

A PRELIMINARY REVISION OF THE GENERA MITRICEPHALA BOLÍVAR 1898, AND VERDULIA BOLÍVAR, 1905 (Orthoptera: Acridoidea: Pyrgomorphidae)

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Abstract: *Verdulia* and *Mitricephala*, as well as some of their included species, have been confused in the literature and the 2 genera have latterly been synonymized. The type species of *Verdulia*, *Acridium* (*Pyrgomorpha*) *cycloideum* De Haan, and of *Mitricephala*, *M. vittata* Bolívar, however, are not congeneric and both genera must now be regarded as valid. The genus *Batjanacris* Ramme is synonymous with *Verdulia*. *Mitricephala rhodoptera* Miller represents a third genus, herein named *Mitricephaloides*, n. g., of which it is designated type species.

As now recognized, *Verdulia* contains 2 species, *V. cycloidea* (De Haan) and *V. subcycloidea* Willemse (of which *Batjanacris karnyi* Ramme is a synonym) from New Guinea and the Moluccas respectively; *Mitricephaloides* also comprises 2 species, *M. rhodopterus* (Miller) from Malaya and *M. rubrosignatus* (Ramme) from Borneo; *Mitricephala* includes 4 species, *M. vittata* Bolívar from the Mentawai Islands, *M. dohrni* (Bolívar)—of which *Verdulia olivacea* Bolívar, *V. rufipennis* Bolívar nom. nud., *M. obtusa* Willemse and *M. gracilis* Willemse are all synonyms—from Sumatra, *M. milleri* Ramme from Malaya, and *M. javanica*, n. sp., from Java.

All type specimens are designated and discussed. Keys to genera and species are given and complete bibliographies for all species are included.

For genera in which so few specimens are known, an extraordinary degree of confusion in the taxonomy of *Mitricephala* and *Verdulia* exists. Bolívar (1898), when he erected the former genus, did not indicate suprageneric categories, but neither did he associate *Mitricephala* with other pyrgomorphid genera, for he placed it between the unrelated *Pseudoctanaë* Bolívar and *Gonista* Bolívar. *Mitricephala* was not referred by Bolívar (1904, 1905, 1909) in his works on Pyrgomorphidae, so that it seems clear that he did not recognize it for what it was. Kirby (1910), presumably following Bolívar's original positioning, listed the genus in his Cyrtacanthacr[id]inae, as did Willemse (1921). Willemse (1930), Miller (1934) and Chopard (1938) also included it in the same subfamily for which, however, they used the name Catantopinae. *Verdulia*, on the other hand, was originally placed in the Pyrgomorphidae by Bolívar (1905) and there has been no confusion over its general systematic position.

Miller (1935), on the suggestion of Uvarov, was the first to mention that *Mitricephala* was a pyrgomorphid and he indicated that *Verdulia* was probably a synonym, although the

latter name was retained for the species to which he referred. According to Miller (*l. c.*) Uvarov was alleged to have stated that "all species of *Verdulia* have been described from males, and those of *Mitricephala* from females," thus implying a reason for the existence of one genus instead of two—although offering no explanation of how they had come to be placed in different (sub)families. In fact the alleged statement, as published, is incorrect: *Verdulia cycloidea* (De Haan) was described from the female, and *V. dohrni* Bolívar and *V. subcycloidea* Willemse from both sexes. All species of *Mitricephala*, however, were described from females only.

Ramme (1941) gave formal recognition to the suggested synonymy of *Verdulia* with *Mitricephala* and definitely placed the latter correctly in the Pyrgomorphinae (Pyrgomorphidae). In the same group he also erected the genus *Batjanacris*, the type species of which, *B. karnyi* Ramme, proves to be synonymous with *Verdulia subcycloidea* Willemse. The latter is congeneric with *V. cycloidea* (De Haan), the type species of *Verdulia*, but not with other species described in that genus which are in fact referable to *Mitricephala*. The suggestion of Miller (1935) and the action of Ramme (*l. c.*) are thus only partially correct and both genera are valid, *Batjanacris* being synonymous with *Verdulia*. It should, perhaps, also be noted that Willemse (1939) referred his new genus *Esoacris* to the Pyrgomorphinae (Pyrgomorphidae), indicating that it might be placed near *Mitricephala*. *Esoacris* is, in fact, a synonym of *Pseudocarsula* (Acrididae, Catantopinae) and not a pyrgomorphid (Henry, 1940: 520, footnote). A genus which may be related to *Mitricephala*, however, is *Kuantania* Miller (see Kevan, 1963a).

The confusion has not been limited to the generic level. The name of the type species of *Verdulia* and the designation of its type specimen need considerable clarification, as will be explained below. Carl (1916), in recording material from Java as *Verdulia dohrni*, failed to recognize it as belonging to a new species, so that Willemse (1930) and Ramme (1941), were also misled into stating that the species was Javanese as well as Sumatran. Too much emphasis on the color of the hind wing of *V. dohrni*, as given in Bolívar's (1905) description, has also led to misinterpretation of this species by Willemse (1930) and Miller (1935) (see below). Willemse (1930) used unreliable tegminal and fastigial characters in his descriptions of *Mitricephala obtusa* and *M. gracilis*, admitting that he was uncertain that they differed from *M. vittata* Bolívar (which he also seems to have misinterpreted), and leading Ramme (*l. c.*) to exclaim, "Warum aber dann erst beschreiben?" Further to add to the confusion, Miller (1935) described the male of his own *M. rhodoptera*, supposing that he was giving a redescription of "*Verdulia*" *dohrni*; he also described the male of a new species—subsequently named *M. milleri* by Ramme (1941)—under the impression that he was redescribing "*Verdulia*" *olivacea* Bolívar. He would appear to have accepted uncritically the determinations placed on his specimens by Uvarov, so that the misinterpretations were not his alone.

While *Verdulia* and *Mitricephala* may be readily distinguished by their external morphology, a detailed study of the phallic structures by S. S. Akbar and myself (in preparation) has indicated considerable differences not only between the two genera showing that they are not closely related, but also between *M. rhodoptera* Miller and other species of *Mitricephala*, thus necessitating the erection of a new genus. The latter may also be distinguished by external characters. Only the epiphallus among the phallic structures is considered in the present work although the differences between the three genera extend also

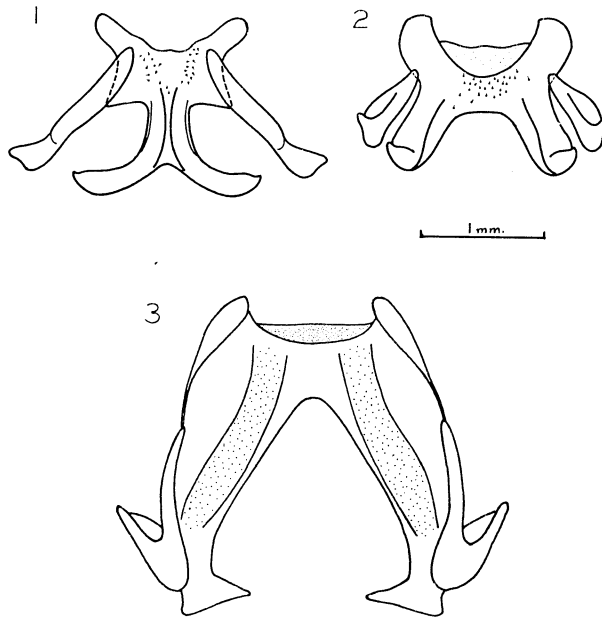
to the endophallus (to be discussed in a future publication).

KEY TO THREE GENERA AT PRESENT RECOGNIZED

1. Generally smaller (♂ ca. 22–27 mm, ♀ ca. 30–37 mm) and more slender, particularly in ♀; no distinct pale lateral stripe along head and thorax; fastigium verticis parabolic, lateral margins slightly convex; tegmina and hind wings reaching, or almost reaching, end of abdomen, leaving at most 1 or 2 segments exposed; tegmina usually faintly mottled; hind wings faintly to strongly infuscated throughout, not yellow or red, any other pigmentation bluish (extreme base); prosternal tubercle transversely compressed, much wider apically than basally, especially in ♀, and bearing distinct lateral bosses at apex; interspace between mesosternal lobes comparatively broad, lateral margins little concave; terminalia of ♂ abdomen somewhat compressed, not particularly enlarged or elaborated (fig. 4); cerci simple; epiphallus with posterior projections of lateral plates (*sensu* Dirsh, 1956) closely united at base (fig. 1); ovipositor valves long and slender, dorsal valves only slightly curved and with weak apices (fig. 5); W. New Guinea, Moluccas to Sangihe and Talaud Is. **Verdulia**
- Generally larger (ca. 25–32 mm, ♀ ca. 35–48 mm) and more robust, particularly in ♀; usually (but not always) with a distinct pale lateral stripe from cheek, across inferior part of lateral pronotal lobe, to pleura; fastigium verticis triangular, lateral margins straight or slightly concave; tegmina and hind wings short, leaving several abdominal segments exposed; tegmina not mottled; hind wings infumated (but not strongly) or colored red or yellow, no blue color, sometimes with a dark marginal band; prosternal tubercle transversely compressed, often widest at apex, but without distinct lateral bosses; interspace between mesosternal lobes narrow with strongly concave lateral margins; terminalia of ♂ abdomen strongly depressed, enlarged, often very elaborate (figs. 8–11); ♂ cerci inwardly curved, elongate or expanded; epiphallus with posterior projections of lateral plates widely separated at base (figs. 2, 3); ovipositor valves usually elongate but of more normal form, dorsal valves sinuously curved and with fairly strong apical hooks (figs. 6, 7); Malaya, Sumatra, Java, Borneo..... 2
2. Fastigium of vertex short, no longer than wide; hind wing red or yellow, with a distinct, clearly defined (even if rather faint) marginal band; abdominal tergum X of ♂ with broad, simple, subcircular or semicircular posterior excision; ♂ epiproct simple, tongue-like; ♂ cerci simple, elongate, evenly curved inwards and acute apically (fig. 8); epiphallus of orthodox pyrgomorphid type (fig. 2); Malaya, Borneo..... **Mitricephaloides**
- Fastigium of vertex longer, at least as long as wide; hind wing not distinctly red or yellow (so far as known), without a clearly defined marginal band (although margin may be more strongly infumated than disc); abdominal tergum X of ♂ with a deep, narrow, elongate, oblong or key-hole-shaped posterior excision having thickened lateral margins; ♂ epiproct spatulate, ending in a short point and having a longitudinal ridge (at least at base); ♂ cerci robust, flattened, rather abruptly curved inwards towards the apices which are blunt or truncated (figs. 9–11); epiphallus peculiarly modified (fig. 3); Malaya, Sumatra, Mentawai Is., Java **Mitricephala**

Note: All species have not been examined for their phallic structures, due to the absence of ♂♂ in some of them, but the similarities between the various members of each genus lead one to believe that the key will stand the test when further material becomes available.

