

A REVISION OF THE AMERICAN TWO-WINGED FLIES OF THE PSYCHODID SUBFAMILY BRUCHOMYINAE

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The recent discovery of two undescribed species of the subfamily Bruchomyiinae, the most generalized of the four subfamilies of Psychodidae, makes it advisable to review our knowledge of this group of flies. Tillyard (1926), in writing of the genus *Nemopalpus*, one of the included genera, remarks as follows: "This genus, placed by some authors in Tanyderidae, unites that family with the Psychodidae, and is probably one of the oldest existing types of Diptera."

I wish to express my deepest thanks to the collector, Mr. Raymond C. Shannon, for the opportunity of studying and describing the two new Peruvian species of *Bruchomyia*.

Subfamily BRUCHOMYINAE

1904. *Phlebotominae* EATON, Ent. Mo. Mag., ser. 2, vol. 15, p. 55 (part).
1920. *Bruchomyiinae* ALEXANDER, Ann. Ent. Soc. America, vol. 13, p. 402.
1921. *Nemopalpinae* EDWARDS, Ann. Mag. Nat. Hist., ser. 9, vol. 7, p. 439.
1922. *Phlebotominae* TONNOIR, Ann. Soc. Ent. Belgique, vol. 62, p. 127 (part).
1926. *Bruchomyiinae* CRAMPTON, Ent. News, vol. 37, pp. 33-39, 65-70.
1927. *Bruchomyiinae* ALEXANDER, Genera Insectorum, fasc. 189, p. 3.
1927. *Phlebotominae* SHANNON and DEL PONTE, Rev. Inst. Bact., Buenos Aires, vol. 4, p. 733 (part).
1928. *Bruchomyiinae* EDWARDS, Journ. Fed. Malay St. Mus., vol. 14, p. 65.
1928. *Bruchomyiinae* ALEXANDER, Proc. Linn. Soc. New South Wales, vol. 53, p. 292.

The use of the name Bruchomyiinae, based on the second proposed genus, *Bruchomyia*, in preference to *Nemopalpinae*, erected for the oldest genus, *Nemopalpus*, is on the principle of selection of the first proposed group of higher rank than the genus.

The Bruchomyiinae, including only the two genera *Nemopalpus* Macquart and *Bruchomyia* Alexander, appear to represent the most generalized of the recent Diptera. The subfamily is well differentiated from the Phlebotominae, with which it has sometimes been placed, by the retention of the primitive arrangement of the branches of *Rs*, this being dichotomously twice forked. In the Phlebotominae

the anterior branch of the posterior fork of R_s , R_4 , has been captured by the stem of the anterior fork, R_{2+3} , to form a short to longer fusion, R_{2+3+4} . Because the first branch of the sector, R_2 , has not fused backward with R_1 , the venation of the Phlebotominae appears pectinate.

The Bruchomyiinae may be separated from the remaining Psychodidae by the following key:

1. Radial sector, R_s , with four branches-----2.
 Radial sector, R_s , with three branches-----**TRICHOMYINAE.**
2. Distal section of vein Cu_1 elongate, extending generally parallel to vein M_4 , cell M_4 at wing margin being approximately equal in width to cell M_3 ; cell Cu sometimes very wide at margin, exceeding cell M_4 ; Sc reduced, Sc_1 and usually Sc_2 atrophied-----**PSYCHODINAE.**
 Distal section of vein Cu_1 short to very reduced, bent toward the axilla, longer and more nearly straight in *Bruchomyia*; cell M_4 at wing margin as wide as or wider than cell Cu , usually very wide; Sc long, Sc_2 and usually Sc_1 preserved-----3.
3. R_s pectinately 4-branched, R_4 being captured by the upper fork of the sector; mouth parts of female elongate, formed for blood sucking.
 PHLEBOTOMINAE.
 R_s dichotomously 4-branched, R_{2+3} and R_{4+5} being present; mouth parts normal, not formed for blood sucking-----**BRUCHOMYINAE.**

The Trichomyiinae (Tonnoir, 1922) will presumably include *Sycorax* Haliday. The validity of this group as a separate subfamily is confirmed by the recent discovery of the larva of *Sycorax*¹ erroneously considered by its discoverer as being a new genus of Dixidae. Edwards² has indicated the probability that *Sycorax* should represent a subfamily of Psychodidae.

