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BIOLOGICAL SCIENCES

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Contributions Toward a Monograph of the Sucking Lice

PART VII

By

GORDON FLOYD FERRIS

Associate Professor of Zoology

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SYSTEMATIC TREATMENT (Cont.)

Genus **ECHINOPHTHIRIUS** Giebel

1871. Giebel, *Zeitschrift für die gesamten Naturwissenschaften*, 37: 177.
1874. Giebel, *Insecta Epizoa*, p. 43.
1880. Piaget, *Les Pediculines*, p. 656.
1904. Enderlein, *Zoologischer Anzeiger*, 28: 136.
1906. Enderlein, *ibid.*, 29: 661.
1908. Dalla Torre, "Anoplura," in *Wytzman's Genera Insectorum*, p. 17.
1909. Enderlein, *Deutsche Südpolar Expedition*, 10: 507.
1915. Kellogg and Ferris, *Anoplura and Mallophaga of North American Mammals*, Stanford University Publications, University Series, p. 51. (Genus erroneously ascribed to Enderlein.)
1916. Ferris, "Catalogue and Host List of the Anoplura," *Proceedings of the California Academy of Sciences* (4), 6: 181.
1928. Freund, "Anoplura Pinnipediorum," in *Die Tierwelt der Nord und Ostsee*, Teil XI, p. 6.
1929. Ewing, *Manual of External Parasites*, p. 149.

Anoplura without eyes; with four-segmented antennae, which are not sexually dimorphic; with the legs all of essentially the same size and structure, very large and stout, the claw with a basal lobe; thorax with the notum reduced to at the most a slight median furrow and a median pit which is inclosed within the mesothoracic phragma, the sternum with an irregular, sclerotic but not free plate; abdomen entirely membranous in both sexes except for the ninth tergum and genital areas; paratergal plates entirely lacking; gonopophyses lacking; entire body thickly beset with setae which are for the most part short, stout, and thorn-like but are never modified into scales; spiracles present on the mesothorax and the third to eighth abdominal segments, rather small and provided with a specialized closing apparatus.

HOSTS. Known only from the family Phocidae of the order Pinnipedia.

TYPE OF THE GENUS. *Pediculus setosus* Burmeister, which is considered to be a synonym of *Pediculus horridus* Olfers.

SYNONYMICAL LIST OF NAMES PREVIOUSLY USED IN THE GENUS

NOTE.—Names in italics are synonyms of the name with which they are coupled.

fluctus Ferris.

Proechinophthirus fluctus (Ferris).

groenlandicus Becher.

Echinophthirus horridus (Olfers).

horridus (Olfers).

Echinophthirius groenlandicus Becher.

Echinophthirius phocae (Lucas).

Echinophthirius sericans Meinert.

Echinophthirius sericeus Meinert (misspelling of *sericans*).

Echinophthirius setosus (Burmeister) (sometimes erroneously credited to Denny).

Haematopinus annulatus Schilling.

Haematopinus setosus (Burmeister) (sometimes erroneously credited to Denny).

Pediculus horridus Olfers.

Pediculus phocae Lucas.

Pediculus setosus Burmeister (not of Olfers).

microchir Trouessart and Neumann.

Antarctophthirius microchir (Trouessart and Neumann).

phocae (Lucas).

Echinophthirius horridus (Olfers).

sericans Meinert.

Echinophthirius horridus (Olfers).

sericeus Meinert (misspelling of *sericans*).

Echinophthirius horridus (Olfers).

setosus (Burmeister).

Echinophthirius horridus (Olfers).

NOTES.—Apparently but one species may definitely be referred to this genus. The genus has been utilized as the type of a family, the Echinophthiriidae, which includes all the species occurring on the Pinnipedia. The status of this family will be discussed in the final paper of this series.

There has been some difference of opinion concerning the characteristics of this genus, Enderlein (1909) assigning to it characters which are definitive rather of *Proechinophthirius*, stating that it has the "Vorderbeine und ihre Klauen viel kleiner und zierlicher als die übrigen." No basis appears for such a statement and the genus was certainly founded upon the species which is here recorded and described, whether that species be actually the *Pediculus horridus* of Olfers and the *Pediculus phocae* of Lucas or not.

The specialized closing apparatus of the spiracles will be considered in connection with the morphological section of this series.

1. *Echinophthirius horridus* (Olfers)¹

FIGS. 277, 278

1816. *Pediculus horridus* Olfers, *De vegetativis et animatis corporibus in corporibus animatis reperiundis commentarius*, Part I, p. 84.

1834. *Pediculus phocae* Lucas, *Guerin's Magasin de Zoologie*, 4: Cl. IX; pl. 121, fig. 12.

1838. *Pediculus setosus* Burmeister, *Genera Insectorum, Rhynchota, Genus Pediculus, Species 12*.

¹Owing to the rather close similarity of male and female in this and the other Pinniped-infesting species and to the excessive labor involved in preparing the figures of such elaborately spined and scaled forms, only one sex is figured completely in the case of all these species.

1842. *Haematopinus setosus* (Burmeister), Denny, *Monographia Anoplurorum Britanniae*, p. 36.

1857. *Haematopinus annulatus* Schilling, Gurtt, *Archiv für Naturgeschichte*, 23: 281.

1871. *Echinophthirius setosus* (Denny) [sic], Giebel, *Zeitschrift für die gesamten Naturwissenschaften* (2), 3: 177.

1874. *Haematopinus* (*Echinophthirius*) *setosus* (Denny) [sic], Giebel, *Insecta Epizoa*, p. 42.

1878. *Haematopinus setosus* B. [sic], Gurtt, *Archiv für Naturgeschichte*, 44 (I): 167.

1878. *Haematopinus annulatus* Schilling, Gurtt, *ibid.*, p. 167.

1880. *Echinophthirius setosus* (Lucas) [sic], Piaget, *Les Pediculines*, p. 656; pl. 54, fig. 1.

1886. *Echinophthirius groenlandicus* Becher, "Insecten von Jan Mayen," in *Die internationale Polarforschung 1882-1883. Beobachtungs-Ergebnisse*, 3: 60; pl. 5, fig. 1.

1896. *Echinophthirius setosus* (Lucas) [sic], Osborn, *United States Department of Agriculture, Division of Entomology, Bulletin* (new series), 5: 188.

1897. *Echinophthirius sericans* Meinert, *Vedenskabelige Meddelelser, Kjobenhavn*, 58: 177.

1901. *Echinophthirius setosus* (Burmeister), Breddin, *Fauna Arctica*, 2: 557.

1904. *Echinophthirius phocae* (Lucas), Enderlein, *Zoologischer Anzeiger*, 28: 136.

1906. *Echinophthirius phocae* (Lucas), Enderlein, *ibid.*, 29: 661.

1909. *Echinophthirius groenlandicus* Becker [sic], Dalla Torre, "Anoplura," in *Wysman's Genera Insectorum*, p. 17.

1909. *Echinophthirius phocae* (Lucas), Dalla Torre, *ibid.*, p. 17.

1909. *Echinophthirius sericeus* Meinert [sic], Dalla Torre, *ibid.*, p. 18. (Misspelling of *sericans*.)

1910. *Echinophthirius* [sic] *phocae* (Lucas), Mjöberg, *Arkiv för Zoologi*, 6: 13: 176.

1916. *Echinophthirius groenlandicus* Becher, Ferris, "Catalogue and Host List of the Anoplura," *Proceedings California Academy Sciences* (4), 6: 181.

1916. *Echinophthirius phocae* (Lucas), Ferris, *ibid.*, p. 181.

1916. *Echinophthirius sericeus* [sic] Meinert, Ferris, *ibid.*, p. 182. (Misspelling of *sericans*.)

1916. *Echinophthirius horridus* (Olfers), Ferris, *ibid.*, p. 205. (*Fide* Cummings.)

1919. *Echinophthirius horridus* (Olfers), Fahrenholz, *Jahresbericht des Nierersächsischen zoologischen Vereins zu Hannover*, 5-10: 22.

1919. *Echinophthirius horridus* (Olfers), Ferris, *Report Canadian Arctic Expedition*, 3: D: 11.

1928. *Echinophthirius horridus* (Olfers), Freund, "Anoplura Pinnipediorum," in *Die Tierwelt der Nord- und Ostsee*, Teil XId, pp. 6-16; 11 t.f.

1928. *Echinophthirius groenlandicus* Becher, Freund, *ibid.*, p. 16.

1928. *Echinophthirius sericans* Meinert, Freund, *ibid.*, p. 17.

PREVIOUS RECORDS. Many times recorded from *Phoca vitulina* on the coasts of Europe; *Phoca groenlandica* and *Halichoerus gryphus*, Greenland; *Phoca variegata*, without indication of origin; *Phoca hispida*, Beaufort Sea, Alaska.

SPECIMENS EXAMINED. From *Phoca vitulina*, Shetland Islands, Waterston (British Museum and Stanford University), Edinburgh, Scot-

land, *Evans* (British Museum), Hamburg Zoölogical Garden (Hamburg Museum); *Phoca hispida*, Beaufort Sea, Alaska (Stanford University); *Phoca richardü geronimensis*, Pacific Grove, California (Stanford University); "Greenland seal," without indication of origin (Stanford University).

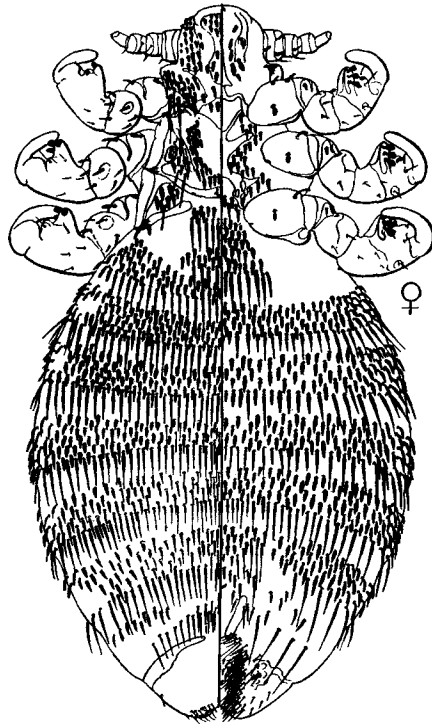


FIG. 277.—*Echinophthirius horridus* (Olfers), female. From specimen from *Phoca vitulina*.

FEMALE (Fig. 277). Length attaining 3.5 mm. *Head* short and broad, with prominent post-antennal angles and with the occipital region constricted into a relatively slender neck. Dorsum beset with numerous short, blunt setae and marked with a conspicuous sclerotic pattern; posterior-lateral angles with two or more long, stout setae. *Antennae* (Fig.

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278 D) with but faint vestiges of sensoria on the fourth segment; first and second segments each with a lobe on the ventral side.

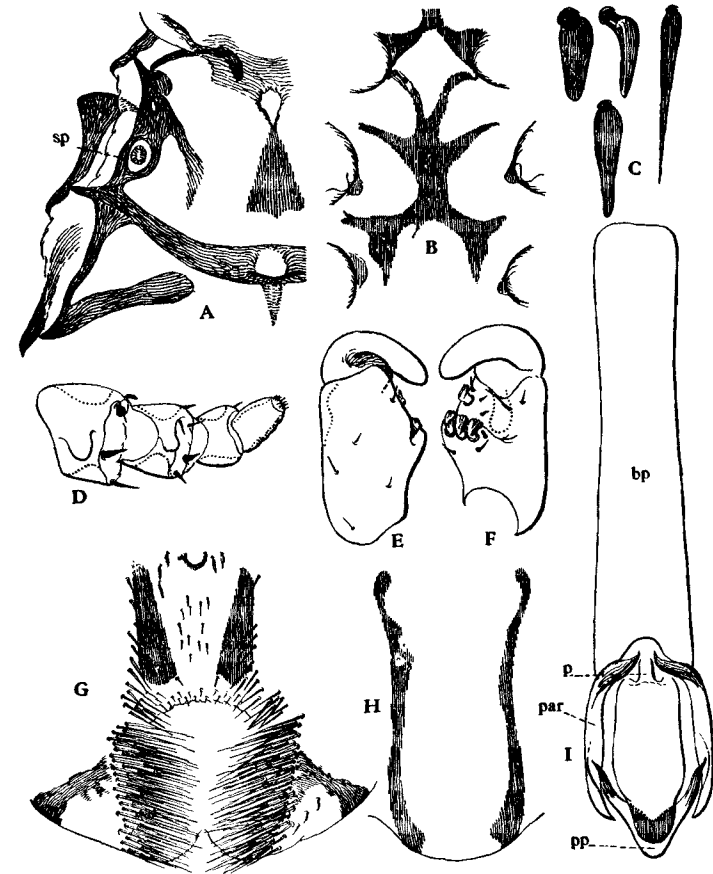


FIG. 278.—*Echinophthirius horridus* (Olfers): A, dorsum of thorax; B, sternum of thorax; C, types of setae; D, antenna; E, F, anterior tibio-tarsus; G, genital region of female; H, genital plate of male; I, genitalia of male.

Thorax (Fig. 278 A) with the phragmata strongly sclerotic and with heavy longitudinal bands connecting the coxal condyles; dorsum with numerous blunt setae; sternum (Fig. 278 B) with an irregular and some-

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what variable, branching, sclerotic area and numerous short, stout setae. Mesothoracic spiracle (Fig. 278 *A*, *sp*) small, but apparently functional. Legs all of the same type, the anterior pair but very slightly smaller than the others; tibia and tarsus (Fig. 278 *E*, *F*) entirely fused and the claw with a pronounced basal lobe.

Abdomen thickly beset with continuous segmental bands of short, blunt, flattened setae of various sizes (Fig. 278 *C*), which become more slender toward the posterior end of the body; each segment, both dorsally and ventrally, with a rather definite row of longer setae along the posterior margin; apex of the abdomen almost or quite bare; ninth tergite with a quite distinct, sclerotic band. Genital region (Fig. 278 *G*) with a pair of indistinct sclerotic plates, which are probably in the wall of the vagina; vulva bearing a number of small setae; gonopophyses entirely lacking; ninth sternite with two longitudinal areas of long, crowded setae. Spiracles very small, provided with a specialized closing apparatus.

MALE. Length attaining 3.00 mm. In all respects essentially like the female but with the abdomen more pointed. Genital plate (Fig. 278 *H*) somewhat lyriform, small. *Genitalia* (Fig. 278 *I*) with a long and rather broad basal plate (*bp*); parameres (*par*) simple, curved, enclosing between their apices the broadly V-shaped pseudopenis (*pp*); a flat, median structure lying between the parameres and partially overlapping the pseudopenis may be regarded as the statumen penis; the penis (*p*) lies between the bases of the parameres.

NOTES.—All the specimens at hand adhere very closely to a common pattern, the specimens from *Phoca richardii geronimensis* being only slightly smaller and slightly more hairy than those from the Atlantic area. They afford no basis for specific separation.

Authentic specimens of *E. groenlandicus* Becher and *E. sericans* Meinert have not been available, although a specimen from "Greenland seal" is at hand. However, the differences which are supposed to distinguish these species are so extremely trivial and in part come so evidently within the range of observed normal variation that they can hardly be taken seriously. There seems no good reason for continuing to carry these names along in the literature.

Genus PROECHINOPHTHIRUS Ewing

1923. Ewing, *Journal Washington Academy Sciences*, 13: 149.

1929. Ewing, *Manual of External Parasites*, p. 149.

Anoplura without eyes; with four-segmented antennae, which are not sexually dimorphic; anterior legs very small, with slender claw, middle and posterior legs very large and stout, with stout claw and with tibia and tarsus completely fused; thorax with the notum reduced

to a median furrow and a median pit which is entirely inclosed within the mesothoracic phragma, sternum entirely lacking; abdomen membranous throughout, with the exception of small genital areas; paratergal plates entirely lacking; spiracles provided with a specialized closing mechanism; abdominal setae abundant, of varying forms and sizes, but none scale-like, for the most part irregularly arranged; gonopophyses entirely lacking.

HOSTS. From members of the family Otariidae of the order Pinnipedia.

TYPE OF THE GENUS. *Echinophthirius fluctus* Ferris, the only included species.

NOTES.—Following the suggestion made by the writer in connection with the original description of *Echinophthirius fluctus*, Ewing has separated this species into a genus by itself. While further discoveries may possibly serve to bridge the gap between this genus and *Echinophthirius*, the two appear at present to be quite distinct. Possibly the common possession of four-segmented antennae is not especially significant, since such a character has undoubtedly arisen quite independently at least three times in the Anoplura.