Virtually nothing is known of the biology of these genera, although *Mitricephala*, at least, would seem to be arboreal (see p. 789).



Figs. 1-3. Epiphalli of: 1, *Verdulia subcycloidea* Willemse; 2, *Mitricephaloides rhodopterus* (Miller); 3, *Mitricephala javanica*, n. sp.

Genus *Verdulia* Bolívar, 1905

[*Acridium*] (*Pyrgomorpha*): De Haan, 1842: 148, 149 (*partim*).

Opomala: Walker, 1870: 506 (*partim*).

Mastax: Bolívar, 1884: 14 (in error).

Verdulia Bolívar, 1905: 281 (*partim*); 1909: 45, 49 (*partim*).—Kirby, 1910: 338 (*partim*).—

Willemse, 1928: 7; 1930: 90 (*partim*); 1932: 381.—Miller, 1935: 686 (*partim*—apparent synonymy with *Mitricephala* discussed).—Neave, 1940a: 634.

Mitricephala: Ramme, 1941: 67 (*partim*).

Batjanacris Ramme, 1941: 69.—Neave, 1950: 31. **New Synonymy.**

Type species (by inference, Bolívar 1905, and by subsequent design., Kirby, 1910): *Acridium* (*Pyrgomorpha*) *cycloideum* De Haan = *Verdulia cycloidea* (De Haan); type species of *Batjanacris* (by monotypy): *Batjanacris karnyi* Ramme = *Verdulia subcycloidea* Willemse.

When he erected *Verdulia*, Bolívar (1905) stated “Á este género corresponde el *A.*

(*Pyrgomorpha*) *cycloidea* De Haan.....” and he listed *cycloidea* first among the 3 species that he placed in the genus. It therefore seems that *cycloidea* was inferred to be the type species of *Verdulia* although no direct statement to this effect was made. Kirby (1910) clearly designated the type species in accordance with Bolívar's (*l. c.*) implication. It is rather important to establish this fact, since the other species described by Bolívar in *Verdulia* are not congeneric with *cycloidea*, but belong instead to *Mitricephala*.

Bolívar's (1905; 1909) definitions of the genus *Verdulia* were based more upon his own species, *dohrni* and *olivacea*, than upon the type species, *cycloidea*. Thus the lateral bosses on the prosternal tubercle are not referred to; the margin of the hind wing is said to be undulating (a character more particularly associated with the reduction of these organs, as in *Mitricephala*, although also occurring in the rather short-winged *V. cycloidea*); the mesosternal interspace is stated to be narrow, X-shaped, and the corresponding lobes rounded (characters which are not applicable to *V. cycloidea*); and the ovipositor valves are said to be sinuous (which is scarcely true of *V. cycloidea*). The apex of the ♂ abdomen, also, is described as being clavate and depressed, the “anal” segment large and deeply sinuous medially, the supra-anal plate spatulate and the cerci compressed and incurved posteriorly. No ♂ of the type species is known, however, and these characters refer only to *dohrni* and *olivacea* (both referable to *Mitricephala* and not to *Verdulia*).

Willemse (1932), in describing *V. subcycloidea*, mentioned the difficulty of placing that species in *Verdulia* because of the disagreement with Bolívar's (1909) generic diagnosis and because it would not fit in the latter's key to the tribes of Pyrgomorphae. He observed that he awaited “material of the true *Verdulia cycloidea*” before being certain that *subcycloidea* belonged to *Verdulia*. He apparently overlooked the fact that he had studied the types of *V. cycloidea* not long previously (Willemse, 1928), but he was correct in assigning *subcycloidea* to the same genus.

Ramme (1941), as noted above, formally synonymized *Verdulia* with *Mitricephala*, presumably without reference to the types of *V. cycloidea* or of *V. subcycloidea*. He also erected a new genus, *Batjanacris*, for his new species *karnyi*, but a direct comparison of one of his type specimens with the type series of *V. subcycloidea* shows the 2 to be synonymous. In his generic diagnosis for *Batjanacris*, Ramme mentions, among other characters, a loop-like area margined by small tubercles on the disc of the fastigium verticis. This is not even a specific character, however, since some specimens of *V. subcycloidea* have such an area, and others do not. He also mentions the expanded basal segments of the antennae, but this character, mentioned also by Willemse (1932) in his description of *V. subcycloidea*, is a specific character only. He does, however, mention and illustrate the peculiar form of the prosternal tubercle, not referred to by Willemse.

KEY TO SPECIES OF VERDULIA

- Antennae of ♀ with rather strongly expanded basal segments and a serrated external basal outline when seen from above; ♂ antennae somewhat expanded basally, but less so than in ♀ and less distinctly serrated; Moluccas, Sangihe & Talaud Is.
 **subcycloidea**
- Antennae of ♀ somewhat flattened but scarcely expanded and not serrated basally; of ♂ presumably similar or subtriquetrous (♂ unknown); W. New Guinea.... **cycloidea**

Note: In typical *V. cycloidea* the tegmina do not quite reach the apex of the abdomen and the hind wings are subcycloid with scalloped margins, whereas in typical *V. subcycloidea* the tegmina slightly exceed the apex of the abdomen and the hind wings are more elongate with plain margins. These characters, however, are inconstant in both species. I am not altogether satisfied that the 2 species are really distinct from one another, but the few available ♀ specimens are distinguishable by the antennal character—which could conceivably be variable. No ♂ of *V. cycloidea* is available for comparison.

Verdulia cycloidea (De Haan) Fig. 16.

[*Acridium* (*Pyrgomorpha*)] *brachypterum* De Haan, 1842: 143.

[*Acridium* (*Pyrgomorpha*)] *Cycloideum* De Haan, 1842: 149.

A[cridium] (*Pyrgomorpha*) *brachypterum* De Haan, 1842: 150.—Bolívar, 1884: 14 (refers species to genus *Mastax*).—Willemse, 1928: 7 (discussion of correct name for species; both generic names given in full).—Kevan, 1962: 7 (discusses homonymy of another species).

A[cridium] (*Pyrgomorpha*) *cycloideum* De Haan, 1842: 164.—Bolívar, 1905: 281 (discussion of correct name for species).—Willemse, 1930: 91 (in citing type species of *Verdulia*; both generic names given in full).

Acridium brachypterum De Haan, 1844: pl. 21, fig. 1, 1a [♀, not pl. 23 as given by De Haan's (1842) text—*cf.* also Bolívar (1905)].

Opomala ? brachyptera: Walker, 1870: 514.

V[erdulia] cycloidea: Bolívar, 1905: 281 (also as *cycloidea* only); 1909: 50.—Kirby, 1910: 338 (as *V. cycloidea*).—Willemse, 1928: 7 (generic name in full, but not combined with specific name); 1930: 381 footnote (generic name in full).

Verdulia cycloidea: Willemse, 1928: 7 (generic name not combined with specific name on this p.), pl. III, fig. 9 [♀].

“*Mitricephala (Acridium) cycloidea* (de Haan) (*brachypterum* de Haan)”, Ramme, 1941: 67.

There has been considerable confusion regarding the correct name for this species. De Haan (1842) in his key (p. 149) used the name *cycloideum*, but elsewhere, except on p. 164, he used *brachypterum*. Bolívar (1905) pointed out that both names referred to the same species, but selected the former as correct “que es el primero con el que aparece designada en la obra en que fué descrita.....” In this he was followed by Willemse (1928) who also stated that *cycloideum* has priority. This is not strictly correct, as *brachypterum* was used (without a directly associated generic name) on p. 143 of De Haan's work. It would, in fact, seem probable that De Haan intended that the species should be called *brachypterum* and that the 2 entries using the name *cycloideum* were left uncorrected through an oversight. A confusion of names may have been anticipated by De Haan when he compared the present species with his *A[cridium] (Mastax) cyclopterum* (p. 164). Bolívar was thus probably technically incorrect in selecting the name *cycloideum* (although he pointed out that *brachypterum* would scarcely be appropriate), but, according to the Code of Zoological Nomenclature, he must be regarded as “first reviser” and his selection must stand. There would be little point in adding to the confusion by rejecting his choice now.

Bolívar (1905) also pointed out that, although De Haan's (*l. c.*) text refers the reader to his pl. 23 for a figure of the species, the actual illustration is on pl. 21. This discrepancy, it may be noted, had led Bolívar (1884) to refer the present species to the genus

Mastax. The confusion in plate numbers stems from the fact that De Haan originally placed the figure concerned at the right-hand end of the top row of figures of what is now pl. 23. When the plates were prepared by the engraver, certain changes in position were made¹, presumably for aesthetic reasons, and the illustration of the present species was moved to pl. 21 (top left) without a corresponding change being made in the text.

As indicated by Willemse (1928) there are 2 syntypic ♀ specimens in the Leiden Museum, one of which he figured. This latter, which has both pairs of wings spread is clearly that illustrated by De Haan. It bears the following labels: 1) "Muller, N. Guinea" [on an ancient round (?original) label]; 2) "Type" [red]; 3) "Verdulia cycloidea de Haan Det C. Willemse." The measurements are given by Willemse (*l. c.*), mostly correctly, although the actual overall length and length of hind femur are 32.5 and 14 mm respectively, not 31 and 13.5 mm. The other syntype has the wings closed [it is also in poor condition, now lacking hind legs and eyes (a hole passes through the head where the latter should be)]; it bears the following labels: 1) "Muller, N. Guinea" [a very old, but not original, rectangular label]; 2) "Type" [red]; 3) "Verdulia cycloidea de Haan Det. C. Willemse"; and 4) "Brachypterum de Haan" [a very old, but not original label]. Its overall body length is 34.5 mm.

Bolívar (1905) referred to "type de Haan" and "el tipo", being apparently unaware that 2 specimens existed. He gave the measurements of the body as 34.5 and of the hind femur as 14.5 mm. The former measurement, as well as the fact that tegmina are said to reach almost to the apex of the abdomen, would suggest that the 2nd syntype referred to above was the one specified by him and that this should be regarded as a lectotype. However, Bolívar did not always give very accurate measurements, and since he also described in fair detail the hind wings which are not visible in the specimen referred to, it may well be that he saw the first of the 2 specimens whose actual measurements lie between those given by Bolívar (*l. c.*) and Willemse (*l. c.*) [The measurements of pronotum and tegmina, 5.5 and 19 mm respectively, are the same for both specimens and both authors], and that he deduced the length of the tegmina in relation to the abdomen from their measurements. Alternatively, of course, he could have obtained his information regarding the hind wings from De Haan's plate.

