SMITHSONIAN MISCELLANEOUS COLLECTIONS
VOLUME 143, NO. 3

SUPPLEMENT TO THE ANNOTATED, SUBJECT-HEADING BIBLIOGRAPHY OF TERMITES 1955 TO 1960

By
THOMAS E. SNYDER
Honorary Research Associate
Smithsonian Institution

(PUBLICATION 4463)

CITY OF WASHINGTON
PUBLISHED BY THE SMITHSONIAN INSTITUTION
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INTRODUCTION

On September 25, 1956, an "Annotated, Subject-Heading Bibliography of Termites 1350 B.C. to A.D. 1954," by Thomas E. Snyder, was published as volume 130 of the Smithsonian Miscellaneous Collections. A few 1955 papers were included. The present supplement covers publications from 1955 through 1960; some 1961, as well as some earlier, overlooked papers, are included. A total of 1,150 references are listed under authors and titles, and 2,597 references are listed under subject headings, the greater number being due to cross references to publications covering more than one subject. New subject headings are Radiation and Toxicology.

ACKNOWLEDGMENTS

The publication of this bibliography was made possible by a grant from the National Science Foundation, Washington, D.C.

Editors of the Smithsonian Institution have been very helpful in the preparation of the manuscript and index.

Mrs. Lucile W. Yates, cataloger of the Entomology Research Division, Agricultural Research Service, U.S. Department of Agriculture, has supplied many references. Miss Emily Bennett, librarian of the Division of Insects Library, U.S. National Museum, Smithsonian Institution, has been especially helpful in checking references and obtaining obscure publications, often difficult to locate. I am grateful to my wife for typing additional references.

Dr. E. W. Ligon, of the Pesticide Regulation Branch, Agricultural Research Service, U.S. Department of Agriculture, has kindly prepared some of the data under the heading "Toxicology."

Dr. Ivan Hrdý, of the Czechoslovak Academy of Science, Prague, was helpful in sending me publications and references.

LIST OF SUBJECT HEADINGS

Anatomy, see Morphology.
Bacteria, see also Nutrition.
Baits, see Soil poisons.
Behavior, see also Biology.
Bibliography, see "Index of American Economic Entomology" for additional references.
Biography.
Biology, ecology.
Building codes, see also Control, Resistant woods, Wood preservation.
Caste determination, also intermediates, intercastes.
Chemical analysis.
Cold, see Temperature.
Control, construction, termite-proofing.
Court rulings.
Cytology (cell growth).
Damage.
Damage to living vegetation.
Detection, see also Experimentation.
Digestion, see also Nutrition, Protozoa.
Diseases, human, plant, and termite; see also Parasites.
Distribution.
Dust, poison, see Soil poisons.
Ecology, see Biology.
Electricity, see Detection, Experimentation.
Embryology.
Evolution.
Experimentation, see also Detection.
Flight.
Folklore.
Food, termites as.
Fossil.
Fumigation.
Fungi, association with; see also Rearing.
Fungus cultivation.
Gaseous environment.
Genitalia, reproductive or sex organs.
Geologic agents.
Heat, see Temperature.
Hermaphrodites, see Biology.
Histology, see Morphology.
Humidity.
Introduced or intercepted.
Legislation or regulation.
Medicine, uses in.
Migration, see Biology.
Moisture, see Biology.
Molds, see Nutrition, Parasites.
Morphology, histology (tissue growth).
Neoteinia, see Biology.
Nests.
Nutrition.
Obituary.
Parasites.
Parthenogenesis, see Biology.
Phylogeny, see also Evolution, Taxonomy.
Physiology.
Poison dusts, see Soil poisons.
Population.
Predators.
Protozoa, see also Digestion, Nutrition.
Racket.
Radiation.
Rearing.
Regeneration.
Regulation, see Legislation.
Repellents, see Soil poisons, Wood preservation.
Reproductive organs, see Genitalia.
Resistant woods.
Respiration, see Gaseous environment.
Reviews.
Secretions.
Sense organs.
Sex organs, see Genitalia.
Shields, metal barriers.
Soil poisons, baits, dusts, repellents.
Sound.
Superorganism, supraorganism, colony as.
Swarm, see Flight.
Symbiosis, see Biology, Nutrition, Protozoa, Termitophiles.
Tax status of loss, see Damage.
Taxonomy.
Temperature.
Termitophiles.
Toxicology.
Uses in industry, arts, and religion.
Wood preservation, poisons for fabrics and fiberboards, insulation, etc.
Zoogeographical regions.

NOTE.—In the "Index of American Economic Entomology," under the heading "Termites" and supplementary subject-headings, there are papers not referred to in this more or less selective bibliography; some are of minor importance, others repetitions.

SUBJECT HEADINGS

(For complete citations see List of Authors and Titles beginning on page 72.)

BACTERIA

BOYER, P., 1955, pp. 569-571. (France, preliminary studies of soil and bacteria of termitaria.)

GRASSÉ, P. P., 1959a, pp. 385-389. (Africa, digestion cellulose by bacteria in posterior intestine for fungus-growing Macrotermitinae.)

IONESCU, M. A., 1959, pp. 114-115. (Rumania, *Reticulitermes lucifugus*. Schizophytes: *Spirochaeta termitis, S. minei,* and *S. hilli, Fusiformis termitidis, F. hilli.*)

POCHON, J., BARJAC, H. DE, and ROCHE, A., 1958, pp. 352-355. (Africa, bacteria principal agents in fermentation cellulose for fungus-growing *Sphaerotermes sphaerothorax, Ruminococcus,* same group as in paunch of ruminants.)

SEBALD, M., and MELLIS, Y. DE, 1958, pp. 357-360. (France, *Spherophorus* n. sp., a sulphite-reducing bacterium from intestine French termite injected in vein rabbit, toxic or allergenic, not infectious.)

TOUMANOFF, C., and TOUMANOFF, T. C., 1959, pp. 216-218. (France, epizootic due to *Serratia marcescens, "Reticulotermes santonnensis."*)

BEHAVIOR

AUTUORI, 1956, pp. 561-575. (Instinct in the behavior of animals and man.)

DESNEUX, J., 1959, pp. 286-292. (Africa, vestigial behavior some species *Apicotermes.*)

EMERSON, A. E., 1956, pp. 248-258. (Regeneration behavior and social homeostasis.)

1958a, *in* Roe and Simpson (Ed.), 1958, pp. 311-355. (Intraspecies group system prime unit, group unit of natural selection leading to adaptive evolution, behavior emphasized in group integration, social behavior in insects genetically determined, in man culturally.)

GRASSÉ, P. P., 1959, pp. 41-83. (French Equatorial Africa, behavior workers *Cubitermes* sp. and *Bellicositermes natalensis* rebuilding nest, masons do not constitute a working team, in beginning individual tasks are uncoordinated, when earth pellets achieve a certain density constitute a new stimulus become starting point of pillars and blades. Stimulation workers by performances inducing adaptable responses named stigmergy. Determining stimuli olfactory.)

SCHMIDT, R. S., 1955, pp. 244-356. (*Apicotermes* nests important ethological material.)

1955a, pp. 157-181. (Evolution of nest-building behavior in *Apicotermes.*)

1958, pp. 76-94. (Most primitive *Apicotermes* nests lack wall perforations, shagreen, internal arrangment cellular.)

VERRON, H., 1958, pp. 309-314. (France, *Calotermes flavicollis* attraction produced by last instar nymphs on larvae, nymphs with short wing pads, and neoteinics increases regularly with the importance of crowding. Last instar nymphs show less response than larvae, soldiers exhibit the highest threshold of response.)

WILLIAMS, R. M. C., 1959, pp. 203-218. (Africa, East Uganda, flight periods *Cubitermes ugandensis* and *C. testaceus,* wing shedding, calling attitude, tropisms, colony formation.)

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ESAKI, T., BRYAN, E. H., JR., and GRESSITT, J. L., 1955, pp. 1-68. (Bibliography, insects Micronesia, includes list Japanese publications cited.)

FRINGS, M., and FRINGS, H., 1960, p. 101. (Sound production and sound reception by termites.)

SNYDER, T. E., 1956, pp. 1-305. (Annotated, subject-heading bibliography 1350 B.C. to A.D. 1954, world, 3,624 references.)

BIOGRAPHY

CRONIN, J. E., 1959, pp. 1-257. (U.S., Hermann von Schrenk, 1873-1953, botanist, plant pathologist, pioneer in American wood preservation, timber engineer.)

BIOLOGY

ANONYMOUS, 1959, pp. 17-19.

ARORA, G. L., and GILOTRA, S. K., 1959, pp. 247-255. (Pakistan, biology *Odontotermes obesus*, common termite of Hoshiarpur damages clothes, wooden articles, grass, sugarcane, trees, both subterranean and mound builders. Royal cell in center above ground level during rainy months but to depth 1 ft. in winter and spring. Workers and soldiers in ratio 97.5% to 2.5%. Queen secretes large quantity fatty liquid. Swarm once a year after first heavy shower, middle July at night. 273 eggs laid per 15 minutes, laid during rainy months.)

BANERJEE, B., 1956a, pp. 203-204. (Royal chamber in mound *Odontotermes redemanni* (Wasmann).)

BROCK, P., 1960, p. 15. (Canada, Toronto, popular account habits and damage, some statements debatable.)

BRUCE, E. L. Co., 1961, pp. 1-8. (U. S., how to build out termites in wood joist and slab construction and continue protection after construction by low-cost Terminix Insured Protection Contract.)

BUCHLI, H., 1956, pp. 131-143. (France, in *Reticulitermes lucifugus* and subspecies *santonensis* there are 2 instars of undifferentiated young, the origin of all of the different castes, caste differentiation due to extrinsic factors. Well-fed young acquire pads at 3d instar and develop to winged reproductives at the 9th. Poorly fed young regress to workers, pseudoergates, lose nymphal characters, mature at 9th instar, but continue to molt, can become apterous reproductives. Nymphs of 7th instar become neoteinic brachypterous reproductives. Worker caste beyond 3d instar can become apterous reproductives, if possess reserve of fat body. Neoteinics can survive in spite of presence of normal, functioning, imaginal king and queen, ectohormonal inhibition not present in *Reticulitermes*.)

1956a, pp. 395-401. (France, development cycle in *Reticulitermes*.)

1958, pp. 264-429. (France, *Reticulitermes lucifugus* and subspecies *santonensis*, egg to adult, longevity castes, alimentation, neoteinia, pseudoergates, inhibition theory, caste determination.)

1960b, pp. 308-315. (France, observations on mating behavior *Reticulitermes lucifugus*.)

1960c, pp. 494-499. (France, first mating and fecundity of a young primary queen of *Reticulitermes lucifugus santonensis*.)

CALABY, J. H., 1956b, pp. 111-124. (Distribution and biology genus *Ahamitermes*.)

CALABY, J. H., and GAY, F. J., 1956, pp. 19-39. (Distribution and biology genus *Coptotermes* in Western Australia.)

1959, pp. 211-223. (Australia, aspects of distribution and ecology.)

CARASSO, M., 1959, pp. 21-24. (U. S., Panama, habits, nest.)

CHHOTANI, O. B., 1959, pp. 43-44. (India, *Kalotermes beesoni*, injures banyan, *Ficus*.)

CLÉMENT, G., 1956a, pp. 148-153. (In laboratory Sahara *Anacanthotermes ochraceus*, egg laying 44 days after gallery dug; nymphs reach stage 4 in 1 month; 1,000 individuals after 1 year; soldiers appear after 1 year from worker in stage 5, 1 soldier for 100 individuals.)

COATON, W. G. H., 1958, pp. 1-112. (South Africa, hodotermitid harvesters life cycle, flights, nest, feeding.)

COLLINS, M. S., 1958, pp. 423-424. (U.S., differences in toleration of drying and rate of water loss between *Reticulitermes, Kalotermes, Neotermes, Cryptotermes*.)

1959, pp. 341-352. (U.S., Florida, survival time and rate of water loss during drying of 9 species—*Kalotermes*, 3; *Cryptotermes*, 2; *Neotermes*, 1; *Reticulitermes* 3. Large size *Neotermes* and *Kalotermes jouteli* facilitates survival, activity leads to more rapid water loss. Unlikely that *Cryptotermes* and *Kalotermes snyderi* survive by maintaining high humidity in galleries, but can subsist in dry surroundings on water released from oxidation of food, rate water loss very low. *Reticulitermes hageni* has lowest moisture requirements of eastern subterranean group, *R. flavipes* highest. Survival times varied from average 4 to 6 hours for *Reticulitermes* to 15 days for *Crypto-*

termes brevis. Nature integument and natural environment factors.)

CUFODONTIS, G., 1955, 501-518. (Significance of termites for the understanding of the African savanna vegetation.)

EBELING, W., 1959a, pp. 24-25, 46-47. (U.S., California.)

EBELING, W., and PENCE, R. J., 1957, pp. 690-692. (Relation of particle size to penetration of *Reticulitermes hesperus* through barriers of sand or cinders.)

EIDMANN, H., 1941, pp. 385, 391, 431, 433, 440, 474. (General.)

EMERSON, A. E., 1958, *in* Weyer, E. M., Jr. (Ed.), 1958, pp. 2798-2807. (Habits, damage, control.)

1959a, pp. 6-7. (Biology, fossils, predators, termitophiles.)

ERNST, E., 1960, pp. 203-206. (Africa, alien termite colonies in *Cubitermes* nests.)

ESAKI, T., 1956, pp. 86-88. (Notes on *Hodotermopsis japonica.*)

ESAKI, T., HORI, H., and YASUMATSU, K., 1938, pp. 30-32. (Illustrations and descriptive notes on Japanese termites.)

FARB, P., 1959, pp. 4, 13, 14, 35, 82-91, 109, 134, 157. (Desert termites depth 100 ft., 1 out of 1,000 survives flight, temperature in mound cooler in summer and warmer in winter than outside, building of tubes in Tropics (Africa), 30 mounds to acre, more than 5,000 tons of soil moved on each acre, 300 species intestinal protozoa identified, inhibition theory caste determination.)

GARRISON, W. B., 1954, pp. 73-76. (General habits, damage.)

GAY, F. J., 1955, pp. 58-59. (Occurrence of functional neoteinics in *Coptotermes lacteus.*)

GAY, F. J., GREAVES, T., HOLDAWAY, F. G., and WETHERLY, A. H., 1955, pp. 1-60. (Australia.)

1960, pp. 228-231. (Australia, discusses probable origin; caste system; subterranean chambers; references to a few species; *Nasutitermes fumigatus; Coptotermes lacteus,* illus.)

GIRALDI, G., 1955, pp. 487-498. (Italy, Venice, *Reticulitermes lucifugus.*)

GÖSSWALD, K., and KLOFT, W., 1958, pp. 743-745. (Radioactive isotopes in the study of colony life of insects.)

GRASSÉ, P. P., 1958, pp. 189-200. (Brazil, São Paulo, *Cornitermes cumulans,* queen moves about in nest.)

GRASSÉ, P. P., and NOIROT, C., 1955, pp. 213-219. (Foundation of new societies by *Bellicositermes natalensis* on Ivory Coast, imaginal founder couple dig an underground cavity copularium in which first brood is tended, take no food. First small workers dig passageways to surface where under covered passageways eat wood, first big workers appear soon after. In one night inside copularium workers construct an even egg-shaped dwelling place, first fungus bed, at once fertile is erected herein, heaps of sawdust used as food reserves laid outside. Homologies drawn between young nest and adult termitarium.)

1958, pp. 1789-1795. (The society of *Calotermes flavicollis* and its foundation to the first swarm.)

1959, pp. 365-372. (Evolution of symbiosis in Blattopteroidea, particularly Isoptera. Double symbiosis occurred in common ancestor blattids and termites, blattids only retained bacteriocytes (except *Cryptocercus*), primitive termites, (except *Mastotermes*) the flagellates. Termitidae have lost flagellates but have a rich and complex bacterial flora, some break down cellulose. Protozoa constantly associated with certain termites (xylophagous amoebae), humus-feeder ciliates, *Termitophrya*). Association between fungus-growing termites and mushrooms (*Termitomyces.*))

GRZIMEK, B., 1956, pp. 146-159. (The vast cities of the tropical bush.)

HARRIS, W. V., 1955, pp. 62-72. (Termites and the soil.)

1955c, pp. 160-166. (As ecological factors.)

1956, pp. 261-268. (Mound building by *Macrotermes* E. Africa.)

1958d, pp. 435-439. (Colony formation by winged, part of an existing colony, migration of reproductives.)

HERFS, A., 1955, *In* Schmidt, H. (Ed.), 1955b, pp. 121-130. (Swarming and colony formation.)

1955a, pp. 481-487. (New research results.)

HESLOP-HARRISON, G., 1958, pp. 59-79. (Origin and function of pupal stadia in holometabolous insects, conception primitive insect life cycle, including Isoptera.)

HICKIN, N. E., 1954, pp. 1-84. (Woodworm, biology and control.)

1959, p. 273. (Isoptera, do not secrete cellulase, symbiosis with intestinal protozoa.)

HRDÝ, I., In press. (Czechoslovakia, contribution to the knowledge of the European species of *Reticulitermes.*)

IMMS, A. D., et al., 1957, pp. 366-395. (Classification and biology; *Hospitalitermes monoceros* harvests lichens in columns, 1,000 termites to each meter of column.)

IONESCU, M. A., 1939. (Rumania, ecology of *Reticulitermes lucifugus.*)

1959, pp. 107-116. (Rumania, *Reticulitermes lucifugus, Kalotermes flavicollis.*)

JENKINS, C. H. F., 1960, pp. 117-123. (Western Australia.)

JUCCI, C., 1960, pp. 1-24. (Societies bees, wasps, ants, termites.)

KALSHOVEN, L. G. E., 1955, pp. 313-321. (Observations on *Macrotermes gilvus* in Java, differences in nest structure between Asian and African Macrotermitinae nests.)

1956a, pp. 455-561. (In nests *Macrotermes gilvus* in Java, accumulations of finely cut vegetation in nests.)

1958, pp. 9-30. (Habits of black termites *Hospitalitermes* spp. of Java and Sumatra, foraging, nests, swarming, formation new colonies, predators, moving columns not disturbed, termitophiles, snake eggs in nests, cetonid, ptinid.)

1959a, pp. 231-242. (Central Java, new colonies start in dead branches in crowns teak trees, termites gnaw hole through rotten wood, winged *Neotermes tectonae* attracted to rotten wood, yellow clayey excrement on outside wood betray presence.)

1960a, pp. 263-272. (Indonesia, notes on biology species *Cryptotermes.*)

KASSAB, A., CHAARAWI, A. M., HASSAN, M. I., and SHAHWAN, A. M., 1960, pp. 1-91. (Egypt, biology *Anacanthotermes* (*Hodotermes*) *ochraceus, Psammotermes fuscofemoralis,* and *P. assuanensis.*)

KEVAN, D. K. McE., et al., 1955, pp. 1-512. (Termites and the soil.)

KIRKPATRICK, T. W., 1957, pp. 3, 4, 10, 28, 61, 71, 91, 99, 103, 121, 134, 139, 143, 146, 171, 194, 195, 198, 228, 238, 241, 271, 276. (Biology, Tropics.)

LIGHT, S. F., and WEESNER, F. M., 1955, pp. 347-354. (Production and replacement of soldiers in incipient colonies of *Reticulitermes hesperus,* only small percentage of colonies produce soldier first year, may develop from first or later eggs. Only one produced, if removed a replacement soldier produced from second group of young in 50% of 12 experimental colonies.)

LOBSENZ, N. M., 1959, pp. 25-28. (Tropics and U.S.)

LÜSCHER, M., 1955, pp. 62-67. (Film recordings of termites.)

1956, pp. 119-128. (Production of supplementary reproductives of *Kalotermes flavicollis* dependent on competence of nymphs and inhibitory effect of functioning repoductives by hormones produced in head or thorax, passed on to nymphs through intestine, completely prevent production supplementary reproductives.)

1956b, pp. 261-267. (Production and inhibition of supplementary reproductives of *Kalotermes flavicollis.*)

1956c, pp. 28-316 to 29-317. (Filming of termites.)

1958a, pp. 372-377. (Origin of soldiers.)

1958b, pp. 144-150. (The effect of the corpora allata on the origin of substitute reproductives.)

1958c, pp. 48-65. (Nutrition, protozoa, insect and human state.)

LUPPOVA, A. N., 1955, pp. 55-56. (Biology and distribution in Turkmenia of the big Transcaspian *Anacanthotermes ahngerianus.*)

McKEOWN, K. C., and CALABY, J. H., 1958, pp. 462-465. (Termites, Australia.)

MAETERLINCK, M., 1939, pp. 1-142. (Life of of the white ant.)

MARCUS, H., 1958, pp. 61-77. (Polymorphism and caste development.)

MARTÍNEZ, J. B., 1957, pp. 147-161. (Morphology, biology, damage, and control, *Cryptotermes brevis.*)

MATHIEU, H., 1959, pp. 1-92. (France, the ignored pest, the termite.)

MATHUR, R. N., and CHHOTANI, O. B., 1960, pp. 623-624. (India, 3 queens in 2 colonies *Odontotermes wallonensis,* with 1 or 2 kings and workers, length queens 5.4 to 5.8 cm., Sambalpur, Orissa.)

MATHUR, R. N., and SEN-SARMA, P. K., 1959, pp. 3-9. (India, Dehra Dun, biology termites, *Angulitermes dehraensis, Coptotermes heimi, Heterotermes indicola Neotermes bosei.*)

1960a, pp. 23-27. (India, Dehra Dun, biology *Capritermes dunensis, Eremotermes dehraduni, Microcerotermes beesoni Microtermes anandi, M. unicolor, Neotermes megaoculatus, N. microculatus Nasutitermes thanensis.*)

MORGAN, F. D., 1959, pp. 155-195. (New Zealand, *Stolotermes ruficeps.*)

NOIROT, C., 1955a, pp. 399-595. (Study various stages *Nasutitermes arborum.* Studies various genera and species in Nasutitermitinae, Amitermitinae, Microcero-

termininae, Termitinae, and Macrotermitinae. Characters of neuter castes, evolution of polymorphism, determination of formation of castes.)

1956, pp. 145-158. (The replacement sexuals in the higher termites, can have three origins—winged imagines, nymphs, and workers (neoteinics). In Termitidae only do imagines become sexually mature in nest, lay eggs in queenless colonies *Anoplotermes*. Formation substitute sexuals from nymphs widespread, preceded by molting. Only with the most primitive types Termitidae possible for workers to be sexualized, as in *Termes hospes*. Formation apterous reproductives takes place during two successive molts, live short time, must be constantly replaced, same in *Microcerotermes amboinensis*. In most highly developed forms sexual maturation only possible for imagines. Development supplementary reproductives influenced by neither diet nor ectohormones.)

1958-1959, pp. 151-169. (General, ecology, water, temperature, light, air, soil, microclimate of nest and its regulation in *Bellicositermes* 27° to 30° C.)

OBENBERGER, J., 1940, pp. 1-402. (Termites pp. 255-402, biology, nests, fungus cultivation, termitophiles, damage, control, predators.)

1949, pp. 1-175. (Biology, nests, fungus cultivation, termitophiles, damage, control, predators.)

1952, 1955. (Vol. 1, pp. 10, 23, 25, 29, 54, 128, 137-139, 154, 295-296, 322-324, 326, 436, 492, 498, 688-689, 711, 753-754. Vol. 2, pp. 576-637.)

PENCE, R. J., 1956, pp. 553-554. (*Kalotermes minor* can exist in wood with 2½ to 3% moisture, can adjust to temperatures of 150° F.)

1957a, pp. 91-95. (Adipose tissue, not chitin fluorescent.)

1957b, pp. 238-240. (End-slotted moisture gradient test tubes set in battery jars, moisture 97½% optimum (*Reticulitermes hesperus*), prefer black-dyed wood.)

PESSON, P., 1959, pp. 41, 55, 78-79, 99, 104, 109, 132, 137-138, 152, 167. (General, polymorphism; nests 30 ft. high; habitats temperature never falls below 15° C., regulate temperature nests, go below ground to escape cold or heat; mate for life; nests in Africa 80 to 100 years old, longest-lived insect; queens *Bellicositermes* lay 36,000 eggs per day; neoteny; trophallaxis; social regulation—inhibition castes; cultivation fungi by higher termites for food for young; preferential nutrition controls production various castes; retrograde molts; temporary orientation, appreciation of duration of time?)

PICKENS, A. L., 1956, pp. 233-238. (Links and gaps in the common castes of termites.)

RHODE ISLAND DEPT. AGRIC. AND CONSERVATION, DIV. OF ENTOMOLOGY AND PLANT INDUSTRY, 1955, pp. 1-4. (Biology of subterranean termites.)

RICHARD, G., 1956a, pp. 502-527. (Study of geotropism of *Calotermes flavicollis*.)

1958a, pp. 571-575. (*Calotermes flavicollis*, effect of light on flight.)

ROONWAL, M. L., 1958a, pp. 77-100. (India, biology, ecology, review all phases research, list references.)

1959, p. 511-523. (India, *Coptotermes heimi*, swarms from early Mar. to early Aug. at and after dusk; nests in dead wood; individuals do not live more than 1 year; soldiers constitute 33% of a soldier-worker colony.)

ROONWAL, M. L., and SEN-SARMA, P. K., 1955, pp. 234-239. (Biology and damage by *Neotermes gardneri*, 15 trees, including *Mangifera indica*, injured, flights Feb. to July; *Odontotermes* flights occur en masse, once or twice a year.)

SANDS, W. A., 1956, pp. 531-536. (Factors affecting the survival of *Odontotermes badius*, fungus *Termitomyces microcarpus* may not support life for prolonged periods, source of vitamins or similar essential substances, symbiosis necessary for survival.)

SCHMIDT, H., et al., 1955b, pp. 1-309. (Systematics, nests, biology, economic importance, control.)

SCHMIDT, H., 1956, pp. 129-130. (Laboratory studies of supplementary reproductives of *Reticulitermes*, the nymphs collect in herds of 80 to 100 and are guarded by a group of workers in a narrow chamber. They are kept isolated from other nymphs. Every 1 or 2 days they change their position. Further development always takes place in the form of herds. Workers feed the nymphs stomodeal food.)

1957a, pp. 99-100. (Germany, Hamburg, colony foundation by the Hamburg termite.)

SIMEONE, J. B., 1956, pp. 1-3. (U.S., New

York State, *Reticulitermes flavipes* and *virginicus*.)

Sims, L., 1957, pp. 312, 322-323. (U.S.)

Skaife, S. H., 1955, pp. 1-134. (*Amitermes atlanticus* in South Africa, 12 workers first year.)

1957, pp. 373-390. (*Kalotermes durbanensis*, biology, distribution, damage, experimentation, rearing, food, protozoa.)

Snyder, T. E., 1957c, pp. 38-39. (Colony formation by supplementary reproductives of eastern *Reticulitermes*.)

1960a, pp. 284-288. (General biology, world species.)

Striebel, H., 1960, pp. 193-260. (Embryological development *Kalotermes flavicollis, Zootermopsis nevadensis*.)

Stuart, A. M., 1961, p. 419. (Trail laying by various termites in laboratory tests, gland secretion produces trails.)

Szent-Ivany, J. J. H., 1959, p. 423. (Papua and New Guinea, *Coptotermes hyaloapex*.)

Tu, T., 1954, pp. 17-27. (Ecological supplement to the Formosan *Capritermes nitobei*.)

1956, pp. 12-18. (Biology Formosan termites, damage and control in buildings.)

Villiers, A., 1960, pp. 1446-1448. (Uganda, study in discipline.)

Vishnoi, H. S., 1955, pp. 143-144. (Royal cells of *Odontotermes obesus* with unusually large openings, India.)

Weesner, F. M., 1956, pp. 36-38. (Colony formation by *Reticulitermes hesperus*, U.S.)

1960, pp. 153-170. (World, termites more diverse than supposed. Variations great. Culture methods must be developed for Termitidae.)

Weidner, H., 1956a, pp. 55-105. (Africa, Angola, biology.)

Wilkinson, W., 1957, pp. 441-443, 446. (Family unit, soldiers and workers, caste system, migration, food production, adaptability, dwellings, lodgers, defense.)

Williams, R. M. C., 1959a, pp. 291-304. (Africa, Uganda, *Cubitermes ugandensis* development incipient colonies, feed on soil, exuviae, dead and living brood, copulate third day after colony foundation in laboratory, parthenogenesis rare, males more active in care young. Egg laying began 5th day after foundation. One egg in 1½ days for 2 to 3 weeks, later, one every 5½ days, 7 workers on average, no soldier. *Dorylus* (*A.*) *kohli* predator.)

Zim, H. S., and Cottam, C., 1956, pp. 30-31. (U.S.)

BUILDING CODES

Clement, M. L., 1959, pp. 1-15. (U.S., southern standard building code, of Southern Building Code Congress, termite-proofing provisions, shields, resistant woods.)

1960, sections 101-2612. (U.S., sect. 1701.7, foundation sills, where clearance is less than 18 in., heartwood of durable species or pressure-treated wood using an approved preservative, sills separated from unit masonry by corrosive resistant metal shield. In appendix 3, Termite control, 1, Metal shields, 2, Foundation timbers treated with approved preservative.)

CASTE DETERMINATION

Brian, M. V., 1957, pp. 107-120. (Caste determination in social insects.)

Buchli, H., 1958, pp. 263-429. (France, *Reticulitermes lucifugus* and *santonensis*, nutrition and ectohormones influence caste determination. Larvae of first 2 stages undifferentiated, crowding and nutrition influence differentiation, workers differentiate in stage 3, and continue to molt and grow up to stage 9, live at 25° C. from 18 months to 5 to 6 years. Workers may be sexualized during stages 5 and 6, effected by an insertion of an intermediate stage of "pseudonymph." Soldiers transform from workers at all stages but principally at stages 5 and 6. Pseudoworkers may transform beyond stage 5 to neoteinic reproductives or soldiers. Swarming not indispensable for copulation and egg laying.)

Jucci, C., 1956, pp. 283-284. (Italy, endocrine gland important in differentiation of castes.)

Kaiser, P., 1955, pp. 303-304. (The organs of internal secretion in determination of caste.)

1956, pp. 651-653. (Hormone organs contribute to caste development.)

1956a, pp. 129-178. (The hormone organs in connection with the origin of castes.)

KARLSON, P., and BUTENHAND, A., 1959, pp. 49-51. (Ectohormones of termites produced by reproductives influence colony members, refers to Grassi and Sandias, Grassé, et al., Light and Lüschner.)

LÜSCHER, M., 1958b, pp. 144-150. (Effect of corpora allata on the origin of substitute reproductives.)

1960, pp. 549-563. (Europe, *Kalotermes flavicollis*, caste determination is controlled by hormones, after each pseudoergate molt corpora allata secrete juvenile hormone bringing individual into reactive state of competence for differentiation. The relative duration and intensity of secretion of the different endocrine glands bring about differentiation.)

LÜSCHER, M., and SPRINGHETTI, A., 1960, pp. 190-212. (Europe, *Kalotermes flavicollis*, role of corpora allata, seems to produce two different kinds of hormones, the juvenile hormone probably increases the competence for supplementary reproductive differentiation. The gonadotropic hormone initiates presoldier differentiation.)

PICKENS, A. L., 1956, pp. 233-238. (Links and gaps in the common castes of termites.)

SKAIFE, S. H., 1954, pp. 345-353. (Caste differentiation *Amitermes atlanticus* due to extrinsic causes.)

CHEMICAL ANALYSIS

ASENJO, C. F., AMOROS-MARÍN, L., TORRES, W., and DEL CAMPILLO, A., 1958, pp. 185-195. (Puerto Rico, analysis West Indian mahogany (*Swietenia mahogani*) isolated waxy-white substance strongly repellent to termites. P_2 fraction varied in effectiveness.)

BOYER, P., 1956, pp. 801-803. (Africa, study of soil, distribution and amounts of basic substances, in the mound material of *Bellicositermes natalensis*.)

1958, pp. 479-482. (Africa, influenced by the reuse by the termite and the erosion of it of the soil evolution of the cement of the mound of *Bellicositermes rex*.)