1. Proechinophthirius fluctus (Ferris)

FIGS. 279, 280, 281

1916. *Echinophthirius fluctus* Ferris, *Entomological News*, 27: 366-70; fig.

1923. *Echinophthirius fluctus* Ferris, McAtee, *North American Fauna*, 46: 142.

1923. *Proechinophthirius fluctus* (Ferris), Ewing, *Journal Washington Academy Sciences*, 13: 149.

PREVIOUS RECORDS. Originally described from specimens taken from a stuffed skin in the Museum of Stanford University, this skin bearing no data but identified by Dr. David Starr Jordan as that of a Steller sea lion, *Eumetopias jubata*, which is a native of the west coast of North America. Later recorded by McAtee and by Ewing from fur seal, *Callorhinus alascanus*, St. Paul and Pribilof Islands, Alaska. It is possible that the host was misidentified in connection with the original record.

SPECIMENS EXAMINED. The types; one female from *Callorhinus alascanus*, Alaska, 1919, G. D. Hanna; one female from the same host, Pribilof Islands, 1918, H. Heath (all in the Stanford University Collection).

MALE (Fig. 279). Length 2.5 mm. A comparatively slender and delicate species. *Head* relatively very large, with prominent post-antennal angles and with the occipital region slightly constricted; ventral side with a slightly raised gular region bearing a fringe of long setae; antennae

(Fig. 280 B) as described for the genus; lateral margins of hind head with a pair of long setae. Thorax (Fig. 280 A) about as long and scarcely wider than the head, the sides nearly parallel, the mesothoracic phragma continuous across the notum, not inclosing the notal pit; coxal condyles connected by a continuous sclerotic band; sternum membranous except

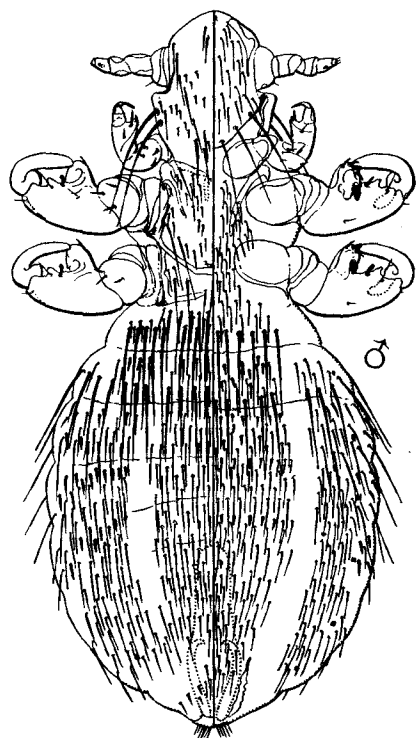


FIG. 279.—*Proechinophthirius fluctus* (Ferris), male.

for a sclerotic bar on each side between the fore and middle coxae; spiracle very small. Anterior legs small and weak, the tibia and tarsus distinctly separated, the claws slender (Fig. 280 F); middle and posterior legs large and stout, the tibia and tarsus closely fused, the claw broad, with a basal lobe.

Abdomen broadly oval, entirely membranous except for the almost vestigial genital plate, thickly beset with setae of various shapes and

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lengths, the first two apparent segments each with a fairly well-defined row of long setae, both dorsally and ventrally, and the marginal area of the anterior half of the abdomen dorsally and the median area ventrally with numerous thorn-like setae, the remaining setae slender. Spiracles (Fig. 280 C) provided with a specialized closing apparatus, the spiracular

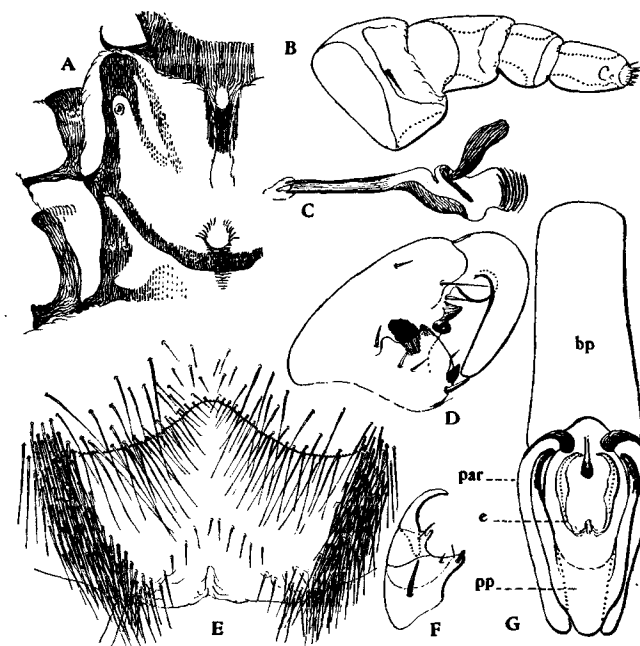


FIG. 280.—*Proechinophthirius fluctus* (Ferris): A, dorsum of thorax; B, antenna; C, abdominal spiracle; D, middle tibio-tarsus; E, genital region of female; F, anterior tibio-tarsus; G, genitalia of male.

opening very small, present on the third to eighth segments. Genitalia (Fig. 280 G) with the basal plate (*bp*) quite small, scarcely longer than the flattened parameres (*par*), to the bases of which the elongate V-shaped pseudopenis (*pp*) articulates; a rather vaguely defined endomeral piece (*e*) is present.

FEMALE. Length 2.75 mm. In general very closely resembling the male. Genital region (Fig. 280 E) with the vulva fringed with setae and with a crowded cluster of long setae on each side of the ninth sternite.

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IMMATURE STAGES. Specimens representing apparently two immature stages are available. One of the stages is the penultimate, certain individuals containing the developing adult. The two stages are essentially identical, differing only in size and in the older stage being somewhat more hairy.

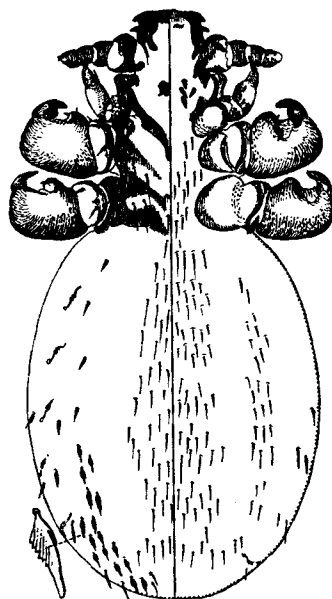


FIG. 281.—*Proechinophthirus fluctus* (Ferris), nymph.

In these (Fig. 281) the antennae are four-segmented as in the adult. The sclerotic areas of head and thorax are heavily pigmented and both head and thoracic dorsum are beset with numerous stout setae. The legs are substantially as in the adult. The abdomen is rather sparsely beset with small setae, some of which, toward the posterior end of the body, are flattened and more or less scale-like.

Genus **ANTARCTOPHTHIRUS** Enderlein

1906. *Antarctophthirus*, Enderlein, *Zoologischer Anzeiger*, 29: 661.
1908. *Antarctophthirus*, Dalla Torre, "Anoplura," in *Wysman's Genera Insectorum*, p. 17.

1909. *Antarctophthirus*, Enderlein, *Deutsche Südpolar Expedition*, 10: 508.
1910. *Arctophthirus*, Mjöberg, *Arkiv för Zoologi*, 6: 13: 177.
1915. *Antarctophthirus*, Kellogg and Ferris, *Anoplura and Mallophaga of North American Mammals*, Stanford University Publications, University Series, p. 48.
1916. *Antarctophthirus*, Ferris, "Catalogue and Host List of the Anoplura," *Proceedings California Academy Sciences* (4), 6: 182.
1928. *Antarctophthirus*, Freund, "Anoplura Pinnipedium," in *Die Tierwelt der Nord- und Ostsee*, Teil XId, p. 17.
1929. *Antarctophthirus*, Ewing, *Manual of External Parasites*, p. 148.

Anoplura without eyes; with five-segmented antennae, which are not sexually dimorphic; with the anterior legs small and weak, with slender claw and with the tibia and tarsus separated; middle and posterior legs very large and stout, the claw with a more or less well-defined basal lobe, the tibia and tarsus entirely fused; thorax with the notum reduced to at the most a slight median furrow and a pit which is inclosed by the mesothoracic phragma, the sternum without a sclerotic area; abdomen entirely membranous in both sexes; paratergal plates entirely lacking; gonopophyses lacking; entire body more or less thickly beset with stout, flattened setae and with scales; spiracles present on the mesothorax, but tending to be very much reduced, those of the abdomen present on the third to eighth segments and provided with a specialized closing apparatus.

HOSTS. From members of the families Otariidae, Odobenidae, and Phocidae, of the order Pinnipedia.

TYPE OF THE GENUS. *Antarctophthirus ogmorhini* Enderlein.

SYNONYMICAL LIST OF NAMES PREVIOUSLY USED IN THE GENUS

NOTE.—Names in italics are synonyms of the names with which they are coupled.

callorhini (Osborn).

Haematopinus callorhini Osborn.

Antarctophthirus monachus Kellogg and Ferris.

lobodontis Enderlein.

Antarctophthirus ogmorhini Enderlein. (Part; misidentification.)

microchir (Trouessart and Neumann).

Echinophthirus microchir Trouessart and Neumann.

monachus Kellogg and Ferris.

Antarctophthirus callorhini (Osborn).

ogmorhini Enderlein.

Echinophthirus setosus (Burmeister). (Misidentification.)

ogmorhini Enderleini. (Part; misidentification.)

Antarctophthirus lobodontis Enderlein.

trichechi (Bohemann).

Haematopinus trichechi Bohemann.

Arctophthirus trichechi (Bohemann).

NOTES.—While there is a certain diversity among the members of this genus, it constitutes—in the opinion here adopted—a quite natural group, and there appears to be no reason for the recognition of the genus *Arctophthirus* Mjöberg once proposed with *A. trichechi* (Bohemann) as type. Representatives of four out of the five included species have been available to the writer.

1. *Antarctophthirus ogmorhini* Enderlein

FIGS. 282, 283

1902. *Echinophthirus setosus* (Burmeister), Rothschild, *Report of the Southern Cross Expedition*, p. 224. (Misidentification.)

1906. *Antarctophthirus ogmorhini* Enderlein, *Zoologischer Anzeiger*, 29: 662; 2 t.f.

1907. *Antarctophthirus ogmorhini* Enderlein, Neumann, *Deuxième Expedition Antarctique Française, Sciences Naturelles, Arthropodes*, p. 13. (Part.)

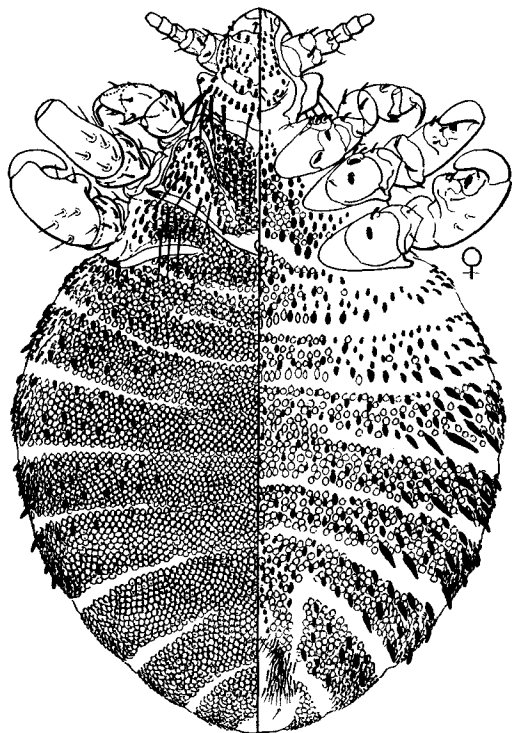


FIG. 282.—*Antarctophthirus ogmorhini* Enderlein, female. From type.

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1908. *Antarctophthirus ogmorhini* Enderlein, Dalla Torre, "Anoplura," in *Wytzman's Genera Insectorum*, p. 17.

1909. *Antarctophthirus ogmorhini* Enderlein, Enderlein, *Deutsche Südpolar Expedition*, 10: 509; figs. 174, 175, 181, 182.

1916. *Antarctophthirus ogmorhini* Enderlein, Ferris, "Catalogue and Host List of the Anoplura," *Proceedings California Academy Sciences* (4), 6: 183.

PREVIOUS RECORDS. From *Ogmorhinus leptonyx*, Victoria Land and Booth Wandel Island, Antarctic.

SPECIMENS EXAMINED. The types, in the British Museum.

FEMALE (Fig. 282). Length 3.25 mm. A very plump, stout-bodied species. Head relatively small, with very prominent post-antennal angles and with the occipital region constricted into a distinct neck; dorsum with numerous, small, flattened, oval setae and with a definite sclerotic pattern; margins of hind head with several long, stout setae; ventral side of the head with small, oval setae only. Antennae presenting no unusual features.

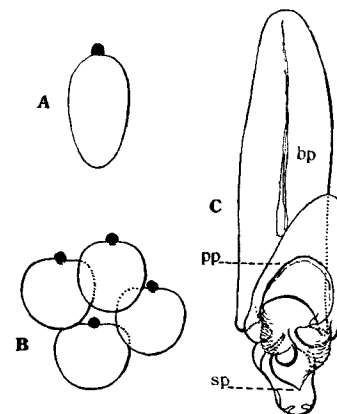


FIG. 283.—*Antarctophthirus ogmorhini* Enderlein: A, B, types of scales; C, genitalia of male.

Thorax slightly longer than the head and much broader, trapezoidal in form, both dorsum and venter beset with many small, oval, flattened setae and numerous scales. Legs with the basal lobe of the middle and posterior claws very much reduced; tibio-tarsal articulation entirely obsolete; the thumb on the middle and posterior legs without stout, modified setae. Mesothoracic spiracle very minute.

Abdomen subcircular, sparingly beset above on the lateral third of the first to sixth segments with small, oval, flattened setae; remainder of

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the dorsum thickly and uniformly beset with small, slightly pigmented scales which are of a very uniform subcircular shape. Venter rather sparsely beset throughout with flattened setae, those near the lateral margins being larger and stouter than the others; scales (Fig. 283 A, B) much fewer than on the dorsum, some of those along the posterior borders of the segments being slightly larger and longer than the others. Gonopophyses lacking; ninth sternite with two clusters of crowded setae.

MALE. Length 2.75 mm. Differing from the female chiefly in having the abdomen more pointed and the abdominal setae slightly larger and perhaps slightly more numerous. *Genitalia* (Fig. 283 C) distorted in the specimen examined; in this the parameres do not show and the V-shaped pseudopenis is turned back; it incloses a small sclerotic piece (*sp*), which may be regarded as the statumen penis.

NOTES.—Unfortunately not as many details as might be desirable were figured by the writer when the types were examined at the British Museum, no figure being made of the genital region of the female. The species should be easily recognizable, however.

2. *Antarctophthirus lobodontis* Enderlein

FIG. 284

1907. *Antarctophthirus ogmorhini* Enderlein, Neumann, *Deuxième Expédition Antarctique Française, Sciences Naturelles, Arthropodes*, p. 13. (Part; misidentification.)

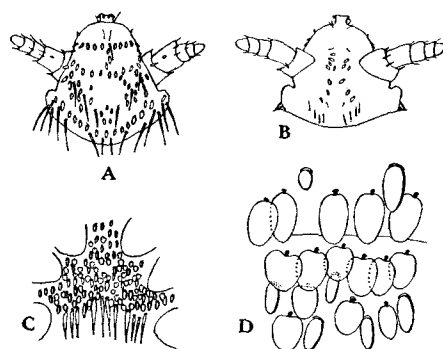


FIG. 284.—*Antarctophthirus lobodontis* Enderlein: A, dorsal aspect of head; B, ventral aspect of head; C, thoracic sternum; D, types of scales from abdomen. After Enderlein.

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1909. *Antarctophthirus lobodontis* Enderlein, *Deutsche Südpolar Expedition*, 10: 510; t.f. KK-NN.

1916. *Antarctophthirus lobodontis*, Enderlein, Ferris, "Catalogue and Host List of the Anoplura," *Proceedings California Academy Sciences* (4), 6: 183.

1928. *Antarctophthirus lobodontis* Enderlein, Freund, "Anoplura Pinnipedium," in *Die Tierwelt der Nord- und Ostsee*, Teil XId, p. 20; figs. 14-16.

PREVIOUS RECORDS. From *Lobodon carcinophagus*, Booth Wandel Island, Antarctic.

SPECIMENS EXAMINED. Not seen by the writer.

