HAMOPHITHIRIUS GALEOPITHECI MJÖBERG REDISCOVERED; WITH THE DESCRIPTION OF A NEW FAMILY OF SUCKING LICE (ANOPLURA: HAMOPHITHIRIIDAE)

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ABSTRACT—The genus Hamophithirus Mjöberg, and species H. galeopitheci Mjöberg, from a Bornean heropithecus, Cynocephalus variegatus, are redescribed, and a new family, Hamophithiridae, named to contain the species. H. galeopitheci is of primary occurrence on C. variegatus and is not related to either the hoplopleural lice infesting tree shrews and lemurs, or to the primate-infesting lice, Phitina, Fedicus, and Fedicinina. Therefore, the structure of Hamophithirus offers no new evidence of relationships amongst lice found on insectivores and primates. However, since dermopterans and bats are considered to have arisen from the same stock, the presence of a primary anopluran species on a dermopteran suggests that absence of Anoplura on bats represents a secondary loss.

The problem of affinities of the insectivores and primates has been approached on the part of entomologists through a study of their lice. Some seemingly obvious relationships amongst the Anoplura of tree shrews and lemurs have encouraged students of the Anoplura to hope that the enigmatic Hamophithirus galeopitheci Mjöberg—not since originally described—might prove to be another connecting link between the insectivores and the primates. H. galeopitheci was from Cynocephalus (= Galeopithecus) variegatus (Audebert), a member of the order Dermoptera, which has been called by Büttner-Janusch (1963) "[possibly] a second line of effort in the attempt to develop a primate type." Furthermore, dermopterans or flying lemurs are regarded by Simpson (1945) as being derived from the same stock as the Chiroptera (bats), but chiropterans do not have anopluran ectoparasites. Since bats do have many other ectoparasites including very specialized dipterans and hemipterans, the lack of lice has puzzled entomologists. There has been no clue as to whether absence of lice on bats was primary or secondary. Hopkins (1949) voiced the opinion that H. galeopitheci were found to be of primary occurrence on the flying lemur, the absence of lice on bats must then be secondary.

The types of Hamophithirus galeopitheci apparently have been lost. Although Mjöberg’s original description is good so far as it goes, the accompanying inadequate and misleading drawings made it impossible to assume much more than that H. galeopitheci was a species of Anoplura although Ferris (1932 and 1951) postulated that it was related to Docophithirus Waterston and Lemurolphithrus Bedford on the basis of head shape.

In 1960 Dr. R. E. Kuntz, then with NAMRU 2 in Formosa, made a collecting trip to British North Borneo. While there he obtained a specimen of Cynocephalus variegatus, the type host of H. galeopitheci. The animal was infested with a good number of anopluran species which were easily identified as Hamophithirus galeopitheci Mjöberg by reference to the original description.

The distinct features of Hamophithirus make it evident that the louse is of primary occurrence on Cynocephalus and furthermore, necessitates the creation of a new family to contain the species. A description of the family and redescriptions of the genus Hamophithirus and species H. galeopitheci follow.

Hamophithiridae, n. fam.

Description: Anoplura without external evidence of eyes. Antennae not sexually dimorphic, three-segmented in only known species; the two sensoria usually associated with segments 4–5 present on ultimate segment. Ocellar apophysis of head present, undivided. Thorax dorsally with well-defined total pit; prothoracic tergal and sternal apophyses both well developed, and both associated with definite apophyseal pits; mesothoracic sternal apophysis and indentation of pit also present. Thoracic sternal plate present. Legs essentially equal in size; tibiotarsal separation evident; tarsal claw with rounded protuberance basally to the side of the true claw; internal surface of tarus (opposing the tibial "thumb") with a raised sensory disc and modified setae; tibial "thumb" with several short, blunt, blade-like apical setae. Majority of abdominal segments lacking plates both dorsally and ventrally; abdominal derm scapulated or reticulate. Paratlegal plates present on at least some of abdominal segments, with the spaces free. Abdominal spiracles with internal lobes. Female with definite gonapophyses on eighth segment and apical appendages on ninth segment; apparently lacking spermatotheca. Male genital plate present, cuticle. Parameters of aedeagus free distally.

