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SYSTEMATIC STUDY OF THE MATURE LARVAE OF  
ORIENTAL POLISTINE WASPS (HYMENOPTERA :  
VESPIDAE) (I) SPECIES OF *ROPALIDIA* AND *POLISTES*  
FROM SUMATRA AND JAVA ISLANDS\*

By

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Abstract

Mature larvae of eight *Ropalidia* and three *Polistes* species from Sumatra and Java are described. Of them seven *Ropalidia* and two *Polistes* species are described for the first time for the larvae. A list of Old World and Oceanian polistine species whose larvae are described and/or illustrated in the literature is given.

Introduction

It has been emphasized that the larval characters are often useful and important in the phylogenetic study of vespid wasps (REID, 1942; YAMANE, 1976; RICHARDS, 1978a). YAMANE and OKAZAWA (1981) discussed some larval characters attempting to find the relationships of the Old World and Oceanian genera of Polistinae. At that time information was quite scanty, and even today only 40 out of approximately 300 described species of the regions are known for larval morphology (cf. Appendix). This situation has prevented us from discussing the polistine phylogeny more comprehensively.

In the present paper, we describe the mature larvae of eight *Ropalidia* and three *Polistes* species from Sumatra and Java Islands, Indonesia. Among them, 7 species of *Ropalidia* (3 in the subgenus *Anthreneida*, 3 in *Icariola*, and 1 in *Icarielia*), *Polistes stigma*, and *P. strigosus* are described for the first time for their larvae.

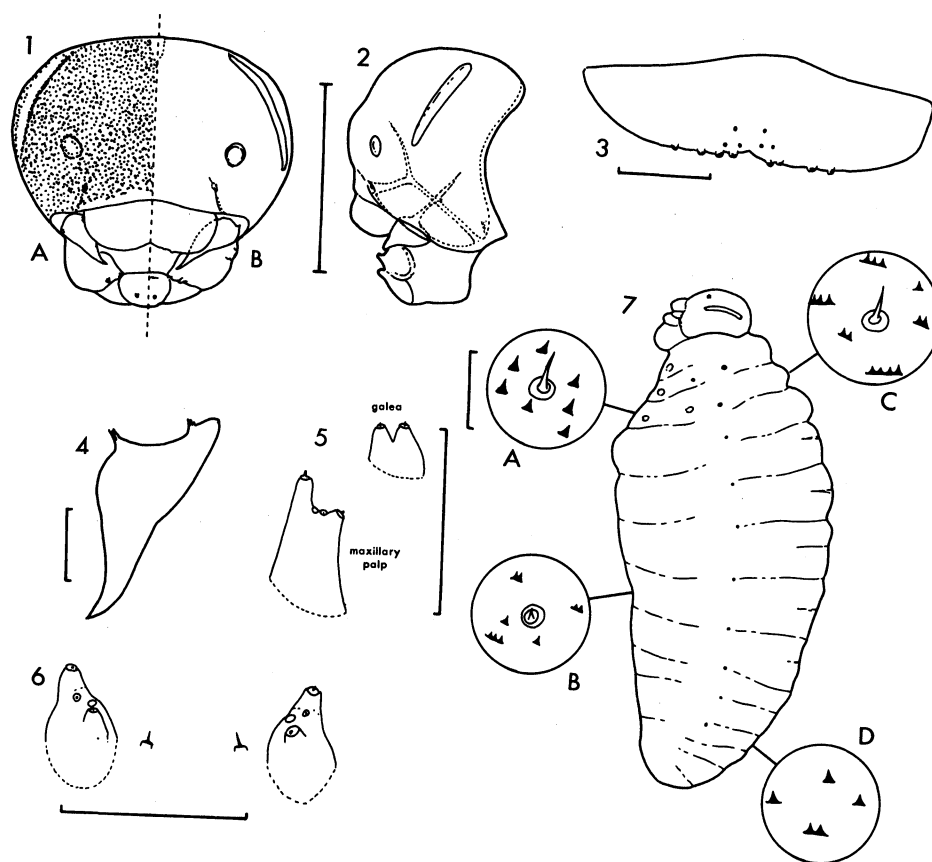
The specimens examined were preserved in 70% ethanol after being fixed in Kahle's solution. Some specimens were cleaned in hot KOH and heavily stained with acid fucsin for detailed observations. The terminology follows mainly that of NELSON (1982). T1-T3 refer to the thoracic segments I-III, and A1-A10 to the abdominal segments I-X.

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Figs. 1–7. Mature larva of *Ropalidia (Anthreneida) erythrospila*. 1. Head in front—A: Coloration; B: External structure. 2. Head in profile. 3. Labrum. 4. Mandible. 5. Maxillary palp and galea. 6. Labial palps and setae behind them. 7. Body in profile, with setae and spicules on venter of T3 (A), venter of A4 (B), dorsum of T2 (C), and dorsum of A8 (D). Scale lines: 1mm (1,2), 0.2mm (3), 0.1mm (4–6), 0.02mm (7).

***Ropalidia (Anthreneida) erythrospila* (CAMERON)**

(Figs. 1–7)

*Specimens examined.* Some mature larvae from a nest, Kota Baru, near Padang, Sumatera Barat, 4 Oct., 1981, R. OHGUSHI leg.

*Head.* Cranium brown in color; gena pale brown; parietal band, ecdysial sulcus, center of antenna and clypeus below whitish. Integument rather strongly sclerotized, not granulate; frons with several punctures bearing inconspicuous setae. Cranium in frontal view subcircular, widest at the level of antenna, in profile emarginate posteriorly at the level of antenna. Ecdysial sulcus very weak, present in upper portion, shallow. Parietal band long and wide; outer half reticulate. Antenna relatively large, flat, with 3 minute sensilla. Clypeus small, in frontal view about half the width of cranium, slightly emarginate ventrally. Frons not separated from clypeus and epicranium by sutures. Postoccipital and hypostomal sulci developed; pleurostomal sulcus very weak. Anterior tentorial pit

distinct, located on parafrontal suture and slightly medial to antenna. Labrum whitish yellow in color, ventrally moderately emarginate in the middle, with conical papillae and small punctures near the ventral margin; palate with a few punctures. Mouth parts whitish; margins of mandible, maxillary palp, galea, margins of prementum and labial palp brownish. Mandible rather short, pointed apically, without subsidiary tooth. Maxilla pear-shaped, not well developed, with basal sclerotized ring (sclerotization not very strong), with isolated, apically pointed spicules on upper surface, and with a minute seta near the base of maxillary palp. Maxillary palp with 4 minute sensilla; outer sensilla each located on a distinctly produced lobe, remaining two sensilla present between lobes. Galea bilobed apically; each lobe apically with a minute sensillum. Prementum subcircular, with sparse punctures bearing minute setae; labial palp similar to maxillary palp in shape, with 4 sensilla, of which outer ones are each located on a lobe; the paired setae behind palps not bifid apically, arising from moderately raised sockets. Postmentum small, with several minute setae.