There is thus an element of doubt regarding which of the 2 syntypes Bolívar actually referred to as "el tipo", and, even if there were not, it is debatable whether his reference constitutes a legitimate lectotype designation. There would seem to be no doubt in Willemse's (*l. c.*) mind that the first of the 2 syntypes (*i. e.* that with the wings spread) should be regarded as lectotype, since the caption to his figure (Willemse, *l. c.*: pl. III, fig. 9) indicates this as "♀ type", and his measurements, although not quite accurate, clearly refer to the same specimen. His determination labels on the specimens, however, make no dis-

1. De Haan's original black and white drawings are preserved in the Leiden Museum. They differ in their positions from the colored "Model van pl. 23" (also preserved in Leiden) from which the plate was produced as well as in the fact that where the published figures show both pairs of wings, the originals show only those of one side (the right except in *A. haematopterum*, where the left wings are shown). The top row of the original pl. 23, in addition to having the present species (unnumbered) tacked on at the right-hand end, has figs. 1 and 2 reversed in position from the published version. In the 2nd row, also, figs. 4 and 5 are similarly reversed. De Haan's text retains the original and not the published numbering.

inction between the two and it is again arguable whether or not his actions constitute a proper lectotype designation.

Since there are these elements of doubt, I would make it clear that the first mentioned syntype (with wings spread) should be regarded as lectotype. It is the specimen illustrated by De Haan himself, is the better preserved, and bears the older (? original) data label, although no longer carrying an ancient determination label like the other syntype (paralectotype).

No specimen, other than the 2 originals have hitherto come to light, but I have before me a ♀ *Verdulia* from western New Guinea (Neth. Ind.-American New Guinea Exped., Araucaria Camp, 800 m, 18. III. 1939, L. J. Toxopeus) which seems to represent a macropterous form of the species. It has the following measurements: length 37, antennae 7.5, pronotum 5.5, tegmen 25.5, hind wing 22.5, hind femur 15.5, hind tibia 13.5 mm. It is of rather dark brown coloration (with the inner faces of the hind femora reddish and the hind tibiae blackish). The hind wings are infumated, infuscated apically and bluish at the extreme base; they are rather stained.

This species is thus known only from W. New Guinea.

***Verdulia subcycloidea* Willemse** Figs. 1, 4, 5, 17.

Verdulia subcycloidea Willemse, 1932: 381, 382, fig. 3 [♀ head (incl. antenna) and pronotum, dorsal].—Kevan, 1963: 392, footnote.

Mitricephala (Verdulia) subcycloidea: Ramme, 1941: 67.

Batjanacris karnyi Ramme, 1941: 69, fig. 33 [♀ head and pronotum, dorsal, antenna and prosternal tubercle], 70, pl. XI, fig. 6 [♀]. **New Synonymy.**

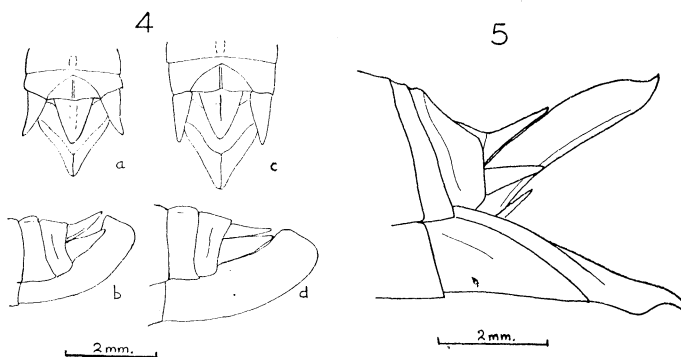
Verdulia subcycloidea was described by Willemse (1932) from 2♂♂ and 3♀♀ syntypes. No single type was designated. A ♂ and 2♀♀ are in the Leiden Museum and the remaining ♂ and ♀ were retained by Willemse and have now passed to the Museum of the Limburg Natural History Society in Maastricht. The ♂ in the former collection is here designated lectotype since it has the measurements given by Willemse and bears a red "type" label placed on it by Willemse, whilst all the other specimens have red "co-type" labels. It also has the following printed data: "Buru, 1921, Station 13, leg. L. J. Toxopeus," to which has been added by hand, "1. IX." The wings of the left side are spread. The other ♂ (which has the right wings spread) is similarly labelled, but the Station number is "9" and the date "10. V." The Maastricht and one of the Leiden ♀♀ bear the printed data: "Buru, 1921, Station 1, leg. L. J. Toxopeus," to which has been added by hand "Leksoela" and "IV-IX"; both have the wings of the left side spread, but the Leiden specimen has the measurements more closely coinciding with those given by Willemse. The remaining syntypic ♀ in Leiden is labelled "Buru, 1921, Station Ehoe [leg.] Estrin, IX" and has the wings of the right side spread. In addition to these types, Willemse also possessed an additional ♀ labelled "Buru, 1921, Station 7, leg. L. J. Toxopeus, IX", but this is not referred to in his text and is therefore not a type. All the syntypic specimens bear determination labels "*Verdulia subcycloidea* nov. sp. det. C. Willemse" whereas the last-mentioned substitutes "Will." for "nov. sp."

Batjanacris karnyi was described by Ramme (1941) from 2♀♀, one from Batjan and the other from Halmahera. One is in Berlin and bears 3 labels: 1) "Batjan"; 2) "Para-

typus" [printed on brick red, to which has been added (in my hand) "? Typus"]; and 3) "Batjanacris karnyi Ramme Paratypus" [not in Ramme's hand]. The other specimen was stated to be in Stettin and, if it is still extant, must now be in Warsaw. I have not seen it, but it is clearly the specimen for which Ramme gives a photograph, since the left wings of the specimen illustrated are spread, whereas those of the Berlin example are not. It is to be presumed that it bears the data "Halmahera" (as given by Ramme), a "Typus" label and Ramme's determination. There is, however, confusion regarding which specimen is in fact to be regarded as the holotype. Ramme states that the type is from Batjan, but indicates that it is deposited in Stettin, whereas the Halmahera specimen is regarded as a paratype but is stated to be in Berlin (which it is not). Ramme's photograph does not assist in reaching a decision because the type status of the specimen illustrated is not stated (Ramme's photographs were not always of holotypes, even when there were available to him). Neither are the measurements given of any help since the specimens are apparently of similar dimensions except for the length of the pronotum. The measurements of the Berlin specimen agree exactly with those given (with the longer pronotal length). It is my opinion that greater weight should be placed on the stated locality of Ramme's designated type (Batjan) than on any other factor, and I therefore maintain that the Berlin specimen should be regarded as the holotype although the opposite was probably Ramme's intention.

In addition to the material discussed above, I also have seen the following specimens of *V. subcycloidea*: 1 ♀, Halmahera Ise., Mt. Siu, 600–700 m, 27. IX–6. X. 1951, native collector; and 1 ♂ Sangi en [=and] Talaud [Islands], N. Malaloem [=N. Maraloem I., off W. coast of Pt. Kerakellang, 04°17' N., 126°41' E.], 1926, Erie. This last specimen is rather larger than the lectotype (body length 28.5, tegmen 19 mm) and much larger than the ♂ paralectotype (length 21, tegmen 14.5 mm), but I can detect no significant difference between the three. Slight differences are apparent between the subgenital plate and epiproct of the Malaloem specimen and those of the ♂ paralectotype (fig. 4), but the latter are rather distorted and differ from the lectotype more than do those of the Malaloem specimen.

The known distribution of this species is now considerably extended from the southern Moluccas (Buru) in the south, northwards through Batjan and Halmahera to the Talaud Islands in the north. A similar distribution is also known in the Pyrgomorphidae for certain species of *Desmoptera* (see Kevan, 1963).



Figs. 4-5. *Verdulia subcycloidea* Willemse. 4, ♂ terminalia (a, c, dorsal; b, d, lateral), (a, b), paralectotype, (c, d), specimen from N. Malaloem, Talaud Is.; 5, ovipositor (lateral).

Genus *Mitricephaloides* Kevan n. gen.

Mitricephala: Miller, 1934: 531 (*partim*—generic name not used alone); 1935: 686 (*partim*—species discussed actually referred to *Verdulia*).—Ramme, 1941: 67 (*partim*).

Verdulia: Miller, 1935: 686 (*partim*).

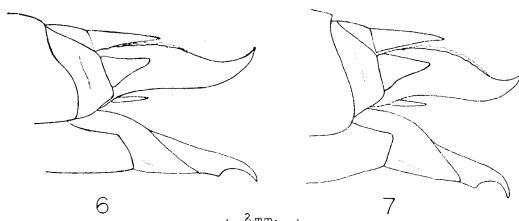
This new genus agrees very closely with *Mitricephala*, but differs in its shorter fastigium verticis, banded hind wings, simpler external ♂ terminalia and more orthodox epiphallus.

Type species: *Mitricephala rhodoptera* Miller = *Mitricephaloides rhodopterus* (Miller).

Two previously described species of *Mitricephala* undoubtedly fall into this genus, although the ♂ of the second, *M. rubrosignata* Ramme, is unknown. The ♀♀ of the 2 species are so similar, however, that there can be little doubt that they are congeneric.

KEY TO SPECIES OF MITRICEPHALOIDES

- Pronotal sulci not very pronounced; tegmen with a short bright red streak at base of costal area; disc of hind wing yellow; ovipositor stouter (fig. 7); [♂ unknown]; Borneo..... **rubrosignatus**
- Pronotal sulci (particularly the median one) very strong; tegmen without a red streak; disc of hind wing red; ovipositor more slender (fig. 6); ♂ terminalia as illustrated (fig. 8); Malaya **rhodopterus**



Figs. 6-7. *Mitricephaloides* spp., ovipositors (lateral). 6, *M. rhodopterus* (Miller); 7, *M. rubrosignatus* (Ramme).

Note: One specimen of *M. rhodopterus* that I have seen has almost colorless (? faded) hind wing discs, so that wing color may be unreliable as a means of distinction. It should be noted that, in some Acridoidea, particularly in oedipodine Acrididae, the wings may be red, orange or yellow in individuals of the same population, although, so far as I am aware, this does occur in Pyrgomorphidae].

Mitricephaloides rhodopterus (Miller) n. comb.

Figs. 2, 6, 8, 18 A-D.

