

THE REDISCOVERY AND PROBABLE PHYLOGENETIC POSITION OF *PSILOPSOCUS* (PSOCOPTERA)

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The genus *Psilopsocus* has posed a puzzle to students of the Psocoptera since the time of its discovery. The original description by Enderlein (1903:305) was based on a single specimen. Although adequate for identification, this description does not permit the genus to be placed beyond suborder in recent classifications. Enderlein placed *Psilopsocus* in the Mesopsocidae, but gave no reasons for this. Roesler (1944), apparently without re-examining the type, erected a new family for this genus and placed it in the group Epipsocetae on the basis of similarity of the lacinia in the Epipsocidae and Psilopsocidae.

It is the purpose of this paper to describe a new species of *Psilopsocus* from the Philippine Islands, to add to the knowledge of the morphology of the genus, and to re-interpret its phylogenetic position.

Genus *Psilopsocus* Enderlein, 1903.

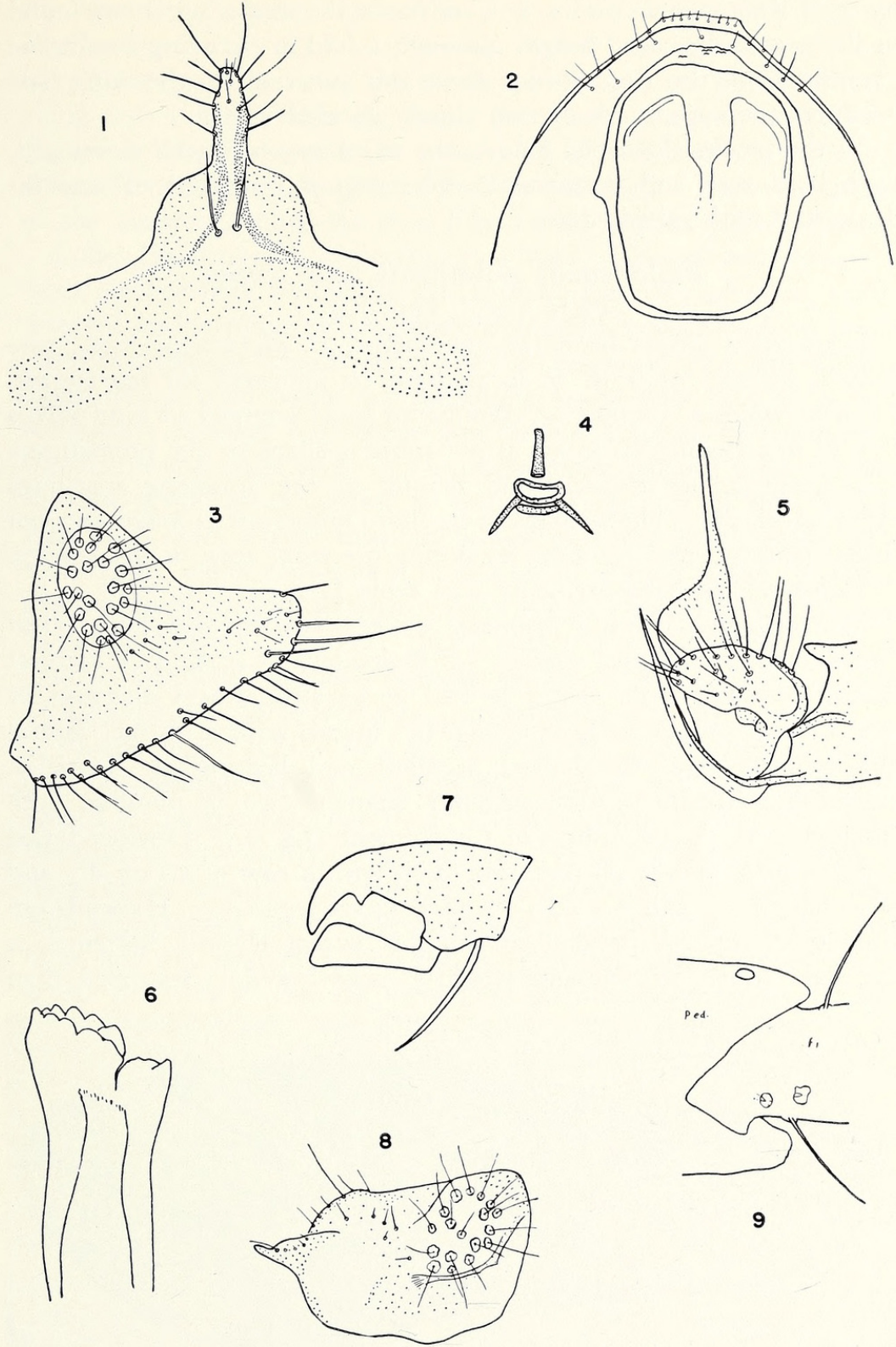
In addition to the characters included by Enderlein in the original description, the following characters are probably important in delimiting this genus:

1. Male phallic sclerotizations in the form of a simple frame with no indication of external parameres (fig. 2.).
2. Ovipositor valvulae complete, i.e. three pairs.
3. Female subgenital plate with a slender central process (fig. 1.).
4. Female paraproct with a decided elongation of the posterior margin (fig. 3.).
5. Male paraproct with a pointed apical process on its posterior margin (fig. 8.).
6. Labrum not of the *Epipsocus* type, lacking a pair of diagonal strap-like sclerites.

The character mentioned by Enderlein of lack of junction of the

EXPLANATION OF PLATE 5

Psilopsocus nebulosus n. sp. Fig. 1, ♀, subgenital plate. Fig. 2, ♂, hypandrium and phallic frame. Fig. 3, ♀, left paraproct. Fig. 4, ♀, sclerites of 9th abdominal sternite (dorsal view). Fig. 5, ♀, ovipositor valvulae. Fig. 6, ♂, lacinial tip. Fig. 7, ♂, tarsal claw. Fig. 8, ♂, right paraproct. Fig. 9, ♂, tip of pedicel (Ped.) and base of first flagellar segment (fl).



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bases of Radius and Media + Cubitus in the hindwing is not found in the species described below, although a fold in the wing membrane running from the Radius just above this junction, to the wing base produces the appearance of two closely parallel veins.

In the species described below, the coxal organ is well developed, with both rasp and tympanum. The rasp is composed of tiny indentations with raised edges.

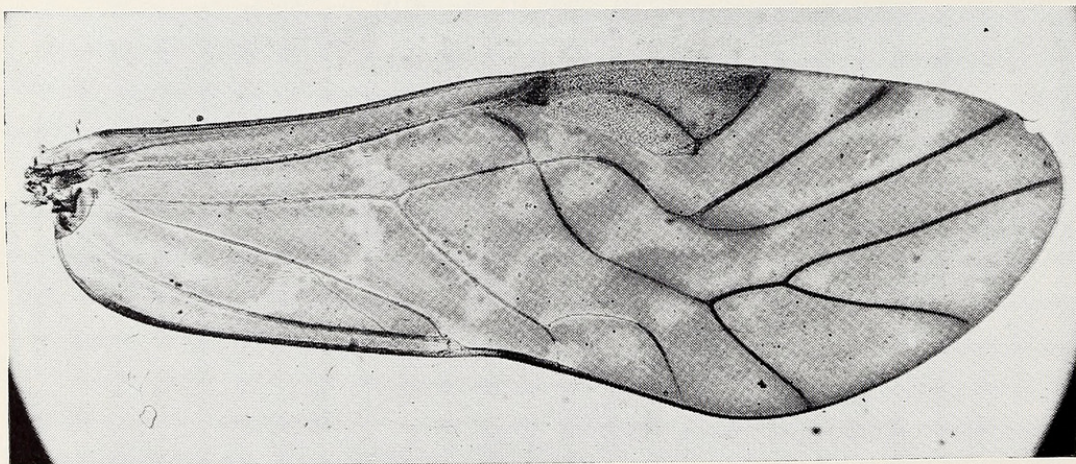
***Psilopsocus nebulosus*, new species**

Plate 5 and Text Fig. 1

Diagnosis: differs from the generotype, *P. nigricornis* End., possibly in number of teeth on lacinial tip (6 indicated for *nigricornis*, 11 in *nebulosus*), number of ctenidia on basal segment of hind tarsus (15 in *nigricornis*, 16 to 19 in *nebulosus*), shape of the pterostigma (less deep in *nebulosus*), and details of the forewing markings (text figure 1), colorless areas being more numerous in *nebulosus*, but there being no colorless areas bordering the wing apex in this species.