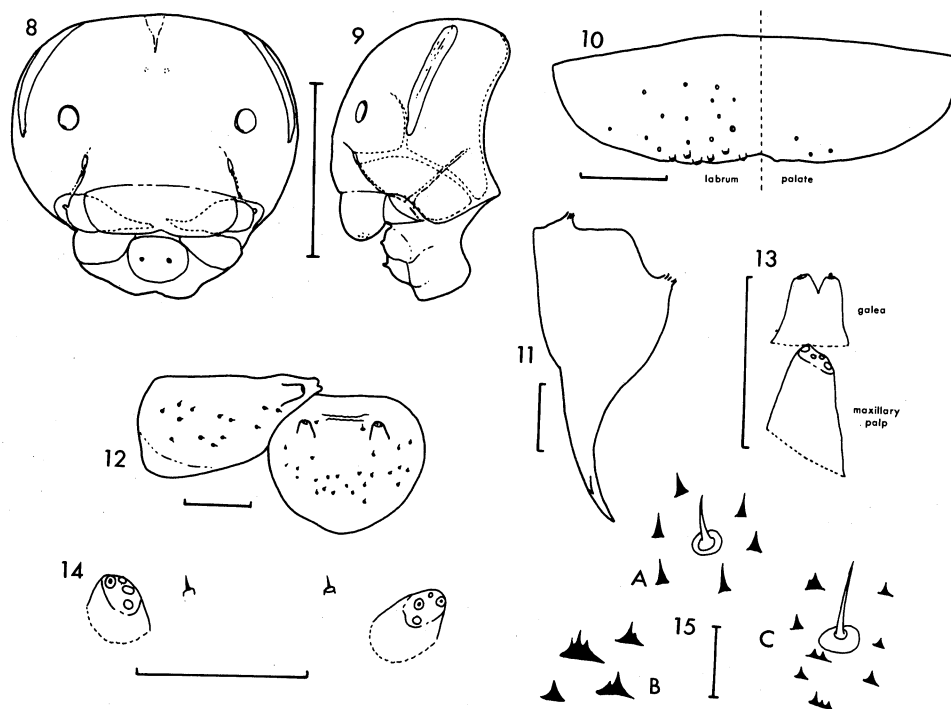
*Body.* Whitish yellow in color, rather thick, thickest and widest at A1; integument not granulate, with sparse setae and dense spicules apically pointed. Venter of T1 with several setae, without spicules; that of T2, T3 and A1–A3 with sparse setae and dense spicules, which are rarely contiguous to form short rows; venter of A4 similar to that of A1–A3, but spicules sometimes contiguous to form short rows. Setae and spicules on ventral surface of A5–A10 becoming sparse toward posterior segments; spicules on these segments all isolated. Dorsum of thoracic segments with sparse setae and dense spicules, most of which are contiguous to form short rows; dorsum of A1–A8 similar to that of thoracic segments, but setae and spicules becoming sparse toward posterior segments, and spicules less often contiguous on posterior segments; spicules on A8 rarely arranged into rows; dorsum of A9 with sparse setae over the surface, and rather sparse, isolated spicules in anterior portion; A10 with sparse setae only. First spiracle in diameter about twice as large as the rest; atrium bare. Wing and leg bud plates and subgenital plates relatively weak in the specimens not stained.

*Remarks.* The maxillary and labial palps of polistine larvae are usually simple and conical in shape. In *Ropalidia marginata*, the palps are somewhat specialized, namely two of the four sensilla are located on produced half of the palp (YAMANE & OKAZAWA, 1981; KOJIMA, 1984a). Such condition is also observed in *R. stigma stigma* and *R. flavopicta flavopicta* (present study). The maxillary and labial palps of *R. erythrospila* differ from those of other polistine wasps; the palp has two outer lobes and each lobe has a sensillum on the apex.

***Ropalidia (Anthreneida) latebalteata* (CAMERON)**

(Figs. 8–15)

*Specimens examined.* Some mature larvae from a nest, Mukomuko, Maninjau, Sumatera Barat, 31 July, 1983, S. YAMANE leg.



Figs. 8–15. Mature larva of *Ropalidia (Anthreneida) latebalteata*. 8. Head in front. 9. Head in profile. 10. Labrum and palate. 11. Mandible. 12. Maxilla and prementum. 13. Maxillary palp and galea. 14. Labial palps and setae behind them. 15. Setae and spicules on venter of T2 (A), dorsum of T2 (B), and dorsum of T3 (C). Scale lines: 1mm (8,9), 0.2mm (10), 0.1mm (11–14), 0.02mm (15).

*Head.* Cranium and mouth parts whitish yellow in color; integument moderately sclerotized, not granulate; frons with very sparse minute punctures bearing inconspicuous setae; punctures on clypeus slightly denser than on frons. Cranium in frontal view sub-circular, about  $5/4$  times as wide as high, widest at the level of antenna, in profile smoothly curved anteriorly, and weakly emarginate posteriorly. Ecdysial sulcus weak, present in upper portion, shallow and rather wide. Parietal band wide and long; outer half reticulate. Antenna somewhat large, flat, with 3 minute sensilla. Clypeus transverse, about half as wide as cranium, gently emarginate ventrally. Anterior tentorial pit distinct, located near the upper end of parafrontal suture and slightly medial to antenna. Postoccipital and hypostomal sulci developed; pleurostomal sulcus weak. Labrum slightly emarginate ventrally, with sparse punctures and several conical papillae near the ventral margin; palate with a few punctures. Mandible slender, weakly curved, pointed apically, with a very short subsidiary tooth. Maxilla spherical, not very developed, with distinctly sclerotized basal ring, with sparse setae on upper surface, without spicules. Maxillary palp thick, with 4 minute sensilla on the apex. Galea apically divided into two lobes; each lobe with a minute apical sensillum. Prementum subcircular; lower half with sparse setae; labial palp similar to maxillary palp in shape, with 4 apical sensilla; the paired setae behind palps arising from raised sockets. Postmentum rather small, slightly and bluntly

emarginate ventrally, with a few setae.

*Body.* White in color; integument not granulate, with sparse setae and dense spicules apically pointed. Venter of T1 with sparse setae, without spicules; that of T2 and T3 with sparse setae and dense isolated spicules; venter of A1 with setae anteriorly and with spicules over the surface, which are sparser than those on T3. Spicules on ventral surface of following segments sparser and smaller. Dorsum of T1 with sparse setae laterally and dense spicules over the surface, some spicules being contiguous to form short rows; dorsum of T2 similar to that of T1, but setae present also in the middle. Dorsum of T3–A5 similar to that of T2; setae and spicules on dorsum of A6–A9 becoming sparser toward posterior segments; spicules on A8 and A9 seldom contiguous; dorsum of A10 with spicules on anterior margin and sparse setae over the surface. First spiracle in diameter about twice as large as the rest; atrium bare. Wing and leg bud plates, and subgenital plates somewhat weak in the specimens not stained.

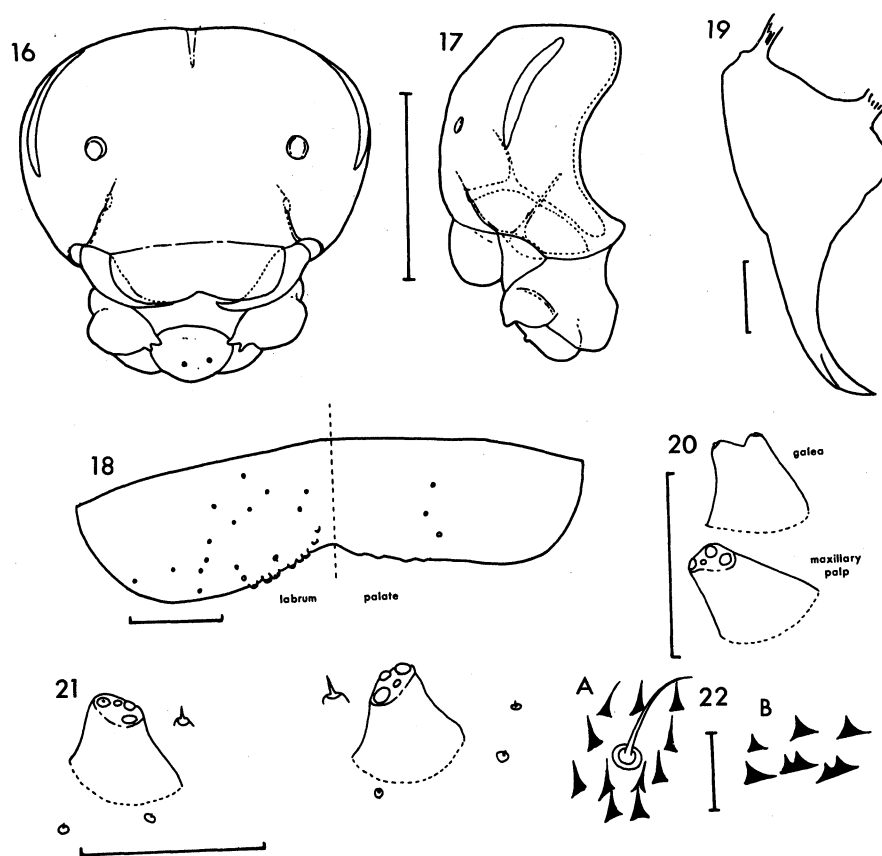
*Ropalidia (Anthreneida) sumatrae sumatrae* (WEBER)

(Figs. 16–22)

*Specimens examined.* Some mature larvae from a nest, Lubukmintrun, Sumatera Barat, 29 Dec., 1980, S. YAMANE leg.