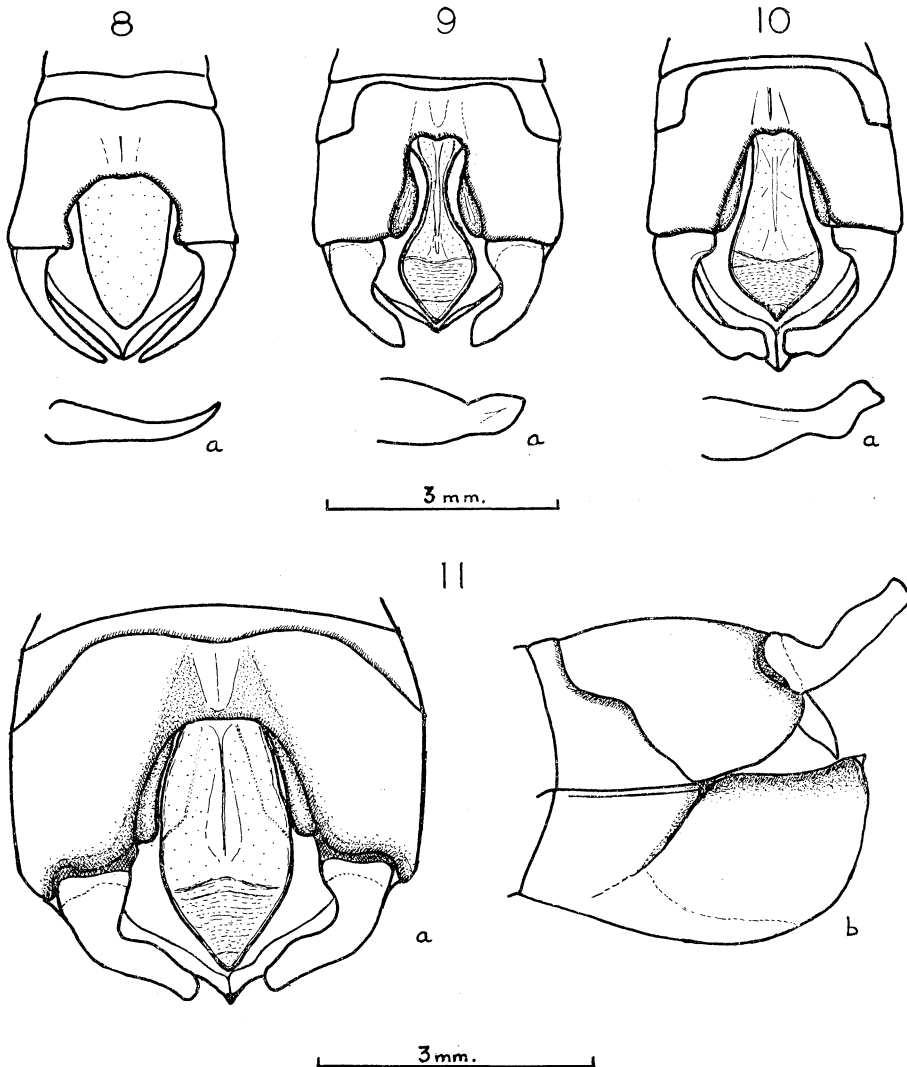
Mitricephala rhodoptera Miller, 1934: 531, pl. XIII, fig. 11 [♀].—Ramme, 1941: 67.

Verdulia dohrni: Miller (*non* Bolívar), 1935: 686, 687, fig. 1 a-e [♂, incl. terminalia and prosternal tubercle), pl. XIV, fig. 9 [♂].

The type of *M. rhodopterus* is a ♀ in the British Museum (Nat. Hist.), London. It agrees in appearance with the colored figure and in measurements and description with those given by Miller (1934). It has the wings of the left side spread and bears, instead of the data "Kanching, Selangor", given in the original description, the labels, "Rinching, F. M. S., 4. 3. 30, N. C. E. Miller", "Pres. by Imp. Inst. Ent., B. M. 1935-32", and "*Mitricephala* sp. det. C. Willemse." There is also a determination label, "*Mitricephala rhodoptera* n. sp., det. N. C. E. Miller", and a red "type" disc. The hind wings have a rather poorly defined dark marginal band.

Miller (1935), also recorded a ♂ under the name of "*Verdulia dohrni*", and described

it under the impression that it belonged to that species. Both he and Uvarov, who determined the specimen for him, were presumably misled by the red color of the hind wings and failed to appreciate that the specimen in fact represented the previously unknown ♂ of *M. rhodopterus*. This specimen bears the data "Malaya, Klang Gates [Selangor], 17. VII. 1932, N. C. E. Miller" as well as Miller's determination label "*Mitricephala* sp." and that of Uvarov "*Mitricephala dohrni*." It is fully described and figured by Miller (*l. c.*).



Figs. 8-11. ♂ terminalia of: 8, *Mitricephaloides rhodopterus* (Miller) (dorsal); 9, *Mitricephala dohrni* (Bolívar) (dorsal); 10, *M. milleri* Ramme (dorsal); 11, *M. javanica*, n. sp. (a, dorsal; b, lateral); 8a, 9a, 10a, left cercus (lateral).

I have also examined specimens from the following localities: 1 ♂, Malacca, Tengah Gebirge, P. Zobris (det. by Ramme as *Mitricephala dohrni*, presumably following Miller's description); 1 ♂, 1 ♀, Camp Jor, Wasserscheide zw. Perak und Pahang (Malakka-Gebiet), 30. XII. 1902, Ab. Grubauer; 3 ♀ ♀, Malaya, Kuala Sleh, K[uala] Lumpur, 8. IX. 1940, N. C. E. Miller; 1 ♂, 26 km NE of Kuala Lumpur, 8. VI. 1962, E. S. Ross & Cavagnaro.

So far, therefore, this species is known only from a rather restricted area of the eastern Malay Peninsula.

Mitricephaloides rubrosignatus (Ramme) n. comb. Figs. 7, 18 E-F.

Mitricephala rubrosignata Ramme, 1941: 68, pl. XVI, fig. 4[♀].

The ♀ holotype is in Berlin. Measurements are as given by Ramme (1941), except that the body is 42.5 and not 38 mm, long. It has the wings of the left side spread and bears the following labels: 1) "Borneo, St[au]d[in]g[e]r"; 2) a brick-red Berlin "Typus" label; and 3) "Mitricephala rubrosignata Ramme" [not in that author's hand].

Only one other specimen is known to me, a ♀ taken in E. Borneo at Tabang, Beugen River, 125 m, 29. IX. 1956, by A. M. R. Wegner.

Genus *Mitricephala* Bolívar, 1898

Mitricephala Bol., 1898: 91.—Kirby, 1910: 384.—Willemsse, 1921: 7, 21; 1930: 106, 107.—Miller, 1934: 531 (*partim*—generic name not used alone); 1935: 686 (spp. discussed were actually referred to *Verdulia*).—Chopard, 1938: 22 (merely noted as typical oriental genus).—Willemsse, 1939: 91.—Neave, 1940: 191.—Ramme, 1941: 67, 68 (*partim*).—Kevan, 1963: 901.

Verdulia: Bol., 1905: 281 (*partim*); 1909: 45, 49 (*partim*).—Kirby, 1910: 338 (*partim*).—Willemsse, 1930: 90 (*partim*).—Miller, 1935: 686 (*partim*—apparent synonymy with *Mitricephala* attributed to Uvarov).

Type species (by monotypy): *M. vittata* Bolívar.

The confusion between this genus and *Verdulia* has already been discussed and requires no further comment. Of 6 previously described species which are referable to *Mitricephala* as at present understood, at most 3 are valid. A previously undescribed species raises the total to 4. Unfortunately 2 species (including the type species) are known from 1 sex only, so that the following key is only tentative.

KEY TO SPECIES OF MITRICEPHALA

1. Antennae of ♀ strongly, of ♂ slightly, ensiform; ♂ terminalia as in fig. 11; Java **javanica**
Antennae of ♀ feebly, of ♂ not, ensiform; ♂ terminalia not as above; Malaya, Sumatra, Mentawai Is. 2
2. Eyes less prominent and head narrower; width across eyes less than 2/3 (♀) or 4/5 (♂) the mid-dorsal length of the pronotum (figs. 14, 15); ♂ terminalia as in fig. 9; Sumatra **dohrni**
Eyes more prominent and head wider; width across eyes about 2/3 (♀) or 4/5 (♂) the mid-dorsal length of pronotum (figs. 12, 13); ♂ terminalia not as above... 3

- 3. Posterior margin of pronotal disc weakly rounded (fig. 13); ♂ terminalia as in fig. 10; (♀ unknown but pronotum presumably as in ♂); Malaya **milleri**
- Posterior margin of pronotal disc rather strongly rounded (fig. 12); (♂ unknown but terminalia presumably not as above); Mentawai Is. **vittata**

Note: I have not yet directly examined the type of *M. vittata*, but I base the relevant part of the above key on a photograph of it given to me by the late Dr. C. J. M. Willemse. It may be observed, however, that the specimen appears to have been preserved in alcohol so that if much distortion has taken place and the species is subject to much variation, it may be that *M. dohrni* may prove to be synonymous with *M. vittata*.

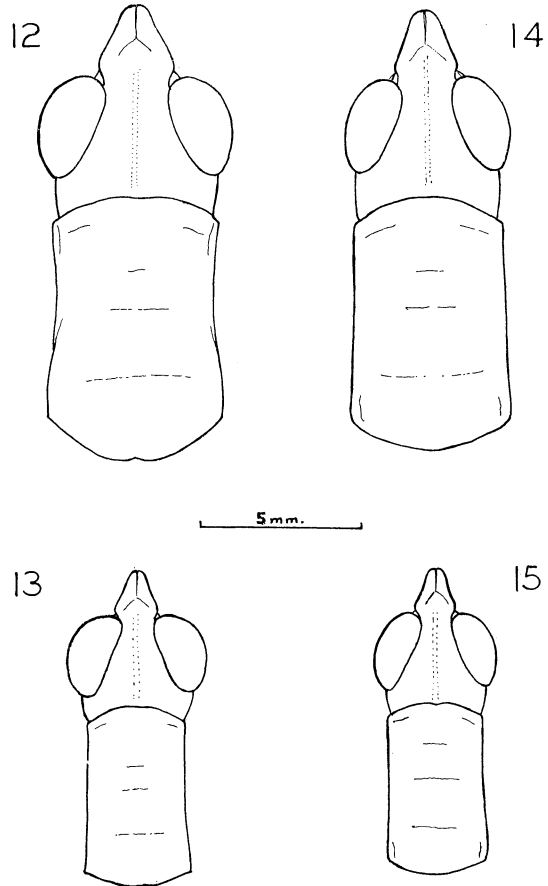
Mitricephala vittata Bolívar Figs. 12, 21A.

