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**THE WATERFOWL
OF THE WORLD**



Pinkfeet in their Winter Quarters in England

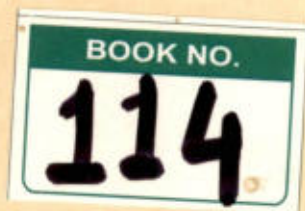
THE
WATERFOWL
OF THE WORLD

BY
JEAN DELACOUR

WITH SIXTEEN PLATES IN COLOUR BY

PETER SCOTT

AND THIRTY-THREE DISTRIBUTION MAPS



VOLUME ONE

The Magpie Goose
Whistling Ducks, Swans and Geese
Sheldgeese and Shelducks

MCMLIV

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Foreword

BOTH the author and the illustrator of this book have been waterfowl enthusiasts for as long as they can remember. We have watched Swans, Geese and Ducks in the wild state throughout the world, and kept them in captivity on a large scale; we have always been thrilled by their grace and beauty as well as by their captivating habits.

During the last thirty years, I have devoted a great deal of time to taxonomic researches on the *Anatidae*, culminating in the publication, in collaboration with E. Mayr, of a comprehensive paper: 'The family *Anatidae*' (*Wilson Bull.* 1945, pp. 3-55), since supplemented by more detailed studies of particular problems.

Three volumes have been planned to cover the family *Anatidae*, the first of which is now offered. It is the most urgently needed as it includes the Swans and Geese, on which no modern general work has so far existed.

My own collection of living waterfowl at Clères, Normandy, was the most complete ever assembled until its destruction in war in 1940. It possessed representatives of all the known Swans, Geese, Shelducks and Whistling Ducks, and only twenty-six species of Duck and Teal were missing. It has been reconstituted since 1946, although many gaps still remain to be filled. Peter Scott's collection at his Lighthouse on the Wash, in Norfolk, was also considerable in 1940, but like that at Clères, became a total war casualty. Since then, he has organized the Severn Wildfowl Trust, at the New Grounds, Slimbridge, Gloucestershire, where the most complete collection of *Anatidae* now in existence has been gathered.

It is our wish that all interested in one of the most fascinating families of birds may find in the following pages a satisfactory synthesis of all that is known today on the Waterfowl of the World as they exist at the present time.

J. DELACOUR



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Acknowledgements

MY thanks are due, for permission to quote, to: Mr Alister Mathews for the quotation from *The Birds of Australia* (Vol. IV) by his father, the late Gregory M. Mathews; H. R. and G. Witherby Ltd for a passage on the Mute Swan in *The Handbook of British Birds* (Vol. III); F. H. Kortright for passages on the Tule Goose, the Atlantic Canada Goose, and the Pacific Black Brant in *The Ducks, Geese and Swans of North America*; Dr F. Salomonsen for several passages from *The Birds of Greenland*; O. L. Austin for a passage on the goose populations of Japan from *Waterfowl of Japan*; A. M. Bailey for passages from *Birds of Arctic Alaska*; Col. F. M. Bailey for observations on the Bar-headed Goose; Ernst Mayr for a passage from *Systematics and the Origin of the Species*; George M. Sutton for observations on the Lesser Canada Goose and Richardson's Canada Goose in *Birds of Southampton Island*; A. C. Bent for a passage on the Aleutian Canada Goose in *Life Histories of North American Waterfowl*; R. C. Murphy for several passages in *Oceanic Birds of South America*.

I am also grateful to the editors of *Ibis*, *The Auk*, *The Avicultural Magazine*, *Audubon Magazine*, *Nature*, *Emu* and *Ostrich* for permission to quote from articles printed in these journals. Thanks are also due to the authors, who are named in the text.

J.D.

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Systematic List

ORDER *Anseres*

FAMILY *Anatidae*

I. SUB-FAMILY *Anseranatinae*

GENUS *Anseranas* Lesson

Anseranas semipalmata (Latham)

II. SUB-FAMILY *Anserinae*

1. TRIBE DENDROCYGNINI

GENUS *Dendrocygna* Swainson

Dendrocygna guttata Schlegel

Dendrocygna eytoni (Eyton)

Dendrocygna arcuata

D. a. arcuata (Horsfield)

D. a. australis Reichenbach

D. a. pygmaea Mayr

Dendrocygna bicolor (Vieillot)

Dendrocygna arborea (Linné)

Dendrocygna javanica (Horsfield)

Dendrocygna viduata (Linné)

Dendrocygna autumnalis

D. a. autumnalis (Linné)

D. a. discolor Sclater and Salvin

2. TRIBE ANSERINI

GENUS *Coscoroba* Reichenbach

Coscoroba coscoroba (Molina)

GENUS *Cygnus* Bechstein

Cygnus atratus (Latham)

Cygnus olor (Gmelin)

Cygnus melanocoryphus (Molina)

Cygnus cygnus

C. c. cygnus (Linné)

C. c. buccinator Richardson

Cygnus columbianus

C. c. columbianus (Ord)

C. c. bewicki Yarrell

C. c. jankowskii Alpheraky

GENUS *Anser*

Anser cygnoides (Linné)

Anser anser

A. a. anser (Linné)

A. a. rubrirostris Swinhoe

Anser albifrons

A. a. albifrons (Scopoli)

A. a. frontalis Baird

A. a. gambeli Hartlaub

A. a. flavirostris Dalgety and Scott

Anser erythropus (Linné)

Anser fabalis

A. f. fabalis (Latham)

A. f. johanseni Delacour

A. f. middendorfi (Severtzow)

A. f. serrirostris Swinhoe

A. f. rossicus Buturlin

A. f. brachyrhynchus Baillon

Anser coerulescens

A. c. coerulescens (Linné)

A. c. atlanticus (Kennard)

Anser rossi Cassin

Anser canagicus (Sewastianow)

Anser indicus Latham

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GENUS *Branta* Scopoli

Branta sandvicensis (Vigors)

Branta canadensis

B. c. canadensis (Linné)

B. c. interior Todd

B. c. maxima Delacour

B. c. moffitti Aldrich

B. c. parvipes (Cassin)

B. c. taverneri Delacour

B. c. fulva Delacour

B. c. occidentalis (Baird)

B. c. leucopareia (Brandt)

B. c. asiatica Aldrich

B. c. minima Ridgway

B. c. hutchinsi (Richardson)

Branta leucopsis (Bechstein)

Branta ruficollis (Pallas)

Branta bernicla

B. b. bernicla (Linné)

B. b. hrota (O. F. Müller)

B. b. nigricans (Lawrence)

B. b. orientalis Tougareinov

III. SUB-FAMILY *Anatinae*

3. TRIBE TADORNINI

GENUS *Cereopsis* Latham

Cereopsis novae-hollandiae Latham

GENUS *Chloephaga* Eyton

Chloephaga melanoptera (Eyton)

Chloephaga poliocephala Sclater

Chloephaga rubidiceps Sclater

Chloephaga picta

C. p. picta (Gmelin)

C. p. leucoptera (Gmelin)

Chloephaga hybrida

C. h. hybrida (Molina)

C. h. malvinarum Phillips

GENUS *Cyanochen* Bonaparte

Cyanochen cyanopterus (Rüppell)

GENUS *Neochen* Oberholser

Neochen jubatus (Spix)

GENUS *Alopochen* Stejneger

Alopochen aegyptiacus (Linné)

GENUS *Tadorna* Fleming

Tadorna tadornoides (Jardine and Selby)

Tadorna variegata (Gmelin)

Tadorna cana (Gmelin)

Tadorna ferruginea (Pallas)

Tadorna radjah

T. r. radjah (Lesson)

T. r. rufitergum Hartert

Tadorna tadorna (Linné)

Tadorna cristata (Kuroda)

GENUS *Lophonetta* Riley

Lophonetta specularioides

L. s. specularioides (King)

L. s. alticola (Ménégaux)

GENUS *Tachyeres* Owen

Tachyeres pteneres (Forster)

Tachyeres brachypterus (Latham)

Tachyeres patachonicus (King)

Introduction

THE term 'Waterfowl' applies to the members of the family *Anatidae*, which is composed of a large number of closely allied species forming a natural, distinctly characterized and homogeneous group. They are popularly known as Swans, Geese and Ducks, the smallest of which are called Teal, but these vernacular names include in reality a number of different types. Until the last decade, these birds had generally been very artificially classified, and it was the object of Delacour and Mayr's paper 'The family *Anatidae*' (*Wilson Bull.* 1945) to propose a 'more natural grouping of species with a better understanding of their affinities expressed by a simpler taxonomy'. It summed up and brought up to date several studies published earlier by the senior author. We have had no reason to alter the general views expressed on that occasion. Research effected since 1945 has brought only a few minor changes, with the exceptions of two important points: anatomical studies have obliged us to consider *Anseranas* as constituting a separate and highly differentiated sub-family, and also, following Niethammer, to merge the tribe *Merganettini* with the *Anatini*.

We therefore quote here some parts of our 1945 work:

'The classification of Ducks which has been accepted up to the present is more than fifty years old. In spite of criticism by a number of recent authors, it has been more or less followed in all recent works, such as Phillips's *A Natural History of the Ducks* (1922-6); Peters's *Check-List of the Birds of the World* (1931); and the fourth edition of *The A.O.U. Check-List of North American Birds* (1931). In fact, Salvadori's classification in the *Catalogue of Birds in the British Museum* (Vol. 27, 1895) is in some ways more acceptable than several later ones. All these systems have the weakness of being based exclusively on a small selection of morphological characters, primarily on the shape of the bill and feet. Nothing could be more misleading, for the form of bill or feet is entirely functional and undoubtedly often recently acquired, representing merely a secondary adaptation that is repeated in widely separate groups. It is useful in distinguishing species, but has certainly no deeper phylogenetic significance. Non-adaptive morphological characters are far more useful taxonomically. The most important of these in the Duck family are: pattern of tarsus (whether scutellate or reticulate in front), a very fundamental character in the family; plumage pattern in both adults and young, the downy young of most of the ten main groups in the family having a very characteristic pattern; presence or absence of a double annual moult; posture, general body proportions, length of neck, and shape of head, all of which show characteristic differences among the ten main groups; characteristics of the internal anatomy, especially

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the structure and shape of the syrinx and trachea. Similarly, biological characters — almost entirely ignored by the currently adopted systems of classification — are of paramount importance to the classifier, for habits and behaviour are deeply rooted and are usually the product of very ancient evolution. In the Duck family the main points are pair formation, displays, nesting, and feeding habits. To be satisfactory and reliable, any system must be based on the greatest possible number of known characters, and an overvaluation of a few primarily functional characters has led to great confusion in the taxonomy of the *Anatidae*.

'Several branches, for example, the Pochard group, the Goldeneye-Merganser-Scoter group, and the Stiff-tailed Duck group, have developed into divers *par excellence*, and are structurally rather similar to one another. However, their non-adaptive characters, such as the general proportions of the body, the colour pattern of the downy young, the structure of the syrinx, and the courtship performances, are sufficiently different among the three groups to suggest that the three are not at all closely related.

'A further instance is that of the so-called Geese. In addition to the typical geese of the *Anser-Branta* group, there are a number of "Goose-like" genera such as the Cape Barren Goose (*Cereopsis*), the Pied Goose (*Anseranas*), the Maned Goose (*Chenonetta*), the South American "geese" (*Chloephaga*), the Egyptian Goose (*Alopochen*), and the group commonly known as Sheldrakes ("*Casarca*" and *Tadorna*), all of which are characterized by rather large size and long legs, many by grazing habits. They are the "ungulates" of the duck family. Again the evidence is rather strong that the goose-like features were acquired independently by the several groups. This adaptability poses a problem to the classifier of the Duck family which by no means has been solved entirely. However, even though the position of certain species and genera is still uncertain, the study of live specimens and the consideration of previously neglected morphological characters have shed much light on the relationship of the birds included in this family.

'We believe in large genera, since it is the function of the generic name to express relationship (as an aid to the memory) not distinctness, which is expressed by the species name. Even Peters, who is certainly not a splitter, recognizes in the family of *Anatidae*, sixty-two genera for 167 species (an average of 2.7 species per genus), and forty-two (70 per cent) of his genera are monotypic. The *A.O.U. Check-List* goes even further. Such nomenclature comes dangerously close to being mononomial. The modern broadening of the species concept (Mayr, 1942: 102-22) necessitates a corresponding adjustment of the genus limits. In the classification here presented we recognize forty genera for 144 species (3.6 species per genus). It is interesting to find that a number of the vernacular names for the waterfowl — swans, scoters, eiders, mergansers — delimit natural groups more accurately than the generic names currently used by taxonomists. It has been our endeavour to bring the generic nomenclature of the duck family back to an expression of these natural groups. The proponents of generic splitting forget that if morphological difference is acknowledged as an inevitable generic criterion, sooner or later nearly every species will deserve a genus of its own. Generic subdivision carried to extremes not only places an unbearable burden on the memory of the taxonomist, but also completely obliterates the difference between the weak and the really distinct genera. The differences separating *Anser*, *Philacte*, and *Chen*; *Anas*, *Nettion*, and *Dafila*,

INTRODUCTION

Aix and *Dendronessa*; or *Somateria*, *Arctonetta* and *Polysticta*, are certainly very slight compared with the differences separating *Anser*, *Cygnus*, and *Coscoroba*; or *Chloephaga*, *Alopochen*, and *Tadorna*; or *Anas*, *Malacorhynchus*, *Tachyeres*, and *Stictonetta*. Since no category above the genus can be expressed in the scientific name, the splitter has no way of making a distinction between "weak" and "good" genera. We consider this another strong argument in favour of recognizing only pronounced genera.

The new classification of the duck family that we propose attempts to do two things: to arrange the species in related groups and in a natural sequence, and to adjust the nomenclature of species and genera to progressive concepts of these categories.

Following the popular classification of this family, the first taxonomists divided the waterfowl into: Swans, Geese, Ducks, and Mergansers. As more and more was learned about the anatomy as well as about the habits of members of the family, it was realized that this simple division was unsatisfactory. For example, Linnaeus included in the Duck genus *Anas* such widely divergent species as the river ducks of the Mallard and Teal type, the Diving Ducks of the Scaup-Pochard group ("*Nyroca*" = *Aythya*), the Diving Ducks of the Goldeneye-Scoter-Eider group (*Mergini*), the Whistling Ducks (*Dendrocygna*), and the Sheldrakes (*Tadorna*). Although subsequent classifiers recognized some of these subdivisions, they were guided in their reclassification mainly by the shape of the bill or by the presence or absence of the diving habit.

All Swans, Geese and Ducks, including the most aberrant species, are so much alike in their basic structure and habits that they must be included in a single family. Within this family a number of genera can be recognized, but they are clearly arranged in three main groups, which we admit as three sub-families:

1. *Anseranatinae*. Formed by the unique species *Anseranas semipalmata*, a primitive bird with a distinctly particular anatomy.
2. *Anserinae*. This sub-family includes the Swans, Geese, and the Whistling Ducks ("Tree Ducks"). The attributes of the group are a 'Goose-like' posture and body shape (with a long neck); a tarsus reticulated in front; a single annual moult; absence of important sexual dimorphism in plumage, voice, and structure of the syrinx. Displays are simple and are similar in the two sexes.
3. *Anatinae*. This sub-family includes the rest of the *Anatidae*. The attributes of the group are a tarsus that is scutellated in front (with a few exceptions); a double annual moult; sexual dimorphism in plumage (frequent), in voice and structure of syrinx (usual). Displays are usually elaborate and different in the two sexes.

Within each sub-family further subdivisions are recognizable. We use the term tribes (with the ending *-ini*) for such groups of genera, following a custom that is widespread in entomology. The reasons for the recognition as well as for the delimitation of these tribes will be found in the course of the work.

The nearest if still distant relatives of the *Anatidae* are the *Anhimidae* (Screamers), which *Anseranas* recalls in some of its anatomical features; they show certain affinities of habits with the Geese, but are different enough to form another family. Through the

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Screamers, the Waterfowl are linked to the South American Game Birds, the Curassows and the Guans (*Cracidae*). The Flamingoes (*Phoenicopteridae*) are also related to the *Anatidae*, perhaps quite closely, being somewhat intermediate between the Geese and the Storks.

The Waterfowl are world-wide in distribution.

A general account of the family *Anatidae* will be given at the end of the last volume. It will include chapters on morphological, anatomical and biological characters; on history, sport, conservation, acclimatization, care and breeding, and a bibliography.

References to literature in the course of the work are restricted to original descriptions and to two recent general works: *A Natural History of the Ducks*, by J. C. Phillips, 4 vols., Boston, 1922-6; and *Check-List of the Birds of the World*, by J. L. Peters, Harvard University, vol. 1, 1931; other sources are indicated in the text whenever required. Phillips's *Natural History of the Ducks* included the genera to be studied in our forthcoming volumes; but much has been learned since its completion, and, in any event, this great book is now practically unobtainable.

Besides my own long experience, I have greatly benefited by the work of many authors, ornithologists, sportsmen, and breeders, past and present. The early ethological studies of O. Heinroth (1910, 1911, 1928) have been of considerable help, as later on those of K. Lorenz. The files on American Geese of the late J. Moffitt also have proved of special value, as well as the observations of numerous workers, among whom F. E. Fooks, H. C. Hanson, H. A. Hochbaum, Terry Jones, T. H. Manning, Dillon Ripley and Ward Sharp should be especially mentioned. The co-operation of Ernst Mayr and of Peter Scott has been particularly useful.

For each sub-family, genus, species and sub-species listed in the following pages, the reader will find their Latin and English names, principal characteristics, geographical distribution, and information on their general habits at liberty and in captivity. Lengthy descriptions have been replaced by illustrations as often as possible. Details of habits, with quotations from first-hand observers, when available, are given for all the rare or little-known birds, but are cut down to a relative minimum for the familiar species.

The Magpie Goose

SUB-FAMILY ANSERANATINAE

THE MAGPIE GOOSE (*Anseranas*) of Australia and New Guinea differs from all other waterfowl in such important characteristics that it is necessary to set up for it a separate sub-family. Indeed, it is almost distinct enough to be considered as constituting a separate family.

In many external features, and even in certain life habits, the Magpie Goose recalls the Spur-winged Goose of Africa (*Plectropterus*), and that explains why a number of authors, including Peters, Mayr and myself, have long associated them in the same group, or tribe. But a deeper study of its anatomy leads to a different opinion. H. von Boetticher (*Zoologischer Anzeiger*, 30, 4, 1943, Bd. 143, pp. 55-8) writes as follows:

'In my opinion *Anseranas* is the representative of a group which branched off from the common ancestor at a very early period before the differentiation of the real *Anserinae* and *Anatinae*, and which has developed in its own independent and peculiar fashion. *Anseranas* shows that it is a relative both of the ancestors of the *Anserinae* and of the *Anatinae*, but not of the modern races. In some respects it resembles each group, for externally it has points of similarity with True Geese and with the Spur-winged Geese, *Plectropterus*, which belong to the *Cairinae* group of *Anatinae*.

'In my opinion the branch representing the sub-family of the *Anseranatinae* was separate from the beginning from the trunk which was later to divide into the three other branches, and consequently it has always been equidistant from the *Anatinae* as well as from the *Anserinae*.

'O. Heinroth called my attention to the fact that various osteological and anatomical features, such as the hole on the inner front side of the coracoid, the formation of the posterior end of the breast-bone, the large heavy ridge of bone on the centre of the head, which is reminiscent of the one on the Cassowary, the formation of the lachrymal bones, the tracheal pipe lying between the skin and the muscles, and other items, are peculiarities not found among other *Anatidae* and which make it difficult to consider *Anseranas* in any definite relationship to them. This circumstance strengthens my conviction that it is essential to place *Anseranas* in a separate sub-family apart from all the rest of the *Anatidae*.'

- - Today we can agree with von Boetticher's conclusions.

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Anatomical features of *Anseranas*, which contrast sharply with those of all other *Anatidae*, but resemble those of the Screamers (*Anhimidae*), have been pointed out by S. MacDowall in an unpublished study:

1. Prevomer without a postero-ventral angle, as in *Anhimidae*.
2. Lacrymal bone with short, descending process, not reaching halfway to jugal bar, intermediate in shape between those of *Anhimidae* and of the other *Anatidae*.
3. Occiput sloping upward and forward, a unique and peculiar feature.
4. Pelvis compressed, as in *Galliforms*, with strong posterior dihedral angles of the ilium; ischium not flared; a distinct lateral longitudinal crest on the postacetabular ilium, much as in *Anhimidae*.
5. Metasternum trilobate, much as in some specimens of *Chauna*, but never seen in ducks.
6. Coracoid with procoracoid bone pierced by circular foramen, as in *Anhima*, but unlike that of other *Anatidae*.

From such evidence it can be concluded that both *Anseranas* and the two genera of *Anhimidae* (*Anhima* and *Chauna*) represent ancient types of birds, related in various degrees to the ancestor of the present Geese and Ducks, and also to the game birds of the Curassow group (*Cracidae*).

Other morphological characteristics of the Magpie Geese are the following: bill long and strong, deep at the base; nostrils small, situated in the middle and close together; lamellae much reduced; nail large, very strong, curved, pointed and overhanging, the lower mandible with a corresponding convex nail-like tip; forehead and lores naked; wings long, the first primary equalling the 7th, the 2nd to 5th the longest; no wing spur; tail long and square of 12 rectrices; legs long, a large portion of the tibia naked; tarsus reticulated; toes very long and slender, the nails long, curved and sharp; hallux long and on the level of the anterior toes; webbing much reduced, extending only half the length of the toes. In the male the trachea is very long (150 cm. about) and convoluted, situated outside the pectoral muscle on the left side, under the skin, and attached to both by cellular tissue.

To such exceptional features are added biological peculiarities: unlike all other species of *Anatidae*, the wing moult is gradual and the birds never lack the power of flight; they exude a strong musky smell similar to that of certain Parrots (Macaws).

The sub-family is restricted to Australia and Southern New Guinea and contains a single genus.

I

THE MAGPIE GOOSE

Genus *Anseranas*

Lesson, *Man. d'Orn.*, II, 1828, p. 418.

Type by monotypy: *Anas melanoleuca* Latham = *Anas semipalmata* Latham.

THIS Australian genus is the only one of the sub-family *Anseranatinae*, and it has no near relative, although it superficially resembles *Plectropterus*, the Spur-winged Goose of Africa. There is only one species.

AUSTRALIAN MAGPIE GOOSE

Anseranas semipalmata

Anas semipalmata Latham, *Trans. Linn. Soc. London*, 4, 1798, p. 103: Hawkesbury River, New South Wales.

Anseranas semipalmata, Peters, *Check-List, Birds of the World*, 1, 1931, p. 145.

CHARACTERISTICS

A fairly large goose-like bird, with long, rather thin neck and legs, a high knob on the crown, a small body, large wings and tail; black, with white mantle, rump and underparts. Wild specimens often have the plumage much stained with reddish clay. Bill deep yellow, with a black band on each side of the horny grey tip. Bare skin of forehead and sides of head dull pink with irregular black dots. Iris dark brown. Legs bright yellow. The female is smaller than the male and the frontal knob is little developed.

Male: wing: 430–460 mm.; tail: 170–190 mm.; tarsus: 90–105 mm.; culmen: 80–85 mm.

Female: wing: 370–390 mm.; tail: 130–160 mm.; tarsus: 80–92 mm.; culmen: 70–78 mm.

Immatures have the dark parts of the plumage brownish; mantle and rump are mixed black and white, sometimes entirely black. The frontal knob is small.

Downy chicks: brown above, the head darker; a buff bar on the wings and a buff stripe on the sides of the back; underparts buffy white, the throat and sides brownish buff; forehead and eyebrows buff; a brown line from bill to eye, and another one from the base of the bill to the nape. They resemble generally the chicks of *Plectropterus*.

Eggs: glossy white, and pitted, five to fourteen in a clutch, measuring 76–80 × 52–55 mm. Incubation: 35 days.

DISTRIBUTION

Australia and Tasmania; southern New Guinea from the Merauke District to the Orioma River.

THE WATERFOWL OF THE WORLD

GENERAL HABITS

Magpie Geese are strange-looking waterfowl; the long legs and neck, the large bill and naked, humped forehead give them a peculiar aspect. They have broad, long wings and tail feathers, much like Spurwings and Muscovies. They walk easily, but rather slowly and cautiously, and on the whole look awkward. They fly well and lightly. They swim rather uneasily, like Screamers and long-legged goose-like birds (*Cereopsis*, Andean, Spurwings). Their call is a shrill trumpeting note. They somewhat resemble Spurwings in shape and colour, and even in certain of their ways. Like them, they perch high on trees, often settling on slim branches; but unlike them they are of mild temper and do not fight viciously. They live in swamps, feed on vegetable matter, and nest in wet patches of flags and reeds, piling up materials down to the mud through the water. They are found in flocks and breed in scattered colonies. Like other Australian waterfowl, their breeding season seems to be irregular and depends much on the rains. Only when conditions are favourable do they go to nest.

Magpie Geese were previously abundant throughout the continent, but they have been wiped out by man more or less completely in the southern part as the country became settled. They still are numerous in the north where the native Blacks have always relied upon them and their eggs for food in some districts. But it is a vulnerable species, as it is easily approached and shot, and some measure of protection will eventually have to be extended to it to avoid its extinction. Its flesh is considered good, which is rather surprising on account of its strong, musky smell.

Life observations on Magpie Geese are far from adequate. Mathews (*The Birds of Australia*, vol. iv, 1914-5, pp. 27-31) gives a *résumé* of what had at that time been reported, and more recent information, which we reproduce here in part:

‘Mr J. P. Rogers’s notes read as follows:

“Feb. 23, 1902. Eleamurda Swamp, North-west Australia. Nest contained seven eggs: was in a shallow swamp covered with long watergrass and weeds and consisted of a large mass of grass and weeds about 24 × 24 inches wide at the water-line. The nest was not floating but rested on the bottom and was trodden solid. The bowl containing the eggs measured 14 × 14 × 3 inches deep and the nest tapered from the water-line to the nesting bowl. The nests of this bird are easily found; if when wading through the swamps a single bird rises, search the place and the nest will usually be found in the centre of a little clearing. The birds drag the nearest weeds together to make the nest. In this district the geese rise straight from the nest, whilst the other waterfowl usually creep away before rising, unless surprised.

“Nov. 23. Had a heavy shower and two hours after a large flock flew round to see if the swamps were filled. A month ago they were rare, now they are seen everywhere. I saw a flock of 200 on Parry’s Lagoons on the 25th Nov. They are to be heard trumpeting as they fly to and fro at night. On Dec. 7th they left the water and are now feeding in the short new grass on the plains. There must be over one thousand on the plains now. A flock of 250 passed my house at 10 a.m.”

THE MAGPIE GOOSE



1. Distribution of *Anseranas semipalmata*.

'Though first described from the Hawkesbury River, New South Wales, it had disappeared from that locality before Gould's time (1838-40). It is now very rare throughout southern-eastern Australia, as Mr J. W. Mellor writes me: "These geese were at one time found in South Australia on lakes Alexandrina and Albert, and other swampy localities, but I have not seen or heard of them here for years now."

'Hall, writing about the Ducks of the Murray River (*Emu*, vol. ix, p. 79, 1909) states: "Is a grass feeder. In 1902, the great drought year, farmers in this locality

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poisoned them because they were feeding almost entirely on the growing crops. Up to 1902 I knew them to be annually in thousands. Cultivation has driven them away for good, so far as present generations are concerned."

'In the north of Australia, however, these wonderful birds still numerous exist.'

D. L. Serventy and H. M. Whittell (*A Handbook of the Birds of Western Australia*, Perth, 1948) report *Anseranas* as very common in the Kimberley Division, but breeding only there in Western Australia. Mr Donald F. Thomson (*Geographical Journal*, vol. CXIV, London, 1949, pp. 56-7) found it very abundant in the Arafura Swamp, 500 square miles in extent, in Arnhem Land, where some natives depend on them almost entirely for their food. The birds breed only in years when the rains have been abundant enough. Various recent explorers of Northern Australia, including H. G. Deignan, report the species as still locally very common.

CAPTIVITY

It seems that the first captive Magpie Geese to arrive in Europe came into the possession of Lord Derby at Knowsley in 1851. The London Zoo had some in 1855. P. L. Sclater (*P.Z.S.*, 1880, p. 497) mentions the fact, and also says that others were received in 1862 and later on. They lived well, but never bred. Ever since, the species has been represented in zoos and private collections in Europe and America, but never very commonly. Blaauw states (*Ibis*, 1878, p. 310) that his birds moulted their quills gradually and perched a very great deal. They never nested with him. Such has been the case in most of the European collections. Several pairs were kept at Clères between 1920 and 1940, but they never attempted to nest. Although fairly hardy and spending normal winters outdoor without inconvenience, they are better placed in a cool shelter if the temperature drops below 15° F. They have not so far shown any inclination to breed in northern countries.

Young birds have often been reared in Australia from eggs collected from wild parents, and the fact is recorded by Bennett as early as 1861 (*P.Z.S.*, p. 266). He states that a Mr Henry Clarke, of Sydney, hatched and raised seven chicks under a hen. But the only success in captivity so far has been achieved at the Zoological Park of San Diego. Mr Ken Stott (*Aviculture*, 1946, p. 13) reports that it was in the first week of May 1945 that this pair of Magpie Geese hatched five out of six fertile eggs which had been laid. Of the five young, one failed to survive infancy, but the remaining four grew steadily until they were as large as their parents. The adults were full grown at the time of their acquisition, July 1941. Mrs Belle J. Benchley, Executive Secretary of the Society, reports, (*in litt.* February 26 1949), that the Magpie Geese bred again in 1946, but not since. They were placed in a large duck pond in 1948, but the female was killed, probably by a Black Swan. The first year, the goose incubated and reared her brood herself. Mrs Benchley has supplied the following data:

First egg laid 18th March 1945; second egg laid 19th March 1945; third egg laid 20th March 1945; fourth egg laid 21st March 1945; fifth egg laid 22nd March 1945; sixth egg

THE MAGPIE GOOSE

laid 23rd March 1945; 5 eggs hatched 27th April 1945 — 35 days incubation; 1 egg infertile; 1 gosling died — 28th April 1945.

4 Magpie goslings hatched and raised 1945.

First egg laid 3rd March 1946; second egg laid 4th March 1946; third egg laid 5th March 1946.

No more eggs were laid and female showed no interest in sitting.

We collected the three eggs and set same under a domestic hen for hatching. 6th March 1946.

2 eggs hatched 10th April 1946; 1 egg infertile; 1 weak gosling died 11th April 1946.

1 Magpie gosling hatched and raised 1946.

No other complete breeding success with this curious species has come to my knowledge.

Magpie Geese are interesting in any collection owing to their strangeness. Their peculiar gait and, if full-winged, their habit of perching on slender twigs, and even on thin wires, are striking. But they can hardly be called beautiful. They are quiet, usually shy, and harmless toward their companions. At Clères we suspected them, however, of having eaten eggs, as we saw them behaving in a queer way at the nests of other waterfowl, including that of Coscoroba Swans.

Whistling Ducks, Swans and Geese

SUB-FAMILY ANSERINAE

THE BIRDS of this group have a long neck and are 'goose-like' in posture and body shape; the tarsi are always reticulated in front, and they have a single annual moult. Sexual dimorphism is absent or very slight, the plumage being always similar in the male and in the female, as are — basically — the voice and the structure of the syrinx. There is no speculum on the wing, nor any metallic colours in the plumage. The displays are simple and the same in both sexes. They pair for life, and the male helps in caring for the young, some of them also sharing the incubation duties. Their chief food is vegetable.

Their general anatomical features are those of the family, except the *Anseranitinae*, and do not differ in any deep-rooted and important way from those of the *Anatinae*.

WHISTLING DUCKS · TRIBE DENDROCYGNINI

THE SMALL but highly particular group of species composing the genus *Dendrocygna*, the only one in this tribe, differs so strikingly from other waterfowl that it has usually been considered as forming a separate sub-family. The general aspect and proportions of these birds are unlike those of all other ducks of similar size, as also are some of their anatomical features (skull, shortened and bent pelvis), the pattern of the plumage of adults and of the down of chicks, their life habits and their voice. But for reasons stated later they are sufficiently near relatives of the Swans and Geese, to which they are linked by *Coscoroba*, to be associated with them in the same sub-family.

II

THE WHISTLING DUCKS

Genus *Dendrocygna*

Swainson, *Classif. Birds*, 2, 1837, p. 365.

Type by subsequent designations: *Anas arcuata*, Horsfield.

THE WHISTLING DUCKS are commonly known as 'Tree Ducks', a rather misleading name since they are considerably less arboreal than the members of the tribe of Perching Ducks (*Cairinini*). The present tribe is formed of one primitive, peculiar genus of eight species. Its only obvious near relative is the *Coscoroba* which stands more or less halfway between it and the Swans, and might almost be associated in a tribe with either of them in the present scanty state of our knowledge of its habits and behaviour.

Whistling Ducks are small birds possessing a high neck of seventeen vertebrae normally held straight as in the Geese; a short, wide body; broad, rounded wings, the primaries and secondaries equal in length, the former variously notched or emarginate; long legs with a half-naked tibia, and tarsi reticulated in front; large feet with indented webs, the thumb long and inserted low, and sharp claws; a rather high and narrow bill, with a large hooked nail at the tip. They generally resemble the Swans and Geese in their structure and shape; but they also somehow recall the Ducks in having forty-four vertebrae in front of the pygostyle while the Geese have more than forty-seven. The trachea has symmetrical enlargements at the base in both sexes, smaller in the female in which, according to Heinroth, there is a slit covered by a membrane in the place of a dilatation. Accordingly, the voice of the female is slightly deeper. The pelvis bones are slender at the tip. A peculiarity of their skull is that the tip of the lachrymal bone is produced backward and united with the squamosal process, thus enclosing the orbit completely.

It is interesting to note that two species of Whistling Ducks (*arborea*, *bicolor*) show on the sides of the neck the same peculiar wrinkled lines, forming spiraled furrows like those found in several species of Geese (*Anser anser*, *A. albifrons*, *A. fabalis*, *A. caerule-scens*, *A. rossi*, *Branta sandvicensis*).

The adult plumage, similar in both sexes, has an elaborate pattern, and there is a tendency to a lengthening of the flank feathers, which become highly ornamental in some species. A duller juvenile plumage is worn during a few weeks only. The pattern of the plumage of the downy chicks is peculiar and characteristic, its special feature, unique among waterfowl (but also indicated in *Coscoroba*), being a white or pale yellow line across the occiput which extends under the eyes and the bill; a broad dark line goes

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2. Distribution of
(A) *Dendrocygna guttata* and
(B) *Dendrocygna eytoni*.

through the eye, and a light line runs above; the underparts are lighter, the upper-parts darker with three or four pairs of large light spots, except in two species (*guttata*, *eytoni*) which have a light line on each side of the back.

The eggs differ from those of other waterfowl in being shorter and rounder, and creamy white. Eggs and chicks are remarkably small, the latter with long, thin necks, high legs and short body.

All the species of *Dendrocygna* are very distinct except two (*bicolor*, *arcuata*) which are quite similar in adult and downy plumage, shape and voice, occupy different areas, and can be considered as forming a super-species. There is very little geographic variation among them, two species only, *autumnalis* and *arcuata*, possessing definite sub-species.

Any sequence of species is entirely tentative and artificial, as certain general resemblances of appearance may be deceptive. Apparently significant characteristics do not always confirm affinities suggested by others. The adults of three species are fairly similar in shape and colour — *bicolor*, *arcuata*, *javanica* — as are also two others, *arborea*, *guttata*; while *eytoni*, *autumnalis* and *viduata* are peculiar and isolated. The first three have short tails; *viduata* a medium-sized one; *guttata*, *eytoni*, *arborea* and *autumnalis* rather long ones. Flank feathers are inconspicuous in *autumnalis* and *viduata*, and

THE WHISTLING DUCKS

3. Distribution of
 (A) *Dendrocygna arborea*
 and
Dendrocygna autumnalis:
 (B) *D. a. autumnalis*;
 (C) *D. a. discolor*.



hardly more noticeable in *guttata*, *arborea* and *javanica*; but they are large and brightly coloured in *bicolor* and *arcuata*, and greatly lengthened and pointed in *eytoni*, in which they constitute a striking ornament. Only two species, *bicolor* and *arborea*, show neck 'striation'. Those two, with *guttata* and *eytoni*, possess distinct occipital tufts. Most species have blackish bills and bluish-grey legs and feet, but *guttata* has dull dark red feet and legs, *eytoni* has a pink bill spotted with black, and flesh-coloured legs and feet, as has *autumnalis*, whose bill is bright pinkish-red. All have dark brown eyes, except *eytoni* in which they are yellow.

The downy chicks fall into three groups: in *autumnalis*, *viduata*, *javanica* and *arborea* they are white or yellow below, and dark above with distinct spots; in *arcuata* and *bicolor* they have a similar pattern, but are light grey or brownish above and whitish below; in *guttata* and *eytoni* they are dark brown above, buff or white below, but the back has two long, pale buff bands instead of spots.

No completely satisfactory system can be devised for classifying the different species with their many and sometimes divergent features. We think that the presence of two pale bands on the back of the chicks is an ancient characteristic, as it is found in the majority of the *Anatidae*. We therefore put *guttata* and *eytoni* at the beginning, followed by *arcuata*, *bicolor* and *arborea*, ending with the more isolated *javanica*, *viduata* and

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autumnalis, whose chicks are brightly and more or less similarly marked. We have adopted different sequences in the past, and others have been proposed by various authors. Indeed, we must admit that almost any is equally acceptable. The present species of Whistling Ducks have, no doubt, been fixed for a very long time and their common ancestor is far away in the past.

The geographical distribution of the Whistling Ducks includes most of the tropics and sub-tropics of the Old and the New Worlds. That of *D. bicolor* is without parallel among birds, as it is constituted by at the least six widely separated areas in the Americas, Africa, Madagascar and Asia, with no variation in size and colour. *D. viduata* is also peculiar in being abundantly represented throughout tropical South America, Africa and Madagascar.

The close connection of the different species of Whistling Ducks, and their distant relationship to other waterfowl, is shown by the fact that they cross rather freely between themselves, but that hybrids between them and other tribes of *Anatidae* have never been recorded.

KEY TO SPECIES OF DENDROCYGNA

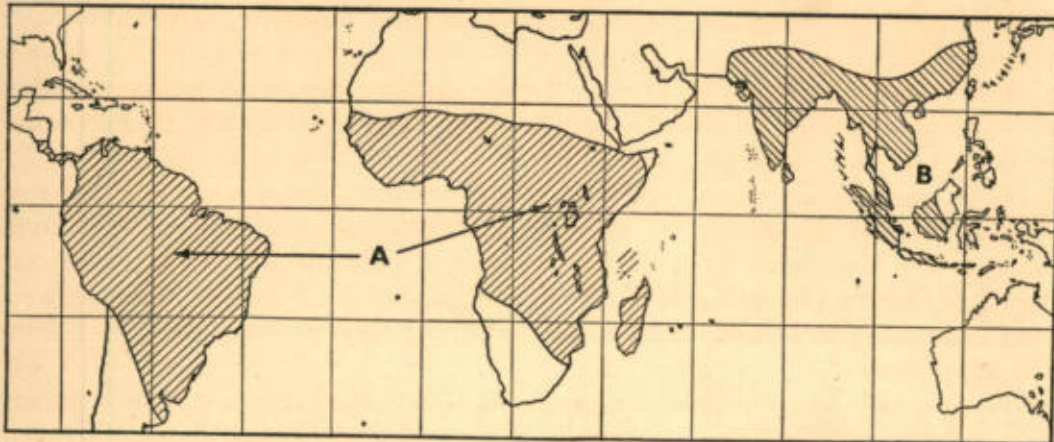
1. Feathers of flanks very long and pointed	<i>eytoni</i>
Feathers of flanks not pointed	2
2. Anterior part of head white	<i>viduata</i>
Anterior part of head not white	3
3. Abdomen black	<i>autumnalis</i>
Abdomen not black	4
4. Abdomen fulvous	5
Abdomen white spotted with black	7
5. Breast spotted with black	<i>arcuata</i>
Breast unspotted	6
6. Large; upper tail-coverts creamy white	<i>bicolor</i>
Small; upper tail-coverts chestnut	<i>javanica</i>
7. Large; bill black; underparts boldly marked with black	<i>arborea</i>
Small; bill dark red; underparts slightly marked	<i>guttata</i>

GENERAL HABITS

The general pattern of the behaviour of the Whistling Ducks is the same as that of the Swans and Geese. There is a similarity of attitudes, voice and display in male and female; one moult a year; the caring for the young by both sexes; as in the Black Swan, male Whistling Ducks perform at least part of the incubation duties.

The eggs are always white, much rounded and rough-shelled; clutches are large, and the incubation lasts from twenty-seven to thirty-two days. They are deposited in a variety of locations, usually on the ground among reeds, rushes, grass or brush. They may also be found in trees and bushes, in nests built for the purpose in large forks, in old aban-

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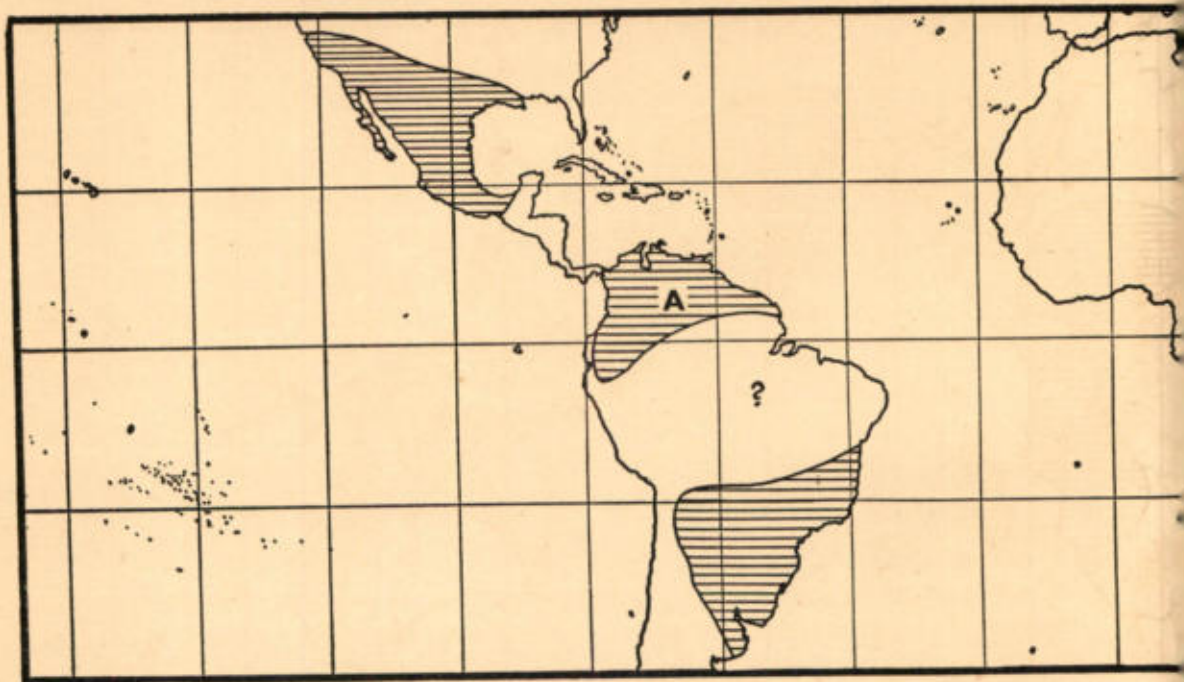
4. Distribution of (A) *Dendrocygna viduata* and (B) *Dendrocygna javanica*.

done nests of other species, or in holes; the same species may use different sites according to place and circumstance. In all cases the nest is substantially built, but it is never lined with down as are those of other waterfowl, and the eggs, when in an exposed location, are carefully hidden under bent-over stalks, others usually forming the base of the structure in marshes. There is sometimes a corridor of access. Such variation and instability of nesting habits suggest an absence of fixation and considerable primitiveness.

Whistling Ducks are gregarious during the greater part of the year and frequent tropical and sub-tropical fresh waters, often congregating in very large numbers. Those inhabiting the warmer parts are practically sedentary, just moving in search of food and water, while populations of the same species breeding farther north, or south, make seasonal migrations of a comparatively small extent. They are distinctly goose-like in appearance, particularly those species possessing a fairly long tail. They assume the special 'threat' and 'triumph' attitudes, the neck extended and lowered as they call loudly. They stand erect, walk gracefully and easily, and they are deliberate and dainty — very different in their ways from the Ducks. Their voice sounds strange for waterfowl, being a high-pitched, shrill, clear or squeaky whistle resembling that of certain passerine birds. Many of them are noisy birds, calling incessantly on the wing, mostly at dusk and at night, while, on the ground, they indulge in lengthy conversations, squabbles and choruses. All species have a distinct call and also whispering notes.

Whistling Ducks are omnivorous feeders, but their main diet is vegetarian. They graze a great deal on land, but they also gather food under water. They dive readily and expertly, in a way that differs widely from that of the Diving Ducks and rather recalls the action of Coots jumping jerkily into the water. They swim rather low and laboriously. They fly comparatively slowly, if lightly, their broad wings flapping at a lower pace than the sharp pinions of River Ducks such as the Mallards and Teal. They produce a strong

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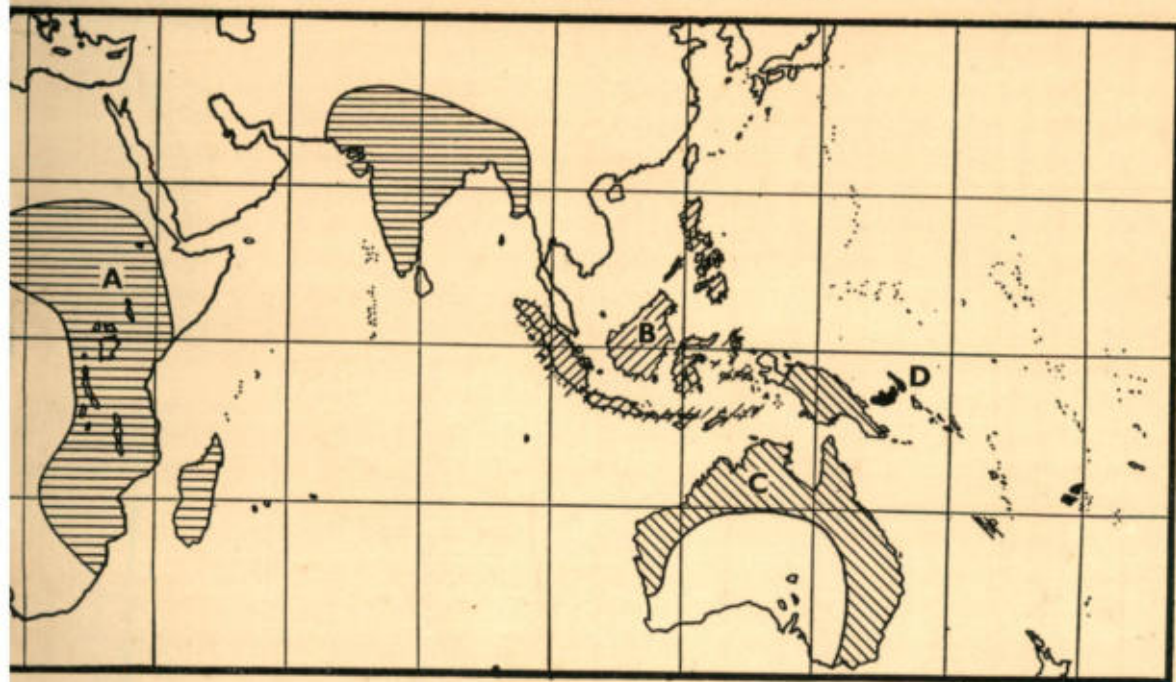


5. Distribution of (A) *Dendrocygna bicolor* and *Dendrocygna arcuata*:

whirring noise, as their primaries are variously notched; the noise differs in strength according to species. Their flight — the long neck and legs stretched out — rather recalls that of the Ibises. The legs are dropped towards the ground long before landing. They are night feeders as a rule, and in the daytime they spend most of the time resting, sitting or standing on banks, islands, sand and mud flats, or hidden in the rushes, seldom swimming or flying. The perching habit varies with species, seasons and circumstances, but it is not often strongly developed. Some species appear never to roost on trees, while others are more or less prone to do it according to conditions. In captivity or semi-liberty, full-winged Whistling Ducks of most species are seldom observed perched.

Pairs remain deeply attached and show their affection in softly preening the feathers of each other's face. They become quarrelsome in the breeding season, and not only with birds of the same species. If many are associated, decided persecution of the females may take place, though this is not usual. The male shares in the duty of incubation and it is even possible that he performs most of it in two species (*viduata*, *bicolor*). The courting display is simple, and resembles that of the Swan, both sexes stretching their necks, dipping their heads, and sometimes diving together; they face each other, lift the breast out of the water and slightly raise the wings. We are still ignorant of many of their habits as there is not one detailed life history of any of the Whistling Ducks in

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(B) *D. a. arcuata*; (C) *D. a. australis*; (D) *D. a. pygmaea*.

ornithological literature; nor is there any good anatomical study of the tribe compared with other waterfowl.

Whistling Ducks, although usually fair for the table, are not considered good game birds by sportsmen as they are too confident, and too slow on the wing.

CAPTIVITY

Whistling Ducks are delightful as ornamental birds, being quaint and graceful, usually very tame and harmless to other birds if they are given sufficient space. The only drawback is that they are relatively sensitive to cold, but this has been much exaggerated as most species can stand heavy frosts, down to 10° F., and even more if open water remains available. In very cold districts, however, it is safer to keep them in a slightly heated shelter, on a good litter of straw, in severe weather. Otherwise they do better when kept, like ordinary Ducks and Teal, at liberty in a large enclosure, a garden or a park; they can often be left full-winged on account of their natural confidence, and of their usual lack of migratory urge. Only during very cold winters, when most of the water is frozen over, do they show any tendency to fly away, particularly the semi-migratory species such as the Fulvous and the Red-billed.

There is no noticeable difference in the behaviour of wild Whistling Ducks and of

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those kept full-winged in a park; for many years the several dozens that lived at Clères used to circle high in the sky on the evening flight just as I had seen them fly in America, in Africa and in Asia, filling the air with their shrill whistles. Under such conditions several species breed freely, either in reed beds, on islands or in nesting boxes. The parents hatch large broods when left to themselves, but, in our experience, never succeed in rearing the young, which disappear as a rule within two or three days. The chicks are very small and fall easy prey to vermin. The best plan is to collect the eggs and entrust them to small bantam hens. The young are then easily reared in the sort of coops used for Teal; they do not require any special care or food. As they are nearly always tame enough, pairs which have hatched their brood can be caught with the chicks and placed in a vermin-proof pen, where they rear their family without trouble. The male helps as much as the female in looking after the young. A very tame pair of Mexican Red-billed, at Clères, was treated in that way every season. The female was caught as she brooded her newly hatched chicks and taken to an aviary some hundred yards away; within a few minutes the male would fly out and join them, walking into the pen as we opened the door for him. This pair reared large broods year after year. We reared Fulvous in the same way, and even wild Plumed Whistling Ducks behaved similarly in Australia. The small species, such as the Wandering (*arcuata*), the Indian (*javanica*), and the Spotted (*guttata*) are better kept apart from the large ones as they are likely to be persecuted by the stronger birds. They did well at Clères in rat-proof enclosures in the company of Teal, but they never bred, nor did the Plumed that lived in the park. Young of the other four species were reared on many occasions there, as in several other collections.

Whistling Ducks were seldom successfully reared in captivity before thirty years or so ago, as they were usually kept in small pens and taken indoors during the winter months because of an erroneous idea of their sensitiveness to cold. But when given plenty of space they breed as easily as many other waterfowl. All species, with the exception of the Spotted, have been reared in captivity.

SPOTTED WHISTLING DUCK

Dendrocygna guttata

Schlegel, Mus. Pays-Bas, 6, 1866, *Anseres*, p. 85.

Peters, *Check-List, Birds of the World*, 1, 1931, p. 154.

D. guttulata, Phillips, *Nat. Hist. of the Ducks*, 1, 1922, p. 174.

CHARACTERISTICS

A medium-sized brown species with a dark brown band on the hind neck, light grey face and throat and whitish belly; breast, sides and flanks fulvous with large white spots surrounded by dark brown border. Upper tail-coverts black and white. Bill, legs and feet dusky red. It somewhat resembles *arborea* in colour, but it is much smaller, has fewer black markings and black spots on the underparts.

THE WHISTLING DUCKS

Wing: 212–223 mm.; tail: 83–87 mm.; culmen: 41–46 mm.; tarsus: 47–51 mm.

Immatures: duller, without distinct spots below and striped feathers on the flanks.

Downy chicks: blackish brown with two white bands on the back and the breast tinged with brown, resembling those of *eytoni*, but more strongly marked. These are the only two species in the genus with pale stripes on the back instead of spots.

Eggs: still undescribed.

DISTRIBUTION

Basilan, Mindanao (Philippines), Celebes, Buru, Ceram, Amboina, Tenimber, Aru and Kei Islands, New Guinea, Bismarck Archipelago.

GENERAL HABITS

Less is known of the Spotted Whistling Duck than of any other species of *Dendrocygna*. It appears to be locally common. At Bernhard Camp, in New Guinea, Rand found many, usually in pairs and small parties, resting on little floating islands or logs in the grassy margins of the lagoon. Broods of small young accompanied the parents in March 1939: 'A tall dead tree in the camp clearing was a favourite roosting place, and each evening in April and May, at dusk and until it was too dark to see, small parties of ducks came to perch there, until several dozen birds had congregated.' (*Bull. Am. Mus. Nat. Hist.*, LXXIX, art. VII, 1942, p. 429.) The same author (*ibid*, art. IV, p. 292) had found them at Lake Daviumbu and on the middle of Fly River in 1937, in company of *D. arcuata*, several hundreds of both species circling over the marshes in the morning. They were not in breeding condition in August and September, while *arcuata* were. They spent the night on a tall dead tree on the river's edge, which seemed to be a common roosting place. No accurate description of nests has ever been given, but Ramsey reports that they are placed in the hollows of trees. The breeding season is a long one, as D'Alberty found birds breeding in April and in September in south-eastern New Guinea. Spotted Whistling Ducks are very noisy on the wing, as their first primaries are deeply notched and the air passes through them with a strong whirr.

CAPTIVITY

According to Miss Hubbard, the Spotted Whistling Duck was first imported into England from Celebes in 1888 by Jamrach, but there is no mention of the birds elsewhere. In 1935, Frost brought to Clères six specimens which lived until 1940. They were kept full-winged in an aviary built over a stream also occupied by various Teal. They proved quiet and inoffensive, and spent the winters outdoors without showing any discomfort. They never bred nor were they observed displaying. They often perched on dead branches, and they seem to be more arboreal in habits than any other species. Their voice is harsh and low, and they are rather silent. In 1953 three were added to the Wildfowl Trust collection at Slimbridge.

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PLUMED WHISTLING DUCK

Dendrocygna eytoni

Leptotarsis eytoni, Eyton, *Monogr. Anat.*, 1838, p. 111: North-west Australia.

Dendrocygna eytoni, Phillips, *Nat. Hist. of the Ducks*, 1, 1922, p. 177. Peters, *Check-List, Birds of the World*, 1, 1931, p. 154.

CHARACTERISTICS

Probably the most beautiful of all Whistling Ducks, of harmonious proportions, with a small bill, long legs, wings and tail, and slightly tufted occiput. Plain, light olive-brown above; throat and foreneck whitish-grey; breast pale brown; sides of body pinkish-chestnut barred with black; abdomen black. The flank feathers are very long, broad, and sharply pointed, buffy yellow bordered with black, forming two fan-like tufts on the sides of the body, as they are usually carried outside of the wing. Bill, dull red spotted with black. Legs, fleshy pink. The iris is orange or yellow.

Wing: 240-245 mm.; tail: 83-88 mm.; culmen: 42-44 mm.; tarsus: 53-56 mm.

Immatures are uniformly pale brown.

Downy chicks: brown and whitish; light lines on the sides of the back instead of spots.

Eggs: 48×37 mm., on an average; ten to twelve in a clutch. Incubation: 28 days.

DISTRIBUTION

Australia and Tasmania, but commoner in the north and west, occasionally straggling to New Zealand.

GENERAL HABITS

This handsome species breeds mostly along the rivers and in the swamps of Northern and North-eastern Australia, wandering according to the rains; it is not usually found on the head-waters or near the sea. Its habits are similar to those of the Wandering Whistling Duck with which it often associates. It is nocturnal, usually shy and wary to a higher degree than other species, and feeds at night on dry land. It sometimes nests far from water, practically always on the ground. It perches rarely and awkwardly. It is remarkably goose-like in aspect, proportions and behaviour, walking erect, often stretching and lowering its neck. Its voice is a low wheezy and rather harsh grunt or a squeaky whistle; it is a rather silent bird. In the south it breeds from September to December, but in the north, the nests are found between February and June, according to the rains.

Excellent observations on this species have been recorded recently by A. F. d'Ombra (Emu, 44, 1945, pp. 324-30; 45, 1945, pp. 80-2), of which we give the following extracts:

'The following is an account of the capture of a complete family of Plumed Tree-Ducks (*Dendrocygna eytoni*) and the method of their capture.

'On March 2, 1943, I drove, in company with Mr A. Bailey of West Maitland, to the

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property of Mr Elliott at Buttai, a settlement about eight miles south of Maitland. The land surrounding the home is cleared for some distance and is good grassy pasture land, but it rises steeply in one part at the back of the home, where it is met by country supporting eucalyptus.

'On February 14, as Mr Elliott was crossing the paddock, he was attracted by a peculiar sound coming from up near the top of the rise, and saw in the distance a pair of ducks evidently rather excited. When he approached he was amazed to see twelve tiny fledgelings, evidently just hatched. They were in single file making in the opposite direction from the lagoon, which was about three-quarters of a mile distant. As he came closer the drake performed the broken wing act, and then, as he followed, rose into the air and flew off.

'Turning his attention to the young birds, he commenced to round them up in sheep-dog style, working quietly from side to side and all the time "steering" them down the slope towards the homestead. All this time the duck remained with the ducklings, keeping slightly in advance. After quietly working the birds for over an hour, during which time they covered more than half a mile, this extraordinary feat of driving was at last completed, and he arrived at the back of the home, where the fowl-runs were situated. The ducklings, of course, "infiltrated" through the large mesh and were soon spread out all over the garden. The duck, which had gone into one of the enclosures, was then left while Mr Elliott and his family concentrated on collecting the babies. This was done, and the duck soon came alongside the cage.

'The drake flew down shortly afterwards and was decidedly "jumpy" about going inside the crate. However, after some time he went inside and sat down with the duck. Mrs Elliott then walked quietly up to the crate and drew a piece of wire netting across, and thus the whole family was caught. As she approached the old birds had made no effort to get out, but became rather aggressive.

'The ducklings readily took to millet thrown on to water in a shallow dish, and later changed over to pollard. Two of the brood were found dead a day or two later outside the large wire enclosure, and it is thought they may have been killed by a large rooster. When we approached the cage the parents kept up a continuous whistling call and at the same time extending the necks and bowing low, almost to the ground, and facing us in an aggressive manner. . .

'Another extraordinary observation we noticed was the tendency of the drake, more than the duck, to look after the young ducklings. At first I could not believe this possible, but we had one sure proof. The drake at present has much larger plumes than the duck—this Mr Bailey had noted when the duck was laying, so we were able to identify the drake positively. Their plumage is so similar at present, apart from this, that it would be impossible to distinguish the sexes.'

CAPTIVITY

Plumed Whistling Duck, often called 'Eyton's Tree Ducks', have always been rare in captivity, although reaching Europe and America occasionally. The London Zoo received some as early as 1832, and Lord Derby possessed a few at Knowsley in 1851.

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They live long and are far the hardiest species of the genus, but they have seldom bred in confinement. Pairs kept for many years at Clères and at Foxwarren never laid, and the only success outside of Australia is recorded by Sibley (*Avicult. Mag.*, 1940, p. 157), who reports having reared two young in 1938 in Connecticut. The female laid the year following her arrival from Australia, but she was killed soon after. Plumed drakes produced hybrids at Leckford, England, in 1939, with Fulvous, Red-billed, and Black-billed females.

Plumed Whistling Ducks are quiet and unobtrusive as a rule, but some males occasionally become bullies. They are more reminiscent of Geese than any other species. They are by far the prettiest and most striking species of *Dendrocygna*, but they have none of the charming tameness and amusing ways of the Red-billed and White-faced Whistling Ducks.

WANDERING WHISTLING DUCK

Dendrocygna arcuata

CHARACTERISTICS

A small, short-tailed species, bright fulvous with dark brown upper-parts, black crown and hind neck, and creamy white upper tail-coverts; flank feathers large, pale buff with black and chestnut borders. It resembles the Fulvous, but it is smaller and darker, with the upper back and breast spotted with black. There are no striations on the neck, and the occipital tuft is less apparent.

Immatures are slightly duller.

Downy chicks are pale brownish grey and ashy white, close to those of *bicolor*, but a little darker and browner.

Eggs: 51 × 35 mm. on an average; clutches of six to fifteen eggs. Incubation about 30 days.

DISTRIBUTION

Philippines, Borneo, Java, east to the Fiji Islands and south to Australia. There are no differences in colour, but the populations vary in size, and three sub-species are recognizable.

GENERAL HABITS

The Wandering Whistling Duck lives within the tropics astride the Equator, and its movements, as well as its breeding season, are conditioned solely by the rains. It resembles the Fulvous in habits, perching exceptionally, and normally nesting among grass and reeds. It is common and tame in all suitable areas where it has not been excessively persecuted. It is a squatter, lower bird than the Fulvous, holding its body more horizontally, like the Indian. In voice it resembles the Fulvous, but rather less loud, and it usually remains silent when not on the wing.

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CAPTIVITY

D. arcuata is not very common in confinement, probably because it resembles too closely the more showy and hardier Fulvous. It reached the London Zoo in 1896. It has seldom bred in captivity, but Sibley (*Avicult. Mag.*, 1940, p. 156) records the successful rearing of a number of young by Mr C. R. Norton, Canoga Park, California, in 1936; these birds bred practically throughout the year. W. J. Parsonson has also reared some at Paramount, California. Heinroth also reported seeing young *arcuata* at Woburn, but this is a doubtful record. Pairs at Clères never nested, but those at Leckford bred in 1939 (*Avicult. Mag.*, 1940, p. 67). The sub-species nearly always imported is the East Indian *arcuata*.

EAST INDIAN WANDERING WHISTLING DUCK

Dendrocygna arcuata arcuata

Anas arcuata, Horsfield, Zool. Res. Java, pt. viii, 1824: Java.

Dendrocygna arcuata, Phillips, *Nat. Hist. of the Ducks*, 1, 1922, p. 140. Peters, *Check-List, Birds of the World*, 1, 1931, p. 153.

CHARACTERISTICS

Medium-sized sub-species. Wing: 180–203 mm.; tail: 50–55 mm.; culmen: 42–48 mm.; tarsus: 43–45 mm.

DISTRIBUTION

Borneo, Sumatra, Java, Lesser Sunda Islands (Bali, Sumba, Timor), Celebes, Amboina (and perhaps other Moluccas), Philippines.

Birds from Celebes and the Lesser Sunda Islands are very slightly larger than the more northern and western birds.

AUSTRALIAN WANDERING WHISTLING DUCK

Dendrocygna arcuata australis

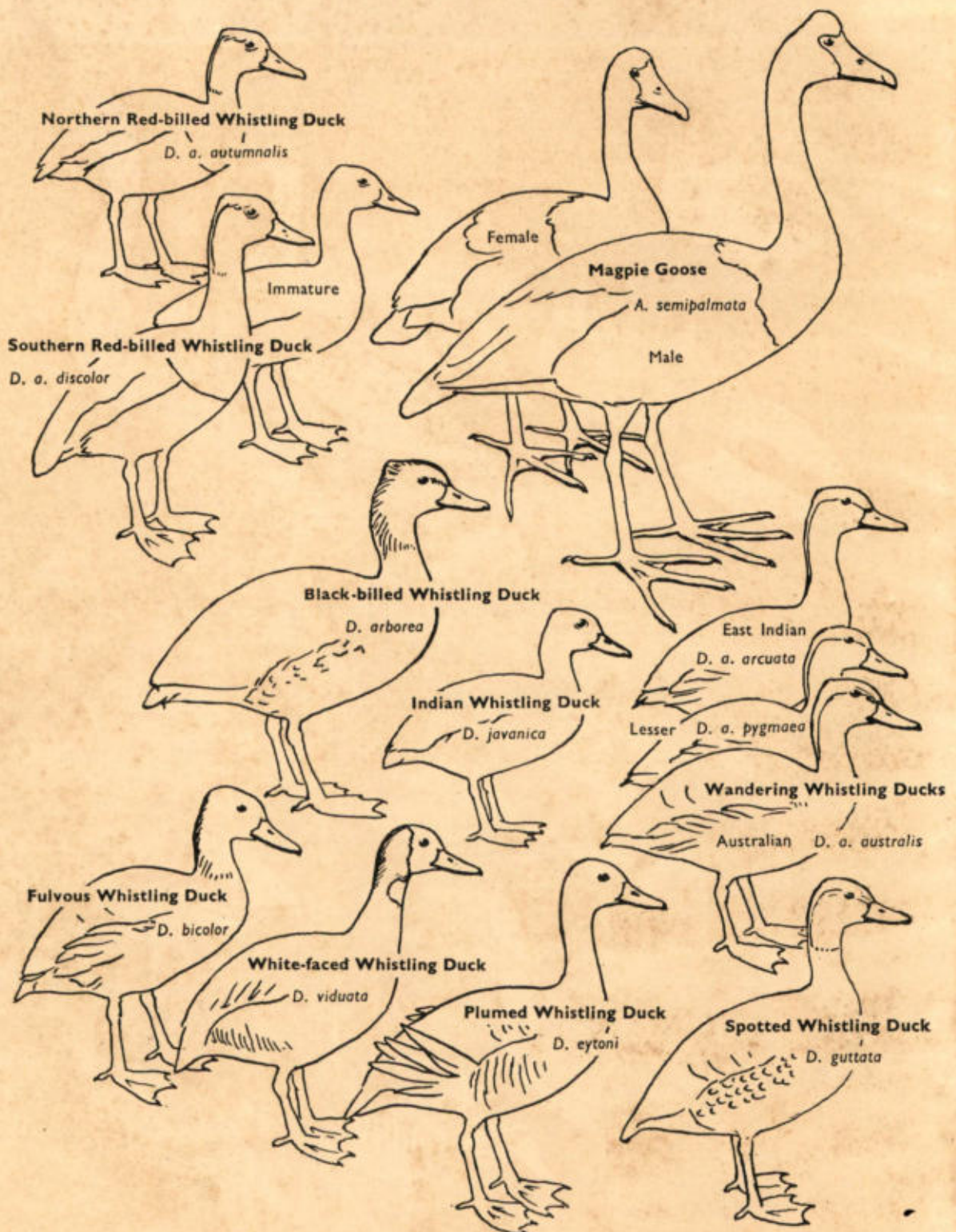
Dendrocygna arcuata (australis), Reichenbach, *Novitiae Synopsi Avium*, No. 4, part 4, 1850: Port Essington, Northern Territory, Australia.

CHARACTERISTICS

The largest sub-species. Wing: 200–222 mm.; tail: 52–57 mm.; culmen: 42–48.5 mm.; tarsus: 44–48 mm.

DISTRIBUTION

Australia (rarer in the southern half), Southern New Guinea. According to Mayr, the populations of Northern New Guinea and New Caledonia, which could not be well studied, probably belong to *australis*, or are intermediate in size between *australis* and the small sub-species.



I. Magpie Goose and Whistling Ducks



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LESSER WANDERING WHISTLING DUCK

Dendrocygna arcuata pygmaea

Mayr, *Am. Mus. Novitates*, 1924, 1945, p. 3: Manlo, Wide Bay, New Britain.

CHARACTERISTICS

The smallest sub-species. Wing: 173-183 mm.; culmen: 40.5-43.5 mm.

DISTRIBUTION

New Britain and probably Fiji Islands, where it has been exterminated by the introduced mongoose.

FULVOUS WHISTLING DUCK

Dendrocygna bicolor

Anas bicolor, Vieillot, *Nouv. Dict. Hist. Nat.*, v, 1816, p. 136: Paraguay.

Dendrocygna bicolor, Phillips, *Nat. Hist. of the Ducks*, 1, 1922, p. 128.

D. bicolor bicolor, Peters, *Check-List, Birds of the World*, 1, 1931, p. 153.

D. b. helva, Peters, *Check-List, Birds of the World*, 1, 1931, p. 153.

CHARACTERISTICS

A rather large, short-tailed Whistling Duck, bright fulvous with dark brown mantle and wings; large ornamental flank feathers; upper tail-coverts creamy white; crown brown; a black line on the back of the neck. The feathers of the sides and front of the neck form 'striations', and those of the occiput are long and constitute a short crest, as in *arborea*. Bill, slaty grey. Legs, bluish-grey.

Wing: 200-235 mm.; tail: 52-58 mm.; culmen: 42-52 mm.; tarsus: 55-61 mm.

Immatures are slightly duller.

Downy chicks are very pale, greyish brown above, whitish below, the usual pattern of Whistling Ducks being present, but less conspicuous than in other species.

Eggs: 53 x 38 mm. on an average; clutches large, sometimes of over twenty. Incubation: 30 to 32 days.

DISTRIBUTION

Probably the most extraordinary range of all species of birds: California, Nevada, Arizona, Texas and Louisiana south to Lake Chapala and the Valley of Mexico, in winter to Guerrero and Tabasco; Trinidad, casual in Cuba; South America from Panama and Colombia to the Guianas, then Eastern Brazil from Bahia to Tucuman and Northern Argentina (Buenos Aires); East Africa, from Lake Chad and Abyssinia to Natal; Madagascar; India, Ceylon and Burma, south to Pegu.

There is no geographical variation throughout this huge and broken range; plumage differences are entirely individual, and the sub-species *helva* Wetmore and Peters (*Proc.*

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Biol. Soc. Washington, 35, 1922, p. 42, San Diego, California) cannot be accepted, even on the ground of a narrower bill, as Conover has pointed out (*Birds of the Americas*, part 1, No. 2, 1948, p. 313).

GENERAL HABITS

Fulvous Whistling Ducks make limited migrations in the colder parts of their ranges and also appear to wander a great deal; records of vagrants are not unusual outside of their regular distributional areas. They are found in the lowlands, but also ascend plateaus and are numerous on certain lakes up to 5,000 feet. Everywhere they are of extremely local occurrence, even though common, and they are absent from large territories which look favourable to them. In Madagascar, for instance, we found them only at Lake Iotry in the west, Lake Aloatra in the east, and near Tananarive, while White-faced Whistling Ducks were ubiquitous. Wherever found, they are numerous, particularly in South America.

Fulvous Whistling Ducks inhabit such different territories that it is difficult to ascribe to them a special kind of habitat. They are normally found, like the other species, near fresh water surrounded by reed beds and other vegetation, but they appear to prefer open country and are rare near heavy forest. They are decidedly nocturnal, feeding and flying mostly at night, and they are not very tame in disposition, although easily approached and shot. Their flight is strong, but not noisy. Except in a few districts, they appear never to perch, and we have not observed captive birds do so. They dive readily. Their voice is harsh and low, and except on the wing they keep rather silent or only twitter. They breed in every month of the year according to locality. The nest is usually placed among reeds, bent stalks constituting their foundation. At Clères they always nested in flag clumps, building elaborate and well-concealed nests. There are many records of nests in trees, but such a location must be unusual except in certain localities, particularly in India.

CAPTIVITY

Fulvous Whistling Ducks are showy, but their large feet and short legs and tail give them a less attractive appearance than some other species. They are quiet and rather dull, seldom very tame and rarely indulging in the amusing antics of which the Red-billed and White-faced are masters. They are commonly kept in captivity, are hardy and will breed. They first reached the London Zoo in 1867 and bred there in 1872, as they did later at Woburn and elsewhere in England and in France. Many were hatched at Clères between 1934 and 1940, and they proved easy to rear. Our birds came from South America, Madagascar and India. They sometimes fight violently during the breeding season and persecute small species, particularly the Wandering and Indian, which we had to remove to safer quarters on several occasions. Hybrids have been recorded between the species and *javanica*, *arcuata*, *eytoni* and *viduata*.

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BLACK-BILLED WHISTLING DUCK

Dendrocygna arborea

Anas arborea, Linné, *Syst. Nat.*, ed. 10, 1, 1758, p. 128: America—Jamaica.

Dendrocygna arborea, Phillips, *Nat. Hist. of the Ducks*, 1, 1922, p. 168. Peters, *Check-List, Birds of the World*, 1, 1931, p. 154.

CHARACTERISTICS

A very large, dark brown Whistling Duck, with a whitish neck and throat, a black band on the nape and hind neck, the feathers of the occiput long and forming a small crest, and the underparts pale buff spotted with black; flank feathers black with a broad pale buff stripe; upper tail-coverts black. Bill and legs black.

Wing: 230–270 mm.; tail: 100–105 mm.; culmen: 45–53 mm.; tarsus: 62–75 mm.

Immatures: paler and duller, with no black spots below.

Downy chicks: blackish above and buffy white below, with a dark grey spot on the foreneck, and white spots on the upper-parts.

Eggs: about 55 × 40 mm., ten to twelve in a clutch. Incubation: 30 days.

DISTRIBUTION

Bahama Islands, Greater Antilles, Virgin Islands, Northern Lesser Antilles.

GENERAL HABITS

Black-billed, or West Indian, Whistling Ducks inhabit forested swamps and mangroves, and are usually found on land where they walk with great ease. They are not very wary, or shy, but are seldom seen in the daytime as they rest in the swamps. They feed mostly at night, often on the fruit of the tall royal palms on which they alight. They are rarely seen swimming on open water, but often perch on trees. Their voice is rather harsh. They breed from June to October, and possibly later. They most commonly nest among reeds on the ground. They are still locally numerous, but they have been much persecuted by man and also by the mongoose.

CAPTIVITY

This species was imported early into Europe and birds were kept in England by Sir Charles Wager before 1750. Latham possessed a specimen sent from Jamaica in 1785 and it was represented in the collection of the London Zoological Society in 1831. It bred in captivity for the first time at the Cologne Zoological Garden in 1869, and later at Le Havre in M. Mame's aviary in 1873, and next at M. Cornély's park, Beaujardin, Tours, in 1876. More recently, Black-billed Whistling Ducks have been reared at Lilford, England, in 1932, and at Clères, France, in 1934 and during the following years. In the United States they have been raised regularly by Mr W. Mackensen, at Yardley, Pennsylvania, and at a few other places. Breeding birds fight a good deal, and sometimes females are much persecuted and even killed, but they seldom attack other species.

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Despite their tropical origin they prove fairly hardy, particularly those reared in captivity. They are the largest of all Whistling Ducks, very high on the legs, rather clumsy and awkward in their movements, but striking, and unusually tame. At Clères they habitually laid under boxes disposed on the ground; but they were rather erratic layers and sometimes used the nests of ducks, sometimes even those of Carolina Wood Ducks which were off the ground.

INDIAN WHISTLING DUCK

Dendrocygna javanica

Anas javanica, Horsfield, *Trans. Linn. Soc. London*, xiii, 1821, p. 199: Java.

Dendrocygna javanica, Phillips, *Nat. Hist. of the Ducks*, i, 1922, p. 148; Peters, *Check-List, Birds of the World*, i, 1931, p. 153.

CHARACTERISTICS

A very small species of Whistling Duck, with a short tail. Light rufous brown, the crown and mantle darker, the wings and tail black with chestnut coverts. Bill and legs slaty grey.

Wing: 170–204 mm.; tail: 53–55 mm.; culmen: 38–42 mm.; tarsus: 40–50 mm.

It superficially resembles the Fulvous and Wandering Whistling Ducks, but it is smaller, duller, lacks the black line on the back of the neck and the crest, and the upper tail-coverts are chestnut instead of creamy white.

Immatures: similar but duller.

Downy young: blackish brown and whitish grey, with large spots on the back.

Eggs: 47×38 mm. on an average; six to ten in a clutch. Incubation probably 30 days.

DISTRIBUTION

India, from the Indus east to China south of the Yangtze, the Riu Kiu Islands, Formosa and Hainan, south to Sumatra, Java, southern and western Borneo, and neighbouring islands.

GENERAL HABITS

The Indian, or Lesser Whistling Duck, is very abundant throughout its range. It seems that the northern breeding birds go south in the winter. Elsewhere, the rains condition its movements. During the floods the birds scatter and breed throughout the country while they congregate in huge numbers on swamps, jungle pools and rivers during the dry months. They prefer small lakes, ponds and sluggish streams. They deposit their eggs in almost any kind of location: among reeds, on canes or low bushes, in the forks and hollows of trees and in old nests of Crows, Herons or Kites. The breeding season is usually the summer, but it varies according to the locality. When left undisturbed, they are tame and more diurnal than other species, roosting on trees at night in many places.

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The male is often found sitting on a branch near the nest, if established in a tree, and it is probable that he takes his turn in sitting. The first primaries have curious notches and a sharp projection which makes the flight very noisy. The voice is a rather low, repeated whistle. The flesh has often a strong and disagreeable taste, and they are not considered interesting game birds in India. They do not stand so upright as the other Whistling Ducks, and their neck and legs are shorter.

CAPTIVITY

It seems that the Indian Whistling Duck first reached England in 1857, and some of these early birds lived at the London Zoo for more than twenty-five years. It has been commonly imported since, but it does not breed easily. The only records we can find are those of Mr de Laveaga in California, and of Sibley in Connecticut (*Avicult. Mag.*, 1940, pp. 155-7). It has also been crossed with the Fulvous. Being a small, rather weak bird, it needs closer supervision and protection than the larger species. It used to be sold by the thousand in the markets of Calcutta, Singapore, Saigon and other far-eastern cities.

WHITE-FACED WHISTLING DUCK

Dendrocygna viduata

Anas viduata, Linné, *Syst. Nat.*, ed. 12, 1, 1766, p. 205: Carthagenia, Colombia.

Dendrocygna viduata, Phillips, *Nat. Hist. of the Ducks*, 1, 1922, p. 117; Peters, *Check-List, Birds of the World*, 1, 1931, p. 153.

CHARACTERISTICS

A medium-sized Whistling Duck with white face, throat and foreneck; black nape, sides and back of neck, wing, abdomen and tail; chestnut upper back and breast; sides of body barred black and white; brown and buff back. Bill blackish grey with a whitish band near the tip. Legs grey. There are no ornamental flank feathers, and the bill and feet are proportionally large. Specimens vary individually in the black band on the lower throat which can be completely or more or less interrupted. This character is independent of sex and distribution (Friedmann, *Condor*, 49, 1947, pp. 194-5).

Wing: 205-220 mm.; tail: 68-72 mm.; culmen: 45-48 mm.; tarsus: 47-48 mm.

Immatures have the crown and hind neck blackish brown, the face, throat and fore-neck light grey, and the rest of the plumage duller.

Downy chicks: dark olive-brown and pale yellow, with large spots on the back and sides.

Eggs: 47 × 37 mm. on an average; eight to twelve in a clutch. Incubation, 28-30 days.

DISTRIBUTION

From southern Costa Rica and Trinidad to northern Argentina, Paraguay and Uruguay; accidental in the West Indies (Cuba and Hispaniola); Africa, south of the Sahara to southern Angola and the Transvaal (Umlazi River); Madagascar, Comoro Islands.

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GENERAL HABITS

White-faced Whistling Ducks are very abundant in all the suitable parts of South America, Africa and Madagascar, being widely distributed. They are found on flooded ground, in swamps, salt-water lagoons, estuaries, pools and rivers. They are not arboreal and have seldom, if ever, been seen perched. They are mainly nocturnal, naturally tame, and have the same habits as most other Whistling Ducks. Their long bill, large feet, rather short body and tail give them a peculiar, slightly awkward appearance, but their charming ways and pretty colour pattern make them very attractive. They indulge in noisy demonstrations and affectionate preening more than any other species, and their amusing, cautious actions are matched only by the Red-billed. They dive skilfully and fly strongly, very often emitting bird-like, liquid chirps and clear three-syllabled calls: 'tsi-ri-ri'. Pairs often seem to quarrel and insult one another. They congregate in huge flocks. They seem to nest in hollow trees in the more forested part of the range, such as the Guianas, but they normally build among reeds and grass on the ground. Although they are perhaps the commonest Duck in Africa and South America, remarkably little is known of their breeding habits. The male undoubtedly shares in the incubation, and even perhaps sits on the eggs most of the time. He is often slightly smaller than the female. They breed at different seasons, according to country and rains.

CAPTIVITY

White-faced Whistling Ducks have long been common in waterfowl collections and are often imported from Africa and South America. The first specimens reached the London Zoo in 1835. They are fairly robust and live long. Being quaint of aspect and most engaging in their tameness and dainty ways, they prove very popular. They breed fairly readily, but rather irregularly, building on the ground elaborate and well-hidden nests of grass. There are no early breeding records; those of the Cairo Zoo (1910) and Germany (Mr Sammerein and Berlin Zoo, after Heinroth, 1911) being the first. They have since bred many times in England, in France and in the United States (Sibley and de Laveaga), and they have crossed with the Fulvous. We kept many at Clères, from one to two dozen at a time, mostly full-winged. They were charmingly tame and amusing, breeding for the first time in 1923, building on an island and laying as late as August (*L'Oiseau*, 1924, pp. 16-20). The chicks are not difficult to rear, although small and delicate-looking as are all young *Dendrocygna*.

RED-BILLED WHISTLING DUCK

Dendrocygna autumnalis

CHARACTERISTICS

A fair-sized Whistling Duck of graceful shape, with a bright pinkish-red bill and pinky, flesh-coloured feet, a comparatively long black tail, grey face, whitish throat, vinous

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chestnut mantle and breast turning to fulvous grey in South American birds; abdomen black, more or less spotted with white on the vent; wings whitish grey and black.