The two genera of Bruchomyiinae may be separated as follows:

1. Antennae with 27-30 segments, including the reduced apical button; distal section of vein Cu_1 long, approximately as long as the basal section.
 Bruchomyia Alexander.
- Antennae with 17 segments, including the reduced apical button; distal section of vein Cu_1 short, curved strongly to the anal margin.
 Nemopalpus Macquart.

Genus BRUCHOMYIA Alexander

1920. *Bruchomyia* ALEXANDER, Ann. Ent. Soc. America, vol. 13, p. 403.

1927. *Bruchomyia* ALEXANDER, Genera Insectorum, fasc. 189, p. 4.

The genotype and hitherto only known species of *Bruchomyia* is *B. argentina* Alexander (1920), known only from various parts of Argentina. The species recently described as *Bruchomyia pallipes* Shannon and del Ponte (1927) is herewith transferred to the genus *Nemopalpus*. Two additional species of *Bruchomyia*, recently discovered in Peru by Raymond C. Shannon and kindly loaned to me for study, are described in the present report.

¹G. W. Müller, Zeltschr. Morph. Oekol. Tiere, vol. 7, pp. 535-542, 1927.

²Entomologist, vol. 61, pp. 207-208, 1928.

The generic definition of *Bruchomyia* must be slightly modified as a result of the discovery of these two novelties. The antennae in number of segments range from 27 to 30, the terminal segment being very small and buttonlike. Tonnoir (1922, p. 127, footnote) suggested that the increased number of flagellar segments in *Bruchomyia* might have been brought about by the bipartition of the 14-segmented flagellum in *Nemopalpus*. An examination of the three known species of *Bruchomyia* shows the impossibility of such an explanation, since the segments decrease gradually in size outwardly and there is no suggestion of a pairing of the segments, as would be the case if a primitive segment had been evenly subdivided. The chief venational peculiarity of *Bruchomyia* is the long sinuous distal section of Cu_1 .

The only ecological notes available concerning this genus are those made by Doctor Bruch concerning the genotype, *argentina* (Alexander, 1927). "The flies always occur in damp places, being found on damp earth and in crevices of rocks. Pieces of wood, roots, moss, and other substances were examined critically, but the early stages could not be discovered. No plant mines were found and the larvae could not be located in the mud and wet earth along the margins of streams. In a position of rest, the adult flies sit rather high-legged, the wings held obliquely divergent. In copula, the male rests on the female, their bodies not being held in opposition. The flies are rather wary and take flight readily when disturbed. However, this flight is of brief duration and one can readily watch such a disturbed fly in flight and see it alight again."—*Bruch*.

KEY TO THE SPECIES OF BRUCHOMYIA ALEXANDER

1. General coloration of head and mesonotum dark gray; vestiture of head and thorax whitish; antennae (female) 29-segmented, the basal segment of flagellum subequal to the second. (Peru.)-----*peruviana*, new species.
General coloration of head and mesonotum brown or yellowish, the vestiture pale brown to dark brown; antennae not 29-segmented, the first flagellar segment approximately one-half longer than the second.-----2.
2. General coloration pale yellow, the vestiture pale brown; antennae of male 28-segmented, of female 27-segmented, nearly as long as the body; no patch of dark setae on wing-disk at the bend of R_5 , the latter not incrassated at this point. (Peru.)-----*shannoni*, new species.
General coloration brown, with brown setae; antennae of male 30-segmented, shorter than the body; a patch of dark setae on wing-disk at the bend of R_5 , the latter strongly incrassated at this point. (Argentina.)

argentina Alexander.

BRUCHOMYIA ARGENTINA Alexander

1920. *Bruchomyia argentina* ALEXANDER, Ann. Ent. Soc. America, vol. 13, p. 405.

General appearance much like a *Molophilus*; antennae elongate, 30-segmented; a dark patch of setae at $r-m$.

The fly was described from La Granja, Alta Garcia, Province of Córdoba, Argentina, April 1-8, 1920 (Charles Bruch). More recently

(Shannon and del Ponte, 1927:733) the fly has been recorded from Tucumán, Salta, and Jujuy in Argentina.

Paratype.—Female, Cat. No. 41589, U.S.N.M.

BRUCHOMYIA SHANNONI, new species

General coloration pale yellow; antennae of male 28-segmented, of female 27-segmented, nearly as long as the body; wings uniformly pale, with pale brown macrotrichiae; M_1 in alignment with M_{1+2} , $r-m$ at the fork of M_{1+2} .