Hamophithirus Mjöberg, 1925


Homophthirius galeopitheci Mjöberg, 1925


Type data: Type series from Galeopithecus sp. [Cynocephalus variegatus], Fesselton [Jesselton], British North Borneo.

Specimens examined: A series of 3 males, 20 females, and 10 nymphs from Cynocephalus variegatus, Ranau, British North Borneo, 20 September 1900, R. E. Kuntz collector, no. FJ9477.

Description: Male (fig. 21): Head (fig. 10, female) dorsally and posterior to interantennal hook be before antennal insertion, with small rounded lateral lobe bearing several thin setae, with definite anterodorsal head plate which is rounded posteriorly. Dorsally, posterior to antennae, with small oblate sclerotized plate medially. Ventrally, just posterior to postantennal angle, head margins with acutely triangular calcic lobe directed posteriorly. On each side occiput extended postero-laterally into lobe bearing 3-5 medium-sized setae. Lateral post-antennal area with about 10 medium-sized setae on each side; ventrally lateral postantennal area with about 7 smaller setae. Thoracic sternal plate (fig. 8, female) large, with pronounced subacute apicolateral angles. Jointed setae of meso- and metathorax extended posteriorly into 2 acute lateral lobes, each bearing 2 subapical setae (fig. 7, female). Tibial thumb of first pair of legs with 5 short modified apical setae; other pairs of legs with 4 such setae (fig. 12, A, B). Sternal plate of first abdominal segment with postero-apical row of 12-13 setae. Dorsally with 3 lateral setae on each side of segments 2-8, these separated from medial rows and near paratergal plates. Paratergal plate II apically joined to paratergal plate III, and with vestige of spiracle; plates III-VII with lateral apices extended into short points; apical setae borne near these points; plates III-V with 3 apical setae, the median one much smaller than others; plates VI-VII with 2 apical setae; plate VIII reduced, lacking free setae apically. Genital plate an acute triangle with rounded angles. Aedeagus (fig. 6) with parameres hooked apically; pseudopenis long, narrowly tapered apically, basally divided into 2 elongate arms, each arm apparently with a central articulation or break, at this break the proximal part is extended apicolaterally into a short acute lobe.

Female (fig. 11): As male except abdominal setae somewhat more numerous; paratergal plates III with 4 apical setae, and plates IV-VI with 3 apical setae; plate VII with 2 apical setae (fig. 5). Genitalia as in fig. 11; apical lobe of ninth segment with 1 subapical seta.

Nymphs: All of the three stages with legs essentially as in adult. Notal pit present in all; spiracles present on abdominal segments 3-8; paratergal plates present on segments 3-7. Sternal plate of abdominal segment 2 not developed. Prothoracic sternal and tergal apophyses developed in all stages but mesothoracic ones not developed in first stage and weakly developed or missing in older stages. In all stages, mouthparts are anterior, not ventral. Hooks of head and antenna missing.

Stage Three (fig. 3): Head narrower posteriorly than adult, but lateral expansion evident; setation much as adult but setae smaller. Thoracic sternal plate present but not heavily sclerotized. Typical abdominal segment dorsally with
lateral setae near paratergal plate and medially with 2 definite rows of setae, the anterior row of 2 long medial and 2-3 shorter lateral setae on each side. Ventrally typical segment with 1 apparent row containing 2 long medial and 2-3 small lateral setae. Paratergal plates III-VII similar to those of adult except smaller and with only 2 apical setae.

Stage Two: Similar to third stage except smaller, head narrower and with fewer setae, and size difference between large median setae of abdominal rows and smaller lateral setae more marked.

Stage One (fig. 4): Postantenal area scarcely broadened, with only a few small setae. Thoracic sternum plate absent. Typical abdominal segment with 2 median setae both dorsally and ventrally. Paratergal plates III-VII barely indicated posteriorly, each with 2 apical setae.

The affinities of *Hamophthirius galeoptileti* are obscure. The thorax is of a generalized type. I consider the retention of the thoracic apophyses (or phragmata) (figs. 7, 8) in particular as a primitive, non-specialized character. The protuberances on the base of the tarsal claws (fig. 12, A, B) could be either the vestiges of a second claw or a specialized development, but the marked division of the tibia from the tarsus as well as the similarity in size of the legs must be primary characters. The three-segmented antennae are an obvious specialization. The female and male genitalia are of a generalized form, with the retention by the female of well-developed gonopods on the second segment and terminal lobes of the ninth segment, and in the male, a non-specialized aedeagus with distally free parameres. Loss of abdominal plates and coalescence of antennal segments occurs sporadically throughout the Anoplura, as does the presence of a notal pit.

The pronounced prothoracic sternum pits are reminiscent of the Haematopinididae Enderlein as are the female genitalia and the possession of an occipital head apophysis (Qadri, 1948, believes these to be phragmata of the prothorax). Otherwise, the two families depart radically in the form of the legs, the head, the male genitalia, the paratergal plates, the abdominal spiracles, etc.

Like the Linognathitidae Webb, the spiracles of *Hamophthiridae* have internal ledges which appear like rings (fig. 9 A, B), abdominal plates are lacking on the majority of the segments, and the two families have somewhat similar male and female genitalia. However, *Linognathus* Enderlein and allies lack the occipital head phragma and a thoracic sternum plate, and the tarsi are very different, with the seta on the tibial thumb either missing or unmodified in linognathids. The head of *Linognathus* is also very different in appearance, and the male genital plate, when present, is not entire but either has a lacuna cen-

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**Figs. 3-6. Hamophthirius galeoptileti** Möberg: 3, third stage nymph; 4, first stage nymph; 5, paratergal plates II-VII, female; 6, aedeagus, male, ventral view. Figures 3-4 to same scale: the line equals 0.5 mm.
between these groups and Hamophthiridae are even greater than between the Linognathidae and Haematopotinae on one hand, and Hamophthiridae on the other.

Typical members of the Hoplopleuridae Ferris are even further removed. The thorax, sclerites of the head and its setation, the genitalia, and the legs are all widely divergent in the two families. For example, a promont is often present in hoplopleurids, and the metanotum is well developed and entire across the median part of the thorax, with the notal pit, if present, found within the notal sclerite. In particular, *Hamophthirus* is not closely related to the genera described from tree shrews (tupauids) and lemurs (lemuriformes).

An example of what may be retention of primary characters or convergent evolution occurs with *Hamophthirus* and two genera of the Echinopthiridae Enderlein, which infests pinnipeds (sea lions and seals). *Lepidophthirus* Enderlein and *Echinopthirus* Giebel both have the tiabal thumb with several broadened, short setae rather than the single seta that is usual in Anophlura. There is also a very strong tendency through the Echinopthiridae for the tarsal claw to have a basolateral lobe similar to that present in Hamophthiridae. Whether this feature represents a held-over primitive character or convergent evolution is not clear. *Hybopthirus notophallass* (Neumann) from *Orycteropus afer* (Pallas), the aardvark, also has modified, rather leaflike setae on the tibial thumb. In this species the tarsal claw of the first leg has a short clawlike structure arising beside the true claw (as does Scipio Cummings, from African rodents). The aardvark is a relict mammal belonging to the order Tubulidentata, most of whose species are no longer living. Like the lice of pinnipeds and of *Cynocephalus*, *Hybopthirus* probably has been separated from the other Anophlura for a very long time.

To conclude, in my opinion there are no obvious relationships between the Hamophthiridae and any particular group of the sucking lice although the hoplopleurids are probably further removed than the haematopotinae and linognathids, and there may be a relationship with the echinopthirids. Most characters held in common seem to be either of a general primitive nature or the result of sporadic convergent evolution.

**References**