Mitricephala vittata Bolívar, 1898: 92.
 —Kirby, 1910: 384 (as *M. Vittata*).—Willemse, 1930: 107 (also as *vittata* only), 109 (*partim*), 110, fig. 55 [♀].—Ramme, 1941: 67, 68 (latter p. as *vittata* only).

In the above bibliography, the reference to *M. vittata* by Miller (1934: 531) has been omitted since it refers to Willemse's material and not to *M. vittata* proper (see below).

The ♀ holotype of *M. vittata* is in Genoa and is labelled "Iles Mentawai: Si-Oban, Avril-Août 1894, E. Modigliani." Its measurements are given by Bolívar (1898) and by Willemse (1930)—the lesser of those given by the latter author. Willemse also gives a photograph.

The specimen has been alcohol-preserved and is thus somewhat distorted, so that, in the absence of ♂♂ and further material from the Mentawai Is., I am not certain that the next species is distinct from *M. vittata*. Willemse (1930) had misgivings about his species, and certainly the fastigial and tegminal characters used by him are valueless owing to their variability. Sumatran specimens placed in *vittata* by Willemse are quite comparable with ♀♀ clearly referable to *Verdulia olivacea* (= *Mitricephala dohrni*). Ramme (1941) actually queries [Willemse's] record of the species from Sumatra. The species is known only by



Figs. 12-15. Head and pronotum (dorsal) of *Mitricephala* spp. 12, *M. vittata* Bolívar, ♀; 13, *M. milleri* Ramme, ♂; 14, *M. dohrni* (Bolívar), ♀; 15, *Id.*, ♂.

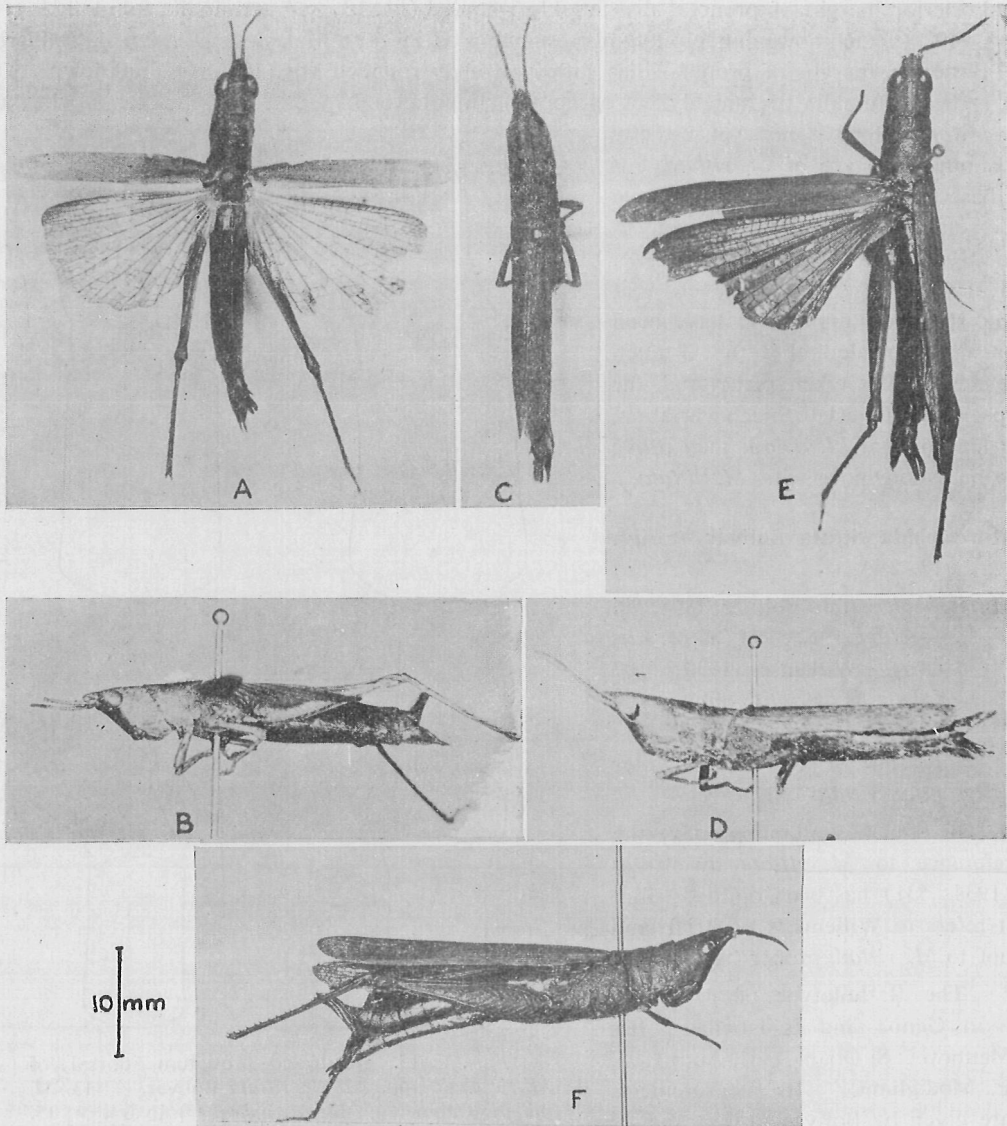


Fig. 16. *Verdulia cycloidea* (De Haan). A, ♀ lectotype, dorsal; B, *Id.*, lateral; C, ♀ paratype, dorsal; D, *Id.*, lateral; E, Macropterous ♀ (Araucaria Camp, New Guinea) - presumably this species (see text), dorsal; F, *Id.*, lateral.

the type.

Mitricephala dohrni (Bolívar) Figs. 2, 9, 14, 15, 19, 20.

V[erdulia] Dohrni Bolívar, 1905: 282 (as *Dohrni* only), 283; 1909: 50.—Kirby, 1910: 338.—

Willemse, 1930: 91 (*partim*—Sumatra only—generic name in full or omitted entirely).

V[erdulia] olivacea Bolívar, 1905: 282 (as *olivacea* only), 284.—Kirby, 1910: 338 (as *V.*

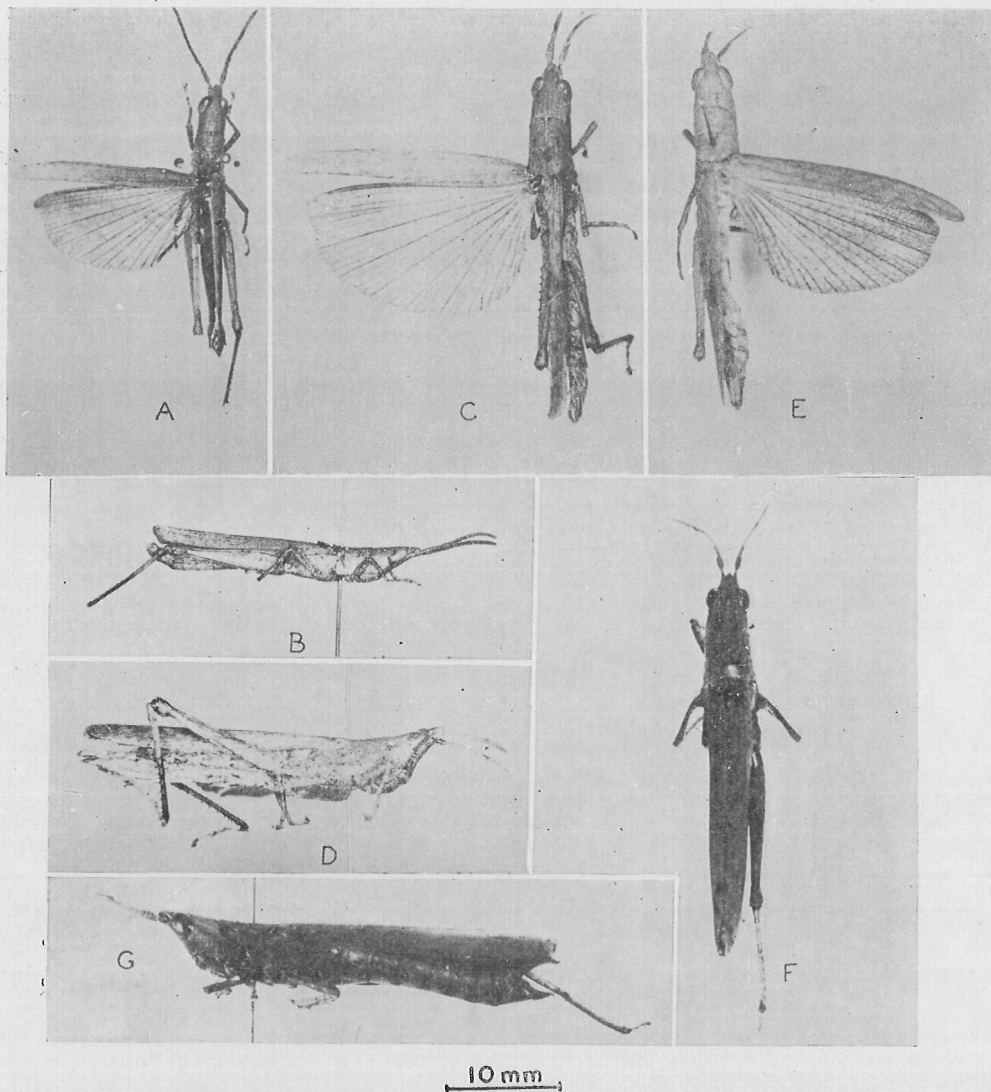


Fig. 17. *Verdulia subcycloidea* Willemse, types. A, ♂ lectotype, dorsal; B, *Id.*, lateral; C, ♀ paralectotype (Buru, Leksoela), dorsal; D, *Id.*, lateral; E, ♀ paralectotype (Buru, Ehoe) dorsal; F, ♀ holotype of *Batjanacris karnyi* Ramme (see text), dorsal; G, *Id.*, lateral.

Olivacea.—Willemse, 1930: 91 (generic name in full or omitted entirely).

