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THE HIPPOBOSCIDAE OF THE GALAPAGOS ARCHIPELAGO (NOTES ON THE HIPPOBOSCIDAE. 8.) WITH AN APPENDIX ON THE TABANIDAE.

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The Templeton Crocker Expedition obtained three of the six species of Hippoboscidæ known to occur in the Galapagos Islands. Since the status of some of the names applied to these flies is as yet open to discussion, while I have had the opportunity to study material from the Galapagos from several sources, a review of the entire fauna may be useful. Three genera are represented thus far, *viz.*, *Olfersia*, *Lynchia*, and *Microlynchia*, the first by three, the second by two, and the third by one species.[1]

Olfersia Wiedemann

(*Feronia* Leach; *Pseudolfersia* Coquillett)

The genus is reviewed in a paper now being printed in Psyche (1933, XL.) The three species known from the Galapagos may be separated as follows:

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[1] I am much indebted to Mr. J. L. Peters, Assistant Curator of Ornithology, Museum of Comparative Zoölogy, for valuable information concerning several of the birds mentioned in this paper.

1. Posterior orbits (above eyes) much shorter than the greatest width of the inner orbits; occipital margins of posterior orbits and of postvertex scarcely produced and separated by shallow curves. Second basal cell long, the second section of the fourth longitudinal vein at most one and one-third times the length of the first section of the fifth (the two sections usually of about the same length). Third longitudinal vein bare or at most with a few minute setæ on apical portion. Postvertex forming one, undivided smooth plate from occiput to frontoclypeus.. *O. fossulata* Macquart.

Posterior orbits about as long as the greatest width of the inner orbits; occipital margins of posterior orbits and of postvertex strongly produced behind and separated from one another by deep curved notches. Postvertex divided by a slight transverse depression into two areas.....2.

2. Occipital margin of postvertex somewhat more produced behind than the posterior orbits. Third longitudinal vein setulose throughout. Cross-vein closing second basal cell very oblique, the upper outer angle of the cell acute.....*O. spinifera* (Leach).

Occipital margins of postvertex and of posterior orbits about equally produced behind. Third longitudinal vein bare or at most with a few setæ toward apex. Cross-vein closing second basal cell nearly vertical, the upper outer angle of the cell almost square. .....*O. erythropsis* Bigot.

Olfersia fossulata Macquart

Olfersia fossulata Macquart, 1843, Mém. Soc. Sci. Lille, (1842), p. 434 (no sex; Brazil, no host); 1843, Dipt. Exot., II, pt. 3, p. 277; C. W. Johnson, 1924, Zoologica, New York, V. No. 8, p. 91 (Daphne Major Island, off *Pelecanus fuscus occidentalis);* Curran, 1932, Nyt Mag. Naturvidenskab., LXXI, p. 366; J. Bequaert, 1933, Psyche, XL.

Pseudolfersia fossulata Coquillett, 1901, Proc. Washington (D. C.) Ac. Sci., III, p. 379 (Wenman Island, no host).

I have not seen the specimens recorded by Johnson and by Coquillett from the Galapagos, but there is no reason to doubt the identifications.

O. fossulata is a common species along the coasts of western South America, where it is sometimes found in large numbers on young birds, especially on the Guanay, the White Gannet, Belcher's Gull, and Pelicans.

Olfersia spinifera (Leach)

Feronia spinifera Leach, 1817, On the Genera and Species of Eproboscideous Insects, p. 11, Pl. XXVI, figs. 1-3 (no sex, no locality, no host).

Olfersia spinifera C. W. Johnson, 1924, Zoologica, New York, V. No. 8, p. 91 (Tower Island, off *Fregata aquila);* Curran, 1932, Nyt Mag. Naturvidenskab., LXXI, p. 366 (Floreana or Charles Island, off Man-o'-war bird); J. Bequaert, 1933, Psyche, XL.

Darwin Bay, Tower Island, without host, one specimen (M. Willows Jr. Coll.—Templeton Crocker Expedition, Calif. Acad. Sci.); Tower Island, off Frigate Bird, *Fregata minor ridgwayi*

Mathews, April 15, 1930 (J. P. Chapin Coll.—Astor Galapagos Exp., Am. M. N. H.), and off Frigate Bird, two males, April 15, 1928 (W. S. Brooks Coll.—Mus. Comp. Zoöl.) In addition, I have seen three females and one male, part of the material recorded by C. W. Johnson from Tower Island, and some of the specimens recorded by C. H. Curran from Post Office Bay, Floreana (Charles) Island.