Male.—Length, about 4.5 mm.; wing, 4.5–5 mm.; antenna about 4–5 mm.

Female.—Length, about 5 mm.; wing, 6 mm.

Rostrum yellow; palpi elongate, brownish yellow. Antennae of male unusually long for a member of this genus but varying in relative length in different specimens, 28-segmented, including the terminal button; first flagellar segment longest, more than one-half

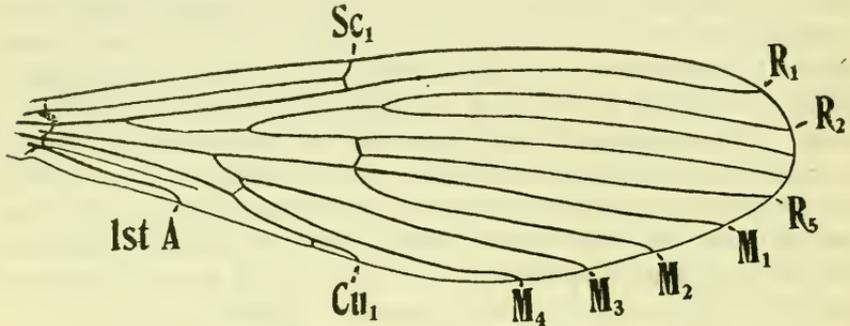


FIGURE 1.—WING-VENATION OF BRUCHOMYIA SHANNONI, NEW SPECIES:
A=ANAL; C=CUBITAL; M=MEDIAL; R=RADIAL; SC=SUBCOSTAL VEINS

longer than the second; succeeding flagellar segments gradually decreasing in length, the outermost oval, the terminal segment very reduced in size; flagellar segments clothed with long appressed to semiappressed setae; antennae pale, the setae brown. In the female antennae 27-segmented, the proportions of the segments about as in the male. Head yellowish testaceous, the center of the vertex somewhat darker.

Mesothorax entirely pale yellow to testaceous yellow, the notum somewhat darker, the conspicuous setae pale brown. Halteres pale, the knobs a little darker. Legs pale brown, clothed with chiefly pale appressed setae, with scattered smaller erect setae. Wings uniformly pale, with abundant pale brown macrotrichiae; costal fringe dense; no incrassation of R_5 at bend or grouping of trichiae into a dark patch at this point as in *argentina*. Venation (fig. 1): Sc_2 extending to about opposite three-fourths the length of R_{2+3} , Sc_1 subequal but pale and relatively indistinct; R_s gently angulated and broken at near midlength; R_{2+3} about one-third longer than R_{4+5} ; basal section

of R_3 and $r-m$ subequal and in transverse alignment; cell M_1 sessile; $m-cu$ very pale; distal section of Cu_1 long, sinuous, in the specimen figured with a short branch before apex; cell M_4 relatively narrow at margin, subequal to Cu ; vein $1st A$ distinct, the cell a little wider on basal half. Most of the specimens lack the apical branch on the distal section of Cu_1 and its occurrence must be held as adventitious.

Abdomen pale, densely clothed with long setae, very dense at end of organ, rendering it difficult to separate the two sexes. Male hypopygium (fig. 2) with the basistyle (b) relatively stout, the outer face on basal two-thirds with numerous large setigerous punctures,

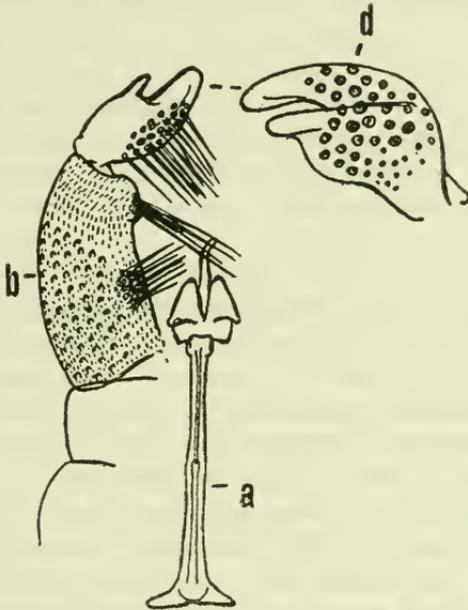


FIGURE 2.—MALE HYPOPYGIUM OF BRUCHOMYIA SHANNONI, NEW SPECIES:
 a =AEDEAGUS; b =BASISTYLE; d =DISTISTYLE

the apex of style with microscopic setulae only; mesal face of basistyle near apex with a small tuft of very long setae directed mesad and cephalad; ventral face of basistyle with a larger low tubercle bearing a dense brush of shorter setae. Dististyle (d) small, the ventral outer face densely set with long erect setae, the dorsal face with a conspicuous lateral tooth or flange. Aedeagus (a) appearing as a stout chitinized rod, extending cephalad into the seventh segment of the body.

Locality.—Peru.

Holotype.—Male, Verrugas Cañon, Department of Lima, April 7, 1928 (R. C. Shannon).

Paratopotypes.—Four males. *Allotopotype*.—Female.

Type.—Male, Cat. No. 41582, U.S.N.M.

This very distinct species of *Bruchomyia* is named in honor of the collector, my friend Raymond C. Shannon, to whom I am very

greatly indebted for the opportunity of studying not only the present material but other rich collections from many parts of the Americas.

BRUCHOMYIA PERUVIANA, new species

General coloration dark gray, the vestiture whitish; rostrum and palpi dark brown; antennae (female) 29-segmented, the basal 15 or 16 flagellar segments subequal in length; femora with appressed whitish setae.

Female.—Length, about 4.7 mm.; wing, 5 mm.

Rostrum and palpi dark brown. Antennae with the scapal segments pale yellow, the flagellum dark brown, 29-segmented, including the microscopic terminal button; first flagellar segment subequal in length to the second; proximal 15 or 16 flagellar segments nearly equal in length but becoming more slender, the ends a little constricted; succeeding segments gradually shortened, the outer segments more oval; terminal segment buttonlike; antennae much shorter than in the corresponding sex of *shannoni*. Head dark plumbeous gray.

Mesonotum dark gray, the lateral margins of the praescutum somewhat more brownish; setigerous punctures dark brown; vestiture of thorax whitish. Pleura dark brown. Halteres pale, the base of the stem whitish, the knobs infuscated. Legs with the coxae and trochanters infuscated; femora pale, with appressed whitish setae that are scarcely apparent against the background; tibiae and tarsi darker; segments of legs with sparse scattered erect setae. Wings yellowish subhyaline, the macrotrichiae brown; veins very pale brown. Costal fringe relatively short and inconspicuous. Venation as in *shannoni*, with the following modifications: *Rs* scarcely broken; proximal end of distal section of *R*₂ thickened, as in *argentina*, jutting as a weak spur into cell *R*; *r-m* on *M*₁ nearly its own length beyond the fork of *M*₁₊₂; *M*₃₊₄ very short and arcuated; *m-cu* pale, without macrotrichiae; distal section of *Cu*₁ sinuous, longer than the basal section.

Abdomen dark brown, densely covered with white setae, the genital segments more yellowish.

Locality.—Peru.

Holotype.—Female, Colonia Peregé, Chanchomayo, altitude 3,000 feet (R. C. Shannon).

Type.—Female, Cat. No. 41581, U.S.N.M.

Genus NEMOPALPUS Macquart

1838. *Nemopalpus* MACQUART, Dipt. exot., vol. 1, pt. 1, p. 85.

1845. *Nygmatoles* LOEW, Dipterolog. Beiträge, vol. 1, p. 9.

1904. *Nemopalpus* EATON, Ent. Mo. Mag., ser. 2, vol. 15, p. 55.

1905. *Palaeosycorax* MEUNIER, Miscell. Ent., vol. 13, p. 50.

1922. *Nemopalpus* TONNOIR, Ann. Soc. Ent. Belgique, vol. 62, p. 125.

The genus *Nemopalpus* as now known is represented by six living and two additional fossil species. Of these, two closely allied forms occur in the New World and are discussed in the present report. The species are all very uncommon and their distribution as known is markedly discontinuous, indicating a palæogenic group of Diptera. The genotype, *flavus* Macquart (1838 a, 1838 b) was described from the Canary Islands. Since the original definition, a few additional specimens have been taken (Eaton, 1904; Becker, 1908), but the fly must be considered as being excessively rare. The New Zealand *N. zelandiae* Alexander (1921) and the Australian *N. australiensis* Alexander (1928) are the only known representatives in the Australasian Region. *N. orientalis* Edwards (1928) has recently been described from the Malay Peninsula and is the sole known representative of the subfamily in the Oriental Region. The two fossil forms, *N. tertiariae* (Meunier, 1905) and *N. molophilinus* Edwards (1921), are known only from Baltic Amber (Lower Oligocene).