*Head.* Cranium whitish yellow in color; parietal band, antennal socket and side of labrum pale brown. Some specimens with large irregular pale-brownish spots on frons. Integument moderately sclerotized, not granulate; vertex, frons and clypeus with very sparse punctures bearing quite minute setae. Cranium in frontal view subcircular, about  $5/4$  times as wide as high, in profile the posterior margin rather strongly emarginate at the level of antenna. Ecdysial sulcus present in upper portion, shallow and rather wide. Parietal band wide and long; outer half reticulate. Frons not defined. Antenna large, flat, with 3 minute sensilla. Clypeus transverse, not emarginate ventrally. Anterior tentorial pit distinct, located near the upper end of parafrontal suture and ventral to antenna. Post-occipital and hypostomal sulci developed; pleurostomal sulcus weak. Labrum transverse, weakly emarginate ventrally, with sparse punctures and several conical papillae near ventral margin; palate with a few punctures. Mandible slender, weakly constricted near mid-length, pointed apically, with a rather long subsidiary tooth. Maxilla somewhat elongate, not very developed, with basal sclerotized ring, very sparse setae on upper surface, and no spicules. Maxillary palp thick, with 4 apical sensilla. Galea apically divided into two lobes, each lobe with an apical minute sensillum. Mouth parts whitish yellow; prementum rounded-quadrangle, with sparse punctures bearing quite minute setae; labial palp the same as maxillary palp in shape, with 4 apical sensilla; the paired setae behind palps rather long, arising from distinctly raised sockets. Postmentum small, with very sparse minute setae.

*Body.* Whitish yellow in color. Integument not granulate, with sparse setae and dense apically pointed spicules as follows: Venter of T1 with sparse setae, and no spicules; that



Figs. 16–22. Mature larva of *Ropalidia (Anthreneida) sumatrae sumatrae*. 16. Head in front. 17. Head in profile. 18. Labrum and palate. 19. Mandible. 20. Maxillary palp and galea. 21. Labial palps and setae behind them. 22. Setae and spicules on venter of T2 (A), and dorsum of T1 (B). Scale lines: 1mm (16, 17), 0.2mm (18), 0.1mm (19–21), 0.02mm (22).

of T2–A2 with sparse, relatively long setae and dense isolated spicules; spicules rather large on T2–A1. Venter of A3–A9 similar to that of A2; setae and spicules becoming sparse toward posterior segments; A10 with sparse setae and no spicules. Dorsum of body segments with very sparse setae; spicules on dorsum of T1–A3 dense and sometimes contiguous to form bi- or tridentate rows; those on A4–A8 sparse and rarely contiguous; dorsum of A9 and A10 almost without spicules. First spiracle in diameter about twice as large as the rest; atrium bare. Leg and wing bud plates and subgenital plates distinct even without staining.

*Remarks.* *R. latebaleata* and *R. sumatrae* have similar nesting habits; the comb (or combs) is made in cavity, on buttress roots or on tree barks, and, in all cases, the ventral surface of the comb (corresponding to cell opening) faces to the substrate and the dorsal surface is exposed (VAN DER VECHT, 1962; S. YAMANE, pers. commun.). The larvae are, therefore, invisible to aerial predators, even though the combs are not enclosed with an envelope. KOJIMA (1982a) discussed the camouflaging effect of the pigmented larval head

in an exposed comb, noting that brownish larval head in the exposed comb of *Ropalidia* helps to make the nest less conspicuous to visual predators by making a comb uniformly brown in color. Because of their peculiar nesting habits, in *R. latebalteata* and *R. sumatrae* the pigmentation on larval head may have lost its camouflaging effect and have been selected out.

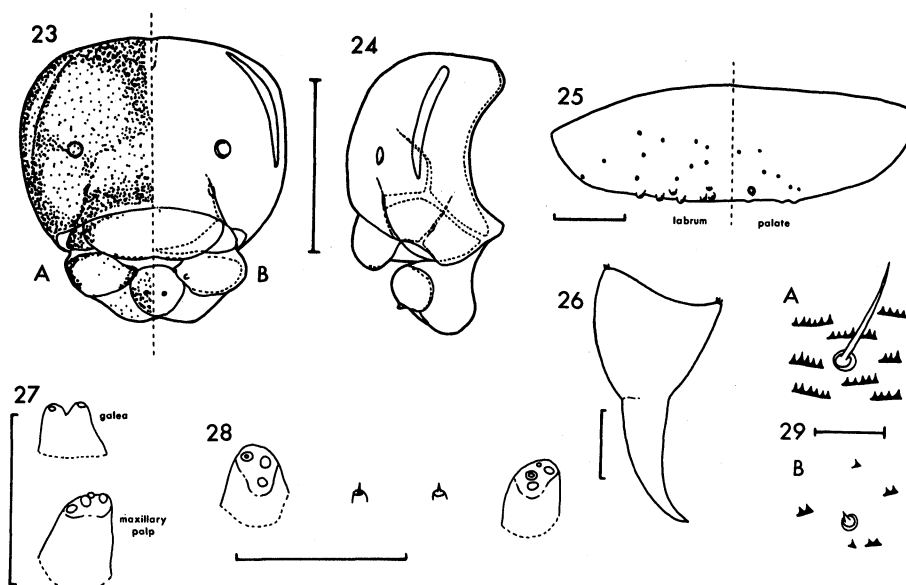
YAMANE & OKAZAWA (1981) noted that the lack of setae on the upper face of the maxilla is a derived condition for *Ropalidia*. The larvae of both *R. latebalteata* and *R. sumatrae*, however, have setae on maxilla, and *R. (Icarielia) flavopicta flavopicta* larva has, though inconspicuous, setae on upper face of maxilla (present study). It is not clear whether this condition is ancestral or a secondary specialization in this genus.

*Ropalidia (Icariola) fasciata* (FABRICIUS)

(Figs. 23–29)

*Specimens examined.* Some mature larvae from a nest, Lubukmintrun, Sumatera Barat, 13 Aug., 1982, S. YAMANE leg.

*Head.* Cranium brown; large spot inside parietal band, frons, spot below antenna, parietal band and ecdysial sulcus whitish yellow; antenna whitish yellow and encircled with brown; ventral margin of clypeus whitish. Integument rather strongly sclerotized, not granulate; frons and clypeus with very sparse punctures bearing quite minute setae.



Figs. 23–29. Mature larva of *Ropalidia (Icariola) fasciata*. 23. Head in front—A: Coloration; B: External structure. 24. Head in profile. 25. Labrum and palate. 26. Mandible. 27. Maxillary palp and galea. 28. Labial palps and setae behind them. 29. Setae and spicules on venter of Al (A), and venter of A2 (B). Scale lines: 1mm (23,24), 0.2mm (25), 0.1mm (26–28), 0.02mm (29).