Immatures: fulvous brown, darker above, with a grey bill and yellowish feet.

Downy chicks: black and yellow, very clearly marked and spotted, usually with a black spot on the foreneck.

Eggs: 50 × 39 mm. on an average; clutches of eight to twelve. Incubation 27 days.

DISTRIBUTION

Central and South America, from the border of Texas to northern Argentina. Occasional occurrences in the Lesser Antilles; they have been introduced into the Greater Antilles from Central America. J. Bond reports that they have been recently brought into the province of Pinar del Rio and the Zapota Swamp of Cuba (according to Morales). There are two well-marked sub-species which intergrade in the vicinity of Panama. The arrangement of sub-species and the two new names proposed by Friedmann (*Condor*, 49, 1947, pp. 190-1) are not acceptable, as Conover has shown (*Cat. Birds of the Americas*, part 1, No. 2, *Zool. Ser. Field Mus., Chicago*, 1948, pp. 314-6).

GENERAL HABITS

Red-billed Whistling Ducks are common in all suitable parts of their range, unless destroyed through excessive hunting, as has been the case in Texas where they have become scarce. They are migratory in the extreme northern and southern parts of the range, but elsewhere they appear to move about only in search of food and water. They are tropical, low altitude birds, not found on the mountains. In Texas they arrive in April or May and leave in September or October. They prefer shallow waters, perhaps through fear of alligators, and frequent cultivated districts, feeding on crops. They are tame and easily approached. They feed mostly at night, resting during the day, being even more nocturnal than other species. They congregate sometimes in very large flocks. They rarely perch except during the breeding season, but often nest in the hollows of trees. In the greatest part of their range they breed during a long period. Their voice is peculiar, clear and loud; the usual call, often emitted, is a descending, four-syllable 'pee-chi-chi-ne', the first note long drawn and high pitched. They also twitter frequently.

CAPTIVITY

Red-billed Whistling Ducks have long been great favourites on account of their graceful shape and elegant plumage, and still more because of their amusing familiarity. They are often kept as house pets and watch birds in their native countries. Sir Charles Wager had a specimen in England before 1750, which Edwards painted and Linné named. The London Zoo received some in 1831, and they seem to have been reared for the first time in 1872 by M. Herbert at Le Havre, France. Breeding records, however, have been scarce in the past. In America, young were raised some thirty years ago for several

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seasons by Mr H. Cook at Woodbury, Long Island, and by Mr de Laveaga at San Mateo, California (*Avicult. Mag.*, 1940, p. 155). In France, they bred in M. Dulignier's park in 1927 (*L'Oiseau*, 1928, pp. 48-53). Young were reared at Clères in 1934 and the following years, and other successes have been obtained at various places in Europe and in the United States. Hybrids have been recorded only with *D. eytoni*. All the breeding records at Clères pertained to the larger and more robust *autumnalis* of Central America; although several pairs of *discolor* were kept full-winged for many years, they never nested. They usually built in long grass or among bushes, but several times they laid in rabbit holes, and once in a drain, never using boxes. They hid their nests very cleverly and we often failed to find them, catching the parents and the chicks as soon as they hatched and rearing them in pens where they were safe from rats and other pests. The tiny, beautifully marked black and yellow chicks are probably the prettiest of all downy young waterfowl.

NORTHERN RED-BILLED WHISTLING DUCK

Dendrocygna autumnalis autumnalis

Anas autumnalis, Linné, *Syst. Nat.*, ed. 10, 1, 1758: West Indies—Texas.

Dendrocygna autumnalis, Phillips, *Nat. Hist. of the Ducks*, 1, 1922, p. 157.

Dendrocygna autumnalis autumnalis, Peters, *Check-List, Birds of the World*, 1, 1931, p. 153.

Dendrocygna autumnalis fulgens, *Dendrocygna autumnalis lucida*, Friedmann, *Condor*, 49, 1947, pp. 90-91.

CHARACTERISTICS

The whole breast, back and mantle vinous chestnut, occasionally with a paler and greyer tinge where it meets the black on the abdomen.

Wing: 217-246 mm.; tail: 82-85 mm.; culmen: 43-53 mm.; tarsus: 52-65 mm.

DISTRIBUTION

Sinaloa, Nuevo Leon and Southern Texas, south to Panama, intergrading with *discolor* in Eastern Panama. Introduced into Jamaica and Cuba on several occasions. The bird which has served for the original description and plate by Latham, on which Linné's name has been based, is obviously a bird from Central America, probably imported into Jamaica. In the *Proceedings of the Academy of Natural Sciences*, Philadelphia, vol. 16, p. 70, 1870, March records birds of this sub-species as 'imported into Kingston from the Spanish Main'!

CAPTIVITY

This stronger sub-species is more inclined to breed in captivity than the smaller South American *discolor*. Practically all records referred to the present sub-species.

THE WHISTLING DUCKS
SOUTHERN RED-BILLED WHISTLING DUCK

Dendrocygna autumnalis discolor

Dendrocygna discolor, Sclater and Salvin, *Nomencl. Av. Neotrop.*, 1873, p. 161: Surinam. Phillips, *Nat. Hist. of the Ducks*, 1, 1922, p. 163.

D. autumnalis discolor, Peters, *Check-List, Birds of the World*, 1, 1931, p. 153.

CHARACTERISTICS

Breast and upper back greyish fulvous, contrasting with the chestnut mantle and lower neck. The tone and extent of the grey tinge varies individually, some specimens being much redder than others in the same localities. Slightly smaller than *autumnalis*.

Downy chick has a wider black band from the cheeks to the nape than in *autumnalis*.

Wing: 210-232 mm.; tail: 80-83 mm.; culmen: 40-48 mm.; tarsus: 51-59 mm.

DISTRIBUTION

South America, from Eastern Panama and Trinidad to Guayaquil in the West, and to Northern Argentina in the East. Occasional visitor to the Lesser Antilles and to Puerto Rico, where it has been reported to breed by Danforth (*Journal Dept. of Agriculture, Puerto Rico*, vol. 151, No. 1, p. 44, 1931).

CAPTIVITY

This Whistling Duck has often been imported into Europe since the end of the eighteenth century and Latham (*Gen. Synopsis of Birds*, 1781, p. 274) reports, perhaps erroneously, its breeding at Shonbrun, Sweden. Curiously enough, there are few other records, and the sub-species is much less inclined to breed in captivity than *autumnalis*. Sibley (*Avicult. Mag.*, 1940, p. 157) writes that it has bred only on two or three occasions, and a brood was reared at the Wildfowl Trust, Slimbridge, in 1950, since when it has bred there regularly. A hybrid with *autumnalis* has proved fertile.

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SWANS AND GEESE · TRIBE ANSERINI

SWANS AND GEESE agree so closely in structure, pattern of downy chicks, general behaviour, courtship and nesting habits that it is preferable to include them all in the same tribe. Swans are larger and better adapted to aquatic life; consequently they have shorter legs, larger feet, and longer necks with more vertebrae (twenty-three to twenty-five, against eighteen to nineteen). But the latter feature is not very important, as it varies with species. Certain of their habits, however, are at some variance with those of the Geese, and their chromosome number is not the same.

The *Anserini* differ considerably from all other waterfowl, except the Whistling Ducks (*Dendrocygnini*) with which they share a number of characteristics. They are linked by the intermediate genus *Coscoroba*. Both sexes are similar in plumage. The larynx is symmetrical and there is no bulla as in the Ducks (*Anatinae*). They never show any metallic colour, and the downy chicks never have a strongly contrasted pattern, except in *Coscoroba*, an intermediate genus. They possess a bony knob at the bend of the wing. Adult status and sexual maturity are not reached before the second or third year. Swans and Geese have only one annual moult, and therefore lack an eclipse plumage.

The curious *Coscoroba coscoroba*, from South America, occupies a special place. It resembles the Swans in its colour, its large size, and some of its habits, and it has a syrinx without a bulla in both sexes. In some other characteristics, however, it recalls the Whistling Ducks, particularly in its general shape and proportions, large feet, long legs, and comparatively rounded wings. In display and voice, it is unique. The eggs are numerous, white and rounded, like those of *Dendrocygna*. The downy young, very different from cygnets, have bold, dark grey markings which resemble those of *Dendrocygna* on the head, although the light band across the occiput is interrupted by a thin, dark line running from the crown downward; but on the back they are rather similar to those of *Tadorna*. *Coscoroba* appears to be an intermediate between the *Anserini* and the *Dendrocygnini*. Until we know more about its anatomy and life habits, it can be placed almost indifferently in either group. It certainly constitutes a very distinct genus.

All the true Swans are better considered as congeneric; the fact that they may or may not have black in their plumage is of little significance. The various species have in common essential characteristics of structure and behaviour.

The Geese clearly fall into two distinct generic groups, *Anser* and *Branta*, the latter being characterized by a more elaborate and contrasted colour pattern, a longer and thinner neck, and a more slender, smoother bill.

Swans are found in all the colder parts of the world, including Australia and South America, but the Geese are restricted to the Northern Hemisphere.

Species of *Anserini* belonging to the same genus interbreed readily and generally produce fertile hybrids, while the intergeneric crosses are usually sterile. Interbreeding with Ducks (*Anatinae*) is possible, but exceptional.

SWANS AND GESE

KEY TO GENERA OF ANSERINI

- | | |
|--|------------------|
| 1. Neck very long and size large, legs short | <i>Cygnus</i> |
| Neck moderately long, size moderate, legs fairly long | 2 |
| 2. Tail very short, bill flattened, feet large | <i>Coscoroba</i> |
| Tail fairly long, bill narrow and high, feet moderate in size | 3 |
| 3. Plumage pattern generally uniform and little contrasted; neck comparatively thick and short | <i>Anser</i> |
| 4. Plumage pattern elaborate, with sharply contrasted colours; neck long and thin | <i>Branta</i> |

GENERAL HABITS

Swans and Geese are characterized by their closely knit family life. Male and female pair for life although a widowed individual will accept a new mate, and very exceptionally a male may change his consort or even become a polygamist. They share in the watch on the nest and the care of the brood. The family migrates and winters as a unit, the young normally remaining with the parents until the new breeding season.

Almost all species are migratory to a greater or lesser extent, and many travel twice a year from their far northern or southern breeding grounds to their sub-tropical or temperate winter quarters, often by different routes. They are sociable, in a general way, congregating in large flocks during the autumn and winter, but even then family units remain visible. During the mating season, each breeding pair holds more or less jealously a territory, often extensive but sometimes very small; the Swans more so than the Geese. Many breed in colonies. Non-breeding birds remain in flock formation the year round.

Nuptial display is simple and consists of a rhythmic dipping and stretching of the neck by both sexes, whose voices are similar, as a rule slightly deeper and lower in the female, shriller and more metallic in the male. They indulge in much formalized threatening, with a great deal of neck stretching, wing moving, calling, running and swimming to and fro. The male drives off intruders, demonstrating vigorously, then returns to the female with much triumphal posturing. When well paired up, she answers with a similar display. They nest on the ground, piling up a large amount of material in or near water. A few species of Geese occasionally use ledges or old nests in large trees. They do not normally perch.

Their food is mainly vegetable, mostly grass, leaves and seeds which they obtain by grazing and dipping, sometimes eating small animals, worms, insects and shells.

Geese, and even Swans, have been and still are much valued as game birds; although very wary and careful, they have been slaughtered in such numbers that several species are or should be completely protected. The ever easier penetration of so far secluded nesting grounds make conservation measures more urgent every year, if the disappearance of those majestic and most interesting birds is to be avoided. Their flesh is generally rather poor and tough unless the birds are very young.

THE WATERFOWL OF THE WORLD

CAPTIVITY

Swans and Geese are perfect ornaments for waters and lawns. The former, to be at their best, require large ponds. They are powerful and quarrelsome, and unless space is practically unlimited, it is advisable to isolate breeding pairs. Geese, with a few exceptions, are sociable and can be associated in large numbers; they need less water but a good deal of space for grazing. The Swans subsist mostly on aquatic vegetation which they obtain under water, the Geese on grass which they find on land. Both eat grain readily and thrive on it, but lack of green food results in inferior condition and poor breeding. They should be fed a large amount of water weeds, lettuce, cut grass, alfalfa pellets etc. when natural food is not available.

All species of *Anserini* have been kept in captivity, some since the earlier days of man's history. All breed readily in confinement except the Brent, a marine species which has almost never nested in captivity. Several species have become domesticated, particularly two Geese, the Greylag and the Swan Goose, which are the wild ancestors of the numerous breeds of Common and Chinese Geese. The Mute Swan is also practically domesticated, but it has remained indistinguishable from the genuine wild bird.

Swans and Geese are admirable parents, incubating their eggs and rearing their broods perfectly as long as they are not exposed to vermin. When conditions are unsafe, the chicks can be easily hatched and reared in machines or under foster mothers — hens or turkeys. They first eat grass, duckweed, lettuce and other greens, with the addition of a little biscuit and egg, or substitute prepared food; and they should have access to water, although this is not necessary for Geese during the first weeks.

All Swans and Geese are hardy, except one tropical species which needs some shelter in the coldest spells, and a few others requiring constantly open water. Being highly intelligent and large in size, they can defend themselves against the smaller predators, and few birds are better suited to semi-captivity on lakes, ponds, and grasslands. As with all migratory birds, they are rather inclined to stray if kept full-winged, but some species can be induced to settle down satisfactorily, and their flights and air evolutions are most attractive to watch. Under ordinary conditions, however, it is preferable to pinion them.

III

THE COSCOROBA

Genus *Coscoroba*

Reichenbach, *Av. Syst. Nat.*, 1852 (1853), p. x.

Type, by original designation and tautonymy, *Anser candidus*, Vieillot=*Anas coscoroba*, Molina.

THE very peculiar *Coscoroba* of South America is related to the Swans and to the Whistling Ducks, as we have said before, recalling the first in size and general colour, the second in shape and a few other features, while it has other characteristics of its own. Its true position still remains somewhat doubtful. In *Coscoroba* the bill resembles in shape that of *Dendrocygna*, being high at the base but soon becoming deeply depressed and flattened, to the point of being slightly concave. It is considerably expanded sideways toward the tip. The upper mandible becomes very broad, with strong lamellae, and it considerably overhangs the lower one. The nail is of moderate size and blunt. The face and lores are completely feathered, as in the Whistling Ducks, while it is always bare in the Swans. The neck is long, but not so much as in *Cygnus*. The wings are comparatively short and broad, the tail short and rounded, the legs thick and high, and the feet large, as in *Dendrocygna*. There is a small bony knob at the bend of the wing, as in *Cygnus*. The chicks are much more vividly marked than in the Swans, and intermediate in pattern between those of *Dendrocygna* and *Tadorna*.

The genus contains only one species, confined to the southern parts of South America. The suggestion that the mysterious *Cygnus davidi* of China could have been related to *Coscoroba* appears to be without any serious foundation. The original specimen collected by Père David and described by Swinhoe (*P.Z.S.*, 1870, p. 430) has long been lost, and the so-called specimens of *C. davidi* recorded from Siberia by Tackzanowski, Giglioli and Salvadori and other authors have proved to be nothing but young Jankowski's Swans. The true identity of David's Swan remains a complete mystery. It might even have been a Snow Goose.

COSCOROBA SWAN

Coscoroba coscoroba

Anas coscoroba, Molina, *Sagg. Stor. Nat. Chili*, 1782, p. 234=Chile.

Coscoroba coscoroba, Peters, *Check-List, Birds of the World*, 1, 1931, p. 156.

CHARACTERISTICS

PURE white, with the tip of the six outer primaries black on about one-third of their

THE WATERFOWL OF THE WORLD

total length. Iris whitish in adult males; dark brown in females and young birds; eyelids pink. Bill carmine-crimson, the nail whitish. Legs and feet light rosy pink.

Wing: 430-450 mm.; tail: 145-170 mm.; tarsus: 88-98 mm.; culmen: 65-70 mm. The female is markedly smaller than the male.

Immatures have strong, brownish grey markings on the head and the upper-parts, reproducing the pattern of the downy chicks. Bill grey above, the borders, the nail and the lower mandible fleshy white. Legs grey. Some grey patches on the wings are retained after the first moult until the second year.

Downy chicks: greyish white with bold, blackish patch on the crown and the region around the eyes; there is a black loreal line; a white crescentic mark under the eye; a white patch on the forehead divided by a black line in the centre; a thin grey line from the nape to the back where it broadens and runs down to the rump, expanding there on both sides; a band along the wings from the shoulders connected with the back band, and another across the sides above the thighs, which almost joins with the dark patch on the rump delineating a large white oval patch on the sides of the lower back. Bill and feet grey.

Eggs: comparatively small and rounded, about 91×63 mm., four to nine in number. Incubation: 35 days (after Mrs B. Benchley and Peter Scott).

DISTRIBUTION

Falkland Islands, Tierra del Fuego, Argentina, Chile, Uruguay, Paraguay and extreme south of Brazil, breeding in the south and wintering farther north. Exceptional in the northernmost part of the range.

GENERAL HABITS

Very few observations of the life habits, movements, breeding and general behaviour of this interesting species have been recorded. From some meagre notes it appears that Coscorobas are numerous in certain localities but lacking in many parts of the range, more local and less common generally than many other South American waterfowl, particularly the Black-necked Swan. Various authors report them as abundant in a few lagoons of north-western Tierra del Fuego (*Gente Grande*), but absent from other districts of that island. It is rare in the Falklands, but fairly common in certain parts of Patagonia (Chubut Valley). In Northern Argentina, Central Chile and, exceptionally, northward, it is but a winter visitor, usually met with in small parties of five or six, probably families, or twenty to thirty, sometimes in flocks of two or three hundred. Their migrations are irregular. They swim a great deal, but they also walk and fly with great ease, rising straight from land or water. They nest usually in shallow water, less often on the ground, building a pile of reeds and mud 50 cm. or more high, with a 25 cm. hollow in the centre lined with grass and down. The nesting season lasts from September to December, in the austral spring. The female incubates alone, the male keeping guard and helping fully in the education of the young. These, as far as is known, mature in the third year.

THE COSCOROBA

6. Distribution of
Coscoroba coscoroba.
(A) Breeding range;
(B) Non-breeding range.



The display is simple. In anger, both sexes raise the wings, push violently forward with their feet, curving their neck, much as Mute Swans do, but not quite so intensely; at the same time they move the neck fairly fast forward and backward, often uttering their call. This consists of four loud syllables sounding much like their name, which was derived from it. The first note is longer and higher pitched, the others shorter and descending. The tone is that of a toy trumpet, lower in the female as usual. There are no records of their natural food, but it is probably composed mainly of water weeds, seeds, and invertebrates. They do not graze much, as the shape of their bill indicates.

CAPTIVITY

The London Zoo was the first to receive live Coscorobas in 1870. It is reported that these birds nested but did not hatch their eggs. They have been fairly often imported since, both into Europe and America. They have proved hardy in more or less temperate climates, such as England, northern France, and the eastern United States but rather susceptible to contagious diseases. They require pure water and a good deal of natural food, or good substitutes. We kept pairs on the lake at Clères between 1920 and 1940

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without difficulty. Although saucy in their ways during the nesting season, they do not quarrel seriously, nor do they make dangerous attacks on Geese or large Ducks. In fact, one of our pairs was badly beaten on one occasion by Canada Geese. Only in 1936 did a pair attempt to breed. A female laid four eggs on August 10, after fifteen years in the park. She sat faithfully but the eggs proved infertile. She laid again the following year, but the nest was disrupted by Magpie Geese.

The only early breeding success in Europe took place at Woburn Abbey, where a young bird was reared around 1910. The female hatched several chicks but lost them all but one owing to her excitable temper and restlessness. There is no proper report of the rearing of this bird, but it became extraordinarily tame and attached itself to the late Duchess of Bedford (*Avicul. Mag.*, 1931, pp. 62-63). I knew this extraordinary bird well, and I was often much amused by her antics, as I saw her year after year.

Only very recently a complete success has been registered in the Philadelphia Zoo. Mr J. A. Griswold, Curator of Birds, reports that a pair of Coscorobas imported in 1948 and housed in a small, very exposed pen with a good-sized round concrete pool in the middle, in February 1950 built on the side of the pool a nest of twigs and brush provided by their keeper. The female laid two eggs, but one rolled into the pool and the other was infertile. They built again in June and after forty-six days of incubation two chicks hatched out. Both parents guarded them jealously, but they never molested white Call Ducks living in the same pen. Their young grew up without difficulty on the usual diet for young waterfowl.

In 1952, one young bird was reared at New Grounds, and two more hatched at the San Diego Zoo but were not reared. One of the latter had the pale band across the nape as clearly indicated as in a Whistling Duck chick.

IV

THE SWANS

Genus *Cygnus*

Bechstein, *Orn. Taschenb.*, part 2, 1803, p. 404, note.

Type by monotypy=*Anas olor*, Gmelin.

THE majestic, long-necked waterfowl called Swans are too well known to need a detailed description. All are large in size, with short legs and large feet; the neck surpasses the body in length, and thus differs from *Coscoroba* and Geese. Their bill is fairly high at the base, longer, less flattened and expanded near the tip than in *Coscoroba*, but wider and less compressed than in *Anser* and *Branta*. The nail does not occupy the entire tip of the upper mandible. In the adult stage, the lores and sides of the forehead are naked, but they are feathered in the chicks and in some of the immatures. The chicks are pale grey and white, without any distinct markings. The first-year plumage is much tinged with brownish grey, but pure white, sooty grey, and black are the only colours seen in the adults of the different species. According to Yamashina, Swans have the same basic chromosome number as the Ducks (84 in males, 83 in females, the sex chromosome rod-shaped).

There are five species of Swans. The most generalized and Goose-like are arranged in two species, each having one or two palearctic and one nearctic sub-species, all being alike in general shape and behaviour. Both these species have a loud, trumpeting voice due to a greatly elongated and convoluted trachea; that of the other three species is short, with a more or less acute bend, and their voice is weaker. Other birds with bugle-like voices, particularly the Cranes, have also long, circumvolved windpipes. Each of the other three species stands more or less alone. The three species of the Northern Hemisphere are pure white in colour, while the South American bird is white with a black neck, and the Australian, dark grey and black with white primaries.

KEY TO SPECIES OF CYGNUS

- | | |
|---|--------------------------|
| 1. Adult plumage pure white | 2 |
| Adult plumage white and black or blackish grey | 4 |
| 2. No prominent knob on forehead | 3 |
| A prominent knob on forehead | <i>C. olor</i> |
| 3. Larger (wing over 550 mm.), neck and bill longer | <i>C. cygnus</i> |
| Smaller (wing under 575 mm.), neck and bill shorter | <i>C. columbianus</i> |
| 4. Body white | <i>C. melanocoryphus</i> |
| Body blackish grey | <i>C. atratus</i> |

THE WATERFOWL OF THE WORLD

GENERAL HABITS

The different species of Swans are very much alike in their general habits and behaviour. Water is their true element and they swim to perfection, feeding mainly on submerged vegetation which they reach with their long neck, sometimes 'upending' as mallard ducks do. They walk heavily and they seldom dive, except to escape danger. They fly powerfully, with the neck fully extended and with slow, regular wing-beats, producing a more or less loud humming noise. Before taking wing, they hold the neck erect, and they rise with some effort, flapping along the surface of the water or running on the ground a good deal before rising into the air. Flocks generally fly in an oblique line or in V-shaped formation.

All Swans are migratory to a certain extent, the Trumpeter, the Mute and the Black, which breed in more temperate regions, less so than the other species, and moving only in search of food and open water. Whistler, Jankowski's and Bewick's, nesting in Arctic regions, accomplish long journeys in the spring and in the autumn, as also do the Whooper and, in South America, the Black-necked Swan.

Swans are aggressive and savage during the breeding season. Each pair jealously holds a large territory, attacking all intruders. But in certain cases the territory may be small, and the birds appear to nest in colonies. Pair formation, which lasts for life, takes place without any elaborate display. The birds swim in close proximity, pressing the plumage close to their bodies, and hold their necks up, sometimes shaking the head. Their copulatory display is the basic one of the tribe, both birds repeatedly dipping the head and neck into the water until the female flattens herself, with the neck half extended. The Swans frequently face each other and half rise out of the water, breast to breast.

Swans build bulky nests of reeds and water weeds on islets and banks, sometimes in shallow water; both sexes take part in the work. They lay a comparatively small number of eggs, cream coloured, pale grey or bluish green, never pure white, fairly elongate oval in shape. These hatch after an incubation of from thirty-five to forty days. Incubation is carried out by the female alone, with the one exception of the Black Swan in which both sexes sit; in all others the male keeps a watchful guard on the nest. He always helps in taking care of the young and fiercely defends the family.

Swans are vegetable feeders, eating almost exclusively water weeds and seeds. They normally cause no damage of any sort to crops, and they should not be considered game birds as their flesh is tough and of poor quality. The great ornamental value of such large and graceful birds can hardly be over-estimated, and it has struck man since the earliest days of civilized life. They deserve complete protection as long as their number does not become too great, an eventuality hardly to be feared at present.

CAPTIVITY

Swans live and breed well in captivity if a balanced diet of grain and green food is placed at their disposal. Plenty of water and aquatic weeds are, of course, most beneficial to them, but they can be satisfactorily accommodated in surprisingly small runs and ponds.

THE SWANS

It is true however that such big birds only look their best on a large piece of water, where they can display all their grace in swimming, as they appear ill-proportioned and awkward on land. Unless they can enjoy the quasi-freedom of really large grounds, with enough water to enable each pair to isolate themselves on a private territory of several acres, it is far better to seclude them on separate ponds, with enough land on which they may rest comfortably. They like grazing, but it is not essential to them if other green food is available. Although pairs of the same or of different species will fight savagely to keep a stretch of water large enough for a dozen to themselves, they seldom interfere with the smaller waterfowl, persecuting only the larger Geese and Ducks, in particular those which are coloured like themselves. However, when a large number of Swans are placed on a moderate-sized pond, as in zoos and public gardens, they seem to lose their pugnacity and to realize the vanity of trying to establish a territory and to insure privacy. No severe fighting normally takes place in these conditions, and many pairs will live fairly peacefully on a piece of water where it would be impossible to keep two or three without mortal encounters. But no satisfactory breeding results can be expected from such gatherings.

Swans are hardy and do not mind severe cold, although some species may suffer from lack of open water. Unless the temperature falls very low and the water is completely stagnant, they manage to keep open a hole sufficient to swim in during freezing periods if the ice is broken now and then.

All species of Swans have been kept and reared in captivity.

BLACK SWAN

Cygnus atratus

Anas atrata, Latham, *Ind. Orn.*, II, 1790, p. 834: Lakes of Australia.

Chenopsis atrata, Peters, *Check-List, Birds of the World*, I, 1931, p. 144.

CHARACTERISTICS

Neck very long and thin; tail short; tertiaries and greater wing coverts broadened and undulated. Entirely blackish grey, dark above, with paler borders to the feathers, lighter below, primaries and outer secondaries white, the inner secondaries mostly black. Iris red. Bill without a frontal knob, but thick at the base, crimson-red with a broad white band near the tip, which is always white at its extremity. Legs and feet blackish grey.

Male: wing: 475–510 mm.; tail 130–145 mm.; culmen: 66–77 mm.; tarsus: 90–105 mm.

Female: wing: 415–480 mm.; tail: 120–125 mm.; culmen: 63–70 mm.; tarsus: 85–100 mm. The female has a shorter neck. Size varies much individually in both sexes.

Immatures: brownish grey spotted with whitish above, pale grey to white below; quills white, more or less marked with blackish grey. Iris brown. Bill brownish black with the nail whitish. Feet dull grey. After the first moult, they become similar to the

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7. Distribution of *Cygnus atratus*. (A) Natural range; (B) Introduced.

adults, but a slightly lighter grey, and dark markings remain on the quills until the third year.

Downy chicks: light brownish grey above, white below, with a black bill and brownish grey feet.

Eggs: pale green, 115×65 mm., on an average; 4 to 8 in number. Incubation: 34 to 37 days.

DISTRIBUTION

Australia, except the north-central part, and Tasmania. Acclimatized in New Zealand.

GENERAL HABITS

The Black Swan was discovered at the end of the seventeenth century and was first mentioned in 1698 (*Phil. Trans. London*, xx, p. 361) by Mr Witsen of Amsterdam. It was formerly common on the lakes and rivers of southern Australia, but it was soon decimated, as the birds were easy to shoot and were good eating. It was found in the Bass Strait in large flocks, moulting and unable to fly. Today the birds are still numerous in many places, mostly in sanctuaries, and they have quickly responded to protection, reappearing in districts where they had been completely exterminated. They frequent

THE SWANS

salt lagoons and estuaries as well as fresh water. They breed in reed beds, building large nests and laying from four to ten eggs; both male and female take turn in the incubation, a unique feature in Swans. They are more or less sedentary or migratory, according to circumstances, moving in search of food and water. They travel at night at high altitudes, in a long line, calling as they fly. They nest in June and July in South Australia. Elsewhere the season varies with the rains. They sometimes fail to hatch and rear the young owing to lack of water. They often congregate in hundreds, and unless too mercilessly persecuted, they hold their own easily. In New Zealand, where they were introduced many years ago, they have multiplied to the point of becoming a nuisance, as they destroy the food and habitat of other waterfowl. In Western Australia, great quantities of eggs are gathered by the natives, who also kill a lot of flightless birds.

A detailed study of the life habits of these fine birds in their native land is still lacking; it is highly desirable that Australian naturalists should devote their attention to this subject and fill the great gaps in our knowledge.

Black Swans have a high-pitched, modulating voice, which reminds one of the sound of a penny trumpet; they possess a great variety of notes. They usually call with an extended neck. Their trachea shows a sharp angle, without, however, approaching the convolutions of the Northern Swans. They reproduce some of the attitudes of the Geese, indulging in a 'triumph' ceremony. Like the Mute Swans, they raise their shoulders in anger, but they hold the neck erect, only curving sharply the upper part of it, close to the head. In behaviour and posture they recall that species more than any other Swans. It seems that despite their fierce and jealous temper, breeding pairs keep a fairly small territory and may nest in colonies when circumstances make it necessary. Their methods of feeding, of taking flight, of displaying and courting and, generally speaking, their life habits, are very close to those of the Mute Swan. They rise in the air with some difficulty and they walk awkwardly, but they are most graceful on the water. They look beautiful and strange on the wing on account of their tremendously long black neck and white pinions, and they produce a strong humming noise, like the Mute Swan.

CAPTIVITY

The first Black Swans to be brought alive from Australia were the two specimens which reached Batavia in 1746. They probably came to Europe for the first time about 1791, first to England, then France. The Empress Joséphine had several on the ponds at Malmaison, and the Dauphine kept some at Villeneuve l'Etang, near Paris. It seems that Black Swans first bred in captivity in the Earl of Derby's menagerie at Knowsley. They were reared in large numbers later on. In a letter to Gould, Samuel Gurney, of Carshalton, Surrey, gives the following account of his Black Swans:

'They were purchased in 1851 and laid their first egg in January 1854; it was a most severe winter, snow on the ground and intense frost nearly the whole time they were sitting; it was observed that both sexes assist in the duty of incubation, the female usually remaining on the nest during the night; they hatched their young during the greatest cold

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of that winter, for which they did not suffer, though they had no shelter of any kind, and their nest was fully exposed to the east wind. Out of ninety-three young ones hatched by them up to the present year 1862 (inclusive), about half of that number has been reared. Some of them have died of disease, but most of them have been killed by the old ones dragging them about in the fields, where they have fallen into small holes on their backs, and have not been able to recover themselves. They have been bred sixteen times in seven years, having laid 111 eggs.'

In France, Dr Le Preste was very successful with Black Swans at about the same time. He reports that he bought two pairs in England in 1851. One pair produced in two years six broods of five or six eggs. They were incubated by the parents, but the chicks were removed at birth, so that four months later another clutch was laid. To ensure that all eggs were hatched on the same day, Dr Le Preste removed all of them but one, until the end of the clutch. He then put them all back, as the birds never leave the nest after the first egg is laid.

Black Swans have since become well acclimatized in Europe and in America, where they breed freely. But they have never been established in a feral state like Mute Swans. They are much more migratory, or rather, like many other Australian birds, prone to wander about according to climatic conditions, and they stray far away. Also, in England at least, they are considered unlucky and therefore have not been encouraged to settle down.

Black Swans are just as bad-tempered as their white relatives, and it is necessary to isolate breeding pairs under ordinary circumstances. They are not quite so dangerous, however, being less powerful; curiously enough, they usually dominate other Swans in a mixed collection. They do best if allowed plenty of water and natural foods, but they are the most accommodating birds of the genus; they often breed in very small pens with a tiny pool, and they have even been known to nest and hatch without enough water to swim in. They often become savage towards human beings, attacking them and striking with the wings. They are completely hardy. They have no fixed nesting season and may breed in any month, but individual pairs normally lay each year at the same time, many twice a year. They are excellent parents and successfully rear their young, even during the winter. Black cygnets are also easy to raise under a foster mother if they have access to a pool.

Black Swans are very desirable birds, altogether strange and beautiful. They are not perhaps quite so graceful in their proportions nor so imposing as Mute Swans, having rather too long a neck, but, small and elegant, they come next to them as an ornament of waters and can compete with the Black-necked Swan. They have hybridized with the Mute Swan on several occasions.

MUTE SWAN

Cygnus olor

Anas olor, Gmelin, *Syst. Nat.*, 1, part 2, 1789, p. 502: Russia.

Cygnus olor, Peters, *Check-List, Birds of the World*, 1, 1931, p. 144.

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CHARACTERISTICS

A large, pure white Swan with a rather long, pointed tail. Bill pinkish orange with some black on the borders and around the nostrils, and a prominent black knob on the forehead. Feet black, iris brown. The neck is long and fairly thick, often gracefully carried in an S-shaped curve. The feathers of the head are sometimes stained rusty by ferruginous mud.

Male: wing: 560–625 mm.; tail: 190–200 mm.; tarsus: 100–120 mm.; bill from knob: 70–85 mm.

Female: wing: 535–570 mm.

Immatures are an uneven brown above, whitish below, with grey bills and feet; no frontal knob. The second year, they are white with a dull orange bill; the knob is present, but small. Full adult status is assumed the third year.

Downy Chicks are a fairly uniform light grey above, white below.

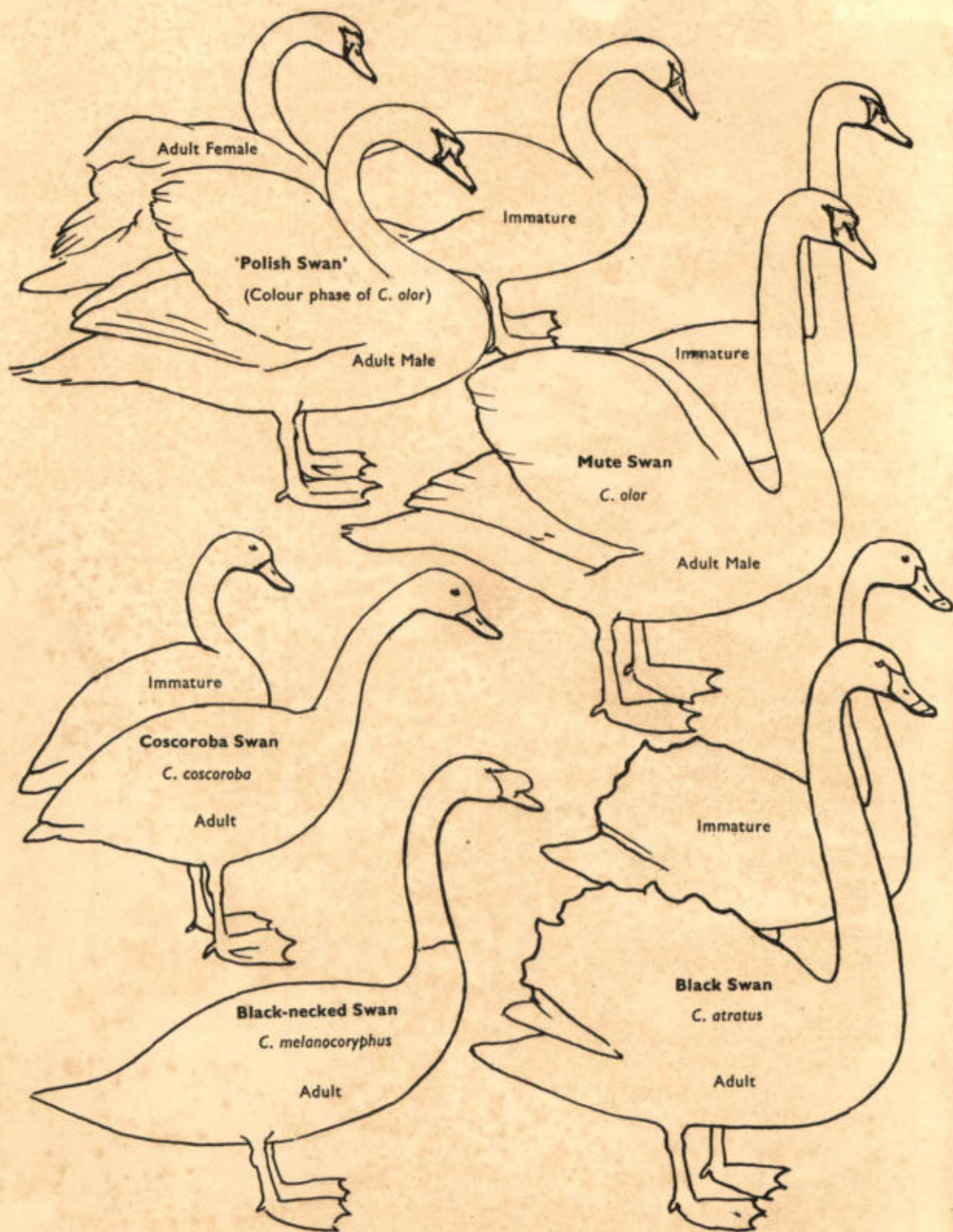
Eggs: greyish or bluish, 115 × 75 mm. on an average, four to seven as a rule, but sometimes up to twelve. Incubation: 35–38 days, usually 35.

There is a colour phase, called *C. immutabilis* by Yarrell (*Proc. Zool. Soc. London*, 1838, p. 19), and known as 'Polish Swan', in which the adults have fleshy grey feet, instead of black, while the chicks are born pure white, as are also the immatures. Mixed broods sometimes occur.

DISTRIBUTION

At present, Denmark, central and southern Sweden, northern Germany, Poland, Rumania (Dobruja), central Russia (Crimea, Caspian Sea region), Asia Minor, Central Asia, east to Mongolia and Dauria. Migrant to south-eastern Europe and south-western Asia. Introduced long ago and semi-domesticated in many parts of western Europe, later on in eastern North America (Long Island), Australia, etc. Very common in a feral state in England, where they were probably natives long ago.

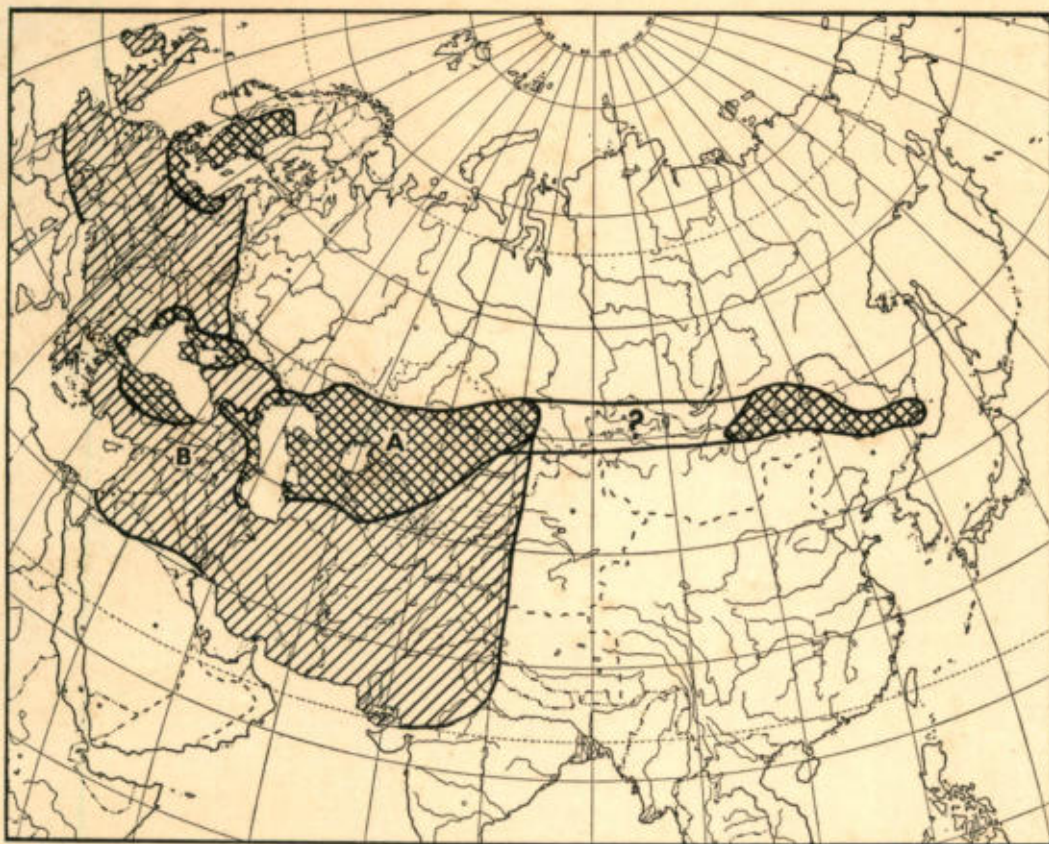
'Evidence for former theory of early introduction fallacious. More likely to have been originally indigenous in Lincolnshire, Cambridgeshire, Huntingdonshire, Norfolk, Suffolk, and probably Thames and perhaps other parts. Original wild stock gradually brought by capture and pinioning into semi-domestic condition, beginning prior to A.D. 1186, and ceased to exist as a wild race. From thirteenth to eighteenth centuries, all swans were property of Crown and, under royal licence, of communities, corporations or private persons, and their keeping governed by a strict code of statutes, orders and ancient customs enforced through the King's Swan-Master and his deputies. Under licence marks were assigned to all qualified owners by which birds could be distinguished. During the eighteenth century the custom of marking and usage appendant to it gradually died out, except to a limited extent on Thames and on Yare and Wensum (E. Norfolk), where still observed. Elsewhere, swans have since reverted to original wild state and now generally distributed, though probably all now living are descendants of the medieval, semi-domestic stock. The swannery at Abbotsbury (Dorset) is not only the largest individual congregation of swans in England, but is unique. Though foot-



II. Swans



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8. Distribution of *Cygnus olor*. (A) Breeding range; (B) Introduced, or migrant.

marked and living under conditions to some extent artificial, the birds are all full-winged and virtually wild. Dependent to some extent on annual fluctuations of food supply, numbers vary between under 200 and over 500 pairs.' (*The Handbook of British Birds*, vol. III, 1943, pp. 177-8).

GENERAL HABITS

Mute Swans are heavy, powerful birds. They move very clumsily on land and only on the water do they appear at their best. There, they are undoubtedly the handsomest of all Swans, as their proportions and posturing are far more harmonious than in any other species; it is the greater rarity, and the smaller size of some of them, that make them more highly appreciated.

Mute Swans fly well and their pinions produce a peculiar, musical, humming throb, very distinctive and audible at a mile's distance. They are sociable, except during the breeding season when breeding pairs normally establish and keep a territory to them-

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selves; but if very numerous, as at Abbotsbury, the nests can be built close to each other. Non-breeding birds remain in flocks. They very seldom dive, even the cygnets. They are naturally inclined to become tame, even the genuine wild birds.

Mute Swans inhabit fairly temperate parts of Europe and Asia, far from the Arctic, and they migrate only in search of food and open water, seldom for great distances. Under favourable conditions they are more or less sedentary.

Besides the general habits of the genus, Mute Swans possess a few of their own. They often extend a leg over leg backwards and sideways, with the web extended to dry it before bringing it forward to insert it under the flank feathers, a habit they share with Black Swans, but in which other species seldom indulge. They often wag their tails. As their name implies, they are quieter, and their call is less loud, than the other species. When excited, however, they emit an explosive, snorting sound, and also a shriller note, and they hiss. Their trachea is almost straight. The chicks have a low piping call, like other cygnets.

Their aggressive posture is well known: the neck is thrown back and the elbows raised so that the secondaries and tertiaries form a graceful arch over the back. The birds advance jerkily and violently by moving both feet at once. The female displays like the male, but less often and less completely as a rule. When the enemy is driven off, male and female reunite and soon stretch up and return to normal, with a prolonged snorting call. They court like the other Swans and show friendliness in tightening up their body feathers, except those of the head, which appears swollen. After mating, both birds rear breast to breast, snort and beat the water with their feet, then sink down and return to normal, bathe and preen. The habit of raising the elbows is one shared only by the Mute Swan with the Black Swan and the Coscoroba.

The nest is usually placed on islets in swamps or in shallow, reed-grown water, but semi-domestic birds nest anywhere near water. They build a bulky nest. The female normally incubates alone, protected by the male. The chicks remain one day in the nest, and the male often takes the first-born to the water while his mate continues to sit. The chicks have the habit of riding on the parents' back, under the wings, as do those of the Black-necked Swans, but not so constantly.

Mute Swans feed mainly on water weeds, very occasionally eating some small invertebrates, frogs and fishes. Most wild birds frequent marshy lakes and reedy lagoons, and, in winter, estuaries and sheltered bays on the sea coast. Feral swans are found on any sort of open, still waters, such as lakes, ponds and slow-moving rivers.

Excellent studies of the habits and behaviour of the Mute Swans have been published, particularly those of Heinroth (*V. Int. Orn. Congress*, Berlin 1910), of N. Peters (*10 Jahre Brutstatistik und Entwicklung der Hamburger Alsterschwäne*, Naturw. Verein., Hamburg 1931), and of H. Poulsen (*Dansk. Orn. For. Trdss.*, 47, 1948, pp. 173-202), the latter also dealing with the Whooper and Black Swans.

CAPTIVITY

Little need be said on the Mute Swan in captivity. On moderate-sized ponds, breeding

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pairs should be isolated, as they are jealous and bad-tempered, sometimes persecuting and killing even Ducks; but individuals vary in temper. Very tame males attack animals and people readily, striking heavy blows with their powerful wings; they can be dangerous to children.

No birds constitute finer ornaments for rivers, lakes and large ponds, or are easier to maintain. They prove perfectly hardy and require little care other than an occasional feed of grain and greens. Their great strength enables them to repulse the attacks of the smaller predators. They prove most useful in destroying weeds and keeping waters clean.

Mute Swans appear to have been kept in captivity by the Greeks and the Romans, and they have been famous and popular ever since. They have crossed occasionally with the other species, also with Greylag (domestic) and Canada Geese. All such hybrids appear to be infertile. There are no records of hybrids with Bewick's or Black-necked Swans. Those between Mute and Black Swans are very large and powerful, spotted grey and white, and generally of savage temperament.

BLACK-NECKED SWAN

Cygnus melanocoryphus

Anas melanocorypha, Molina, *Sagg. Stor. Nat. Chili*, 1782, p. 234: Chili.

Cygnus melanocoryphus, Peters, *Check-List, Birds of the World*, 1, 1931, p. 144.

CHARACTERISTICS

A rather small Swan, with a long, narrow body, a pointed tail, comparatively short neck, wings and legs. Body pure white; velvety black head and neck, with the chin and a line from the sides of the forehead through the eyes to the nape, white. Iris dark brown. Bill rather small, plumbeous grey, with the base and a very large, fleshy, double-lobed frontal caruncle scarlet. Legs and feet pale flesh colour.

Male: wing: 435–450 mm.; tail: 195–200 mm.; culmen: 82–86 mm.; tarsus: 85–88 mm.

Female: wing: 400–415 mm.; tail: 165–180 mm.; culmen: 71–73 mm.; tarsus: 78–80 mm. The female has the frontal caruncle as red and as large as in the male, and this characteristic varies individually; but she is distinctly smaller, with a considerably shorter neck.

Immatures have no frontal caruncle, and the base of the bill is dull red. The head and neck are brownish black flecked with pale grey; the white body feathers have rusty grey tips on the upper-parts and sides, and the ends of the primaries are broadly edged and spotted with blackish grey. They become pure white, with black head and neck, the second year, retaining a little black at the tip of the primaries, but the frontal caruncle remains small, only developing the third or even fourth year when the bird becomes adult.

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9. Distribution of *Cygnus melanocoryphus*.
(A) Breeding range;
(B) Non-breeding range.

Downy chicks are almost pure white, very faintly washed with pale grey above. Bill and feet black. The base of the bill is covered with white down as far as the nostrils.

Eggs: long oval in shape, 105×65 mm., on an average, smooth and glossy, cream-coloured, four to seven in a clutch. Incubation: 34–36 days.

DISTRIBUTION

South America, from southern Brazil, Uruguay, Paraguay; Chile south of lat. 35° S. and Argentina south to Tierra del Fuego; Falkland Islands; a winter visitor only north of lat. 35° to 40° S.

GENERAL HABITS

Black-necked Swans are partial to open lakes and marshes, even brackish lagoons, where they are found in flocks the greater part of the year. They are usually more numerous near the coasts than in the interior. Even more than the Mute, they are awkward on land because of their very short legs and long body. They fly rapidly, their

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short wings producing a loud rustling sound; they get up with difficulty, particularly with the wind, and they flap a good deal before rising.

Very little has been observed of their breeding habits in the wild state. It appears that each pair claims a territory as other Swans do. They are shy and cautious. They migrate from the extreme south to the extreme north of their range, but the populations of the middle parts and of the Falkland Islands seem to be sedentary to a great extent.

Black-necked Swans are fairly vocal, both on the wing and when alarmed or excited. Their voice is a soft and musical whistle, quickly repeated, emitted on the water with up and down movements of the neck. Their trachea shows only a slight bend. Both sexes will swim around each other, moving their heads up and down, and this constitutes their display. The male swims toward and attacks intruders with the neck curved and thrust forward, but the elbows are never raised as in the Mute and Black Swans.

Bulky nests are built among rushes in or near shallow water. The eggs are never covered when the hen, who does all the incubating, leaves them to feed, but when she does so the male always keeps guard close to the nest, without sitting on it. When newly hatched, and for two or three weeks, the cygnets spend most of their time on the backs of the parents, hidden under the wings, coming out only to feed, returning at once to their shelter if disturbed.

Black-necked Swans feed mostly on water weeds, like other swans. They were formerly very abundant and still are numerous on the Argentine pampas and in Patagonia, as a rule in small flocks; but sometimes a few hundred congregate together. They are decreasing in numbers at present and protective measures are becoming urgent. They normally nest from July to November, according to location and circumstance, but the breeding season, as well as their movements, seems to be fairly variable and uncertain. In the Falkland Islands, where they are resident, they have always proved extremely shy; they are more numerous in the eastern parts, nesting in August and September. In Tierra del Fuego they are very common in the north (Gente Grande lagoons), but rare in the south.

A detailed study of life habits, behaviour, breeding distribution and movements of this remarkable species is highly desirable.

CAPTIVITY

It seems that the first Black-necked Swans to reach Europe alive came to the Antwerp Zoo in 1846. They soon bred, apparently in the following year. One pair produced three clutches and reared fifteen cygnets in a year. Admiral Homby brought several for Lord Derby in 1851, which later went to Windsor and to the London Zoo, where they bred in 1857. They soon became well established in captivity and many were successfully reared during the following years, in England as well as on the continent of Europe.

One of the most successful breeders of Black-necked Swans in the later part of the nineteenth century was M. Maillard, at Le Croisic, Brittany. He acquired a pair in 1880,

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raised five cygnets the first year, and many more later on. From three pairs he reared a couple of dozen young each season. It was his habit to take the eggs so that the birds soon laid again, and thus from each pair three clutches were often obtained. Each pair was accommodated with a pond 75×45 feet, and a pen 30×30 feet. They were fed various grains, boiled rice, and soaked bread, and ate a great deal of grass and other greens.

The chicks were usually reared by domestic geese, and fed duck weed and egg yolks at first, followed by bread and milk, minced meat, boiled rice and grain.

Blaauw was also regularly successful for many years with this species, and it did extremely well at Clères, at Leckford, at Foxwarren and in several other collections, but there does not seem to be any successful breeding record for North America, although pairs laid several times at Mr C. L. Sibley's farm in Connecticut and at the Brookfield Zoo, Chicago. Females bred in captivity often lay in their second year.

A young imported pair was established at Clères in 1920 on a fair-sized, shady pond below a waterfall, and for twenty years these birds reared a brood of young every season. We let them incubate their eggs and raise the cygnets. The parents and their brood looked lovely against the background of the falls. In a few cases, when the eggs were taken away or the nest disturbed, they had a second clutch. They usually laid in April, making a large nest near the water on a high bank, wherever bunches of straw and rushes had been placed at their disposal. They were excellent parents. A day after hatching they took the chicks to the water. The cygnets immediately climbed on the back either of father or mother, so that it was difficult to see them or even to suspect their presence. Occasionally a tiny head would stick out; only when hungry did they come out to feed. They were given duck weed, custard and biscuit meal four times a day, and later on plenty of lettuce and grain. They were very easily reared. This excellent breeding pair was lost in 1940 during the German invasion. Most of the Black-necked Swans bred in captivity today are their descendants. A newly imported pair has now taken their place at the waterfall and has just started breeding.

Black-necked Swans are hardy and can stand sub-zero temperatures without trouble if open water remains available. Otherwise, it is better to shut them into a cold shed on a thick litter of straw during the most severe spells. They are perfectly robust, long-lived, and easy to keep once acclimatized; but newly-imported birds (usually young) are decidedly difficult as they often arrive in poor condition, and losses are to be expected. They should be carefully fed, and put on very clean water.

Black-necked Swans have never been known to cross with any other species. Although breeding pairs are better kept isolated, they are less savage than Blacks or Mutes toward other waterfowl, and they never molest ducks. They will, of course, bully Flamingoes and Geese, and they persecute especially common Shelducks because of a colour-pattern similarity. They usually ignore other Shelducks. Because of their long elegant shape, moderate size and striking plumage, Black-necked Swans count among the most desirable waterfowl for the adornment of waters.

THE SWANS

Northern Swans

The various knobless white Swans which breed in or near the Arctic parts of the Northern Hemisphere are all generally similar in shape and habits. Their bill is high, angular and flattened near the forehead, and the nostrils are nearer to the tip than to the base. Unlike the Mute Swan, they have no frontal knob, nor do they arch their wings in anger. Their legs are high and they walk easily. They usually hold the neck straight. The tail is fairly short and almost square. Their voice is resounding and bugle-like, varying in intensity and pitch, but of a similar general quality; it is caused by a long and convoluted trachea, entering the cavity of the sternum.

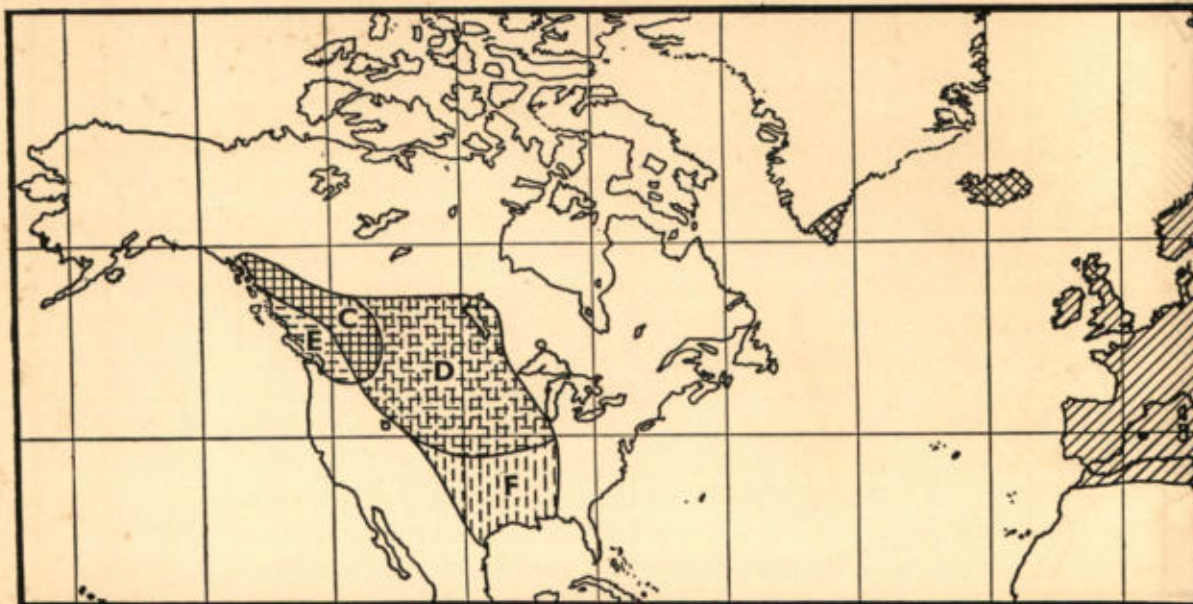
Each of the two continental regions, Eurasia and America, possess two distinct but closely related groups of Swans, differing mostly in size. Those found in Eurasia — Whooper, Bewick's and Jankowski's Swans — have a large yellow patch on the bill between the nostrils and eyes, while the two American birds, the Trumpeter and the Whistler, have either an entirely black bill or a very small yellow patch on the lores only. It seems better to recognize two species, a larger and smaller one, each with two or three sub-species. In each case, the American birds are larger than their closest Eurasian relatives.

The two larger Swans, the Trumpeter and the Whooper (*Cygnus cygnus*) have a more elongated shape, comparatively longer neck and bill which is higher near the base, and a deeper, stronger voice caused by an upward loop of the trachea inside the sternum, which does not exist in the smaller species (*Cygnus columbianus*).

The smaller White Swans are, in a general way, similar to the larger ones; they do not only differ in size, however, but also slightly, though decidedly, in their proportions. The body is shorter and rounder, the neck shorter, the head more rounded, and the bill shorter and more depressed in the middle of the upper mandible. Their trachea is also long and convoluted, but it lacks the upward bend within the sternum. Their voice is of a similar nature, but shriller. They nest in the tundra of the extreme north of both continents and they migrate south regularly.

All northern Swans have fairly similar life habits and behaviour. They fly much like the Mute Swan, but their wings merely produce a swishing noise, not a loud throb. They walk briskly and easily. They carry the neck stiffly erect when alarmed or resting; it is often bent sharply back for a distance, then turned up; when feeding, and also in anger, it is gracefully curved. Non-breeding birds congregate in parties and even in large flocks, but nests are always isolated in a territory which is jealously defended. Instead of raising the elbows like the Mute and Black Swans, they may lift them slightly when excited, but their aggressive posture consists of spreading them and holding them out from the body, the neck curved and the head low. They also rise in water, paddling violently at times, and male and female call loudly, moving the head up and down. This display is much more active and noisy than in the Mute Swan, and very different in character, but it is not nearly so graceful. The nest is placed on islets in lakes or in shallow water, and in

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10. Distribution of *Cygnus cygnus*. C. c. *cygnus*: (A) Breeding range; (B) Non-breeding range. C. c. *buccinator*: (C) Present breeding range;

grass close to the bank. Only the female incubates. They feed mostly on vegetable matter.

Although the adult state is assumed in the third year, it seems that most of these Swans do not breed until the fifth or sixth year, perhaps because it is often difficult for young birds to appropriate a nesting territory.

The White Swans are often stained rusty by the ferruginous or organic content of the water in which they feed, principally on the head, neck and underparts.

WHOOPER SWAN

Cygnus cygnus cygnus

Anas cygnus, Linné, Syst. Nat., ed. 10, 1, 1758, p. 122: Sweden (restricted locality).

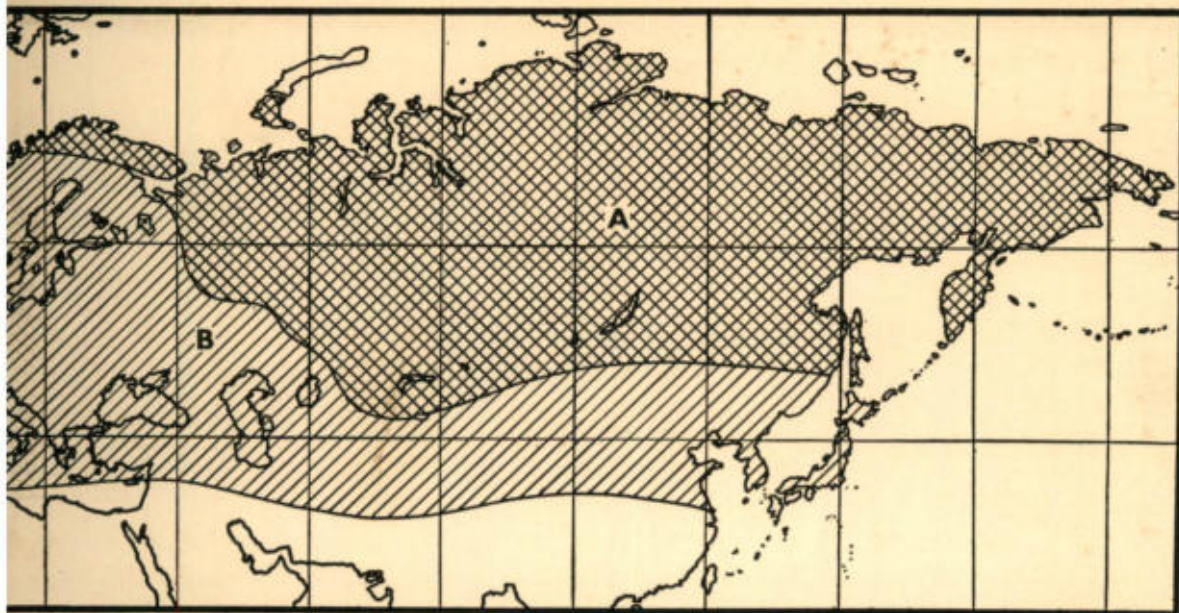
Cygnus cygnus cygnus, *Cygnus cygnus islandicus*, Peters, Check-List, Birds of the World, 1, 1931, p. 143.

CHARACTERISTICS

Entire plumage white. Iris brown. Tip of bill black, base and lores yellow, this colour extending forward laterally to the nostrils. The trachea shows a small, upward loop inside the sternum. Legs and feet black. The female is only slightly smaller than the male.

Male: wing: 560–630 mm.; tail: 160–200 mm.; tarsus: 112–120 mm.; culmen: 100–112 mm.

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(D) Past breeding range; (E) Present non-breeding range;
(F) Past non-breeding range.

Female: wing: 550–600 mm.; tail: 155–180 mm.; tarsus: 110–118 mm.; culmen: 95–103 mm.

Immatures are first brownish grey above, less brown than young Mutes, white around the eyes and whitish below. Bill flesh colour or pink, edged and tipped with black. Legs and feet pale fleshy grey. The first winter and spring they become whiter, but still remain mostly grey above, blotched with white, and the base of the bill turns first a livid white, then yellow, and the feet black.

Downy chicks: pale greyish white above, slightly darker on the crown, nape, shoulders and rump, white below; base of bill feathered in a point to the nostrils. Bill and feet flesh-coloured.

Eggs: four to seven, elongate oval in shape, creamy white, 113×73 mm., on an average. Incubation: 35–42 days.

It has been stated that the Whooper Swan breeding in Iceland is smaller and should be separated as a distinct sub-species. Material available does not warrant such a distinction. All Icelandic Swans are small, but not more so than a number of European and Asiatic specimens.

DISTRIBUTION

Breeds in Iceland (occasionally at certain periods in southern Greenland), in the northern parts of Scotland, Norway, Sweden, Finland, Russia, Siberia to Kamchatka, Sakhalin,

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the Commander Islands, and Japan; also in Central Asia. Winters in the British Isles, Europe, North Africa, Asia Minor, Persia, northern India, Japan and China.

GENERAL HABITS

Whooper Swans breed on moorlands and tundra lakes, pools and marshes, and in the deltas of Arctic rivers. The rest of the time they resort to sea coasts, estuaries and brackish lochs, and also to inland lakes, large rivers and flood waters. They are less tame in disposition than Mute Swans, intolerant of human settlement and scarce in inhabited regions, where they are found mostly on passage. On migration, they fly at low altitude, sometimes in V-shaped formations or in oblique lines, but also in no definite order. They feed both by day and night, moving according to the tide and moon, and they often collect at dusk in large, noisy parties. Their call consists of a double bugle-like note, the second syllable higher-pitched, often repeated with a short pause between each of them; they are usually louder on the wing. To this they add shorter and weaker conversational notes and many variants (see E. Christoleit, *Jour. f. Orn.*, 1926, pp. 476-80). In alarm, they give a loud and harsh 'kwock'. When a pair calls in duet, the male's note is shriller, and they make a great and prolonged noise, with heads and necks going up and down quickly and much shaking of the more or less extended wings. The legend of the song of the dying Swan is probably based on the fact that a shot bird exhaling air from its long, circumvolved windpipe can produce a prolonged musical note.

A good account of the nesting of the Whooper in the West Highlands of Scotland in May 1922 is given by Mrs Audrey Gordon (*British Birds*, 15, p. 170):

'Near an island, where many Herons nested on low birch trees, we saw a pair of Whooper Swans swimming. Suspecting a nest, a search was made and soon revealed the Swan's nest with four eggs. It was situated in a patch of green grass amid a mass of hummocks of blueberry and heather and about four yards from the edge of the lock. The nest was composed of dead grass and weeds, and was raised some fifteen inches from the ground level. . . . The Swan always landed exactly at the same place, on a tiny sandy beach, and approached the nest slowly, drying her breast feathers by rubbing them with her head. While sitting she spent a good deal of time building up the nest by pulling the grasses up and around her from the base of the nest. Several times she stood up and laboriously turned the great eggs completely over. Once she left the nest to feed and before doing so carefully covered the eggs with nesting material. On returning however she did not remove the covering but wriggled it off the eggs with her body. Often she went to sleep on the nest, her long neck along her back in tortuous curves.'

CAPTIVITY

Whooper Swans are fairly often captured on winter migration, and they have been kept wing-clipped on ornamental waters for many centuries. The first recorded breeding success in captivity is that of the London Zoo in 1839, and it was repeated in following years.

They do very well under the same conditions as the other Swans. Surprisingly enough,

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they do not require much space, although they are very active, sometimes even restless, covering a lot of ground on foot, often grazing and feeding far from water.

Breeding pairs are savage and jealous, and they should be isolated under ordinary circumstances, but they are rather less quarrelsome than Mute Swans. At the Vincennes Zoo, for example, six or eight pairs live together on a fairly small moat, and several of them nest and hatch every year, with the simple precaution of temporary fencing around each nest, leaving an access to water. They raise their young without difficulty in a small pen. At the Kellogg Sanctuary, Battle Creek, Michigan, several pairs of Whoopers live and nest regularly and successfully, each of them keeping to a comparatively small territory. There, as elsewhere where they come into contact, Whoopers are dominant over the heavier Mute Swans, as they are quicker and more active, attacking with greater speed. Although less graceful in shape and posture than some other species, Whoopers are handsome and interesting, their musical voice and brisk, active ways being highly attractive.

TRUMPETER SWAN

Cygnus cygnus buccinator

Cygnus buccinator, Richardson, in Swainson and Richardson, *Fauna Bor. Am.*, II, 1831, p. 464; Hudson Bay. Peters, *Check-List, Birds of the World*, I, 1931, p. 144.

CHARACTERISTICS

The largest of all Swans, with a long, thick, black bill. A heavier bird than the Whooper, and lacking the yellow bill patch, but otherwise very similar. It weighs thirty pounds on an average, sometimes a good deal more; its length reaches twenty-six inches, and its wing-spread ten feet. The massive bill is wholly black except for a narrow red border to the anterior part of the upper mandible. The trachea shows a high upward loop inside the sternum. It differs from the Whistling Swan by its greater size, more elongated shape and long neck. Its bill is comparatively longer and wider near the tip, thicker, higher and straighter along the culmen, and it is always without any trace of yellow on the lores. The forehead looks flatter.

Male: wing: 605–650 mm.; tail: 225–240 mm.; tarsus: 120–140 mm.; culmen: 107–120 mm.

Female: wing: 585–610 mm.; tail: 210–225 mm.; tarsus: 110–130 mm.; culmen: 105–118 mm.

Immatures: earthy grey above, more or less flecked with white; darker on the crown, face and on a line down the hind neck; wing feathers white with dark shafts; underparts whitish grey, less pale than in the other forms. Bill fleshy pink, with black borders, patches around the nostrils and base. Legs and feet greyish fleshy-pink, turning to olive-grey and black later on. Second-year birds are white, retaining very few grey neck and body feathers, with brownish crown and wings. Bill and feet black.

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Downy young: white, washed with grey above, similar to Whoopers, but darker on the nape, hind neck and rump. Bill and feet flesh colour.

Eggs: like those of the Whooper, creamy white and rather rough-shelled, 110×7 mm., on an average; five to eight, exceptionally up to ten, in a clutch. Incubation: 36-40 days.

DISTRIBUTION

North America; formerly breeding from southern Alaska to California, east to Manitoba, Minnesota, Indiana, Iowa, Nebraska, Missouri; wintering south to Illinois, the Mississippi Valley, Louisiana and Texas; accidental farther east. Probably even more widespread at an earlier period, as remains have been found in the lower Mississippi Valley, Maryland and Florida. Now restricted to Montana, Wyoming, Western Canada (British Columbia, Alberta), and Southern Alaska.

GENERAL HABITS

Compared to its highly migratory close relatives, the Trumpeter Swan is a fairly sedentary bird, much like the Mute Swan, only wandering far enough to find open water and food. It breeds as far south as it can, and winters as far north as possible, while the Whooper, the Whistler, Jankowski's and Bewick's Swans nest in the far north and accomplish long and regular journeys to the south, to return punctually in the spring.

Whenever conditions are suitable, Trumpeters stay on or around their breeding grounds, and their movements are irregular, conditioned by the weather, which affects the food supplies and the freezing of waters. Such life habits have almost proved fatal to these majestic birds. In former days they ranged all over central and western North America and had an extensive distribution, although they were probably never very numerous at any one place. It is also probable that several early records from the coasts of California and of the Gulf of Mexico apply in reality to Whistlers with a completely black bill.

Trumpeter Swans seem always to have preferred inland waters, only occasionally reaching the sea in their winter wanderings. A great part of the territory on which they used to live and nest has now been well settled by man. They were easily slaughtered, the more so because they are of a tame disposition and fly low, well within the gunner's range. An important trade was made of their skins for the manufacture of powder puffs, and thus they soon vanished from most of their old range. Today, they are reduced to a few scattered colonies in southern Alaska, British Columbia, Alberta, Montana, and Wyoming. Until quite recently, little was known of the Alaskan and Canadian populations, and in 1935, only about sixty survived in the United States, on the Red Rock Lakes (Montana) and in the Yellowstone Park (Wyoming). Since then, the Red Rock Lakes have been made a sanctuary and the Swans have greatly increased in number. More than a hundred cygnets were raised annually in 1948, 1949 and 1950. The full census of 1949 in the United States showed a population of 451, but it was found reduced to 376 in 1950, a decrease difficult to explain; it was up again to 451 in 1952.

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The Canadian and Alaskan stock is estimated at close to a thousand birds, so that probably 1,500 Trumpeters are still living.

It seems that the protected population of Trumpeters in the sanctuaries of Montana and Wyoming has reached saturation point. Nesting territories at Red Rock Lakes are not available to more than a minority of the adult pairs; many therefore cannot breed and remain in flock formation throughout the summer. Efforts have been made to resettle the birds in suitable grounds of their former range, namely the sanctuaries of Malheur Lake (Oregon), Ruby Lake (Nevada) and Jackson Hole (Wyoming). They were only partially successful at Jackson, where three birds out of ten settled down and bred. They disappeared elsewhere. Attempts to breed them in captivity in these sanctuaries failed because their accommodation was unsatisfactory.

Co-operating in the project, I repeatedly visited Red Rock Lakes, the Yellowstone and other western sanctuaries between 1944 and 1947. I found that the Trumpeters remained there all the year round, congregating in winter into the few places where strong or hot springs kept the water open. As natural food soon becomes exhausted in such restricted areas, it is necessary to feed grain heavily to the wintering Swans. Otherwise they would leave the sanctuaries and many would be illegally shot, despite the complete protection accorded to the species, or die of starvation on frozen waters.

Farther north, the Swans seem to move about a good deal more. The first report of Trumpeters in Alaska was a note by Dr. I. Gabrielson (*Auk*, 1946, pp. 102-3). He had been told of the occurrence of the birds in 1940, but he could not check it personally until March 1944, when he counted some 300 as he flew over Prince of Wales Island, several smaller islands and part of the Cleveland Peninsula. In March 1945, D. Ralston counted 257 there and sixty-one on Revillagigedo Island; he knew of twenty-five more wintering from South Belm Canal to Cape Fox. A dead bird was positively identified as a Trumpeter.

There are many records from British Columbia, particularly those of K. Racey, *Auk*, 1948, p. 385 (Alta Lake), and of J. P. Holman, *Auk*, 1950, pp. 381-2.

They also occur in Alberta, as stated by J. D. Soper (*Auk*, 1949, 1, p. 240).

Broadly speaking, the Trumpeter Swan is now sparingly distributed in the region from the east end of Lesser Slave Lake westward to lakes immediately west of Hythe, Alberta. This distribution, though spotty, is therefore seen to have a breadth of about 200 miles. The species was not detected at any lakes between Athabaska and Lesser Slave Lake, nor did any data secured from residents indicate its present occurrence in that district.

'Adult Swans apparently return to the same nest year after year. On the smaller lakes and sloughs there will be but one nest, and should another pair of swans attempt to build a nest, or even to feed, on the same body of water, the nesting birds will drive them away. On the larger lakes, swans will build about a half a mile apart. Under these circumstances, each pair of swans seem to respect "the territorial rights" of the other birds. The Swans also drive off any geese that may land in the vicinity of a nest, but they pay no attention to ducks or other marsh birds. We found nests of the mallard, the ruddy

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duck, the lesser scaup, and the American coot within a few feet of swans' nests.

'Non-breeding Swans sometimes have a problem finding a place to feed. The moment they land within a half-mile or so of a nest, they are immediately driven off by the male breeder. They seldom resist. Once a pair of immature Swans finds a spot where they are not molested by the breeding Swans, they remain for the season. It seems probable that they use the spot as a nesting site in future years. . . .

'Both nesting and immature birds often come on land to feed. They are not particular about their diet, eating vegetation, seeds, grain, insects, snails, small reptiles, and quadrupeds. Grain fields fronting the lakes are among favoured feeding spots. The Swans are especially fond of wild celery. As this plant is found in abundance in the Alberta lakes, it seems likely that the birds will continue to breed there. They pluck the celery from the lake bottom, and after a pair of swans has been feeding in one spot for several days, the water will be dotted with the floating, uneaten tops.'

In the Yellowstone National Park, and the Red Rock Lakes Refuge, I have often observed Trumpeter Swans during the summer. While non-breeding birds remain in parties and small flocks, moving on the wing here and there, each adult pair appropriates a territory and keeps it to themselves. Their habits prove to be the same as those of the Alberta birds. The Swans are not wild, although they will swim away when too closely approached in a boat. When disturbed by the catching of cygnets, the parents, still enjoying their power of flight, would circle round at low elevation, angry and calling loudly. Once such a pair alighted on the territory of another one, and despite our close proximity, the four birds started a savage fight, males and females alike, until the involuntary intruders were driven away and took wing.

On a stretch of river kept free from ice by very strong springs, where swans winter and are fed, losses were experienced one year through attacks on immature birds by a pair of Golden Eagles. This is rather an unusual occurrence, and those particular eagles had to be destroyed.

To prove that the white mutation of the Mute Swan is not an extraordinary development, I should mention that out of a brood of four Trumpeter cygnets hatched on a lonely lake in the Yellowstone, three were the normal grey above while one was pure white.

CAPTIVITY

Trumpeter Swans do very well in captivity. They soon become tame, prove completely hardy, easy to feed, and they breed readily. The first specimens to reach Europe arrived at the London Zoo in 1866, and the earliest breeding success in captivity took place there in 1870, when three cygnets hatched on July 6 and were reared on the Three-Islands Pond. Other successes followed. The species reached Paris, at the Jardin des Plantes, in 1873, but not until 1880 were eggs laid, and these proved infertile; in 1885, however, five eggs hatched and four cygnets were reared.

Later on, Trumpeters bred regularly in Europe, but since the beginning of this century, only the Duke of Bedford, in England, and F. Blaauw, in Holland, seemed to have

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possessed and raised any. The latter was consistently successful with these birds, and even shipped a number back to America, particularly to the Kellogg Bird Sanctuary. In *Ibis*, 1904, pp. 73-74, Blaauw writes as follows:

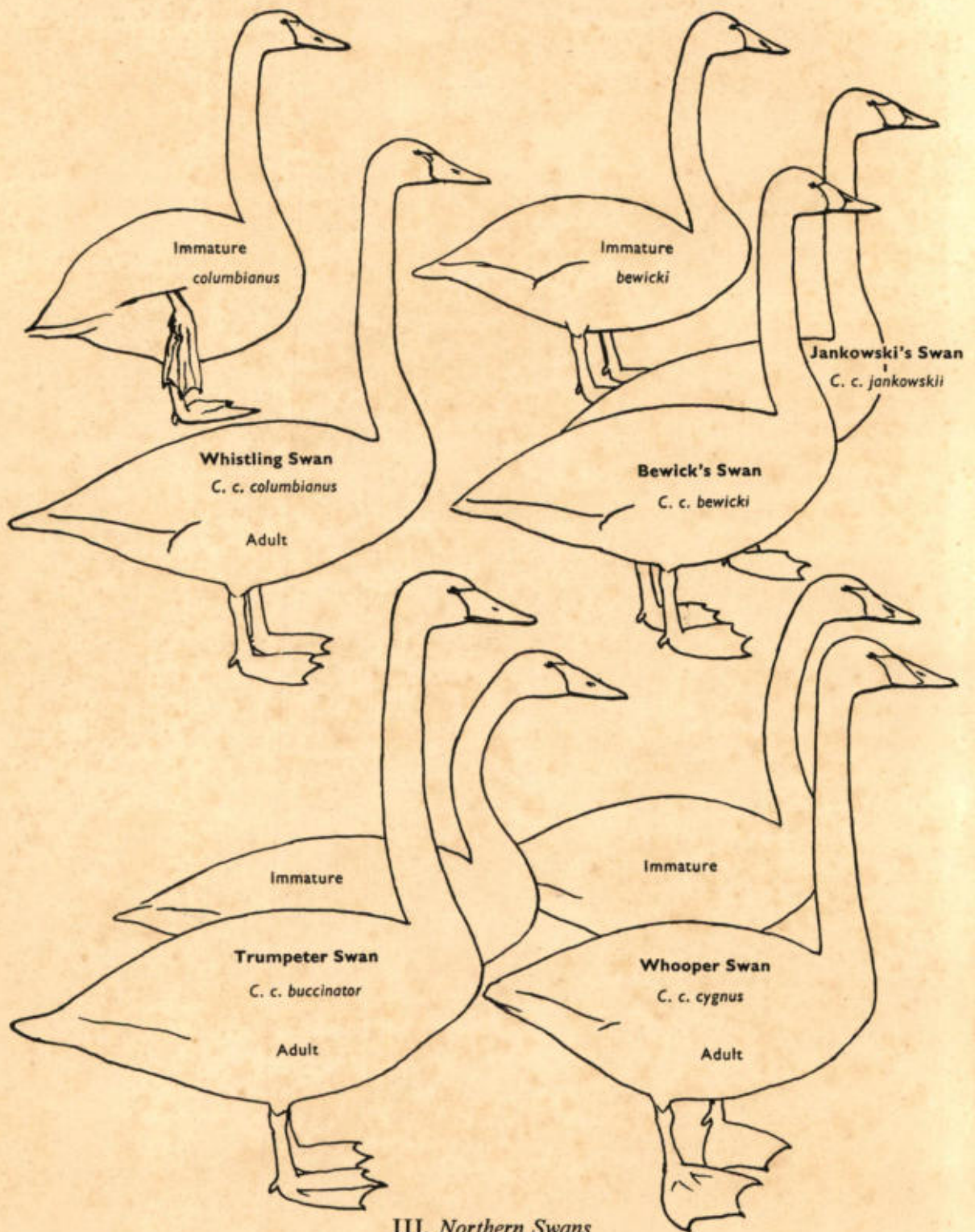
'My pair of Trumpeter Swans (*Cygnus buccinator*) bred again this season. Six eggs were laid and six chicks were hatched. The chicks are white, with a grey tinge on the back. The cere is covered with pure white down. The bill is flesh-coloured, with a dark tip, and the legs are also flesh-coloured. The down of these chicks is very short and dense, quite different from the longer and more fluffy down of the chicks of *Cygnus nigricollis* and *C. atratus*. The result is that the chicks look much smaller in comparison. A conspicuous feature is the long neck, which is carried very stiff and upright. At the age of about six weeks the first feathers appear, and the birds then begin to grow very quickly. The first feathers are brownish grey, without any markings as a rule, but one of this year's birds is remarkable for having transverse markings on the shoulders and greater wing-coverts. After the birds are feathered the bills gradually acquire the black colour, the black beginning at the point and at the forehead, and gradually increasing. Later, the middle part, which is still pink, gets spotted with black, and in the course of the February following the first summer the whole of the bill usually becomes quite black. The legs by that time have also gradually darkened into dusky grey, which becomes black after the birds are a year old. About March, white feathers begin to replace the grey plumage, and when a year-and-a-half old the birds are quite white, except for some fine grey spots, which are still visible on the back of the neck and on the head. *Cygnus buccinator* never carries its chicks on its back, as *Cygnus nigricollis* and some of the other Swans are apt to do.

