

## The Lasiocampid Moths of the Genus *Trabala* (Lepidoptera) from the Philippines<sup>1)</sup>

By

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**Abstract** The lasiocampid moths belonging to the genus *Trabala* WALKER, 1856, of the Philippines are enumerated. Six nominal taxa have hitherto been described from the Philippine Islands; two of them, *T. sudara* ROEPKE and *T. mahadeva* ROEPKE, are synonymized with *T. durga* ROEPKE. In addition to these, a new species, *T. veni*, is described from Palawan, and *T. irrorata* MOORE is recorded for the first time from Mindanao. All the males, known females and male genitalia are described and illustrated.

The genus *Trabala* was proposed by WALKER (1856) as the replacement name of *Amydona* WALKER, 1855, which was preoccupied by a limacoid genus described by the same author (WALKER, 1854). This genus is distributed in the Old World tropics. Although most of lasiocampid moths are cryptic to dead leaves having dark brown or fuscous grey wings, males of *Trabala* exhibit a fine apple green coloration and the females, markedly larger than the males, also have green or yellowish wings.

Asian species of *Trabala* were extensively studied by ROEPKE (1951). Though only five species had been known from India to Taiwan northwards and to New Guinea eastwards before the publication of his paper, ROEPKE described fifteen species from the Philippine Islands and the Malay Archipelago.

In July to September 1985, the National Science Museum, Tokyo, made a zoogeographic expedition to the Philippines in cooperation with the National Museum of the Philippines, Manila. This expedition consisted of three parties, ornithological, crustacean and entomological. One of us (OWADA) participated in the entomological party which covered mountainous areas of northern Luzon, southern Mindanao, and northern and central Palawan. In all the areas, he was able to collect many *Trabala* specimens which were later classified into six species.

SEMPER (1896–1902) recorded *T. vishnu* [sic] (LEFÉBVRE, 1827) from Mondoro and

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Mindanao. Judging from the data of ROEPKE (1951) and ours, however, it can be safely concluded that the true *vishnou* is not distributed in the Philippine Islands. ROEPKE (1951) described six species from these islands, *T. subadra* from Luzon, *T. mahatma*, *T. rama*, *T. sudara*, *T. durga* and *T. mahadeva* from Mindanao. However, it became apparent by close examination of our material and the original descriptions and figures, that the last three should be considered synonymous. Fortunately, OWADA was able to collect all the known species and to add two more species, one of which was *T. irrorata* MOORE, 1884, from Mindanao and the other a new species from Palawan. In this paper, we will describe the new species and give brief descriptions of the known species with notes on their relationship.

As was already shown by ROEPKE (1951) and HOLLOWAY (1979, 1982), the male genitalia of Asian *Trabala*-species are quite homogeneous. ROEPKE stressed the importance of "uncus" (=caudal margin of tegumen), stating that "from a taxonomic point of view, only the dorsal part, uncus, unc, is of importance; the other parts are less typical and show little or no marked differences." To the present authors, however, such organs as tegumen, valva and aedeagus seem equally important not only for differentiating species but also for analyzing their relationship.

For comparison with ROEPKE's figures and descriptions, the following preparations of male genitalia are adopted: tegumen is separated from vinculum and depressed; the other portions are set in ordinary shape.

### *Trabala subadra* ROEPKE

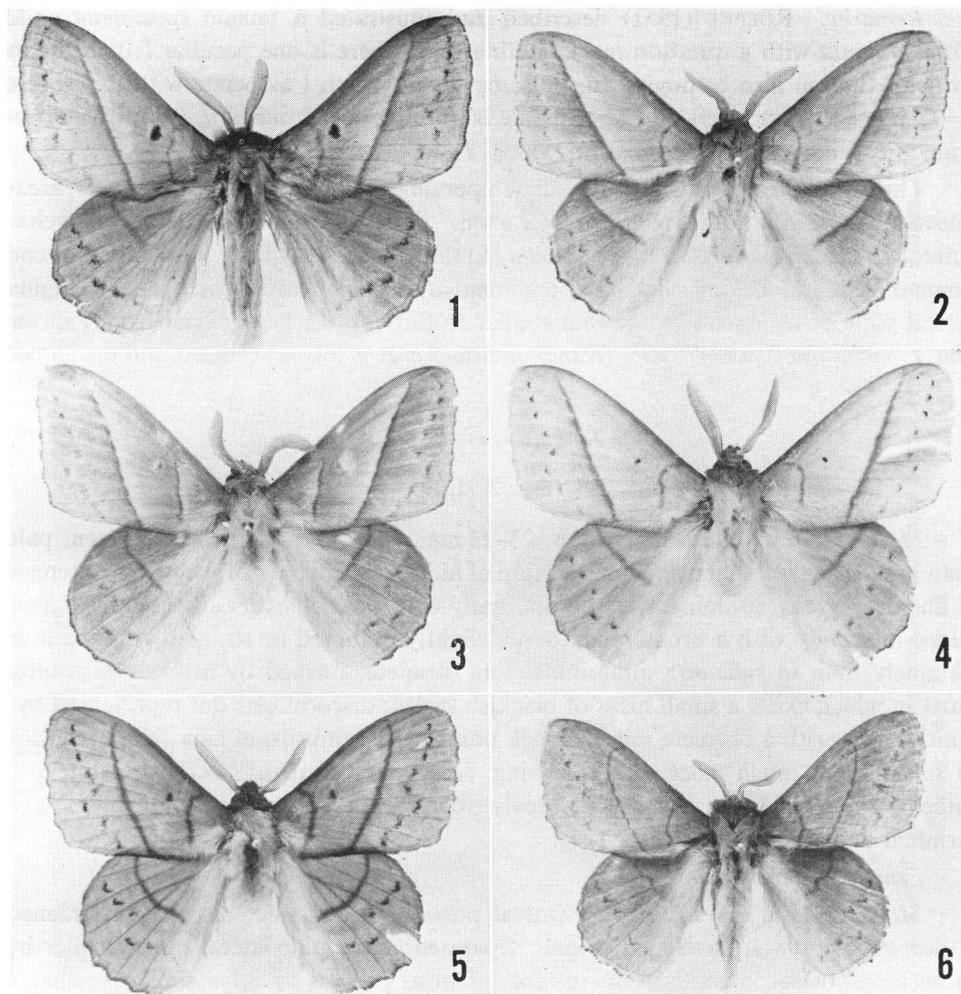
(Figs. 1, 7, 8, 11, 18)