Cranium in frontal view subcircular, widest at the level of antenna, in profile moderately emarginate posteriorly. Ecdysial sulcus very weak, present in upper portion, wide and shallow. Parietal band wide and rather long; outer half reticulate. Frons not defined. Antenna moderate in size, with 2 or 3 (usually 3) sensilla. Clypeus rather small, about half as wide as cranium, weakly emarginate ventrally. Postoccipital and hypostomal sulci developed; pleurostomal sulcus weak; parafrontal suture distinct, disappearing above the distinct tentorial pit. Labrum white in color, with brown spots on the lateral margin; not emarginate ventrally, with sparse punctures and several conical papillae near the ventral margin; palate with several punctures and one or two conical papillae. Mandible brown, slender, with a single apically pointed tooth. Maxilla whitish, rather small in size, with dense spicules on upper surface, no setae; basal brownish ring distinctly sclerotized. Maxillary palp with 4 or 3 apical sensilla. Galea bilobed apically; each lobe with an apical sensillum. Prementum brownish (margins darker), wide above and slightly narrower below, with sparse punctures, some of which bear quite minute setae. Labial palp thick, with 4 or 3 apical sensilla; the paired setae behind palps arising from rather distinctly raised sockets. Postmentum small, without punctures or setae.

*Body.* Whitish yellow in color; integument not granulate. Venter of T1 almost bare; that of T2, T3 and A1 with sparse setae at midlength of each segment and dense spicules over the surface; each 5 to 10 spicules always arranged into a row; setae on A1 slightly longer than those on two preceding segments. Setae on venter of A2–A10 minute; spicules on them less often contiguous to form rows; spicules on A9 and A10 all isolated. Dorsum of thoracic segments similar to venter of T2 and T3, but setae slightly shorter; dorsum of A1–A8 with setae shorter and, with spicules, which are sparser and less often contiguous than those on ventral surface of each segment. Dorsum of A9 and A10 with sparse minute setae; spicules on them not contiguous and confined to anterior portion of each segment. First spiracle in diameter more than twice as large as the rest; atrium bare. Leg and wing bud plates and subgenital plates weak in the specimens not stained.

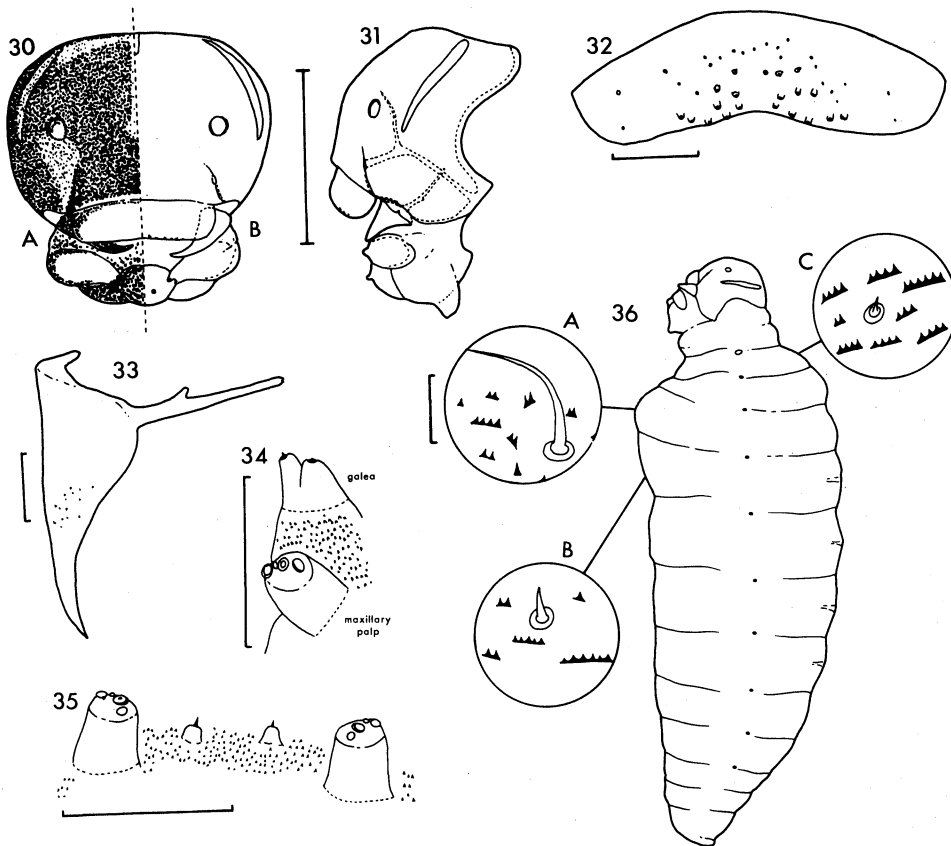
*Remarks.* The result of the present study well agrees with that of KOJIMA (1984a) based on the specimens from Palawan, the Philippines. Though the number of apical sensilla of labial palp is quite stable (four) in the genus *Ropalidia* (YAMANE & OKAZAWA, 1981), in *R. fasciata* larva it was often found to be three. The larva of *R. stigma* has rarely five sensilla on the labial palp (present study).

*Ropalidia (Icariola) jacobsoni* DU BUYSSON

(Figs. 30–36)

*Specimens examined.* Some mature larvae from three nests, Padang, Sumatera Barat, 15 Nov., 1980, S. YAMANE leg.; Lubukmintrun, Sumatera Barat, 13 Aug., 1982, S. YAMANE leg.; Padang, Sumatera Barat, 1–2 Sep., 1983, S. YAMANE leg.

*Head.* Cranium colored dark brown; ecdysial sulcus, center of antenna whitish; spot below antenna, and vertex paler; labrum whitish, with dark patch on the side, where the



Figs. 30–36. Mature larva of *Ropalidia (Icariola) jacobsoni*. 30. Head in front—A: Coloration; B: External structure. 31. Head in profile. 32. Labrum. 33. Mandible. 34. Maxillary palp and galea. 35. Labial palps and setae behind them. 36. Body in profile, with setae and spicules on venter of A1 (A), venter of A2 (B), and dorsum of T2 (C). Scale lines: 1mm (30,31), 0.2mm (32), 0.1mm (33–35), 0.02mm (36).

integument rather strongly sclerotized. Integument of cranium strongly sclerotized, not granulate, frons and clypeus with sparse minute punctures. Cranium in frontal view sub-circular, about  $6/5$  times as wide as high, as seen in profile strongly emarginate posteriorly at the level of antenna. Ecdysial sulcus visible in upper portion, shallow and somewhat wide. Parietal band wide and long; outer half reticulate. Frons not defined. Antenna rather large, with 3 minute sensilla. Clypeus strongly transverse, slightly emarginate ventrally. Anterior tentorial pit distinct, located on parafrontal suture and slightly medial to antenna. Postoccipital and hypostomal sulci developed; pleurostomal sulcus weak. Labrum strongly transverse, hardly emarginate ventrally, with sparse punctures and conical papillae near the ventral margin; palate with a few punctures. Mandible dark brown, slender, moderately curved, with a tooth apically pointed. Maxilla white in color, with basal dark brownish ring (distinctly sclerotized), pear-shaped, with dense spicules on upper face and at apex, without setae. Maxillary palp thick, with 4 apical sensilla. Galea apically divided into two lobes; each lobe with a minute apical sensillum. Prementum and postmentum dark brown; prementum subcircular; labial palps each with 4 minute

apical sensilla; the paired setae behind palps rather short, arising from distinctly raised sockets; area around palp with dense spicules; remaining part of prementum with sparse punctures bearing quite minute setae. Postmentum moderately developed, with sparse punctures above; ventral emargination strong; projection on each side of emargination strongly and irregularly sclerotized.