'During the first days of the life of her chicks, the old female Trumpeter often retires to her nest for hours together, warming them under her, and she continues to do this during the night for a long time. Young Trumpeter Swans, when fully fledged, are very active birds. They fly with great ease, rising directly from the water into the air, without running over it at first with flapping wings, as so many of the larger waterfowl do. They also dive with great ease.'

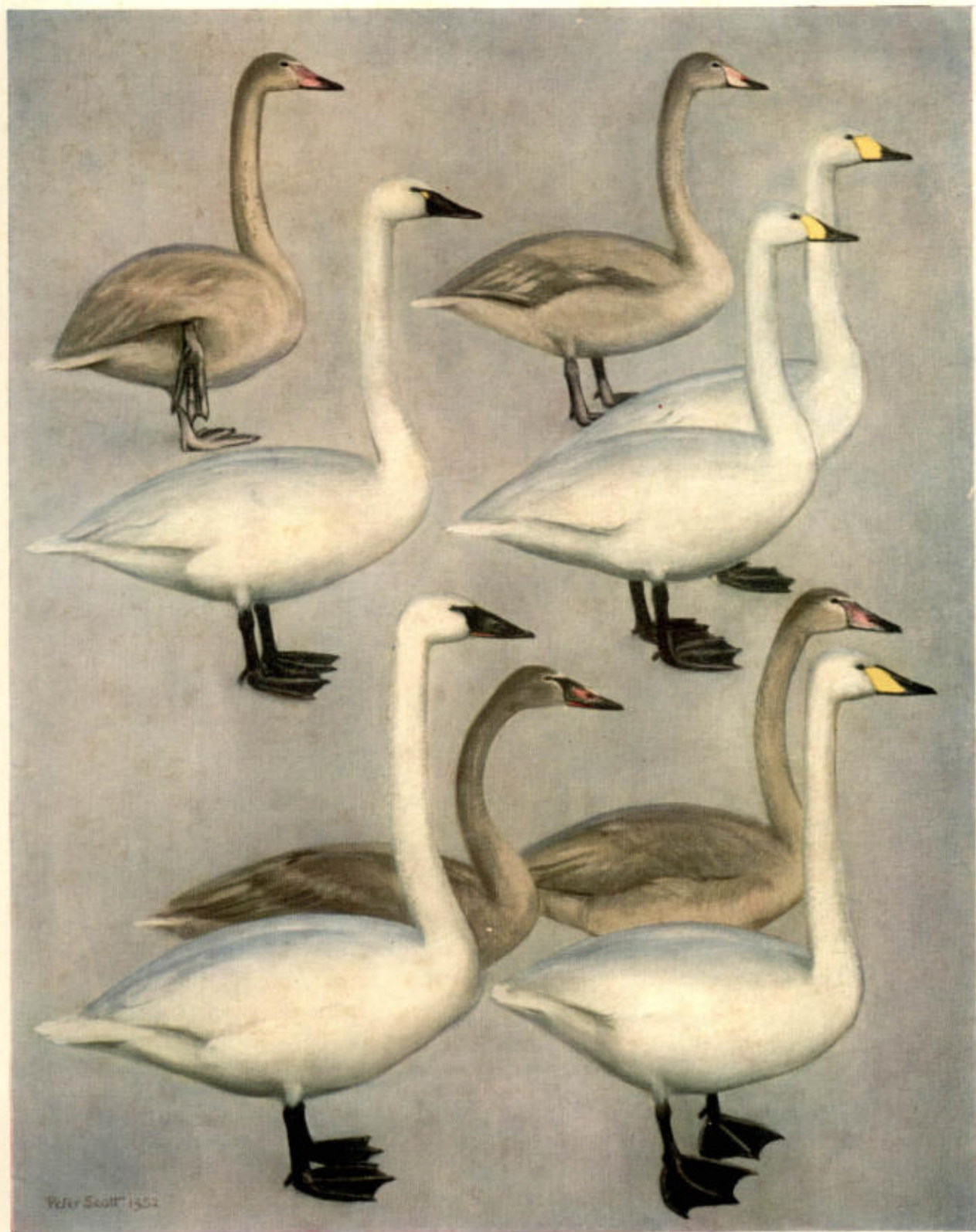
Blaauw reared Trumpeters at Gooilust almost every year until his death in 1936. There were then sixteen birds left, old and young, and they all went to Woburn Abbey, as they had been bequeathed to the Duke of Bedford, who still possessed four. Unfortunately, all these birds died through lack of food during the 1939-45 war. In 1952 the Canadian Government presented Her Majesty the Queen with five young Trumpeters, which are in the care of the Severn Wildfowl Trust.

Curiously enough, no breeding success has yet been achieved in its native country. Only a hybrid between a male Whooper and a female Trumpeter was reared in 1938 by C. L. Sibley (*C. R. 9th Int. Orn. Congress*, 1938, p. 329), who also mentions hybrids of Trumpeters with Whistling and Mute Swans, and Canada Geese.

We kept only one pair at Clères, in 1920 and 1921. They were two years old when they arrived from Gooilust, and they were placed on the lake. They swam and walked all over the park, at great speed. Very soon they became quarrelsome and attacked large



III. Northern Swans



Peter Scott 1952

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birds, particularly white Rheas, which they pursued relentlessly over the hills. It became impossible to keep them at large, and as all suitable pens were already occupied, we sent them away to the London Zoo.

Trumpeters kept at liberty at Woburn did not molest other birds in the huge park. Each pair established a territory and nested, but the young were often lost. At Gooilust, each pair was kept on a comparatively small pond, and bred regularly.

I gained personal experience in catching and rearing Trumpeter Swans during the years 1944-7, as adviser to the Fish and Wildlife Service, Department of the Interior, U.S.A. In this capacity, I visited the Red Rock Lakes (Montana), Jackson (Wyoming), and Malheur Lake (Oregon) Refuges in May, 1944.

The first idea had been to remove eggs from some of the Swans' nests at Red Rock Lakes, to hatch them and to rear the cygnets under hens. But on our first visit we found that the Trumpeters easily raised their broods, which were out of the reach of predators on the numerous small islands of the shallow lakes, and that it was simpler to catch the wild cygnets before they could fly.

A clutch of five eggs, however, had been taken before our arrival at Red Rock Lakes, and was already being incubated under bantam hens. These hens proved to be too small to cover them properly. In spite of this unfortunate start, two eggs were duly hatched and easily reared by Dr Ward Sharp, the manager of the sanctuary, on a very simple diet of milk curd, chicken feed and green food. We had hopes that the robbed pair of Swans would nest again, but they refused to do so, and the only supposed advantage of taking eggs rather than catching cygnets was thus disproved. On August 30 and 31 and on September 1, we caught twenty cygnets on the Red Rock Lakes. The operation was not difficult as all the broods had been carefully located in advance by Dr Sharp, and it was easy to run down the birds in flat-bottomed boats. The captured cygnets joined the two hand-reared ones in a small enclosure, and at once they started feeding, showing no fear whatever.

All the young Swans were then transported to the Malheur Lake Refuge in eastern Oregon. The 700-mile journey was made by truck, in specially built crates. After a day's rest in a small pen, the cygnets were pinioned and released in a roomy enclosure, including a three-acre pond fed by springs and free from ice the year round, which had been especially built for them. The plan was to leave them there until they reached their third year, when they would be separated in pairs and settled in breeding pens to be installed for them at the Malheur Lake and other government sanctuaries offering adequate conditions of climate and protection, as well as permanent open water.

These young Swans did very well at first. Although they pecked at each other, they did not fight badly, only a weak and ailing bird being killed by the others. But they soon manifested their violent temper towards other waterfowl. Canada and Snow Geese alighting on their pond were viciously pursued, and during the following spring, several migrating Whistling Swans, which tried to join them, were promptly killed.

The following year, in September, we caught twenty more cygnets at Red Rock Lakes,

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out of fifty-six seen. We found that four clutches had failed to hatch. The new lot of cygnets were established at Malheur Lake in a separate enclosure, next to that of the 1944 birds. No more birds have been caught since. The 1944 Swans began to pair off in 1945, and they had to be segregated in 1946, while the 1945 birds were moved to the Ruby Lake Refuge, Nevada, situated in a high valley where strong springs keep a channel of open water during the severest frosts. Unfortunately, it was found impossible to build suitable breeding pens in time, as I had advised, or to obtain permanent and competent keepers for the care of the birds. Consequently, losses were high and no satisfactory results followed, which is to be greatly deplored. The discovery of more colonies of Trumpeter Swans in Alaska and in Canada at that time no doubt influenced the authorities and diminished their interest in the project of propagating in confinement this largest of all waterfowl, at present threatened with extinction.

WHISTLING SWAN

Cygnus columbianus columbianus

Anas columbianus, Ord, in Guthrie, *Geogr.* 2nd Am. ed., II, 1815, p. 319: The Dalles, Oregon.

Cygnus columbianus, Peters, *Check-List, Birds of the World*, I, 1931, p. 144.

CHARACTERISTICS

Pure white, with a black bill and, in the majority of cases, a small yellow patch on the naked lores, in front of the eye near the base of the bill. This patch is long and narrow, rarely more than twenty mm. in length; sometimes it is minute or completely lacking, certain specimens having an entirely black bill like Trumpeters, thus being difficult to identify. But differences in size can usually be detected; a large Whistler weighs not more than twenty pounds and is, on an average, fifty-one inches long, while the Trumpeter weighs thirty pounds and is fifty-six inches long. There is no red border to the Whistler's bill. The voice is diagnostic, as are the convolutions of the trachea which lacks the sharp upward bend of the Trumpeter. There can be no mistake when dissection is possible.

Male and female differ only slightly in size. Wing: 510–575 mm.; tail: 175–210 mm.; culmen: 90–100 mm.; tarsus: 95–115 mm. The adult plumage is acquired the second year, and then the birds are usually pure white, only a few retaining some brownish grey feathers.

Immatures much resemble young Whoopers, being brownish grey on the head, hind neck and upperparts, with a pink bill and flesh-coloured feet.

Downy chicks are white, tinged with pale grey above, much like young Whoopers.

Eggs: creamy white, 107×68 mm. on an average, four to seven in a clutch. Incubation: 35 to 40 days.

DISTRIBUTION

North America, breeding chiefly north of the Arctic Circle from Alaska to the Hudson Bay and Baffin Land, north to about 79° ; St Lawrence Island. Winters principally along

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the Pacific Coast, from southern Alaska to California, and the Atlantic Coast, from Chesapeake Bay to Currituck Sound. Elsewhere on migration, or accidental.

GENERAL HABITS

Migrating or wintering Whistling Swans are one of the sights of the American bird world. Nesting in the so far little-disturbed wilderness of the North, and completely protected now in the United States, the Whistling Swan still occurs in great numbers. They are early departers, leaving their winter quarters at the end of March in large flocks, resting at various places on their way north. They usually arrive singly, or in pairs or small parties at their breeding grounds the last days of April or the first days in May. They sometimes suffer much from late bad weather, and there is still much snow and ice when they reach the tundra. Each pair claims a breeding territory, with much calling and displaying, often on land, the birds walking about with arched neck and outstretched wings, and bowing to each other with the extended neck bobbed up and down. The nest is generally built on an islet, or close to the edge of a pond; it is similar to that of the other Northern Swans, and well hidden. The breeding grounds are always near the coast, the species being found in the interior on migration only.

Whistling Swans feed mostly on vegetable matter, like the other species, adding small animals, particularly snails. They fly well and rise easily, and they travel at great speed, usually in V-shaped formation and at considerable height, and they show considerable caution and wariness. They are noisy and call a great deal, emitting various high-pitched trumpeting notes, and also soft and musical ones; of course, they do not whistle!

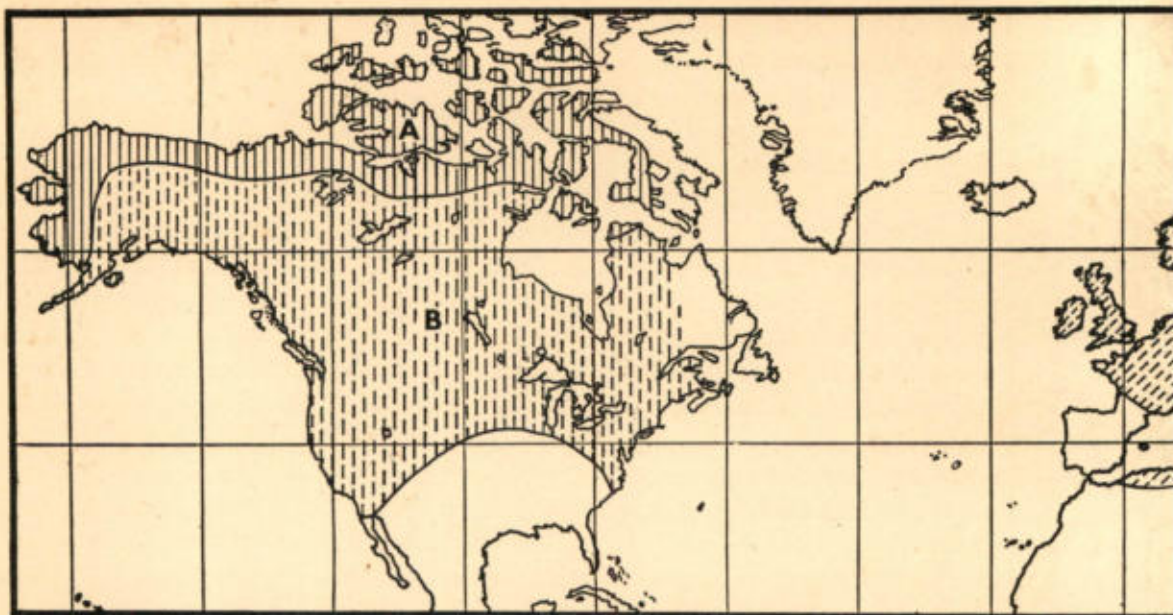
The young leave the nest early in July and can fly by the middle of September. They migrate about mid-October, congregating in large flocks of several hundred. They reach their winter quarters in November, as a rule.

CAPTIVITY

Although easy to keep pinioned on ornamental waters, Whistling Swans are less often seen than others as they are not so beautiful, are wilder, and less inclined to breed than the Trumpeters and Whoopers. Like Bewick's, they are decidedly shorter, rounder and more goose-like than the larger species. They require the same accommodation and care, and behave in every way like other Swans. They are hardly mentioned, if at all, in European writings on waterfowl in captivity, and it seems that they had never reached the Old World before three specimens arrived at the London Zoo in 1903. No breeding success has been reported in Europe, and apparently hybrids only have been produced in America until quite recently. C. S. Sibley has recorded (*Aviculture*, 1940, pp. 47-8) from his farm at Sunnyfields, Connecticut, hybrids with Mute, Whooper and Jankowski's Swans, and also with a Canada Goose.

The only complete success in breeding Whistling Swans in confinement seems to be that of Mr John Gebauer, a Canadian farmer living nine miles north-west of the town of Morris, south of Winnipeg, Manitoba, who possesses several large ponds on which

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11. Distribution of *Cygnus columbianus*. *C. c. columbianus*:
(A) Breeding range; (B) Non-breeding range.

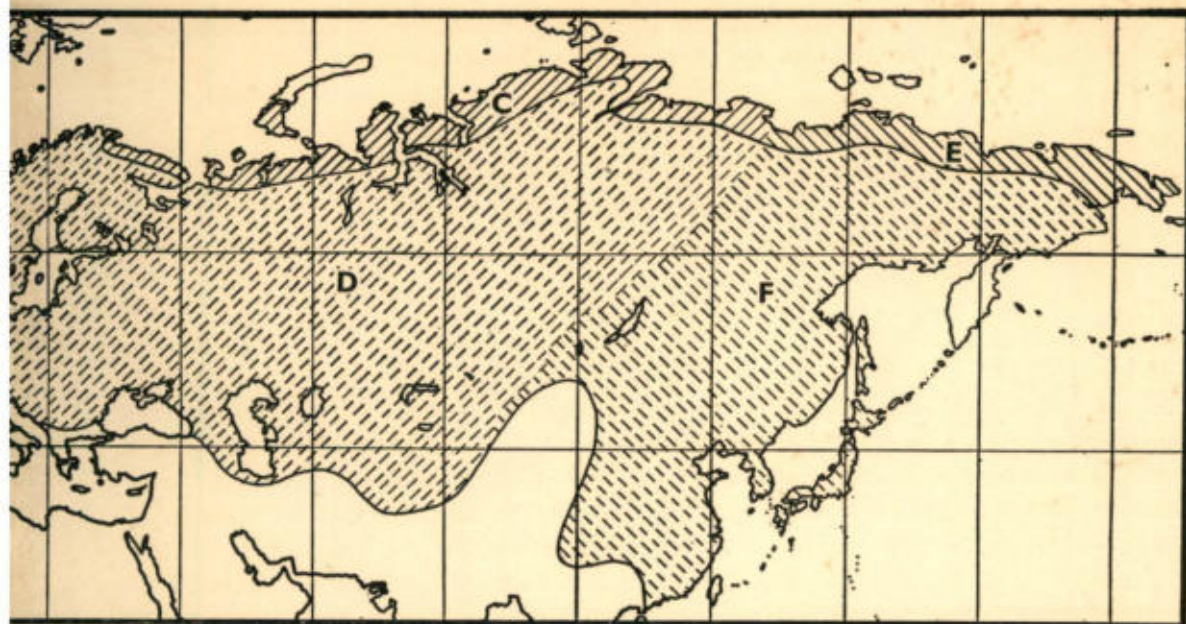
he keeps native waterfowl, including two pairs of Whistling Swans; two adult males, one wounded in 1933, the other one in 1940; one adult female, wounded in 1940, and another which came on migration in October 1940 and has stayed ever since. He reports as follows, in a letter, December 10, 1948:

'At present, my two pairs of Swans are paired; the old male (A) is mated to the female immature (D) and B and C are paired.

'The immature (D), on arrival was uninjured and had the bill marked pale flesh pink; the legs showed no pink. The plumage was a pale grey. She did not mate until she was five years old, when she mated with the old male (A) in the spring of 1945. The nest was on the bank of one of the ponds near the water and was the nest of a tame or domestic Goose who had deposited one egg. The male Swan did all the nest building, which consisted of rebuilding the Goose's nest with sticks brought from a distance and of what appears to be like moss growing at the water's edge. To gather the "moss", the Swan threw the weeds near the nest and only carried them when they were collected some distance from the nest. He then arranged the material, enlarging the nest without damaging the Goose's egg. He got on the nest itself to help to shape it. The female took no part at all in nest building. The nest building took at least four or five days.

'After the nest had been finished about a week, the female laid an egg and then one egg on alternate days. When four eggs had been laid, she started to sit at once. Incubation took five weeks and she started to sit on about the May 20, 1945. The Swan's eggs

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C. c. bewicki: (C) Breeding range; (D) Non-breeding range.
C. c. jankowskii: (E) Breeding range; (F) Non-breeding range.

seemed to be exactly the same size and proportions as the Goose's egg. The smallness may be due to it being the first clutch.

'All four swans' eggs hatched and also the goose's egg, but during the first few days, the female squashed three of the cygnets but continued to look after the survivor. The cygnet always followed the female and the gosling always followed the male on the pond. After a week, the Goose died, apparently from starvation, as it never seemed to have a chance to remain long enough on land to get its normal food.

'During some hot weather, during incubation, the male and female changed places on the nest every fifteen minutes, but this was never observed on cool or dull days; the male was never seen to enter the nest on cooler days.

'On hatching, the cygnets were pure white and looked like cotton wool. My brother, Peter, and I are confident that the feet and webs were pure black, as we commented that they were exactly like those of young Canada Geese at the time. I believe the bills were black with very small pink spots and I think the nail at the tip of the beak was black. I am uncertain as to the colouring of the spots on the bill, however.

'When the down was lost, the fledgling was slate-coloured, much darker than when it got into its later immature plumage in the fall. The change from dark to light grey was gradual, and by the following autumn it was a bleached grey. Peter and I believe that this young bird never had any pink on the legs at any time; they were always black. When it died from unknown causes (it appeared to be in good health), in the following October, the blotches on the bill were still flesh-pink.

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'In 1948, late in May, the male again built a nest high up on the bank; the female laid no eggs, never sat on the nest, but was often sitting just outside on the ground.'

BEWICK'S SWAN

Cygnus columbianus bewicki

Cygnus bewickii, Yarrell, *Trans. Linn. Soc. London*, xvi, 1830, p. 453: England.

Cygnus bewickii bewickii, Peters, *Check-List, Birds of the World*, i, 1931, p. 143.

CHARACTERISTICS

The smallest of the white Swans, with a yellow patch on the base of the bill, very much larger than in the Whistler, but smaller than in the Whooper. The extent of the yellow varies according to individuals, some having the whole base of the culmen yellow, others black; near the nostrils, the yellow patch is abruptly truncated 10 mm. or more from them. The culmen is depressed in the middle, as in the Whistler.

Male: wing: 515–535 mm.; tail: 150–180 mm.; culmen: 90–100 mm.; tarsus: 90–105 mm.

Female: wing: 475–525 mm.; culmen: 84–95 mm.

Immatures: like *C. c. cygnus* and *C. c. columbianus*, lighter than *C. c. buccinator*.

Downy chicks: the same, the down not extending so far on the bill as in the Whooper.

Eggs: five to seven, exceptionally more, greyish white, 115×74 mm., on an average.

Incubation: 34 to 38 days.

DISTRIBUTION

Northern Russia and Siberia from Petsamo west to the Lena Delta, wintering in Scandinavia, the British Isles, Continental Europe and Central-Western Asia.

GENERAL HABITS

Bewick's Swans do not differ much from the other northern Swans in habits and behaviour. During the winter they congregate in large flocks, like the Whistlers, particularly in Ireland and in Holland, which are among their favourite haunts. Their voice is much like the Whistlers', rather softer and lower pitched, and pleasantly musical. Their display and nesting behaviour are those of the group.

They breed in the estuaries of large rivers; the nests often are fairly near one another, and always far to the north. There are colonies in northern Russia, Kolguev Island, the south of Novaya Zemlya and along the Siberian coast east to the Lena River, where the present form appears to intergrade with the eastern one. The nest is a large, conical heap of moss and lichen. Their breeding grounds are confined to the tundra, like those of the Whistling Swans. They arrive in western Siberia, within the Arctic Circle, early in May. They are found during the winter on all sorts of waters also suitable to Whoopers. They

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are often common along the coasts, and are also found on large rivers, lakes and floods. Their food is that of other Swans.

A great deal remains to be learned on the life habits, distribution and variation of the Lesser Swans of northern Europe and Asia; particularly, a detailed study of the birds on their breeding grounds from Russia to Eastern Siberia is required.

CAPTIVITY

Bewick's Swans captured on winter migration have probably been kept in Europe for a very long time, but they were long mistaken for small Whoopers. Although breeding pairs are just as fierce and dangerous to other birds as any of the other Swans, single Bewick's are usually harmless. Rogeron, who for many years kept in Anjou a male that had been wounded in the neighbourhood, has nothing but praise for the bird's behaviour on his pond and has written about it at great length (*Bull. Soc. d'Accl. de France*, 1883, p. 220).

In *Ibis*, 1904, p. 74, Blaauw writes:

'Of Bewick's Swan, I have not bred any yet, but in October 1902, a young bird of the year, which had been winged on the Zuider Zee, was brought to me. I had therefore opportunities of observing its juvenile and its changes of plumage. The colour of the feathers was of a uniform brownish grey, of a lighter shade than in a young Trumpeter Swan. The bill was flesh-coloured, blackish at the point, with a few black spots near the front, and lighter at the sides in front of the eyes. The legs were grey. By the following March the bill had become black, with a few flesh-coloured spots. The parts of the beak which in the adults are yellow, were now well-defined white zones. The legs and feet were blackish. The grey plumage was at that time much intermingled with white. When a year-and-a-half old, the bird was like an adult, except that the neck had still some grey spots, as in the case of a young Trumpeter Swan of the same age.'

The Duke of Bedford reports that this species has bred occasionally in captivity, the first record being one at Woburn before 1914, but no dates or details are given. It seems to be a very shy breeder in confinement, and success can only be achieved on large and secluded ponds. Pairs kept at Villers, at Clères, at Leckford and elsewhere in comparatively small pens always looked restless and never tried to nest.

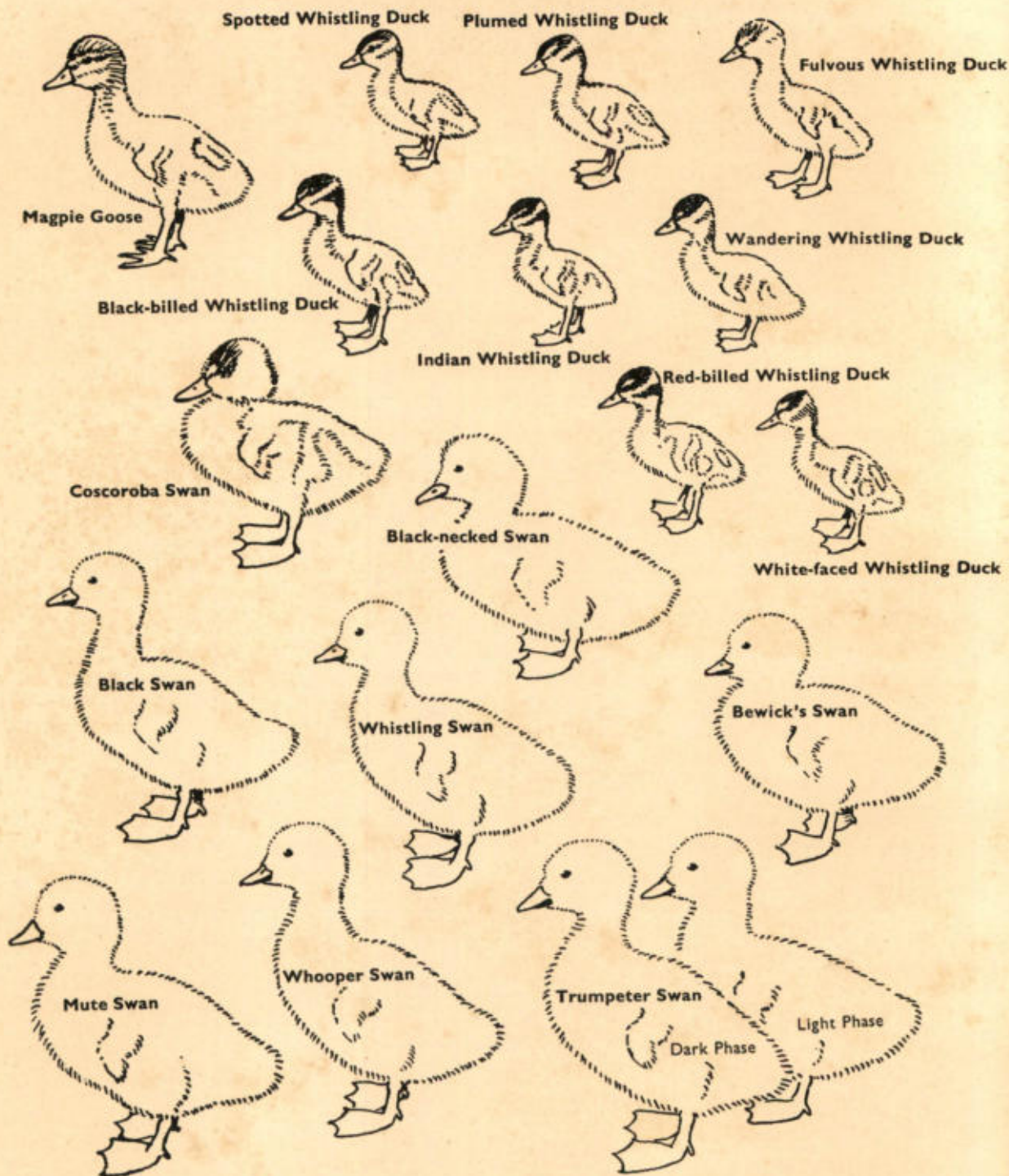
JANKOWSKI'S SWAN

Cygnus columbianus jankowskii

Cygnus bewicki jankowskii, Alphéraky, *Priroda i Okhota*, Sept., 1904, p. 10: Ussuriland. Peters, *Check-List, Birds of the World*, 1, 1931, p. 143.

CHARACTERISTICS

This eastern race differs from Bewick's only by its larger bill, which is longer, broader near the tip and higher near the base, and by its yellow patch which extends a little



IV. Magpie Gosling, Whistling Ducklings and Cygnets



THE SWANS

farther towards the nostrils and is not so bluntly truncated. There seem to be no differences in the body size, or in any other way. A. J. Tougarinov (*Faune de l' U R R S, Aves*, Vol. I, No. 4, Moscow 1941, p. 365) declares in a note:

'In specimens of Bewick's Swan obtained in the eastern part of the range, the bill is on the average longer and wider than in western birds; those features do not characterize all the eastern individuals of Bewick's Swan. In some specimens from Novaya Zemlya, the bills are large and these birds cannot be distinguished from specimens obtained near Yakutsk; some East Siberian Swans have on the contrary small bills, not differing from those of the western type. In any case, in the eastern part of the range, large-billed specimens certainly prevail, without being strictly localized geographically. Specimens with bills of an intermediate size are to be met with throughout the range. Under such circumstances, the east Siberian race described under the name of *C. c. jankowski* cannot be recognized.'

Admittedly, Russian ornithologists have at hand a far greater number of specimens of these Swans, particularly breeding ones, than exist in American and West European collections; nevertheless, our examination of dead and live specimens does not confirm Tougarinov's conclusions. All Eastern Arctic Lesser Swans which we have been able to study show a conspicuously higher and straighter culmen, more angular near the base, with a more extensive yellow patch which resembles in shape and colour those of Whooper Swans, although a good deal shorter. From Buturlin's study, however, it appears that the population that breeds on the Lena Delta is mixed, birds of both types, as well as intermediates, being found in the area.

DISTRIBUTION

Eastern Siberia, from the Lena Delta to Anadyr. Winters in China and Japan, exceptionally northern India.

GENERAL HABITS

Apparently the same as those of Bewick's Swans, from which they differ only in a very slight degree. According to La Touche (*Handb. Birds of Eastern China*, Vol. II, 1934, p. 472), they appear in March on the north-eastern coast of China and on the marshes and rivers, in considerable numbers. On the lower Yangtze, toward the mouth of the river, and on the Poyang Lake, they are abundant in winter. They are seen as far south as Fokien. Père David reports that they pass regularly twice a year through the northern provinces of China, and are more abundant than the Whoopers. Exceptionally they reach northern India, and also winter in Japan and neighbouring islands.

CAPTIVITY

Because of its close similarity to the more easily procurable Bewick's, Jankowski's Swan has seldom been imported into Europe, but it sometimes reaches America. During the last fifty years several pairs have been sent over from China and a few still remain in

THE WATERFOWL OF THE WORLD

various collections. They behave exactly like their close relatives, and so far they have shown little inclination to breed, the only record being a hybrid between a female Jankowski's and a male Whistler reared in Connecticut by Sibley in 1942. A pair now living in the New Grounds, Gloucestershire, collection, had long before been kept at Leckford, where they never tried to nest in a separate pen. When let out one year on the large pond inhabited by many Geese and Ducks, they came into breeding condition and would probably have laid, but they tried to kill several birds and had to be removed.

THE TRUE GEESE

Genus *Anser*

Anser, Brisson, *Orn.* 1, 1760, p. 58.

Type by tautonomy = *Anas anser*, Linné.

THE holarctic genus *Anser* is composed of migratory birds, many of which nest in the tundras and arctic woods of the North. They are particularly interesting from several points of view.

Geese are of moderately big size. They have comparatively large heads and thick necks, long legs set forward and small feet adapted to walking on land, where they gather most of their food by grazing. The bill is comparatively high and narrow, with a strong nail and serrations, called 'teeth', on the sides. The lores are feathered. The wings are long and sharp, with a bony knob at the bent. The tail is fairly long and rounded, composed of sixteen to eighteen, seldom twenty, rectrices. The colours are brown, grey and white, and the pattern is always sober; the tail coverts are white, except in *canagica*, as also is the greater part of the shaft of the wing quills. The fresh plumage, after the moult, is brighter; wear makes the ground colours duller and more brownish, and the markings less clear. The legs and feet are always brightly coloured, varying from yellow to orange and pink; the bill is generally also yellow, orange or pink, except in two species, when it is marked with black (*fabalis*, *coerulescens*), and another (*cygnoides*) in which it is plumbeous black. The first plumage is duller than that of the adults, without most of the characteristic markings. After the first autumn moult of the body feathers, immatures are much like the adults, but not so bright, with less distinctive markings, the body and mantle feathers being narrower and more pointed. The full adult dress is assumed the second year, and it becomes brighter the following seasons. Chicks are grey or olive-brown above, marked with pale yellow or whitish below, showing no sharply defined pattern. Their basic chromosome number is 90 in males, 88 in females, the sex chromosomes V-shaped, thus differing from Swans and Ducks. The significance of chromosome number in establishing relationships is still obscure, and probably of doubtful value.

The True Geese are all very closely related. Such generic names as *Cygnopsis*, *Chen*, *Eulabeia*, *Philacte*, based upon relatively unimportant bill or colour characteristics, cannot be accepted, and all species are here included in the genus *Anser*. Their taxonomy at the specific and sub-specific levels, however, is far more complicated, and even to the present day remains somewhat uncertain and debatable in some cases. The lack of

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information on live birds and of material gathered on the breeding grounds leaves several questions unanswered. Because of their highly migratory and gregarious habits, which confine the nesting of various populations to certain habitats and to special grounds, it is possible to find some obviously con-specific forms breeding within short distances. Moreover, where two of them meet, there are cases of overlapping, with very little, if any, intergradation. Criteria usually applicable to other groups of birds must therefore be used with particular care where Geese are concerned. Also, some differences in the colour of soft parts, principally of the bill, which are diagnostic, disappear very rapidly after death, so that the study of living or freshly killed birds is essential, but not always possible.

In the present state of our knowledge, it seems that the True Geese are better divided into seven species.

The Swan Goose (*A. cygnoides*) stands alone.

The Bean Goose (*A. fabalis*) with its numerous and complicated sub-species is peculiar, but it has definitely near affinity to the three species *anser*, *albifrons* and *erythropus*, which are more closely related, particularly the last two, though intermediates between them are unknown. These four species form what is commonly designated as the 'Grey Geese' group.

The Snow Geese (*A. coerulescens* and *A. rossii*) form two distinct species and are near relatives of the Grey Geese.

A. canagicus and *A. indicus* are farther apart, elegant in shape and more elaborately coloured, with small bills and no traces of the neck furrows, or striations, which exist in all other species of *Anser*, except *A. cygnoides*.

The shape and colour of the bill are very important specific and sub-specific characters in Geese, but they must be carefully studied, as they vary with age and individuals, and sometimes under the influence of external conditions such as season and food.

Hybrids between the different species are fertile, but those between *Anser* and *Branta* are usually sterile, although the birds often interbreed in captivity. An exception is recorded by Berry (*Avicult. Mag.*, 1945, p. 104), for a Gander *A. anser* x *B. canadensis*. Infertile hybrids between Geese and Swans are not uncommon. Those between Geese and waterfowl of the *Anatinae* sub-family are unusual, even between domestic breeds, of which two so far have been recorded (Taibell, *Boll. di Zoologia*, 1930), and Paulsen (*W.P.S. Journal*, 5(3), 1949, pp. 173-176). Hybrids between Geese and Shelducks, or Muscovies, are however not infrequent.

KEY TO SPECIES OF ANSER (ADULTS)

- | | |
|------------------------------------|---------------------|
| 1. General colour brown | 2 |
| General colour grey or white | 6 |
| 2. Bill black | <i>A. cygnoides</i> |
| Bill mostly yellow, orange or pink | 3 |
| 3. Bill uniform in colour above | 4 |

THE TRUE GEESE

Bill with black tip and base	<i>A. fabalis</i>
4. Large white band on forehead	5
No large white band on forehead	6
5. Large, white on forehead not extending to level of eyes	<i>A. albifrons</i>
Small, white on forehead extending on crown to level of the eyes	<i>A. erythropus</i>
6. General colour greyish brown	<i>A. anser</i>
Greatest part of plumage white or grey	7
7. Plumage white except black tips of primaries	8
Plumage mostly grey	9
8. Large, bill long and thick	<i>A. coerulescens</i> (white phase)
Small, bill short and slight	<i>A. rossii</i>
9. Body mottled dark grey, head white	10
Body pale grey, head white, with two blackish bars on nape	<i>A. indicus</i>
10. Bill large, legs pink	<i>A. coerulescens</i> (grey phase)
Bill small, legs yellow	<i>A. canagicus</i>

GENERAL HABITS

Geese are grazing waterfowl, and, like most grazing animals, they are highly social. They differ little from the Swans in their behaviour, but family units are perhaps still more closely knit, the young stay longer with the parents, and pairs usually appropriate a much smaller territory, so that the majority of species can be considered colonial nesters. They are not nearly so jealous and quarrelsome as are Swans and Sheldgeese, and males do not fight seriously except close to the nest, or when defending the brood.

All the Geese are very similar in their life habits. They fly and walk with great ease and feed mostly on land on grass, leaves, berries and seeds. They sometimes cause damage to crops in their winter quarters. In grazing, they use the teeth of their mandibles to great advantage, cutting the grass with the sides of the bill. Except during the breeding season, they congregate in flocks and migrate in regular formation. They are wary and careful, and show great wisdom in their movements. While feeding, a bird always watches and warns the flock of dangers, and their flights have a leader. The sight of great flocks of Geese in their wintering grounds, or on migration, is one of the marvels of the bird world. They spend the night on banks and flats, or among reeds, in lakes, marshes, rivers or estuaries, flying to fields and steppes in the early morning. They return to water for drink and rest in the middle of the day, flying out to their feeding grounds again in the early afternoon until dusk, when they move to their aquatic dormitory in great, noisy flocks. They sometimes perform spectacular evolutions in the air, plunging in spiral nose dives, with wings half folded, tipping over and side slipping. Before taking wing, they indulge in jerky, side to side movements of the bill. Geese swim well, but only occasionally feed in the water. They are expert divers when pressed by danger, or at play.

The voice of all Geese is loud and trumpeting, varying according to species and sub-

THE WATERFOWL OF THE WORLD

species, deeper in the larger forms, shriller in the smaller ones. That of the male is higher pitched and more metallic than that of the female; otherwise both sexes have similar voices. They have resounding call notes and a variety of weaker conversational ones, which not only vary with the form, but individually. Under any kind of excitement, Geese will extend the neck and lower it to the ground, the head slightly raised, calling and also hissing. Their display consists mostly of what has been called the 'triumph ceremony'. The gander, after threatening the intruder, who may be a man, attacks and drives him away with extended neck and much hissing and calling, then returns to the female in haste, with special, loud notes — a sort of a song in which she joins in a similar manner. This display is also used in pair formation, which lasts as long as both birds live. The mating display is, generally speaking, that of the group; the gander swims in a particularly proud way, the wings slightly raised, the tail cocked up and the neck curved. A dipping display precedes copulation, as in the Swans.

Geese usually establish their nests in vegetation near water, sometimes on ledges of cliffs and rocks; they are usually primitive and unskilfully built, more or less bulky according to species and sub-species. They lay a moderate number of eggs, which the female alone incubates, the male guarding the nest and helping rearing the brood. Incubation lasts from twenty-four to thirty days. As soon as they hatch, the young are taken to water, reed coverts and marshes for protection. Protection is also sought at this time by the parents who soon undergo their annual moult which leaves them flightless for some weeks. Many families congregate at that time.

Geese are long-lived, and specimens nearly fifty years old have been known to breed regularly. All species travel through regular fly-ways, which are usually different on their movements to and from their breeding grounds. But because of changes in climate, both annual and cyclic, and of destruction by man or other predators, nesting grounds, fly-ways and winter quarters are subject to some changes.

CAPTIVITY

Geese are easily accustomed to captivity and soon become tame, even when captured as adults. They breed readily, although adult, wild-caught birds may not start laying for a number of years; but this varies with individuals and species. Birds bred in captivity normally nest in their third year. Although some species are fairly dull in colour, they all are ornamental, particularly on large lawns and meadows. Four species — Lesser White-fronted, Ross's, Bar-headed and Emperor Geese — are among the most attractive of waterfowl. Their ways are always interesting. Unlike the Swans and Sheldgeese, they are sociable, and many can be associated without risk of any trouble whatsoever. The different species usually live amicably in large, mixed flocks, and pairs isolate themselves during the breeding season in a very small territory around the nest which may not exceed a few square feet. They are also harmless to other waterfowl. But breeding results are more satisfactory when ample space is available and only birds of fairly similar size and strength are associated.

THE TRUE GEESE

All Geese are hardy and easy to feed. When it is available they mostly eat grass, which is very important to their welfare, although they live satisfactorily on substances such as lettuce and other greens, and alfalfa pellets. They also eat grain readily. They build along banks in reeds or under bushes; they will also use artificial sites made of stones, bunches of grass, and also boxes. The parents take excellent care of the young, which also do very well under hens, feeding principally on grass and green food, to which soaked biscuit and egg food is added to advantage.

Geese are usually kept pinioned, but many will stay well in a full-winged state when space allows it, for they are then much more attractive. It is better, however, to clip the wing feathers of young birds of the year, which are inclined to stray as soon as they can fly. Free-flying tame Geese are only induced to leave in very cold winters, when open water and grazing become unavailable.

All species of True Geese have been kept and bred in captivity, and two, the Greylag and the Swan Goose, have been completely domesticated, probably long before chickens and ducks.

SWAN GOOSE

Anser cygnoides

Anas Cygnoid, Linné, *Syst. Nat.*, ed. 10, 1, 1758, p. 122 = *Asia*.

Abbreviation for *cygnoides* (see next line and ed. 12, 1, 1766, p. 194).

Cygnopsis cygnoid, Peters, *Check-List, Birds of the World*, 1, 1931, p. 149.

CHARACTERISTICS

A large brown Goose, dark above and very pale below, with a dark band running from the crown to the back, a long black bill, orange feet and legs. In the wild birds the neck is moderately long, and the legs high; the body is carried horizontally, as in all other wild Geese. Crown, sides of head and a broad band on the hind neck, deep chestnut; sides of the head pale brown; a white band around the base of the upper mandible and a white spot on the chin are more or less developed, sometimes obsolete; upper-parts ashy brown, the feathers conspicuously bordered with whitish buff; wing-coverts greyish brown; sides of body like the upper parts; front and sides of neck, breast and abdomen very pale brown, varying in shade; vent, upper and lower tail coverts, white. Iris dark brown. The bill is long and depressed near the tip, which is broad; the upper mandible is thick, angular, slightly swollen near the forehead on which it projects a little archwise, faintly suggesting a knob; the bill on the whole resembles rather that of the Swans. Females are slightly smaller, with a shorter neck.

Male: wing: 450–460 mm.; tail: 140–152 mm.; culmen: 87–98 mm.; tarsus: 80–82 mm.

Female: wing: 375–440 mm.; culmen: 75–85 mm.

Immatures have the chestnut bands on the head and neck less bright and no white around the bill.

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Downy chicks: brown above and dirty yellowish buff below, with a broad blackish patch over the lores and eyes, and pale buff patches on the wings and sides of the tail; bill and feet blackish grey, the former with a light tip.

Eggs: white, five to ten in a clutch, 82×56 mm., on an average. Incubation: 28 to 30 days.

DISTRIBUTION

Breeds in central and southern Siberia, from the basins of the Ob and the Tobol in the west, east to Kamchatka and the Commander Islands, south to central Asia and northern Mongolia. Migrates through Mongolia, Manchuria, Sakhalin, the Kuriles and Hokkaido, wintering in the Kanto Plain of Honshu (Japan) and in Northern China, occasionally as far south as Fokien.

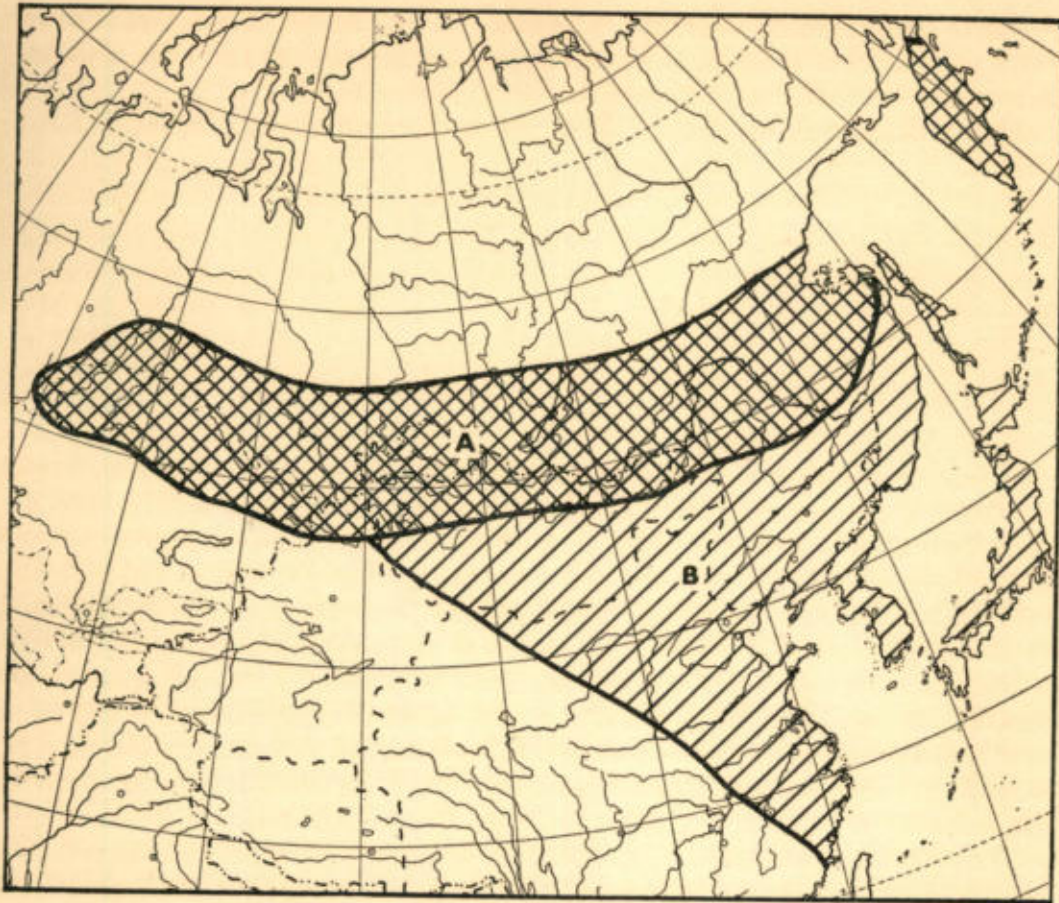
GENERAL HABITS

The Swan Goose is a bird of the interior, never going far north. Nowhere does it reach the Arctic Circle, but its breeding territory is still very poorly recorded. Its main distributional area in summer appears to consist of the Lake Baikal region, northern Mongolia and the Amur basin, and of parts of central Asia. Observations of wild birds on their breeding grounds are still very scarce and fragmentary. According to Radde, Swan Geese on Lake Baikal keep to the mouths of the large streams falling into the lake, never frequenting steep shores. They are common in summer, and are often caught during their moult. On Tarei-Nor, they arrived on April 3, 1856. They were breeding near Lake Ildza by the middle of that month. In Amurland, they arrive in March, begin to lay in April and to moult in June. They leave Tarei-Nor in the first days of September. Przewalski writes:

'On the lakes and swamps of the valley of the Lefu, of all the Geese, the one most frequently met with is the Swan Goose, whose broods I came upon from the beginning of June. There are usually from four to six goslings. The two parents always keep with them, and sometimes, two or three broods will unite. . . . If surprised on an open spot, for example a river or a lake, the old birds as a rule fly off, while the young ones try to save themselves by diving.' They hide successfully by lying close to the ground among grass.

Przewalski also notes: 'Met with other geese in small numbers in the beginning of April on Dalai Nor. . . . On Lake Khanka, *Anser cygnoides* appear in great number on spring migration, which is always rapid in the first third of April. Ordinarily these Geese keep in flocks of twenty to forty individuals. On the wing they often form a wedge within which Ducks of various kinds frequently find room.' Przewalski found young in June the size of a Mallard. 'On the whole, this species is not very cautious, but extremely curious.' Swan Geese were found breeding in great numbers in Dauria along the Orgun, where they nested in the steppe grass, making a hollow which was lined with down. In their incubation habits and the care of the young, they conform to the ways of other Geese, as also in their behaviour during migration and on their wintering grounds.

THE TRUE GEESE



12. Distribution of *Anser cygnoides*. (A) Breeding range; (B) Non-breeding range.

In display and posturing they are typical of the genus. Their voice, however, is quite distinct, possessing a special squealing quality, their principal calls being drawn out and ending on a higher note. Domesticated birds have completely retained the voice of their wild ancestors, but are louder and much more vocal and noisy. They have a variety of calls, with special alarm and conversational notes, the first being harsh, brief, and repeated two or three times.

CAPTIVITY

The Swan Goose takes readily to captivity and soon becomes tame. For that reason it has been kept and raised in confinement for many centuries in China, whence it has spread to India, Africa and Europe, as it has evolved into the domestic bird known as the Chinese Goose. It is not possible to find out exactly when the species became truly domesticated, but it probably goes back to more than 3,000 years ago. It was common

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in Europe in the eighteenth century, and probably long before, and it reached America early in the nineteenth (about 1830). It has been bred in Africa for a long period. In warm countries, the Chinese Goose has proved more satisfactory than the domestic breeds descending from the Greylag (*Anser anser*) commonly kept in Europe and North Africa since the earliest days.

The domestic breeds of Swan Goose differ more widely from their wild ancestors than do even those descending from the Greylag. Their bill has become much shorter and thicker, and they have developed a large frontal knob recalling that of the Mute Swan, while the neck has grown considerably longer. Not only has the body become heavy and the wings lost their power of flight, but the general shape has greatly changed. Domestic Swan Geese stand completely erect, the breast forward and the neck thrown slightly backward, and the tail is normally held cocked up. Those of the breed known as 'African' Geese are very heavy and have developed large lappets and dewlaps; they do not stand quite so erect as the Chinese Geese. While these two brown breeds, African and Chinese, have retained the pattern and colours of the wild species, a third one has evolved from the Chinese into a completely white bird, with yellow bill, knob and legs. All three are widely bred as utility birds, in a more or less pure state, and are often preferred to domesticated Greylag breeds, which are larger and fatter. Hybrids between the two species are fertile.

Wild Swan Geese, however, are newcomers to European and American aviculture. It does not seem that many, if any, had been sent before the present century, and those mentioned at the London Zoo in 1863 probably were domestic birds. The first breeding record of genuine wild Swan Geese appears to be that of R. and N. Stevens, at Walcot, England, who reared three young in 1937. One of these young birds, a female, was mated at Clères to a wild-caught gander imported from China, and seven goslings were hatched in 1940. Other breeding successes were also recorded in Europe and in America about the same time. Two ganders left in England after the war, in Peter Scott's collection, were mated to a small domestic Chinese Goose; young were reared in 1947, which looked much like the father in shape, and three-quarter-bred birds raised in 1950 did not differ to any extent from the wild form. Several imported pairs have since arrived in Europe and in America from China and Japan.

Wild Swan Geese look very handsome, and they do well in captivity, proving somewhat fussy, but harmless to other waterfowl. They are perfectly hardy and show a great inclination to breed.

The species crosses readily with other Geese of the genera *Anser* and *Branta*, but hybrids with the latter are normally infertile. Crosses with the Egyptian Goose have also been obtained.

Greylag Geese

Anser anser

Large greyish-brown Geese, unevenly marked with black underneath, with light pink

THE TRUE GEESE

feet and legs. The bill varies from orange to pink according to sub-species; it is long, stout and high near the base, with apparent teeth. Average weight, $7\frac{1}{2}$ pounds.

DISTRIBUTION

Northern and eastern Europe and the central parts of Asia, always south of the Arctic Circle, which it crosses only in Scandinavia where the climate is influenced by the Gulf Stream. Winters south to North Africa, Iraq, Persia, northern India and Indo-China.

GENERAL HABITS

This species is the typical Goose, and it has all the general habits of the genus. It inhabits temperate countries, breeding as far south as Macedonia, very occasionally in Spain, Algeria, etc. One record in eastern France. It used to be more widely distributed as a breeder, particularly in Europe, but it has been exterminated by man in a number of localities. It becomes tame very readily, although it is a shy and wary bird in the wild state.

Greylag Geese are birds of the open country and are largely terrestrial, walking and running well. They also fly easily and fast, with regular wing-beats. Flocks migrate in V-shaped formations or trailing lines, led by an old bird; in ordinary flights to and from feeding grounds, they move less regularly. They rise very freely from the ground, but not so well from water. Like other Geese, they live in flocks most of the year, but during the nesting season breeding pairs isolate themselves in a territory.

The call of the Greylag is like that of the domestic Goose, deep, sonorous and trisyllabic. The voice, however, is varied; there are nasal conversational undertones, repeated several times, a sharp alarm note, and several other noises, as well as strong hissing in anger. The gander's voice is higher tuned, and individual variations are numerous. In display and courting, this species does not differ from the others. A number of birds gather for communal display before the breeding season, and there is much formal threatening and hissing, as well as running with wings open and flapping.

Greylags build among heather and grass in the proximity of water, or among reeds and rushes, sometimes making floating nests. They feed on grass, water-plants and, in their winter quarters, on grain and young crops.

CAPTIVITY

Greylag Geese have been domesticated for a very long time and all the tame breeds of Geese have been derived from them with the exception of those called Chinese or African, which have the Swan Goose for their ancestor.

WESTERN GREYLAG GOOSE

Anser anser anser

Anas anser, Linné, Syst. Nat., ed. 10, 1758, p. 123: Sweden.

Anser anser, Peters, Check-List, Birds of the World, 1, 1931, p. 146.

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CHARACTERISTICS

A large, ashy brown Goose, lighter below, the feathers of the upper-parts and sides dark brown bordered with whitish, producing a striped or mottled effect; abdomen and tail-coverts white; lesser wing-coverts and rump light grey; tail white and dark brown; sometimes a narrow white line round the base of the upper mandible; belly whitish with irregularly and sparingly spaced black spots. The neck feathers are curled forming furrows. Eyes dark brown, with fleshy-pink eyelids. Bill orange, with a narrow stripe of flesh colour behind the nail and along the edges of the mandibles, sometimes also on culmen; nail whitish. Legs and feet pink.

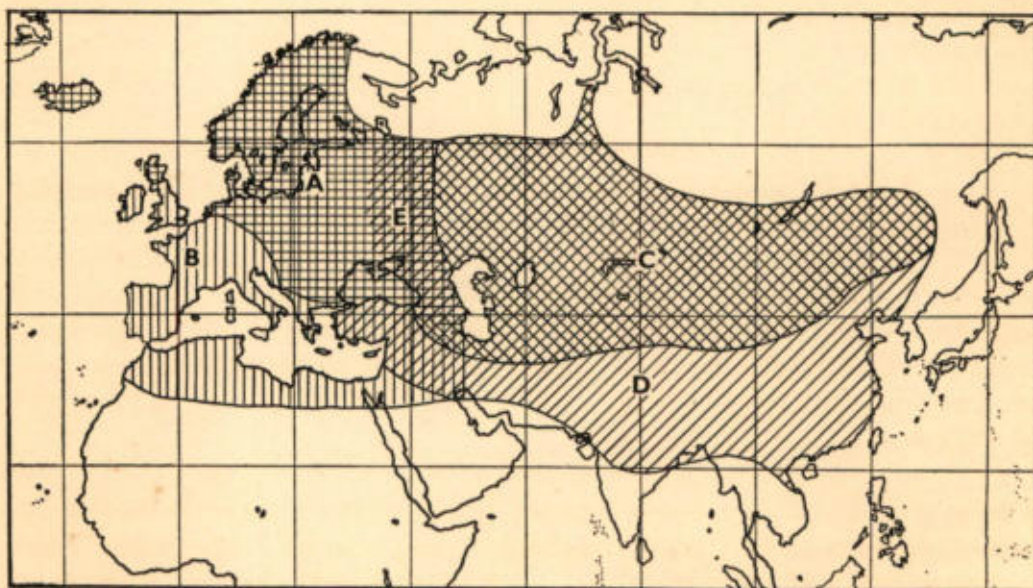
Male: wing: 445–482 mm.; tail: 129–150 mm.; culmen: 55–72 mm.; tarsus: 73–82 mm.

Female: wing: 416–470 mm.; tail: 125–145 mm.; culmen: 54–70 mm.; tarsus: 52–70 mm.

Immatures are similar but duller, and have no black spots below. Bill at first greenish grey, changing to yellow and orange. Legs greyish.

Downy chicks: olive-brown on the crown, hind neck, sides and upperparts, with a pale yellow bar on the wing; forehead, sides of head and neck, and underparts greenish-yellow. Bill and legs greenish grey.

Eggs: creamy white, fairly elongated ovate, 85×58 mm., on an average, usually four to seven in a clutch, exceptionally up to twelve. Incubation: 27 to 28 days.



13. Distribution of *Anser anser*. *A. a. anser*: (A) Breeding range; (B) Winter range. *A. a. rubrirostris*: (C) Breeding range; (D) Winter range. (E) Mixed populations.

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DISTRIBUTION

Breeds in Iceland, Scotland and the Hebrides (rarely now), Norway (up to 71°), Sweden, Finland, south to Austria, North Yugoslavia, Macedonia, Russia (south of 60° in the east) to the Caucasus. The eastern limit of *A. a. anser* is imperfectly known, but appears to run west of the Urals and along the lower Volga. Birds from Sarepta are variable in plumage, but nearer to the eastern sub-species. It is possible that most of the Russian population is unstable and intermediate, and the reluctance of Russian ornithologists to accept the validity of *A. a. rubrirostris* may come from the fact that over the greater part of that country Greylag Geese are dark and brownish in colour like *A. a. anser*, but have the pink bill of *A. a. rubrirostris*, as constantly stated by Alpheraky and other Russian authors. This Russian population is better designated as *A. a. anser* $\leq$ *rubrirostris* until a more reliable study of living or freshly killed birds from the different parts of the area has been effected. The geographical variation of the species is still insufficiently known at the present time.

GENERAL HABITS

The Western Greylag has the life habits of the species. It is a more southern migrant than any other European wild Geese, normally reaching North Africa. It is resident in several parts of its range.

CAPTIVITY

Greylag Geese are large and rather coarse, but highly intelligent and attractive in their ways. They breed readily in confinement and constitute a decided ornament of large parks.

EASTERN GREYLAG GOOSE

Anser anser rubrirostris

Anser cinereus var. *rubrirostris*, Swinhoe, *Proc. Zool. Soc. London*, 1871, p. 416: Shanghai.

Anser anser, Peters, *Check-List, Birds of the World*, 1, 1931, p. 146.

CHARACTERISTICS

Generally similar to *A. a. anser*, but distinctly lighter and greyer in colour, with a pink instead of orange bill. There is no important variation in size between the two forms. Live specimens, when seen side by side, look strikingly different. Downy chicks are paler and yellower.

DISTRIBUTION

As far as it is known today, breeds from the west of the Urals and of the lower Volga, south to the shores of the Caspian Sea, northern Iraq, Iran and Afghanistan; Turkistan; northern Mongolia and Manchuria, north to the Yenesei valley, southern central and eastern Siberia. Wintering in Asia Minor, Iraq, Iran, Northern India south to Bombay and Calcutta, Northern Burma, and through China to Indo-China south to Huê.

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Exceptionally found among western birds in Eastern Germany (Elbe estuary, J. Harrison, *Bull. Br. Orn. Cl.*, 69, 12, p. 125, Oct. 8 1899).

GENERAL HABITS

Eastern Greylags do not appear to differ in habits from the Western birds. They are very common in Northern India in the winter, and they also visit Tonkin and Annam in numbers, frequenting the paddy fields of the low country. They seem to be mostly transients in China. They are inland birds, practically never visiting islands and peninsulas such as Japan and Korea.

CAPTIVITY

It does not seem that the Eastern Greylag was ever domesticated in Asia as was the Western form in Europe, as all the domestic stock in China, Indo-China and India originally derived from the Swan Goose. It appears to have been brought to America and Europe only recently. It is a rather more ornamental bird than the Western subspecies, being of a lighter and prettier colour. It breeds readily.

White-fronted Geese

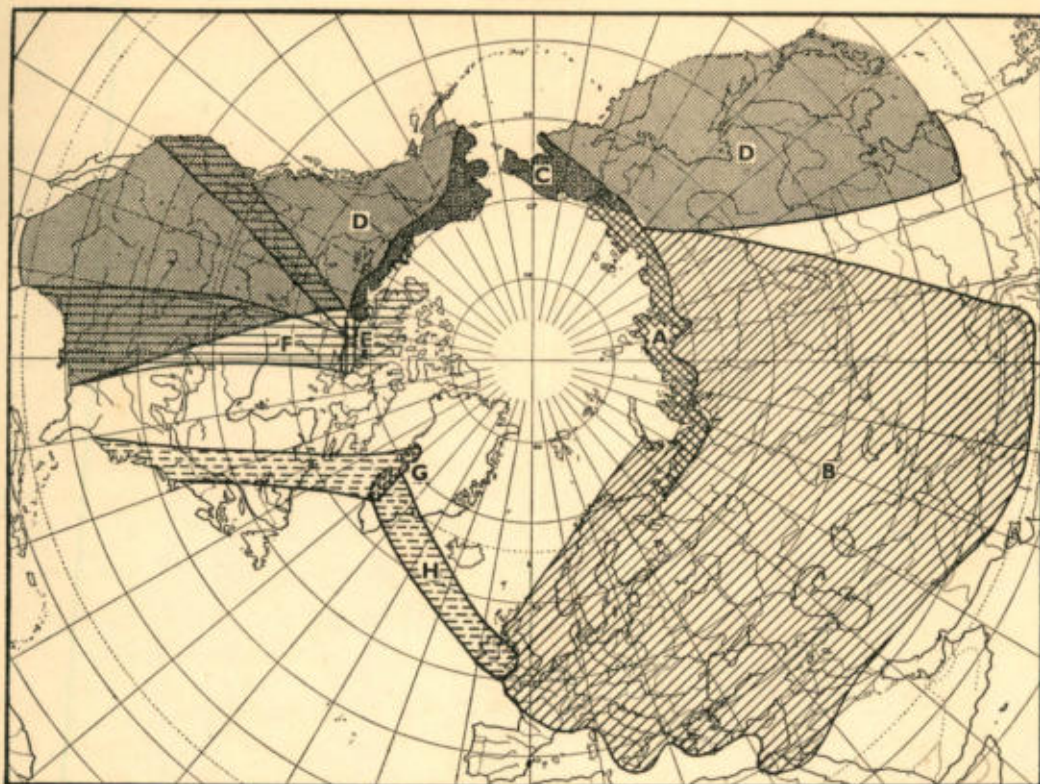
Anser albifrons

The White-fronted Geese are near relatives of the Greylags, only considerably smaller and more delicate in shape, with a less heavy bill, and a large white patch on the fore crown and the sides of the face; they are also darker and browner. The tail is of sixteen to eighteen feathers. They breed on the Arctic tundra, and they constitute a northern representative of the Greylag in Europe and in Asia. They also occur in West Greenland and in North America. They are still more closely related to the Lesser White-fronted Goose (*A. erythropus*), which differs mostly in its far inferior size, its proportionally shorter bill and the greater extent of the white patch on the crown. *A. erythropus* is an Old World species, nesting on higher and more wooded ground, never reaching the Arctic coast and extending south to the Arctic Circle; but it breeds side by side with *albifrons* in the forest tundra, probably everywhere in Siberia, according to Johansen (*in litt.*). As no intermediate populations have ever been found between *anser*, *albifrons* and *erythropus*, they are better considered three distinct species.

DISTRIBUTION

Breeds along the Arctic Ocean in Europe west of the White Sea; Kolguev Island, Novaya Zemlya, Siberia, Western Greenland, Western North America, east to the Hudson Bay. Winters in the British Isles, south to Italy and the countries bordering the eastern Mediterranean; Egypt, Asia Minor, Iraq, Persia, Northern India, China south to the Yangtze, Japan; in America, casual on the east coast, but frequent in Louisiana, Texas, western Mexico, California, Oregon and Washington. The species is lacking in

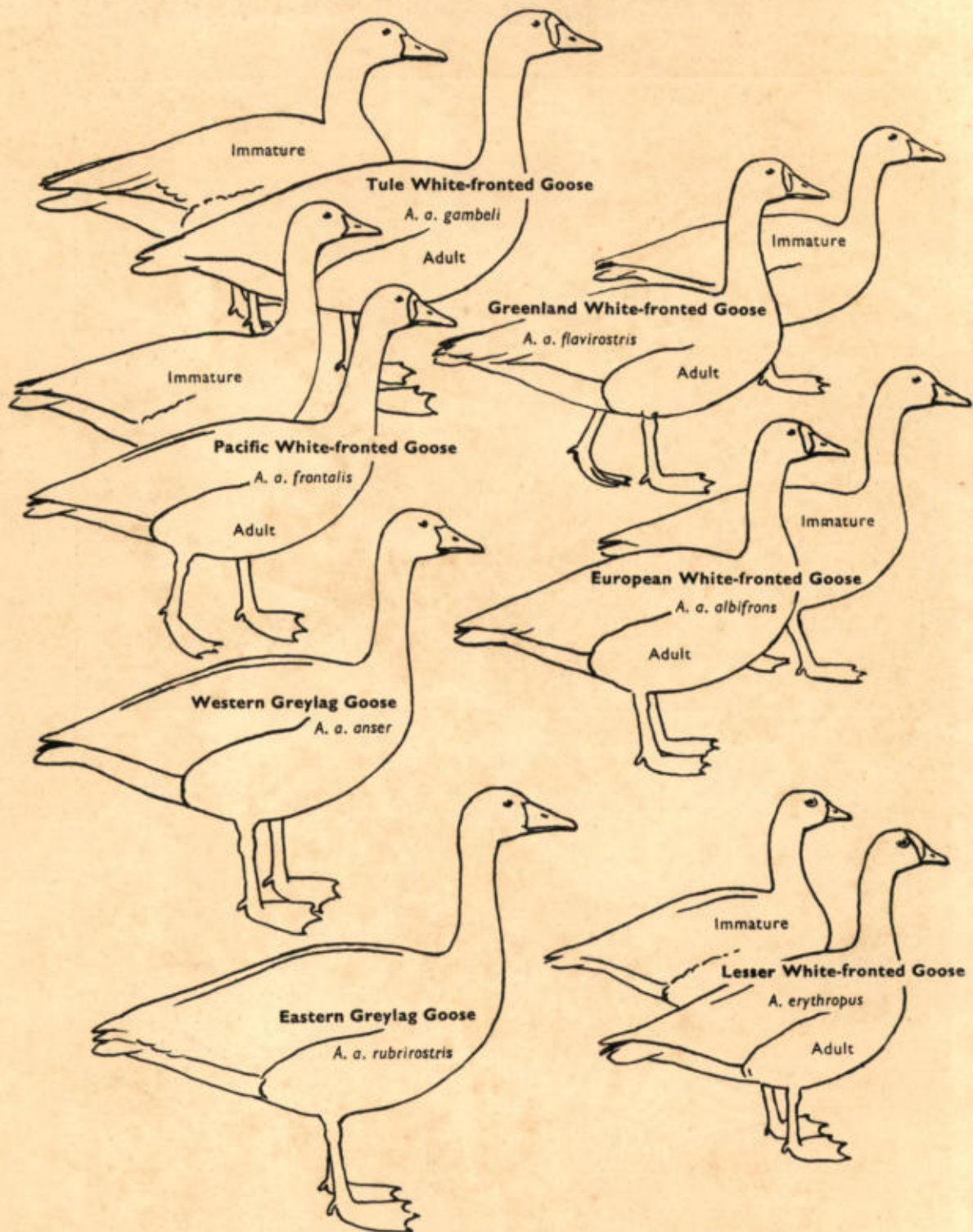
THE TRUE GEESSE



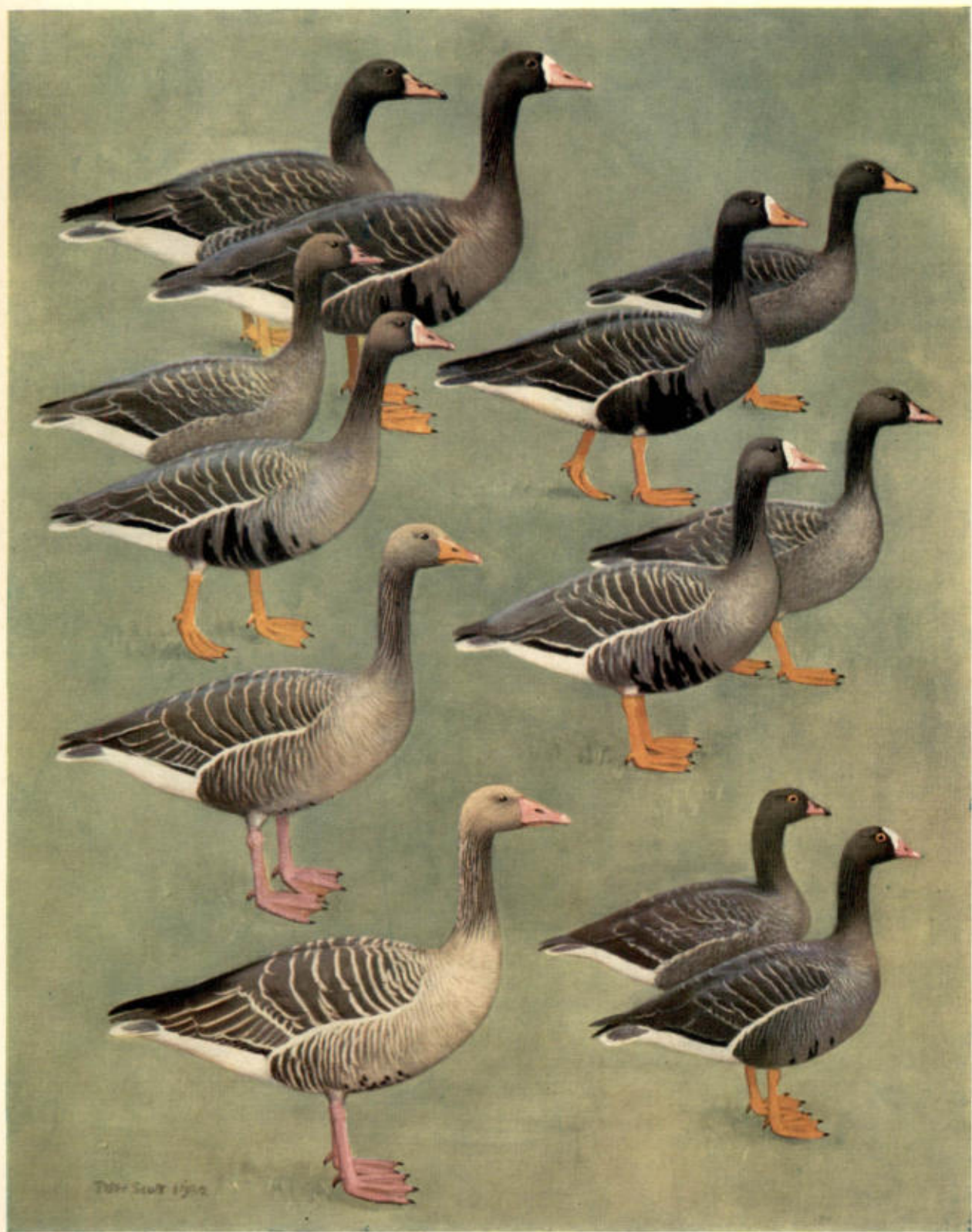
14. Distribution of *Anser albifrons*. *A. a. albifrons*: (A) Breeding range; (B) Non-breeding range. *A. a. frontalis*: (C) Breeding range; (D) Non-breeding range. *A. a. gambeli*: (E) Possible breeding range; (F) Non-breeding range. *A. a. flavirostris*: (G) Breeding range; (H) Non-breeding range.

Scandinavia, Iceland, Spitzbergen, Eastern Greenland and Eastern Arctic America as a breeding bird. Accidental in south-western Europe and elsewhere.

A great deal of confusion has long prevailed in the distribution and nomenclature of the various forms of this species. It is now certain that four sub-species can be recognized: *albifrons*, breeding in Arctic Eastern Europe and Western Asia; *frontalis*, in Arctic Eastern Asia and Western America; *gambeli*, in Arctic Central Northern America, and *flavirostris* in Western Greenland. The variations of the species have been well studied by Dalgety and Scott (*Bull. Br. Orn. U.*, 68, 1948, pp. 109–21) for the birds of Greenland and Europe, and by W. E. Clyde Todd (*Condor*, 52, 1950, pp. 63–8) for the North American populations. We have personally ascertained that the birds from Far Eastern Asia (Kichiga, Anadyr, Japan) are identical with the West American sub-species *frontalis*. The boundaries between *frontalis* and *albifrons* in Central Siberia remain to be



V. True Geese (1)



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ascertained; it may be the valley of the Kolyma and there is probably a good deal of intergradation. The same applies to the breeding distribution of *frontalis* and *gambeli*, the limits of which remain vague and somewhat confused.

GENERAL HABITS

All White-fronted Geese are birds of the high Arctic tundra with the exception of the Greenland sub-species which breeds inland in the low Arctic zone of the west coast. They accomplish long migrations. Generally speaking, their habits are those of the other Grey Geese. They fly well and lightly and are adepts at reversing direction on the wing and other air acrobatics. They have, as a rule, a high-pitched, pleasant voice which has caused them to be known in many countries as 'Laughing Geese', a well-deserved name.

White-fronted Geese were exceedingly abundant in the past. While their remote nesting grounds remain fairly safe from disturbance, they have been decimated during recent centuries on several of their wintering grounds, and although still common in places, they are rapidly diminishing in numbers. Also, northern natives kill them while they are flightless. They are better eating than most other wild Geese.

CAPTIVITY

All White-fronted Geese are easily tamed, and they breed readily in confinement. They are decidedly prettier and more ornamental than Greylag and Bean Geese, and they prove sociable and peaceful in an enclosure.

EUROPEAN WHITE-FRONTED GOOSE

Anser albifrons albifrons

Branta albifrons, Scopoli, *Annus 1, Hist. Nat.*, 1769, p. 69: Northern Italy.

Anser albifrons albifrons, Peters, *Check-List, Birds of the World*, 1, 1931, p. 147.

CHARACTERISTICS

A comparatively small White-fronted Goose, greyish brown and fairly light in colour, with a short neck and a small pink bill; rump dark grey; underparts whitish, with more or less extensive black markings; the feathers of the mantle, wings and breast have a broad light border. Iris dark brown; eyelids brownish or greyish. Legs orange. The bill varies in the shade of pink and is sometimes very pale; it is washed with orange yellow around the nostrils and along the rami of the lower mandible; nail white.

Male: wing: 380-442 mm.; tail: 114-132 mm.; culmen: 42-52 mm.; tarsus: 60-80 mm.

Female: wing: 368-421 mm.; culmen: 42-52 mm. Weight varies from four to five-and-a-half pounds.

Immatures have no white on the forehead, and they are duller and more uniform in colour. The bill is at first greyish yellow and the legs yellowish grey, changing gradually to pink and to orange.

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Downy chicks have the crown, hind neck and upperparts sepia brown, a yellowish white patch across the wing, buffy yellow forehead, face, throat, rest of the neck, with a brown line from lore to eye; rest of underparts greyish white.

Eggs: four to six, as a rule, creamy white, 79×52 mm., on an average. Incubation: 28 days.

DISTRIBUTION

Breeds in the tundra of the Arctic zone, from the Kanin Peninsula in the west, Kolguev Island and Novaya Zemlya, to probably the Kolyma River in the east (Johansen, *in litt.*), but limit and intergradation with the next sub-species still unknown. Winters west to England, exceptionally farther west, through France south to Sicily, Italy, Greece, Asia Minor, Egypt, Iraq, Iran, east to Northern India and Burma.

GENERAL HABITS

European White-fronted Geese nest more or less gregariously on the open tundra, preferably on islands in rivers, marshes and lakes, on top of grassy hillocks. They are more active than Greylag and Bean Geese, and although congregating in large flocks, they are apt to segregate into families and small groups. On migration, they may associate with other species. Their voice is high-pitched and laughing, very characteristic, less nasal and more musical than in the Greylag; it is uttered quickly, consisting usually of two syllables. In posture, display and daily habits, they resemble the Greylag, but they are not so heavy and move more quickly. They remain in their winter quarters from October till April or even May. They seem to have well-defined favourite winter grounds, such as the mouth of the Severn in England, the Po River in Italy, the shores of the Black Sea, etc. They are still numerous in many districts.

CAPTIVITY

European White-fronts have been kept in captivity as far back as the early Egyptian dynasties.

PACIFIC WHITE-FRONTED GOOSE

Anser albifrons frontalis

Anser frontalis, Baird. Baird, Cassin and Lawrence, *Rep. Expl. and Surv. R. R. Pacific*, ix, 1858: Fort Thorn, New Mexico.

Anser albifrons albifrons, Peters, *Check-List, Birds of the World*, i, 1931, p. 147.

CHARACTERISTICS

Differs from *A. a. albifrons* in being very slightly larger, with longer neck and bill, and browner, less slaty in colour; the wings are hair-brown instead of pale mouse-grey, and the lower back and rump are blacker, less greyish; the amount of dark markings on the underparts is equally variable; the throat, cheeks and neck are all browner.

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Male: wing: 395-453 mm.; culmen: 47-60 mm.

Female: wing: 382-432 mm.; culmen: 47-56 mm.

Downy chicks and eggs as in *albifrons*.

Differences between *frontalis* and *albifrons* may not be very apparent when skins are examined; but they are striking in living birds, as the varying proportions of the neck and bill stand out.

DISTRIBUTION

Breeds in the Arctic tundra of Alaska, from the coast of the Bering Sea west probably to the Mackenzie River; St. Lawrence Island; Eastern Siberia, but not in the eastern part of the Tchuktchi Peninsula (Johansen, *in litt.*); western limits unknown, probably the Kolyma valley. Winters in the western United States, east to Louisiana, in western and central Mexico, in China and in Japan.

GENERAL HABITS

The Pacific White-fronts do not seem to differ in general habits from the European. We are not yet well informed about their nesting habits in Siberia, but in Alaska they arrive about the middle of May, and the first eggs are found in the last days of that month. They nest in colonies, for example, along the Yukon River, or in scattered pairs, laying four to seven eggs, always in the muddy tundra, usually on small hillocks and knolls. Old and young fly well in August and leave late in September, when frost sets in. Nelson found large numbers of moulting adults and young at the head of the Kotzebue Sound in the middle of July 1881. They visit the Aleutians, but never breed there. They reach their winter quarters in October, after stopping in huge flocks on the way at different spots. They are still numerous in America, but they have greatly decreased in numbers in Asia because of the merciless killing in Japan during the winters of the last seventy years.

CAPTIVITY

Pacific White-fronts are often kept in America and in Japan, but they have seldom been sent to Europe because of their close similarity to *albifrons*. In life, they are rather less graceful because of their longer bill and neck. They look different enough for American game breeders and dealers to have long distinguished between the two sub-species, while ornithologists persisted in considering them identical.

TULE WHITE-FRONTED GOOSE

Anser albifrons gambeli

Anser gambeli, Hartlaub, *Rev. et Mag. Zool.*, (2)4, 1852, p. 7: Texas and southern United States.

Anser albifrons gambeli, Peters, *Check-List, Birds of the World*, 1, 1931, p. 147.

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CHARACTERISTICS

Larger and darker than *albifrons* and *frontalis*; the feathers with dull and narrow light borders; the crown, hind neck and the feathers next to the white on the sides of the head, blackish. Legs, bill and neck considerably longer. Often a distinct fleshy yellow ring around the eye. Wing-length and body-size highly variable, some birds being huge, others hardly bigger than large *frontalis*.

Male: wing: 422–474 mm.; culmen: 54–63 mm.; tarsus: 75–90 mm.

Female: wing: 493–440 mm.; culmen: 52–62 mm.; tarsus: 71–80 mm. Weight varies from five to ten pounds.

Immatures and *downy chicks* not definitely known.

DISTRIBUTION

Breeding grounds still unknown, but probably one of the northern islands, perhaps Victoria Island. Birds collected by Towmey in the Mackenzie delta are *gambeli*. Those of the Perry River are intermediate between *gambeli* and *frontalis*, nearer to the latter in size and colour; but their downy chicks are lighter, with more extensive yellow markings (Hanson). Winters in California (Sacramento Valley), occasionally Texas and Louisiana. The type, which does not seem to exist today, was reported as from Texas. A young female in very worn plumage collected by Austin Paul Smith, May 24, 1912, at Brownsville, Texas, together with another one of the *frontalis* sub-species, appears to be the larger *gambeli*, with a culmen of 62 mm. and a tarsus of 74 mm. Todd (*Condor*, 52, 1950, pp. 65–6) has shown that Hartlaub's real measurements of his type (culmen: 63 mm.; tarsus: 78 mm.) fall well within those of the average Tule Geese, and that none of the three small specimens in the Berlin Museum, reputed to be Hartlaub's birds, actually answer his description. A great deal more, however, remains to be learned of the breeding territory of the Tule Goose. Reports of small White-fronts breeding in the same districts, if well founded, might change our present concept and even necessitate the recognition of *gambeli* as a full species, but their reliability so far is extremely doubtful.

GENERAL HABITS

Swarth and Bryant (1917) first pointed out the existence of two distinct forms of White-fronted Geese in the Sacramento Valley of California (*Univ. Calif. Publ. Zool.*, 17, 1917, pp. 209–22). Kuroda (*Condor*, 331, 1929, pp. 173–80) also contributed an important study of them. Kortright (*The Ducks, Geese and Swans of North America*, Washington, 1943, pp. 124–6) has summed up what was known of the Tule Goose.