1958a, pp. 488-490. (Africa, the material composing the giant mound of *Bellicositermes rex*, clay is the base of the cement.)

HESSE, P. R., 1955, pp. 449-461. Soil of termite mounds are not altered chemically.)

MALDAGUE, M., 1959, pp. 343-359. (Belgian Congo, Macrotermitinae take soils from depth, texture finer in mounds than in adjacent soils; no difference for *Amitermes* mounds; mounds *Cubitermes* and *Nasutitermes* have greater rate fine elements than surrounding soils which contain important amount of iron oxide concretions. Mounds Macrotermitinae poorer in organic matter than adjacent land, but contrary occurs in mounds *Cubitermes, Nasutitermes*, and *Amitermes*.)

MANZANILLA, E. B., and YNALVEZ, L. A., 1958, p. 36. (Essential amino acid content of some tropical termites, Philippines, arginine, histidine, lysine, and phenylalanine in three species tropical termites.)

CONTROL

AGARWALA, S. B. D., 1955, pp. 533-537. (Aldrin and dieldrin most effective in control of *Microtermes obesi* attacking sugarcane, chiefly in India.)

AGARWALA, S. B. D., and HAQUE, M. W., 1955, pp. 347-348. (Effects of BHC treatments of soils in protection against *Odontotermes assmuthi* and growth of sugarcane.)

AGARWALA, S. B. D., and SHARMA, C., 1954, pp. 78-79. (Aldrin and dieldrin outstanding in control *Microtermes obesi* on maize in Bihar.)

ANONYMOUS, 1955, pp. 44, 46-48, 50. (Proper care and maintenance of termite equipment pays off.)

1956c, pp. 42-56. (Standard termite control methods for U.S. Dept. Defense.)

1956f, p. 186. (Best advice on control.)

1956g, pp. 18, 20, 22. (BRAB report criticized.)

1957a, pp. 66, 68. (Questions and answers on control.)

1957b, p. 85. (*Cryptotermes*, the drywood termite.)

1957d, pp. 6-8, 23, 25. (Vapor barriers, asphalt paper, penetrated.)

1957p, pp. 16, 18, 20, 30. (Clays kill drywood termites, cinders or sand soil barriers; dieldrin has some vapor toxicity; EDB fumigation slabs.)

1958c, pp. 34, 36, 38, 40. (PCO equipment directory.)

1958i, pp. 1-7. (Soil treatment.)

1958k, p. 22. (California, Dr. I. B. Tarshis, U.C.L.A., stated SG 67, a treated silica

aerogel (Davison Chem. Co., Baltimore, Md.), nontoxic sorptive dust, effective preventive for drywood termite, use 1 lb. to 1,000 sq. ft. of attic area.)

1958l, pp. 113-119. (Termite protection, pp. 113-118, only mandatory in region of heavy attack; concrete foundations, reinforced concrete caps, metal shields, soil treatment, treated lumber; in areas where drywood or dampwood hazard, additional precautions required. Decay, p. 119, treated lumber, resistant woods.)

1958n, pp. 2-10. (Australia, termite-proofing, control.)

1959, pp. 17-19. (U.S. Dept. Agric. methods soil treatment.)

1959a, p. 17. (U.S., cooperation with builder, view building plans, bid early, advertise.)

1959b, pp. 19-20, 22-23. (U.S., Savannah, Ga. Navy project, timing pretreatment of construction, performance bond, work with field superintendent.)

1959d, pp. 1-4. (U.S., National Better Business Bureau warns against termite quackery and recommends National Pest Control Association's advice on how to purchase wisely.)

1959j, pp. 30, 32, 34. (Abbot Exterminating, pretreatment 837-unit Fort Campbell, Ky., housing project soil poisoning, wood preservation, 1958-1961.)

1960g, p. 5. (U.S., statistics by R. E. Heal, Exec. Secy., National Pest Control Assoc., on pest control industry; 15,000 to 20,000 service personnel in industry, 225-million-dollar annual business; 40% or 90 million dollars derived from pre- and post-construction termite work alone.)

1960k, pp. 56, 58. (U.S., no Approved Reference Procedure for pretreatment recommended as yet by National Pest Control Assoc., common procedures used outlined, use dyes, etc.)

1960l, p. 182. (U.S., 3 types termites, call on licensed pest control operator.)

1960n, pp. 28, 34, 36, 46, 48, 50, termites; pp. 50, 51, 56, fumigation; pp. 51, 54-56, safety. (U.S., equipment directory for control.)

1960o, pp. 62, 64-69. (U.S., how to choose efficient equipment and methods for drilling masonry, hardness, abrasiveness, moisture factors affecting drilling, also types bits, sharpening, application-pressure, speed, use of rigs.)

1960p, p. 70. (U.S., termite publicity program, series news stories sent to newspapers in various States, damage, issuance of statements by local authority, cartoon.)

1960t, p. 5. (U.S., National Pest Control Assoc. offers insured termite control service warranty on both corrective and pretreat work to qualified members.)

1960u, p. 46. (U.S., National Pest Control Assoc. board approves insured termite control service warranty program. Corrective work and preconstruction termite prevention treatment, qualified members participate for insurance by depositing $35 covering 10 warranty jobs; Lexington Insurance Co., Wilmington, Del.; members responsible for retreatment for first $100, repairs in excess of $100 filed with NPCA. Damage occurring within 1 year after service will be made at expense of TO and/or NPCA not to exceed $5,000.)

1960v, pp. 56-57. (U.S., how to sell soil poisoning pretreatment of buildings to various groups interested in building.)

1960w, pp. 28-30, 32-34. (U.S., termites pp. 28-30, heptachlor, and sodium arsenite added, in National Pest Control Assoc. supplement to ARP (approved reference procedures for termite control), to list chemicals accepted by FHA, rates application, inspections, etc.)

1960y, pp. 42-43. (U.S., free inspections on way out, term "clearance" not to be used, termite report safer legally.)

1960z, pp. 1-5. (Philippines, U.S. methods.)

1960a[1], pp. 34, 36. (U.S., should concrete block foundations be treated at grade level or near footings? Experiments under way; above grade level most effective?)

1960b[1], pp. 1-15. (U.S., design of wood structures for permanence, National Lumber Manufacturers Assoc. recommends: sanitation, sound foundation, drainage, ventilation, proper clearance, durable or treated wood, metal shields, periodic inspection for termite prevention, detailed diagrams.)

Ayoub, M. A., 1959, pp. 429-432. (Saudi Arabia, *Microcerotermes diversus* attacking live plants.)

Beal, J. A., 1958, pp. 20, 22. (Soil poisoning dosages, poisoned vapor barriers, insulating materials tested.)

Beechem, H. A., 1955, pp. 36, 50. (Methyl bromide poisoning, gas in applicator near lethal concentration.)

Beesley, J., 1957, pp. 4-6, pp. 1-3, 3-4. (Australia, eradicating termites from buildings.)

BENDER, A. H., 1959, p. 68. (U.S., clean-up equipment—brushes, rags, trash cans, vacuum cleaner and drill combination.)

BOETTGER, C. R., 1957, pp. 105-121. (Protection of construction timber.)

BOWSER, C. A., 1955, pp. 9-10, 12. (Federal Housing requirements.)

BREHM, W. L., et al., 1955, pp. 44, 46-48, 50. (Equipment care and maintenance.)

BRICKEY, P. M., 1957, pp. 33, 36. (Prices must be adjusted.)

BRIEGLEB, P. H., 1954, pp. 73-76. (Resistant wire, soil poisons.)

BRINKMAN, G., 1956, pp. 199-202.

BUSWELL, W. S., JR., 1955, p. 44. (In roof.)

BUTTS, W. L., 1959, p. 32. (Chemical dispersion in concrete blocks.)

CAPINPIN, R. I., 1955, pp. 170-172. (Philippines, termite-proofing foundations.)

CASIMIR, M., 1957, pp. 67-68. (Australia, detection and control.)

CEYLON COCONUT RESEARCH INSTITUTE, 1958, pp. 1-2. (Ceylon, paradichlorobenzene in planting holes.)

CHAARAOUI, A. M., and CHAHOUAN, A. A. M., 1955, pp. 286-297. (Egypt.)

CHATTERJI, S., SARUP, P., and CHOPRA, S. C., 1958, pp. 399-405. (India, dieldrin, DDT, and BHC mixture (50:50) superior to DDT and toxaphene mixture (50:50), 5, 10, 15, and 20 lb. to acre applied to soil once before planting.)

1960, p. 108. (India, control termites attacking wheat by insecticides.)

CLEMENTS, W. B., 1955, p. 32. (U.S., Florida.)

COATON, W. G. H., 1958, pp. 1-112. (South Africa, hodotermitid harvester termites, poison baits—sodium fluosilicate grassveld reclamation, arresting soil erosion.)

DAS, G. M., 1959, pp. 493-498 (p. 8, reprint). (NE. India, *Microcerotermes* sp. live wood eater, dieldrin as soil poison, use leads to injury by other insects.)

DAVIS, J. J., 1955, pp. 1-3. (Prevention and control, U.S.)

DAVLETSHINA, A. G., and BOGOLYUBOVA, A. S., 1960a. (U.S.S.R., *Anacanthotermes turkestanicus*, results of experiments on control in Golodnaya Steppe.)

DICKINSON, L. E., 1961, pp. 40-43. (General: Taiwan, damage to underground cable, control coat with pentachlorophenol. Australia, use of vaseline-based serving containing arsenic applied to outside lead sheathing, also attack on plastic sheathed cable. Panama, cables employing jute fillers attacked. Hawaii, termites eat through synthetic rubber, polyethylene or neoprene insulation, control blow pentachlorophenol or chlordane into ducts. Cuba, synthetic insulation type cable replaced. Congo, termite hills too close to lines must be removed.)

DILLER, J. D., 1958, pp. 1-3. (U.S., in crawl-space houses, on basis cost and performance for 9 to 10 years, most desirable moisture-barrier ground cover two layers asphalt-saturated felt. Installed cost $24 for coverage 1,000 sq. ft. area. Where much physical wear, 45-lb. roll roofing, or heavier grade asphalt-saturated felt more durable.)

DILLON, R. M., (Ed.), 1956, pp. 1-60. (Protection against decay and termites in residential construction for FHA-concrete or masonry capped foundations, shields, treated wood, or soil poisons.)

1958, pp. 1-33. (Vapor-barriers not recommended; all structural lumber must be treated.)

DOERING, K. W., 1958, pp. 46, 48, 50. (How termites affect approval of Veterans Administration home loans.)

EBELING, W., 1959a, pp. 24-25, 46-47. (U.S., California, how to prevent termites from ruining your house, danger in doing control work yourself, licensed operators and trade associations have raised standards, structural alterations, insecticides, treated wood, poison dusts, wood preservation, fumigation, silica aerogel, for control drywood termites.)

EBELING, W., and PENCE, R. J., 1956, pp. 46, 50, 52, 54, 55, 56-57, 58, 62, 64. (U.C.L.A. entomologists evaluate research data on control *Kalotermes* and *Reticulitermes*.)

1958a, pp. 1-16. (Prevention and control western subterranean termite.)

EBELING, W., PENCE, R. J., and WAGNER, R. E., 1958, pp. 50, 52. (Period for 50% paralysis: lindane outstanding; period for 50% mortality; pentachlorophenol, dilution affects results—subterranean termites. Drywood termites can be prevented from reinfesting buildings by dusting timbers with inert dusts which remove lipids of epicuticle causing rapid desiccation.)

EBELING, W., and WAGNER, R. E., 1959, pp. 40, 42, 44-46. (U.S., California, control drywood termites. Woodtreat-TC, to kill and aerogels to prevent attack.)

1959a, pp. 5-8. (Same as 1959.)

1959b, pp. 190-207. (U.S., California, drywood termites more susceptible to sorptive than to abrasive dusts, remove lipoid protective layer covering epicuticle caus-

ing rapid loss water after crawling on thin film dust. Lose 30% of body weight in water, then die. Silica aerogels particularly effective. Water soluble fluorides incorporated into the silica gels greatly increase effectiveness with increasing relative humidities. After wax is disrupted, fluorides can act as contact insecticides, ability to adhere to dusted surfaces increased.)

EMERSON, A. E., 1958, *in* Weyer (Ed.), 1958, pp. 2798-2807. (Damage and control.)

ESSIG, E. O., 1958, pp. 112-119. (Western North America, *Zootermopsis, Reticulitermes.*)

FERRERO, F., 1959, pp. 30-31. (France, Banyuls, Eastern Pyrenees, *Calotermes flavicollis* attacking grapevines controlled by use dieldrin as dust (20% active material) or suspension with 1.5 l. dieldrin per 100 l. water, soil thoroughly treated especially around roots, and dust or spray applied under pressure. Wounds should be dusted.)

FEYTAUD, J., 1957, pp. 1-117. (France, control in buildings.)

FONSECA, J. P. C. DA, 1952-1954, pp. 13-19. (Control *Syntermes* injurious to Eucalyptus seedlings with organic insecticides, Brazil.)

FOREST PRODUCTS JOURNAL, 1957, pp. 23A-27A. (U.S., practical approach to prevention of decay and termites in building construction.)

FRANCIA, F. C., 1957, pp. 29-30. (Philippines, control subterranean termites.)

1957a, pp. 15-17, 19. (Philippines, control drywood termites.)

FRANCIA, F. C., and VALINO, A. J., 1960, pp. 21-25, 31. (Philippines, importance various species, descriptive notes, habits, distribution, control.)

FRENCH STANDARDS ASSOCIATION, 1957, pp. 1-12. (France, *Reticulitermes lucifugus* and *R. lucifugus* subsp. *santonensis*, detection, prevention, control.)

GARLICK, G. G., 1956, pp. 485-488. (U.S., report of Building Research Advisory Board Committee on Protection Against Decay and Termites in Residential Construction.)

GAY, F. J., and WEATHERLY, A. H., 1959, pp. 26-28. (Australia, powerful contact toxic effect by adding small amount dieldrin to concrete during mixing, good permanence.)

GIRALDI, G., 1955, pp. 487-498. (Italy, Venice, structural, soil poisons, wood preservation.)

GÖSSWALD, K., 1958, pp. 129-151. (France, *Calotermes flavicollis* control by synthetic insecticide, Thiodan, carburetted hydrogen gas.)

GOUSE, D., 1960, pp. 30, 64. (U.S., Muncie, Ind., pest control operator designs Ford tank truck for pumps, hose, tools, etc., for termite work.)

GRAHAM, J. F., 1957, p. 64. (Africa, Kenya, destruction termite nests.)

GREAVES, T., 1959, pp. 114-120. (Development even age stands in alpine areas will prevent attack by *Porotermes adamsoni; Coptotermes acinaciformis* controlled by blowing ¼ to ½ oz. white arsenic dust into nursery with portable dust gun. Silvicultural methods will assist in control *Coptotermes* but insecticides necessary in mixed age stands, Australia.)

GUNDERSON, H., 1957, pp. 1-8. (U.S., Iowa, detection and control.)

GUNN, J. W., 1952, p. 28. (Purdue University conference report.)

HARRIS, W. V., 1955a, pp. 12-13. (Australia, war on white ants.)

1955b, pp. 1-6 (Prevention damage to buildings, British Commonwealth.)

1959a, pp. 47-50. (World crops.)

1960a, pp. 73-76.

1960c, pp. 103-106. (Damage to timbers by different types termites of world, control by wood preservatives and barriers.)

HARRIS, W. V., and BROWN, E. S., 1958, pp. 737-750. (Solomon Islands, concrete foundations, shields, wood preservation.)

HARTWIG, E. K., 1955, pp. 361-366. (Destruction *Trinervitermes* nests, South Africa, by mechanical and chemical methods; winged appear in Apr. or June, according to rains; tobacco dust or dimethyl parathion powder, 20%, no harmful effect.)

1956, pp. 629-639. (Africa, *Trinervitermes*, population distribution as basis for control measures.)

HATFIELD, I., 1958, pp. 36, 38, 40, 42, 44. (Most economical combined fungicide and wood insect control chemical—pentachlorophenol.)

HEISTERBURG, W., 1958, pp. 66-67. (Austria, criticism of Kurir's 1958 paper on termite danger in Austria.)

1959, pp. 142-143. (Austria, introduction and radical eradication possibility.)

HERFS, A., 1959, pp. 148-150. (India, dip sugarcane cuttings in aqueous emulsions DDT, 0.25% BHC, 1% chlordane, 1% aldrin, 0.25 to 5% dieldrin; dust furrows with 5% BHC or chlordane at a level of 20 lb. per acre effective. Dosages higher

than 1 lb. BHC per acre injured growing shoots. Chlordane improves growth at 0.75 or 5 lb. per acre.)

HICKIN, N., 1957, p. 23. (East Africa, *Cryptotermes brevis.*)

HOAG, R., 1959, pp. 3-5, 9. (California, Structural Pest Control Board rules.)

HOLDSWORTH, H. P., 1959, pp. 1-6. (Ohio.)

HRDÝ, I., and HRDÁ, J., 1960, pp. 209-215. (Czechoslovakia, effect of DDT and gamma BHC, Lindane on *Kalotermes flavicollis* and *Reticulitermes lucifugus.*)

HUNT, F., 1958, pp. 1-3. (U.S., Florida homeowners termite guide.)

ISHERWOOD, H. R., 1955, pp. 12, 14. (Equipment for subterranean termite control.)

JACQUIOT, C., 1957, pp. 1-7. (France, resistant woods, products used for control.)

JAKOBI, H., and LOYOLA E. SILVA, J. DE, 1959, pp. 113-117. (Portugal, control of parasites of termites by biochemistry, symbiosis, defaunation by an antibiotic—Acetarson, flagellates in *Eucryptotermes* in three days, no injury to termites.)

JENKINS, C. F. H., 1960, pp. 117-123. (West Australia, sanitation, ventilation, inspection, termite-proof construction, shields, soil poisons, wood preservation, resistant woods.)

JONES, G. D., 1958, pp. 1-2. (U.S., North Carolina.)

JOTTRAND, M., and DETILLEUX, E., 1959, pp. 111-129. (Belgian Congo, Elizabethville, leveling, tillage, and costs, mound nests.)

KALYANARAMAN, V. M., NARAYANASWAMY, P. S., and DAVID, A. L., 1960, pp. 166-171. (India, sugarcane, by insecticides.)

KASSAB, A., CHAARAWI, A. M., HASSAN, M. I., and SHAHWAN, A. M., 1960, pp. 1-91. (Egypt, control *Anacanthotermes ochraceus, Psammotermes fuscofemoralis* and *assuanensis.*)

KATZ, H., 1958, p. 49. (Treat soil, where old woody shrubs grow near foundation, with aqueous solution of toxicant to control subterranean termites.)

1959, p. 46. (Exposed threshold under door on side facing worst weather conditions accumulates water, can provide termites with moisture reservoir, no ground contact needed, use Woodtreat-TC on wood nearest wet threshold.)

KIRKPATRICK, T. W., 1954, pp. 126-132. (British Commonwealth, developments in termite research.)

KOPPENHAFER, W. D., 1960, pp. 54-55. (U.S., Albany, N.Y., quotation sheet for estimating costs and justifying bids by Abalene Pest Control Service.)

KOWAL, R. J., 1957, pp. 155-156. (The National Research Council's BRAB report on protection against decay and termites in residential construction.)

1957a, pp. 9, 10, 36. (Index to cooperating public agencies in termite control.)

1958, p. 401. (Southern U.S., research on control.)

KURIR, VON A., 1958, pp. 8-15. (Austria, *Reticulitermes flavipes,* destruction all buildings in infested area and burning all wood in them, chemical treatment brick and mortar debris, fumigation soil.)

1958a, pp. 84-87. (Austria, *Reticulitermes flavipes* eradication with cobalt 60 or strontium 90, not in favor of Long-Term Control.)

1959, pp. 101-104. (Austria, radical control methods, radiation.)

KYLE, C. V., 1958, pp. 32, 34, 36, 38, 49. (U.S., removal and replacement floor tile.)

LATIF, A., and JILANI, S. G., 1957, pp. 11-12. (Pakistan, control termites on chillies.)

LEE, P. G. M., 1959, pp. 34-35. (Malaya, structural and chemical barriers.)

1959a. pp. 63-64. (World, crops.)

LEFEVRE, F., 1956, pp. 47-50. (Control of termite damage, date palm station, Kan Kossa, Mauritius.)

LEMIRE, E. H., 1959, pp. 36, 38. (U.S., when to sell home building market preconstruction treatment.)

LEWIS, R., 1958, pp. 33. (Chevrolet equipment truck with compartments and pump, Muncie, Ind.)

LONG, E. J., 1955, pp. 14-16. (U.S., termite counterattack.)

LYONS, F. H., 1956, pp. 112-114, 203-206. (How to protect against termites in conventional construction.)

1956a, pp. 203-206. Idem. (Slab-type construction.)

MAHER, P., 1955, pp. 18, 20, 44. (Pretreatment with 4% chlordane emulsion, slab homes.)

MALLIS, A., 1960, pp. 219-324. (U.S., dampwood, drywood, subterranean termites.)

MANUEL, M. W., 1958, pp. 36, 38, 40. (U.S., California, termite report must not misrepresent, inspection, legal liability.)

MARTÍNEZ, J. B., 1956, pp. 102-117. (Spain.)

1957, pp. 147-161. (Canary Islands.)

MASON, N. P., 1958, p. 18. (Termite protection required by FHA in United States of building in danger zone; inspection once or twice a year; destroy tunnels, if reach wood, call an exterminator.)

1958a, pp. 19-20. (Minimum property standards for FHA in the U.S. for ter-

mite control, including both physical and chemical barriers.)

MATHUR, R. N., 1960a, pp. 376-378. (India, control in houses, sanitation, ventilation, grading, drainage, sound foundations, proper clearance, periodic inspections, soil poisons, metal shields, resistant woods, wood preservatives, destruction nests by poisons.)

MAYER, P., 1955, pp. 18, 20, 44. (U.S., built-in termite proofing.)

MESECHER, R. B., 1957, pp. 20, 22, 45. (U.S., California, how to remove, repair, replace baseboards.)

METCALF, R. L. (Ed.), 1957, pp. 147-192. (Use chemicals as pesticides, repellents: organic phosphorous insecticides.)

1958, pp. 1-426. (Application pesticides, residues, insect resistance.)

MOUTIA, L. A., 1955, pp. 48-51. (Mauritius, household.)

NEWSAM, A., and RAO, B. S., 1957, pp. 98. (*Coptotermes curvignathus* attacking rubber trees in Malaya controlled with aldrin, less costly than superior dieldrin, chlordane less persistent.)

1958, pp. 209-215. (Malaya, *Coptotermes curvignathus* controlled by treating soil about trunk with 0.4% BHC dust (2 oz. around collar); 5% DDT or 5% toxaphene failed; emulsions more effective than dusts. ½ gal. per planting hole, emulsions of chlordane, aldrin, dieldrin effective, dieldrin most persistent.)

NEW SOUTH WALES DEPT. AGRIC., ENTOMOLOGICAL BRANCH, 1958, pp. 1-19. (Australia, N.S. Wales.)

NIRULA, K. K., ANTHONY, J., and MENON, K. P. V., 1953, pp. 26-34. (Chlordane and parathion mixed with soil effective against *Termes obesus* attacking coconut seedlings, India.)

ORR, L. W., 1959, pp. 639-640. (U.S., soil poisons cannot be relied on alone, sanitation, drainage, ventilation, proper clearance, impervious foundations, treated wood; disturbance symbiosis with protozoa.)

OSMUN, J. V., 1957a, pp. 592-593. (Response of *Reticulitermes flavipes* to certain insecticides.)

OSMUN, J. V., and PFENDLER, D. C., 1955, pp. 479-480. (Device for subslab injection of insecticides by pressure.)

PACKARD, H. R., 1955, pp. 25-26, 28. (Cooperation between termite operator and real estate agencies in California.)

PARCHER, J. V., and MEANS, R. E., 1959, pp. 29-30, 32. (U.S., characteristics soil, cohesion, plasticity, strength, void ratio, loads on sand, clay, shrinking and swelling.)

1959a, pp. 57-58, 60. (U.S., chemical application, structural safeguards, penetration soil, soaking or low-pressure injection for coarse-grained soil, pressure injection for fine-grained soils; effect of building on water content of clay and dry soils.)

PARRY, M. S., 1949, pp. 287-292. (Africa, Tanganyika, Eucalyptus plantations.)

PARSONS, H. L., and EHRLICH, A., 1961, pp. 20, 23-24. (Use AM-9-American Cyanamid Co. water-soluble mixture of acrylamide and N,N-methylene-bisacrylamide to solidify soil. A 10% mixture by weight in water prepared and 2 catalysts added, resulting in a gel. Solution applied in rodding holes, 8 in. apart, parallel to wall. Mass of soil patricles held together. Dries out soil. Toxic, remove plants. May be applied with insecticide?, not determined.)

PEARSON, E. O., and MAXWELL-DARLING, R. C., 1958, pp. 61-63. (Tropical Africa, damage to cotton by *Hodotermes* can be allowed for by closer spacing; subterranean termites can be controlled by use bait sawdust poisoned by paris green applied at time thinning; ground applications BHC effective.)

PENCE, R. J., 1958, p. 56. (Chemically treated asphalt vapor barrier stops termites—1% chlorinated hydrocarbons added to asphalt.)

PEPPER, J. O., and GESELL, S. G., 1959, pp. 1-8. (U.S., Pennsylvania, detection and control.)

PURUSHOTHAM, A., SEBASTIAN, V. O., and GROVER, P. N., 1959, pp. 15-19. (India, protection timber logs from termites.)

RANGEL, J., GOMES, J., and SOUZA, H. D., 1952-1955. (Control of *Nasutitermes brevioculatus* by disinfection of sugarcane cuttings with Rhodiatox, Rodiaclor, and other insecticides, Brazil.)

REDD, J. C., 1957, pp. 37-38, 46. (Special control specification needed for each structure.)

RENO, J., 1960, pp. 27-28. (Protection of houses with basements against termites.)

1960a, p. 77. (U.S., protection against termites for houses with slab floors.)

ROONWAL, M. L., 1955a, pp. 22-23, 26, 30. (Fighting the white ant, India.)

1958a, pp. 77-100. (India, mounds, water suspensions chlorinated hydrocarbons, fumigation; sugarcane, soak setts, dust furrows BHC; other crops, chlorinated hydrocarbons—fruit trees, soil poisons, spraying trunks, paste on trunks, DDT, BHC; wood, resistant woods, shields, wood preservatives.)

Rui, D., 1956, pp. 1-2. (Italy, Venice, 4% malathion and 1% gamma benzene hexachloride in kerosene unsuccessful against *Reticulitermes lucifugus*.)

Russell, R. M., 1958, pp. 74, 76, 78, 80. (Relationships construction to infestations by subterranean termites, floating, supported, and monolithic slabs; costs resistant woods; vapor barriers, expansion joints.)

St. George, R. A., 1957, pp. 38, 40, 42, 44. (Subterranean termites attacking yews in Maryland controlled with chlordane emulsion.)

St. George, R. A., Johnston, H. R., and Kowal, R. J., 1960, pp. 1-30. (U.S., recommendations of Forest Service, following BRAB reports.)

Sands, W. A., 1960, pp. 106-108. (West Africa, control termites damaging living trees, dieldrin emulsion in planting holes; use polythene planting pots, use 2% dieldrin dust. Mechanical cultivation in plantations.)

Sastry, K. S. S., 1956, pp. 77-83. (India, Visvesvaraya Canal Tract, *Odontotermes obesus* injury to sugarcane.)

Schmidt, H., 1955a, pp. 222-224. (Methods of research on wood products.)

Schmitt, J. B., Libby, J. L., and Wilson, B. R., 1960, pp. 1-16. (U.S., chiefly *Reticulitermes flavipes*.)

Schmitz, G., 1956, pp. 1551-1596. (Belgian Congo.)

1957, pp. 229-230.

Scott, K. G., 1960, pp. 35, 36, 38. (U.S., Southern California, shields not necessary, usually 4 or 5 control methods necessary; all areas should be pretreated, not only critical areas, 5-year guarantee impractical.)

Sharma, D. K., 1959, pp. 18-19, 22. (India, termites must be tackled.)

Simeone, J. B., 1956, pp. 1-3. (U.S., New York State, prevention and control subterranean termites.)

Sims, L., 1957, pp. 312, 322-323. (U.S.)

Sinel'nikov, N. A., 1950, pp. 38-48, (U.S.S.R., the use of DDT in the control of termites.)

Singh, S. H., Sandhu, G. S., and Arora, K. S., 1958, pp. 331-332, 335-336. (India, Punjab sugarcane).

Singh, S. S., 1957, pp. 19-20. (India, prevention termites entry through cracks in floor, provide in certain areas layer clean dry sand of 9-inch thickness below floor.)

Singh, S. S., and Sharma, P. L., 1957, pp. 91-95. (India, aldrin 0.4 oz. 40% emulsion concentrate in 12 gal. water effective in destroying nests *Odontotermes gurdaspurensis*.)

Smith, C. F., 1954, pp. 16-17. (U.S., south, stop termite attack.)

1960, pp. 40-41. (U.S., North Carolina, 3-year-old inspection form for wood-destroying organisms developed through cooperation with the Veterans Administration still acceptable.)

Smith, D. N., 1945, pp. 1-12. (British Columbia, dampwood and subterranean.)

Smith, M. W., 1956a, pp. 36, 38, 40. (Subterranean termites.)

1957, pp. 34, 36, 38, 42. (Slab-type houses.)

Snyder, T. E., 1955f, pp. 50, 66. (Colonizing termites.)

1956, p. 36. (Venezuela, control by poison dust infestation from roof by subterranean termites.)

1956f, pp. 27-37. (World.)

1957b, p. 3. (Summary BRAB report, protection in residential construction.)

1960a, pp. 284-288. (Control, general.)

Soares, J., 1958, pp. 230-232. (Portugal.)

Spear, P. J., 1956, pp. 1-4. (Termite control in U.S. 35% of 100-million-dollar annual pest-control business; recommendations BRAB report; State legislation; 130 gradute entomologists in commercial work.)

1958, pp. 49-50. (Pest control in structures in the U.S. 100-million-dollar business annually, 35% termite control, 25% fumigation.)

Spector, W. S. (Ed.), 1956, p. 491. (Handbook.)

Srivastava, J. C., 1957, p. 743. (India, protection sugarcane.)

Strong, V. E., 1956, pp. 38, 40. (Cost routine inspection, California.)

Thakur, C., Prasad, A. R., and Singh, R. P., 1958, pp. 155-163. (0.5 lb. dieldrin per acre protects sugarcane against *Microtermes obesi*, *Odontotermes assmuthi*, and *Trinervitermes heimi*, India; no adverse effect on soil fertility.)

1961, pp. 127-131. (India, Pusa, in calcareous soil both aldrin and dieldrin effective as

dust and emulsion in protecting sugarcane, dieldrin having longer residual effect.)

THORNHILL, F., 1955, pp. 16, 18.

TOUMANOFF, C., and TOUMANOFF, T. C., 1959, pp. 216-218. (France, biological control by *Serratia marcescens, "Reticulitermes santonnensis."*)

TU, T., 1953, pp. 277-287. (Formosa, insecticidal action of various chemicals and by-products of camphor on *Coptotermes formosanus.*)

1956, pp. 12-18. (Formosa, control in buildings.)

VANCE, A. M., 1956, pp. 10, 18, 24. (Southwestern U.S., lawns protected by 1¼ gal. 75% (8 lb. per gal.) chlordane emulsifiable concentrate, loosen soil before application, *Gnathamitermes.*)

VANETTI, F., 1959, pp. 437-443. (Brazil, *Cornitermes cumulans.*)

VAYSSIÈRE, P., *in* Coste, 1955, p. 241. (World, biological control in coffee plantations.)

VAYSSIÈRE, P., 1957, pp. 473-480. (Malaya.)

WAGNER, R. E., and EBELING, W., 1959, pp. 208-211. (U.S., California, insecticide diluents, silica gels, aerogels or precipitates, montmorillonite clays, attapulgite clays, diatomites, in decreasing order effectiveness as preventives. Lighter material superior to heavier, increase with distance from point of discharge.)

WARD, J. C., 1958, pp. 14-16. (U.S., use pesticides with care.)