*Trabala subadra* ROEPKE, 1951, Meded. LandbHoogeschool Wageningen, **50**: 125, pl. 4, fig. 7, pl. 8, fig. 6. *Trabala hantu*: ROEPKE, 1951, *ibid.*, **50**: 123, pl. 5, fig. 2, misidentification.

*Male* (Fig. 1). Forewing length: 24–29 mm. Ground colour apple green, deep in thorax, whitish in abdomen and anal portion of hindwing. In forewing, antemedial line deep green, obsolete, excurved; postmedial line deep green, tinged slightly with orange, rather broad, edged internally with white, almost straight, slightly sinuate in some specimens, arising from near apex; subterminal line formed by a series of blackish dots between veins; discocellular mark blackish brown, markedly large; costa and tips of cilia dark brown. In hindwing, postmedial line rather short, subterminal line and cilia same as in forewing.

*Female* (Figs. 7, 8). Forewing length: 33–35 mm. Ground colour dark yellowish green (Fig. 7), or greenish dark brown (Fig. 8). Wing maculation similar to that of male, but much more dull.

*Male genitalia* (Figs. 11, 18). Tegumen moderate in shape; uncus composed of a pair of gentle swellings, not well sclerotized; latero-caudal portion slightly sclerotized except for the centre, forming a triangular plate. Dorsal process of valva rather short and stout; ventral lobe of valva rather short and broad, scattered with minute spines



Figs. 1-6. Males of *Trabala*. 1: *T. subadra* ROEPKE. 2: *T. veni* sp. nov., holotype. 3: *T. mahatma* ROEPKE. 4: *T. irrorata* MOORE. 5: *T. dura* ROEPKE. 6: *T. rama* ROEPKE.

in rounded apical portion. Aedeagus thick in basal portion, apical portion slender, smoothly curved, with a blunt apex.

*Material examined.* Luzon:—Sayangan 2,300 m, Benguet Prov., 1 ♂, 10. VII. 1985 (M. OWADA); Sant Tomas, Baguio, 1 ♂, V. 1985; Mt. Data 2,250 m, Mountain Prov., 4 ♂, 30. V. 1977 (Y. KUROSAWA), 11 ♂, 7-9. VI. 1977 (Y. KUROSAWA), 13 ♂ 2 ♀, 12-14. VII. 1985 (M. OWADA), 4 ♂, 24-26. VII. 1985 (M. OWADA); Mt. Puguis 1,900 m, Mountain Prov., 2 ♂, 5-6. VI. 1977 (Y. KUROSAWA), 1 ♂, 18. VII. 1985 (M. OWADA); Barlig 1,550 m, Mountain Prov., 17, 19. VII. 1985 (M. OWADA).

*Distribution.* Luzon (Baguio, Benguet, Mountain Prov.).

*Remarks.* ROEPKE (1951) described and illustrated a female specimens under *Trabala hantu* with a question mark, stating that "there is one peculiar female in the British Museum also belonging to the same series, which I associate with this species [= *T. hantu* ROEPKE, 1951]." This female is nothing but *T. subadra*, probably derived from the Wileman Collection from which *T. subadra* was described.