NOTES.—It is possible here only to quote the original description and reproduce its accompanying figures. According to Enderlein the species differs from *A. ogmorhini*, with which it was at first confused, in the following particulars:

"Unterseite des Kopfes [Fig. 284 B] mit weniger Dornen, im wesentlichen nur 2 einander nahe gerückte Längsreihen der kurzen Dornen; am vorderen ende 2 Haare; hinten jederseits 4 Borsten. Kopfoberseite [Fig. 284 A] in der mitte mit 7 langen Borsten im gegensatz zu 2-3. Der Hauptunterschied ist der, dass die Dornen des Hinterrandes des Thorakalsternum [Fig. 284 C] sich sehr lang und spitz ausgezogen haben. Die Schuppen der Ober- und Unterseite des Thorax und Abdomen sind verhältnismässig lang und weniger verbreitert; Textfig. [284 D] zeigt Schuppen von der Ventralseite des Abdomen an der Grenze zwischen Sternit 2 und Sternit 3. Textfig. [284 C] solche vom Sternum des Thorax. Auf der Oberseite des Thorax fehlen die Dornen nahe der Mittellinie und sind durch Schuppen ersetzt."

Length of the female 2.5 mm.

3. *Antarctophthirus microchir* (Trouessart and Neumann)

FIGS. 285, 286

1888. *Echinophthirus microchir* Trouessart and Neumann, *Le Naturaliste*, 10: 80-81; figs.

1906. *Antarctophthirus microchir* (Trouessart and Neumann), Enderlein, *Zoologischer Anzeiger*, 29: 663-65; figs. 3, 4.

1908. *Antarctophthirus microchir* (Trouessart and Neumann), Dalla Torre, "Anoplura," in *Wytzman's Genera Insectorum*, p. 17.

1909. *Antarctophthirus microchir* (Trouessart and Neumann), Neumann, *Archives de Parasitologie*, 13: 537.

1909. *Antarctophthirus microchir* (Trouessart and Neumann), Enderlein, *Deutsche Südpolar Expedition*, 10: 511; figs. 176, 177, 183, 184.

1916. *Antarctophthirus microchir* (Trouessart and Neumann), Ferris, "Catalogue and Host List of the Anoplura," *Proceedings California Academy Sciences* (4), 6: 183.

1916. *Antarctophthirus microchir* (Trouessart and Neumann), Ferris, *Entomological News*, 27: 370.

1928. *Antarctophthirus microchir* (Trouessart and Neumann), Freund, "Anoplura Pinnipedium," in *Die Tierwelt der Nord- und Ostsee*, Teil XId, pp. 21-23; figs. 17, 18, 19.

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PREVIOUS RECORDS. Recorded by Trouessart and Neumann from *Phocarctos hookeri*, Auckland Island, and by Ferris from *Zalophus californianus*, California.

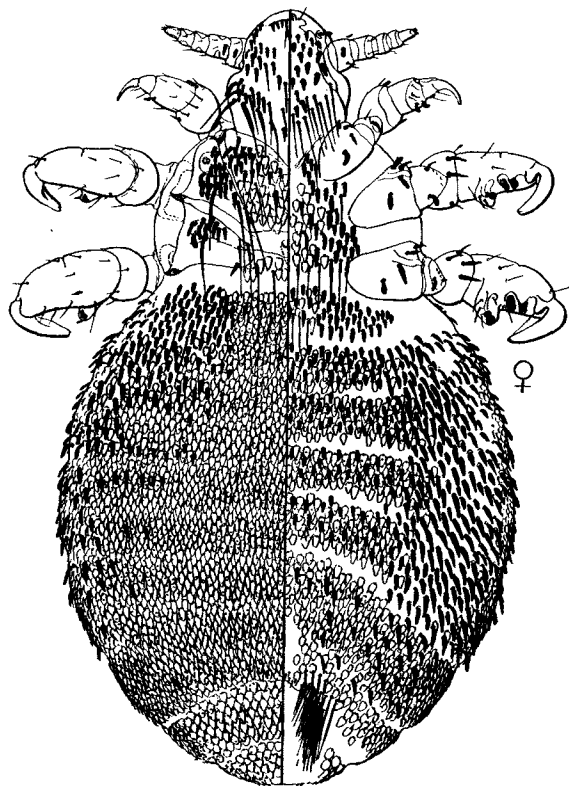


FIG. 285.—*Antarctophthirus microchir* (Trouessart and Neumann), female. From specimen from *Zalophus californianus*, California.

SPECIMENS EXAMINED. Those upon which the record by Ferris was based and others from the Steller sea lion, *Eumetopias jubata*, Año Nuevo Island (Stanford University).

FEMALE (Fig. 285). Length 3.00 mm. A stout-bodied and moderately pigmented form. Head with prominent post-antennal angles, but the hind head only slightly constricted and thus without a distinct neck;

both dorsum and venter with numerous short, thorn-like setae and with a posterior fringe of long setae; antennae presenting no distinctive features.

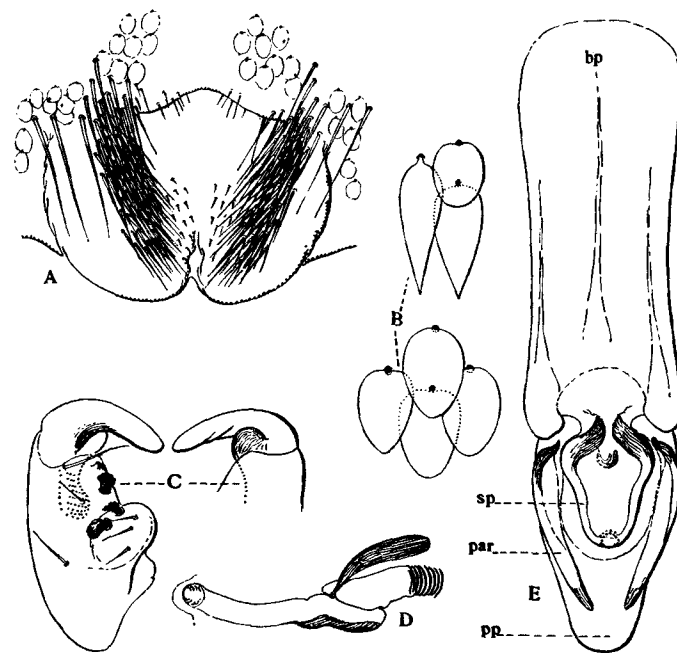


FIG. 286.—*Antarctophthirus microchir* (Trouessart and Neumann): A, genital region of female; B, types of scales; C, middle tibio-tarsus and claw; D, abdominal spiracle; E, genitalia of male.

Thorax slightly longer than the head and considerably broader, somewhat trapezoidal, the sclerotic areas large, both mesothorax and meta-thorax dorsally with numerous stout setae laterally and with scales medially; sternal area with numerous stout setae and scales intermingled; legs of the generic type. Mesothoracic spiracle very small.

Abdomen subcircular or very broadly oval, the derm somewhat pigmented, the dorsum very thickly and quite uniformly beset with scales, which toward the lateral margins on the anterior portion of the abdomen are intermingled with flattened, pointed, stout setae. On the ventral side the scales are less numerous and the setae more abundant and

larger, the latter forming a longitudinal band along each lateral margin and there intermingled with but few scales. The scales are quite uniform in size and shape, being slightly elongate-oval and narrowly rounded at the apex, some of those on the abdomen being longer and more pointed (Fig. 286 B).

Genital region (Fig. 286 A) with a tuft of long setae at each side of the genital opening.

MALE. Length 2.5 mm. In general closely resembling the female, but with the abdomen more pointed. Genitalia (Fig. 286 E) with a relatively very large basal plate (*bp*); parameres (*par*) short, not reaching to the apex of the very large pseudopenis, the arms of which articulate with the bases of the parameres; inclosed within the arms of the pseudopenis is a quite large structure that may be regarded as the statumen penis (*sp*).

NOTES.—The figures given by Enderlein, which were made from specimens from the type lot, are very precise and complete, making the identification of the species certain. The specimens from the two species of California sea lions agree very closely with these figures and with each other.

This species is very similar to *A. ogmorhini* from which it differs in the form of the scales and in not having the occiput constricted into a neck.

4. *Antarctophthirus trichechi* (Bohemann)

Figs. 287, 288

1865. *Haematophinus trichechi* Bohemann, *Vetenskaps-Akademie Förhandlingar, Kopenhagen*, 22: 557; pl. 35, fig. 2.
 1880. *Haematopinus trichechi* Bohemann, Piaget, *Les Pediculines*, p. 656.
 1908. *Haematopinus trichechi* Bohemann, Dalla Torre, "Anoplura," in *Wytzman's Genera Insectorum*, p. 11.
 1909. *Antarctophthirus trichechi* (Bohemann), Neumann, *Archives de Parasitologie*, 13: 532-37; figs. 30, 31.
 1909. *Antarctophthirus trichechi* (Bohemann), Enderlein, *Deutsche Südpolar Expedition*, 10: 512-13; figs. 172, 173, 185-88.
 1910. *Arctophthirus trichechi* (Bohemann), Mjöberg, *Arkiv för Zoologi*, 6: 13: 178-80; figs. 90-92.
 1915. *Antarctophthirus trichechi* (Bohemann), Kellogg and Ferris, *Anoplura and Mallophaga of North American Mammals*, Stanford University Publications, University Series, p. 49; t.f. 17B; pl. 3, fig. 1.
 1916. *Antarctophthirus trichechi* (Bohemann), Ferris, "Catalogue and Host List of the Anoplura," *Proceedings California Academy Sciences* (4), 6: 183.
 1928. *Antarctophthirus trichechi* (Bohemann), Freund, "Anoplura Pinnipedium," in *Die Tierwelt der Nord- und Ostsee*, Teil XId, pp. 25-30; figs. 24-29.

PREVIOUS RECORDS. Recorded by various writers from *Odobenus* (= *Odobenus* = *Trichechus*) *rosmarus* from Greenland, Spitzbergen, and adjacent regions, and by Kellogg and Ferris from *O. obesus*, "northeast of Siberia."

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SPECIMENS EXAMINED. Those upon which the foregoing record by Kellogg and Ferris was based and others from "walrus," caught in the Kara Sea (Hamburg Museum).

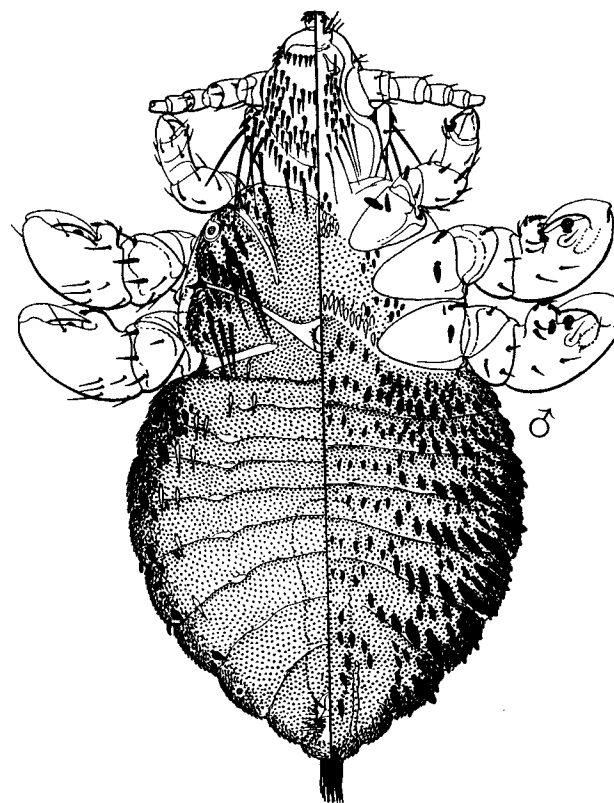


FIG. 287.—*Antarctophthirus trichechi* (Bohemann), male. From specimen from *Odobenus obesus*.

MALE (Fig. 287). Length 2.75 mm. A deeply pigmented species. Head relatively large, with prominent post-antennal angles and with the occipital region slightly constricted; anterior margin bordered by a conspicuous sclerotic band and the ventral side with a longitudinal band extending from the anterior margin around the base of the antenna to the occipital border;

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dorsum with numerous, short, acute setae and with a cluster of long setae along the lateral margin of the hind head; ventral side with short setae and with a gular fringe of long setae. Proboscis (Fig. 288 *D*) unusually prominent and with unusually large hooks.

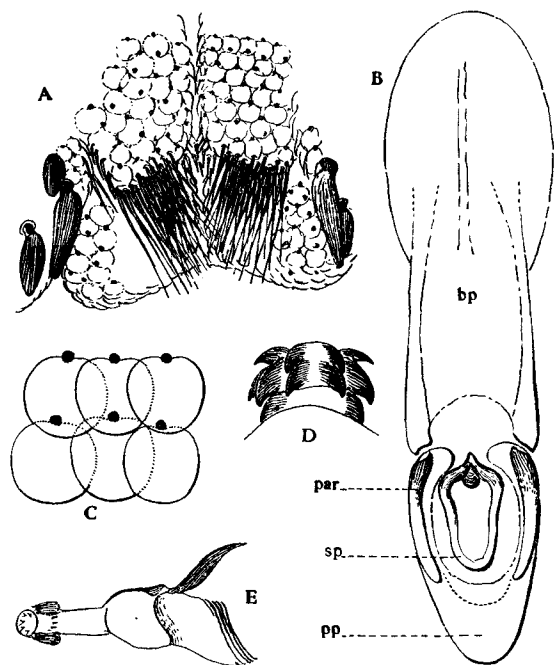


FIG. 288.—*Antarctophthirus trichechi* (Bohemann): *A*, genital region of female; *B*, genitalia of male; *C*, scales; *D*, rostrum; *E*, abdominal spiracle.

Thorax about as long as the head and about one and one-half times as wide, the lateral margins arcuate; dorsum thickly beset with scales and with numerous flattened setae near the lateral margins; sternum with but few short setae and with numerous scales. Legs of the form typical of the genus, exceedingly stout, the mesothoracic and metathoracic claws with but an inconspicuous lobe at the base.

Abdomen slightly pointed, very thickly beset both dorsally and ventrally with scales, with a few lanceolate setae near the lateral margins dorsally and with more and larger setae ventrally. Scales (Fig. 288 *C*) quite uniform in size and shape, slightly cordate, very transparent and scarcely

visible unless disturbed, but with very conspicuous pedicels. Apex of the abdomen with a tuft of setae. Spiracles (Fig. 288 *E*) small, provided with a specialized closing apparatus. *Genitalia* (Fig. 288 *B*) with a long basal plate (*bp*); parameres (*par*) very small and inconspicuous, much exceeded by the very large V-shaped pseudopenis (*pp*), the arms of which inclose a strongly sclerotized piece that may be regarded as the statumen penis (*sp*). Genital plate consisting of a pair of very small and inconspicuous longitudinal areas.

FEMALE. Length 3.00–4.00 mm. In general very similar to the male, but with the abdomen more nearly circular, the ninth segment forming a small median apical lobe. *Genital region* (Fig. 288 *A*) very small and close to the apex of the abdomen. It is difficult to determine the exact disposition of the parts, but there appear to be two median lobes each bearing a cluster of crowded setae. Whether these lobes represent the vulva or the tufts of setae on the ninth sternite which appear in other species of this group is not determinable in the material at hand, but probably it is the latter.

IMMATURE STAGES. Representatives of the penultimate and possibly one other stage are at hand. These differ from the female significantly only in size.

NOTES.—This species has been utilized by Mjöberg as the type of his genus *Arctophthirus*, but while it departs in some respects from other members of *Antarctophthirus* there seem to be no good grounds for a generic separation.

5. *Antarctophthirus callorhini* (Osborn)

FIGS. 289, 290

1899. *Haematopinus callorhini* Osborn, in *The Fur Seals and Fur-Seal Islands of the North Pacific Ocean*, 3: 553; fig. 1.
 1915. *Antarctophthirus monachus* Kellogg and Ferris, *Anoplura and Mallophaga of North American Mammals*, Stanford University Publications, University Series, p. 49; t.f. 17 *B*; pl. 3, fig. 1.
 1916. *Antarctophthirus monachus* Kellogg and Ferris, Ferris, "Catalogue and Host List of the Anoplura," *Proceedings California Academy Sciences* (4), 6: 183.
 1923. *Antarctophthirus callorhini* (Osborn), McAtee, in "Insects, Arachnids and Chilopods of the Pribilof Islands, Alaska," *North American Fauna*, 46: 142.
 1928. *Antarctophthirus monachus* Kellogg and Ferris, Freund, "Anoplura Pinnipediorum," in *Die Tierwelt der Nord- und Ostsee*, Teil XI d, pp. 23–25; figs. 20–23.