Holotype ♂. Measurements (see table I.).

Morphology: IO/D (distance between eyes divided by greatest dorsal diameter of eye, method of Badonnel) = 0.78, PO (lateral diameter of eye from above divided by greatest dorsal diameter of eye) = 0.94. Apex of lacinia (fig. 6.) broad, with a distinct lateral and median cusp, the lateral broadest and bearing 10 denticles. Coeloconic sensilla of first flagellar segment two in number, both situated at the extreme base of the segment (fig. 9.). Distinct tarsal ctenidia present only on posterior tarsi, with a row of 17 on T1 and one each on T2 and T3 (T1 = basal tarsal segment). Hypandrium weakly sclerotized, its margin rounded except slightly flattened at the apex; this flattened apex slightly more heavily sclerotized than



Text figure 1. *Psilopsocus nebulosus* n. sp., ♂, photomicrograph of right forewing.

the rest of the hypandrium and bearing a row of tiny cilia (fig. 2.). Phallic frame (fig. 2.) a simple ring, slightly oblong, rather uniform in width except somewhat thickened apically and for a short distance along each side. Within the frame are a pair of membranous lobes. Paraproct (fig. 8.) with the usual field of trichobothria extending obliquely downward from its antero-dorsal angle. Posterior margin of the paraproct extended as a lobe tipped with a pointed process.

Color (in alcohol): compound eyes black. General body color dull ivory marked with medium to pale brown. Labrum, antennae, ocellar interval, and terminal two segments of maxillary palpi medium brown. Clypeal striations, cloudy spots around compound eyes and antennal bases, and a band bordering epicranial suture pale brown. Thorax irregularly mottled with large pale brown areas including most of the pleura and large areas of the tergal lobes. Brown areas of mesothoracic tergal lobes darkest at their borders, pale in their centers. Legs dull ivory except medium brown on each coxa, distal end of each femur, distal end of each tibia, and all of each tarsus. Forewing hyaline, marked with extensive pale brown cloudy bands and spots as in text figure 1. Abdomen ringed with irregular pale brown cloudy bands. Terminal segments medium brown.

Allotype ♀. Measurements (see table I).

Morphology: $IO/D = 1.56$, $PO = 0.72$. Tarsal ctenidia present only on posterior tarsi with a row of 18 on T₁ and one each on T₂ and T₃. Subgenital plate (fig. 1.) with basal pigmented area in the form of two widely diverging arms. Median process of subgenital plate broad basally, abruptly narrowing to a slender tongue about half-way toward its tip; the broad basal portion bearing two large setae and the slender apical portion bearing many setae of various sizes. Sclerites of the 9th abdominal sternite (fig. 4.) in the form

Table I. Length (in mm.) of various characters of
Psilopsocus nebulosus

Character	♂	♂	♂	♂	♀
Entire body	2.87	2.82	2.61	3.03	3.67
Forewing	4.44	4.40	4.44	4.59	4.65
Hind tibia	1.39	1.43	1.43	1.57	1.43
Hind tarsus, T ₁ *	0.465	0.440	0.476	0.476	0.405
Hind tarsus, T ₂	0.071	0.071	0.059	0.071	0.059
Hind tarsus, T ₃	0.119	0.119	0.131	0.131	0.119

* First posterior tarsal segment.

of a transverse ring with three straps radiating from it and a transverse strap basal to it. Ovipositor valvulae (fig. 5.) with first valvula slender; second valvula broad basally, terminating in a long, slender process; third valvula a broad flap bearing many setae. Paraproct (fig. 3.) with field of trichobothria in its antero-dorsal angle. Posterior margin of paraproct markedly protruding; ventral and posterior margins bearing many setae.

Variation: aside from variations noted in the descriptions and measurements (table I), four male paratypes have wing and body markings somewhat paler than the holotype male, but this may be due to tenerality. IO/D ratios for three male paratypes are 0.69, 0.70, and 0.70; PO ratios for these are 0.88, 0.85, and 0.91; numbers of ctenidia on posterior basal tarsal segment are 16, 19, and 18.

Nymph: one nymph taken with adults of *P. nebulosus* is with little doubt this species. The association is made on the basis of similarity in size, color, (except the distal two-thirds of the abdomen is dark brown in the nymph), and general body shape, also on the structure of the lacinia and tarsal claws. The lacinia is broad apically with several indistinct denticles on the outer cusp. The tarsal claw bears a preapical tooth and a pulvillus of medium width bent at a decided angle near its base, as in the adult (fig. 7.).

