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Description of a New Species of *Mendanacoris* Miller, with Notes on the Systematic Position of the Genus (Reduviidae, Hemiptera, Insecta)

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The reduviid subfamily Mendanacorinae was described by Miller (1956) from the Solomon Islands, with a single genus and species, *Mendanacoris browni;* no new information has been published since on the genus. The finding of a second species of *Mendanacoris* now gives us opportunity to add to the knowledge of the taxon.

Miller (1956) compared *Mendanacoris* to *Phimophorus* (Phimophorinae), enumerating some characters common to both, but certain differential characters were to Miller "sufficient to warrant the erection of a new subfamily" for *Mendanacoris.*

Since *Mendanacoris* was described, additional data on *Phimophorus* have come to hand (Carayon, Usinger, and Wygodzinsky, 1958), supplementing the information given by Handlirsch (1897a, 1897b) and Wygodzinsky (1948), so that a re-evaluation of the relationship between *Mendanacoris* and *Phimophorus* is now possible. Comparative descriptions of the groups involved will facilitate the comparison between the two taxa.

We wish to express our thanks to Mr. N. C. E. Miller, who has generously allowed us to make use of his original drawings (figs. 21-23); all other illustrations have been prepared by the second author.

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MENDANACORIS MILLER

Figures 1, 3-15, 21-23

Small (under 5 mm.), somewhat depressed, general aspect aradid-like. Body surface partly granulose; all setae glabrous; patches of wool-like waxy secretion on various regions of body and appendages. General color brownish, conspicuous markings absent.

Head slightly shorter than pronotum, subrectangular in dorsal view; anteocular region much longer than postocular, posterior border abruptly truncate before neck in dorsal and lateral views. Head strongly granulose dorsally and laterally; ventral surface glabrous, bordered by anteriorly open bucculae beset with a series of spiniferous tubercles. Eyes relatively small, remote from level of dorsal and ventral surfaces of head. Ocelli present, not situated on a distinct elevation. Dorsal interocular sulcus present but very shallow. Clypeus in shape of an elongate, apically falcate, interantennal process. Labrum large, adpressed to first rostral segment, over half as long as the latter. Antenniferous tubercles very large, plate-like, slit along middle longitudinally, covering insertion of antennae laterally, but separated dorsally by base of interantennal process. Antennae inserted at apex of head, short and stout; first segment slightly wider than others, second and third of identical diameter, somewhat compressed, rigid; fourth not free, reduced to a prominence at apex of third article. First and second segments subequal in length, third much longer; first deeply incised apically for reception of second. Rostrum faintly bent between first and second segments, slightly compressed dorso-ventrally; first adpressed to gula when at rest, over half as long as entire rostrum, second much shorter, third shortest.

Pronotum wider than long, fore lobe shorter and narrower than hind lobe. Structure of pronotum simple, without spines or projections; lateral margins slightly expanded. Fore lobe with 1+1 submedian longitudinal carinae continued faintly on hind lobe. Scutellum triangular, pointed apically, with 1+1 distinct lateral ridges and one faint median longitudinal ridge. Prosternal processes transformed into 1+1 small subtriangular plates shielding prosternal stridulatory groove. Mesothoracic and metathoracic sterna centrally flattened.

Legs short, granulose; femora and especially tibiae compressed laterally. Fore coxae contiguous, mid and hind coxae widely separated. All coxae subglobular. Trochantera short, simple; femora simple, without basal processes, deeply incised at apex for reception of tibiae. Tibiae narrowed and slightly curved distally, their extreme apex with a tuft of short rigid setae; their distal end dorsally distinctly excavated for reception of

upwardly bent tarsi. Tarsi minute, about as long as diameter of tibia, two-segmented, the basal segment shortest; claws simple.

Hemelytra wide, approaching apex of abdomen; their texture almost uniformly membranous. Clavus very narrow. Region corresponding to corium very narrow but over half as long as total length of hemelytron. Membrane with two elongate cells, formed by M and Cu, and Cu and Pcu, respectively; base of outer cell situated at level of center of inner cell; region corresponding to corium with one small, closed, triangular cell situated at base of outer cell, formed by R and M. Apical portion of R free; irregular cross veins or anastomosing veinlets absent. Hind wings with hamus; m–cu cross vein very short or absent, in the latter case hamus inserted directly on Cu.