WEIDNER, H., 1955g, *in* Schmidt, H. (ed.), 1955b, pp. 160-164. (Control of termites injurious to plants.)

WILKINSON, W., 1957a, pp. 493-494. (World.)

WILLCOCKS, F. C., and BAHGAT, S., 1937, p. 217. (Egypt, termites injure young cotton plants in Sudan, no records in Egypt.)

WILSON, H. B., 1959, pp. 35, 37, 39, 41, 43, 45, 47-49, 51, 53, 89-91, 93-95. (Australia.)

WOLCOTT, G. N., 1955, pp. 113-122. (Resistant woods, use chemicals.)

1955a, pp. 115-149. (Organic termite repellents tested against *Cryptotermes brevis.*)

WOLFENBERGER, D. O., 1959, pp. 1-51. (U.S., Florida, *Neotermes castaneus* damage to living avocado trees controlled by removing and burning old trees; in case young trees, ½ cup 5% chlordane dust, or aldrin, dieldrin, and heptachlor effective.)

YEAGER, P., 1957, pp. 26, 28, 30, 43, 45. (Trend toward greater leniency in tax deductibility for termite loss, especially if damage has occurred within 1 year or so after inspection, cases cited.)

1958, pp. 70, 72, 98-99. (Enforcement restrictive covenant must not involve restraint of trade; trade secrets must not be disclosed.)

ŽEHELJ, D., 1958, pp. 110-111. (Austria, struggle against termites.)

COURT RULINGS

ANONYMOUS, 1957j, p. 46. (U.S., Michigan court held suppressing a material fact constitutes fraud.)

YEAGER, P., 1957, pp. 26, 28, 30, 43, 45. (Trend toward greater leniency in tax deductibility for termite loss, especially if damage occurred within 1 year or so after inspection, cases cited.)

1958, pp. 70, 72, 98-99. (Enforcement restrictive covenant must not involve restraint of trade; trade secrets must not be disclosed.)

CYTOLOGY

BANERJEE, B., 1957, pp. 288-289. (Haploid chromosome numbers in the testis of king *Odontotermes redemanni.*)

DENIS, C., 1958a, pp. 240-247. (Cytology terminal nerves in course of ontogeny *Calotermes flavicollis.*)

NOIROT, C., and NOIROT-TIMOTHÉE, C., 1960, 2779-2781. (General, *Anoplotermes* worker, *Microcerotermes*, structure posterior intestine.)

DAMAGE

ANONYMOUS, 1949. (In 1849, C. Inge, probate court of Adams Co., Mississippi, had records destroyed by termites. Dr. T. W. Harris identified them, suggested paper be impregnated with alcohol solution of corrosive sublimate of mercury.)

1957, pp. 24, 25. (Estimates of incidence and damage by termites in States in 1956.)

1957d, pp. 6-8, 23, 25. (Florida, damage by termites and decay, asphalt impregnated building paper vapor barrier ineffective.)

1957l, p. 22. (Termites in inlaid floor, St. George's Hall, Kremlin, Moscow, 56° N.; former records, Ukraine, Odessa, 46° N.)

1958a, pp. 8-10. (Infestation Chicago homes, other northern localities listed.)

1958d, p. 48. (Rutgers University study estimates damage at 2 million dollars in New Jersey.)

1958n, pp. 2-10. (Australia, kinds damage.)

1959, pp. 17-19. (U.S., map showing regions heavy, medium, and light damage.)

1959f, p. 54. (U.S., damage allowable by Revenue Service if proven occurs between September and June of following year—not over several years.)

1959n, p. 16. (Italy, Venice, St. Mark's church damaged by "Lucifubis" (*Reticulitermes lucifugus*), United Press release Oct. 5, 1959, in New York Herald Tribune.)

1960, p. 25. (U.S., in California 25 to 60% of slab houses infested, 1 to 2 years old in one area inspected. In Louisiana, Alexandria and Lake Charles areas 25 to 30% infested in 5 years. In Jackson, Miss., 50 to 60% under 5 years old infested. In Texarkana, Tex., 90% slab houses in old forested area infested in first year; Texas in general 10 to 50% infested.)

1960j, p. 4. (U.S., Annapolis, Md., in 1957, 5-year-old Health Department building infested, termites crawled through cracks in concrete; also through lime mortar. In central Florida slab-on-ground homes 10 times more vulnerable, suspended floor next, crawl-space house with piers 3 ft. above ground least susceptible. 75 to 90% concrete-block homes infested within 3 to 5 years of completion. In Charleston, S.C., 600 brick veneer George Legere homes built in 1941 of untreated wood on concrete slab floors; 14 years later 240, or 40% of dwelling units, had to have wood replaced.)

1960q, pp. 23-24. (Honolulu, Hawaii, 3 million dollars spent in single year recently for repairs to buildings damaged by termites in city and county Honolulu; run from 20 to 50% permit values. Subterranean termites cause 75% total damage, drywood 25%; subterranean termites in almost every building in city; less infestations in outskirts.)

1960c,[2] pp. 20, 24. (Hawaii, damage by *Coptotermes formosanus* and a drywood termite severe, 3 million dollars (including decay) in 1956. Drywood termite responsible for one-quarter total termite damage.)

BARTA-NEVES, C. M. B., 1956a, pp. 156-158. (Lisbon, corks damaged.)

BECKER, G., 1957, pp. 403-410. (North Italy, Chioggia, first record in Europe cases of docks (pine) and piles (oak) infested with *Kalotermes flavicollis*.)

BOETTGER, C. R., 1957, pp. 105-121. (In Tropics, damage to commercial timber.)

BOURNIER, A., 1956, pp. 384-388. (France, damage by *Reticulitermes lucifugus*.)

BOWER, C. A., 1959, p. 15. (U.S., Oklahoma, increase of 25% of termite control jobs in 1957-1958 over 1956-1957; 6,843 in 1958, 5,121 in 1957; 118 new licenses issued in 1958.)

CARR, D. R., 1957, pp. 1-19. (New Zealand, decay and subterranean termites not as injurious as beetle borers and native drywood termite *Calotermes brounii*.)

COATON, W. G. H., 1958, pp. 1-112. (South Africa, hodotermitid harvester termites, damage to walls buildings, undermine, thatched roofs, linen, cotton, clothes, wallpaper, books, paper, matting.)

CORTESI, A., 1960, pp. 1, 4. (Italy, Rome, art treasures endangered by termites: books in National and Vatican libraries damaged, historic buildings, art treasures in large galleries, furniture in modern buildings in Rome and village of Oriago, devoured most of homes and trees that adorn streets. Historic Doge's Palace, Venice, invaded.)

DORSEY, C. K., 1958, pp. 1-10. (U.S., West Virginia.)

EBELING, W., 1959b, p. 4. (U.S., California, remarks before recent meeting American Society Testing Materials, San Francisco, Calif.: In California's San Fernando Valley, 20 to 25 million dollars worth of property every year in Southern California destroyed by termites, 350 firms engaged in eradication. One species increased activities during last several years. Approximately 18,000, or 75% of 24,000 representative buildings, inspected in 11 California counties, infested, 62% by subterranean termites, 25% by fungi, 5% by powder-post beetles. Both subterranean and drywood termites found in 49% of buildings in 4 regions. Concrete slabs provide no barrier, termites penetrate cracks 1/32 inch in width, ingest concrete and pass it through digestive tract, can widen minute cracks. In San Fernando Valley 46% slab houses infested within 5 years of construction, considerable proportion within 1 to 2 years.)

EMERSON, A. E., 1958, *in* Weyer (Ed.), 1958, pp. 2798-2807. (Damage, the termite problem.)

FEYTAUD, J. C., 1955, pp. 32-38. (Increased hazard in France.)

FRANCIA, F. C., 1957, pp. 27-30. (Philippines, damage by subterranean termites, *Coptotermes, Heterotermes, Macrotermes.*)

1957a, pp. 15-17, 19. (Philippines, damage by drywood termites.)

FRANCIA, F. C., and VALINO, A. J., 1960, pp. 21-25, 31. (Philippines, importance of various species.)

GILES, D. T., 1960, pp. 20, 22. (Del-Mar-Va peninsula, 75 to 95% houses infested by termites, many only 4 to 5 years old, older houses on Eastern Shore better constructed, less susceptible, crawl space; only 2% slab-on-ground type.)

GIRALDI, G., 1955, pp. 487-498. (Italy, Venice, *Reticulitermes lucifugus.*)

HARRIS, W. V., 1955c, pp. 160-166. (Damage in Tropics.)

1955d, pp. 9-11. (Persistent termite.)

1956c, pp. 145-177. (Destruction of timber.)

1957c, pp. 20-32. (Malaya.)

1958, pp. 161-166. (East Africa, damage by drywood termites, *Cryptotermes.*)

HARRIS, W. V., and BROWN, E. S., 1958, pp. 737-750. (Solomon Islands.)

HATFIELD, I., 1958, pp. 50, 52-54, 56-58, 60. (U.S., damage by decay and subterranean termites, buildings.)

HENRY, T. R., 1958, p. 45. (Panama, Canal Zone, eat lead, dissolve concrete, thrive on arsenic.)

HEPBURN, C. A., 1959, pp. 14-16. (South Africa, properties.)

HERFS, A., 1959, pp. 178-181. (Europe, damage to paper and books by *Reticulitermes lucifugus.*)

HICKIN, N., 1960, pp. 459-461. (France, *Kalotermes flavicollis, Reticulitermes lucifugus,* and *R. lucifugus,* var. *santonensis; flavicollis* injures vineyards, cuts life vine stock from 80 to 40 years; *santonensis* more injurious to buildings and trees than *lucifugus.*)

KURIR, VON A., 1956, pp. 1-3, (Europe.)

1958, pp. 7-15. (Austria and Central Europe, *Reticulitermes flavipes* in 1955 at Hallein, near Salzburg, in a paper factory, introduced in 1950 or 1951 in wooden boxes from Hamburg, where first found in 1937. In beech flooring, spruce and larch doorposts, by 1957 spread to other buildings and railway sleepers.)

KUSHWAHA, K. S., 1960, pp. 39-40. (India, Udaipur (Rajasthan), type of damage by *Odontotermes* (*O.*) *obesus, O.* (*O.*) *obesus gurdaspurensis, O.* (*O.*) *bangalorensis, Microtermes anandi,* and *Trinervitermes biformis;* hosts.)

LUPPOVA, A. N., 1955a, pp. 1-28. (S.S.R., Turkmenia, termites injuring buildings and their control.)

MAL'KO, B. D., 1934, pp. 34-35. (U.S.S.R., termites pest of wood.)

MARTÍNEZ, J. B., 1957, pp. 147-161. (Canary Islands.)

MATHIEU, H., 1957, pp. 87-91. (Hazard in France.)

1959, pp. 1-92. (Hazard in France.)

MATHUR, R. N., 1960a, pp. 374-380. (India, most important termites damaging houses, *Coptotermes heimi, Heterotermes indicola, Odontotermes feae,* type of damage.)

MERCADER, C., 1956, pp. 11, 37. (Destroyer, the termite.)

MEYER, M. T., 1960, p. 52. (U.S., Philadelphia, Pa., 100-year-old row house had window frame on second floor infested, no ground contact.)

MONEO-TRALLERO, M., 1959, pp. 21-22. (Spain.)

MOUTIA, L. A., 1955, pp. 48-51. (Mauritius, household.)

NOVAK, P., 1928. (Yugoslavia, Dalmatia, injurious insects.)

ROONWAL, M. L., 1955, pp. 103-104. (*Heterotermes indicola* causing widespread damage in town Sri Hargobindpur in Punjab since 1940.)

1958, pp. 320-321. (India, damage to buildings.)

1959, pp. 511-523. (India, *Coptotermes heimi* one of the three most important termites that infest buildings in India.)

RUI, D., 1956, pp. 1-2. (Italy, Venice.)

SALMOND, K. F., 1956, pp. 149-150. (Damage by Macrotermitinae in Nyasaland to stored groundnuts.)

SCHMIDT, H. (Ed.), 1955, pp. 193-207. (Commercial timber.)

1955a, pp. 222-224. (Wood products.)

1955b, pp. 1-309. (World.)

1956b, pp. 325-338. (Hamburg–Altona.)

1957, pp. 217-222. (*Reticulitermes,* Hamburg.)

SCHULTZE-DEWITZ, G., 1957, pp. 933-941. (*Populus* and *Pseudotsuga menziesii.*)

SILVA, J. M. BARATA DA, 1952. (Portugal, Lisbon. *Leucotermes* (*Reticulitermes*) *lucifugus.*)

SIMEONE, J. B., 1956, pp. 1-3. (U.S., New York State, map danger zones.)

SIMS, L., 1957, pp. 312, 322-323.

SKAIFE, S. H., 1957, pp. 373-390. (South Africa, Durban, *Kalotermes durbanensis.*)

SPENCER, G. J., 1958, pp. 8-9. (British Columbia, damage to buildings by *Zootermopsis* and *Reticulitermes hesperus,* collapse of two houses due to *Reticulitermes* at Kamloops and Kelowna.)

SPRINGHETTI, A., 1957, pp. 1-13. (Italy, Padova, Venezia, Oriago, Mira.)

1957a, pp. 1-14. (Italy, Verona, Vicenza, Treviso, Ravigo.)

TENISONAS, A., 1955, pp. 13-15. (Europe.)

TSVETKOVA, V. P., 1950, pp. 95-96. (Russia, construction.)

TU, T., 1956, pp. 12-18. (Formosa.)

1956a, pp. 19-22. (Formosa, important documents.)

U.S. DEPT. AGRICULTURE, PLANT PEST CONTROL DIV., COOP. ECON. INSECT REP., 1959a, p. 74. (Iran, *Amitermes vilis,* heavy damage to house timbers and railroad ties, Khuzistan Prov.; *Anacanthotermes vagans septentrionalis* does not cause extensive damage.)

WEIDNER, H., 1954, pp. 55-61. (*Reticulitermes,* Germany, Hamburg.)

WILKINSON, W., 1957a, pp. 493-494. (World.)

DAMAGE TO LIVING VEGETATION

ANONYMOUS, 1955a, pp. 63-67. (Malaya, *Coptotermes curvignathus* damage to new plantings rubber.)

1958h, pp. 66. (Australia, Canberra, in hardwood forests presence of large colony *Coptotermes frenchi* results in increased temperature within infested tree, maximum increase in "nursery" region.)

1958o, p. 63. (Australia, Canberra, *Coptotermes acinaciformis* and *frenchi* most injurious to living trees. *Porotermes adamsoni* to trees in alpine forest in Victoria and New South Wales.)

1959s, p. 66. (Western Australia, in mallee country north of Murchison River, *Coptotermes brunneus* attacking living eucalyptus trees in forest, galleries extending over 90 ft. from mound. Near Pingrup, *Coptotermes acinaciformis* traced from mound to several gimlet gums (*Eucalyptus salubris*).)

AYOUB, M. A., 1959, pp. 429-432. (Saudi Arabia, *Microcerotermes diversus,* injury to live plants.)

BHASIN, G. D., ROONWAL, M. L., and SINGH, B., 1958, pp. 10, 17, 18, 63, 86, 95, 99, 102, 115, 124. (India, forest plants, p. 10, in split bamboos, *Termes feae;* p. 17, *Bassia latifolia, Odontotermes obesus,* under bark on dry stump; p. 18, *Bassia longifolia, Kalotermes* sp., possibly in green trees, *Coptotermes ceylonicus* damages living trees; p. 63, tea, *Glyptotermes dilatatus* nests in heartwood green bushes, infests through roots, *Neotermes greeni* same, *N. militaris* same; *Capritermes hutsoni* among roots, *Eurytermes ceylonicus* damages stems and roots, *Nasutitermes ceylonicus* damages bark living stems; *Odontotermes* (*O.*) *horni* same; *O.* (*O.*) *redemanni* damages living and dead bushes, *O.* (*O.*) *taprobanes* same; *O.* (*Hypotermes*) *obscuriceps* same; p. 86, *Cassia multijuga, Neotermes greeni,* borer in living trees; p. 95, *Casuarina equisetifolia, Glyptotermes dilatatus* nests in heartwood living trees, infests through snags, knots or wounds, *Neotermes greeni* same, *N. militaris* same; *Odontotermes brunneus* var. *wallonensis* injurious in plantations; p. 99, *Cedrela toona, Glyptotermes coordensis* in solid wood old logs; *G. dilatatus* nests in heartwood living trees, infests through snags, knots, wounds, *Kalotermes jepsoni* infests both dead and live wood, *Neotermes greeni* same; *N. militaris* same, *Heterotermes indicola* damages wood and wooden structures; p. 102, *Cedrus deodara, Archotermopsis wroughtoni* nests in fallen trees and moist, decaying stumps, *Microtermes mycophagus* damages wood or sleepers stacked on ground, *Odontotermes bangalorensis* same; p. 115, *Cistanche tubulosa, Amitermes belli* in roots; p. 124, *Citrus* sp., *Odontotermes obesus* attacks fallen wood.)

BONAVENTURA, G., 1956, pp. 465-467. (Italy, Naples, plane tree of "San Benedetto.")

CAPCO, S. R., 1956, pp. 9, 17, 32, 44, 51, 53, 55, 56, 64, 66. (Philippines, field crops, fruit trees, vegetables.)

CHATTERJI, S., SARUP, P., and CHOPRA, S. C., 1958, pp. 399-405. (India, dieldrin, DDT and BHC mixture (50:50) superior to DDT and toxaphene mixture (50:50), 5, 10, 15, and 20 lb. per acre applied to soil once before planting.)

COATON, W. G. H., 1958, pp. 1-112. (South Africa, hodotermitid harvester termites, veld, standing crops, wheat, oats, rye, barley, groundnuts, beans, peas, lawns, flowerbeds, etc.)

1960, pp. 6-9. (South Africa, Rapid Karoo, destruction of grazing by harvester termites, *Hodotermes mossambicus.*)

COHIC, F., 1956, pp. 1-91. (New Caledonia, (1) alphabetical list plants, insect pests in various orders, pp. 1-32; (2) alphabetical list pest, order and family, plant hosts or prey, hosts of parasites.)

DAS, G. M., 1958, pp. 553-560. (Northeast India, tea.)

1959, p. 8. (Northeast India, tea, *Microcerotermes,* live wood eater.)

DAVIS, S. H., 1954, pp. 35-43. (U.S., termite-proofing injuries to shade trees and shrubs.)

DINTHER, J. B. M. VAN, 1960, p. 21. (Surinam, 3 families termites pests of cultivated plants.)

DUMBLETON, L. J., 1954, pp. 1-202. (South Pacific Territories.)

EBELING, W., 1959, pp. 155, 224, 263, 266, 267, 270-272, 274, 277. (Citrus pests—*Amitermes arizonensis, Coptotermes lacteus, niger, vastator, Gnathamitermes perplexus, Heterotermes aureus, Kalotermes minor, Macrotermes gilvus, Mastotermes darwiniensis, Nasutitermes costalis, Neotermes castaneus, Odontotermes* (*O.*) *formosanus, Paraneotermes simplicicornis, Reticulitermes flavipes, hesperus, lucifugus, virginicus, Zootermopsis angusticollis, Schedorhinotermes lamanianus, Tenuirostritermes incisus;* p. 317, avocado pests—*Reticulitermes hesperus, Kalotermes minor;* p. 325, grape pests.)

EDEN, T., 1958, pp. 40, 130-131. (Pests of tea, low planting and heaping earth about stem leads to infestation; *Kalotermes* sp. rings collar.)

ESSIG, E. O., 1958, pp. 112-119. (Western U.S., apple tree, potato.)

FERRERO, F., 1959, pp. 30-31. (France, vine in Banyuls in eastern Pyrenees severely injured by *Calotermes flavicollis.*)

FONSECA, J. P. DA, 1952-1954, pp. 13-19. (Brazil, *Syntermes* harmful to Eucalyptus seedlings.)

GARCIA, M. L., 1958, pp. 25-27. (Philippines, *Neotermes malatensis* injuring avocado trees.)

GAY, F. J., 1957, pp. 86-91. (Australia, radiata pine timber in plantations by *Coptotermes.*)

GREAVES, T., 1959, pp. 114-120. (Australia, *Porotermes adamsoni* most serious pest alpine forests in New South Wales, Tasmania, and Victoria. *Coptotermes acinaciformis* and *frenchi* serious pests trees in coastal forests and savannah woodland areas. Former can attack other living trees 120 ft. distant from infested living tree, mature colony population over 770,000; latter over 400,000. Temperature colonies in living trees (nursery area) higher (by over 20° C.) than ambient temperature. 170 species in 23 genera on Australian mainland.)

GUAGLIUMI, P., 1958, p. 218. (Venezuela, sugarcane by *Heterotermes crinitus.*)

GUPTA, B. D., 1955, pp. 1-80. (India, sugarcane.)

HARRIS, W. V., 1959, pp. 1-181. (British Honduras, forest trees, *Kalotermes tabogae, Cryptotermes brevis, Heterotermes convexinotatus, Coptotermes niger, Nasutitermes corniger, N. nigriceps.*)

1959b, p. 30. (British Honduras, *Coptotermes niger* causes serious damage to timber trees.)

HERFS, A., 1955a, *in* Schmidt, H. (Ed.), 1955b, pp. 131-159. (Plants.)

1959, pp. 148-150. (India, grains and field crops—sugarcane, peanuts injured. *Neotermes tectonae* kills living trees.)

HETRICK, L. A., 1961, pp. 53-54. (U.S., Florida, *Kalotermes approximatus* injures pear and cherry trees, causing breakage.)

HICKIN, N., 1960, pp. 459-461. (France, *Kalotermes flavicollis, Reticulitermes lucifugus,* and *R. lucifugus,* var. *santonensis; flavicollis* injures vineyards, cuts life vine stock from 80 to 40 years; *santonensis* more injurious to buildings and trees than *lucifugus.*)

HUFF, G. E., 1959, p. 61. (U.S., Indianapolis, Ind., subterranean termites damage refrigerated display case, moisture in bottom due to leak.)

JANJUA, N. A., and KHAN, M. H., 1955, pp. 69-70. (West Pakistan, *Termes obesus* and *Microtermes obesi* pests of wheat.)

KALSHOVEN, L. G. E., 1957, pp. 7-12. (Java, teak trees, rotten branches in crowns living trees more attractive to flying adults than branchwood from girdled trees, enter by biting hole in soft wood.)

1959, pp. 138-143. (Java, new teak plantations, 30% infested in 12-year-old compartment, not evident until 15 to 20 years old.)

KAPUR, A. P., 1953, pp. 12-13. (India, *Odontotermes obesus,* nursery beds of palas, host for lac cultivation.)

KAY, D., 1960, p. 90. (Africa, Nigeria, *Neotermes aburiensis* damaging living tissue cacao trees.)

LATIF, A., and JILANI, S. G., 1957, pp. 11-12. (Pakistan, injury to chillies.)

LE PELLEY, R. H. (Compiler), 1959, pp. 62-66. (East Africa, injury to plants by many species termites, distribution, hosts, etc.)

MAMET, J. R., 1955, pp. 46, 47, 74, 79. (Mauritius, food plants.)

MAROTTA, A., 1954, pp. 337-338. (Italy, *Reticulitermes lucifugus* death of plants.)

MARTELLI, M., and ARRU, G. M., 1957-1958, pp. 5-49. (Sardinia, *Calotermes flavicollis,* injury to cork oak, *Quercus suber.*)

MATHUR, R. N., and SINGH, B., 1960, pp. 1-45. (India and adjacent countries, termites injurious to forest plants, pp. 7, 10-11, 15-17, 29, 33, 36.)

1959, pp. 1-163. (India and adjacent countries, termites injurious to forest plants, pp. 13, 19, 26, 61, 68-70, 79-80, 84-85, 89, 92-94, 99, 103, 120, 123, 126, 141, 150, 153.)

1960a, pp. 1-91. (India and adjacent countries, termites as pest of forest plants.)

MILSUM, J. N., 1959, pp. 425-428. (World, termites as pests of mango, *Mangifera indica.*)

MOUTIA, L. A., 1955, pp. 48-51. (Mauritius, orchards, food crops, vegetables, flower gardens.)

NAKAJIMA, S., and SHIMIZU, K., 1959, pp. 261-266. (Formosan white ant injuring Japanese cedars.)

NEVES, C. M. B., 1956, pp. 156-158. (Portugal, cork of bark and branches *Quercus suber* damaged by *Leucotermes lucifugus.*)

NIRULA, K. K., and MENON, K. P. V., 1957, pp. 1-5. (India, *Odontotermes obesus* damage to coconut palms.)

OSSOWSKI, L. L. J., and WORTMANN, G. B., 1958-1959, p. 47. (Southern Africa, injury to wattle by *Hodotermes mossambicus, Macrotermes natalensis,* and *Microtermes* sp.)

PEARSON, E. O., and MAXWELL-DARLING, R. C., 1958, pp. 61-63. (Tropical Africa, *Hodotermes mossambicus* pest of cotton seedlings. Mound-building termites affect soil fertility; subterranean termites attack cotton. *Microtermes* sp. serious in Tanganyika, attacks stem near collar, loss 10 to 30% of stand.)

PIERCE, W. D., 1930, pp. 99-104. (Philippines, *Macrotermes gilvus* injury to seed sugarcane, in ground; *Coptotermes vastator* and *Microcerotermes los-banosensis* injury to young cane.)

ROONWAL, M. L., 1958, pp. 320-321. (India, damage to plantations.)

ROONWAL, M. L., and BHASIN, G. D., 1954, pp. 5-93. (India, forest plants.)

ROONWAL, M. L., and SEN-SARMA, P. K., 1955, pp. 234-239. (India, *Neotermes gardneri* injury to living trees.)

RUI, D., 1956, pp. 1-2. (Italy, Venice.)

SASTRY, K. S. S., 1956, pp. 77-83. (India, Visvesvaraya Canal Tract, *Odontotermes obesus* injury to sugarcane.)

SPRINGHETTI, A., 1957c, pp. 1-20. (Italy, Manduria (Puglia), infestation of vines.)

SRIVASTAVA, J. C., 1957, p. 743. (India, sugarcane.)

SZENT-IVANY, J. J. H., 1956, pp. 82-87. (*Microcerotermes biroi* on *Cocos nucifera,* New Britain; *Nasutitermes novarum-hebridarum* on *Cocos nucifera,* Aroa Island; *Neotermes* sp. on *Theobroma cacao,* New Britain.)

1959, pp. 423-429. (Papua and New Guinea, p. 423, *Coptotermes hyaloapex,* hosts.)

THAKUR, C., PRASAD, A. R., and SINGH, R. P., 1958, pp. 155-163. (India, *Microtermes obesi, Odontotermes assmuthi* and *Trinervitermes heimi* injury to sugarcane.)

U.S. DEPT. AGRIC., PEST CONTROL DIV., 1959b, p. 922. (U.S., California, Vallejo, Solano County, *Reticulitermes hesperus* damage to roots and stems chrysanthemum plants, Sept. 25.)

1960, p. 1069. (Bolivia, Santa Cruz, *Heterotermes* sp., *Cornitermes* sp., *Nasutitermes globiceps* injuring sugarcane.)

VANCE, A. M., 1956, pp. 10, 18, 24. (Southwestern U.S., injury to lawns.)

VAYSSIÈRE, P., *in* Coste, 1955, p. 241. (World, injury to coffee plantations.)

WEIDNER, H., 1955c, *in* Schmidt, H. (Ed.), 1955b, pp. 160-164. (Plants.)

WILKINSON, W., 1957a, pp. 493-494. (World crops.)

WOLFENBERGER, D. O., 1958, pp. 36-38, figs. 26-27. (U.S., Florida, *Neotermes castaneus* (dampwood termite) usually causes infrequent minor loss to avocado trees, but may cause young trees to die and older trees to become unthrifty.)

ZONDAG, R., 1959, pp. 15-17. (New Zealand, *Calotermes brouni* attacking living *Pinus radiata,* unhygienic conditions provide sources infestations, stumps, prunings, dead trees.)

DETECTION

ANONYMOUS, 1959, pp. 17-19. (U.S.)
CASIMIR, M., 1957, pp. 68-78. (Australia.)
GUNDERSON, H., 1957, pp. 1-8. (U.S., Iowa.)
HARRIS, W. V., 1958, pp. 161-166. (East Africa, drywood termites, *Cryptotermes.*)
HOBBS, K. R., 1961, pp. 14, 16, 18. (U.S., a key to help identify wood-destroying organisms. Subterranean termites: earth in galleries in wood; drywood termites: small conical pellets with longitudinal riflings; dampwood termites: larger pellets.)
MASON, N. P., 1958, p. 18. (U.S., by putty-colored tubes.)
NEW SOUTH WALES DEPT. AGRIC., ENTOMOLOGICAL BRANCH, 1958, pp. 1-19. (Australia.)
PEPPER, J. O., and GESELL, S. G., 1959, pp. 1-8. (U.S., Pennsylvania, detection and control.)
SIMEONE, J. B., 1956, pp. 1-3. (U.S., New York State, tubes, flight, damage.)

DIGESTION

GRASSÉ, P. P., 1959a, pp. 385-389. (Africa, a new type of symbiosis, digestion by fungus-growing termites, through collaboration bacteria, illustrates strata of mastigated wood on which fungi grow, Macrotermitinae.)
LASKER, R., 1959, *in* Ray, 1959, pp. 348-355. (Reviews studies of symbiosis among termites by Oshima, 1919, Cleveland, 1924, 1925, 1928, Trager, 1932, and Hungate, 1946.)
LEOPOLD, B., 1952, p. 784. (Digestion Douglas-fir wood by *Cryptotermes brevis* takes a few hours.)
McBEE, R. H., 1959, *in* Ray (Ed.), 1959, pp. 342-347. (Termite cellulase, Cleveland found intestinal protozoa in species of Kalotermitidae, Rhinotermitidae, and Mastotermitidae, in Termitidae no protozoa except in 3 wood-feeding species. Most flagellates symbionts. Not all protozoa beneficial. *Trichonympha* most effective in wood digesting. A few cellulose-digesting bacteria and fungi in gut not significant. Protozoa cellulose fermenting, may be 16 to 36% of weight of termite.)
PENCE, R. J., 1957, pp. 44, 58. (U.S., California, stucco and cement.)
POCHON, J., BARJAC, H. DE, and ROCHE, A., 1958, pp. 352-355. (Africa, digestion of cellulose by *Sphaerotermes sphaerothorax* through bacteria.)
WATERHOUSE, D. F., HACKMAN, R. H., and McKELLAR, J. W., 1961, pp. 96-112 (Australia, extracts whole termites (*Coptotermes lacteus*), break down undenatured chitin.)

DISTRIBUTION

AHMAD, M., 1955, pp. 25-27. (East Pakistan, *Microtermes pakistanicus*, n. sp.)
1955a, pp. 202-264. (West Pakistan, new species of *Neotermes, Microcerotermes, Eremotermes, Amitermes, Angulitermes.*)
1958, pp. 33-118. (Indomalayan.)
1958a, pp. 119-198. (Indomalayan.)
ANONYMOUS, 1957l, p. 22. (U.S.S.R., Moscow.)
1957q, pp. 1-70. (Italy, Venice, *Reticulitermes lucifugus, Calotermes flavicollis.*)
1958m, p. 42. (U.S., *Reticulitermes hagemi* swarming in building, Trenton, N.J.)
1958o, p. 63. (Australia, *Mastotermes darwiniensis* not present in Weipa area of Cape York Peninsula, results survey termite hazard.)
1959, pp. 17-19. (U.S., map showing where termites most and least numerous.)
ARAUJO, R. L., 1958, pp. 185-217. (Biogeography termites State of São Paulo, Brazil, faunistic list 45 species, including 2 introduced species, only 3 species confined within its boundaries.)
1958a, pp. 219-236. (Biogeography termites State of Minas Gerais, Brazil, faunistic list 31 species, only 2 species confined within its boundaries.)
AYOUB, M. A., 1959, pp. 429-432. (Saudi Arabia, *Microcerotermes diversus.*)
BANERJEE, B., 1956b, pp. 204-206. (India, Calcutta.)
BIEBERDORF, G. A., 1958, pp. 52-53. (U.S., Oklahoma.)
CALABY, J. H., 1956, pp. 89-92. (Western Australia.)
1956a, pp. 93-96. (Western Australia.)
1956b, pp. 111-124. (Western Australia, *Ahamitermes.*)
CALABY, J. H., and GAY, F. J., 1956, pp. 19-39. (Western Australia, *Coptotermes*

acinaciformis, raffrayi subsp., *michaelseni, frenchi,* and *brunneus.*)

CHAMBERLIN, R. V., 1944, p. 187. (New Hebrides, *Kalotermes* (*Neotermes*) *sanctaecrucis.*)

CHAUDHRY, G. U., 1955, pp. 40-43. (Pakistan, *Cryptotermes dudleyi, Odontotermes assamenensis, O. parvidens,* and *Eremotermes paradoxalis.*)

CHILSON, L. M., 1960, p. 171. (Hawaii, Molokai, *Kalotermes immigrans,* Camp Halena, light trap, new record.)