V[erdulia] rufipennis Bolívar, 1909: 50. **Nomen nudum.**

Mitricephala obtusa Willemse, 1930: 107 (also as *obtusa* only), 108, fig. 53 [♀], 109 (footnote suggesting synonymy with Willemse's conception of *M. vittata*, but *obtusa* not mentioned by name).—Sjöstedt, 1932: 32.—Ramme, 1941: 67 (suggests synonymy with *olivacea*). **New Synonymy.**

Mitricephala gracilis Willemse, 1930: 107 (as *gracilis* only), 108, fig. 54 [♀], 109 (footnote

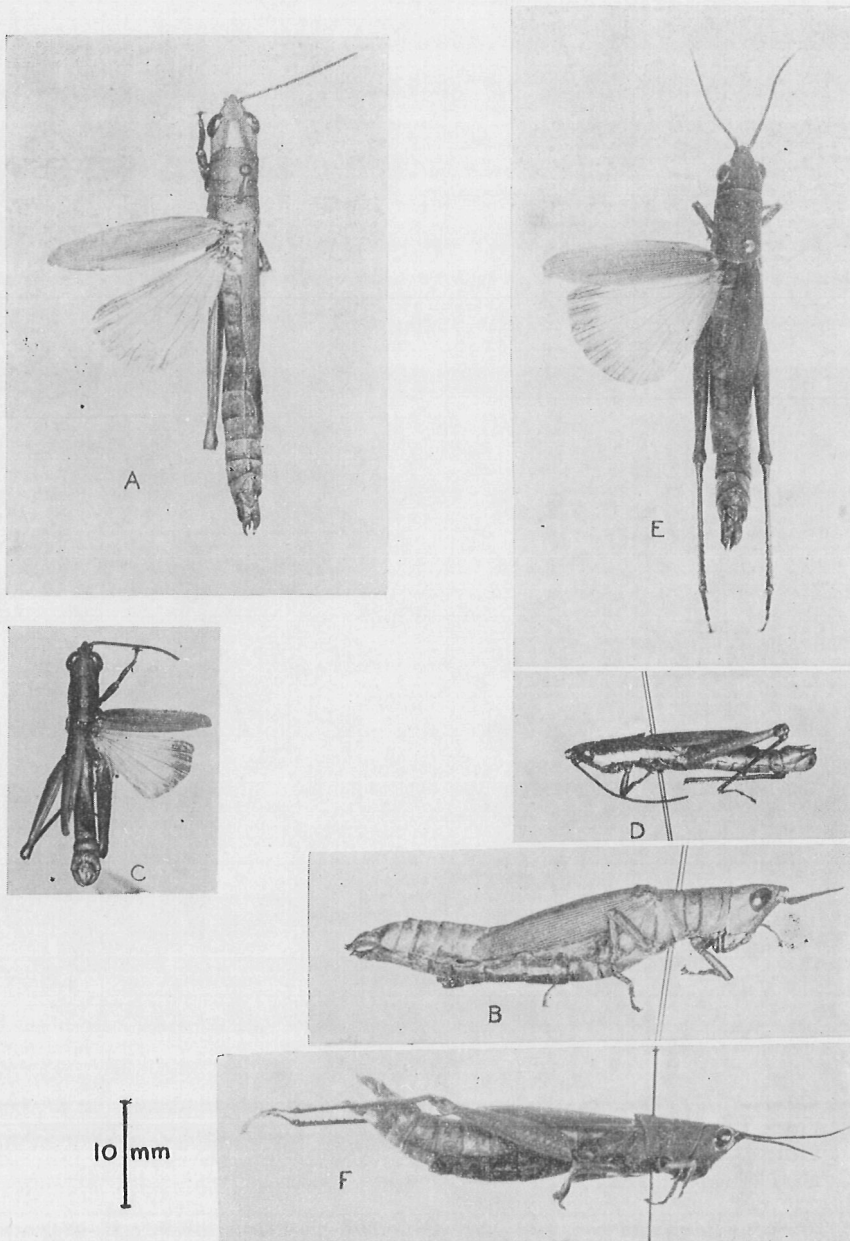


Fig. 18. *Mitricephaloides* spp. A, *M. rhodopterus* (Miller), ♀ (Malaya, Kuala Sleh, Kuala Lumpur), dorsal; B, *Id.*, lateral; C, *Id.*, ♂ recorded by Miller (1935) as *Verdulia dohrni* (see text), dorsal; D, *Id.*, lateral; E, *M. rubrosignatus* (Ramme), ♀ holotype, dorsal; F, *Id.*, lateral.

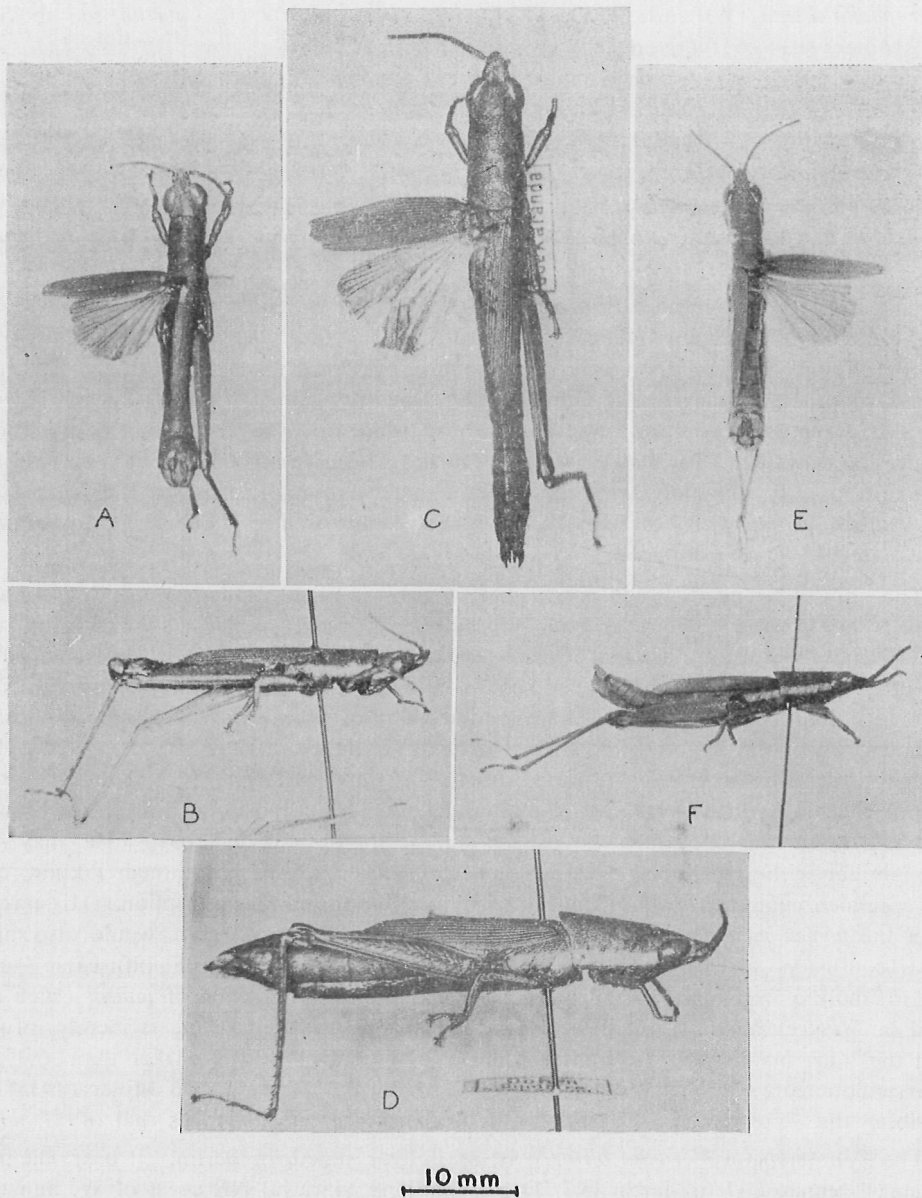


Fig. 19. *Mitricephala dohrni* (Bolívar), types. A, ♂ lectotype dorsal; B, *Id.*, lateral; C, ♀ paralectotype, dorsal; D, *Id.*, lateral; E, ♂ holotype of *Verdulia olivacea* Bolívar, dorsal; F, *Id.*, lateral.

suggests synonymy with Willemse's conception of *M. vittata*, but *vittata* not mentioned by name).—Sjöstedt, 1932: 32.—Ramme, 1941: 67 (suggests synonymy with *olivacea*). **New Synonymy.**

Mitricephala vittata: Willemse, 1930: 107 (as *vittata* only), 109–110 (*partim*, see above).—
Miller, 1934: 531 (refers to Willemse's material).

Mitricephala (*Verdulia*) *dohrni*: Ramme 1941: 67 (*partim*—Sumatra only).

Mitricephala (*Verdulia*) *olivacea*: Ramme, 1941: 67.

Mitricephala olivacea: Ramme, 1941: 68 (*olivacea* only), 68, fig. 32 (name in full) [σ^7 terminalia and cercus].

From the above synonymy have been omitted references to "*Verdulia Dohrni*" by Carl (1916: 466) and Miller (1935: 686 ff.) since the former concerns *Mitricephala javanica*, n. sp., and the latter, *Mitricephaloides rhodopterus* (Miller), *q. v.* *Verdulia olivacea* of Miller (*l. c.*: 689 ff.) is also omitted; the species involved is *Mitricephala milleri* Ramme, *q. v.*

Bolívar (1905) did not indicate specifically where the types of *Verdulia dohrni* were located (although he said they were given to him by Dohrn), nor how many specimens he had, nor data further than "Sumatra. Col. Dohrn" [*sic!*]. There appear, however, to be but 2 syntypes (σ^7 & ♀) and these are in Madrid. They bear the data "Dohrn, Sumatra, Soekaranda" [printed]. They have no determination label, but their measurements are as given by Bolívar (*l. c.*), except that the overall length of the ♀ is a little less. Both have the wings of the left side spread, those of the ♀ being slightly damaged. I designate the σ^7 as lectotype.

The only difference between *dohrni* and *olivacea* given by Bolívar in his key is that the former is said to have "alae rufae extus infuscatae", whereas the latter has "alae infumatae." His descriptions are not such that direct comparison between the two is easily made, and such other differences as there may appear to be are of a minor nature (or even misleading—e. g. Bolívar incorrectly stated that the hind tibiae of *olivacea* are not "griseo villosae"). A comparison of the lectotype of *dohrni* with the holotype of *olivacea* (see below) shows no significant difference even in the distinctive σ^7 terminalia (fig. 9). The alleged red color of the hind wings is lacking—the latter are, in fact, almost uniformly faint brownish olive and there thus appears to have been some error on Bolívar's part. He may have been familiar with red-winged material (e. g. of *Mitricephaloides*), although I know of no such specimen examined by him, and this may have confused his description. His puzzling use of the *nomen nudum*, *rufipennis* (Bolívar, 1909), in place of *olivacea*, would also suggest similar confusion (see below). Bolívar's expression "extus [or externe] infuscatae" might seem to imply a well-defined dark marginal band on the hind wing of *dohrni* (such as is found in *Mitricephaloides*), but in the types the apical part of the wing is merely infumated in the same manner as in *olivacea*, where it is (usually) a little darker than the disc. It was undoubtedly this misrepresentation of the wing color that misled Miller (1935) into describing the σ^7 of his own *Verdulia* [= *Mitricephaloides*] *rhodoptera* as that of *M. dohrni*.

