

THE TAXONOMY AND HOST RELATIONSHIPS OF THE BITING LICE OF THE GENERA DENNYUS AND EUREUM, INCLUDING THE DESCRIPTIONS OF A NEW GENUS, SUBGENUS, AND FOUR NEW SPECIES

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The Mallophagan genera *Dennyus* and *Eureum* are of particular interest to those who use the host-parasite method of attack in their studies of the phylogeny of either the hosts or the parasites. Species of the two genera infest swifts and swallows, hosts of similar habits but presumably of no phylogenetic unity. Yet in the past species from both types of bird hosts have been placed in both genera.

Harrison (1916) in his catalogue contributed much toward clarifying the synonymy of the species of *Dennyus*. He listed as valid six species of the genus. He also listed four other species, three from *Micropus apus* and one from *Aeronautes melanoleucus* as being synonyms. Of Harrison's six valid species all but one of them come from swifts. This one, *D. latifrons* Carriker and Shull, was taken from a bank swallow.

The genus *Dennyus* has for its type the *Nitzschia burmeisteri* of Denny. The generic name *Nitzschia* Denny (1842), being pre-occupied by *Nitzschia* Baer (1827), is superseded by *Dennyus*, a name proposed by Neumann in 1906. The species *burmeisteri* Denny was taken from the same host, *Micropus (Cypselus) apus*, as *truncatus* Olfers and is, according to Harrison, a synonym of the latter species.

But this type host of the type species of *Dennyus* is also the type host of the type species of *Eureum* Nitzsch! But the type species of *Eureum*, *E. cimicoides* Nitzsch (fig. 5), is a very distinctive one and could not be confused with *truncatus* Olfers from the same host. *E. cimicoides* is a very large and very broad louse and to the unaided eye does suggest a bedbug, as its name indicates. *D. truncatus*, on the other hand, is a slender species.

Included also in *Eureum* Nitzsch besides the type species is another, *E. malleus* Nitzsch, which comes from a swallow, not a swift. The writer has not seen this second species, but has studied a similar one taken from an American swallow, the purple martin.

abdominal sternites. He also notes that in the development of the mesothorax and the shape of the head these four genera have much in common. His diagnosis of the genus is good, but a restudy of the species, and also those of *Eureum* necessitates new definitions for the old characters and the addition of new characters. The genus *Dennyus* is redescribed as follows:

Antennal fossae partly roofed over above by an expansion of the head; eyes double, the two conreas of one side being partly fused; esophageal sclerite small or wanting; temporal lobes pronounced, quadrangular.

Prothorax rather narrow, but pronotum expanded laterally into a pair of spine-bearing lobes; prosternal plate well developed, with heavy chitinous borders. Mesothorax small but usually distinct and separated from metathorax by a dorsal suture.

Abdomen long; pleurites each typically with a marginal row of spines and a small tuft of long hairlike setae; tergites bare except for a posterior marginal row of setae. Some of the abdominal sternites with patches of setae of about the same size as those clothing the body.

Genital armature of male symmetrical, with long, narrow basal plate; parameres not united, free, clasperlike; endomeres short, never clasperlike; penis not developed.

Legs of the first pair short, others long; first femora very short, frequently as broad as long; last femora very long, each with a patch of setae below. All tibiae with an indistinct pseudarticulation somewhat beyond the middle.

Subgenus DENNYUS Neumann

The most important characters of the typical subgenus of *Dennyus* have been given in the key. It should be added, however, that the species composing this subgenus are remarkably alike, not only in their subgeneric characters but also in their specific characters. Hence there has been and is yet great confusion in regard to the synonymy of the species. Neither Harrison nor Ferris was able entirely to clear up the synonymy of the species. It had been the hope of the present writer to make a definite contribution along this line, but the inability to get hold of the types has prevented. All of the lots of specimens of the subgenus *Dennyus* examined by the writer belong to three species, of which two are new. They are separated by the following key.

KEY TO SPECIES OF SUBGENUS DENNYUS DESCRIBED IN THIS PAPER

1. Setae on central hyaline area of prosternal plate short and spikelike and about 10 in number.....D. richmondi, new species.
 Setae on central hyaline area of prosternal plate long, setiform and much less than 10 in number..... 2.

2. Prosternal plate with more than 5 setae; lateral pronotal processes each with 2 setae and 2 spines.....*D. australis*, new species.
 Prosternal plate with less than 5 setae; lateral pronotal lobes each with 1 and 2 spines.....*D. dubius* (Kellogg.)

DENNYUS (DENNYUS) RICHMONDI, new species

Head broader than long; forehead distinctly angulate laterally; temples expanded laterally at the anterior angles, thus lacking their typical shape. Eyes of a pair subequal, but slightly fused and poorly pigmented. Posterior subapical seta of temporal lobe much longer than the other cephalic setae and flanked on each side by a minute marginal spine.