*Body.* Whitish yellow in color, thick, in profile narrow at thoracic segments and thickest at A1; integument not granulate. Venter of T1 nearly bare; venter of T2 bare anteriorly and with several setae and dense spicules posteriorly; all spicules arranged into short rows. Venter of T3 similar to that of T2, but spicules present over the surface. Venter of A1 with setae anteriorly, and with spicules over the surface, which are mostly arranged into rows. Setae on venter of A2–A10 very short and becoming sparse toward posterior segments; spicules on them sparse and less often contiguous on posterior segments. Dorsum of thoracic segments with sparse minute setae at midlength of each segment, and covered with dense spicules, most of which are contiguous to form rows; venter of A1–A9 similar to that of thoracic segments; spicules on posterior segments sparser and less often contiguous; spicules on A8 and A9 rarely arranged into rows; venter of A10 with sparse setae, without spicules. First spiracle in diameter about twice as large as the rest; atrium bare. Leg and wing bud plates and subgenital plates indistinct in the specimens not stained.

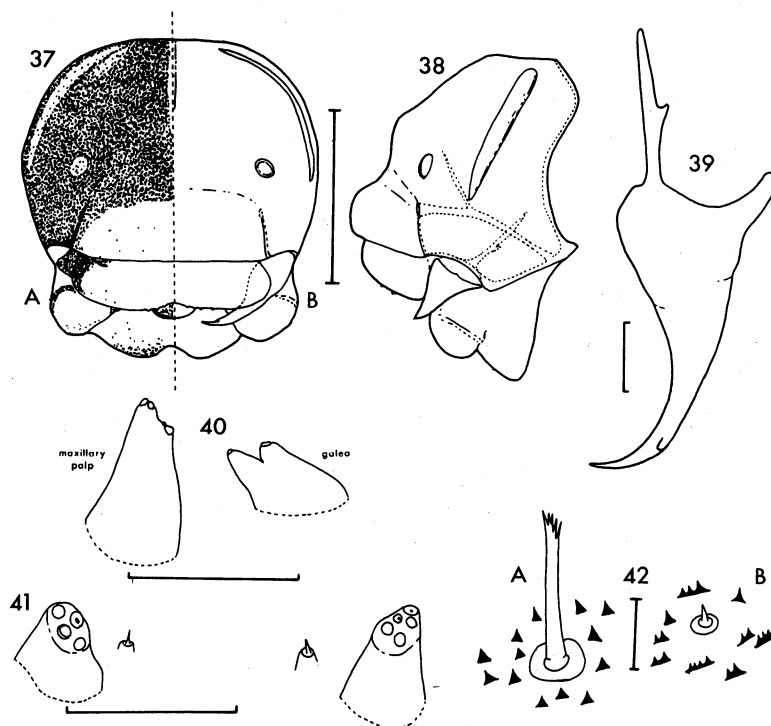
*Remarks.* VAN DER VECHT (1941, 1962) treated this species as a subspecies of *R. variegata*, while RICHARDS (1978b) considered it to be a good species. YAMANE & YAMANE (1979) described the larva of the Nepalese *R. variegata variegata* from which that of *R. jacobsoni* differs only slightly: the ventral emargination of postmentum distinctly deeper in *R. jacobsoni* than in *R. variegata*.

### *Ropalidia (Icariola) stigma stigma* (SMITH)

(Figs. 37–42)

*Specimens examined.* Some mature larvae from two nests, Lubukmintrun, Sumatera Barat, 14 Dec., 1980, S. YAMANE leg.

*Head.* Cranium dark brown; parietal band, small spot below parietal band, ecdysial sulcus, center of antenna and clypeus whitish yellow. Integument strongly sclerotized, weakly granulate, with a few inconspicuous setae on frons. Cranium in frontal view sub-circular, slightly wider than high, widest at the level of antenna, moderately emarginate posteriorly. Ecdysial sulcus weak, present in upper portion, shallow and narrow. Parietal band wide and rather long; outer half reticulate. Frons not defined. Antenna rather large, with 3 minute sensilla. Clypeus transverse, about two-thirds as wide as cranium, not emarginate ventrally, in profile strongly swollen anteriorly. Postoccipital and hypostomal sulci developed; pleurostomal sulcus weak; parafrontal suture distinct and disappearing above the distinct anterior tentorial pit. Labrum whitish yellow, with dark brownish spot on the lateral corner, scarcely emarginate ventrally, with a few punctures and a few con-



Figs. 37–42. Mature larva of *Ropalidia (Icariola) stigma stigma*. 37. Head in front—A: Coloration; B: External structure. 38. Head in profile. 39. Mandible. 40. Maxillary palp and galea. 41. Labial palps and setae behind them. 42. Setae and spicules on venter of T2 (A) and, dorsum of T1 (B). Scale lines: 1mm (37,38), 0.1mm (39–41), 0.02mm (42).

ical papillae near the ventral margin; palate with a few conical papillae. Mandible brown, slender, pointed apically with a rudimentary subsidiary tooth (apex not acute). Maxilla whitish yellow, pear-shaped, developed, with basal sclerotized ring (colored brown), with dense spicules on upper face and at apex, without setae. Maxillary palp with 4 minute apical sensilla, two of which are located on produced half of the palp. Galea bilobed apically; each lobe with an apical sensillum. Prementum whitish, with sparse punctures bearing quite minute setae; labial palp thick, with 4 or 5 (usually 4) sensilla on the apex; the paired setae behind palps short, arising from distinctly raised sockets. Postmentum with a dark spot on each side, emarginate ventrally, with irregular sclerotized patches, without punctures or setae.

*Body.* Whitish yellow in color; integument not granulate, with sparse setae and dense apically pointed spicules. Venter of T1 without setae, with isolated spicules posteriorly; that of T2 bare anteriorly, with setae at midlength of the segment and with dense isolated spicules in posterior half; spicules on the sides more or less contiguous to form short rows; venter of T3 similar to that of T2, but covered with spicules over the surface; setae on T2 and T3 rather long and apically divided into several ends. Setae and spicules on venter of A1 similar to those on T2 and T3, but most spicules contiguous. Setae on venter of A2–A10 sparser than those on A1, short and pointed apically; spicules on these

segments sparser and less often contiguous than on A1; spicules on A6–A10 seldom contiguous. Dorsum of thoracic segments with sparse setae and dense spicules, which are often arranged into short rows, and more often so on the side of each segment; setae and spicules on dorsal face of A1–A10 sparser on posterior segments, and spicules less often contiguous on posterior segments; A10 with almost no spicules. First spiracle in diameter about 2.5 times as large as the rest; atrium bare. Leg and wing bud plates and subgenital plates distinct even in the specimens not stained.

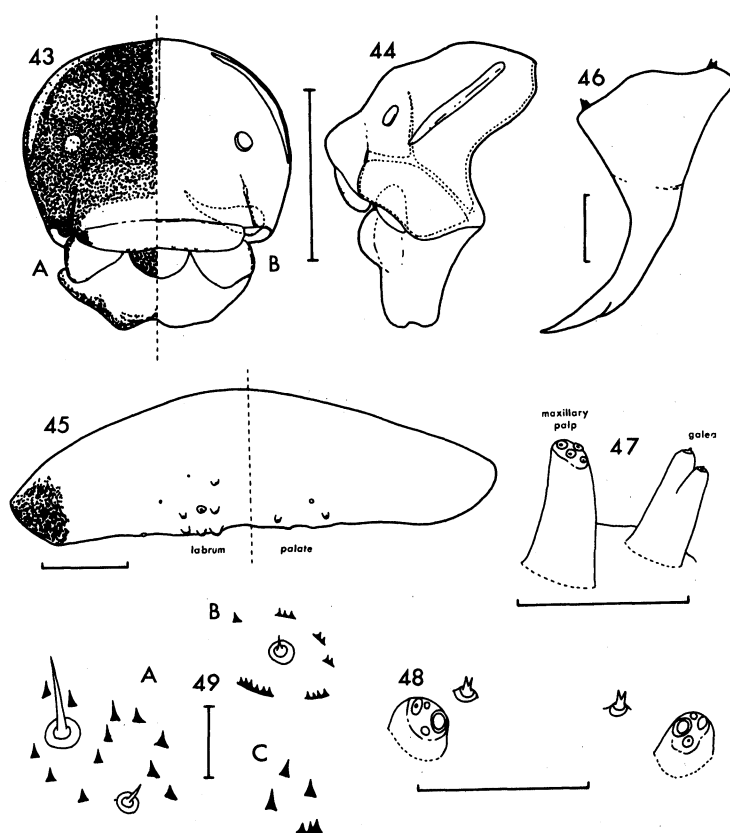
*Remarks.* YAMANE & YAMANE (1979) described the larva of *R. stigma rufa* from Nepal. We found the following differences between it and the present form: mandible with no subsidiary tooth in *rufa* (with a short subsidiary tooth in *stigma*), maxillary palp more or less flat apically in *rufa* (somewhat produced in its half in *stigma*), prementum elongate in *rufa* (subcircular in *stigma*). In addition, YAMANE & YAMANE did not confirm apically branched setae on body integument, which have so far been observed only in *R. stigma stigma* within the genus *Ropalidia*. However, it is not yet certain to us whether these differences are specific or subspecific.