The σ^7 holotype of *Verdulia olivacea* is, as Bolívar stated, in Berlin. It bears the printed data: "Sumatra, Deli, Martin G." [Deli=Tandjong Marawa, NE coast of W. Sumatra], but again no Bolívar determination label. This is presumably the so-called topotypic σ^7 referred by Ramme (1941) and of which he figured the terminalia. The specimen has the wings of the right side spread; its measurements agree with those given by Bolívar.

It is curious that Bolívar (1909) applied the *nomen nudum*, *rufipennis*, to *olivacea* (which, like *dohrni*, has no trace of red on the wings), but the page and locality references given and the fact that he also lists *dohrni*, make it quite clear that this was so and further suggests confusion in Bolívar's mind regarding wing color (see above).

The ♀ holotype of *Mitricephala obtusa* is in Stockholm. It bears the printed label "Sumatra, *Mjöberg*", but there is no mention of the more precise locality, Perdagangan, given by Willemse (1930), nor to the fact that it was found "creeping very slowly along the trunks of trees." It does, however, have a small red label "87/62", a red printed "Type" label, and Willemse's determination "*Mitricephala obtusa* nov. sp. ♀. Det. C. Willemse." The specimen has been figured by Willemse (*l. c.*). It is somewhat discolored and has the wings of the left side spread. Its measurements are as given in the original description. The tegmina are rather shorter and the fastigium verticis a little broader than usual, but there is nothing else distinctive about it. Willemse himself was hesitant to separate *obtusa* from what he erroneously believed to be Sumatra specimens of *M. vittata*. The synonymy of Bolívar's *Verdulia* species with *Mitricephala* was not appreciated at the time, and the ♀ of *olivacea* was not known, so that Willemse's reticence is understandable.

Mitricephala gracilis is represented in Stockholm by the ♀ holotype which bears the printed data, "Sumatra, Medan, *Mjöberg*" and a red numbered square and type label similar to those on *M. obtusa*, together with Willemse's determination, "*Mitricephala gracilis* nov. sp. ♀. Det. C. Willemse." It is a small, discolored specimen with a rather narrow fastigium verticis, but it is otherwise unremarkable. It has the wings of the left side spread and is figured by Willemse (1930). Its measurements are as given in the original description. It may be noted that the type locality is not far from that of *olivacea*.

Mitricephala dohrni is known only from Sumatra, but is now known from widely scattered localities. References to it or its synonym, *olivacea*, from outside Sumatra, refer to other species, as discussed elsewhere. In addition to the localities indicated by the various type specimens, I have seen the following material (all without a trace of red on the hind wings): 1 ♀, Sumatra, Eserell v. Studt; 1 ♀, W. Sumatra, Padang, Liman Manis b., 8. I. 1909, Schoede S. G. [resembling the type of *gracilis*, but larger]; 1 ♀, N. O. [coast of W.] Sumatra, Tandjong Marawa, Serdang, Dr. B. Hagen, [nr. type locality of *olivacea*]; 1 ♀, Westkust, Sumatra, Lubukikaping, 450 m, 1926, E. Jacobson [Last 2 have rather narrow tegmina and are recorded as *M. vittata* by Willemse (1930)].

***Mitricephala milleri* Ramme** Figs. 10, 13, 21 B-C.

Verdulia olivacea: Miller (*non* Bolívar), 1935: 689, fig. 2 a-e [♂, head, pronotum, terminalia, cercus, prosternal tubercle], pl. XIV, fig. 4 [♂]. [Ramme (1941: 68) incorrectly cites Miller as using the generic name *Mitricephala*].

Mitricephala milleri Ramme, 1941: 68 [Ramme indicates that his fig. 32 illustrates this species, but the fig. itself is correctly titled "*Mitricephala olivacea*".]

Ramme (1941) compared a "topotypic" (actually the holotype) ♂ of *olivacea* with Miller's figures and concluded, without seeing the latter's specimen, that it belonged to a new species which he called *milleri*. An examination of Miller's specimen in the British Museum (Nat. Hist.) enables me to concur with Ramme's opinion. The ♂ terminalia distinguish the 2 species (*cf.* Miller and Ramme, *ll. cc.* and figs. 9, 10).

Since Miller had but 1 specimen, this is automatically the holotype of *Mitricephala milleri* and it has now been so labelled. It bears the data, "MALAYA, Kuala Lumpur, Bukit Cheraakah F[orest] R[eserve], April 21, 1932, H. M. Pendlebury", a number "682" [on green], a label "Pres. by Imp. Inst. Ent. B. M. 1936-17" and the determination, "*Mitricephala olivacea* I. Bol. Det. B. Uvarov 1933." It may be noted that the data are

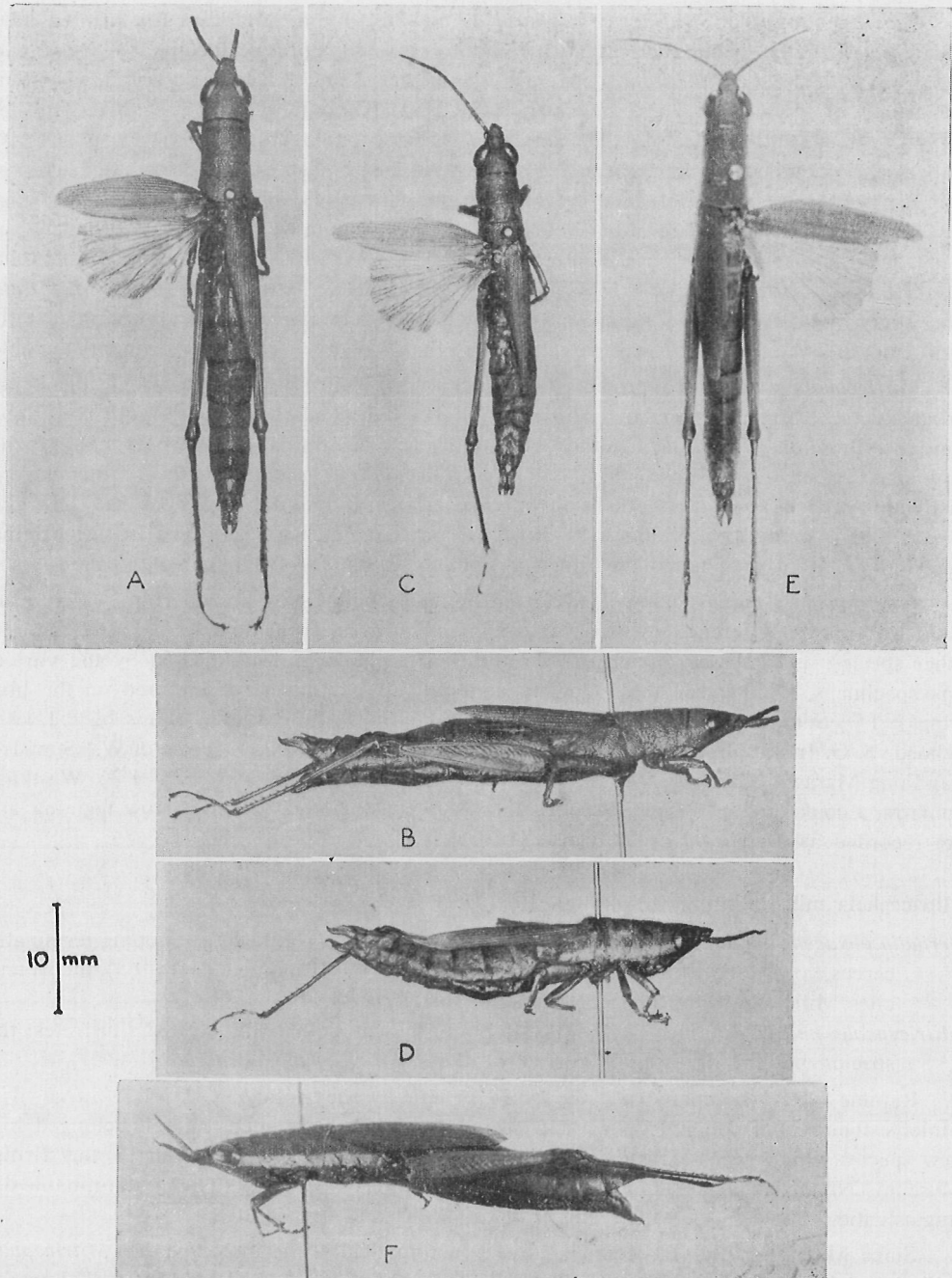


Fig. 20. *Mitricephala dohrni* (Bolívar), types of synonymous species, etc. A, ♀ holotype of *M. obtusa* Willemse, dorsal; B, *Id.*, lateral; C, ♀ holotype of *M. gracilis* Willemse, dorsal; D, *Id.*, lateral; E, *M. dohrni* ♀ from "Sumatra" (form which has been called ♀ of *Verdulia olivacea* Bolívar), dorsal; F, *Id.*, lateral.