CLAGG, C. F., 1958, pp. 338-339. (Western Pacific Islands, *Prorhinotermes inopinatus,* Guam; *Coptotermes formosanus,* Guam, Midway, Kwajalein Naval Stat., Marshall Islands.)

COATON, W. G. H., 1958, pp. 1-112. (South Africa, *Hodotermes mossambicus, Microhodotermes viator.*)

CUFODONTIS, G., 1955, pp. 501-519. (Africa, savannahs.)

DAVLETSHINA, A. G., and BOGOLYUBOVA, A. S., 1960. (U.S.S.R., termites in Golodnaya Steppe and how to control them.)

EMERSON, A. E., 1958, *in* Weyer (Ed.), 1958, pp. 2798-2807.

ESAKI, T., BRYAN, E. H., JR., and GRESSITT, J. L., 1955, pp. 1-68. (Micronesia.)

FIELD, H., 1956, p. 488. (Baghdad, Iraq, *Microcerotermes diversus.*)

FONSECA, J. P. C. DA, 1959, pp. 701-704. (Portuguese Guinea, lists species identified by Sjöstedt, Silvestri, and Harris, 16 species.)

GEORGHIOU, G. P., 1957, p. 4. (Cyprus, *Reticulitermes lucifugus.*)

GHIDINI, G. M., 1955, pp. 69-82. (Ethiopia, Sagan-Omo, *Bellicositermes jeanneli goliath* distinguishing characters, *Microtermes vadschaggae* var. *grasséi,* n.n. for var. *dubius* Grassé preoc., fig. *Termes* (*Cyclotermes*) *maledictus* and *Trinervitermes eldirensis.*)

GIRALDI, G., 1955, pp. 487-498. (Italy, Venice, *Reticulitermes lucifugus.*)

GRASSÉ, P., 1954, pp. 17-21. (France.)

HARRIS, W. V., 1954-1955a, p. 44. (Europe, *Reticulitermes flavipes* and *R. lucifugus* var. *santonensis.*)

1955, pp. 62-72.

1955a, pp. 12-13. (Australia.)

1955b, pp. 1-6. (British Commonwealth.)

1956a, pp. 926-937. (Africa, French Cameroons, *Microcerotermes progrediens, Pericapritermes amplignathus,* n. sp., *Odontotermes silvaticus,* n. sp.)

1957, *in* Gardner, J. C. M., 1957, p. 46. (East African forest termites.)

1957a, pp. 421-433. (Southwest Arabia, new species *Amitermes stephensoni, A. harleyi, Eremotermes sabaeus,* and *Trinervitermes arabiae.*)

1957b, pp. 25-30. (Solomon Islands, Rennell Island, 10 species in Solomon Islands.)

1957c, pp. 20-32. (Malaya.)

1958, pp. 161-166. (East Africa, *Cryptotermes dudleyi, domesticus,* and *brevis.*)

1958a, pp. 59-60. (Solomon Islands, *Schedorhinotermes browni,* n. sp.)

1958b, pp. 87-97. (Malaya.)

1959, pp. 181-185. (British Honduras, *Coptotermes niger, Heterotermes convexinotatus, Nasutitermes corniger, N. nigriceps, Kalotermes tabogae, Cryptotermes brevis.*)

HARRIS, W. V., and BROWN, E. S., 1958, pp. 737-750. (Solomon Islands, 12 species listed.)

HRDÝ, I., 1958, p. 12. (Czechoslovakia.)

IKEHARA, S., 1957, pp. 44-61. (Ryukyu Islands.)

IONESCU, M. A., 1932, pp. 108-113. (Rumania.)

1936. (Rumania, frequence of *Reticulitermes lucifugus.*)

1936a, pp. 1-7. (Rumania, *Reticulitermes lucifugus.*)

1951, pp. 1-22. (Rumania.)

1959, p. 109. (Rumania, *Reticulitermes lucifugus, Kalotermes flavicollis,* map distribution in Balkans, *R. lucifugus* in Balkans has northern limit above Trieste, Belgrade, Bucharest to Kichinev and the Dniester River, *K. flavicollis* known along Adriatic coast near the Vardar River and above Turkey near eastern shore Black Sea.)

KALSHOVEN, L. G. E., 1960, pp. 34-40. (Java and Sumatra, occurrence of *Glyptotermes* and *Neotermes.*)

KARAMAN, Z., 1954, pp. 21-30. (Yugoslavia, *Kalotermes flavicollis* and *Reticulitermes lucifugus.*)

KASSAB, A., CHAARAWI, A. M., HASSAN, M. I., and SHAHWAN, A. M., 1960, pp. 1-91. (Egypt, *Anacanthotermes ochraceus, Psammotermes fuscofemoralis* and *astuanensis.*)

KEMPNY, P., 1905. (Rumania, Neuropteroid fauna.)

KHALAF, K. T., 1959, pp. 18-19. (Iraq, *Microcerotermes diversus, Amitermes vilis, Anacanthotermes* sp.)

KHAN, M. A., and AHMAD, M., 1954, p. 140. (Pakistan, Lahore, list termites.)

KRAUSS, N., 1957, p. 186. (Canton Island, *Coptotermes formosanus.*)

KUSHWAHA, K. S., 1960, pp. 39-40. (India, Udaipur (Rajasthan), *Odontotermes* (*O.*) *obesus; O.* (*O.*) *obesus gurdaspurensis; O.* (*O.*) *bangalorensis; Microtermes anandi; Trinervitermes biformis.*)

LE PELLEY, R. H. (Compiler), 1959, pp. 62-66. (East Africa, list termite and hosts 111 species.)

LUPPOVA, A. N., 1955, pp. 56-66. (U.S.S.R., Turkmenia, *Anacanthotermes ahngerianus.*)

1958, pp. 81-141. (S.S.R., Turkmenia, termites of.)

MARTELLI, M., and ARRU, C. M., 1957-1958, p. 11. (Sardinia, *Calotermes flavicollis.*)

MARTÍNEZ, J. B., 1956, pp. 102-117. (Spain, *Reticulitermes lucifugus, Calotermes flavicollis,* and *C. dispar.*)

MATHUR, R. N., and SEN-SARMA, P. K., 1960a, pp. 23-27. (India, Dehra Dun, *Capritermes dunensis, Eremotermes dehraduni, Microcerotermes beesoni, Microtermes anandi, M. unicolor, Neotermes megaoculatus, N. microculatus, Nasutitermes thanensis.*)

MILLER, D., 1956, pp. 477-478. (New Zealand.)

MOSZKOWSKI, L. I., 1955, pp. 15-41. (Madagascar, *Cryptotermes kirbi,* n. sp., and *C. havilandi,* introduced.)

NOVAK, G. B., 1890, pp. 119-128. (Yugoslavia, fauna of the Island of Lesina in Dalmatia.)

PAULIAN, R., 1957, p. 29. (Madagascar, Réunion Island, *Neotermes reunionensis, Procryptotermes* n. sp., and *Coptotermes havilandensis.*)

PETERSEN, E., 1910. (Rumania, additions to the knowledge of the Neuropterous fauna.)

PIERRE, F., 1958, p. 149. (Africa, NW. Sahara, *Psammotermes hybostoma* in sand.)

ROEMHILD, G., 1960, pp. 1-7. (U.S., Montana.)

ROONWAL, M. L., 1959, pp. 511-523. (India, *Coptotermes heimi,* India and Punjab, West Pakistan.)

1960, pp. 211-215. (India, Burma, Ceylon, Nepal, and East and West Pakistan have 170 species termites, probably 250 exist.)

RUI, D., 1956, pp. 1-2. (Italy, Venice, *Reticulitermes lucifugus.*)

SANDS, W. A., 1959, pp. 127-156. (Ethiopian region, *Amitermes,* 13 species, 3 new.)

SEN-SARMA, P. K., and MATHUR, R. N., 1957, p. 399. (India, *Cryptotermes dudleyi.*)

SILVA, J. M. BARTA DA, 1952, (Portugal, *Leucotermes* (*Reticulitermes*) *lucifugus.*)

SIMEONE, J. B., 1956, pp. 1-3. (U.S., New York State.)

SIMS, L., 1957, pp. 312, 322-323. (U.S.)

SKAIFE, S. H., 1957, pp. 373-390. (South Africa, *Kalotermes durbanensis.*)

SNYDER, T. E., 1955g, pp. 28, 30. (Northward, U.S.)

1956d, pp. 189-202. (Puerto Rico.)

1957h, p. 70. (France and Italy.)

1957i, pp. 1-16. (U.S., Europe.)

1959a, p. 40. (U.S., *Reticulitermes hageni* to New Jersey; *R. virginicus* to Long Island, New York; *R. lucifugus* northward in France and Italy.)

SNYDER, T. E., and FRANCIA, F. C., 1961, in press. (Philippines.)

SPENCER, G. J., 1958, pp. 8-9. (British Columbia, *Zootermopsis* on west coast Vancouver Island, around Victoria, at Nanaimo on mainland coast from international border to Prince Rupert, around Salmon Arm and Revelstoke, perhaps to Quesnal Lake. *Reticulitermes hesperus* in dry belt from Osoyoos up the Okanagan Valley to Kelowna, Kamloops, and from Lytton to Lillooet, on Vancouver Island on the eastern dry side from Victoria to Nanaimo and on some of the gulf islands.)

STELLA, E., 1953-1954, *in* Zavattari (Ed.), 1953-1954, p. 229. (Italy, Pontine Island, Zannone.)

SUEHIRO, A., 1960, p. 291. (Midway Atoll, *Coptotermes formosanus* and *Cryptotermes brevis* (Keck, 1952, Proc. Hawaiian Ent. Soc., vol. 14, p. 351.)

SZENT-IVANY, J. J. H., 1956, pp. 82-87. (*Microcerotermes biroi* on *Cocos nucifera* in New Britain and center distribution in Papua; *Nasutitermes novarum-hebridarum* on *Cocos nucifera* Aroa Island near Kieta, Bougainville district; *Neotermes* sp. on *Theobroma cacao,* New Britain, p. 83.)

1959, p. 423. (Papua, New Guinea, *Coptotermes hyaloapex.*)

TU, T., 1955, pp. 30-39. (China.)

1955a, pp. 80-87. (Formosa.)

1956, pp. 12-18. (Formosa.)

U.S. DEPT. AGRIC., PEST CONTROL DIV., 1957, p. 853. (U.S., Texas, *Reticulitermes hageni.*)

1958, p. 119. (U.S., *Reticulitermes flavipes* infesting buildings, St. Paul, Minn.)

1958a, p. 982. (U.S., *Reticulitermes flavipes,* St. Paul, Minn.; *R. hesperus* flying week of Nov. 23, Corvallis, Oreg.)

1959, p. 6, (U.S., Trenton, N.J., *Reticulitermes hageni.*)
1959a, p. 74. (Iran, *Amitermes vilis, Anacanthotermes vagans septentrionalis.*)
1959b, p. 239. (U.S., Oklahoma, Tulsa, *Reticulitermes hageni* swarming early Mar. in house; Ponca City, *R. tibialis* damage to house.)
1959c, p. 288. (U.S., Utah, infestation houses Pleasant Grove, Provo, Logan.)
1959d, p. 362. (U.S. infestation houses Monongalia County, W. Va., *Reticulitermes flavipes;* Twin Falls, Idaho, *R. hesperus;* Oregon, central and eastern, *R. hesperus.*)
1959e, p. 393. (U.S., Idaho, swarms in houses, *Reticulitermes hesperus,* Lewiston to Lapwai.)
1959f, p. 473. (*Cryptotermes dudleyi,* Neotropical, Indo-Malayan, Papuan, Australian, Ethiopian.)
1960, p. 1069. (Bolivia, Santa Cruz, *Heterotermes* sp., *Cornitermes* sp., *Nasutitermes globiceps.*)
1961, p. 326. (Superior, Douglas Co., Wis., *Reticulitermes flavipes* flying in building.)
1961a, p. 392. (*Rhynchotermes nasutissimus* intercepted from Peru.)

USMAN, S., and PUTTARUDRAIAH, M., 1955, pp. 10-11. (India, Mysore State.)

VAYSSIÈRE, P., *in* Coste, 1955, p. 241. (World.)
1957, pp. 473-480. (Malaya.)

WEIDNER, R. H., 1955c, pp. 157-164. (Southwest Europe.)
1955e, *in* Schmidt, H. (Ed.), 1955b, pp. 5-81. (World.)
1958, pp. 4-16. (Iraq.)
1959, pp. 28, 32-33. (Yugoslavia, Greece, Corfu.)
1960, pp. 30-39. (East Africa, 1 Rhinotermitidae, 6 Macrotermitidae, 3 Termitidae, Termitinae—all known species.)
1960a, pp. 43-70. (Afghanistan, Iran, Irak, map for *Anacanthotermes vagans, ahngerianus, baeckmannianus, murgabicus, septentrionalis, ubachi, macrocephalus, Heterotermes indicola, Amitermes vilis, Microcerotermes gabrielis* and *Angulitermes dehraensis.*)

WERNER, F., 1920, pp. 189-234. (Yugoslavia, Dalmatia, studies of the fauna.)

WILLCOCKS, E. C., and BAHGAT, S., 1937, p. 217. (Egypt, termites in arid border between desert and arid land, *Anacanthotermes ochraceus* (Burm.) and *Psammotermes hybostoma* Desn.)

WILLIAMS, E. C., 1941, pp. 76, 92. (Panama rain forest.)

ZIMMERMAN, E. C., 1957, p. 179. (Hawaii, corrections and additions.)

EMBRYOLOGY

GEIGY, R., and STRIEBEL, H., 1959, p. 474. (Europe, *Kalotermes flavicollis.*)

OBENBERGER, J., 1952, pp. 1-869.

STRIEBEL, H., 1960, pp. 193-260. (Development of *Kalotermes flavicollis; Zootermopsis nevadensis* described.)

EVOLUTION

BARROS-MACHADO, A., 1957, pp. 80-81. (Architecture and evolution of African *Apicotermes* nests.)

DESNEUX, J., 1956, pp. 1-12. (Africa, Congo, *Apicotermes lamani,* atypical subterranean nests.)
1956b, pp. 277-281. (Africa, Lower Congo, *Apicotermes.*)

EMERSON, A. E., 1958a, *in* Roe and Simpson (Ed.), 1958, pp. 311-355. (Intraspecies group system prime unit, group unit of natural selection leading to adaptive evolution, behavior emphasized in group integration, social behavior in insects genetically determined, in man culturally.)
1959b, pp. 1416-1417. (Data substantiate many aspects theory recapitulation and evidence for long persistence of genetic elements.)
1960c, pp. 307-348. (Evolution of function directed toward ends can be demonstrated; modern biological analysis and synthesis give some understanding of the teleonomic processes.)
1960d, pp. 1-27. (Adaptive evolution progresses in improved individual, social, and ecological homeostasis. Phylogenetic persistence for millions of years of functionless characters explained on basis of homologies resulting from a degree of molecular identity in replicating genes.)

GRASSÉ, P. P., and NOIROT, C., 1957, pp. 974-979. (Equatorial Africa, giant termitaria.)

LÜSCHER, M., 1958c, pp. 48-65. (Evolution termite society.)

SCHMIDT, R. S., 1958, pp. 76-94. (Africa, *Apicotermes trägårdhi,* evolution of nest building, most primitive lack wall perforations, shagreen, internal arrangement cellular.)

EXPERIMENTATION

ALIBERT, J., 1959, pp. 1040-1042. France, study of trophallactic exchanges in *Calotermes flavicollis* with the aid of radioactive phosphorous.)

BRIEGLEB, P. H., 1954, pp. 73-76. (Resistant wire insulation, soil poisons.)

DICK, W. E., 1957, pp. 1-150. (Tag underground insects with radioactive cobalt—cobalt-60—pick up with Geiger counter. Wood borers in wood treated by radiation dosage 1000 curies cobalt 60—Nucleonics, Dec. 1952.)

EBELING, W., and PENCE, R. J., 1957a, pp. 637-638. (Sodium pentachlorophenate and pentachlorophenol relax termites to lifelike appearance but turn them black.)

GÖSSWALD, K., 1955, *in* Schmidt, H. (Ed.), 1955b, pp. 165-192. (*Calotermes flavicollis* as an experimental animal.)

1958, pp. 129-151. (Effect of Thiodan on *Kalotermes flavicollis.*)

GÖSSWALD, K., and KLOFT, W., 1959, pp. 268-278. (*Kalotermes flavicollis* 5th instar larvae and "Pseudoergates" good test animals, after molt larvae do not feed for 4 days; 30 larvae for 21-day test. Textile pulled into metal frame projector slide, termites gnaw through materials otherwise resistant, if covered with thin perforated film of termite-proof material.)

GRASSÉ, P. P., 1956, *in* Autori, 1956, pp. 561-575. (Termite experiments, same instinct triggers building and feeding.)

HRDÝ, I., NOVÁK, V. J. A., and ŠKROBAL, D., 1960, pp. 172-174. (Czechoslovakia, influence of the honeybee queen inhibitory substance on the development of supplementary reproductives in *Kalotermes flavicollis.*)

KLEE, O., 1958, p. 20. (Germany, toxic effect of Thiodan on termites under different temperatures and humidities.)

LÜSCHER, M., 1958, pp. 69-70. (*Kalotermes flavicollis,* implantation corpora allata active in determination molting supplementary reproductives.)

LÜSCHER, M., and KARLSON, P., 1958, pp. 341-345. (Classification of prothoracic gland hormone as a growth and differentiation hormone questionable.)

PENCE, R. J., 1957a, pp. 91-95. (Fluorescent differentiation of internal organs and tissues, *Reticulitermes hesperus, Kalotermes minor,* and *Zootermopsis angusticollis* studied with ultraviolet radiation, adipose tissue, not chitin, fluoresced.)

SEBALD, M., and MELLIS, Y. DE, 1958, pp. 357-360. (France, *Spherophorus,* n. sp., sulphite-reducing bacteria from intestine French termite injected in vein rabbit, toxic or allergenic, not infectious.)

SKAIFE, S. H., 1955, pp. 1-134. (South Africa, *Amitermes atlanticus,* nails inserted into mound nest to measure rate of growth, nest 2 ft. high 25 to 50 years old.)

1957, pp. 373, 390. (South Africa, *Kalotermes durbanensis,* effects temperature on protozoa, prefers newsprint.)

SPRINGHETTI, A., 1959, pp. 1-4. (Italy, mortality of *C. flavicollis* and *R. lucifugus* treated with diverse saline solutions.)

SPRINGHETTI, A., and FRIZZI, G., 1957, pp. 395-396. (Italy, *Kalotermes flavicollis,* transplantation of endocrine organs.)

VERRON, H., 1957, pp. 25-30. (France, *Calotermes flavicollis,* olfaction takes a part in reciprocal attraction between different individuals and density of grouping, no difference in responses between sexes.)

1958, pp. 309-314. (France, *Calotermes flavicollis,* olfaction attraction produced by last instar nymphs on larvae, nymphs with short wing pads, and neoteinics increases regularly with importance of crowding. Different types of individuals (soldiers excepted) do not react to last instar nymphs as well as they do to larvae. Soldiers exhibit a higher level of response toward nymphs, react in same way toward 10 nymphs or 20 larvae.)

WYBOURN, J., 1958, pp. 171-172. (Reactions *Zootermopsis angusticollis* to variation in light and temperature.)

FLIGHT

CLAGG, C. F., 1958, pp. 338-339. (*Coptotermes formosanus* flights Apr. 23, June 1957, Guam, Midway.

CLÉMENT, G., 1956, pp. 98-103. (*Anacanthotermes ochraceus*, Centres de Recherches, Béni-Abbès, Algeria, behavior workers, flights Jan. 31, May 10, humidity, temperature.

COATON, W. G. H., 1958, pp. 1-112. (South Africa, *Hodotermes mossambicus* after rains Dec. to Feb., *Microhodotermes viator*, Aug. to Dec.)

GLICK, P. A., 1960, p. 5. (U.S., Louisiana, Mississippi, Arkansas, at 200 ft. elevation *Reticulitermes virginicus* collected by airplane.)

ROONWAL, M. L., 1958a, pp. 77-100. (India, *Neotermes bosei* flights from end Feb. to beginning July.)

SKAIFE, S. H., 1955, pp. 1-134. (South Africa, *Amitermes atlanticus*, after rains at the Cape, late Apr. or early May, 11 a.m. or 3 to 4 p.m., not all leave in first flight, 50 to 60 yd., small percentage survive predators.)

SPENCER, G. J., 1957, p. 13. (British Columbia, *Zootermopsis angusticollis* Aug. 1, 1956, 150 to 200 ft., normally 300 to 500 ft. above ground, eaten by Bonaparte's gulls.)

TANG, C., and LI SHEN, 1959, pp. 477-482. China, Hangchow, forecasting swarming *Reticulitermes flaviceps;* swarming usually mid-Mar. after spring rain, temperature and atmospheric pressure factors; sunny warm days, noon to 2 p.m. One swarm lasts 10 min. from small colony; in large, several swarms over successive favorable days.)

U.S. DEPT. AGRIC., PLANT PEST CONTROL DIV., 1959, p. 813. (*Reticulitermes flavipes* unseasonal swarm Providence, Rhode Island.)

VISHNOI, H. S., 1957, pp. 792-793. (India, Delhi, 7 species.)

WILLIAMS, R. M. C., 1959, pp. 203-218. (Africa, East Uganda, flight periods *Cubitermes ugandensis* and *C. testaceus*, wing shedding, calling attitude, tropisms, colony formation.)

FOLKLORE

ALPHONSE, E. S., 1957, p. 280. (Guaymi Indians, western Panama, victim bad dream put inside fence, heavy smoke caused by burning wood, termite nests, etc., to fumigate evil spirit.)

GUNTHER, J., 1953, pp. 291, 429, 680. (Africa, Bantu, dead buried in ant hills—the important individuals (p. 291); "One feature of the landscape, here (Jinja) as elsewhere in Uganda, is the procession of giant ant hills, which line the roads. They are jagged and craggy and often reach a height of 12 to 15 ft., towering like ugly sentinels; they are bright ocher red, and resemble mountain peaks in miniature. Oddly enough the *termites* or ants living in these fantastic structures contribute some form of chemical change to the earth, with the result that they make good as well as readily available material for road repair—earth harder and stickier than normal." (P. 429.) In Congo, on death a Bakutu is put into a termite hill, a simple procedure and quite sanitary. (P. 680.))

FOOD, TERMITES AS

ROONWAL, M. L., 1958a, pp. 77-1000. (India, food of some tribes in Assam.)

FOSSIL

BUCHSBAUM, R., 1938, p. 332, fig. (Winged termite in amber.)

EMERSON, A. E., 1958, *in* Weyer (Ed.), 1958, pp. 2798-2807. (In Age of Reptiles, evolved from roachlike ancestors. *Zootermopsis* and *Reticulitermes* confined to temperate regions, and fossils from Oligocene (Europe) and Miocene (Colorado) indicate these genera have been in temperate climates for at least 40 million years.)

FENTON, C. L., and FENTON, M. A., 1958, p. 247. (Winged termite in amber.)

HAUPT, H., 1956, pp. 22-30. (Eocene, Termitina, 3 n. spp. in 3 n. gen., *Idomasto-*

termes mysticus, Eotermes multivenosus, Architermes simplex, Geiseltales.)

HURD, P. D., JR., and SMITH, R. F., 1957, pp. 6-7. (Mexican amber same age (Oligocene) as Baltic amber and shale from Florissant, Colo.)

HURD, P. D., JR., SMITH, R. F., and USINGER, R. L., 1958, p. 851. (Mexican amber, Chiapas, Mexico, Oligocene and Miocene, possibly some Eocene.)

MARTYNOVA, O., 1961, pp. 285-294. (General, fossil insects, including termites in references.)

PIERCE, W. D., 1958, pp. 13-24. (U.S., California, Miocene, *Cryptotermes ryshkoffi, Parastylotermes calico, Reticulitermes laurae, R. tibialis dubitans, Gnathamitermes magnoculus rousei,* n. sp.)

1959, pp. 72-78. (U.S., California, Miocene arthropods including termites among the insects, p. 76.)

RIEK, E. F., 1952, pp. 15-22. (Tertiary, Dinmore, Queensland, Australia, ?Eocene, *Blattotermes neoxenus,* Mastotermitidae, *M. wheeleri* (of Tennessee) to *Blattotermes,* n. gen.)

SANDERSON, M. W., and FARR, T. H., 1960, p. 1313. (Oligocene amber from Dominican Republic first reported by Christopher Columbus, 1494-1496. In 1959 near Pedro Garcia amber contained insects in several orders including Isoptera. Lists amber deposits of world.)

SNYDER, T. E., 1960, pp. 493-494. (Mexican amber, Oligocene, *Kalotermes nigritus* and *Heterotermes primaevus,* n. sp., winged.)

WEIDNER, H., 1955d, pp. 55-74. (Amber, in Geological States Institute, Hamburg, Germany.)

1956, pp. 363-364. (Amber, pellets, uncertain, only in Pleistocene?)

FUMIGATION

ANONYMOUS, 1957f, pp. 39, 41. (Ethylene dibromide and methyl bromide as soil fumigants.)

1957o, p. 37. (U.S., Oklahoma, *Kalotermes minor* introduced, 150 lb. methyl bromide and 2,000 lb. tarpaulins to fumigate house.)

1957p, pp. 16, 18, 20, 30. (Ethylene dibromide fumigation under slabs.

1958g, pp. 8, 10. (U.S., California, Structural Pest Act of California. Fumigation, 19 items of instruction, precautions, etc.)

1959k, p. 34. (U.S., Houston, Tex., large wooden drydock and pier infested by *Coptotermes crassus* fumigated with 20,000 lb. methyl bromide released into 3½ million cu. ft. of space tightly covered with plastic sheeting weighted on ends and dropped below water level, 24 to 48 hr. period for dock sections.)

1960i, pp. 60, 62. (U.S., Houston, Tex., successful fumigation with methyl bromide under tarps of large floating drydock infested by tropical *Coptotermes crassus* by Admiral Pest Control Co., of Bellflower, Calif.; fans were used for better circulation.)

1960n, pp. 50-51, 56. (U.S., equipment directory.)

BEECHEM, H. A., 1955, pp. 36, 50. (Methyl bromide left in applicator near lethal dosage for 20 min. in auto, operator recovered.)

BESS, H. A., and OTA, A. K., 1960, pp. 503-510. (Hawaii, *Cryptotermes brevis* infesting buildings, methyl bromide 2.5 lb. per 1,000 cu. ft. for 15 hr. effective within 23 of 24 buildings; mortality in exposed wooden block cages in 18 buildings varied from 10 to 100%. Sulfuryl fluoride at 2 lb. per 1,000 cu. ft. for 1.5 hr. killed all termites in blocks. Ethylene dibromide at 2 to 3 lb. per 1,000 cu. ft. for 24 hr. failed. Also gas failed in 2 out of 5 buildings. Sulfuryl fluoride in 8 buildings far superior to methyl bromide, also reduces exposure time. Methyl bromide far superior to ethylene dibromide.)

FORDE, E. L., 1958, pp. 18, 20. (Hawaii, *Cryptotermes brevis?,* methyl bromide under Fumiseal tents.)

GÖSSWALD, K., 1958, pp. 129-151. (Effect of carburetted hydrogen gas on *Calotermes flavicollis.*)

GRAY, H. E., 1960, pp. 43-46. (U.S., Vikane, sulfuryl fluoride, nonflammable, nonexplosive, noncorrosive, no objectionable odor or color, volatile, superior penetration, released from cylinders outside building; use fan for dispersion, 2 lb. per 1,000 cu. ft., at 55° F. and above, for 12 to 24 hr., aerate for 4 hr., fans for aeration, special detection devices. Fumigation for drywood termites as well as subterranean.)

HASSLER, K., 1960, pp. 36, 38, 40, 42. (U.S., ethylene dibromide greater penetrating power, dosage on 5 ft. centers 0.6 pt. per hole=3 gal. liquid per 1,000 sq. ft.; greater precautions required with lethal

gases—do not wear gloves, keep skin dry, use halide lamp; 15% solution in petroleum solvent with flash point 350°, 3 pt. per hole.

HENDERSON, L. S., 1958, pp. 14, 16. (U.S., Div. Stored Product Insect Investigations in 1954 transferred to Marketing Research Div., Agricultural Marketing Service. Fumigation: measuring gas concentrations during fumigation and correction; use plastic film as tarpaulins.)

HILL, R. L., 1958, pp. 271-272. (Fumigation techniques, control *Cryptotermes dudleyi.*)

KENAGA, E. E., 1957, pp. 1-6. (Sulfuryl fluoride, no odor, nonflammable, 75.8 oz. per 1,000 cu. ft.)

LANCE, W. D., 1958, pp. 9-10. (U.S., fumigation committee, Pest Control Operators California, proposed specifications, sealing, sampling gas (methyl bromide), injection hoses, circulation by fans, application, dosage, general provisions.)

1960, p. 6. (U.S., Houston, Tex., in fumigating floating drydock infested with *Coptotermes crassus,* termites will not eat water-soaked timber, usually stay above waterline, hence gas effective, penetrates wood.)

MONRO, H. A. U., 1960, pp. 1-13. (General, modern fumigants for control of pests; the more important fumigants; treatments, residues, and tolerances; resistance; precautions.)

PADGET, L. J., 1960, pp. 11-14. (U.S., Houston, Tex., program for eradication of *Coptotermes crassus,* a subterranean termite new to the U.S., at Todd Shipyards by fumigation with methyl bromide.)

SHAW, H. R., 1959, p. 13. (Panama, fumigation residence against drywood termites, use of tarpaulin.)

STEWART, D., 1957, pp. 7-11. (Sulfuryl fluoride, *Kalotermes minor,* California, not as toxic as methyl bromide to humans; only ⅓ lb. per 1,000 cu. ft. Vegetation killed, heavier than air; used above 45° F., forced circulation gas, no odor, nonflammable.)

THORNHILL, F., 1955, pp. 16, 18. (Drywood termites.)

YOUNG, T. R., 1955, pp. 45-46. (U.S., inexpensive heat-exchanger for methyl bromide drywood termite fumigation.)

FUNGI, ASSOCIATION WITH

ANONYMOUS, 1960h, p. 65. (U.S., A. E. Lund (Koppers Co.) finds that a number of unidentified wood-destroying fungi may be antagonistic to subterranean termites, fungus *Lentinus lepideus* has definite influence.)

BREADY, J. K., 1960, pp. 43-44. (U.S., studies 3 kinds microorganisms that interfere with termite diet. Methods for eliminating protozoa, fungi, and bacteria, the last-named with antibiotics.)

LUND, A. E., 1959a, pp. 320-321. (U.S., subterranean termites and fungi, mutualism or environmental association.)

1960, pp. 26-28. (U.S., presence of fungi or bacteria for prolonged existence of subterranean termites not resolved. (*Reticulitermes* spp. capable of initiating attack on sound yellow pine sapwood.)

1960a, pp. 40, 42, 44. (U.S., studies relationship termites and fungi. *Reticulitermes flavipes* and *virginicus* capable of attacking sound yellow pine. Nutritional needs. Degrees compatibility specific wood-destroying fungi with termites in order of decreasing compatibility to *R. flavipes:* 1, *Poria incrassata;* 2, *Lenzites trabea, Polyporus versicolor;* 3, *Poria monticola;* 4, *Lentinus lepideus;* last has definite antagonistic influence.)