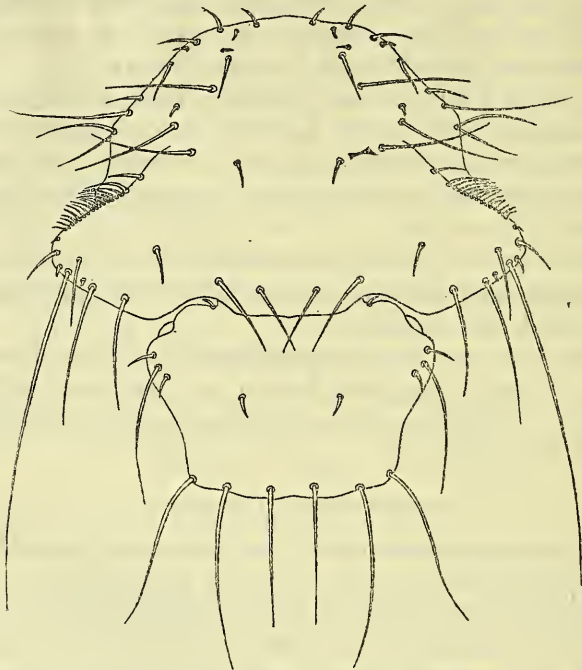


FIGURE 1.—*DENNYUS (DENNYUS) RICHMONDI*, NEW SPECIES.
 DORSAL VIEW OF HEAD AND PROTHORAX, $\times 60$. (DRAWN BY
 Miss Heurich)

Prothorax broader than long, with broad lateral pronotal lobes, each bearing a single long seta and two short spinelike ones. Discal setae of pronotum very short, spinelike; marginal setae equally spaced, the middle pair being slightly the longest. Prosternal plate with very broad chitinous margins. It has a single pair of long setae and about a dozen short spinelike ones.

Mesthorax distinct, separated from the metathorax by a definite dorsal suture, more than twice as broad as long. It is outwardly rounded behind, has an enormously thickened anterior wall and no dorsal setae.

Metathorax considerably larger than the mesothorax, over twice as broad as long and with greatly thickened lateral walls. It bears three pairs of short dorsal discal setæ and a row of mixed long and short ones on the posterior margin.

Abdomen almost twice as long as broad and somewhat swollen in the middle. Basal plate of male genital armature decidedly rod-like and extending forward into the third abdominal segment; parameres slender, gently incurved and surpassing the endomeres by almost half their length; endomeres free, more or less spatulate, not united, even at their bases.

Legs short for the genus with the pseudoarticulations of the tibiæ very evident; first femora broader than long; patches of setæ on last femora extending along over one-half the length of the segment.

Length of male, 1.80 mm.; width, 0.70 mm.

Type host.—Richmond's swift, *Chaetura richmondi*.

Type (cotype).—Cat. No. 42760, U.S.N.M.

Described from two males; one from type host, Eden, Nicaragua, 1922 (W. Huber), the other, an evident straggler, from boat-billed flycatcher, *Megarynchus pitangua*, Eden, Nicaragua, 1922 (W. Huber). This species is very distinct in the characters of the prosternal plate, the setae on the temporal lobes and in having much shorter femora than most of the others. It is named in honor of Dr. C. W. Richmond, of the United States National Museum, for whom the bird host was named a number of years ago.

DENNYUS (DENNYUS) AUSTRALIS, new species

Head of typical shape for the subgenus; forehead strongly arched in front and with slight lateral angles; temples quadrangular, with posterior angles rounded. Eyes with fused double corneas but with a single pigment spot. The two inner pairs of the marginal setæ of temporal lobes subequal and very long, being equal in length to any of the setæ of the head. Occipital setæ equally spaced and over two-thirds as long as the prothorax.

Prothorax broader than long; lateral pronotal lobes pronounced, each bearing two long setae and two short spines. Prosternal plate with very heavy lateral borders, and bearing about half a dozen moderate setae in addition to the anterior pair of minute setae.

Mesothorax over twice as broad as long, separated from metathorax by a distinct dorsal suture. Its lateral margins are slightly rounded outwardly and the posterior border is subangulate at the median line. The mesothorax is covered above in part by the backwardly projecting pronotum and bears no dorsal setae.

Metathorax over twice as broad as long, with almost straight divergent sides; dorsally it bears three pairs of small, short, discal setae and a posterior marginal row of long setae.

Abdomen about twice as long as wide; pleural spines not stout but somewhat setalike; last tergite of female, which forms the posterior margin of the body, with a fringe of very closely set, subequal setae.