PREVIOUS RECORDS. Known only from the original record by Osborn, from *Callorhinus alascanus* (= *ursinus*), Pribilof Islands, Alaska. The specimen, without host or locality data, upon which the description of

A. monachus Kellogg and Ferris was based, now appears without doubt to have come from this same lot.

SPECIMENS EXAMINED. A male, the type of *A. monachus* Kellogg and Ferris, undoubtedly one of the specimens originally recorded by Osborn; a male and a female and one immature specimen from the type host, Pribilof Islands, 1918, G. D. Hanna (all Stanford University).

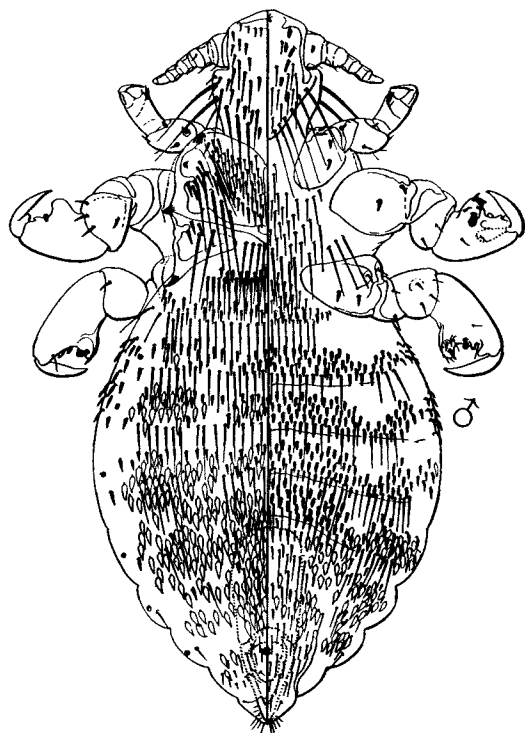


FIG. 289.—*Antarctophthirus callorhini* (Osborn), male.

MALE (Fig. 289). Length 2.5 mm. A comparatively slender-bodied member of this group. *Head* relatively large, with prominent post-antennal angles and a slightly constricted occipital region; dorsally with numerous short setae and a lateral and posterior fringe of long setae; ventral side with small setae of various shapes and a gular fringe of long setae.

Thorax about as long as the head and twice as wide, the lateral margins

nearly parallel, with many setae of various lengths both dorsally and ventrally, but without scales. Mesothoracic spiracle exceedingly small. Meso- and metathoracic legs very large and stout, the claw with a distinct basal lobe (Fig. 290 D).

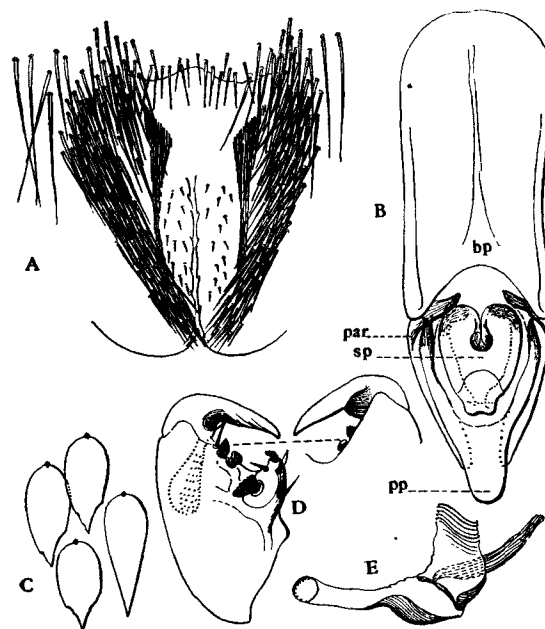


FIG. 290.—*Antarctophthirus callorhini* (Osborn): A, genital region of female; B, genitalia of male; C, types of scales; D, middle tibio-tarsus and claw; E, abdominal spiracle.

Abdomen elongate and slightly pointed, beset dorsally with setae of various lengths and sizes and particularly in the posterior half with scattered scales; ventral side more thickly beset with setae which are for the most part short and stout and with a few scattered scales in the apical region. Scales (Fig. 290 C) somewhat variable in form, but for the most part elongate, pointed, and with irregular serrations near the apex. Spiracles (Fig. 290 E) very small, provided with a specialized closing apparatus. *Genitalia* (Fig. 290 B) with a short, broad basal plate (*bp*); parameres (*par*) inconspicuous, shorter than the rather elongate and somewhat Y-shaped pseudopenis (*pp*), the arms of which inclose a conspicuous piece that may be regarded as the statumen penis (*sp*).

FEMALE. Length 3.00 mm. In general very similar to the male. *Genital region* (Fig. 290 A) with an elongate area of crowded setae on each side on the ninth sternite.

NOTES.—In the paucity of its scales this species departs from the common characteristics of *Antarctophthirus* and in its general appearance suggests *Proechinophthirus fluctus* (Ferris) which occurs on the same host. But there seems to be no good reason for removing it from *Antarctophthirus*.

6. *Antarctophthirus* sp.

SPECIMENS EXAMINED. A fragment of a single specimen, from *Arctcephalus* sp., no data (U.S.N.M. 16463).

NOTES.—This fragmentary specimen seems to represent an undescribed species, with scales somewhat of the type of those of *A. microchir* but more elongate. While it should not be named from such a specimen, its occurrence is worthy of record.

Genus *LEPIDOPHTHIRUS* Enderlein

1904. Enderlein, *Zoologischer Anzeiger*, 28: 44.

1908. Dalla Torre, "Anoplura," in *Wytzman's Genera Insectorum*, p. 18.

1909. Enderlein, *Deutsche Südpolar Expedition*, 10: 513.

1916. Ferris, "Catalogue and Host List of the Anoplura," *Proceedings California Academy Sciences* (4), 6: 184.

1928. Freund, "Anoplura Pinnipediorum," in *Die Tierwelt der Nord- und Ostsee*, Teil XIId, p. 31.

1929. Ewing, *Manual of External Parasites*, p. 148.

Anoplura without eyes; with four-segmented antennae, which are not sexually dimorphic; with the anterior legs relatively small and weak and with slender claw, the posterior and middle legs equal, very large and stout, with stout claw which has a distinct lobe at the base; thorax with the notum reduced to at the most a very slight median furrow and a pit which is inclosed by the mesothoracic phragmata, the sternum not sclerotic; abdomen without tergal and sternal plates; paratergal plates entirely lacking; gonopophyses lacking; entire body very thickly beset with setae of various forms, many flattened and passing into scales with which the dorsum of thorax and abdomen is thickly beset; spiracles present on the mesothorax, but exceedingly small, and on the third to eighth abdominal segments, all provided with a specialized closing apparatus.

HOSTS. Known only from the genus *Macrorhinus*, the southern sea elephants, of the family Phocidae.

TYPE OF THE GENUS. *Lepidophthirus macrorhini* Enderlein, the only included species.

NOTES.—The single known species of *Lepidophthirus* represents in many respects the ultimate of specialization in the sucking lice. Enderlein has indicated that spiracles are present on the metathorax and second abdominal segment as vestiges, but the writer is unable to agree that such is the case.

1. *Lepidophthirus macrorhini* Enderlein

FIGS. 291, 292

1904. *Lepidophthirus macrorhini* Enderlein, *Zoologischer Anzeiger*, 28: 46-47; figs. 1-5.

1908. *Lepidophthirus macrorhini* Enderlein, Dalla Torre, "Anoplura," in *Wytzman's Genera Insectorum*, p. 18.

1916. *Lepidophthirus macrorhini* Enderlein, Ferris, "Catalogue and Host List of the Anoplura," *Proceedings California Academy Sciences* (4), 6: 184.

1928. *Lepidophthirus macrorhini* Enderlein, Freund, "Anoplura Pinnipediorum," in *Die Tierwelt der Nord- und Ostsee*, Teil XIId, pp. 32-34; figs. 30-35.

1929. *Lepidophthirus macrorhini* Enderlein, Bedford, *Director of Veterinary Services, Union of South Africa, Report*, 15: 507.

PREVIOUS RECORDS. From the "elephant seal," *Macrorhinus leoninus*, Kerguelen Island (Enderlein), and near Capetown, South Africa (Bedford).

SPECIMENS EXAMINED. A male and a female, received through the kindness of Mr. G. A. H. Bedford and derived from the lot recorded by him.

FEMALE (Fig. 291). Length 3.5 mm. A very stout-bodied form. Head short and broad, the hind head forming a narrow lateral lobe and much constricted to form a broad neck; dorsum thickly beset with short setae and with a fringe of long setae along the posterior margin of the hind head; ventral side with a few small, stout setae and with a raised gular region; mouth opening retracted to the ventral side of the head. Antennae (Fig. 292 C) clearly four-segmented, without trace of a fifth segment.

Thorax but little longer than the head and more than twice as broad, the lateral margins arcuate, the coxal condyles not connected by longitudinal bars; sternum non-sclerotic except for a piece in the form of an inverted Y, which extends from the posterior point of the head to behind the anterior coxae; sternum beset only with short, flattened setae. Legs presenting no unusual characteristics, the claw of the middle and posterior pairs with a distinct basal lobe.

Abdomen subcircular, very thickly beset dorsally with flattened, lanceolate setae near the lateral margins, these intermingled with and in the median region giving way entirely to scales. The setae and scales are all directed toward a point on the meson of the sixth and seventh segments, which leads to the curious fact that those of the ninth to seventh segments

are directed forward. In the median region of the dorsum the scales are more heavily pigmented than elsewhere, leading to the formation of two

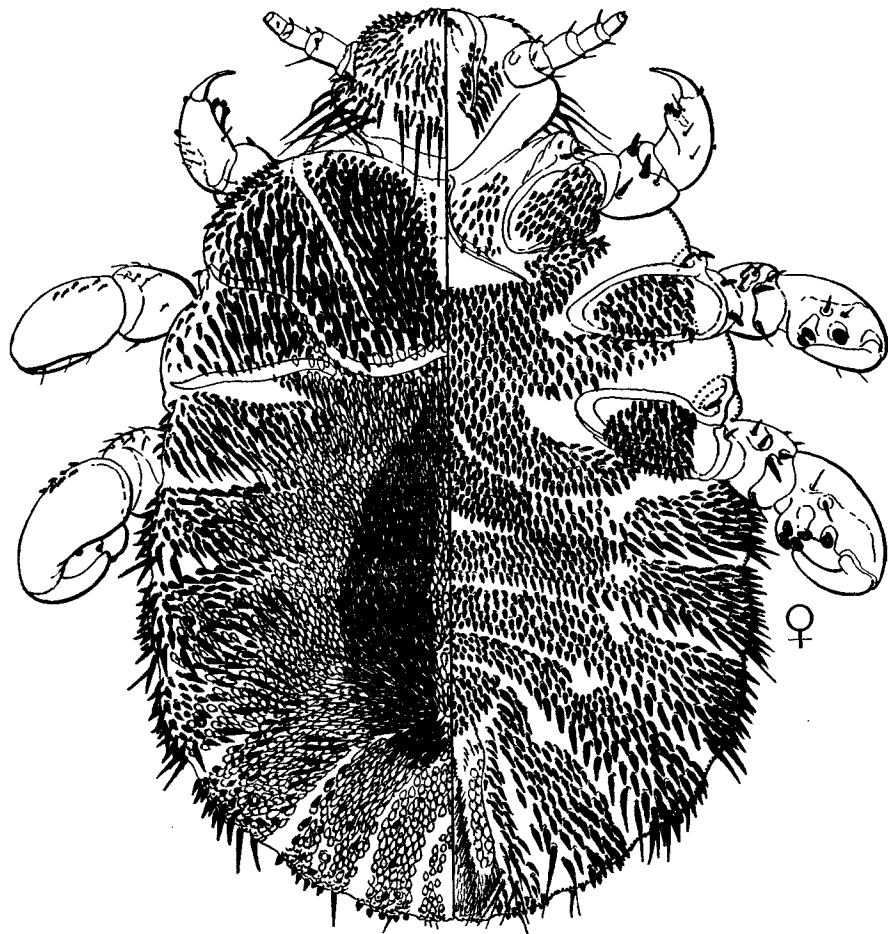


FIG. 291.—*Lepidophthirus macrorhini* Enderlein, female.

dark, longitudinal bands which are conspicuous even to the naked eye. The scales are of varying form and size (Fig. 292 B), some being sharply pointed, others slightly emarginate at the apex.

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On the ventral side the scales are for the most part lacking, appearing only in the genital region, and the derm is thickly beset with flattened lanceolate setae of various sizes. *Genital region* (Fig. 292 A) of unusual form, there being two elongate and slightly divergent lobes, which are

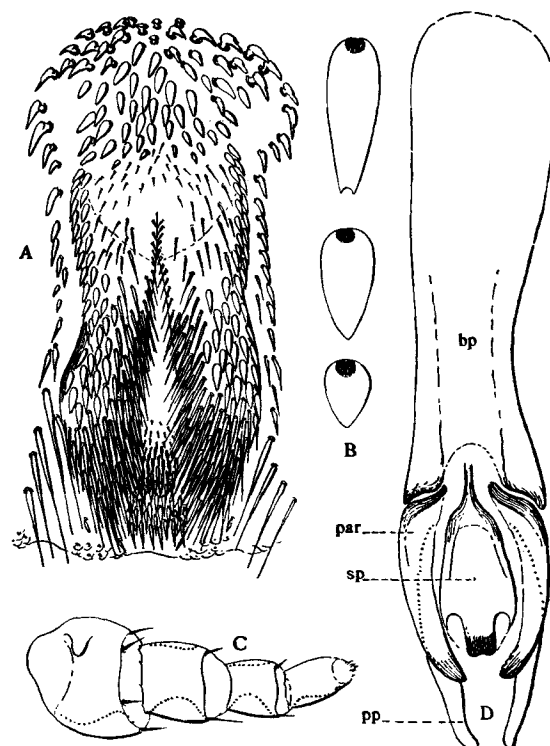


FIG. 292.—*Lepidophthirus macrorhini* Enderlein: A, genital region of female; B, types of scales; C, antenna; D, genitalia of male.

thickly beset with setae. These lobes have the appearance of gonopophyses, but, on the basis of comparison with related species, it appears possible that they are merely lobes formed by the vulva. It has not been possible to work out the spiracular closing apparatus.

MALE. Length 3.00 mm. In general very closely resembling the female, but with the dark dorsal bands of the abdomen not so conspicuous.

[501]

Genitalia (Fig. 292 D) in general of the type common to the other pinniped-infesting species, the basal plate (*bp*) large and long, the parameres (*par*) rather small, much exceeded by the pseudopenis (*pp*) which in the single specimen at hand appears to be divided into two parts; between the parameres is a large statumen penis (*sp*).

NOTES.—Possibly because of individual variation, the scales on the specimens at hand do not agree entirely with the figure given by Enderlein, being much less truncate or emarginate than indicated by him. There is no reason to question the specific identification, however.

Genus *PEDICINUS* Gervais

1844. *Pedicinus* Gervais, in Walckenaer's *Histoire naturelle des insectes aptères*, 3: 301.
 1874. *Pedicinus*, Giebel, *Insecta Epizoa*, p. 32.
 1880. *Pedicinus*, Piaget, *Les Pediculines*, p. 630.
 1904. *Pedicinus*, Enderlein, *Zoologischer Anzeiger*, 28: 136, 138.
 1908. *Pedicinus*, Dalla Torre, "Anoplura," *Wysman's Genera Insectorum*, p. 9.
 1910. *Pedicinus*, Mjöberg, *Arkiv för Zoologi*, 6: 172.
 1912. *Phthirpedicinus* Fahrenholz, *Zoologischer Anzeiger*, 39: 54.
 1912. *Pedicinus*, Fahrenholz, *Jahresbericht des Niedersächsischen zoologischen Vereins zu Hannover*, 2-4: 12-16.
 1912. *Phthirpedicinus*, Fahrenholz, *ibid.*, p. 22.
 1913. *Pedicinus*, Patton and Cragg, *Textbook of Medical Entomology*, p. 546.
 1916. *Pedicinus*, Ferris, "Catalogue and Host List of the Anoplura," *Proceedings California Academy Sciences* (4), 6: 139.
 1916. *Phthirpedicinus*, Ferris, *ibid.*, p. 140.
 1916. *Neopedicinus* Fahrenholz, *Archiv für Naturgeschichte*, 81 (Abt. A): Fasc. 11: 7.
 1929. *Pedicinus*, Ewing, *Manual of External Parasites*, p. 143.
 1929. *Neopedicinus*, *ibid.*
 1929. *Phthirpedicinus*, *ibid.*
 1932. *Pedicinus*, Werneck, *Annaes da Academia Brasileira de Sciencias*, 4: 179-83.