Type locality: Philippine Islands: Mindanao, east slope of Mt. McKinley, Davao Province, August and September, 1946, in mossy forest, elevation 6400 feet, H. Hoogstraal collector; holotype ♂, allotype ♀, 4 ♂ paratypes and one nymph, all in collection of Chicago Natural History Museum.

Discussion: *Psilopsocus* is apparently very close to the Myopsocidae. The following points of similarity were noted:

1. Tarsal structure
 - a. Number of segments same.
 - b. Distribution of ctenidia same.
 - c. Both with preapical tooth on tarsal claw.
 - d. Pulvillus in both of medium width with a decided bend near its point of attachment.
2. Lacinial structure. The lacinial tip of *Lichenomima sparsa* has a broad lateral cusp bearing 13 stubby denticles, and a short median cusp, hence it shows marked similarity to the lacinial tip of *Psilopsocus*.
3. Male genitalia.
 - a. Hypandrial margin. The rounded hypandrial margin of *Psilopsocus* is similar to that of several species of *Rhaptoneura*, *Phlotodes*, and *Lichenomima*.

b. Phallic frame. The simple, rounded phallic frame of *Psilopsocus* bearing a pair of lateral thickenings and enclosing a pair of membranous lobes is reminiscent of this structure in *Lichenomima pauliani* Bad. (Badonnel, 1955, fig. 529) and *Rhaptoneura eatoni* McL. (Badonnel, 1943, fig. 143). It differs little from this structure in *Lichenomima maxima* Sm. (Smithers, 1957, fig. 6).

c. Paraproct. The paraproct of *Psilopsocus* is similar to those of most Myopsocids in bearing a pointed process on its posterior margin. Although several species of Myopsocids have two such processes, there is only one in *Phlotodes angolensis* Bad. (Badonnel, 1955, fig. 514). The male paraproct of the latter species resembles that of *Psilopsocus* in several other respects, including shape of the field of trichobothria and presence of a roughened area antero-dorsad of this field.

4. Female genitalia.

a. Subgenital plate. The subgenital plate of *Psilopsocus* is similar in structure to that of *Rhaptoneura*. The resemblance is especially marked in the case of *R. africana* Bad. (Badonnel, 1955, fig. 508). In both forms the pigmented basal area consists of a pair of widely diverging arms; the central process is broad basally, narrowing abruptly to a slender tongue which bears setae on or near its apex.

b. Ovipositor valvulae. Both *Psilopsocus* and the Myopsocids have three pairs of ovipositor valvulae. The second valvula terminates as a long, slender process in both groups, although this is generally much longer in the Myopsocidae than in *Psilopsocus*. The third valvula is a simple flap bearing many setae in both groups.

c. Sclerites of the ninth abdominal sternite. These sclerites in several *Lichenomima* species (Badonnel, 1955, figs. 522-525; Smithers, 1957, fig. 11) are composed of three main sclerotized areas, and are thus similar in appearance to the same group of sclerites in *Psilopsocus nebulosus* with their three radiating sclerotized straps.

d. Paraproct. The female paraproct is similar in shape, ciliation, and position of the field of trichobothria in the two groups.

The differences between the Myopsocidae and the Psilopsocidae are not great. The only ones which I have found are (1) presence in Myopsocidae of a connection between areola postica and medial stem in the forewing and absence of this in Psilopsocidae, (2) presence in Psilopsocidae of a spur vein from the pterostigma and its absence in Myopsocidae, and (3) much more complex markings of the forewing in Myopsocidae than in Psilopsocidae, with characteristic alternating dark and light areas on veins in the former group.

Pearman (1936) has designated the families Myopsocidae, Psocidae, and Thyrsopteridae as constituting the group Psocetae. To this group should be added the Psilopsocidae. It appears that this group represents an ancient phylogenetic line within the suborder Psocomorpha, in which the most primitive forms share a broad, multidenticulate lacinial tip with the Group Epipsocetae. It seems likely that this type of lacinial tip, found also in the Amphientomidae (Suborder Troctomorpha) was present in the earliest forms of the Suborder Psocomorpha.

ACKNOWLEDGEMENTS

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