O. spinifera is a common and widespread parasite of Frigate or Man-o'-war birds (species of *Fregata*), in the Pacific and Atlantic oceans. I have seen also a few specimens taken off Pelicans and Cormorants.

Two specimens, collected by Dr. J. P. Chapin, bear interesting parasitic mites of the genus *Myialges* (see G. F. Ferris, 1928, Ent. News, XXXIX, pp. 137-140, Pl. III). In one fly a female mite is fixed in the first longitudinal vein, on the upper side and close to the base of the left wing. In the other specimen, a female mite, surrounded by numerous stalked eggs, is attached to the left mesopleuron immediately behind the articulation of the fore leg.

Olfersia erythropsis Bigot

Olfersia erythropsis Bigot, 1885, Ann. Soc. Ent. France, (6) V, p. 239 (no sex, New Caledonia, no host); J. Bequaert, 1933, Psyche, XL.

Pseudolfersia diomedeæ Coquillett, 1901, Proc. Washington (D. C.) Acad. Sci., III, p. 379 (no sex, Albemarle Island, off Albatross, *Diomedea irrorata*).

Olfersia diomedeæ Curran, 1932, Nyt Mag. Naturvidenskab., LXXI, p. 366.

Pseudolfersia spinifera Ferris and Cole, 1922, Parasitology, XIV, pt. 2, p. 196 (in part), figs. 13 and 14 A-C (drawings of male paratype of *P. diomedeæ*). Not of Leach.

Indefatigable Island, without host, one specimen (M. Willows Jr. Coll.—Templeton Crocker Exp., Calif. Acad. Sci.); Hood Island, off *Diomedea irrorata*, one specimen (F. X. Williams.—Calif. Acad. Sci.). I have also studied the types of *P. diomedeæ*, from Albemarle Island, at the U. S. National Museum and in Professor G. F. Ferris' collection.

O. erythropsis I have seen also from the Bahamas, Desecheo Island (near Porto Rico), Clarion Island (off the western coast of Mexico), Laysan Island, the Marquesas, the Tahiti Islands, and the Caroline Islands. The hosts known to me are the Albatross, *Diomedea irrorata* Salvin, the Red-tailed Tropic-bird, *Phaëton rubricauda* Boddaert, the White-bellied Booby, *Sula leucogaster* (Boddaert), the Small Noddy, *Anous minutus* Boie, the Wedge-tailed Shearwater, *Puffinus cuneatus* Salvin, and the Sooty Tern, *Sterna fuscata* Linnæus.

Lynchia Weyenbergh

(*Olfersia* of Authors; *Icosta* Speiser; *Ornithoponus* Aldrich)

The two species of the Galapagos are very readily separated as follows:

1. Large species. Wing 7.5 to 8.5 mm. long. Posterior fourth to third of anal cell (Cu+1st An) bare on the upper side. Inner orbital bristles of frons very numerous. Postvertex without anterior pit-like depression..... *L. nigra* (Perty).

   Small species. Wing 5 to 5.5 mm. long. Anal cell (Cu+1st An) entirely covered with setulæ on the upper side. Inner orbital bristles of frons moderately numerous. Postvertex anteriorly with a more or less pronounced pit-like depression... *L. albipennis* (Say).

Lynchia nigra (Perty)

Hippobosca nigra Perty, 1833, Delectus Anim. Artic. Brasil., III, p. 190, Pl. XXXVII, fig. 15 (no sex, no host, State of Piauhy, Brazil).

Lynchia nigra J. Bequaert, 1933, Psyche, XL, pp. 70 and 79.

Ornithomyia intertropica Walker, 1849, List Dipt. Brit. Mus., IV, p. 1144 (no sex, no host, Galapagos).

Ornithoponus americanus C. W. Johnson, 1924, Zoologica, New York, V, No. 8, p. 91 (off *Buteo galapagoensis;* Seymour Bay, Indefatigable Island); Curran, 1932, Nyt Mag. Naturvidenskab., LXXI, p. 366 Santa Cruz, (Indefatigable Island). Not of Leach.