'In its winter quarters, Moffitt (1926) found the Tule Goose only along the heavily wooded banks of the larger sloughs of Butte and Sutter counties of California, "where they apparently remain throughout the day, feeding in the small ponds formed by openings in the heavy tule growth of the surrounding overflowed marsh". Flocks of Tule Geese are composed of fewer individuals than those of White-fronts.'

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The same writer says:

'Six to eight birds is probably the mode (the usual number) of the former, with twelve the highest number observed by me, and pairs rather numerous, while the latter form is often seen in much larger gatherings. . . . The voice of the Tule Goose . . . is noticeably harsher and coarser than that of the White-fronted Goose, as might be expected in a larger bird, and to me it is more stentorian. It does not seem to be so noisy a bird as the smaller form, and landings are accompanied with much less cackling than those above described, being executed, in some cases, in absolute silence. . . . The Tule Goose is less shy than the White-fronted, often decoying without the usual wary circling of the latter.'

The late J. Moffitt had gathered a great deal of material, measurements and notes of this sub-species in California, which have been entrusted to me and have greatly helped our studies.

H. C. Hanson, P. Queneau and Peter Scott went to the Perry River district of Canada in 1949. They found only a few White-fronted Geese nesting in the area. They brought back a live pair, and seven skins were collected by Hanson, as well as some downy chicks. These hardly differ from Alaskan specimens; two males are adults and have wings of 436-422 mm.; culmen of 58-54 mm.; tarsus of 78-75 mm. They weigh 6 lb. 8 oz., and 5 lb. 10 oz. Four young females weigh 5 lb. 2 oz. to 5 lb. 4 oz. They may represent a definite intermediate population; they have the characteristic voice of *gambeli*.

CAPTIVITY

A pair was brought back from the Perry River to the Severn Wildfowl Trust at Slimbridge, England. When observed side by side with specimens of the other three sub-species of White-fronts, these Geese looked different because of their long bills, necks and legs, although they are not very considerably larger. Their voice is much louder and harsher than in the others, resembling that of Greylags. Tule Geese have occasionally been kept in captivity in America, but records are very uncertain, as *gambeli* and *frontalis* have so long been confused. Sibley reports, however (*Avicult. Mag.*, 1943, pp. 77-8), that a pair of Tule Geese reared two young at Wallingford, Conn., in 1942.

GREENLAND WHITE-FRONTED GOOSE

Anser albifrons flavirostris

Dalgety and Scott, *Bull. Br. Orn. Cl.*, 68, 1948, p. 115: North Slob, Wexford, Ireland.

Anser albifrons albifrons, Peters, *Check-List, Birds of the World*, 1, 1931, p. 147.

CHARACTERISTICS

A very slightly larger bird than *frontalis*, with similar long neck and bill, but much darker, the underparts often almost black, and with an orange-yellow bill. In the narrow, pale borders of the feathers and deep general colour, the present sub-species approaches *gambeli*, but it is even darker, also smaller and lighter in weight (4-6 lb.), and, of course, the difference in the colour of the bill is striking.

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Male: wing: 410–455 mm.; culmen: 45–57 mm.; tarsus: 73–77 mm.

Female: wing: 392–420 mm.

Immatures and downy young as in other sub-species.

DISTRIBUTION

Breeds on the west coast of Greenland from lat. 64° to 72° 30' N. It winters in Ireland, but a small number of birds reach England and others migrate to the East Coast of America, the few records from Virginia, North and South Carolina, Georgia, etc, definitely belonging to the dark Greenland sub-species. A straggler elsewhere.

GENERAL HABITS

Dalgety and Scott have added a detailed study of the sub-species to its description, and F. Salomonsen has recently written an excellent account of this Goose in Greenland (*The Birds of Greenland*, 1, Copenhagen, 1950, pp. 56–64), parts of which are now quoted:

'The White-fronted Goose frequents the low, rolling country inland, with many lakes and streams and covered with heath, shrub and willow-copses. It avoids the mountainous areas, but is found in high plateaus if these are only slightly hilly and have many lakes. At the head of the 160-km.-long Søndre Strømfjord we found it, in July 1925, breeding in great numbers on the plateau Nakajanga, at an altitude of 700 m. The breeding-biology is well known owing to the careful studies recently undertaken by H. Fencker. The geese arrive at the breeding-ground in small skeins, usually of twenty to thirty birds, rarely up to fifty. They nest not too far from a lake or a marshy valley and the nest is invariably placed on gently sloping hills or on top of elevated ground in order to keep a free lookout in all directions. They do not form colonies; each pair has its own territory. Territorial fights sometimes take place; the two ganders meet on the lake, and uttering strong trumpeting notes they strike each other with heavy blows with their wings until one of them withdraws. Egg-laying starts at about May 20–25. The nest is only a scrape in heath or grass. The eggs are laid on consecutive days in the morning. When the egg is laid both birds leave the place after having covered the eggs with vegetation. When the clutch is full incubation starts, and the brooding goose then gradually forms the nest-lining by collecting grass, leaves and twigs from between and around the eggs, adding her own down and feathers. The eggs are creamy-white and measure on an average 79.5 × 52.3 mm. (seventeen eggs; Schiøler). Clutch-size: five to seven. The goose only seldom feeds while brooding, and in the last three or four days it fasts completely. The gander, which stays close to the nest watching the goose, also does not feed very much during this period and both birds lose a lot of weight. Incubation lasts for twenty-two to twenty-three days. The goslings are then led to the lake or marsh where the soil is swampy and there is plenty of water, grass and sand. When alarmed the whole family takes to the lake. If there is no lake near, the young conceal themselves in the vegetation while the adults take to the wing. If an adult bird is taken by surprise it will crouch motionless with neck stretched out and not fly until it is almost touched; I have witnessed this on two occasions. Sometimes two or more families join in a single flock. I have sometimes seen one pair with eleven, twelve or even thirteen young, i.e. the pair has adopted the

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offspring of another pair. The family walks or swims generally in Indian file, the goose in front, the gander behind. When the young are about two weeks old and are able to run as fast as their parents the adult birds moult the remiges. The young are fledged late in July or early in August when about five weeks old.

Immature birds are common throughout the whole breeding area. They become flightless as early as June. In the following month they collect in large flocks on the lakes. In the latter part of July and in August they roam about in small skeins (up to seventy in a flock have sometimes been observed) and gradually begin moving to the south.

In September the adults are ready to depart with their young. The migration takes place in the interior along the ice-cap and is possibly nocturnal as nobody has ever witnessed it. The geese never visit the coast during the autumn passage, but keep to the desolate and uninhabited interior. . . .

The call-note is more melodious than that of other geese, being usually bisyllabic, the adult gander uttering *krii-it* or a similar note, but I have also heard more ordinary goose-like notes, like *ga-gi*, uttered by flying birds, possibly immature birds. According to H. Fencker the note of the gander is much higher-pitched than that of the goose.

'The food in Greenland is chiefly grass, but no details have been recorded.'

CAPTIVITY

It seems certain that the Greenland White-front had been occasionally kept in Ireland and in Great Britain, but no special attention had been paid to it. Since 1948, a number have been imported from Greenland and distributed by the Copenhagen Zoo. A pair was received at Clères in 1949. They nested in 1950, five young being reared; this constitutes the first record of the sub-species breeding in captivity. Live Greenland White-fronts look extremely different from all others on account of their very dark colour and bright orange bill.

LESSER WHITE-FRONTED GOOSE

Anser erythropus

Anas erythropus, Linné, Syst. Nat., ed. 10, 1, 1758, p. 123: North Sweden.

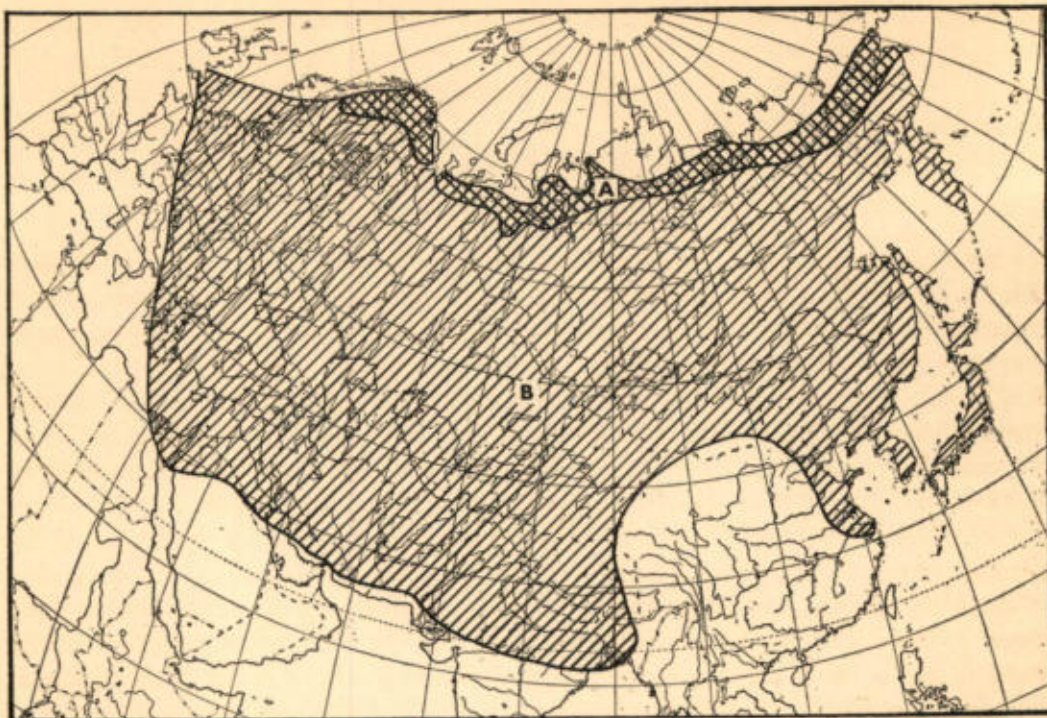
Anser erythropus, Peters, Check-List, Birds of the World, 1, 1931, p. 147.

CHARACTERISTICS

Resembles *A. albifrons* generally, but it is much smaller. The white frontal patch extends considerably farther on the fore crown, reaching between the eyes on top of the head, and there is a conspicuous swollen yellow ring around the eye. It is of a fairly dark brown, and the closed wings project beyond the tail, while they do not in *albifrons*. The bill is proportionally much shorter and the serrations are not visible. The shape of the head is rounder, the forehead and nape more curved. The neck is held less straight and more gracefully. Iris brown. Bill pink. Legs orange-yellow.

Male: wing: 365-403 mm.; tail: 95-110 mm.; culmen: 28-35 mm.; tarsus: 58-62 mm.

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15. Distribution of *Anser erythropus*. (A) Breeding range; (B) Non-breeding range.

Female: wing: 334–381 mm.; culmen: 25–35 mm.

Weight: $3\frac{1}{2}$ – $4\frac{1}{2}$ lb.

It has been alleged that the eastern populations are larger, but the measurements of numerous specimens do not confirm it.

Immatures are without the white forehead, much like young *albifrons*, but smaller and darker on the crown. After a few months they resemble adults, only lacking black patches and spots on the abdomen.

Downy young: as in *albifrons*, but darker above, with a sepia brown forehead.

Eggs: pinkish or yellowish white, four to five, exceptionally six or seven, $76\cdot50 \times 49$ on an average. Incubation: 25 days.

DISTRIBUTION

Breeds in woody and scrubby highlands north to lat. 70° N. in Norway, Sweden south to Jämtland (63°); Finland, south to 68° ; northern Russia and Siberia, from the Kola Peninsula to the Anadyr basin, occupying the forest tundra and the northernmost edge of the forest zone, not extending north to the Arctic Ocean, but reaching north to the Arctic Circle (Johansen *in litt.*) in the regions of Salegard (Obdorsk), along the Ob to Dudinka, along the Yenissei to the basin of the Vilyui, to the mouth of the Adycha on

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the Yana, to Zashiversk on the Indigirka and Verkhne-Kolymsk on the Kolyma (Tougarinov, 1941). Winters in central Europe, Greece and southern Russia, being very abundant on the Caspian Sea; Asia Minor, Iraq, Persia, Aralo-Caspian steppe, Turkistan, northern India (rare), China and Japan. Casual visitor to Great Britain, Holland, Belgium, Switzerland, Italy, Spain, Egypt; a straggler in Novaya Zemlya.

GENERAL HABITS

The breeding grounds of *A. erythropus* run south of those of *A. albifrons* but overlap with it in the forest tundra of Siberia. In Lapland, these Geese haunt swamps around streams bordered with willows and birch, up to 1,000 feet and close to ice and snow. They nest higher up than other species. Otherwise, they are similar in habits to other Grey Geese. They congregate in large flocks in their winter quarters, feeding in fields and open steppes, roosting on banks and islands in lakes and lagoons, and seeking the cover of reeds to a greater extent than other Geese. Peter Scott, however, watched as many as 50,000 in the south of the Caspian Sea, roosting on the mud flats. Alphéraky (*The Geese of Europe and Asia*) reports seeing huge flocks of both *albifrons* and *erythropus* in the Armenian steppe, but the two species never mixed. They were abundant in the autumn on the Mius estuary, and crops had to be protected against their depredations. They appear to travel back in the spring through another route. Their voice resembles that of *albifrons*, but is much higher pitched and more squeaky, and is easily distinguishable. We refer the reader to this work for details.

This pretty little Goose still is common in Central Siberia, but the far-eastern population, which used to migrate to Japan in large numbers, has been almost destroyed.

CAPTIVITY

The Lesser White-front is a very much prettier bird than the other Grey Geese, being dainty and graceful in shape and actions. It has long been a favourite in captivity. It reached the London Zoo in 1852, but it did not breed there, and it long remained rare in live collections. The first success in captivity was that of St Quintin at Scampston Hall, England, who reared a young male in 1918.

Blaauw also raised some in Holland in 1922, and often since. The young were easily reared under broody hens.

A pair made up of an adult female imported from Calcutta in 1932 and a male reared by Blaauw in 1934, started breeding at Clères in 1936, and continued to do so regularly until 1940. They never nested near the water, but always built among the heather quite a long way from the river. Mr Schuyl, of Rotterdam, still breeds birds of that strain. The species breeds regularly at the Wildfowl Trust, Slimbridge.

Blaauw gives an interesting account of this bird in *Ibis*, 1923, pp. 415-7. He reports that a few immature birds come to Holland every winter with flocks of Bean Geese, never mixing with the larger White-fronts, a fact in contradiction to experience in western England, where a few *erythropus* have been found recently on several occasions

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on the Severn wintering grounds among flocks of *albifrons*. He had kept some locally-caught Lesser White-fronts for many years before a pair started breeding in 1922. The nest was situated on the edge of a pond and was elaborately built. Seven pinkish white eggs were laid, and five hatched in twenty-five days under a broody hen, only two chicks surviving. The chicks had greyish-black bill and legs, the latter turning yellowish on the fourteenth day; the yellow ring around the eye showed at an early age, the fleshy skin being granulated and greyish flesh-colour at first. At the age of five weeks the birds were completely feathered, the ring around the eye yellowish, the legs dirty yellow and the bill greyish flesh-colour. At two months, the legs became dusky orange, and the white front began to appear. At five months they were much like the adults, having moulted all their feathers except the large flight quills, but they had no black patches on the belly.

Bean Geese

Anser fabalis

Bean Geese are easily distinguished from other Grey Geese by their parti-coloured bill, which is black and yellow, or pink. They have uniform dark brown head and neck, contrasting with the lighter breast and back; the pale edges of the feathers of the mantle, wings and sides are conspicuous; the tail is of eighteen feathers. The legs and feet are orange-yellow, or pink.

During the breeding season Bean Geese occupy both the tundra and the forest zones of the Palearctic Region, from eastern Greenland to eastern Siberia.

There are two different types of populations: the Forest Bean Geese, breeding in the southern wooded part of the range, elongate in shape, with long, slender bills, the lower mandible almost straight and the nail at the tip rounded; the Tundra Bean Geese, nesting farther north in the tundra belt along the Arctic Ocean, stockier in shape, with the bill shorter and higher near the base, the lower mandible deep and distinctly curved outward, the nail long, oval and tapering.

In both groups size increases from west to east in a continuous cline, so gradually that it seems inadvisable to recognize at present more than a few well-marked and stable sub-species, as overlapping is considerable throughout extensive areas and our knowledge of the characteristics, stability and distribution of the various breeding populations remains inadequate. In the two extreme parts of the range, Forest and Tundra forms are quite distinct but, according to Johansen who has studied these Geese very carefully, they meet and mingle in north-eastern Russia and western Siberia east to the Khatanga River region, where a mixed population occurs. To add to difficulties, many Forest Geese move into the tundra to moult during the summer, particularly to Novaya Zemlya, and they have been mistaken for local breeding birds. During migration and in their winter quarters, birds of both groups are not infrequently found together; also, as

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happens with all sorts of Geese, stragglers sometimes join flocks of birds of another form. Furthermore, a number of aberrant and intermediate specimens with the bill band and legs of a different colour (orange-yellow in Pink-footed Geese, and pink in other forms of Bean Geese) occur throughout the range. Bean Geese with pink bill and legs are fairly numerous in Hungary during the winter, and in the Ufa district of Russia on migration, and they have long been considered by some ornithologists a separate species (*A. neglectus* Sushkin). But it is now believed that they constitute just a colour phase; this is Johansen's present opinion.

It is only quite recently that the geographical variation of the Bean Geese has been fairly well understood in a general way. Such reliable authors as Hartert, Witherby and Dementiev, lacking adequate material and information, have failed to distinguish between the two forms of Yellow-legged Bean Geese which visit Europe during the winter. But Coombes and Johansen have shown that they are perfectly distinct, as Naumann, Alphéraky and Buturlin had already pointed out. Until better data on the variation and distribution of the Bean Geese is available, I recognize three sub-species of Forest Bean Geese, and three of Tundra Bean Geese; but populations change very gradually and are intermediate, or mixed, in a number of regions. We still ignore the degree of stability of different populations and the significance of certain characteristics, so that it is possible that later on a greater number of forms can be named. I have discussed in detail the taxonomical problems related to these Geese in a separate paper (*Ardea*, 39, 1951, pp. 135-42).

DISTRIBUTION

Breeds in eastern Greenland, Iceland, Spitzbergen, northern Norway, Sweden, Finland and Russia; Kolguev Island and Novaya Zemlya; Siberia, northern Mongolia and the Altai. Winters south to the Mediterranean, Black and Caspian Seas, Asia Minor, Persia, Turkestan, China and Japan. Occasional stragglers elsewhere.

GENERAL HABITS

The name of Bean Geese has been given to these birds because it was noticed long ago that they arrived in England regularly in October, at the time of harvesting beans, which in olden days were widely grown, and they fed on the wasted seeds left in the fields. In the north, they nest on grassy islets and on tussocks in the tundra; also in wooded areas among dwarf willows, other bushes and scattered trees. In their winter quarters some prefer dry pastures, roosting near fresh water, while others seek large estuaries and sea coasts. They do not differ much from the Greylag and White-fronted Geese in their general habits. They are more silent than other Grey Geese, and their usually disyllabic call is gruff and low.

Bean Geese are still abundant at the present time in many parts of their range. They do not habitually mix much with other species, but a few hybrids with White-fronts have been recorded.

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CAPTIVITY

Bean Geese live and breed well in captivity when sufficient and suitable space is available. They are sociable and unobtrusive, but not very ornamental, rather dull in plumage and uninteresting in their ways. They are shy and become tame less readily than the Greylag and White-fronted Geese.

I. FOREST BEAN GEESE

WESTERN BEAN GOOSE

Anser fabalis fabalis

Anas fabalis, Latham, *Gen. Syn. Suppl.*, 1, 1787, p. 297. Great Britain.

Anser fabalis fabalis, Peters, *Check-List, Birds of the World*, 1, 1931, p. 147 (part).

Anser neglectus, Peters, *Ibid*, p. 148 (part).

CHARACTERISTICS

A long-necked, slender and elongate Goose, with a thin and straight bill, yellow with a black tip, a black line along the culmen from the frontal feathers to the nostrils or a little beyond, the basal half of the lower mandible black, and a small black patch on the sides of the upper one close to the feathers. The extent of these black markings varies a great deal, but most birds of this form have more yellow on the bill, particularly along the sides, than all the others. Head and neck, uniform dark brown; no black markings on the underparts; otherwise much like the White-fronted Goose in general colour. Iris brown. Legs orange-yellow. There is generally a narrow band of white feathers around the base of the bill and a white spot on the chin.

Male: wing: 450–498 mm.; tail: 71–87 mm.; culmen: 58–67 mm.; tarsus: 72–85 mm.

Female: wing: 410–450 mm.; culmen: 51–60 mm.

The visible depth of the lower mandible, which is almost straight, 6–9 mm.; weight: 5 to 8½ lb.

Immatures: duller generally, with no white around the bill; feathers of the mantle, scapulars and underparts narrower and more rounded at the tip, not broad and square as in the adult; tail-feathers more pointed; wing-coverts more rounded, as in other Geese.

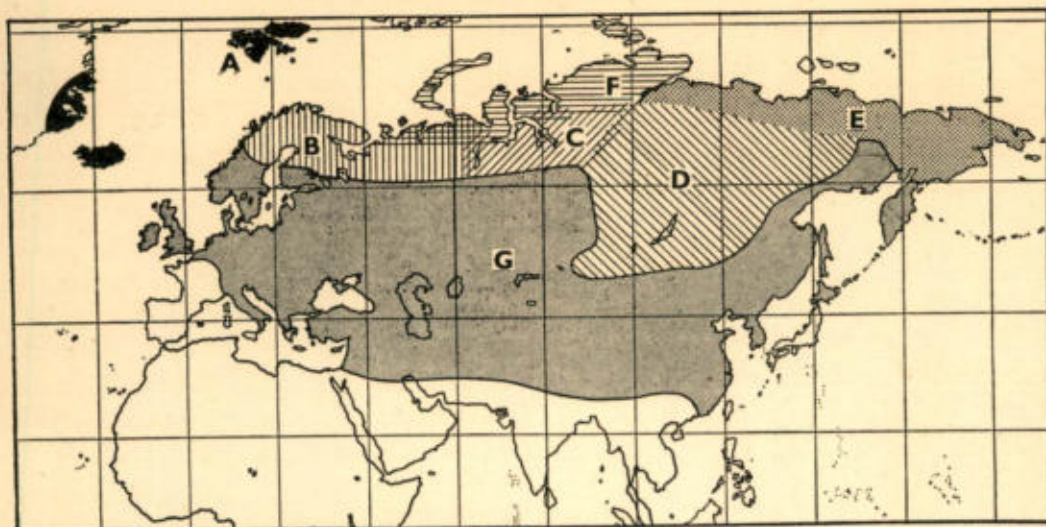
Downy chicks: olive-brown above, long filaments on nape and mantle yellowish; indistinct spots below and bar across the wing pale yellow; blackish eyelids and line from bill to eye; underparts whitish yellow, tinged with olive-brown on the sides of the body, thighs and cheeks. Bill and feet grey.

Eggs: white, four to eight, 84 × 55.5 mm. on an average. Incubation: 27 to 29 days.

DISTRIBUTION

Breeds in the wooded parts of Norway, Sweden, Finland and northern Russia, between about lat. 62° and 70° N., east to the Ural Mountains. Interbreeds with *A. f. rossicus* in the wooded tundra zone in Arctic Russia. Winters in Great Britain, Europe south to the

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16. Distribution of *Anser fabalis*. Breeding ranges: (A) *A. f. brachyrhynchus*; (B) *A. f. fabalis*; (C) *A. f. johanseni*; (D) *A. f. middendorfi*; (E) *A. f. serrirostris*; (F) *A. f. rossicus*; (G) Non-breeding range of the species.

Mediterranean and the Black Sea, more or less accidental farther east and south. Distribution as yet incompletely known.

GENERAL HABITS

The sub-species breeds in June in swamps and lakes of forested country, among scattered trees and bushes near water. In winter, it behaves much like other Grey Geese, but it generally frequents hilly ground and dry pastures inland, sleeps on or near fresh water, and feeds more on grass and weeds, less on stubble and grain. It is fairly rare from October until April in eastern England and south-west Scotland, but common in various localities of Eastern Europe. These birds are not very vocal.

CAPTIVITY

This Goose has been kept and bred without difficulty, although it is a shyer bird as a rule than other Grey Geese. It is fairly elegant in shape, but dull in colour, and usually only large collections include it.

JOHANSEN'S BEAN GOOSE

Anser fabalis johanseni

Delacour, *Ardea*, 39, 1951, p. 139: Tai-pai-Shan, Tsinling Mountains, N.W. China.

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CHARACTERISTICS

Generally similar to *fabalis*, but larger, with a longer bill which shows more black near the base; as a rule, the black covers the entire sides of the upper mandible as far as the nostrils; white feathers around the bill seldom present.

Wing: 425-520 mm.; culmen: 62-72 mm.; visible depth of lower mandible: 7-10 mm.

DISTRIBUTION

Breeds in the forested region of western Siberia, east to the Khatanga River, south to lat. 61-62° N., pairs occasionally nesting in the forest steppe where there are many lakes; mingling and interbreeding with *A. f. rossicus* in the north on the wooded tundra; intergrades with *fabalis* and *middendorfi* in the border areas to an unknown extent. Winters in Persia, Turkestan and western China. A series of fourteen specimens collected at Tai-pai-Shan, Tsinling Mountains, north-western China, all belong undoubtedly to this intermediate sub-species.

GENERAL HABITS

This larger form of the Forest Bean Goose seems to have the same habits as the western birds. There is very little information on its life habits to be found in literature.

CAPTIVITY

No record of this Goose having been kept in confinement.

MIDDENDORF'S BEAN GOOSE

Anser fabalis middendorfi

Anser middendorfi, Severtzow, *Vertikalnōe i Gorizontale Rasprostranenie turkest. Ikhivot.*, 1872 (1873), p. 149: *Sibérie Oriental* (Oudskoi Ostrog). New name for *Anser grandis*, Middendorf, nec Gmelin.

Anser fabalis sibiricus, Peters, *Check-List, Birds of the World*, I, 1931, p. 147.

CHARACTERISTICS

A large, elongate Bean Goose with a very long neck and a long, slender, straight bill, black on the basal half as in *johanseni*. Seldom shows any white around the bill.

Wing: 440-562 mm.; culmen: 64-87 mm.; visible depth of lower mandible: 7-10 mm.

Immatures and *chicks* like *fabalis*, but larger.

Eggs measure from 73 to 93 mm. by 53 to 62 mm.

DISTRIBUTION

Breeds in the forests of Eastern Siberia, from the Khatanga to the Kolyma region, south to the Altai (where a special form may occur), Sayan, Alatau-Kuznezki and northern Mongolia. Winters in Japan and eastern China. Straggler to Pribilov Islands.

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GENERAL HABITS

The large eastern Forest Bean Geese are similar in habits to the smaller forms. As they breed farther south, their migrations are more limited. They nest on lakes far removed from human settlements; young have been found in the Vilyui basin as early as June 8. Flightless birds are killed in great numbers by the local Tunguz in July and early in August. During the winter, it is fairly common in Eastern China, as far south as Foochow, and in Japan, but it is always less abundant than the Tundra Bean Goose (*serrirostris*).

CAPTIVITY

It does not seem that the Middendorf's Geese have ever been sent alive to Europe or America. But they have often been kept in confinement in Japan, and we have observed some in Marquis Kuroda's collection. They look strikingly different from all other Bean Geese because of their elongated neck and bill.

II. TUNDRA BEAN GEESE

THICK-BILLED BEAN GOOSE

Anser fabalis serrirostris

Anser segetum var. *serrirostris*, Swinhoe, *Proc. Zool. Soc. London*, 1871, p. 417:
Ningpo, China.

Anser fabalis serrirostris, Peters, *Check-List, Birds of the World*, 1, 1931, p. 148.

CHARACTERISTICS

A large, heavy Bean Goose, shorter and thicker in shape than *middendorfi*, with a moderately long but very massive bill, high near the base, the lower mandible much curved outward. The nail is long, oval and pointed.

Wing: 420-525 mm.; culmen: 65-76 mm.; visible depth of lower mandible: 8-13 mm.

Immatures, chicks and eggs much as in *fabalis*, but larger and heavier.

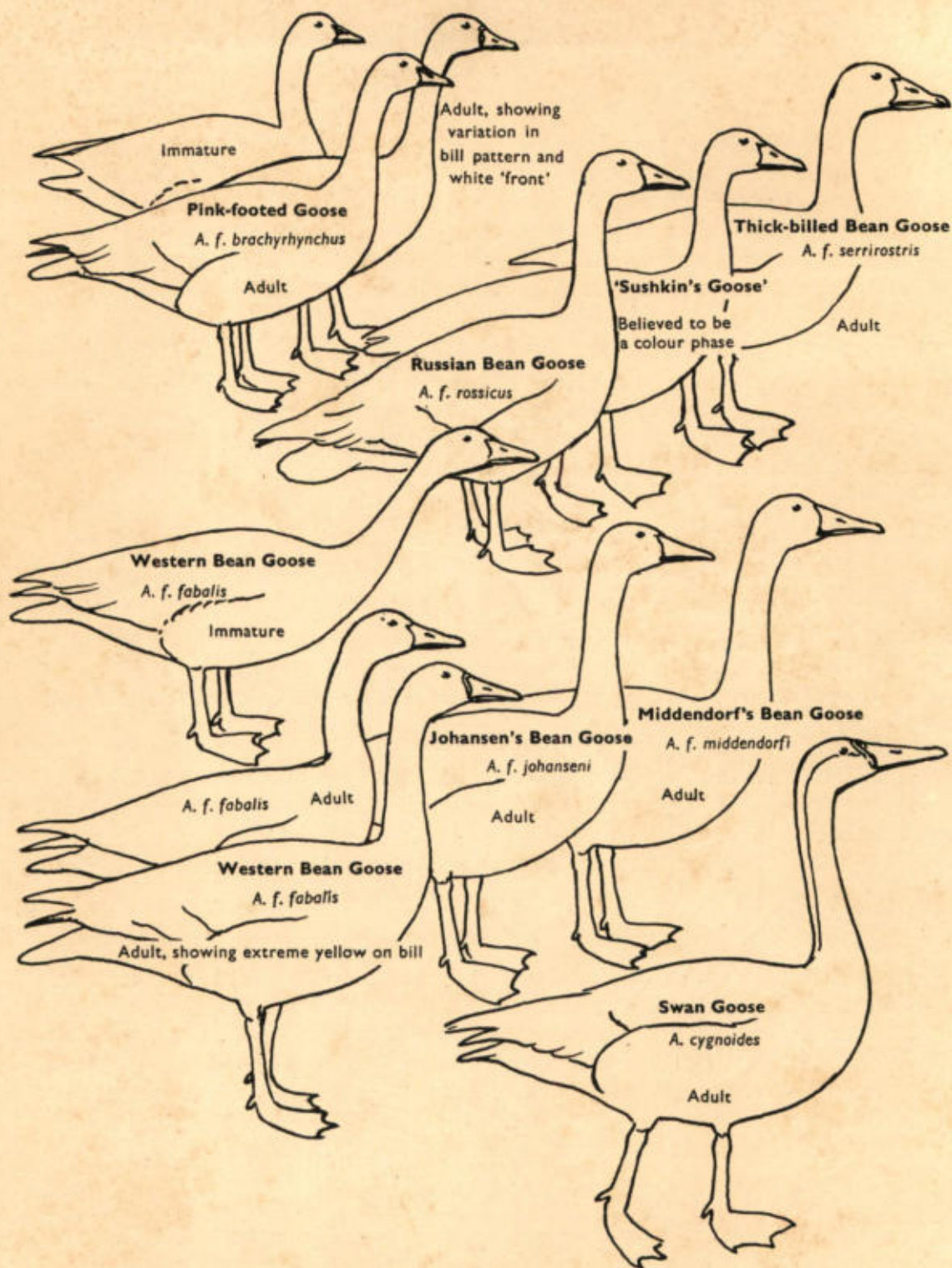
DISTRIBUTION

Breeds in the tundra zone from the Khatanga to the Anadyr, and Tchuckchi Peninsula. Winters in China south to Fokien, and in Japan, migrating through Sakhalin, Hokkaido and Korea.

Birds with very thick bills are found in the eastern part of the range, but individual differences are considerable everywhere. As Johansen agrees that over fifty per cent of the specimens cannot be told apart, we cannot recognize, as he did under the name of *mentalis*, Oates, a distinct sub-species for the large-billed birds of the Far East.

GENERAL HABITS

Tundra Bean Geese breed much farther north, on a terrain completely different from that frequented by the Forest sub-species. In winter, they are more partial to estuaries



VI. True Geese (2)



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and maritime coasts. Both forms mix in their winter quarters in China and Japan, but Thick-billed Geese are far the more numerous. Not only has *serrirostris* very different proportions, being together rounder, with a larger head, a shorter neck, and a thicker bill, but it has also a peculiar voice, deeper and more honking. According to O. L. Austin (*Waterfowl of Japan*, Tokyo, 1949, pp. 16-18), they arrive in Japan later in the autumn and also leave later in the spring than the White-fronted Geese:

'Geese reach Japan in autumn by three distinct routes. The first flight comes through Sakhalin to Hokkaido in September and early October and moves southward to Aomori and Miyagi prefectures in November. The second flight crosses the Japan Sea from Ussuriland and Amurland, arriving in late October on the northern coast of Honshu between Fukui and Niigata prefectures where the birds rest for a few weeks before moving on in late November. Part of this flight winters in the Lake Biwa area and the Kansai Plain in southern Hyogo prefecture; the remainder winters in the Kanto Plain, mainly in Chiba prefecture, where apparently it is joined in late winter by birds from the eastern flight moving southward. The third and smallest autumn flight reaches western Honshu by crossing Tsushima Straits from Korea in late October and November.

'Both the Bean Goose and the White-fronted Goose formerly wintered extensively on all the plainlands of Japan. They are now restricted largely to the Sendai, Kanto, Gifu, and Kansai plains, where the largest kills are reported. Many still are killed on migration in Hokkaido, and along the northern shore of Honshu between Fukui and Niigata.

'The wintering Goose population of Japan has been dwindling steadily since the Meiji Restoration. The stories in the few old records remaining of their former abundance are almost unbelievable. Englebert Kaempfer wrote in 1692 that geese "are very common in this country, particularly the grey ones, and so familiar, that they might be taken for tame, for they will not fly up, nor get out of the way at anybody's approach. They do a great deal of mischief in the fields, and yet nobody may disturb or kill them under pain of death, except those who have bought the privilege to shoot them on some tract of ground. The country-people, to keep them off, surround their fields with nets, tho' to very little purpose, for they will fly over the nets, as I have seen myself, to get at their food."

'Abandonment of feudal customs and control at the end of the Tokugawa Shogunate period signalled the decline of the Geese, as well as all other large game. The first marked shrinkage was noted between 1880 and 1890. The geese then practically disappeared from Kyushu, where they formerly had been plentiful, but never have been since. Their number elsewhere in Japan has decreased steadily, though less marked by sudden disappearance.

'Ponds at Ueno and Shinjuku in Tokyo were famous goose grounds until the city was built up around them and destroyed them. Geese wintered regularly in Tokyo in the moat and on the lawns in front of the Imperial Palace grounds and at Ueno until 1923. Flocks of fifty or more wild geese were one of the regular winter sights on the main Imperial plaza until the area was turned into a temporary tent city for refugees after the 1923 earthquake. The building of a road across the Ueno pond in 1924 drove the geese from that spot. These flocks have never returned to central Tokyo.'

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CAPTIVITY

A few specimens of this coarse, unattractive Bean Goose have arrived in America, but records are very scarce. The only pair to reach Europe was sent to Clères by Dr Kuroda in 1932. They were quiet and uninteresting, and they never nested. After some years they were presented to Messrs R. and S. Stevens and they did not breed at Walcot Hall either. They are often kept in China and Japan.

RUSSIAN BEAN GOOSE

Anser fabalis rossicus

Anser serrirostris rossicus, Buturlin, *Opredelitel promysl. ptiz*, 1933, p. 60: Western Siberia = Beluchia Guba, Taymyr (Dementiev, *Alauda*, 1936, p. 190).

Anser fabalis fabalis, Peters, *Check-List, Birds of the World*, 1, 1931, p. 147.

Anser neglectus, Peters, *ibid.*, p. 148 (part).

CHARACTERISTICS

Similar to *serrirostris* and intergrading with it in central Siberia, but smaller, with a shorter and slighter bill. The curve of the lower mandible is well marked, but less acute. Differs from *fabalis* in its shorter body and neck, in its slightly larger head and in its shorter bill, higher near the base which is always black well beyond the nostril; its nail, as in *serrirostris*, is more oval and longer, ending in a curved point.

Wing: 405–462 mm.; culmen: 51–66 mm.; visible depth of lower mandible: 7–10 mm.

Immatures, chicks and eggs as in *fabalis*, or nearly so; eggs measure 87 × 56 mm. on an average.

DISTRIBUTION

Breeds in the tundra zone of Novaya Zemlya and of the Yamal, Gyda and Taymyr peninsulas. Winters as far west as Belgium, Holland, northern Germany, south to Italy, south-central Europe, Russia, western Siberia, Turkestan and China. Stragglers in France and elsewhere. Intergrades with other sub-species when they come into contact. The population of northern Russia is mixed *rossicus* and *fabalis*; at the mouth of the Khatanga, Johansen found eight *rossicus*, twenty-two birds intermediate between *rossicus* and *serrirostris* (Lonnberg's *curtus*) and seven resembling *fabalis*.

GENERAL HABITS

When seen next to *fabalis*, the Western Tundra Goose is strikingly different in its general proportions. It also has a different voice, which resembles much that of the Pink-foot. When both Tundra and Forest Bean Geese are found on the same wintering area, flocks usually do not mix, the first being always partial to mud flats and low pastures near estuaries and sea-coasts. Contrary to what happens in Eastern Asia, Tundra Geese seem to be less numerous in Europe than Forest Geese.

Tundra Geese nest on dry tussocks near lakes and rivers.

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CAPTIVITY

Russian Bean Geese caught in Holland during the winter have been commonly kept in captivity, and they have no doubt nested, but the long confusion between the two western forms has prevented accurate recording. It is less attractive and ornamental than the Forest Bean Goose, being heavier in shape.

PINK-FOOTED GOOSE

Anser fabalis brachyrhynchus

Anser brachyrhynchus, Baillon, *Mém. Soc. R. Abbeville*, 1833, p. 74: Abbeville, France.

Anser brachyrhynchus, Peters, *Check-List, Birds of the World*, 1, 1931, p. 148.

CHARACTERISTICS

A small greyish Bean Goose with a very short bill, black and pink, and pink legs and feet. Back and underparts pale pinkish brown; wings and tail ashy grey with whitish borders to the feathers; occasionally a little white around the bill.

Wing: 400–450 mm.; culmen: 37–54 mm.; visible depth of lower mandible: 4.5–7 mm.

Immatures: duller and browner.

Downy chicks: as in *fabalis*, but lighter and more strongly tinged with yellow, as a rule, although some lack it almost entirely.

Eggs: dull white, four to eight in a clutch, measuring 78×52 mm. on an average in Spitzbergen, 81×53 mm. in Iceland. Incubation: 25–28 days.

DISTRIBUTION

Breeds in the middle parts of eastern Greenland, Iceland and Spitzbergen. Winters in Great Britain, northern France (rare), Belgium, Holland, Germany, passing through Jan Mayen, Bear and Faeroe Islands, and Scandinavia. Accidental as far as Russia and North America.

It is possible that the populations of Greenland, Iceland and Spitzbergen show some slight geographical variation, but they do not appear to be worth sub-specific distinction.

GENERAL HABITS

Pink-feet resemble the other Bean Geese, but they are definitely different in many ecological peculiarities. They certainly are less close to the other sub-species than the latter are to one another, and they no doubt have long separated from them. They are successful and adaptable birds. During the winter they often congregate in very large flocks and roost mostly on sand-banks in estuaries and sea coasts, also, in some areas, on heather moors, highland lakes and reservoirs, less often in flooded marshes. Their voice is variable, at times very high-pitched and brief, then lower and disyllabic. They often breed on tops of terraces and ledges on cliffs for protection against foxes, but also

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on the open tundra, generally in colonies. Salomonsen has given excellent information on the subject (*The Birds of Greenland*, 1950, pp. 49-53).

The Pink-footed Goose has a comparatively restricted range in Greenland, breeding only in the middle parts of East Greenland. It was first discovered in Greenland by Bay, who found it breeding in Scoresby Sound in 1891-2. It is now known to breed from Mikis Fjord up to Hochstetter Foreland, although not continuously. The breeding-place at Mikis Fjord, which was found by Degerbol and Mohl-Hansen in 1932, is completely isolated by the barren Blossville Coast from the main breeding-territory farther to the north. In Scoresby Sound it breeds in large numbers along the eastern, southern and western coasts at Jameson Land, right up to Nordost Bay, probably also in the valley of Ryders River (Pedersen). Further, it is commonly met with in the interior branches of the fjord where it has been proved to breed on Danmarks Island (Bay). It is no doubt very widespread in the interior judging from the large number of geese seen on migration in the outer parts of the fjord. It may also breed on the little-known south coast of Scoresby Sound. In the country between Scoresby Sound and Franz Joseph Fjord it is apparently absent as a breeding bird; Norwegian trappers have observed it in Segelsällskapets Fjord, Röhss Fjord and Vega Sound (Schaanning) in the middle part of August, but breeding has never been recorded. North of Franz Joseph Fjord it is again very numerous, commonly breeding on Gauss Peninsula, Hudson Land and Hold-with-Hope Foreland, in decreasing numbers on Clavering Island, Wollaston Foreland, Kuhn Island, Peters Bay, and Hochstetter Foreland up to its northern parts. Farther north it does not breed, but a flock of six, probably immature birds, was observed at Morkefjord in August, 1933.

Thanks to the observations of Alw. Pedersen the life habits in East Greenland are now well-known. The arrival in spring takes place about May 23-24. On spring migration it has been observed in Angmagssalik District from early May to the end of the month, sometimes passing in enormous skeins numbering 1,000-1,500 individuals (Chapman). On arrival at their place of destination the Pink-footed Geese are still grouped in skeins, but are already paired. They move immediately to the breeding-places, and egg-laying starts in the very first days. In a few days all members of the colony have arrived at the breeding locality.

The Pink-footed Goose usually breeds in colonies, but several solitary nests have been found. The largest colony is apparently the one situated at Constable Point in Hurry Fjord, which has been visited by several ornithologists. The number of pairs nesting in 1933 was estimated at 150-200 by Tcherniakofsky; in 1928 there were, however, only thirty pairs (Pedersen). At Loch Fine a colony of forty nests was found by Pedersen. As in Iceland and Spitzbergen, its choice of nesting place varies. It nests either on terraces and ledges on steep cliffs on the sides of valleys, or on low islands in deltas or simply on the open heath, its main requirement being a free and unimpeded view in all directions as a necessary safeguard against predators. The open, unprotected heath is, however, only resorted to as a breeding-ground by solitary pairs, for the colonies are careful to choose places which are more or less inaccessible to the Arctic Fox. The most usual nesting locality is in the large deltas, where the nest is placed on the top of small hillocks from one to two metres high built of glacial sand or shingle which can be found

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on islands densely overgrown with willow and with grassy plains, surrounded by broad and deep torrents with a strong current. . . .

'The one-year-old, non-breeding geese are numerous in the breeding area, roaming about in flocks of from five to eight. They lose the remiges as early as the first part of July and then usually keep to the fjord-coasts where they take to the sea when pursued, diving with great facility.

'As soon as the adult birds have regained their flying power and the goslings are fledged, migration starts for the south. They leave the breeding area from the end of August to early September, the latest record being September 8, and go to the south in large skeins. They have been observed on passage in Angmagssalik District in September. The majority winter in England, where they arrive from mid-September to mid-October; a smaller number carries on to the northern shore of the European continent.'

Extensive study and ringing of Pinkfeet have recently been conducted in Iceland by Peter Scott.

CAPTIVITY

Pink-footed Geese are prettier than other Bean Geese, both in colour and in shape, and they are small and elegant. They are therefore more popular with amateurs. They do well in confinement, usually keeping somewhat apart in a mixed collection, but they do not breed freely, although they have nested in captivity several times. The first record seems to be about 1918 (Major P. Hammond, Morston, Norfolk, according to Wormald). More recently they have bred again in Norfolk (J. Williams, Tunstead) and also in Scotland (John Berry, Tayfield, Newport, Fife) and in America. A female at Clères crossed with Blue Snow and Emperor ganders, the young hybrids being unevenly spotted and unattractive.

Snow Geese

Anser coerulescens

Snow Geese are characterized by a stout bill, which is rather short but high near the base. It is crimson-red in colour, with the edges of both mandibles black, forming a thick black line along the borders. The serrations are strong and conspicuous, the lower mandible is curved outward somewhat as in the Tundra Bean Geese, and the nail is of a whitish colour. Another feature is the shape of the tertiaries, inner secondaries and their greater coverts, which are considerably lengthened, falcated and curved, constituting ornamental plumes. The tail has sixteen feathers. The legs and feet are deep pink, and the iris dark brown. These various characters are not important enough to warrant a generic separation from the Grey Geese, to which they are closely allied, and the genus *Chen* is here rejected.

There are two distinct colour-phases of plumage. The birds can be pure white, with black primaries, the outer ones grey near the base, grey primary-coverts and bastard wing; or ashy blue-grey, with head, neck, rump, tail-coverts, vent, and parts, or the whole, of the abdomen and breast white.

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Snow Geese breed in colonies on the tundra of Arctic North America, extending to western Greenland and north-eastern Siberia. Over the greater part of the range, only the white phase occurs; but 'blue Geese' are found nesting in the eastern part, mixed in varying proportions with white birds, and interbreeding with them. All are similar in size and proportions, except the populations of the extreme north-east which are larger and constitute a distinct sub-species (*atlanticus*).

The taxonomic position of the blue and the white Snow Geese has long remained unsettled, and even today it is still discussed by a few ornithologists. It seems obvious, however, that they represent two colour phases of the same species, since during the last two or three decades they have been found nesting on the same grounds, mingling and inter-breeding. There are no differences in habits, behaviour, voice, proportions or size between them in mixed populations, nor any uneven patterns of plumage indicating hybrids between sharply distinct forms. So far, blue Geese have been found breeding only in the eastern part of the wide range of the Lesser Snow Goose.

Dimorphism in Snow Geese, and other birds, was suggested by Stresemann (*Jour. Orn.*, 74, 1926, pp. 377-85), and it has since been accepted by the majority of ornithologists. But it was not until the breeding grounds of the blue Geese had been discovered that a final opinion could be formed. Blue Geese were found breeding on Baffin Island by J. D. Soper in 1929, on Southampton Island, Hudson Bay, by G. M. Sutton in 1930, and on both by T. H. Manning in 1934-6; furthermore, a few pairs were observed, nesting in the Perry River area, much farther west, by A. Gavin in 1940, and by H. C. Hanson, Paul Queneau and Peter Scott in 1949. In the large colonies of Southampton and Baffin Islands, blue Geese were always intermingling with white ones, and mixed pairs composed of one bird of each colour were observed in variable proportions. Mixed pairs produce either blue or white chicks, the blue usually predominating. It seems that the blue mutation is increasing and spreading, being new and proving successful at the present time of milder temperatures. The white phase is, however, still much more widespread and apparently older, having probably been evolved successfully at an earlier period from more generalized grey ancestors, with the cooling of the climate.

The dimorphism of the Snow Geese is comparable to what exists in numerous species of birds, but the peculiarities of their life habits have made the issue more confused than in other cases, as Mayr has rightly written (*Systematics and the Origin of Species*, N.Y., 1942, pp. 242-3).

In captive flocks, pairs of blue Geese are known to have produced at intervals a small number of white offspring; but white ones seldom produce any blue goslings. Blaauw (*Jour. Orn.*, 55, 1907, p. 623) states that he has repeatedly bred young from a blue male and a white female, which have invariably been blue. A pair of these heterozygous blues bred in 1906, the result being four blue goslings. Hawkins, Wellein and Crissey, however, report three dark goslings with a pair of white parents at Cape Henrietta Maria (*Waterfowl Population*, 1950, Dep. Int. and Canada Dep. Res., Wildlife, 8, p. 18, 1950).

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17. Distribution of *Anser caerulescens*. *A. c. caerulescens*: (A) Breeding range; (B) Non-breeding range. *A. c. atlanticus*: (C) Breeding range; (D) Non-breeding range.

As to the preference that individuals may show to mates of their own colour, which is not, however, very apparent in confinement, it can also be due to the general tendency in birds to be attracted by others of the same colour and pattern. It is well known to observers when various species are artificially brought into contact, and is particularly strong in waterfowl; for instance, Black Swans will persecute the darker Geese and leave alone the pale-coloured ones, while Black-necked Swans are particularly excited by European Shelducks, who also possess a black head and neck and a mostly white body, as I have witnessed on numerous occasions. They will even pair up with one of them, if single.

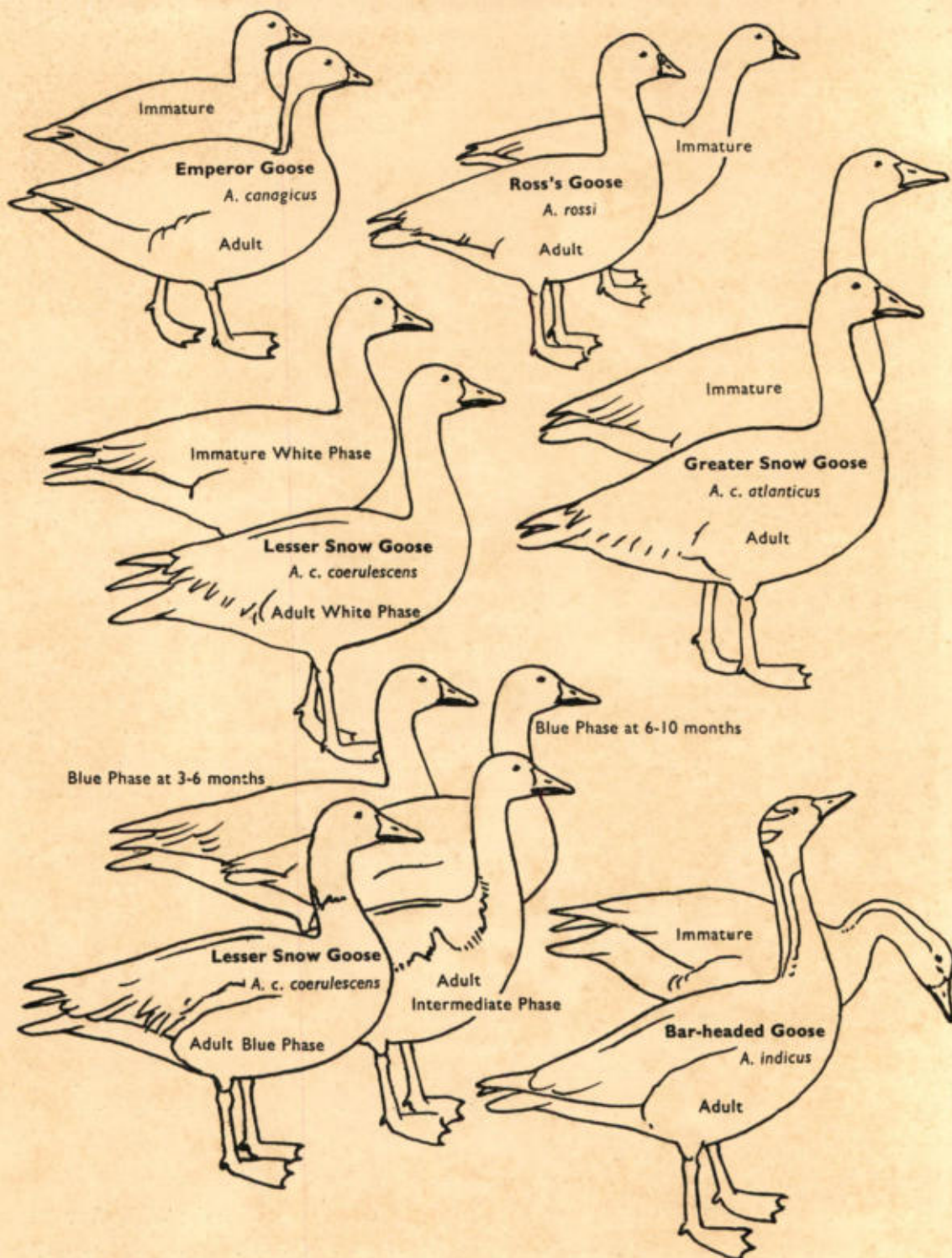
The head and neck of Snow Geese are often stained rusty red by ferrugineous mud, but they are basically pure white.

DISTRIBUTION

Breeds in north-western Greenland, Arctic North America, the extreme north-east of Siberia, and the neighbouring islands to the north. Winters on the eastern coast of North America, the northern and anterior coast of the Gulf of Mexico, in the large valleys of California, and in Japan. Stragglers elsewhere. Passing through many parts of Canada and the United States on migration.

GENERAL HABITS

Snow Geese do not differ widely in habits from the Grey Geese. Like the White-fronted and some of the Bean Geese, they are colonial nesters of the Arctic tundra, but they



VII. True Geese (3)



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breed still farther north. Their nests are not built very close to one another. They are mere hollows in the ground among the vegetation, lined with grass, moss and down.

Snow Geese arrive fairly late on their far northern breeding grounds and they leave them in September, spending some time on their way at several favourite resting spots, both in spring and autumn. They congregate in huge flocks on migration and during the winter, travelling along well defined, but different, routes on their way to and from their breeding grounds. They are still abundant in North America, although the Eskimos and the Indians destroy a large number of birds and eggs; but they are adequately protected in their winter quarters. The Asiatic population wintering in Japan has been practically wiped out since 1868.

In display and general behaviour, Snow Geese resemble the Grey Geese. Their voice is harsh and high-pitched. The notes are monosyllabic, clipped at the end and never drawn out. They also cackle in a sort of falsetto voice.

CAPTIVITY

Snow Geese live and breed well in captivity and behave in every way like the Grey Geese. They are showy and conspicuous, and distinctly ornamental in large parks. A big flock of Snow Geese, particularly white ones, produce a great effect, especially on the wing, when their black pinions show against the white of the rest of the plumage. It is a curious fact that this highly migratory species becomes sedentary and stays well in the full-winged state, as has been proved at Woburn, where a large flock lived and bred until 1942, and left only through lack of food. At close range, however, Snow Geese look coarse and less attractive. They are perfectly hardy and harmless to other birds.

All forms of Snow Geese have bred in confinement in Europe and in America. Hybrids with other species of *Anser* are fertile, but those with *Branta* are sterile. A strain of hybrid Blue Snow x Emperor, originated at Clères more than twenty years ago, are still breeding in the Paris Zoo and in St James's Park, London, remaining perfectly even in shape and colour.

LESSER SNOW GOOSE

Anser coerulescens coerulescens

Anas coerulescens, Linné, *Syst. Nat.*, ed. 10, 1, 1758, p. 124: Hudson Bay.

Chen coerulescens, Peters, *Check-List, Birds of the World*, 1, 1931, p. 146.

Chen hyperboreus, Peters, *ibid.*, p. 146.

CHARACTERISTICS

A medium-sized Goose, either white, or bluish grey and white.

WHITE PHASE. Pure white, with black primaries and grey coverts. Bill red and black. Legs and feet pinky red.

Immatures have a patch in front of the eyes; the crown, hind neck, mantle and scapulars ashy brown; wings ashy brown, with white tips and borders to the feathers,

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the greater coverts, secondaries, tertiaries blackish with broad white border; primaries as in the adults; rest of the plumage white, the face, neck, upper breast and sides suffused or speckled with greyish brown. The ornamental wing-coverts are short and inconspicuous. Bill brown with black side-bands. Legs and feet purplish grey.

Downy chicks have the back of the crown and neck, a line through the eyes, and the upperparts yellowish brown, the rest of the head and neck, and the underparts, golden greenish yellow; indefinite yellow patches on wings and back, and a brownish band from thighs to flanks. Iris brown. Bill and legs grey, the nail horny yellow. The intensity of the yellow varies considerably.

BLUE PHASE. Head and neck white, sometimes with irregular grey spots, the grey of the breast unevenly defined from the white and extending up the neck more or less according to individuals; mantle and underparts dark purplish grey, the feathers with narrow light brown borders. In some specimens, which are supposed to be the offspring of mixed pairs, the grey of the breast and abdomen is replaced by white; in others, the breast is grey fading to white on the abdomen. Vent and under tail-coverts white; back light grey fading to white on the upper tail-coverts; rectrices grey, bordered with white; primaries and secondaries black, with grey bases; long tertiaries dark grey with whitish borders; inner greater covert black with broad white or pale grey borders; other greater and middle coverts greyish blue with black centres; small coverts greyish blue. Bill and feet as in the white phase.

Immatures: like adults, but duller, darker and browner, with the head and neck brownish grey, deeper on the crown and hind neck, and a white patch on the chin and upper throat; wing-coverts short. Bill and legs dark grey.

Downy chicks: dusky olive-green, blackish on the head and back, the breast and abdomen lighter, with a yellow patch on the chin. Bill and feet black, the nail whitish.

Male: wing: 395–460 mm.; tail: 115–140 mm.; culmen: 51–62 mm.; tarsus: 78–91 mm.

Female: wing: 387–450 mm.; culmen: 50–61 mm.; tarsus: 71–85 mm.

Eggs: similar in both phases, four to seven generally, white, 78 × 52 mm. on an average. Incubation, 22–25 days.

DISTRIBUTION

Lesser Snow Geese breed in Arctic Siberia (Wrangel Island and Tchutchki Peninsula), the Arctic coast of Alaska, and the islands of the north, east to Baffin Island. The blue phase has been found nesting in Baffin and Southampton Islands on the western coast of Hudson Bay and in the Perry River region (rare), always associated with white birds. Winters in Japan (very rare now), China (rare), the large interior valleys of California and the coasts of Louisiana, Texas and Mexico, rarely east of the Mississippi. Blue Geese winter mostly in Louisiana, a few in Texas, and exceptionally elsewhere, always mixed with white birds in a greater or smaller proportion. Stragglers occur in Greenland, in Europe and in the West Indies, the Bahamas, Bermuda, etc. It is possible that the Snow Geese which still nest very abundantly on Wrangel Island (Tougarinov, 1941)

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migrate to California, as the species has become exceedingly rare in Japan, where it used to be common forty years ago. It has also become very rare on the Siberian tundra as a breeding bird.

GENERAL HABITS

Lesser Snow Geese are the most abundant of all American Geese. Because of their far northern nesting grounds, very little information on the breeding birds is available for the greater part of their range. They are far better known as migrants and winter residents. The only detailed information we have is due to G. M. Sutton (*Memoirs of the Carnegie Museum*, XII, Part II, Sect. 2, 1932, pp. 44-57), J. D. Soper (*Proc. Boston Nat. Hist. Soc.*, 42, 1942, pp. 121-5) and T. H. Manning (*Auk*, 59, 1942, pp. 158-75) who have fairly recently studied the breeding birds personally on Southampton and Baffin Islands, where both phases occur. In 1950, Hawkins, Wellein and Crissey found a large breeding colony of white Snow Geese, mixed with blues, between the rivers Thlewieza and Tha Anne on the western coast of Hudson Bay; also some were nesting at Cape Maria-Henrietta. We can only refer the reader to their works for details. Manning's account is particularly interesting.

A. Gavin (*Wilson Bull.*, 59, 1947, pp. 198-9) has reported that he found them nesting in the Perry River region. Ten or twelve pairs of white birds were breeding on an island two miles up from the mouth of the Perry River; four pairs of blues were found on July 2, 1940, nesting in a grassy bay of the lake in which Ross's Geese were nesting. One male standing guard at a nest was shot and photographed. This species had not been observed before in the district. The Eskimos had not seen it and had no name for it.

In the same area, in 1949, Hanson, Queneau and Scott found Lesser Snows (white) breeding in small numbers in a Ross's Geese colony. A few blue geese were also present, but only two are known to have bred. These were both males and were mated in both cases to white females. In one case, the blue gander had white flanks and belly and the two chicks were both greeny-yellow and typical of the white phase; in the other case, there were also two chicks, one yellow and one sooty, typical of the blue phase.

In their wintering grounds in California (all white), and in Louisiana (blue dominant) and Texas (white dominant), Lesser Snow Geese occur in huge flocks, associated in California with numerous gaggles of Ross's, White-fronted and Canada Geese. These masses of tens and sometimes hundreds of thousands of Geese, flying to their feeding grounds and back to the marshes where they drink and rest, are a truly admirable sight. They are fortunately protected in a number of refuges on their lines of migration and in their favourite places of winter concentration in the United States. Large numbers of flightless birds are killed and eggs gathered by the Eskimos, vast quantities are shot under regulation at James Bay, Canada, by the Indians and some sportsmen, and at many other places on migration in Canada, the United States and Mexico, but Lesser Snow Geese so far are holding their own. Their flesh is considered of very poor quality, inferior to that of the White-fronts and Canadas.

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CAPTIVITY

Both white and blue Lesser Snow Geese have bred in captivity, in a pure as well as in a mixed state. Lord Derby possessed white specimens, and both the blue and white phase bred in a mixed flock at Woburn Abbey more than fifty years ago. Blaauw reared blue goslings from a blue male and a white female in 1898 and the following years. The first pure blue Snow Geese to have bred in captivity appear to have been (according to Bent) those of R. H. Barnes, in Illinois. The Washington Zoo recorded a success in 1924 (*L'Oiseau*, 1926, p. 325). They have repeatedly bred since both in Europe and in America, and many have been reared during the last six years in England and at Clères.

When blue and white Snow Geese are associated and interbreed, the offspring are generally either blue or white. In a few cases, however, white specimens with some irregular dark markings on the wings and sometimes a few dark spots on the head and neck have been produced. It appears that such specimens have not been found in the wild. They perhaps occur when populations from widely distant areas are artificially brought together.

GREATER SNOW GOOSE

Anser coerulescens atlanticus

Chen atlantica, Kennard, *Proc. New England Zool. Cl.*, ix, 1927, p. 93: Princess Ann Club, Back Bay, Virginia.

Peters, *Check-List, Birds of the World*, i, 1931, p. 146.

CHARACTERISTICS

Similar to the Lesser Snow Goose, but larger, heavier ($5\frac{1}{2}$ to $10\frac{1}{2}$ lb. against 4 to $6\frac{1}{2}$ lb.), with a longer bill. A coarser bird altogether, with a massive head. The white phase is the only one recorded so far. Blue Geese found among the Greater Snows during the autumn and winter have proved to belong to the Lesser sub-species.

Male: wing: 430–485 mm.; tail: 135–160 mm.; culmen: 59–73 mm.; tarsus: 86–97 mm.

Female: wing: 425–475 mm.; culmen: 57–68 mm.

DISTRIBUTION

Breeds in north-western Greenland (Thule, and between Robertson and McCormick Bays), northern Baffin, Bylot, Devon and probably Grinnell Islands. Winters on the eastern coast of America, from Chesapeake Bay to North Carolina.

GENERAL HABITS

The Greater Snow does not differ in habits from the Lesser sub-species. Although most specimens are decidedly larger and longer-billed, it is not always easy to differentiate a few small-sized ones. It is exclusively a bird of the Atlantic coast, breeding in the high north and wintering in the south-eastern United States. The entire population visits the lower St Lawrence River on migration in the spring and autumn. They have increased

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during the last forty years, and now number about 42,000. The area at St Joachim, where they spend most of their time, is a reserve belonging to a Fish and Game Club. They are completely protected in the spring and shot in limited numbers in the autumn only. A few birds are killed outside the reserve.

The breeding grounds of the Greater Snow Geese in Greenland are the only ones which have been well studied. Salomonsen (*Birds of Greenland*, 1950) writes:

'The Greater Snow Goose breeds in small numbers in the Thule District. The first record of nesting in Greenland was made by L. Gibson who, as a member of one of Peary's expeditions, found it breeding in 1892 at Five Glacier Valley west of MacCormick Bay. It also breeds in the extensive areas behind Thule Settlement.

'The arrival in spring in Thule takes place in early June. Some continue farther north to Ellesmere Land. A skein of ten was observed at Etah June 10, 1917 flying northwards (MacMillan). When they arrive, the Snow Geese are mated, although they remain in flocks until the freshwater lakes begin to thaw. They usually nest on grassy flats in the vicinity of a small lake (Gibson, Freuchen, Rasmussen, Ekblaw), but may sometimes — like the Pink-footed Geese in north-east Greenland — place the nest on mountain-slopes or on ledges on cliffs overhanging the sea (Haig-Thomas, Vibe). The nest is placed in a depression in high vegetation, built of grass and straw and lined with white feathers and down. Egg-laying takes place after mid-June; the full clutch consists of six or seven eggs; incubation lasts for four weeks (Ekblaw). The young, which hatch about mid-July, are at once taken to the lakes, with both parents in attendance. The family stays inland until the departure for the south. The shedding of the remiges takes place in the last days of July. On a lake behind Thule, about twelve kilometres inland, I observed a flock of twelve adult birds accompanied by twenty-five well-sized goslings on August 6, 1936, all the adult birds being flightless. A number of them were collected for the Zoological Museum; the stomachs contained quantities of leaves and stems of grass. On the same date I saw a skein of fifteen specimens in the air, certainly immature, non-breeding birds which already had regained their flying-power.

'The southward migration takes place slightly before mid-September, as soon as the moult is finished and the young are fledged. A skein of about 200 birds on passage was observed by Freuchen on September 9, 1917, when it alighted on the plains behind Thule. On September 10, 1919 an adult male of this sub-species was secured at Igdlorssuit in Umanaq District. The migration southwards has for a long time become familiar, thanks to American ornithologists. The Greater Snow Geese fly straight to the Gulf of St Lawrence where they stay from about mid-September till freeze-up, which occurs in the latter half of November. Here the total population of the Greater Snow Goose, at least 10,000 birds, collects together in a fairly limited area at St Joachim, about twenty-five miles north-east of Quebec, according to the excellent investigations by E. F. G. White and H. F. Lewis. The geese winter along the Atlantic coast of Maryland, Virginia and North Carolina and revisit St Joachim from early April to about May 20.'

CAPTIVITY

It is not easy to find early records of Greater Snow Geese in confinement, as they have

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long been confused with Lesser Snows. They have bred, however, at Woburn before 1914, and regularly at Clères, at Leckford and in other European and American collections since 1930. They are large showy birds, but coarse and, in my opinion, rather unattractive.

ROSS'S GOOSE

Anser rossii

Anser rossii, Cassin, *Proc. Acad. Nat. Sci. Philadelphia*, 1861, p. 73: Great Slave Lake, Canada.

Chen rossii, Peters, *Check-List, Birds of the World*, 1, 1931, p. 146.

CHARACTERISTICS

Similar in plumage to a white Snow Goose, but considerably smaller, with a different bill, very short, high near the base, thin at the tip, the sides of the upper mandible, from base to nostrils, corrugated and covered with warty protuberances, conspicuous in old males, but small or absent in females and young birds, pink tinged with greenish blue near the base; legs and feet deep pink.

Male: wing: 360–380 mm.; tail: 117–127 mm.; culmen: 40–46 mm.; tarsus: 61–70 mm.

Female: wing: 345–360 mm.; tail: 100–119 mm.; culmen: 37–40 mm.

Immature: like young white Snow Geese, but with a much shorter bill; legs greenish grey, bill brownish pink.

Downy chicks are polymorphic. Some are yellowish grey, darker above and lighter below, with a bright yellow head; lores dusky; bill grey with a whitish nail; legs olive-green. Others lack all yellow tinge and are whitish-grey. The down is very long and fluffy.

Eggs: white, five to nine in number, 70 × 47 mm. on an average; incubation, 24 days.

DISTRIBUTION

Breeds in the Perry River region of Central Arctic Canada. Winters in California, mostly in Sacramento and St Joachim valleys, migrating through Great Slave Lake and Lake Athabasca to Montana, then turning across the Rocky Mountains. Stragglers in Arizona, Mexico, Texas, Louisiana and British Columbia.

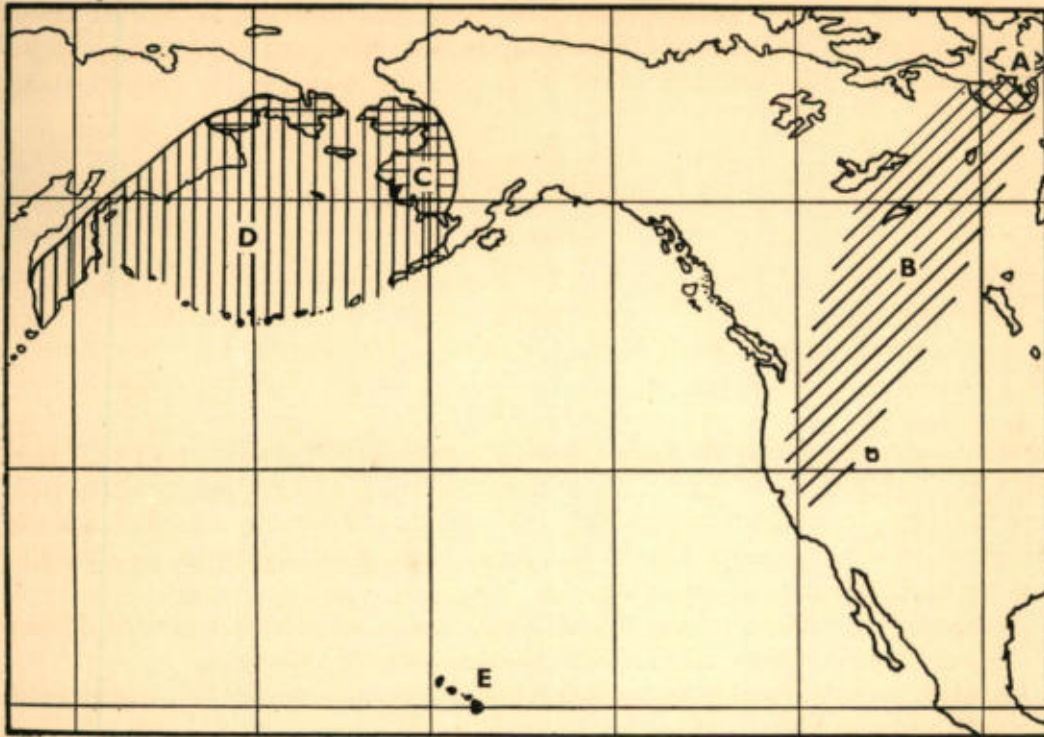
GENERAL HABITS

This very small white Goose is one of the prettiest and most elegant species. Its breeding grounds have only recently been discovered. The story is condensed by F. H. Kortright (*The Ducks, Geese and Swans of North America*, 1943, pp. 146–7).

In the *Wilson Bulletin*, 59, 1947, p. 200, Angus Gavin writes:

'I first found the previously undescribed nest of Ross's Goose in June 1938, on an island in a small lake about twelve miles up the Perry River, and eight miles south-east along a tributary (Taverner, 1940. *Can.-Field-Nat.*, 54: 127–130; Cartwright and Gavin,

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18. Distribution of *Anser rossi*: (A) Breeding range; (B) Non-breeding range. Distribution of *A. canagicus*: (C) Breeding range; (D) Non-breeding range. (E) Distribution of *Branta sandvicensis*.

Beaver, Dec. 1940: 6-9). I again visited the colony in 1939, 1940 and 1941. In 1941, about a hundred pairs were nesting on four islands, an increase of about 50 per cent over the number in 1940. In 1940, the largest clutch noted contained six eggs; in 1941, there were several nests with seven eggs, and two nests with eight and nine eggs respectively. These geese were also found on two lakes near by. About six hundred pairs nest on the three lakes. The Eskimos informed me that Ross's Goose nested right down to the coast when they first arrived there, but had retreated in face of raids on their eggs by the natives. They are now, however, quite unmolested by the Eskimos.'

In 1949, Hanson, Queneau and Scott visited the Perry River and found Ross's Geese nesting, reporting as follows:

'Only one breeding colony of Ross's Geese was found in the area. Two hundred and sixty nests were counted on five islands in a lake about twenty-five miles inland. No Ross's Geese were breeding on the lakes where they were previously found by Angus Gavin. Ross's Geese were found moulting on lakes to the west of the Armark River, and others which may have been of this species were seen on some lakes near the

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headwaters of the Perry. None of these were nesting this summer, but the lakes may have breeding colonies in a normal summer.

'It is rather unlikely that any other substantial colonies of Ross's Geese exist in this area. There are indications therefore that the world stock of Ross's Geese in June, 1949 may have been under 2,000 birds.

'A striking polymorphism was observed in the downy young of the Ross's. In one brood of five, two goslings were silvery white, one grey, one greenish yellow and one bright yellow.'

CAPTIVITY

Ross's Geese apparently first reached Europe around 1900, Blaauw, the London and Berlin Zoos obtaining a few specimens from California. The first breeding successes occurred at Gooilust, and Blaauw reports as follows: (*Ibis*, 1903, pp. 245-7; *Ibis*, 1905, pp. 137-8):

'At a meeting of the British Ornithologists' Club on March 20, 1901 (see *Bull. B.O.C.*, xi, p. 55), I exhibited an egg of the rare Ross's Snow Goose laid in captivity by a solitary female kept by me at Gooilust. A year later, through the courtesy of Dr Heck of Berlin, I received a second specimen of this species, which fortunately proved, as I hoped it would, to be a male. The birds soon paired, and in the beginning of May 1902 the female made a nest under a bush in her enclosure. The nest was, as is usual with Geese, a small depression in the soil, lined with dry grass and grass-roots.

'Towards the end of the month the female began to lay, and on the 30th, when the full complement of five eggs had been deposited, she began to sit, having in the meantime abundantly lined her nest with down from her own breast.

'The two birds had always been of a very retiring disposition, but after the female had laid her eggs the male, who nearly always kept watch close by the nest, became quite aggressive. He would fearlessly attack anybody that approached.

'So far everything had gone as is usual with Geese, but on June 21, in the morning — that is, after twenty-one days of incubation — I was much astonished to find that the young had already been hatched.

'Although I had bred Geese of very different sizes, from the large *Chloephaga magellanica* to the small *Bernicla jubata*, and of very different genera, I had never experienced a shorter time than twenty-eight days as the term of incubation. Probably *Chen rossi* breeds very far up in the north, where the summers are short and the vegetation short-lived, so that the whole process of propagation of the species has only a restricted time for completion. This may explain why this species has the advantage of a week over the other kinds of Geese.'

Of five goslings hatched, three were yellow and two white. Such dimorphism is of usual occurrence in Ross's Geese.

'Although the chicks soon began to feed and grew very rapidly at first, I soon observed that one after the other got something wrong with its breathing-organs, and to my great disappointment they died successively, so that the last was found dead a fortnight after they had all been hatched. All that I can add is that, as is usual with chicks, the intensity

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of the colouration gradually diminished as they got older, and in particular the brightness of the yellow of the head and the depth of the black in front of the eyes slowly diminished, so that even when a week old its delicate glory had largely disappeared.

'The chick of *Chen rossi* differs from that of *Chen hyperboreus* chiefly in having a shorter and comparatively higher bill and in the want of a blackish stripe over the head, which is present in *C. hyperboreus*. The chick of *C. hyperboreus* is also darker, especially on the back, and is of a more olive-green colour, while the down is less dense.'

'I am now able to give a complete account of the development of Ross's Goose, *Chen rossi* (see *Ibis*, 1904, p. 73). This season my female laid three eggs, and as in previous years she had proved to be a bad mother, I took the eggs away and put them under a common hen. The period of incubation was twenty-four days this time, and the eggs were hatched on July 10. All the three eggs were hatched, but, unfortunately, the hen in some way or other killed two of the chicks on the day they were born. The third escaped this fate and was tenderly cared for by its foster-mother. I have previously described in detail the colour of the down, so that it will suffice to say that the chick was a fluffy object with grey down and a bright canary-yellow head.

'The little bird grew very rapidly, and when two weeks old was about the size of a Japanese bantam-hen. The bill was still black at this stage with a pink tip (the nail) and the legs were greenish. When three weeks old the feathers began to appear on the shoulders, the flanks, the tail, and the wings. When four weeks old the bird was about the size of a small hen. The body was almost entirely feathered, but the head and neck were still in down. The legs were bluish and the bill was getting lighter in colour. When five weeks old the whole body was feathered, and when six weeks old even the flight-feathers were of their full length. The first plumage is strongly tinged with brownish grey.

'When ten weeks old the bird began to moult, and the grey feathers of the juvenile dress were rapidly replaced by white ones. Also the large tail-feathers were moulted, the central rectrices being dropped first. The legs now began to turn pink in earnest, and the bill assumed its double colouration of a greenish base and a pink tip.'

Ross's Snow Geese have since been regularly reared at Gooilust, and later on at Clères from birds obtained from Blaauw. In 1937 I brought in two birds captured in the Butte district of California, but they never would pair up with other Ross's Geese, as they had lived too long on a farm with Cackling Geese. After Blaauw's death, the whole stock was concentrated at Clères, whence birds were distributed to several friends in England. Today there still are some breeding pairs in the Clères, Leckford and Slimbridge collections to which some birds captured in the Perry River district were added in 1950. Birds from Clères also bred in C. S. Sibley's collection in Connecticut, and are still breeding today at Mr J. Deeter's farm in Massachusetts. There are a few more captive specimens in America, particularly in Mr J. Livermore's and Dr D. Ripley's collections.

Ross's Geese are extremely dainty and pretty, a most desirable ornament to a garden. They require plenty of space, with good grazing and clean water, but they live and breed well. The newly-born chicks are very soft and they are easily lost by the parents, or crushed by a broody hen. It is therefore better to put the eggs in an incubator a day or

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two before they are due to hatch, returning them to the hen when they have gained strength. We always found it risky to leave them with their natural parents, and better to rear them under light hens.

EMPEROR GOOSE

Anser canagicus

Anas canagica, Sewastianov, *Nova Acta Acad. Imp. St. Petersburg*, 13, 1802, p. 349, pl. 10: Kanaga Island, Aleutian Islands.

Philacte canagica, Peters, *Check-List, Birds of the World*, 1, 1931, p. 149.

CHARACTERISTICS

A medium-sized Goose with a short, smooth bill, the serrations hardly visible outside; no furrows on the neck. Crown, sides of head and hind neck white; chin, throat and foreneck blackish; body plumage, mantle and wing-coverts silvery grey, each feather having a black subterminal and whitish terminal band producing a regularly barred effect; flight feathers greyish black; tail white, the rectrices grey at the base. Iris dark brown. Bill pale pink, the upper mandible tinged with blue around the nostrils, with a whitish nail tipped black; lower mandible mostly black. Legs and feet deep yellow. In wild birds the head and underparts are often strongly stained rusty yellow. Freshly moulted birds are considerably bluer and brighter than those in worn plumage.

Male: wing: 380–400 mm.; tail: 140–152 mm.; culmen: 40–49 mm.; tarsus: 66–72 mm.

Female: wing: 350–385 mm.; culmen: 35–40 mm.

Immatures: generally similar to the adults, but the feathers are narrower and duller, the barring less regular and clear, the head and neck entirely mottled grey, the face, throat and foreneck darker, the crown slightly spotted with white; bill and legs brownish. After the autumn moult they are much like the adults, but many black spots remain on the head and hind neck.

Downy chicks: pearl-grey, darker on the head and above, lighter below; bill and legs black.

Eggs: three to eight, long in shape, creamy white, 76.5 × 52 mm. on an average. Incubation, 24 days.

DISTRIBUTION

Breeds on the north-western coast of Alaska from the Kuskokwin River to the north of the Seward Peninsula, St Lawrence Island, and the north-eastern coast of Siberia from the mouth of the Anadyr north along the shores of the Tchuktchi Peninsula, and west to Kolyutchin Bay. Winters in the Aleutian Islands, along western coast of Alaska Peninsula, south to Cook Inlet, the Commander Islands and Kamchatka. Stragglers in California, Wrangel Island, the northern coast of Alaska, Russia (Volga) and even Hawaii.

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GENERAL HABITS

Emperor Geese are maritime birds frequenting the sea-shores and nesting on the tundra around lagoons. They arrive in the second half of May on their breeding grounds and leave them late in August or early in September. A. M. Bailey (*Birds of Arctic Alaska*, 1948, pp. 159-60) writes :

'Emperor Geese are summer residents of the Wales area. The first two observed were flying over the shore-ice in a north-westerly direction on May 19; several were noted May 29, and after that time they were seen more or less frequently.

'They nested regularly on the shores of Lopp Lagoon, and I found my first eggs on June 22. The well-constructed grass nests lined with feathers and down from the breasts of the brooding birds are sometimes within a few feet of the water. Nesting starts before the majority of the ponds are free of ice, and fresh eggs are laid between June 20 and July 10.

'During the daytime, flocks of fifty or more often congregate, flying low along the shores of Lopp Lagoon or feeding on the wide-stretching bars at the mouths of the various salt-water "rivers".

'The Emperor Geese are not wild, as I several times crawled within gun range of birds before they took wing. The number of eggs ranges from two to seven, and June 20 is the earliest date for a large set.

'It is probable that Emperor Geese occur in favourable places along the entire shores of Kotzebue Sound, although less commonly on the north, and that they probably range regularly to the vicinity of Point Hope.'