*Ropalidia (Icariola) mathematica binotata* VAN DER VECHT

(Figs. 43–49)

*Specimens examined.* Some mature larvae from three nests, Ragnan Jakarta, Jawa, 19 July, 1983, R. OHGUSHI leg.

*Head.* Cranium dark brown; irregular spot below parietal band slightly paler; parietal band, ecdysial sulcus and center of antenna whitish; clypeus dark brown above, whitish below. Integument strongly sclerotized, finely granulate, nearly impunctate. Cranium in frontal view subcircular, widest at the level of antenna, rather deeply emarginate posteriorly. Ecdysial sulcus present in upper half, rather distinct, narrow and shallow. Parietal band wide and long; outer half reticulate. Frons not defined. Antenna rather large, flat, with 3 minute sensilla. Clypeus strongly transverse, about two-thirds as wide as cranium in frontal view, bluntly and slightly emarginate ventrally, in profile moderately swollen anteriorly. Anterior tentorial pit distinct. Postoccipital and hypostomal sulci developed; pleurostomal sulcus rather weak; parafrontal suture distinct. Labrum white in color (lateral margin colored dark brown and strongly sclerotized), strongly transverse, not emarginate ventrally, with several conical papillae near ventral margin; palate with a few conical papillae. Mandible brownish (base and teeth darker), slender and moderately curved, pointed apically, with a short subsidiary tooth at some distance from apex. Maxilla white (basal sclerotized ring dark brown; palp and galea dark), not very developed, with a few punctures bearing inconspicuous setae near apex, dense isolated apically pointed spicules on upper face and at apex. Maxillary palp slender, with 4 minute apical sensilla. Galea bilobed apically; each lobe with a quite small apical sensillum. Prementum white, encircled with dark brown, nearly subcircular, with very sparse minute setae in ventral half; labial palp thick, with 4 apical sensilla; the paired setae behind palps



Figs. 43–49. Mature larva of *Ropalidia (Icariola) mathematica binotata*. 43. Head in front—A: Coloration; B: External structure. 44. Head in profile. 45. Labrum and palate. 46. Mandible. 47. Maxillary palp and galea. 48. Labial palps and setae behind them. 49. Setae and spicules on venter of T2 (A), dorsum of T2 (B), and dorsum of A9 (C). Scale lines: 1mm (43, 44), 0.2mm (45), 0.1mm (46–48), 0.02mm (49).

short, bifid apically and arising from a weakly raised sockets. Postmentum large, weakly emarginate ventrally, with irregular dark patches, where the integument strongly sclerotized, without setae or punctures.

*Body.* Whitish yellow in color; integument not granulate, with sparse setae and dense apically pointed spicules. Venter of T1 with dense isolated spicules in posterior half, without setae; anterior half of venter of T2 bare; posterior half of T2 and whole ventral surface of T3 and A1 with sparse setae and dense spicules, which are not contiguous in the middle of the segment, and often contiguous to form short rows on the side. Setae on ventral surface of A2–A10 shorter than those on A1 and becoming sparse toward posterior segments, spicules on A2–A4 sometimes contiguous in the middle of each segment and those on A5–A10 rarely or seldom contiguous. Dorsum of thoracic segments with sparse minute setae and small spicules; 2 to 7 spicules nearly always arranged into rows. On the dorsum of A1–A9 setae sparser and spicules less often contiguous than on thoracic segments; spicules on A7–A9 rarely contiguous. Dorsum of A10 with sparse setae and isolated spicules on anterior margin. First spiracle in diameter about twice as

large as the rest; atrium bare. Wing and leg bud plates and subgenital plates very weak in the specimens not stained.

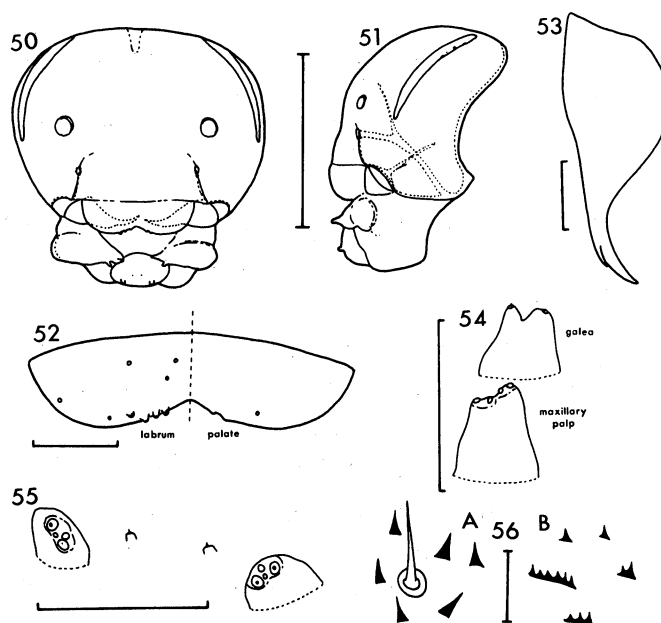
*Remarks.* REID (1942) noted that Neotropical polistine species, *Protopolybia minutissima* and *P. sedula*, have a pair of setae behind labial palps on larval prementum, which are apically subdivided. On the other hand, no species of four polistine genera endemic to the Old World, of which larvae are so far known, has such subdivided setae behind labial palps. Apically bifid setae behind labial palps in *R. mathematica binotata* may be a derived state.

*Ropalidia (Icarielia) flavopicta flavopicta* (SMITH)

(Figs. 50–56)

*Specimens examined.* Some mature larvae from a nest, Pulai (near Padang), Sumatera Barat, 29 Aug., 1982, S. YAMANE leg.

*Head.* Cranium and mouth parts whitish yellow, with large irregular pale brownish spots on frons. Cranium moderately sclerotized, not granulate, in frontal view subcircular, slightly wider than high, widest at the level of antenna, in profile moderately emarginate posteriorly. Ecdysial sulcus present in upper portion, wide and shallow. Parietal band wide and rather long; outer half reticulate. Frons not defined, with a few punctures



Figs. 50–56. Mature larva of *Ropalidia (Icarielia) flavopicta flavopicta*. 50. Head in front. 51. Head in profile. 52. Labrum and palate. 53. Mandible. 54. Maxillary palp and galea. 55. Labial palps and setae behind them. 56. Setae and spicules on venter of T2 (A), and dorsum of A1 (B). Scale lines: 1mm (50, 51), 0.2mm (52), 0.1mm (53–55), 0.02mm (56).

bearing inconspicuous setae. Antenna somewhat large, with 3 minute sensilla. Clypeus about half as wide as cranium, not emarginate ventrally. Anterior tentorial pit distinct, located on parafrontal suture. Postoccipital and hypostomal sulci developed; pleurostomal sulcus weak. Labrum not very wide, weakly emarginate ventrally, with a few punctures and a few conical papillae near ventral margin; palate almost bare. Mandible slender, weakly curved, pointed apically, with a short subsidiary tooth. Maxilla rather small, with moderately sclerotized basal ring, with a few punctures bearing inconspicuous setae on upper face, without spicules. Maxillary palp with 4 sensilla, two of which are located on slightly produced half of the palp. Galea bilobed apically; each lobe with a minute apical sensillum. Prementum subcircular, with sparse minute setae; labial palp thick, with 4 minute apical sensilla; the paired setae behind palps short and arising from weakly raised sockets. Postmentum small, without setae or punctures.