Legs rather long for the genus; first pair of femora longer than broad; last femora considerably longer than the middle pair, and each patch of setae extending for over two-thirds the length of the segment.

Length of female, 2.75 mm.; width, 1.30 mm.

Type host.—A swift, *Micropus andecola*.

Type (holotype).—Cat. No. 42761, U.S.N.M.

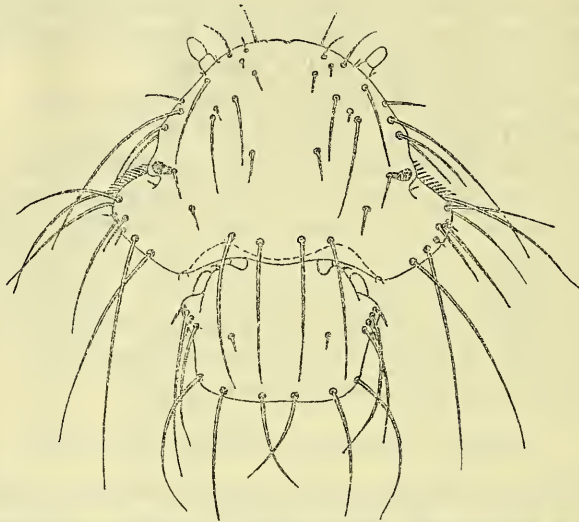


FIGURE 2.—DENNYUS (DENNYUS) AUSTRALIS, NEW SPECIES.
DORSAL VIEW OF HEAD AND PROTHORAX, $\times 60$. (Drawn by
Dr. E. A. Chapin)

Described from a single female taken from the type host at Potrerillos, Mendoza, Argentina, March 18, 1921 (A. W. No. 6245), by Dr. A. Wetmore. This species is closely related to *D. dubius* Kellogg, but has the head differently shaped and has a different prosternal plate.

DENNYUS (DENNYUS) DUBIUS (Kellogg)

Head of typical shape for the genus but varying much in regard to the development of the lateral angles on the forehead. These may be wanting, as shown in Figure 3, or they may be as well developed as in *D. australis*. Posterior angles of temples pronounced; eyes with double, and usually partly fused, corneas; occipital setae about two-thirds as long as prothorax.

Prothorax typical in shape, with well-developed lateral pronotal lobes, each bearing a long seta and two spines; middle pair of pos-

terior marginal setae the longest. Prosternal plate with very long setae.

Mesothorax about three times as broad as long but with a distinct dorsal suture separating it from the metathorax. Its sides are very strongly divergent, posterior margin outwardly rounded, and it bears no setae above.

Metathorax over twice as broad as long, its straight, divergent lateral borders being heavily chitinized.

Abdomen about twice as long as broad; setae forming pleural tufts very long and somewhat flagellate; marginal setae of last tergite of female much longer toward the sides than in the middle. Basal plate of male genital armature distinctly platelike, though narrow

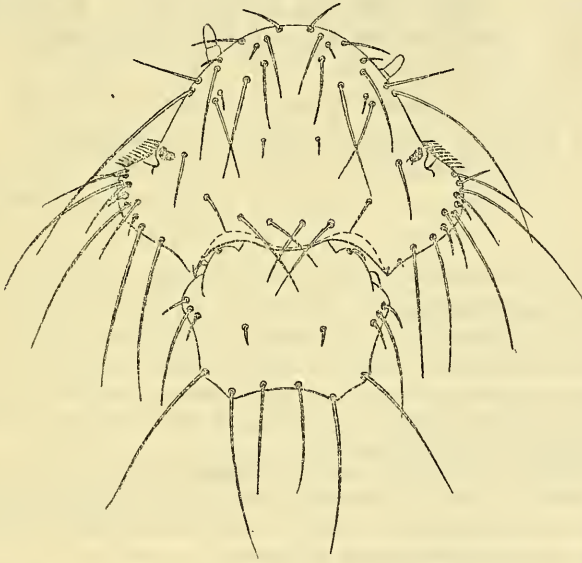


FIGURE 3.—DENNYUS (DENNYUS) DUBIUS (KELLOGG). DORSAL VIEW OF HEAD AND PROTHORAX, $\times 60$. (Drawn by Dr. E. A. Chapin)

and with incurved lateral margins; parameres incurved toward their distal ends so that these touch each other; endomeres separate and about two-thirds as long as parameres.

Legs typical; anterior femora as broad as long; patch of setae on each posterior femur extending for about two-thirds the length of the segment; pseudosegmentation of each tibia very evident.

Length of female, 2.40 mm.; width, 1.00 mm.; length of male, 2.20 mm.; width, 0.80 mm.