Indefatigable Island, three females, off *Buteo galapagoensis* (Gould) (J. P. Chapin Coll.—Astor Exp., Am. M. N. H.). I have also seen two of the specimens, from Indefatigable, erroneously referred to *O. americanus* by Johnson. I assume that the specimen recorded by Curran belongs to the same species, but I have not studied it. I have never yet seen true *L. americana* (Leach) from south of Mexico.

L. nigra probably occurs over most of North and South America, since I have seen it also from Quebec, British Columbia, Colorado, Montana, New Mexico, Texas, Mexico, Republic of Honduras, Panama, Brazil, and Bolivia, as well as from the Hawaiian Islands. The hosts are various diurnal birds of prey. I have fully discussed this species in a recent paper (1933).

Lynchia albipennis (Say)

Olfersia albipennis Say, 1823, Jl. Acad. Nat. Sci. Philadelphia, III, p. 101 (no sex, off Great Blue Heron, *Ardea herodias* Linnæus, no locality); Swenk, 1916, Jl. New York Ent. Soc., XXIV, p. 126.

Ornithoponus intertropicus C. W. Johnson, 1924, Zoologica, New York, V, No. 8, p. 91 (off *Butorides sundevalli* Reichenow, Seymour Bay, Indefatigable Island); Curran, 1932, Nyt Mag. Naturvidenskab., LXXI, p. 366. Not of Walker.

Narborough Island, seven specimens, off *Ardea herodias cognata* Bangs, May 28, 1932 (M. Willows Jr. Coll.—Templeton Crocker

Exp., Calif. Acad. Sci.); James Island, one specimen, without host, June 4, 1932 (M. Willows Jr. Coll.—Templeton Crocker Exp., Calif. Acad. Sci.); North Seymour Island, two specimens, without host, June 12, 1932 (M. Willows Jr. Coll.—Templeton Crocker Expedition, Calif. Acad. Sci.). Tower Island, one specimen, off Yellow-crowned Night Heron, *Nyctanassa violacea pauper* (Sclater and Salvin), April 15, 1928 (W. S. Brooks Coll.—Mus. Comp. Zoöl.). I have also seen one of the specimens recorded by Johnson from Indefatigable as "*Ornithoponus intertropicus*."

The Galapagos flies listed above agree in every respect with North American specimens of *L. albipennis*. I have also seen the species from the Republic of Honduras. It is, moreover, an open question whether this species is really distinct from the Old World *L. ardeæ* (Macquart), which I have seen from Sicily (the type locality), the Island of Rhodus, and the Belgian Congo. A most careful comparison of Old World specimens of *ardeæ* and New World specimens of *albipennis*, fails to disclose reliable differences.

In America, *L. albipennis* is a frequent parasite of wading birds, especially of Herons.

Microlynchia Ad. Lutz, Neiva and da Costa Lima

Microlynchia agrees with *Pseudolynchia* in most particulars, except the following. (1) The sides of the scutellum are rounded off, not produced into flattened, strongly ciliate, right angles. (2) The second longitudinal vein ends freely in the costa, while in *Pseudolynchia* its apical portion runs for a long stretch side by side with the costa, the two veins gradually coalescing. (3) Ocelli are usually more or less developed, one, two, or three being visible; but they may be entirely lacking, so that this character has not the value that was originally given it.

Only one species was known with certainty in the genus, but I have seen a second one, as yet undescribed.

Microlynchia pusilla (Speiser)

Lynchia pusilla Speiser, 1902, Zeitschr. Syst. Hym. Dipt., II, p. 157 (no sex, no host, Cuba); 1907, Ent. News, XVIII, p. 104.

Microlynchia pusilla Ad. Lutz, Neiva and da Costa Lima, 1915, Mem. Inst. Osw. Cruz, VII, p. 185, Pl. XXVII, fig. 6, and Pl. XXVIII, fig. 6; Ad. Lutz, 1928, Est. Zoöl. Paras. Venezolanas, p. 9; Ferris, 1930, Can. Ent., LXII, p. 66, figs. 3-4 (♀ ♂).

Hood Island, one specimen, off *Buteo galapagoensis* (Gould), April 5, 1929 (W. S. Brooks Coll.—Mus. Comp. Zoöl.)