Anoplura with eyes; antennae five-segmented, but frequently—especially in the female—with the last three segments more or less fused, causing a three-segmented appearance; sexually dimorphic by the presence of a short, stout seta on the dorsal side of each of the last three antennal segments; dorsum of the thorax with the pleural ridges uniting at the meson into a sclerotic area which incloses a slit-like median fold or pit which probably represents the vestiges of the true notum; sternal plate lacking; legs of varying form, the anterior pair always slender and with slender claw, the middle and posterior pairs ranging from but little stouter than the first to much stouter and with heavy claws; abdomen always membranous except for the usual sclerotization of the ninth tergite and the genital area; free paratergal plates present on the fourth to sixth or fifth and sixth segments; abdominal setae always very small, arranged in a single

definite transverse row on each segment both dorsally and ventrally; gonopophyses vestigial, their position indicated chiefly by a row of small setae; genitalia of the male of a distinctive type, the parameres present and well developed, inclosing the pseudopenis between their apices, the penis borne at the apex of a sclerotic tube of varying form, the preputial sac not evident.

HOSTS. Known only from old-world monkeys of the group Cynomorpha.

TYPE OF THE GENUS. *Pedicinus longiceps* Piaget (= *P. eurygaster* of Gervais, not of Burmeister).

SYNONYMICAL LIST OF NAMES PREVIOUSLY USED IN THE GENUS

NOTE.—Names in italics are synonyms of the name with which they are coupled. The genera *Phthirpedicinus* and *Neopedicinus*, being here regarded as synonyms of *Pedicinus*, all names previously used in them are here recorded as if used in *Pedicinus*.

- albidus* (Rudow).
Haematopinus albidus Rudow.
breviceps Piaget.
Pedicinus eurygaster (Burmeister). (Part.)
Pedicinus longiceps Piaget. (Part.)
colobi Fahrenholz.
Pedicinus longiceps Piaget.
eurygaster (Burmeister).
Pedicinus breviceps Piaget. (Piaget, part; Mjöberg, part; misidentification.)
Pedicinus eurygaster (Burmeister). (Piaget, part.)
Pedicinus longiceps Piaget. (Part.)
Pedicinus microps (Nitzsch).
Pedicinus piageti Stroebelt.
Pediculus eurygaster Burmeister.
Pediculus microps Nitzsch.
Phthirpedicinus micropilosus Fahrenholz.
Phthirpedicinus microps (Nitzsch).
eurygaster (Burmeister). (Misidentification.)
Pedicinus longiceps Piaget. (Part.)
graciliceps Piaget.
Pedicinus longiceps Piaget.
hamadryas Mjöberg.
longiceps Piaget. (Part.)
Pedicinus breviceps Piaget. (Part.)
Pedicinus colobi Fahrenholz.
Pedicinus eurygaster (Burmeister). (Gervais; Piaget, part; misidentification.)
Pedicinus graciliceps Piaget.
Pedicinus paralleliceps Mjöberg.
Pedicinus paralleliceps var. *colobi* Fahrenholz.
Pedicinus rhesi Fahrenholz.
Pedicinus vulgaris Fahrenholz.
microps (Nitzsch).
Pedicinus eurygaster (Burmeister).

micropilosus (Fahrenheit).

Pedicinus eurygaster (Burmeister).

obtusus (Rudow).

Haematopinus obtusus Rudow.

paralleliceps Mjöberg.

Pedicinus longiceps Piaget.

paralleliceps var. *colobi* Fahrenheit.

Pedicinus longiceps Piaget.

patas (Fahrenheit).

Neopedicinus patas Fahrenheit.

piageti Stroebe.

Pedicinus eurygaster (Burmeister).

rhesi Fahrenheit.

Pedicinus longiceps Piaget.

vulgaris Fahrenheit.

Pedicinus longiceps Piaget.

NOTES.—The available material representing the three named genera *Pedicinus*, *Phthirpedicinus*, and *Neopedicinus* has been very extensive, although it still leaves something to be desired. It has been sufficient at least to permit the clearing away of the more important nomenclatorial problems and a substantial basis for further studies is now available. Fortunately, this material has included specimens not only from captive monkeys but from animals in the wild state as well.

The literature on these monkey-infesting species is beset with errors from its very beginning. The genus *Pedicinus* itself was originally based upon a species which was obviously misidentified. The work of Piaget involved the confusion of two species, even in the same slide preparation, and the identification of them under four different names. Later authors have added to the tangle until there have been established fourteen names for what are here recognized as but five clearly defined species, and three generic names for what is here regarded as but a single genus. These errors have undoubtedly arisen chiefly from the fact that the characters which mark the species are somewhat obscure, that the insects make very unsatisfactory slide preparations, and that authors have seized upon the most trivial of details as bases for their proposed names.

Some question will arise as to the selection of the genotype for *Pedicinus*. As will later be shown, the species identified by Gervais as the *Pediculus eurygaster* of Burmeister and utilized as the type of the new genus *Pedicinus* is obviously misidentified, being in the present writer's opinion the species later described by Piaget as *Pedicinus longiceps*. What, then, is the type of *Pedicinus*? Is it the species which Gervais had at hand or is it the species which he supposed he had? The matter is of nomenclatorial importance, for these two species would in the opinion of some authors belong to different genera, the species described by Burmeister being, in the opinion here adopted, that which has since been utilized as the type of *Phthirpedicinus*.

The International Code of Zoological Nomenclature is silent in regard to this problem and no decision of the International Commission covering it has yet been promulgated.

The view is here adopted that the type of the genus *Pedicinus* is properly that species which Gervais actually had before him and upon which he based his genus, not the species which he erroneously supposed that he had. By this procedure no

change in the application of the name *Pedicinus* will be produced, even if the genus *Phthirpedicinus* be accepted.

Neither *Phthirpedicinus* Fahrenheit nor *Neopedicinus* Fahrenheit is here accepted as valid. The former was named for the reception of species in which the claws of the middle and posterior legs are stout and heavy and but two pairs of paratergites are present. The latter was established for species with claws of this same type but with three pairs of paratergites. *Pedicinus* was thereby restricted to species with all the legs and claws essentially similar and with three pairs of paratergites. It does not appear that anything is to be gained by these divisions. The few known species are all obviously closely related members of a common stock and constitute a well-defined and homogeneous group which expresses nicely the concept of a genus that is adhered to throughout this series of papers.

1. *Pedicinus longiceps* Piaget

Figs. 293, 294, 295, 296 D

1844. *Pedicinus eurygaster* (Burmeister), Gervais, in Walckenaer, *Histoire naturelle des insectes aptères*, 3: 301; pl. 48, figs. 1, 1b. (Misidentification.)
1869. ? *Haematopinus obtusus* Rudow, *Zeitschrift für den gesamten Naturwissenschaften*, 23: 169.
1880. *Pedicinus eurygaster* (Gervais), Piaget, *Les Pediculines*, pp. 630-32; pl. 51, fig. 6. (Part; misidentification.)
1880. *Pedicinus longiceps* Piaget, *ibid.*, p. 632; pl. 51, fig. 7. (Part.)
1880. *Pedicinus breviceps* Piaget, *ibid.*, pp. 632-33; pl. 52, fig. 1. (Part.)
1885. *Pedicinus graciliceps* Piaget, *ibid.*, Supplement, pp. 141-42; pl. 15, fig. 2.
1908. *Pedicinus eurygaster* (Gervais) [sic], Dalla Torre, "Anoplura," in Wytsman's *Genera Insectorum*, p. 9.
1908. *Pedicinus longiceps* Piaget, Dalla Torre, *ibid.*, p. 9.
1910. *Pedicinus paralleliceps* Mjöberg, *Arkiv för Zoologi*, 6: 174-76; fig. 88.
1910. *Pedicinus breviceps* Piaget, Mjöberg, *ibid.*, p. 172. (Part; misidentification.)
1912. *Pedicinus rhesi* Fahrenheit, *Zoologischer Anzeiger*, 39: 54.
1912. *Pedicinus rhesi* Fahrenheit, *Jahresbericht des Niedersächsischen zoologischen Vereins zu Hannover*, 2-4: 16-19; pl. 16, figs. 4-9.
1912. *Pedicinus eurygaster* (Burmeister), Fahrenheit, *ibid.*, pp. 14-15. (Part.)
1912. *Pedicinus longiceps* Piaget, Fahrenheit, *ibid.*, p. 15. (Part.)
1912. *Pedicinus breviceps* Piaget, Fahrenheit, *ibid.*, p. 16. (Part.)
1913. *Pedicinus eurygaster* (Burmeister), Patton and Cragg, *Textbook of Medical Entomology*, p. 546; pl. 68, fig. 1.
1916. *Pedicinus breviceps* Piaget, Ferris, "Catalogue and Host List of the Anoplura," *Proceedings California Academy Sciences* (4), 6: 139. (Part.)
1916. *Pedicinus eurygaster* (Burmeister), Ferris, *ibid.*, p. 139. (Part.)
1916. *Pedicinus longiceps* Piaget, Ferris, *ibid.*, p. 139. (Part.)
1916. *Pedicinus rhesi* Fahrenheit, Ferris, *ibid.*, p. 140.
1916. *Pedicinus rhesi* Fahrenheit, Fahrenheit, *Archiv für Naturgeschichte*, 81 (Abt. A): Fasc. 11: 5-6, 32; figs. 5-6.
1916. *Pedicinus vulgaris* Fahrenheit, *ibid.*, p. 32.
1916. *Pedicinus obtusus* (Fahrenheit), *ibid.*, p. 33.
1917. *Pedicinus paralleliceps* Mjöberg, Fahrenheit, *Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten*, 34: Beiheft 2: 3.

1917. *Pedicinus paralleliceps* var. *colobi* Fahrenholz, *ibid.*, pp. 3, 8.

1932. *Pedicinus eurygaster* (Burmeister), Werneck, *Annaes da Academia Brasileira de Ciencias*, 4: 183; figs.

PREVIOUS RECORDS.² Recorded by Gervais, as *Pedicinus eurygaster* (Burm.), from Guenon, *Macacus*, and *Cynocephalus*. By Piaget (part) as

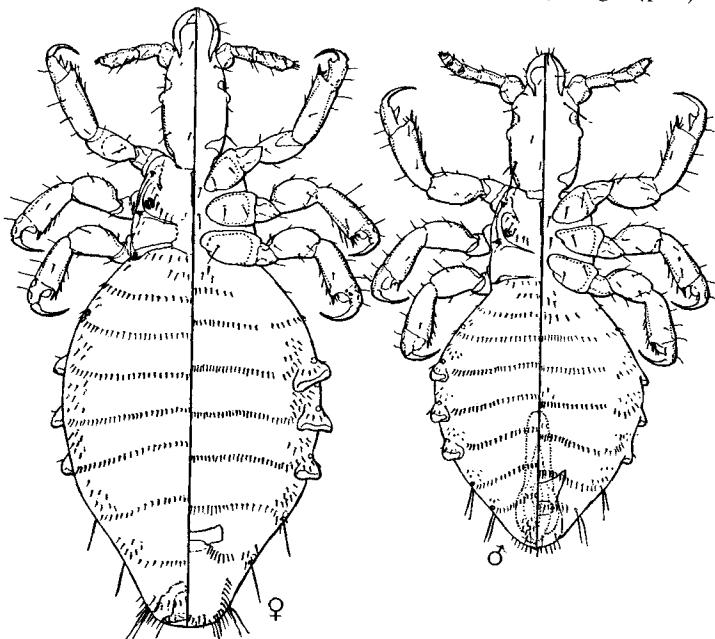


FIG. 293.—*Pedicinus longiceps* Piaget, male and female. From specimens in the Piaget Collection.

P. eurygaster, from *Inuus sinicus*, *I. nemestrinus*, and *Macacus cynomolgus*; as *P. longiceps* Piaget (part) from *Cercopithecus pruinus* and

² The host names will be cited throughout the discussion of the monkey-infesting species as they have been published or as they occur on the labels of the specimens cited. The nomenclature of the monkeys is in a most extraordinary tangle and probably many of the records involve misidentifications of the hosts or misapplication of names. An attempt will be made to clarify the host nomenclature in connection with the host list which will appear in the final parts of this series. For the nomenclature of the Primates see C. W. Stiles and A. Hassall, "Key Catalogue of Primates for Which Parasites Are Reported," *United States Treasury Department, Public Health Service, Hygienic Laboratory Bulletin No. 152*, 1929.

Macacus cynomolgus; as *P. breviceps* Piaget (part) from *Cercopithecus mona*; as *P. graciliceps* Piaget from unnamed host. What is possibly this species was recorded by Rudow as *Haematopinus obtusus* from *Semnopithecus maurus*. Recorded by Mjöberg as *P. paralleliceps* Mjöberg from *Macacus silenus* and as *P. breviceps* from *Cercopithecus* sp. Described by Fahrenholz as *P. rhesi* from *Macacus rhesus* and as *P. paralleliceps* var. *colobi* from *Colobus caudatus*. Recorded by Werneck as *P. eurygaster* from *Pithecus rhesus* and from rabbit, *Oryctolagus cuniculus*. Apparently all these records are from specimens taken from hosts in captivity.

SPECIMENS EXAMINED. From the Piaget Collection as follows: From *Semnopithecus pruinus*, three slides, males, females, and immatures. These may be accepted as co-types of the species and from among them the lecto-holotype should be chosen. Two slides from "*Cercopithecus cynomolgus* (Java)." Two slides labeled "*Pedicinus graciliceps* sur un singe?" which undoubtedly contain the types of this species. A slide of immature specimens labeled "*Pedicinus breviceps* sur un *Cercopithecus mona* (Guinée)." A slide labeled "*Pedicinus eurygaster* Gerv. sur un *Macacus cynomolgus*," containing a male and immature specimens of *P. longiceps* in company with a male of the species here regarded as *P. eurygaster*; a slide with the same data containing a female of *eurygaster* and males and females of *longiceps*; four slides with the same data and containing males, females, and immatures of *longiceps*. A slide labeled "*Pedicinus eurygaster* Gervais sur un *Inuus nemestrinus*," and containing immatures and one adult male.

From the Berlin Museum, three slides determined by Fahrenholz as *Pedicinus rhesi* Fahrenholz, these including a male and a female from *Cynopithecus niger*, Zoölogical Garden, Berlin, and immature specimens from *Cercopithecus griseo-viridis*.

From the Hamburg Museum a slide labeled as from "*Semnopithecus maurus*, A. Poppe det. 1881/2." These are from the type host of Rudow's *Haematopinus obtusus*, and as others of Rudow's supposed types are in the Hamburg Museum it is possible that they are the types of *obtus*.

Immature specimens from the type lot of *P. paralleliceps* Mjöberg and two females labeled "Typen" of *P. paralleliceps colobi* Fahrenholz have been available through the kindness of the Hamburg Museum.

Other specimens, as follows, have been examined:

Cercopithecus diana, no data (British Museum); *Cercopithecus pygerythraeus*, Rustenberg District, Transvaal, G. A. H. Bedford; *Cercopithecus* sp., Hamburg Zoölogical Garden, 26: XIII: 1911 (Hamburg Museum) and Lagos Laboratories, Nigeria (British Museum).

Macacus arctoides, Zoölogical Garden, Washington (United States National Museum); *Macacus rhesus*, Zoölogical Garden, London (British

Museum and Molteno Institute); *Macacus speciosus*, Shinano Province, Japan, S. Nakayama (Stanford University).

Nasalis larvalis, Kuching, Borneo (British Museum).

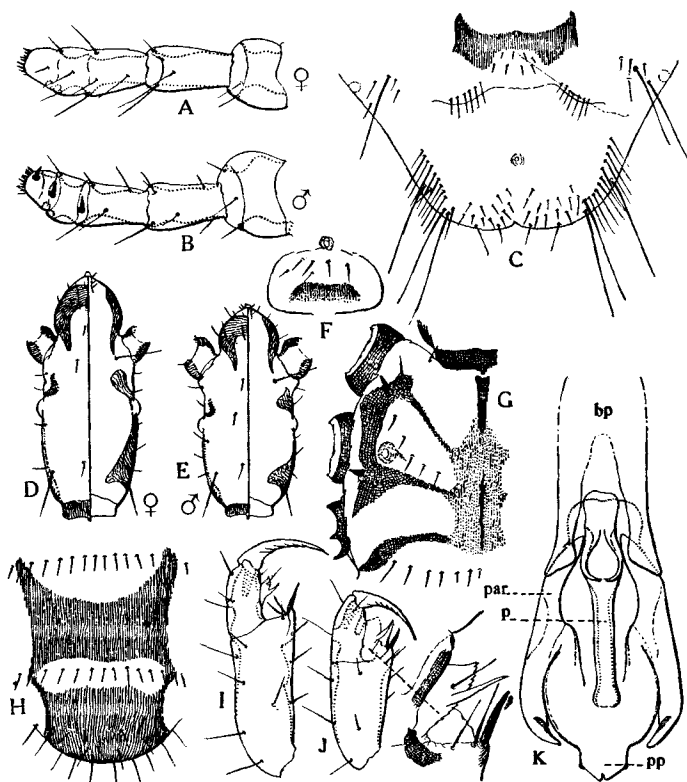


FIG. 294.—*Pedicinus longiceps* Piaget: A, antenna of female; B, antenna of male; C, genital region of female; D, head of female; E, head of male; F, paratergal plate; G, portion of dorsum of thorax; H, genital plate of male; I, anterior tibio-tarsus; J, middle or posterior tibio-tarsus, with detail; K, genitalia of male.

Pithecus adustus, Telok Besar, Tenasserim (U.S.N.M. 124286); *Pithecus mindanensis*, Mt. Apo, Mindanao, Philippine Islands (U.S.N.M. 125319); *Pithecus mindorus*, Mt. Halcon, Mindoro, Philippine Islands (U.S.N.M. 144675); *Pithecus martini*, London Zoölogical Garden (Brit-

ish Museum); *Pithecus patas*, no data (British Museum); *Pithecus rhesus*, Kotihar, Kashmir (U.S.N.M. 173812); *Pithecus* sp., Kashmir (U.S.N.M. 63471), West Sumatra (U.S.N.M. 114559), Chance Island, Mergui Archipelago (U.S.N.M. 104439).

Presbytis sanctorum, Sullivan Island, Mergui Archipelago (U.S.N.M. 124113).

Semnopithecus entellus, London Zoölogical Gardens (British Museum).

"Monkey," Alabang, Philippine Islands, W. B. Mitzmain (British Museum); Miri, Sarawak (British Museum).

"Java Monkey," Lagos Laboratory, Nigeria (British Museum).

FEMALE (Fig. 293). Length attaining 2.5 mm. **Head** (Fig. 294 D) elongate and slender, the fore head sharply rounded; the sclerotic areas forming a curved band across the dorsum of the fore head and longitudinal lateral areas on the hind head; eyes distinct, one faceted; antennae (Fig. 294 A) with the last three segments partially fused. **Thorax** with the prothoracic and mesothoracic coxal condyles united by a longitudinal bar (Fig. 294 G). **Legs** all with slender claws, the tibio-tarsus of the fore legs (Fig. 294 I) longer and relatively more slender than that of the middle and posterior legs (Fig. 294 J). **Abdomen** with the setae of the transverse rows numerous and set closely together, the lateral margins both dorsally and ventrally with scattered setae. Paratergal plates present on the fourth to sixth segments, only slightly sclerotic except for a small median area (Fig. 294 F). Genital plate (Fig. 294 C) very small.

MALE (Fig. 292). Length attaining 1.75 mm. **Head** (Fig. 294 E) shorter and stouter than that of the female, the antennae (Fig. 294 B) clearly five-segmented. **Abdomen** essentially as in the female. **Genitalia** (Fig. 294 K) of a distinctive form, the basal plate (bp) about as long as the parameres and deeply bifid posteriorly, the parameres (par) acutely pointed and inclosing the rather narrow pseudopenis (pp), the penis (p) in the form of an elongated tube, slightly expanded at the apex and forming a flat, truncate anterior process between the arms of the basal plate; genital plate (Fig. 294 H) quite small.

NOTES.—It is only the opportunity of examining the types of the species described by Piaget, Mjöberg, and Fahrenholz that has made possible the unravelling of the tangle associated with this species, a tangle that has effectually blocked progress in the study of the systematics of this group. To explain the situation it is necessary to go back to the description of *Pediculus eurygaster* Burmeister, the first of the monkey-infesting forms to be named.

While the original description of *Pediculus eurygaster* is very inadequate, it definitely indicates³ the presence of two pairs of paratergal plates and the name must be applied to a species with this character. Such a species—and apparently only one such

³ "... spiraculis segmenti quarti et quinti prominentibus fuscis."

—exists and is here recognized under the name of *Pedicinus eurygaster* (Burmeister). It is evident that the species upon which Gervais based the genus *Pedicinus* and which he recorded as the *eurygaster* of Burmeister was misidentified, it being clearly figured as possessing three pairs of paratergal plates. Later authors failed to note this discrepancy and perpetuated the misidentification.

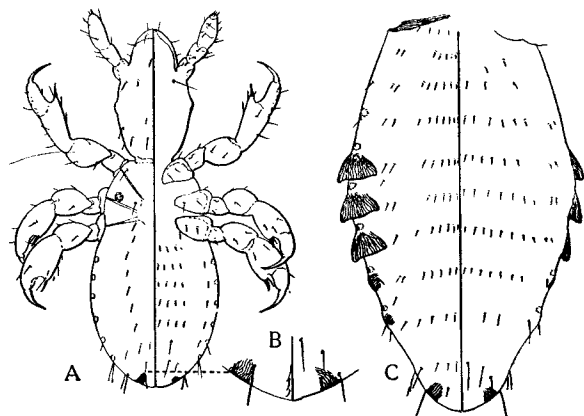


FIG. 295.—*Pedicinus longiceps* Piaget: A, first-stage nymph; B, detail of apex of abdomen of same; C, abdomen of penultimate-stage nymph.

Rudow (1869) complicated the situation by naming two new species from monkeys, both included by him in *Haematopinus*. One of these, *H. albidus*, is here recognized as a valid species and will be dealt with later. The other, *H. obtusus*, from *Semnopithecus maurus*, is undoubtedly a *Pedicinus*. It is possible that the specimens from this host recorded above as received from the Hamburg Museum are the actual types of *obtusus*, for others of Rudow's types are in this museum. If their validity could be established the name *obtusus* would have to be recognized and would replace the name *longiceps* which is here utilized. However, the facts are not established and it seems unreasonable to displace a name, the application of which is definite, on such dubious grounds.

But the greatest complications are those for which Piaget was responsible. His material has been remounted by the writer and put into condition for study. It includes but two species, but these were recorded by Piaget under four specific names, three of which were new. One species, *P. graciliceps* Piaget, was based upon pure material, but each of the others included both actual species, they being included even in the same slide preparations. It appears, furthermore, that Piaget was confused as to the difference between adult and immature specimens and that his figure of *P. breviceps* was based upon the head of one species and the body of another. It remains to the present author, as the first reviser, to select lectotypes which will fix the status of these species. This has been done, keeping in mind the evidence afforded by Piaget's descriptions and records, with the following results:

Pedicinus longiceps, as identified by Piaget, is represented by specimens from *Semnopithecus pruinus* and *Macacus cynomolgus*. Accepting the hint given by

Piaget as to the specimens upon which his conclusions were chiefly based, the lectotypes may be chosen from the first lot, and the name will stand on this selection, although this material includes also specimens of what is here considered to be *Pedicinus eurygaster* (Burm.).

Pedicinus graciliceps Piaget, which was described five years later, is identical with *P. longiceps* as here fixed, the supposed differences being nonexistent.

P. longiceps is the common species with three pairs of paratergal plates occurring upon monkeys in zoological gardens. It may therefore reasonably be accepted as the species which was erroneously identified by Gervais as the *Pediculus eurygaster* of Burmeister.

However, the complications continue. Fahrenholz, recognizing certain of the facts presented above, although not in possession of material which could clarify the situation, considered that the *Pedicinus eurygaster* of Piaget, based upon the specimens from *Inuus nemestrinus*, being a misidentification, was without a name and renamed it *Pedicinus vulgaris*. He also named as new *Pedicinus rhesi*, but himself later placed this as a synonym of *P. paralleliceps* Mjöberg. Further, he named a *P. paralleliceps* var. *colobi*. But all these names, in the opinion here adopted, are synonyms of *P. longiceps* Piaget. Werneck (1932) has recognized some of the facts here enumerated.

In the wide range of material at hand there is naturally a certain amount of variation. There are slight differences in head form and in the proportions of the legs, but there appears to be nothing which offers grounds for specific separation. It is entirely possible that there exist minor strains or races which upon genetical examination would prove to be distinct, but their recognition in preserved material cannot be accomplished.

Immature stages of this species are well represented in the material examined. In the first stage (Fig. 295 A) the paratergal plates are entirely lacking and the apex of the abdomen is provided with a pair of small sclerotic spots (Fig. 295 B). The antennae have the last three segments closely fused. What are apparently the second and third stages differ from each other only in size. In these the paratergites are well developed, there being three pairs as in the adult, and in addition there is on the seventh and eighth segments a sclerotic spot of variable size accompanying each spiracle (Fig. 295 C), together with the apical spots which were present in the first stage. There is some variation in the specimens at hand, some having the spots of the seventh and eighth segments and the abdominal apex more strongly developed.

2. *Pedicinus albidus* (Rudow)

FIG. 296

- 1869. *Haematopinus albidus* Rudow, *Zeitschrift für die gesamten Naturwissenschaften*, 34: 168.
- 1908. *Haematopinus* ? *albidus* Rudow, Dalla Torre, "Anoplura," in *Wytzman's Genera Insectorum*, p. 11.
- 1916. *Haematopinus* ? *albidus* Rudow, Ferris, "Catalogue and Host List of the Anoplura," *Proceedings California Academy Sciences* (4), 6: 141.
- 1916. *Pedicinus albidus* (Rudow), Fahrenholz, *Archiv für Naturgeschichte*, 81 (Abt. A): Fasc. 11: 33.

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PREVIOUS RECORDS. Known only from the original record, from the "Barbary ape," *Macaca sylvanus* (= *Simia sylvanus*, *Macacus inuus*).

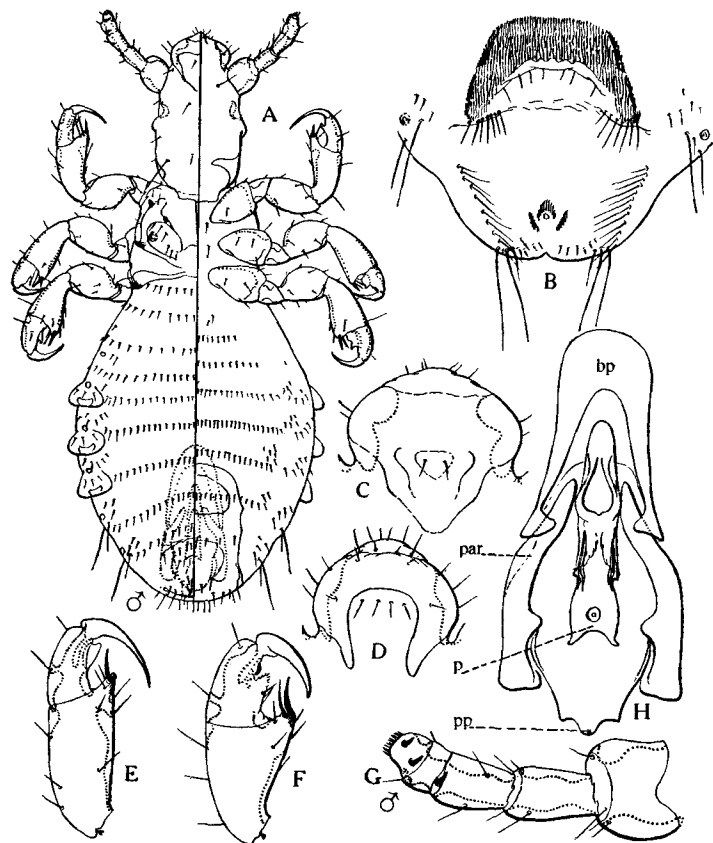


FIG. 296.—*Pedicinus albidus* (Rudow): A, male; B, genital region of female; C, fore head of male; E, anterior tibio-tarsus; F, middle or posterior tibio-tarsus; G, antenna of male; H, genitalia of male.
Pedicinus longiceps Piaget: D, fore head of male.

SPECIMENS EXAMINED. Several males and females from the type host, London Zoölogical Garden (British Museum) and Morocco (U.S.N.M. 196984).

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FEMALE. In all respects essentially identical with that of *P. longiceps* Piaget, differing chiefly in the form of the genital plate (Fig. 296 B), which is constantly much larger and of trapezoidal form with the posterior margin deeply emarginate. Antennae distinctly five-segmented. Legs all with slender claw, the anterior tibio-tarsus (Fig. 296 E) but little more slender than the middle and posterior (Fig. 296 F).

MALE (Fig. 296 A). Essentially similar to the male of *P. longiceps*, from which it differs conspicuously only in the character of the genitalia (Fig. 296 H), the penis (*p*) being flattened instead of forming a cylindrical tube as in *P. longiceps*, and the parameres (*par*) having a strong tooth on the mesal margin. The fore head (Fig. 296 C) is noticeably shorter and broader than in *P. longiceps* (Fig. 296 D). Antennae (Fig. 296 G) with the usual modified setae and distinctly five-segmented.

NOTES.—While this species is quite unrecognizable from the original description, its identity may be regarded as reasonably established on the basis of its host, especially as some of the material examined originated from hosts uncontaminated by life in a zoölogical garden. The characters given are constant in the two lots of material taken in different places and at different times, and the species is quite distinct and worthy of recognition.

3. *Pedicinus hamadryas* Mjöberg

FIGS. 297, 298

1910. *Pedicinus hamadryas* Mjöberg, *Arkiv för Zoologi*, 6: 172-74; figs. 86, 87.
1916. *Pedicinus hamadryas* Mjöberg, Ferris, "Catalogue and Host List of the Anoplura," *Proceedings California Academy Sciences* (4), 6: 139.
1916. *Pedicinus hamadryas* Mjöberg, Fahrenholz, *Archiv für Naturgeschichte*, 81 (Abt. A): Fasc. 11: 32.

PREVIOUS RECORDS. Known only from the original record by Mjöberg, from *Hamadryas* sp.

SPECIMENS EXAMINED. Males and females from the type lot, received through the kindness of Dr. Von Brun of the Hamburg Museum, and a single specimen in the British Museum labeled merely "louse of monkey, *Pediculus hamadryae*."

FEMALE (Fig. 297). Length attaining 2.75 mm. In general characteristics very similar to *P. longiceps* Piaget, differing tangibly chiefly in the form of the legs. These are very long and slender, with the pigmented areas very sharply defined, the tibio-tarsus of the fore leg (Fig. 298 A) being especially slender. The slenderness of the tarsus of the middle and posterior legs (Fig. 298 B) is a distinctive feature. The accompanying figures are to the same scale as are the corresponding figures of other

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species. The setae in the transverse abdominal rows seem to be distinctly fewer than in *P. longiceps*.

MALE (Fig. 297). Length 2.00 mm. Head shorter and broader than in the female, the first segment of the antennae much larger than in the

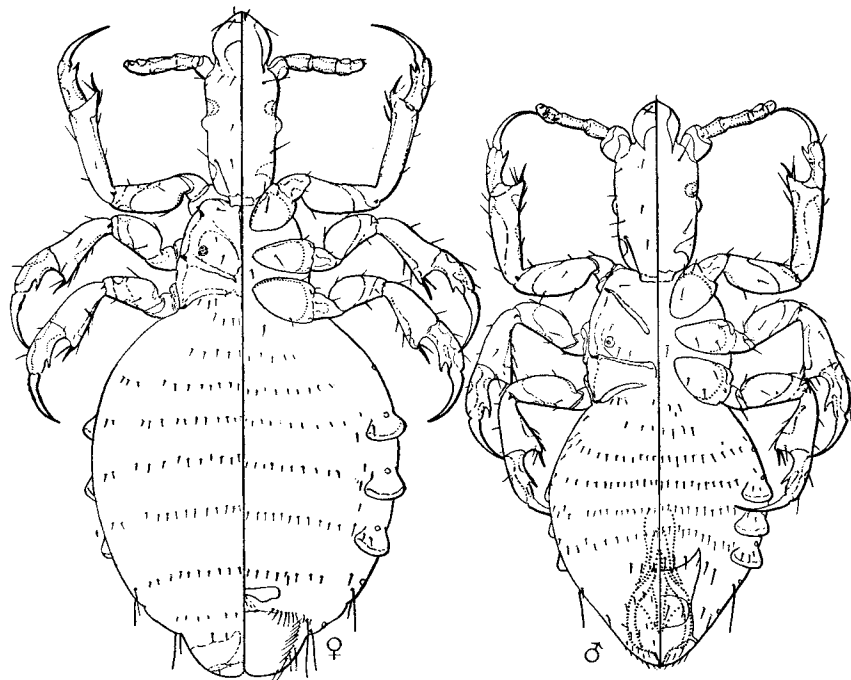


FIG. 297.—*Pedicinus hamadryas* Mjöberg, male and female. From paratypes.

female, the fore head rather strongly constricted. The legs are similar to those of the female. *Genitalia* (Fig. 298 C) differing from those of *P. longiceps* in certain details: parameres (*par*) without an acute point at the apex, rather broad and flat; pseudopenis (*pp*) quite small and narrow; penis (*p*) forming a cylindrical tube which is sharply pointed at the apex, its basal prolongation between the arms of the basal plate (*bp*) acute and not truncate as in *P. longiceps*.