FUNGUS CULTIVATION

COATON, W. G. H., 1961, pp. 39-54. (Africa, Macrotermitinae, conidia of agaric *Termitomyces* fungi eaten by termites, symbiotic, fruiting bodies brought to surface.)

GRASSÉ, P. P., and NOIROT, C., 1957a, pp. 1845-1850. (Africa, Macrotermitinae.)

1958b, pp. 113-128. (Africa, Macrotermitinae, association with *Termitomyces,* construction of fungus garden.)

1958c, pp. 515-520. (Africa, Macrotermitinae, types nests.)

HESSE, P. R., 1957, pp. 104-108. (East Africa.)

KALSHOVEN, L. G. E., 1956a, pp. 455-461. (Java, *Macrotermes gilvus,* accumulations of finely cut vegetation in nests—wood particles, bark, leaves, grass, etc.)

ROONWAL, M. L., 1958a, pp. 77-100. (India, agaric in mounds *Odontotermes obesus,* pH combs acidic.)

SANDS, W. A., 1956a, pp. 531-536. (Africa, Kenya, Nairobi, *Odontotermes badius,* fungus comb maintains high humidity and heat, fungus only a parasite, not cultivated by the termites.)

GASEOUS ENVIRONMENT

Grassé, P. P., and Noirot, C., 1958a, pp. 1-28. (Behavior of termites with relation to atmosphere and air of nest and its renewal. Calotermitidae and Rhinotermitidae as well as humivorous African Termitidae (Apicotermitinae, Termitinae), except for *Anoplotermes*, do not need fresh air. Hodotermitidae, Macrotermitinae and Nasutitermitinae may go out to collect food, termitaria do not communicate directly with external air, no ventilation except by diffusion through walls. An undisturbed atmosphere necessary.)

Lüscher, M., 1955a, pp. 289-307. (Africa, Ivory Coast, Uganda, *Macrotermes natalensis*, mechanisms for a supply of oxygen for nests.)

1956a, pp. 273-276. (Africa, Ivory Coast, *Macrotermes natalensis*, air circulates in nest, heated in fungus combs in center, driven through channels downward through the wall, cooled air rises into nest again; in Uganda similar aeration system.)

Shimizu, K., 1959, pp. 267-271. (Formosa, expiration carbon dioxide.)

Skaife, S. H., 1955, pp. 1-134. (South Africa, *Amitermes atlanticus*, 15% CO_2 in nest.)

GENITALIA

Gelmetti-Bonomi, L., 1958, pp. 48-54. (*Calotermes flavicollis*, many anucleated spherules present in seminal vesicles resproductives, drops RNA (ribonucleic acid) trophic material for sperms.)

Noirot, C., 1958, pp. 557-559. (The appearance of heterologous gonoducts in the course of development of termites, cockroaches, and Orthoptera.)

Roonwal, M. L., 1955b, pp. 107-114. (External genitalia.)

In Tuxen (Ed.), 1956, pp. 34-38. (External.)

Snodgrass, R. E., 1957, p. 19. (Phallic organs greatly reduced.)

Weesner, F. M., 1955, pp. 323-345. (U.S., Arizona, *Tenuirostritermes tenuirostris*, internal, external, references to other publications on genitalia.)

GEOLOGIC AGENTS

Boyer, P., 1956, pp. 95-103. (Tropical Africa, action of termite structures on certain soils, *Bellicositermes natalensis*, *B. rex*, and *Thoracotermes brevinotus*.)

1956a, pp. 105-110. (Tropical Africa, *Bellicositermes natalensis*, the ingredients of the termitarium.)

De la Rüe, E. A., Bourlière, F., and Harroy, J. P., 1957, p. 151. (In Oubangui Chari, Africa, mounds of *Bellicositermes rex* 130 to 1,600 cu. yd. in volume, bring up clay from lateritic stratum, upward transport of clay. In savannas in Guinea, influence flora and fauna soils by mining. Their mass per unit surface area is equal to one-half entire microfauna, earthworms excepted.)

Robinson, J. B. D., 1958, pp. 58-65. (Africa, Kenya coffee fields, *Odontotermes badius* activities in soil decrease length effective mulch life, termite soil material has higher percent calcium plus magnesium and higher pH value than topsoil or subsoil.)

Shipman, R. F., 1958, pp. 23-24. (Africa, Rhodesia, anthills in sandy soils a valuable asset.)

HUMIDITY

Ernst, E., 1956, pp. 229-231. (In laboratory, reaction of termites to humidity, *Nasutitermes* 1 hr., *Kalotermes* and *Reticulitermes* 72 to 48 hr., *Zootermopsis* 3 to 6 hr.; receptors on antennae.)

1957, pp. 97-156. (Influence of humidity on duration of life and behavior of termites. *Kalotermes flavicollis* reacts in 3 days, *Reticulitermes lucifugus* in 2 days, *Zootermopsis nevadensis* in 5 to 6 hr., *Nasutitermes arborum* in 1 hr.)

Pence, R. J., 1957b, pp. 28-30. (*Reticulitermes hesperus* in laboratory, optimum moisture 97.5%.)

Skaife, S. H., 1955, pp. 1-134. (South Africa, *Amitermes atlanticus* seek humid atmosphere in artificial nest, shun dry part, where calcium chloride has absorbed water vapor.)

INTRODUCED

ANONYMOUS, 1958j, p. 86. (U.S., Florida, *Nasutitermes nigriceps* (Hald.) winged in dead orchid pseudopods at Miami, Dade County.)

DORWARD, K., 1956, p. 57. (U.S., Houston, Tex., *Coptotermes crassus* in dry dock, control by burning.)

FULLAWAY, D. T., and KRAUSS, N. L. H., 1945, pp. 21-23. (Hawaii, *Cryptotermes* present since 1904, *Coptotermes* since 1913.)

HARRIS, W. V., 1955e, pp. 366-367. (*Zootermopsis angusticollis* in Douglas fir from western Canada to England.)

1955f, pp. 36-37. (*Kalotermes jouteli* in lignum vitae lumber from Santo Domingo; *Zootermopsis angusticollis* in Douglas fir from North America to England.)

HEISTERBERG, W., 1959, pp. 142-143. (Austria, introduction and radical eradication possibility.)

HICKIN, N., 1957, p. 23. (East Africa, *Cryptotermes brevis* from West Indies.)

1961, pp. 26-27. (England, colony of *Cryptotermes brevis* Walk., from Port-of-Spain, Trinidad; 5th known record of accidental importation; found in gramophone when household goods unpacked.)

KURIR, VON A., 1958, pp. 1-15. (*Reticulitermes flavipes* introduced to Hallein (Salzburg) Austria—47.5° north latitude—in 1955, by way of Vienna, from Hamburg, Germany, in wooden boxes.)

1958a, pp. 84-87. (More data on above.)

MOSZKOWSKI, L. I., 1955, pp. 15-41. (*Cryptotermes kirbyi* n. sp., from Madagascar and *C. havilandi* from Africa and introduced into Madagascar, India, and South America.)

SCHMIDT, H., 1958, pp. 226-228. (Europe, experiences with introduced termites.)

SNYDER, T. E., 1957, p. 30. (Danger of introduction of subterranean termites in ships.)

1957c, p. 92. (Danger of introduction of subterranean termites in ships.)

1959, p. 6. (U.S., Houston, Tex., *Coptotermes*, introduced, spread from drydock to waterfront structures, *Kalotermes nigritus* in logs from Guatemala, intercepted at San Francisco, Calif.)

U.S. DEPT. AGRIC., PLANT PEST CONTROL DIV., 1957, p. 651. (U.S., *Kalotermes minor* infesting building in Oklahoma.)

WICHMANN, H. E., 1957, pp. 183-185. (Circumstances of importation of termites in families Kalotermitidae, Rhinotermitidae, and Termitidae, observations on *Zootermopsis angusticollis* and *Reticulitermes flavipes*.)

LEGISLATION

ANONYMOUS, 1960r, p. 1. (U.S., California, Assembly Bill 1930, financial responsibility law holds operator in amount of $25,000 for personal or bodily injury and $25,000 for property damage, minimum cost under $100 per year; law does not limit liability to $25,000, suit can be brought for greater amounts.)

BRUER, H. L., 1960, pp. 66, 68, 70-72. (U.S., Tennessee, inadequate financing, personnel, operations stifle enforcement termite laws. PCO's required to pay for own regulation, trained personnel impossible to employ at salaries offered, minimum standards become maximum, routine inspections necessary. Violations due to ignorance, arrogance, fraudulent intent. Cost enforcement $25,000 per year at start, now higher.)

CONCIENNE, E. A., 1959, pp. 40, 44. (U.S., Louisiana, either university degree in entomology or 4 years' experience working for state license holder. $2,000 surety bond posted, renewed yearly, report number jobs, pay $3 (reduced from $5) for each job, pays for inspection termite jobs.)

DU CHANOIS, F. R., 1960, pp. 37-39. (U.S., Florida, Structural Pest Control Act of 1959 strengthens Structural Pest Control Commission, liberalizes provisions of law favoring the industry; latter encouraged to become self-regulating; industry services based on applied entomology, indebted to entomology for its origin and present stature.)

1960a, p. 84. (U.S., Florida, commissions for structural pest control composed of nonindustry members more effective, wood treating should be licensed, large amount of preserved lumber in existing structures goes under guise of nonstructural pest control.)

HOAG, R., 1959, pp. 3-5, 9. (U.S., California, discussion new rules and regulations Structural Pest Control Board, and suggestions from industry for changes.)

LEWIS, J. W., 1960, pp. 6-7. (U.S., New York, Buffalo, since 1944 law binding pest control operators flouted by nonlicensed workers without complying with the ordinance.)

NELSON, J. A., 1960a, pp. 6-7. (U.S., list States which license pest control operators: Alabama, Arkansas, California, Connecticut, Florida, Georgia, Kansas, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, Tennessee—13 States in all. Cities in other States with such laws: District of Columbia; Cincinnati, Cleveland and Columbus, Ohio; New York City; Pasadena, Calif.; San Antonio, Houston, and La Porte, Tex.; 9 such cities, not a complete list.)

NORTH CAROLINA STRUCTURAL PEST CONTROL COMMISSION, 1960, pp. 5-6. (U.S., North Carolina, heptachlor approved as soil poison for termite control.)

PENN, L. A., 1960, p. 7. (U.S., Wisconsin, Milwaukee, exterminators who work with poisons and fumigants require license.)

PEST CONTROL OPERATORS CALIFORNIA, 1953, pp. 1-11. (U.S., California, explanation terms accepted standards; inspection reports; good practice; recommendations.)

PLUMMER, J. M., 1960, p. 6. (U.S., Texas, Galveston and La Marque have city ordinance regulating pest control.)

POPHAM, W. L., 1960, pp. 4-7, *in* U.S. Dept. Agric., ARS Publ. 20-9, 1960. (U.S., functions Dept. Agric. and Dept. Health, Education, and Welfare in regulation pesticides.)

ROBINSON, M. C., 1960, p. 6. (U.S., Arizona, Maricopa County, requires license for pest control operators in Phoenix and other cities in county.)

SHEBOYGAN, CITY OF, 1957, p. 1. (U.S., to control spread of termites and provide protection of buildings, any structure, post, wooden article or building or part thereof infested with termites declared public nuisance; after inspection, public nuisances must be abated on advice provided by Building Inspection Dept. or the work done and costs charged against property as special tax, 146.14 (5) Wisconsin Statutes. No soil, fill, or building shall be moved without prior inspection—cost $1, violation forfeiture of $100 plus costs prosecution, or imprisonment for 30 days in county jail.)

STRUCTURAL PEST CONTROL BOARD CALIFORNIA, 1953, pp. 1-26. (U.S., amendments on licenses, examinations, and fraud structural pest control act of California.)

TAYLOR, A. F., 1960, p. 7. (U.S., Texas, Pasadena, new ordinance passed for regulation pest control operators.)

MEDICINE, USES IN

ANONYMOUS, 1957c, p. 5. (Panama, medicine is the supreme secret among the Guaymi Indians, according to Rev. Ephrain S. Alphonse, Wesleyan Methodist missionary. Certain sores, like those of yaws, are smoked. A hole is dug in the ground, the nest of a colony of wood termites is broken and put in, and a fire is set. This gives off a heavy smoke which rises for hours. An affected leg is held over this smoke for a whole day while the patient lies prostrate. The cure, Mr. Alphonse says, usually works so far as the sore is concerned.)

MORPHOLOGY

BANERJEE, B., 1958, pp. 56-57. (India, *Odontotermes redemanni*, changes in cellular morphology oocytes, at different stages of development, in ovaries mature queen.)

BARTH, R., 1955, pp. 257-263. (Brazil, *Syntermes dirus*, tergite glandular areas.)

ERNST, E., 1959, pp. 289-295. (Observations on the nasus in *Nasutitermes* soldiers.)

GELMETTI-BONOMI, L., 1958, pp. 48-54. (*Calotermes flavicollis*, many anucleated spherules present in seminal vesicles and reproductives as drops of RNA (ribonucleic acid) represent trophic material for sperms.)

GUPTA, S. D., in press. (India, primitive termite *Anacanthotermes macrocephalus*.)

JUCCI, C., 1959, pp. 16-28. (In the Mastotermitidae and Calotermitidae the tentorial gland occupies an extracephalic position as in the Blattidae, an ancestral condition. It probably originated in the thorax.)

KUSHWAHA, K. S., 1955, pp. 203-204. (India, *Odontotermes obesus*, external morphology soldier.)

1959, pp. 298-299. (India, *Odontotermes obesus*, external morphology worker and alate.)

1959a, pp. 415-417. (India, *Odontotermes obesus,* chaetotaxy soldier, worker, alate.)

McMAHAN, E. A., 1960, pp. 270-272. (Hawaii, external sex characteristics *Cryptotermes brevis* and *Kalotermes immigrans,* sterna and styles differentiate sexes.)

MORGAN, F. D., 1959, pp. 155-195. (New Zealand, *Stolotermes ruficeps,* external morphology.)

MOSCONI, P. B., 1958, pp. 77-90. (Study tentorial glands, "corpora allata," and neurosecretory cells *Mastotermes darwiniensis,* close affinity with Blattoidea. Glands composed of two parts, one in head, one in neck, structurally different. Neurosecretory cells with variable dimension in brain, in subesophageal and prothoracic ganglion.)

1958a, pp. 129-139. (*Zootermopsis angusticollis* in nymphal stage endocrine system studied. Neurosecretory cells in protocerebrum and in ganglia ventral chain. Corpora allata have round form and small or large cells, with uniform character. Tentorial (prothoracic) gland shows extracephalic part much greater than retrocerebral one. Cells very chromophilous, in intracellular spaces small black granules, perhaps a Gomori-positive material.)

MUKERJI, D., and BANERJEE, B., 1955, pp. 289-290. (India, *Odontotermes redemanni,* mouthparts.)

NOIROT, C., and KOVOOR, J., 1958, pp. 439-471. (Africa, Termitinae, study digestive tract 19 of 22 genera. From anatomical variations, two types tracts correspond to two lines evolution. Under *Thoracotermes* type: *Apilitermes, Crenetermes, Megagnathotermes, Orthotermes, Basidentitermes Fastigitermes, Probositermes, Cubitermes, Procubitermes, Noditermes, Tuberculitermes, Ophiotermes,* and *Euchilotermes;* the gizzard is simple, the enteric valve is complex, a blind diverticulum is present on second pouch of hindgut. Among *Termes* and allied *Pericapritermes, Capritermes,* and *Promirotermes,* the internal wall gizzard is covered with longitudinal folds, as in lower termites, simpler enteric valve, second pouch hindgut without blind diverticulum. *Ceratotermes* classification difficult.)

OBENBERGER, J., 1952, pp. 1-869. (Anatomy and morphology.)

RICHARD, G., 1956, pp. 487-489. (France, *Calotermes flavicollis,* nerves and tracheae.)

ROONWAL, M. L., and CHHOTANI, O. B., 1960, pp. 125-132. (Tibial spur formula for *Coptotermes* 3:2:2 based on study 32 world species.)

SCHMIDT, H., 1956a, pp. 115-125. (Nourishment organs and biology.)

1959, pp. 79-86. (Nourishment organs and biology of nutrition, grinding, and predigestion. Importance of proventriculus in *Macrotermes natalensis* different Basically gizzard consists of 12 chewing plates, thickened chitinized projections of the inner cuticular layer of the foregut, different in each species and provided with teeth and ridges. Gizzard activated by muscles. Opposed chewing plates have grinding effect and break up solid food (wood) into food (mechanical predigestion). Padlike lobes ("wing folds") reaching from the chewing plates into the cardiac valve press back the chewed food into the crop. Important proventriculus "social feeding organ," food ground and fed growing larvae as a brei rich in carbohydrates.)

SPRINGHETTI, A., 1957b, pp. 333-349. (Italy, *Kalotermes flavicollis,* tentorial glands (ventral, prothoracic) and corpora allata.)

VISHNOI, H. S., 1956, pp. 1-18. (India, *Odontotermes obesus,* structure, musculature, and mechanism of feeding apparatus of various castes.)

1956a, pp. 45-46. (India, *Odontotermes obesus,* cephalic musculature.)

WEIDNER, H., 1955e, *in* Schmidt, H. (Ed.), 1955b, pp. 5-81. (Body structure.)

ZUBERI, H. A., 1959, pp. 288-291. (Africa, architecture of brain *Ancistrotermes latinotus* and *A. crucifer* figured.)

1959a, pp. 3341-3343. (Africa, *Trinervitermes tchadensis* structure of brain in relation to polymorphism, brains minor and major soldiers and workers discussed.)

1960, pp. 3506-3508. (Palearctic, structure of brain of *Anacanthotermes ochraceus,* a primitive harvester termite; differences in brains castes.)

NESTS

AUBREVILLE, A., 1959, pp. 21-24. (Africa, Ghana, termitaria aligned on savanna and in brush on plains.)

BANERJEE, B., 1956, p. 742. (India, *Odontotermes redemanni,* mounds.)

Barros-Machado, A., 1957, pp. 80-81. (Architecture and evolution of African *Apicotermes* nests.)

Boyer, P., 1956, pp. 95-103. (Africa, tropical, action of termitaria on certain soils, *Bellicositermes natalensis, B. rex. Thoracotermes brevinotus.*)

1956a, pp. 105-110. (Africa, tropical, the ingredients of the termitarium of *Bellicositermes natalensis.*)

Coaton, W. G. H., 1958, pp. 1-112. (South Africa, *Hodotermes mossambicus* and *Microhodotermes viator* mounds, soil dumps, nest system.)

De la Rüe, E. A., Bourlière, F., and Harroy, J. P., 1957, pp. 27, 48, 100, 127, 139, 148, 151. (Tropics, tree nests in Panama, mushroom-shaped nests West Africa, magnetic nests *Amitermes meridionalis,* Australia; in savannas in Guinea their mass per unit surface area is equal to one-half entire microfauna, earthworms excepted; eat humus. Influence flora and fauna soils by mining, mounds *Bellicositermes rex* 130 to 1,600 cu. yd. in volume, bring up clay from lateritic stratum, upward transport of clay.)

Desneux, J., 1956, pp. 1-12. (Africa, atypical subterranean nests *Apicotermes lamani.*)

1956a, pp. 92-97. (Africa, *Apicotermes rimulifex* nests.)

1956b, pp. 277-281. (Africa, *Apicotermes lamani,* atypical subterranean nests.)

1958, pp. 281-285. (Africa, *Apicotermes arquieri* double nests.)

1959, pp. 286-292. (Africa, *Apicotermes rimulifex* nest Belgian Congo, ancestral type related to *A. arquieri* and *occultus* while *holmgreni* and *trägårdhi* are still more primitive in morphology and behavior with nests without pores in walls.)

Emerson, A. E., 1956, pp. 248-258. (Regeneration nest structures, ventilation mechanisms, homeostasis of nests.)

Fonseca, J. P. C. da, 1959a, pp. 705-719. (Portuguese Guinea, nests in landscape, various types figured.)

Grassé, P. P., 1958, pp. 189-200. (Brazil, São Paulo, *Cornitermes cumulans,* subterranean nest transformed later into mound nest 1.60 m. high, base diameter 0.95, queen moves about in nest.)

Grassé, P. P., and Noirot, C., 1948, pp. 869-871. (Africa, the climatization of the nest by its inhabitants and the transportation of water.)

1957, pp. 974-979. (French Equatorial Africa, giant mounds.)

1958c, pp. 515-520. (Africa, 3 types nest, *Odontotermes, Bellicositermes, Sphaerotermes,* etc., with and without paraécie, habitacle, exoécie, or large canals to exterior not communicating with nest proper; habitacle, where population assembles and true royal cell; paraécie, open space isolates habitacle. Nests of soil chiefly clay cemented with saliva, royal cell, macerated vegetation in fungus garden. *Sphaerotermes* royal cell constructed of excrement, no fungus garden, absence of partition of habitacle.)

Harris, W. V., 1954-1955, p. 35. (Africa, Angola, *Apicotermes* nests.)

1956, pp. 261-268. (Eastern Africa, mound building.)

Harris, W. V., and Brown, E. S., 1958, pp. 737-750. (Solomon Islands.)

Hartwig, E. K., 1956, pp. 629-639. (Africa, *Trinervitermes,* population distribution in nests.)

Jongen, P., and Oosten, M. van, 1956, p. 247. (Africa, Ubangi soil of a mound nest.)

Kalshoven, L. G. E., 1956, pp. 269-272. (Java, *Macrotermes gilvus,* inner structure mounds.)

Kevan, D. K. McE., 1956, pp. 498-499. (SE. Ethiopia, Ogaden, massive termitaria.)

Leleup, N., 1955, pp. 374-375. (Africa, Belgian Congo.)

1960, pp. 197-206. (Africa, Belgian Congo, types nests described.)

Noirot, C., 1959, pp. 179-184. (Vietnam, nests *Macrotermes gilvus* common in paddy fields of Mekong plain, Cambodge, inundated several months of year, architecture nests compared with those of other regions; fungus gardens supply food reserves during floods.)

1959a, pp. 259-269. (Vietnam, Cambodge (Indochina), *Globitermes sulfureus* builds intricate nest, modified in rice marshland. Soil, excrement (ligneous), and wood fragments (cellulose) used in nest building, earth exterior, inner wall excrement, more internal regions replaced by vegetal material. Wood fragments for food reserve.)

Pathak, A. N., and Lehri, L. K., 1959, pp. 87-90. (India.)

Rand, A. L., and Brass, L. J., 1940, pp. 358. (New Guinea, Mabadauan savannas southern New Guinea very large pinnacled nests 3 ft. in height, characteristic feature, plate 33.)

SCHMIDT, R. S., 1955, pp. 344-356. (Africa, *Apicotermes* nests important ethological material.)

1955a, pp. 157-181. (Idem, evolution nest building.)

1958, pp. 76-94. (Africa, *Apicotermes trägårdhi*, evolution of nest-building, most primitive lack wall perforations, shagreen, internal arrangement cellular.)

SKAIFE, S. H., 1955, pp. 1-134. (South Africa, *Amitermes atlanticus* mound nests 2 ft. high, 25 to 50 years old.)

VISHNOI, H. S., 1955, pp. 143-144. (India, *Odontotermes obesus*, royal cell with unusually large openings.)

1955a, p. 291. (India, *Odontotermes obesus* mounds.)

WEIDNER, H., 1955a, pp. 201-207. (Africa, Angola, nest of *Apicotermes machodoensis*, n. sp.)

WEIDNER, H., *in* Schmidt, H. (Ed.), 1955b, pp. 82-120. (Nests, Tropics, phylogeny *Apicotermes* nests; nests in temperate regions, tubes.)

NUTRITION

ALIBERT, J., 1960, pp. 4205-4206. (France, *Kalotermes flavicollis* trophallactic exchanges between sexual and larvae in young and more aged colonies.)

BREADY, J. K., 1960, pp. 43-44. (U.S., studies 3 kinds microorganisms that interfere with termite diet. Methods eliminating protozoa, fungi, and bacteria—latter with antibiotics.)

GAY, F. J., GREAVES, T., HOLDAWAY, F. G., and WETHERLY, A. H., 1955, pp. 1-60. (Australia, food preferences.)

HENRY, T. R., 1958, p. 45. (Canal Zone, Panama, eat lead, thrive on arsenic.)

LUND, A. E., 1960a, pp. 40, 42, 44. (U.S., studies relationship termites and fungi. *Reticulitermes flavipes* and *virginicus* capable attacking sound yellow pine. Nutritional needs. Degrees compatibility specific fungi with termites, some have definite antagonistic influence.)

PENCE, R. J., 1956b, pp. 238-240. (*Reticulitermes hesperus* prefers black dyed wood.)

1957, pp. 44, 58. (Stucco and cement digested by *Reticulitermes hesperus*.)

SCHMIDT, H., 1956a, pp. 115-125. (Organs and biology nutrition.)

SKAIFE, S. H., 1955, pp. 1-134. (South Africa, *Amitermes atlanticus*, eat decayed stems plants, cow pats, decayed wood, 20,000 termites devour 500 times own volume in one year.)

1957, pp. 373-390. (South Africa, *Kalotermes durbanensis* prefers newsprint paper.)

TRACEY, M. V., and YOUATT, G., 1958, pp. 70-72. (Australia, cellulase and chitinase in two species of Australian termites.)

OBITUARY

ANONYMOUS, 1960f, p. 46. (Karl Hassler, 1898-1960.) (Fumigation to control termites in U.S.)

BULLOCK, T. H., 1947, pp. 483-484. (S. F. Light, 1886-1947.)

CONKLIN, E. G., 1951, pp. 433-434. (Harold Heath, 1868-1951.)

CRONIN, J. E., 1960, p. 25. (Hermann von Schrenk, 1873-1953.) (Experiments on soil poisons and wood preservatives.)

PEMBERTON, C. E., 1960, pp. 332-333. (Otto Hermann Swezey, 1869-1959.)

1960a, pp. 182-185. (Otto Hermann Swezey, 1869-1959.) (Notes on termites in Hawaii from 1914-1954.)

SNYDER, T. E., GRAF, J. E., and SMITH, M. R., 1961, pp. 68-73. (William M. Mann, 1886-1960.) (Collected termites on expedition to Tropics, described new termitophiles.)

SNYDER, T. E., WETMORE, A., and PORTER, B. A., (1959) 1960, pp. 1231-1232. (James Zetek, 1886-1959.) (Termite tests in the Canal Zone, Panama.)

PARASITES

BUCHLI, H., 1960, pp. 1320-1321. (France, ectoparasite *Antennopsis gallica* on *Reticulitermes lucifugus, santonensis*, out of 20 young colonies, 15 are dead 11 to 13 months after foundation.)

1960a, pp. 3365-3367. (Madagascar, *Antennopsis grassei* parasite on *Neotermes amplus, N. desneuxi*, and *Glyptotermes longiceps*, also on eggs.)

DIEUZEIDE, R., 1930, pp. 569-571. (North Africa, Tyroglyphid *Caloglyphus* with *Reticulitermes.*)

GALLO, F., 1955, pp. 134-142. (Italy, *Tyrolichus casei* parasitic mite attacking laboratory colonies *Kalotermes flavicollis* and *Reticulitermes flavipes.*)

OUDEMANS, A. C., 1928, p. 313. (Acarine, *Caloglyphus feytaudi,* n. sp., parasite of *Reticulitermes lucifugus,* North Africa and Spain.)

PÉREZ, C., 1908, p. 631. (France, *Duboscquia lezeri,* new microsporidian parasite of *Termes lucifugus.*)

SÉGUY, E., 1935, p. 181. (China, *Hylemyia cana,* Muscid, *Idia flavipennis,* Calliphorid, *Termes fukiensis*? nests, *Reticulitermes fukiensis.*)

1953, p. 9. (Morocco, Calliphoridae: *R choestus weissi,* Maroc saharien, ectop site *Hodotermes ochraceus.*)

1955, pp. 166-177. (Madagascar, Calliph *Rhynchomyia anterotes,* n. sp., parasit *Coarctotermes clepsydra;* records o other species associated with termites

SENIOR-WHITE, R., et al., 1940, pp. 188- 192-194, 197. (British India, Diptera, *bororhina bivittata* attracted to fre opened *Eutermes* mounds, also *Sto rhina luteigaster.* Calliphoridae: *Sto rhina discolor, Stomorhina lunata* neath termite infested cow dung, Te kheri, Nagpur, from white ants nest)

TOUMANOFF, C., and TOUMANOFF, T. C., 19 pp. 216-218. (France, epizootic due *Serratia marcescens, "Reticulotermes tonnensis."*)

PHYLOGENY

EMERSON, A. E., 1960, pp. 1-28. (Oriental, Malagasy, and Australian regions, phylogeny Nasutitermitinae, separate origin nasute soldier in two major branches; imago-worker mandibles valuable in taxonomy. Subfamily arose in Neotropical region; *Subulitermes* branch, paralleling *Nasutitermes* branch, had spread to all tropical regions by mid-Cretaceous time. No species from Papuan region. Imago-worker dentition trend toward prop tional enlargement apical teeth compar to first marginal tooth. Vestigial ma dibles of soldier have lost apical poi in *Subulitermes.*)

1960a, pp. 1-21. (Africa, phylogeny 4 n genera on *Subulitermes* branch Nasutit mitinae, from Belgian Congo.)

1960b, pp. 1-49. (Africa, Belgian Cong phylogeny 6 new genera Termitinae

PHYSIOLOGY

CLARK, E. W., and CRAIG, R., 1953, pp. 101-107. (U.S., calcium and magnesium content in the haemolymph of adult *Zootermopsis angusticollis.*)

GRÉGOIRE, C., 1957, p. 9. (Canal Zone, Panama, *Cryptotermes,* coagulation haemolymph pattern 1, inception of plasma in shape of islands of coagulation around hyaline hemocytes.)

HOWELL, D. E., 1960, pp. 12, 14, 16. (U.S., some chlorinated hydrocarbons, etc., may enter insect body in more than one way; oil solutions act more quickly than w ter, nervous system affected by DDT, et inhibition of enzymes by parathion, et organophosphates.)

JUCCI, C., 1958, pp. 475-479. (Italy, resistan of termites to insecticides.)

ROEDER, K. D. (Ed.), 1953, pp. 94, 130, 27 307, 323-324, 337-338, 344, 385, 482, 66 677, 697, 748, 751-753, 755, 757, 761, 76 768-770, 774-777, 779, 827, 853. (Termit physiology.)

POPULATION

DESNEUX, J., 1956, pp. 1-12. (Africa, *Apicotermes lamani,* coordination of collective work of workers in nest construction; atypical subterranean nests illustrated.)

HARTWIG, E. K., 1956, pp. 629-639. (Africa, population distribution *Trinervitermes* nests.)

HEINZELIN, J. DE, 1955, pp. 1-37. (Africa, tropical, termite populations.)

LÜSCHER, M., 1955a, pp. 289-307. (Africa Ivory Coast and Uganda, *Macroterme natalensis,* 2 million population larg mound.)

SKAIFE, S. H., 1955, pp. 1-134. (South Africa *Amitermes atlanticus,* 40,000 individuals in mound 12 in. high in winter, prob ably never exceeds 50,000.)

PREDATORS

ANONYMOUS, 1957e, p. 20. (U.S., Washington, D.C., Zoo, damage to photo file by termites, control by *Tamandua*.)

BEIER, M., 1930, pp. 44-48. (West Africa, pseudoscorpions, *Pilanus pilatus* and *pilifer* in termite nests.)

BRACKBILL, H., 1955, pp. 260-261, 282. (U.S., birds and termites, flying, species of *Reticulitermes*.)

CALABY, J. H., 1956a, pp. 93-96. (West Australia, food habits of *Myobatrachus gouldi*, white anteater.)

1960, pp. 79-80. (W. Australia, desert frogs feeding on termites.)

1960a, pp. 143-146. (SW. Australia, marsupial "numbat" (*Myrmecobius*) eats *Coptotermes acinaciformis*, lives in hollow eucalyptus logs—small banded anteater.)

1960b, pp. 183-207. (SW. Australia, marsupial numbat (*Myrmecobius f. fasciatus*) feeds on termites and ants.)