*Body.* Whitish yellow in color; integument not granulate. Venter of T1 with several setae and rather dense isolated apically pointed spicules in the middle; venter of T2, T3 and A1 with sparse, rather long setae and dense isolated spicules, which are sometimes arranged into short rows. Setae and spicules on the venter of following segments short, becoming sparse toward posterior segments; spicules seldom contiguous. Dorsum of thoracic segments with several setae on midlength of each segment; spicules not very dense and sometimes contiguous to form rows; spicules on dorsum of A1 often arranged into rows. Dorsum of A2–A8 with sparse setae and dense spicules, which are rarely contiguous and sparser on posterior segments; that of A9 with very sparse setae and sparse spicules in anterior half, bare posteriorly; dorsal surface of A10 with very sparse setae, without spicules. First spiracle in diameter nearly twice as large as the rest; atrium bare. Leg bud plates rather distinct; wing bud and subgenital plates very weak without staining.

*Remarks.* The larva of this species is similar to that of *R. extrema*, *R. nigrescens* and *R. flavobrunnea* from the Philippines, which belong to the subgenus *Icarielia* (KOJIMA, 1982a). However, larvae of these three Philippine species have no setae on maxilla like the most *Ropalidia* species (this form, though inconspicuous, has them).

Unpigmented larval head seems to be a character common to the species of this subgenus, of which all species construct enveloped nests. This fact may support KOJIMA's (1984a) view.

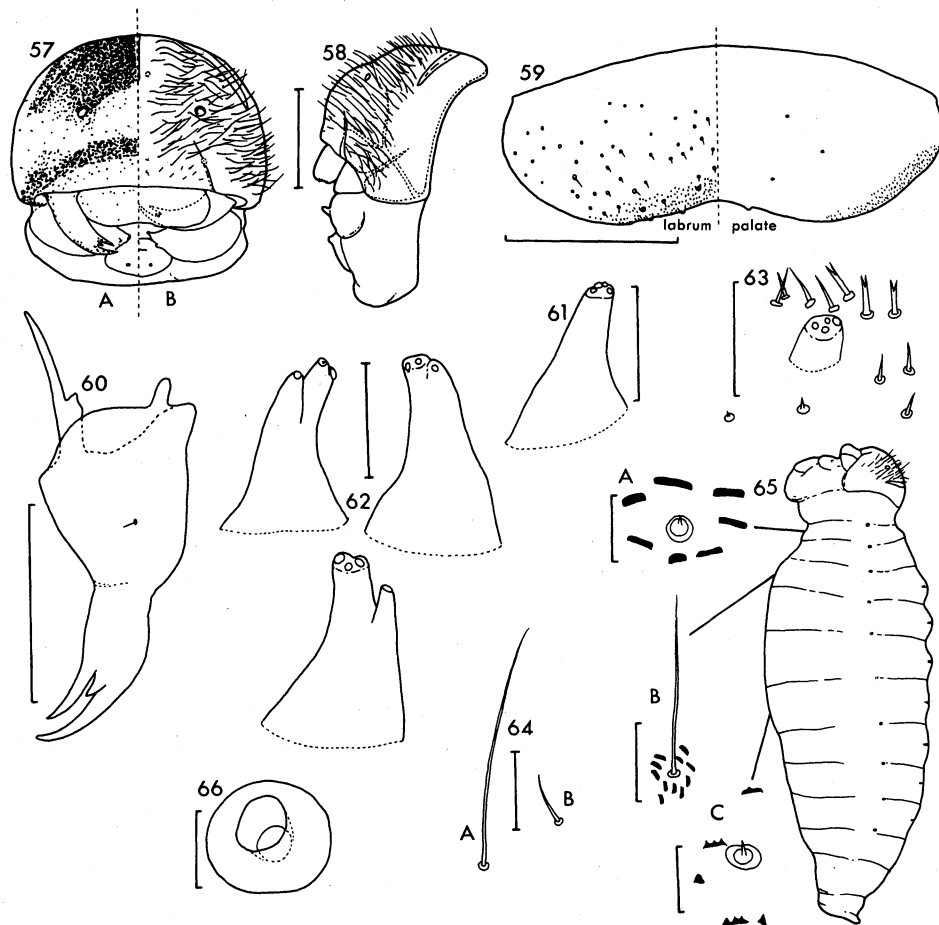
### *Polistes (Polistella) stigma* (FABRICIUS)

(Figs. 53–66)

*Specimens examined.* Some mature larvae from a nest, Lubukmintrun, Sumatera Barat, 23 Dec., 1980, S. YAMANE leg.

*Head.* Vertex, temporal region dark brown; gena and frons whitish yellow; wide band transversely across the cranium just above the dorsal margin of clypeus, which extends ventrolaterally along pleurostomal sulcus dark brownish; clypeus whitish yellow below.





Figs. 57–66. Mature larva of *Polistes (Polistella) stigma*. 57. Head in front—A: Coloration; B: External structure. 58. Head in profile. 59. Labrum and palate. 60. Mandible. 61. Maxillary palp. 62. Variation of galea in shape. 63. Labial palp and setae around it. 64. Setae on frons (A) and clypeus (B). 65. Setae and spicules on venter of T2 (A), venter of A1 (B), and venter of A4 (C). 66. 4th spiracle. Scale lines: 1mm (57, 58), 0.5mm (59, 60), 0.1mm (61–64, 65B), 0.02mm (65A, C), 0.05mm (66).

Integument of cranium strongly sclerotized, not granulate. Frons and temporal region medial to parietal band with very long hairs; clypeus with hairs shorter than those on frons. Cranium in frontal view nearly hemispherical, widest near the base of mandible, in profile weakly emarginate posteriorly. Ecdysial sulcus distinct, narrow. Parietal band rather wide and short; outer half reticulate. Frons not defined. Antenna small, flat, with 3 or 4 minute sensilla. Clypeus about half as wide as cranium, hardly emarginate ventrally. Anterior tentorial pit small, but distinct. Postoccipital and hypostomal sulci moderately developed; pleurostomal sulcus very weak; parafrontal suture rather distinct. Labrum white in color, broadly and gently emarginate ventrally, with sparse punctures over the surface (some of the punctures bear setae), with a few conical papillae and dense spicules on ventral margin; palate with a few punctures and dense spicules on the sides. Mandible brown (teeth darker), wide at base and narrowed apically, weakly constricted at mid-

length, sometimes with one or two setae near base, pointed apically, with two subsidiary teeth apically pointed (both well set back from apex; inner one long and outer one very short). Mouth parts whitish yellow. Maxilla pear-shaped, moderately developed, with sparse (ca. 15) setae and dense spicules on upper face. Maxillary palp slender, with 4 minute apical sensilla. Galea usually divided into two lobes, one of lobes with a single apical sensillum, and the other with 2 or 3 sensilla. Prementum subcircular; labial palp with 4 apical sensilla; area around palp with about 10 rather long setae, some of which are bifid or trifid; remaining portion of prementum with sparse punctures bearing quite minute setae. Postmentum large, with sparse punctures.