Abdomen wide, slightly depressed. Ventral surface flattened along center, but flattened region not limited by a ridge. Three pairs of scent-gland openings present, situated at bases of fourth, fifth, and sixth tergites.

MALE: Genital segments ventrally situated. Eighth sternite completely invaginated into seventh. Pygophore somewhat depressed, with a posterior shield-like compression concealing parameres. Parameres simple. Articulatory apparatus about as large as phallotheca, the latter membranous. Struts conspicuous, forming an elongate shield-like sclerite, this structure continued subapically into two narrow bands. Endosoma entirely membranous.

FEMALE: Eighth tergite almost contiguous with connexival margin.

Mendanacoris milleri, new species

Figures 1, 3–15

MALE: Length, 4.9 mm. Color light brown; disc of hind lobe of pronotum, as well as mesopleura and metapleura, suffused with dark brown. Head with antennae, anterior border, lateral portions and submedian carinae of fore lobe of pronotum, entire hind lobe of pronotum, pleura with exception of acetabula, sterna, scutellum, corium along veins, legs entirely, and most of abdomen ventrally with exception of small glabrous areas, all with very short setae, these setae not barbed or serrate, and generally covered with a whitish wax-like substance.

Head as shown in figures 1, 3–6, its width anteriorly equal to its length along middle as measured from its posterior margin to base of interantennal process. Posterior margin of head wide-angled in dorsal view. Length of eyes in dorsal view equal to three-fourths of length of anteocular portion to apex of antenniferous tubercles. Ratios of first through third antennal segments = 0/0.63/2.3 (in *browni:* 1/0.84/2.5).

Pronotum as shown in figures 1, 3, and 4, deeply constricted at level of limit between fore and hind lobes; hind lobe somewhat angularly rounded laterally, coarsely granulated on disc.

Fore legs as shown in figures 7 and 8; mid and hind legs similar.

Fore wings as shown in figures 1 and 3; venation of hind wings as shown in figure 9; m-cu cross vein not developed, hamus inserted on Cu; apex of wing faintly pigmented.

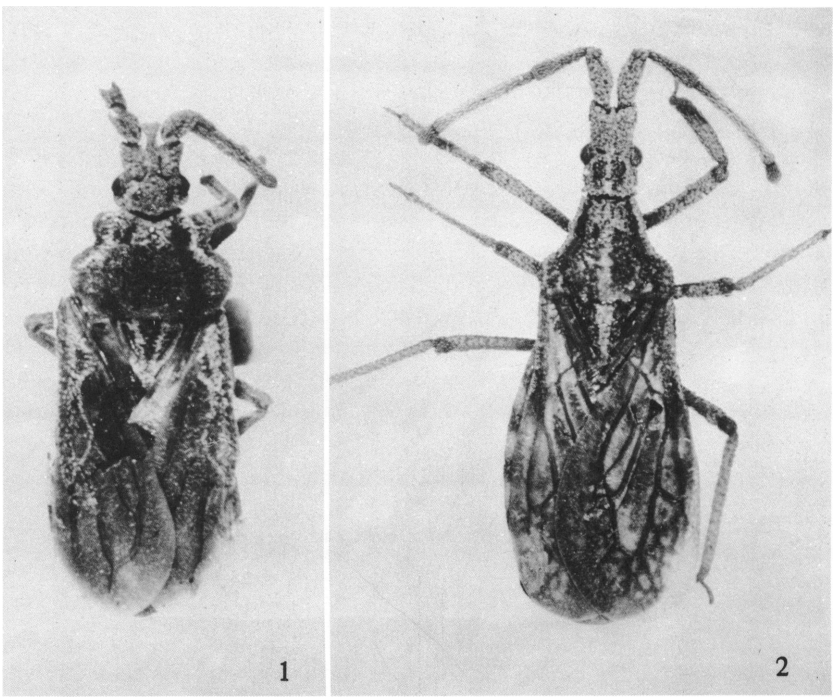
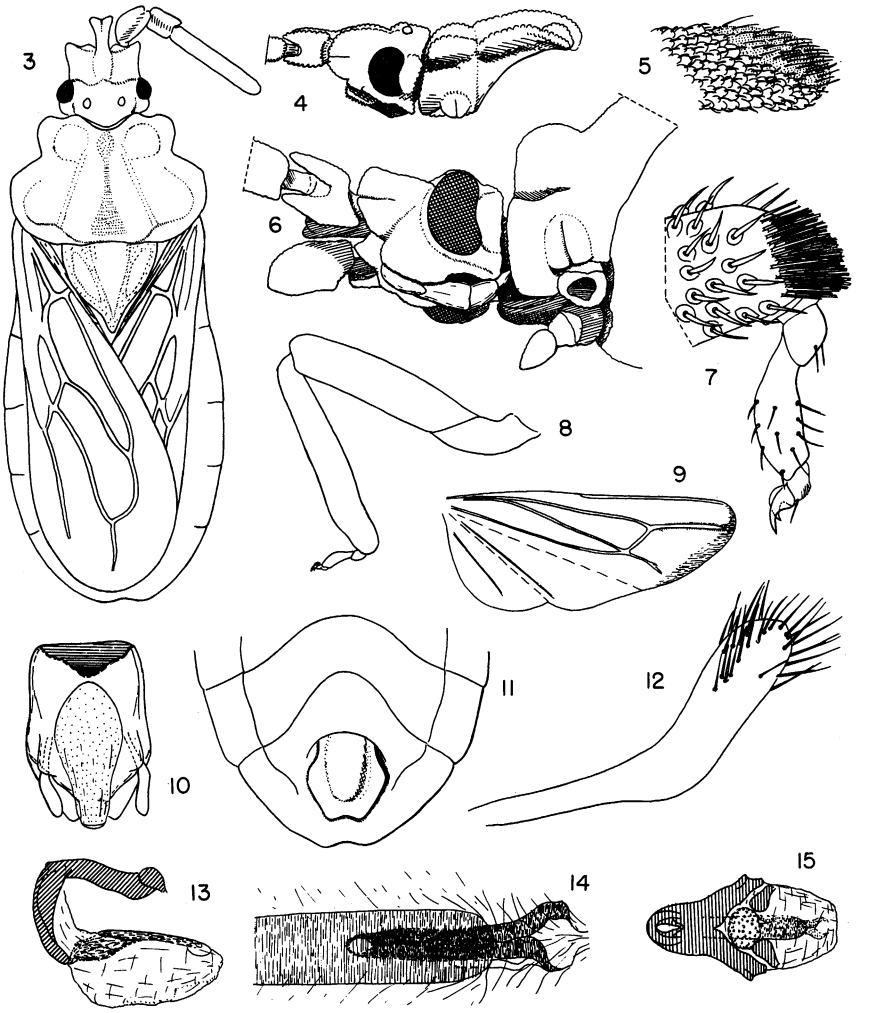


FIG. 1. *Mendanacoris milleri*, male holotype.
FIG. 2. *Phimophorus spissicornis*, female.

Abdomen as shown in figures 3 and 11. Posterior border of pygophore (fig. 11) broadly emarginated at center. Parameres as shown in figures 10 and 12. Phallus as shown in figures 13 to 15. A membranous structure with granular surface situated between basal plates at level of dorsal connectives. Basal plate struts directed toward upper walls of phallotheca, completely fused, forming an elongate, tongue-shaped shield, apically underlain with 1+1 narrow, parallel, distally separated, sclerotized bands.



FIGS. 3–15. *Mendanacoris milleri*, male. 3. Dorsal view. 4. Head and prothorax, lateral aspect. 5. Apex of last antennal segment, high magnification. 6. Head and prothorax, lateroventral view. 7. Apex of fore tibia with tarsus. 8. Foreleg. 9. Forewing. 10. Pygophore seen from above. 11. Apical portion of abdomen, seen from below. 12. Paramere. 13. Phallus, lateral view. 14. Part of distal portion of dorsal wall of phallotheca. 15. Phallus, dorsal aspect.

MATERIAL EXAMINED: Malaya: Island of Penang (Baker), one male holotype, in the United States National Museum.

The new species, named for N. C. E. Miller, differs from *M. browni*

by the wider head and the single constriction of the pronotum (figs. 3 and 23), the posteriorly emarginated pygophore (rounded in *browni*), and the larger size (4.9 mm. in *milleri*, 4.3 mm. in *browni*). The larger eyes of *milleri* might be attributable to the different sexes of the specimens figured. Ours is a male; Miller's, a female.

A scrutiny of the redescription of *Mendanacoris* and that of *Phimophorus* which follows reveals that these genera agree in a considerable number of characters; these are indicated by italics in the redescription of *Phimophorus*.

PHIMOPHORUS BERGROTH

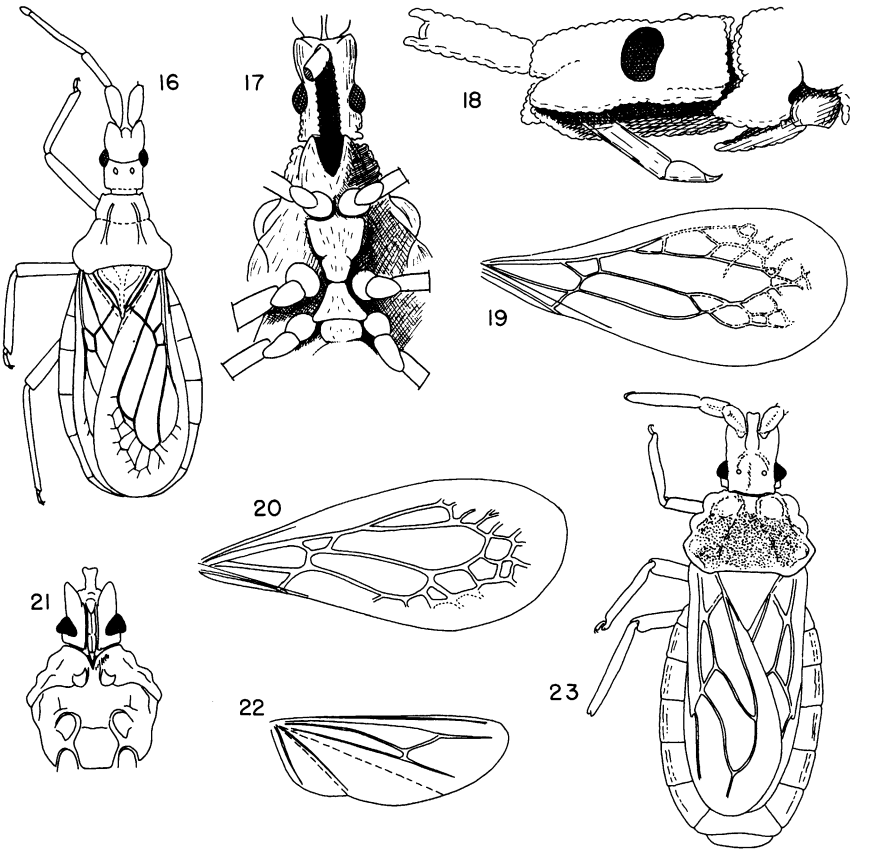
Figures 2, 16–20

Small (under 8 mm.), *somewhat depressed, general aspect aradid-like or coreid-like. Body surface granulose;* larger setae serrulate; *patches of wool-like waxy secretion on various regions of body and appendages. General color brownish, conspicuous markings absent.*

Head subrectangular in dorsal view, about as long as pronotum; anteocular and postocular regions subequal in length; *posterior border abruptly truncate before neck, in dorsal and lateral views. Head strongly granulose dorsally and laterally; ventral surface glabrous; bucculae anteriorly closed, beset with series of spiniferous tubercles. Eyes relatively small, remote from level of dorsal and ventral surfaces of head. Ocelli present, ocelliferous elevation only slightly marked. Dorsal interocular sulcus present but very shallow.* Clypeus strongly reduced, almost imperceptible. Labrum minute. *Antenniferous tubercles very large, plate-like, entire, completely covering insertion of antennae laterally* and from above; bases of antenniferous tubercles almost meeting dorsally. *Antennae inserted at apex of head, short and stout;* first segment the widest, *second to fourth segments of identical diameter, somewhat compressed, rigid, first and second segments subequal in length, third longest,* fourth ovate; *first deeply incised apically for reception of second. Rostrum* straight, *slightly compressed dorsoventrally, adpressed to gula when at rest; first segment over half as long as entire rostrum, second much shorter, third shortest, its apex conspicuously curved upward.*

Pronotum wider than long, fore lobe shorter and narrower than hind lobe. Structure of pronotum simple, without spines or projections; fore lobe with 1+1 submedian longitudinal carinae continued on hind lobe. Scutellum triangular, pointed apically, with 1+1 marginal and one median longitudinal ridge. Prosternal processes transformed into 1+1 large subtriangular plates shielding the prosternal stridulatory groove. Mesothoracic and metathoracic sterna centrally flattened.