On St Lawrence Island, Emperor Geese breed in large numbers, mostly on the southern shores, where they also moult, and it may well be their centre of abundance. According to Nelson, they are mated on their arrival at their breeding grounds, the males walking around the females, swinging their heads and uttering low love notes. The male is jealous and guards the female, moving restlessly. Along the sea-coasts the nests are made among bleached and wave-torn scraps of driftwood along the highest tide-marks. They never seem to nest more than ten miles inland. The chicks are hatched in June or early July. Young and flightless adults wander through the tundra in August, being then quite helpless. The destruction by Eskimos is very great, and strong steps should be taken to protect this most interesting species. As the Emperor Geese gather a great deal of the food on the shore, eating seaweed, shellfish and other marine organisms, their flesh is extremely rank and unpleasantly flavoured. On the tundra, however, they feed on grass and berries, like other Geese. They make only fairly short migrations, and consequently their flight is comparatively low and laboured, owing to their short neck, heavy body and broad wings. Their voice is peculiar and pleasing, shriller than in any other Goose, a high-pitched and modulated, brief 'kla-ha' being repeated several times. They also have a longer and lower alarm call, as well as pretty conversational notes.

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CAPTIVITY

The Emperor Goose is one of the most desirable species, graceful in shape, beautifully marked and coloured, dainty, tame, quiet and good-tempered, and amusing in its ways. The short, pink, blue and black bill is a most attractive feature.

The London Zoo received the first two birds ever imported into western Europe in 1908, but the Berlin Zoo also received a pair almost at the same time. None of these birds lived long. Soon afterwards six birds arrived at Woburn. Blaauw obtained three pairs in 1912, and he was first to breed the species, reporting as follows (*Ibis*, 1916, pp. 252-3):

'Two or three years ago I got a pair of Emperor Geese from North America, and a few months later two pairs more. The first year following their arrival the birds did not lay, but in the spring of 1914 one pair laid six eggs under a bush. The eggs were put under a common hen, and only one chick hatched, which came to maturity and is still alive and well.

'In the spring of 1915 the same pair of birds laid again — a clutch of five eggs this time, which I left to the birds to take care of. The nest was made at a good distance from the water, and was a rather well-constructed nest for a Goose to make.

'The eggs, when fresh, were yellowish-white and of an elongated shape. During incubation the male bird was in constant attendance, and never left the female. Incubation lasted twenty-four days. All five eggs hatched, but one of the chicks had a malformed leg and did not live long. The chick in down is of a beautiful pearl-grey, darkest on the head and upperside and lighter below. The legs and bill are black.

'The chicks grew very fast, and in a few weeks were completely feathered. In the first feather-dress the bird resembles the adults, but the grey is not so bluish. The black markings on the feathers are only indicated, and the coverts on the upperside are not so square, but more pointed. The black throat is wanting, and so is the white head and neck — these parts being grey like the rest of the body. The tail is white. The bill is dusky bluish, flesh-colour at the base and black at the tip. The legs are yellowish black. As soon as the birds are full-grown they begin to moult, shedding all the feathers except the large flight-feathers. The tail-feathers are also moulted.

'At the end of October the young birds are quite grown, and similar to the old birds. By this time the upper mandible has the beautiful blue and flesh colours of the old birds, whilst the lower mandible has become black. The legs are now orange. When the bird is moulting, the first white feathers of the head to appear are near the base of the bill.'

Blaauw gave a few more details in the *Avicultural Magazine* (3rd ser., vii, pp. 277-9), and went on rearing Emperor Geese until 1936, as did also the Duke of Bedford, who presented me with several young birds in 1926. The first four were all females and produced seven hybrids with a blue Snow gander in 1929, and one with a Ross's gander in 1931, the former being intermediate in colour between the two parents, the latter a white bird with uneven black spots and patches. More birds arrived at Clères from Woburn in 1930, and young Emperors were reared at Clères in 1932 and every year afterwards until 1940.

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Emperor Geese require pure water and good grass. They dislike summer heat and they do much better in cool climates. They feed mostly by grazing, but also readily eat bread, mash, dog-biscuit and grain; maize is better avoided as it proves too fattening. It is curious that these Geese do not show any preference for animal food in captivity if, as it has often been reported, they feed mostly on marine animal matter in their native haunts. Although rather susceptible to various infections, it can be said that they do well in captivity under suitable conditions.

There is still today a small breeding stock in England (at Leckford, Woburn, Slimbridge, Whipsnade) and at Clères, and a few wild-caught birds have lately been added. Some pairs also figure in American collections, quite a few having been imported recently from Alaska, and young were reared by Dillon Ripley in 1952 and 1953.

BAR-HEADED GOOSE

Anser indicus

Anser indica, Latham, *Ind. Orn.*, II, 1790, p. 839: India in winter, Tibet.

Eulabeia indica, Peters, *Check-List, Birds of the World*, I, 1931, p. 148.

CHARACTERISTICS

A medium-sized, slender Goose, with fairly long neck with no furrows, a thin, smooth and almost straight bill. General colour pale grey, tinged with buff on the mantle, the feathers with whitish borders; head white with two horseshoe-shaped brownish black bars on the occiput and nape; hind neck dark brown merging into the grey of the back; sides and upper front of neck white; lower foreneck deep brown merging into the grey of the breast; vent and tail-coverts white; flanks brownish; rectrices grey tipped with white; flight-feathers grey turning to black at the tip. Iris brown. Bill yellow with black nail and nostrils. Legs and feet deep yellow.

Males: wing: 450–482 mm.; tail: 140–170 mm.; culmen: 48–63 mm.; tarsus: 70–80 mm.

Female: wing: 406–460 mm.; tail: 127–160 mm.; culmen: 47–55 mm.; tarsus: 63–75 mm.

Immatures: like the adults, but paler and without markings on the head and neck, which are pale grey with the back of the crown, hind neck and a line through the eyes dusky brown. Bill and feet greenish yellow.

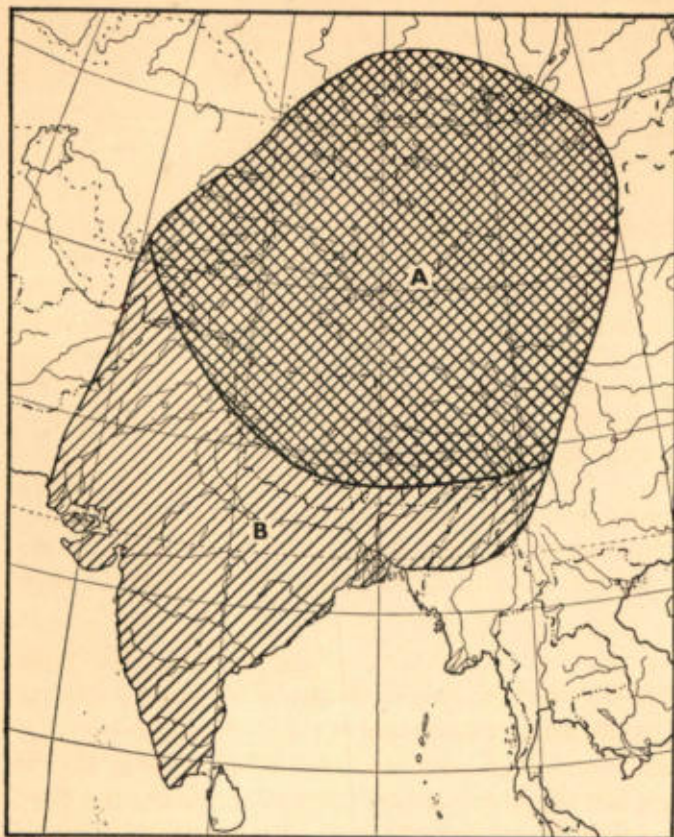
Downy chicks: pale yellow underneath, the head and neck brighter; a grey patch on the occiput; upperparts pale greyish brown, with yellow patches on the wings, below them and on the flanks. Bill bluish grey, with fleshy nail. Legs greenish grey.

Eggs: white, 84 × 55 mm. on an average, four to eight. Incubation: 28–30 days.

DISTRIBUTION

Breeds in Central Asia, from the Pamirs and Tian Shan to Ladakh, the southern slopes

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19. Distribution of *Anser indicus*.
(A) Breeding range;
(B) Non-breeding range.

of the Altai, Kokonor, Mongolia, the Selanga River and the region south of Lake Baikal (seldom). Winters in India, Assam and northern Burma.

GENERAL HABITS

Bar-headed Geese nest on the lakes of Central Asia at high altitudes, preferably on islands, scraping a hole in the short grass and building in colonies. Bailey writes on these birds in Tibet:

'On June 2, 1908, on my way down from Gyantse to Phari, I left the main road, which skirts the northern shore of the Hramtso — a lake 14,700 feet above sea-level, and some eight miles long by four broad — and travelled round the southern side, halting for two days at the village of Hram. The southern shore of this lake is bordered by a belt of marsh about two miles broad in its widest parts. On this marsh thousands of Bar-Headed Geese breed, and it was the hope of being able to visit their nests that brought me here. On arriving at the village I sent for some men who could show me where the nests were, and we walked the mile between the village and the edge of the lake, carrying with us a flat-bottomed Tibetan skin-boat. This we launched at the edge of the lake, and I was

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pushed across a few hundred yards of clear water which was only about two feet deep. Here we were on the marsh and could see dry islands ahead of us, white with thousands of geese.

'At last we reached the first nests. They were situated on a grassy island about two feet higher than the marsh. This island was circular and about twenty yards in diameter and contained fifteen nests. The nest consists of a slight hollow in the grass plentifully lined with down which is banked up round it. The nests contain from two to eight eggs, the commonest number being four, and the number of birds in the broods that are seen all along the roadside on the Northern shore of the lake is almost invariably four. These birds seem to lay their eggs in a very promiscuous manner, for I saw many single eggs laid on the grass outside the nests.

'As soon as the eggs are hatched, the birds leave the marsh, and move across to the open water, and are seen in great numbers on the northern shore of the lake; and except for the very freshly hatched birds, I saw no young ones on the marsh. This lake is frozen over in winter, but at the beginning of March, as soon as some clear pools are melted, a few geese and duck may be seen, and birds remain there until the lake freezes in November. Apparently, the only protection which the birds have, is the impassability of the ground between their nests and the shore, as no attempt at concealment of the nests is made.'

Similar observations have been made in other parts of central Asia. The birds have been found by the Asiatic Expedition of the American Museum nesting under the same conditions in Mongolia, along the Selanga River and in the Urga region.

In winter, Bar-headed Geese are abundant in northern India, particularly in Bengal and in the north-western provinces, but uncommon in the south of the peninsula. They frequent rivers, large lakes and marshes. In the day, they rest near the water, often on sand-bars, a few birds being posted as sentries. They feed in fields in the morning, the evening and at night, causing damage to crops in some places. They arrive in India late in October and in November, leaving in March. Their voice recalls that of other Geese, but it is nasal and rather musical. In their ways and behaviour they recall very closely the Grey Geese, but are daintier. They have a special way of holding their head backward, the bill up.

These Geese are still abundant despite a good deal of destruction of eggs and birds by the natives of Tibet and neighbouring countries, and shooting in India during the winter.

CAPTIVITY

Bar-headed Geese are very handsome birds, elegant in shape and pretty in colour. Their neck is long and slim, and their bill slender. They are perfectly hardy and breed readily; highly sociable, they do not molest other birds. They have long been popular in captivity. In 1845 the London Zoo received probably the first birds to have been imported, but it seems that the first nesting took place at the Jardin des Plantes, Paris, in 1888. About the same time, the species bred at the Berlin and Antwerp Zoos, and soon in many other

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collections. Young have been reared at Clères every season since 1920, and also in many public and private collections.

Bar-headed Geese are fair stayers when kept full-winged provided the young birds' quills are clipped before they can fly, otherwise they will stray immediately; but they seldom leave the grounds on which they have settled down after the first winter.

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Genus *Branta*

Branta, Scopoli, *Annus 1*, *Hist. Nat.*, 1769, p. 67.

Type by subsequent designation, *Anas bernicla*, Linné (Bannister, *Proc. Acad. Nat. Sci. Philadelphia*, 1870, p. 131.)

THE five distinct species of Geese placed here in the genus *Branta* are near relatives of the True Geese of the genus *Anser*. They are, however, distinguished from them by a more elaborate pattern of the plumage, in which black and white markings are present, a longer and thinner neck, a smaller and smoother bill (the 'teeth' hardly visible outside) which is always black, as are the legs and feet which in *Anser* are brightly coloured in pink, yellow or orange. The chicks also show a more distinct pattern. Furrows on the neck are present in one species only. In other morphological features they completely recall the True Geese, also resembling them closely in habits and behaviour. Like them, they nest in the northern hemisphere, and winter in temperate parts; one very distinct species, however, *sandvicensis*, inhabits the tropical Island of Hawaii, where it is a resident, constituting a unique exception in the whole tribe *Anserini*.

All five species are closely related and the various generic names proposed for each of them: *Nesochen* (*sandvicensis*), *Leucoblepharon* (*canadensis*), *Leucopareia* (*leucopsis*), *Rufibrenta* (*ruficollis*), are better synonymized.

The intricacy of the distribution of one species (*B. canadensis*) is such as to make the taxonomic arrangement of sub-species still uncertain in the present insufficient state of our knowledge; much more collecting and observing on the breeding grounds is necessary for a complete understanding. The status of another species, the circumpolar *B. bernicla*, also poses a problem, as two well-marked forms apparently co-exist without mingling near their boundaries in central Arctic America and the islands to the north, while they intergrade in the Old World. The other three species have well-defined, small ranges, and show no variation.

All species of *Branta* replace each other geographically except one (*B. bernicla*), a far northern breeder, which can be found on the same nesting grounds with one of the others; it also differs more in proportions and in life habits.

KEY TO SPECIES OF BRANTA (ADULTS)

1. No bright chestnut red in plumage
Breast and part of neck chestnut red

2
B. ruficollis

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- | | |
|--|------------------------|
| 2. Head not entirely black | 3 |
| Head entirely black | <i>B. bernicla</i> |
| 3. Ear coverts and neck buff | <i>B. sandvicensis</i> |
| Head black and white | 4 |
| 4. Fore-crown black, underparts brown | <i>B. canadensis</i> |
| Fore-crown and abdomen white, breast black | <i>B. leucopsis</i> |

GENERAL HABITS

Brent Geese resemble True Geese in their life habits and in general behaviour. They are rather quicker in their movements, more aggressive and demonstrative, more vocal. Their notes vary much according to species, and even sub-species, but they are generally short, harsh, metallic and rapidly repeated.

CAPTIVITY

All species of *Branta* have been kept successfully in confinement. Four breed readily, but one, *B. bernicla*, a predominantly marine bird, has seldom nested in captivity — which is unique among Geese. The Red-breasted Geese are among the most beautiful of all waterfowl, and all are handsome and decorative. Most of them prove harmless in mixed flocks, although the larger Canada Geese prove somewhat quarrelsome in the breeding season, and the Hawaiian Goose is decidedly ill-tempered, so that it is necessary to isolate breeding pairs. All the others can be safely associated with other waterfowl, and many pairs live and breed successfully together, although they are more excitable and fussy than True Geese.

They are fair stayers in the full-winged state. The Canada Goose has been naturalized in Great Britain, in New Zealand and in a few other countries.

HAWAIIAN GOOSE

Branta sandvicensis

Anser sandvicensis, Vigors, *List Anim. Garden Zool. Soc.*, ed. III, 1833, p. 4: Hawaiian Islands.

Nesochen sandvicensis, Peters, *Check-List, Birds of the World*, I, 1931, p. 151.

CHARACTERISTICS

A medium-sized Goose with a comparatively long bill, broad and high near the base, depressed at the tip. Crown, face and area around the eyes, throat and a wide band on the hind neck deep black; sides of head, sides and front of neck tawny buff, the feathers with dark bases forming deep furrows and producing a striped appearance; a blackish ring around the base of the neck, broad on the back; breast pale brown; rest of the body plumage greyish brown barred with whitish buff, the feathers having pale borders; rump black; tail-coverts white with grey bases; rectrices and primaries black. Iris brown.

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Bill and legs black. The tarsus and toes are long and strong, and the webbing much reduced. The female is smaller, with a shorter neck, slightly duller and darker.

Male: wing: 372-378 mm.; tail: 147-158 mm.; culmen: 40-47 mm.; tarsus: 81-90 mm.

Female: wing: 350-368 mm.; tail: 144-151 mm.; culmen: 40-42 mm.; tarsus: 73-78 mm.

Immatures: duller and more mottled.

Downy chicks: greyish brown, the forehead, sides of head, throat, foreneck and centre of underparts whitish buff; a dark spot on the ear-coverts and whitish spots on the base of the wings.

Eggs: creamy white, five to eight, 80 × 50 mm. on an average. Incubation: 30 days.

DISTRIBUTION

The Island of Hawaii (now rare); Maui (now accidental); perhaps formerly other islands of the group.

GENERAL HABITS

The Hawaiian Goose, or Néné, as it is called locally, is a relative of the Canada Goose, which visits the islands fairly frequently on migration, and it probably represents an ancient offshoot. But it has evolved into a very distinct species under special and completely different conditions of climate and habitat. In its ways and behaviour, it resembles the Canada Goose to a great extent, but it has characteristics of its own; the voice is rather different, as is the display. It is more jealous and quarrelsome than is usual among Geese. The gander defends his territory, mate and brood savagely, but also sometimes has the unpleasant and very strange habit of attacking his own mate.

Hawaiian Geese live mostly in uplands, on old lava flows covered with vegetation, where the only available water is that of small and often temporary pools. This dry habitat has no doubt caused the reduction of the webs of the feet and the great size and strength of the legs and toes. Today the species is threatened with extinction and it has dwindled in number to such a point that probably fewer than seventy survive. Some have still been seen recently in the wild state. Recent foot-prints were observed by J. Yealland in 1950, and according to J. H. Baker (*Audubon Magazine*, 53, 4, 1951, p. 255), seven were sighted on June 7, 1951, within the boundaries of the National Hawaiian Park at 6,200 feet, on the slopes of Mauna Loa. On April 1, 1949, a group of twelve and another group of five were also seen there. Three were subsequently observed on the slopes of Haleakala in Maui. J. Donald Smith, Territorial Game Conservationist, says (*Audubon Magazine*, 1951, pp. 28-30):

'The disappearance of the Néné is mysterious because no one knows exactly why this waterfowl should have become so scarce. All that we definitely know is that it is extraordinarily reduced in numbers compared to "estimates" of its former population of the nineteenth century. We know that the Néné is, among waterfowl, unique in its vulnerability to attacks by ground predators, particularly during the nesting and rearing seasons.

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In Hawaii there are not the marshes, lakes and streams so characteristic of the natural range of the other geese of the world. The Néné, therefore, after its appearance in Hawaii æons ago, had to become accustomed to a terrestrial existence. It was unfortunate that adaptability did not take arboreal lines. Rather, the Hawaiian goose became adapted to living among the lava flows and learned to eat the many types of fruits and herbs growing in the *kipukas* (open, fertile spaces) on the volcanic slopes of the various coner found on Hawaii and Maui.

'My own opinion, and it is only that, concerning the causes of destruction is simply that the Néné is extremely vulnerable to depredations during its nesting season. It is vulnerable to man, who has for centuries sought the Goose for food. Although there has been a law forbidding the taking of Nénés for many years, it has been relatively ineffective because of poor facilities for enforcement, the wide area of application, and ignorance on the part of the general public. The Néné is vulnerable to predation by the wild pig, which even now literally ploughs up acres of the former favourite nesting areas, and to attack by wild dogs which have no difficulty at all in wiping out entire families of Geese during the breeding season. Of course, I could go on and list other predators, but the point is amply illustrated.

'The only way in which we can restore the Néné to even a semblance of its former numbers is by obtaining a large tract of land within the historic Néné range and by diligent patrol to control the destructive factors which I have named.'

In an excellent article (*Condor*, 47, 1945, pp. 27-37) Paul H. Baldwin has studied in detail the history, distribution and reduction in numbers of the Hawaiian Goose. Its present range encircles the big volcano Mauna Loa at 5,000 to 7,500 feet elevation, and it extends to or near the sea-shore in parts of the districts of Kau, North Kauna and South Kohala. Its former range was extensive on the Island of Hawaii and, in 1800, still included much larger tracts of lowlands than in 1950. The last centre of population is Puuwaana, north of Mount Hualalai. The wild population may have totalled 25,000 or more in the eighteenth century; the reduction began between 1778 and 1850, progressed rapidly until 1900 and tapered off slowly between 1900 and 1930. According to the 1953 census, there were nineteen captive birds in Hawaii, sixteen in England, and an estimated total of thirty-three wild birds. In another article (*Condor*, 49, 1947, pp. 108-20), Baldwin gives a detailed account of the food of the species. He found that it feeds on thirty-one different plants growing in areas which receive between fifteen and 120 inches of rainfall yearly, between sea level and 9,000 feet. During dry summers, green food is scarce on the leeward slopes of the island at low level, while it is abundant at all seasons at high altitudes, so that the Geese are compelled to move up. They do not depend upon any particular food plant, but utilize those which are available in any particular locality. The reduction of the population is not due to any lack of food, but their retreat to the higher grounds may have been caused by greater abundance at greater altitude. In the wild state they pluck leaves and berries rather than pick them from the ground. Although seldom having the opportunity to enter water, Hawaiian Geese are good swimmers and take to it with ease and pleasure. They fly

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well, much as Canada Geese do, although they do not perform any extensive migration.

The species has enjoyed complete official protection for the past twenty-five years, and the local government has recently started projects to propagate it under control.

CAPTIVITY

The first Hawaiian Geese to reach Europe alive were collected in 1823 and sent to Lord Derby's famous menagerie at Knowsley where they bred in the following years. A pair arrived at the London Zoo in 1832, presented by Lady Glengall, and the Knowsley birds also went there when the collection was dispersed. They started breeding in London in 1834, and continued to do so for many years. Young birds were soon distributed to other zoos and to private collections. They nested repeatedly at the Jardin des Plantes, Paris from 1881, and at the Antwerp Zoo. From records published in Paris (Montlezun, *Bull. Soc. Accl.*, 1886, pp. 146-9), it appears that the birds laid between February 1 and April 5.

Hawaiian Geese bred regularly for many years and were fairly common in Europe, but they had become scarce after 1900 and eventually disappeared entirely. Good management could have kept the species going forever. The last specimen lived at Clères until 1940 when it vanished at the time of the invasion of France. It had come from the late F. E. Blaauw's collection in Holland, where it had been reared forty-two years before. Blaauw had a great deal of experience with the species and was the last breeder to rear it successfully. He reports as follows in *Ibis*, 1904, p. 68:

'The next birds to lay eggs in 1903 were a pair of Sandwich Island Geese, a species which has become extremely rare in Europe of late years. These birds are kept at Gooilust in a small grass-grown enclosure, with plenty of shrubs and a wooden shed in it. As they are not happy in the frost and snow, I have them shut up in the shed every night after winter has set in. One good result of this arrangement is that the birds usually build a nest in the hay which covers the floor, and this makes it possible to protect them and their eggs from the cold weather that often prevails at the early season when they are accustomed to lay.

'Last February five eggs were laid. These were all hatched, and during the whole time of incubation the male was constantly on the watch beside the female, running with great fury at everyone who came near. The chicks are of a dark olive-green, darker on the head and back and whitish on the underparts. The tips of the wings are nearly white, the bill and legs black. These birds grow very quickly, so that at the age of about nine weeks the wings have to be cut to prevent them from flying away.

'The immature dress is very much like that of the adults, but the general tone is more grey than yellow, and all the black or brown markings are less clearly defined. The curious spiral ridges in the neck-feathering are already visible in the young bird. The yellow of the neck is greyish black, and is darker in the young males, so far as my experience goes. At the end of July the young birds began to moult, and in about six weeks had acquired the adult plumage, the flight- and tail-feathers being retained, as in other young waterfowl, until the following year.

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'Of this particular brood of five, I had the misfortune to lose three when they were only half-grown. A very cold night seems to have been the cause of their death.'

In 1910, Blaauw still possessed ten Nénés, including three adult pairs, and there were two other pairs in the Berlin and Cologne Zoos (*Bull. Soc. Accl.*, 1910, pp. 60-61). But they all died out subsequently and at his death, in 1936, only one old male was left.

Nénés require the same treatment as most other Geese. In Europe, the only difficulties were their limited resistance to cold winters, their early laying, and the bad temper of the ganders (which are inclined to attack their mates suddenly, even after years of peaceful life, and to kill them). Otherwise, they are easy to keep and to breed.

As with all Geese, the first condition of success is an abundance of grazing. The birds feed mostly on grass to which they must have free access throughout the year. They are quarrelsome, and it is necessary to separate each adult pair in a pen large enough never to become overgrazed. It is advisable to surround the pen with a thick live hedge to ensure privacy and shelter, and to plant a few clumps of shrubs and small trees for shade. There should be sufficient water for free swimming and mating, a pool six by ten feet being a minimum; the old gander at Clères swam freely on the river at times. If rain and wind are strong, shelter is useful, even in the warmer districts. In the colder ones, it is essential, and the birds must be shut up at night during the winter. Besides grass and other green food, a daily ration of grain and rich protein mash are all they need. The old Geese will take care of the goslings, but if any predators are around, it is safer to incubate the eggs under a broody hen, or in an incubator. Besides grass, lettuce and other greens, mash, soaked biscuits and custard, and plenty of duckweed, if available, is the best diet for the chicks.

Hawaiian Geese are particularly tame and amusing in their ways, and they are certainly most attractive and desirable in captivity.

Since 1950, a considerable effort has been made in Hawaii to save the Néné. Miss Nell B. Elder has described the project (*Audubon Magazine*, 1951, pp. 24-30.) But practical results so far have been disappointing, probably from lack of experience with captive birds.

Besides the birds in Hawaii, the only specimens in captivity at present are in the care of the Severn Wildfowl Trust, Slimbridge, England. From three adults nine goslings were reared in 1952 and four more in 1953, a very encouraging result.

Canada Geese •

Branta canadensis

North America is the home of a very interesting species of Goose which poses difficult problems that have not yet been completely solved. The species varies very little in general pattern, and only moderately in colour, but so considerably in size and relative proportions that the largest as well as the smallest of all Geese are found within its

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numerous sub-species. Canada Geese have a long, thin black neck; the head is black with large white patches on the cheeks; body brown, the light borders of the feathers forming bars; vent and tail-coverts white; flight-feathers blackish brown; rump black; tail-feathers black, sixteen to twenty in number. The occurrence of a black band on the throat, or of streaks, more or less completely separating the white cheek patches, has no systematic significance and is purely individual, as is also the minute black spotting of the white areas. A more or less complete white ring at the base of the black neck has no importance in many forms, although it is always present in the Aleutian and Bering Islands populations, frequent in north-western Alaskan ones, but very rare in the east. Many birds become stained with rust on the head and underparts. The bill, legs and feet are black, as in all species of *Branta*.

Although the popular Canada Geese have been perhaps more carefully watched, studied and hunted than any others, we are yet far from fully understanding their variations. This is due to two reasons. First, series of breeding specimens are wanting from many parts of the breeding range which remain difficult of access, and we are still in doubt about the true identity of a number of populations, some of which have already been exterminated. Second, *Branta canadensis* shows to the greatest possible degree the various complications which make the taxonomy of Geese often so confused: great individual variation in colour and size; complicated post-breeding and winter migrations, causing the mixing of several sub-species during the non-breeding season; a tendency of individuals, or small groups, to stray far from their normal quarters, and of non-breeding birds to wander in the summer; strong family ties which prevent interbreeding and mingling, making it possible for two well-characterized sub-species to breed in close proximity without mixing and to remain isolated from each other. Mayr has written (*Systematics and the Origin of Species*, New York, 1942, p. 242):

'Pair formation in the Geese (*Anser*, *Branta*, and related genera) takes place under different circumstances, and the result is an entirely different species structure. Geese are among the very few birds in which the family does not break up at the end of the breeding season, but parents and young stay together for nearly a year. They migrate together to the winter quarters, they spend the entire winter together, and they do not separate until after the return to their nesting area. This closeness of the family system, together with their colonial or semi-colonial breeding habits, guarantees the closest kind of inbreeding. No other Arctic or sub-Arctic bird breaks up into so many pronounced races as the geese. The Canada Geese of the genus *Branta* have some six to nine geographic races in North America, some of which are so different that some authors propose to put them in three or four different species. On Southampton Island, Sutton (1932) found at least two forms; a larger one (*leucopareia* = *parvipes*) inland on streams, and a smaller one (*hutchinsi*) on islands in the shallow coastal lakes. The inland form arrives earlier in the spring and builds a large moundlike nest; the coastal species starts nesting later in the season and lays its eggs in a depression of the ground. The two forms are exceedingly similar, except for the small difference in size, but habits have produced a degree of reproductive isolation which may be of specific rank. The very peculiar

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taxonomic conditions of these Geese, e.g. the geographic proximity of strikingly different forms in the absence of geographic barriers or of intergrading populations, can be explained only on the basis of internal factors. These factors consist, as stated, in the social habits, colonial nesting, and the long continuance of the family unit, as demonstrated by Heinroth (1911) for *Anser* and confirmed for *Branta* by J. Moffitt (*in litt.*).'

On the other hand, evidence supplied by some breeding specimens, and many more migrating or wintering ones, shows that other sub-species interbreed in numerous bordering areas, producing intermediate individuals and unstable populations which we are not yet in a position to appreciate with any great degree of accuracy.

Another factor of great importance in the distribution of Geese is the intervention of predators, particularly of man. Various populations have repeatedly changed their breeding grounds, flyways and wintering areas as a result of egg-collecting, drives and slaughter by northern natives, and of excessive shooting farther south. This has further complicated distributional problems to a considerable degree.

In the present still unsatisfactory state of our knowledge, we can only indicate some general tendencies, and recognize a limited number of sufficiently well-characterized sub-species occupying definite breeding territories. It has been proved by H. C. Hanson and R. H. Smith in their excellent work *Canada Geese of the Mississippi Flyway* (1950) of the large inland form *interior* that this taxonomic grouping includes several distinct populations having their particular breeding range and flyways, which intermingle to an unknown, but probably fairly small extent. It is possible that more of them could be named if adequate series of breeding birds and better records of their habits were available. As in other Geese, differences in behaviour, voice and aspect (particularly the relative proportions of the body, neck, bill and legs, often very difficult to detect on skins) are striking in live birds, and their study is absolutely indispensable to form a clear opinion.

All we can now say is that, generally speaking, there is a cline from north to south; very small birds nest in the Arctic tundra, while large ones breed in the wooded or prairie regions to the south. Very dark birds are found on the Pacific shores, and light ones in north-eastern America. Populations intermediate in colouring are found between the two oceans, but those of the drier districts of the Western Prairies and the Great Basin are also pale and grey. The very small, short-billed, short-necked forms of the tundra intergrade with the larger forms breeding farther south in several parts of the western half of the range, as a number of intermediates indicate, except in the extreme west, along the Bering Sea. They do not appear to mingle to any significant extent in the east, where both smaller and larger birds are found breeding within short distances, but in different habitats, on the coasts and islands north of Hudson Bay.

If we compare the complicated variations of the Canada Geese with those of the two main groups of Grey Geese, which also pose difficult problems, we find that the Greylag-Whitefront complex has undergone a more advanced stage in evolution. It now consists of three separate species (*Anser anser*, *A. albifrons*, *A. erythropus*), one fairly distinct in

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colour pattern (*anser*), the other two closely similar in plumage, but quite different in size, and co-existing as breeding birds over a large area of the wooded tundra of Siberia. No intermediate populations between the three exist anywhere, and natural hybrids are extremely rare. In the Bean Geese (*Anser fabalis*), the variation of which approximates in the Old World to those of *Branta canadensis* in America, we also find an intricate pattern of variation within one species, but the increase in size goes from west to east, not from north to south, and it never reaches such a great extent. Nowhere are two very different forms found nesting in close proximity without inter-breeding, as in the Canada Geese, but they meet and mix outside of the breeding season, stray and mingle, producing intermediate populations, groups and individuals. Canada Geese occupy a comparatively larger territory to the south than Bean Geese, more like the Greylag-Whitefront group.

The degree of characterization of the different forms, their distribution, and their tendency to intergrade, or not, have certainly been influenced by ancient climatic and other changes which have modified life conditions. Persecution by man has no doubt considerably altered and restricted their range.

Some of the most important papers on the subject published during the last twenty years should be mentioned here:

1931. Taverner, P. A., 'A study of *Branta canadensis* (Linnaeus), the Canada Goose'. *An. Rept. Nat. Mus. Canada*, 1929, pp. 30-40.
1938. Todd, W. E. C., 'A new eastern race of the Canada Goose'. *Auk*, 55, pp. 661-2.
1943. Brandt, H., 'Alaska Bird Trails'. Cleveland, Ohio, pp. 271-7, 325-7.
1946. Aldrich, J. W., 'Speciation in the White-cheeked Geese'. *Wilson Bull.*, 58, pp. 94-103.
1948. Bailey, A. M., 'Birds of Arctic Alaska'. *Col. Mus. N. H., Pop. Ser.* 8, pp. 151-5.
1948. Conover, B., In C. E. Hellmayr and B. Conover, 'Cat. Birds of the Americas'. *Zool. Ser. Field Mus. N. H.*, XIII, Part 1, No. 2, pp. 297-306.
1950. Hanson, H. C., and Smith, R. H., 'Canada Geese of the Mississippi Flyway'. *Bull. Illinois N. H. Survey*, 25, 3, pp. 67-210.
1951. Todd, W. E. C., 'A morphometrical study of the Canada Goose, *Branta canadensis interior*'. *Auk*, 68, pp. 164-173.
1952. Hanson, H. C., and Griffith, R. E., 'Notes on the South Atlantic Canada Goose population', *Bird Banding*, 23, pp. 1-22.

All have considerably increased our knowledge of Canada Geese.

Our greatest asset, however, has been the enormous documentation that our late friend, James Moffitt, of San Francisco, had accumulated. It has been made available to us by his widow. Moffitt had dedicated most of his time during ten years to a patient and careful investigation of all forms of *Branta canadensis* in preparation of an exhaustive monograph of the species. When he joined the Armed Forces in 1942, he had gathered all the material and information then available, and he had actually begun to write the first pages of his study. He had hoped to resume his work after the war, but fate decided otherwise, and he was killed on duty in 1943. His work was never completed. The

multitude of critical notes and measurements, the annotated lists of all the specimens preserved in the principal museums which he had visited, and his correspondence with a number of well-informed ornithologists, field-workers and sportsmen, constitute a priceless and so far untapped source of information. His understanding of the birds is illuminating, and it has allowed us to form an opinion on several points which could not have been easily elucidated otherwise.

The last word on the taxonomy of the Canada Geese will be said only when all the breeding populations have been carefully investigated, but this is not yet in sight. We hope sometime to edit, condense, and bring up to date Moffitt's work. The writer has already published a short article where his systematic findings have been condensed (*American Museum Novitates*, New York, 1537, 12 November 1951, pp. 1-10), to which we refer the reader.

I have recognized one species, *Branta canadensis*, with twelve sub-species, although, as has been said before, others may have to be accepted later on. I have had little to alter in Moffitt's conclusions.

I differ with Conover only in admitting one species instead of four and in accepting three additional sub-species, being in general agreement with him as to the range and nomenclature. As to Aldrich's taxonomy, I am in accord with much of it, but differ in some details of distribution. I cannot either accept two species, as he proposes, nor the alleged existence of two different forms breeding on Bering Island on the evidence of a single bird somewhat larger than the other four available specimens. It is wiser, I think, to admit an individual variation in the size of that population which does not exceed what is often found in other sub-species. The Commander and Kurile Islands populations, apparently extinct since 1914, were the only ones found breeding on theoretically Asiatic ground. They do not seem to differ greatly from the nearby Aleutian birds (*leucopareia*), also nearly exterminated, but as the only five Bering Islands specimens known are all distinctly lighter in colour, I accept for them, with some reservation, the sub-species *asiatica*. These island Geese can be distinguished from the closely related mainland forms by a distinct white collar ring, always present, and a somewhat differently shaped bill, narrow and tapering towards the tip with a long, sharp nail. The Aleutian sub-species very likely intergraded with the larger and darker form *occidentalis* on the Alaska Peninsula, as three specimens from Pavlov Bay indicate.

The very small, dark and purplish *minima*, confined to the shore tundra of western Alaska, does not seem to intergrade or mingle with the bigger and lighter *taverneri* between the Kuskokwin River and the vicinity of Wainwright, the larger bird breeding farther inland, although sometimes in close proximity, in a different habitat, and building a different nest (Brandt). But from Wainwright to Point Barrow, intermediates and mixed pairs have been found (Bailey).

Farther east, beyond the Mackenzie River and in the interior, it is permissible to suppose, although we still lack adequate evidence, that *taverneri* intergrades with the larger and lighter *parvipes*. Their breeding grounds, scattered throughout the inland

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tundra and barren grounds, are still very incompletely known. These two sub-species consist of a number of more or less isolated populations, and vary a great deal. We know very little on this subject, and their study remains to be completed. As they stand today, *taverneri* and *parvipes* are but unsatisfactory and vague group designations.

In the north of the Hudson Bay, another very small tundra Goose, *hutchinsi*, reappears along the sea shore, while *parvipes* breeds inland, but in close proximity, just as *minima* and *taverneri* do in western Alaska. Farther south, *parvipes* intergrades with *interior* and *moffitti*.

It appears that the exclusively coastal forms, *fulva*, *occidentalis*, *leucopareia*, *asiatica* and *minima* in the west, *hutchinsi* in the east, rarely interbreed and mingle with the more interior forms. All of the latter (*taverneri*, *parvipes*, *moffitti*, *maxima*, *interior* and *canadensis*) intergrade and overlap considerably.

DISTRIBUTION

Canada Geese occupy the Nearctic Region, breeding from the Arctic tundra south to the northern parts of eastern California, Nevada, Utah, Colorado, South Dakota, Nebraska, Indiana, east to the Gulf of St Lawrence and Newfoundland. They trespass into Asia on the Commander and Kurile Islands, and they also occasionally nest in western Greenland. Their breeding range no doubt extended farther south formerly, before settlement destroyed the local populations, probably to New Mexico, northern Kansas, north-western Arkansas, western Tennessee and North Carolina, a vast zone in which pairs may still exceptionally be found nesting; but it is difficult now to ascertain whether they are genuinely wild or re-introduced birds. They winter from British Columbia, Wyoming, South Dakota, southern Wisconsin, Ohio, southern Ontario, Maine and Nova Scotia, south to Mexico, the Gulf Coast States and Florida. Accidental elsewhere (Hawaii, Bermuda, Jamaica, etc).

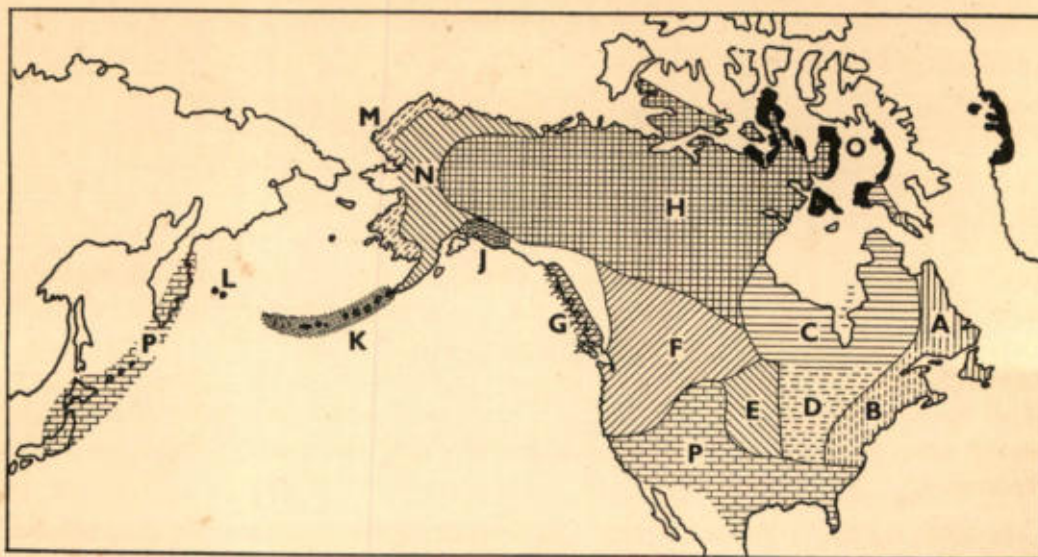
The larger sub-species occupy the wooded and most temperate districts; the smaller ones the open, treeless barren grounds and tundras.

GENERAL HABITS

As may be expected of such a widely distributed and highly adaptable species, the habits of the Canada Geese vary according to populations and location. They will therefore be dealt with in some detail for each sub-species.

They are found in a variety of habitats, from the temperate regions of woods, prairies or semi-deserts of the interior, to the ocean shores and the tundra. In a general way, they live much like other Geese, particularly the Grey Geese. They fly fast with measured, regular wing beats, in regular formation for long travels. They walk and swim without effort and can dive well if pressed. They feed by grazing, and, in the breeding season, they are fairly aquatic; they are normally day feeders, but resort to night feeding when persecuted. They nest usually on banks and islands, some resorting to ledges, pinnacles and even old nests in trees.

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20. Breeding distribution of *Branta canadensis*. *B. c. canadensis*: (A) Present; (B) Past. *B. c. interior*: (C) Present; (D) Past. *B. c. maxima*: (E) Past. *B. c. moffitti*: (F) Present. *B. c. fulva*: (G) Present. *B. c. parvipes*: (H) Present. *B. c. occidentalis*: (J) Present. *B. c. leucopareia*: (K) Past. *B. c. asiatica*: (L) Past. *B. c. minima*: (M) Present. *B. c. taverneri*: (N) Present. *B. c. hutchinsi*: (O) Present. Winter range of the species: (P).

The voice of the larger forms is a resonant 'honking', 'Ah-honk', with a break between the two syllables, the second one drawn out and higher. The smaller forms have a higher-pitched voice, a natural consequence of a shorter windpipe, as in all other birds, and they call much faster, in a cackling way. They all have a variety of conversational notes. Their display is typical of the Geese, very loud and fussy, with peculiar, snake-like movements of the long, thin neck which is often stretched out on the ground or the water; they have a peculiar way of shaking the head sideways, and they hiss and show their lifted tongue, as do Barnacle Geese.

Moffitt and Stead have found (*in litt.*) that Canada Geese possess a double annual moult of the black feathers of the head and neck, a very interesting exception in the tribe which, however, might also be observed in other species if experiments were made. Feathers clipped after the annual moult, in September, had been completely renewed in January, while others clipped on the breast remained until the next complete moult.

During the last five years, exhaustive studies of Canada Geese have been carried out in America. Some of the results have already been published by W. H. Elder, H. C. Hanson, R. E. Griffith and C. W. Cossacks. Other important contributions to these studies, such as Cecil Williams' report, still await publication.

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CAPTIVITY

All forms of Canada Geese have been kept in captivity, and many of them have bred successfully. The larger forms lay readily and the young are easily reared; but they are of doubtful temper during the breeding season and may prove dangerous to other birds. On very large grounds, where pairs can isolate themselves in a sufficient territory, they can be kept in large numbers; otherwise, it is better to seclude them. The smaller forms, however, are completely inoffensive, but they are much shyer breeders. All are completely indifferent to cold. While the larger Canadas are highly ornamental in extensive parks, but too big and coarse for lesser places, the smaller sub-species are extremely attractive in gardens. They stay well full-winged, as a rule, and they have been successfully acclimatized in Great Britain and in parts of Europe since the eighteenth century. More recently, they have been introduced into New Zealand. In a letter addressed to Moffitt June 20, 1939, E. F. Shead has recorded the whole story of this successful experiment:

'In 1905, the Government (of New Zealand) imported a number of Canada Geese, distributing them widely. The North Canterbury Acclimatization Society received eight. Of these, six were turned out on a lagoon at Glenmark, and a pair was kept in an enclosure in the Gardens of Hagley Park in Christchurch. This pair, once they had laid, nested every year, successfully rearing a remarkably high proportion of young hatched. The birds at Glenmark also bred freely and every year some birds were taken thence to establish new colonies elsewhere. Some of the young birds from the Gardens were also distributed through these flocks, the idea being to have the birds of each flock of as mixed ancestry as possible. The only other really successful flock was established in the Cold Lakes District in Otago.

'In 1920 the North Canterbury Society decided to import some more of these geese and eventually ten were secured from Dr A. R. Baker, Chairman, Game Conservation Board, Vancouver.

'At first there was a limited open season for the birds; then a complete open season during the duck-shooting season, and finally protection was removed from the Canada Geese throughout the year. The result has been that considerable numbers of geese are shot by pot-hunting parties during the moulting period when the birds cannot fly.

'It seems that the two races have still a marked tendency to breed true, for in flying flocks of these geese one notes that the birds are separable into two sizes, a larger and a smaller one.

'The Canada Goose will breed in New Zealand during the summer after its arrival, as indeed do most, if not all, imported birds. It is a great mistake to think that there is a long period of adjustment to the altered seasons. If adult geese were imported and arrived in say September (which would be a favourable time) then they would probably nest before Christmas. The next year they would nest in early October which is their normal nesting period here.

'If the district in which the birds nest is not of such an altitude that most of the open water freezes in the winter, then the birds will remain residential on their nesting grounds

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throughout the year. At Lake Coleridge (1,675 ft.) the birds live throughout the year; at Lake Sumner (2,300 ft.) they leave for the winter, coming down to Lake Ellesmere (sea level) in March and April, and returning in August and September.

'The birds here are extremely wary and, being prized for the table, it is difficult to get specimens. I have, however, been very fortunate this year, getting sixteen. . . .

'The weight of thirteen birds varies from $8\frac{3}{4}$ to $12\frac{1}{2}$ lb. All these birds were shot in the Lake Coleridge district and all were in good condition. I may say that this is a greater number than the total I have shot in the previous years.

'The birds begin to lay at the end of September, nesting on hillsides or on the edges of streams or swamps. They lay from five to seven eggs, usually five or six.'

The Canada Goose is an adaptable and successful species which accommodates itself readily to various life conditions. It interbreeds freely with other Geese, particularly the Barnacle, more rarely with Swans and the larger species of *Anatinae*; but only hybrids with other species of *Branta* are fertile. The showy head and neck pattern of the Canada Goose is usually dominant in their offspring.

ATLANTIC CANADA GOOSE

Branta canadensis canadensis

Anas canadensis, Linné, *Syst. Nat.*, ed. 10, 1758, p. 123: Canada, restricted to city of Quebec (Todd).

Branta canadensis canadensis (part), Peters, *Check-List, Birds of the World*, 1, 1931, p. 150.

CHARACTERISTICS

A large Canada Goose, with a long neck, large bill and feet, the males weighing from 9 to 12 lb., the females $6\frac{1}{2}$ to $8\frac{1}{2}$ lb. The white cheek-patches are almost always confluent on the throat; practically never a white ring at the base of the neck, which is creamy white, as are also the upper breast and the upper back, forming an ill-defined but complete broad collar; rest of underparts, sides only slightly darker than the breast; upperparts and flanks sepia brown, the feathers broadly tipped with buffy white, forming conspicuous bars. Tail usually of eighteen feathers, seldom twenty, and exceptionally sixteen.

Wing: 450-550 mm.; tail: 120-168 mm.; culmen: 48-65 mm.; tarsus: 78-95 mm.

Immatures: smaller and duller, the breast and belly darker, and the barring of the upperparts narrower and less distinct.

Downy chicks have the forehead, sides of head, chin, throat and underparts clear yellow, brighter on the cheeks and breast, paler on the throat and belly, passing to olive-green on the flanks; lores, a small patch around the eyes, crown, hind neck and upperparts olive-green, with yellow patches on wings and back. Bill dull black. Legs and feet greenish-olive.

Eggs: creamy white, dull, four to ten, 86×52 mm. on an average. Incubation: 25 to 30 days.

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DISTRIBUTION

Breeds in south-eastern Baffin Island, eastern Labrador west probably to the watershed line, Newfoundland, Anticosti and Magdalen Islands, occupying the country up to the limits of trees and sometimes beyond when suitable willows and other bushes are available; formerly south to North Carolina, but exterminated throughout the eastern United States. Occasional breeding records in recent years may be of genuine wild birds, but more likely of reintroduced stock. Winters along the Atlantic Coast from New Brunswick to Georgia, but rare south of Virginia. Introduced into Europe and New Zealand, in a more or less pure state.

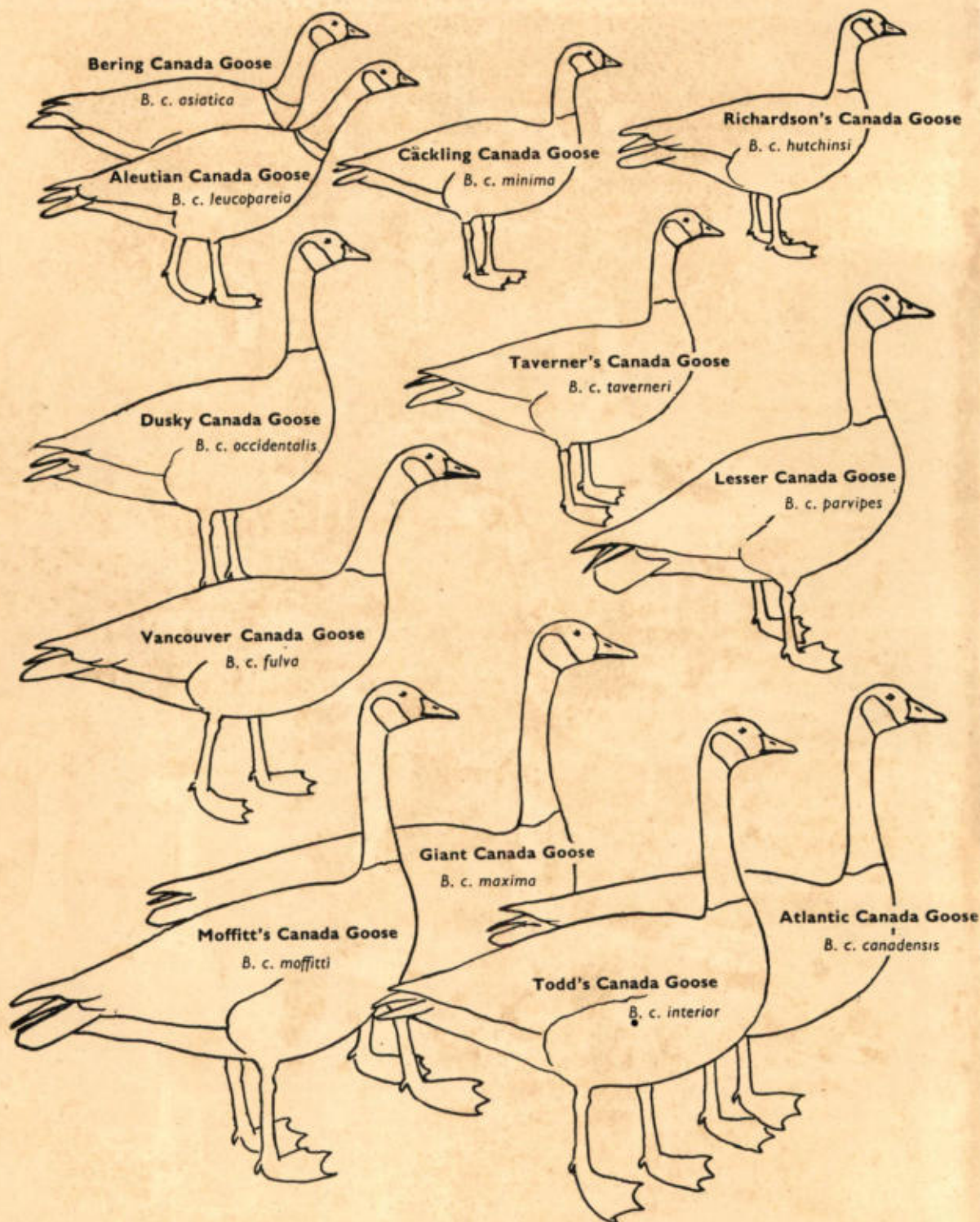
GENERAL HABITS

The Atlantic Canada Goose is the oldest and best known of the species. It is a large, showy bird, very popular in eastern North America. Its musical honking, which is mostly given on the wing, is a thrilling noise, one which is characteristic of the American wilderness. Much has been written on its habits, which has been condensed by Kortright.

'On migration Canada Geese often assume the well-known V-shaped formation, with the leader at the head. From time to time during long flights change of leadership will take place. The familiar, resonant *honk-honk* of these geese in flight, as the leader calls to his flock and they respond at frequent intervals, never loses its mystic charm. Flying by night or by day, as circumstances require, they stop only when necessary to rest or feed, and then only in such places as their experienced leaders know to be safe.

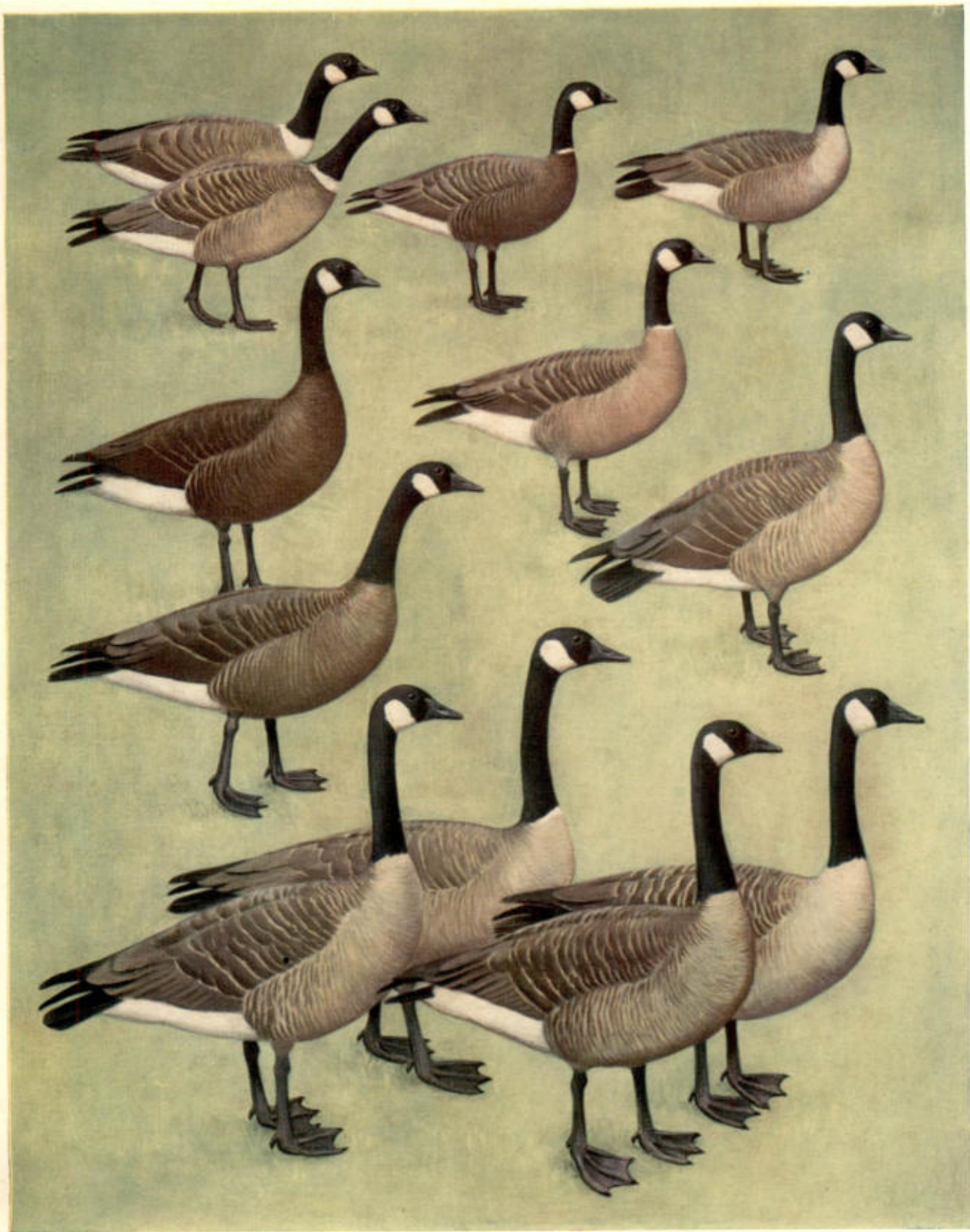
'The Canada Goose usually nests on the ground near water. The type of nest will vary considerably with the locality. Generally the nest is a depression in the ground lined with material from the vicinity, sticks, flags or grasses, and soft grey down. Sometimes the nests are large, bulky affairs of about two feet outside diameter, and again they may be mere depressions with scanty lining of any sort. In certain parts of the country nests will occasionally be found in trees, and in such instances are often the disused nests of ospreys, hawks, or other large birds. The number of eggs varies from four to ten, but the usual set consists of five or six. The eggs when freshly laid are of a creamy-white colour and the average size is 3.37 by 2.29 inches. The period of incubation is from twenty-eight to thirty days and is performed by the goose alone. While the gander never sits on the eggs, he is always in close attendance ready to protect the family from any danger. . . .

'The Common Canada Goose is one of the earliest water-birds to migrate in the spring. "The first signs of approaching spring come early in the far south, with the lengthening of the days and the increasing warmth of the sun; the wild geese are the first to appreciate these signs and the first to feel the restless impulse to be gone; they congregate in flocks and show their uneasiness by their constant gabbling and honking, as if talking over plans for their journey, with much preening and oiling of feathers in the way of preparation; at length a flock or two may be seen mounting into the air and starting off northward, headed by the older and stronger birds, the veterans of many a similar trip; flock after flock joins the procession, until the last have gone, leaving their winter homes deserted and still" (Bent, 1925). Those that have wintered farthest south



ALL IN ADULT PLUMAGE

VIII. Canada Geese



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are the first to start on the journey and often by the last week in February are on their way. March, however, is the month of greatest movement.

'Before the beginning of September the flocks once more become restless and start gathering in large numbers along the coasts and on the larger bodies of water preparatory to the journey south. While many flocks may be seen in September, the period when they move in greatest numbers is through October and the first half of November. They winter in southern Nova Scotia, British Columbia and along both coasts of the United States, being particularly abundant in the coastal regions of North Carolina where extensive shallow sounds and smaller bodies of water, fresh and salt, provide excellent feeding-grounds. They also winter inland as far north as they can find suitable food and large bodies of open water.'

CAPTIVITY

The Atlantic Canada Goose seems to have been brought to Europe early, as Willoughby (1676) described it from specimens living in St James's Park, London, and it was breeding in large numbers in the park of Versailles, according to Buffon. It soon became well established, and hundreds are still living and breeding in a feral state in Great Britain today. Although birds of the darker form *interior* may have also been imported occasionally, the European stock resembles completely the Atlantic sub-species. It was also the present form that was first introduced into New Zealand in 1950. The birds were soon established in the North Canterbury region, whence they were widely distributed. But smaller birds were also imported from Vancouver in 1920 (*taverneri*?) so that the population is now probably a mixed one. It is hardy, strong and prolific. Pairs are noisy and quarrelsome in the breeding season, but become harmless as soon as the young are hatched. It is, however, better not to associate them too closely with other Geese as they may prove dangerous. Their loud voice, fussy antics, displays and general behaviour are typical of the large sub-species of *Branta canadensis*.

TODD'S CANADA GOOSE

Branta canadensis interior

Todd, *Auk*, 55, 1938, p. 662: Port Harrison, Hudson Bay (east coast).

Branta canadensis canadensis (part), Peters, *Check-List, Birds of the World*, 1, 1931, p. 150.

CHARACTERISTICS

Similar to *canadensis*, but darker, browner, mouse-grey with narrower whitish tips to the feathers and consequently less conspicuously barred; the base of the neck and upper breast are light in tone, but the upper back and base of hind neck are uniform with the rest of the upperparts. Size slightly inferior to those of *canadensis*.

Wing: 410-549 mm.; tail: 105-165 mm.; culmen: 43-64 mm.; tarsus: 75-91.5 mm.

Immatures and *downy chicks* much as in *canadensis*, perhaps a little darker.

Eggs like those of *canadensis*.

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DISTRIBUTION

Breeds in northern Quebec, Ontario and Manitoba around the Hudson and James Bays, apparently south to lat. 52° N., and as far north as Churchill in the west and the Hudson Strait in the east. Probably bred farther south before the settlement of the country. Hanson and Smith have found (*Canada Geese of the Mississippi Flyway*, 1950) that there are four different populations in the range of the present sub-species with distinct breeding areas and flyways: eastern Prairie, nesting from Churchill to the Severn River, wintering due south to eastern Texas; Mississippi Valley, nesting from the Severn to Hannah Bay, migrating south to Louisiana; south-east, nesting near the southern end of James Bay where it overlaps with its two neighbours, wintering south to eastern Alabama and north-western Florida; South Atlantic, nesting along the eastern shore of the James and Hudson Bays and south-western Baffin Island, and wintering along the Atlantic coast from southern New Jersey to Pamlico Sound, North Carolina (Hanson, Griffith).

This race no doubt intergrades with *canadensis* in the east, and *moffitti* in the west, as proved by many intermediate specimens found on migration and on their wintering grounds. It shows no tendencies towards the small northern sub-species as far as we know. Winters from south-western Ontario, Michigan, Wisconsin, Minnesota, Illinois, south chiefly from the delta of the Mississippi, west to Galveston Bay, Texas, and St Mark's Refuge, Florida, and along the Atlantic coast from southern New Jersey.

GENERAL HABITS

These Canada Geese of the interior have exactly the same habits as the Atlantic sub-species. They have been better studied than any others by H. C. Hanson and R. H. Smith, who have banded them on their breeding grounds and on migration, particularly the large flock wintering at the Horseshow Lake Refuge in southern Illinois. All those interested in Canada Geese should read their important study *Canada Geese of the Mississippi Flyway*.

CAPTIVITY

Very little has been recorded about this sub-species in captivity. Nothing has been mentioned for Europe, where it is either unknown or, more probably, overlooked. It has, however, been noticed for many years in public and private collections in the eastern United States that darker, less bulky Canada Geese are sometimes observed which are found to be more active and quarrelsome than the paler birds. Otherwise they behave just like *B. c. canadensis*.

GIANT CANADA GOOSE

Branta canadensis maxima

Delacour, *Am. Mus. Novitates*, N.Y., 1537, 1951, p. 5: Round Lake, Grant Co., Minnesota.
Branta canadensis canadensis (part), Peters, *Check-List, Birds of the World*, 1, 1931, p. 150.

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CHARACTERISTICS

A larger, more elongate bird with considerably longer neck, bill, tarsus and middle toe than the other big sub-species, pale and greyish in colour, the upperparts buffy brown, the underparts very light. It closely approaches *canadensis* in colour, but it is even paler and less conspicuously barred above; the underparts are more uniform, the base of the hind neck and upper back being not whiter than the rest of the mantle; a white ring at the base of neck is often present, and a black line on the throat, dividing the cheek patches. Adult males weigh up to 18 lb.

Wing: 480–550 mm.; tail: 147–170 mm.; culmen: 60–68 mm.; tarsus: 90–106 mm. (Middle toe: 95–107 mm.)

Immatures: as in *B. c. canadensis*, but larger and paler.

Downy chicks: much as in *canadensis*, but larger and more golden, less brown, above; loreal line and circles around the eyes very pale, hardly indicated (after specimens in the American Museum from Minnesota and North Dakota).

DISTRIBUTION

The Giant Canada Goose appears to be extinct. Specimens and written records show that it bred formerly in the great plains of the Central United States, in North and South Dakotas, Nebraska, Kansas, Minnesota, Iowa, Missouri, western Kentucky and Tennessee, and northern Arkansas. It was non-migrating. Geese of other sub-species, mostly *canadensis*, have been reintroduced into several parts of the former range of *maxima*, so that the question has been further confused.

GENERAL HABITS

If the Giant Canada Goose has now vanished, much has been written about it by sportsmen of former days. Moffitt had exchanged a lengthy correspondence with a few hunters who were still living, and he gathered notes and articles of great interest. The late W. B. Mershon, an authority on the subject, published an important paper in *Field and Stream*, May 1925, pp. 26–27. The following extracts are here quoted:

‘Away back in 1883 I began going to North Dakota, Goose shooting. Dawson, in Kidder County, was probably the greatest Goose-hunting grounds ever known or that ever will be known. When I first began going there, it was on the western edge of the wheat belt. Great wheat ranches were being formed by Eastern men of means, or syndicates. . . .

‘Now as to the big Goose. I observed that sometimes before the flight had come from the north, and while we were still engaged in shooting local ducks or sharp-tailed grouse, local Geese — the Geese that had bred in that locality — would come on the feeding ground, apparently each brood by itself — the two old ones and five or six young ones, sometimes not so many. Possibly at times two broods would join and occasionally we would see as many as a dozen or fifteen together.

‘They were all big Geese. We knew them as such. While having the general markings

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of the Canada Goose, such as the black head and neck with white throat and cheeks, they were lighter coloured, of a blue-ashy general appearance, and the bodies were shaped differently — long ovals instead of round, chunky ovals.

'Even after the big flight came from the North and the White-fronted or Laughing Goose, the Snow Goose, the Canada and his smaller brother, the Hutchins, had come in thousands and thousands and were literally covering the fields at feeding time, these big geese held aloof and did not mix with the others. If they happened to alight on the same stubble field, it would be in a different part of the field from where the big lighting took place. They came into their feeding ground quietly, without any honking or noise; knew right were they wanted to go and did not circle about, but went right to their feeding ground.

'They usually flew low, not so high in the air as the other geese. If we had a shot at a bunch of them, the geese we got were all big ones. We would never get out of the same flock one large one and one small one. By "small Geese" I mean anything 12 lb. or under.

'Now as to the weights of these big fellows, which we all recognized as a different goose from the ordinary Canada. When in North Dakota, some time in the late eighties, '87 or '88, a gentleman in a private car adjoining our old "City of Saginaw" hunting car came in with a Goose that he had weighed and claimed that it weighed 18 lb. To my mind that stood as a record, and we were always trying to obtain an equally large or larger one, so that we weighed our Geese.

'We frequently had them 14 and 15 lb. My friend Sanford Keeler, at that time General Superintendent of the Péré Marquette Railroad here in Saginaw, accompanied me north of Dawson one day and we shot on the north side of Lake Sibley. We got a number of large Geese. He killed one that weighed 17½ lb., and I shot one that weighed 17 lb.'

CAPTIVITY

Giant Canada Geese were formerly kept and bred locally in captivity, mostly to be used as decoys or for the table, but there are no avicultural details available on these fine birds.

MOFFITT'S CANADA GOOSE

Branta canadensis moffitti

Aldrich, *Wilson Bull.*, 58, 1946, p. 97: Blue Lake, near Coulee City, Washington.

Branta canadensis canadensis (part), Peters, *Check-List, Birds of the World*, 1, 1931, p. 150.

CHARACTERISTICS

Completely similar in colour to *B. c. maxima*, but less elongate, rounder in shape, with shorter bill, legs and feet. Slightly bigger than *canadensis*. Weight 8 to 13 lb.

Wing: 455–520 mm.; tail: 140–170 mm.; culmen: 48–59 mm.; tarsus: 82–101 mm. (Middle toe: 86–101.5 mm.)

Immatures, downy chicks and eggs as in *B. c. canadensis* in size, but like *maxima* in colour.

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DISTRIBUTION

Breeds in the Great Basin region of the United States between the Rocky Mountains and the eastern parts of the Pacific States, from northern California, Oregon and Washington to eastern Colorado, northern Utah and Nevada; and in western Canada — central British Columbia, Alberta, Saskatchewan, south-western Manitoba. Intergrades in the north with *parvipes*, and in the south-east with *interior*. Winters from southern British Columbia and north-eastern Wyoming to California and the Gulf of Mexico.

GENERAL HABITS

This western sub-species has the same habits as the Atlantic and Todd's Canada Geese, all of them being very similar in every way. The nesting habits have been well studied in several places, particularly at the Bear River Refuge, northern Utah, where it nests in large numbers (Williams and Nelson, *Auk*, 60, 1948, pp. 341-5).

CAPTIVITY

Moffitt's Canada Goose has seldom been kept in captivity outside of its own area, as it is too similar to the Atlantic form to be worth importing into Europe or the eastern United States. It does well in captivity and seems to be completely like *canadensis* in behaviour. A pair in the New Grounds collection bred in 1949.

LESSER CANADA GOOSE

Branta canadensis parvipes

Anser parvipes, Cassin, *Proc. Acad. Nat. Sci. Philadelphia*, 1852, p. 187: Vera Cruz, Mexico.
Branta canadensis hutchinsii (part), Peters, *Check-List, Birds of the World*, 1, 1931, p. 150.

CHARACTERISTICS

Similar to *moffitti* in shape and proportions, particularly the long bill and neck, and also generally in colour although varying a little more in tone, but much smaller.

Wing: 410-442 mm.; tail: 120-145 mm.; culmen: 36-49 mm.; tarsus: 73-88 mm. (Middle toe: 58-73 mm.)

Immatures, downy chicks and eggs probably as in *moffitti* but smaller; none accurately recorded.

This is an intermediate form between the large Canadas of the southern forested or prairie regions and the small northern tundra forms. As here constituted, it is certainly a highly variable, uneven and unstable sub-species. Much more remains to be known on these intermediate populations, which extend over a large territory, but are widely scattered and probably not numerous anywhere owing to the unsuitability of the habitat. It also resembles the smaller and usually darker *taverneri*.

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DISTRIBUTION

Breeds in the treeless interior of Canada and Alaska west to the Fairbanks region, intergrading with *taverneri* in the west and *moffitti* in the south; records from western Baffin and Southampton Islands, north-eastern Manitoba, the Perry River, the Mackenzie Province (type of *B. barnstoni* Ross, 1862, from Fort Simpson), northern Saskatchewan and Alberta (Lake Athabasca region). Occasionally in western Greenland (Godhavn, Disco Island). Winters from California to Louisiana, and in Mexico.

GENERAL HABITS

The Lesser Canada Goose is closely related to the large forms that live farther south. It is exactly alike in proportions, shape and habits. Sutton (*Birds of Southampton Island*, 1932, pp. 31-36) gives interesting information, under the name '*leucopareia*':

'This close relative of the big Honker is a rather rare summer resident, found principally in the interior along the shores of the larger streams and lakes. It is not a bird of the coastal lakes, as is *B. c. hutchinsi*. It arrives in the spring a little earlier than the latter bird, from which it is quite impossible to distinguish in the field; and both these species arrive earlier than the Brant, which is one of the latest species to reach its breeding-grounds. The Lesser Canada Goose appears to be somewhat more common in the South Bay region, especially along the rivers which drain into the western side of the Bay, than it is in the rugged eastern or flat western parts of the Island. The few recorded individuals of the larger Honker were found in this same part of the Island, and this immediately suggests the possibility that *canadensis* and *leucopareia* (= *parvipes*) are not even sub-specifically distinct. As noted in our discussion of the status of the larger form, however, the presence of *canadensis* is probably largely accidental, so that its occasional occurrence has little to do with the status of the present race. . . .

'The Lesser Canada Goose and smaller Hutchins's Goose do not arrive simultaneously in the spring, as has been noted above. The larger, earlier bird makes its way inland at once, so that it is practically never seen in company with the flocks of the smaller species; and it is almost never seen feeding on the salt-water flats. The Eskimos believe it possible to distinguish the two species by their call-notes; but I am not convinced that such recognition is possible. The nesting habits of the two forms are, however, distinctly different. The present form builds a mound-like nest, somewhat like that of a Whistling Swan, but much smaller, along the edge of a river or large lake, usually many miles inland, so far inland, in fact, that the parent birds never come out to the coast to feed, but eat the weeds which they find in the lakes, and the grass which grows on the tundra. The nest is composed of grass and down, like that of the larger *canadensis*, and often has a well-defined foundation of heavy grasses, twigs, and weed-stalks.

'The nest of the Hutchins's Goose, on the other hand, is always built on a small island or an almost insulated peninsula, in one of the coastal lakes. It is well scooped out, and lined warmly with down, but it has no foundational material heavier than dry grass or chunks of moss. I never saw the nest of a Hutchins's Goose anywhere along the bank of a stream or of a large lake. I examined at least one hundred and fifty nests, and all of

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them, but one, were situated on small islands; one nest was placed on a slender point, which had probably been an island at the time the eggs were laid.²

We know very little else of the Lesser Canadas in their vast and probably very spotty range. It appears to be everywhere a bird of the open tundra and treeless spaces nesting always at some distance from the coast. In the Perry River district, Hanson, Queneau and Scott found many pairs breeding singly on islands in lakes and also among the colony of Ross's Geese. The size of the birds was very constant, weighing more or less 6 lb. They were the most numerous of the Geese, constituting 33 per cent of the whole population. Recently found breeding near Fairbanks, Alaska.

CAPTIVITY

Lesser Canada Geese live and nest as easily in captivity as the larger sub-species. Old breeding records are difficult to identify as the present form has so far been confused with the smaller ones, *taverneri* and *hutchinsi*, and also with the Atlantic *canadensis*. They have often been reared lately in Europe and America. They look just like the larger forms, only smaller in size, and are preferable on limited grounds, but the difference is hardly big enough to make them of particular interest.

TAVERNER'S CANADA GOOSE

Branta canadensis taverneri

Delacour, *Am. Mus. Novitates*, N.Y., 1937, 1951, p. 7: Colusa, California.

Branta canadensis hutchinsii (part), Peters, *Check-List, Birds of the World*, 1, 1931, p. 150.

CHARACTERISTICS

Resembles *B. c. parvipes*, but smaller, with shorter bill and neck, and generally darker, although very variable in colour, some specimens being as pale as *parvipes*, others as dark as *leucopareia*. It also resembles the latter closely, but it is generally larger and it has a differently shaped bill, less high near the base and broader towards the tip, with a smaller nail. The white neck ring is often lacking, and when present it is narrow or incomplete.

Wing: 365–424 mm.; tail: 105–134 mm.; culmen: 32–38 mm.; tarsus: 66–82 mm. (Middle toe: 62–77 mm.) There is considerable variation in the relative proportions according to individuals.

Immatures: duller and lighter.

Downy chicks: quite different from those of the preceding sub-species and much as in *occidentalis* and in *minima*, but rather greyer on the flanks and back, the cheeks and lores browner.

Eggs: five to eight, white, 75 × 50 mm. Incubation: 28 days.

DISTRIBUTION

Breeding areas as yet poorly known. Breeds probably throughout the interior, ten to

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fifty miles from the coast, from the base of the Alaska Peninsula to the Mackenzie River delta. It intergrades with *minima* in the Wainwright area, and with *occidentalis* in the south-west. It certainly also intergrades with *parvipes*, but the ranges and intergradation of the two forms are yet to be worked out. The identification of the various populations remains difficult, and until further knowledge is acquired we unite them under the name *taverneri*. Winters from Washington to Texas and Mexico, mostly in the large interior valleys of California.

GENERAL HABITS

Taverner's Goose replaces the larger *parvipes* in northern and western Alaska, but we know very little about the intergrading and distribution of the two sub-species. It behaves toward the smaller *minima* that breed on the shore tundra along the Bering Sea as *parvipes* to *hutchinsi* along the shores of the northern Hudson Bay, breeding farther inland, migrating separately, and building different, much bulkier nests. Both *taverneri* and *minima* winter together with Lesser Snow, Ross's and White-fronted Geese in the large interior valleys of California. The best report on the birds on their breeding grounds is that of A. M. Bailey (*Birds of Arctic Alaska*, 1948, pp. 151-5):

'The dark Cackling Goose is a western form, and its breeding ground seems to extend from the coast of Bering Sea northward along the north-west coast of Alaska to the vicinity of Barrow, while the coast of Alaska to the eastward into Canada is occupied by a dusky-bellied race which is intermediate in colour between the dark *minima* of the west, and the light-bellied *hutchinsi* of the north-eastern part of the continent.

'The dusky Arctic Alaskan birds range from the general vicinity of Barrow on to the eastward. They are not numerous, but a few are seen each season, often with bands of White-fronted Geese, as they work along the inland rivers. According to Brower, they do not colonize as does the White-front; instead, isolated pairs nest along the shores of the shallow lagoons, usually twenty to thirty miles back from the coast. . . .

'There is considerable variation in size and colour of Alaskan birds, and there seems to be no correlation between length of wing and other measurements, for short-winged geese may have long tarsi or beaks. Large birds are often taken from flocks containing exceedingly small individuals, and while males may average larger than females, it is impossible to judge the sex of these geese by their size. Some of the smallest prove to be males.'

In behaviour on the ground, Taverner's Geese resemble the larger Canadas if allowance is made for their small size and the resulting daintier ways and higher-pitched voice. Like *parvipes*, they build a bulky nest, while the small shore forms *minima* and *hutchinsi* merely scratch a hole in the grass. They may use cliffs and old nests.

CAPTIVITY

Taverner's Goose has also been kept in American and European collections, where it was often recorded some years ago as 'Hutchins' Goose'. Specimens were captured in the Sacramento Valley where large numbers spend the winters. These miniature

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Canadas are somewhat intermediate in colour and proportions between the small Cackling and Richardson's Goose, and the Lesser Canada, but are nearer to the latter in general shape; occasionally distinction between them and *parvipes* is difficult to make, as no doubt several intermediate populations occur. But typical *parvipes* are decidedly larger, with a longer, flatter bill, and they are always light in colour. The London Zoo had specimens as early as 1860, but it seems that the first breeding success with 'Hutchins' Geese' was achieved at Woburn in 1910, as reported by the Duchess of Bedford (*Avicult. Mag.*, 1910, p. 198, and 1911, p. 162). They have often bred in Europe and in America since. They live very well in confinement, but they do not nest so readily as the larger Canadas, which they surpass in attractiveness. They are inoffensive to other Geese.

VANCOUVER CANADA GOOSE

Branta canadensis fulva

Delacour, *Am. Mus. Novitates*, N.Y., 1537, 1951, p. 7: Graham Island, Queen Charlotte Islands, British Columbia.

Branta canadensis occidentalis (Part), Peters, *Check-List, Birds of the World*, 1, 1931, p. 150.

CHARACTERISTICS

A big Canada Goose, darker, more fulvous and uniform above and below than the preceding sub-species, with a very slightly smaller bill and longer legs. White neck-ring seldom, if ever, indicated, and black neck abruptly contrasting with brown breast and back.

Wing: 432-513 mm.; tail: 137-162 mm.; culmen: 45-60 mm.; tarsus: 84-100 mm. (Middle toe: 73-89 mm.) Weight up to 13 lb.

Immatures: like adults, but duller.

Downy chicks differ from *B. c. canadensis* and allies in being browner above, whiter below and on the face, and in having dusky lores and eyelids; they resemble in colour those of *minima* and *taverneri*.

Eggs: like those of *canadensis*, measuring 87×58 mm. on the average.

DISTRIBUTION

Breeds along the coast and on the islands of British Columbia and southern Alaska, from the north of Vancouver Island to the Alexander Archipelago (Glacier Bay). The different populations seem to vary more or less. Those of Vancouver and Queen Charlotte Islands, and around the mouth of the Stikine River are the largest and lightest in colour that we have seen; rather smaller and darker ones are found along the coast of British Columbia, but those of the Alexander Archipelago, although equally dark, are large. Mostly non-migratory, but wandering birds go as far as northern California (Humboldt County) during the autumn and winter. No geese have been found nesting between Glacier Bay and Prince William's Sound.

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GENERAL HABITS

These big, dark Geese are strictly coastal in habit. Otherwise, they behave like other large Canadas. They are common enough in their restricted range. Willett, quoted by Kortright, reports that they sometimes nest on top of stumps in the woods, thirty feet above the ground; but they usually build on the ground near water, like other Canadas. Young hatched near beaches are taken up the mountains by the parents to feed on berries, returning to salt water when mostly full grown and flying well.

Mr O. Agathon, of New York, has recently obtained specimens of adults and young for the American Museum, as well as interesting information. His guide, Mr Ralph W. Young wrote from Petersburg, Alaska on March 19, 1951:

'These Geese are here all year round. They never migrate. In fact it appears that they seldom, if ever, leave a limited area in which they were born, live and die. Every bay in south-eastern Alaska has them; they range in numbers in these bays from a dozen or so up to two or three hundreds, and band together in flocks of from ten to twenty-five or so. Right now they are beginning to pair up, so I would guess this is the beginning of the mating season. They nest in April and we begin to see young goslings in the middle of May. They make their nests just inside the woods or brush on the shore of both fresh and salt-water lakes as well as out on the open muskeg. A favourite nesting place is on an island in a lake. They are wary and hard to approach at all times except when they are nesting, or have young. At such times one can almost pick them up.

'These Geese range from northern Chichagof and Admiralty Islands to British Columbia. I have never seen or heard of them anywhere else in Alaska. They are definitely salt-water birds, although in the spring and summer they fly back into lakes a few miles from the beach. I have seen them early in the fall in lakes that were 2,000 feet above sea-level. They are poor eating, being tough, very dark meat and decidedly fishy in taste. They have peculiar feeding habits for Geese. They eat practically anything. Small clams, mussels, various grasses in season and even dead salmon. I have seen them many times far up a salmon stream feeding on salmon carcasses and loose eggs in the gravel.'

CAPTIVITY

These dark Canada Geese of the Pacific Coast have been kept and bred in captivity during the last thirty years, both in Europe and in America, under the name of 'White-cheeked Geese'. They are perhaps handsomer than the eastern birds, but they also prove more jealous, quarrelsome, and dangerous to other waterfowl. A breeding pair at Clères killed a Coscoroba. They must be isolated when nesting. The form is more often seen in confinement than its darker northern close relative.

DUSKY CANADA GOOSE

Branta canadensis occidentalis

Bernicla occidentalis, Baird, *Rep. Expl. Surv. R. R. Pac.*, ix, p. 766, 1858: Port Townsend, Washington.

Branta canadensis occidentalis (part), Peters, *Check-List, Birds of the World*, i, 1931, p. 150.

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CHARACTERISTICS

A darker and smaller bird than *B. c. fulva*, which it resembles generally, with a shorter and higher bill. Underparts almost uniformly deep brown; the narrow borders of the feathers are reddish; white lower belly and vent contrasting sharply; white neck ring seldom present.

Wing: 395-460 mm.; tail: 140-165 mm.; culmen: 41-48 mm.; tarsus: 70-84 mm.

Immatures, downy chicks and eggs similar to those of *fulva*, only smaller, as far as it is known.

DISTRIBUTION

Breeds around Prince William Sound, perhaps extending farther south along the Gulf of Alaska. Specimens from the Copper River are lighter and appear to intergrade with the smaller and lighter *taverneri* of the interior. Farther north and west, there are no records from Cook Inlet and the eastern part of the Alaska Peninsula. Still farther west, specimens from Pavlov Bay approach the Aleutian *leucopareia* in colour and shape, particularly the bill, but they are larger, which seems to indicate an intergradation with *occidentalis*. Much remains to be learned of these populations. Usually sedentary but occasionally migratory, as specimens have been found during the autumn as far as Oregon and near Sitka.

GENERAL HABITS

These very dark, medium-sized Geese are similar in habit to the larger *fulva*, with which it has been confused until the last few years. J. Grinnell (Birds of the 1908 Alexander Alaskan Exp., *Univ. of California Publ. Zool.*, 5, n. 12, 1910, pp. 361-428) writes:

'Only this one species of goose was seen in the Prince William Sound region. At the head of Cordova Bay there were a few individuals, as also at Graveyard Point, Montague Island; and at Chenega Island. Flocks of from five to eight were noted at Heinchbrook Island. At Hawkins Island there were many pairs and some flocks of three to six each. Dixon found a nest with six eggs on June 18 on this island near Canoe Passage. It was located at the head of a tide slough at the edge of the woods. The nest was made up of moss and down and was placed in the open near the base of a hemlock. The eggs would have hatched in two or three days.'

Ed. Bilberback, of Cordova, Alaska, reports (*in litt.* 1953) that 1,500 Canada Geese remain all the year round in Prince William Sound in three or four localities, particularly in the Port Wells district where the country is flat and the tide high, uncovering a mile or so of mud and sand. The geese feed at low tide on small mussels and clams, and on dead grass. There are Geese at the end of most bays on the north of the Sound. The weather is fairly mild in the area. Snow and White-fronted Geese migrate through it, but no other forms of Canada Geese.

CAPTIVITY

These Geese have been seen in confinement now and then, and they have long attracted

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our attention; it was obvious that two different forms were represented in the stock of so-called Western Canadas, or White-cheeked Geese. A pair have been kept for several years at the 8 Rods Farm, Rhode Island, and we pointed out to the manager, Mr Campbell, that they represented a form of very special interest. They have bred the last few seasons, and the young are exactly like the parents. At first sight, they differ strikingly from the more often seen, larger birds (*fulva*). Their rich chocolate colour is particularly attractive.

ALEUTIAN CANADA GOOSE

Branta canadensis leucopareia

Anas leucopareius, Brandt, *Bull. Sci. Acad. Sci. St Petersburg*, 1, p. 37, 1836: Unalaska, Aleutian Islands.

Branta canadensis hutchinsii (part), Peters, *Check-List, Birds of the World*, 1, 1931, p. 150.

CHARACTERISTICS

Small Canada Geese, fairly rich in colour, the underparts ochraceous, but much less dark and rufous than *occidentalis*, the light borders of the feathers more conspicuous; a white ring always present at the base of the black neck, often broad in front (20 mm.), followed by a dark brown band; back of the neck often sprinkled with white feathers. Bill short and high, tapering and narrow near the tip, the nail high, long and pointed. The white patches of the cheeks are often, but not always, separated by a black gular band. Legs and feet heavy.

Wing: 358–405 mm.; tail: 106–125 mm.; culmen: 31–36 mm.; tarsus: 66–81 mm. (Middle toe: 62–75 mm.)

Immatures, downy chicks and eggs unrecorded.

DISTRIBUTION

Breeds in the Aleutian Islands, from Atka, and probably from Unalaska, to Attu; Pribilof Islands (?). Now very rare (one collected and several others seen by J. Krog on Amchitka in 1952). Winters in Japan, and from British Columbia to California. It is probable that *leucopareia* extended as far as the western reaches of the Alaska Peninsula, as three specimens from Pavlov Bay are very similar, only larger and slightly darker, showing a certain tendency towards *occidentalis*.

GENERAL HABITS

The Aleutian Goose was previously very abundant on many of the islands. Nelson (*Birds of the Bering Sea and Arctic Ocean*, 1883) writes:

‘There is no record of its presence on St Lawrence Island, but on the western portion of the Aleutian chain it is a regular summer resident, rearing its young in considerable numbers upon the isolated islands there. The natives at these western islands have domesticated considerable numbers of these birds, and whether caused by confinement

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or otherwise, the white collar on the neck, dividing the brown of the body-colour from the jet-black of the head and neck, was very conspicuous, and an inch in width in some specimens seen at Unalaska the autumn of 1881. The small flock of these Geese seen at Unalaska, with their dark, handsomely contrasted colours and gentle ways, made very interesting and fine-looking pets. They were noted upon the Seal Islands by Elliot, who tells us that they occurred there as irregular or straggling visitants, which remained but a short time before resuming their line of migration.'

Bent (1925) says:

'The primitive hunters of the Aleutian Islands formerly killed large numbers of these geese by catching them in long nets set on the edges of ponds where they fed. Some of the natives were also quite expert at throwing at the passing flocks a bolas made of three stones attached to a leather thong, which became entangled with the necks and wings of the birds, bringing sometimes two or even three birds down to the ground. The birds were salted away for future use during the winter and must have served as an important addition to the food supply of the natives.'

Indiscriminate killing by the natives and destruction by introduced Arctic foxes have wiped out many breeding colonies on the Aleutians, while birds wintering in Japan were decimated. It would be interesting to know if any populations of this well-marked subspecies still exist in fair numbers.

CAPTIVITY

Formerly commonly kept in Japan. Marquis Kuroda had several specimens in his Tokyo collection during the last thirty years. They appear to be similar to *B. c. taverneri* in habits.

BERING CANADA GOOSE

Branta canadensis asiatica

Branta hutchinsi asiatica, Aldrich, *Wilson Bull.*, 58, 1946, p. 95: Bering Island, Siberia.

Branta canadensis hutchinsii (part), Peters, *Check-List, Birds of the World*, 1, 1931, p. 150.

CHARACTERISTICS

Similar to *leucopareia* but, as far as can be judged from the five known specimens (American Museum, New York, and National Museum, Washington), distinctly lighter in colour, particularly below. This small series is very even in plumage, but specimens vary greatly in size.

Two males: wing: 376, 380 mm.; tail: 108, 109 mm.; culmen: 33, 31 mm.; tarsus: 77, 67 mm.

Three females: wing: 380, 365, 400 mm.; tail: 125, 112, 122 mm.; culmen: 32, 30, 34 mm.; tarsus: 72, 68, 81 mm.

Immatures, downy chicks and eggs unknown.

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DISTRIBUTION

Bering Island (Commander Islands), breeding there until about 1900; now extinct. Recorded also from the Kurile Islands as breeders in 1892 (Ushishir and Ekarma).

GENERAL HABITS

Practically nothing recorded, but probably very similar to those of *B. c. leucopareia*. According to Tougarinov (1941), these Geese used to breed on Bering Island sixty years ago. A single specimen was obtained in 1914, the last seen. Later explorers discovered no sign of it there.

CAPTIVITY

Nothing recorded.

CAKCLING CANADA GOOSE

Branta canadensis minima

Brantam inima, Ridgway, *Proc. U. S. Nat. Mus.*, VIII, 1885, p. 22: Pacific coast of North America: St Michaels, Alaska.

Branta canadensis minima, Peters, *Check-List, Birds of the World*, I, 1931, p. 150.

CHARACTERISTICS

The smallest and darkest of all Canada Geese, with a tiny bill, a short neck, long wings and legs. White neck-ring either present, merely indicated, or absent. The black of the neck runs into the dark grey and brown of the upper back and the deep chocolate of the breast, a unique characteristic in the species. The purplish lilac tinge of the plumage, due to the deep grey base, rich brown subterminal and tawny buff terminal bands of the feathers, the reduced size and special proportions are so peculiar among Canada Geese that Cacklings are easily identified, especially in life.

Wing: 330-370 mm.; tail: 100-118 mm.; culmen: 26-32 mm.; tarsus: 60-70 mm. (Middle toe: 47-60 mm.) Weight 3 lb. 2 oz. to 3 lb. 12 oz.

Immatures: like the adults, but usually slightly lighter below.

Downy chicks: much as in *fulva*, *occidentalis* and *taverneri*, whitish below and olive above, with a dusky line from lores to postocular region.

Eggs: four to eight, usually five or six, elongate oval, white and chalky, 72×48 mm. on an average, but variable in size. Incubation unrecorded. •

DISTRIBUTION

Breeds along the shores of western Alaska, from Nushagak Bay to the vicinity of Wainwright in the north, where it intergrades with *taverneri*. Absent from the Seward Peninsula. Winters from southern British Columbia to southern California, in the large interior valleys. Stragglers in Japan.

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GENERAL HABITS

This very small and dark coastal bird has been well studied, and several ornithologists have recorded its habits. Nelson was the first of the observers, and he wrote in 1887:

'The flocks come cleaving their way from afar, in May, and as they draw near their summer homes, raise a chorus of loud notes in a high-pitched tone like the syllable 'luk', rapidly repeated, and a reply rises upon all sides, until the whole marsh re-echoes with the din, and the newcomers circle slowly up to the edge of a pond amid a perfect chorus raised by the geese all about, as in congratulation.

'Although many are mated, others are not, and the less fortunate males fight hard and long for possession of females.'

More recently (1924), Conover and Brandt have watched and collected them in western Alaska, in the area of the Yukon delta, between Point Dall and Hooper Bay. Conover reports as follows (*Auk*, 43, 1926, pp. 175-7):

'The first Cackling Geese were seen on May 8, and by the middle of the month they had arrived in full force. During the last half of May, singles, pairs and flocks of three or four were seen commonly, wandering aimlessly about the tundra, as if looking for company. After having seen the same birds in their winter haunts, I found the gullibility of these Geese on their arrival in the north almost beyond belief.

'The first nest was found on June 3. From information supplied by Murie and Brandt, the nests were generally placed on some little islet in the ponds. Sets averaged about five eggs each. By July 8 most of the young of these Geese were a week or two old. On July 14, however, a newly hatched brood of four young was found and collected with the two adults. In all pairs of these Geese seen, it was very noticeable that the gander was much larger than the goose. It would seem that this difference in size between the sexes as well as that of age should be taken into account in studying the *canadensis* group.'

Later on A. M. Bailey (*Birds of Arctic Alaska*, 1948, p. 155) wrote:

'The small dark-bellied race of *canadensis* seems to be restricted to the western coast of Alaska, with only an occasional straggler reaching the Barrow region. There are no records from Wales except for bones not identifiable as to sub-species, which were found in five archaeological sites, so it is probable that birds migrating north along the shores of Bering Sea cut across Seward Peninsula to the Kotzebue Sound region, where they occur more or less commonly. The last was observed September 14 and the first the following spring on May 14; then they soon became numerous, and scattered in pairs among the tundra lakes.'

Cackling Geese have been much persecuted in the past, and they still are by the Eskimos on their breeding grounds; but the excessive shooting in California has been halted and the sub-species remains common.

The ways of these miniature Canadas are fundamentally the same as in the larger sub-species, but naturally more delicate; their voice is very high-pitched, and to a shrill honking they add a repeated cackle, from which their vernacular name has been derived.

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CAPTIVITY

These pretty little Geese are by far the most attractive of the species in captivity. The short bill and neck, high legs and deeply coloured plumage, gives them a distinct and charming aspect. They are dainty in their ways, quiet, and harmless to other birds. They do well in captivity, but are less inclined to breed than the larger Canadas, many of the wild-caught specimens never laying in confinement. They have, however, nested in the pens of several breeders in the United States and in Europe, the first success having apparently taken place at Woburn in the first years of the century. Some have been reared recently in America, and in Holland (Schuyt).

RICHARDSON'S CANADA GOOSE

Branta canadensis hutchinsii

Anser hutchinsii, Richardson, in Swainson and Richardson, *Fauna Bor.-Amer.*, II, 1832, p. 470: Melville Peninsula, Canada.

Branta canadensis hutchinsii (part), Peters, *Check-List, Birds of the World*, I, 1931, p. 150.

CHARACTERISTICS

A very small, light-coloured Goose, slightly larger than *minima* and with a relatively longer bill, resembling *moffitti* and *parvipes* in colour, but even paler on the breast; white neck-ring extremely rare if ever present. The bill is small, high at the base, approaching that of *leucopareia* in shape but not quite so tapering at the tip.

Wing: 350-408 mm.; tail: 110-130 mm.; culmen: 31-39 mm.; tarsus: 65-75 mm. (Middle toe: 52-60 mm.) Weight: 4 to 5 lb. as a rule.

Immatures: lighter and duller.

Downy chicks: like those of the larger eastern and mid-western forms, and differing from the Pacific forms and *taverneri* in having the face and underparts entirely bright yellow, the upper parts light olivaceous brown.

Eggs: as in other small Canada Geese.

DISTRIBUTION

Breeds on the shores of the Melville Peninsula, Southampton and Baffin Islands, Ellesmere Island (Craig Harbour), probably elsewhere in eastern Arctic America, occasionally on the west coast of Greenland (Umanak, Sargag and Egedesminde districts). Winters in Texas and Mexico.

GENERAL HABITS

This pale little Canada of the eastern coast tundra is very much like the still smaller and darker Cackling of western Alaskan shores in its habits, ways and high-pitched voice. It breeds exclusively on the low tundra along the sea.

It was not until 1926 that its nesting grounds on southern Baffin Island was discovered

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by Soper, who also found it breeding in 1929 on the Fox Peninsula. It was found that the name *hutchinsi* applied to the present sub-species, first discovered on Melville Peninsula, Taverner being the first (1931) to solve the problem.

Sutton (1932) says that Richardson's Goose

'is a common, locally abundant, summer resident all along the the southern coast of Southampton Island wherever there are little lakes with small islands, upon which it may nest. As a migrant it is sometimes so common, that I am led to believe that birds which nest on Melville Peninsula and even on Baffin Island may occasionally pass over or stop for a time at Southampton. It arrives a little later in the spring than the Lesser Canada Goose, the Lesser Snow Goose, and the Blue Goose, but considerably in advance of the Brant. In the fall its migrant flocks are composed of from one to three family-groups, which travel southward together. It has never been known to winter in the region. . . .

'On June 16 early in the morning I found a nest containing two eggs on a small, grassy island, about forty yards from the shore of a rather large lake two miles inland from the frozen bay. There was much ice in this lake, and I was able to make my way out to the island by leaping from chunk to chunk. The eggs were uncovered. When I returned early in the afternoon I found the female on the nest, and the male standing nearby, his head held downward as if he were trying to hide. As I drew nearer, he snaked his way slowly to the water's edge, slipped quietly in, and swam off rapidly, cronking loudly. In the nest were now three eggs. The nest was a broad cup, about five inches deep, which appeared to me to have been in use for several seasons. It was situated almost in the centre of the island, and was not sheltered in the slightest by any stone or vegetation. . . .

'On June 18 at the head of South Bay we found fifty-seven nests, all on islands in shallow lakes. Many of these were so close together as to suggest a sort of colony.

'The first young birds were seen on July 14. On this date I found one nest with only two eggs, one of which was just hatching, and several newly hatched broods of five and six young with their parents.

'The eggs, which number from two to six, are laid daily, after the set is begun. The first eggs are usually laid about June 15. If we may infer that most of the nests hold full, fresh sets by June 19, and that in most cases the young hatch about July 15, the period of incubation must be about twenty-seven or twenty-eight days.' (The eggs are dull white in colour, are similar to those of the Common Canada Goose, and average 3.14 to 2.04 inches, determined by one set of eggs in the Carnegie Museum.)

Richardson's Geese have also been recorded in 1925 at Craig Harbour, Ellesmere Island, and sporadically on western Greenland, and it may be on any suitable tundra of the north-east where it is not too much persecuted. They seem to migrate mostly along the western side of Hudson and James Bays through the Middle West.

CAPTIVITY

Richardson's Geese are not often seen in captivity. Until recently they were not discriminated from other small forms called 'Hutchins' Geese' and consequently there are no accurate records of their keeping and breeding in Europe. Mr Sibley reared some in

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Connecticut before 1940, and other breeders in America seem to have raised them successfully since; but it is difficult to be certain whether the stock is pure or crossed with other forms. They are pretty, pale little birds, possibly the most attractive of the species after *minima*.

BARNACLE GOOSE

Branta leucopsis

Anas leucopsis, Bechstein, *Orn. Taschenb.*, Th. 2, 1803, p. 424: Germany.

Branta leucopsis, Peters, *Check-List, Birds of the World*, 1, 1931, p. 150.

CHARACTERISTICS

A medium-sized Goose with a long neck and a short, slender bill. Head creamy or buffy white except for the hind part of the crown, an irregular line from bill to eyes, some small specks on the cheeks and a line around the bill, which are black; neck, upper back and upper breast deep black; mantle barred, the feathers grey, with a broad subterminal black and a narrow terminal white band; primaries and secondaries grey with black tips; rectrices black; tail-coverts, sides of rump and vent white; underparts silvery white, shading to pale grey, strongly barred with brownish grey and white on the sides and flanks.

Wing: 385–420 mm.; tail: 119–140 mm.; culmen: 27–32 mm.; tarsus: 63–74 mm.

Immatures: duller and less distinctly marked, the neck greyish and the upper parts brownish.

Downy chicks: greyish brown on the centre of the crown and upper parts, with the three usual pairs of whitish spots on the wings and back; brownish black lines from bill to and around the eyes; rest of the head pale yellow; underparts buffy white with a brown band on the upper breast.

Eggs: three to six, greyish white and dull, 76 × 50 mm. Incubation: 24–25 days.

DISTRIBUTION

Breeds in north-eastern Greenland, Spitzbergen and southern Novaya Zemlya. Winters in Ireland, the islands to the north of Scotland, the coasts of Great Britain, France (rare), Belgium, Holland, Germany, Denmark, Poland and the Baltic States. Accidental farther south and in North America.

GENERAL HABITS

Barnacle Geese frequent rivers and marshes in the hilly parts of the Arctic regions, nesting in lesser or greater colonies on rocky outcrops, niches and ledges in cliffs, in positions affording protection against foxes and other predators. They build more rarely on small, low islands in estuaries, and they use the same hollows year after year, filled with a few bits of moss and lichens and plenty of dark grey down. They feed on grass and leaves, and also on certain mosses. During the winter, and on migration, they resort

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21. Distribution of *Branta leucopsis*. (A) Breeding range; (B) Non-breeding range.
Branta ruficollis: (C) Breeding range; (D) Non-breeding range.

to all sorts of marshes and grasslands, always close to the sea. In flight and general behaviour, they resemble other Geese, particularly Canadas to which they are closely related, replacing that species in the north Atlantic islands; but they are not very wary, which explains the great decrease in their numbers during recent decades. They occasionally rest on the sea, but their habits are not nearly so marine as those of the Brents. They are very noisy and seldom stop squabbling and pretending to fight. Their call is a brief, abrupt, metallic, one-syllabled bark, 'ark', frequently and quickly repeated in different keys; they also have a shrill, triumphant note and lower conversational tones, all of the same harsh kind. They also frequently hiss, with snake-like movements of the neck, the tongue raised and showing threateningly.

Barnacle Geese were first found nesting in Spitzbergen by Koenig, and later (1891) in Greenland by Ryder, where their breeding area is restricted to the high Arctic part of the eastern coast from Scoresby Sound to Germania Land.

Salomonsen (*The Birds of Greenland*, 1950, pp. 71-75) writes:

'The Geese arrive in spring on May 20-23, in skeins of from fifteen to twenty, occasionally a hundred or more, and fly along the coast and westwards into the fjords and sounds. They are paired on the arrival and seek out the breeding place immediately. They nest in colonies on ledges and terraces on steep and inaccessible cliffs which either face a fjord or lake, or are situated not more than one kilometre from the nearest lake with a north, north-east or north-west exposure. The large colonies number up to 100-

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150 pairs, the usual size is less than fifty; sometimes only a few pairs form a colony and even solitary breeding pairs are known. The nest is a depression in sand or earth, used year after year, lined with quantities of mouse-grey down and greyish-white feathers. A terrace may be occupied by more than one nest, but there is at least a metre between two neighbouring nests. Egg-laying takes place from the end of May to early June. The eggs are greyish-white and measure on an average 76.9×50.9 mm. (based on eleven eggs: Loppenthin). Clutch-size: usually four to six, but two to nine recorded.

'It is evident that goslings hatched on precipitous cliffs some hundred metres above the ground cannot leave the ledges by their own effort. The method of transporting the young has not been fully explained, but some interesting observations have been made. Pedersen has witnessed both adults dropping down from the nesting-terrace to the shore of a nearby lake, each of them carrying a young one in their bills. C. Madsen has studied the colony on Dahl Skerry which is situated 35 metres up a cliff facing the sea. He observed that a goose, when chased from the nest, placed a young one on its back and flew down on the water where it called the other goslings. When he approached another nest the young ones managed the journey unaided, casting themselves from the cliff at a height of 30 metres and landing safely on the water. Pedersen observed a family walking down a gently sloping part of the mountain on their way to a lake. The families stay on the lakes for from one to two weeks and the young are then escorted to the fjord coasts. Here many families gather together into flocks, generally numbering from ten to fifteen pairs with young, and frequent preferably shores with low and sandy beaches.'

CAPTIVITY

Barnacle Geese are popular in captivity on account of their elegant shape and showy plumage, and also of their amusing ways and tame disposition. Their only drawback lies in their excessive and noisy chatter. They live and breed well in parks and gardens. They have certainly been kept in Europe for very many years and probably nested long ago, the earliest accurate record being one at the London Zoo in 1848. They have bred readily in many collections since, and they were well established at Woburn, among other places, before 1914. They stay full-winged as long as food and open water are available. Breeding pairs are fussy and noisy, but not really vicious, and they can be kept in numbers with other Geese without trouble. They feed almost entirely on grass, but accept grain, bread and mash. Today there is a large breeding stock in Europe, particularly a fine full-winged flock at Wormley Bury, in England, and it is also reared in America.

Barnacle Geese have crossed readily with Canada Geese, the offspring being fertile, and with most species of *Anser*.

RED-BREASTED GOOSE

Branta ruficollis

Anser ruficollis, Pallas, *Spic. Zool.*, fasc. vi, 1769, p. 21: Lower Ob, Siberia.

Branta ruficollis, Peters, *Check-List, Birds of the World*, 1, 1931, p. 150.

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CHARACTERISTICS

A very small Goose, the most beautiful of the whole tribe, with striking colours and an elaborate pattern. Bill small and very short. Two large white patches between the bill and the eyes; crown, rest of the face, throat, nape and hind neck deep black; ear-coverts and sides of the head bright reddish chestnut, surrounded by a white line which runs down on the sides of the neck; rest of neck and breast reddish chestnut, separated from the black upper parts and under parts by a white line; a broad white border along the sides and flanks; lower belly, vent and tail-coverts white; fine white lines across the greater wing-coverts.

Wing: 342-363 mm.; tail: 100-110 mm.; culmen: 23-27 mm.; tarsus: 52-58 mm.

Immatures: like the adults but duller, the black parts tinged with brown and spotted with white on the breast and wing; red parts paler, brownish cinnamon, greyish on the ear coverts; the white lines irregular.

Downy chicks: dark greenish sepia-brown above, with the forehead, spots on wings and back, and underparts greenish yellow; lores and a ring round the eyes blackish.

Eggs: creamy white, five to nine in number, 71×49 mm. Incubation: 25 days.

DISTRIBUTION

Breeds in the open and the wooded tundra of western Siberia, from the eastern borders of the Yamal Peninsula and the lower Ob, to the basin of the Khatanga, but it does not penetrate the Taymyr Peninsula. Winters mostly in the south of the Caspian Sea area, and also in the Syr Daria delta in the Aral region, travelling south along the Ob, Irtysh, Ural and other rivers, through the Kirgiz steppes. Occasional stragglers in Greenland, Iceland, Scandinavia and throughout Europe to Algeria, Egypt and Iraq. That it may have been a more common visitor to Egypt in the past is indicated by its representation in ancient tombs.

GENERAL HABITS

In its restricted breeding range the Red-breasted Goose behaves much as does the Barnacle farther west in more mountainous and rocky countries, frequenting the vicinity of cliffs, bluffs and holes in banks affording proper nesting sites sheltered by brush and low shrubs. It breeds in small colonies, or singly, in mere hollows thickly lined with dark brown down. The general habits are those of all Geese; the birds are fussy and vocal like Barnacles, but more dainty in their ways and postures. Although the neck is fairly long, it looks thicker as the feathers are less tight, and it is held gracefully curved most of the time. Their voice is high-pitched, pleasant and rather musical, if a little harsh, their calls consisting of a two-syllabled staccato 'Kee-kwa', 'Kik-wit', 'ti-che' and so forth, the second note a little broken. They hiss frequently and squeak constantly in an irritated way while feeding.

In their winter quarters around the southern shores of the Caspian and Aral Seas, and elsewhere on migration, they feed on the grass and crops of the steppes, plucking their

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food with very fast movements of the head. They retire to salt water at night and roost on sand-banks and islands. They frequently associate with Lesser White-fronts.

Red-breasted Geese arrive at their breeding grounds at the end of May or the beginning of June, but they begin their journey north very early, leaving their winter quarters in February and March; they stop at many points on the way, reaching Astrakhan in March and the Kirgiz steppes in April. They lay early in June, and Seeböhm observed newly hatched goslings in the Yenisei valley at the end of that month. H. L. Popham found nests at the foot of a cliff where Peregrine Falcons and Rough-legged Buzzards were breeding.

Although their flesh is of poor quality, the various natives kill great numbers of them; the population, however, has remained large so far despite the comparatively small breeding and wintering ranges of the species.

CAPTIVITY

This lovely Goose has long been very rare in captivity as only a few stray specimens, captured in western Europe, found their way to Zoological Gardens. There was a female in London in 1853, which lived for many years, and two birds in Amsterdam, captured on the island of Texel in 1883. Jamrach finally imported some from Russia in 1903. Blaauw reports that five or six specimens have been exhibited in Holland, and he had one at Gooilust in 1906. The first breeding success took place at Woburn, as late as 1926, and the Duchess of Bedford reported (*Avicult. Mag.*, 1927, p. 65):

'Nine of these birds were obtained, some from Mr Carl Hagenbeck, and some from Mr Falz-Fein, between 1911 and 1913. They showed no sign of nesting until July 1926. One of the birds was then missed, and on search being made was found sitting on six eggs. The eggs were lifted and put under a hen. Four goslings were hatched, one of which died after three days. Another nest of six eggs was found, all of which had been destroyed. This probably accounted for a single egg which was found a week later and proved fertile. The eggs were removed from the hen and put in an incubator to hatch out to avoid the danger of the hen killing the young birds by trampling upon them. The period of incubation was twenty-five days. The young birds were put in a foster-mother (brooder) on a grass lawn. . . . They did well, feeding on grass only. In six weeks' time they showed a good deal of colour in their feathers, and by the end of September were in full plumage as regards colour and markings. At this day (17 January, 1927) all survive.'

From 1926, Red-breasted Geese bred almost every year at Woburn, and the locally reared birds started nesting in their third year. Several were sent to Clères, where they joined a few imported birds received soon after 1920, and they bred there, as they did later on in various collections in England. During the last few years young have been reared in some numbers at Clères, at Leckford, and at Whipsnade, as well as at a few other places in England, including Woburn, where some thirty were hatched in 1950. The species has also been kept in America during the last thirty years, but the first breeding success was achieved by Dillon Ripley in 1950, when three goslings were reared

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at Litchfield. A number of imported birds have also arrived from Russia in Western Europe and in North America during the last two years.

Red-breasted Geese are easy to keep in captivity. They are of a very confident disposition and Russian authors report that wild-caught birds become tame in a few days. They stand both heat and cold well, and although noisy, fussy and demonstrative, they prove quite harmless to other birds. They are most amusing in their calling and posturing. Many pairs can be kept together; all they require is the ordinary treatment for Geese. Altogether, they are the best birds of the tribe, as suitable for small gardens on account of their small size and dainty ways, as for large parks. Curiously enough, they usually nest in wide open locations, such as the middle of a lawn or meadow.

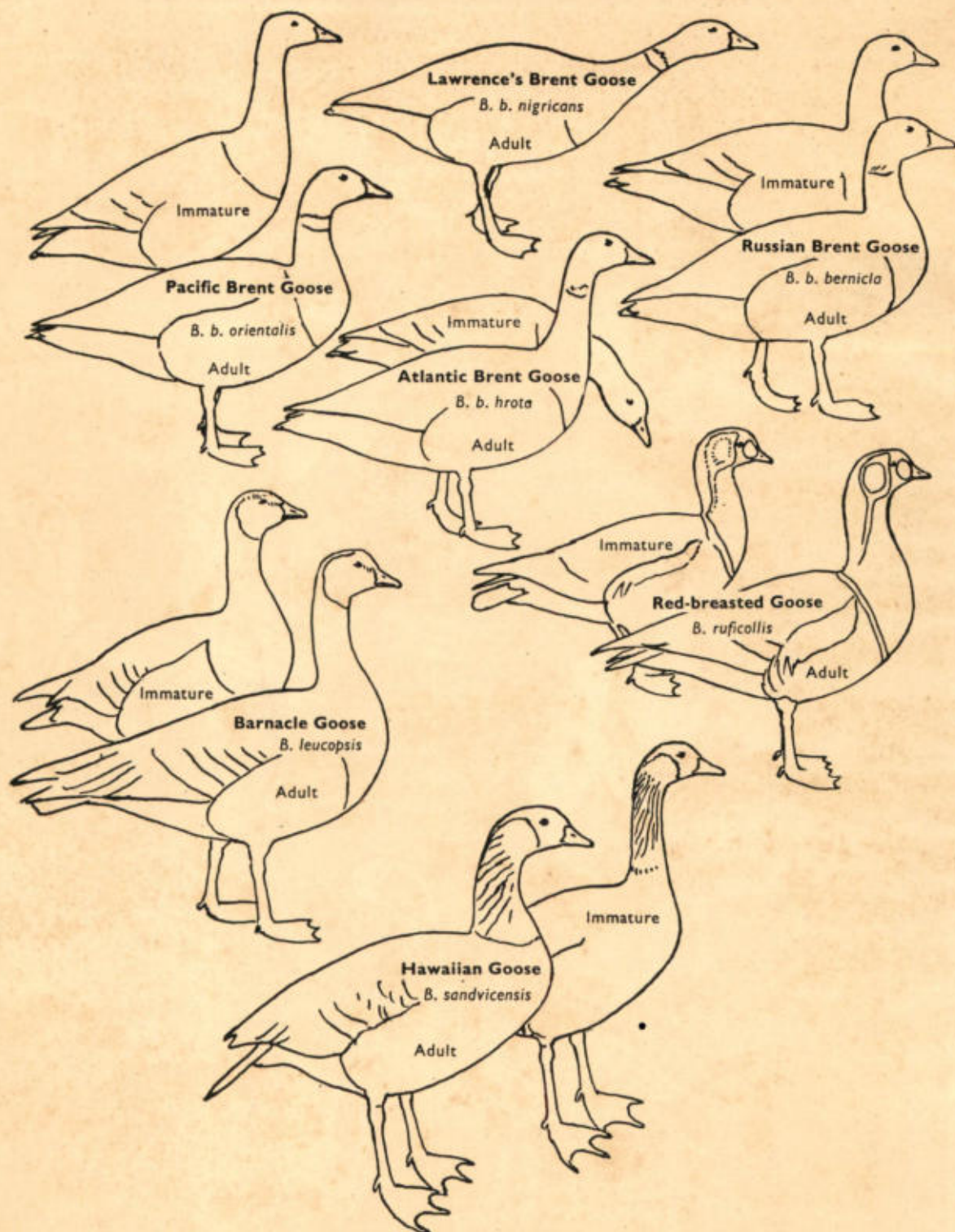
Brent Geese

Branta bernicla

A small, dark species with a comparatively slender bill, a short neck, long wings, and a very short tail, the rectrices never longer than their coverts. It has a strikingly different appearance from the other species of *Branta*. Head, neck, upper back and breast plumbeous black, contrasting more or less with the lighter underparts; sides of body and flanks broadly barred with white or pale brown; vent and tail-coverts white; a broad, striated white collar on the lower neck, interrupted behind and sometimes in front. The sexes are practically alike in size.

The geographical variations of the Brent Geese (or Brants, as they are called in N. America) are interesting, as the species ranges throughout the extreme northern shore and islands of the whole northern hemisphere. In the eastern part of Arctic America, in Greenland, in Spitzbergen, in Franz Joseph Land, and probably in the north of Novaya Zemlya, the breeding populations have very pale to light grey underparts (*hrota*). Others with darker, brownish grey underparts (*bernicla*) occupy the Arctic coast of Eurasia and the islands to the north from Novaya Zemlya to the Khatanga River in Siberia; farther east to the Tchukchi Peninsula, and also in Arctic north-western America, probably as far as the Perry River region or a little farther east, a blackish form occurs with very dark underparts, the white-spotted collar extending across the foreneck, and broader white borders to the feathers of the sides and flanks (*orientalis*). Between these very dark populations, and the pale-bellied ones farther east, exists the remnant of an almost extinct form, much like *bernicla* in the medium grey colour of the underparts, but with more white on the collar and sides, as in the *orientalis*; it is the true *nigricans* of Lawrence.

There is some evidence of a continuous cline from light to dark in Europe and Siberia, with transitional and mixed populations and many intermediate individuals making identification sometimes difficult. But not many cases of mixing or blending between *orientalis*, *nigricans* and *hrota* have yet been reported by the few observers who have



IX. Brents



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visited the grounds where they meet in central Arctic Canada and the northern islands. Flocks and individuals of two forms have been reported in the same areas, notably the Perry River region (Gavin; Hanson, Queneau and Scott), and Prince Patrick Island (C. O. Handley). It appears that the two forms seldom gather in mixed flocks. No mixed pairs or broods, nor intermediate specimens have been noticed on St Patrick Island or at Perry River, and few elsewhere. It does not seem admissible, however, to recognize two distinct species, as all Brents are completely alike in shape, size, life habits and behaviour.

We no doubt have here another example of those not unusual cases when two subspecies of the same species, reunited probably through climatic and ecological circumstances, behave like two species, or rather two colour phases, over a small overlapping area. The more or less colonial habits of Geese and the tendency of families, which remain long together, to return to their old breeding grounds, preserve the isolation of populations; young birds of the same families are apt to pair to one of their close relatives, and they mate for life. All this has to be taken into account in the present case. Also the breeding grounds are often abandoned, and new ones established, sometimes at a considerable distance. Birds have to move to new districts because of persecution by man and predators, or of changes in climate, and when nesting territories are regularly visited, shifts are frequently observed. The taxonomy of *Branta bernicla* has been discussed in a special paper by J. Delacour and J. Zimmer (*Auk*, 69, 1952, pp. 83-84).

DISTRIBUTION

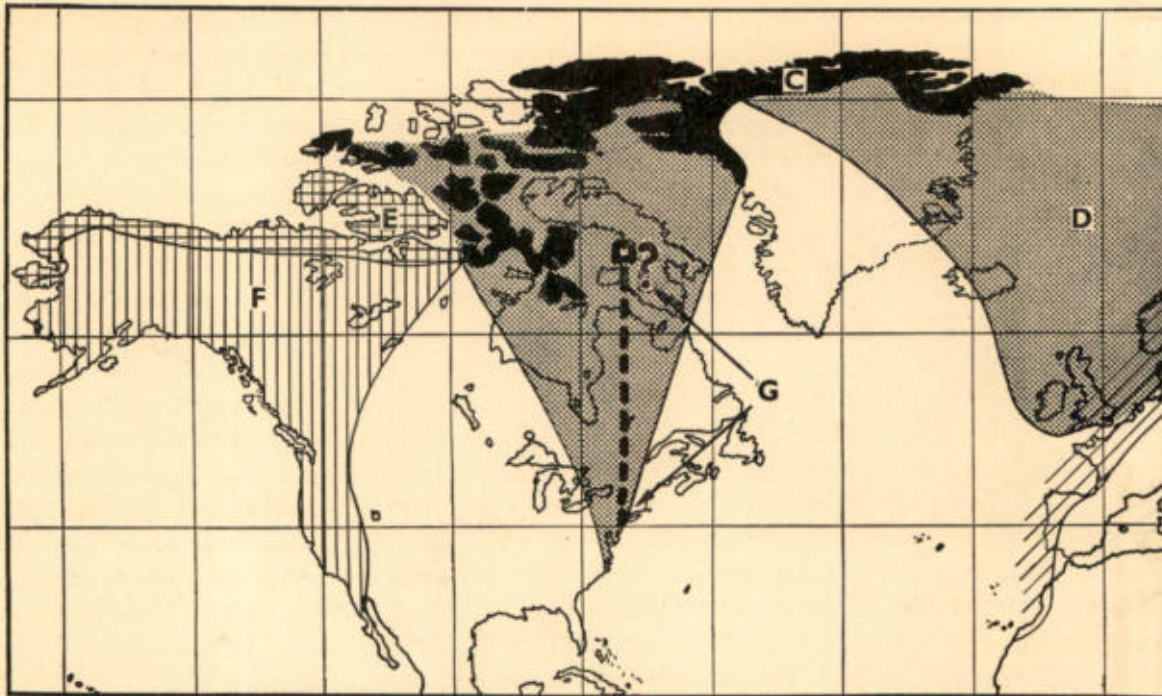
Brents are more marine and breed farther north than any other Geese, and they have a circum-polar distribution. They winter along the coasts of northern and western Europe, south to Morocco, the British Isles, north-eastern Asia and North America. They migrate through the intermediate areas, and stragglers occur elsewhere, sometimes within the range of another sub-species. They always remain on or close to salt water, but fly overland in certain areas.

GENERAL HABITS

Brents are completely marine in their habits during the greater part of the year, although they breed near fresh water, chiefly in the deltas and wide valleys of the Arctic, but seldom far from the sea. They often nest on islands off the coast. Apart from the nesting season, however, they resort exclusively to salt water, living on tidal flats, resting on the sea at high tide and at night; feeding on marine vegetation, mostly on eel grass (*Zostera*), but also on other grasses, on certain algae (*Fucus*) and on small shellfish and invertebrates. They are a great deal more aquatic than the other species of *Branta*.

Brents are stocky and rather Duck-like in aspect, but they fly much like other Geese, and particularly swiftly, although seldom in V-shaped formation. They are sociable and gregarious, assembling by the hundreds, feeding in water, up-ending like Mallards, pulling out eel-grass roots which they particularly relish. Wigeons and other Ducks

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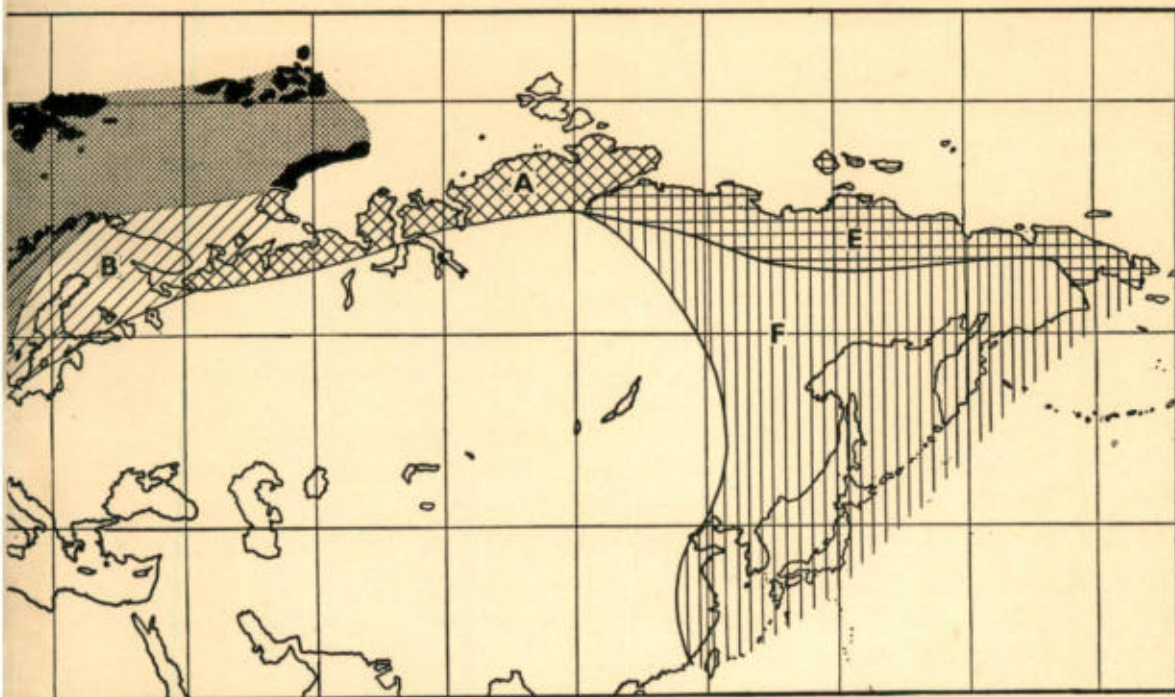
22. Distribution of *Branta bernicla*. *B. b. bernicla*: (A) Breeding range; (B) Non-breeding range. *B. b. hrota*: (C) Breeding range;

often accompany them and benefit by their efforts. When flightless, they dive well.

Brents are not noisy and their voice is guttural, metallic, but still pleasant to hear. They emit one- or two-syllabled calls on different tones, low or shrill, the neck extended forward. But they are quicker, and less deliberate and fussy in their ways than Barnacle or Canada Geese, and it is reported that they indulge in pursuit flights and aerial display rather like Ducks. The nests are often built among rocks and debris, also on the tundra grass, sometimes in colonies, sometimes isolated, often in company with Eiders. They are usually substantially made of grass, moss, lichens and lined with down; but on shingle banks they may be nothing but hollows among stones. The males guard them faithfully. At that season Brents feed mostly on grasses and other plants. The chicks are taken to sea by the parents as soon as they hatch, and at once they swim and dive perfectly, several broods often gathering together under the vigilant watch of the old birds. They grow very fast and they can fly by the middle of September, when the parents have recovered their power of flight. They leave as soon as the ice forms, early in October. They fly high overland, in irregular formation, but over water they almost touch the surface as a rule.

Brents are a great attraction on the coasts of Europe and America during the winter.

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(D) Non-breeding range. *B. b. orientalis*: (E) Breeding range;
(F) Non-breeding range. *B. b. nigricans*: (G) Hypothetical range.

CAPTIVITY

Brent Geese do well enough if plenty of grazing and some animal food is available, but they are decidedly less robust and more difficult to accustom to captivity than other species. They are quite harmless to weaker birds, but often remain shy. Their ways are less amusing and less graceful than those of other *Branta*; their plumage is rather dull and sombre. They had never nested in confinement until very recently (1953), even when kept in very large parks, although a few hybrids with other Geese have been mentioned. For all these reasons, they are not very popular on ponds and in gardens.

RUSSIAN BRENT GOOSE

Branta bernicla bernicla

Anas bernicla, Linné, *Syst. Nat.*, ed. 10, 1, 1758, p. 124: Sweden.

Branta bernicla bernicla, Peters, *Check-List, Birds of the World*, 1, 1931, p. 149.

CHARACTERISTICS

Head, neck, upper back and upper breast dull black; an irregular, striated patch on each

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side of the neck formed by the white tips of the feathers, the foreneck remaining pure black as well as the hind neck; rest of upper parts hair-brown; sides of the rump, vent and tail-coverts white; rectrices and flight-feathers sooty black; sides of body and flanks greyish brown, the feathers tipped with whitish brown, forming bars; rest of underparts deep greyish brown.

Wing: 295–360 mm.; tail: 85–120 mm.; culmen: 29–37 mm.; tarsus: 55–66 mm.

Immatures resemble the adults, but are duller, with no white patches on the neck and broad whitish tips to the wing-coverts and rectrices, most feathers narrower. After the first moult, the neck patches are present, but small, and the white tips on the wing and tail-feathers remain.

Downy chicks are yet undescribed, but they are probably intermediate between those of pale Atlantic and the dark Pacific Brents.

Eggs: smooth-shelled, creamy white, 75 × 47 mm. on an average, three to five, rarely six, seven or eight. Incubation period not definitely known, reported as 30 days, but probably 24 or 25.

DISTRIBUTION

The Arctic tundra, and islands to the north of Russia, western Siberia, from southern Novaya Zemlya to the Khantanga River. Wintering on the coasts of northern and western Europe, and of western Morocco.

GENERAL HABITS

The Russian Brent, the species commonly wintering in Europe, travels along the coasts of Russia and Scandinavia on its way south, and back. Despite the recent diminution in numbers, due to excessive depredation and persecution but also to the great reduction of eel-grass some years ago following a disease of the plant, these Brents are still numerous.

CAPTIVITY

This is the Brent most commonly seen in captivity in Europe, and also the least attractive in colour. It was formerly captured in great numbers in Holland and sold at low prices, but it is better protected today (also much rarer) and therefore less easily procurable. A pair in the collection of Dr R. Pilcher, Boston, Lincolnshire, since 1939, nested in 1953, close to the nest of Barnacle Geese, a first record for the species. Two eggs were laid, one of which hatched, but the chick did not survive.

ATLANTIC BRENT GOOSE

Branta bernicla hrota

Anas hrota, O. F. Müller, *Zool. Dan. Prodr.*, 1776, p. 14: Iceland.

Branta bernicla hrota, Peters, *Check-List, Birds of the World*, 1, 1931, p. 149.

THE BRENTS

CHARACTERISTICS

Differs from the Russian Brent in its much paler underparts, which vary considerably in colour from light brownish to whitish grey, the darker base of the feathers producing a more or less mottled appearance. As in *bernicla*, the white neck patches are small and restricted to the sides and the pale borders to the sides and flanks feathers are narrow. Same size and measurements. Albinistic specimens, with brown head and neck and mottled white and pale brown upper parts are not uncommon.

Immatures: as in *bernicla*, but lighter below.

Downy chicks: light mouse-grey above, darker on the centre of the crown; lores and ring around the eyes dark brownish grey; spots on the wings, the sides of the upper and lower back whitish; a broad band of light brownish grey on the chest, followed by a wide white belt; rest of underparts pale grey, the thighs brownish.

Eggs: as in *B. b. bernicla*.

DISTRIBUTION

Breeds in Franz Joseph Land, probably northern Novaya Zemlya; Spitzbergen, northern Greenland, eastern Arctic Canada and the islands to the north. Winters on the coasts of the British Isles, Holland, Germany, and the Atlantic coast of North America, from New Jersey to North Carolina. Rare or accidental elsewhere, except on migration in the intermediate regions.

GENERAL HABITS

The Atlantic Brent does not differ in habits from the darker Russian form. It is abundant in winter on the coasts of north-eastern America, of Ireland and of western Great Britain, but scarce farther east and south. Both in America and in Europe it meets with the darker forms in several areas. Its migrations in America have been studied by Harrison F. Lewis (*Auk*, 1937, pp. 73-95) and Salomonsen has given a good summary of its life in Greenland (*The Birds of Greenland*, 1950, pp. 78-84):

'The northward movement takes place along the outermost skerries, and the fjords and bays are seldom visited. The breeding-grounds in Thule District are reached in the first half of June, but the greater part of Brents observed appear to be still on passage northwards to Ellesmere Island and north Greenland. The earliest observations in northernmost Greenland are June 11 (Wulff on northern coast of Peary Land) and June 17 (Bessels in Hall Land).

'The migration in W. Greenland may be linked up with that in America. According to H. F. Lewis, the Brent leaves its winter quarters along the Atlantic coast of the U.S. in early March and reaches the feeding-grounds in the northern part of St Lawrence Gulf in early May. When leaving here at the end of May it makes a long flight overland, covering about 1,000 km., to James Bay or Ungava Bay. The Greenland population continues from Ungava Bay to the north-east, moving south of the firm ice of the western Davis Strait and reaching Greenland at about the Polar Circle, as mentioned above. On the migration it avoids the large, unbroken areas of solid ice, and when the ice after

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severe winters still covers Baffin Bay in early June it will interrupt its flight and rest, as noticed by Bertelsen at Godhaven in 1914 when more than 1,000 Brents were congregated south of the ice-border.

'In East Greenland the Brent was discovered by Nathorst in 1899. From its winter quarters in the British Isles it moves along the south and west coasts of Iceland, which are passed from early April to mid- or end May, and continues across the Danmark Strait to Angmagssalik District. Here it occurs annually in great numbers in the middle of May (earliest record May 6), usually between May 11 and 19, only seldom in June (Helms). It appears to rest here and is often seen on water or on land. The skeins continue west or north-west, and this flight-direction implies that the Brent crosses the ice-cap and heads towards the inner parts of Egedesminde District. Here the country is penetrated by large fjords with strong tides and consequently with much open water. A most important observation was made by E. Knuth on his crossing of the ice-cap in 1936. On May 30 he saw large skeins of geese, which so late in spring could only be Brents. They came from the south-east and numbered 500-600 birds. The observation was made on lat. 68° 18' N., long. 47° 50' W. This locality is situated on the ice-cap on the line connecting Angmagssalik and Egedesminde. . . .

'The Brent breeds generally on low islets and skerries off the coast, often in company with Eiders. The nest is placed in the grass and is heavily lined with down, which is a shade lighter than that of the Eider. Egg-laying starts immediately after arrival. Eggs are found from June 14 to July 8. Clutch-size three to six, usually four. Incubation lasts 21-28 days. Goslings have been recorded from mid-July to mid-August.'

CAPTIVITY

This light-bellied sub-species is the prettiest and most desirable Brent in captivity, but it is less often seen in collections than the darker birds.

LAWRENCE'S BRENT GOOSE

Branta bernicla nigricans

Anser nigricans, Lawrence, *Ann. Lyc. Nat. Hist. New York*, iv, 1846, p. 171: Egg Harbour, New Jersey.

Branta bernicla nigricans, Peters, *Check-List, Birds of the World*, 1, 1931, p. 449 (part).

CHARACTERISTICS

Resembles closely *B. b. bernicla* in colour, but is rather browner in general tone. The white collar extends to the foreneck where it is very wide, and the pale borders to the feathers of the sides and flanks are broader.

Size as in other forms. *Immatures, chicks and eggs* still undescribed.

For a detailed study, see Delacour and Zimmer (*Auk*, 69, 1952, pp. 83-84).

DISTRIBUTION

Breeding range unknown, probably in the north-east of Hudson Bay, migrating overland to the coast of New Jersey, and surviving in very small numbers only.

THE BRENTS

GENERAL HABITS

This still somewhat mysterious bird is certainly very rare and possibly nearing extinction. We know very little of its whereabouts, except that a very few have been found, together with Atlantic Brents, on the coast of New Jersey and farther south during the winter. Three specimens in the American Museum, New York, are all that exist in collections. Harrison Lewis, in his study of the migrations of the American Brent (*Auk*, 1937) reports that two distinct flights of Brents occur in the spring at the Bay of Seven Islands, in the St Lawrence Gulf. He writes that the local hunters differentiate definitely between an early flight of a small number of dark Brents, and a later and larger one of lighter birds.

'The larger body of migrants that goes north by way of Ungava Bay somewhat later in the season is presumably the breeding Brant of the more northern Arctic islands. If the hunters at Seven Islands are correct in maintaining that the birds in the early flight of Brant at that place were easily distinguished from the birds in the main flight by morphological characters, then the group of Brant migrating north by way of the Connecticut River, Ile Verte, Seven Islands, and James Bay, and having breeding grounds around the north end of Hudson Bay, more or less distant from those of the majority of the Brant of eastern North America, may have become sufficiently differentiated from other Brant to form a recognizable race. However that may be, this smaller group of Brant, with the more western spring migration route, appears to be nearly extinct at present.'

Birds nesting on Southampton Island are *B. b. hrota*.

The fact that this sub-species of Brent perhaps breeds farther south than the others may account for its near disappearance.

CAPTIVITY

Nothing has been reported on this Brent in confinement.

PACIFIC BRENT GOOSE

Branta bernicla orientalis

Tougarinov, *Faune de l'U. R. S. S., Aves*, 1, No. 4, *Anseriformes*, *Acad. Sc. U. R. S. S., Moscow*, 1941, p. 180: eastern Siberia.

Branta bernicla nigricans, Peters, *Check-List, Birds of the World*, 1, 1931, p. 149 (part).

CHARACTERISTICS

The darkest of all Brents, the upper parts more sooty and uniform, the abdomen and lower breast uniform and fuliginous brown, contrasting a little or not at all, according to age and individuals, with the dull black of the upper breast; neck heavily marked with white on the sides and in front; sides and flank feathers broadly bordered with white.

Wing: 307-346 mm.; tail: 88-102 mm.; culmen: 32-37 mm.; tarsus: 53-66 mm.

Cackling Canada



Taverner's Canada



Richardson's Canada



Pacific Brent



Atlantic Brent



Dusky Canada



Atlantic Canada



Barnacle



Hawaiian



Western Bean



Swan Goose



Red-breasted



Pinkfoot



Perry River Whitefront



Lesser Whitefront



European Whitefront



Pacific Whitefront



Western Greylag



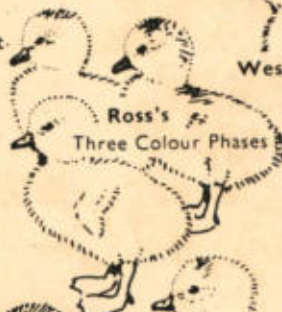
Eastern Greylag



Bar-headed



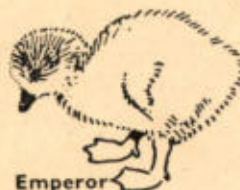
Ross's
Three Colour Phases



Greater Snow



Emperor



Lesser Snow
Blue Phase



Lesser Snow
White Phase



X. Goslings of Brents and True Geese



THE BRENTS

Immatures: as in other forms, but considerably darker and more uniform below, the neck, breast and belly of the same sooty colour.

Downy chicks: also similar, but much darker grey above and below, the whole crown and sides of head blackish.

Eggs: as in other forms, but deeper cream in colour, four to eight in a clutch.

DISTRIBUTION

Breeds in the Arctic tundra of north-western Siberia west to the Khatanga River delta; New Siberian, De-Long and Wrangel Islands; north-western America from the Bering Strait to the Perry River, and islands to the north. Winters on the coasts of China and Japan, where it is now rare, and of western North America from Vancouver Island and southern British Columbia, to Lower California.

GENERAL HABITS

The Pacific Black Brent does not differ from the other sub-species in habits or behaviour, being strictly a coastal bird. A great deal of study has been made of this form in western North America, which has been well summed up by Kortright (*The Ducks, Geese and Swans of North America*, 1943, pp. 108-9).

'In Alaska the nest of this species is a depression in the moss or grass near the lakes out in the tundra. Bent (1925) says: "The nests of this species are the most beautiful nests I have ever seen of any of the ducks and geese; they are great, soft, thick beds of pure, fluffy down, unmixed with the tundra rubbish so common in nests of other species; the down is a rich, handsome shade of . . . deep brownish drab, flecked with whitish; it must make a warm and luxurious blanket to cover the eggs." The Black Brant lays from four to eight eggs, but five seems to be the commonest number; they are olive-buff, or cream colour, and average 2.80 by 1.87 inches. As is usual with geese, the male stands ready to guard the nest while the female is incubating. Hoare, quoted by Bent (1925), relates that one summer he witnessed a battle between a male Black Brant and three gulls. The female was on the nest and did not move. The gulls kept returning to the attack and were very fierce. Usually they are cowardly. Eventually the Brant, although badly mauled, drove them away.

'The main flight northward takes place in March and early April and the birds arrive on their breeding grounds early in June. In the autumn, migrating flocks pass through the Bering Sea during the last half of September and the first half of October to reach the coasts of California in October and November.'

The movements of the Asiatic populations are less well known, but Tougarinov (1941) gives some interesting information on their migrations. They pass through Yakoutsk at the end of May and arrive at the mouth of the Indigirka the first week in June, reaching that of the Lena a week earlier. Eggs have been found on the New Siberian Islands early in July, and on Wrangel Island the last days of June. Birds from the more southern parts migrate north to moult, but, according to Tougarinov, only the males, the females remaining with broods, the moult beginning by July 20. All birds can fly and leave their

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northern range after August 15. They travel a different route in the autumn than that of their spring flyway.

CAPTIVITY

The Pacific Black Brent is occasionally kept in captivity in California and other west coast states, and in Japan, but seldom in eastern North America and in Europe. It is a more attractive bird than the commoner Russian Brent, the large white collar and flank markings showing well against the blackish background of the general plumage. Because of the long-standing confusion of the different forms, it is difficult to tell when it first reached European collections, but we imported a pair to Clères from California in 1937, and there are several birds now in the New Grounds collection at Slimbridge. Pacific Brents behave exactly like the other sub-species in confinement.

Ducks

SUB-FAMILY ANATINAE

THE NUMEROUS SPECIES of Ducks form the rest of the family *Anatidae*. Their characteristics are a tarsus scutellated in front (with a very few exceptions), a double annual moult, sexual dimorphism in plumage in most cases, and always in voice and in display, which is generally complicated. As a rule, the male has a bony bulla of the syrinx, big on the left side, small or absent on the right, which never exists in the female. In the majority of species, breeding males are brightly coloured, but they assume a dull eclipse plumage after the breeding season; in those whose plumage remains almost the same throughout the year, and in the females, a suggestion of eclipse is often discernible. In nearly all species, the wing shows a brilliant, usually metallic speculum.

Although males watch the nest and help in the education of the young in several genera and species, most of the drakes leave the females during incubation and take no part in the rearing of the brood. They congregate in flocks and migrate separately. New pairs are formed each year, but if they have a chance, the same male and female will reunite.

The *Anatinae* can be divided into seven tribes. Among them are found birds which feed habitually on land by grazing, superficially resembling the Geese; the majority, however, feed on the water, while others dive to gather submerged plants, invertebrates or even fish. Between the goose-like Ducks, which walk with ease and grace, and the divers, hardly able to progress on land, there are many intermediates; the degree of adaptation to life on land or on water, fresh or salt, is not usually indicative of close relationship.

The Ducks differ little from the Geese and Swans in their general anatomic characteristics. Their chromosome number is the same as in Swans.

SHELDGEESE AND SHELDUCKS · TRIBE TADORNINI

THE BIRDS of this tribe form a group of large waterfowl closely related to the River Ducks (*Anatini*), to which they are linked by species that form a gradual transition between them. But, at the opposite end, they also include large, long-legged grazing

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species which superficially resemble Geese and have long been called so in vernacular terms. There is, however, no really close affinity between the true Geese (*Anserini*) and the Sheldgeese. They differ widely in structure, morphology and habits.

The members of the different genera of the tribe *Tadornini* have the bill comparatively short and thick, or depressed and slightly turned up at the tip; the legs long and inserted well forward; the neck short. The colouration in the two sexes is either alike or unlike, but nearly always bright in both, while the voices of the male and female differ in a striking way. The males have a large asymmetrical bulla on the syrinx, except in *Cereopsis*. The latter aberrant and primitive genus is also the only one with the tarsus reticulated in front, all others having it scutellated. There is a bony knob on the bend of the wing in both sexes. The pattern of the downy chicks is generally bold, with sharp contrasts; the upper parts are black, grey or brown, usually forming a cap on the head; the underparts are white or pale grey; there are showy white marks on the wings and back, often fusing into a longitudinal stripe. All the *Tadorna* chicks are very similar and have a dark cap down to the eyes, a dark band on the hind neck connecting it with back, and a white face. Those of *Chloephaga* and *Cyanochen* resemble them in pattern, but have a dark line from bill to eye and white bands above the eyes, the cap being reduced to a broad central stripe. Those of *Alopochen* are intermediate, while the chicks of *Neochen* have a bold black patch on the ear-coverts. Young *Cereopsis* are very similar to *Chloephaga*, black and white, but they have a black facial mask and very little white on the wing. The chicks of *Chloephaga hybrida* are very pale, almost white, but they show faint indications of the general pattern of the genus. Downy young of *Tachyeres* have a peculiar pattern which, however, recalls *Chloephaga* better than any other genus, and those of *Lophonetta* are somewhat intermediate between the Shelducks and Pintails, as are also the adults.

With the exception of the aberrant genera *Cereopsis* and *Tachyeres*, the inclusion of which in the present tribe is only tentative, all *Tadornini* possess a large metallic wing-mirror on the secondaries or on the greater coverts; the lesser and median wing-coverts are plain-coloured, white in most cases. The adult male of *C. hybrida* is pure white, but both females and immature males of that species have the normal wing of the genus.

Sheldgeese and Shelducks are widely distributed throughout the world, but none are found in North America. Their affinity to other Ducks is shown in their ability to cross with many of them, not only with species of their own tribe. They rarely cross with true Geese. We shall, however, call a number of them 'Geese' in vernacular English, as they have so long been known as such by laymen.

KEY TO GENERA OF TADORNINI

- | | |
|--|---|
| 1. Wing with a metallic speculum, or entirely white | 2 |
| Wing without a metallic speculum, and mostly grey | 7 |
| 2. Bill high, narrow and short (exposed culmen under 40 mm.) | 3 |
| Bill flatter and long (exposed culmen over 40 mm.) | 5 |

DUCKS

3. Lesser wing-coverts white	<i>Chloephaga</i>
Lesser wing-coverts not white	4
4. Lesser wing-coverts bluish grey	<i>Cyanochen</i>
Wing-coverts greenish black	<i>Neochen</i>
5. Wing-coverts white	6
Wing-coverts brown	<i>Lophonetta</i>
6. Legs long	<i>Alopochen</i>
Legs short	<i>Tadorna</i>
7. Bill short, legs long (over 100 mm.)	<i>Cereopsis</i>
Bill long, legs short (under 50 mm.)	<i>Tachyeres</i>

GENERAL HABITS

Tadornini show consistent peculiarities in their habits, and they are even more clearly related in their ethology than in their morphology. They differ radically from the true Geese in their behaviour. Their main characteristic is their great intolerance of and pugnacity toward birds of their own tribe, or any other which they imagine to be possible competitors. Although they often gather in flocks when immature or after the breeding season, they never are truly gregarious, like the Geese, and old breeding birds remain quarrelsome at all times. They mate for life, and each adult pair keeps an extensive territory during the nesting season, fighting intruders fiercely.

Males and females have different displays. That of the male is simple, consisting generally in vertical movements of the head and neck, accompanied by much shrill or hoarse whistling or whooping. At the same time, they expose their wings and puff out their chest more or less elaborately. The females indulge in a special incitement courtship, with extended neck and vertical or side movements of the head, which is akin to that of river Ducks; there is much angry, loud cackling, running and swimming alongside or around the male. In their breeding behaviour, *Tadornini* stand close to other Ducks.

The eggs are smooth and glossy, not rough as in the Geese; only the female incubates, but both parents care for the young. They nest either in holes in the ground or in trees, or they build open nests in tall grass or under a bush. Sexual maturity, and the pugnacity connected with it, are reached the second or third year. Adults can dive when necessity arises, but many species are little aquatic.

Typical Sheldgeese are vegetarians and adapted to grazing; Shelducks are more omnivorous, a few even feeding mostly on animal matter. They are land birds as a rule, only the very specialized Kelp Goose and the aberrant Steamer Ducks living habitually near salt water. Two of them, the Orinoco Goose and the Rajah Shelduck, are prone to perch on trees.

All are indifferent sporting birds, as they are not very fast on the wing, and the flesh of the majority of them is poor.

CAPTIVITY

The striking colour pattern and elegant shape of Sheldgeese and Shelducks have made

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them of great interest as ornamental birds. Most of the species also prove easy to feed, hardy and inclined to breed. They have therefore long been popular with amateurs and in zoos. Their drawback, however, is their bad temper, which, with the exception of a few species, necessitates the isolation of each breeding pair in a special pen, unless they can be kept practically at liberty in hundreds or thousands of acres. Even then losses must be expected from spring fighting. One condition of success is an unlimited supply of good grass. Not much water is needed in many cases. Besides grass and other vegetable growth, all that is necessary is to feed them a limited quantity of grain or mash, but Common Shelducks require some animal food, and Steamer Ducks plenty of it. So far, Kelp Geese have proved impossible to feed satisfactorily. The parents rear their brood with great care and they may advantageously be allowed to do so if they can be protected from vermin during the first few weeks. But if this is not possible, the eggs should be entrusted to a hen or placed into an incubator. The chicks need plenty of tender grass and lettuce, and it is a good plan to move their coop and pen over a good lawn three or four times a day. Grass may be supplemented with duck weed, egg food, biscuit meal or suitable pellets. They are usually easy to rear and grow fast. Young birds can be associated in numbers until the second, and sometimes the third year, if there is sufficient space. Most Sheldgeese are good stayers and can be kept full-winged, but Shelducks and *Cereopsis* are inclined to stray, particularly soon after they can fly.

All species of *Tadornini* have been kept in Europe and in America, and all have bred in captivity with the exception of the Kelp Geese and the Steamer Ducks.

VII

THE CEREOPSIS

Genus *Cereopsis*

Latham, *Ind. Orn., Suppl.*, 1801, p. lxvii.

Type by monotypy, *Cereopsis novae hollandiae*, Latham.

THE Australian species of the genus *Cereopsis* has no very close living relative, although the extinct *Cnemiornis calcitrans* from New Zealand was probably similar. It is a peculiar bird, quite different on the one hand from typical Sheldgeese in its reticulated tarsi and its syrinx without bulla (both characters indicating a primitive condition) and also in the pattern of the adult, its skull, and its bill covered by a fleshy cere. On the other hand, the colour pattern of the downy young, the general proportions, behaviour and postures of the adults, as well as their quarrelsome temper, indicate relationship with *Chloephaga*. But the real place of this primitive genus remains somewhat uncertain.

The sexes are alike in plumage, but the voice differs; it is loud and trumpeting in the male, low and grunting in the female. The bill is short and thick, covered with a greenish yellow cere except at the tip, which is black with a strong nail. The webs are small, and the nails long and sharp. The nest is placed on the ground, in grass or among low bushes.

CAPE BARREN GOOSE

Cereopsis novae-hollandiae

Latham, *Ind. Orn., Suppl.*, p. lxvii — New South Wales — Islands of Bass Straits.

Peters, *Check-List, Birds of the World*, 1, 1931, p. 145.

CHARACTERISTICS

A large, light ashy grey Goose-like bird, with a whitish crown, the tips of the primaries and secondaries, the rump and tail black; big blackish spots on the tertiaries and wing-coverts. The wings are broad, the tail long and square. Iris reddish brown. Bill greenish yellow, tipped black. Legs purplish pink, the webs and toes black.

Male: wing: 450–500 mm.; tail: 160–200 mm.; culmen: 45–50 mm.; tarsus, 100–110 mm. The female is slightly smaller than the male.

Immatures: like the adults, only a little lighter in colour, with more dark spots on the wings. The legs are first lead-grey, but soon turn greenish, then become purplish.

Downy chicks have a large blackish brown patch on the sides of the head, including the eyes, and a narrow black band from the bill to the upper back; underparts white

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23. Distribution of *Cereopsis novaehollandiae*.
(A) Breeding range;
(B) Non-breeding range.

tinged with grey on the breast and sides; upper parts blackish brown, with two large whitish bands from shoulder to tail. Bill black and legs lead-grey.

Eggs: elliptical, 87×59 mm. on an average, white and glossy, but with a thin lime coating. Incubation period: 35 days.

DISTRIBUTION

Breeding on the islands off the coast of Southern Australia, from Albany in the west to Bass Strait. Visits the mainland on migration. Introduced into New Zealand.

GENERAL HABITS

It seems that the *Cereopsis*, or Cape Barren Goose, was first discovered in 1792 by M. de Labillardière, who called it '*Cygne cendré*' and brought a skin to the Paris Museum, according to Vieillot. But the species was later on described by Latham from a specimen sent to the British Museum.

It is essentially a bird of the small islands, visiting the mainland during the non-breeding season. It has greatly diminished in numbers owing to persecution, as it is good to eat, and it also consumes a great deal of grass, leaving an odour which is distasteful to sheep. But it is now afforded protection and is slowly recovering. It breeds on the islands between June and August, during the austral winter, and visits the mainland, in the Victoria plains, arriving from September to December, leaving again in March, according to F. S. Smith (Mathews). Some wounded and non-breeding birds sometimes stay on the mainland. Today, the strongholds of the *Cereopsis* are the islands of the Bass Strait and the Archipelago of the Recherche in Southern Australia.

THE CEREOPSIS

Cape Barren Geese are wary and cautious. Although frequenting islands, they feed entirely on grass and seldom come to the shore. Adults rarely swim, but wounded and threatened flightless birds take to water to escape pursuit. They fly well. The nests are saucer-shaped, made of grass and lined with down, sometimes elevated a little on a thick bush. The male helps much in building it. They forsake the eggs when they have been touched. Pairs isolate themselves in a territory, are very fierce, and ganders fight viciously whenever they come into contact.

Cape Barren Geese have become very shy and are not easily approached. They have been considered good game birds. Today they are too few to be hunted without endangering the survival of the species.

CAPTIVITY

Cape Barren Geese were first mentioned in captivity in England in 1831 by Yarrell. Lord Derby procured some in 1830 and presented a few to the King. They bred freely at Windsor and in the London Zoo. Ever since, these birds have been more or less commonly kept in public parks and private collections, but their number has always been limited by the necessity of isolating adult pairs unless they could be kept on very large grounds, as has been done at Woburn Abbey and at Walcot Hall, in England, where each pair could appropriate a sufficient territory. They are very ornamental, striking in appearance and interesting in their ways, perfectly hardy, easy to feed and to rear. They lay readily, but they usually keep up the bad habit of nesting during the cold winter months when eggs and chicks are likely to be injured by frost unless special precautions are taken. It has been commonly believed that this tiresome habit is due to the birds sticking to the reversed seasons of the southern hemisphere. It is, however, nothing of the sort, as, in Australia, they nest in the cold weather, which corresponds to our summer months (June to August). The fact is that they maintain their inborn habit of nesting during the winter. However, a number of pairs have gradually taken to nesting in the early spring, and when they do so it does not matter whether the parents are left to raise their brood, or the eggs are entrusted to a hen or to an incubator. With winter broods, however, precautions must be taken. If the Goose is sitting in very cold weather, it is essential not to disturb her from the nest; when she leaves it of her own accord she usually covers the eggs in such a way that they cannot get frozen during her short absence. Otherwise, it is safer to entrust the clutch to a broody hen kept in a frost-free house, or to a machine. When the young are hatched, they can be let out with the parents, or in a run attached to a coop with a foster mother, when it is not freezing, being shut at night and during cold spells in a cool house. We had excellent results at Clères from such treatment. It is necessary to keep them indoors at night until they are fully feathered as long as the nights are cold. We lost broods, which were left outside, when the goslings became too large to be sheltered under their mother, and had to sleep in the open.

Both parents take excellent care of the young; they usually are very savage, the male

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attacking even human beings and large animals and birds. The goslings eat mostly grass and other green food, to which a mixture of duckweed and biscuit is added. If the first clutch is removed, the pair usually lays again.

Since 1940, *Cereopsis* have become rather scarce, but some are still reared every year in Europe and in America.

VIII

THE SOUTH AMERICAN SHELDGESE

Genus *Chloephaga*

Eyton, *Monogr. Anat.*, 1838, p. 13.

Type by original designation: *Anas magellanica* = *Anas picta*, Gmelin.

THE colder parts of South America are the home of five species of Goose-like birds which are characterized by a short, high and narrow bill without prominent lamellae, a short, thick neck and long legs. The tail is rather long and almost square. All are nearly alike in shape and habits. Although superficially resembling Geese and, like them, being adapted to grazing, their structure, shape and proportions are quite different, as well as their life habits and postures. Whoever has any experience of them in life is struck by their peculiar look. Besides size and other features due to adaptation to a similar way of living, the only true resemblance between *Chloephaga* and the Geese is that their bill is very much like that of *Branta*. But bill characteristics in birds are the least reliable indication of relationship.

Sheldgeese are obviously more closely related to the Ducks, with which they are linked by intermediate forms. The males possess syrinx bullae; their tarsi are scutellated; their wings have a bold pattern and are normally adorned with a metallic speculum. They are decidedly akin in behaviour, and they also have two moults a year. The sexes are similar in colour in three species, but different in the other two. The downy young are of the usual pattern for the tribe, the markings more or less strongly contrasted, always with a dark line through the eyes. The wing speculum is formed by the greater wing-coverts; the secondaries and the lesser coverts are white. Of the five species, three are very closely related in every way, while the other two (*melanoptera*, *hybrida*) are more different. It is known that four species of *Chloephaga* (*melanoptera*, *poliocephala*, *rubidiceps*, *picta*) cross readily, as they do with related genera, but hybrids *Chloephaga* × *Alopochen* have proved sterile. We know of no hybrids with members of other tribes, nor with true Geese.

KEY TO SPECIES OF CHLOEPHAGA

- | | |
|-------------------------------|-------------------------|
| 1. Head white | 2 |
| Head brown or grey | 4 |
| 2. Plumage entirely white | <i>hybrida</i> ♂ |
| Plumage not entirely white | 3 |
| 3. Upper back white, bill red | <i>melanoptera</i> ♂, ♀ |
| Upper back barred, bill black | <i>picta</i> ♂ |

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- | | |
|---|--------------------------|
| 4. Head grey, underparts not barred | <i>poliocephala</i> ♂, ♀ |
| Neck reddish or blackish brown, underparts barred | 5 |
| 5. Crown pale brown, neck blackish brown | <i>hybrida</i> ♀ |
| Head reddish cinnamon | 6 |
| 6. Larger, abdomen barred | <i>picta</i> ♀ |
| Smaller, abdomen plain coloured | <i>rubidiceps</i> ♂, ♀ |

GENERAL HABITS

Sheldgeese are distinctly land birds, and although they swim freely whenever they find it necessary, they progress rather slowly on the water, to which they resort mostly for protection when unable to fly. But they walk and run with ease and grace. Their flight is powerful, but heavy, more laboured than that of the true Geese. They feed on grass even more than true Geese, with the exception of one species (*hybrida*) which is curiously adapted to a diet of seaweed. They do not perch on trees.

They recall the Ducks in their general behaviour, particularly the Shelducks (*Tadorna*). The voice varies strikingly in the sexes: the male emits a high-pitched, soft whistle, while the female utters a harsh cackle. The display is distinctly Duck-like. The male stands erect, throws the breast forward, the neck backward, and calls, displaying his brightly marked wings. The female quacks, with lowered head and extended neck, and some vertical movements, also slightly releasing the wings. The display is more elaborate in one species (*melanoptera*) and we know too little of that of another one (*hybrida*) in which, however, it seems to be simple.

South American Sheldgeese lay their eggs in the open, among tussock grass, rocks or bushes; they line their nest heavily with grey down. The female incubates alone, but the male guards the nest and helps in rearing the young, fiercely defending the family. He is very jealous and keeps his territory strictly free from intruders. Pairs are united for life.

Many Sheldgeese do not migrate, while some populations appear to move regularly, and others in special circumstances. Probably non-breeding birds wander more than others and gather in large flocks, outside of the breeding season, although pairs remain together all the time. Sheldgeese used to be found in countless numbers, and they still are numerous despite incessant persecution and a bounty for their killing. They are deeply disliked by herders as they eat much of the grass needed for sheep. However, they seem to hold their own in many of the less accessible parts of the extreme south. Great concern for the future of these fine birds has been shown recently, and to an inquiry made about their status by the International Committee for Bird Preservation, the Chairman of the Argentine Section, Admiral P. S. Casal, replied as follows, on June 30, 1948:

‘Answering your letter of June 17 and the memorandum from Dr S. Dillon Ripley of Peabody Museum of Yale University, I can tell you that all the details of the memorandum are correct and I can further add that one owner of an estancia destroyed last

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24. Distribution of
 (A) *Chloephaga melanoptera*;
 (B) *C. poliocephala*,
C. rubidiceps and *C. picta*;
 (C) *C. hybrida*;
 (D) *Neochen jubatus*.



year 250,000 Goose eggs. Nevertheless in spite of this destruction, which we can consider as fabulous, the number of Geese does not diminish. The tales of the early explorers of Patagonia and Tierra del Fuego tell of the enormous quantity of these birds that we improperly call Avutardas, and all seems to prove that their number has increased since then. The greatest enemies of the *Chloephaga* were the Indians and the foxes, both great consumers of eggs and goslings; there are no Indians today and the foxes are fast diminishing because their hides are used for making imitations of finer furs. These two factors are in favour of *Chloephaga*.

'Furthermore, the number of sheep farms has increased, thereby increasing the quantity of tender grass that is the food — almost exclusively — of the Geese. We have therefore three favourable factors for their reproduction.

'Now, on the other hand, we have their destruction by the sheep farmers in defence of

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their pastures. Dr Ripley is right when he says that due to competition with sheep in grazing, these Geese are considered a pest, and a bounty is paid for their destruction. The farmers get together to study methods for destroying or chasing away the birds from their regions, yet in spite of their efforts the number of geese does not diminish. Even the species *poliocephala* and *rubidiceps*, which are not so numerous in the southern region of Patagonia and Tierra del Fuego, are very numerous in the northern part of the country where they sometimes cover a great extent of land.

'The only species that does not trouble the farmers is the bird we call Avutarda de Mar (*C. hybrida* — Kelp Goose). This species never leaves the coast. It eats kelp and molluscs, lives in pairs and is not numerous.

'There is no danger of the extermination of these birds because of the great extent of Patagonia. A sheep farm may have anything from 12,000 to 25,000 acres of land, but in general the pastures are poor, and for that reason the sheep are scattered over a large area in order to get sufficient food to live. This is favourable to the Geese, not only for their reproduction but for their protection when pursued.

'Flocks may consist of 5,000 or more birds. Their vitality is great, and, according to species, they can lay from six to fifteen eggs. They are also very skilful in hiding their young. In general, all the species are friendly to man: one can walk very near to them even among thousands of them. They are generally killed with sticks, but the farmers, who also eat eggs and goslings, kill those that are near their houses and do not bother about those many miles away, at times forming great flocks that are scattered through the extensive Patagonian highlands far from all human contact.

'The only species that seems to diminish is *C. melanoptera* which is found on highlands at 4,000 to 5,000 metres in the Andes. It is not a southern species.

'Our government has not passed any law for the protection of the Geese because they are already protected by the disequilibrium that is evidently in their favour. The proof is that they do not diminish.

'I have delayed a few days in answering you, awaiting the arrival of a farmer from Tierra del Fuego. He tells me he saw one flock, four hundred Geese wide, which took more than an hour to pass over the campo.

'However, after giving you this information, we will endeavour to take defensive steps whenever we notice any diminution.'

CAPTIVITY

With the exception of the Kelp Goose (*C. hybrida*) which so far has proved very difficult to cater for on account of its special diet, South American Sheldgeese have done well in parks and enclosures, where they live and breed satisfactorily. They can stand any cold weather. Their main necessity is good grass, on which adults and young feed almost exclusively, and which can be supplemented with grain. When grass is insufficient, a considerable amount of lettuce, cabbage, other vegetables and alfalfa pellets must be fed.

Because of their quarrelsome habits, Sheldgeese are dangerous to other birds, and adult pairs are better kept separately in pens large enough to supply grazing all the year round. Only a small tub of water, sufficient for bathing, is needed, as they can mate on

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land. They will lay under a bush or in a low coop and they successfully raise their young with great care if they can be protected from rats, crows and other vermin during the first three weeks. In other respects they should be treated as are *Cereopsis*. They have the advantage of always laying in the spring, being summer breeders in their native country.

When space is practically unlimited Sheldgeese can be kept in numbers and full-winged, as they are good stayers; only in very cold winters do they ever stray. Losses occur, however, from fighting before each pair has established its territory. In a crowded pen, there is little fighting, but the birds do not breed. Although generally ignoring the smaller Ducks, these birds attack other Sheldgeese and Shelducks, the true Geese and larger Ducks, and sometimes even Swans. They particularly hate birds of their own tribe, showing that they recognize their nearest relatives as their main competitors.

Young *Chloephaga*, like *Cereopsis*, are easily reared either with their parents, or with foster mothers, on a diet of grass and lettuce, with duckweed and biscuit as useful, but not indispensable, additions. This applies to all species, except *hybrida* which has never bred in captivity.

ANDEAN GOOSE

Chloephaga melanoptera

Anser melanopterus, Eyton, *Monogr. Anat.*, 1838, p. 93: Lake Titicaca.

Chloephaga melanoptera, Peters, *Check-List, Birds of the World*, 1, 1931, p. 151.

CHARACTERISTICS

A large Sheldgoose, the neck very short and the legs long, white, with a black tail and partly black wings; the scapulars have brownish black centres, forming large spots; the primaries and tertiaries are glossy bronze-black, the greater coverts metallic purple; the under down is grey. The whole plumage is long and rather loose. Iris dark brown with pink eyelids. Bill coral red, the nail black. Legs and feet light red, the nails black.

Males and females are alike in colour, but the former are much larger.

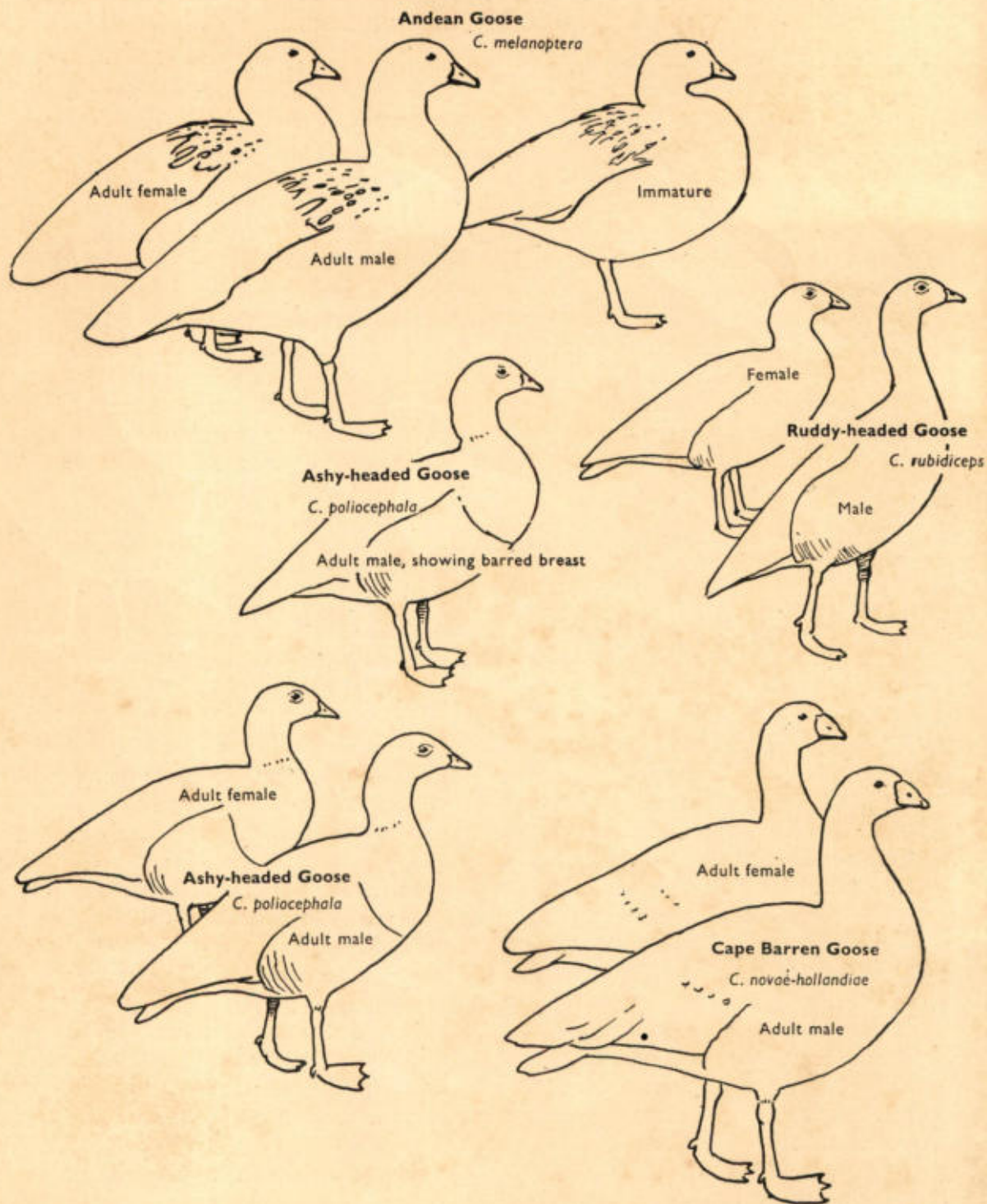
Male: wing: 460–475 mm.; tail: 180–185 mm.; culmen: 38–43 mm.; tarsus: 90–105 mm.

Female: wing: 420–430 mm.; tail: 170–175 mm.; culmen: 34–37 mm.; tarsus: 75–82 mm.

Immatures: like the adults, but duller and the white less pure until the second moult; also a little grey remains on the sides of the head.

Downy chicks: black and white, of the usual pattern, but with a black spot on the ear-coverts, another one on the thighs, and a golden-yellow tinge on the head, which disappears after a few days; the down is long and fluffy. Bill and legs black; the legs begin to turn red at the age of three weeks, while the bill remains black for about three months.

Eggs: dirty white and glossy, six to ten in number, 75 × 50 mm. on an average. Incubation period: 30 days.



XI. Sheldgeese and Cereopsis



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DISTRIBUTION

The highlands of southern Peru and Bolivia, south to Chile and Argentina, between lat. 10° and 38° S., breeding at altitudes of 10,000 feet and above, and wintering lower down.

GENERAL HABITS

Andean Geese are inhabitants of the Cordilleras. The pairs separate in the breeding season, which coincides with the southern spring and summer (November to January). They nest at high altitudes up to the limit of the snow, and, in the autumn, they gather in small parties, representing families, or in larger flocks of sub-adults and non-breeding birds, which move down to the marshy plains at the foot of the Andes for the winter. They are locally common, but they have decreased in number in recent years. They are confident by nature. Their nest is placed in a hollow between rocks, or in a hole in a sandy cliff.

In flight, Andean Geese look stouter than other *Chloephaga* on account of their shorter neck. Unless alarmed or unable to fly, as it is the case with young and moulting birds, they are seldom seen on the water. They are poor swimmers, keeping the breast deep in the water and the back part of the body high as they progress slowly, like other *Chloephaga*; but they are even less aquatic than the other species. However, they take their chicks to the water for safety. The gander is devoted to his mate and brood, and he defends them courageously, keeping a very careful guard on them. The food is almost exclusively grass.

Andean geese are easily tamed and some are often seen in a semi-domesticated state near native houses. Young birds are edible, but adults have an unpleasant smell, and their flesh is dark and tough.

Although Andean Geese do not breed until they reach the age of two, and sometimes three, the young of both sexes are similar to the adults. The male has a soft, high-pitched voice, while that of the goose is low and cackling, although not so harsh or loud as in the other species. They are very talkative and chatter almost continuously.

Adults display constantly and elaborately. The male puffs out his feathers, turns around, throws his neck back and sinks his head among the feathers of the back; then, holding his bill down against the foreneck, whistles and stumps in a much more specialized way than other *Chloephaga*. He also emits a low grunt. At other times, he will flatten himself completely on the ground, the wings half open, then rushes towards any one who happens to be there. The hen also does a lot of feather puffing as she cackles. In its elaborate antics, as in its voice, the Andean Goose indicates an approach to the neo-tropical Orinoco Goose (*Neochen jubatus*) found farther north and east; like it, it has a red bill and red legs. But in its neck and body proportions, and its general posture behaviour, it is very close to other *Chloephaga*, and it certainly represents a montane, highly specialized species of that genus.

CAPTIVITY

The London Zoo received Andean Geese in 1871 and later, but they did indifferently,

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not living very long, and they never bred. However, the first success was recorded at the Zoo when, in 1915, a recently acquired pair laid five eggs which hatched, one chick being reared to maturity (*Avicult. Mag.*, vii, 1915-16, p. 300). Blaauw received two males in 1911, and several pairs in 1931, rearing nine young in 1933, about which he wrote as follows (*Avicult. Mag.*, 1933, p. 434):

'Since I commenced to keep waterfowl, about fifty years ago, I have always tried to obtain a pair of the Black-winged Andean Goose, but, until recently, never succeeded. I was often the owner of one or two birds of this species, but they were always *males*, so that there was never any chance of breeding them. Then at last, in the summer of 1931, I got an offer from a dealer in Hamburg of two pairs (*true* pairs, as he said) and when I bought them, I indeed *did* get the, so long vainly promised, *true* pairs.

'The females are, as is well known, exactly like the males in plumage, but a good deal smaller and have a different voice. The first females I remember having seen were those stuffed in the Museum of Buenos Aires in 1911, and I also saw chicks in down there, in their white and black livery.

'Afterwards, a pair got to the London Zoo, and under the good care of Mr Seth Smith a chick was born there, which, I believe, was figured in the *Field*. I saw *wild* birds of this species near a mountain lake in southern Chile in the Maritime Andes between Los Sauces and Puren in 1911. There was quite a gathering of these geese at the spot mentioned, and some beautiful Black-faced Ibises (*Theristicus melanops*), and some Cayenne Lapwings enhanced the beauty of the sight in those splendid surroundings. The Geese, when flying, struck me at once as being different from the, to me, familiar Magellan Geese, as they were much shorter and heavier to look at, although their flight was strong enough, and when they came nearer it was easy enough to identify them. The birds I got from Hamburg were in good health, but very badly feathered; probably as the result of the long voyage from Bolivia, where they came from. They were extremely tame and the males had an amusing way of puffing themselves up whilst the females cackled at their side. After the moult, when the flight feathers had been renewed, I found that they were very expert flyers (they were kept in a large covered-in place), and that they liked to perch on a small brick house that was in the enclosure. They would walk up to the wall of the house and then fly up almost vertically to the roof. If I came near their enclosure whilst they were sitting on the roof they would always fly down to me, extending their legs well forward when they landed, only just clear of the wire-netting, and then the showing-off would begin.

'After I had had my birds a few months the dealer, Mr Fockelmann, wrote to me to say that he had several more specimens and hoped that I would also buy those. As I chanced to have to go to Germany about that time I resolved to go by Hamburg and have a look at the birds first. I found them to be in fairly good health although in bad plumage, but as it had taken too many years to get my wish of having a flock of those birds realized, I bought the thirteen of them and had them sent to Gooilust. Three died after I obtained them, and I parted with three pairs, so that in the end I had four pairs of healthy birds in all.

'Of those four pairs, two pairs nested last spring in the beginning of June. One female

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laid nine eggs and the other one, six eggs. After they had sat on them a couple of weeks I took the eggs away, put the nine eggs under a broody turkey hen, and the six under a common hen.

'After thirty days of incubation, under the Geese themselves and substitutes, six chicks hatched under the turkey hen and five under the common hen, the other eggs being infertile. One gosling died soon after hatching. The chicks in down were beautiful things, marked very intensively black and white; both bills and legs were also black. They were hatched on June 30 and July 4. The eggs I may mention as being dirty white.

'When first hatched there is a golden-yellow glow on the down of the chicks' heads which, however, disappears after a week or so, leaving the head white and black like the rest of the body, and it is a curious coincidence that the newly-hatched chicks of the Abyssinian Blue-winged Goose (*Cyanochen cyanopterus*), a species which, I am told, also lives near lakes in the mountains, have the same yellow glow on their heads during the first days of their lives.

'The goslings were very active and strong, and grew very well, so that at the age of three weeks the black legs began to turn red. About July 30, little greyish feathers began to grow on the shoulders and white ones on the sides. On August 13 the legs were mostly red, whilst the bills were still black and the birds were strongly feathering. On August 21 some birds began to show the red on their bills, and on October 11 the bills were mostly red, although not so clear as in adult birds. The legs at this time were almost entirely red, and the birds had almost attained the size of the adults and were entirely covered with feathers. The first feather dress is almost exactly like that of the adults, the only difference being that the shoulder feathers, which are, especially in male birds, almost pure white marked with black stripes in the adults, are mostly brownish grey in the immature birds, whilst the black markings are not so well defined. Even the glossy purple mirror in the wings is there, although slightly duller.'

Two pairs also came to Clères in 1932. Three young were reared in 1934, and many more in the following years; Mr A. Morrison brought new birds from Peru in 1938. In a cool climate, with plenty of shade and cold water, Andean Geese are not difficult to keep or to breed. But they are apt to contract tuberculosis, aspergillosis and other diseases in warmer districts. We had good luck with them at Clères until 1940, when our four breeding pairs and a number of younger birds were killed and eaten by occupying troops. Two years before, the Blaauw stock had been brought to Clères, so that only a few captive birds were left in Europe, in the Leckford collection in England. These also disappeared, with the exception of two ganders, bred at Clères. One is still living today. He was paired in 1946 to a female Egyptian Goose, and five hybrids resulted, somewhat intermediate in shape and colour, but more akin to *Alopochen*. A female has now been paired to her father, but she has not laid during the last three years and is probably infertile. In 1948, the same Andean gander produced, with a Magellan Goose, a dozen hybrids intermediate about equally between the two species, the males and females being dissimilar in colour. A curious feature of the two sets of hybrids is that instead of the white lesser and median wing-coverts of the three parent species, they have them black

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as in the Orinoco Goose, probably an ancestral characteristic which has reappeared. So far they have proved sterile.

Several pairs of Andean Geese have recently reached Holland, France, England, and the United States from Peru.

At Clères, each adult pair of Andean Geese inhabits a paddock with good grass, plenty of shade trees, a small pool of cold, running water, and a shed, into which we found it useful to shut the birds during winter nights, as they seem to dislike damp cold. They are usually extremely tame, but the males become savage, attacking all sorts of birds and even human beings. Pairs must be completely isolated. We even found it necessary to separate pairs or males after the first year, as they show their bad temper as soon as they reach their second year. The females lay rather late, in May or June. No *Chloephaga* ever tries to lay during the northern winter, and they adapt themselves immediately to reversed seasons. The nests are usually established in the shed. The eggs are hatched and the young reared under broody hens, without any special difficulty.

Certain hand-reared females become absurdly attached to human beings; they make delightful pets and follow one about like dogs. But such birds will never pair up and they prove incapable of breeding.

ASHY-HEADED GOOSE

Chloephaga poliocephala

P. L. Sclater, *Proc. Zool. Soc., London*, 1857, p. 128: Chiloe Island (ex. G. R. Gray, *List B. Br. Mus.*, III, p. 127, 1844, *nomen nudum*).

Peters, *Check-List, Birds of the World*, I, 1931, p. 151.

CHARACTERISTICS

A small Sheldgoose, the male and female differing mostly in size and voice. They are richly coloured: head and neck ashy grey, lighter around the bill, on the forehead and crown, changing into reddish on the nape and lower neck, with a white ring around the eyes; the feathers of the hind neck long and fluffy, forming a short mane; mantle and breast rufous chestnut, with fine black bars or plain-coloured; back and tail black; wings white, with a metallic green speculum, chestnut scapulars, brown tertiaries and black primaries; abdomen white, flanks broadly barred with black. Iris dark brown. Bill black. Legs black inside, orange outside, the feet and webs black and orange; the extent and distribution of those two colours varies individually, and perhaps in different populations, as also the length of the nuchal nape, and the degree of barring on the breast and mantle. The adult breeding plumage is assumed the second year, and more fully as the bird grows older; they also have less reddish on the lower neck. Female slightly duller.

Male: wing: 355–380 mm.; tail: 138–145 mm.; culmen: 30–33 mm.; tarsus: 62–70 mm.

Female: wing: 335–340 mm.; tail: 133–138 mm.; culmen: 26–28 mm.; tarsus: 57–62 mm.

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Immatures: similar, but duller, the breast, flanks and upperparts much washed with brown and narrowly barred with black; head and neck brownish grey; no metallic green speculum, which is replaced by dark brown.

Downy chicks: whitish and blackish grey, very strikingly marked. Bill and legs black.

Eggs: like those of other *Chloephaga*, four to six as a rule, 68-78 × 48-50 mm. Incubation period: 30 days.

DISTRIBUTION

Chile and Argentina, nesting on Chiloé Island, Southern Chile, Patagonia, Southern Tierra del Fuego, and on the islands near Cape Horn; migrating during the cold months north to Colchagua and the south of Buenos Aires, where it is sometimes an abundant winter visitor. A few have been found in the Falkland Islands, where they may only be rare visitors. The exact breeding and winter ranges of the species are still imperfectly known. Common in the foothills of the Andes, around farms.

GENERAL HABITS

Ashy-headed Geese live on the grasslands of the interior. Even on islands, they seldom come near the sea. They are reported to breed abundantly around the lakes of the Island of Chiloé, of southern Chile and of Patagonia. They have also been found nesting on Tierra del Fuego and on the islands around Cape Horn, but not in large numbers. They go north in winter, leaving in April, appearing on the Rio Negro, in the Province of Buenos Aires, and in central Chile in May, usually in small flocks, but sometimes as many as 200 together. Although numerous in places, they are not nearly as common as the larger Magellan Geese. They are more western in their distribution than the Ruddy-headed Geese, with which, however, they associate in Tierra del Fuego, and accidentally in the Falkland Islands. All three species have completely grazing habits.

There are practically no observations of the life and habits of this bird in literature. It was first known in 1830 and confused with *C. picta* by King under the name of *inornata*. The flesh is reported to be better than that of the larger species.

The male's voice is a soft whistle and that of female a harsh cackle, much as in the Magellan Goose, but shriller and weaker. Their display, too, which is typical of the genus and not as elaborate as that of the Andean Goose, hardly differs from that of *C. picta*.

CAPTIVITY

Ashy-headed Geese reached Europe alive before the more common Magellan. The first examples arrived at the London Zoo in 1833. They first bred at Lord Derby's menagerie at Knowsley Hall, and at the Zoo in 1852 till 1869, when the stock died out. It was soon imported again, and both Courtois and the Paris Zoo (Jardin des Plantes) in France reared young in the 1880's and later, while Blaauw kept and bred the species between 1890 and 1936, and reports as follows (*Ibis*, 1904, p. 70):

'The Ashy-headed Goose is certainly the finest, but also the most delicate, of all the Geese that I have had in my garden. The best way to ensure success with this species is

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to give a constant supply of cabbage, besides grass and grain. With care, I have managed to keep it since 1890, having only once had to procure a fresh importation of two males. At the present time I am the happy owner of an old pair, three young pairs, and an odd male.

'The female of my breeding pair laid five eggs last spring, from which four chicks were hatched. One of these died, but the remaining three have been doing well and are now in their first moult.

'The chicks in down have dark grey markings on the back of the head and neck on a whitish-grey ground. Their first plumage resembles that of the adults, but is much less brilliant. The breast is brownish and striped all over with blackish lines. The white of the belly is also less in extent. They begin their first moult in October, but seldom finish it until the following spring.

'During cold nights, especially if there is snow on the ground, I have these birds driven into a shelter, and the birds of the year appreciate this arrangement very much.'

Ashy-headed Geese, mostly full-winged, thrived at Woburn and in several other English collections, where they bred well. We were also successful with them at Clères between 1920 and 1940, rearing young every year. We usually kept four or five breeding pairs in separate pens, and a number of two- and three-year-old birds together in a meadow, along with other young Geese and Shelducks.

Like other Sheldgeese, their first requirement is good grass and plenty of green food. They are supposed to be a little more difficult to keep than Magellans, but we never had any trouble with them. They are pugnacious, and adult pairs are better kept separated unless allowed plenty of space. It is one of the prettiest species of the genus and well worth keeping in any collection. Our first birds were of the Blaauw stock, but we obtained a couple of imported ganders for a change of blood in 1933. There is still a fair number of Ashy-headed Geese today in England and at Clères, and a few in the United States.

RUDDY-HEADED GOOSE

Chloephaga rubidiceps

P. L. Sclater, *Proc. Zool. Soc., London*, 1860, p. 387: Falkland Islands.

Peters, *Check-List, Birds of the World*, 1, 1931, p. 151.

CHARACTERISTICS

The smallest of the *Chloephaga*. Both sexes are alike in colour: head and neck reddish cinnamon; mantle, breast and flanks finely barred black and buffy grey, passing to cinnamon on the lower breast; abdomen plain reddish cinnamon, a few albinistic specimens showing irregular white patches. Colours fade and bleach before the moult. Wings as in other species, the speculum bronzy green; tail black. Iris dark brown. Bill black. Legs and feet yellow marked irregularly with black.

Male: wing: 330-350 mm.; tail: 125-140 mm.; culmen: 28-30 mm.; tarsus: 60-73 mm.

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Female: wing: 310–320 mm.; tail: 120–128 mm.; culmen: 25–28 mm.; tarsus: 56–64 mm.

Specimens from Tierra del Fuego and Patagonia have slightly longer legs than a series from Port Louis, Falkland Islands, but birds from other parts of this archipelago are also long-legged.

Immatures resemble the adults, but are duller and have no metallic wing speculum.

Downy chicks: rather dully marked, pale grey and dark grey, but with the usual pattern. Black legs and bill.

Eggs: like those of other *Chloephaga*, four to eleven, about 65 × 48 mm. Incubation period: 30 days.

DISTRIBUTION

The Falkland Islands, Tierra del Fuego, rarely Patagonia; migrating north as far as the Rio Selado, in the Province of Buenos Aires in Argentina, during the winter. It does not seem to occur in the islands of Cape Horn, nor to visit the mainland of Chile. Distribution still imperfectly understood.

GENERAL HABITS

This small Sheldgoose is abundant in suitable localities, and it is not very wary in disposition. Like the Ashy-headed and Magellan Geese, it often lives far from the water, feeding almost entirely on grass, and nesting among tussock and bushes. The male and the female differ in size and in voice, which is very similar to that of *poliocephala*, perhaps a little shriller in both sexes.

Wherever they occur, Ruddy-headed Geese gather in large flocks, but each nesting pair guards a territory and the males fight for it. They are migratory in Tierra del Fuego, arriving from farther north in September and nesting in great numbers in the lowlands, associating with the other two species, leaving again in April for the north. They have greatly increased in numbers with the clearing of the country for grass and the disappearance of their enemies, Indians and foxes. But they are much persecuted, particularly in the Falkland Islands, where they are known as 'brents', a bounty being paid for their beaks. Nests are found from September until November. They seem to remain all the year round in the Falklands, being far less abundant however than the Greater Magellan Goose. They conceal their nests cleverly among dry bushes and tussock grass. R. Crawshaw writes (*Birds of Tierra del Fuego*, London, 1907, p. 100):

'In the warm spring weather, the males become exceedingly pugnacious and noisy, engaging in combat on land and water, while others of their kind are spectators and scream encouragements. All day long they are tourneying on the Rio San Martin, at San Sebastian Settlement, within sight and earshot of the manager's house, until at times the noise becomes irritating.'

Their flesh is considered good.

CAPTIVITY

The Ruddy-headed Goose was first procured alive from the Falkland Islands by the London Zoo in 1860, and it bred there in 1865 and during the following years until 1887.

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Blaauw later on continued to breed it till 1936 and most of the present captive stock derives from his. We obtained our first birds from him in 1923, and a couple of imported pairs came to Clères in 1933. These Geese do well in captivity if properly treated, and they prove hardy and prolific. It is safer to separate breeding pairs unless very extensive grounds are available. They are, however, less quarrelsome and dangerous than Magellans. There still are a few birds today in France and in England. Blaauw reports as follows (*Ibis*, 1904, pp. 70-1):

'The Ruddy-headed Goose is the smallest of the South American group, but thrives well under domestication. I obtained my first male of the species — an imported bird — and at the same time I procured a female from the Gardens of the Zoological Society of London. From this pair I have had numerous broods, and unless I am very much mistaken, all Ruddy-headed Geese now in Europe have descended from them. The old male, which is now mated to one of his daughters born in 1887 (his original mate having died six years ago) has been in my park for seventeen years, but nevertheless gave me this spring a brood of three young birds, which have done well, and are now moulting.'

Contrary to other opinions, we found this Goose rather less strong and free-breeding than the Ashy-headed, but both species can be considered as very satisfactory wherever the climate and grazing are suitable. They are particularly attractive and ornamental.

Ruddy-headed Geese have crossed in the past with Magellans at Woburn and elsewhere, the offspring being intermediate, the males whitish, more or less tinged with reddish, and proving fertile.

Magellan Geese

Chloephaga picta

Large Sheldgeese, very similar to *poliocephala* and *rubidiceps* in shape, voice and habits, but much bigger. Sexes entirely dissimilar in colour; the adult male is white with a black, or black and white, tail, and black bars on the mantle and flanks, which may or may not extend right across the lower parts; wings white and dark grey, with a metallic green speculum as in the other species of the genus. Bill and legs black. Maturity and complete adult plumage are attained in the third year. Males in their second year have black, or black and white, back and rump, and their barring is less regular. In their first year, they are less clearly and more narrowly barred; the neck and crown are tinged with brownish grey, and the wing speculum is dull brown. Both sexes assume their respective dress as soon as they feather. The female is smaller, deep reddish cinnamon barred with black on the mantle and the lower parts. Bill black, legs yellow. First-year birds have a brown wing speculum and are generally duller and less clearly barred. The reddish cinnamon colour fades gradually after the moult, becoming less vivid and paler, particularly on the crown.

Downy chicks: pale grey with the usual markings dark brown, but those of the Falkland Islands form are darker and more uniform above.

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Eggs: cream-coloured, glossy, five to seven, sometimes more, in a clutch. Incubation: 30 to 32 days.

DISTRIBUTION

South America from about lat. 36° S. to Cape Horn, and the Falkland Islands. There are two sub-species, differing mostly in size.

GENERAL HABITS

Magellan Geese, also often called Upland Geese, used to occur in fantastic numbers some years ago in all suitable parts of their range, and they are still plentiful despite ruthless persecution due to their habit of feeding on grass which is needed for sheep, the main resource in these inhospitable districts of South America.

What we have said on the subject at the beginning of this chapter applies generally to the Magellan Geese, the most plentiful of *Chloephaga*. Being little aquatic, they sometimes build their nests rather far from water, to which, however, they lead the chicks for safety. Pugnacious and bold, each pair jealously holds a territory, and the male eagerly watches over the sitting female, and later on, the family. They are naturally tame, but they become wary when persecuted.

Magellan Geese are often permanent residents except in the southernmost parts of their range, but a number of birds migrate more or less regularly during the austral winter. They are found breeding from the Rio Negro in Argentina, to Cape Horn, but north of this area they are cold-season visitors only, reaching Central Chile and Argentina up to about sixty miles south of Buenos Aires. They are seldom found near the sea, but they are very numerous inland, on low ground as well as on hills and plateaux, up to the foot of the Andes. Besides adult breeding pairs, non-breeding birds are found in flocks all the year round and probably wander and migrate more than the older birds. There is also a great deal of local movement in relation to available food. It seems that some birds never become completely flightless.

On the subject of Magellan Geese collected in Tierra del Fuego in 1948, D. Ripley writes:

'This is the most numerous species in the San Sebastian region. An adult and an immature male and an adult female were collected on May 1 and 2, 1948. These are the Barred Upland type, the predominant type in the area. Mr Migdalski failed to find the white males during his stay. Local information claimed that 90 per cent were of the barred type.

'This species arrives in the area in early September and seldom begins breeding before October 17. The average clutch is seven eggs which take the normal incubation period. By the end of February most of the young can fly. Migration begins the last week in April, and by May 20 nearly all the birds have left. Those few that stay over the winter usually suffer from frozen feet and become very thin. Local estimates report that seven to ten geese eat as much grass as one sheep. Geese are said to be actually drawn by the sheep, as they prefer cropped grass. Thus the density of the geese is greater in the sheep-

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grazing areas. Where they are heavily concentrated, the amount of goose excrement is said to become so great that sheep are actually driven away. Consequently for many years now the Upland Geese have been a pest and a bounty is paid for their destruction. In 1947-8 alone at the Estancia 'Sara' at Rio Grande 35,000 eggs were broken, and at a nearby estancia 75,000 eggs were broken. The cook and her husband on one estancia during that season collected 4,000 eggs, 900 young, and 400 adults for the bounty.'

Nests are found from August to November, among bushes and grass, always in dry situations. The voice of the male is a high, soft whistle, that of the female a deep, harsh cackle, both louder than in the two smaller species, but very similar in all three. They are rather indifferent game birds: the young are edible, but older birds are tough and coarse.

CAPTIVITY

Magellan Geese were first imported in 1857 and bred in 1863 in the London Zoo. They have since been frequently reared in captivity and also re-imported, so that the species has long been common in parks and gardens. They are large and beautiful birds, very hardy, easy to feed and to rear, and they constitute a wonderful ornament to lawns and meadows, by the waterside, in which, however, they swim only occasionally and not too easily. The principal drawback is their dangerously savage disposition towards birds of their own or allied species. But if the grounds at their disposal are very extensive, large numbers can be kept together. For many years hundreds of full-winged Magellans lived and bred in the huge park at Woburn Abbey, an unforgettable sight. Hard winters and lack of food during the last war reduced them to a score of pairs, but their numbers are again increasing. Casualties resulted every spring from vicious fighting, but on the whole the species had established itself successfully. It is not given to straying, except during unusually cold weather.

In smaller parks, however, it is preferable to isolate breeding pairs in pens as they become increasingly bad-tempered with the years, attacking other large waterfowl. They rear their broods perfectly if they are free from vermin; otherwise, young are easily hatched and raised under hens and turkeys, or in incubators and brooders. Grass and lettuce are practically all they require for food.

LESSER MAGELLAN GOOSE

Chloephaga picta picta

Anas picta, Gmelin, *Syst. Nat.*, 1, (2), 1789, p. 504 — based on 'Painted Duck'.

Latham, *Gen. Syn. Birds*, III (2), p. 443 — Staaten Islands.

Chloephaga leucoptera, Peters, *Check-List, Birds of the World*, 1, 1931, p. 151.

Chloephaga dispar, Peters, *ibid.*

CHARACTERISTICS

The Magellan Geese of Southern Chile and Argentina, including Tierra del Fuego and neighbouring islands, are definitely smaller than those from the Falkland Islands.

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Oustalet (*Mission Scient. à Cap Horn*, vi, p. 1; *Zoology*, 1891, p. 191) had already pointed out those differences in size, but he refrained from formally separating the two birds. Besides the size, the females of the two species also differ conspicuously in the barring.

Lesser Magellan males are dimorphic, and throughout the range two colour phases may occur together. The great majority of the birds in Tierra del Fuego are completely barred black and white on the underparts; the rectrices are all black, the head and neck are slightly grizzled; the barring is variable as to the width of the black and white lines. A number of birds, however, dominating in certain populations, particularly in Patagonia, are completely white underneath, with the exception of black bars on the flanks; the head and neck are pure white or very slightly tinged with dusky, and two to four pairs of outer rectrices are white; the upperparts and wings are a lighter grey. Some specimens exhibit intermediate characteristics between those two phases, being barred incompletely underneath, with more or less white on the rectrices. The females are all much alike, and individual variation is slight, consisting of a deeper or paler shade of cinnamon and more or less thick black bars. Their vent and undertail-coverts are blackish grey.

Immature males of the first year often retain a good deal of pale dusky-brown on the head and neck. In first plumage, they are either narrowly barred, or white, with black spots and lines, according to the phase of colour.

Male: wing: 395–435 mm.; tail: 150–180 mm.; culmen: 33–40 mm.; tarsus: 73–88 mm.

Female: wing: 380–403 mm.; tail: 130–160 mm.; culmen: 31–38 mm.; tarsus: 71–78 mm.

From a wild collected brood (north Patagonia, white phase), it appears that the chicks are brighter in tone than those of the larger Falkland sub-species, and more distinctly marked above; they have broad whitish bands over the eyes, on the wings and on the sides of the back, and the dark line from the forehead to the upper back is narrow.

DISTRIBUTION

Southern Chile and Argentina, breeding south of lat. 36° S. (nests found at Lagun Las Truchas, Cordillera de Neubles, alt. 6,000 feet), Tierra del Fuego and nearby islands, migrating north in part during the winter. The two colour phases are more or less segregated in different regions, the barred type dominating in the south, the white one in the north.

In March 1953 Scott found that 40 per cent of males were of the white phase in the pampas on the west side of the Magellan Strait near Punta Arenas, whereas in Tierra del Fuego white males represented only 0.5 per cent of the population.

CAPTIVITY

The Lesser Magellan Goose first reached London in 1871, and hybrids with the Greater sub-species were reared in 1875. It has often been imported and bred since. The Woburn

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stock belongs to the present sub-species. Racial hybrids are intermediate, or recall one of the parents.

In *Ibis*, 1904, p. 70, Blaauw writes:

'A pair of the Black-banded Goose (*Chleophaga dispar*) at Gooilust laid six eggs, which were all hatched. In the chicks of this species the differences in colour correspond with those of *C. magellanica*, but are intensified. Some of the chicks are most brilliantly marked with black and white, whilst others are almost entirely black. These striking colours, however, soon fade, so that after the chicks are a week old much of their brilliancy is gone.'

It is possible that Blaauw's birds were of mixed blood.

GREATER MAGELLAN GOOSE

Chloephaga picta leucoptera

Anas leucoptera, Gmelin, *Syst. Nat.*, 1, pl. 2, 1789, p. 505: Falkland Islands.

Chloephaga leucoptera, Peters, *Check-List, Birds of the World*, 1, 1931, p. 151 (part).

CHARACTERISTICS

The male is larger than *C. p. picta* and is always pure white underneath in the adult plumage. Second-year males keep a few black feathers on the breast and abdomen. Young males have the lower parts spotted with black, the spots sometimes constituting broken bars. The female is also larger, and the black barring is narrower, so that the underpart appears lighter and redder, the reddish bars being almost twice as wide as the black ones, while the reverse is the case in *picta*. The vent is whitish and the under tail-coverts strongly peppered with white.

Male: wing: 430–462 mm.; tail: 165–200 mm.; culmen: 42–47 mm.; tarsus: 92–95 mm.

Female: wing: 400–425 mm.; tail: 145–160 mm.; culmen: 40–45 mm.; tarsus: 78–90 mm.

Downy chicks are dusky; the light band over the eyes, the sides of back and the wings much reduced and indistinct.

DISTRIBUTION

The Falkland Islands, where it is a resident. Introduced into South Georgia, but very scarce.

CAPTIVITY

The Greater Magellan Goose was first imported when Governor Moore sent a pair to the London Zoo in 1857, and another pair in 1861. The first young were raised in 1863. Ever since, young have been reared annually there and elsewhere, and the birds became common in a captive or a semi-wild state. It is a larger and finer bird than the preceding sub-species, with which it crosses readily.

Blaauw (*Ibis*, 1904, p. 69) supplies the following notes:

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'Of the Magellanic Goose (*Chloephaga magellanica*) I reared a brood of four this year, two males and two females being the produce of four eggs. It is worthy of note that in this Goose, as well as the nearly allied *C. dispar*, there are two colour-forms when the chicks are in down. Some of them are dark grey all over, being only slightly lighter on the underside, with black heads and whitish throats, whilst others have distinct dark markings on a nearly white ground and a light head with only a longitudinal dark mark on it. At first (for I had never bred these birds before) I thought that the dark chicks were females and the light chicks males. Afterwards, however, I found that the colour of the down had nothing to do with the sex of the birds. The young females get their yellow legs when the feathers begin to appear, and their first plumage resembles that of the old female except that the brown is duller and the black markings are not so well defined and seem thinner and more numerous. The young males differ from the adult male in not having the breast pure white, but striped with narrow blackish lines. Besides, all the markings are weaker and less conspicuous.

'The shining green wing-bar is absent in the young birds of both sexes. At the end of September they begin to moult, and assume the adult dress in a couple of months. The green wing-bar, however, is not generally assumed until the second summer, and the male does not get its white breast at once, but the colour increases gradually as the bird gets older.'

It seems doubtful whether Blaauw's birds were of pure Falkland ancestry.

Kelp Geese

Chloephaga hybrida

CHARACTERISTICS

Kelp Geese are of moderate size, hardly bigger than *C. poliocephala*, but thicker set. While generally resembling other *Chloephaga*, they have conspicuously shorter legs and larger feet, an adaptation to their rock-dwelling habits along the sea-shore.

Adult males are pure white, with dark brown irises, black bill (some specimens show a little yellow at the base of the culmen), and lemon-yellow legs and feet. In their first year, they resemble the females, with less bright markings, no metallic wing speculum, a good deal of white on the head, neck and lower breast; the bill and feet are dusky. White feathers appear here and there on the mantle and breast. Later on, they gradually assume the white plumage, but it seems that the primaries keep black tips during the second year. Adult females are brightly marked: crown light brown; a whitish ring round the eyes; rest of head and neck blackish brown with very fine white lines; mantle and wing dark brown, with the usual white coverts and secondaries of the genus and a green metallic speculum; back, tail and abdomen white; breast and flanks black barred with white. Iris brown. Bill yellowish flesh colour. Legs deep yellow. Young females are less brightly marked. They have a dark brown speculum, a darker crown, the underparts

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more closely and less regularly barred, bar and spots extending to the abdomen, and the tail-coverts are mostly black. Bill and feet dusky yellow.

Downy chicks are fluffy and mostly white with a narrow black line around the eye except underneath, extending a little beyond; the base of the down is grey, and they are faintly marked above with pale brown, indicating the pattern peculiar to the genus; these markings seem to be stronger in the females than in the males, or there are two different phases of downy plumage. Bill black with a white nail. Feet black.

Eggs: creamy white, five to six in a clutch, 73×53 mm. on an average. Incubation period not accurately known; probably 30 days.

DISTRIBUTION

Southern Chile, from the vicinity of Corral to the Strait of Magellan and the islands to the south; the Falkland Islands. Two sub-species.

GENERAL HABITS

The Kelp Goose is very closely adapted to life on the rocky shores of the ocean and to a diet of sea-weeds. They have a curious habit of hopping from rock to rock. An excellent summary of what is known of its habits has been given by R. C. Murphy (*Ocean Birds of South America*, New York, 1936, pp. 942-51), part of which is reproduced later under the two sub-species.

Their flesh is quite unpalatable, and they do not consume grass. Consequently Kelp Geese are little persecuted. Their eggs also have an unpleasant flavour.

CAPTIVITY

Kelp Geese so far have not thrived well in captivity. A single example reached the London Zoo in 1868 and another one went to Berlin later on. A few may also have been imported into North America, but none survived more than some weeks. Blaauw brought back a male to Holland in 1911. It first did well, mostly on dried kelp, but it lived only a few months on a different diet.

A. Morrison brought about forty specimens from Chile in April 1939. All came to Clères, with the exception of four pairs, which went to Leckford; later on two pairs were sent to Peter Scott. The majority of them arrived in excellent condition, having been fed during the long journey on fresh and dried kelp, biscuit meal and a lot of lettuce. We first continued this diet at Clères, gradually replacing the unobtainable South American dried kelp by European powdered sea-weed. The birds were let out in a grassy paddock after a week's confinement in small pens. They frequently bathed in the stream, nibbled the grass, and liked to jump and perch on rocks, logs and boxes. Much quarrelling started the moment the birds were released from the crates, as they are decidedly unsociable, and after a few days this developed into such serious fighting that pairs and groups of immatures had to be isolated. All did apparently well, feeding greedily and looking active and happy. But after a few weeks one or two were found dead now and

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then for no apparent reason, and after six months only a few remained alive. One male and two females were left when the collection was abandoned in June 1940.

About the four pairs at Leckford, Terry Jones has reported in *Avicult. Mag.*, 1939, pp. 302-3. His experience differed little from ours.

War conditions did not permit an adequate study of the birds' food requirements as experiments were impossible; and none lived more than a couple of years. They are undoubtedly difficult, but it should not be impossible to find a proper substitute for their natural diet. We hope this will be done some day, as it is a most unusual and interesting species, perhaps the most beautiful of the genus.

In the *Avicult. Mag.*, 1947, p. 200, Morrison gives the following information on his collecting of Kelp Geese:

'It is a bird of rocky shores, where it feeds on a small sea-weed which grows along the tide line, called *luche*. I had no difficulty in collecting a large number of live ones during my stay in Melinka between the end of February and the middle of March. They ate *luche* readily and were easy to keep alive as long as supplies of that sea-weed were available. After that I gave the birds soaked biscuit with a little *luche*. They also eat lettuce freely, but it is almost impossible to store reasonable quantities for the voyage home. On the whole they travel well and my few losses were primarily due to a form of heat stroke while the ship was picking up cargo off North Chile. Some other birds got fits of the "staggers", continually throwing themselves over backwards and moving their heads in a peculiar way. Most of the birds affected in this way recovered after they arrived in England and were provided with plenty of fresh green-food. Other birds got a form of cramp during rough weather in the Bay of Biscay, but on the whole I had few losses and do not regard Kelp Geese as being particularly difficult subjects. They are naturally tame and are very active, and can hop from rock to rock. In this country they soon took to grazing like normal Geese and but for the outbreak of the war would, in my opinion, by now be well established, as I am sure they would breed readily.'

LESSER KELP GOOSE

Chloephaga hybrida hybrida

Anas hybrida, Molina, *Sagg. Stor. Nat. Chili*, 1782, p. 241: Chiloé Island.

Chloephaga hybrida hybrida, Peters, *Check-List, Birds of the World*, 1, 1931, p. 152.

CHARACTERISTICS

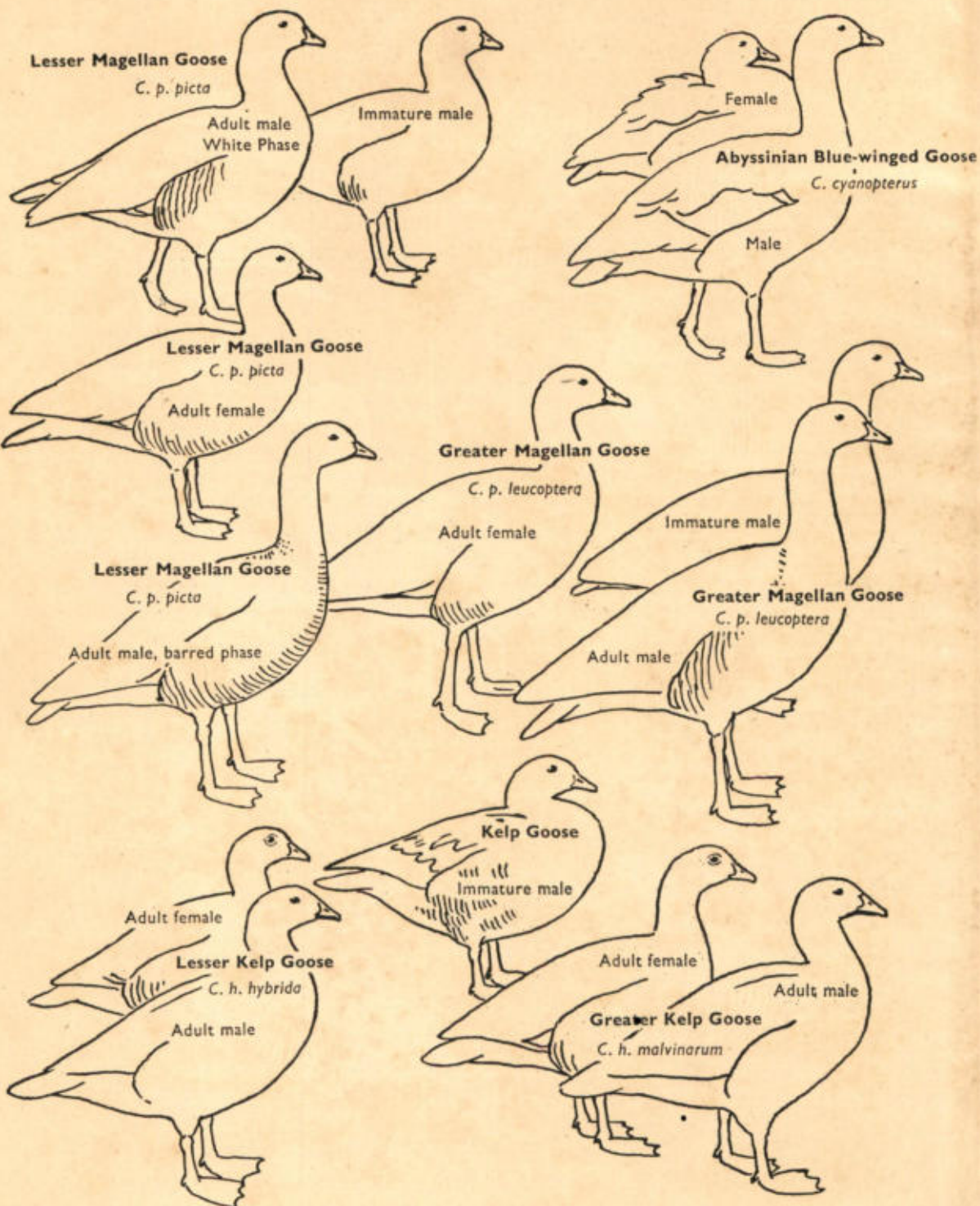
Those of the species; smaller than *C. h. malvinarum*.

Male: wing: 363-385 mm.; tail: 128-140 mm.; culmen: 35-38 mm.; tarsus: 67-71 mm.

Female: wing: 334-360 mm.; tail: 127-139 mm.; culmen: 35-38 mm.; tarsus: 61-66 mm.

DISTRIBUTION

Southern Chile, Tierra del Fuego and neighbouring islands.



XII. Sheldgeese



THE SOUTH AMERICAN SHELDGESE

GENERAL HABITS

These have been well recorded by Murphy (*Oceanic Birds of South America*, II, 1936, pp. 942-7).

'The range of the Kelp Goose extends from a point on the Chilean coast near Corral, or about lat. 40° S., southward through the archipelagoes to Cape Horn and Staten Island. It is also common in the westerly part of the Strait of Magellan, and apparently once bred as near to the Atlantic end as Elizabeth or Isabel Island, which is just to westward of the Second Narrows. The Kelp Goose is, however, a largely pedestrian bird of the intertidal zone, and, like the Flightless Steamer Duck, it avoids coasts subject to enormous daily variation in the tidal level. For such reasons it is rare or absent along the eastern coast of Tierra del Fuego and the corresponding stretch of generally straight and cliffy shore of Atlantic Patagonia. . . . It never goes far inland nor far from salt water, and yet, on the other hand, as Coppinger (1884) writes, it rarely wets its feet except on the damp seaweed of the foreshore. Only after the young hatch do the Kelp Geese take for a time to life afloat. At other periods of the year the birds walk their own beats along rocky or shingly coasts, avoiding sandy stretches, and browse upon a delicate green dulse which the Chileans call *luche*. Furthermore, the Kelp Geese are seldom to be seen in flocks as are other members of their genus, and, except during the season of family parties, just before the full-grown goslings separate from their parents, they are usually to be found only in pairs.

'Chiloé is the type locality of this species, and the western rocky coast of the island probably marks the northern limit of the breeding range. Beck first encountered Kelp Geese at islets about twenty-five kilometres from Ancúd, in northern Chiloé, on April 7, 1914.

'His notes upon the condition of the gonads show that the height of the breeding season is reached during November, and that the moult of the wing quills, which may make the Kelp Geese for a time quite flightless, is begun soon after the eggs have hatched and while the whole family has taken together to a swimming life. At Hermite Island, in December, Reynolds (1934) saw a score of Kelp Geese flap out on the water, apparently unable to fly. He took them to be either yearlings, or non-breeders which had moulted exceptionally early.

'Reynolds (1934) reports that the Kelp Goose is the common *Chloephaga* of the Cape Horn region.'

CAPTIVITY

The Lesser Kelp Goose is the sub-species imported by Blaauw and Morrison.

GREATER KELP GOOSE

Chloephaga hybrida malvinarum

Phillips, *Auk*, 33, 1916, p. 423: Port Stephens, West Falkland Island.

Peters, *Check-List, Birds of the World*, 1, 1931, p. 152.



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CHARACTERISTICS

Similar to *C. h. hybrida*, but larger. The barring on the female's breast and flanks is much coarser, the white lines being twice as broad as those of *C. h. hybrida*. Alleged differences in the colours of the crown seem to be individual.

Male: wing: 390–396 mm.; tail: 140–153 mm.; culmen: 38–40 mm.; tarsus: 70–75 mm.

Female: wing: 360–380 mm.; tail: 132–136 mm.; culmen: 36–40 mm.; tarsus: 67–70 mm.

GENERAL HABITS

According to Murphy, Greater Kelp Geese do not differ from the continental subspecies in their general habits.

'Today the Kelp Goose is more abundant in the western part of the archipelago than elsewhere. Vallentin, who has studied the species in West Falkland, writes as follows:

'“When once paired, these birds are inseparable, and the snow-white gander is a most conspicuous object amid a landscape of greys and browns and can be easily distinguished at almost any distance. . . . Frequently while having my lunch near the sea-shore quite a number of these birds would gather round and amuse me with their quaint ways. By far the most inquisitive was the goose, who would boldly walk up to within two or three yards of my seat, and prance about, raising and lowering her head, and uttering soft notes of apparent self-satisfaction the while. Soon the snow-white gander would come near, but he was at once driven off, and then the antics were renewed. After a time, several birds of both sexes would come up, and then a free fight always followed, the victorious pair remaining masters of the field.”

'Before nesting commences there is a deal of courting and sorting out of undesirable partners. The females seem to outnumber the males very considerably, so that the eligible ganders are mobbed by perhaps seven or eight fascinating young geese, and, like human beings, find some difficulty in selecting the right one. When she has been selected, she is given the difficult job of driving off all the rejected from the gander, scolding as she rushes first at one and then at another of the geese, which, being geese, appear still hopeful that something will turn up to give them a chance (Cobb, 1934).

'Since the male of this species is not harried like the unfortunate Upland gander, he behaves quite as though aware of his own conspicuousness, and of the futility of attempting to hide. The only ordinary defensive reaction is a tendency to move away from the nest when danger threatens, and even this has been questioned by Cobb.

'The Kelp Goose nests rather later than the other geese of the Falklands, few eggs appearing until November. The female carefully covers the eggs with feathers and grass when she leaves them. The goslings are hustled to the nearest water as soon as they hatch out. Cobb states that the gander, in contrast with the valiant behaviour of the male Upland Goose, takes no part in the defense of the young when danger strikes.

'Brooks writes that when the female becomes nervous, she utters a harsh “Uh-húh-uh-húh-uh-húh”, with a rising inflection. The male's only call is a thin and feeble “Seep-seep”.

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CAPTIVITY

Until 1952 this Kelp Goose had probably never been imported into Europe from the Falklands, unless it was among some of the early birds which reached London, Berlin or North America, of which no definite records can be found. In that year a pair reached the Severn Wildfowl Trust's grounds at Slimbridge. A trio came to the Washington Zoo in 1949, but lived for only two months.

IX

THE BLUE-WINGED GOOSE

Genus *Cyanochen*

Bonaparte, C. R., *Acad. Sci. Paris*, 43, 1856, p. 648.

Type by monotypy: *Bernicla cyanoptera*, Rüppell.

THIS African genus, confined to the highlands of Abyssinia, resembles greatly the South American *Chloephaga* in aspect and in behaviour. It differs mostly in its slightly flatter bill and longer neck, its more graduated tail, and its blue-grey, instead of white, wing-coverts; the wing speculum of metallic green is formed by the secondaries, not the greater wing-coverts. The downy chick's pattern is generally similar to that of *Chloephaga*. In display and voice it also recalls the species of *Chloephaga*, with some variation, as it does in habits, but it is more aquatic. Like them, it is of a jealous and quarrelsome temper.

There is only one species in this genus.

ABYSSINIAN BLUE-WINGED GOOSE

Cyanochen cyanopterus

Bernicla cyanoptera, Rüppell, *Syst. Uebers.*, 1845, p. 129: Shoa.

Cyanochen cyanopterus, Peters, *Check-List, Birds of the World*, 1, 1931, p. 152.

CHARACTERISTICS

A medium-sized Sheldgoose, light brownish grey on the head and neck, paler on the throat, face and forehead, mottled dusky brown and pale grey on the mantle and underparts; back slaty grey passing to pale brown on the upper tail-coverts; under tail-coverts white; tail rounded, black, as also the primaries; secondaries glossy green; tertiaries brown; wing-coverts light slaty blue, with a small white patch on the bend of the wing and a large one on the under wing-coverts. Bill, legs and feet black. Iris brown. The male is considerably larger than the female.

Male: wing: 368–374 mm.; tail: 160–165 mm.; culmen: 32–33 mm.; tarsus: 70–73 mm.

Female: wing: 314–334 mm.; tail: 135–142 mm.; culmen: 30–31 mm.; tarsus: 51–65 mm.

Immatures: slightly duller than the adults.

Downy chicks: brownish black above, marked with silvery white which covers the underparts; a large black spot behind the eye. The head is tinged with yellow, as in *Chloephaga melanoptera*, which soon fades out. Bill and legs black.

THE BLUE-WINGED GOOSE

25. Distribution of
(A) *Cyanochen cyanopterus*,
and (B) *Tadorna cana*.



Eggs: cream-coloured, six to seven in a clutch. Incubation: 30 days.

DISTRIBUTION

The highlands of Abyssinia and Shoa, above 8,000 feet.

GENERAL HABITS

This interesting Sheldgoose has a very restricted habitat. Although it is neither wild nor rare in suitable localities, very few observations have been published on its habits. Von Heuglin, quoted by Reichenow, said:

'Blue-winged Geese live in isolated pairs and seldom in groups. They are found on brooks and puddles on tablelands, on meadows and at the edge of swamps which are not overgrown with bushes or banks of reeds. I have never seen them in the middle of ponds or in deeper water. They like to graze on the border of shallow brooks and bogs as ducks do, or they pick the young leaves of plants on the damp ground of the bank. When they are frightened, they usually do not go very far. One bird close behind another, they fly rather low and not very fast, and they generally follow the course of the brook. Their food seems to consist of animals rather than plants. I found chiefly worms, insects, larvae and remains of snails along with tiny pebbles in their stomachs.'

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Much more recently, R. E. Cheesman (*Ibis*, 1935, p. 179) reports on these birds:

'They are local birds, not being seen eighteen miles away from Dangila, or in the Lake Tana area, but became plentiful from Injabara toward Addis Ababa, where they are common on rivers between 8,000 and 9,000 feet. It seems that 8,000 feet is their lowest limit. They are usually in pairs and frequent the streams where the country is open and meadows of short grass adjoin the river banks. They are tame and only rise when approached within fifty yards.'

When disturbed or resting, Blue-winged Geese have the peculiar habit of resting the neck on the back, the elongated feathers of the mantle fluffed out; but when they show no fear, they behave like other Sheldgeese, and they are not more nocturnal.

Their voice recalls that of the Andean Goose, but is softer; the voice of the female in particular being lower and much less harsh. The display is simpler even than in the Magellan and allied Sheldgeese, but fairly similar.

In general shape, appearance, posture and actions, Blue-winged Geese are much like their South American cousins. They appear rather short-legged, like the Kelp Geese, and long-necked. They often hold their tail downward and their back slightly arched, with the feathers of the mantle loose.

CAPTIVITY

Although rather dull-coloured, the Blue-winged Goose is a desirable and quaint bird on a pond. The species has only relatively recently been kept and bred in captivity. Blaauw, who was first to rear it, reports as follows (*Ibis*, 1927, pp. 422-4):

'The Blue-winged Goose of Abyssinia has for years been a more or less mysterious bird, as it was never imported alive and was also rare as a skin in the Natural History Museums. The first importation of live specimens was shortly before the war, when a pair came to Schönbrunn. Nothing was heard about these birds, which did not survive long. The second importation was during the autumn of 1923, when Ruhe, of Alfeld, procured me seven birds; these proved to be four males and three females.

'[The] snowy-white spot [under the wing-coverts] is very conspicuous when the flying bird is seen from below; the neck-feathers are a little lengthened at the back of the neck and the upper wing-coverts are also lengthened and rounded, and often carried loosely. The bill, legs, and feet are black.

'The voice of the male is a very melodious whistle. The female makes the same sort of sound, but it is tuned lower. It has not the coarse voice which nearly all the females of other species of Geese have.

'During the winter the birds are kept in a house, but in summer they are out in separate enclosures. One of the pairs was placed in an enclosed garden with a small pond in it, near which grows a large clump of sedge.

'During the beginning of June last spring, it was observed that a nest had been made under a bush, but no egg was laid. Towards the end of the month another more elaborate nest was found in the clump of sedge, and shortly after an egg was laid. The female continued laying until there were five, when she began to incubate, laying one more egg the day after.

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'The making of the nest, the courting and mating were probably all done during the night, as during the day the birds were sitting about with their breasts carried forward and their heads on their backs as usual. The only difference was that, if another bird came near the nest, the male would dart at it and drive it away.

'As the temperature was very low here last summer, I feared that the chicks might not survive under the care of the parents, and I therefore put the eggs under a common hen after the female had incubated three weeks.

'On the thirtieth day of incubation, August 8, the eggs, at least five of them, were cracked so that the bills of the chicks were visible. Next day four had hatched, but the fifth had died in the shell, whilst the sixth egg proved to be clear.

'The downy dress of these newly-hatched chicks was extremely beautiful and showy in contrast with the inconspicuous dress of the old birds. There is a large black spot behind each eye, and all the light markings of the head and neck have a beautiful golden-yellow colour.

'The birds grew rapidly. When three weeks old the feathers began to show, and at four weeks the undersides were feathered, also the shoulders. The legs then turned to a bluish-black. About September 15 the blue wing-coverts became visible and the tails were well developed. At the age of about six weeks the birds were completely feathered, but the wing-feathers and their coverts were still short. . . .

'At the end of January the birds were beginning to moult.

'These four young birds, probably as a result of their diurnal education by the farm-yard hen, are much more active during the day than their parents.'

Young birds from Blaauw's park were distributed in following years to several zoological gardens and private collections. Two pairs reached Clères in 1930 and started breeding in 1932, usually nesting in boxes buried in a bank. We found them less dangerous than the various *Chloephaga*, although fussy and quarrelsome; it was found possible to keep one breeding pair for many years on the lake among other waterfowl. They nest more easily if given plenty of room and water, although they do well in pens. The young require more animal food than other Sheldgeese, more like those of the various *Tadorna*. The parents rear them well if allowed to.

Blue-winged Geese are hardy and breed freely, and they have quickly become well established. They have been crossed with Egyptian Geese (*Alopochen*), and the offspring, usually sterile, has proved occasionally fertile, as C. L. Sibley reports that eggs laid by hybrid female mated to a Blue-winged gander hatched normally, although the chicks did not survive.

THE ORINOCO GOOSE

Genus *Neochen*

Oberholser, *Journ. Washington Acad. Sci.*, viii, 1918, p. 571.

Type by original description and monotypy — *Anser jubatus*, Spix.

THE tropical, low-lying lands of South America are inhabited by a peculiar species which in a way provides a link between the previously studied genera of Sheldgeese and the Shelducks, rather nearer to the latter in behaviour, habits and in the pattern of the downy chicks. Although short and high at the base, the bill is broader than in *Chloephaga* and *Cyanochen*, and slightly turned up at the tip; the neck is longer, the feathers lengthened, but not disintegrated, loose and erectile on the nape and hind neck; body shorter and held more upright; the legs are high; the tail is rather long and square. Alone in the tribe, it has the wings entirely glossy greenish black, with the exception of a small white patch on the secondaries. Both sexes are alike in colours, but differ in size and voice. The display is elaborate and very specialized. The nest is placed in holes in trees or in the ground.

The Orinoco Goose resembles the Egyptian Goose (*Alopochen*) in a general way, but it is too different in voice, in postures and in the pattern of young and adults to be placed in the same genus.

ORINOCO GOOSE

Neochen jubatus

Anser jubatus, Spix, *Av. Bras.*, ii, 1825, p. 84 — 'Ad ripam fl. Solimoëns in insula Praya das Oncas.'

Alopochen jubatus, Phillips, *Nat. Hist. of the Ducks*, ii, 1922, p. 300; Peters, *Check-List, Birds of the World*, i, 1931, p. 154.

CHARACTERISTICS

A medium-sized Sheldgoose, with the head, neck and upper breast pale isabelline appearing slightly and unevenly mottled, as the base of the feathers is of a more or less dark greyish-brown and the tip buffy white; the face and neck are darker; upper mantle and scapulars reddish-cinnamon, passing to blackish-brown in the centre; back and tail glossy greenish-black, as also the wings, which show a white speculum formed by the basal part of the outer webs of the secondaries; sides and abdomen chestnut splashed with white on the middle and passing to dark brown on the vent; under tail-coverts

THE ORINOCO GOOSE

white. Iris brown; bill black with the sides of the upper and most of the lower mandible red; legs and feet light red.

Male: wing: 315–333 mm.; tail: 118–125 mm.; culmen: 38–40 mm.; tarsus: 75–82 mm.

Female: wing: 300–310 mm.; tail: 115–117 mm.; culmen: 35–37 mm.; tarsus: 70–72 mm.

Immatures: like the adults, only slightly duller, with legs a lighter red.

Downy chicks: very similar to those of *Tadorna*, black and white, of the normal pattern of the tribe, with a large black spot on the ear-coverts and a rufous tinge between the black and the white; the white bands on the wings and back are very broad; bill and feet black.

Eggs: pale brownish cream, 59–61 × 41–45 mm., six to ten. Incubation: 28–30 days.

DISTRIBUTION

South America, from the eastern foot of the Andes to the Atlantic, and from Venezuela to northern Argentina.

GENERAL HABITS

Orinoco Geese are tropical, non-migratory birds which live in pairs along the open banks of rivers and streams that flow through savannas and forested low country. They feed on grass and weeds, but also they eat seeds and animal matter such as worms and insects. They lay in hollow trees and perch readily, lining their nest with white down. Along the Rio Portuguesa and the Apure in Venezuela, in December 1921, we met a pair every mile or so on the mud flats and low, open banks, resting or picking up food. They were not wild, and none was ever seen flying or swimming. On one occasion only did we find three birds together.

Very little has been reported on the habits of the species in the wild state. It is abundant in all suitable localities in the basins of the Orinoco and of the Amazon, rarer to the south, but it is not found in the coastal areas. At the moulting season, when they are flightless, a number may gather in flocks. Otherwise they live in pairs or families.

Orinoco Geese have a peculiar habit of often extending the neck, puffing out their long feathers. The male's voice is high-pitched whistle, much like that of *Chloephaga*, and that of the female is a loud cackle, resembling that of the Egyptian Goose; both are highly vocal. They seem to breed during the winter months in Venezuela, and ganders fight fiercely. Their display consists of a stiff-legged walk, the head thrown back, the breast puffed out and the bright metallic-wing open at the shoulder; with each forward movement of the chest, the bird emits a puffing grunt which interrupts the constant whistling. They erect themselves and lean backward to such a point that they may even fall over. At the same time, the female calls loudly, extending her neck held very low and walking around, much as Shelducks do.

Being poor fliers and coarse of flesh, Orinoco Geese are indifferent game birds.

CAPTIVITY

Lord Derby early introduced the species into England, and the London Zoo possessed

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some in 1830. They bred well at Knowsley, displaying constantly, flapping their wings and attacking intruders, so we are told.

Blaauw kept Orinoco Geese for many years and wrote as follows to the Hon. Rose Hubbard (*Ornamental Waterfowl*, London, 1907, p. 124):

'I have also repeatedly bred Orinoco Geese and have kept the species since 1887.

'These beautiful birds, which are interesting not only from their splendid plumage, but also by their curious antics, are not hardy; that is they cannot stand frost. If kept inside in frosty weather they do extremely well, and live for many years in captivity. Besides grain and green food they want a good supply of animal food (worms or meat chopped finely), and I have found that without this animal food the eggs are not fertilized. . . .

'The young birds are very active and easy to rear. They feed principally on duck-weed, bread crumbs, and ants' eggs, and gradually take grain when they get older. The first plumage is a weak washed-out copy of the dress of the adults. Very soon after they are full grown, they begin to moult, and before the winter they have assumed adult plumage. At that time the legs have also acquired the red colour, but the red is not so intense as in old birds.'

Blaauw had only one female left at Gooilust in 1921, when we brought three males from Venezuela, one of which was presented to him. Young were reared later on from the pair and more were imported from Brazil now and then, until they became fairly numerous. There are still a few today in Europe and North America. A new breeding stock has been established during 1952 and 1953 by the Wildfowl Trust at Slimbridge.

Orinoco Geese are easy to keep. They are as little aquatic as the *Chloephaga* and swim rather awkwardly, but they require much more animal food, such as a mash rich in protein and cut-up meat, to supplement whatever worms and insects they can find. They are more fussy than savage, and although it is better not to associate breeding pairs, they do not usually molest other birds. The drawback is their sensitiveness to cold. They spend normal winters outdoors at Clères, but they have to be taken in whenever the temperature drops below 20°F. They are irregular breeders in northern countries, and we never had a clutch from them at Clères until recently, although pairs have been kept during thirty years. A full-winged female stayed well. In warmer climates, Orinoco Geese have bred freely. The young are easy to rear if provided with plenty of duck-weed and animal food such as worms, larvae and cut-up meat. They have been crossed with Egyptian Geese.

XI

THE EGYPTIAN GOOSE

Genus *Alopochen*

Stejneger, *Standard Nat. Hist.*, vi, 1885, p. 141.

Type by subsequent designation: *Anas aegyptiaca*, Linné.

THE Egyptian Goose is a very common bird of the African tropics extending to North Africa and to Palestine. It generally resembles the Orinoco Goose in shape, but it is larger, coarser, with a shorter neck and a longer and broader bill, which becomes swollen at the base in breeding males. As in *Neochen*, the feathers of the head and neck have a slightly mottled appearance, and those of the nape and hind neck are lengthened, loose and erectile to a point. The legs are strong and high, the tail long and square, the upper wing-coverts white; the secondaries form a metallic speculum. In the pattern of the wings and in their habits, they recall also the Shelducks (*Tadorna*). Both sexes are alike in colour, the female only a little smaller than the male, but they differ much in voice. The display is simpler than in the Orinoco Goose, both sexes calling loudly as they move the head and neck, and half spread the wings. They often nest on trees, in holes or in old abandoned nests, or among rocks and on ledges, but also on the ground in rushes and under bushes.

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Alopochen aegyptiacus

Anas aegyptiaca, Linné, *Syst. Nat.*, ed. 12, 1, 1766, p. 197: Egypt.

Alopochen aegyptiacus, Phillips, *Nat. Hist. of Ducks*, 1, 1922, p. 187.

Alopochen aegyptiaca, Peters, *Check-List, Birds of the World*, 1, 1931, p. 154.

CHARACTERISTICS

A fairly large Sheldgoose, with long pink legs, and a rather large bill. Head and neck a pale grey mottled with brown on the sides and crown, with reddish cinnamon band on the hind neck, chestnut patches around the eyes and ring on the lower neck; mantle and underparts rusty grey finely lined with black, the mantle darker, the abdomen paler, and a showy dark chestnut patch on the middle of the lower breast; scapulars dusky brown finely freckled with whitish; back, rump and tail black; under tail-coverts light cinnamon; wing-coverts white, with a black line on the greater; tertiaries chestnut and brown; secondaries metallic green; primaries black. There is a good deal of individual variation in the intensity of the various colours; some specimens almost lack the breast patch and

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26. Distribution of
Alopochen aegyptiacus.

are greyish and pale, while others are very reddish in colour. This variation is most marked on the upper mantle. Iris dark yellow. Bill pink with tip, margins and base black. Legs pink. There is little difference in the size of the sexes.

Male: wing: 380–405 mm.; tail: 135–150 mm.; culmen: 45–55 mm.; tarsus: 76–85 mm.

Female: wing: 330–400 mm.; tail: 130–145 mm.; culmen: 40–52 mm.; tarsus: 67–83 mm.

Immatures: like the adult, but duller, lighter and lacking the chestnut on the face, neck and breast; bill and legs yellowish grey.

Downy chicks: dark brown above and greyish white below; face white with a narrow post ocular brown line; large white patches on the wings and on the sides of the back, resembling closely young *Tadorna*, but with a wide, pale supercilium; bill and legs dark grey.

Eggs: five to eight, creamy white, comparatively small and round, 44–48 × 55–68 mm. Incubation: 28–30 days.

DISTRIBUTION

Africa, including the north, except the desert and deep forest districts, extending to Palestine, Syria, perhaps farther north. Sporadic in many parts of Europe, where, however, the majority of the records are of feral birds.

THE EGYPTIAN GOOSE

GENERAL HABITS

The Egyptian Goose is a tropical bird like the Orinoco Goose, but stronger and more adaptable, and it extends to the sub-tropical parts of Africa, north and south, and beyond. It is a highly successful species in the struggle for life, which can accommodate itself to various habitats and climates, and is found wherever conditions are not too forbidding, frequenting the banks of rivers, lakes, ponds and marshes, in fact, all places where sufficient food and water are available. It is less abundant in the west than in the east, and its present scarcity in Algeria, Tunisia and Egypt is probably due to long human interference. It no doubt tries to expand, as some of the European records seem to be of genuine wild birds, particularly in the south-east. In Asia Minor, it appears to be endemic, if scarce, in Palestine and Syria, as it is perhaps in Greece.

Egyptian Geese live generally in pairs or families, but they gather in fairly large numbers after the breeding season, principally flightless moulting birds. We saw about fifty of them in September 1927 on Lake Aramaya, Harrar, Abyssinia, at an altitude of 6,000 feet. Our only other observations of wild birds were along the Niger in the French Sudan, in February 1938, where pairs and small family groups were noticed here and there between Mopti and Gao. They are scarce in the forested regions of West Africa and occur only along very large rivers. They are seldom if ever seen near the sea, but they are found in lowlands as well as on mountains and plateaus, up to 8,000 feet, exceptionally at 12,000 feet (Kivu volcanos). They fly strongly and occasionally perch on large limbs of trees.

Egyptian Geese are of a jealous and violent disposition, and pairs fight fiercely. They are noisy; the male's voice is hoarse and hollow, producing a husky, breathing sound; that of the female is harsh and trumpeting. They are very vocal in display, fast repeating their notes with movements of the extending neck and head, the half-spread wings showing their bright pattern.

Egyptian Geese feed mostly on grass and leaves, but may also eat seeds, often visiting grain fields, and animal food. They live mostly on land, but they swim and dive expertly. They are wary and careful, difficult of approach, and as their flesh is poor and coarse, they are not much pursued as game birds.

CAPTIVITY

Apart from the domesticated Mallard and Muscovy Ducks, Grey and Chinese Geese, and from the Mute Swan, the Egyptian Goose is probably better established than any other waterfowl as a captive or feral bird in various parts of the world. It was kept by the Egyptians, to whom it was sacred, the Greeks and the Romans; it was common in the seventeenth century in Europe, and probably before. It has always been a popular bird on account of its fine appearance and striking ways, and also of its robust health and hardiness which makes it easy to cater for. No waterfowl is more satisfactory in that regard. But it also has great faults: because of its savage temper and extreme pugnacity, it is dangerous to other birds, unless unlimited space is given.

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Egyptian Geese are therefore not recommended for mixed collections, but on large lakes where Swans and big Geese only are kept, they show at great advantage. They breed freely and any food, even a plain diet of corn, suits them. They have been established at liberty in England, in France and in other countries, although never in large numbers. But some can be seen around waters in many large public and private parks. It is still one of the commonest waterfowl in captivity. They hybridize easily with other species, particularly with those of the allied genera, *Chloephaga*, *Cyanochen*, *Neochen* and *Tadorna*, and also with *Anas* and *Anser*. Their offspring with *Cyanochen*, *Neochen* and *Tadorna* proved partly fertile.

During the last century, when great efforts were made to introduce new plants and animals into France, Egyptian Geese were propagated on a big scale, and a larger breed selected. There is not much of it left today, although some captive strains are still larger than wild African stock. We long possessed at Clères a semi-albinistic specimen from East Africa, in which all normal colours and markings were present, but very much paler. Greyer and redder strains exist today in captivity.

XII

THE SHELDUCKS

Genus *Tadorna*

Fleming, *Philos. Zool.*, II, 1822, p. 260.

Type, by tautonymy: *Anas tadorna*, Linné.

SHELDUCKS differ from the Sheldgeese (*Chloephaga*, *Cyanochen*, *Neochen*, *Alopochen*) in their shorter legs and broader, flatter bill, decidedly curved upward near the tip and fitted with conspicuous lamellae. They are adapted to a more aquatic life and to a less vegetal diet. Otherwise they resemble *Neochen* and *Alopochen* closely, looking, however, longer in the body, which is held more horizontal and lower, but they are still Goose-like in shape and habits.

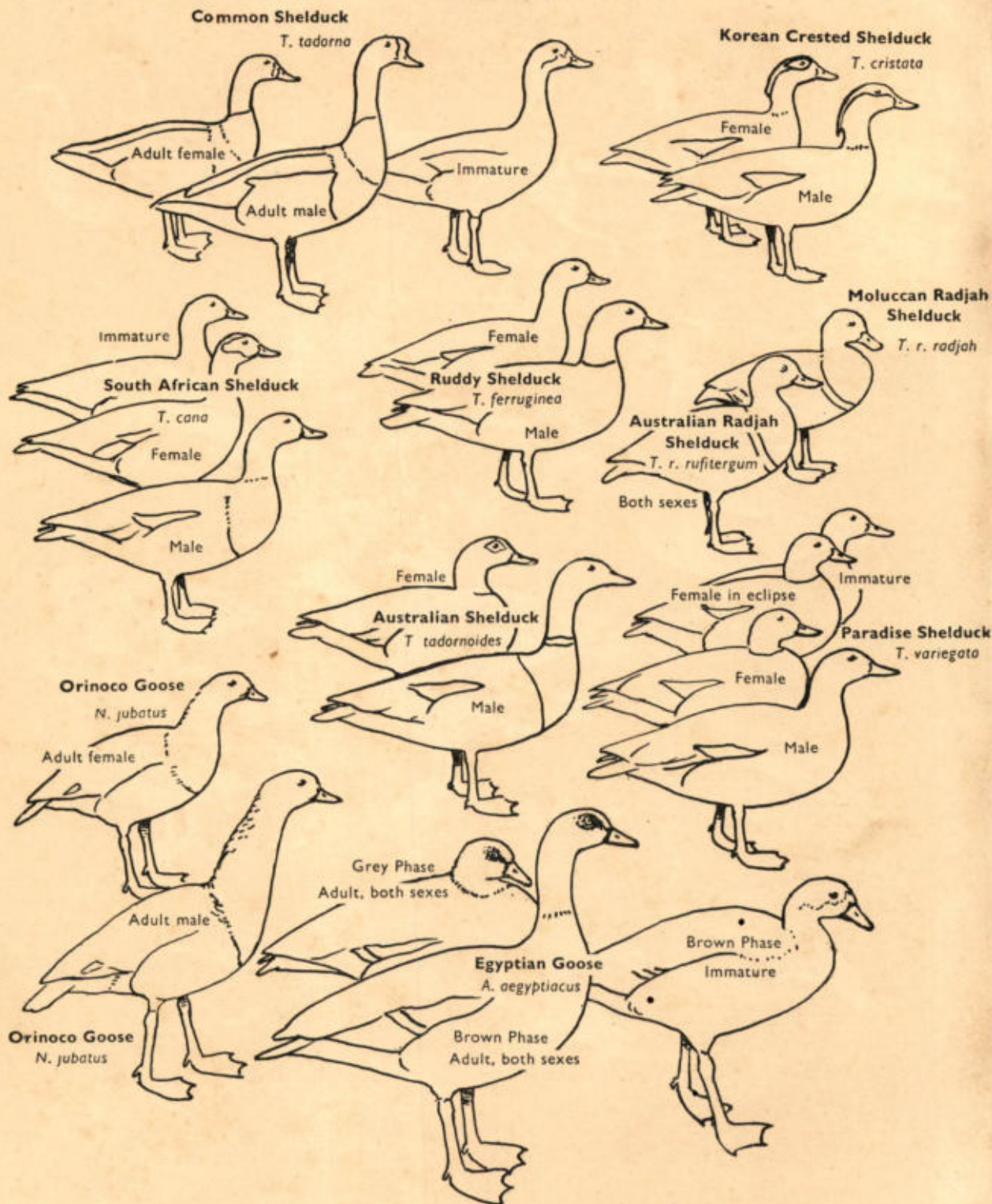
Four species, usually known as Casarcas, are closely related and are better considered as a super-species; the voice varies, but is loud and resounding in both sexes, which differ more or less in plumage. In two others, males and females are alike in plumage, and the former whistles while the latter quacks, much as in the Sheldgeese. Another species, the perhaps extinct Korean Shelduck (*T. cristata*), is more specialized, possessing a nuchal crest and a more graduated tail; all the others having a square or hardly rounded tail.

The four species of the first group (*tadornoides*, *variegata*, *cana*, *ferruginea*) have often been placed in a separate genus, as they are fairly different from the common European species (*tadorna*) in shape, pattern and behaviour. But they are all connected by the species *radjah*, which possesses the body proportions and shape of '*Casarca*', the voice of '*Tadorna*', as well as its more sociable disposition, a bill and a plumage pattern intermediate between the two, which *tadornoides* however also approaches. It seems therefore best to unite them all in one genus.

The downy young of all *Tadorna* are very similar, and they resemble Egyptian Goose chicks, but they have brighter colours, a flatter bill and no white bands above the eyes. They are white below, brown or black above, with white forehead and cheeks. The white patches on the sides of the back are more or less connected. Their eyes are dark brown, their bill and feet grey.

All species of Shelducks have the same showy wing pattern as the Egyptian Goose; white coverts, chestnut tertiaries, metallic green secondaries and black primaries, but only one, the *radjah*, has a black line across the greater coverts. There is an eclipse plumage in some cases.

Shelducks inhabit the temperate regions of Europe, Asia, Africa, Australia and New Zealand, with the exception of one species found in the tropical parts of Australia, New



XIII. Shelducks



THE SHELDUCKS

Guinea and the Moluccas. They are replaced in South America by the Orinoco Goose (*Neochen*) and by the Crested Ducks (*Lophonetta*), the first forming a transition between *Tadorna* and the more specialized, Goose-like *Chloephaga*, the second with the River Ducks (*Anatini*).

KEY TO SPECIES OF TADORNA

1. Head crested	<i>T. cristata</i>
Head not crested	2
2. Neck black	3
Neck not black	5
3. Upper breast and back blackish	<i>T. variegata</i> ♂
Upper breast and back not blackish	4
4. Upper breast chestnut	<i>T. tadornoides</i> ♂ ♀
Upper breast white	<i>T. tadorna</i> ♂ ♀
5. Neck white	6
Neck not white	7
6. Underparts chestnut	<i>T. variegata</i> ♀
Underparts white	<i>T. radjah</i> ♀ ♂
7. Neck grey	<i>T. cana</i> ♂ ♀
Neck fulvous buff	<i>T. ferruginea</i> ♂ ♀

GENERAL HABITS

Shelducks do not differ very much from Sheldgeese in their general life habits. They are only more omnivorous and less herbivorous, feeding more in the water and on muddy or sandy shores. Grass, seeds and water weeds form the base of the food of most species, but *T. tadorna* and *T. radjah* have a diet consisting mainly of worms, crustaceans and molluscs. Most of the species are very jealous and quarrelsome. Pairs call loudly in a duet, the female enticing the male to fight in running or swimming around him and in making false attacks. They nest in holes or other sheltered locations, and they lay a rather large number of eggs. Being almost uneatable, Shelducks are not too much persecuted as a rule, although the New Zealand species (*variegata*) has been greatly reduced in numbers by so-called sportsmen, and the Korean bird (*cristata*) appears to have been exterminated.

CAPTIVITY

Shelducks do well in captivity, living thirty years or more and breeding readily, and they count among the most ornamental of waterfowl. Those of the *Casarca* group, unfortunately, are very bad-tempered and prove dangerous to other birds. The other two species, *radjah* and *tadorna*, are fussy, but harmless. We know nothing of the habits of the Korean Shelduck.

All they require is a diet of green food, grain and rich mash in which protein is given in different quantities according to the species. They breed better if they have a good deal

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of space, both land and water, where they can find natural food. Many can be kept together if space is available, although losses are to be expected from fighting during the breeding season among the *Casarca*. Radjahs and Common Shelducks do not quarrel badly, being satisfied with a great deal of threatening and calling. The more savage species, however, are better kept paired in pens, which they can share with Swans or even small Ducks, for these they generally ignore. Deep boxes and long drain pipes buried in the ground should be provided, as they will seldom lay in the open. All are hardy in temperate districts.

Young Shelducks are easy to rear if treated in a general way like Sheldgeese, but they require more animal food, such as custard, cut-up meat, worms and insects, and rich mash or pellets. At Clères, where all species but one have been reared in large numbers, they did well under broody hens, or when left to their parents in safe pens, on a diet of grass, lettuce, plenty of duck weed, water insects, biscuit meal, meat meal and custard. Radjah and Common Shelducks require more custard and mash, and less grass and lettuce.

AUSTRALIAN SHELDUCK

Tadorna tadornoides

Anas tadornoides, Jardine and Selby, *Ill. Orn.*, II, 1828, pl. 62 and text. New South Wales.

Casarca tadornoides, Phillips, *Nat. Hist. of the Ducks*, I, 1922, p. 259; Peters, *Check-List, Birds of the World*, I, 1931, p. 156.

CHARACTERISTICS

A large Shelduck, with a longer neck and a shorter tail than in most species. The male has the head and neck metallic black, with a broad, white ring at the base of the neck; mantle and breast fulvous cinnamon; scapulars, upper back, flanks and abdomen black finely vermiculated with buffy white; vent, under tail-coverts, lower back, rump and tail black; wings of the genus. Iris brown. Bill and legs black. The female resembles the male, but is slightly smaller and duller, with broad white rings at the base of the bill and around the eyes; the breast and mantle are chestnut, which is not sharply separated from the more brownish black of the upper back and abdomen; white collar narrower.

Male: wing: 363–383 mm.; tail: 140–148 mm.; culmen: 41–47 mm.; tarsus: 60–64 mm.

Female: wing: 325–350 mm.; tail: 130–136 mm.; culmen: 38–40 mm.; tarsus: 56–60 mm.

Immatures: like the female, but paler and browner, with less white on the head in the male.

Downy chicks: paler than the other species, the dark markings being umber-brown. Bill and legs bluish grey.

Eggs: pale cream colour, eight to fifteen, measuring 68–70 × 49–50 mm. Incubation: 30–33 days.

DISTRIBUTION

Southern Australia and Tasmania, north to the Tropic of Capricorn in the west.

THE SHELDUCKS



27. Distribution of (A) *Tadorna radjah radjah*, (B) *Tadorna radjah rufitergum* and (C) *Tadorna tadornoides*.

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GENERAL HABITS

Australian Shelducks, locally known as Mountain Ducks, are plentiful in South-western Australia, and also in Western Victoria, rarer in Tasmania. They are apparently fond of salt and brackish water. During the breeding season, they move to more elevated districts. Their habits are those of all Shelducks in a general way. They go in pairs, but gather in huge flocks for a short time after the breeding season. They usually nest in the hollows of trees, often thirty feet above the ground, and sometimes far from water; also in burrows, under thick cover, or in crevices in rocks. They are wary and difficult to approach, and their flesh is very poor.

The male's voice is harsh and grunting, usually double-syllabled; that of the female is loud and trumpeting. Their diet is a mixed one. They breed early in the southern spring, from July to October.