This species is confined in warm temperate forests of the mountainous areas, above 1,500 m in altitude, of northern Luzon. Judging from the male genitalic characters, *T. subadra* is related to *T. vishnou* (LEFÉBVRE, 1827), widely distributed in continental Asia, in having moderate tegumen and similar aedeagus. The triangular lateral plate of tegumen is somewhat similar to those in the new species from Palawan and *T. mahatma* ROEPKE, 1951, from Mindanao, but is less sclerotized and developed.

***Trabala veni* sp. nov.**

(Figs. 2, 12, 19)

*Male* (Fig. 2). Forewing length: 23–23 mm. Ground colour apple green, paler than in *subadra*; abdomen and anal portion of hindwing whitish. In forewing, antemedial line deep green, prominent, edged internally with white; postmedial line deep green, edged internally with a broad white band, slightly excurved or straight, running more obliquely than in *subadra*; subterminal line obsolete, formed by a series of whitish parts in which exists a small mass of blackish scales; discocellular dot represented by a whitish spot with a obsolete minute black point; costa and tips of cilia similar to those in *subadra* but much paler. In hindwing, inner area whitish; postmedial line prominent, almost straight, running markedly oblique, curved inwards below costa; subterminal line and cilia as in forewing.

*Female.* Unknown.

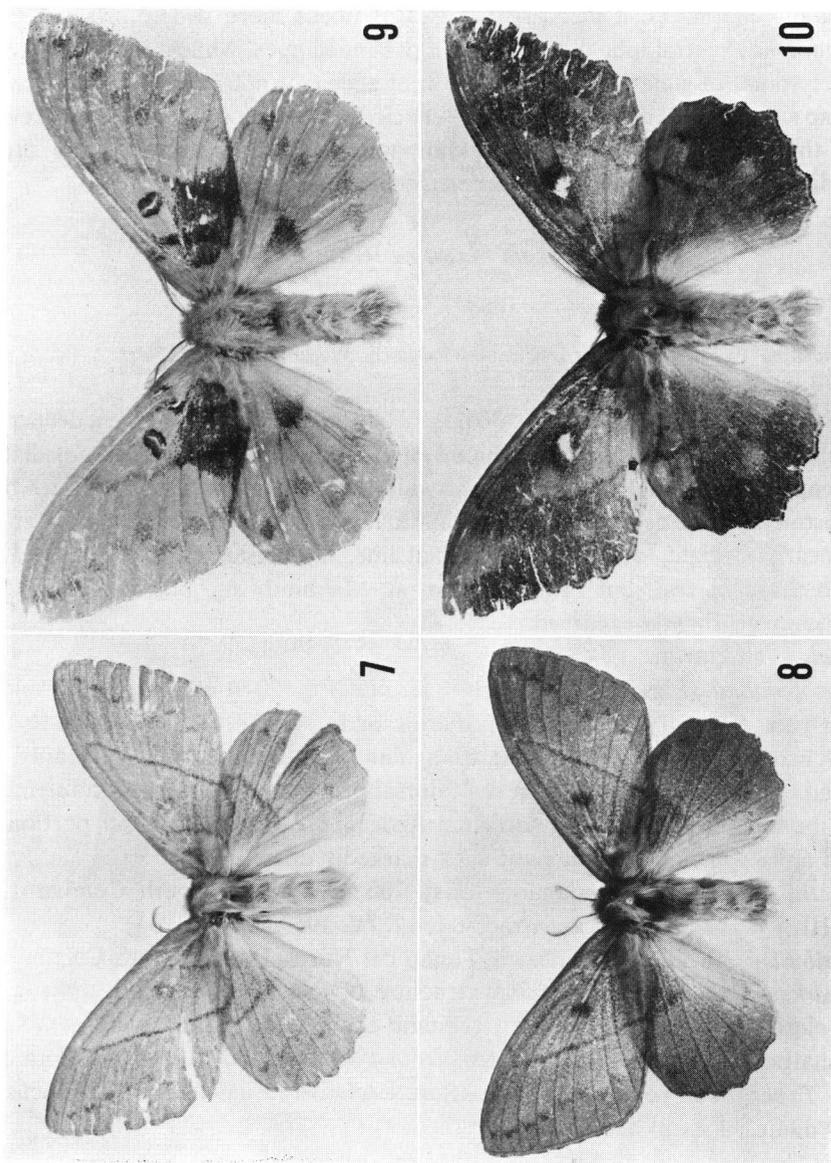
*Male genitalia* (Figs. 12, 19). Dorsal portion of tegumen markedly broadened; a pair of uncus well developed, widely separated; triangular lateral plate smaller but more heavily sclerotized than in *subadra*. Dorsal process of valva similar to that in *subadra*, though slenderer; ventral lobe of valva longer. Aedeagus slightly larger than that in *subadra*, apical portion somewhat dilated.

*Type series.* Holotype ♂, labeled "Philippines, North Palawan, Matalangao 150 m, 28–30. VII. 1985, M. OWADA/Genitalia Slide No. NSMT 4003 ♂." Paratypes: 2 ♂, same data as holotype.

The holotype and a paratype are preserved in the National Science Museum (Nat. Hist.), Tokyo, and a paratype will be donated to the National Museum of the Philippines, Manila.

*Distribution.* North Palawan.

*Remarks.* Judging from the external and genitalic characters, this species is closely related to *T. ganessa* ROEPKE, 1951, distributed in Malaya, Sumatra, Java and Borneo, but can be distinguished from it by the following characters:



Figs. 7-10. Females of *Trabala*. 7: *T. subadra* ROEPKE, pale form. 8: *T. subadra* ROEPKE, dark form. 9: *T. diuga* ROEPKE. 10: *T. rama* ROEPKE.

In wing maculation, postmedial line of hindwing curved below costa, while it is straight in *ganesha*; discocellular mark obsolete, not so prominent as in *ganesha*. In male genitalic characters, a pair of processes of uncus more widely separated than those in *ganesha*; ventral lobe of valva with a prounged apex, while it is heavily toothed with short spines in *ganesha*; caudal portion of aedeagus not so dilated as in *ganesha*.

The specific name is dedicated to Mr. Venacio U. SAMARITA ('Ven' is an abbreviated name) of the National Museum of the Philippines, Manila, without whose support our expedition could not have been completed successfully.

*Trabala mahatma* ROEPKE

(Figs. 3, 13, 20)

*Trabala mahatma* ROEPKE, 1951, Meded. LandbHoogesch. Wageningen, **50**: 124, pl. 4, fig. 8, pl. 14, figs. 1-3, 13.

*Male* (Fig. 3). Forewing length: 30 mm. Ground colour apple green, deeper than in *veni*; abdomen and anal portion of hindwing whitish. In forewing, antemedial line deep green, edged internally with a broad white band, straight, right angulate below costa; postmedial line deep green, edged internally with a white band narrower than in *veni*, nearly straight, oblique; subterminal line, discocellular dot, costa and cilia similar to those in *veni*, but rather prominent. In hindwing, postmedial line deep green, prominent, slightly excurved.

*Female*. Unknown.

*Male genitalia* (Figs. 13, 20). Eighth tergite (Fig. 20 b) exceedingly developed, bearing a pair of long processes on posterior margin. Dorsal portion of tegumen markedly broadened; uncus vestigial; triangular lateral plate well developed and sclerotized. Valva similar to that in *veni*; dorsal process a little shorter and slenderer; ventral lobe longer, with smooth surface. Aedeagus slenderer in basal portion and thicker in apical portion than in *veni*; apex markedly dilated.

*Material examined*. Mindanao:—Gasy 700 m, Maitum, South Cotabato, 1 ♂, 12-13. VIII. 1985 (M. OWADA); Davao, 1 ♂, 12. IV. 1969 (M. OWADA).

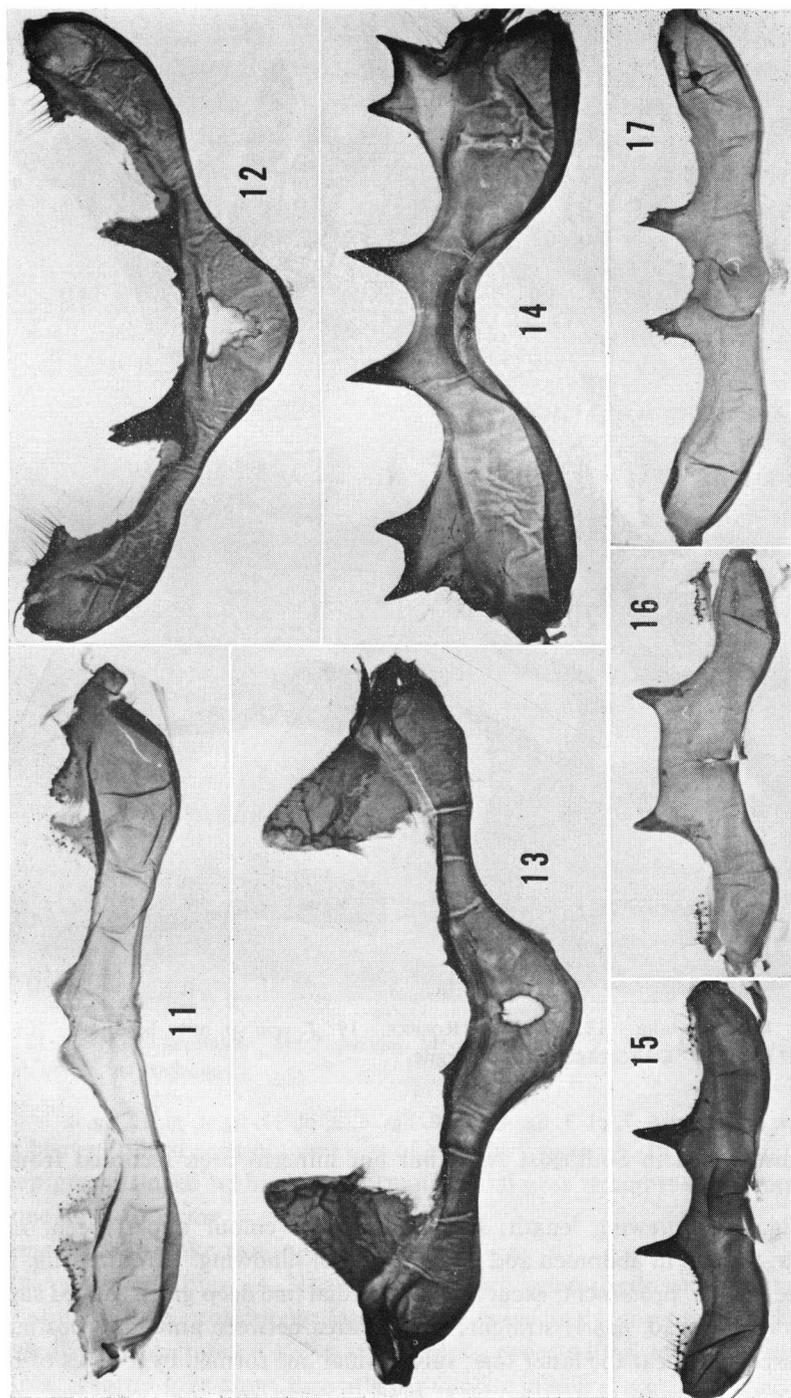
*Distribution*. Mindanao (Surigao, Lanao del Norte, Davao, South Cotabato).

*Remarks*. Excepting the peculiar structure of the male 8th tergite, this species shows a close affinity in external and genitalic characters to *T. shiva* ROEPKE, 1951, from Sumatra, Java and Borneo, *T. veni* from Palawan, and *T. ganesha* from Java. Of these, *T. shiva* can be considered the closest relative in having reduced uncus and markedly dilated apex of aedeagus.

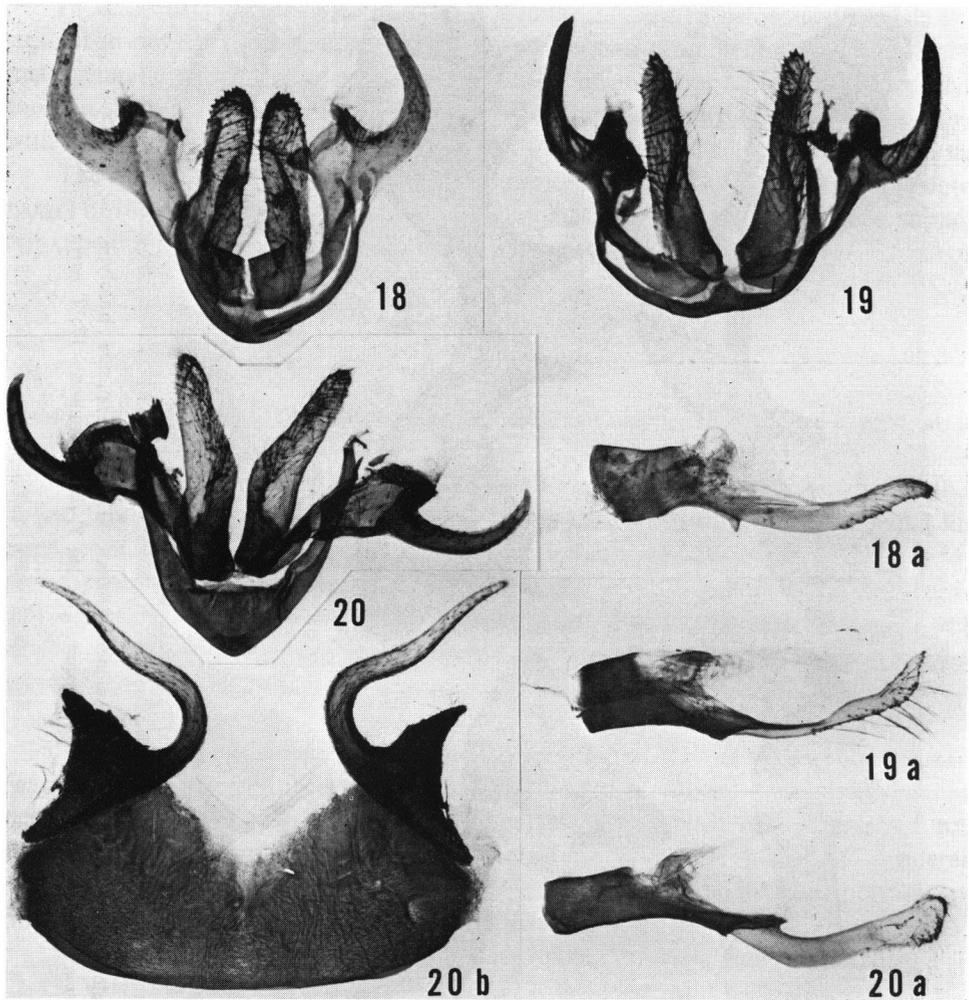
*Trabala irrorata* MOORE

(Figs. 4, 14, 21)

*Trabala irrorata* MOORE, 1884, Trans. ent. Soc. Lond., **1884**: 375; TAMS, 1935, Mem. Mus. r. Hist. nat. Belg., (hors s.), **4** (12): 44, pl. 4, fig. 2; ROEPKE, 1951, Meded. LandbHoogesch. Wageningen,



Figs. 11-17. Male genitalia, tegumen. 11: *T. subadra* ROEPKE. 12: *T. veni* sp. nov., holotype.  
 13: *T. mahatma* ROEPKE. 14: *T. irrorata* MOORE. 15, 16: *T. diturga* ROEPKE. 17: *T. rama*  
 ROEPKE.

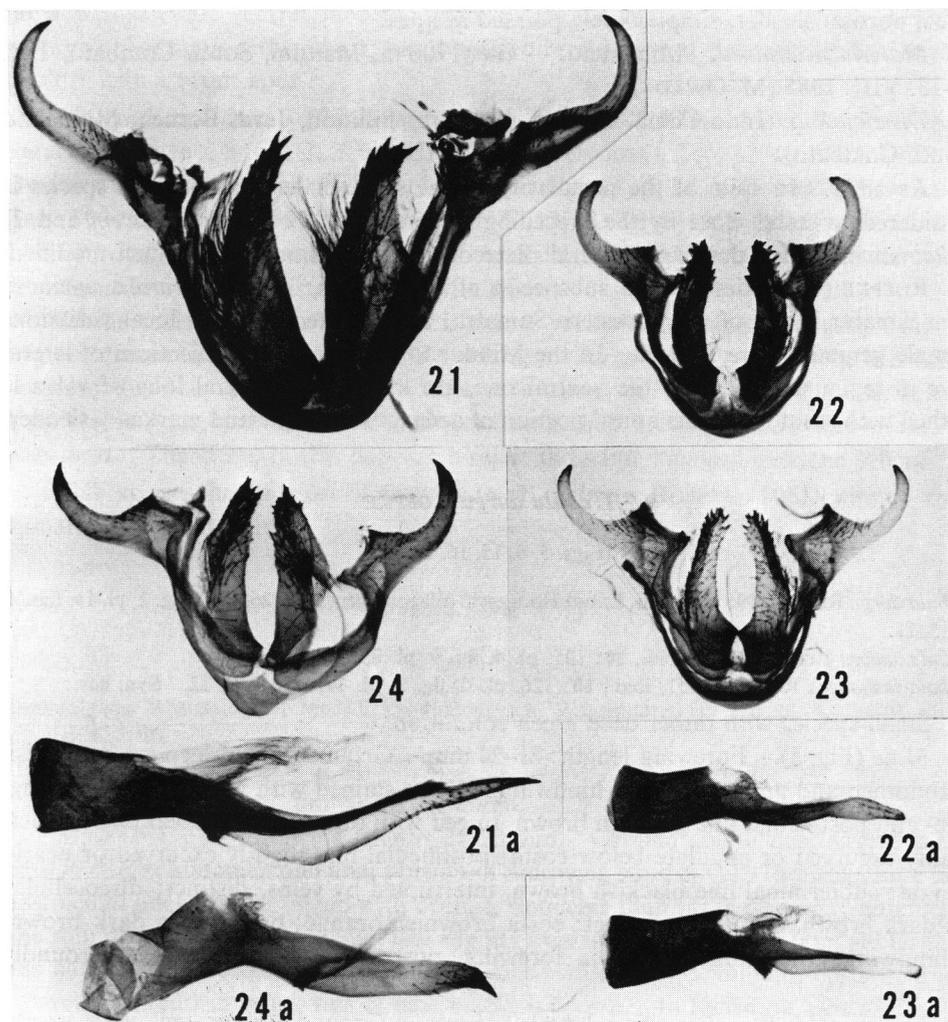


Figs. 18–20. Male genitalia. 18: *T. subadra* ROEPKE. 19: *T. veni* sp. nov., holotype. 20: *T. mahatma* ROEPKE. a: Aedeagus; b: 8th tergite.

50: 114–116, pl. 1, figs. 6, 7, pl. 3, fig. 4, pl. 10, figs. 1, 2, pl. 11, fig. 4, pl. 12, fig. 4.

Widely distributed in Southeast Asia, but not hitherto been recorded from the Philippines.