NOTE.—While this is very similar to *P. longiceps* it is probably a valid species.

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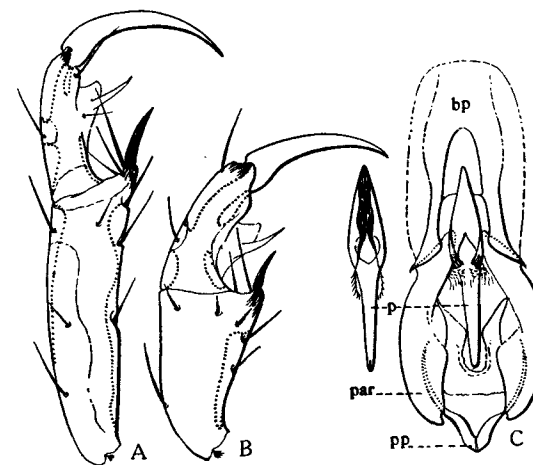


FIG. 298.—*Pedicinus hamadryas* Mjöberg: A, anterior tibio-tarsus; B, middle or posterior tibio-tarsus; C, genitalia of male.

4. *Pedicinus patas* (Fahrenheit)

FIG. 300 G

1916. *Neopedicinus patas* Fahrenheit, *Archiv für Naturgeschichte*, 81 (Abt. A: Fasc. 11: 6-7; pl. f, fig. 2; t.f. 7.

PREVIOUS RECORDS. Known only from the original record, from *Cercopithecus patas*, without indication of locality. The host, for which the name *Erythrocebus patas* is apparently correct, is a native of West Africa.

SPECIMENS EXAMINED. Several individuals from *Erythrocebus whitei*, Guas Ngishu Plateau, British East Africa (U.S.N.M. 162844); *Lasiopyga kolbi*, Lake Naivasha, British East Africa (U.S.N.M. 162844); *Lasiopyga albogularis kibonotensis*, Taveta, East Africa (U.S.N.M.). On the basis of hosts and the original description by Fahrenheit, I assume these to be this species. Specimens in the British Museum labeled merely "From *Cercopithecus*, Prof. Minchin," represented only by very poor preparations, appear to be the same.

NOTES.—The material at hand, unfortunately, is all in very bad condition, such as to make it impracticable to present complete figures. It is extremely close to the

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next to be described and its distinctive characters will be discussed in connection therewith.

This species has been designated by Fahrenholz as the type of his genus *Neopedicinus*, the genus being based upon the combination of three pairs of paratergites with heavy claws on the middle and posterior legs. This genus is not here regarded as worthy of recognition.

5. *Pedicinus ancoratus* n. sp.

FIGS. 299, 300 A-F, H, I

SPECIMENS EXAMINED. Holotype, a male, and allotype and four paratypes from *Presbytis pullata*, Pulo Sebang, East Sumatra (U.S.N.M.

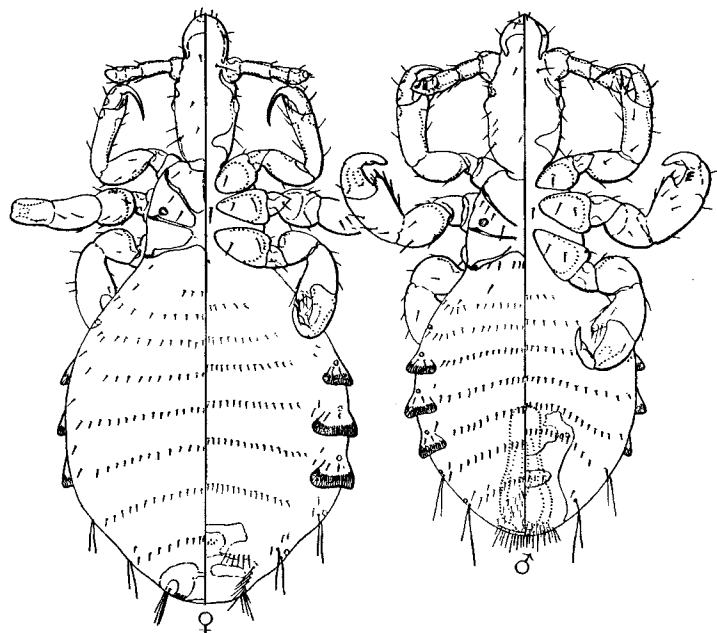


FIG. 299.—*Pedicinus ancoratus* n. sp., male and female. From the types.

123070); numerous paratypes from *Presbytis cristata*, Indragin River, East Sumatra (U.S.N.M. 113170), and Tanjong Ringsam, Banka (U.S.N.M. 124713); *Presbytis germaini mandibularis*, Koh Chang Island, Siam (U.S.N.M. 201549); *Presbytis schistacea*, Lolab, Kashmir (U.S.

N.M. 63470); *Presbytis rubicunda rubida*, Sukadana, West Borneo (U.S.N.M. 145334); and a single female doubtfully referred to this species, from *Pygathrix priamus*, Ceylon (U.S.N.M. 191986).

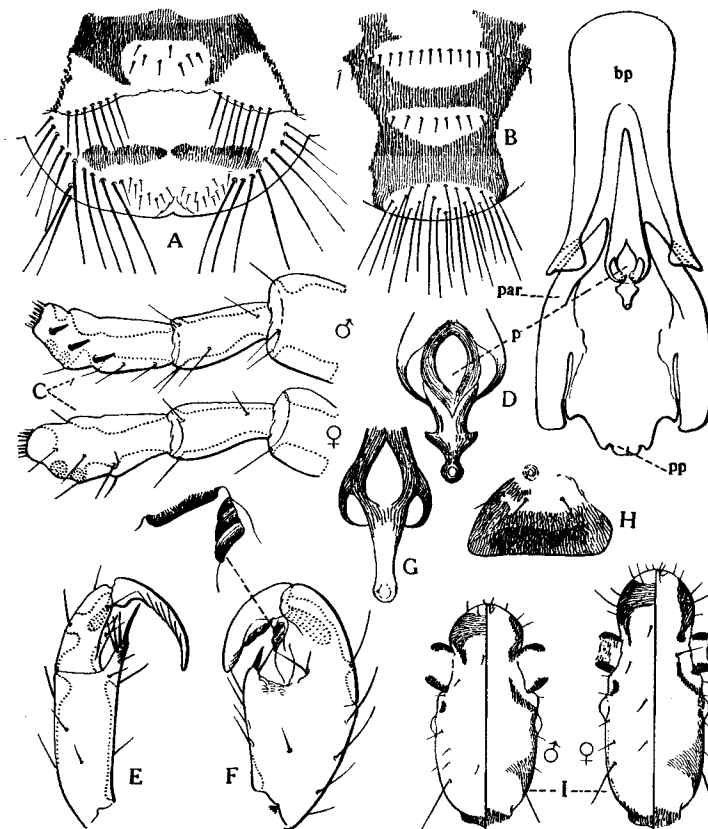


FIG. 300.—*Pedicinus ancoratus* n. sp.: A, genital region of female; B, genital plate of the male; C, antennae of male and female; D, genitalia of male with detail of penis; E, anterior tibio-tarsus; F, middle or posterior tibio-tarsus, with detail; H, paratergal plate; I, heads of male and female. *Pedicinus patas* Fahrenholz: G, detail of penis.

FEMALE (Fig. 299). Length 2.5 mm. Head (Fig. 300 I) relatively slender, with the antennae set at about the anterior third, the anterior

margin of the head smoothly rounded, the occiput constricted into a short neck, the markings of the usual type; antennae (Fig. 300 C) with the last three segments quite closely fused. *Thorax* of the form characteristic of the genus, the coxal condyles not connected by longitudinal bands; anterior legs with the tibio-tarsus (Fig. 300 E) moderately slender and with slender claw; middle and posterior legs (Fig. 300 F) with the tibio-tarsus stout and flattened, with stout claw and with a heavily sclerotic area on the inner face of the tarsus, this opposing a similar area on the claw (Fig. 300 F, detail).

Abdomen of the ordinary form, the setae rather sparse and without marginal clusters; paratergites present on segments four to six, their posterior half (Fig. 300 H) strongly sclerotic; genital plate (Fig. 299 A) of a distinctive form as shown.

MALE (Fig. 299). Length 1.75 mm. In general closely resembling the female, but with the head (Fig. 300 I) shorter and broader, the antennae (Fig. 300 C) of the typical form, with the third and fourth segments quite closely fused. *Genitalia* (Fig. 300 D) distinctive by reason of the peculiar form of the penis (*p*) which is strongly produced anteriorly between the arms of the basal plate (*bp*), with its posterior prolongation short, strongly sclerotic, and with distinct lateral points, the form of this suggesting the specific name; parameres (*par*) with their apices truncate and inclosing the broad pseudopenis (*pp*). Genital plate (Fig. 300 B) relatively large.

NOTES.—This species is very close to that which is here considered to be *P. patas* (Fahrenholz), the one precise and definite difference being found in the form of the penis. All the specimens at hand from hosts of the genus *Presbytis* agree in having the penis of the form described, while all those which seem to be *P. patas* agree in lacking the lateral processes (Fig. 300 G). There are other apparent but slight differences, the specimens of *patas* having the head larger and more slender and apparently lacking the short "neck" which occurs in other species, the head having the appearance of rising from the dorsal aspect of the thorax as noted by Fahrenholz. None of the available specimens of *P. patas* show adequately the form of the genital plate in the female.

Some specimens, including unfortunately but poor preparations of females only, labeled as "found on cats and dogs by hospital assistant, sent by Acting Consul H. A. Attewill, Teng Yack, China, 1911—147," in the British Museum, may be *P. ancoratus*.

6. *Pedicinus pictus* n. sp.

Figs. 301, 302

MATERIAL EXAMINED. Holotype, a male, and allotype and numerous paratypes from *Colobus caudatus*, Mt. Kenya, British East Africa (U.S.N.M. 163125). Paratypes from the same host and from *Pygathrix*

entellus, London Zoölogical Gardens (British Museum). The normal host is in all probability *Colobus caudatus*.

FEMALE (Fig. 301). Length 2.00 mm. *Head* (Fig. 302 E) with the antennae set at about one-third of the length from the anterior apex, the

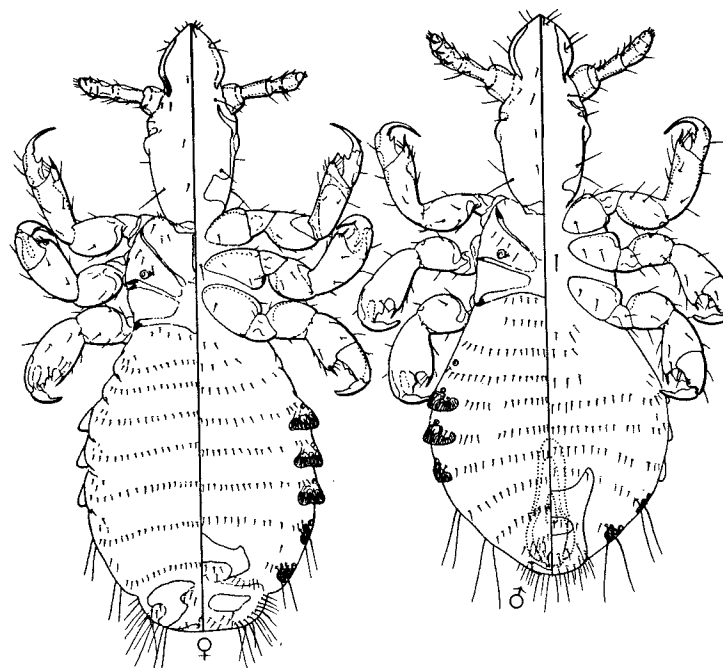


FIG. 301.—*Pedicinus pictus* n. sp. From the types.

eyes slightly behind the middle; fore head sharply parabolic; occiput constricted into a distinct neck; markings those common in the genus; antennae (Fig. 302 H) quite distinctly five-segmented. *Thorax* with the pleural ridges uniting into a median sclerotic area, the lateral margins without bands connecting the condyles. Legs short, the tibio-tarsus of the fore leg comparatively slender and with slender claw (Fig. 302 F), that of the other legs (Fig. 302 G) stout, with stout claw and with two or three sclerotic ridges across the inner face of the tarsus at the base of the claw.

Abdomen rather short and rotund in the specimens at hand, the

paratergites and the genital plate and dorsal areas of the ninth segment strongly sclerotic and pigmented. Setae arranged in closely set rows. Paratergites with free margins (Fig. 302 *B*) present on the fourth to sixth segments, the seventh to eighth with an irregular sclerotic plate

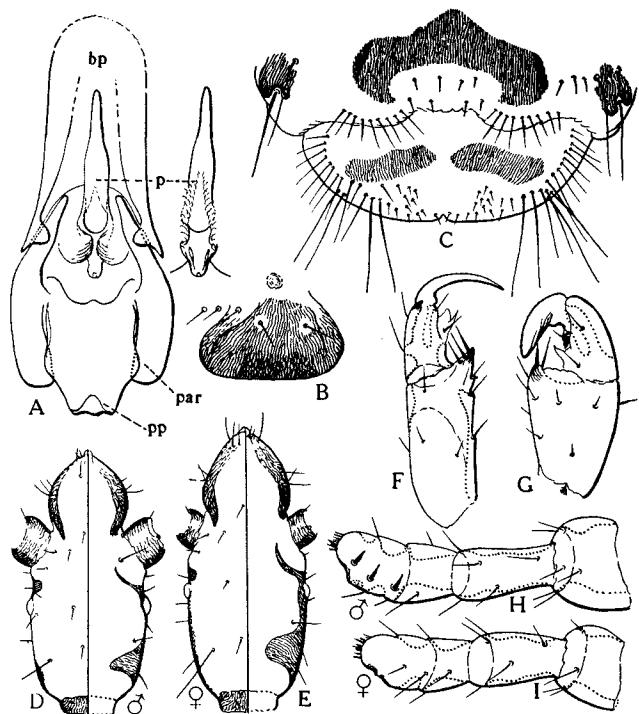


FIG. 302.—*Pedicinus pictus* n. sp.: A, genitalia of male; B, paratergal plate; C, genital region of female; D, head of male; E, head of female; F, anterior tibio-tarsus; G, middle or posterior tibio-tarsus; H, antenna of male; I, antenna of female.

without free margins caudad of the spiracle. Genital plate (Fig. 302 *C*) relatively very large, of a distinctive and constant form; between the gonopophyses and the apex a pair of moderately sclerotic transverse plates.

MALE (Fig. 301). Length 1.75 mm. In general closely resembling the female, the head (Fig. 302 *D*) somewhat shorter and stouter. Antennae (Fig. 302 *H*) with the usual modified setae on the last three

segments. *Genitalia* (Fig. 302 *A*) distinguished especially by the form of the penis (*p*) which is prolonged anteriorly far up between the arms of the basal plate (*bp*), while its posterior prolongation is exceedingly small; parameres (*par*) blunt tipped, inclosing the rather narrow pseudo-penis (*pp*).

NOTES.—This species is evidently quite closely related to *P. patas* (Fahrenholz), being marked chiefly by the paratergal plates of the seventh and eighth segments. The pigmentation of the sclerotic areas is unusually strong for a species of this genus and has suggested the name.