CHAMBERLIN, R. V., 1925, pp. 35-44. (Canal Zone, Panama, Barro Colorado Island, chilopods (centipedes) found with termites: *Cryptops zeteki* with *Mirotermes panamaensis*, *Cryptops* sp. with *Obtusitermes biformis*, *Physida nuda* with *Leucotermes tenuis*, *Cupipes ungulatus* with *Eutermes* sp., *Orphnaeus brevilabiatus* with *Nasutitermes columbicus* and *Anoplotermes parvus*, probably all predators.)

1926, p. 10. (Canal Zone, Panama, centipede *S.* (*Schendylotyn*) *integer* Chamberlin in nest of *Anoplotermes gracilis* Snyder.)

1944, p. 187. (New Hebrides, centipede *Mecistocephalus consocius*, n. sp., with *Kalotermes* (*Neotermes*) *sanctaecrucis*.)

DE LA RÜE, E. A., BOURLIÈRE, F., and HARROY, J. P., 1957, pp. 147, 151. (Tropics, in Africa ants *Megaponera* and *Pallothyreus;* in savannas anteaters, aardvark and pangolin.)

GREGG, R. E., 1958, pp. 111-121. (Madagascar, *Metapone madagascarica* and *emersoni*, ants in rotten wood with termites.)

GUIDO, A. S., and RUFFINELLI, A., 1958, p. 919. (Montevideo, predaceous wasp (*Cryptocheilis* sp.) paralyzes *Nasutitermes*.)

HENRY, T. R., 1958, pp. 21, 49. (*Tamandua;* snakes Typhlopidae and Glauconidae prey on termites, snakes eat eggs and young.)

HUNT, R., 1958, p. 58. (U.S., San Diego, Calif., dermestids *Trogoderma ornatum* scavengers on dead *Kalotermes minor*.)

KRANTZ, G. W., 1958, pp. 127-131. (U.S., Oregon, Diplogynid mite *Lobogyniella trägårdhi* associated with *Zootermopsis angusticollis*.)

MAIN, A. R., and CALABY, J. H., 1957, pp. 222-223. (NW. Australia, termites as food of frogs.)

ODHIAMBO, T. R., 1958, pp. 167-175. (Africa, Uganda, hemipteron, reduviid (*Acanthaspis petax*) in mounds.)

ROONWAL, M. L., 1958a, pp. 77-100. (India, rats in Assam, anteaters, lizards, birds.)

SKAIFE, S. H., 1955, pp. 1-134. (South Africa, *Amitermes atlanticus*, at time of swarm few survive predators, in nests red and white mites, solpugid.)

SPENCER, G. J., 1957, p. 13. (British Columbia, *Zootermopsis angusticollis* winged eaten by Bonaparte's gulls.)

VON PORAT, C. O., 1894, p. 25. (Cameroon, centipede in tunnels termite hills.)

WEIDNER, H., 1955a, pp. 201-207. (Africa, Angola, struggle between soldier *Pseudacanthotermes militaris* and soldier of a forest ant *Dorylus* (*Typhlopone*) *fulvus dentifrons*.)

1957, p. 109. (Germany, Hamburg, carabid larvae as enemy of termites, *Reticulitermes flavipes* preyed on by *Harpalus aeneus* and *Pterostichus vulgaris?*)

WERNER, F., 1935, p. 470. (Africa, Portuguese Guinea, whipless whipscorpion *Paracharon caecus* in termite nest.)

PROTOZOA

ANSARI, M. A. R., 1955, p. 62. (Pakistan, Lahore, Mastigophora: Retortamonidae, *Retortamonas termitis*, *Amitermes beaumonti*, Panama.)

CHAKRAVARTY, M. M., and BANERJEE, A. K., 1956, pp. 35-44. (India, holomastigotid and trichonymphid flagellates from an Indian *Heterotermes*.)

CLEVELAND, L. R., 1955, pp. 511-542. (U.S., hormone-induced sexual cycles of flagellates, unusual behavior of gametes and centrioles of *Barbulanympha*.)

1958, pp. 47-62. (U.S., factual analysis of chromosomal movement in *Barbulanympha*, depends on number and position of poles.)

1958a, pp. 63-68. (U.S., movement of chromosomes in *Spirotrichonympha* to centrioles instead of the ends of central spindles.)

1958b, pp. 105-115. (U.S., photographs of fertilization in the smaller species of *Trichonympha*.)

1958c, pp. 115-122. (U.S., photographs of fertilization in *Trichonympha grandis*, a protozoan in *Cryptocercus*, difference in fusion gametes.)

1960, pp. 326-341. (General, the centrioles of *Trichonympha* from termites and their function in reproduction.)

CLEVELAND, L. R., and BURKE, A. W., 1956, pp. 74-77. (Effects of temperature and tension on oxygen toxicity for protozoa of *Cryptocercus*.)

CLEVELAND, L. R., and NUTTING, W. L., 1954, pp. 785-786. (U.S., protozoa as indicators of developmental stages in molting of the roach *Cryptocercus*.)

1955, pp. 485-513. (Suppression of sexual cycles and death of protozoa of *Cryptocercus* [*punctulatus*] resulting from change of hosts during molting period.)

DE MELLO, I. F., 1952-1954, pp. 127-133. (Brazil, *Stephanonympha havilandi* from intestine of *Cryptotermes havilandi*, an African termite introduced into Brazil.)

DOGEL', V. A., 1956, *in* Poltev and Pavel'eva (Ed.), 1956, pp. 47-62. (Protozoan symbionts of termites and their general biological significance in life of their hosts.)

GEORGÉVITCH, J., 1929. (Yugoslavia, intestinal fauna termites.)

1931. (Yugoslavia, flagellates termites.)

GRASSÉ, P. P., 1959b, pp. 482-483. (Chromosomes of protozoa, symbionts of termites, in small zooflagellates the chromosome interphases are recognizable in the nuclear fluid, having the appearance of vesicules limited by a thin membrane. There is neither a filament nor structure in the interior of the chromosome vesicule.)

GRIMSTONE, A. V., 1959, pp. 480-482. (U.S., cytoplasmic organization in *Trichonympha*, symbiont flagellates in *Zootermopsis angusticollis*, functional significance parabasal apparatus, membrane of saccules may contain enzyme system responsible for synthesizing the polysaccharide.)

GUTIERREZ, J., 1956, pp. 39-42. (Metabolism of cellulose-digesting symbiotic flagellates of the genus *Trichonympha* from *Zootermopsis*.)

IONESCU, M. A., 1959, pp. 112-115. (Rumania, *Reticulitermes lucifugus*, flagellates, hypermastigines—*Spirotrichonympha flagellata, S. segmentata, S. crinita, Trichonympha agilis, Trichonympha agilis*, var. *danubica, Trichonympha agilis*, var. *japonica, T. chattoni, T. serbica, Holomastigotes elongatum*.)

IONESCU, M. A., and MURGOCI, A., 1949, pp. 618-623. figs. 2-4. (Rumania, *Reticulitermes lucifugus* intestinal fauna, protozoan *Spirotrichonympha crinita*, n. sp., *Trichonympha agilis*, var. *danubica*.)

1950, p. 1. (Rumania, *Reticulitermes lucifugus*, intestinal fauna.)

LAVETTE, A., 1959, pp. 474-476. ("Phosphatase" acids in symbiotic flagellates of termites.)

NOIROT, C., and NOIROT-TIMOTHÉE, C., 1959, pp. 775-777. (*Termitophrya*, n. gen., new type of ciliate infusoria commensal of certain termites, *T. africana* in posterior intestine *Jugositermes tuberculatus* workers, Oubangui-Chari, or Gabon. Other species *Termitophrya* occur in three Apicotermitinae: *J. tuberculatus* Emerson, *Rostrotermes cornutus* Grassé, *Trichotermes villifrons* Sjöst., and in Termitinae: *Pericapritermes chiasognathus* Sjöst. of Gabon and *P. urgens* Silv. of the Ivory Coast.)

NUTTING, W. L., 1956, pp. 83-90. (Reciprocal protozoan transfaunations between the cockroach *Cryptocercus* [*punctulatus*] and the termite *Zootermopsis* [*angusticollis*].)

NUTTING, W. L., and CLEVELAND, L. R., 1954, p. 747. (U.S., effects of transfaunations on the sexual cycles of the protozoa of the roach *Cryptocercus*.)

1954a, p. 786. (Effects of reciprocal transfaunations on protozoa of the roach *Cryptocercus* and the termite *Zootermopsis*.)

1955, pp. 485-513. (Suppression of sexual cycles and death of the protozoa of *Cryptocercus* [*punctulatus*] resulting from change of hosts during molting period.)

1958, pp. 13-37. (Effects of glandular extirpations on *Cryptocercus* and the sexual cycles of its protozoa.)

RITTER, H. T. M., 1956, pp. 209-210. (Biology certain intestinal associates of *Reticulitermes flavipes*.)

ROONWAL, M. L., 1958a, pp. 77-100. (India, intestinal flagellates.)

SALEEM, M., 1955, pp. 34-39. (Pakistan, 2 new genera of hypermastigote flagellates from *Archotermopsis wroughtoni*.)

SCHMIDT, H., 1956c, pp. 269-275. (Intestinal flagellates of termites.)

1960a, pp. 261-263. (Associations termites and microorganisms.)

SKAIFE, S. H., 1955, pp. 1-134. (South Africa, *Amitermes atlanticus*, protozoan *Nyctotherus silvestrianus* in alimentary canal, not numerous, probably unimportant in digestion cellulose.)

1957, pp. 373-390. (South Africa, *Kalotermes durbanensis*, exposure to temperature 36° C. for 24 hr. has little effect on protozoa, but −10° C. for 2 to 3 hours harmful.)

RACKET

ANONYMOUS, 1956e, pp. 1-4. (National Better Business Bureau report on Dry-Cure Engineering Co.; summary of Hunsberger's claims that termites cannot eat wood and comments by entomologists.)

1956h, pp. 1-3. (Supplemental report to Anon., 1956e.)

1957k, p. 1. (Refutes Hunsberger's claim that termites cannot eat wood.)

1959d, pp. 1-4. (National Better Business Bureau warns against termite quackery, scare tactics, and recommends National Pest Control Association's advice on how to purchase wisely.)

SNYDER, T. E., 1956a, p. 26. (Warning against rackets in termite control.)

RADIATION

ALIBERT, J., 1959, pp. 1040-1042. (France, radioactive phosphorus as an aid in the study of trophallactic exchanges, *Calotermes flavicollis*.)

ANONYMOUS, 1960d, p. 28. (Hawaii, Honolulu, wood soaked with radioactive isotope solution; "hot" wood eaten, showed how fast food travels through colony, how various castes fed.)

BLETCHLY, J. D., and FISHER, R. C., 1957, p. 670. (England, cobalt-60 kills eggs powder post beetles by exposure to 4000 röntgens 1 to 4 days after hatching, resistance increases rapidly as develop; larval development arrested by irradiation at 8000 röntgens; same dosage adults, no fertile eggs. Tests on all stages outside of wood.)

DICK, W. E., 1957, pp. 1-50. (U.S., wood borers treated by dosage 1000 curies cobalt-60.)

GÖSSWALD, K., and KLOFT, W., 1958, pp. 743-745. (Radioactive isotopes in the study of colony life of insects.)

KURIR, VON A., 1958a, pp. 84-87. (Austria, *Reticulitermes flavipes*, eradication with cobalt-60 or strontium-90 radioactive ashes in soil in areas not thickly populated, as Hallein, but not in Hamburg, Germany—radioactive isotopes would be dangerous.)

1959, pp. 101-104. (Austria, *Reticulitermes flavipes*, eradication by irradiation, cobalt-60 or strontium-90 suggested.)

METCALF, R. L. (Ed.), 1957, pp. 81-146. (Use of radioisotopes in pesticide research; radioactive insecticides, tagging.)

1958, pp. 183-206. (Isotope dilution techniques for determination pesticide residues.)

REARING

HENDEE, E. C., 1937, *in* Galtsoff, et al., 1937, pp. 275-278. (U.S., rearing of dampwood termites in laboratory, rotten wood in containers; drywood termites, wood with 10% moisture minimum; subterranean termites, moist grooved wood in glass jars with soil.)

OSMUN, J. V., 1956, pp. 141-143. (Rearing method for subterranean termites, *Reticulitermes flavipes*.)

1956a, p. 21. (Rearing of subterranean termites, *Reticulitermes flavipes*.)

PENCE, R. J., 1955, pp. 28-30. (Easy-to-build termite houses.)

1957b, pp. 238-240. (*Reticulitermes hesperus* maintained for long periods in end-slotted moisture gradient test tubes set in battery jars, moisture 97.5% optimum.)

SKAIFE, S. H., 1955, pp. 1-134. (South Africa, *Amitermes atlanticus*, observation nests—portions of mound in plaster of paris, sheet cork with cells.)

1957, pp. 373-390. (South Africa, *Kalotermes durbanensis*, artificial nests, glass tubes, plaster of paris with sawdust. Wooden nests.)

REGENERATION

EMERSON, A. E., 1956, pp. 248-258. (Africa, regenerative behavior—nest structure.)

RESISTANT WOODS

ANONYMOUS, 1953t, p. 70. (Australia, Canberra, *Syncarpia laurifolia, Eucalyptus crebra, E. tereticornis, paniculata, micrantha, grandis* resistant.)

1956i, p. 67. (Australia, Canberra, *Eucalyptus rostrata, propinqua, punctata, saligna, eugenioides, sieberiana;* plastics, polystyrene unsaturated polyesters, epoxylenes, and phenolic laminates, polyvinyl chloride and cellulose acetate become susceptible when plasticized.)

1957h, pp. 1-15. (U.S., Mississippi State Highway Dept. guard rail posts, native red cedar round posts (1937-1955) 60% perfect; 1939-1953, 85%; 1949-1953, 85%. Western red cedar (1938-1947) 25% perfect. Black locust (1938-1955) 85% perfect.)

1958h, p. 66. (Australia, Canberra, order decreasing resistance: *Eucalyptus rostrata, E. propinqua, E. punctata, E. saligna, E. eugenioides, E. sieberiana* to *Coptotermes lacteus* and *Nasutitermes exitiosus*. Extracts from black bean *Castanospermum australe* have antitermitic effect. Plastics thin films polyethylene, polyvinylidene chloride, and polyvinyl chloride penetrated by termites. Cable sheathings of polyvinyl chloride containing fractional percentages of aldrin and dieldrin immune, permanence not known.)

1958l, pp. 113-119. (U.S., FHA, California redwood, foundation grade, tidewater red cypress, 100% heartwood.)

1959q, pp. 1-15. (U.S., Mississippi State Highway Dept. guard rail posts, native red cedar round posts, 8 to 10 in. in diameter, 1937-1955 and all other tests naturally resistant woods closed as of 1957 report.)

1959s, p. 66. (Western Australia, tests commercial timbers underway.)

ASENJO, C. F., AMOROS-MARIN, L., 1958, p. 183. (Puerto Rico, resistance mahogany wood (*Swietenia mahogani*) to *Cryptotermes brevis*.)

ASENJO, C. F., et al., 1958, pp. 185-195. (Puerto Rico, resistance mahogany wood (*Swietenia mahogani*) to *Cryptotermes brevis*.)

BAVENDAMM, W., 1955, *in* Schmidt, H. (Ed.), 1955b, pp. 245-306. (Natural resistance of woods to termites, alphabetical and systematic—by family lists woods of world.)

GAY, F. J., and WETHERLY, A. H., 1958a, pp. 1-13. (Australia, hardboards of *Juniperus* stock.)

GÖSSWALD, K., 1956, pp. 65-70. (Europe, *Calotermes flavicollis,* laboratory testing resistant woods.)

HARRIS, W. V., 1956b, pp. 1-13. (Field tests for resistance.)

1958, pp. 161-166. (East Africa, *Cryptotermes* spp., resistant woods.)

HERFS, A., 1956, pp. 2-5. (*Reticulitermes lucifugus* test on *Larix* wood.)

JACOBSON, M., 1958, pp. 1-299. (Extractives render wood resistant.)

JENKINS, C. F. H., 1959, pp. 117-123. (Western Australia, jarrah (*Eucalyptus marginata*), native pine (*Callitris* spp.), jam (*Acacia acuminata*.)

MARTÍNEZ, J. B., 1957, pp. 1-15. (Canary Islands, *Cryptotermes brevis,* resistant woods.)

RUDMAN, P., and DA COSTA, E. W. B., 1958, pp. 1-8. (Australia, Canberra, resistance to decay, role toxic extractives silver top ash, *Eucalyptus sieberiana*.)

RUDMAN, P., DA COSTA, E. W. B., GAY, F. J., and WETHERLY, A. H., 1958, pp. 721-722. (Australia, tectoquinone not solely responsible for durability in teak—*Tectona grandis*.)

SANDERMANN, W., and DIETRICHS, H. H., 1957, pp. 281-297. (Research on termite resistant woods, Germany.)

SCHMIDT, H., 1960, pp. 59-63. (Germany, test of sawdust of different woods.)

SCHULTZE-DEWITZ, G., 1958, pp. 248-251. (Germany, natural resistance of endemic hardwoods to European termites.)

WOLCOTT, G. N., 1957, pp. 259-311. (Puerto Rico, *Cryptotermes brevis,* natural resistance woods.)

1958, pp. 417-421. (Puerto Rico, extractives from Osage orange, substance 1, and tetrahydroosajin greater value; pinosylvin (Scots pine), taxifolin (Douglas fir), Venezuelan and Trinidad *Ryania speciosa* wood toxic, chlorophorin from African iroko preservatives.)

REVIEWS

ANONYMOUS, 1959c, p. 22. (U.S., California, review of Prevention and Control of the Western Subterranean Termite. Ebeling and Pence, Univ. California Agric. Exper. Stat., Extens. Serv. Circ., 469, 1958. Construction, design, soil poisoning, treated lumber.)

1959i, p. 20. (Review of Advances in Pest Control Research. R. L. Metcalf, 1957-1958, Pest Control, vol. 27, No. 9, p. 20. Sept.)

1959l, pp. 19, 22, 24. (U.S., statistics on wood preservation, 15% decline in 1958 from 1957. Tanalith gained 1%, Osmosalts 20%.)

ROONWAL, M. L., 1956a, pp. 454-455. (South Africa, review of Dwellers in Darkness, Skaife, 1955, London.)

ROZEN, H. J., 1958, p. 127. (U.S., review of Protection against Decay and Termites in Residential Construction, 1956. Building Research and Advisory Board, Nat. Acad. Sci., Nat. Res. Counc., Rep. No. 448, May 10, 1956.)

SCHEFER-IMMEL, V., 1960, p. 128. (Europe, review of Zur Laboratoriumprüfing von Textilien auf Termitenfestigkeit mit *Kalotermes flavicollis* Fabr., Gösswald and Kloft, 1959, Entomologica. Laboratory tests termite-proofing textiles.)

SNYDER, T. E., 1957f, p. 294. (U.S., California, review of The Biology of Colony Formation in *Reticulitermes hesperus* Banks, F. M. Weesner, 1956. Laboratory and field studies, factors that influence production and suppression soldiers, influence of source of alates on types of variation in colonies.)

1959b, p. 50. (U.S., comparison of FHA Minimum Property Standards, Anon., 1958l, with BRAB reports, Dillon 1956 and 1958, on prevention attack by termites and decay to residences.)

VARLEY, G. C., 1956, pp. vii-viii. (South Africa, review of Dwellers in Darkness, S. H. Skaife, 1955. *Amitermes atlanticus* 15% CO_2 in nest; food rotten cellulose; 12 workers first year; population 40,000 in nest 1 ft. high; caste origin due to extrinsic causes; laboratory cultures maintained.)

SECRETIONS

HRDÝ, I., and NOVÁK, V. J. A., in press. (Czechoslovakia, contribution to the question of the nonspecificity of the exohormones.)

JUCCI, C., 1956, pp. 283-284. (Italy, endocrinal gland has a secretion important in differentiation of castes.)

KARLSON, P., and BUTENHAND, A., 1959, pp. 49-51. (Pheromones (ectohormones) of termites, refers to Grassi and Sandias, Grassé, et al., Light and Lüscher, substance produced by reproductives used to influence colony members.)

LAMBINET, F., 1959, pp. 163-177. (France, *Calotermes flavicollis*, mandibular gland consists of 2 types secretory cells, large and small, latter degenerate after molting; gland at its maximum among functional reproductives.)

LÜSCHER, M., 1959, pp. 55-56. ("Pheromones," ectohormone secretion acts through mouth, active substances of functional reproductives inhibit production supplementary reproductives.)

LÜSCHER, M., and MÜLLER, B., 1960, p. 503. (*Kalotermes* and *Zootermopis*, a trail-forming secretion.)

NOIROT, C., 1957, pp. 743-745. (France, *Calotermes flavicollis*, neurosecretion and sexuality.)

VERRON, H., 1957, pp. 25-30. (France, *Calotermes flavicollis*, olfaction plays part in reciprocal attraction between different individuals, nymphs very responsive to smell other nymphs, especially as number increases, neoteinics most sensitive to smell other nymphs, no sex difference, soldiers least sensitive.)

1960, pp. 2931-2932. (France, *Calotermes flavicollis*, perception of odors.)

SENSE ORGANS

DENIS, C., 1958, pp. 171-188. (France, *Calotermes flavicollis*, development neurosensorial organs on legs, after each molt number increases, regression number and size sensorial organs accompanies development pseudoergates.)

1958a, pp. 240-247. (France, *Calotermes flavicollis*, cytology terminal nerves in course ontogeny.)

1959, pp. 712-713. (*Calotermes flavicollis*, evolution peripheral sense cellules.)

RICHARD, G., 1957, pp. 107-111. (France, *Calotermes flavicollis*, chordonotal organs on antennae.)

VERRON, H., 1957, pp. 25-30. (France, *Calotermes flavicollis*, olfaction takes part in reciprocal attraction between different individuals in colony. Larvae very responsive to smell and density of grouping; nymphs 7th instar exhibit higher level of response, especially to grouping of 15 to 20 individuals. Neoteinics give best response to smell of larvae, but not as good to differences of density. Soldiers are least sensitive, interest toward larvae but only for groups of 20 or more.)

SHIELDS

ANONYMOUS, 1958f, p. 4. (U.S., Georgia, termites circumvent even properly installed shields. H. C. Smith, Chief Architect FHA, Atlanta, estimates 90% Georgia's shielded FHA homes 2½ years and older now infested.)

1958l, pp. 113-118. (U.S., FHA recommendations.)

DILLON, R. M. (Ed.), 1956, pp. 1-60. (U.S., metal shields, design, material, installation.)

HARRIS, W. V., and BROWN, E. S., 1958, pp. 737-750. (Solomon Islands.)

SAPP, D. R., 1960, p. 68. (U.S., Gainesville, Fla., termite control operator eliminates FHA 5-year warranty by pretreating with soil poisons and installing cheap shields.)

SOIL POISONS

ANONYMOUS, 1953t, p. 70. (Australia, Canberra, creosote and 5% pentachlorophenol failed as soil poisons after 5 years' test.)

1956d, pp. 1-78. (U.S., clinical memoranda on economic poisons.)

1957i, pp. 30, 32, 34. (U.S., Nat. Pest Control Assoc. now recognizes ethylene dibromide as soil fumigant, gives use instructions; warns against methyl bromide.)

1957n, pp. 19-20. (U.S., pest control operators certification board for soil pretreatment.)

1958, pp. 36, 49-50. (U.S., Texas, demonstration of slabtreating.)

1958b, p. 48. (U.S., Indiana, Purdue Univ. pretreatment tests include granules size of coarse sand, chlorinated hydrocarbons.)

1958h, p. 66. (Australia, Canberra, against *Nasutitermes exitiosus*, 5% DDT failed after 7 years; against *Coptotermes lacteus*, 5% pentachlorophenol and 5% DDT failed after 6 years.)

1958i, pp. 1-7. (U.S., Forest Service recommendations.)

1958l, pp. 112-118. (U.S., FHA recommendations.

1958o, p. 63. (Australia, Canberra, against *Nasutitermes exitiosus* as soil poisons lindane, chlordane, and tetrachlorobenzene have given complete protection for 3 years; against *Coptotermes lacteus*, dieldrin and chlordane have given complete protection for 4 years, and aldrin and tetrachlorobenzene for 3 years. Similar tests against a termite complex in the Riverina, pentachlorophenol, sodium pentachlorophenate, chlordane and creosote have given complete protection for 5 years. After 2 years weathering chlordane, lindane, aldrin and dieldrin used in surface treatments were still effective.)

1959, pp. 17-19. (U.S., Forest Service recommendations.)

1959e, p. 50. (U.S., "chlorohepton" soil poison said to combine chlordane with heptachlor.)

1959g, p. 62. (U.S., California, termite control operator "not responsible" for death customer following treatment chlordane, latter not registered as "ultra-hazardous.")

1959h, p. 58. (U.S., combination of aldrin and dieldrin to compete with Orkin's combination of chlordane and heptachlor as soil poisons.)

1959j, pp. 30, 32, 34. (U.S., Kentucky, Fort Campbell, 1958-1961, preconstruction termite control specifications, cost estimates on inside and pad, stud, and outside soil pretreatments, monthly payments, consulting engineer coordinated work, 3 operators, crew 8 to 10 laborers housed on job site. Soil poison 6.6% dieldrin water solution, 550 gal. applied each housing unit, pump 50 gal. per min. First application after footings poured, in trench 12 in. wide, 8 in. deep, 1 gal. per 4 linear ft., ⅓ at bottom, ⅔ applied to backfill as

replaced, tamped with air compressor. Chemical applied around all pipes and ducts. All exposed soil or pad treated, 1 gal. per 10 sq. ft. Slab areas covered with gravel after treatment, then polyethylene vapor barrier, next steel reinforcement, finally concrete poured. After houses constructed, soil adjacent to outside foundation treated in 6-in.-wide, 12-in.-deep trench, 4 gal. to 10 linear ft. No responsibility for retreats. Insurance, thorough preparation, and supervisor on job at all times essential.)

1959s, p. 66. (Western Australia, soil treatment tests have been continued and all chemicals mentioned in 1958 report remain effective.)

1960b, pp. 23-25. (U.S., St. Louis, Mo., Getz exterminators pretreats house 80% full basement and 20% crawl space. 0.3% dieldrin solution in trench with rodding. 2¼ gal. per 5 linear ft., backfill treated, surface soil sprayed 1 gal. per 10 sq. ft. Debris removed.)

1960c, p. 25. (U.S., in Memphis, Tenn., pretreatment with soil poisons costs 40% of cost control in slab houses, 5% less than correction in crawl space houses; in Oklahoma City 25% less.)

1960e, pp. 44, 58. (U.S., Oklahoma, 19 termiticides are approved as soil poisons including chemicals that have been eliminated by Federal agencies for ineffectiveness or other reasons.)

1960h, pp. 54, 62, 64-65. (U.S., H. R. Johnston (Forest Service) warns to discontinue downward trend in reducing concentrations of soil poisons for economic reasons. Many pest control operators feel Federal Housing Administration's concentrations for soil poisons are too low. In the Canal Zone, Panama, twice as much insecticide required for same results as in Mississippi; high rainfall may have bearing. Ethylene dibromide an effective soil fumigant in California for 4 years; Bill Butz (Purdue) stated when a residual chlorinated hydrocarbon is used with a fumigant, the residual will not reach as far as the fumigant will to get the initial toxicity. Joe Kahn (Purdue) stated research shows that ethylene dibromide will not move through the soils of midwestern United States because of the texture and compactness of these soils.)

Beesley, J., 1957, pp. 1-3, 3-4, 4-6. (Australia, Melbourne, treated soil barriers, sodium arsenite, chlordane, dieldrin, benzene hexachloride.)

Bollen, W. B., Roberts, J. E., and Morrison, H. E., 1958, pp. 214-219. (U.S., Oregon, variation in toxic effect in soil led to discovery after 21 months nearly half aldrin lost, significant amount recovered as dieldrin.)

Boswell, V. R., et al., 1955, pp. 1-59. (U.S., Washington, New Jersey, Illinois, and Georgia, investigations 1950-1953 on injury to plants by soil insecticides and residuals, varies with soil type.)

Briegleb, P. H., 1954, pp. 73-76. (U.S., Mississippi, Forest Service tests.)

Butts, W. L., 1961, pp. 44-52. (U.S., termite resistance may crop up at any time.)

Byerly, T. C., 1960, pp. 1-4, *in* U.S. Dept. Agric., ARS, Publ. 20-9, 1960. (U.S., use heptachlor severely limited by fact that under some conditions resulted in small residues of its epoxides.)

Coaton, W. H., 1958, pp. 1-112. (South Africa, *Hodotermes mossambicus* and *Microhodotermes viator*, sodium fluosilicate grass bait less toxic to grazing animals than sodium arsenite.)

Conley, B. E., 1958, p. 18. (U.S., first aid for poisoning.)

Dean, L. A., 1960, pp. 63-69, *in* U.S. Dept. Agric., ARS, Publ. 20-9, 1960. (U.S., persistence of organic substances in soil depends on physical, chemical, or biological processes.)

Dillon, R. M. (Ed.), 1956, pp. 1-60. (U.S., Forest Service tested and approved soil poisons, proprietary poisons, percentages, dosages for various types houses, where to apply.)

Ebeling, W., and Pence, R. J., 1958, pp. 207-211. (U.S., California, laboratory evaluation insecticide-treated soils against *Reticulitermes hesperus*.)

Eno, C. F., 1958, pp. 348-351. (U.S., effect of insecticides in soil and germination and yield plants, especially chlorinated hydrocarbons.)

Ferrero, F., 1959, pp. 30-31. (France, Banyuls, Eastern Pyrenees, *Calotermes flavicollis* damages grapevines. Many have to be replaced each year. DDT, HCH (BHC), heptachlor, and aldrin have been used but without success. Dieldrin used as a dust (20% of active material) or a suspension with 1.5 l. of dieldrin per 100 l. of water has given effective control when the soil was thoroughly treated especially around the roots and the dust or spray was applied under pressure. Wounds in the grapevine stock should be dusted. This method is a curative rather than preventive method. Control of the adults be-

fore flight would prevent new colonies from forming. Sealing galleries would prevent flight and use of an attractant for the adults should furnish means for capturing the adults. These termites attack not only the woody grapevine stocks but also other woody plants.)

FOSTER, A. C., et al., 1956, pp. 1-36. (U.S., rapid deterioration chlorinated hydrocarbons in soil, at dosages used, residues will not accumulate in soil to the extent of impairing growth of plants.)

GANNON, N., and BIGGER, J. H., 1958, pp. 1-2. (U.S., Illinois, conversion aldrin and heptachlor to their epoxides in soil. Aldrin converted to dieldrin more rapidly than heptachlor to heptachlorepoxide, hence toxicity due to dieldrin, heptachlor exceeded quantity epoxide but latter more toxic, hence epoxidation advantageous increasing both toxicity and residual effect.)

GILLESPIE, B. B., 1959, p. 34. (U.S., Indiana, topical application and laboratory soil tests, former showed aldrin and dieldrin most toxic, then heptachlor and chlordane, higher dosage required for *Reticulitermes flavipes* than for *R. hageni;* latter showed aldrin and heptachlor most toxic, then dieldrin and chlordane, no difference between species termites.)

GUNTHER, F. A., and BLINN, R. C., 1955, pp. 1-708. (Analysis of insecticides and acaricides.)

HEAL, R. E., 1957, pp. 73-76. (U.S., chemicals in termite control.)

1957a, pp. 118-120. (U.S., chemicals in built-in protection.)

HETRICK, L. A., 1956, pp. 28-29. (U.S., *Reticulitermes flavipes,* organic insecticides, benzene hexachloride and chlordane decreasing speed action.)

1957, pp. 316-317. (Benzene hexachloride effective more than 10 years in sandy soil, *Reticulitermes flavipes.*)

1957a, pp. 343-348. (Evaluation new chemicals, *Reticulitermes flavipes.*)

INDIA MINISTRY FOOD AND AGRIC., 1958, p. 748. (India, treating soil with chemicals.)