*Male* (Fig. 4). Forewing length: 31 mm. Ground colour apple green, rather deep in thorax, whitish in abdomen and anal portion of hindwing. In forewing, ante-medial line deep green, prominent, excurved; postmedial line deep green, tinged slightly with orange, rather broad, nearly straight; median area between ante- and postmedial lines whitish especially near the latter line; subterminal line formed by a series of black dots which are smaller and more prominent than those in *veni* and *mahatma*; costal



Figs. 21-24. Male genitalia. 21: *T. irrorata* MOORE. 22, 23: *T. durga* ROEPKE. 24: *T. rama* ROEPKE. a: Aedeagus.

margin brown, tinged with orange; tips of cilia dark brown. In hindwing, postmedial line deep green, tinged with orange, prominent, almost straight; subterminal line and cilia same as in forewing.

*Female.* Still unknown in the Philippines.

*Male genitalia* (Figs. 14, 21). Tegumen well sclerotized; uncus consisting of a pair of stout simple projections; lateral plate exceedingly developed and sclerotized, with two distal projections. Valva stout; dorsal process long, markedly curved, pointed at apex; ventral lobe stout, strongly denticulate in apical portion. Aedeagus stout,

apical portion slender, simple, finely pointed at apex.

*Material examined.* Mindanao: — Gasy 700 m, Maitum, South Cotabato, 1 ♂, 12–13. VIII. 1985 (M. OWADA).

*Distribution.* Indo-China, Malaya, Sumatra, Billition, Java, Borneo, Mindanao (South Cotabato).

*Remarks.* In spite of the peculiarity of the stout male genitalia, this species is considered to stand close by the preceding three species, *T. subadra*, *T. veni* and *T. mahatma*, in having developed lateral plate of tegumen, though it is much modified.

ROEPKE (1951) described a subspecies of this species, *Trabala irrorata simalura*, from Simalur Island off northwestern Sumatra, and pointed out that local variations of male genitalia were present. In the Mindanao specimen, the projections of lateral plate in tegumen, especially the ventral one, are longer; the ventral lobe of valva is clothed with stout teeth; the apical portion of aedeagus is simple and markedly slender.

### *Trabala durga* ROEPKE

(Figs. 5, 8, 15, 16, 22, 23)

*Trabala durga* ROEPKE, 1951, Meded. LandbHoogesch. Wageningen, **50**: 126, pl. 4, fig. 2, pl. 14, figs. 4, 5, 11.

*Trabala sudara* ROEPKE, 1951, *ibid.*, **50**: 125, pl. 4, fig. 9, pl. 8, fig. 5. *Syn. nov.*

*Trabala mahadeva* ROEPKE, 1951, *ibid.*, **50**: 126, pl. 4, fig. 3, pl. 14, figs. 7, 9, 12. *Syn. nov.*

Small species with rather deep green coloration.

*Male* (Fig. 5). Forewing length: 21–24 mm. Ground colour deep green, whitish in abdomen and anal portion of hindwing. Veins stained with brown. In forewing, ante- and postmedial line greenish brown, tinged with orange; antemedial line distinct, weakly excurved or angulate below costa; postmedial line slightly excurved or nearly straight; subterminal line blackish brown, interrupted by veins, distinct; discocellular dot dark brown, small but distinct; costa brownish orange; tips of cilia dark brown. In hindwing, coloration same as in forewing, postmedial line rather long, roundly excurved.

*Female* (Fig. 8). Forewing length: 45 mm. Ground colour yellowish green, basal portion of wings yellow. In forewing, antemedial line black, broad, angulate below costa and slightly excurved; postmedial line bluish green, broad but obsolete, angulate below costa and then nearly straight, running closer to base; subterminal line formed by a series of bluish dots between veins; discocellular mark large, reniform, bluish grey tinged with black, with a transparent line in the middle; subdorsal patch brown, large, cilia tipped with brown. In hindwing, postmedial line obsolete, running close to base, only traceable in anal portion where it is edged internally with a dark brown patch; subterminal line and cilia as in forewing.

*Male genitalia* (Figs. 15, 16, 22, 23). Small in size. Tegumen moderate, uncus consisting of a pair of simple sclerotized projections which are rather variable in length and shape as shown in Figs. 15 and 16; lateral plate not developed. Dorsal process of

valva well curved; ventral lobe moderate in length, markedly denticulate in apical portion. Aedeagus rather short; basal portion broad; apical portion slender, slightly sinuate, with a brunt apex.

*Material examined.* Mindanao:— Mt. Talomo 1,100 m, Apo Range, Upper Baracatan, Davao, 8 ♂ 1 ♀, 3–6. VIII. 1985 (M. OWADA), 2 ♂, 17–19. VIII. 1985 (M. OWADA); Motoklot 650 m, Maitum, South Cotabato, 1 ♂, 11. VIII. 1985 (M. OWADA); Gasy 700 m, Maitum, South Cotabato, 1 ♂, 12–13. VIII. 1985 (M. OWADA).

*Distribution.* Mindanao (Surigao, Lanao del Norte, Davao, South Cotabato).

*Remarks.* Widely distributed in Mindanao.