Type host.—Chimney swift, *Chaetura pelagica*.

Types.—In Stanford University Collection.

Description based upon many adult specimens chiefly from the type host. They have the following data: From *Chaetura pelagica* Thomasville, Ga., October 7, 1927 (1 male, 2 females); from nest of

the same host, Maywood, Va., July 22, 1926 (1 female); from same host, Four-mile Run, northern Virginia, August 17, 1913 (1 male, 1 female); same host, District of Columbia, August 20, 1895 (4 females); same host, Arendtville, Pa., May 20, 1923 (1 female); same host, Columbus, Ohio, June 5, 1899 (3 nymphs); from *Aeronautes melanoleucus*, San Bernardino County, Calif., November 30, 1916 (4 females); from *Chaetura richmondi*, Eden, Nicaragua, 1922 (1 female); from *Falco rusticolus*, Commander Islands, February 28, 1883 (1 female) (straggler). The original description of this species was based on immature specimens and, according to Ferris (1916), it "is very likely a synonym of either *D. burmeisteri* or *D. tibialis*." Ferris examined a cotype of *D. bruneri* (Carriker) and said that it "is almost certainly a synonym of *D. dubius*." The present writer agrees with Professor Ferris in regarding *bruneri* as a synonym of *dubius*.

This species which apparently has the chimney swift for its favored host, also is found on the other swifts. It is variable to a considerable degree in the adult state and of course the characters of the immature individuals are decidedly different from those of the adults.

ANNOTATED LIST OF SPECIES OF THE SUBGENUS DENNYUS WITH THEIR TYPE HOSTS

1. *D. bruneri* CARRIKER (1903). Univ. Neb. Stud., vol. 3, p. 55.
Type host: *Aeronautes melanoleucus* (= *D. dubius* Kellogg.)
2. *D. burmeisteri* DENNY (1842). Anop. Brit., p. 230, pl. 22, fig. 5.
Type host: *Micropus apus*. (= *D. truncatus* Olfers.)
3. *D. distinctus* FERRIS (1916). Can. Ent., vol. 48, p. 310, figs. 10a, 15.
Type host: *Collocalia* species.
4. *D. dubius* KELLOGG (1896). New Mallophaga, vol. 2, p. 540, pl. 73, fig. 6.
Type host: *Chaetura pelagica*. (May = *D. truncatus* Olfers.)
5. *D. femoralis* KISTIAKOWSKY (1926). Zool. Anz., vol. 68, p. 10, fig. 1.
Type host: *Hirundo rustica gutturalis*.
6. *D. major* UCHIDA (1923). Tokyo Journ. Col. Agr., vol. 9, No. 1, p. 32, figs. 10-11.
Type host: *Hirundapus caudacutus caudacutus*. (Described as type species of *Takamatsuia*.)
7. *D. meridionalis* CARRIKER (1903). Univ. Neb. Stud., vol. 3, p. 178.
Type host: *Chaetura griseiventris*.
8. *D. minor* KELLOGG and PAINE (1914). Rec. Ind. Mus., vol. 10, p. 242.
Type host: *Micropus affinis*.
9. *D. piageti* KISTIAKOWSKY (1926). Zool. Anz., vol. 68, p. 11, fig. 2.
Type hosts: *Hypotrionchis subbuteo* and *Riparia riparia*.
10. *D. pulicaris* NITZSCH (1861). Zeit. f. ges. Nat., vol. 18, p. 304.
Type host: *Micropus apus*. (= *D. truncatus* Olfers.)
11. *D. tibialis* PIAGET (1880). Pédiculines, p. 576, pl. 68, fig. 5.
Type host: *Micropus apus*. (= *D. truncatus* Olfers.)
12. *D. tibialis* CARRIKER (1902) (not Piaget, 1880). Journ. New York Ent. Soc., vol. 10, p. 225, pl. 22, figs. 4, 5.
Type host: *Aeronautes melanoleucus*. (= *D. dubius* Kellogg.)
13. *D. truncatus* OLFERS (1816). De vegetativis, etc., p. 91.
Type host: *Macropus apus*. (Type species of genus.)

Subgenus CTENODENNYUS, new subgenus

In addition to the characters of the subgenus *Otenodennyus* given in the key to the subgenera of *Dennyus*, some others of minor importance should be added. The head is broader than in the typical subgenus, and the posterior angles of the temples are much reduced. The inflation of the anterior femora is so pronounced that these segments are much broader than long, also the second and third femora are inflated along the dorso-distal aspect, the expansion extending beyond the tibio-femoral articulation as a cusp.

Type species.—*C. spiniger*, new species.

Only the type species included. It was taken from a swift, *Cypseloides niger borealis*. This is the first record, apparently, of a species of *Dennyus* from a swift of the genus *Cypseloides*. The host was taken at Seattle, Wash. It will be interesting to see what kind of lice the South American representatives of *Cypseloides* have.

DENNYUS (CTENODENNYUS) SPINIGER, new species

Head broader than usual, with pronounced anterior angles on temporal lobes; eyes single and poorly pigmented; fringe of setae on posterior margin of ocular emargination pronounced. Above, the head bears six pairs of pigmented, peglike spines, four of which are discal and two of which are marginal on temporal lobes.

Prothorax slender, longer than broad; pronotal expansions not conspicuous, each bearing two peglike spines and a long seta. There is an additional pair of peglike setae on the pronotum near the middle of the same. Posterior marginal setae of pronotum subequal. Prosternal plate with very heavy margins and 10 peglike spines situated on the central hyaline area.

Mesothorax about twice as broad as long and separated from metathorax dorsally by an indistinct suture; dorsally it bears a minute pair of discal setae and on each shoulder three sharp, slightly curved spines.

Metathorax over twice as broad as long. Of the three pairs of dorsal discal setae the antero-lateral pair only is setalike, the other two being peglike. Of the posterior marginal setae there is a group of three (the most lateral ones) that are peglike and a pair of two sublateral peglike ones.

Abdomen about twice as long as broad; tergites bare above except for the row of spines and setae on posterior margins. Typically a spine and a seta alternate in these marginal rows, but on the first abdominal segment there are about twice as many spines as setae. The pleural plates bear spines chiefly, there being no tufts of setae. Ventrally the abdomen bears no spines; the patches of setae are situated on the sternites of fifth to seventh segments.

Legs short; first femora much broader than long, the anterior expansion of the same being quadrangular. Pseudosegmentations of tibiae faint for first pair but conspicuous for the others.

Length of female, 2.90 mm.; width, 1.05 mm.

Type host.—A swift, *Cypseloides niger borealis*.

Type (holotype).—Cat. No. 42762, U.S.N.M.

Described from a single female taken from the type host, Seattle, Wash., August 2, 1924, by W. L. McAtee.

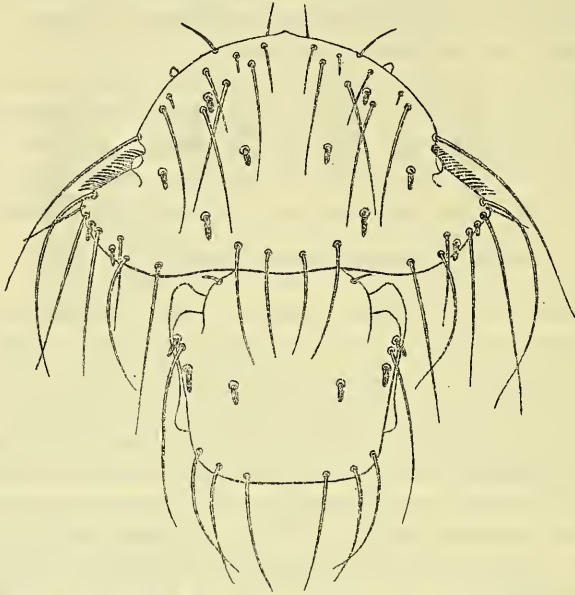


FIGURE 4.—DENNYUS (CTENODENNYUS) SPINIGER, NEW SPECIES.
DORSAL VIEW OF HEAD AND PROTHORAX, $\times 60$. (Drawn by
Dr. E. A. Chapin)

Genus EUREUM Nitzsch

In addition to the characters given in the key others of minor generic importance should be added: Instead of there being only six posterior marginal setae on the pronotum there are twelve. The mesothorax is greatly reduced, so much so that but little of it is seen above; however, it is separated from the metathorax by a distinct suture. The last abdominal tergite is deeply and roundly emarginate on the median line.

Type species.—*E. cimicoides* Nitzsch.

The type species of the genus has as its type host the European swift, *Micropus apus*. What appears to be the same species comes from our American swift.

EUREUM CIMICOIDES Nitzsch

Head fully twice as broad as long, the forehead being broadly and evenly rounded throughout; eyes revealing their double nature in

the two almost completely amalgamated corneas; posterior angles of temples produced so as to be slightly appendiculate, anterior angles obliterated. Dorsal discal setae reduced to three or four pairs, only one of which is conspicuous.

Prothorax much enlarged, being about equal in size to the head but not so broad as the latter; pronotal lobes conspicuous, each bearing a small spine and two long setae. The prothorax is conspicuously emarginate laterally and posteriorly. On the posterior margin there is a central median tubercle. Prosternal plate as figured (fig. 7, e).

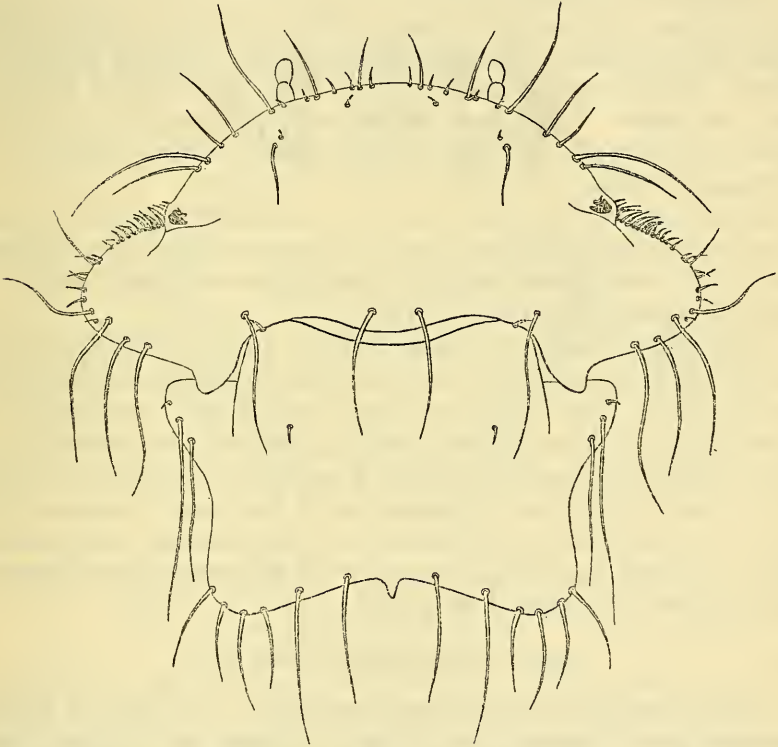


FIGURE 5.—*EUREUM CIMICOIDES* NITZSCH. DORSAL VIEW OF HEAD AND PROTHORAX, $\times 60$. (Drawn by Miss Heurich)

Mesothorax very short, being about four times as broad as long; sides strongly divergent; posterior margin doubly concave; bare above and considerably overlapped by the posteriorly projecting pronotum.

Metathorax very broad, about four times as broad as long; sides almost straight and strongly divergent; antero-lateral discal setae minute, the others short spines.

Abdomen very broad, being about three-fourths as broad as long; dorsal setae rather short and hairlike, pleural tufts pronounced. Notch in last tergite extending two-thirds the way across the sclerite

and fringed with close-set hairlike setae. Ventral abdominal setae swollen at their bases and tapering to an exceedingly fine point; patches of setae on the sternites of abdominal segments five to seven.

Legs not stouter than usual for the genus; femora II and III each with a patch of spines on the anterior margin at the base; each coxa of posterior pair of legs set in a coxal cavity formed by the posterior border of the metathorax and the lateral borders of the first two abdominal sternites. Pseudosegmentation of tibiae all but wanting.

Length of female, 3.75 mm.; width, 2.10 mm.

Type host.—*Micropus apus*.

Described from a single female taken from the chimney swift, *Chaetura pelagica*, Columbus, Ohio, June 9, 1899, by Prof. J. S. Hine. This is the only specimen that to the knowledge of the writer has been taken of this rare species in North America. Mr. H. S. Peters has already reported (Peters, 1928) on the taking of this specimen in Ohio.

There may be some doubt about the identification of this specimen from our American chimney swift as *Eureum cimicoides*. It agrees well with the very good description and figures of Denny which were based on specimens taken in England.

If this identification is correct, how are we to explain the presence of this louse on our chimney swift, a species of a different genus from its European host and occurring in a different continent? One hypothesis is that our chimney swift has obtained the species through host transfers in recent geological times from the western *Chaetura vauxi* and the Siberian representative of the genus *Chaetura*. This is, of course, a mere speculation. It may possibly have persisted since the days of a common ancestor of *Micropus* and *Chaetura* on descendants in both of these genera.

Genus *HIRUNDOECUS*, new genus

This genus is a very distinct one and in fact has but little in common with *Dennyus*, as is clearly indicated in the key already given. Some other generic characters should be mentioned. The prothorax is not at all of the *Dennyus* type, but is of the type of such genera as *Menopon* and *Ancistrona*; that is, it has a very broad pronotum with an outwardly, almost evenly rounded margin. The mesothorax is distinct and separated from the metathorax by a dorsal suture, but is reduced until it is scarcely one-fifth the size of the metathorax. The genital armature is of much the same type as in *Dennyus*, but the basal plate is broader. The endomeres are united and poorly developed.

The closest affinity of *Hirundoecus* appears to be with certain species of *Menopon*, those of the type of *M. loomisii* Kellogg and

M. infrequens Kellogg, yet our knowledge of the valid generic characters of the Menoponidae is not sufficient to enable us to place this genus in its proper taxonomic position.

Type species.—*Hirundoecus americanus*, new species.

HIRUNDOECUS AMERICANUS, new species

Head very broad, being over twice as broad as long; ocular emarginations slight; temporal lobes reduced, rounded. Dorsal setae on or near the margins except for a centro-lateral pair.

Prothorax almost as broad and almost as large as head, with rounded lateral and posterior margins. Along its postero-lateral and lateral margins the prothorax bears sixteen long setae; at the

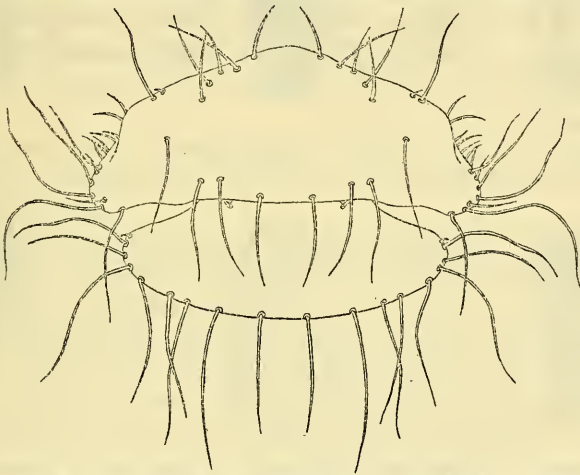


FIGURE 6.—*HIRUNDOECUS AMERICANUS*, NEW GENUS AND NEW SPECIES. DORSAL VIEW OF HEAD AND PROTHORAX, $\times 60$. (Drawn by Miss Heurich)

shoulders is a pair of small spines and near the front margin another pair of small spines. Prosternal plate as figured (fig. 7, *f*).

Mesothorax inconspicuous but separate, about six to eight times as broad as long; without any setae.

Metathorax as broad as the prothorax and about two-thirds as long; of similar shape to first abdominal segment. It bears a posterior marginal row of long setae and several small lateral marginal spines.

Abdomen two-thirds as broad as long; tergites bare except for the posterior row of spines and setae, the spines of the row being lateral toward the pleurites; pleurites with conspicuous, sharp, marginal spines. Basal plate of male genital armature long and slender, reaching to about the front margin of seventh abdominal segment; parameres long, almost equal in length to the basal plate.

curved first inward then outward at their tips; parameres but slightly developed and united.

Legs short and somewhat stout, the first pair being but slightly shorter than the second, and the second but slightly shorter than the third; first segment of tarsi poorly developed; claws moderate.

Length of male, 1.70 mm.; width, 0.80 mm.

Length of female, 1.90 mm.; width, 1.15 mm.

Type host.—*Progne subis subis*.

Type (cotype).—Cat. No. 42763, U.S.N.M.

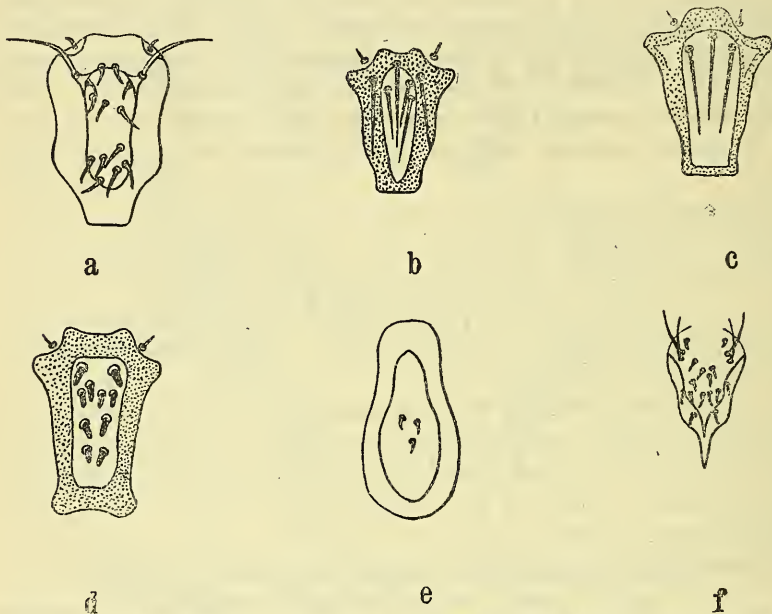


FIGURE 7.—THE PROSTERNAL PLATES OF; a, *D. (DENNYUS) RICHMONDI*, NEW SPECIES; b, *D. (DENNYUS) AUSTRALIS*, NEW SPECIES; c, *D. (DENNYUS) DUBIUS* (KELLOGG); d, *D. (CTENODENNYUS) SPINIGER*, NEW SPECIES; e, *EUREUM CIMICOIDES* (NITZSCH); f, *HIRUNDOECUS AMERICANUS*, NEW SPECIES. (All enlarged 80 times, and drawn by Miss Heurich and Dr. E. A. Chapin)

Described from a male and a female taken from purple martin, *Progne subis subis*, Reserve, New Mexico, May 25, 1927, H. H. Kimball. A very distinct species.

THE SYSTEMATIC POSITION OF THE GENERA DENNYUS AND EUREUM

In view of the fact that the closely related genera *Dennyus* and *Eureum* are well defined and show an abundance of evidence of constituting a natural group confined to swifts, interest attaches to their zoological or systematic position in the suborder *Amblycera*, a suborder which is the more primitive of the two making up the order Mallophaga.

In certain respects *Dennyus* and *Eureum* are primitive or generalized, having the primitive characters as follows:

1. A well developed and clearly separated mesothorax.
2. A double pair of eyes.
3. Simple and generalized tarsi, devoid of important reductions or modifications.
4. A simple and generalized type of male genital armature.

On the other hand, the genus is characterized by a much larger number of specialized characters, among them being:

1. Last two segments of antennae formed into a subglobose structure.
2. Antennae situated in very deep fossae.
3. Temples of head modified into a shape different from practically all other genera of Mallophaga and characteristic of the genus.
4. Anterior femora greatly modified by inflation.
5. Prothorax specialized in having lateral, expanded, spiniferous lobes.
6. Prosternal plate abnormally developed and overchitinized.
7. Posterior femora and some of abdominal sternites provided with patches of setae.
8. Pleurites of abdomen bear marginal spines.
9. Tibiae show marked evidence of incipient segmentation by the development of a transverse suture.

All points considered, *Dennyus* and *Eureum* should be regarded in the same light as many other mallophagan genera. They evidently are ancient genera with many highly specialized and correlated characters, yet at the same time they possess a few very primitive ones. They in all probability represent a complex that has had a paralleled phylogeny with their hosts, the swifts.

THE SYTEMATIC POSITION OF THE GENUS HIRUNDOECUS, NEW GENUS

Let us now take these same 13 characters that have been considered in regard to *Dennyus* and *Eureum* and observe them in *Hirundoecus*. We have:

1. Mesothorax greatly reduced, inconspicuous, yet showing a dorsal suture between it and metathorax.
2. Eyes wanting.
3. Same as in *Dennyus* and *Eureum*.
4. Genital armature showing slight modification from generalized type.

The adaptive or specialized characters follow:

1. Same as in *Dennyus* and *Eureum*.
2. Fossae even deeper than in *Dennyus* and *Eureum*.
3. Temples considerably modified from usual shape.
4. Anterior femora similar to others.

5. Prothorax specialized almost entirely by its great breadth.
6. Same as in *Dennyus* and *Eureum*.
7. No patches of setae on posterior femora or on some of abdominal sternites.
8. Same as in *Dennyus* and *Eureum*.
9. No evidence of any incipient segmentation of the tibia.

Hirundoecus thus has two only of the four important primitive characters listed for *Dennyus* and *Eureum*. Of the nine specialized characters of *Dennyus* and *Eureum*, *Hirundoecus* has three of the same kind. Of the remaining six specialized characters, *Hirundoecus* is without three, it has two that are less specialized or developed than in *Dennyus* and *Eureum* and one that is more specialized.

Hirundoecus, therefore, is not to be regarded as of such an ancient type as *Dennyus* or *Eureum*, also it is not a genus as highly specialized. It is decidedly more in line with the prevailing types of Menoponidae than is *Dennyus* and *Eureum* notwithstanding the unusual shape of the body.

BEARING ON HOST PHYLOGENY

Our data are not sufficient to enable us to present much that is of value bearing on host phylogeny. It appears, however, that the Amblycerous Mallophaga of swifts and swallows instead of being closely related and belonging to the same genera should be placed, on morphological grounds alone, into widely separated genera.

The swift-infesting genera *Dennyus* Neumann and *Eureum* Nitzsch are not related to the hummingbird-infesting genus *Trochiloecetes* Paine and Mann. *Trochiloecetes* belongs to a different family, the Ricinidae, which should include lice almost, if not entirely, from passerines and hummingbirds.

A study of the Ischnoceran Mallophaga of swallows may throw some light on the problem of host and parasite phylogeny.

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