JOHNSTON, H. R., 1956, pp. 1-8. (U.S., Mississippi, and Canal Zone, Panama, tests soil poisons.)

1958, pp. 9, 11-16. (Mississippi and Canal Zone, 10- to 13-year tests.)

1958a, pp. 423-431. (Mississippi and Canal Zone, tests soil poisons (chlorinated hydrocarbons most effective.)

1959, p. 32. (Mississippi and Canal Zone, tests of soil poisons: aldrin 0.5%, 100% effective after 9 years; BHC (benzene hexachloride) 0.8% gamma isomer, 80% after 10 years; chlordane 1%, 100% after 10 years; DDT 5%, 90% after 11 years; dieldrin 0.5%, 100% after 9 years. Heptachlor promising; duration increased by increased concentration.)

1960, pp. 44-45. (U.S., Mississippi, volatilization, vaporization, evaporation, and temperature major factors in disappearance of termiticides from soil. Types soil important, 96% heptachlor applied to mucky soil remained, after 56 days only 45% in sandy soil. Alternate wetting and drying causes chemical to disappear rapidly.)

1960a, pp. 1-6. (Tests of soil poisons in Mississippi and the Canal Zone, Panama. Later data than 1956 report, chlorinated hydrocarbons most effective.)

1961, pp. 40, 42. (U.S., Mississippi, breakdown of chemicals in soil includes decomposition, alkalies decompose benzene hexachloride, iron DDT; volatilization is evaporation, is big factor instability. Chemicals with high vapor pressure evaporate more rapidly. Temperature and formulation affect volatilization, as do soil types, moisture, rate application, alkalinity or acidity of soil.)

JOHNSTON, H. R., and OSMUN, J. V., 1960, pp. 62-63. (U.S., Forest Service and Purdue Univ. tests show soil poisoning effective, but narrow margin exists between protection and no protection, standards of formulation and dosages should not be lowered.)

KATZ, H., 1958, p. 49. (U.S., soil near old woody shrubs should have nearby soil treated with aqueous solution toxicant.)

1958a, p. 6. (U.S., termites will not live in soil so alkaline that chlordane or dieldrin would break down, but might survive in soil alkaline enough to destroy DDT.)

1961, pp. 40, 43. (U.S., paradichlorobenzene and naphthalene, old standbys, will suppress posttreatment swarmers, but not used for long-time control, based on A. E. Lund's tests and commercial use.)

1961a, pp. 9, 11-12, 64. (U.S., treatment of gravel fill material more important than treatment of soil, 1 gal. toxicant per 10 sq. ft. Weight of toxicant/volume of soil more exact, degree wetness of soil will vary dosage.)

KITGEMAGI, U., MORRISON, H. E., ROBERTS, J. E., and BOLLEN, W. B., 1958, pp. 193-204. (U.S., Oregon, aldrin, dieldrin, and

heptachlor gave good control of *Scutigerella immaculata* in some field tests, not in others. Where not successful, rapid decline in soil of all three compounds.)

LICHTENSTEIN, E. P., 1959, pp. 31-32. (U.S., factors affecting termite resistance: soil types; application rate; presence or lack of cultivation; soil temperature, soil moisture; soil microorganisms affect persistence of insecticide; persist longer: in soils high organic content, high application rate, noncultivated, low temperature, dry soil, sterilized soils.)

1959a, pp. 40, 42, 56. (U.S., factors affecting insecticide persistence in various soils: soil type, soil temperature, moisture, microorganisms, chemical application rate, chemical conversion in soil.)

LICHTENSTEIN, E. P., BECK, S. D., and SCHULZ, K. R., 1956, p. 936. (U.S., colorimetric determination of lindane in soils and crops.)

LICHTENSTEIN, E. P., DE PEW, L. J., ESHBAUGH, E. L., and SLEESMAN, J. P., 1960, pp. 136-142. (Midwestern U.S., amount organic matter within a particular soil type and climatic conditions of area major factors affecting persistence of DDT, aldrin, and lindane in soils, DDT most persistent, lindane least, all disappeared most rapidly in Kansas experiment soils.)

LICHTENSTEIN, E. P., and MEDLER, J. T., 1958, pp. 222-226. (U.S., Wisconsin, alfalfa treated with heptachlor and aldrin at rates ¼ to ⅛ lb. per acre, 7 days after treatment both were recovered at rate of 0.1 part per million by chemical analysis. 2 weeks after treatment no heptachlor found, 3 weeks after treatment no aldrin found.)

LICHTENSTEIN, E. P., and POLIVKA, J. B., 1959, pp. 289-293. (U.S., top dressings (turf soils), 15% of applied chlordane recovered after 12 years by chemical analysis, 12% by bioassay. 11 years after application, 41% BHC of applied dosage recovered by chemical analysis, 8% by bioassay. After 9 years no heptachlor recovered by analysis, but 4 to 5% by bioassay. Most aldrin had disappeared during 4 years, part converted to dieldrin to extent 8 to 10% of applied dosage.)

LICHTENSTEIN, E. P., and SCHULZ, K. R., 1958, pp. 848-849. (U.S., colorimetric determination of heptachlor in soils and crops.)

1959, pp. 118-124. (U.S., lindane broke down, within 2 weeks, to nontoxic compound, aldrin converted to dieldrin, more dieldrin formed in a sandy loam soil and in soils treated at lower concentrations and at higher temperatures.)

1959a, pp. 124-131. (U.S., 3½ years after treatment 1.43 times more DDT, 4.25 times more aldrin, and 8.45 times more lindane were recovered from a muck soil than from Miami silt loam. Temperature important factor. No loss in frozen soil. Loss 16 to 27% at 6° C. of aldrin and heptachlor, only 2 to 14% persisted at 46° C. after 56 days.)

1960, pp. 192-197. (U.S., aldrin readily transformed into dieldrin in wet, nonautoclaved Carrington loam, less rapidly in muck soil; amounts aldrin and dieldrin recovered equal 16 months after treatment in field. In soils containing low number microorganisms (autoclaved loam, Plainfield sand), or in dry soils amount dieldrin found small. Heptachlor applied to Carrington loam persisted longer than aldrin, but amount of heptachlorepoxide formed smaller than that of dieldrin. Lindane most persistent in dry soil and least in wet, nonautoclaved soil.)

LUND, H. O., 1960, pp. 32, 44, 36. (U.S., Georgia, tests show termites will tunnel up through foundation voids. When treated with dieldrin, aldrin, and chlordane emulsions, tunnels were only built over 0.002% of chlordane after 7 weeks, over the lowest concentrations of aldrin or dieldrin or 0.02% chlordane after 9 months.)

MALINA, M. A., KEARNY, J. M., and POLEN, P. B., 1959, pp. 30-32. (U.S., determination chlordane in air of habitations treated for insect control.)

MARTÍNEZ, J. B., 1958, pp. 1-29. (Spain, arsenic and chlorinated hydrocarbons used as soil poisons.)

METCALF, R. L., 1955, pp. 1-402. (Organic insecticides.)

METCALF, R. L. (Ed.), 1957, pp. 1-523. (Chemistry, uses, hazards in insect pest control, references, etc.)

1958, pp. 1-426. (Application pesticides, isotope dilution for determination residues, spread, insect resistance, etc.)

MILSUM, J. N., 1959, pp. 425-428. (World, termites attacking mango controlled by 20 lb. 5% chlordane dust per acre.)

NELSON, J. A., 1960, p. 5. (U.S., editorial, 5-year guarantee for soil poisoning discriminatory, 10 years experience proves it

effective, other approved methods not inspected as to proper installation.)

NEWSAM, A., and RAO, B. S., 1957, p. 98. (Malaya, aldrin preferred, less costly, dieldrin superior, chlordane less persistent, attack on rubber trees by *Coptotermes curvignathus*.)

1958, pp. 209-215. (Malaya, chlordane, aldrin, dieldrin effective, prevent reattack.)

OSMUN, J. V., 1956b, p. 29. (U.S., laboratory techniques for evaluation effect soil insecticides on *Reticulitermes flavipes*.)

1957, pp. 9, 11-12, 16, 19, 48. (Better control through research.)

1957a, pp. 592-593. (Responses *Reticulitermes flavipes* to certain insecticides.)

1958, pp. 23-24, 56. (Ethylene dibromide as fumigant in different types soil, factors affecting dispersion in soil, subslab.)

PARCHER, J. V., and MEANS, R. E., 1959, pp. 29-30, 32. (U.S., characteristics of soils, cohesion, plasticity, strength, void ratio, loads on sand, clay, shrinking and swelling.)

1959a, pp. 57-58, 60. (U.S., chemical application, structural safeguards, penetration soils, soaking for coarse-grained soil, pressure injections for fine-grained soils, effect of building on water content of clay and dry soils.)

1959b, pp. 50, 52, 54. (U.S., texture reveals permeability, cohesionless soils—sand, gravel, silt; cohesive—clay, latter low permeability. Moisture content, macroscopic structure.)

POWELL, J. M., JR., 1959, pp. 20, 22, 24. (U.S., National Assoc. Homebuilders state 5-year warranty required for soil poisoning by FHA unreasonable since not required for other 4 methods termite control, builder responsible. FHA requires guarantee because work cannot be checked. Guarantee should be removed or pretreatment dropped.)

1960, pp. 32, 42, 44. (U.S., Baton Rouge, La., southern builder believes home owner should have responsibility, recommends pipes for later retreatment.)

RHODE ISLAND DEPT. AGRIC. AND CONSERVATION, DIV. ENTOMOLOGY AND PLANT INDUSTRY, 1958, pp. 1-4, (U.S., Rhode Island, soil poisoning against subterranean termites.)

SAPP, D. R., 1960, p. 68. (U.S., Gainesville, Fla., termite control operator eliminates 5-year warranty for soil poisoning by pretreating and also installs cheap shields to satisfy FHA; 90% buildings pretreated around Gainesville.)

SHEPARD, H. H., 1958, pp. 1-355. (Effect chemicals on physiology insects, technique for tests, screening, etc.)

SHEPARD, H. H. (Ed.), 1960, pp. 1-250. (Methods of testing soil insecticides, chap. 6, W. E. Fleming.)

SMITH, M. W., et al., 1956, pp. 34, 36, 38, 42. (U.S., what effect soil texture has on penetration and retention chemicals.)

1957, pp. 36, 38, 40. (U.S., new approaches to "sub" treatment of slab houses.)

SPITZ, W. J., 1958, pp. 38, 40, 43, 51. (U.S., Texas, complete coverage by drilling under slab from side, chlordane emulsion.)

U.S. DEPT. AGRIC., ARS, 1960, pp. 1-221. (U.S., nature and fate of chemicals applied to soils, plants, and animals.)

WARD, J. C., 1958, pp. 14-16. (U.S., use pesticides with care.)

WESTLAKE, W. E., and SAN ANTONIO, J. P., 1960, pp. 105-115, *in* U.S. Dept. Agric., ARS, Publ. 20-9, 1960. (U.S. degradation and products formed of chlorinated hydrocarbons and organic phosphorus compounds. Persistence.)

YOUNG, W. R., and RAWLINS, W. A., 1958, pp. 11-18. (U.S., New York, relative persistence heptachlor in 4 different soil types, Dunkirk sandy loam, silt loam, and silty clay loam and muck, not significant, rapid losses, especially in soil surfaces exposed to sun, less from emulsion than from wettable powder, will not accumulate to dangerous levels in cultivated soils.)

ZAVON, M. R., 1958, pp. 9-12. (U.S., are comparative toxicities meaningful—today's pesticides?)

ZIMMERN, A., 1957, pp. 32, 34, 36, 50. (U.S., soil penetration by chemicals.)

SOUND

BLANDFORD, H. F., 1881, p. 32. (Sound-producing ants, Termitidae sound producing).

BRISTOWE, W. S., 1924, pp. 475-504. (Sound-producing Termitidae.)

1925, pp. 640-641. (Sound-producing Termitidae.)

DE BAISIEUX, P., 1938, pp. 79-302. (Blattoidea: Isoptera, p. 124, scoloparia on femora and tibiae termites from Congo, chordonotal organs register vibrations.)

FOTHERINGHAM, J., 1881, p. 55. (Sound-producing Termitidae.)

FRINGS, M., and FRINGS, H., 1960, p. 101. Bibliography of sound-producing and sound-receiving termites.)

GIBB, G., 1859, pp. 121-130. (Sound production by Canadian insects.)

GRAVELY, F. H., 1915, pp. 483-539. (India, sound-producing termites.)

SUPERORGANISM

LÜSCHER, M., 1958c, pp. 48-65. (Colony as an organism.)

TAXONOMY

AHMAD, M., 1955, pp. 25-27. (East Pakistan, *Microtermes pakistanicus*, n. sp., soldier.)

1955a, pp. 202-264. (West Pakistan, Keys, *Neotermes pishinensis*, n. sp.; *Microcerotermes baluchistanicus*, n. s.p., *M. sakesarensis*, n. sp., *M. longignathus*, n. sp.; *Eremotermes neoparadoxalis*, n. sp., *E. malki*, n. sp.; *Amitermes paradentatus; Angulitermes hussaini*, n. sp.; etc.)

1958, pp. 33-118. (Key to Indomalayan termites, 176 of 394 species.)

1958a, pp. 119-198. (Key to Indomalayan termites, 218 of 394 species.)

AHMAD, M., and KHAN, M. A., 1955, pp. 28-30. (Pakistan, imago *Kalotermes beesoni*.)

ANONYMONS, 1959, pp. 17-19. (Number species in world (2,100) and in Smithsonian collection (1,322).)

BECKER, G., 1955, pp. 393-404. (Italy, Sicily, *Kalotermes flavicollis, fuscicollis*, n. var.)

BRADLEY, J. C., 1946, pp. 111-126. (Classification termites.)

CALABY, J. H., and GAY, F. J., 1956, p. 20. (*Coptotermes raffrayi* reduced to subspecies of *acinaciformis*.)

COATON, W. G. H., 1955, pp. 109-136. (Africa, Belgian Congo, *Neotermes aburiensis*, soldier, *N. collarti*, n. sp., *N. lepersonneae*, n. sp.; *Glyptotermes ueleensis*, n. sp., etc.)

1958, pp. 1-112. (South Africa, synonymy *Hodotermes mossambicus, Microhodotermes viator*.)

EMERSON, A. E., 1956a, pp. 98-101. (Africa, Katanga, *Apicotermes rimulifex*, n. sp.)

1956b, pp. 1-31. (Africa, *Apicotermes gurgulifex*, n. sp., *A. holmgreni*, n. sp., *A. aburiensis* transferred to *Allognathotermes*.)

1959, pp. 1-42. (Africa, new combinations, *Firmitermes abyssinicus, ?F. tripolitanus; Hoplognathotermes subterraneus, ?H. submissus; Acutidentitermes osborni*, n. sp., sold.; *Duplidentitermes furcatidens, D. jurioni*, n. sp., sold., *D. latimentonis*, n. sp., sold.; *Heimitermes moorei*, n. sp., sold.)

1960, pp. 1-28. (Oriental, Malagasy and Australian regions, new genera related to *Subulitermes*. Oriental region: *Leucopitermes*, n. gen., type species *leucops* Holmgren, Malacca, sold., work. *Aciculitermes*, n. gen., type species *aciculatus* Haviland, Sarawak, imago, sold., work. *Ceylonitermellus*, n. gen., type species *hantanae* Holmgren, Hantana, Ceylon, imago, sold., work. *Oriensubulitermes*, n. gen., type species *inanis* Haviland, Malaya, sold., work.; *O. inaniformis* (Holmgren), n. comb. Malagasy region: *Malagasitermes*, n. gen., type species *milloti* Cachan, Madagascar, sold., work. Australian region: *Occultitermes*, n. gen., type species *occultus* Hill, N. Terr., Australia, imago, sold. *Macrosubulitermes*, n. gen., type species *greavesi* Hill, N. Queensland, Australia, imago, sold.; *M. perlevis* (Hill), new combination, Port Darwin, N. Terr., Australia, sold. *Australitermes*, n. gen., type species *dilucidus* Hill, Queensland, Australia, sold.)

1960a, pp. 1-21. (Africa, Belgian Congo, new genera and species on *Subulitermes* branch Nasutitermitinae: *Verrucositermes*, n. gen., type species *tuberosus*, n. sp., Leopoldville, imago (king), sold. *Afrosubulitermes*, n. gen., type species *congoensis*, n. sp., Stanleyville, sold., work. *Postsubulitermes*, n. gen., type species *parviconstrictus*, n. sp., Yangambi, imago (queen), sold., work. *Tarditermes*, n. gen., type species *contracolor*, n. sp., Camp Putnam (on Epulu River), imago, sold.)

1960b, pp. 1-49. (Africa, Belgian Congo, 6 new genera of Termitinae: *Nititermes*, n. gen., type species *berghei* Keyberg, imago (king), sold., work., close to *Lepidotermes*. *Mucrotermes*, n. gen., type species *osborni*, n. sp., near Camp Putnam, sold., work., close to *Procubitermes*. *Furculitermes*, n. gen., type species *winifredae*, n. sp., Camp Putnam, imago (queen), sold., work., close to *Euchilo-*

termes; other species, *F. hendrickxi,* n. sp., Camp Putnam, sold.; *F. brevilabius,* Camp Putnam, imago (queen), sold.; *F. cubitalis,* n. sp., Stanleyville, sold., work.; *F. soyeri,* n. sp., Keyberg, sold., work.; *F. parviceps,* n. sp., Camp Putnam, sold., work.; *F. longilabius,* n. sp., Camp Putnam, sold., work; *F. brevimalatus,* n. sp., Stanleyville, sold., work. *Pilotermes,* n. gen., type species *langi,* n. sp., near Camp Putnam, imago, sold., work., close to *Basidentitermes. Profastigitermes,* n. gen., type species *putnami,* n. sp., Camp Putnam, sold. *Forficulitermes,* n. gen., type species *planifrons,* n. sp., Sona Mpangu, sold., work., not close to *Basidentitermes.*)

EMERSON, A. E., and BANKS, F. A., 1957, pp. 1-17. (Revision Neotropical genus *Armitermes, A. brevinasus,* n. sp., *A. latidens,* n. sp., *A. parvidens,* n. sp., *A. snyderi,* n. sp., *A. spissus,* n. sp., redescription *A. silvestrii.*)

ESAKI, T., 1956, p. 87. (*Hodotermopsis japonica* imago.)

GAY, F. J., 1956, pp. 207-213. (Australia, *Ahamitermes pumilus* winged; *Paracapritermes hesperus,* n. sp., queen and sold.; *Termes iridipennis,* winged and sold.)

GESELL, S. G., 1959, pp. 1-6. (U.S., some wood-boring insects mistaken for termites.)

GHIDINI, G. M., 1955, pp. 69-82. (Africa, Ethiopia, Sagan-Omo, *Bellicositermes jeanneli, goliath* distinguishing characters; *Microtermes vadschaggae* var. *grasséi,* n. n. for var. *dubius* Grassé preocc.; figured *Termes (Cyclotermes) maledictus, Trinervitermes eldirensis.*)

GRASSÉ, P. P., and NOIROT, C., 1955a, pp. 345-388. (Africa, *Allognathotermes ivoriensis,* n. sp.; *Coxotermes,* n. gen., *C. boukokoensis,* n. sp.; *Heimitermes,* n. gen., *H. laticeps,* n. sp.; *Jugositermes tuberculatus,* queen.)

HARRIS, W. V., 1956a, pp. 926-937. (Africa, French Cameroons, *Microcerotermes progrediens* alate female; *Pericapritermes amplignathus,* n. sp., sold.; *Odontotermes silvaticus,* n. sp., sold.; etc.)

1957a, pp. 421-433. (Southwest Arabia, *Amitermes stephensoni,* n. sp., *A. harleyi,* n. sp., sold.; *Eremotermes sabaeus,* n. sp., sold.; *Trinervitermes arabiae,* n. sp., sold.[1-2].)

1957c, pp. 20-32. (Malaya, list of species, Kalotermitidae, Rhinotermitidae, Termitidae, field key to sold., heads and mandibles, figured for some.)

1958a, pp. 59-60. (Solomon Islands, *Schedorhinotermes browni* n. sp., sold., Guadalcanal.)

1958c, pp. 3-26. (Belgian Congo, *Crenetermes fruitus,* n. sp., winged, sold., Lusinga; *Thoracotermes lusingensis,* n. sp., winged, sold., Lusinga; *Cubitermes muneris,* winged, *C. oblectatus,* n. sp., winged, sold., Lusinga; *Noditermes festivus,* n. sp., winged, sold., Kenia; *Microtermes upembae,* n. sp., winged, Riv. Lupiala, 15 species listed.)

1960, pp. 17-21. (East Africa, *Odontotermes montanus,* n. sp., sold., Kenya; *O. lacustris,* n. sp., winged, sold., Northern Rhodesia; *O. flammifrons* (Sjöstedt), Northern Rhodesia, Nyasaland.)

1960b, pp. 253-256. (*Eremotermes nanus,* n. sp., soldier, Sudan; *Termes melindae,* n. sp., soldier, British Honduras.)

HARRIS, W. V., and BROWN, E. S., 1958, pp. 737-750. (Solomon Islands, 12 species listed, key to sold.)

HUNT, R., 1958, p. 31. (U.S., how to distinguish Embioptera from termites.)

KARAMAN, Z., 1954, pp. 21-30. (Yugoslavia, *Reticulitermes lucifugus* and *Calotermes flavicollis,* key to separate.)

KHAN, M. A., and AHMAD, M., 1955, pp. 28-30. (Pakistan, *Kalotermes beesoni* winged.)

KRISHNA, K., 1956, pp. 1-5. (Malaya, *Coptotermes sepangensis,* n. sp., sold., *C. bentongensis,* n. sp., sold.)

KUSHWAHA, K. S., 1960a, pp. 54-65. (India, chaetotaxy of *Odontotermes assmuthi,* soldier.)

MACHADO, A. DE B., 1959, pp. 205-207. (*Apicotermes,* Africa, concept of ethological species.)

MATHUR, R. N., 1960, pp. 79-85. (South India, *Glyptotermes nigrifrons,* n. sp., sold., nymph.)

MATHUR, R. N., and CHHOTANI, O. B., 1959, pp. 40-53. (India, revision *Stylotermes,* description *S. fletcheri* Holmgr. and Holmgr. and *S. bengalensis,* n. sp., sold., work., Darjeeling, West Bengal.)

MATHUR, R. N., and SEN-SARMA, P. K., 1958, pp. 233-241. (India, *Anacanthotermes rugifrons,* n. sp., sold. and work., key.)

1958a, pp. 1-9. (India, imago *Globitermes audax, Microcerotermes burmanicus, Odontotermes parvidens.*)

1959a, pp. 66-78. (India, *Emersonitermes thekadensis,* n. gen., n. sp., sold., work.,

South India: Thekaday (Travancore), close to *Subulitermes; Trinervitermes nigrirostris,* n. sp., winged, sold. (major, intermediate), Madras; *Nasutitermes beckeri,* n. sp. (Baini Prashad and P. K. Sen-Sarma) described elsewhere.)

1960, pp. 79-85. (South India, *Glyptotermes nigrifrons,* n. sp., sold. and nymphs, Madras, type sold., Forest Research Inst., Dehra Dun.)

1961, pp. 401-406. (Tinnevelly Distr., So. India, *Angulitermes acutus,* n. sp., sold. and workers.)

MOSZKOWSKI, L. I., 1955, pp. 15-41. (Madagascar, *Cryptotermes kirbyi,* n. sp.)

NOIROT, C., 1955, pp. 139-150. (Angola, *Macrotermes angolensis,* n. sp., sold.[1-2]; *Basidentitermes trilobatus,* n. sp., winged, sold.[1-2]; *Pericapritermes machadoi,* n. sp., sold.; *Coarctotermes brunneus,* n. sp., sold.)

OBENBERGER, J., 1955, pp. 576-637. (Theories classification, systematic section Isoptera.)

OLDROYD, H., 1958, p. 225. (Family Termopsidae.)

RHODE ISLAND DEPT. AGRIC. AND CONSERVATION, DIV. ENTOMOLOGY AND PLANT INDUSTRY, 1955, pp. 1-4. (U.S., how to tell ants from termites.)

ROONWAL, M. L., and BOSE, G., 1960, pp. 38-39. (India, Rajasthan, *Psammotermes rajasthanicus,* n. sp., sold. (holotype), work., first record of genus for India.)

ROONWAL, M. L., and CHHOTANI, O. B., 1959, pp. 325-326. (Southern India, new species *Odontotermes, kulkarni,* sold. and work., Bijapur; *meturensis,* sold., work., Metur Dam.)

1959a, pp. 1967-1968. (India, *Anoplotermes,* n. sp., first record in India, to be described elsewhere.)

1959b, pp. 57-68. (India, further descriptions of *Odontotermes kulkarnii* and *O. meturensis.*)

1960a, p. 701. (Assam, India, *Anoplotermes shillongensis,* n. sp.)

1960b, pp. 143-144. (India, soldier caste found in Mysore in *Speculitermes cyclops sinhalensis* places genus in Amitermitinae.)

ROONWAL, M. L., and KRISHNA, K., 1955, pp. 143-152. (Ceylon, *Coptotermes gaurii.*)

ROONWAL, M. L., and SANGAL, S. K., 1960, pp. 1-22. (India, near Dehra Dun, *Odontotermes obesus,* variability in size of soldier mandibles.)

ROONWAL, M. L., and SEN-SARMA, P. K., 1956, pp. 1-38. (India and Burma, new species and subspecies, *Parrhinotermes khasii, Macrotermes serrulatus hopini, Hypotermes nongpriangi, Hospitalitermes blairi,* and *Parrhinotermes* new for India.)

1958, pp. 1-406. (India and Burma, *Eremotermes dehraduni,* n. sp., and *Indotermes maymensis,* n. sp., in new family Indotermitidae.)

SANDS, W. A., 1956, pp. 83-84. (Africa, Gold Coast, *Mimeutermes edentatus,* n. sp., sold.)

1957, pp. 13-24. (Soldier mandibles Nasutitermitinae, specific difference in some genera, lend support to Ahmad's phylogenetic conclusions, with minor exceptions.)

1957a, pp. 1-28. (East Africa, revision Nasutitermitinae.)

1959, pp. 127-156. (Ethiopian Region, *Amitermes,* 13 species, 3 new, keys, distribution map, *Amitermes acinacifer,* n. sp., sold., Kenya; *A. importunus,* n. sp., sold., Nyasaland; *A. truncatidens,* n. sp., winged, sold., Tanganyika; description winged species known only from soldiers.)

SNYDER, T. E., 1955h, p. 30. (U.S., need funds for Isopterist, U.S. Nat. Mus.)

1955i, p. 300. (Bolivia, *Anoplotermes brucei,* n. sp., winged.)

1956d, pp. 189-202. (Keys to termites West Indies, Bahamas, Bermuda.)

1957a, p. 352. (Panama, *Neotermes setifer,* n. sp., winged.)

1957d, pp. 81-82. (Bolivia, *Rugitermes laticollis,* n. sp., winged.)

1957g, pp. 42, 44. (U.S. and Europe, death thinning out ranks world's foremost isopterists.)

1958, pp. 229-231. (Philippines, *Glyptotermes franciae* and *magsaysayi,* n. sp., sold. and winged and sold., keys to Philippine species.)

1959c, pp. 313-321. (Venezuela, new species, *Neotermes araguaensis,* winged *Anoplotermes franciscoi,* winged, *Velocitermes bolivari,* sold.[1-2], ?winged, keys to Venezuelan species.)

SNYDER, T. E., and FRANCIA, F. C., 1961, in press. (Keys to Philippine termites.)

THURICH, L., 1960, pp. 145-160. (Palearctic, comparative morphological studies of sold. of *Reticulitermes* from Europe and the Near East.)

WEIDNER, H., 1955, pp. 63-68. (Anterior Asia, *Microcerotermes gabrielis,* n. sp., winged and sold.)

1955a, pp. 201-207. (Africa, Angola, *Apicotermes machodoensis*, n. sp.)
1955b, pp. 247-254. (Types in Zool. Mus. Hamburg, 98 species listed.)
1955c, *in* Schmidt, H. (Ed.), 1955b, pp. 5-81. (Systematic, keys to families, genera.)
1956a, pp. 55-105. (Africa, Angola, *Synacanthotermes angolensis*, n. sp., *Odontotermes* (*O.*) *chicapenensis*, n. sp., *Pericapritermes minimus*, n. sp., keys.)
1958, pp. 4-16. (Iraq, keys to winged, sold.)
1960a, pp. 43-70. (Afghanistan, Iran, Iraq distribution, descriptions and keys to winged and sold. of *Anacanthotermes ahngerianus, baeckmannianus, macrocephalus, murgabicus, septentrionalis, ubachi, vagans; Heterotermes indicola; Reticulitermes clypeatus, lucifugus; Amitermes vilis; Angulitermes dehraensis; Microcerotermes diversus, gabrielis.*)

Wilkinson, W., 1958, pp. 109-115. (West Africa, *Kalotermes spinicollis*, n. sp., imago, sold., Nkpoku; *K. exsertifrons*, n. sp., imago, sold., Nkpoku.)
1959, pp. 61-72. (East Africa, *Kalotermes sylvaticus*, n. sp., winged, sold., Uganda, Kenya; *K. angulatus*, n. sp., winged, sold., Tanganyika; *Neotermes aridus*, n. sp., winged, sold., Kenya; *Glyptotermes ignotus*, n. sp., winged, sold., Uganda.)
Williams, R. M. C., 1956, p. 128. (East Africa, erratum Williams, 1954, Proc. Roy. Ent. Soc. London (B), vol. 23, pp. 215-227, figs. 2 and 5, pp. 218 and 225 transposed, fig. 2, *Noditermes wasambaricus*, fig. 5, *Cubitermes umbratus.*)

TEMPERATURE

Anonymous, 1958h, p. 66. (Australia, Canberra, in hardwood forests presence large colony *Coptotermes frenchi* results in increased temperature within infested tree, maximum increase occurs in "nursery" region.)
1960x, pp. 41-42. (U.S., Wisconsin, evolutionary change, termites more frequent in northern U.S.; termites can become winter- or cold-hardy. In tests, termites collected in summer entered "cold stupor" at 38° F.; collected in late August and September, survived temperature near 38° for 2 months longer. Termites in soil in December in upper 6 in. soil, same depth as frost line.)

Huff, G. E., 1959, p. 61. (U.S., Indianapolis, Ind., subterranean termites in refrigerated display case, moisture in bottom due to leak.)
Pesson, P., 1959, pp. 77-79. (General, temperature habitats never fall below 15° C., go below ground to escape cold or heat, regulate temperature nests.)
Skaife, S. H., 1955, pp. 1-134. (South Africa, *Amitermes atlanticus*, temperature in mounds less than surrounding air.)
1957, pp. 373-390. (South Africa, *Kalotermes durbanensis*, temperature exposure 36° C. for 24 hr. not harmful but −10° C. for 2 to 3 hr. harmful to protozoa.)

TERMITOPHILES *

Boyer, P., 1956, pp. 111-113. (Africa, *Bellicositermes natalensis*, relation between intestinal flora and soil.)
Briton, E. B., 1957, pp. 1-185. (Australian chafers, Scarabaeidae: Melolonthinae.)
Dieuzeide, R., 1930, pp. 569-571. (North Africa, Tyroglyphid *Caloglyphus* with *Reticulitermes.*)
Fernando, W., 1957, pp. 81-84. (Ceylon, *Sphecophila ravana*, n. sp., cockroach in colony *Coptotermes ceylonicus.*)
Hindwood, K. A., 1959, pp. 1-36. (Australia, birds in termite nests, 23 species kingfishers, 13 species parrots, 4 trogons, 2 puffbirds, a jacamar, and a cotinga.)
Kistner, D. H., 1958, pp. 1-198. (Africa, Belgian Congo, India, Staphylinidae, p. 84, *Typhloponemya khandalae*, n. sp., with *Odontotermes* (*O.*) *obesus;* p. 88, *T. termitophilus* (Wasm.) with *Cubitermes fungifaber*, accidental, probably guest of ants *Dorylus;* p. 107, *Odontoxenus butteli* (Wasm.) with *Odontotermes* (*Hypotermes*) *obscuriceps;* p. 108, *O. transfuga* (Wasm.) with *Odontotermes* (*O.*) *obesus; O. longesetosus* (Cameron); *O. proximus* (Cameron); p. 110, *O. brevi-*

* Fauna and flora of nests including symbiotic forms, as well as casual seekers of shelter; some may be predacous on the host termites, or parasites.

cornis (Cameron); *O. termitophilus* Wasm.) with *Odontotermes* (*O.*) *obesus;* p. 112, *O. triarticulatus* (Kemner) with *Odontotermes* (*O.*) *javanicus; O. ceylonicus* (Wasm.) with *Odontotermes* (*O.*) *redemanni;* p. 113, *O. eutermitis* (Wasm.) with *Trinervitermes biformis; O. peradenyiae* (Wasm.) with *Odontotermes* (*O.*) *redemanni; O. splendidus* (Wasm.) with *Odontotermes* (*Hypotermes*) *obscuriceps. Odontoxenus* more primitive than myrmecophile *Doryloxenus,* not found with *Odontotermes* in Africa, transfer to *Odontotermes* after genus reached India during Miocene extension of grasslands.)