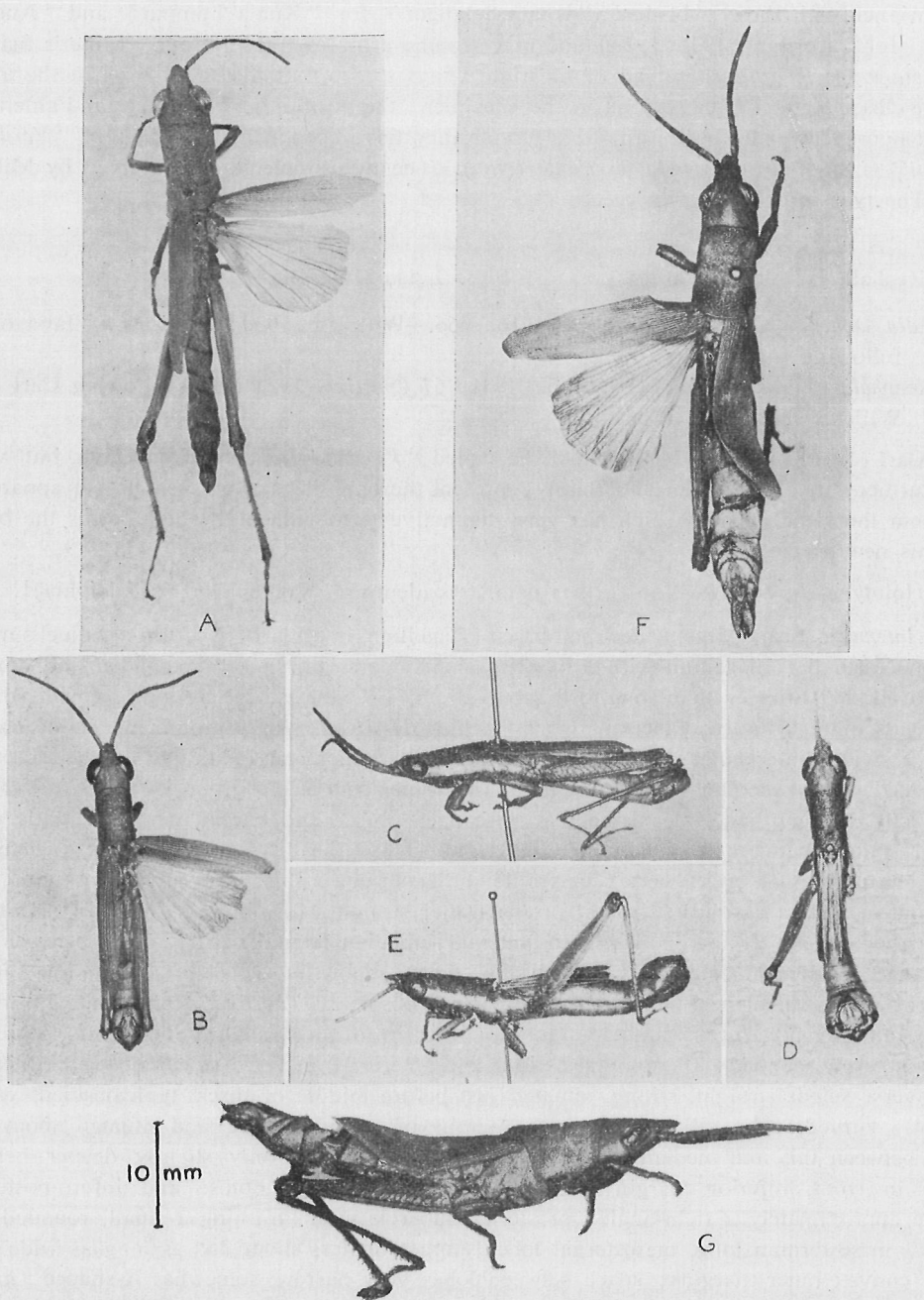


Fig. 21. *Mitricephala* spp., types. A, *M. vittata* Bolívar, ♀ holotype, dorsal [Photo: the late C. J. M. Willemse]; B, *M. milleri* Ramme, ♂ holotype, recorded by Miller (1935) as *Verdulia olivacea* (see text), dorsal; C, *Id.*, lateral; D, *M. javanica*, n. sp., ♂ holotype dorsal; E, *Id.*, lateral; F, *Id.*, ♀ allotype, dorsal; G, *Id.*, lateral.

at variance with those published ("Kuala Selangor" for "Kuala Lumpur" and "August 1921" for "April 21, 1932"], but one may assume error in transcription. Miller's figures also show the left wings instead of the right wings spread, but the small twist at the apex of the closed tegmen is exactly as in the specimen; the positioning of the legs and antennae in the figures have also been formalized just as they have been in his drawings of "*Verdulia dohrni*" (i. e. ♂ *Mitricephaloides rhodopterus*). The measurements are as given by Miller.

The type is unique.

Mitricephala javanica Kevan, n. sp. Figs. 3, 11, 21 D-G.

Verdulia Dohrni: Carl (non Bolívar), 1916: 466.—Willemse, 1930: 91 (*partim*—Java only, following Carl).

Mitricephala (Verdulia) dohrni: Ramme, 1941: 67 (*partim*—Java only—following Carl and Willemse).

Carl (1916) recorded 2♀♀, which he called "*Verdulia Dohrni*", from Java, but without further data. These almost certainly represent the opposite sex of a single ♂, apparently from the same island, which has very distinctive terminalia and which forms the basis of this new species.

Holotype ♂, ? JAVA [no further data. (Academy of Nat. Sci. of Philadelphia)].

Antenna: Scape large, wider than base of flagellum, irregularly pyriform; pedicel similar but much smaller; flagellum with 4 basal segments depressed, slightly expanded and dorsally ridged, 1-2 broader than long, 3rd subquadrate, 4-7 at least 2× as long as wide, distal segments more cylindrical (terminal ones lacking). **Head**: Eyes prominent, about 2× as long as wide; interocular space about 2/3 the shortest diameter of an eye and about equal to dorsal width; median ocellus absent (as in all members of this group); fastigium verticis distinctly longer than wide, triangular with apex obtuse and lateral margins slightly concave; sulcus between foveolae extending to about 1/2 the distance from apex to level of anterior margins of eyes; vertex in profile rather straight, surface evenly rugoso-punctate, without a median carinula; frontal profile rather straight, forming an angle of about 30° with the vertex; frons finely rugoso-punctate; median frontal carina strong between the antennae obsolescent below this and obsolete from about the level of the middle of the eyes as far as the clypeus; lateral frontal carinae obsolete. **Thorax**: Pronotum cylindrical, finely and evenly rugoso-punctate; anterior margin of disc slightly biarcuate, posterior margin gently rounded; all pronotal carinae and anterior transverse sulcus obsolete; median transverse sulcus straight, strong, situated just before middle of disc; typical sulcus weak, slightly curved, subparallel to posterior margin of pronotal disc and situated about 1/2 way between this and median sulcus; lateral pronotal lobe only slightly deeper behind than in front, inferior margin straight, infero-anterior angle obtuse and infero-posterior angle approximately a right-angle; prosternal tubercle weak, forming a small, rounded papilla; mesosternum long, mesosternal lobes subrectangular, about 2× as long as wide and with convex inner margins; space between lobes very narrow, somewhat X-shaped; metasternum elongate; metasternal pits forming a V-shaped depression; metasternal lobes almost touching, the space between apices triangular. **Legs**: Four anterior legs with femora very slightly incrassate; hind femora rather slender, smooth and somewhat flattened, about 5× as long as wide; posterior tibiae rather shorter than femora; tarsi with segment 3 longer

than other 2 together. *Wings*: (Tegmina lacking but presumably abbreviate and not extending beyond 2/3 of length of abdomen); hind wings a little more than 1/2 as long as abdomen. *Abdomen*: Cylindrical or deeper than wide, parallel-sided as far as segment 8; segment 9 considerably wider behind than in front; segment X much expanded, depressed and deeply and elaborately emarginate (fig. 11a); epiproct tongue-like with a median carinula and a transverse groove towards the acute apex (fig. 11a); cerci broad at base and strongly and sinuously curved inwards towards their truncated apices (fig. 11 a, b); subgenital plate broad and deep, broadly rounded and terminating in a short spout-like process (fig. 11 a, b); epiphallus as in fig. 3. *Coloration*: The specimen seems to have been alcohol-preserved and is of a general testaceous color, darker above, but in life it was probably olive-green; eyes brown, mottled darker; a wide, pale band extending from behind the eye across the cheeks, along the lower part of the lateral pronotal lobe and across the pleura as far as the base of the hind femur; hind knees, hind tarsi and the posterior margins of terga IX and X and of the subgenital plate, as well as the extreme apices of the cerci, dark brown; hind wings infumated [if colored in life this is no longer visible], apical 2/5 darker. Length of body 31, head 4.9, pronotum 5.6, hind wing 10.4, hind femur 13.0, hind tibia 12.2 mm.

Allotype: ♀, "JAVA, 601/39" [also bears Carl's determination label: "Verdulia dohrni Bol." (Museum d'Histoire Naturelle, Genève)].

Agrees generally with the above description of the holotype but larger and more robust. It differs principally as follows: antennae distinctly ensiform, base of flagellum wider than scape, at least 6 flagellar segments distinctly depressed and expanded, segment 1 about as long as broad, 2 very transverse, 4-10 alternative subquadrate and elongate (less than 2× as long as wide), 11 subquadrate, remainder more or less fused into a single article about 5× as long as wide; eyes rather less prominent, scarcely 2× as long as wide; interocular space about as great as the shortest diameter of an eye and greater than dorsal width; fastigium of vertex only slightly longer than wide, sulcus between foveolae not 1/2 as long as fastigium; vertex very slightly convex in profile and with a faint median carinula; frontal profile forming an angle of about 43° with vertex; 4 anterior femora not incrassate; tegmina reaching to about 2/3 of length of hind femora; terminal abdominal segments not strongly modified; epiproct triangular about as wide as long and with slightly convex margins; cerci short, conical, not quite reaching apex of epiproct. Ovipositor valves rather elongate, sinuous, with strong, curved apical hooks, dorsal valves slightly crenulated above. *Coloration*: Alcohol-preserved, almost completely discolored, brownish testaceous, but general pattern, including lateral stripe indicated as in holotype; inner face of hind femur and apical 1/2 of hind tibiae dark; antennae with segment 8 to apex paler than the rest. Length of body 46², antennae 14, head 7.0, pronotum 8.8, tegmen 20.5, hind wing 16, hind femur 19, hind tibia 17 mm.

Paratype: ♀, same data as allotype, but with extra label "X 6."

Very similar to allotype, but slightly smaller; not differing in any significant detail but having the antennal segments beyond the 4th of more even length (all slightly longer than wide) and the median transverse sulcus of the pronotal disc rather less distinct. Length

2. Original length was probably about 48.5 mm, but the abdomen has been broken and subsequently repaired and now lacks segment VI.

of body 48, head 6.2, pronotum 8.5, tegmen 18.5, hind wing 14 mm. [hind legs lacking].

This new species is known only from Java. It differs from other species in its larger size, subensiform (♂) or ensiform (♀) antennae, and in the ♂ terminalia. It seems to be closest to *M. dohrni*.

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EXCHANGE OF TYPE SPECIMENS AND OTHER MATERIAL

An exchange of holotypes and other material has been undertaken between the Commonwealth Scientific and Industrial Research Organization, Canberra, and Bishop Museum. The purpose of this exchange is to concentrate type specimens of Australian insects in Australia and of Pacific island insects in Hawaii; to improve representation of the Australian insect fauna in the Bishop Museum by the addition of named series from Australia; and to augment representation of New Guinea species at both institutions. Following is a list of type transfers to date: