The top of the head is covered with symmetrical shields and the ventral pholidosis is usually well differentiated from the dorsal. Femoral organs are usually present.

The Lacertidæ are inhabitants of the Old World. They are found in Europe, Asia, and Africa, but not in Madagascar

or the Australian Region. They are most abundant in Africa; comparatively rare in the Oriental Region.

Boulenger in his Monograph of this family recognized 22 genera and 145 species. The theoretical ancestry of the Lacertidæ has been concisely summed up by him as follows:—"At present we are in the dark as to the immediate ancestors of the Lacertidæ; we may, however, provisionally regard them

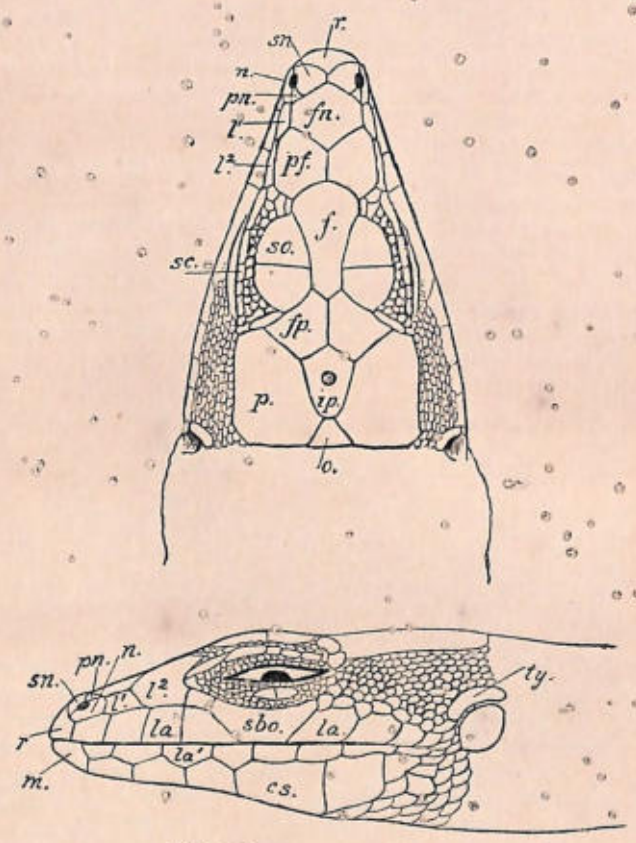


Fig. 87.—Upper and side views of head of *Eremias guttulata*, to explain the nomenclature of the shields. (After Boulenger.)

cs. Submaxillary shields.
f. Frontal.
fn. Fronto-nasal.
fp. Fronto-parietal.
ip. Interparietal.
*l*¹, *l*². Loreals.
la. Upper labials.
*la*¹. Lower labials.
m. Mental.
n. Nasal.
o. Occipital.
p. Parietal.
pf. Prefrontal.
pn. Postnasal.
r. Rostral.
sbo. Subocular.
sc. Supraciliaries.
sn. Supranasal.
so. Supraocular.
ty. Tympanic.

on theoretical grounds as derived from the Teiidæ, now confined to America, but which may have had representatives in the Old World in Eocene times, and which appear to be at least as old as the Cretaceous (*Chamops*, Marsh, from the Laramie of Wyoming). These two families are closely related, the former differing from the latter in the dermal ossification over the skull and the ultra-pleurodont dentition, characters expressive of a more advanced evolution."

Key to the Genera:

I. Not more than 3 femoral pores; dorsal scales large and keeled; flanks granular . . [p. 365. TAKYDROMUS,

II. Femoral pores 7 to 27, except in *Eremias aporosceles*, which has none.

A. Nostril between two nasals and the first labial; digits fringed laterally . . . . . [p. 370. ACANTHODACTYLUS,

B. Nostril not touching the first labial.

a. Lower eyelid with a very large transparent disc through which the eye is entirely visible; dorsal scales pointed, imbricate, keeled; no collar.

Lower eyelid distinct from the upper . . . . . CABRITA, p. 374.

Lower eyelid fused with the upper . . . . . OPHISOPS, p. 376.

b. Lower eyelid scaly or with a semi-transparent disc formed of two or more scales; dorsal scales small, subimbricate or juxtaposed; collar complete or nearly so . . . . . EREMIAS, p. 381.

Genus **TAKYDROMUS** *.

Takydromus Daudin, Hist. Nat., Rept. iii, 1802, p. 251 (type *quadrilineatus*).—*Tachydromus*, Günther, Ann. Mag. Nat. Hist. (6) i, 1888, p. 166; Boulenger, Fauna Brit. Ind. 1890, p. 168, and Mem. Asiat. Soc. Beng. v, 1917, p. 207, and Monogr. Lacert. ii, 1921, p. 126; Annandale, J. Asiat. Soc. Beng. (n. s.) i, 1905, p. 140.

Tachysaurus Gray, Cat. Liz. Brit. Mus. 1845, p. 52 (type *japonicus*).

Head-shields normal †; nostril between the nasal, one or two postnasals, and the first labial. Lower eyelid scaly; collar more or less distinct or absent; back with large, strongly keeled plates which form continuous lines; flanks with small granular or pointed scales; ventral plates large imbricate, the outer always keeled. Digits more or less cylindrical, the subdigital lamellæ with tubercles. Tail cylindrical, long or very long; femoral pores 1 to 3.

Range. S.E. China and Japan; Indo-China; the Malayan Subregion.

Some ten species are known.

* ταχυς—quick; δρόμος—to run.

† *i. e.*, a fronto-nasal, a pair of prefrontals, a frontal, a pair of fronto-parietals, a pair of parietals, an interparietal and an occipital.

Key to the Indo-Chinese Species

I. Dorsal plates in 4, rarely 6, longitudinal rows; 3 pairs of submaxillary shields.	
1. Scales on the flanks granular, 7 to 10 in a vertical series	
Two femoral pores on each side	*s. sexlineatus*, p. 366.
One femoral pore on each side	*s. ocellatus*, p. 368.
2. Scales on the flanks pointed, keeled, 3 to 5 in a vertical series; 2 or 3 femoral pores on each side	*s. khasiensis*, p. 369.
II. Dorsal plates in 6 rows; 4 pairs of submaxillary shields	*haughtonianus*, [p. 369.

Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 87, records 25 specimens from the low valleys of Sikkim, which he refers to *T. sexlineatus*. One, he states, has 2 femoral pores on each side, several have 3, but most 4 or 5. Later, in 1888, on account of the unusual number of femoral pores, Günther named these specimens *sikkimensis* (Ann. Mag. Nat. Hist. (6) i, 1888, p. 167), but did not see them. No *Takydromus* has yet been found with more than three pores on each side, nor is any member of the genus known from so far west. Stoliczka's specimens, unfortunately, cannot now be found.

273. Takydromus sexlineatus sexlineatus.

Takydromus sexlineatus Daudin, Hist. Nat. Rept. iii, 1802, p. 256, pl. xxxix (type loc. Indes orientales; Paris).—*Tachydromus sexlineatus*, Günther, Rept. Brit. Ind. 1864, p. 69, pl. viii, fig. C; Jerdon, P. Asiat. Soc. Beng. 1870, p. 72; Boulenger, Fauna Brit. Ind. 1890, p. 169, and Fauna Malay Pen. 1912, p. 79, and Monogr. Lacert. ii, 1921, p. 151 (in part); Kopsteia, Treubia, xi. 1931, p. 305.

Takydromus quadrilineatus Daudin, l. c. s. p. 252 (type loc. unknown; Paris).

Tachydromus sexlineatus var. *æneofuscus* Peters, Mon. Akad. Berlin, 1863, p. 405 (type loc. unknown; Berlin).

Nasals just touching each other behind the rostral, rarely separated by the fronto-nasal; fronto-nasal single, about as long as broad; prefrontals in contact with one another; 3 supraoculars in contact with the supraciliaries, the first two much the largest, the first in contact with the posterior loreal; 3, rarely 4, supraciliaries; interparietal about half the size of the fronto-parietals, usually larger than the occipital; anterior loreal smaller than the posterior; temporal scales strongly keeled, the upper two or three which border the parietal being larger than the others; fifth, rarely sixth, labial subocular; three pairs of submaxillary shields, the first two pairs in contact with their fellows. Collar indistinct, not free; 17 to 24 gular scales on a line between submaxillary shields and collar, those on the anterior half of the gular region being more elongate and considerably smaller than those on

the posterior half. Dorsal plates truncate and shortly mucronate behind, in six rows across the nape, four across the back, the reduction from six to four being caused by the fusion of the two central pairs; scales upon the flanks small, more or less granular, bordered above and below by larger ones, from 7 to 10 in a vertical series between the dorsal and ventral plates; ventral plates strongly keeled and mucronate, in 10 longitudinal series; six of these are upon the belly proper, the others being smaller and upon the lower part of the flank; from 21 to 28 scales between the collar and the groin; a single large præanal plate; tail extremely long; caudal

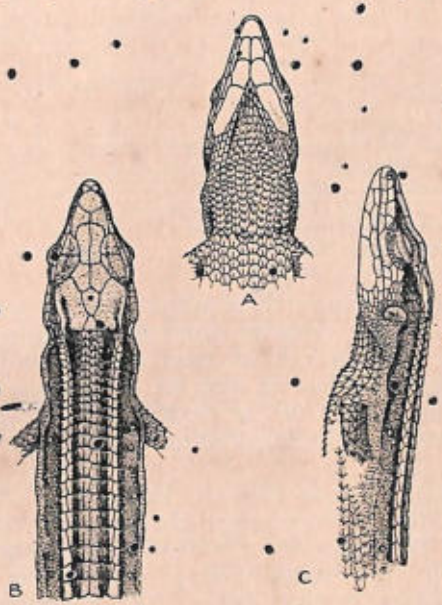


Fig. 88.—*Takydromus sexlineatus.*
A. Lower view. B. Dorsal view. C. Side view.

scales about as large as the dorsal plates, strongly keeled and mucronate. Two femoral pores on each side. The hind-limb reaches to the elbow or to the axilla.

Male brown or greenish-brown above, with metallic gloss; a light, green in life, dorso-lateral stripe starting from above the eye and extending on to the base of the tail. It is usually edged above and below with black. Flanks with or without a series of white black-edged ocelli. The brown colour terminates half way down the flank and is often bordered by a thin black stripe which starts from the nostril and passes above the ear. Upper head-shields and upper parts of tail

with small black spots; lower parts and upper lip greenish-white.

In the females the brown of the upper parts is paler; the dorso-lateral stripes are less distinct and the ocelli are absent. The young ones resemble the female in coloration.

From snout to vent 60; tail 300 mm.

Range. Burma (Rangoon, Bhamo, Namhkam, N. Shan States, Assam, *fide* Jerdon 1870) Sumatra, Java, Borneo.

273 *a*. Takydromus sexlineatus ocellatus.

Tachydromus ocellatus (Cuv.) Guérin, Icon. Règne Anim., Rept. 1829, pl. v, fig. 3 (type loc. les Indes orientales); Duvernoy, Règne Anim., Rept. 1836, pl. xi (Cochin China).

Tachydromus typus Gray, Ann. Mag. Nat. Hist. i, 1838, p. 389 (type loc. China; London).—*Tachydromus typicus*, Gray, Cat. Liz. Brit. Mus. 1845, p. 52.

Tachydromus meridionalis Günther, Rept. Brit. Ind. 1864, p. 70, pl. viii, fig. D (type loc. S. China; same specimens as *T. typus* Gray); Mell, Arch. f. Naturg. Berlin, lxxxviii, 1922, p. 113.—*Tachydromus sexlineatus meridionalis*, Stejneger, Proc. U.S. Nat. Mus. lxvi, 1925, p. 55; Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, pp. 419 & 487.

Tachydromus sexlineatus, Smith, J. Nat. Hist. Soc. Siam, ii, 1916, p. 155, and vi, 1923, p. 200.

Differs from the typical form in the following particulars:—Upper head-shields rougher, sometimes distinctly rugose; dorsal plates sometimes in six rows across the middle of the back owing to the reduction from six to four not taking place until past the middle of the body; ventral plates in 12, sometimes 10, rarely 14, longitudinal series; a single femoral pore on each side.

Range. Siam; Burma (Kalaw, Martaban); French Indo-China; S. China; Hong-kong; Hainan; the northern part of the Malay Peninsula (Jalor in Patani, Kelantan).

Common in many parts of Siam and French Indo-China, usually inhabiting grassy plains. The enormous length of the tail serves as a support and enables the creature to run about on the top of long grass in search of its food. The tail is not remarkably fragile, and does not usually break off when the creature is seized by it.

Two or three eggs are deposited in the ground, generally at the roots of a tuft of grass or other herbage.

The exact type locality of Daudin's *sexlineatus* is not known but in morphological characters it agrees with the form which inhabits the Malayan Region and Burma. Duméril and Bibron mention having examined specimens from Java, and that island may be regarded as the type locality of *T. s. sexlineatus*.

Guérin's *T. ocellatus* represents the Indo-Chinese form. He gives no type locality, but Duvernoy, apparently working on the same material, mentions Cochin-China. No proper

description is given by either author, but the specimen is figured with a single femoral pore on each side.

The distribution of these two forms is unusual. Boulenger records *sexlineatus* (*sensu latu*) from the northern part of the Malay Peninsula as far south as Taiping; unfortunately the specimens from that locality cannot now be found. Examples from Patani and Kelantan, farther north in the Peninsula, which I have examined, have a single pore only on each side, and are thus referable to *ocellatus*.

273 *b*. Takydromus sexlineatus khasiensis.

Tachydromus sexlineatus, Boulenger, Fauna Brit. Ind. 1890, p. 169 (in part).

Tachydromus khasiensis Boulenger, Mem. Asiat. Soc. Beng. v, 1917, p. 221, pl. xlvii, fig. 1 (type loc. Khasi Hills; London), and Monogr. Lacert. ii, 1921, p. 144.

Differs from *T. s. sexlineatus* in the following particulars:—fronto-nasal often broader than long; fourth or fifth labial subocular; scales on the flanks larger, pointed, keeled, bordered above and below by larger strongly keeled scales, 3 to 5 small scales in a vertical series between the larger ones; 2 or 3 femoral pores on each side.

Green or greenish-brown above with metallic gloss; a light dorso-lateral stripe starts from the eye and extends on to the base of the tail; it is bordered above and below with black spots which may form a continuous line; a black streak along the side of the head through the ear, and along the flank to the hind-limb. Lower parts greenish-white.

From snout to vent 52; tail 120 mm.

Range. The Khasi Hills; Cachar; Sittaung, Upper Chindwin, Burma.

Four specimens from Cachar and one from Sittaung connect this form with the typical one. The scales upon the flanks are granular, 6 to 9 in a vertical series, and the fifth labial subocular; all have 3 femoral pores on each side. The largest measures 64 mm. from snout to vent.

274. Takydromus haughtonianus.

Tachydromus haughtonianus Jerdon, P. Asiat. Soc. Beng. 1870, p. 72 (type loc. Goalpara, Assam; Calcutta); Anderson, Proc. Zool. Soc. London, 1871, p. 156; Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 88; Boulenger, Monogr. Lacert. ii, 1921, p. 155.

Tachydromus tachydromoides (not of Schlegel), Boulenger, Fauna Brit. Ind. 1890, p. 169 (in part).

Tachydromus septentrionalis (not of Günther), Annandale, P. Asiat. Soc. Beng. (2) i, 1905 p. 139.

Differs from *T. s. sexlineatus* as follows:—Head longer and

narrower; fronto-nasal distinctly longer than broad; 5 or 6 supraciliaries, the last three or four being much smaller than the others; interparietal larger; anterior loreal not half as large as the posterior; fifth supralabial subocular; 4 pairs of submaxillary shields, the first two pairs in contact with their fellows; 27 gular scales on the median line; dorsal plates in 6 rows across the neck and back, in 8 rows just behind the occiput; 29 ventral plates between the collar and groin; a single femoral pore on each side; the hind-limb reaches to the elbow.

Reddish-brown above, with a broad light green streak on each side proceeding from the supraciliary edge; below this a dark brown lateral streak; greenish-white below.

From snout to vent 60; tail 145 mm.

Known from a single male specimen.

Genus **ACANTHODACTYLUS.**

Acanthodactylus Wiegmann, Herp. Mex. 1834, p. 10 (type *Lacerta boskiana* Lichtenstein); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 458, and Fauna Brit. Ind. 1890, p. 170, and Bull. Soc. Zool. France, xliii, 1918, p. 143, and Monogr. Lacert. ii, 1921, p. 37.
Ida (not of Gray 1828), Gray, Ann. Mag. Nat. Hist. i, 1838, p. 281.
Photophilus Fitzinger, Syst. Rept. 1843, p. 20 (type *A. scutellatus* Dum. & Bibr.).

Head-shields normal, but the occipital often vestigial or absent; nostril between two nasals and the first labial; lower eyelid scaly; collar distinct; dorsal scales small and juxtaposed or large and imbricate; ventral plates subquadrangular, smooth, imbricate; digits subcylindrical, with keeled lamellæ below and a more or less developed lateral denticulation, at least on the outer side of the toes. Femoral pores present.

Range. Spain and Portugal; Africa north of the Equator; South-western Asia eastward to North-western India.

Some 12 species are recognized, with numerous subspecies.

Key to the Indian Species.

I. Scales on the back large, much larger than those on the flanks, strongly keeled; not more than 46 dorsal scales across the middle of the body.
25 to 36 dorsal scales across middle of body .... *c. cantoris*, p. 371.
40 to 46 dorsal scales across middle of body .... *c. blanfordi*, p. 372.

II. Scales on the back scarcely larger than those on the flanks, feebly keeled; more than 54 dorsal scales across the middle of the body. *microlepis*, p. 373.

275. Acanthodactylus cantoris cantoris.

Acanthodactylus cantoris Günther, Rept. Brit. Ind. 1864, p. 73 (type loc. Ramnagar; London); Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 91; Blanford, Zool. E. Persia, 1876, p. 381, pl. xxvi, fig. 3; Boulenger, Proc. Zool. Soc. London, 1881, p. 745, pl. lxiv, fig. 3, and Fauna Brit. Ind. 1890, p. 170, and Monogr. Lacert. ii, 1921, p. 91; Murray, Zool. Sind, 1884, p. 348; Prashad, Rec. Ind. Mus. x, 1914, p. 271; Procter, J. Bombay N.H. Soc. xxix, 1923, p. 124.

Acanthodactylus micropholis (not of Blanford), Murray, l. c. s.

Snout acuminate; nasal shields swollen, in contact with one another; fronto-nasal single, as long as or longer than broad; prefrontals in contact with one another; frontal long and narrow, with a median groove which extends on to the fronto-nasal; 4 supraoculars, the first not half the size of the second or third, in good contact with the second; fourth supraocular small, transversely elongate and more or less separated from the third by small granules; supraciliary margin separated from the supraoculars by small granules; interparietal very small; no occipital shield; anterior loreal about as long as broad, much smaller than the posterior; subocular not bordering the mouth, separated from it by the fifth and sixth supralabials; temporal scales keeled, the lower large, the median small, the upper two in contact with the parietal, large and elongate; ear-opening with a well-marked denticulation upon its anterior border; 5 pairs of submaxillary shields, the first three in contact with one another; collar curved, free, or bound just in the mid-line, its marginal scales distinctly enlarged; from 26 to 38 gular scales on a line between submaxillary shields and collar; median dorsal scales large, strongly keeled, imbricate, in from 14 to 20 oblique longitudinal rows, larger than those on the nape or on the flanks; 26 to 36 dorsal scales across the middle of the body; ventral plates in regular longitudinal and transverse series, all except the outermost row broader than long; in 8 or 12, rarely 14, longitudinal and 28 to 32 transverse series; the outer two rows of plates always smaller than the others, sometimes merging into the lateral scales, so that it is difficult to decide which to call them; usually two large preanal plates, one in front of the other. The hind-limb reaches to between the ear and the collar in the male, to between the collar and the axilla in the female. Fourth toe with well-developed lateral denticulation, particularly upon the outer side; no enlargement of the ungual lamellæ. Caudal scales large, the upper ones keeled, not twice as large as the posterior dorsal scales. From 16 to 23 femoral pores.

Young with black and white longitudinal streaks; usually 5 white streaks on the nape, 5 or 4 on the middle of the back, and 3 on the base of the tail, the number on the back depending upon the length of the median nuchal streak; a light lateral denticulated streak starting from the ear and terminating at the groin; head with black symmetrical markings; upper lip with black vertical bars which may extend on to the temple. Limbs with large round light spots; end of tail sometimes blue in life. The streaks may persist more or less distinctly in the adult, but adult males are usually greyish or brownish, uniform or with round, light, dark-edged spots corresponding with the arrangement of the light streaks, or with a dark network; the dark bars in the upper lip often persist. Lower parts white.

From snout to vent, ♂ 76, ♀ 64; tail, ♂ 185, ♀ 115 mm.

Range. Baluchistan; N.W.F.P. (Dehra Ismail Khan dist.); Sind; Punjab (Campbellpur, Ramnagar, Lahore, Ferozepore, Ambala, Hissar); U.P. (Agra); Persia.

Common in Baluchistan and the desert parts of Sind and the Punjab; Ingoldby, in Procter (1923), records it as "the commonest lizard of the Indus Plain" (Dehra Ismail Khan); not found above 1,000 feet altitude.

Variation. There is considerable variation in the character of the dorsal scales, in the strength of the keels, in the manner in which the median series grade into the lateral, whether abruptly or more gradually. These variations cannot be correlated with geographical distribution.

Acathodactylus cantoris is usually met with only on sand. Blanford found it abundant in Sind, Baluchistan, and S.E. Persia near the coast, where hillocks of blown sand have permitted tamarisk and other plants to grow. In such places the tracks of these lizards could be found in all directions. They lived in holes, usually made near the roots of bushes. In them they passed the night and took refuge when alarmed. In the cold season they would not leave their homes until 9 or 10 in the morning, when the air had become thoroughly warmed by the sun, and they retreated into them before sunset. They were very swift and easily alarmed. From the fact that he found large numbers of the young in November Blanford thought it probable that the eggs were hatched in the autumn.

275 *a*. Acanthodactylus cantoris blanfordi.

Acanthodactylus cantoris Blanford, Zool. E. Persia, 1876, p. 381, pl. xxvi, fig. 3 (in part).

Acanthodactylus cantoris blanfordii Boulenger, Bull. Soc. Zool. France, 1918, p. 154, and Monogr. Lacert. ii, 1921, p. 94 (type loc. Bam, Persia, and Mand, Baluchistan; London).

Differs from the typical form in the higher average number of scales and in the absence of any marked gradation between the median dorsal and the lateral dorsal scales; 32 to 38 gular scales on the median line; median dorsals in 18 to 20 transverse series; 40 to 46 dorsal scales across the middle of the body.

Range. Southern Persia and S.W. Baluchistan (Mand, Dashti, Bam, Jask).

276. Acanthodactylus micropholis.

Acanthodactylus micropholis Blanford, Ann. Mag. Nat. Hist. (4) xiv, 1874, p. 33 (type loc. Magas, Baluchistan; London and Calcutta), and Zool. E. Persia, 1876, p. 383, pl. xxvi, fig. 2; Boulenger, Proc. Zool. Soc. London, 1881, p. 745, pl. lxiii, fig. 3, and Fauna Brit. Ind. 1890, p. 171, and Monogr. Lacert. ii, 1921, p. 76; Lataste, Ann. Mus. Civ. Genova, (2) ii, 1885, p. 503.

Differs from *A. cantoris* in the following particulars:— Fronto-nasal broader than long; first supraocular smaller, often completely separated from the second by small granules; fourth supraocular broken up into small scales or granules; subocular just reaching the mouth or separated from the labial margin by the fourth and fifth supralabials; temporal scales smooth or feebly keeled, the lowermost two or three series separated by a large median area of smaller scales from a large superior shield which borders the parietal; from 30 to 32 gular scales on the median line; median dorsal scales smaller, less strongly keeled, less markedly differentiated from the lateral dorsals; 54 to 60 dorsal scales across the middle of the body; ventral plates in regular longitudinal and transverse series, all broader than long except the outermost row; in 10 longitudinal and 28 to 31 transverse series; one large preanal plate or several small ones. The hind-limb reaches to the ear or the eye. Caudal scales more than twice as large as the posterior dorsals. From 21 to 25 femoral pores.

Greyish above, with whitish longitudinal streaks. These are usually seven in number including the lateral, the vertebral bifurcating on the nape; the intervals between the light streaks blackish or with small white and black spots. Head greyish, uniform or speckled with darker; lower parts white.

From snout to vent 62; tail 125 mm.

Range. Baluchistan (Magas, Bampur); S.E. Persia (Rigan).

Genus CABRITA.

Cabrita Gray, Ann. Mag. Nat. Hist. i, 1838, p. 282 (type *brunnea*), and Cat. Liz. Brit. Mus. 1845, p. 43; Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 69, and Fauna Brit. Ind. 1890, p. 171, and Monogr. Lacert. ii, 1921, p. 193.
Calosaura Dum. & Bibr., Erp. Gen. v, 1839, p. 261 (type *leschenaultii*)
Cabritopsis Beddome, in Blanford, J. Asiat. Soc. Beng. xxxix, 1870, p. 348 (type *jerdoni*).

Head-shields normal, but the occipital usually absent in *jerdoni*. Nostril between two or three nasals. Lower eyelid large, distinct from the small upper lid, and having a very large transparent disc (fig. 2, p. 10). A fold in front of the shoulder; no proper collar. Dorsal scales imbricate and strongly keeled; ventrals imbricate, smooth. Digits with sharply keeled lamellæ beneath. Tail cylindrical. Femoral pores present.

Range. The Peninsula of India, and Ceylon. Two species are known.

Key to the Species.

Anterior labials ridged, forming a projecting margin; occipital present ..... *leschenaulti*, p. 374.
Labials not keeled; normally no occipital .... *jerdoni*, p. 375.

277. Cabrita leschenaulti.

Lacerta leschenaultii Milne-Edwards, Ann. Sci. Nat. Paris, xvi, 1829, pp. 80, 86, pl. vi, fig. 9 (type loc. Coromandel coast; Paris).—*Cabrita leschenaultii*, Blanford, J. Asiat. Soc. Beng. xxxix, 1870, p. 345, and ibid. xlviii, 1879, p. 112; Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 70, and Fauna Brit. Ind. 1890, p. 172, and Monogr. Lacert. ii, 1921, p. 194; Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 157, pl.
Cabrita brunnea Gray, Ann. Mag. Nat. Hist. i, (4) 1838, p. 282 (type loc. unknown); Blanford, J. Asiat. Soc. Beng. xxxix, 1870, p. 350.

Upper head-shields strongly keeled and finely striated, smooth or nearly so in the young; anterior labials with a strong ridge forming a projecting margin, best marked on the upper lip; canthus rostralis sharp; nostril between two large swollen nasals which are followed by one or two small postnasals, the upper of which may touch the nostril; a single fronto-nasal, broader than long; prefrontals in contact with one another; frontal long and narrow, touching the first three supraoculars; interparietal small, in contact with a smaller occipital; four supraoculars, the second and third much the largest and separated from the supraciliaries by a row of small granules; fourth supraocular small and transversely elongate; two loreals, the anterior distinctly smaller than the posterior; loreal region distinctly concave; fifth, rarely sixth or fourth, upper labial largest and subocular; temporal scales strongly keeled, small, except

the upper two which border the parietal and are larger; tympanic shield very large, smooth; six, rarely five, pairs of submaxillaries, the first three in contact with their fellows. No proper collar, its position indicated by enlarged scales. Dorsal scales subequal, much smaller than the caudals, in oblique series converging towards the vertebral line; ventrals large, in 6 longitudinal and 24 to 28 transverse series, the median pair being the narrowest; 42 to 50 scales round the middle of the body; a large preanal plate. The hind-limb reaches to the ante-humeral fold or just beyond the ear in the male, sometimes only to the axilla in the female. From 12 to 16 femoral pores on each side.

Brownish or golden above; a light stripe edged above with black commences behind the supraciliary edge and passes along the side of the body and tail; a second borders the upper lip and passes along the flank, the interval between the two light stripes being black, or green spotted with black; sometimes the lower light stripe may be bordered with black below. Lower parts greenish-white, the tail and hind-limbs often reddish in life.

From snout to vent 50; tail 100 mm.

Range. The Indian Peninsula; Chota Nagpur, Gangam, Palkonda Hills, S.E. Berar, Godavari district, Nilgiri and Chitteri Hills, Salem district, Travancore, Sivagiri Hills. Ceylon; Mullaitivu (E.P.), Jaffra (N.P.).

An active lizard, usually found in open jungle country. Not rare according to Blanford (1879) in the dry forests of the Godavari. A female caught in April contained six eggs; young ones were also obtained in the same month, their coloration being much like that of the adult.

278. Cabrita jerdoni.

Cabrita jerdonii Beddome, Madras Month. J. Med. Sci. 1870, p. 34 (type loc. between Kollegal and Caverypuram, State of Mysore; type lost); Blanford, J. Asiat. Soc. Beng. xxxix, 1870, p. 348, and xlviii, 1879, p. 112; Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 71, and Fauna Brit. Ind. 1890, p. 173, and Monogr. Lacert. ii, 1921, p. 197.

Differs from *leschenaulti* in the following particulars:—Upper head-shields coarsely striated. Nostril between a large anterior and two small posterior nasals, which are not distinctly swollen; no ridge on the labial shields; one or two small shields separating the prefrontals often present; interparietal larger and broader, completely separating the parietals; rarely it is divided in two, an occipital thus being formed; first supraocular often broken into several small shields; loreal region feebly concave. Dorsal scales larger, nearly as large as the caudals, larger than the

laterals; ventral plates subequal, in from 6 to 8 longitudinal and 19 to 23 transverse series; from 26 to 30 scales round the middle of the body; femoral pores 11 to 15.

Brownish or golden above with two light lateral stripes, the upper much more conspicuous than the lower; they are bordered with a longitudinal series of black spots; lips and throat speckled with black.

Range. Northern and Central India. Agra (U.P.), Chanda, Bilaspur and Bhandara (C.P.), Udaipur and Jashpur, west of Chota Nagpur, Palkonda Hills, Godavari district, S.E. Berar.

Blanford (1879) remarks that it is common in the dry forests of the Godavari, quite as plentiful, if not more so, than *leschenaulti*.

Beddome's description was drawn up from a single specimen, and this cannot now be traced. There are, however, in the British Museum specimens collected by Beddome and identified by him as *jerdoni*.

Genus **OPHISOPS.**

Ophisops Ménétries, Cat. Rais. 1832, p. 63 (type *elegans*).—*Ophiops*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 72, and Fauna Brit. Ind. 1890, p. 173, and Monogr. Lacert. ii, 1921, p. 201.

Amystes Wiegmann, Arch. f. Nat. ii, 1835, p. 1 (type *ehrenbergi*).

Gymnops (not of Spix, 1824), Blanford, J. Asiat. Soc. Beng. xxxix, 1870, p. 351 (type *microlepis*).

Pseudophiops Jerdon, P. Asiat. Soc. Beng. 1870, p. 71 (type *theobaldi*).

Chondrophiops Blanford, J. Asiat. Soc. Beng. xlii, 1873, p. 144 (type *microlepis*); susbtitute name for *Gymnops*, preoccupied).

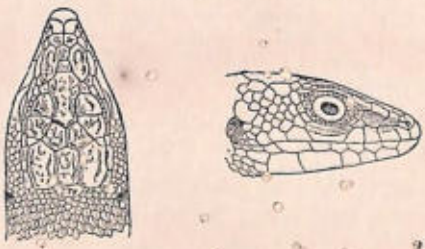


Fig. 89.—Upper and side views of head of *Ophisops beddomei*. (After Boulenger.)

Head-shields normal. Nostril between two to four nasals. Lower eyelid with a very large transparent disc, completely united with the upper, which is vestigial or absent. A fold in front of the shoulder; no distinct collar. Dorsal scales pointed, imbricate and strongly keeled; ventrals imbricate, smooth. Digits with sharply keeled scales beneath. Tail cylindrical. Femoral pores present.

Range. North Africa; Turkey; S.W. Asia.

Five species are recognized, four of which inhabit India.

Unless otherwise stated the following characters are common to all the species mentioned in this work:—Nasal shields in contact with one another; frontal long and narrow; anterior loreal distinctly smaller than the posterior; loreal region concave; subocular bordering the lip; 6, sometimes only 5, pairs of submaxillary shields, normally the first three in contact with their fellows.

Key to the Species.

I. Upper head-shields rugose, keeled, and striated; 25 to 35 scales round the middle of the body.	
A single fronto-nasal	*jerdoni*, p. 377.
Two or three fronto-nasals	*beddomei*, p. 378.
II. Upper head-shields smooth.	
31 to 38 scales round the body; snout shorter than the breadth of the head across the eyes	*c. elegans*, p. 379.
56 to 66 scales round the body; snout as long as the breadth of the head across the eyes	*microlepis*, p. 380.

279. Ophisops jerdoni.

Ophiops jerdonii Blyth, J. Asiat. Soc. Beng. xxii, 1853, p. 653 (type loc. Mhow, Indore, C.I.; type lost); Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 89, and P. Asiat. Soc. Beng. 1872, p. 74; Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 73, and Fauna Brit. Ind. 1890, p. 174, and Monogr. Lacert. ii, 1921, p. 201; Hora, Rec. Ind. Mus. xxv, 1923, p. 375; Procter, J. Bombay N.H. Soc. xxix, 1923, p. 125.—*Tropidosaura jerdoni*, Theobald, Cat. Rept. Asiat. Soc. Mus. 1868, p. 22.—*Pseudophiops jerdoni*, Jerdon, P. Asiat. Soc. Beng. 1870, p. 71.

Pseudophiops theobaldi Jerdon, P. Asiat. Soc. Beng. 1870, p. 71 (type loc. Alpine Punjab).

Ophiops bivittata Jerdon, in Beddome, Madras Month. J. Med. Sci. ii, (9) 1870, p. 172 (type loc. Punjab).

Calosaura chaperi Sauvage, Bull. Soc. Philom. (7) viii, 1884, p. 142 (type loc. Bellary, Madras Pres.; London and Paris).

Upper head-shields strongly keeled and striated, smooth or nearly so in the young; canthus rostralis well marked; nostril in a large anterior nasal, sometimes divided, with two smaller postnasals, the lower of which is larger than the upper and might sometimes be regarded as an anterior loreal; fronto-nasal single, in rare cases longitudinally bisected; prefrontals in contact with one another or separated by a small scale; four supraoculars, the second and third much the largest, and separated from the supraciliaries by a row of small scales; interparietal larger than the occipital; fifth labial subocular; temporal scales strongly keeled, the upper two, which border the parietal, being the largest; tympanic shield moderately large; no distinct collar, but

its position indicated by enlarged scales. Dorsal scales subequal, rhomboidal, nearly as large as the caudal, in oblique longitudinal series converging towards the vertebral line; ventral plates in 6 longitudinal and 23 to 29 (♂ 23–27, ♀ 26–29) transverse series; 28 to 35 scales round the middle of the body; a large preanal plate; the hind-limb reaches to the ante-humeral fold, or between it and the ear in the male, to the axilla or not so far in the female; from (6) 7 to 12 femoral pores on each side.

Olive-brown, golden or greyish above, with two light (golden) lateral streaks, the upper extending from the supraciliary edge to the tail, the lower bordering the upper lip and extending along the flank to the base of the hind-limb; the space between the stripes, as well as the upper margin of the upper stripe, usually spotted with black. Below yellowish-white.

From snout to vent 45; tail 90 mm.

Range. Northern and Central India. N.W.F.P. (S. Waziristan); Baluchistan (Quetta); Sind (Thar and Pakar district, Kotri, Karachi); Cutch; Alpine Punjab; Rajputana (Jaisalmer); Sarai, Rewa State, C.I.; Madras Presidency (Bellary).

Hora found it common in the Salt Range.

280. Ophisops beddomei.

Pseudophiops beddomei Jerdon, P. Asiat. Soc. Beng. March 1870, p. 72 (type loc. Bramagherry Hills, Wynaad; London).—*Ophiops beddomii*, Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 90; Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 74, pl. iii, fig. 3, and Fauna Brit. Ind. 1890, p. 174, and Monogr. Lacert. ii, 1921, p. 205.

Pseudophiops monticola Beddome, Madras Month. J. Med. Sci. Sept. 1870, p. 172 (London).

Closely allied to *jerdoni*, from which it differs in the following particulars:—Two, sometimes three, fronto-nasals in a transverse series; prefrontals usually separated from one another by one or two shields; first and fourth supraoculars usually broken up into small scales; lateral scales smaller than the dorsal; 26 to 32 scales round the body; femoral pores 8 to 13.

Coloration as in *jerdoni*, but the upper lateral light streak usually absent.

From snout to vent 34; tail 60 mm.

Range. S. Kanara plains, Madras; Satara district, Bombay.

Bramagherry Hills.

The types were obtained by Beddome on the summit of the Bramagherries in the Wynaad, at an elevation of 5,000 feet. It was a common lizard there in grassy places. He sent a specimen, with the manuscript name *monticola*, to Jerdon, who, however, had forestalled him by publishing a description of it six months earlier.

281. Ophisops elegans elegans.

Ophisops elegans Ménétries, Cat. Rais. 1832, p. 63 (type loc. near Baku, Caspian Sea).—*Ophiops elegans*, Anderson, Proc. Zool. Soc. London, 1872, p. 374; Blanford, Zool. E. Persia, ii, 1876, p. 367; Boulenger, Fauna Brit. Ind. 1890, p. 175, and J. Linn. Soc., Zool. xxvii, 1899, p. 378, and Monogr. Lacert. ii, 1921, p. 211.—*Ophisops elegans elegans*, Lantz, Bull. Mus. Georgia, vi, 1931, p. 31.

Gymnops meizolepis Stoliczka, P. Asiat. Soc. Beng. 1872, p. 12 type loc. S.W. of Kalabagh, Mianwali dist., Punjab; London).—*Ophiops meizolepis*, Blanford, Zool. F. Persia, ii, 1876, p. 369, pl. xxv, fig. 2.—*Ophiops elegans* var. *mizolepis*, Boulenger, Monogr. Lacert. ii, 1921, p. 216.

Ophiops elegans var. *persicus* Boulenger, Ann. Mag. Nat. Hist. (9) ii, 1918, p. 160, and Monogr. Lacert. ii, 1921, p. 215.

Snout obtusely pointed, shorter than the breadth of the head across the eyes; upper head-shields smooth; canthus rostralis sharp; nostril between two large protuberant nasals, an upper and a lower; two smaller postnasals; fronto-nasal single; frontal touching three supraoculars, with a longitudinal groove in the middle which extends on to the fronto-nasal; four supraoculars, the second and third much the largest and separated from the supraciliaries by a row of small granules; first supraocular subtriangular, larger than the fourth, which is transversely elongate; interparietal narrow, in contact with or just separated from the small occipital; fifth labial subocular; temporal scales small, more or less keeled except the upper two which border the parietal and are smooth and very much larger; tympanic shield large, smooth; no distinct collar, but its position indicated by enlarged scales; dorsal scales rhomboidal, subequal, all except the outermost, which are much larger, and are almost as large as the adjacent ventrals; they are arranged in oblique longitudinal series converging towards the vertebral line, and are not much smaller than the caudal scales; ventral plates in 6 longitudinal and 23 to 29 transverse series; 31 to 38 scales round the middle of the body; a large preanal plate. The hind-limb reaches to about the ear in the male, to the shoulder or a little beyond in the female. From 10 to 12 femoral pores on each side.

Olive-greenish or brownish above, with two light dorso-lateral stripes starting from the supraciliary margin; the second stripe starts from below the eye, and passes through the ear and along the flank to the hind-limb; the upper margin of the dorso-lateral stripe is spotted with black; a series of small vertebral spots may be present. Lips, sides of the neck, and the space between the two light stripes also spotted with black. Head above olivaceous, uniform or spotted with black; lower parts greenish-white.

From snout to vent 55; tail 100 mm.

O. elegans elegans is included in the Indian Fauna on the strength of a specimen obtained by Stoliczka near Kalabagh, and described by him under the name of *Gymnops meizolepis*. Unfortunately his description is not quite accurate, and it has lead Boulenger to regard *meizolepis* as a distinct race. I have examined the specimen, and find that it has two distinct postnasal shields, 34 scales and plates round the middle of the body, and 27 plates between the collar and the femoral pores, which are 12 in number on each side. It thus agrees in all respects with the form which inhabits Persia. Lantz (1931), who has examined a large number of specimens from the type region of *elegans*, which were not available to Boulenger, considers that *elegans*, and *persicus* are synonymous. The variation which he gives for the number of scales round the body and the number of femoral pores is slightly greater than the variation given here. My description is drawn up from Stoliczka's type and a large number of specimens from Persia.

282. Ophisops microlepis.

Ophiops (*Gymnops*) *microlepis* Blanford, J. Asiat. Soc. Beng. xxxix, 1870, p. 351, pl. xv, figs. 1–5 (type loc. Korba, Bilaspur, C.P.; Calcutta); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 77, and Fauna Brit. Ind. 1890, p. 175, and Monogr. Lacert. ii, 1921, p. 222; Boettger, Kat. Rept. Mus. Senckenb. 1893, p. 91.—*Gymnops microlepis*, Stoliczka, J. Asiat. Soc. Beng. xli, 1872, p. 90, and P. Asiat. Soc. Beng. 1872, p. 74.

Snout elongate, more or less pointed, as long as the breadth of the head across the eyes; upper head-shields smooth; canthus rostralis sharp; nostril between two large protuberant nasals, an upper and a lower; a small posterior nasal wedged in between the two; fronto-nasal single; four supraoculars, the second and third much the largest, and separated from the supraciliaries by a row of small granules; first supraocular subtriangular, larger than the fourth, which is small and transversely elongate; interparietal long and narrow, narrower than the occipital; fifth labial subocular; temporal scales keeled, the upper two, which border the parietal, being smooth and much larger than the others; tympanic shield large, smooth; no proper collar, but its position is often defined by a series of enlarged plates; dorsal scales rhomboidal, subequal, except the outermost rows, in oblique longitudinal series converging towards the vertebral line, very much smaller than the caudal scales; ventral plates in 6 longitudinal and 24 to 27 transverse series; from 56 to 66 round the middle of the body; a large preanal plate; the hind-limb reaches to the ear or a little beyond; from 12 to 16 femoral pores on each side.

Olive-greenish or brownish above, a light dorso-lateral

stripe starts from behind the supraciliary edge and extends on to the base of the tail. It is bordered above with black, or black spots; a second stripe, much less distinct, passes along the upper lip and along the flank as far as the base of the hind-limb; sides of neck and flanks more or less thickly spotted with black and white. Below greenish-white. "Tail in life reddish in young specimens; lower side of adults and lower side of thighs often with a distinct yellow tinge" (*Stolizzka*, 1872). The young are brown above, with the light longitudinal stripes very distinct and bordered more or less heavily with black.

From snout to vent 65; tail 145 mm.

Range. Ajmer; Karharbari in Bihar; Central Provinces; Cutch.

Stolickza (1872) found this lizard extremely common throughout Cutch, frequenting sandy and moderately rocky ground with low brushwood. It was hardly possible, he states, to move a step there without meeting it. After an examination of hundreds of specimens, he found it extremely constant both as regards scalation and coloration.

Genus EREMIAS.

Eremias Wiegmann, Herp. Mex. 1834, p. 9 (type *Lacerta velox* Pallas); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 80, and Fauna Brit. Ind. 1890, p. 176, and Monogr. Lacert. ii, 1921, p. 224, and J. Zool. Res. iii, 1918, p. 1; Lantz, Bull. Mus. Géorgie, Tiflis, 1928, p. 1; Inter. Rules Zool. Nomen., Opin. 92.

Scapteira (Fitz.) Wiegmann, Herp. Mex. 1834, p. 9 (type *Lacerta graminica* Lichtenstein); Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 107, and Fauna Brit. Ind. 1890, p. 179, and Monogr. Lacert. ii, 1921, p. 347.

Mesalina Gray, Ann. Mag. Nat. Hist. i, 1838, p. 282 (type *lichtensteinii*).

Meroles (in part) Gray, Ann. Mag. Nat. Hist. i, 1838, p. 282 (type *knoxi*).

Aspidorhinus Eichwald, Faun. Casp.-Cauc. 1841, p. 74 (type *Lacerta gracilis*).

Eremioscopus Fitzinger, Syst. Rept. 1843, p. 20 (type *Eremias guttulata* Dum. & Bibr.).

Dioptroblepharis Fitzinger, Syst. Rept. 1843, p. 21 (type *Eremias pardalis* Dum. & Bibr.).

Saurites Peters, Mon. Akad. Berlin, 1869, p. 60 (type *cuneirostris*).

Pseuderemias Boettger, Abh. Senck. Ges. xiii, 1883, p. 118 (type *Eremias lineolata* Rüppell).

Boulengeria Lataste, Ann. Mus. Civ. Genova, (2) ii, 1885, p. 16 (type *mucronata*).

Macmahonia Boulenger, J. Zool. Res. iii, 1918, p. 2 (type *Scapteria aporosceles*), and Monogr. Lacert. ii, 1921, p. 373.

Rhabderemias Lantz, Bull. Mus. Georgia, 1928, p. 36 (type *scripta*).

Ommateremias Lantz, l. c. s. p. 37 (type *arguta*).

The synonymies given above apply to the Asiatic forms only.

Head-shields normal, but the occipital often vestigial or absent; nostril between three or four nasals, not touching the labial; lower eyelid scaly or with a more or less transparent disc formed of two or more scales; collar complete or nearly so; dorsal scales small or granular, subimbricate or juxtaposed; ventral scales subquadrangular, imbricate, smooth; digits with or without a lateral fringe. Tail cylindrical. Femoral pores present, except in *aporosceles*.

Range. S.E. Europe; Central Asia; Africa. Some 45 species are recognized, with numerous subspecies.

Unless otherwise stated the following characters are common to all the species mentioned in this work:—

Upper head-shields smooth; nasal shields swollen, in contact with one another; fronto-nasal single, prefrontals in contact with one another; anterior loreal much smaller than the posterior; loreal region feebly concave; five pairs of submaxillaries, the fifth small and sometimes absent, normally the first three in contact with their fellows.

Lantz (1928) has followed Blanford in placing in the genus *Eremias* only those species in which the ventral scales are arranged in oblique longitudinal series; the others, in which the scales form straight rows, are transferred to *Mesalina*. His paper deals solely with the western Asiatic species, and, as far as they are concerned, the separation presents no difficulty. Unfortunately it breaks down in other regions. In both groups the scales upon the breast are always more or less irregular and oblique, and this condition may extend partly or completely down the belly, as in the Chinese *E. argus*, the African *E. lineoocellata* and several others. They bridge the gap between the two groups, and Boulenger was, therefore, right in refusing to accept the character of the abdominal scales as a basis for generic separation.

There is also no clear line of demarcation between *Eremias* and *Scapteira* as these genera were conceived by Boulenger. He himself fully recognized this fact, but for reasons of convenience preferred to keep them apart (Monograph, ii, p. 347). The lateral digital fringe or denticulation upon which *Scapteira* is based has been developed from *Eremias* independently in many species and in many places, apparently as an adaptation in response to a deserticolous existence.

The denticulation is formed of small pointed scales. When feebly developed, as in *fasciata* and *scripta*, it is upon the outer side of the toe only *; when strongly developed, as in *acutirostris* and *aporosceles*, it is upon both sides; in the two last named the upper and lower surfaces of the digit are covered with a single series of large, more or less flat scales,

* The character of the denticulation is best marked on the fourth toe, and for the purpose of description here that toe only is considered.

and there is also a marked expansion of the ungual lamellæ to form an oval disc. In *E. velox*, on the other hand, the digit is covered above with large flat scales, and below and on the outer side with two series of keeled lamellæ.

Key to the Indian Species.

I. Ventral plates in oblique longitudinal series; lower nasal resting on 2 or 3 supralabials; no occipital shield.

a. Femoral pores present.

Two large supraocular; subocular bordering the mouth; back with dark longitudinal stripes, at least in the young. — *v. velox*, p. 385; *v. persica*, p. 383; *fasciata*, p. 386; *scripta*, p. 386.

Three large supraoculars; subocular not bordering the mouth ..... *acutirostris*, p. 387.

b. Femoral pores absent.

Three large supraoculars; subocular not bordering the mouth ..... *aporosceles*, p. 388.

II. Ventral plates in straight longitudinal series; lower nasal resting on first supralabial only; an occipital shield. [p. 389.

Occipital in contact with interparietal .... *guttulata watsonana*,

Occipital separated from interparietal .... *brevirostris*, p. 390.

283. Eremias velox persica.

Lacerta velox Pallas, Reise Russ. Reichs. i, 1771, p. 457 (type loc. Lake Inder, Kirghiz Steppes).—*Eremias velox*, Boulenger, Fauna Brit. Ind. 1890, p. 178 (in part); Procter, J. Bombay N.H. Soc. xxix, 1923, p. 125.

Eremias persica Blanford, Ann. Mag. Nat. Hist. (4) xiv, 1874, p. 370 (type loc. near Ispahan, Persia; London), and Zool. E. Persia, 1876, p. 370, pl. xxvi, fig. 1.—*Eremias velox* var. *persica*, Boulenger, Monogr. Lacert. ii, 1921, p. 312.—*Eremias* (*Eremias*) *persica*, Lantz, Bull. Mus. Géorgie, 1928, p. 53.

Snout subacuminate; lower eyelid covered with small scales; nostril between two large anterior and a small posterior shield, the lower anterior nasal touching the rostral and two or three labials; two large supraoculars, the second and third in contact with the frontal and fronto-parietal, the place of the first occupied by small scales; fourth supraocular small and transversely elongate; supraciliary margin formed of elongated scales, separated more or less completely from the supraoculars by small granules; interparietal much smaller than the fronto-parietals, usually shorter than the suture between the parietals; no occipital shield; anterior loreal not elongate; seventh, rarely sixth, labial subocular, bordering the mouth; temporal scales small, flat; a small tympanic shield; collar slightly curved, free, its marginal scales enlarged; 25 to 35 gular scales on a line between the submaxillary shields and the collar. Dorsal

scales small, granular, subimbricate or juxtaposed, the outermost rows slightly larger than the others, from 56 to 68 across the middle of the back; ventral plates subquadrangular, in oblique longitudinal series, converging posteriorly; 30 or 34 transverse and 14 to 16 longitudinal series. Preanal plates small, irregular; the hind-limb reaches to the collar or the ear in the male, to the axilla or the collar in the female. Digits keeled below, without lateral denticulations. Caudal scales distinctly longer than broad, about half the size of the ventrals, smooth or feebly keeled; from 18 to 24 femoral pores on each side.

The young are pale grey above, with black dorsal stripes extending from the nape to the base of the tail; across the middle of the back these are three or four in number, anteriorly they usually bifurcate, forming 5, less often 7, stripes, and the place of bifurcation determines the number at mid-body; flanks and sides of the neck with white spots enclosed in a black stripe and usually another dark stripe below; limbs above with large white spots on a black ground.

These markings usually disappear more or less completely in the adult, which is greyish or brownish, spotted or longitudinally streaked with black; with or without round whitish spots on the back, sides, and limbs. Sometimes a series of large blue or black ocelli on each side. Lower surfaces white.

From snout to vent 90; tail 140 mm.

Range. According to Blanford *E. v. persica* is common in almost all parts of the Persian Plateau where there are open plains not absolutely desert. It is usually found among bushes, at an elevation of not less than 4,000 feet. Eastwards its range extends to Baluchistan, S. Afghanistan (near Quetta, Helmand), and S. Waziristan (Ladha, Wana).

Ingoldby, in Procter (1923), found it common in S. Waziristan at 5,000 feet altitude and higher. The young had blue tails.

Blanford states that these lizards are very active in their movements. He did not think they lived in holes, although they would take refuge in those of other animals.

E. v. persica is regarded by some authors as a distinct species, closely allied to *E. velox velox*. The differential diagnosis of the two will be found on p. 385; but inasmuch as the characters given there fail in many specimens, I prefer to regard *persica* as the southern race of *velox velox*. The type locality of the latter is in the Kirghiz Steppes, and it has been met with as far south as New Gulran in the N.W. corner of Afghanistan.

The following table will show the differential characters between *velox velox*, *velox persica*, *fasciata*, and *scripta*.

velox velox.	*velox persica.*	*fasciata.*	*scripta.*
Supraoculars usually separated from frontal and fronto-parietals by small granules.	Supraoculars in contact with frontal and fronto-parietals.	Supraoculars usually separated from frontal and fronto-parietals by small granules.	Supraoculars separated from frontal and fronto-parietals by small granules.
Interparietal usually longer than the suture between the parietals.	Interparietal not longer, usually shorter than the suture between the parietals.	Interparietal shorter than the suture between the parietals.	Interparietal shorter than the suture between the parietals.
Collar slightly curved; 25 to 35 gular scales in the median line.	Collar slightly curved; 25 to 35 gular scales in the median line.	Collar slightly curved; 23 to 30 gular scales in the median line.	Collar curved, with distinctly enlarged scales; 19 to 25 gular scales in the median line.
52 to 66 scales across the back.	56 to 68 scales across the back.	44 to 56 scales across the back.	56 to 65 scales across the back.
No fringe of scales along the outer side of the fourth toe.	No fringe of scales.	No fringe of scales.	A distinct fringe of scales along the outer side of the fourth toe.
Caudal scales strongly keeled.	Caudal scales smooth or obtusely keeled.	Caudal scales strongly keeled.	Caudal scales moderately keeled.
Back of juvenile with 3 or 4 dark stripes; flanks with large white spots enclosed in a black stripe.	As in the typical form.	Back and sides of adult with 5 or 7 narrow dark stripes, no white spots on the sides; head above cream-coloured, uniform.	Back with narrow longitudinal stripes or with vermiculations; head above grey, with darker spots.
15 to 23 femoral pores.	18 to 24 femoral pores.	15 to 18 femoral pores.	12 to 16 femoral pores.

284. Eremias fasciata.

Eremias fasciata Blanford, Ann. Mag. Nat. Hist. (4) xiv, 1874, p. 32 (type loc. Saidabad, S.W. of Karman, Persia; London), and Zool. E. Persia, 1876, p. 374, pl. xxv, fig. 3; Boulenger, Fauna Brit. Ind. 1890, p. 179, and Monogr. Lacert. ii, 1921, p. 318; Procter, J. Bombay N.H. Soc. xxix, 1923, p. 125.—*Eremias* (*Rhabderemias*) *fasciata*, Lantz, Bull. Mus. Géorgie, 1928, p. 90.

Very closely allied to *E. velox velox* and *E. velox persica*, but smaller and with a different colour-pattern; closely related also to *scripta*.

Very pale grey or sandy above, with narrow, dark, longitudinal streaks, 5, 7, or 9 upon the neck, reducing to 5 or 7 upon the back; a lateral stripe starts from the eye and passes above the ear, and there is another and narrower one along the outer margin of the ventral shields; head above cream-coloured, uniform. Lower parts white.

From snout to vent 58; tail 115 mm.

Range. Persia; Southern Afghanistan; Baluchistan (Kharan, Kohak); S. Waziristan (Dehra Ismail Khan, Wana).

According to Blanford it lives on bushy plains, and is very active and difficult to catch.

285. Eremias scripta.

Podarces (*Scapteira*) *scripta* Strauch, Mél. Biol. Ac. St. Pétersb. vi, 1867, p. 424 (type loc. Aralo-Caspian Desert).—*Scapteira scripta*, Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 122, and Monogr. Lacert. ii, 1921, p. 365; Alcock & Finn, J. Asiat. Soc. Beng. lxv, 1896, p. 559; Nikolsky, Fedtschen. Reise Turkes. ii. 1899, pt. vii, p. 38, pl. vii, fig. 2.—*Eremias* (*Rhabderemias*) *scripta*, Lantz, Bull. Mus. Georgia, 1928, p. 73.

Snout subacuminate; lower eyelid covered with small scales; nostril between two large anterior and a small posterior shield, or the posterior may be absent; lower nasal not touching the rostral; two large supraoculars completely surrounded by a ring of granules, the place of the first and fourth supraocular taken up by small granular scales, or a small fourth supraocular may be present; supraciliary border formed of elongated scales; interparietal small, widely separated from the occipital, which is minute; anterior loreal not elongate; sixth or seventh supralabial largest and below the eye; temporal scales small, the upper ones granular; no tympanic shield; collar slightly curved, the marginal scales enlarged; from 19 to 25 gular scales on a line between the submaxillary shields and the collar. Dorsal scales very small, granular, a little larger on the sides than on the back, 58 to 65 across the middle. Ventral plates subquadrangular, subequal, in oblique longitudinal series; 32 to 34 transverse and 14 to 16 longitudinal series. Preanals small, irregular; the hind-limb reaches to the axilla or the collar;

digits keeled inferiorly, with moderately developed lateral denticulations upon the outer sides of the toes. Caudal scales smaller than the ventrals, feebly keeled. From 12 to 16 femoral pores on each side.

Pale sandy grey above; starting from the parietal shields and extending down the back are 7, sometimes 5, narrow dark stripes, or some or all of them may be arranged in a vermiculate pattern; a broader dorso-lateral stripe starts from the eye, and below it, along the margin of the ventrals, there is usually a narrow one; head grey, with darker markings; upper surface of limbs with wide-meshed dark brown reticulations; lower surfaces white.

From snout to vent 42; tail 85 mm.

Range. From Transcaspia to Baluchistan. Dr. Maynard obtained three specimens on the Afghan-Baluchistan Frontier. They were found on the sand-hills between Soru and Darband, at an elevation of 3,500 feet.

286. Eremias acutirostris.

Scapteira acutirostris Boulenger, Cat. Liz. Brit. Mus. iii, 1887, p. 114 (type loc. between Nushki and Helmand, Baluchistan; London), and Tr. Linn. Soc., Zool. (2) v, 1889, p. 100, pl. ix, fig. 4, and Fauna Brit. Ind. 1890, p. 179, and Monogr. Lacert. ii, 1921, p. 368.—*Eremias* (*Scapteira*) *acutirostris*, Lantz, Bull. Mus. Géorgie, 1928, p. 41.

Snout acuminate; nostril between two large nasals, an upper and a lower, the latter not touching the rostral, with a small posterior one wedged in between them; four supraoculars, the first about half the size of the second and third, the latter two being surrounded by small granules; fourth supraocular small and transversely elongate; supraciliary margin formed of elongated scales; interparietal small; no occipital shield; anterior loreal not elongate; 8 or 9 supralabials, the sixth and seventh below the eye but separated from it by a large elongate subocular. Temporal scales small, granular; no tympanic shield. Collar straight, complete, its marginal scales feebly enlarged; 25 to 28 gular scales on a line between the submaxillary shields and the collar. Dorsal scales very small, granular, subequal, 70 to 78 across the middle of the back; ventral plates subquadrangular, in oblique longitudial series; 34 to 38 transverse and 18 to 22 longitudinal series. A large preanal plate; the hind-limb reaches to the posterior border of the eye; digits nearly smooth below, with well-developed lateral denticulations on both sides of the fourth toe; the ungual lamellæ enlarged, forming a suboval disc. Caudal scales smaller than the ventrals, keeled. From 12 to 17 femoral pores on each side.

Sand-coloured above, with blackish net-work; head with symmetrical black markings; lower surfaces white.

From snout to vent 48; tail 75 mm.

Range. Baluchistan (Nushki district, Dalbandin, Chagai district). I have seen three examples.

287. Eremias aporosceles.

Scapteira aporosceles Alcock & Finn, J. Asiat. Soc. Beng. lxv, 1896, p. 559, pl. xiii (type loc. near Nushki, N. Baluchistan; London and Calcutta).—*Macmahonia aporosceles*, Boulenger, Monogr. Lacert. ii, 1821, p. 373.—*Eremias* (*Scapteira*) *aporosceles*, Lantz, Bull. Mus. Géorgie, 1928, p. 127.

Snout acuminate; nostril between two large anterior and a small posterior shield; four supraoculars, the first about half the size of the second or third, which are completely surrounded by small granules; fourth supraocular small and transversely elongate; supraciliary margin formed of elongated scales; interparietal small; no occipital shield; anterior loreal not elongate; from 8 to 10 supralabials, sixth and seventh or seventh and eighth below the eye, but separated from it by a large elongate subocular; temporal scales small, flat, more or less granular; no tympanic shield; collar straight, complete, the marginal scales feebly enlarged; from 28 to 33 gular scales on a line between the submaxillary shields and the collar. Dorsal scales very small, granular, subequal, 68 to 82 across the middle of the back; ventral plates subquadrangular, in oblique series; 34 or 36 transverse and 18 or 20 longitudinal series; a single large preanal plate, sometimes divided into two. The hind-limb reaches to the ear or the posterior border of the eye; digits nearly smooth below, with well-developed lateral denticulations on both sides of the fourth toe; ungual lamellæ enlarged, forming a suboval disc. Caudal scales smaller than the ventrals, keeled. No femoral pores.

Sand-coloured or greyish above, with blackish net-work; head with symmetrical black markings; lower surfaces white.

From snout to vent 65; tail 130 mm.

Dr. Maynard found this species common on the Afghan-Baluchistan frontier, near Koh Malik-do-khand; 25 specimens were caught. They ran very fast and made for bushes or entered holes.

A comparison of the description of this lizard with that of *Eremias acutirostris* will show that the two agree in all essential details except that of the femoral pores and in coloration.

The absence of pores in *aporosceles* led Boulenger to separate it from *Eremias* and to erect a separate genus for

it—*Macmahonia*. In view, however, of the variation in the number of pores which is to be found in *Eremias*—7 to 15 in *multiocellata*, 17 to 25 in *velox*—the lack of them altogether, in the absence of other morphological differences, does not seem sufficient to warrant generic separation.

288. Eremias guttulata watsonana.

Lacerta guttulata Eichtenstein, Verz. Doubl. Zool. Mus. Berlin, 1823, p. 101 (type loc. Egypt; Berlin).—*Mesalina guttulata*, Blanford, J. Asiat. Soc. Beng. xlviii, 1879, p. 127.—*Eremias guttulata*, Boulenger, Fauna Brit. Ind. 1890, p. 177, and Monogr. Lacert. ii, 1921, p. 258 (in part); Proctor, J. Bombay N.H. Soc. xxix, 1923, p. 125.

Eremias (*Mesalina*) *watsonana* Stoliczka, P. Asiat. Soc. Beng. 1872, p. 86 (type loc. Sind, between Karachi and Sukkur; London and Calcutta).—*Mesalina watsonana*, Murray, Zool. Sind, 1884, p. 349.

Mesalina pardalis (not of Licht.), Blanford, J. Asiat. Soc. Beng. xlv, 1876, p. 26, and Zool. E. Persia, 1876, p. 377; Murray, Zool. Sind, 1884, p. 350.

Mesalina pardaloides Blanford, Ann. Mag. Nat. Hist. (4) xiv, 1874, p. 32, and Zool. E. Persia, 1876, p. 381 (type loc. Henjam I., Persian Gulf; Calcutta).

Snout subacuminate; lower eyelid with a semi-transparent disc formed of 3 to 5 scales, one or two of which are always larger than the others; nostril between two large anterior and a small posterior shield, the lower anterior in contact with the rostral and the first labial only; four supraoculars, the second and third very large, the second in contact with or just separated from the prefrontal, the third extensively in contact with the fronto-parietal; first and fourth very small or broken up into small scales; supraciliary margin composed of elongated scales separated from the supraoculars by small granules; interparietal much smaller than the fronto-parietal, in contact with a small occipital; anterior loreal distinctly longer than high; fifth, sometimes sixth, labial subocular; temporal scales small, smooth or obtusely keeled; a small tympanic shield. Collar curved, quite free or just bound in the middle, its marginal scales distinctly enlarged; from 21 to 29 gular scales on a line between the submaxillary shields and the collar. Dorsal scales very small, granular, subimbricate; from 40 to 50 (56 in one example from Baluchistan) across the middle of the back; ventral plates distinctly broader than long, in straight series, 8 or 10 across the middle of the belly, the outer row much narrower than the others; 28 to 34 between the collar and the femoral pores; usually a single large preanal plate.

The hind-limb reaches to the collar or the ear in the male, to the axilla or a little farther in the female. Digits keeled below, without lateral fringe. Caudal scales longer than

broad, the upper ones keeled, 20 to 26 round the thickest part of the tail. From 9 to 14 femoral pores on each side.

Greyish or olivaceous above, with longitudinal series of small white spots, edged or accompanied by black spots, down the back; flanks with small white black-edged spots; usually a pale dorso-lateral stripe passing to the eye; limbs marbled with black and white; hinder side of thigh with a black streak. Lower parts greyish-white or white.

From snout to vent 55; tail 90 mm.

Range. Baluchistan; Sind; N.W.F.P. (S. Waziristan, Dehra Ismail Khan); Rajputana (Jaisalmer); S. Afghanistan; Persia.

Blanford (1876) records it as common in the western part of Upper Sind, keeping chiefly to open plains and deserts.

Ingoldby (in Procter, 1923) found it "extremely common throughout the tract (S. Waziristan) from the Tank neighbourhood upwards."

Boulenger in his 'Monograph of the Lacertidæ' recognizes six varieties of *guttulata*, all of which, with the exception of the typical form, occur in the Ethiopian Region. *Guttulata guttulata*, according to him, ranges from N.E. Africa to India, and is to be found, moreover, sometimes side by side with his varietal forms. But on comparison of material from Egypt, the type locality of *guttulata*, with material from India, I find constant differences, notably in the character of the collar. In the Indian form the collar is complete or nearly so, and its scales are distinctly enlarged; in the African form it is free only at the sides, and its scales are not or but slightly enlarged.

For the Indian form, therefore, a name is required, and for this Stoliczka's *watsonana* is available. A comparison of the types with other material from India and Persia show no essential differences.

289. Eremias brevirostris.

Eremias watsonanus Stoliczka, P. Asiat. Soc. Beng. 1872, p. 125 (Kalabagh; *nec ante*, p. 86).

Mesalina brevirostris Blanford, Ann. Mag. Nat. Hist. (4) xiv, 1874, p. 32, and Zool. E. Persia, 1876, p. 379 (type loc. Kalabagh, Punjab, and Tumb I., Persian Gulf; London and Calcutta).—

Eremias brevirostris, Boulenger, Fauna Brit. Ind. 1890, p. 177, and J. Bombay N.H. Soc. xxvii, 1920, p. 352; and Monogr. Lacert. ii, 1921, p. 273; Anderson, Herp. Arabia, 1896, p. 43.

Eremias bernoullii Schenkel, Verh. Nat. Ges. Basel, xiii, 1901, p. 187, fig. (type loc. Palmyra, Syria; Basel).

Differs from *E. guttulata watsonana* in the following particulars:—Snout shorter; nasals more swollen; disc of the lower lid smaller, eyelids more developed; second supraocular usually separated from the prefrontal by one

or more scales or by a single scale representing the first supraocular; interparietal separated from the occipital, which is minute; subocular sometimes separated from the labial margin by a small shield. Ventral plates in 10 or 12 longitudinal series, the four median rows distinctly broader than long.

Grey or greyish-brown above, with numerous white and black spots, largest and most closely arranged upon the sides of the body; tail with dark lateral spots; lower parts whitish. From snout to vent 55; tail 102 mm.

Range. From Syria to N.W. India. Within Indian limits it has been found on the Dasht River and Quetta district in Baluchistan, and Kalabagh in the N.W. Punjab.

Family ANGUIDÆ.

Angu(i)dæ Gray, Ann. Phil. xxvi, 1825, p. 201 (in part).—*Anguidæ*, Cope, Proc. Acad. Philad. 1864, p. 228; Boulenger, Cat. Liz. Brit. Mus. ii, 1885, p. 265; Gadow, Amphib. and Rept. 1901, p. 537; Fejervary-Laugh, Palæont. Hung. i, 1921–23, p. 123 (fossil); Camp, Bull. Amer. Mus. Nat. Hist. xlviii, 1923, p. 326 *et seq.*

The skull is of the normal Lacertilan type, with bony postorbital and post-fronto-squamosal arches. The supratemporal fossa is roofed over by dermal bones, and the whole

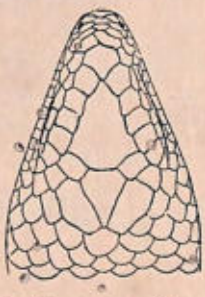


Fig. 90.—Head of *Ophisaurus gracilis*. (After Boulenger.)

body is protected by bony plates underlying the imbricate scales. In the Asiatic *Ophisaurus* this armour is very complete. Each plate is provided with a system of fine tubules, which differ from those of the Scincidæ in being irregularly arranged (fig. 1, p. 2). The dentition is pleurodont and the teeth are always solid; they vary much in shape, from the large tubercular crowns of *Ophisaurus* to the slightly curved and sharply pointed teeth of *Anguis*. New teeth

grow at, not into, the base of the old ones or between them. There is a tendency in this family towards elongation of the body and reduction or complete loss of the limbs; the pectoral and pelvic girdles, however, always remain, although sometimes only vestiges of them. The tail is long and fragile and is quickly reproduced. The head is covered above with symmetrical shields, an occipital or azygous posterior shield being always present, in which respect the Anguidæ differ from the Scincidæ.

The tongue is moderately elongate, deeply notched anteriorly, and is composed of two distinct portions, namely, an anterior narrower part, dark in colour and covered with scale-like papillæ, and a thick basal portion, which is covered with villose papillæ (fig. 4, p. 18). The anterior part can be more or less retracted into a sheath formed by a transverse fold at the anterior end of the basal part, but when the tongue is fully extended all trace of this fold disappears. There are no femoral or preanal pores.

The Anguidæ are strictly terrestrial in their habits and live upon animal diet. Seven genera are recognized. They are most abundant in Central America. The English representative of this family is the common Slow-worm, *Anguis fragilis*. Fossil *Ophisaurus* has been recorded from the Lower Miocene of Germany.

Genus **OPHISAURUS.**

Ophisaurus Daudin, Hist. Nat. Rept. vii, 1803, p. 396 (type *ventralis*); Boulenger, Cat. Liz. Brit. Mus. ii, 1885, p. 279, and Faura Brit. Ind. 1890, p. 159.
Bipes Oppel, Ordn. Rept. 1811, p. 43 (type *pallasii*).
Proctopus Fischer, Mem. Soc. Imp. Sci. Mosc. iv. 1813, p. 241 (type *pallasii*).
Pseudopus Merrem, Tent. Syst. Amphib. 1820, pp. 13 & 78 (type *apus*).
Hyalinus Merrem, l. c. s. pp. 14 & 79 (type *ventralis*).
Dopasia Gray, Ann. Mag. Nat. Hist. (2) xii, 1853, p. 389 (type *Pseudopus gracilis* Gray).
Ophiseps Blyth, J. Asiat. Soc. Beng. xxii, 1853, p. 655 (type *tessellatus*).
Hyalosaurus Günther, Ann. Mag. Nat. Hist. (4) xi, 1873, p. 351 (type *koellikeri*).

Limbs absent externally, or reduced to a rudiment of the hind pair; a lateral fold; scales squarish-rhomboidal, forming straight longitudinal and transverse series. Pterygoid teeth present; palatine and vomerine teeth present or absent.

Range. S.E. Europe to S.W. Asia; N. Africa; Indo-China as far south as lat. 23°; S. China; N. America.

Six species are known, two of which occur in the Indo-Chinese Subregion.

Key to the Indo-Chinese Species.

I. No external vestiges of limbs.
Dorsal scales in 14 or 16 rows across the back; three scales in a line between the nostril and the azygous prefrontal ..... *gracilis*, p. 393.
Dorsal scales in 16 or 18 rows across the back; two scales in a line between the nostril and the azygous prefrontal ..... *harti*, p. 394.
II. External vestiges of hind limbs ..... [*apodus*], p. 395.

290. Ophisaurus gracilis.

Pseudopus gracilis Gray, Cat. Liz. Brit. Mus. 1845, p. 56 (type loc. Khasi Hills; London); Günther, Rept. Brit. Ind. 1864, p. 75; Anderson, Proc. Zool. Soc. London, 1871, p. 156.—*Dopasia gracilis* Gray, Ann. Mag. Nat. Hist. (2) xii, 1853, p. 389; Günther, Proc. Zool. Soc. London, 1860, p. 172.—*Ophisaurus gracilis* Boulenger, Cat. Liz. Brit. Mus. ii, 1885, p. 283, pl. xv, fig. 1; Evans, J. Bombay N.H. Soc. xvi, 1904, p. 171; Annandale, Proc. Asiat. Soc. Beng. (n. s.) i, 1905, p. 90; Wall, J. Bombay N.H. Soc. xviii, 1908, p. 503; Annandale, Rec. Ind. Mus. viii, 1912, p. 42, and ibid. 1914, p. 357; Prashad, ibid. x, 1914, p. 369; Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 486.
Ophiseps tessellatus Blyth, J. Asiat. Soc. Beng. xxii, 1853, p. 655 (type loc. "Rangoon"; type lost).

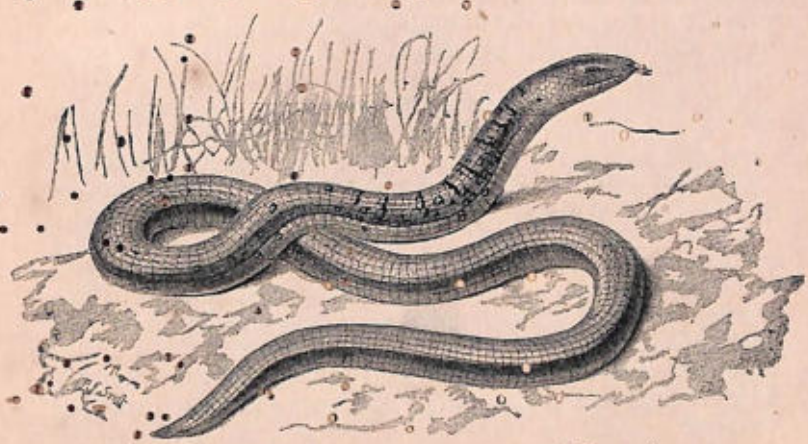


Fig. 91.—*Ophisaurus gracilis*. (After Boulenger.)

Lateral teeth conical, pointing backwards, finely striated; pterygoids with from one to three series of teeth. Three shields on a line between the nasal and the azygous prefrontal, which is narrower than the greatest width of the frontal and is separated from it by two or three prefrontals in a transverse series; five supraoculars; interparietal broader than the parietals, broader than the occipital. Ear-opening subcircular, about as large as the nostril. Dorsal scales

keeled, the median rows very broadly, in from 14 to 16 (17) longitudinal and 88 to 94 transverse series (counted in the length of the lateral fold); ventrals smooth, in 10 longitudinal series. No vestiges of limbs externally. Tail about twice as long as the head and body, the upper scales more strongly keeled than the lower.

Light or dark brown above, with a darker lateral band and frequently irregular transverse series of blue, black-edged spots; sometimes a series of vertebral spots; lower parts pale brownish or yellowish. Specimens from the Abor country are described by Annandale (1912) as having the back bright brick-red in life.

The young are light brown above, with small black spots and a very dark brown lateral band two scales above the lateral fold, this band extending along the side of the head to the nostril and also along the side of the tail; a second, much narrower line lies parallel to it below the lateral fold, the edge of which may also be margined with brown.

From snout to vent 180 mm.

Range. From the Eastern Himalayas (Darjeeling district) to Western Yunnan; north to the Abor country and south in Burma to lat. 23°. Prashad (1914) records a specimen which was found on the Mashobra–Tibet road, near Simla, at an altitude of about 8,000 feet. The specimen, unfortunately, has been lost.

The Burmese Glass-Snake is common in many parts of the Eastern Himalayas, Assam, and Upper Burma (Darjeeling district, Khasi Hills, Bhamo district), at between 3,000 and 5,000 feet altitude. By day it hides beneath logs and stones, issuing forth as darkness falls in search of its food, which consists largely of insects. It is quite harmless, and makes no attempt to bite when handled. Annandale says it is a sluggish creature, and shams dead when handled. The nesting habits of *O. harti* have been described by Pope, and those of *gracilis* do not appear to be different. From 4 to 7 eggs are laid in July or August: they measure roughly 12 by 18 mm. The egg-tooth of the embryo has been described by Wall.

291. Ophisaurus harti.

Ophisaurus harti Boulenger, Proc. Zool. Soc. London, 1899, p. 160, col. pl. xvi (type loc. Fukien; London); Pope, Bull. Amer. Mus. Nat. Hist. lviii, 1929, p. 370, pl. xvii; Smith, Ann. Mag. Nat. Hist. (10), vi, 1930, p. 681.

Ophisaurus ludovici Mocquard, Bull. Mus. Hist. nat. Paris, xi, 1905, p. 76 (type loc. Bac-lac, Upper Tonking; Paris), and Bull. Soc. Philom. vii, 1905, p. 317, fig.

Ophisaurus gracilis (not of Gray), Angel, Bull. Mus Hist. nat. Paris, (2) i, 1929, p. 75.

Differs from the preceding species in the following particulars :—A single series of teeth on each of the pterygoids ; two shields in a line between the nasal and the azygous prefrontal ; a pair of prefrontals, sometimes separated from one another. Ear-opening minute, smaller than the nostril. Dorsal scales in from 16 to 18 (19) longitudinal series and 94 to 100 transverse series.

Brown above, with transverse blue markings or series of spots, which may be absent in the female ; under parts whitish, uniform or with the tail speckled with brown.

The young are light brown above with small dark spots ; the whole of the lower parts, including the sides of the body just above the lateral fold, are very dark brown.

From snout to vent 270 mm. ; the tail is not quite as long as the head and body.

Range. Tonking and Yunnan (Chieng-kuang, Fan-si-pan Mts., Wuting-chou) ; Southern China ; Formosa.

Pope's notes on the nesting habits of this species are as follows :—On August 17 a Glass-Snake guarding five eggs was discovered in the Upper Kuatun Valley. The eggs were deposited in a small irregular cavity two to three inches below the surface of the floor of a thinned-out bamboo grove. The nest was at the edge of a pile of decaying bamboo waste, which probably afforded suitable material in which to deposit the eggs. The adult, a female, was irregularly coiled about them and took flight at slight alarm. Another nest was discovered beneath a big flat stone lying out in an open, dry field fully exposed to the sun. A third was found in a pile of decaying bamboo waste. The young hatched out in September.

Ophisaurus apodus.

Lacerta apoda Pallas, Novi Comment. Acad. Petrop. xix, 1775, p. 435, pls. ix, x (type loc. borders of the Caspian Sea).—*Ophisaurus apus*, Boulenger, Cat. Liz. Brit. Mus. ii, 1885, p. 280 ; Annandale, J. & P. Asiat. Soc. Beng. i, 1905, p. 90.

The occurrence of this species within Indian limits still requires confirmation. Its present known range is from S.E. Europe to Turkestan and the northern border of Afghanistan. Annandale (1905) states : "There are several specimens in the Indian Museum which have come from the Alipore Zoological Gardens, unfortunately without any definite history ; but the probability is that they are from North-Western India."

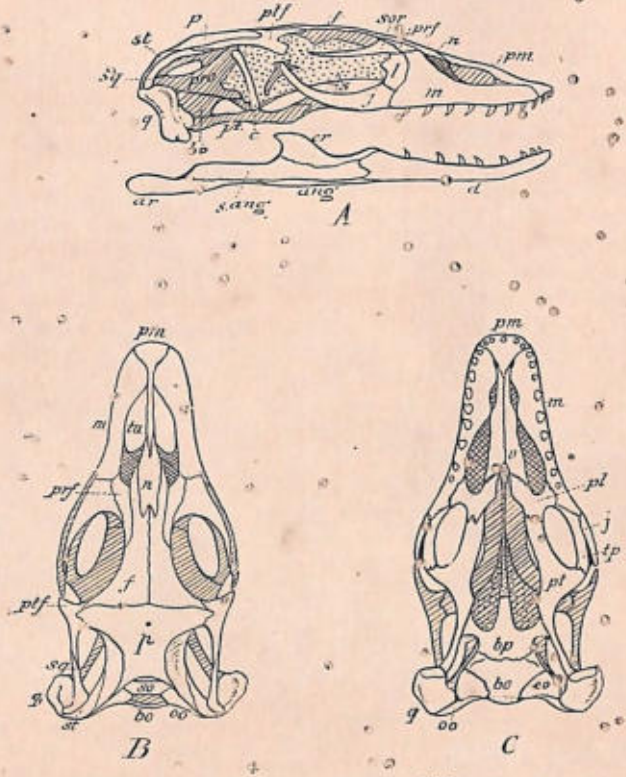


Fig. 92.—Skull of *Varanus griseus*. (After Boulenger.)

A. Side view. B. Upper view. C. Lower view.

ang. Angular.
ar. Articular.
bo. Basioccipital.
bp. Basisphenoid.
c. Epipterygoid.
cr. Coronoid.
d. Dentary.
eo. Exoccipital
f. Frontal.
is. Interorbital septum.
j. Jugal.
l. Lachrymal.
m. Maxillary.
n. Nasal.
oo. Opisthotic.
p. Parietal.
pl. Palatine.
pm. Premaxillary.
pro. Prootic.
prf. Prefrontal.
pt. Pterygoid.
ptf. Postfrontal.
q. Quadrate.
s.ang. Supra-angular.
so. Supraoccipital.
sor. Supraorbital.
st. Supratemporal.
sq. Squamosal.
tp. Ectopterygoid.
tu. Turbinal.
v. Vomer.

Family VARANIDÆ.

Varanidæ Gray, Phil. Mag. (n. s.) ii, 1827, p. 54; Boulenger, Cat. Liz. Brit. Mus. ii, 1885, p. 303; Camp. Bull. Amer. Mus. Nat. Hist. N. York, xlviii, 1923, p. 320; Gilmore, Proc. U.S. Nat. Mus. lx, 1922, art. 23 (fossil).
Monitoridæ Gray, Ann. Mag. Nat. Hist. i, 1838, p. 392.

Postorbital arch incomplete; temporal arch complete; supratemporal fossa not roofed over; premaxillary single, narrow; nasals narrow, united; infraorbital vacuity bounded by the pterygoid, palatine, and ectopterygoid bones, the maxillary being excluded. An epipterygoid. Teeth dilated

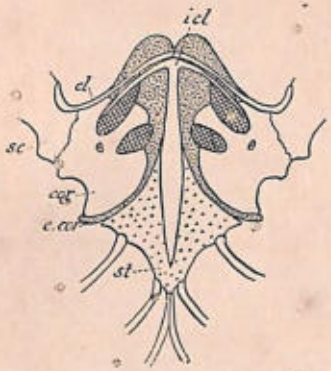


Fig. 93.—Pectoral arch of *Varanus griseus*. (After Boulenger.)

cl. Clavicle. *cor.* Coracoid. *icl.* Interclavicle.
st. Sternum. *ecor.* Epicoracoid. *sc.* Scapular.

at the base, fixed to the inner side of the jaws (pleurodont); palate toothless. Clavicle slender, not dilated; interclavicle anchor-shaped.

Tongue smooth, very long and slender, bifid, retractile into a sheath at the base, as in snakes. Pupil round; eyelids well developed. Head covered with small juxtaposed scales; back with roundish or oval scales, surrounded by rings of granules, except in the very young in which they are not developed; ventral scales quadrangular, arranged in transverse series. Tail long, not fragile.

Preanal pores are present, a single pair opening just in front of the vent. Occasionally I have failed to find them.

Their position varies slightly according to the species. Anderson states that they become functionally active at times, exuding a yellowish-red secretion (Proc. Zool. Soc. London, 1895, p. 643).

Apical pits (?) are also present, and can usually be seen on most of the scales. In front of the vent and upon the thighs they are larger and their structure appears to be different from that in other parts of the body.

The osteoderms have already been discussed (p. 2). *V. komodoensis* has a well-developed os penis.

The earliest records of the family are from the Eocene of Wyoming, and the bones of fossil forms, of later date, and indistinguishable from present-day species except that they are larger, have been described by Lydekker from the Siwâlik Hills.

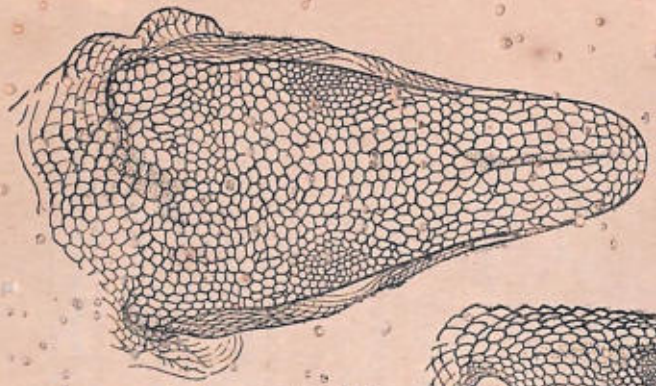
Only a single genus survives today.

Genus **VARANUS.**

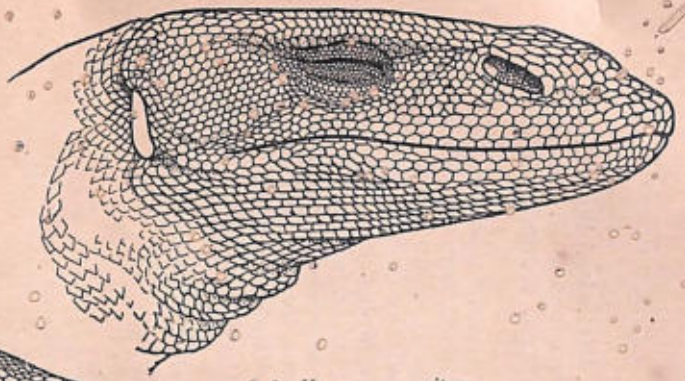
The Monitors.

Monitor (not of Blainville, 1816) Lichenstein, Zool. Mus. Univ. Berlin, ed. 2, 1818, p. 66 (type *niloticus*).
Varanus Merrem, Tent. Syst. Amphib. 1820, p. 58 (type *Lacerta varia* Shaw); Boulenger, Fauna Brit. Ind. 1890, p. 161; Smith, J. Bombay N.H. Soc. xxxv, 1932, p. 615.
Psammosaurus Fitzinger, Neue Class. Rept. 1826, pp. 21, 51 (type *griseus*).
Dracæna (not of Daudin, 1802) Gray, Phil. Mag. (n. s.) ii, 1827, p. 55 (type *Lacerta dracæna* Linn.).
Polydædalus Wagler, Nat. Syst. Amphib. 1830, p. 162 (type *niloticus*).
Hydrosaurus Wagler, l. c. s. (type *varius*).
Empagusia Gray, Ann. Mag. Nat. Hist. i, 1838, p. 393 (type *flavescens*).
Odatria Gray, l. c. s. p. 394 (type *punctatus* = *indicus*).
Psammoscopus Fitzinger, Syst. Rept. 1843, p. 20 (type *picquotii*).
Pantherosaurus Fitzinger, l. c. s. 1843, p. 19 (type *gouldii*).
Cylindrurus Fitzinger, l. c. s. 1843, p. 19 (type *punctata*).
Agalmatosaurus Fitzinger, l. c. s. 1843, p. 19 (type *timoriensis*).
Euprepiosaurus Fitzinger, l. c. s. 1843, p. 19 (type *chlorostigma* = *indicus*).
Rhinoptyon Fitzinger, l. c. s. 1843, p. 20 (type *ocellatus*).
Pachysaurus Fitzinger, l. c. s. 1843, p. 20 (type *albogularis*).
Regenia Gray, Cat. Liz. Brit. Mus. 1845, p. 8 (type *albogularis*).

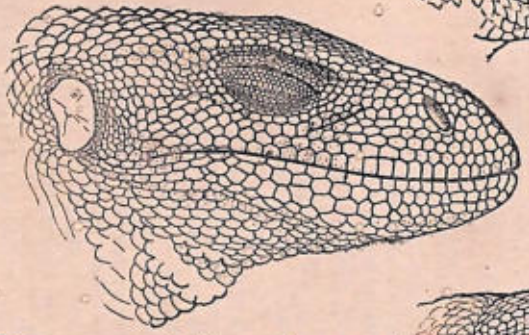
The living species are confined to the Old World, being found in the warm parts of southern Asia, Africa, the East Indies, and the Australian Region. About 30 are known. All of them are carnivorous, and they are usually prepared to eat animal food of any kind that they can overcome. Birds and their eggs, small mammals, reptiles, fish, crustaceans, and even large insects are readily devoured. They are not averse to eating carrion.



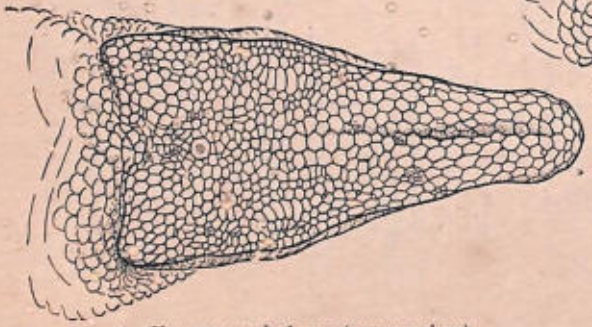
1. *Varanus monitor* (upper view).



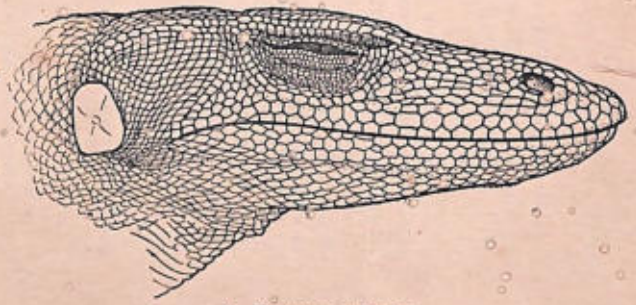
2. *Varanus monitor*.



3. *Varanus flavescens*.



4. *Varanus nebulosus* (upper view).



5. *Varanus salvator*.

Heads of Monitors. (After Smith. By kind permission of the Bombay Natural History Society.)

According to Parry (J. Bombay Nat. Hist. Soc.) the natives in the Garo Hills say that they (*V. monitor* or *V. salvator*) will come into the fields and eat melons, cucumbers, and ears of paddy.

Though they can be destructive at times to poultry and their eggs, this is probably offset by the numbers of vermin, in particular rats and mice, that they destroy.

With the exception of *V. griseus*, all the Asiatic species are good climbers and take readily to water. *V. nilotica* is said to be able to remain one hour under water. When angered and cornered they distend themselves with air, which they expel with a loud, deep hiss, at the same time lashing vigorously with their powerful tails. Their eggs are oval and soft-shelled and are deposited in holes in the ground or in ant-hills.

The young in India are sometimes called *bis-cobra*, and are regarded as venomous.

Key to the Species.

A. Tail round or slightly compressed posteriorly; nostril an oblique slit, nearer to the orbit than to the end of the snout ..... *griseus*, p. 400.

B. Tail compressed, with a low double-toothed crest above.

a. Nostril an oblique slit (sometimes oval in the very young) nearer to the orbit than to the end of the snout.

1. Nostril not twice as near to orbit as to end of snout; nuchal scales* not larger than those on crown of head.

Supraoculars not enlarged ..... *monitor*, p. 402.

Median supraoculars transversely enlarged ..... *nebulosus*, p. 403.

2. Nostril twice as near to orbit as to end of snout; nuchal scales* larger than those on crown of head ..... *dumerili*, p. 405.

b. Nostril nearer to the end of the snout than to the orbit.

Nostril an oblique slit; nuchal scales* larger than those on crown of head; snout convex ..... *flavescens*, p. 404.

Nostril round or oval; nuchal scales* smaller than those on crown of head; snout depressed .... *salvator*, p. 406.

292. Varanus griseus.

Tupinambis griseus Daudin, Hist. Nat. Rept. viii, 1803, p. 352 (type loc. Egypt).—*Varanus griseus*, Boulenger, Cat. Liz. Brit. Mus. ii, 1885, p. 306, and Fauna Brit. Ind. 1890, p. 163; Thilenius, Zool. Jahrb., Syst., x, 1897, p. 227; Anderson, Zool. Egypt, 1898, i, p. 134, col. pl.; Wall, J. Bombay N.H. Soc. xxi, 1911, p. 132, Corkill, ibid. xxxii, 1928, p. 603.

Varanus scincus Merrem, Tent. Syst. Amphib. 1820, p. 59 (type loc. Egypt).

* In referring to the nuchal scales the surrounding ring of granules is not included. The abdominal scales in transverse series are counted from collar-fold to groin

Tupinambis arenarius Is. Geoff. St. Hil., in Savigny's Egypte, i, (1) 1827, p. 123, pl. 3, fig. (type loc. Egypt).
Psammosaurus caspius Eichwald, Zool. Spec. iii, 1831, p. 190.
Varanus terrictris Schinz, Nat. Abild. Rept. 1834, p. 94, pl. 32, fig. 2.
Varanus ornatus (no. of Daudin) Carlleyle, J. Asiat. Soc. Beng. xxxviii, 1869, p. 192 (type loc. Sikandra, near Agra).
Psammosaurus arabicus Tornier, in Hempr. & Ehrenb., Symbol. Phys. 1899, col. pl. (type loc. Nubia; Berlin).

Teeth acute, compressed. Snout depressed at the end, its length from two to two and a half times its height; canthus rostralis distinct. Nostril an oblique slit, much nearer to the orbit than to the end of the snout. Scales on the crown of the head usually larger than the nuchal scales; the latter are conical in shape, particularly those on the sides of the neck; supraocular scales small, subequal; dorsal scales obtusely keeled; abdominal scales smooth, in from 110 to 125 transverse series. Digits moderately elongate. Tail rounded or slightly compressed posteriorly; lateral caudal scales indistinctly keeled, scarcely smaller than the subcaudal scales.

Greyish-brown or yellowish-brown above with smaller brown spots, and with brown cross-bars upon the back and tail and two or three longitudinal brown streaks upon the neck; these markings usually absent in old individuals; below yellowish. In juveniles the dark dorsal bars are almost black and are very clearly defined, and yellow spots or ocelli may be present between them. Corkill states that the bellies of the males that he has noticed have a pinkish tinge in the early summer.

Head and body 525; tail 800 mm.

Range. The desert regions of N.W. India and westwards through southern Asia to the Caspian Sea and North Africa. It appears to be fairly common in parts of Rajputana, and has been obtained as far east as Ambala, Agra, and Narsingarh in the extreme north of Central Provinces. Wall records it from Chitral, at an altitude of 4,000 feet.

The Desert Monitor inhabits sandy places, usually where the ground is undulating and the vegetation sparse. Anderson states that they can run with great speed, the body being raised well above the ground, but according to Corkill they can be easily outstripped by a running man. When overtaken they stop and remain on the defensive, with the mouth wide open and the body puffed out, hissing loudly and lashing the tail furiously from side to side. They feed chiefly upon small rodents, lizards, snakes, and crickets; they dislike water. They sometimes dig their own burrows, but more often adopt the disused holes of other animals, and to these they usually retire during the heat of the day; they are said not to hibernate. From 15 to 20 eggs are laid; they are buried in the sand or placed at the end of the burrow.

293. Varanus monitor.

Lacerta monitor Linnæus, Syst. Nat. ed. x, 1758, p. 201 (type loc. India; based on Seba's Illustr. ii, pl. 86, figs. 2, pl. 94, figs. 1 & 2, and ? ii, pl. 105, fig. 1); M. A. Smith, J. Bombay N.H. Soc. xxxv, 1932, p. 615, figs. 1 & 2; d'Abreu, ibid. xxxvi, 1932, p. 269.

Stellio thalassinus Laurenti, Syst. Amphib. 1768, p. 57 (based on Seba's Illustr. i, pl. 110, figs. 4 & 5; habitat in "India orientali").

Tupinambis bengalensis Daudin, Hist. Nat. Rept. iii, 1802, p. 67 (type loc. Bengal; Paris).—*Varanus bengalensis*, Boulenger, Cat. Liz. Brit. Mus. ii, 1885, p. 310, and Fauna Brit. Ind. 1890, p. 164; Nikolski, Ann. Mus. Zool. St. Pétersb. iv, 1899, p. 394; Thapar, Proc. Zool. Soc. London, 1921, p. 487; Procter, J. Bombay N.H. Soc. xxix, 1923, p. 124; H. C. Smith, ibid. xxxiv, 1930, p. 368; pl. in M. A. Smith, ibid. xxxv, 1932, p. 615; Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 161.

Tupinambis cepedianus Daudin, Hist. Nat. Rept. iii, 1802, p. 43, pl. xxix (type loc. unknown; Paris).

Varanus punctatus Merrem, Tent. Syst. Amphib. 1820, p. 59.

Monitor elegans (not of Daudin) Gray, Zool. Journ. iii, 1827, p. 225 (based on Hardwicke's drawings, nos. 53–59, vol. ii.).

Monitor dracæna Gray, Ann. Mag. Nat. Hist. i, 1838, p. 393, and Cat. Liz. Brit. Mus. 1845, p. 11 (type loc. India).—*Varanus dracæna*, Günther, Rept. Brit. Ind. 1864, p. 65, pl. ix, figs.

Monitor gemmatus Guérin, Icon. Règne Anim. 1829–44, i, pls. Rept. pl. 3 (type loc. unknown).

Monitor heraldicus Gray, in Griffith's Anim. King. iv, 1831, Suppl. p. 27 (type loc. Bengal; Paris).

Varanus lunatus Gray, Cat. Liz. Brit. Mus. 1845, p. 10 (type loc. India; London); Günther, Rept. Brit. Ind. 1864, p. 66, pl. ix, figs.

? *Varanus bibronii* Blyth, J. Asiat. Soc. Beng. xi, 1842, p. 869 (type loc. unknown).

Teeth acute, feebly compressed; snout convex at the end, its length from two to two and a half times its height; canthus rostralis distinct. Nostril an oblique slit, a little nearer to the orbit than to the tip of the snout. Scales on the crown of the head larger than the nuchal scales, which, like those on the fore part of the back, are rounded, not keeled; posteriorly they may be keeled; supraocular scales small, subequal; abdominal scales smooth, in from 96 to 110 transverse rows. Digits elongate. Tail strongly compressed, with a low double-toothed crest above; lateral caudal scales keeled, a little smaller than the subcaudal scales.

Young dark olive, with numerous light spots or ocelli more or less transversely arranged, and often alternating with dark spots or bars, rarely with dark bars only; top of the head with light spots; a more or less distinct dark temporal streak; lower parts whitish, with narrow dark transverse bars which may be broken up into spots. Adult brownish or olive above, usually with blackish dots; lower parts yellowish, uniform or mottled or spotted with black; the spots most numerous upon the throat.

Head and body 750 ; tail 1,000 mm.

H. C. Smith (1930) states that he has observed individuals much larger than this, but that he has not measured them. A hatchling from Dibrugarh, Assam, measures: head and body 80, tail 95 mm.

Range. The Common Indian Monitor occurs throughout India, Ceylon, Assam, and the greater part of Burma. Nikolski records it from S.E. Persia and Procter from Waziristan ; Hodgson obtained it in Nepal, and there are specimens in the Indian Museum from Bigrani, W. Himalayas, and Darjeeling, E. Himalayas ; in Burma it occurs as far south as Tharawaddy and the Henzada district (lat. 17° 30′). It has not been met with in Siam.

H. C. Smith (1930) states that in Burma they are particularly partial to the drier places ; they are found both in remote forests as well as on the outskirts of villages. They can run at a great pace, and when travelling the tail is held up at an angle of about 45 degrees from the ground. When cornered they can bite hard, and once they have got a firm hold are difficult to dislodge. When chased they usually make for a hollow tree, running up the trunk with great ease and disappearing down a hole at the top ; sometimes, however, in the hope of escaping observation, they will lie motionless upon the ground in the open, or against the trunk of a tree, and when behaving thus they can often be picked up by the tail, or will allow a noose at the end of a long pole to be slipped over their heads. Their coloration harmonizes well with their surroundings and so makes them difficult to spot. They are much sought after for the sake of their flesh, being hunted with dogs. Their eggs also are considered great delicacies. The breeding season in Burma is during the hot weather ; the eggs, from 25 to 30 in number, are deposited in a hole or an ant-heap. After depositing her eggs the female closes up the hole with leaves, rubbish, etc., and departs. d'Abreu states that in the Central Provinces the eggs are deposited during September. They measure approximately 25 by 45 mm. in size.

294. Varanus nebulosus.

Monitor nebulosus Gray, in Griffith's Anim. King. ix, 1331, Suppl. p. 27 (type loc. "Java" ; Paris).—*Varanus nebulosus*, Günther, Rept. Brit. Ind. 1864, p. 66, pl. ix, fig. ; Boulenger, Cat. Liz. Brit. Mus. ii, 1885, p. 311, and Fauna Brit. Ind. 1890, p. 165 ; H. C. Smith, J. Bombay N.H. Soc. xxxiv, 1930, p. 376.

Monitor nebulatus Schlegel, Abbild. neu. Amphib. 1839, p. 75.

Teeth acute, feebly compressed, the posterior ones becoming rounded in old individuals. Snout convex, its length about two and a half times its height ; canthus rostralis distinct. Nostril an oblique slit, a little nearer to the orbit than to

the end of the snout; scales on the crown of the head larger than the nuchal scales, which are smooth or feebly keeled; scales on the back more strongly keeled; median supraoculars transversely enlarged; abdominal scales smooth or feebly keeled, in 70 to 90 transverse rows. Digits elongate. Tail strongly compressed, with a low double-toothed crest above; lateral caudal scales keeled, about as large as the subcaudal scales.

Dark olive or brownish above, dotted all over or marbled with yellow; chin and throat with transverse blackish bands or marbled with blackish; belly marbled with dark brown and yellow; top of the head, and sometimes also the nape, mostly yellow. Young with a dark temporal streak and sometimes also with yellow ocelli upon the back arranged in transverse series. Specimens from the Malay Peninsula may have more or less distinct dark dorsal cross-bars.

Head and body 580; tail 850 mm.

Range. Southern Burma, Siam, Southern Annam, and the Malay Peninsula.

In Burma it has been found as far north as Yé (lat. 15°) and in Siam it occurs as far north as Pre district (lat. 18°); I obtained one specimen at Dran, altitude 1,000 metres, on the Langbian Plateau, in southern Annam. De Rooij records it from Krawang, in Java (Rept. Indo-Austr. Arch. i, 1915, p. 146), but apparently had not seen the specimen, and the identification may not be correct.

The habits of the Clouded Monitor as I have observed it in Siam are similar to those of the preceding species. Individuals that I have had in captivity resented being handled, and would hiss violently and lash out with their tails, but I never knew them to bite.

295. Varanus flavescens.

Monitor flavescens Gray, Zool. Journ. iii, 1827, p. 226, and Ill. Ind. Zool. ii, 1834, pl. 67 (type loc. India).—*Varanus flavescens*, Günther, Rept. Brit. Ind. 1864, p. 65, pl. ix; Theobald, Cat. Rept. Brit. Ind. 1876, p. 38; Boulenger, Cat. Liz. Brit. Mus. ii, 1885, p. 309, and Fauna Brit. Ind. 1890, p. 164; Hora, Rec. Ind. Mus. xxv, 1923, p. 375; H. C. Smith, J. Bombay N.H. Soc. xxxiv, 1930, p. 368; M. A. Smith, ibid. xxxv, 1932, p. 616; d'Abreu, ibid. xxxvi, 1932, p. 270.

Varanus russelii v. Heyden, in Rüppell's Atlas Reise nörd. Afr. 1830, p. 23 (type loc. Bengal); Mertens, Senckenb. vi, 1924, 5/6, p. 177.

Varanus picquotii Dum. & Bibr., Erp. Gen. iii, 1836, p. 485, and Atlas, pl. 35, fig. scales (type loc. Bengal; Paris).

Monitor exanthematicus var. B, Schlegel, Abbild. neuer Amphib. 1839, p. 71.

Teeth acute, feebly compressed. Snout short, convex, its length less than twice its height; canthus rostralis distinct.

Nostril an oblique slit, a little nearer to the tip of the snout than to the orbit. Scales on the crown of the head smaller than the nuchal scales, which, like the dorsal scales, are strongly keeled; median supraoculars slightly enlarged transversely; abdominal scales smooth, in 65 to 75 transverse rows. Digits short. Tail strongly compressed, with a low double-toothed crest above; subcaudal scales not much larger than the lateral caudal.

The young are dark brown above, with yellowish spots transversely arranged or confluent into bars; there is a dark temporal streak, sometimes confluent with the dark brown of the top of the head; the lips, throat, and sometimes also the belly, have dark brown cross-bars, the rest of the under parts being yellowish. With age these markings become less distinct, and the dark brown of the upper parts becomes more reddish in hue. The final result, upon the back and tail, is a fairly distinct pattern of alternating transverse bars of reddish-brown and dirty yellow, as figured in Gray's 'Illustrations of Indian Zoology.'

Head and body 365; tail 465 mm.

Range. Northern India from the Punjab (Salt Range) to Western Bengal. Apparently common in many places, but poorly represented in Museums. According to d'Abreu it is the common Monitor in Bihar. He states that during the rains its colour is yellow or yellowish with broad red cross-bands; at other times of the year the bands are indistinct or absent.

Gray's *Monitor flavescens* was based on two of Hardwicke's drawings, nos. 60 and 61 in vol. ii, the former being reproduced in 'Illustrations of Indian Zoology.' The plates, although printed in 1829, were not issued until 1834.

296. Varanus dumerili.

Monitor dumerilii Schegel, Abbild. Amphib. 1839, p. 78 (type loc. Borneo).—*Varanus dumerilii*, Boulenger, Cat. Liz. Brit. Mus. ii, 1885, p. 312, and Fauna Brit. Ind. 1890, p. 165; H. C. Smith, J. Bombay N.H. Soc. xxxiv, 1930, p. 371.

Varanus macrolepis Blanford, J. Asiat. Soc. Beng. l, 1881, p. 239, pl. xvi (type loc. Tenasserim, ? Tavoy; Calcutta).

Teeth acute, compressed. Snout depressed at the end, its length from two and a half to three times its height; canthus rostralis now well marked. Nostril an oblique slit (oval in the very young), twice as near to the orbit as to the end of the snout. Scales on the crown of the head smaller than the nuchal scales, which are very large, the hindermost being keeled; median supraocular scales slightly enlarged transversely; scales on the back large, irregular in size, keeled. Abdominal scales smooth or feebly keeled, in from

75 to 85 transverse rows. Digits moderate. Tail strongly compressed, with a low double-toothed crest above; lateral caudal scales keeled, irregular in size, much smaller than the subcaudal scales.

Brown above, spotted with black and with four (rarely five) narrow pale yellowish cross-bars upon the back, the broadest and most conspicuous one being across the shoulders; a dark temporal streak usually confluent with a U-shaped mark upon the neck; limbs dark brown, spotted with yellow; top of head all brown. Lower parts yellow, uniform or barred or mottled with brown. In the fully grown all these markings are very indistinct. The very young are black above, with the dorsal bars and the whole of the head except the temporal streak bright yellow (said to be vermilion in life); tail banded with black and yellow.

Head and body 500; tail 750 mm. The young when born are from 90 to 100 mm. from snout to vent; tail 100 to 130 mm.

Range. A Malayan species that extends into the Indo-Chinese Subregion as far north as Tavoy. H. C. Smith (1930) remarks: "Noted specially on islands in the Mergui Archipelago and in the mangrove forests along the coast of Mergui. Plentiful on Sir Charles Forbes Island." It has not yet been found in Siam.

With regard to their habits, Smith states that, if roused by dogs in the dense evergreen forest which grows right down to the coast, they bolt across the beach and take refuge in the sea.

297. Varanus salvator.

Stellio salvator Laurenti, Syn. Rept. 1768 (based on Seba's Illustr. ii, pl. 88, fig. 2)—*Varanus salvator*, Cantor, Cat. Rept. Malay Pen. 1847, p. 29; Boulenger, Cat. Liz. Brit. Mus. ii, 1885, p. 314, and Fauna Brit. Ind. 1890, p. 166; Laidlaw, Proc. Zool. Soc. London, 1901, p. 309; Symons, Spol. Zeyl. viii, 1912, p. 65; Mell, Arch. f. Naturg. Berlin, lxxxviii, 1922, p. 112; Schmidt, Bull. Amer. Mus. Nat. Hist. liv, 1927, p. 418; Editors, J. Bombay N.H. Soc. xxxiii, 1928, p. 165; H. C. Smith, ibid. xxxiv, 1930, p. 372, photo; M. A. Smith, ibid. xxxv, 1932, p. 916.—Deraniyagala, Ceylon J. Sci., B, xvi, 1931, p. 159.—*Hydrosaurus salvator*, Günther, Rept. Brit. Ind. 1864, p. 67, pl. ix, fig. E.

Tupinambis bivittatus Kuhl, Beitr. Zool. 1820, (1) p. 125 (based on Seba's Illustr. ii, pl. 30, fig. 2).

Varanus vittatus Lesson, in Belang., Voy. Ind. Or., Rept. p. 307 (type loc. mouth of the Ganges).

Teeth acute, strongly compressed. Snout depressed at the end, its length at least three times its height; canthus rostralis obtuse. Nostril round or oval, twice as far from the orbit as from the tip of the snout. Scales on the crown of the head larger than the nuchal scales; median supraoculars transversely enlarged; dorsal scales keeled. Abdominal scales

feebly keeled, in from 80 to 95 transverse series. Digits elongate. Tail strongly compressed, with a low double-toothed crest above; subcaudal scales much larger than the lateral caudal.

Young blackish above, with small yellow spots and larger rounded spots or ocelli arranged in transverse series. Snout lighter, with black transverse bars, most distinct on the lips, and usually continued below on to the chin; a black temporal streak, commencing from the eye, with a more or less distinct yellow band below which usually extends on to the side of the neck. Lower parts yellow, usually with narrow, black, vertical, V-shaped marks extending on to the sides of the belly. Limbs blackish above, with small whitish spots; tail alternately banded with black and whitish. As age advances the markings become less distinct, and adult individuals are very dark olive above, indistinctly spotted with yellow.

Head and body 1,000; tail 1,500 mm.

Range. Ceylon; India; Indo-China; southern China; the East Indian Archipelago; N. Australia; the Andaman and Nicobar Islands.

Not found in the Peninsula of India except in the extreme north-east, Eastern Bengal and the Eastern Himalayas (up to 6,000 feet); said to be common in the Sundarbans and plentiful throughout Burma in suitable localities (*Smith*, 1930); also common in Siam, Cambodia, and Cochin-China; rare in southern China (*Mell*).

The Common Water-Monitor is more aquatic in its habits than the other Asiatic species, and is seldom found far from water. It frequents rivers, canals, and the sea-coast, particularly in the neighbourhood of estuaries. It climbs trees readily in search of food, but never to any great height. When disturbed it takes to the water, and it has been seen swimming far out to sea. On land it can travel at a considerable pace. The eggs, in Siam, are laid at the beginning of the rainy season, about June; they are deposited in holes on the banks of rivers, or in trees beside the water.

From 15 to 30 are laid at a time; they measure about 70 by 40 mm., and are said to taste like turtles' eggs. The flesh of this lizard is not usually eaten.

ALPHABETICAL INDEX.

abdominalis, Lygosoma, 290.
Ablepharus, 2, 257, **309.**
Acanthocercus, 211.
Acanthodactylus, 15, 365, **370.**
Acanthosaura, 133, 157, 166, 167, 180.
Acontiadæ, 254.
Acontias, 356.
acutirostris, Eremias, 383, **387.**
acutirostris, Scapteira, 387.
æneofuscus, Tachydromus sexlineatus, 366.
affinis, Ceramodactylus, 32.
affinis, Cnemaspis, 28.
affinis, Euprepes, 263.
affinis, Hemidactylus, 89.
Agalmatosaurus, 398.
Agama, 132, 135, **211.**
Agamidæ, 20, **130.**
Agamura, 24, 25, 29, **61.**
agilis, Agama, 213, **221.**
agilis, Blepharosteres, 310.
agrorensis, Agama, 212, 215, **216.**
albofasciatus, Gecko, 113.
albofasciatus, Gymnodactylus, 39, 41, **60.**
albomaculatus, Platydactylus, 113.
albopunctata, Riopa, 15, 256, 313, **316.**
albopunctatum, Lygosoma, 316.
albopunctatus, Eumeces, 316.
allapallensis, Mabuya, 264.
Allodactylus, 349.
Alsophylax, 25, 29, **36.**
alticristatus, Calotes, 195.
amboinensis, Lophura, 15.
Amphixestus, 322.
Amydosaurus, 115.
Amystes, 376.
anamallayana, Lophosalea, 179.
anamallayana, Salea, 177, **179.**
andamanense, Phelsuma, **121.**
andamanensis, Calotes, 182, **205.**
andamanensis, Mabuya, 259, **271.**
andersoni, Gonatodes, 73.
andersoniana, Japalura, 168, **173.**
Anguidæ, 21, **391.**
anguina, Riopa, 313, 320, **321.**
Anguinicephalus, 356.
anguinoides, Lygosoma, 304.
anguinoides, Ophioscincus, 333, **334.**
anguinum, Lygosoma, 321.
Anguis, 391.
angularis, Cymnodactylus, 39, 40, **52.**
angularis, Gymnodactylus peguensis, 52.
Anisoterma, 349.
annamallensis, Dravidogecko, **82.**
annamallensis, Gecko, 82.
annamallensis, Hoplodactylus, 82.
annamensis, Liolepis belliana, 240.
annamiticum, Lygosoma, 284.
annulatus, Gecko, 111.
Anomalopus, 280.
Anomalurus, 37.
Anoplopus, 120.
anukalar, Mabuya, 273.
Aphaniotis, 167.
apoda, Lacerta, 395.
apodus, Ophisaurus, 393, 395.
aporosceles, Eremias, 383, **388.**
aporosceles, Macmahonia, 388.
aporosceles, Scapteira, 388.
Apterygodon, 276.
apus, Ophisaurus, 395.
arabicus, Psammosaurus, 401.
archiducissæ, Pseudocalotes, 184.
Ardeosaurus, 22.
arenaria, Scincus, 344.
arenarius, Tupinambis, 401.
argentii, Nubilia, 91.
armata, Acanthosaura, 158, 160.
armatus, Goniocephalus, 133, 157, **158.**
Arua, 157.
Ascalabótæ, 21.

Ascalabotes, 21.
Ascalabotoidea, 21.
asmussi, Centrotrachelus, 247.
asmussi Uromastyx, 244, 246, **247**.
aspera, Ceratophora, 152, **154**.
Aspidorhinus, 381.
Aspris, 322.
assamensis, Tropidophorus, 323, **327**.
Ateuchosaurus, 257, **291**, 358.
aurantiacus, Hemidactylus, 108.
aurantiacus, Hemiphyllodactylus typus, 106, 107, **108**.
aurantiacus, Lepidodactylus, 108.
aurata, Lacerta, 262.
aurata, Mabuya, 259, **262**.
aureus, Calodactylodes, **78**.
aureus, Calodactylus, 78.
aurolineatus, Lepidodactylus, 115.
austeniana, Mictopholis, **165**.
austeniana, Salea, 165.
australis, Ophioscincus, 333.

baluchiana, Agama ruderata, 213, **223**.
barbouri, Leiolopisma, 303.
Barkudia, 14, 257, **352**.
Barycephalus, 211.
beccarii, Draco, 137.
beddomei, Cnemaspis, 67, **71**.
beddomei, Gymnodactylus, 71.
beddomei, Leiolopisma, 294, **305**.
beddomei, Lygosoma, 305.
beddomei, Pseudophiops, 378.
beddomii, Euprepes, 274.
beddomii, Mabuya, 259, **274**.
beddomii, Ophiopps, 376, 377, **378**.
beddomii, Otocryptis, 146, **147**.
beddomii, Ristella, 330, **332**.
beebei, Gehyra, 105.
belli, Goniocephalus, 134.
beliii, Evesia, 359.
bellii, Hemidactylus, 97.
bellii, Leiolepis, 238.
belliana, Leiolepis, **238**.
bengalenis, Japalura, 174.
bengalensis, Tupinambis, 402.
bengaliensis, Hemidactylus, 98.
berdmorei, Aspris, 325.
berdmorei, Hemidactylus (Doryura), 99.
berdmorei, Leiurus, 99.
berdmorei, Tropidophorus, 323, **325**.
bernoullii, Eremias, 390.
Biancia, 167.
bibroni, Mabuya, 258, 259, **260**.
bibronii, Euprepes, 262.
bibronii, Tiliqua, 260.
bibronii, Varanus, 402.
bicarinatus, Euprepes, 270.
bilineatum, Leiolopisma, 294, **306**.
bilineatum, Lygosoma, 306.
bilineatum, Mocoa, 306.
Bipes, 392.
bipes, Nessia, 357, **359**.
bireticulatus, Gonatodes, 69.
bivittata, Ophiops, 377.
bivittata, Otocryptis, 146.
bivittatus, Tupinambis, 406.
blanfordana, Charasia, 210.
blanfordanus, Psammophilus, 208, **210**.
blanfordi, Acanthodactylus cantoris, 370, **372**.
blanfordi, Draco, 136, 138, **141**.
blanfordi, Hemidactylus, 101.
blanfordi, Ophiomorus, 346, **347**.
Blepharosteres, 309.
blythi, Euprepes, 299.
blythiana, Mabouia, 340.
blythianus, Eumeces, 338, **340**.
boiei, Cnemaspis, 68, **75**.
boiei, Gonatodes, 75.
boiei, Goniodactylus, 75.
Boltalia, 83.
borneensis, Goniocephalus, 133, 134.
bornmuelleri, Hemidactylus, 87.
boulengeri, Cnemaspis, 66, 68, **76**.
boulengeri, Lygosoma, 280, **282**.
boulengeri, Sphenomorphus, 282.
Boulengeria, 381.
bowringi, Eumeces, 315.
bowringi, Hemidactylus, 85, **99**.
bowringi, Lygosoma, 281, 315.
bowringi, Riopa, 313, **315**.
bowringii, Doryura, 99.
brachypoda, Lygosoma, 290.
brachypus, Scincus, 290.
Brachysaura, 211.
brandtii, Ablepharus, 310.
braueri, Acanthosaura, 161.
brevipalmatus, Gymnodactylus, 8, 39, 41, **55**.
brevipes, Ablepharus, 310.
brevipes, Calotes, 188.
brevipes, Gymnodactylus, 44.
brevipes, Ophiomorus, 346, **348**.
brevipes, Zygnidopsis, 347.
brevipes, Zygnopsis, 348,

brevirostris, Eremias, 383, **390**.
brevirostris, Mesalina, 396.
brevis, Euprepes, 264.
Bronchocela, 180.
brooki, Hemidactylus, 84, **89**.
brunnea, Cabrita, 374.
Bunopus, 36.
burmana, Bronchocela, 184.
burmanicus, Phyllodactylus, 81.
burtoni, Acontias, 357.
burtoni, Nessia, 357.

Cabrita, 365, **374**.
Cabritopsis, 374.
cachiarense, Lygosoma, 281.
Cainodactylus, 106.
calamus, Lygosoma, 320.
calcaratus, Chamæleon, 251.
Callisaurus, 227.
Calodactylodes, 29, **77**.
Calodactylus, 77.
Calosaura, 374.
Calotes, 135, **180**, 192.
calotes, Agama, 201.
calotes, Calotes, 182, **201**.
calotes, Iguana, 201.
calotes, Lacerta, 201.
Campsodactylus, 312.
candeloti, Gymnodactylus, 115.
cantoris, Acanthodactylus, 370, **371**, 372.
cantoris, Peripia, 115.
capra, Goniocephalus, 133, 157, 160, **162**.
carbonel, Gecko, 95.
carinata, Mabuya, 259, **266**.
carinata Tiliqua, 266, 270.
carinatus, Euprepes, 268, 271, 272.
carinatus, Euprepis, 266.
carinatus, Scincus, 266, 268.
carinatus, Stellio, 219.
caspius, Gymnodactylus, 42.
caspius, Psammosaurus, 401.
caucasica, Agama, 213, **229**.
caucasicus, Stellio, 220.
caudicinctus, Physignathus, 236.
caudivolvulus, Phrynocephalus, 230, 231.
Centrocercus, 242.
Centrotrachelus, 242.
cepedianus, Tupinambis, 402.
Ceratophora, 13, 134, **151**.
ceylanica, Cophotis, **150**.
ceylonensis, Calotes, 182, **202**.
ceylonensis, Lepidodactylus, 107.
ceylonicus, Chamæleo, 251.
Chalcides, 257, **349**.
chalcides, Lygosoma, 290.
Chalcidoceps, 257, **354**.
Chalinocnemis, 104.
Chamæleon, **251**.
Chamæleonidæ, 20, **249**.
chamæleontinus, Goniocephalus, 133, 134.
chameleon, Gecko, 121.
Chamops, 365.
chaperi, Calosaura, 377.
Charasia, 208.
chaus, Gecko, 95.
Chiamela, 312.
chinense, Lygosoma, 292.
chinensis, Ateuchosaurus, **292**.
chinensis, Eumeces, 358.
chinensis, Gekko, 110, **114**.
chinensis, Mabouia, 238.
chinensis, Tiliqua, 338.
chitralensis, Gymnodactylus, 39, 40, **46**.
Chondrophiops, 376.
clamosa, Iguana, 155.
Cnemaspis, 22, 23, 24, 25, 28, 29, **65**.
cochinchinensis, Physignathus, 236.
cochinchinensis, Tropidophorus, 328, 329.
cochinsinensis, Istiurus, 236.
cocincinensis, Tropidophorus, 323, **329**.
cocincinus, Physignathus, **236**.
coctæi, Hemidactylus, 97, 98.
collegalensis, Gymnodactylus, 39, **41**, **56**.
Coloscincus, 280.
comotti, Lygosoma, 315.
concolor, Lygosoma dussumieri, 286.
condorensis, Gymnodactylus, 39, 40, **49**.
consobrinoides, Gymnodactylus, 39, 40, **47**, 48.
consobrinus, Gymnodactylus, 45.
Copeoglossum, 258.
Cophotis, 132, **134**, **150**.
coromandelicus, Chamæleon, 251.
coronata, Acanthosaura, 161.
corpulenta, Riopa, **313**.
corpulentum, Lygosoma, 313.
Coryphophylax, 157.
Cosymbotus, 102.
courcyanum, Lygosoma, 281, **289**.
craspedotus, Platyurus, 102.
crepuscularis, Platydactylus, 107.
cristatella, Agama, 184.
cristatella, Bronchocela, 184.
cristatellus, Calotes, 181, 182, **184**.
cristatus, Calotes, 190.
crucigera, Acanthosaura, 160.
crucigerus, Goniocephalus, 133.
cruciger us, Goniocephalus armatus, 157, 159, **160**.
cruralis, Agamura, **61**.
Cryptoblepharus, 309.
Cubira, 37.

cuvieri, Lophura, 236.
cyanella, Riopa, 320, 321.
cyanellum, Lygosoma, 320.
cyanodactylus, Hemidactylus, 89.
Cyclodina, 293.
Cylindrurus, 398.
Cynosaura, 238.
Cyrtodactylus, 37.
Cyrtopodion, 37.

Dactyloperus, 104.
Dasia, 256, **276.**
Dasyderma, 37.
dawsoni, Lygosoma, 264.
dayana, Agama, 214, 215.
dayanus, Stellio, 214.
decćanensis, Gymnodactylus, 59, 60.
deccanensis, Sitana, 144.
dekkanensis, Gymnodactylus, 39, 41, **59.**
depressus, Hemidactylus, 84, **91.**
Dibamidæ 21, **360.**
Dibamus, 5, 14, **361.**
didactyla, Nessia 357, **358.**
didactylus, Acontias, 358.
Dilophyrus, 157.
Dioptroblepharis, 381.
Diplodactylus, 80.
Diploderma, 167.
Discodactylus, 80.
dissimilis, Euprepis, 261.
dissimilis, Mabuya, 259, **261.**
divergens, Lepidodactylus, 115.
Dopasia, 392.
doriæ, Goniocephalus, 133.
doriæ, Leiolopisma, 294, **302.**
doriæ, Lygosoma, 302.
doriæ, Mabuia, 259, 261.
dorsalis, Agama, 209.
dorsalis, Charasia, 209, 210.
dorsalis, Psammophilus, 208, **209.**
Doryura, 83.
Dracæna, 398.
dracæna, Monitor, 402.
Draco, 13, 133, 134, **135.**
Dracocella, 135.
Dracontoidis, 135.
Draconus, 135.
Dracunculus, 135.
Dravidogecko, 22, 25, 29, **82.**
dumerilii, Monitor, 405.
dumerilii, Varanus, 400, **405.**
dunstervillei, Stenodactylus, 33.
dussumieri, Draco, 138, **143.**
dussumieri, Eumeces, 286.
dussumieri, Hinulia, 286.
dussumieri, Lygosoma, 281, **286.**
duvaucelii, Hoplodactylus, 82.
dymondi, Acanthosaura, 172.
dymondi, Japalura, 133, 168, **172.**

Elania, 280.
elegans, Eumeces, 338, 339.
elegans, Mabuya, 318.
elegans, Monitor, 402.
elegans, Ophisops, 10, 377, **379.**
ellioti, Oriotiaris, 169.
ellioti, Tiaris, 169.
elliotti, Calotes, 182, 183, 206, **207.**
emma, Calotes, 182, **195.**
Emoia, 9, 310.
Empagusia, 398.
Enoplosaurus, 322.
Eremias, 365, **381.**
Eremioplanis, 211.
Eremioscopus, 381.
ernestii, Euprepes, 277.
Eublepharidæ, 21.
Eublepharinæ, 21.
Eublepharis, 9, 23, 24 25, 30, **125.**
Eugongylus, 312.
Eulamprus, 279.
Eulepis, 293.
Euleptes, 80.
Eumeces, 4, 256, 257, **337.**
Eumecia, 312.
eunice, Leiolopisma, 295.
Euprepiosaurus, 398.
Euprepis, 258.
euptilopus, Phrynocephalus, 15, 229, **254.**
Eurylepis, 337.
Eutropis, 258.
Evesia, 356.
exanthematicus, Monitor, 404.
exigua, Mocoa, 303.

fallax, Lygosoma, 281, **288.**
fasciata, Eremias, 383, **385, 386.**
fasciata, Homonota, 123.
fasciata, Japalura, 168, **176.**
fasciata, Teratolepis, **123.**
fasciolatus, Eublepharis, 127.
fasciolatus, Gymnodactylus, 39, 40, **45.**
fasciolatus, Nauli[illegible], 45.
feæ, Calotes, 188.
feæ, Gymnodactylus, 39, 40, **45.**
feæ, Lygosoma, 320.
fedtschenkoi, Gymnodactylus, 38, 39, **41,** 42.
femoralis, Agamura, 61, **63.**
fischerii, Eumeces, 316.
flavescens, Monitor 404.
flavescens, Varanus, 399, 400, **404.**
flaviceps, Japalura, 133, 168, **176.**
flavigula, Calotes, 183.
flavipunctatus, Pristurus, 65.
flaviviridis, Hemidactylus, 85, **98.**
floweri, Calotes, 181, **186.**
formosa, Mocoa, 298.
formosensis, Lygosoma, 283.

formosum, Leiolopisma, 294, **298**.
formosum, Lygosoma, 298.
frenatus, Gymnodactylus, 8, 39, 40, **49**, 56.
frenatus, Hemidactylus, 85, **95**.
fruhstorferi, Acanthosaura, 188.
fruhstorferi, Calotes, 181, **188**.
fumosus, Gymnodactylus, 54.
fuscus, Stellio nuptus, 219.

garnoti, Hemidactylus, 85, **100**.
gaudama, Doryura, 100.
gecko, Gekko, 12, 23, 28, 29, 110, **111**.
gecko, Lacerta, 111.
Geckoella, 37.
geckoides, Gymnodactylus, 42.
Geckonidæ, 21.
Geckotidæ, 21.
Gehyra, 25, 29, **104**, 106.
Gekko, 22, 29, **109**.
Gekkonidæ, 20, **21**.
gemmatus, Monitor, 402.
giganteus, Hemidactylus, 85, **99**.
gigas, Calotes, 190.
glaucus, Gonatodes, 77.
gleadowi, Hemidactylus, 89.
godeffroyi, Goniocephalus, 130.
Gonatodes, 65.
Gongyloseps, 349.
Gongylus, 349.
Goniocephalus, 133, 135, **157**, 180.
Goniodactylus, 37, 65.
Goniurosaurus, 125.
gracilis, Cnemaspis, 68, **74**.
gracilis, Dopasia, 393.
gracilis, Gonatodes kendianus, 74.
gracilis, Gymnodactylus, 74.
gracilis, Hemidactylus, 85, **93**.
gracilis, Opnisaurus, **393**, 394.
gracilis, Pseudopus, 393.
grandis, Goniocephalus, 133.
grandisquamis, Calotes, 182, **200**.
grayanus, Ablepharus, 310, **311**.
griseus, Tupinambis, 400.
griseus, Uromastix, 244.
griseus, Varanus, 396, 397, **400**.
gubernatoris, Gymnodactylus, 39, 40, **54**.
guentheri, Euprepes, 262.
guentheri, Lygosoma, 319.
guentheri, Riopa, 313, **319**.
guentheri, Ristella, 330, **332**.
guineensis, Hemidactylus, 89.
gularis, Ptyctolæmus, **149**.
gularis, Salea, 183.
guttata, Leiolepis belliana, 238, **240**.
guttatus, Gecko, 111.
guttatus, Leiolepis, 240.
guttulata, Eremias, 364, 389.
guttulata, Lacerta, 389.
guttulata, Mesalina, 389.
gutturosa, Agama, 184.
Gymnodactylus, 25, 29, **37**.
Gymnops, 376.
gyldenstolpei, Isopachys, 335.
gyldenstolpei, Ophioscincus, 14, 233, **335**.

haasei, Draco, 138.
Hagria, 312.
hainanensis, Acanthosaura, 161.
hainanensis, Goniurosaurus, 129.
hainanus, Tropidophorus, 323, **326**.
haliana, Dasia, 276, **278**.
halianus, Euprepes, 278.
halianus, Lygosoma, 278.
halianus, Theconyx, 278.
hamptoni, Japalura, 133, 168, **175**.
hardwickii, Eublepharis, **126**, 127.
hardwickii, Riopa, 318.
hardwickii, Uromastix, **244**.
harrieti, Gecko, 105.
harti, Ophisaurus, 393, **394**.
harveyi, Goniocephalus, 133.
hasselquisti, Ptyodactylus, 79.
haughtonianus, Takydromus, 366, **369**.
helenæ, Lygosoma, 280, **283**.
helenæ, Sphenomorphus, 283.
Heliscopus, 227.
Hemidactylus, 25, 27, 29, **83**, 102.
Hemiphyllodactylus, 22, 25, 29, **106**.
Hemipodion, 345.
heraldicus, Varanus, 402.
herberti, Lygosoma, 317.
herberti, Riopa, 313, **317**.
Herinia, 258.
Heteromeles, 349.
himalayana, Agama, 212, **213**.
himalayana, Mocoa, 299.
himalayanum, Leiolopisma, 294, **299**.
himalayanum, Lygosoma, 299.
himalayanus, Eumeces, 299.
himalayanus, Stellio, 213.
himalayensis, Alsophylax, 58.

himalayicus, Gymnodactylus, 53.
Hinulia, 279.
hirsutus, Mecolepis, 178.
hodgarti, Mabuya, 262.
homalocephala, Lacerta, 117.
homalocephalum, Ptychozoon, 117, 118.
Hombronia, 293.
homolepis, Ptyodactylus, **79**.
Hoplodactylus, 25, 27, 82.
Hoplopodion, 83.
horrescens, Acanthosaura, 160.
horsfieldi, Ptychozoon, 119.
horsfieldi, Salea, 165, **177**.
hughi, Riopa, 317.
hughi, Sphenosoma, 317.
humei, Gonyocephalus, 165.
humei, Gymnodactylus, 73.
humei, Tiaris, 163.
Hyalinus, 392.
Hyalosaurus, 392.
Hydrosaurus, 398.
Hypsilurus, 157.

Ida, 370.
indica, Agama, 190.
indica, Bronchocela, 207.
indica, Cnemaspis, 67, **68**.
indica, Hinulia, 281.
indicum, Lygosoma, 280, **281**, 283.
indicus, Eumeces, 281.
indicus, Gekko, 111.
indicus, Gonatodes, 68.
indicus, Goniodactylus, 68.
indicus, Gymnodactylus, 68.
indicus, Spheromorphus, 281.
indicus, Stellio, 214.
indochinensis, Draco, 138, **141**.
ingoldbyi, Gymnodactylus, 44.
innotata, Mabuya, 259, **263**.
innotatus, Euprepes, 263.
inornatus, Hemidactylus, 95.
insularis, Barkudia, **352**.
insularis, Hemiphyllodactylus, 107.
insulensis, Dactyloperus, 105.
intermedia, Ptychozoon, 119.
intermedius, Gymnodactylus, 39, 40, **44**.
irregularis, Gymnodactylus, 39, 40, **51**.
irregularis, Gymnodactylus peguensis, 51.
isodactyla, Riopa, 313, **317**.
isodactylum, Lygosoma, 317.
isodactylus, Eumeces, 317.
isolepis, Agama, 221.
Isopachys, 333.
isozona, Agama, 213.

Japalura, 13, 133, 134, **167**.
japonicus, Gecko, 114.
japonicus, Gekko, 27.
jerdoni, Cabrita, 10, 374, **375**.
jerdoni, Calotes, 182, **184**.
jerdoni, Cnemaspis, 68, **74**.
jerdoni, Gonatodes, 74.
jerdoni, Gymnodactylus, 74.
jerdoni, Ophiops, 377.
jerdoni, Ophisops, **377**.
jerdoni, Pseudophiops, 377.
jerdoni, Salea, 178.
jerdoni, Tropidosaura, 377.
jeyporensis, Gymnodactylus, 39, 41, **60**.
jubata, Bronchocela, 185.
jubatus, Calotes, 131, 132, 181, **185**.

kachhensis, Gymnodactylus, 38, 39, **43**.
kakhienense, Lygosoma, 295.
kakhienensis, Acanthosaura, 188.
kakhienensis, Calotes, 182, 183, **188**.
kakhienensis, Oriocalotes, 188.
kandiana, Cnemaspis, 68, **73**.
kandianus, Gonatodes, 73.
kandianus, Gymnodactylus, 73.
karachiensis, Hemidactylus, 86.
karenorum, Doryura, 102.
karenorum, Hemidactylus, 85, **102**.
kargilensis, Euprepes, 300.
kelaartii, Calotes, 202.
kelaartii, Hemidactylus, 97.
Keneuxia, 276.
khasiensis, Gymnodactylus, 39, 40, **52**.
khasiensis, Pentadactylus, 52.
khasiensis, Tachydromus, 369.
khasiensis, Takydromus sexlineatus, 366, **369**.
kingdon-wardi, Calotes, 182, 183, **204**.
kohtaoensis, Leiolopisma, 296.
komodoensis, Varanus, 398.
koratense, Lygosoma, 314.
koratense, Riopa, 312, 313, **314**.
kronfanum, Lygosoma vittigerum, 298.
kuhli, Goniocephalus, 133.
kuhli, Ptychozoon, **117**, 119.
kumaonensis, Japalura, 168, **171**.
kushmorensis, Hemidactylus, 90.

Lacertæ, 20.
Lacertidæ, 21, **363**.
Lacertila, 20.
Lacertinidæ, 363.
ladacense, Leiolopisma, 294, **300**.
ladacense, Lygosoma, 300.
ladacensis, Eumeces, 300.
lamarrei, Campsodactylus, 322.
lamnidentata, Acanthosaura, 161.
Lampropelis, 276.
Lampropholis, 293.
Lamprosaurus, 337.
laotus, Tropidophorus, 323, **325**.
larutensis, Hemiphyllodactylus, 109.
laterale, Leiolopisma, 295.
laterale, Lygosoma, 303.
laterimaculatum, Leiolopisma, 294, **305**.
laterimaculatum, Lygosoma, 305.
Laudakia, 211.
lawderanus, Gymnodactylus, 39, 41, **58**.
layardi, Acontias, 359.
layardi, Acontias (Anguinicephalus), 359.
layardi, Nessia, 357, **359**.
Leiolepis, 132, 135, **238**.
Leiolopisma, 257, **293**.
Leiurus, 83.
Lepidodactylus, 27, 29, 106, **115**.
lepidogaster, Calotes, 161.
lepidogaster, Goniocephalus, 133, 157, **161**.
Lerista, 309.
leschenaulti, Cabrita, **374**.
leschenaulti, Hemidactylus, 84, 85, **97**.
leschenaulti, Lacerta, 374.
leucostictus, Hemiphyllodactylus, 107.
leucurus, Typhlina, 362.
leveretti, Sphenomorphus, 282.
lichtenfelderi, Eublepharis, 125, **129**.
lichtenfelderi, Goniurosaurus, 129.
lineata, Agama, 201.
lineata, Chiamela, 321.
lineata, Riopa, 313, **321**.
lineatum, Lygosoma, 321.
lineolata, Riopa, 313, **320**.
lineolatum, Lygosoma, 320.
liocephalus, Calotes, 182, 183, **204**.
liolepis, Calotes, 182, **203**.
lionotum, Ptychozoon, **118**.
Lioscincus, 293.
Liosoma, 312.
Liotropis, 276.
Lipinia, 293.
lirata, Agama, 218.
liratus, Stellio, 218.
Lissonota, 280.
littoralis, Cnemaspis, 9, 67, 68, **76**.
littoralis, Gonatodes, 76.
littoralis, Gymnodactylus, 76.
lobatus, Ptyodactylus, 79.
Lomatodactylus, 109.
longicaudata, Euprepis, 270, 273.
longicaudata, Mabuya, 259, **270**.
longiceps, Hemidactylus, 95.
Lophodeira, 180.
Lophognathus, 236.
Lophopholis, 22, 24, 30, **124**.
Lophosalea, 177.
Lophosaurus, 157.
Lophosteus, 157.
Lophyrus, 157.
ludekingi, Typhlina, 362.
ludekingii, Hemidactylus, 100.
ludovici, Ophisaurus, 394.
lugubris, Lepidodactylus, **115**.
lugubris, Platydactylus, 115.
lumsdeni, Stenodactylus, 33, **34**.
lunatus, Gymnodactylus, 126.
lunatus, Varanus, 402.
luteoguttatus, Phrynocephalus, 229, **235**.
Lygosaurus, 291.
Lygosoma, 256, **279**, 291, 293, 333.
Lygosomella, 293.
Lyriocephalus, 13, 132, 134, 151, **155**.

mabouya, Lacertus, 257.
Mabuia, 257.
Mabuya, 256, **257**.
macgregorii, Lyriocephalus, 155.
Macmahonia, 381.
macrolepis, Varanus, 405.
macrotis, Euprepes, 303.
macrotis, Leiolopisma, 294, **303**.
macrotis, Lygosoma, 303.
macrotympanum, Leiolopisma, 295, **308**.
macrotympanum, Lygosoma, 308.
macrotympanum, Mocoa, 308.
macrurus, Tropidolepisma, 268.
macularia Mabuya, 259, **264**, 269.
macularius, Cyrtodactylus, 127.
macularius, Eublepharis, 126, **127**.
macularius, Euprepes, 264.
maculata, Hinulia, 285.
maculata, Lissonota, 285.
maculatum, Lygosoma, 15, 281, **285**.
maculatus, Draco, 136, 137, **138**.
maculatus, Dracunculus, 138.
maculatus, Gymnodactylus, 69.

maculatus, Hemidactylus, 84, **85**, 90.
maculatus, Phrynocephalus, 229, **223**.
maculatus, Uromastyx, 238.
madarensi, Mabuia, 264.
major, Acanthosaura, 171.
major, Calotes versicolor, 190.
major, Draco, 141.
major, Japalura, 133, 168, **171**.
major, Oriocalotes, 171.
malabarica, Ristella, 331.
malabaricus, Gymnodactylus, 67.
mandellianus, Hemidactylus, 100.
margarethæ, Hemiphyllodactylus, 107.
margaritaceus, Lyriocephalus, 155.
marginatus, Gecko, 103.
marginatus, Hemidactylus, 103.
maria, Calotes, 181, **193**, 194.
marmoratus, Chamæleon, 251.
marmoratus, Gonatodes, 71.
marmoratus, Gymnodactylus, 54, 71.
marmoratus, Hemidactylus, 97.
martensi, Typhloscincus, 362.
Mastigura, 242.
maynardi, Stenodactylus, 33, **35**.
maximiliani, Coryphophylax, 163.
Mecolepis, 177.
Megalochilus, 227.
megalonyx, Agama, 218, **224**.
megalonyx, Trapelus, 221.
megalops, Lygosoma, 281, **289**.
meijeri, Hemidactylus, 117.
meizolepis, Gymnops, 379.
meizolepis, Ophiops, 379.
meizolepis, Ophiops elegans, 379.
melanostictum, Leiolopisma, 294, **296**.
melanura, Agama, 211, 213, **218**.
melanura, Leudakia (Plocederma), 218.
Menëthia, 309.
mentager, Dilophyrus, 236.
mentager, Physignathus, 236.
meridionalis, Tachydromus, 368.
meridionalis, Tachydromus sexlineatus, 368.
Meroles, 381.
Mesalina, 381.
mexicanus, Chamæleo, 251.
Microblepharis, 309.
microcerum, Leiolopisma vittigerum, 295, **308**.
microcerum, Lygosoma (Leiolopisma), 308.
Microdactylus, 83.
microlepis, Calotes, 181, 183, 186, **187**.
microlepis, Gymnodactylus, 42.
microlepis, Gymnops, 380.
microlepis, Japalura, 173.
microlepis, Ophiops, 377, **380**.
microlepis, Teratoscincus, 30, **32**.
microlepis, Tropidophorus, 323, **328**.
micropholis, Acanthodactylus, 370, 371, **373**.
Mictopholis, 135, **164**.
Miculia, 309.
Mimetozoon, 102.
minor, Agama, 213, **225**.
minor, Acanthosaura, 166.
minor, Calotes, 166, 226, 227.
minor, Oriocalotes, 166.
minor, Sitana, 144, 145.
mitanense, Lygosoma, 285.
mitranus, Scincus, 14, **344**.
Mochlus, 312.
Mocoa, 293.
modestum, Leiolopisma, 294, **303**.
modestus, Eurheces, 303.
mœstus, Gecko, 115.
moluccana, Agama, 184.
monarchus, Gekko, 110.
Monitor, 398.
monitor, Lacerta, 402.
monitor, Varanus, 17, 399, 400, **402**.
Monitoridæ, 397.
monodactyla, Nessia, 357, **358**.
monodactylus, Acontias, 358.
monodactylus, Evesia, 358.
montanus, Dibamus, 362, **363**.
monticola, Euprepes, 261.
monticola, Mabuia, 268.
monticola, Pseudophiops, 378.
montium-salsorum, Gymnodactylus, 38, 39, **42**.
Morethia, 309.
mortoni, Hemidactylus, 101.
multifasciata, Mabuya, 10, 258, 259, **268**, 271.
multifasciatus, Scincus, 268.
mutilata, Gehyra, **105**.
mutilatus, Hemidactylus (Peripia), 105.
mutilatus, Hemidactylus (Peropus), 105.
mutilatus, Peropus, 105.
mutilatus, Spathodactylus, 107.
mutilatus, Spathoscalabotes, 107.
murrayi, Hemidactylus, 90.

mysorensis, Peripia, 115.
mysoriensis, Cnemaspis, 66, 68, **72.**
mysoriensis, Gonatodes, 72.
mysoriensis, Gymnodactylus, 72.
mystaceus, Calotes, 182, **197.**

Naultinus, 27.
navarri, Hemidactylus, 105.
nebulatus, Monitor, 403.
nebulosus, Gymnodactylus, 39, 41, **56,** 57.
nebulosus, Monitor, 403.
nebulosus, Varanus, 399, 490, **403.**
neglectus, Peropus, 115.
nemoricola, Calotes, 162, **199,** 203.
nepalensis, Hemidactylus, 103.
Nessia, 257, **356.**
nicobaricum, Rhinophidion, 362.
nicobaricus, Dibamus, 362.
nicobaricus, Typhloscincus, 362.
niger, Biancia, 173.
nigrilabris, Calotes, 182, **206.**
nigrilabris, Calotes (Bronchocele), 206.
nigrilabris, Japalura, 167.
nigropunctatum, Lygosoma, 295.
niloticus, Varanus, 400.
Norbea, 322.
norvilli, Draco, 138, **142.**
novæ-guineæ, Dibamus, 14, 360, **362.**
novemcarinata, Mabuya, 259, **261.**
novemcarinatus, Euprepes, 261.
Nubilia, 83.
nupta, Agama, 213, **219.**
nuptus, Stellio, 219.
Nycteridium, 102.

ocellata Lacerta, 349.
ocellatus, Chalcides, **349.**
ocellatus, Gongylus, 349.
ocellatus, Seps, 349.
ocellatus, Takydromus sexlineatus, 366, **368.**
Odatria, 398.
oldhami, Gymnodactylus, 39, 40, **50.**
Oligosoma, 293.
olivacea, Dasia, 15, 276, **277.**
olivacea, Tiliqua, 277.
olivaceum, Lygosoma, 277.
olivaceus, Euprepes, 277.
olivieri, Phrynocephalus, 229, 230.
Ommateremias, 381.
Onychopus, 83.
ophiomachus, Agama, 201.
ophiomachus, Calotes, 201.
Ophiomoridæ, 254.
Ophiomorus, 257, **345.**
Ophiops, 376.
Ophiopsis, 309.
Ophioscincus, 11, 14, 257, **333.**
Ophisaurus, 391, **392.**
Ophiseps, 392.
Ophisops, 9, 365, **376.**
orientalis, Stenodactylus, 25, **33,** 35.
Oriocalotes, 133, 134, **166.**
Oriotiaris, 167.
ornata, Brachysaura, 225, 226.
ornata, Charasia, 225.
ornata, Cnemaspis, 67, **70.**
ornata, Japalura, 167.
ornatus, Gonatodes, 70.
ornatus, Gymnodactylus, 70.
ornatus, Phrynocephalus, 229, **232.**
ornatus, Varanus, 401.
Otocryptis, 13, 133, 134, **146,** 149.
Otolepis, 343.
Oxytropis, 258.

Pachysaurus, 398.
packardi, Peropus, 105.
palmatus, Gecko, 104.
palmatus, Gekko, 110, **114.**
palnica, Lygosoma travancoricum, 305.
palnicum, Leiolopisma, 294, **305.**
Panaspis, 309.
pannonicus, Ablepharus, 309, **310.**
Pantherosaurus, 398.
Paragonatodes, 65.
pardalis, Mesalina, 389.
pardaloides, Mesalina, 389.
pardus, Gecko, 105.
Pariocela, 337.
Parœdura, 80.
paulus, Oriocalotes, **166.**
paviei, Phyllodactylus, 81.
pavimentatus, Eumeces, 341.
pavimentatus, Scincus, 341.
Pedoryehus, 343.
peguensis, Gymnodactylus, 39, 40, **50.**
Pelturagonia, 167.
pentadactylus, Chalcides, 349, **350.**
pentadactylus, Seps, 290.
pentadactylus, Sphenocephalus, 350.
percarinatus, Euprepes (Tiliqua), 273.
Peripia, 104.
Perodactylus, 104.
Peromeles, 279.
peronii, Hemidactylus, 105.
Peropus, 28, 104.
persica, Agamura, **61.**
persica, Eremias, 383.
persica, Eremias velox, **383, 385.**
persicus, Gymnodactylus, 61.
persicus, Hemidactylus, 84, **87.**
persicus, Ophiops elegans, 379.
persicus, Stellio, 220.

petersi, Euprepes, 262.
petrensis, Gymnodactylus, 43.
Phaneropus, 309.
Phelsuma, 9, 23, 24, 28, 30, **120**.
philippinicus, Gymnodactylus, 54.
Photophilus, 370.
Phrynocephalus, 13, 14, 132, 135, **227**.
Phrynopsis, 211.
Phrynosaurus, 227.
Phyllodactylus, 25, 29, **80**.
Phyllurus, 24, 37.
Physignathus, 132, 135, **236**.
physignathus, Istiurus, 236.
picquotii, Varanus, 404.
piersii, Hemidactylus, 91.
planidorsata, Japalura, 133, 168, **170**.
planipes, Gymnodactylus, 76.
Planodes, 211.
platyceps, Calotes, 193, 194.
platyceps, Hemidactylus, 94.
Platydactylus, 109.
Platyglossæ, 21.
Platyurus, 24, 27, 30, **102**.
platyurus, Cosymbotus, 102.
platyurus, Hemidactylus, 102, 105.
platyurus, Nycteridium, 102.
platyurus, Platyurus, **102**.
platyurus, Stellio, 102.
Plestiodon, 337.
Pleuropterus, 135.
Plocederma, 211.
Pnoëpus, 83.
Podophis, 279.
Podorrhoa, 211.
Polydælus, 398.
ponticeriana, Sitana, **144**, 145, 260.
pranensis, Leiolopisma, 306.
prashadi, Hemidactylus, 84, **92**.
Pristurus, 23, 24, 25, 26, 28, 29, **64**.
Proctopus, 392.
Psammophilus, 135, **208**.
Psammorrhoa, 211.
Psammosaurus, 398.
Psammoscopus, 398.
Pseuderemias, 381.
Pseudocalotes, 180.
Pseudodactylus, 356.
Pseudophiops, 376.
Pseudopus, 392.
Pseudotrapelus, 211.
Pteropleura, 117.
Pterosaurus, 135.
Ptychozoon, 24, 27, 39, **117**.
Ptyctolæmus, 13, 134, **149**.
Ptyodactylus, 29, **79**.
Puellula, 37.
pulchellum, Lygosoma, 306.
pulchellus, Gymnodactylus, 26, 28, 38, 47, 48, 54.
pulchra, Tiliqua, 256.
pumilus, Chamæleo, 251.
pumilus, Hemidactylus, 95.
punctata, Geckoella, 55.
punctata, Riopa, 313, **318**, 319.
punctatolineatum, Leiolopisma, 294, **297**.
punctatolineatum, Lygosoma, 288.
punctatolineatus, Lygosoma (Sphenomorphus), 288.
punctatostriatus, Euprepes, 315.
punctatum, Lygosoma, 318, 319.
punctatus, Cynosaura, 238.
punctatus, Hemidactylus, 95.
punctatus, Scincus, 318.
punctatus, Sepsophis, 353.
punctatus, Varanus, 402.
pusillus, Ablepharus, 310.
pustulosus, Hemidactylus, 97.
Pygopodidæ, 11.

quadricarinata, Mabuya, 259, **273**.
quadrilineata, Mabouia, 359.
quadrilineatus, Eumeces, 338, **339**.
quadrilineatus, Plestiodon, 339.
quadrilineatus, Takydromus, 366.
quadrivirgatus, Eumeces, 339.
quadrupes, Anguis, 290.
quadrupes, Lygosoma, 14, 281, **290**.
Quedenfeldtia, 37.
quinquecarinata, Mabuia, 273.

Reptenbacheria, 236.
reevesii, Gecko, 121.
reevesi, Leiolepis, 238.
reevesi, Leiolopisma, 294, **295**.
reevesi, Tiliqua, 295.
Regenia, 398.
reticulatus, Hemidactylus, 85, **94**.
reticulatus, Phrynocephalus, 229, **231**.
reticulatus, Uromastix, 244.
Rhabderemias, 381.
Rhacodracon, 135.
Rhinophidion, 361.
Rhinoptyon, 398.
Riopa, 14, 257, **312**.
Ristella, 257, **329**.
robinsoni, Goniocephalus, 133.
robinsoni, Japalura, 167.
robinsoni, Tropidophorus, 323, **326**.
roulei, Ophioscincus, 333, **335**.
roulei, Typhlosaps, 335.
rouxi, Calotes, 182, 183, **206**, 207.
rubida, Puellula, 54.
rubidus, Cyrtodactylus, 54.

rubidus, Gymnodactylus, 39, 41, **54**.
rubricollis, Mabuia, 273.
rubriguluris, Agama, 213, **224**.
rubriventris, Tiliqua, 264, 266.
rufescens, Euprepes, 264, 266, 268.
rufescens, Lacerta, 348.
rufescens, Tiliqua, 270.
rugifera, Mabuya, 259, 269, **273**.
rugifera, Tiliqua, 273.
ruhstrati, Euprepes, 270.
rupestris, Pristurus, **64**.
rupicola, Leiolopisma, 294, **297**.
rurki, Ristella, 330, **331**.
russelii, Varanus, 404.

Saara, 242.
Saccostoma, 227.
sacra, Agama himalayana, **214**.
sacra, Mocoa, 301.
Salea, 135, **177**.
saleoides, Calotes, 202.
salsburyi, Lygosaurus, 292.
salvator, Hydrosaurus, 406.
salvator, Stellio, 406.
salvator, Varanus, 3, 399, 400, **406**.
sarasinorum, Acontias, 360.
sarasinorum, Nessia, 357, **360**.
Sauria, **20**.
Saurites, 281.
Sauroscincus, 293.
scaber, Gonyodactylus (Cyrtopodion), 42.
scaber, Gymnodactylus, 38, 39, **42**.
scaber, Stenodactylus, 42.
scabriceps, Lophopholis, **124**.
scabriceps, Teratolepis, 124.
scalpensis, Gymnodactylus, 74.
Scapteira, 381.
Scelotretus, 109.
schlegelii, Eumeces, **301**.
schlegelii, Tiliqua, 301.
schneideri, Eumeces, 338, **341**.
schneideri, Nycteridium, 103.
schneideri, Scincus, 341.
schneideriana, Lacerta, 103.
Scincidæ, 21, **254**.
scincoides, Seps, 318.
Scincus, 13, 257, **343**.
scincus, Stenodactylus, 30.
scincus, Teratoscincus, 28, **30**.
scincus, Varanus, 400.
scripta, Eremias, 383, **385, 386**.
scripta, Podarces (Scapteira), 386.
scripta, Scapteira, 386.
scutata, Lacerta, 155.
scutatus, Eumeces, 342.
scutatus, Lyriocephalus, 12, **155**.
scutatus, Plestiodon, 342.
scutellata, Agama, 229.
scutellatus, Phrynocephalus, **229**.
sebæ, Euprepes, 264, 266, 268, 269.
Semiophorus, 144.
Sepacontias, 312.
Sepophis, 353.
Sepsidæ, 254.
Sepsophis, 257, **353**, 358.
septemlineatus, Euprepes (Tiliqua), 274.
septemtæniata, Mabuia, 263.
septemtæniatus, Euprepis, 263.
septentrionalis, Tachydromus, 369.
serpens, Lacerta, 290.
sexlineatus, Takydromus, **366**; 368, 369.
siamensis, Cnemaspis, 25, 68, **71**.
siamensis, Eumeces, 270.
siamensis, Gonatodes, 71.
siamensis, Mabuia, 270.
siamensis, Phyllodactylus **81**.
Siaphos, 279.
sikkimense, Leiolopisma, 294, **301**.
sikkimense, Lygosoma, 301.
sikkimensis, Mocoa, 301.
sikkimensis, Plestiodon 268.
similignum, Gecko, 114.
sinicus, Tropidophorus, 323, **327**.
sisparensis, Cnemaspis, 67, **39**.
sisparensis, Gonatodes, 69.
sisparensis, Gymnodactylus, 69.
Sitana, 133, 134, **144**.
sloanii, Scincus, 257.
smaragdina, Broncho-cela, 185.
smaragdinus, Calotes, 181, **185**.
smithi, Acontias (Evesia), 359.
smithi, Gekko, 110, **113**.
smithii, Tetrapedos, 359.
sowerbyi, Lygosaurus, 292.
Spasmocnemis, 104.
Spathodactylus, 106.
Spathoscalabotes, 106.
speciosus, Gymnodactylus, 56.
Sphænops, 349.
Sphenocephalus, 345.
Sphenomorphus, 279.
Sphenoscincus, 345.
Sphenosoma, 312.
spinipes, Goniocephalus, 133.
Spondylurus, 258.
Squamata, **20**
stellatum, Lygosoma, 280, **284**.
Stellionidæ, 130.
Stenodactylus, 25, 28, **33**.
stentor, Gecko, 113.
stentor, Platydactylus, 113.

stoddarti, Ceratophora, **152**.
stoliczkai, Euprepes, 300.
stoliczkai, Gymnodactylus, 39, 41, **57**.
stoliczkai, Phrynocephalus, 230.
striatopunctatum, Lygosoma, 281, **288**.
subcæcus, Acontias, 362.
subcærulea, Dasia, 15, 276, **278**.
subcæruleum, Lygosoma, 278.
subcristata, Tiaris, 163.
subcristatus, Goniocephalus, 133, 157, **163**.
sublævis, Boltalia, 98.
subtriedroides, Hemidactylus, 90.
subtriedrus, Hemidactylus, 84, **89**.
subunicolor, Euprepes macularius, 264.
sulcatus, Mecolepis, 178.
sykesii, Barycephalus, 214.
sykesii, Hemidactylus, 85.

Tachybates, 83.
tachydromoides, Tachydromus, 369.
Tachydromus, 365.
Tachysaurus, 365.
tæniolata, Mabouia, 342.
tæniolatus, Eumeces, 337, 338, **342**.
tæniolatus, Eurylepis, 342.
tæniopterus, Draco, 138, **140**, 141.
Takydromus, **365**.
Tapaya, 211.
taprobanense, Eumeces, 287.
taprobanense, Lygosoma, 281, **287**.
taprobanensis, Eumeces, 288.
tavesæ, Leiolopisma, 294, **298**.
tenkatei, Hemidactylus, 90.
tennenti, Ceratophora, 152, **153**.
Teratolepis, 22, 24, 30, **122**, 124.
Teratoscincus, 14, 23, 24, 25, 28, **30**.
teres, Gecko, 111.
terrestris, Varanus, 401.
tersum, Lygosoma, 280, **284**.
tesselatus, Ophiseps, 393.
Tetrapedos, 356.
thai, Tropidophorus, 323, **328**.
thalassinus, Stellio, 402.
Theconyx, 276.
theobaldi, Phrynocephalus, 228, 229, **230**.
theobaldi, Pseudophiops, 377.
thwaitesi, Chalcidoceps **355**.
thwaitesi, Nessia, 355.
Tiaris, 167.
tickelli, Phrynocephalus, 229.
tiedmanni, Agama, 189.
tiedmanni, Calotes, 189.
tigris, Gecko, 54.
Tolarenta, 33.
Trachylepis, 258.
Trapeloidis, 211.
Trapelus, 211, 221.
travancorica, Mocoa, 304, 305.
travancorica, Ristella, 331.
travancoricum, Leiolopisma, 10, 294, **304**.
travancoricum, Lygosoma, 304.
travancoricus, Ateuchosaurus, 331.
triangularis, Salea anamallayana, 179.
tricarinata, Acanthosaura, 169.
tricarinata, Charasia (Oriotiaris), 169.
tricarinata, Japalura, 133, 168, **169**.
tricarinata, Oriotiaris, 169.
tricarinatus, Calotes, 169.
tridactylus, Ophiomorus, **346**.
tridactylus, Sphenocephalus, 346.
tridactylus, Sphenoscincus, 346.
triedrus, Gecko, 88.
triedrus, Gymnodactylus, 39, 41, **55**.
triedrus, Hemidactylus, 84, **88**.
trilineata, Euprepis, 260.
trispinosus, Mecolepis, 178.
trivittata, Mabuya, 259, **275**.
trivittata, Tiliqua, 275.
trivittatus, Eumeces, 275.
trivittatus, Euprepes, 275.
tropidogaster, Gonatodes kandianus, 73.
tropidogaster, Lophyrus, 161.
Tropidophorus, 256, 257, **322**.
Tropidoscincus, 293.
tuberculata, Agama, 212, **214**.
tuberculatus, Alsophylax, **36**.
tuberculatus, Bunopus, 36.
tuberculatus, Stellio, 214.
turcica, Lacerta, 86.
turcicus, Hemidactylus, 84, **86**.
tympanistriga, Calotes, 183.
Typhlinidæ, 254.
Typhloseps, 333.
Typhloscincus, 361.
typicus, Tachydromus, 368.
typus, Hemiphyllodactylus, **107**.
typus, Tachydromus, 368.
tytleri, Gecko, 89.
tytleri, Mabuya, 259, **270**.
tytleri, Scincus, 270.

Uma, 227.
Uromasticidæ, 130.

GLOSSARY AND GENERAL INDEX.

Acrodont.—Having teeth which are fixed to the parapet of the jaw-bone.

Azygous.—Single; not one of a pair.

Bipedal action, 2, 145, 237.

Cloaca, 4.

Colour and colour-pattern, 6.

Colour-changes in sex, 6, 146, 179, 192, 194, 195, 198, 210, 215, 219, 267.

Colour-changes with age, 6, 239, 277, 307, 340, 372, 384.

Courtship, 6, 137, 146, 192, 198, 210, 252.

Degeneration of ear, 13, 133.

Degeneration of limbs, 14.

Digital characters, 14, 15.

Digital pad, evolution, 8.

Dorsal scales.—In this work all those scales on the back and sides of the body that are not termed ventrals.

Ear, anatomy, 11, 344, 249.

Ear, degeneration, 13, 133.

Economics, 16.

Eggs, egg-laying, 5, 27, 120, 137, 146, 153, 158, 186, 193, 195, 199, 246, 252, 256, 291, 302, 338, 362, 395, 401, 403, 407.

Egg-tooth, 5, 195.

Endolymphatic glands, 23.

Evolution, 7.

Examination of specimens, 17.

Eye-coverings, 9, 310.

Femoral glands or organs, 4, 25, 132, 211, 244.

Geographical distribution, 15, 192, 265, 130.

Gular.—Pertaining to the throat.

Uromastix, 16, 130, 132, 135, **242**
Uroplatidæ, 21.

Varanidæ, 21, **397**.
Varanus, **16**, **398**.
varcoæ, Acanthosaura, 172.
varcoæ, Japalura, 168, **172**.
variegata, Japalura, 168, **173**.
variegatum, Lygosoma, 286.
variegatus, Gymnodactylus, 39, 40, **46**.
variegatus, Naultinus, 48.
Velernesia, 83.
velox, Eremias, 383, **385**.
velox, Lacerta, 383.
vesrauxi, Gecko, 113.
versicolor, Agama, 189.
versicolor, Calotes, 181, 183, **189**.
vertebralis, Mabuia, 275.
verticillatus, Gecko, 111.
verus, Gekko, 111.
viridis, Calotes, 190.
vittatus, Hemidactylus, 95.
vittatus, Varanus, 406.
vittigerum, Leiolopisma, 8, 295, **306**.
volans, Draco, 136.
vosmaeri, Hagria, 322.
vosmaeri, Lygosoma, **322**.
vosmaeri, Riopa, 313, 325.
vulgaris, Chamæleo, 251.
vulpecula, Doryura, 100.
vultuosa, Agama, 189.

walli, Gymnodactylus, 57.
warthii, Euprepes, 262.
watsonana, Eremias guttulata, 383, **389**.
watsonana, Eremias (Mesalina), 389.
watsonanus, Eremias, 390.
watsoni, Gymnodactylus kachhensis, 43, **44**.
whiteheadi, Draco, 138.
whiteheadi, Lygosoma, 315.
wicksii, Gymnodactylus, 73.
wiegmanni, Otocryptis, **146**.
wynadensis, Cnemaspis, 67, **69**.
wynadensis, Gonatodes, 69.
wynadensis, Goniodactylus, 69.
wynadensis, Gymnodactylus, 69.

Xystrolepis, 258.

yarkandensis, Cyrtodactylus, 57.
yunnanensis, Cainodactylus, 109.
yunnanensis, Calotes, 194.
yunnanensis, Gehyra, 109.
yunnanensis, Hemiphyllodactylus, 107, **109**.
yunnanensis, Japalura, 133, 168, 174, **175**, 176.
yunnanensis, Tropidophorus, 325.

zebra, Chamæleo, 251.
zebratum, Lygosoma, 281.
zeylanicus, Chamæleo, **251**.
Zygnidopsis, 345.
Zygnus, 349.
Zygnopsis, 345.

Limbs, degeneration, 14, 310, 331.

Mandible.—The inferior maxillary bone, or bone of the lower jaw.

Mucronate.—Terminating in a sharp point.

Nape.—The back of the neck.

Osteoderms, 2, 335, 357.

Oviparity, 6, 263.

Pholidosis.—The arrangement and character of the scales.

Placentation in reptiles, 5.

Pleurodont.—Having teeth fixed to the inner side of the jaw-bone.

Postanal bones and sacs, 25.

Sinciput.—The front half of the head as opposed to the occiput or back part of the head, the dividing line between the two being the fronto parietal suture; the top of the head between the tip of the snout and a line connecting the posterior borders of the orbits.

Skin, 2.

Spatulate.—Shaped like a spatula, with a flattened rounded end.

Tail, fragility, 7, 164.

Tail, coloration in young, 6.

Teeth, 3, 130.

Tongue, 3, 18, 250.

Verticillate.—Disposed in whorls or verticils.

Viviparity, 6, 17, 27, 151, 256, 228, 263, 323.

Viviparous.—Producing living young, the nourishment for the developing embryos being provided through some form of placentation. How far this definition holds for the species mentioned in this work is not yet known. See also Vol. I, p. 29.

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Map of the Indian [illegible]ese Hill Districts.