In the New World the first described species was *N. pilipes* Tonnoir (1922), described from Paraguay, but now recorded from northeastern Argentina. The species recently described by Shannon and del Ponte as *Bruchomyia pallipes* proves to be more correctly referable to *Nemopalpus*. Although closely allied to *N. pilipes*, I believe the two species to be distinct.

The antennae of species of *Nemopalpus* have been described as being 16-segmented, but there is an additional tiny buttonlike segment at the end of the organ which is herein held to be 17-segmented. The chief point of difference in the venation from *Bruchomyia* is in the short distal section of Cu_1 , which is scarcely one-half the basal section and rather conspicuously bent toward the anal angle. As a consequence, cell M_4 at the margin is very wide.

Little is known concerning the ecology of any members of the genus. *Nemopalpus orientalis* Edwards was taken at Camerons Highlands, Gunong Berumban, Pahang, Federated Malay States, altitude 5,500 feet, March 14, 1924, by H. M. Pendlebury. Two specimens were observed, resting on damp moss on a tree trunk. These occurred in a type of rain-forest that was continually dampened by mist.

KEY TO THE NEOTROPICAL SPECIES OF NEMOPALPUS MACQUART

1. General coloration brown, the body and wings with abundant pale brown setae, the wings with additional patches of dark setae at fork of R_{2+3} , $r-m$, base of M_3 , M_{3+4} and end of Cu_1 , with paler and less distinct areas at ends of medial veins; legs pale brown, the tarsi paler. (Paraguay, Argentina.)

pilipes Tonnoir.

General coloration dark brown, the body and wings with almost black setae, the patches on the wings arranged as above but inconspicuous due to the dark color of the costal fringe; legs brownish black, the tarsi conspicuously pale. (Argentina)-----*pallipes* (Shannon and del Ponte).

Since the male sex of *pallipes* is still unknown, the above key is based only on the female sex. The male of *N. pilipes* is generally similar to the female in coloration but differs most remarkably in the extremely long dorsal fringes of setae on the tibiae and, less accentuated, on the basitarsi.

The South American species of *Nemopalpus* differ conspicuously from those of the old world in the venation, R_{2+3} being very elongate, exceeding three times R_2 alone; $r-m$ and the basal section of R_5 lie far distad, being connected posteriorly with M_1 far beyond the fork of M_{1+2} .

NEMOPALPUS PILIPES Tonnoir

1922. *Nemopalpus pilipes* TONNOIR, Ann. Soc. Ent. Belgique, vol. 62, pp. 130-134, 8 figs.

Tonnoir's description and figures are so complete that nothing further need be added. The species was described from material taken in Paraguay by Fiebrig. One additional male was taken at the Iguazu Falls, Argentina, October, 1927, by R. C. and Elnora Shannon, now preserved in the National Collection.

NEMOPALPUS PALLIPES (Shannon and del Ponte)

1927. *Bruchomyia pallipes* SHANNON and DEL PONTE, Rev. Inst. Bact., Buenos Aires, vol. 4, pp. 733-734.

The type of *pallipes*, a female, was taken at Iguazu Falls, Misiones, Argentina, June 21, 1927, by R. C. Shannon. The type was very kindly loaned to me for study by Mr. Shannon and Doctor Aldrich and a few supplementary notes are given.

Female.—Length about 4 mm.; wing 5 mm.

The species is undoubtedly closely allied to *N. pilipes*, but differs in the black coloration of the setae of the body and wings and the more conspicuously whitened tarsi.

Antennae pale, the setae black; 16-segmented, with an additional microscopic terminal button, as in the genus. Venation as in *pilipes*, Sc_1 being distinctly preserved; R_{2+3} very elongate, the fork correspondingly shortened; basal section of R_5 and $r-m$ in transverse alignment, both far beyond the fork of M_{1+2} ; distal section of Cu_1 very short. The long conspicuous crests of setae on head and thorax nearly black. Costal fringe very long and dense, brownish black, with paler hairs becoming more numerous on the distal half, the coloration of the fringe fully as dark as the hair patches on the disk, which are thus relatively inconspicuous. Legs with the vestiture appressed, with only scattered erect setae, dark-colored, those of the tarsi creamy, producing a pallid effect.

Type.—Female, Cat. No. 41580, U.S.N.M.

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