LELEUP, N., 1955, pp. 374-375. (Africa, Belgian Congo, beetles and flies.)

1960, pp. 197-206. (Africa, Belgian Congo, morphological classification insects found in nests.)

REICHENSPERGER, A. VON, 1956, pp. 81-91. (Africa, Congo, new species Coprinae.)

1957, pp. 323-324. (Africa, a new species of Coprinae.)

SALMON, J. T., 1941, p. 348. (Collembolan *Sinella termitum,* Australia, New Zealand.)

SCHMITZ, H., 1954, pp. 514-519. (Africa, Belgian Congo, Phoridae, *Aenigmatistes* and *Termitostroma,* n. gen.)

1955, pp. 33-60. (Africa, Angola and SW. Africa, 6 new phorid termitophiles.)

1955a, pp. 229-239. (Africa, phorid, *Thaumatoxena,* n. sp.)

1955b, pp. 48-66. (Africa, Belgian Congo, *Termitomyia,* n. sp.)

SEEVERS, C. H., 1957, pp. 1-334. (Termitophilous Staphylinidae, world, host relationships, phylogeny, classification, maps distribution.)

1960, pp. 825-834. (New termitophilous Staphylinidae of zoogeographic significance, Madagascar *Spirachthodes* first Old-World genus with exudatory abdominal appendages shared only with neotropical *Spirachtha.*)

SKAIFE, S. H., 1955, pp. 1-134. (South Africa, *Amitermes atlanticus,* sarcophagid fly *Termitometopia skaifei,* n. gen., n. sp.; springtail Collembola *Cyphoderus arcuatus;* white mite *Termitacarus cuneiformis,* red mite *Cosmoglyphus kramerii;* green protea beetle cetonid *Trichostetha fascicularis* scavenger beneath mounds; solpugid; termites *Microcerotermes malmesburyi, Termes winifredae* live in outer parts mounds, former not true inquiline.)

TORREALBA, J. F., and RICCARDI, B., 1941, p. 248. (Venezuela, Zaraza, *Triatoma* group not found in termite nests.)

WOMERSLEY, H., 1939, p. 174. (South Australia, *Sinella termitum.*)

TOXICOLOGY

ANONYMOUS, 1952, pp. 1-45. (U.S., fire and explosion hazards of thermal insecticidal fogging; experiences; safety precautions; flammability chemicals, toxicity, impede fire extinguishing.)

1956d, pp. 1-78. (U.S., clinical memoranda on economic poisons, aldrin, allethrin, benzene hexachloride, chlordane, chlorothion, DDT, demeton, dieldrin, diazinon, dilan, kerosene, parathion, sodium fluoroacetate, toxaphene, warfarin, xylene; formulae, formulation, uses, routes of absorption, physiological action, dangerous acute and chronic doses in man, signs and symptoms of poisoning in man, laboratory findings, pathology, differential diagnosis, treatment, reporting.)

1959, p. 62. (U.S., California, termite control operator "not responsible" for death customer following treatment chlordane, latter not registered as "ultrahazardous.")

1959r, pp. 1-21. (U.S., toxicity dieldrin to man.)

1960, pp. 9-11. (U.S., precautions in pesticide usage; 75% accidents occurred among children less than 10 years old, 90% under 5. Less than 0.9 persons per hundred thousand population die due to pesticides. 65% of accidental adult deaths due to failure to read label. Protective clothing, creams, gloves, masks, respirators. Residues, allergies, 1 min. of precautions may save life.)

1960n, pp. 51, 54-56. (U.S., safety in termite control.)

1960s, p. 10. (U.S., Georgia, South Carolina, and Arkansas, homes commercially treated with 1% chlordane; samples air collected 2 weeks to 6 months after treatment, living portions homes treated for termites contained no chlordane.)

BEECHEM, H. A., 1955, pp. 36, 50. (U.S., methyl bromide left in applicator near lethal dosage for 20 min. in auto, operator recovered.)

CONLEY, B. E., 1958, p. 18. (U.S., first aid for poisoning.)

DU BOIS, K. P., and GEILING, E. M. K., 1959, pp. 1-313. (U.S., textbook of toxicology.)

GAINES, T. B., 1960, p. 88. (Compares toxicology /LD_{50} values and symptomatology/ of 42 pesticides and 2 metabolites of DDT administered by single dose orally and dermally to Sherman strain adult rats. Includes chlorinated hydrocarbons, organic phosphates, and a group of miscellaneous pesticides.)

HAYES, W. J., 1959, p. 891. (Reports on a survey of human illnesses during antimalaria spray program in Kenya, Tanganyika, Indonesia, India, and Iran. Based on this and pertinent literature concludes that hazard of dieldrin is proportional to degree of exposure as determined by concentration of spray, area of bare skin, duration of contact, and lack of personal hygiene.)

1960, pp. 379-404. (Safety records newer compounds good because of careful labeling in the United States. Safety should be improved in all countries. Investigation required of those exposed to many times greater dosages than the general public.)

INGLE, L., 1956, pp. 1-11. (U.S., toxicity aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, lindane, methoxychlor, toxaphene: acute oral and dermal lethal dosages, tests on animals, case histories man.)

KERR, S. H., and BROGDEN, J. E., 1960, p. 19. (U.S., relative acute oral doses of parathion and malathion compared with DDT. Acute dermal toxicity higher than oral—takes more to kill. Toxicity of most insecticides given in Florida Agric. Res. Inst. Exten. Ent. Mimeogr. No. 10, rev. Apr. 1, 1960.)

KNIPLING, E. F., 1960, pp. 28-36, *in* U.S. Dept. Argic., ARS, Publ. 20-9, 1960, pp. 1-221. (U.S., soil insecticides for control termites. Insecticides responsible for fewer accidental deaths than are many other household chemicals.)

LEHMAN, A. J., 1951, pp. 122-133. (Acute toxicity of 86 pesticides. Single dose oral toxicity to rats, with symptomatology.)

1952, pp. 3-9. (Dermal toxicity of pesticides. Single 24-hr. exposures of rabbits to 39 pesticides, and multiple exposures of rabbits to 35 of these, with toxicity values and symptomatology.)

MELLAN, I., and MELLAN, E., 1956, pp. 1-150. (Symptoms and antidotes for poisons—soil poisons, wood preservatives.)

METCALF, R. L. (Ed.), 1957, pp. 1-38. (Health hazards in use of pesticides; manufacture and distribution; user; medical control, treatment; accidental poisoning; residues in food.)

NATIONAL ACAD. SCI.—NATIONAL RES. COUNC., DIV. MEDICAL SCI., 1954, pp. 1-16. (Safe handling of pesticides employed in public health.)

NATIONAL SAFETY COUNC., 1960, in Safety Education, 1960, pp. 1-4. (Safe use of pesticides in home and garden.)

NEGHERBON, W. O., 1959, pp. 1-854. (A compendium of information including toxicological data for insecticides. Arranged alphabetically, mostly by chemical names, occasionally by trade names, each section includes a general statement; physical and chemical properties; toxicological data; pharmacology, pharmacodynamics, and physiology; symptoms; phytotoxicity; toxicity for insects; precautions.)

PESTICIDES REGULATION BRANCH, U.S. DEPT. AGRIC., 1960, pp. 1-5. (Pesticides can be used safely, read and heed the label, causes of accidents, precautions.)

SCHOOL PUBLIC HEALTH, UNIV. MICHIGAN, 1954, pp. 1-50. (Industry and public health points of view of toxicology. Pest control operational hazards and precautionary measures, discussion hazards.)

SOLLMAN, T., 1957, p. 48. (Treatment of poisoning, pp. 172-181; insecticides and pesticides, specific chemicals; see index.)

STILWELL, H., 1960, pp. 34-36, 76-78. (U.S., dangers to man in use of chlorinated hydrocarbons as insecticides on the farm; advocates congressional investigation.)

U.S. PUBLIC HEALTH SERVICE, 1956, p. 78. (General summary of available toxicological data on pesticides, with symptomatology and suggestions for treatment of poisoning.)

1960, p. 31. (Entire U.S. Lists location, telephone number, and officer to be contacted at Poison Control Centers, facilities which provide to the medical profession on a 24-hr. daily basis information concerning the prevention and treatment of accidents involving ingestion of or contact with poisonous or potentially poisonous substances. Treatment is available at most of the centers.)

1961, pp. 1-38, idem, revised, April.

WARD, J. C., 1958, pp. 14-16. (U.S., use pesticides with care.)

USES IN INDUSTRY, ARTS, AND RELIGION

TREAT, I., 1957, p. 40. (Africa, Abyssinia, Somali huts built of red-brown earth taken from termite mounds, ant-proof and hard as mortar.)

WOOD PRESERVATION

ALLOUARD, P., 1956, pp. 96-97. (France, protection wood against termites and decay by simple cheap methods.)

ANONYMOUS, 1953t, p. 70. (Australia, Canberra, low percent pentachlorophenol, 0.75% dry weight of board, added to local hardboard resistant to termites.)

1954d, pp. 68-69. (Australia, plywood made from karri (*Eucalyptus diversicolor*) termite-proofed by dipping in sodium pentaborate or mixture zinc chloride and arsenic pentoxide before bonding; aldrin superior to chlordane or dieldrin as preservative.)

1956, pp. 1-4. (U.S., availability of pressure-treated lumber, list localities, pictorial sampling, list lumber companies.)

1956a, pp. 1-22. (U.S., how to prevent decay and termite damage in houses.)

1956b, pp. 1-24. (U.S., how to build homes that will outlive the mortgage.)

1956i, p. 67. (Australia, Canberra, plastics resistant to termites, polystyrene, unsaturated polyesters, epoxylenes, and phenolic laminates, polyvinyl chloride and cellulose acetate become susceptible when plasticized.)

1957g, pp. 1-26. (U.S., Mississippi State Highway Dept., southern yellow pine stakes, coal tar creosote 1934-1957, 100% perfect; pentachlorophenol 1938-1957, 100% perfect; chemonite 100% perfect; crewood, 1933-1957, 90%, 1934-1957, 100%; osmosar, 1935-1951, 0%.)

1957h, pp. 1-15. (U.S., Mississippi, State Highway Dept., southern yellow pine square posts, coal tar creosote 1931-1957, 90% perfect; 1933-1953, 100%; 1938-1957, 95%; 1939-1957, 100%; Douglas fir square posts, 1944-1957, coal tar creosote, 100%.)

1958e, pp. 16-19. (U.S., 1957 industry production 6.5% increase over 1956, which was 4% over 1955; volume 274.5 million cu. ft., 95% treated products pressure treated, lumber and timber increased 2%, creosote used for 80% all material, pentachlorophenol 13%.)

1958f, p. 4. (U.S., Georgia, all large lumber users, responsible for maintenance properties, use treated wood, homeowners ignorant and not concerned until now.)

1958h, p. 66. (Australia, Canberra, surface treatments with creosote, sodium arsenite, chlordane, dieldrin and pentachlorophenol have given at least 2 years' protection against *Nasutitermes exitiosus*.)

1958l, pp. 113-119. (U.S., FHA minimum property standards, protection against termites and decay, treated lumber alternate control method.)

1956o, p. 63. (Australia, as surface treatment pentachlorophenol effective for 3 years against *Nasutitermes exitiosus*, other materials failed after 2 years.)

1959j, pp. 30, 32, 34. (U.S., Kentucky, Fort Campbell, pretreatment studs for outside walls, dipped up to 4 ft. high in 5% oil solution pentachlorophenol solution dyed red, rest of studs sprayed.)

1959l, pp. 19, 22, 24. (U.S., 15% decline in treated lumber products (41.7 million cu. ft.) from 1957; fire-retardant treatment showed a 13% increase from 7.8 million bd. ft. to 8.9 million. Use liquid preservatives declined 41.5 million gal. or 18%, solid declined 5%. Straight creosote declined 14% (14 million gal.); creosote petroleum solutions declined 26%, creosote and coal tar declined 18%. Volume creosote-pentachlorophenol solutions rose from 300,000 gal. in 1957 to 2.3 million gal. in 1958. Use pentachlorophenol decreased 3%; water-borne preservatives, except for Tanalith and Osmosalts, declined 1% for Celcure, 40% for Boliden salt. Tanalith gained 1%, Osmosalts 20%. Creosote or solutions were used for 76% of all material treated, pentachlorophenol for 16%, all other preservatives for 8%. 95% material pressure treated. Lumber and timbers treated declined 7%. Creosote and creosote solutions used for 50% total. Volume treated with Tanalith increased 3%, with pentachlorophenol increased less than 1%, with Osmosalts increased 48%. Treatment piles declined 10%, plywood increased 55%, highway posts 9%. Fire-retardant treatments for lumber and plywood in-

cluded 1,019,963 lb. of Minalith; 705,042 lb. Protexal and Pyresote; 232,062 lb. chromated zinc chloride, 98,063 lb. of other chemicals.)

1959m, pp. 12-14, 16. (U.S., Jacksonville, Fla., building constructed of untreated lumber in 1954, inspected by VA badly damaged by decay. Hidden value of house built in 1956 of pressure-treated lumber. Cost allowed in mortgage loan and loan insurance, protected against both termites and decay, estimated in U.S. Dept. Agriculture's Wood Handbook at 500 million dollars per year.)

1959o, pp. 6-7. (U.S., Augusta, Ga., home damaged by termites, protection pressure-treated lumber.)

1959p, pp. 1-24. (U.S., Jackson, Miss., State Highway Dept., open grain southern yellow pine, coal tar creosote, 16 lb. per cu. ft., 1934-1959, 100% perfect; pentachlorophenol 5%, 10.72 lb. per cu. ft., 1938-1959, 100% perfect; chemonite 1938-1959, 100% perfect.)

1959q, pp. 1-15. (U.S., Mississippi State Highway Dept., yellow pine square posts, coal tar creosote 1931-1959, 90% effective; 1939-1957, 100% perfect—test closed; 1938-1959, 95% perfect; 1938-1957, 100% perfect—test closed; Douglas fir round posts, coal tar creosote, 1944-1959, 100% perfect.)

1959s, p. 66. (Western Australia, dip-diffusion treatments of *Pinus radiata* with sodium arsenite or fluoroborate-chromium-arsenic mixture protect against *Coptotermes* as best available pressure treatments. Chlordane or white arsenic added to glue line of karri plywood at all levels effective against termites. Plastic, gypsum plaster boards and insecticide treated hardboards with small additions of aldrin or dieldrin effective. Both dense and "no-fines" concrete termite-proofed by adding small amount dieldrin. Surface treatments with 5% pentachlorophenol only effective wood preservative against *Nasutitermes exitiosus* after 3 years. Tests of more than 30 types of plastic-covered, lead-sheathed, or bitimum-served cables have been under way against *Mastotermes* at Rollingstone, Queensland.)

1960a, pp. 14-17. (U.S., 3 types houses, basement, crawl-space, slab-on-ground, (1) limited protection: for basement houses, pressure preserved sills (cost $20 to $40 more); for crawl-space houses, pressure preserved lumber in substructure (cost $120-$150 more); for slab-on-ground houses, pressure preserved sills, plates, sleepers, columns, studs, porch lumber. (2) full protection: pressure preserve all framing lumber, cost 2% total price. Sills must be preserved, condensation leads to decay, settling. Shields repudiated, become racket, no protection against decay. Soil poisoning only short-term protection, will not prevent decay. Pressure-treated wood safest.)

1960j, p. 4. (U.S., homes up to 45 years old prove pressure-treated lumber provides most efficient protection.)

1960m, p. 4. (U.S., properly pressure-preserved lumber most effective protection against decay and termites, low cost insurance. For limited protection, cost $20 to $40 for average-sized home in areas where termites and decay range from slight to moderate; where range from moderate to heavy (28 States and D.C.) $120-$150. For full protection necessary in 8 States, especially in Florida and California, use pressure-treated lumber from sills to roof boards, cost 2 to 2½ percent additional.)

1960c,[1] pp. 20, 24. (Hawaii, termites controlled by use pressure-treated wood and kiln drying, local plants, Wolman salts for lumber and plywood, pentachlorophenol for millwork and trim, 80% wood treated Douglas fir, 10% Philippine mahogany.)

Barnacle, J. E., 1959, pp. 1-3. (Australia, a pole test against *Mastotermes darwiniensis*.)

Becker, G., 1958, pp. 123-142. (Germany, organic solvents; preparations added to glues, especially Kaurit glue, successful in protecting against termites in Tropics.)

Behr, E. H., 1960, pp. 9-10, 12, 14, 16, 19-20. (U.S., describes wood rots, how to treat, types of preservatives, penetration.)

Blew, J. O., Jr., 1956, pp. 1-7. (U.S., comparison wood preservatives in stake tests.)

1957, pp. 1-48. (U.S., comparison wood preservatives in stake tests.)

1958, pp. 1-8. (U.S., comparison wood preservatives in stake tests.)

1959, pp. 1-8. (U.S., comparison wood preservatives in stake tests. Mississippi, Wisconsin, Louisiana, Florida, Canal Zone, Panama, superficial treatments by dipping and brushing with coal tar creosote and petroleum oils containing copper naph-

thenate, zinc naphthenate, phenyl mercury oleate have added a few months to 4 years to the life of untreated stakes. Some water-borne preservatives have provided less protection than standard preservative oils, when retentions have corresponded to commercial usage, others compare favorably.)

1960, pp. 1-8. (U.S., In Mississippi stakes impregnated with 0.2 lb. fluor chrome arsenate phenol (Tanalith) per cu. ft. had an average life of 10 years; stakes pressure treated with the fire-retarding formulation containing ammonium phosphate and ammonium sulfate lasted 2 to 3 years; with these salts plus borax and boric acid stakes lasted 6 years; copper naphthenate is more effective than zinc naphthenate; stakes pressure treated with phenyl mercury oleate in naphtha have lasted 5 to 9 years. In Canal Zone, Panama, stakes pressure treated wtih chromated zinc arsenate (Boliden salt) 0.33 lb. per cu. ft. had an average life of 9 years, while those with 1.0 lb. had an average life of 15.3 years; stakes treated with 0.6 lb. per cu. ft. of Tanalith had an average life of 14 years; 5% solution of pentachlorophenol in light fuel oil—5-10 lb. per cu. ft. have lasted 14 years; 8 to 16 lb. per cu. ft. of coal tar creosote have lasted over 13 years.)

1961, pp. 1-8. (Mississippi, stakes pressure treated with ammonium phosphate and sulfate lasted on the average 2-3 years. With these salts plus borax and boric acid the life on an average was 4 years.)

BLEW, J. O., JR., and JOHNSTON, H. R., 1956, pp. 272-281. (International termite exposure test, 22d progress report.)

1957, pp. 225-234. (International termite exposure test, 23d progress report.)

BLEW, J. O., JR., and KULP, J. W., 1956, pp. 1-13. (U.S., Mississippi, comparison wood preservatives in post study.)

1957, pp. 1-16. (U.S., Mississippi, comparison wood preservatives in post study.)

1958, pp. 1-14. (U.S., Mississippi, comparison wood preservatives in post study.)

1959, pp. 1-14. (U.S., Mississippi, comparison wood preservatives in post study, untreated southern yellow pine posts installed from 1936-1938 had an average life of 3.3 years. Untreated longleaf pine posts installed in 1949 had an average life of 2.3 years, those treated with No. 2 fuel oil or Wyoming residual petroleum oil retention 5 to 7 lb. per cu. ft. have an average life of 8 to 9 years. Of southern yellow pine posts, installed from 1936-1941, treated with borax-boric acid all failed after 20 years, average life 10.6 years. Posts treated with the following preservatives have had failures totaling less than 10% and should last 33 years or longer on an average: water gas tar; 50-50 solution of creosote–crankcase oil (latter may contain chlorinated naphthalenes which injure cattle on contact); tetrachlorophenol 4.8% in crankcase oil; pentachlorophenol 3% and 4.8% in crankcase oil; copper sulfate and sodium arsenate applied by double diffusion and zinc meta arsenite. Posts in test in 1936-1941 treated with other preservatives have an estimated average life of 13 to 32 years.)

1960, pp. 1-16. (U.S., Mississippi, posts treated with the following preservatives (installed from 1936-1941) have had failures totaling 10% or less, should last 36 years or longer on an average; water gas tar; 50-50 solution of creosote—crankcase oil; pentachlorophenol 3% and 4.8% in crankcase oil; copper sulfate and sodium arsenate applied by double diffusion and zinc meta arsenite. Posts treated with other preservatives have an estimated average life of 13 to 35 years.)

1961, pp. 1-14. (U.S., Mississippi, experimental untreated southern yellow pine posts installed from 1936 to 1938 at the Harrison Experimental Forest, Saucier, Miss., had an average life of 3.3 years. Untreated longleaf pine posts installed in 1949 had an average life of 2.3 years, while those treated with a No. 2 fuel oil and with Wyoming residual petroleum oil have an estimated average life of 5 and 8 years, respectively. Of southern yellow pine posts installed from 1936 to 1941, those treated with borax-boric acid have all failed with an average life of 10.6 years and those treated at the groundline and top with Osmoplastic have all failed after an average life of 11.2 years. Posts treated with the following preservatives and installed from 1936 to 1941 have had failures totaling 10 percent or less of the number installed and should last 38 years or longer on an average. Pentachlorophenol, 3% and 4.8% in crankcase oil; copper sulfate and sodium arsenate applied by double diffusion; and zinc meta arsenite. Posts in tests in 1936 to 1941 treated with other

preservatives have an estimated average life of 8 to 37 years.

BROWN, G. E., and ALDEN, H. M., 1960, pp. 434-438. (U.S., pentachlorophenol and sodium pentachlorophenate to protect particle board.)

BULMAN, R. A., 1959, p. 15. (Africa, protection buildings by efficient wood preservatives for timber.)

CARR, D. R., 1957, pp. 1-19. (New Zealand, decay and subterranean termites not as injurious as native drywood termite *Calotermes brounii*. Boric acid treatment satisfactory for weather boards but not for wood in contact with ground. Pressure treatments with coal tar creosote, 5% pentachlorophenol, zinc and copper naphthenates or boric acid used in New Zealand.)

CHAPMAN, A. W., 1958, pp. 1-9. (U.S., Ferox process for insulation boards.)

CLAGG, C. F., and KECK, C. B., 1960. (Hawaii, *Coptotermes formosanus* entered and damaged commercially pressure-treated lumber.)

CLEMENTS, W. B., 1956, pp. 18-20, 31-34. (U.S., Florida, termite damage increasing due to scarcity virgin timber, turpentining, poor construction, land clearing and slab construction. Treated lumber will protect.)

DILLON, R. M. (Ed.), 1956, pp. 1-60. (U.S., protection against decay and termites in residential construction, Nat. Acad. Sci.—Nat. Res. Counc. for FHA.)

1958, pp. 1-33. (Addendum A, all structural lumber must be treated to give full protection against termites.)

EBELING, W., and PENCE, R. J., 1958a, pp. 1-16. (U.S., California, treating all rough lumber in house would add 3% to cost, or less expensive, treat all wood up to and including subfloor, cost 10 cents per sq. ft.)

GAY, F. J., GREAVES, T., HOLDAWAY, F. G., and WETHERLY, A. H., 1955, pp. 1-60. (Australia, method maintaining laboratory colonies *Nasutitermes exitiosus, Coptotermes lacteus,* and *C. acinaciformis.*)

1957, pp. 1-31. (Australia, field testing techniques.)

GAY, F. J., HARROW, K. M., and WETHERLY, A. H., 1958, pp. 1-14. (Australia, antitermite comparative studies in laboratory, value over 1.09%, boric acid, zinc chloride, 1.8%, "Tanalith U," 0.90%.)

GAY, F. J., and WETHERLY, A. H., 1958, pp. 1-14. (Australia, antitermite value some chlorinated naphthalenes and phenols, low percentages 1 to 2.16% did not give complete protection.)

1958a, pp. 1-13. (Australia, hardboards with 0.75% by weight pentachlorophenol or 0.9% arsenious oxide resistant.)

GÖSSWALD, K., and KLOFT, W., 1959, pp. 268-278. (Germany, termite proofing textiles, laboratory tests with *Kalotermes flavicollis.*)

1959a, pp. 257-278. (Idem.)

GRAF, J. E., 1956, pp. 16-17 (Canal Zone, Panama, Barro Colorado Island, wood-preservative tests.)

HALSTED, C. T., 1958, pp. 116-117. (U.S., termite proofing plywood.)

HARRIS, W. V., and BROWN, E. S., 1958, pp. 737-750. (Solomon Islands.)

HARTMAN, C. F., 1960, pp. 1-7. (U.S., fire-retardant lumber is an ancient building material, Greeks used vinegar in 4th century B.C.; ammonium sulfate and ammonium phosphate combination patented in 1893 by Max Bachert in New York City. Combination chromated zinc chloride with fire retardant salts patented in 1935 by Protexol Corp. Control by liberated water of crystallization, creation glazed surface, emission noncombustible smothering gas, creation clinkerlike charcoal, insulation against flame. Discussion various tests, such as tunnel, etc.)

HATFIELD, I., 1958, pp. 36, 38, 40, 42, 44, (U.S., most economical combined fungicide and wood insect control chemical —pentachlorophenol, "Woodtreat TC," 10% pentachlorophenol by weight oil in water emulsion, coating for wood, penetration equal to 20 brush coatings.)

HATFIELD, I., and ALLEN, R. VAN, 1956, pp. 32, 34, 78. (U.S., Woodtreat TC, containing pentachlorophenol.)

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caused by either subterranean termites or decay. Use of even small amount wood preservatives worth while; copper component desirable.)

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1958, pp. 1-9. (U.S., relationship subterranean termite attack to varying retentions water-borne preservatives, from 0.500 lb. per cu. ft. for copper–zinc compound to 0.031 lb. per cu. ft. for copper–arsenic preservative.)

1959, pp. 220-223. (U.S., Douglas fir plywood treated resistant.)

LUND, H. O., 1959, pp. 533-534. (U.S., Georgia, laboratory tests prove *Reticulitermes flavipes* can build tubes over wood treated by pressure or soaking with creosote, osmose salts, Wolman salts, and copper naphthenate.)

1960, pp. 32, 34, 36. (U.S., Georgia, tests show termites can tunnel over wood freshly treated with creosote, copper naphthenate, Wolman salts, osmose salts within a month; or over wood treated 24 months with pentachlorophenol; 16 months with copperized chromated zinc chloride.)

1961, pp. 63-64. (U.S., termites built tunnels to top of wood treated with Osmose in 9 days; over creosoted wood in 19 days; wood protected with copper naphthenate spanned in 27 days; with Wolman salts 28 days; copperized chromated zinc chloride 16 months; with pentachlorophenol 24 months.)

MARTÍNEZ, J. B., 1952, pp. 1-550. (Conservation of wood, studies of oleaginous antiseptics.)

MELLAN, I., and MELLAN, E., 1956, pp. 1-150. (Dictionary of poisons, wood preservatives included.)

MERRICK, G. D., 1955, pp. 319-352. (U.S., quantity of wood treated and preservatives used in 1954, 250.7 million cu. ft., 14% less than in 1953.)

1956, pp. 289-320. (U.S., 3% more treated wood used in 1955 than in 1954.)

1957, pp. 281-314. (U.S., industry production in 1956 4% over 1955.)

1958, pp. 259-293. (U.S., 16.6 million cu. ft., or 6.5% more wood treated in 1957 than in 1956, use creosote increased 4%, pentachlorophenol decreased 9%.)

1959, pp. 253-287. (U.S., in 1958 volume wood treated the smallest in many years, a decrease of 15% from 1957, only 232.8 million cu. ft., a decrease of 41.7 million cu. ft. from 1957. Use of liquid preservatives declined 18%. Creosote decreased 14%, creosote petroleum 26%, creosote coal tar 18%, creosote pentachlorophenol solutions increased to 2.3 million gal., pentachlorophenol decreased 3%. Water-borne preservatives decreased except Tanalith and Osmosalts, former increased 1%, latter 2%. Creosote or creosote solutions used for 76% of all treated wood, pentachlorophenol 16%; others 8%. 95% treatments by pressure. Preservative-treated lumber and timber decreased 7%.)

1960, pp. 249-283. (U.S., the volume of wood products treated by the wood-preserving industry in 1959 was 214.5 million cu. ft., a decrease of 18.5 million cu. ft. or almost 8% from 1958, and to the lowest level since 1935. Changes from 1958 are: poles +6%, crossties −29%, lumber and timbers +13%, fence posts +6%, piles −9%, switch ties −33%, cross arms +6%, miscellaneous +3%.

The use of liquid preservatives decreased 12 million gal. or 6%, while the use of solids increased 3.8 million lb., or 18%

The use of creosote decreased 7%, creosote in pentachlorophenol-creosote solutions more than tripled; the use of pentachlorophenol increased nearly 19%; the use of all water-borne preservatives except Minalith increased.)

MEYER, F. J., and SPALDING, D. H., 1958, pp. 1-10. (U.S., treatments for fiberboard, hardboard, particle board.)

MOORE, R. F., 1958, pp. 6, 8. (U.S., New Orleans, La., $60,000 plantation home, southern yellow pine, umbrella roof, well above ground, wood pressure preserved with 8 lb. pentachlorophenol per cu. ft., Ricciuti Associates.)

PAGE, R. H., 1958, pp. 7, 14. (U.S., Georgia, Georgia Forestry Commission and U.S. Forest Service adopt recommendations

in "Wood preservation in home construction.")

PUTNAM, R. B., 1957, pp. 360-362. (U.S., how and what to specify in the preservative treatment of wood for buildings.)

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ROBERTS, L., 1957, p. 496. (U.S., propolis—bee glue—vs. wood preservation for beehives.)

SANDERMANN, W., 1955, *in* Schmidt, H. (Ed.), 1955b, pp. 208-244. (Chemical basis wood protectants for use against termites and methods application.)

SELBO, M. L., 1960, pp. 10-14. (U.S., laminated timbers properly glued with resorcinol or phenyl resorcinol adhesives and adequately treated with a suitable preservative effective; treating wood after glueing most practical, with certain species—preservatives feasible to glue already treated lumber. Tanalith showed least interference with bonding.)

SHEPARD, H. H. (Ed.), 1960, pp. 1-250. (U.S., testing resistance chemically-treated textiles to insect damage, chap. 7, M. M. Walton and H. H. Shepard.)

SNYDER, T. E., 1956b, p. 18. (Canal Zone, Panama, Barro Colorado Island, 30-year test proves treated wood building is termite proof.)

1956c, pp. 20, 22. (Summary results "International Termite Exposure Test.")

STOLLOY, I., 1958, pp. 1-6. (U.S., treatments, particle board, to increase resistance to fungi and termites.)

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TU, T., 1957, pp. 13-18. (Formosa, blue camphor oil effective wood preservative.)

WAKEMAN, C., 1959, p. 12. (U.S., Los Angeles, Calif., pressure-treated sills and structural framing (Douglas fir) protects house against termites and decay.)

WOLCOTT, G. N., 1955a, pp. 115-149. (Puerto Rico, organic repellents tested against *Cryptotermes brevis*.)

1956, pp. 85-86. (Puerto Rico, 1% pentachlorophenol protects wood against drywood termite attack for more than 11 years.)

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