Of the male genitalia, the uncus is rather variable in shape. Judging from the original descriptions and figures of *T. sudara*, *T. durga* and *T. mahadeva*, it is safely surmised that they are conspecific. ROEPKE's names of *Trabara*-species are derived from Hindu gods, and are sometimes confusing, like *subadra-sudara* and *mahatma-mahadeva*. Therefore, in this paper, we select the name "*durga*" over the others.

This species has a close affinity with *T. krishna* ROEPKE, 1951, known from Sumatra, Java and Borneo.

### *Trabala rama* ROEPKE

(Figs. 6, 9, 17, 24)

*Trabala rama* ROEPKE, 1951, Meded. LandbHooges. Wageningen, 50: 126, pl. 4, fig. 10, pl. 14, figs. 6, 8, 10.

*Trabala* sp.: ROEPKE, 1951, *ibid.*, 50: 127, pl. 5, fig. 3.

Small species, very similar to *T. durga*.

*Male* (Fig. 6). Forewing length: 21–23 mm. Ground colour deep green, darker than in *durga*; abdomen and anal portion of hindwing whitish. In forewing, ante- and postmedial lines brown, tinged with orange, slenderer than those of *durga*; antemedial line roundly excurved, postmedial line slightly excurved, minutely dentate; subterminal line dark brown, obsolete; discocellular dot brownish orange, minute; costa ochreous brown, with reddish tinge; tips of cilia blackish brown. In hindwing, postmedial line excurved, minutely dentate, subterminal line and cilia as in forewing.

*Female* (Fig. 9). Forewing length: 43 mm. Basal and costal areas of wings and thorax yellowish green, abdomen ochreous brown, other portions dark brown. In forewing, antemedial line represented by blackish brown dull double lines, roundly excurved; postmedial line blackish brown, slender, running as in male, dentation more distinct; discocellular mark blackish brown, with a large transparent centre; cilia tipped with blackish brown. In hindwing, postmedial line running at middle, excurved, irregularly dentate.

*Male genitalia* (Figs. 17, 24). Similar to those of *T. durga*. Distal portion of uncus dentate, while it is rounded or pointed in *durga*. Apex of dorsal process of valva pointed; ventral lobe of valva irregularly denticulate, while it is more uniformly denti-

culate in *durga*. Aedeagus larger and stouter; apical portion thick, with a pointed apex which is blunt in *durga*.

*Material examined.* Mindanao: — Mt. Talomo 1,100 m, Apo Range, Upper Baracatan, Davao, 2 ♂ 1 ♀, 3–6. VIII. 1985 (M. OWADA), 1 ♂, 17–19. VIII. 1985 (M. OWADA).

*Distribution.* Mindanao (Surigao, Davao).

*Remarks.* ROEPKE (1951) described and figured two different females from Surigao, Mindanao, and one of them accords well with this species. However, the other female is still unknown to us.

On Mt. Talomo, two female specimens of *Trabala* were collected at the same night. Although they showed quite different wing maculation, OWADA was unable to decide if they were separate species or not at the first glance, because some *Trabala*-species have quite variable females. They were killed by ammonia injection and set in paper warppers. Fortunately, he found in the next morning that they laid eggs in different manners, that is, a female of *T. durga* made a single row of egg mass and that of *T. rama* double rows.

The closest relative of *T. rama* is *T. leopoldi* TAMS, 1935, from Sulawesi, whose male genital organ is very similar to that of the former.

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## References

- HOLLOWAY, J. D., 1979. Moths of Borneo, with special References to Mount Kinabalu. i-viii+246 pp., 32 pls. Kuala Lumpur, Malayan Nature Society.
- 1982. Taxonomic appendix. In BARLOW, H. S., Introduction to the Moths of South East Asia, pp. 174–271. Kuala Lumpur, Malayan Nature Society.
- MOORE, F., 1884. Descriptions of new species of Indian Lepidoptera-Heterocera. *Trans. ent. Soc. Lond.*, **1884**: 355–376.
- ROEPKE, W., 1951. The genus *Trabala* WALK. in the Far East (Lep. Het., fam Lasiocampidae). *Meded. LandbHoogesch. Wegeningen*, **50**: 105–133, 14 pls.
- SEMPER, G., 1896–1902. Die Schmetterlinge der Philippinischen Inseln, 2. Abtheilung: Die Nachtfalter (Heterocera). Reisen in Archipel der Philippinen, (2 Theil), **6**: 381–728, pls. C–V, 50–66.
- TAMS, W. H. T., 1935. Resultats scientifiques du voyage aux Indes Orientales néerlandaises de LL. AA. RR. le Prince et la Princesse Léopold de Bergique. *Mem. Mus. r. Hist. nat. Berg.*, (hors s.), **4** (12): 33–64.
- WALKER, F., 1855. List of Specimens of lepidopterous Insects in the Collection of the British Museum, Part 5, pp. 977–1257.
- 1855. Ibid. Part 6, pp. 1259–1507.
- 1856. Ibid. Part 7, pp. 1509–1808.