The specific characters of *M. pusilla* will be discussed elsewhere. Meanwhile it will be readily recognized from Ferris' excellent drawings. This parasite seems to be very widely distributed in the New World. I have seen it also from Arizona and Texas, and there are

published records from Cuba, Venezuela, and Brazil (Rio de Janeiro, Minas Geraes, and Espirito Santo). In the United States it has been found on Domestic Pigeon, on Quail, *Callipepla squamata pallida* Brewster (in Arizona), and on Roadrunner, *Geococcyx californianus* (Lesson) (in Texas). In South America it is recorded more particularly from wild pigeons, *Scardafella squammata* (Lesson) (= *squamosa* Temminck), *Columbigallina talpacoti* (Temminck), and *Leptotila rufaxilla* (Richard and Bernard).

APPENDIX: TABANIDÆ

So far as known, only one species of horse-fly occurs in the Galapagos Archipelago.

Tabanus (Neotabanus) vittiger Thomson

Tabanus vittiger C. G. Thomson, 1868, Svensk. Freg. Eugenies Resa, Vet. Iakttag., II, Zoöl., Pt. 1, Insekter, Heft 12, p. 451 (♀ ; Galapagos Islands); Hunter, 1901, Trans. Amer. Ent. Soc., XXVII, p. 144; Kertész, 1900, Cat. Taban., p. 77; 1908, Cat. Dipt., III, p. 292; Coquillett, 1901, Proc. Washington (D. C.) Acad. Sci., III, p. 373 (James Island, Indefatigable Island, Albemarle Island); Surcouf, 1921, Gen. Insect., Taban., p. 88; C. W. Johnson, 1924, Zoologica, New York, V, No. 8, p. 87 (Conway and Seymour bays, Indefatigable Island); Curran, 1932, Nyt Mag. Naturvidenskab., LXXI, p. 349 (♀, Floreana or Charles Island).

Five females from Chatham Island, April 18, 1932 (M. Willows Jr. Coll.—Templeton Crocker Expedition, Calif. Acad. Sci.) I have also seen some of the specimens recorded by C. W. Johnson in 1924 from Indefatigable, and in 1932 by Curran from Floreana. The species seems to be found throughout the Archipelago. Since the known dates of capture fall in January, April, August, October and November, this fly is probably on the wing most of the year. The male is as yet undescribed.

T. vittiger belongs to the group of trivittate species, of which *T. tæniola* is a common North American representative. If one wishes to segregate these species in a subgenus, the name *Neotabanus* Ad. Lutz should be used for the group. *Neotabanus* was validly established in 1909 by Ad. Lutz (in a publication entitled "Instituto Oswaldo Cruz em Manguinhos," Rio de Janeiro, p. 29), two years before the homonym *Neotabanus* Ricardo (1911, Records Indian Mus., IV, p. 363, for an Indian species, *Neotabanus ceylonicus* Ricardo, 1911). In 1927 (Konowia, VI, pt. 1, p. 50), Enderlein designated as type of *Neotabanus* Ad. Lutz, *Tabanus triangulum* Wiedemann, one of the species originally included. The subgeneric name *Tæniotabanus* Kröber (1932, Rev. de Entomologia, S. Paulo, II, pt. 2, p. 201, without species) is a synonym of *Neotabanus* Ad. Lutz, 1909.

In the group of trivittate *Tabanus*, *T. vittiger* may be recognized by the following combination of characters: Frons very wide, about

two and a half times as long as wide at vertex, with the inner orbits markedly converging below, where the frons is about three-fourths the width of the vertex; frontal callosity russet, broad and short, pyriform or square, narrowly separated from inner orbits, connected with a fine, barely raised median line which reaches to about midway the frons; no trace of ocelli or ocellar callosity; subcallus pruinose. Antennæ and palpi shaped and colored almost exactly as in *T. carneus* Bellardi. Fore femora blackish brown, mid and hind femora pale ferruginous or yellowish brown with infuscate bases; fore tibiæ blackish brown with yellowish white basal third; mid and hind tibiæ pale ferruginous; tarsi all black. Abdominal pattern much as in *T. modestus* Wiedemann or *T. lineola* Fabricius. Wings uniformly subhyaline with a slight grayish tinge, not darker nor yellowish along the costa; stigma narrow, amber-yellow; upper branch of third longitudinal vein without appendix (in all six specimens seen). Length 14 to 15 mm. The eyes appear to be banded like those of *T. carneus*.

T. vittiger is evidently a near ally of *T. carneus* Bellardi, of Mexico and Central America; but it differs in the much wider frons, quite conspicuously narrowed toward the subcallus.