Legs short, granulose; femora and tibiae laterally compressed. Fore coxae contiguous, mid and hind coxae widely separated. All coxae subglobular; trochantera short, simple. Femora with a short, basad-directed process dorsally at base



FIGS. 16–20. *Phimophorus spissicornis*. 16. Dorsal view. 17. Head and thorax, ventral aspect. 18. Head and prosternum, sublateral view. 19, 20. Forewings of different specimens.

FIGS. 21–23. *Mendanacoris browni* (from Miller, 1956). 21. Head and thorax, seen from below. 22. Hind wings. 23. Dorsal aspect of female.

above insertion on trochantera. *Tibiae narrowed and slightly curved distally, their extreme apex with a tuft of short rigid setae; their distal end faintly excavated dorsally. Tarsi minute*, scarcely longer than diameter of tibia, *two-segmented, the basal segment shortest; claws simple.*

Hemelytra wide, attaining or *almost attaining apex of abdomen, their texture almost uniformly membranous. Clavus narrow;* region corresponding to corium very short, less than one-third of total length of hemelytron. *Membrane with two narrow cells, formed by M and Cu, and Cu and Pcu, respectively*, their

bases situated approximately at the same level; *region corresponding to corium with one small, closed, triangular cell formed by R and M situated at base of outer discal cell.* Apical portion of R free or connected distally to M. Hemelytra with a few irregularly arranged cross veins; short anastomosing veinlets beyond cells on apical portion of membrane. Hind wings without hamus; R and Cu connected by a strongly oblique vein.

Abdomen wide, slightly depressed. Ventral surface flattened along center, flattened area not limited by a ridge. One pair of scent gland openings, situated on fourth tergite.

MALE: *Genital segments ventrally situated. Eighth sternite completely invaginated into seventh. Pygophore somewhat depressed. Parameres of simple structure,* exposed. Articulatory apparatus much smaller than phallotheca, the latter membranous, sclerotized ventrally. Struts present but not conspicuous. Endosoma membranous, with two pairs of sclerotized, tongue-shaped projections.

FEMALE: Eighth tergite continuous with connexival margins, horizontal. Ninth tergite vertical, subtriangular, forming an almost continuous surface with gonocoxites and small anterior gonapophyses.

For an analysis of the relationship between *Mendanacoris* and *Phimophorus*, only the apomorphic characters need concern us here; the common possession of plesiomorphic features is not significant for proving or refuting affinities.

The following features common to *Mendanacoris* and *Phimophorus* are derivative, within the general framework of reduviid morphology:

General aspect aradid-like
Body and appendages with patches of waxy secretion
Antenniferous tubercles with lateral, shield-like structures protecting insertion of antennae
Antennae inserted at apex of head
All antennal segments conspicuously thickened
Progressive reduction of fourth antennal segment
Presence of bucculae
First rostral segment very long; second and third short
Prosternum with 1+1 large, shield-like structures protecting stridulatory furrow
Flattening of discs of mesosternum and metasternum
Legs very short and stout
Trend of tibiae to develop apical concavity for reception of tarsi
Tarsi minute, two-segmented
Texture of forewings almost entirely membranous, coriaceous only along narrow portion of costal margin
Flattening of central portion of abdomen

Several of the characters enumerated are also found occasionally elsewhere in the family. The aradid-like aspect is typical of many of the

Physoderinae. Waxy secretions are found in some of the Emesinae, Harpactorinae, and Apiomerinae. Plate-like projections shielding the antennal insertions have evolved in the Phymatini and Macrocephalini of the Phymatidae and in many Ectrichodiinae; a trend toward the formation of similar structures can also be observed in some of the Triatominae, Tribelocephalinae, and others, but a more detailed study would be necessary to make sure that these structures are homologous in all groups concerned. A remarkable thickening of the second through fourth antennal segments occurs in the phymatine tribes previously mentioned. Insertion of the antennae at the anterior border of the head is a frequent phenomenon in other reduviids, for example, the Cetherinae, Salyavatinae, Chryxinae, Manangocorinae, and Phymatinae. Bucculae are very prominent in the Phymatinae but make isolated appearances also in other subfamilies, though they are less strikingly developed, such as in some Tribelocephalinae and in one species of *Aradomorpha* (Physoderinae). A very long first rostral segment, though not very common, is also found in many reduviid genera belonging to various other subfamilies. The flattening of the disc of the ventral surface of the thorax and abdomen occurs in many unrelated genera of the subfamilies Reduviinae, Triatominae, Microtominae, Elasmodeminae, and others. The very short and stout legs are common in the Phymatinae, but occasionally appear also in the Reduviinae, Triatominae, Elasmodeminae, and Harpactorinae. Concavities at the apex of the tibiae for the reception of the tarsus are frequent in the Apiomerinae. Two-segmented tarsi occur in many Salyavatinae, in the Elasmodeminae, in several Physoderinae, and in *Themonocoris* among the Phymatinae, as well as in some other groups. Membranization of the entire forewing has developed in some Harpactorinae, the Holoptilinae, Tribelocephalinae, and the Emesinae and Saicinae, but the venation is quite different in these groups.

The foregoing review shows that many of the derivative characters encountered in *Mendanacoris* and *Phimophorus*, though not common in the Reduviidae, are occasionally also found, singly or in various combinations, in other subfamilies, where they may occur in all or only in some genera. It is possible that these features have evolved independently in *Mendanacoris* as well as in *Phimophorus*, but the simultaneous occurence of so many of them makes their common acquisition from a comparatively recent ancestor a distinct possibility.

Two highly derivative characters, seemingly not found in any other reduviid, are the shield-like structures protecting the stidulatory furrow laterally (figs. 6, 18), and the unique reduction of the fourth antennal segment (figs. 3, 16). These features are in all probability not just con-

TABLE 1
DIFFERENCES BETWEEN *Phimophorus* AND *Mendanacoris*

Phimophorus	*Mendanacoris*
Macrochaetae barbed	Macrochaetae simple
Clypeus simple	Clypeus forming a long interantennal projection
Labrum minute	Labrum large, as long as basal half of first rostral segment
Bucculae closed in front	Bucculae open in front
Shield-like projection covering antennal base entire	Shield-like projection covering antennal base split laterally
Fourth antennal segment small but free	Fourth antennal segment entirely fused with third
Antennae sexually dimorphic	Antennae not sexually dimorphic
Base of femora with projection	Base of femora lacking projection
Apical concavity of tibiae poorly developed	Apical concavity of tibiae well developed
Apical portion of forewing with anastomosing veins	Forewing without anastomosing veins
Hind wings without hamus	Hind wings with hamus
One pair of dorsal abdominal gland openings	Three pairs of dorsal abdominal gland openings

vergent but truly synapomorphic and thus significant from a phylogenetic point of view.

Though *Mendanacoris* and *Phimophorus* agree in many derivative traits, as demonstrated above, there are also considerable differences, as shown in table 1.

Most of these differences are not greater than those customarily used for defining genera, but a few seem more significant, namely, the presence or absence of the hamus and the different number of dorsal abdominal scent-gland openings. A short survey of the relative weight of these characters for the higher classification of the Reduviidae might be useful.

The importance generally attributed to the absence or presence of a hamus may be considerably less than usually thought. Davis (1961) has shown that in the Phymatinae, a well-circumscribed subfamily, the hamus is present in some (*Themonocorini*, *Phymata*, *Macrocephalus*) but absent from others of its components (*Carcinocoris*). The hamus is developed in most of the Emesinae, but in a few genera it has been lost (unpublished observations). At the same time, though the m-cu cross vein is well developed in *Mendanacoris browni* (fig. 22), it is completely absent from *M. milleri* (fig. 9), in which the hamus arises directly from Cu, a condition imaginably precursory to its final disappearance.

Similar doubts can be cast upon the value of the number of dorsal abdominal scent-gland openings, as a character to separate subfamilies in the Reduviidae in all cases. Again in the Phymatinae, *Themonocoris* has one pair, but all other genera examined have two pairs, of these glands.

It may be concluded that although important differences are found in the development of the hamus and the number of dorsal abdominal scent-gland openings, these do not speak necessarily against a relatively close relationship of *Phimophorus* and *Mendanacoris*.

An analysis of the data summarized above suggests that *Phimophorus* and *Mendanacoris* are more nearly related to each other than to any other known reduviid, as among the considerable number of similarities some important ones are considered as synapomorphic. Certain other derivative characters shared by *Phimophorus* and *Mendanacoris* are found singly or in various combinations also in other reduviids, but, though the possibility of convergence is not excluded, the interpretation of these characters as synapomorphic, within the present group, is also possible. None of the differences encountered is irreconcilable with the hypothesis of a relatively close relationship between the two genera, suggested by Miller (1956) and by Carayon, Usinger, and Wygodzinsky (1958). As it is admitted that some of the differences are notable, the position of the two genera in the system can be expressed most adequately by placing them in a single subfamily, the Phimophorinae, but in different tribes, the Phimophorini and Mendanacorini. Each tribe has autapomorphic characters, viz., specialized features not shared with the other, thus suggesting different lines of specialization departing from those of a more generalized ancestor. This hypothesis of evolutionary divergence is enhanced by the fact that the two tribes are geographical vicariants, one being restricted to the Old World and the other to the New World. The divergence is thus also geographical.

The Phimophorinae, as now understood, can be defined by the characters in italics in the above description of *Phimophorus*. The type genus is *Phimophorus* Bergroth, 1886. The distribution of the subfamily is circumtropical.

The tribe Phimophorini Handlirsch, 1897 (as Phimophorinae), is characterized mainly by the presence of a free though minute fourth antennal segment, the anteriorly closed bucculae, the absence of a hamus, and the presence of only one pair of dorsal abdominal gland openings. The type and only genus is *Phimophorus* Handlirsch, 1897. The range of the tribe is Neotropical.

The Mendanacorini Miller, 1956 (as Mendanacorinae), are defined by

the loss of a free fourth antennal segment, by the anteriorly open bucculae, the presence of a hamus, and the three pairs of dorsal abdominal gland openings. The type and only genus is *Mendanacoris* Miller, 1956; its range is Oriental.

The relationships of the newly defined Phimophorinae to the other reduviid subfamilies are not clear, as shown by the sometimes contradictory statements made by various authors.

Handlirsch first (1897a) compared *Phimophorus* to the Phymatinae, but later (1897b) to the stenopodine genus *Aulacogenia* Stål. Finally (1925) he placed *Phimophorus* in the Stenopodinae. Usinger (1943) discussed the relationships of the Phimophorinae but did not arrive at any conclusion. Wygodzinsky (1948) rejected any relationship between *Phimophorus* and the Stenopodinae; he compared the genus to the phymatines but found more similarities in *Aradomorpha* Champion, then considered to belong in the Reduviinae, but no definite statement as to the position of *Phimophorus* was made. Carayon, Usinger, and Wygodzinsky (1958) exluded any direct relationship between the phymatines and *Phimophorus*, the former as exemplified by the rather generalized *Themonocoris*. Miller (1956) compared his *Mendanacoris* to *Phimophorus* but failed to discuss the relationship of either to the other Reduviidae. Davis (1961) considered that the Phimophorinae [and Mendanacorinae] are probably related to his phymatine complex (comprising the Phymatinae, Elasmodeminae, and Holoptilinae).

As shown above, the Phimophorinae, as understood here, share derivative characters with a wide array of other reduviids, but these characters are found among the remaining reduviids in multiple combinations (sometimes only on the generic and not even the subfamily level) as opposed to the full complement of these characters found in the phimophorines. Homoplasy rather than homology is indicated, and there is no evidence of propinquity of descent. Further discussion is not profitable at this time, unless the available evidence be interpreted differently. It is hoped that future data obtained from the study of the internal anatomy and perhaps the eggs and nymphs of the Phimophorinae will contribute toward establishing the position of the subfamily in the system of the Reduviidae.

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