Certain specimens at hand, including a single male from *Colobus kirkii*, no data (U.S.N.M. 16604), and males and females from *Colobus* sp., Zanzibar (Molteno Institute), differ from *P. pictus* in lacking the paratergites of the seventh and eighth segments and in having the head noticeably short. The material, however, is poor and for the present I can do nothing more than place it as near *P. pictus*.

Specimens representing the last immature stage of *P. pictus* are at hand. They apparently lack the paratergites of the seventh and eighth segments and possess a pair of terminal sclerotic areas; otherwise they are very similar to the adults.

7. *Pedicinus eurygaster* (Burmeister)

FIGS. 303, 304, 305

1838. *Pediculus eurygaster* Burmeister, *Genera Insectorum, Rhynchota, Species 21*.
 1864. *Pediculus microps* Nitzsch, Giebel, *Zeitschrift für die gesamten Naturwissenschaften*, 23: 32.
 1874. *Pedicinus eurygaster* (Burmeister), Giebel, *Insecta Epizoa*, p. 32.
 1880. *Pedicinus eurygaster* (Burmeister), Piaget, *Les Pediculines*, p. 630. (Part.)
 1880. *Pedicinus longiceps* Piaget, *ibid.*, p. 632. (Part.)
 1880. *Pedicinus breviceps* Piaget, *ibid.* (Part.)
 1881. *Pedicinus piageti* Stroebelt, *Jahresbericht der zoologischen Section des westfälischen provinzial-Vereins für Wissenschaft und Kunst*, 9: 82; pl. 1, fig. 3.
 1908. *Pedicinus eurygaster* Gervais, Dalla Torre, "Anoplura," in *Wytzman's Genera Insectorum*, p. 9. (Part.)
 1908. *Pedicinus longiceps* Piaget, Dalla Torre, *ibid.* (Part.)
 1908. *Pedicinus breviceps* Piaget, Dalla Torre, *ibid.* (Part.)
 1910. *Pedicinus breviceps* Piaget, Mjöberg, *Arkiv för Zoologi*, 6: 172. (Part; mis-identification.)
 1912. *Phthirpedicinus micropilosus* Fahrenholz, *Zoologischer Anzeiger*, 39: 55.
 1912. *Phthirpedicinus microps* (Nitzsch), Fahrenholz, *ibid.*
 1912. *Phthirpedicinus micropilosus* Fahrenholz, Fahrenholz, *Jahresbericht des Niedersächsischen zoologischen Vereins zu Hannover*, 2-4: 23; pl. 1, figs. 1-3.
 1912. *Phthirpedicinus microps* (Nitzsch), Fahrenholz, *ibid.*, pp. 25, 28.
 1912. *Phthirpedicinus piageti* (Stroebelt), Fahrenholz, *ibid.*, pp. 27, 28.
 1916. *Phthirpedicinus micropilosus* Fahrenholz, Ferris, "Catalogue and Host List of the Anoplura," *Proceedings California Academy Sciences* (4), 6: 140.
 1916. *Pedicinus longiceps* Piaget, Ferris, *ibid.*, p. 139. (Part.)
 1916. *Pedicinus breviceps* Piaget, Ferris, *ibid.* (Part.)

1916. *Pedicinus eurygaster* (Burmeister), Ferris, *ibid.* (Part.)
 1916. *Phthirpedicinus microps* (Nitzsch), Ferris, *ibid.*, p. 140.
 1916. *Phthirpedicinus piageti* (Stroebelt), Ferris, *ibid.*, p. 141.
 1916. *Phthirpedicinus micropilosus* Fahrenholz, Fahrenholz, *Archiv für Naturgeschichte*, 81 (Abt. A): Fasc. 11: 4, 32; t.f. 3-4.
 1916. *Phthirpedicinus eurygaster* (Burmeister), Fahrenholz, *ibid.*, p. 32.
 1917. *Phthirpedicinus micropilosus* Fahrenholz, Fahrenholz, *Jahrbuch der Hamburgischen wissenschaftlichen Anstalten*, 34: Beiheft 2: 3.

PREVIOUS RECORDS. Originally recorded by Burmeister from *Inuus sinicus*. Recorded by Piaget, as *Pedicinus eurygaster* (part), from *Macacus cynomolgus*; as *P. longiceps* (part) from *Cercopithecus cynomolgus*; as *P. breviceps* (part) from *Cercopithecus mona*. Recorded by Stroebelt, as *P. piageti*, from *Macacus erythraeus*; by Mjöberg, as *P. breviceps*, from *Macacus silenus*; by Fahrenholz, as *Phthirpedicinus micropilosus*, from *Macacus rhesus*, *M. silenus*, and *Cercopithecus* sp. All these records appear to have been from hosts in zoological gardens.

SPECIMENS EXAMINED. In the Piaget Collection. Two adult females, labeled as "*Pedicinus breviceps*, sur un *Cercopithecus mona* (Guinée)." These must be regarded as including the actual type of *breviceps*, other specimens bearing the same data being immatures of what is here regarded as *P. longiceps*. Three females labeled as "*Pedicinus longiceps*, *Cercopithecus cynomolgus* (Natouna)." One male and one female on different slides, labeled as *P. eurygaster* (Burmeister), mounted with specimens of *P. longiceps*, from "*Macacus cynomolgus*."

Specimens from the Hamburg Museum determined by Fahrenholz as *Phthirpedicinus micropilosus* Fahrenholz, from *Macacus silenus*, Hamburg Zoological Garden.

Other specimens as follows: *Macacus rhesus*, London Zoological Garden (British Museum); *Pithecius rhesus*, Kotihar, Kashmir (U.S.N.M.); *Macacus fascicularis*, Geneva, 1912, A Ghidini (British Museum); *Pithecius adustus*, Telok Besar, Tenasserim (U.S.N.M. 124286); *Pithecius mindorus*, Mt. Halcon, Philippine Islands (U.S.N.M. 144675); *Pithecius* sp., Chance Island, Mergui Archipelago (U.S.N.M. 10440); *Semnopithecius entellus*, London Zoological Garden (British Museum); *Rhinopithecius concolor*, South Pagi Island (U.S.N.M. 121660); *Cynomolgus cynomolgus*, Hamburg Zoological Garden (Hamburg Museum); "Martin's *Cercopithecius*" and without indication of host, London Zoological Garden (British Museum); "Java monkey," Lagos Laboratory, Nigeria (British Museum).

FEMALE (Fig. 303). Length 1.5 mm. Head (Fig. 304 A) relatively small, the fore head short and rounded; markings much reduced except for the dorsal band of the fore head; antennae (Fig. 304 B) with the last

three segments fused. Thorax (Fig. 304 H) without a lateral band uniting the condyles. Anterior legs with the claw (Fig. 304 D) slender and the tibio-tarsus relatively so; middle and posterior legs (Fig. 304 E) with the tibio-tarsus stout and flattened, the claw stout, the tarsus with three distinct, sclerotic ridges on its inner face (Fig. 304 E, detail).

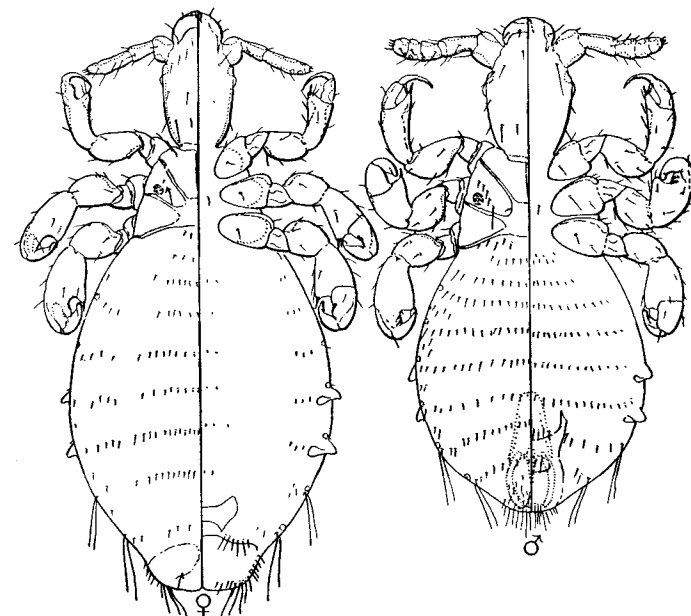


FIG. 303.—*Pedicinus eurygaster* (Burmeister), male and female. From specimens from "*Cynomolgus cynomolgus*," Hamburg Zoological Garden.

Abdomen with the setae very small; paratergites (Fig. 305 C) present on only the fifth and sixth segments, small, their outer angle projecting from the abdomen; seventh and eighth segments with from two to four slender marginal setae; genital region (Fig. 304 C) with a small median plate.

MALE (Fig. 303). Length 1.2 mm. Head (Fig. 304 A) somewhat shorter and broader than in the female; antennae (Fig. 304 B) with the last three segments distinctly separate and each bearing dorsally a short, stout seta. Abdomen as in the female, but blunter at the apex. Genitalia (Fig. 304 G) of the general form common to the group, the apices of the

parameres (*par*) widely separated by the broadly divergent arms of the pseudopenis (*pp*), the penis (*p*) in the form of an elongate, conical tube,

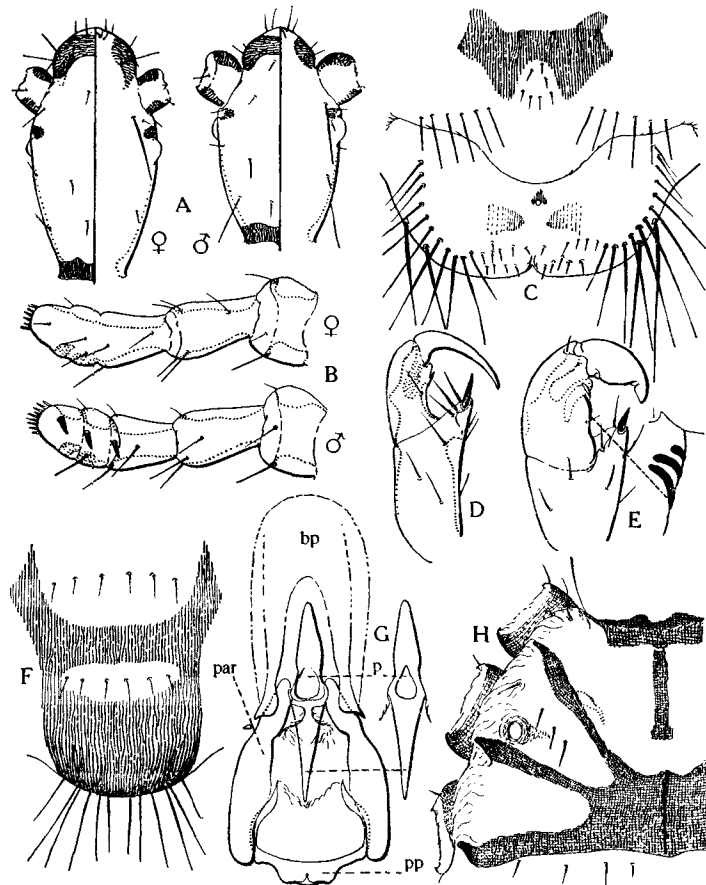


FIG. 304.—*Pedicinus eurygaster* (Burmeister): A, heads of male and female; B, antennae of male and female; C, genital region of female; D, anterior tibio-tarsus; E, middle or posterior tibio-tarsus, with detail; F, genital plate of male; G, genitalia of male; H, portion of dorsum of thorax.

which is produced as a narrow, flat plate between the arms of the basal plate (*bp*). Genital plate as in Fig. 304 F.

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NOTES.—The identification of this species with the *Pediculus eurygaster* of Burmeister rests frankly upon an assumption, but an assumption which seems completely justified. The original description of this species indicates clearly that it possesses but two pairs of paratergites. In all the wide range of material examined in connection with the preparation of this paper there appears but one species which possesses such a character, and this species is evidently very common on various kinds of monkeys in zoological gardens. By accepting the view that all the species which have been described as possessing but two pairs of paratergites are identical, no unrecognizable species of this type are left to encumber the literature, while otherwise *P. eurygaster* (Burmeister) and *P. piageti* Stroebelet cannot be disposed of.

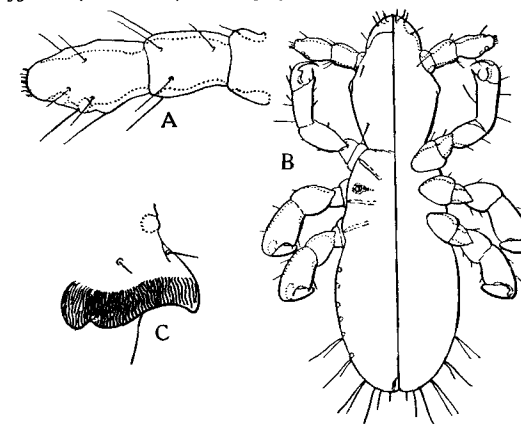


FIG. 305.—*Pedicinus eurygaster* (Burmeister): A, antenna of first-stage nymph; B, first-stage nymph; C, paratergal plate of adult.

As has been pointed out in connection with the description of *P. longiceps* Piaget, the *Pedicinus eurygaster* of authors from Gervais to the time of Fahrenholz is a misidentification. The *Pediculus microps* of Nitzsch, which was resurrected by Fahrenholz with the claim that this name must be recognized, is, upon Fahrenholz' later showing, strictly a synonym of *eurygaster*, the latter having been based by Burmeister upon Nitzsch's notes and figures and the name *microps* having been published long after *eurygaster* had been validated.

Pedicinus piageti Stroebelet is recognizable merely as a species with but two pairs of paratergal plates, and it is upon this basis that it is placed as a synonym of *eurygaster*. *Phthirpedicinus micropilosus* Fahrenholz is sunk on the same basis.

As pointed out in the list of specimens examined, Piaget had this species mounted on the same slides with that here recognized as *P. longiceps* Piaget and labeled with the names *P. eurygaster* (Burmeister), *P. longiceps* Piaget, and *P. breviceps* Piaget. Under the last name were included specimens of what is here considered to be true *eurygaster* and of immature individuals that are considered to be *longiceps*. The original figure of *breviceps* appears to have been compounded from these two species, the head being that of *eurygaster* and the abdomen that of *longiceps*.

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The only possible basis for recognizing more than one species in the material examined is to be found in the fact that in some specimens, notably all those in the Piaget Collection, there are from three to four long marginal setae on the seventh and eighth abdominal segments, while in others there are but two. It does not appear that this offers any reasonable basis for a specific separation.

The immature stages differ but little, except in proportions, from the adult. The apparent first stage is figured (Fig. 305 B). The antennae of this stage (Fig. 305 A) have the three terminal segments closely fused. There are no marginal sclerotic areas on the abdomen, such as appear in the immature stages of *P. longiceps*. The paratergites appear in what is perhaps the third instar, being then of essentially the same character as in the adult.

Fahrenholz has utilized this species as the type of his genus *Phthirpedicinus*. There seems to be no special reason for separating this genus from *Pedicinus*.

8. *Pedicinus obtusus* (Rudow)

1869. *Haematopinus obtusus* Rudow, *Zeitschrift für die gesamten Naturwissenschaften*, 34: 169.
 1908. *Haematopinus ? obtusus* Rudow, Dalla Torre, "Anoplura," in *Wytsman's Genera Insectorum*, p. 11.
 1916. *Haematopinus ? obtusus* Rudow, Ferris, "Catalogue and Host List of the Anoplura," *Proceedings California Academy Sciences* (4), 6: 141.
 1916. *Pedicinus obtusus* (Rudow), Fahrenholz, *Archiv für Naturgeschichte*, 81 (Abt. A): Fasc. 11: 33.

PREVIOUS RECORDS. Known only from the original record by Rudow, from *Semnopithecus maurus*.

NOTES.—This species is utterly unrecognizable from the original description and has been referred to *Pedicinus* solely on the basis of its host.

As has been pointed out in the discussion of *Pedicinus longiceps* Piaget, the writer has examined certain specimens from the type host of *P. obtusus*, belonging to the Hamburg Museum, and it is possible that these are actually Rudow's types, since the supposed types of others of his species are in that museum. But unless it can be shown that such is actually the case, it would seem unjustifiable to suppress a definitely known species in order to recognize anything as vague as is *P. obtusus*. Were we dealing with species rigidly restricted to a single host species and were we certain that the host identification has been correctly made—as is not the case in connection with any of the monkeys—we should be justified in taking such a step, for the probabilities are all in its favor. But there is the possibility that Rudow had some other species, such as *P. eurygaster*, which occurs commonly on various monkeys.

There seems nothing to do at present but to regard *Pedicinus obtusus* (Rudow) as unrecognizable.