CAPTIVITY

The first captive specimens in Europe seem to have been those received in London in 1862. They were imported now and then later on, and figured in many collections, but they showed no inclination to breed, Blaauw himself never having had any luck with them although they lived long and proved hardy. It was only in 1939 that success was achieved at Clères, on which we reported as follows (*Avicult. Mag.*, 1939, pp. 159-60):

'The Australian Shelduck had so far seemed badly disposed to nesting under artificial conditions. I have not heard of its having laid eggs, either in Europe, in America, or in its native country. Although closely related to the others, particularly to the Paradise Shelduck, it has a much longer neck, is more slender in shape, and, a very important point, proves quite peaceful in a mixed collection, both with the members of its own species as well as other Ducks and Geese. In short, its behaviour is much more like that of the European and the Radjah. In voice and display, on the other hand, it closely reminds one of the other Casarcas.

'For a long time the Australian Shelducks were seldom imported and were considered decidedly rare in European collections. The first to arrive after the 1914-1918 war, a male and two females, came six or seven years ago to Mr Laidley, who kindly let me have them. They lived for a few years, but never laid. Four years ago Mr Goodwin brought me another pair from Australia, and the last three years a certain number have arrived, so that the species is now well distributed in the collections of live waterfowl. At present, we keep three pairs: the oldest pair in the garden, where they live peacefully with many different Geese, Radjah Shelducks and smaller ducks; and two pairs on the lake, where they have been for two years and also prove harmless.

'Every year, in January or February, these birds come into breeding condition, but so far nothing has happened, and in April they go into moult.

'This winter, in spite of the severe frost in December, they again looked like breeding, and finally the female in the garden started laying in a nesting-box half-buried in the ground on February 2. Six eggs were laid at two-day intervals, the last on February 14. The colour of the down of the female covering the eggs is very light grey. Mr Fooks put them under a broody hen, and on March 20 and 21 two eggs were chipped on the

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thirtieth day, and three on the thirty-first, and finally five ducklings were hatched on the thirty-second and thirty-third day of incubation, the sixth egg being infertile.

'The young look very lively. They resemble other Shelduck chicks in shape and markings, but the latter are pale greyish brown, therefore quite different from those of young Paradise Shelducks, which are black; they are decidedly lighter in colour than Ruddies and South Africans. They are also more slender in build, and have yellowish-grey feet and legs.'

Three of these young birds reached maturity. The species was also successfully bred the same year at Lilford, as reported by A. F. Moody (*Avicult. Mag.*, 1939, p. 202).

'As to the nest, six eggs were laid beneath an inverted box placed in an isolated shrubbery. During incubation, thirty days, the female frequently left the nest for lengthy periods; the eggs, however, on examination always proved warm, so abundantly were they covered by a mass of grey down. The five young birds hatched are growing well and I hope may be reared.'

Australian Shelducks have also been reared at Leckford since 1940. The temper of the breeding pairs seems to vary a good deal. Those at Clères and in some other collections proved quiet and harmless, but others, such as the Leckford birds, are quarrelsome and dangerous.

PARADISE SHELDUCK

Tadorna variegata

Anas variegata, Gmelin, *Syst. Nat.*, 1, pt. 2, 1789, p. 505: Dusky Sound, New Zealand.

Casarca variegata, Phillips, *Nat. Hist. of the Ducks*, 1, 1922, p. 250. Peters, *Check-List, Birds of the World*, 1, 1931, p. 156.

CHARACTERISTICS

A large, heavy Shelduck, with a rather short neck and high legs. The male has a greenish black head and neck; upper back and mantle black finely vermiculated with pale brown; rest of the mantle black; underparts black vermiculated with pale grey, passing to dark chestnut on the abdomen; vent and under tail-coverts bright chestnut; tail and rump black; wings as in all other species. Iris dark brown. Bill and feet black in both sexes. The female is completely different: head and neck pure white; body plumage rich chestnut; wings and tail as in the male. In the post-breeding plumage, the chestnut is replaced by black vermiculated with brown, much as in the male, but redder.

Male: wing: 365–380 mm.; tail: 160–170 mm.; culmen: 42–45 mm.; tarsus: 65–70 mm.

Female: wing: 325–355 mm.; tail: 130–145 mm.; culmen: 37–40 mm.; tarsus: 58–62 mm.

Immature males are like the adults, but a little browner. Young females are much like the males, with just a few white feathers showing on the head and a reddish tinge on the breast and upper mantle; abdomen barred black and brown. They resemble in colour the adult female *T. tadornoides*.

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Downy chicks are more vividly marked than young Australian Shelducks, the dark markings being almost pure black; they are blacker than young Ruddy Shelducks, and they differ from both in having a dark line on the middle of the forehead, which is pure white in the other species.

Eggs: cream-coloured, five to eleven, 65×47 mm. on an average. Incubation: 30 days.

DISTRIBUTION

New Zealand, rare in the north.

GENERAL HABITS

Paradise Shelducks have much the same habits as their near relatives. They haunt the shores of lakes and rivers, and marshy grounds. Although normally fresh-water birds, they are seen sometimes feeding on the sea-shore; their diet is mixed, vegetables being prevalent most of the year. Breeding pairs are very jealous of invasion of their territories, but non-breeding individuals gather in flocks, up to 150 or more being seen together, moving in search of food. Nests are usually placed in holes in trees, in cliffs and among rocks, or in burrows, seldom among tussocks, but always in a sheltered location.

This is the fiercest and most pugnacious species. The display is that of the genus in a general way, but they have the habit of showing their discontent by holding down the bill still more than any other Shelduck. The male's voice is raucous, low and grunting; that of the female loud, high-pitched and trumpeting. They are very noisy birds, calling in a duet whenever alarmed or excited, so much as to become positively tiresome. Mated pairs become angry at any interference, shouting, and keeping their bills down in the water to the point of suffocation when swimming.

A century ago, Paradise Shelducks were very abundant. They have been much reduced in number since by indiscriminate shooting and trapping by white men and Maoris, despite the poor quality of their flesh. But they are still fairly numerous, and are now holding their own, according to recent observations by R. C. Murphy.

CAPTIVITY

These fine Shelducks live and breed well in captivity. Owing to their exceedingly bad temper, each breeding pair should be isolated in a large pen, as they need plenty of grass and water. They usually ignore the smaller Ducks and Teal. At Clères, they are successfully kept with Black and Black-necked Swans, but they have been known to molest Bewick's Swans and Canada Geese.

They were first imported in London in 1863, bred there in 1865, and have done so regularly almost every year since. French aviculturists, notably Courtois and Rogeron, were very successful with this species, as reported in the *Bulletin de la Société d'Acclimatation*. We reared many at Clères without difficulty. They cross readily with the Ruddy Shelduck.

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SOUTH AFRICAN SHELDUCK

Tadorna cana

Anas cana, Gmelin, *Syst. Nat.*, 1, pt. 2, 1789, p. 510: Cape of Good Hope.

Casarca cana, Phillips, *Nat. Hist. of the Ducks*, 1, 1922, p. 247. Peters, *Check-List, Birds of the World*, 1, 1931, p. 156.

CHARACTERISTICS

A little more slender and less heavy in shape than the Paradise Shelduck. The male has the head and neck ashy grey, a thin dark rufous collar, the breast and upper mantle fulvous, the rest of the mantle and underparts reddish cinnamon slightly lined with grey; abdomen dark chestnut; tail and rump black; under tail-coverts fulvous; back, flanks and thighs finely vermiculated with black and pale brown, wings as in the other species. Iris dark brown. Bill and legs black. The female differs in having the forepart and the sides of the head white; the grey of the neck is darker and tinged with brown, and the body colour is a uniform ruddy chestnut.

Male: wing: 365–380 mm.; tail: 145–150 mm.; culmen: 46–51 mm.; tarsus: 60–62 mm.

Female: wing: 330–340 mm.; tail: 140–145 mm.; culmen: 43–45 mm.; tarsus: 58–60 mm.

Immatures: like the male, but duller, the female with narrow white bands around the bill and the eyes.

Downy chicks: with marking more brownish than in *variegata*, resembling very closely those of the Ruddy Shelduck.

Eggs: six to fifteen, cream-coloured, 65–71 × 46–59 mm. Incubation: 30 days.

DISTRIBUTION

South Africa, Cape Province, Orange Free State and Transvaal.

GENERAL HABITS

South African Shelducks have a restricted range. They are found inland, usually in pairs or families, frequenting marshes and river banks, nesting in holes and burrows. Like other Shelducks, they are poor eaters. Some live around farms in a semi-domesticated state. They are naturally tame, but become wary when persecuted. They recall closely in posture and behaviour the Ruddy Shelducks, which they resemble in shape and colour; like them, they are early breeders. Their voice also is rather similar, but has a deeper tone, and they are not quite so vociferous. They are almost as bad-tempered as the Paradise Shelducks. Little observation of the species in the wild state is available, but J. S. Taylor (*Ostrich*, 15, III, 1944, pp. 188–93) has published an excellent study on the birds in the Graaff-Reinet region, from which we extract the following quotations:

‘The Shelduck, which is known locally as “Berggans”, is generally distributed and common in the Karroo, and at least a few are always to be seen on farm dams and river-pools, while the larger irrigation dams attract considerable numbers. The nature of

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the shore has considerable bearing upon the occurrence of the Shelduck. Dams with shores of wet mud and shallow water are preferred to those with deep water surrounded by shores covered with vegetation.

'As indicated above, Shelduck prefer a muddy shore, and at Graaff-Reinet they particularly frequent a part of the lake where there is usually a wide expanse of mud kept continually wet under an inch or so of water, which apparently comes from springs in the vicinity. The mud here is dotted with clumps of short grass and rushes, and in the shallow water covering the mud there is an abundance of a species of alga (*Spirogyra* sp.). Here the Shelduck feed, and it seems that the alga forms a part of their diet.'

Taylor found that females outnumbered males four to one, a curious fact with strictly monogamous birds. They start displaying in February and pairs with young are seen as late as December. Pairs appropriate territory in June and nests can be found from July till October.

'Nesting commences in late July or early August, and odd eggs, dropped on the mud, have been found from the 1st of the latter month.

'The following details concerning the nest are from the account of one by Gurth Edelsten in the *Ostrich*, III, p. 61 (1932). The nest concerned was found at the end of an ant-bear burrow 27 feet in length. It was composed of down and one large, dry thistle plant, and it contained ten eggs in an advanced stage of incubation on August 7, 1931. Small pieces of broken shell were found at intervals during digging operations, and it was evident that the burrow had been used as a nesting site for some years.

'The parent birds are very solicitous for their young, herding them together and calling them when they wander too far afield. As much as possible, they restrict them to the wet mud and shallow water, only venturing out on the depths when disturbed. The number of young per pair varies; up to thirteen have been observed. The average number of young for fifteen pairs was eight.

'Moulting takes place during the summer (November-January), and throughout this period many birds unable to fly may be seen. For the most part they keep on or near the water, and flap along the surface when approached.'

CAPTIVITY

South African Shelducks have long been rare in captivity, although they were imported into England as early as 1849 for Lord Derby. A female went later on to the London Zoo and produced hybrids first with a Ruddy male, then with one of her own hybrid sons, and finally with a Common Shelduck, living till 1862. Although the species has reached Europe and America on a few occasions since, it had not bred until 1930, not even at Woburn or at Gooilust, where these birds never had shown any inclination to nest. In that year, however, a brood was reared on the lake at St James's Park, in London, and another one at the Berlin Zoo. A number of pairs had been brought over in 1928, three of which came to Clères. They started breeding there in 1931, the father of the brood being a one-year-old male reared in Berlin, and many were reared every year afterwards, as also in England and in America, so that the species became well established in

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captivity. Some have survived the last war and are now being propagated again. The young are just as easy to rear as any other Shelducks.

South African Shelducks are very handsome and highly ornamental, but they are better kept isolated as they prove violent and dangerous, like the Ruddy and the Paradise. We usually keep them with a pair of Swans in an enclosure with a good deal of water, as they are fairly aquatic in their habits and require plenty of room and natural food to breed. They are perfectly hardy.

RUDDY SHELDUCK

Tadorna ferruginea

Anas ferruginea, Pallas, in *Vroeg's Cat.*, 1764, Adumbr., p. 5: Tartary.

Casarca ferruginea, Phillips, *Nat. Hist. of the Ducks*, 1, 1922, p. 230. Peters, *Check-List, Birds of the World*, 1, 1931, p. 156.

CHARACTERISTICS

Much like the South African Shelduck, but lighter and yellower in colour. The male has the head and neck buff, whitish on the face and strongly washed with cinnamon on the throat and the foreneck, and bordered with a black collar; mantle and underparts yellowish cinnamon; rump and tail black; abdomen and under tail-coverts chestnut; wings much as in other Shelducks, but the coverts are usually strongly washed with buffy yellow; the back is finely streaked grey and buff. There is a great deal of individual variation in the general colour, the depth of the buff on the head, neck and wing-coverts, the width of the black collar. The latter is absent or very weak after the post-nuptial moult. The female closely resembles the male, but the general colour is a little darker, more of a uniform chestnut; the face is whiter, the wing-coverts are more often pure white, and she has no black collar.

Male: wing: 365–387 mm.; tail: 142–146 mm.; culmen: 43–48 mm.; tarsus: 60–66 mm.

Female: wing: 340–355 mm.; tail: 140–142 mm.; culmen: 38–42 mm.; tarsus: 55–60 mm.

Immatures: like the female, but with a grey wash on the scapulars and tertiaries.

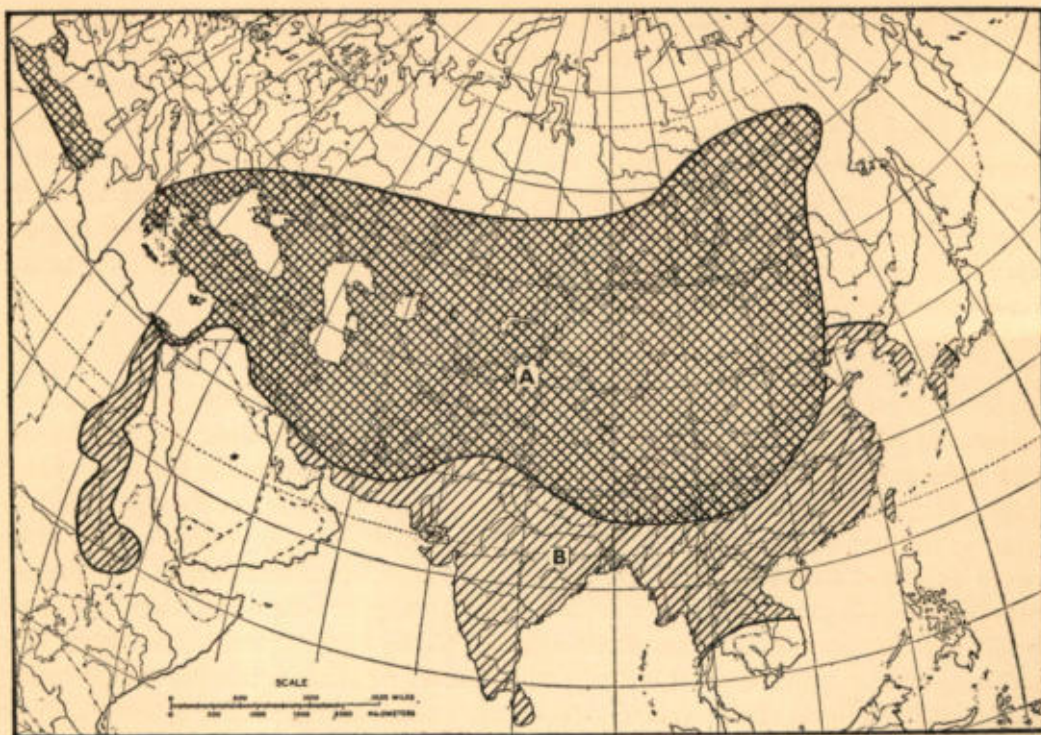
Downy chicks: marked dark brown and white, very similar to *cana*.

Eggs: creamy white, eight to sixteen, 62–70 × 46–50 mm. Incubation: 28–30 days.

DISTRIBUTION

Breeds in the extreme south of Spain (marismas of the Guadalquivir), North Africa, the Nile delta, south-eastern Europe (Greece, Eastern Balkans, Southern Russia), Asia Minor, Mesopotamia, Persia, Central Asia, east to Mongolia, Southern Siberia and China, visiting the Sudan, Abyssinia, the whole of India and Ceylon, southern China, Manchuria and Korea in the winter. Rare vagrant in the rest of Europe, occasionally to Iceland and North America, and in Japan; scarce winter visitor to Burma and Indo-China.

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28. Distribution of *Tadorna ferruginea*. (A) Breeding range; (B) Non-breeding range.

GENERAL HABITS

The Ruddy Shelduck is a strong and successful species which, unlike the other three Casarcas, occupies a very large range and can accommodate itself to various conditions. It is now rare in North Africa and several other countries, but still very common in the Dobrudja, many parts of southern Russia and Central Asia, and also on migration in India, Yunnan and western China, becoming rarer farther east. Although very tame when unmolested, as is the case in Tibet and in Mongolia where they are considered sacred, living and nesting close to human habitations, these intelligent birds become extremely wary when necessity arises, so that they have held their own in most districts. The poor quality of their flesh helps to a great extent, and they are not often pursued as game.

Ruddy Shelducks are denizens of interior fresh-waters, only occasionally seen on the sea-shore. They live in pairs, congregating in flocks after the breeding season, but very soon breaking up again. They are more often met with on bare banks and on sand-bars. Their food is varied and includes grass and vegetable matter as well as small crustaceans, molluscs and worms. Their life habits much resemble those of the Egyptian Goose and of the preceding species of Shelducks. They are jealous, quarrelsome, and dreadfully

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noisy. The male has a rather high-pitched nasal whooping call which sounds like a prolonged 'Ah-ouk', and also repeated ascending notes 'ho-ho-ho . . .'. The female is even louder, with a harsher tone, 'Ka-ha-ha'. They nest mostly in crags and holes in cliffs and rocks, sometimes in ruins, burrows or hollow trees. In India, they are hated by sportsmen as a single pair, always on the watch, can give alarm to hundreds of other Ducks. Their display and breeding habits are those of the genus, and they are early nesters. They are very often resident where they breed, but certain populations migrate south during the winter, though never very great distances, and others make altitudinal movements according to the seasons.

CAPTIVITY

Ruddy Shelducks were kept by the Egyptians and the Greeks, and they have long been popular in captivity in Eastern Europe and Asia on account of their bright plumage, their great tameness and their extreme wariness, which makes them as useful as 'watch dogs'. They seem to have reached Western Europe rather late, as the London Zoo received the first specimens only in 1850. They bred in 1859 and have done so very often since, there and elsewhere. They are among the easiest of all waterfowl to propagate, being as hardy and prolific as the related Egyptian Geese, with which they interbreed readily, as they do with all other Shelducks, producing fertile hybrids. Like them, they are savage and dangerous to other birds, and breeding pairs are better isolated, although a great many can be kept together without too much fighting. But it is impossible to have just a few pairs in a garden or a pen without losses. They require plenty of space and water to do really well. They nest readily in boxes half buried in the soil, and in drain pipes and burrows. The young are very easily raised.

Radjah Shelducks

Tadorna radjah

Radjah Shelducks are smaller and more elegant than the four preceding species; they have a larger bill, otherwise they are very similar in shape and proportions. White dominates in the plumage and the sexes are alike in colour, but differ much in voice; the males whistle and the females quack raucously, much as do the Common Shelduck and the Orinoco Goose. Although noisy and fussy, they are not really savage and they agree well among themselves and with other birds, resembling in this the Common Shelducks. Curiously enough, however, they ignore the presence of the latter species, while they mate readily with Ruddy Shelducks, producing fertile hybrids, so that one is inclined to think that they are more closely allied to the latter species.

Radjahs are white, with a dark brown mantle and narrow belt across the breast, black back, rump and tail, and the lower flanks and under tail-coverts finely vermiculated black and buffy grey. The wings are as in the other Shelducks, but the greater wing-

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coverts have a black line near the tip, as in the Egyptian Goose. Both sexes are alike in colour. Iris pale yellow. Bill and feet white or pale fleshy pink.

Immatures are like the adults, but a little duller, with a brownish tinge on the crown and nape. The iris is dark brown.

Downy chicks are of the same pattern as the Ruddy Shelduck, but very brightly coloured, with black markings and a chestnut brown cap which reaches the eyes; a buffy spot in front of the eye is not very apparent; the pairs of white spots on the upper parts are very distinct, one inside the wings, one on each side of the upper back and one on each side of the lower back.

Eggs: creamy white, six to twelve, $57-61 \times 39-43$ mm. Incubation: 30 days.

DISTRIBUTION

North-eastern and northern Australia, south to the Tropic of Capricorn in the west and to northern New South Wales in the east; New Guinea; the Moluccas and neighbouring islands.

GENERAL HABITS

Radjah Shelducks live around fresh water at low altitudes in warm districts. They are locally common along rivers and lakes, and sedentary, except for wanderings in search of food. They fly swiftly and perch readily on trees, nesting in their holes. They feed on vegetable as well as on animal matter. Very little information on these birds in the wild state can be found in literature since the short initial notes of Gould and Ramsey. Ripley reports that in north-western New Guinea, at Sainkedock, a pair roosted every night on an enormously high tree over a small stream. Sometimes they would fly to and fro over the clearing. Chicks were collected on Batanea in August 1938.

In behaviour, they are somewhat intermediate between the larger species and the Common Shelducks. Like the latter, they display a great deal, but they are not really pugnacious. The male whistles continually as he moves his extended neck up and down, and the female deports herself as those of the other species do. Although closer in shape and posture to the four large Shelducks, it is a daintier, smaller species, and the body looks proportionally shorter. The bill is broader and more turned up.

CAPTIVITY

Radjahs are extremely beautiful and amusing, and being of a fairly good disposition, several pairs can be associated without serious risks. They may demonstrate and chase one another, but never viciously, and they are harmless to other birds. Despite their tropical origin, they prove quite hardy and easy to keep. Unfortunately they have been seldom imported and remain very rare in live collections. The first specimens to come to Europe seem to have been those of Cornély, in France, who had a few in 1886; but they did not live long and never bred. More came to Europe between 1900 and 1904, and some were acquired by the Berlin Zoo, the Duke of Bedford and a few other amateurs. They lived for some time without attempting to nest. Such was also the case with a pair

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which came to the New York Zoo from Australia in 1922, probably the first to reach America alive.

Two males were brought over in 1928 from the Aru Islands by Mr Frost and came to Clères, where they did very well. They first lived in the garden, where they never fought with nor bothered any other birds. Given the choice of female Ruddy and Common Shelducks, one immediately paired up with the former, while the other completely disregarded the Common Shelduck and tried to pair up with an Orinoco Goose, which had to be removed as we needed this rather rare bird for a male of her own species. The Radjahs were very active and amusing, always on the go, running all over the grounds and whistling constantly. One hybrid from the Ruddy female was reared in 1930 and five more the following year. These are mahogany red with a buffy white head, the males being more deeply coloured than the females. Two of the hybrid females were later mated to the Radjah males, and a number of three-quarter hybrids were produced from 1936 till 1940. These were similar to their fathers, with a rather less dark mantle and a broader and slightly irregular brown breast belt. They would have no doubt bred if they had survived the 1940 invasion. To these Moluccan Radjahs we added three pairs of the Australian form in 1936, when Messrs R. and N. Stevens received a large consignment from Melville Island. They had not yet attempted to nest in 1939, nor did those that were kept at Walcot Hall, at Foxwarren and in other collections. In 1940, however, the pair at Leckford laid eleven eggs, ten of which produced healthy young which developed very quickly, according to Miss E. Chawner (*Avicult. Mag.*, 1940, p. 213). During the war years, all captive Radjahs in Europe disappeared except the birds remaining at Leckford in 1946, on which Terry Jones reports as follows (*Avicult. Mag.*, 1946, p. 195):

'Radjahs bred in 1940, when about a dozen were reared, but no eggs were laid till this year, by which time the flock had dwindled to two birds. The pair showed signs of breeding a long time before any eggs were laid, both birds displayed a great deal and in the evenings spent a lot of time hunting worms. For their food they do not wander about searching in the evenings as do most duck. They choose their beat to which they regularly return, evening after evening, or whenever it is wet during the day. The pair always worked very close together and were amusing to watch. Having arrived at the spot, they marked time exceedingly rapidly for a quarter or even half a minute and then, without moving their feet, peered about until they spotted a foolish worm breaking the surface. Having smartly baffled him the spotter returned to its mate and the pair started marking time again. A quiet dialogue is kept up most of the time, particularly during the periods when they are spotting the suckers. I have often seen them working and passed by half an hour later to find them within a yard of their original spot. The technique seems to work really well and their bag, I'm sure, is larger by far than that of the wandering searcher. The next stage was a tour of inspection of the various boxes. The female climbed the ladders and peered suspiciously through the entrance holes while the male generally stayed below. In this way they were not in the least secretive. This went on for some time without getting the pair apparently any further, but suddenly the female started feeding up and that, of course, invariably means business. Eight eggs were laid,

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white or rather very slightly tinted cream, highly glossed and rather rounded. The duck showed no desire to sit. She died before going into eclipse. Incubation is thirty days, and there were five young hatched and reared. The down plumage is the same as the rest of the family in design, in this case the colours are black and white, but the cap is brilliant chestnut. The first plumage is very similar to the adult, but although the beak and legs are flesh white, as in the adult, the iris is dark.'

No further breeding took place until 1949 when a young pair reared two young, the old pair having died in the meantime. More were raised in 1950, 1951, 1952, and 1953.

Like many Australian birds, particularly the Maned Geese and the Australian Shelducks, Radjahs seem to be uncertain breeders, depending a great deal on the weather and other conditions for their nesting. They certainly need much space where they can find natural food, particularly earthworms of which they are very fond. They require a good deal of animal food and a rich mash is necessary to keep them in good health. The young are more difficult than those of the larger species and they should be treated like Common Shelducks.

MOLUCCAN RADJAH SHELDUCK

Tadorna radjah radjah

Anas radjah, Lesson, *Man. d'Orn.*, II, 1828, p. 417: Buru.

Tadorna radjah, Phillips, *Nat. Hist. of the Ducks*, I, 1922, p. 224.

Tadorna radjah radjah, Peters, *Check-List, Birds of the World*, I, 1931, p. 157.

CHARACTERISTICS

A small and dark form. The mantle, scapulars and breast belt are black or very dark brown with very fine brown lines. There is a good deal of variation in the depth of this colour, which seems to be individual and not linked to geographical distribution, as some birds from Ferguson Island are just as dark as others from the Moluccas, where fairly brown birds are also found.

Male: wing: 265–282 mm.; tail: 118–126 mm.; culmen: 43–46 mm.; tarsus: 53–59 mm.

Female: wing: 255–265 mm.; tail: 110–120 mm.; culmen: 40–44 mm.; tarsus: 48–54 mm.

DISTRIBUTION

New Guinea, Aru Islands, Moluccas, and neighbouring Islands, including Ferguson, but not New Britain.

GENERAL HABITS

Those of the species.

CAPTIVITY

The two males that lived at Clères between 1928 and 1940 are probably the only representations of the northern sub-species to have reached Europe, and they have produced hybrids with the Ruddy Shelduck, as reported above.

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AUSTRALIAN RADJAH SHELDUCK

Tadorna radjah rufitergum

Hartert, *Nov. Zool.*, xii, 1905, p. 205: South Alligator River, Northern Territory, Australia.
Phillips, *Nat. Hist. of the Ducks*, i, 1922, p. 227; Peters, *Check-List, Birds of the World*, i, 1931, p. 157.

CHARACTERISTICS

Slightly larger and redder than the Moluccan form; the upper part of the mantle and breast belt are always mahogany red, passing to blackish brown on the scapulars, which are freely lined with pale brown. Much individual variation.

Male: wing: 280–290 mm.; tail: 125–130 mm.; culmen: 52–57 mm.; tarsus: 56–62 mm.

Female: wing: 257–265 mm.; tail: 120–128 mm.; culmen: 42–46 mm.; tarsus: 52–56 mm.

DISTRIBUTION

Northern and north-eastern Australia, including Melville Island.

GENERAL HABITS

Those of the species. Most observations pertain to the Australian sub-species.

CAPTIVITY

The Australian Radjah has been imported now and then, and it has bred several times at Leckford, England.

COMMON SHELDUCK

Tadorna tadorna

Anas tadorna, Linné, *Syst. Nat.*, ed. 10, i, 1758, p. 122: Sweden.

Tadorna tadorna, Phillips, *Nat. Hist. of the Ducks*, i, 1922, p. 204. Peters, *Check-List, Birds of the World*, i, 1931, p. 157.

CHARACTERISTICS

Although resembling in a general way the five species that we have just studied, the Common Shelduck is quite distinct in shape. The bill is longer, broader near the tip, more concave and upturned, and during the breeding season it is ornamented, in the male, with a large fleshy knob at the base of the upper mandible. The body is shorter and broader at the shoulders, and the neck much thinner. There is a definite eclipse plumage and the sexes differ mostly in the intensity of the colours, in the absence of bill knob in the female, and in voice. The female is conspicuously smaller than the male, in contrast with the preceding species in which the sexes are not greatly different in size. The adult male, in the autumn, winter and spring, is white, with the head and neck glossy greenish black, a very broad belt of cinnamon chestnut across the breast and the upper back, and

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a wide black band from breast to vent; under tail-coverts pale cinnamon; tip of the tail and scapulars black; wings white, green, chestnut and black as in all other Shelducks. Iris brown. Bill and knob deep carmine red, with a blackish nail. Legs fleshy pink. During the summer, after the post-breeding moult, the head and neck turns a hoary black, the feathers being tipped with brown, the broad belt becomes irregular, pale and much mixed with grey; the black band on the underparts is greatly reduced and mottled with white and grey; the under tail-coverts are buffy white and the scapulars dull blackish. The frontal knob disappears, and the bill turns a lighter red. The female in breeding dress is much like the male, but duller; the forehead and face are greyish, the belt pale cinnamon, and the band from breast to vent blackish brown, with buffy white under tail-coverts. The bill is light red, with the tip dusky. In eclipse, she is still duller and lighter, like the male, and there is only a mottling of black on the middle of the underparts. The bill is dull red, more or less tinged with grey, and there is a pale grey patch on the forehead.

Male: wing: 318–350 mm.; tail: 110–130 mm.; culmen: 52–60 mm.; tarsus: 50–57 mm.

Female: wing: 290–334 mm.; tail: 100–115 mm.; culmen: 44–54 mm.; tarsus: 48–52 mm.

Immatures are very different from the adults. Until the second moult, in the first autumn, they have a dark grey head with the forehead, face, throat and foreneck white, and a white ring around the eyes; underparts white, slightly washed with pale grey; upper parts brownish grey, bill and legs pale grey. In their first year, they resemble the adults, but are duller, and the males do not show any bill knob.

Downy chicks are of the usual pattern, with dark brown markings, much as in *T. ferruginea*, but with an indistinct central white spot between the shoulders. Bill and feet lead grey.

Eggs: eight to sixteen, rather rounded, creamy white, 61–70 × 45–50 mm. Incubation: 28 days.

DISTRIBUTION

Europe and Asia, from the British Isles and Norway to Manchuria, south to Spain, the south of France (Camargue), Sardinia, the Balkans, the Caucasus, Persia, Tibet and north-western China. In winter, south to North Africa, Egypt, northern India and Indo-China, southern China and Japan. Always on the sea-shore, or around salt-water lakes, wandering inland only on migration.

GENERAL HABITS

Common Shelducks are decidedly salt-water birds. They inhabit chiefly sandy and muddy coasts and estuaries, near dunes, going a little inland to nest in burrows and holes in cliffs or rocks, seldom under the cover of heather or in hollow trees. In Asia, they are common around the many salt-water lakes and inland seas. They fly much like Geese, walk easily and swim well. They are gregarious, unlike other Shelducks. They feed mostly on the shore or in shallow water, eating molluscs, crustaceans and insects, and also algae, seeds, leaves and roots of aquatic plants. They tip-dive like River Ducks and

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29. Distribution of *Tadorna tadorna*. (A) Breeding range; (B) Non-breeding range.

also stamp on the ground to bring up worms. The male's voice is a clear whistle, much like that of the Radjah's, and the female has a harsh, short quack. The display of both sexes is as in the other species, with much bowing, but it shows an indication of the typical Mallard display of rising on the water with the bill pointed downwards. Mating is often accomplished after diving.

In the colder parts of their huge but broken range, Common Shelducks migrate. Elsewhere they are mostly residents, but perform, at least in western Europe, a curious summer migration. In the British Isles, it has been studied recently by R. A. H. Coombes (*Nature*, 164, 1949, p. 1122):

'The British population of the Shelduck performs one highly concentrated migration in the year; this migration takes place neither in spring nor autumn, but shortly after mid-summer, and it has begun, developed and almost ended in four weeks — the month of July. The return is more in the nature of a gradual drift back to the breeding-grounds than true migration. It is spread over a period of at least six months, the waves of

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returning birds varying somewhat from year to year, but showing peak periods in autumn and again in later winter or early spring. It is these returning British and Irish birds that have been mistaken for winter visitors and passage migrants coming from breeding-grounds in other countries. Every year there are in the breeding areas comparatively large populations of Shelducks which are paired and appear to be in adult plumage, but which do not breed. The exodus in July consists of the entire population of these non-breeding pairs and almost the entire population of the adult breeding pairs. The young birds of the year, most of them still in down, are thus deserted by their parents. The broods of downy young usually join to form larger groups. One or sometimes two adults remain with each flotilla of flightless young for a period after the rest of the parents have migrated.

'Analysis of the ringing data from seven European countries and study of the literature had led them (J. Hoogerheide and W. K. Kraak) to put forward the theories that Shelducks in north-west Europe probably migrate in July, and concentrate in the south-east corner of the North Sea to moult, and that return to their countries of origin during autumn or winter could be inferred.

'It was stated by Goethe that flocks of Shelducks in a flightless condition were to be found in August in the Heligoland Bight, particularly in the area around the Island of Mellum. The presence of these flocks was confirmed in 1949 through the assistance of the Air Ministry, and the Air Officer Commanding in Chief of the Royal Air Force in Germany, by observations made from the air by crews of R.A.F. aircraft flying in the region of Mellum.'

CAPTIVITY

Common Shelducks are a great ornament to any pond and garden, and they have long been kept in captivity in Europe. But unless provided with a large range of land and water, where they can find plenty of worms, insects, crustaceans, water plants and other natural food, they require a rich mash, or dog biscuit, to thrive. They are quite harmless to other birds, and several pairs agree well together, only fussing to a certain extent. They lay readily in burrows, holes, drains and deep boxes. The young need a good deal of animal food and some care, but they are not really difficult to rear. They are perfectly hardy.

KOREAN CRESTED SHELDUCK

Tadorna cristata

Pseudotadorna cristata, Kuroda, *Tori*, 1, 1917, p. 1: Naktung River, near Fusan, Korea.

Phillips, *Nat. Hist. of the Ducks*, 1, 1922, p. 228.

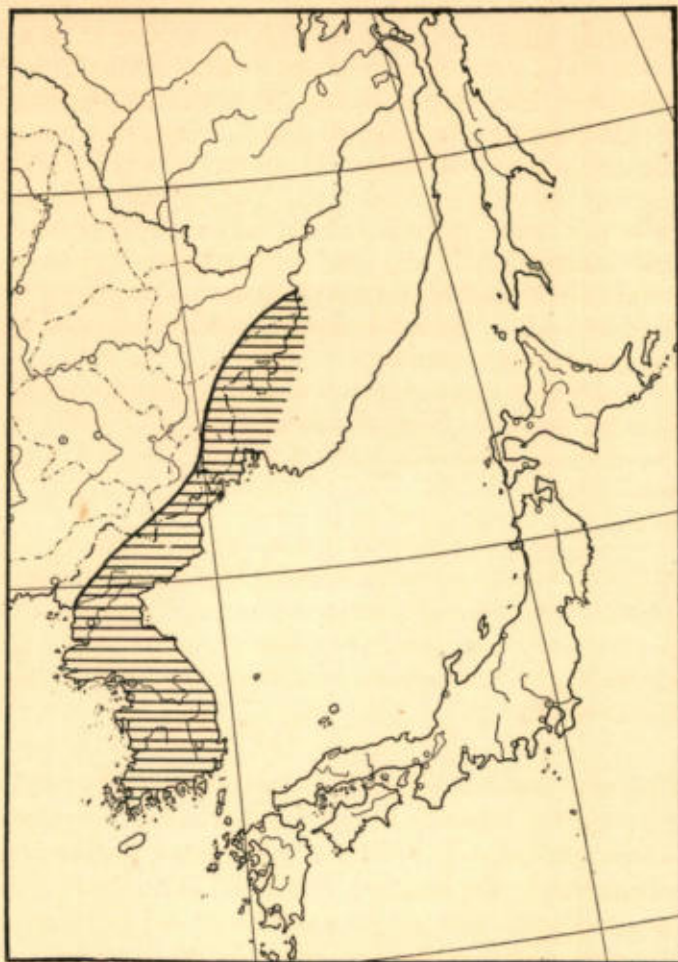
Peters, *Check-List, Birds of the World*, 1, 1931, p. 157.

CHARACTERISTICS

The male has a long, drooping nuchal crest; forehead, crown, nape and hind neck glossy greenish black; rest of the head and neck grey, very finely lined with brown; a black

THE SHELDUCKS

30. Probable part
distribution of
Tadorna cristata.



patch on the chin; upper mantle and breast greenish black; rump and tail black; under tail-coverts cinnamon rufous; wings as in other Shelducks; rest of the plumage grey, finely vermiculated with white, with a rufous wash on the flanks and the scapulars. Iris brown. Bill and feet red. The tail is graduated and there is an indication of a knob on the forehead. The female has the crown, crest and hind neck black, and a black line in front and below the eye; rest of the head and neck white, lightly lined with brown on the sides. Wing and tail as the male, but duller and paler; body plumage dull brown clearly lined with white. Iris brown. Bill and feet fleshy pink.

Male: wing: 320 mm.; tail: 117 mm.; culmen: 45 mm.; tarsus: 49.5 mm.

Female: wing: 310 mm.; culmen: 41.5 mm.; tail: 115 mm.; tarsus: 47 mm.

Immatures, downy chicks and eggs unknown.

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DISTRIBUTION

Korea and Ussuriland; probably extinct, but there is a possible sight record at Chushin-hokudo in late March 1943 (Yasukichi Kuroda, *Tori*, XIII, No. 62, August 1953, pp. 133-5).

GENERAL HABITS

First mentioned by P. L. Sclater, after a female specimen had been taken near Vladivostok in April 1877 by Lieut. F. Irmininger, and preserved in the Copenhagen Museum. It was then considered as a hybrid between the Ruddy Shelduck and a Falcated Duck, a supposition that no experienced student of Ducks can possibly admit. Kuroda obtained a similar bird from Fusan, Korea, in December 1916 and named it. According to Uchida (*Tori*, II, 1918, p. 6), these birds were imported alive into Japan a couple of centuries ago. They were mentioned and figured in the avicultural work *Kanbun-Kinpu* under the name of 'Chosen-Oshi'. In 1924 Kuroda obtained a male which had been taken at the mouth of the Kum-Kiang River, near Kusan, Korea, in 1913 or 1914 (*Tori*, XVIII, 1924).

The three existing specimens are in perfect accord with the old Japanese figures, and it is probable that this exceedingly fine species had become extremely rare, then very nearly extinct during the last fifty or a hundred years.

XIII

THE SOUTH AMERICAN CRESTED DUCKS

Genus *Lophonetta*

Riley, *Proc. Zool. Soc. Washington*, 27, 1914, p. 10.

Type, by original designation: *Anas cristata*, Gmelin = *Anas specularioides*, King.

THE colder parts of South America are the home of a curious species of Duck which represents a transition between the Shelducks and the River Ducks. Like the former, they are large and have the legs set forward, so that they walk gracefully, as well as a bony knob at the bend of the wing. They also possess a savage and violent temper; pairs live isolated, jealously holding their territory against any intrusion. Their tail is long and broad, but pointed. The adults, however, recall in their pattern and colours various River Ducks, particularly Pintails and Marbled Teal, and the downy young are rather intermediate between those of the two tribes.

Although the characteristics advocated by Riley are not convincing (presence of a crest, elongated tail feathers, fourteen in number instead of eighteen or twenty), it seems that this peculiar species should be placed in a special genus because of its shape, proportions and behaviour. The sexes are alike in colour, but the female is slightly smaller. The nuchal crest, longer in the male, is composed of fairly broad, disintegrated feathers, and it is held down along the neck. The secondaries show a very bright metallic speculum. The bill is long and narrow, much compressed laterally at the base. There is only one species in the genus, *Lophonetta specularioides*, with two sub-species.

PATAGONIAN CRESTED DUCK

Lophonetta specularioides specularioides

Anas specularioides, King, *Zool. Jour.*, iv, 1828, p. 98: Straits of Magellan.

Anas cristata cristata, Phillips, *Nat. Hist. of the Ducks*, xi, 1923, p. 132.

Anas specularioides specularioides, Peters, *Check-List, Birds of the World*, i, 1931, p. 165.

CHARACTERISTICS

Fore crown, crest and sides of the head and neck pale greyish brown spotted with black; a dark brown band behind the eyes; hind part of the crown and occiput earthy brown; throat and foreneck whitish; mantle, breast and sides of body light greyish brown with large dark brown spots; back, rump, upper tail-coverts and abdomen mottled dark and pale brown; tail and under coverts black; wings earthy brown, the secondaries forming

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31. Distribution of
Lophonetta specularioides.
(A) *L. s. specularioides*;
(B) *L. s. alticola*.

a very bright speculum, purple with green reflections, white tips and a subterminal black band. Iris light red to orange yellow. Bill and feet dark grey; a pinky orange line along the edges of the lower mandible.

Male: wing: 268–277 mm.; tail: 160–175 mm.; culmen: 43–46 mm.; tarsus: 46–50 mm.

Female: wing: 250–257 mm.; tail: 132–138 mm.; culmen: 40–44 mm.; tarsus: 43–45 mm.

Immatures: like the adults, but duller.

Downy chicks: earthy brown above with large white spots on the wings, on sides of the back and of the rump; forehead and sides of the head pale brown; underparts dirty white; crown and a band across the eyes dark brown. Iris brown. Bill grey, pinkish underneath. Legs dark grey. The tail is long and stiff, as in the Shelducks.

Eggs: cream coloured, five to eight, 60–70 × 40–50 mm. Incubation: 30 days.

DISTRIBUTION

Southern Chile north to Santiago; Patagonia and Western Argentina north to Mendoza; Tierra del Fuego and the Falkland Islands.

THE SOUTH AMERICAN CRESTED DUCKS

GENERAL HABITS

Patagonian Crested Ducks are sedentary, even in the southern parts of their range, moving to inland fresh-waters to breed in many cases, otherwise living near the seashore and resorting to salt water. Farther north, they breed in the Cordilleras and come down in the winter. Their food, mostly animal, is found on the shores and flats, in shallow water, and they also frequent kelp beds. They recall Common Shelducks in their diet. They have been described as quarrelsome and unsociable, but in February and March 1953, in Tierra del Fuego, Scott found them in flocks of up to 20 on the inland pools and in much larger concentrations on the seashore. At the mouth of one stream running into Useless Bay as many as 300 were gathered on the shingle beach at high tide. Both on the mainland shore of the Magellan Strait and in Tierra del Fuego he found them the commonest duck. All observers agree that they are tyrants to other waterfowl, but they probably lose their bad temper after the breeding season. Their flesh is poor eating.

Cobb gives interesting information on these birds, which he calls Grey Ducks, in his *Birds of the Falkland Islands* (London, 1933, pp. 67-9):

'Grey Ducks are most erratic in their nesting dates, seeming to have little regard for seasons. Their eggs have been found in every month of the year. September to November may be said to be the regular nesting months, although a few nests will probably have been found in August and an odd one at any old time outside these months. They lay usually five or six cream-coloured eggs, which are very good for eating, in diddle-dee, grass, or on tussac islands among the tussac. Nests are found in disused Jackass Penguin holes underground. Unusual nests found include a semi-detached affair with two sitting Ducks, each on four eggs; one containing eleven eggs; one close up to a goose's nest.

'Early in August they can be watched on some quiet water, choosing partners for the forthcoming season's dance. Arrayed in their smartest rig, they dash about after one another with their crests sticking out behind their heads, tying their necks into knots, and then darting backwards suddenly for a few feet, squawking most of the time.

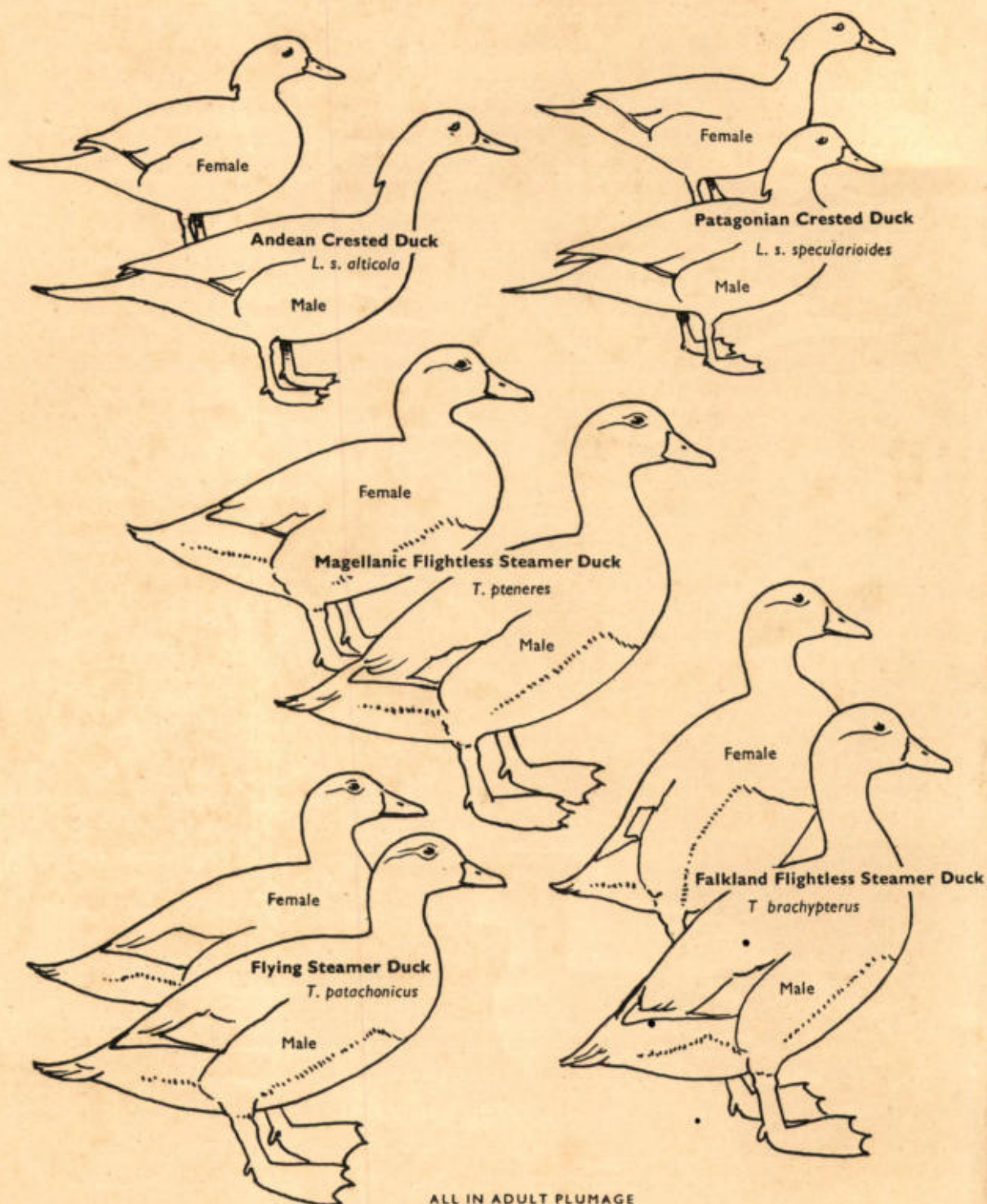
'Then in September, you will see the chosen pairs doing a bit of serious courting, which consists of swimming backwards (even against a strong wind), elongating their necks in an unnatural way, curving them up and pushing backwards, lifting a wing and quickly popping their bill under it, at the same time letting out a little squawk, wagging their tails, shaking their heads, and sticking out their little tufts of bobbed feathers at the back of their heads.

'When hatched, the downy ducklings are hurried to water as quickly as possible regardless of consequences; if no pond is handy then it must be the sea.'

A. Morrison saw two pairs with ducklings at Baño Nuevo and Nirehan in Southern Chile, as well as eggs in January. Pairs were very solitary and, in his opinion, it is not a true *Anas*, nor has it anything to do with *A. specularis* (*Ibis*, 1940, p. 253).

CAPTIVITY

Until very recently, when some of these birds reached the Severn Wildfowl Trust's collection at Slimbridge, only three cases of these birds being kept in captivity in Europe



ALL IN ADULT PLUMAGE

XIV. South American Crested Ducks and Steamer Ducks



THE SOUTH AMERICAN CRESTED DUCKS

had been reported. According to Eyton (1838), they figured in Lord Derby's menagerie at Knowsley. The London Zoo received two in 1887 from the Falklands, one of which lived for over nine years, and there were two males at the Berlin Zoo in 1932. Despite their basic diet of molluscs, crustaceans, worms and insects, they do well in captivity on a régime of grain, green food and mash.

ANDEAN CRESTED DUCK

Lophonetta specularioides alticola

Anas cristata alticola, Ménégaux, *Bull. Soc. Philom. Paris*, (10), 1, 1909, p. 224: Lake Poopo, Bolivia.

Phillips, *Nat. Hist. of the Ducks*, II, 1923, p. 137.

Anas specularioides alticola, Peters, *Check-List, Birds of the World*, I, 1931, p. 165.

CHARACTERISTICS

Larger and browner than the Patagonian sub-species. The underparts are much less spotted and almost pure light buffy brown; the wing speculum is pinker.

Male: wing: 290–310 mm.; tail: 170–190 mm.; culmen: 49–51 mm.; tarsus: 49–52 mm.

Female: wing: 278–290 mm.; tail: 145–155 mm.; culmen: 45–48 mm.; tarsus: 44–46 mm.

Downy chicks are more vividly marked, with broad white eyebrows.

DISTRIBUTION

The high valleys and plateaux of the Andes of Southern Peru, Bolivia, northern Chile and Argentina.

GENERAL HABITS

Andean Crested Ducks are found on the mountain lakes of the highlands, between 10,000 and 15,000 feet and even above. According to most reports they live in isolated pairs or families and frighten away all other birds. A. Morrison found them on all lakes he visited in the Puna region of Peru in 1937, but always in small numbers and usually in pairs. In 1938, they were not common on Lake Junin, but he saw as many as thirty-two feeding together, probably young birds. There were more of them on the smaller, higher lakes. Three lots of ducklings were brought to him between April 19 and 23.

CAPTIVITY

In May 1938 Morrison brought over to Clères three young birds, two males and one female, the first Andean Crested Ducks to have been imported; one male was later sent to Leckford. The pair at Clères was very tame. Although rather irritable, they did not attack other birds on the pond they shared with a pair of Black-necked Swans and various Ducks and Teal. In the spring of 1939, however, they became vicious and killed one or two Ducks, so that they were isolated in a special pen. In May 1940, the female started laying under a low coop, and she was sitting when Clères was invaded in June.

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Nothing more was heard of these birds till 1946, when I found the female swimming among other Ducks on a pond at the Vincennes Zoo, in Paris. A little later, we saw the Leckford male at the London Zoo. It was promptly arranged that both birds should be united at Leckford in 1947, with the happy result that they bred the following year. Terry Jones reports on them as follows (*Avicult. Mag.*, 1948, pp. 196-9):

'They were turned out in the main enclosure with all the peace-loving waterfowl, in spite of Dr Vevers' warnings about the drake's temper. I was anxious to breed them, as they had not previously been bred in captivity, and I wanted them to have the best possible chance of doing so. Mr Delacour had told me that when Clères was overrun by the Germans the duck had been sitting. They ignored each other, though both were anxious to obtain mates. I therefore caught them up and put them in a pen by themselves. For a long time they kept as far apart as possible and should the duck come near the drake she was savagely attacked. Months went by and I began to despair of mating them. Then I noticed the duck nervously, and always at a safe distance, courting the drake. Very slowly he took to her and once they were devoted to each other I again turned them out into the main enclosure.

'The Crested Duck is a curious species, one minute behaving like a Mallard, and the next like a Shelduck. I will now try and describe in detail some of these actions. The typical call note, used, for example, when calling to flighting Mallard, is very similar in the case of the female to the call of the duck Chestnut-breasted Teal. The "quacks" have the same spacing and the same slight cadence — "aap-aap-apapap". The voice, however, is distinctly deeper. The drake's call is the same as the duck's in form, but his voice is a rather windy whistle. The duck is much given to "nattering", an endless series of short grumbling notes, when a person she likes is near or when her mate is creating hell for all around her. The duck's note when courting her mate is very similar to the note a common Shelduck uses on similar occasions. The Shelduck swims by her mate, uttering a series of "arrups", while stretching her neck along the water and at each note slightly raising the angle of her head and beak. The Crested Duck carries her neck stretched upwards with her beak rather below a right angle. At intervals the duck utters the note similar to the Shelduck's, at each note stretching out her neck, opening her beak, and then withdrawing delicately back again to her former vertical carriage. The whole action is extremely graceful and reminds one somehow of the way an Indian dancer uses her hand and arm when symbolically picking a flower. Sometimes when on land she runs around her mate, using the same display and each time she passes in front of him he extends his neck and opens his beak in a similar manner to her, but in his case in silence.

'The drake's display has two main forms, one used on land and the other when on the water. When calling or during display the drake tightens all his plumage as much as possible, giving himself a quite fantastically long and thin outline. When displaying on the water he sits looking extraordinarily long and thin. Sometimes he swings backwards to place himself more favourably in relation to the duck. He keeps repeating an asthmatic "wheek", at each note extending his neck upwards and giving his head a shake. This performance is repeated several times, then suddenly he rears up exactly as does a Mallard, giving the water a lightning bite and pulling his head up along his body. A

THE SOUTH AMERICAN CRESTED DUCKS

difficult display to describe, but anyone who has watched a farmyard drake on a pond will know what I mean. When on land the prelude is the same, but the second movement consists of lowering his head to the ground quite quickly by bending only the base of his neck. It always reminds me of a hammer which has been stood on its handle and is falling down. As soon as his beak touches the ground he raises his head again with a lightning movement, swings his face at right angles away from the duck, uttering at the same time a throaty "wheooo", a noise made by some people when scaring away cats. The duck occasionally does what I call the feather ripping display, common to females of such diverse species as Chiloé Wigeon, Rosy-bill, and Carolina. I think it is really a speculum display which is almost always performed by the female, though the male Mandarin and Carolina both use abridged forms of it in their displays. I have never seen any Shelduck use it, but the female Black-necked Swan often performs. The flights of one wing are slightly lowered and at the same time the tertiaries are slightly raised. The bird puts its head behind its wing, quickly running its beak over the flight shafts, producing a noise like tearing cloth.

The invitation to mate consists of a raising and lowering of the head and neck, while the pair float facing each other. This is the action of Mallard, the Teals, Pintails, and Wigeons, but not of the Shelducks, which immerse their heads and necks, bringing them to the surface with a jerk, as do the geese and swans. After mating, the drake swims rapidly round his mate as does a Mallard.

The duck had three nests during the summer and each one was placed amongst rank herbage and not in a box or burrow. The nest was a well-built affair for a duck and lined with down. Unlike any other duck I have kept, she was noisy when on her nest and always gave her position away by her incessant nattering. The eggs, of which there were eight in the first clutch, are creamy white and rather long. In size, shape, and colour they were indistinguishable from those laid by our female Chiloé Wigeon.

The ducklings when first hatched are very similar to those of the Common Pintail, but whereas the Pintails as they grow tend to become a more level grey, the lighter patches of the Crested duckling's become more conspicuous, and as they grow older they more resemble young Sheld-ducklings. They are quite the worst-tempered of any duckling, and even little birds of a week-old will seize another duckling and attempt to flog it with their little wing stumps. They are not particularly easy to rear and, like the young of the Common Shelduck, require a great deal of animal food. I had always reckoned that once a duckling had begun to feather it was past all rearing troubles, but not so the Crested duckling, which seems to have a critical stage at about five to six weeks old. At this stage they seem to completely go off any artificial food, to take very little grain, and manage to survive on green food and all the live food they are given or can find. At the very stage when any normal duckling endeavours to keep its crop perpetually full in order to grow its flight feathers quickly, the Crested ducklings are off their food and finicky like young Turkeys shooting the red. The first plumage is a fawner and more washed-out edition of the adult's.

The old pair had a very strong desire to stake out a territory; no bird, duck, goose, or waterhen was allowed in it, but as soon as they crossed the boundary the drake gave up his pursuit. When driving off trespassers the drake extends his neck out along the water

XIV

THE STEAMER DUCKS

Genus *Tachyeres*

Owen, *Trans. Zool. Soc., London*, ix, 1875, p. 254.

Type by monotypy: *Anas brachyptera*, Latham.

THE austral parts of South America, mainly along the coasts, are the home of the large, robust, coarse and plain-plumaged Steamer Ducks. They are very difficult to place among the waterfowl, as they hardly resemble any others, being primitive and simple in their pattern and display. As they are great divers and feed mostly on shellfish and other marine animals, they show a certain superficial similarity to the Eiders, to which however they are obviously not really related. But because they are terribly quarrelsome and jealous, and their downy chicks indicate some analogy in the colour pattern with those of *Chloephaga*, showing, like them, a white band (sometimes interrupted) on the sides of the head, we have ventured to associate them with the *Tadornini* as very aberrant members of the tribe. It is possible that the Steamer Ducks represent diving species evolved from the *Chloephaga* group. Furthermore, the males help the females in raising the young, and they seem to pair for life, as do Sheldgeese and Shelducks. The males have an asymmetrical bulla ossea of the syrinx like that found in *Tadornini*, *Anatini* and *Cairinini*. The secondaries are white as in *Chloephaga* and they also possess big bony knobs at the wing-bend. Their general plumage is mottled dark and light grey, more or less tinged with reddish brown; the head is paler and there is a white line from eye to nape; the lower breast and belly are white.

The body is heavy and massive, the legs and feet very large, the bill high and broad, with short lamellae, the wings more or less reduced in length. Although higher in the legs and thicker in the bill, they remind one of domestic ducks in their clumsy gait and posture.

The downy chicks are plain brownish grey above, with a small white spot on the wing only. The breast is grey; the rest of the underparts and the throat, white.

There are three species, as Murphy has demonstrated (*Oceanic Birds of South America*, 1936, pp. 951-72), two flightless and one flying. They have a way of running at great speed on the surface of the water, from which their vernacular name has been derived. The problem of the existence of one or several species has long been discussed, but it has now been satisfactorily solved. While Phillips (1925) and Peters (1931) still list only one species, with some misgivings, Percy Lowe (*Ibis*, 1934, pp. 467-94) has proved that two species occur together, and he has shown that their chicks are strikingly different.

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Oustalet (*Mission Scient. au Cap Horn*, vi, *Oiseaux*, Paris, 1891, pp. 212-32) had already come to the same conclusion. Murphy (*loc. cit.*, p. 965) writes as follows:

'It would doubtless be acceptable and conventional procedure to regard the Falkland and continental Steamer Ducks as sub-species of a common species, rather than to grant each full specific rank. The reason why I have chosen a different course has, however, an excellent measure of justification. It has to do with the fact that the Falkland flightless bird has a particularly strong resemblance to the flying species. Except for the shortness of its wing, and its hypertrophied size, it shows, indeed, many signs of closer affinity with *patachonicus* than with *pteneres*. This fact, no doubt, accounts for a misconception of Phillips, who writes that in the Falklands certain males of the large grey type of Steamer Duck mate with small females of the red type. The field observations and collections of Beck and Brooks show that both adult females and immature males of *brachypterus* are superficial counterparts of some examples of *patachonicus*, but that the differences are, nevertheless, constant. Under such circumstances, I believe that the recognition of three species is the better conclusion in the present state of our knowledge.'

MAGELLANIC FLIGHTLESS STEAMER DUCK

Tachyeres pteneres

Anas pteneres, Forster, *Descrip. Animal.*, 1844, p. 338: Tierra del Fuego.

Tachyeres cinereus, Phillips, *Nat. Hist. of the Ducks*, III, 1925, p. 287.

Tachyeres brachyptera, Peters, *Check-List, Birds of the World*, I, 1931, p. 176.

CHARACTERISTICS

The largest and heaviest species, with very short wings, incapable of flight. The sexes are almost alike. Crown bluish grey; rest of the head and neck pale grey mottled with white; white post-ocular stripes, throat marked with reddish brown; white underparts except the breast; rest of the plumage mottled grey. The female has the head and neck a darker grey, tinged with brown on the sides, and a larger and darker reddish patch on the throat. Iris dark brown. Bill bright deep yellow-orange and swollen at the base, with a black nail, that of the female only very slightly paler, with more black near the tip. Legs yellow, the soles and claws blackish. There is some variation according to age, season and individuals. Some show more brown on the sides and flanks.

Male: wing: 260-288 mm.; tail: 85-99 mm.; culmen: 55-66 mm.; tarsus: 66-79 mm.

Female: wing: 255-271 mm.; tail: 85-94 mm.; culmen: 54-61 mm.; tarsus: 63-71 mm.

Males weigh between 12-14 lb., females about 7½-11 lb.

Immatures: grey underneath, with no brown tinge except on the throat.

Downy chicks: dark greyish brown above, the crown deeper; the white band on the sides of the head starts from the eye and is interrupted in the middle. Bill and legs black.

Eggs: creamy white, six to twelve, 81-88 × 55-61 mm.

THE STEAMER DUCKS

32. Distribution of
(A) *Tachyeres pteneres* and
(B) *Tachyeres brachypterus*.



DISTRIBUTION

Coasts and islands of Western South America from Corral, Chile, south to Cape Horn and Staten Island.

GENERAL HABITS

Steamer Ducks are so peculiar that they aroused the curiosity of early explorers. Pedro Sarmiento de Gamboa (1580) first noticed them, and Darwin has written:

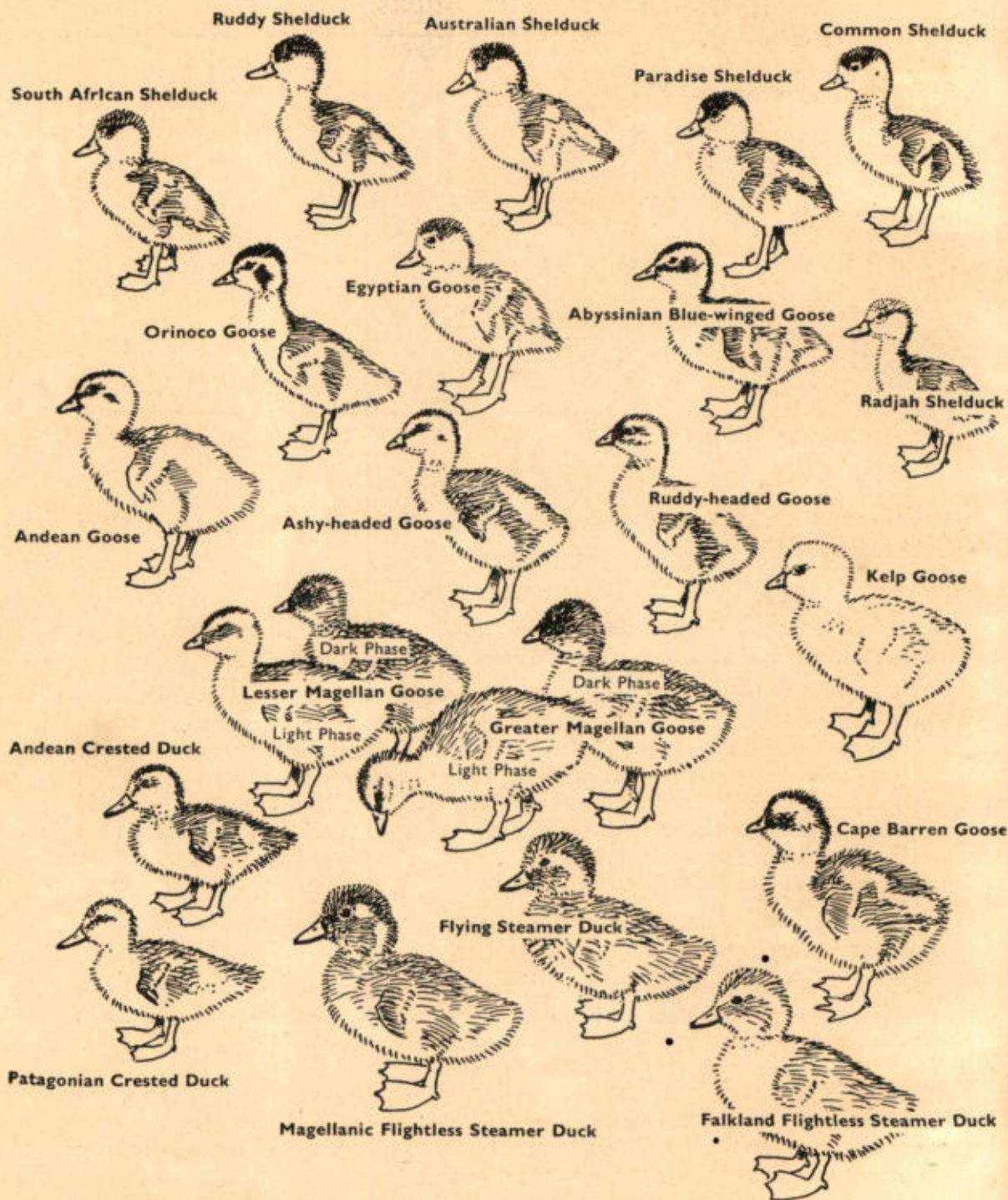
'These great logger-headed ducks, which sometimes weigh as much as twenty-two pounds, were called by the old navigators, from their extraordinary manner of paddling and splashing over the water, race-horses, but now much more properly steamers. Their wings are too small and weak to allow a flight, but by their aid, partly swimming and partly flapping the surface of the water, they move quickly. The manner is something like that by which the common house-duck escapes, when pursued by a dog; but I am nearly sure that the steamer moves its wings alternately, instead of, as in other birds, both together.' (Gould, 1841, 136.)

Murphy has well summarized their life habits (*Oceanic Birds of South America*, pp. 951-72); we quote him in part:

'Darwin speaks of the wings as "weak". Rather, they are merely small and, as Lowe has indicated, capable of somewhat limited extension. Beck found that they would gain for a time when pursued by a launch making eight miles an hour, but that after a chase of two to three kilometres they would begin to weaken.

'Old and young alike, according to Blaauw (1916, 488), are accomplished divers, and Beck found at Chiloé that the Steamer Ducks not only dive skilfully after they have been exhausted by long pursuit, but that they are capable of swimming with the body entirely submerged and the head barely above the surface.

'As to the extraordinary toughness, tenacity of life, and "almost reptilian vitality" of



XV. Shelducklings and Sheldgoslings



THE STEAMER DUCKS

the Flightless Steamer Duck, the experience of Percy and of all other recent observers agrees with that of Darwin, who tested a skull with his hammer!

The flightless continental species avoids highly tidal coasts. It is absent, for example, along the unbroken shores north and south of the eastern entrance of the Strait of Magellan, where the daily ebb and flow of the tide attain record proportions. Along the southernly and westerly sides of the Fuegian complex, however, and in the rugged, broken channels that exhibit relatively little tidefall throughout their extent northward along the Pacific coast to the Gulf of Ancúd, this species is everywhere at home.

During the Brewster-Sanford Expedition, Beck first became acquainted with Steamer Ducks along the shores of Chiloé. Here, in April, May and June, 1914, he found birds of both the flightless and the flying species together, although between December and February of another year no flying birds whatsoever were to be found in this same region (Chapman, 1933, 361; Percy, 1934, 867). The supposition is that during the latter season the flying birds were nesting around lakes or up streams, at a distance from salt water. They seem to pair for life.

Southward through the Chilean Archipelago, the western half of the Strait of Magellan, and along the channels leading toward Cape Horn, Beck found the Flightless Steamer Duck everywhere common. On the shore of O'Brien Island, on January 14, 1915, he saw a flock of nearly a hundred, and in neighbouring waters were many broods of young of various ages, including ducklings as small as others he had met in the vicinity forty days earlier. Five newly hatched birds had been observed at London Island on November 30. Reynolds (1935, 84) has recently reported that "contrary to expectation" the Flightless Steamer Duck proved to be the commoner breeding species near Cape Horn in December, 1932. He found pairs, solitary males standing guard, and family parties with small young at Barnevelt Islet, to eastward of Deceit.'

CAPTIVITY

Steamer Ducks are extremely interesting, but not beautiful, and are therefore little appreciated in captivity. To the coarseness of their aspect they add a vicious temper and the need of a special diet. They are, however, not difficult to feed, and they can be kept in good condition for many years on a régime of a mash rich in protein, with the addition of a little fresh meat and fish. The present species has been seldom imported. The only reliable record is that of two birds brought to Clères in 1939 by A. Morrison from southern Chile. One was in poor health and soon died. The other was in excellent condition until the invasion of June 1940. It was kept isolated in a pen with a good deal of running water.

FALKLAND FLIGHTLESS STEAMER DUCK

Tachyeres brachypterus

Anas brachyptera, Latham, *Ind. Orn.*, II, 1790, p. 834: Falkland Islands.

Tachyeres cinereus, Phillips, *Nat. Hist. of the Ducks*, III, 1925, p. 287.

Tachyeres brachyptera, Peters, *Check-List, Birds of the World*, I, 1931, p. 176.

THE WATERFOWL OF THE WORLD

CHARACTERISTICS

Smaller than *pteneres*, but still large and incapable of flight. Males and females differ conspicuously. The male resembles *pteneres*, but has the head whiter, with more red on the throat; neck yellowish; upper parts and breast a warmer grey, and a little more brown on the back and flanks. Bill and legs yellow as in *pteneres*. The female is much redder, all the feathers margined with maroon brown; the sides of the head and neck vinous brown. Bill greenish and feet yellowish grey. Young males resemble the female.

Male: wing: 272–282 mm.; tail: 91–102 mm.; culmen: 53–61 mm.; tarsus: 63–67 mm. Males weigh up to 9 lb.

Female: wing: 251–272 mm.; tail: 87–100 mm.; culmen: 52–58 mm.; tarsus: 55–63 mm.

Downy chicks are a paler brownish grey above than *pteneres*, with a grey collar on the upper back. The white band on the sides of the head is continuous and starts from the base of the bill instead of behind the eye.

Eggs: as in *pteneres*, but slightly smaller: 80–86 × 55–57 mm.

DISTRIBUTION

The Falkland Islands.

GENERAL HABITS

Here we again quote Murphy:

'The name Loggerhead, as applied to Steamer Ducks, probably originated at the Falklands. It was used by Clayton (1776, 104), who described the speedy flapping of these birds across the water. He writes also that when they are driven ashore they are capable of running very fast for a short distance, but that as soon as they tire they squat and allow themselves to be caught.

'Beck's diary for October 22, 1915, contains the extraordinarily acute observation that the "steaming" Flightless Loggerheads of the Falklands regularly rise higher out of water, when running at full speed, than do the non-flying birds of the continent. Thus, functionally as well as in appearance, the Falkland flightless duck is somewhat intermediate between the two other species.

'On November 4, Beck saw a number of broods of five or six newly hatched downy young in Berkeley Sound. A half-grown duckling was collected on December 15, besides which I have had for comparison the three younger birds taken by Brooks at Port Stephens, West Falklands, also during December. On October 17 Beck discovered a nest with six fresh eggs in a sand-drifted hummock on the beach near Port Stanley, only a step or two from the water.

'Early in the austral spring, the male Loggerheads establish a claim to nesting territory by remaining close to the shores of their choice and entering into combat with all rivals. Vallentin says that pairs not infrequently invade the holdings of other pairs, the male leading. Both sexes then take part in the encounters, rushing forward, each duck trying to seize an opponent by the neck and to hold its head under water while beating with the hard callosities on the wings. The struggling birds spin round and round, making such a commotion in the water that the eye cannot follow their movements. If one succeeds in

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submerging the head of the other, the beating is redoubled and the water is frequently reddened by blood. A defeated bird makes its escape as best it can, and the victor paddles off uttering growls of joy, while his mate expresses the same triumphant emotion by mewing like a cat.

'While the duck incubates, the drake patrols offshore, uttering his bull-frog note of alarm at the sight of an intruder. After incubation is under way, the duck will sit until your foot, or that of your horse, is at the point of stepping upon her, whereupon she will go off with a great fluster and hullabaloo.

'The ducklings are, of course, able to dive well as soon as they hatch. At this time the parents lose their tameness and become very wary, leading the brood well offshore at the distant approach of a man.

'When the ducklings are old enough to fend for themselves, the adults drive their own offspring out of the home territory, not hesitating to dive beneath them or "steam" toward them with apparent ferocity, and to strike with the spurred or knobbed wings. The fledglings thereupon congregate in flocks of hundreds, remaining in such formations, according to Cobb, throughout the winter and the following breeding season, and thus not nesting until they are at least two years old. Such packs move about without scattering, resting on beaches and flats, occasionally crossing to ponds close behind the beaches, but apparently doing all of their feeding in the sea. When one bird dives, they all go down, remaining beneath the surface for about fifteen seconds, and then shooting up more or less simultaneously in the manner of our northern-hemisphere scoters. Both fledglings and adults are fond of dipping in shoal-water along stony beaches. They make an unusual amount of noise when diving, writes Brooks, and on a quiet evening the splashes suggest the rising of trout in some northern "still-water".

' "Their food includes all manner of small marine animal life. A single stomach dissected contained limpets, small chitons, mussels, various gastropods and bivalves, shrimps, and two species of crabs, the carapace of the larger being two inches long by one inch wide which with its legs must have been a large object to swallow" (Brooks, 1917, 156).'

CAPTIVITY

The Falkland Steamer Duck has been more often kept in captivity than the others, though rarely enough. The London Zoo obtained one in 1861, and has had a few more since. Three pairs reached England in 1928, one going to Mr Spedan Lewis, who soon sent them to Clèfes where they lived for seven years. We first let them out on the lake, where they proved very amusing in their ways, being tame and apparently sociable. But we soon found dead Ducks, principally Pochards, and we discovered that the female had a way of diving, catching other birds from underneath and drowning them. The male never molested other birds. We removed them to a pen with plenty of running water for them to swim and dive in. They did well, feeding greedily on mash and cut-up meat with whatever live food they could get. The female built a nest every year, but never laid. The male had no kind of display, but the female did show an approach to enticing him to fight and was aggressive. These birds have lived for a long time in the waders'

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aviary of the London Zoo, some for nearly twenty years. Ungainly as they look, Steamer Ducks are of interest, and efforts should be made to study them more closely.

FLYING STEAMER DUCK

Tachyeres patachonicus

Micropterus patachonicus, King, *Proc. Zool. Soc., London*, 1830, p. 15: Straits of Magellan.

Tachyeres cinereus, Phillips, *Nat. Hist. of the Ducks*, III, 1925, p. 287.

Tachyeres brachyptera, Peters, *Check-List, Birds of the World*, I, 1931, p. 176.

CHARACTERISTICS

Considerably smaller and less heavy than the two preceding species, the wings longer and capable of flight, the tail longer, the bill flatter and less thick, the legs shorter and more slender.

The male's pattern is that of the other species, but it is more reddish generally. Bill orange-yellow with bluish areas near the nostrils, paling to whitish near the tip. Younger males are like the female, which is much like that of *brachypterus* in colour, that is to say, very reddish, and having a greenish bill.

Male: wing: 287–317 mm.; tail: 92–124 mm.; culmen: 48–57 mm.; tarsus: 55–69 mm.

Female: wing: 276–301 mm.; tail: 89–106 mm.; culmen: 50–59 mm.; tarsus: 50–61 mm.

Males weigh from 6–6½ lb., females from 5–6 lb.

Downy chicks: earthy brown above, with a broad diffuse white band through the eye and around the cheeks. Bill smaller than in the other species, slaty blue, with the nail and border of the mandible horny flesh colour.

Eggs: 75–77 × 51–53 mm.

DISTRIBUTION

Southern South America and the Falkland Islands, along the coasts and also on inland lakes and bodies of fresh water, from Valdivia, Chile, to Puerto Deseado, Argentine, south to Tierra del Fuego.

GENERAL HABITS

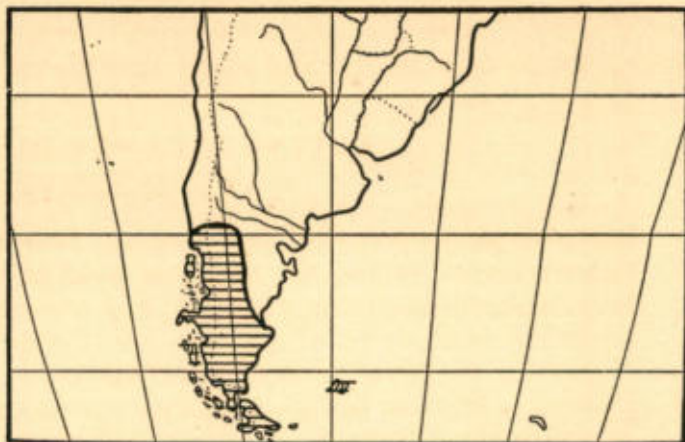
Reynolds (in Lowe, 1934, 474) summarizes the behaviour of the Flying Steamer Duck as follows:

'*Tachyeres patachonicus* is capable of sustained and rapid if somewhat heavy flight. Not infrequently, especially in summer, it takes what appear to be joy-rides over land. Two, three, or four individuals leave the sea together, flying inland. They either describe a huge semicircle, returning to the beach, or they may go completely round and pass the observer a second time. At intervals during these flights, but for short periods only, they simultaneously check the rapid movement of the wings, and stoop downwards, pausing momentarily after each successive wing-beat. The effect is curious, and unparalleled by any other Fuegian Duck.

'At times *T. patachonicus* may well be taken for a flightless bird, and some of the

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33. Distribution of *Tachyeres patachonicus*.



confusion in distinguishing between the two species is probably due to the unaccountable reluctance to rise so often demonstrated by this species. Commonly on the sea it may be shot at or otherwise alarmed, and, instead of flying, dives and then steams, or simply steams out of range. It steams in the same manner as the larger flightless bird, but its progress is more buoyant. It does not kick up so much spray, and its speed is, I should think, greater. In summer it is constantly seen on the wing on all sides; in winter it rises less often, but in places sleeps regularly on ice at some distance from the sea.'

According to Murphy:

'In early June, during a period of very rainy and windy weather, Beck devoted much time to the pursuit of Flying Steamer Ducks in the bay of Ancúd. On June 6 he encountered about a hundred ducks of both species, mostly in groups of from four to fifteen, on or near a spit which blocked an inlet. Some of them flew off at his approach. By working to windward of a pair, he shot the female, but the drake continued and subsequently pitched close to a couple of big Flightless Loggerheads. Beck gave chase to the three, and learned that the flying bird swam a trifle more slowly than the flightless pair. The former took wing, after it had fallen behind and flew about 200 metres before settling again on the water. By continuing his tactics of keeping to windward, Beck collected on this day eleven Flying Steamer Ducks. They rarely dived at the approach of his craft, but preferred to take wing. Some of them flew heavily, not rising far above the water, while others mounted high into the air and passed quite out of sight.

'Many of the Chiloé birds taken in June, particularly the females, showed distinct signs of the annual enlargement of their ova. The most richly coloured of the males had bright orange-yellow bills, but the less mature males and all of the females showed more or less bluish in their bills. Furthermore, the bills of many old birds were somewhat carunculated at the base, this being a character sometimes alleged to be restricted to the flightless species.

'Farther southward, toward the tip of the continent, Beck met with many Flying Steamer Ducks on salt water during their breeding season.

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'Beck found only a few of the Flying Steamer Ducks at Deceit Island, and elsewhere close to Cape Horn. It is noteworthy that downy young of both the flying and the flightless species were collected at Stewart Island on the same date. Another downy youngster was collected at Isla Grande on December 4.

'Fledglings of the flying species, no less than those of the flightless, acquire their wing quills very slowly, so that they have only barely sprouted primaries for a considerable period after the down has entirely disappeared.

'The Flying Steamer Duck is equally at home in either fresh or salt water and, as Reynolds has recently pointed out, it is the only species inhabiting coasts characterized by great tidal changes.

'The nesting season seems to be identical with that of the Flightless Steamer Duck. Oustalet (1891, 229) reports newly hatched young in Beagle Channel on November 13 and February 1, and states that Picton Island, at the eastern entrance of this waterway, is a favourite nesting ground. He also reports the species as common on Staten Island. The eggs often number seven, although eight or nine have also been reported. Several writers have alleged that eggs can be distinguished from those of the flightless duck by their shape. However, Reynolds states definitely in Lowe's account that the eggs of the flightless species are half again as heavy as those of the flying duck.

'The food of the Flying Steamer Duck is in part similar to that of its two larger relatives, but seems to comprise a smaller proportion of thick-shelled molluscs, and more prawns, crabs, and other crustaceans.'

CAPTIVITY

To our knowledge, the Flying Steamer Duck has never been kept in captivity in Europe or in North America.

Indexes

Latin and English names are indexed separately. In both, full page references are given irrespective of whether the reference in the text is by the Latin or the English name.

Figures in bold type refer to main entries. References to the appropriate maps are given only in the Index of Latin names.

In the Index of English names the entries 'Goose' and 'Geese' are confined to species of the True Geese (*Anser*). Birds of other genera also called 'Geese' will be found under their full names. For example, 'Magpie Goose' and 'Canada Goose'; but 'Goose, White-fronted' and 'Goose, Bean'.

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