*Body.* Whitish yellow in color; integument not granulate. Venter of T1 with sparse minute setae and weak, transverse, ridge-like spicules on posterior margin; venter of T2 and T3 similar to that of T1, but spicules present over the surface. Venter of A1 with sparse long setae; some setae hairy, as long as those on frons. Setae and spicules on ventral surface of A2–A4 as in A1, but setae shorter and some spicules dentate; those on A5–A8 becoming sparse toward posterior segments, and spicules more often dentate. Venter of A9 with several setae and sparse, weak spicules on anterior margin; that of A10 with several setae and no spicules. Dorsum of T1–A8 similar to venter of T2; setae and spicules sparser on posterior segments. Dorsal surface of A9 with sparse setae and spicules on anterior margin; the spicules are small, isolated and usually rounded apically; dorsum of A10 with sparse setae over the surface and, small, apically rounded spicules on anterior margin. First spiracle as large as the second, the latter being about 1.5 times as large in diameter as the rest; atrium bare; primary tracheal opening distinctly smaller than atrial opening. Wing and leg bud plates and subgenital plates rather distinct even in the specimens not stained.

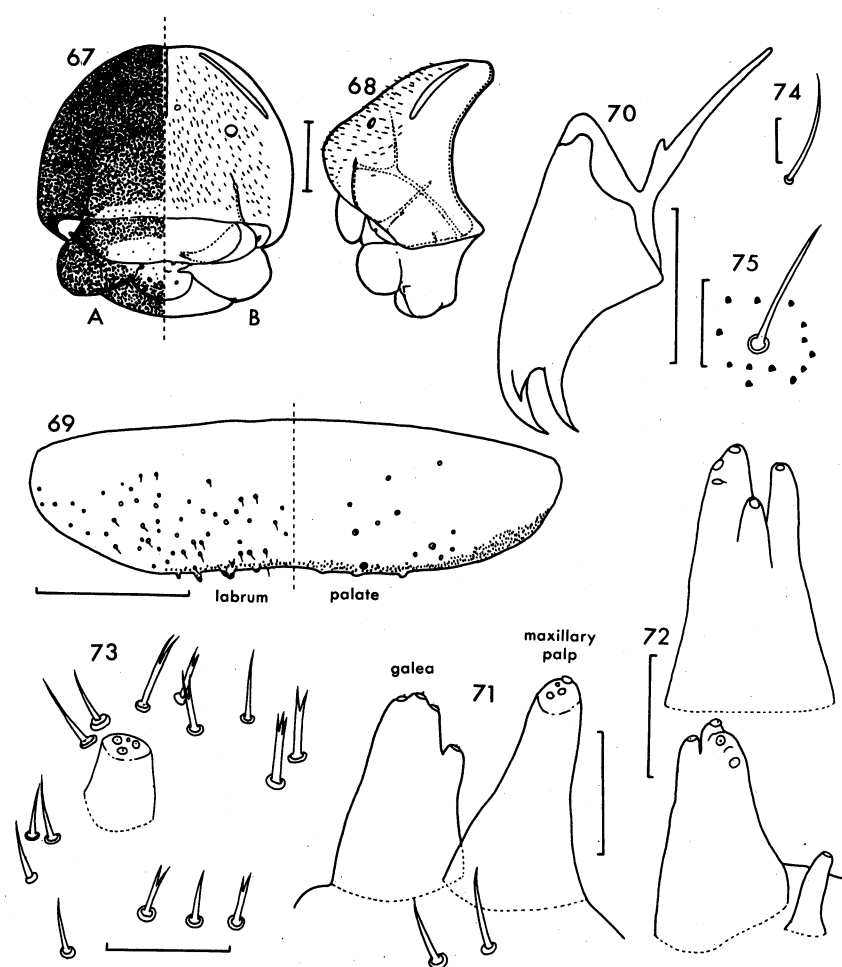
*Remarks.* The larvae of *P. stigma* is similar to those of *P. manillensis* from the Philippines (KOJIMA, 1984b) and a species from New Guinea (YAMANE & OKAZAWA, 1981). In the three species, the larva has conspicuously long hairs on cranium and ventral surface of the first abdominal segment. RICHARDS (1978b) noted that the larvae of *Polistes (Polistella) humilis* and *P. (P.) bernardi bernardi* have long hairs on ventral surface of the first and/or second abdominal segments. However, it is not clearly shown whether the hairs are as long as those of *P. stigma*. Larvae of other subgenera of *Polistes* and of other polistine genera have no such long hairs on the cranium and body integument.

***Polistes (Polistella) strigosus* BEQUAERT\***

(Figs. 67–75)

*Specimens examined.* Some mature larvae from a nest, Singkarak (ca. 360m alt.), Sumatera Barat, S. YAMANE leg.

\* Two subspecies have been described in *P. strigosus*: nominate subspecies and *minus* (BEQUAERT, 1934). The present form well agrees in structure with *P. strigosus*, but distinct from the two described subspecies in coloration.



Figs. 67–75. Mature larva of *Polistes (Polistella) strigosus*. 67. Head in front—A: Coloration; B: External structure. 68. Head in profile. 69. Labrum and palate. 70. Mandible. 71. Maxillary palp and galea. 72. Bilateral variation of galea. 73. Labial palp and setae around it. 74. Setae on frons. 75. Setae and spicules on venter of A1. Scale lines: 1mm (67, 68), 0.5mm (69, 70), 0.1mm (71–73), 0.05mm (74, 75).

*Head.* Cranium dark brown; lower half of frons, irregular spots on vertex and gena slightly paler; ecdysial sulcus whitish; parietal band bordered with black; clypeus brown with large medial whitish spot near the ventral margin. Integument strongly sclerotized, weakly granulate; frons, clypeus and lower margin of gena sparsely punctate; each puncture bearing a rather long hair. Cranium in frontal view nearly hemicircular, widest near the mandibular base, in profile swollen anteriorly at the level of upper margin of clypeus, moderately emarginate posteriorly. Ecdysial sulcus present in upper half, rather distinct, narrow. Parietal band narrow and short; outer one-third to half reticulate. Antenna rather small, with 3 minute sensilla. Frons not defined. Clypeus transverse, not emarginate ventrally. Anterior tentorial pit distinct, located on parafrontal suture. Postoccipital and hypostomal sulci narrow, moderately developed; pleurostomal sulcus very weak; parafrontal suture weak, disappearing in upper portion. Labrum brown above, whitish below,

transverse, and broadly and very shallowly emarginate ventrally, with a number of punctures (some of them bear setae), with several conical papillae near ventral margin; palate with several punctures and dense spicules on ventral margin. Mouth parts brown; maxilla apically, prementum above whitish; maxillary and labial palps and galea dark brown. Mandible thick at base, narrower apically, with three teeth; all the teeth pointed apically; two subsidiary teeth set back from apex; one of subsidiary teeth long, as long as the main tooth, the other being much shorter. Maxilla pear-shaped, moderately developed, with sparse setae; upper face with dense spicules apically pointed. Maxillary palp slender, with 4 minute apical sensilla. Galea variable in shape, with 4 or 5 apical sensilla; each sensillum usually located on a separate lobe; division of lobes usually weak, but one or two lobes often sharply separated. Prementum subcircular; labial palp with 4 apical sensilla; area around palp with about 15–20 setae (some are bifid or trifid apically); remaining portion of prementum with sparse setae. Postmentum small, with several setae.

*Body.* Whitish yellow in color; integument not granulate, with sparse setae and rather dense spicules, which are usually rounded apically or tubercle-like and not contiguous to form rows. Venter of thoracic segments with sparse punctures bearing quite minute setae, without spicules; that of A1 with sparse setae (some are very long, as long as those on frons), covered with rather dense spicules. Venter of A2–A8 with sparse setae and dense spicules, some spicules being pointed apically; venter of A9 and A10 with sparse setae, without spicules. Dorsum of each segment generally similar to venter of the segment, but dorsal surface of thoracic segments with rather dense tubercle-like spicules; setae on dorsum of A1 not long. First spiracle in size nearly the same as the second, which is slightly larger than the rest; atrium bare; primary tracheal opening distinctly smaller than atrial opening. Leg and wing bud plates and subgenital plates rather distinct even in the specimens not stained.

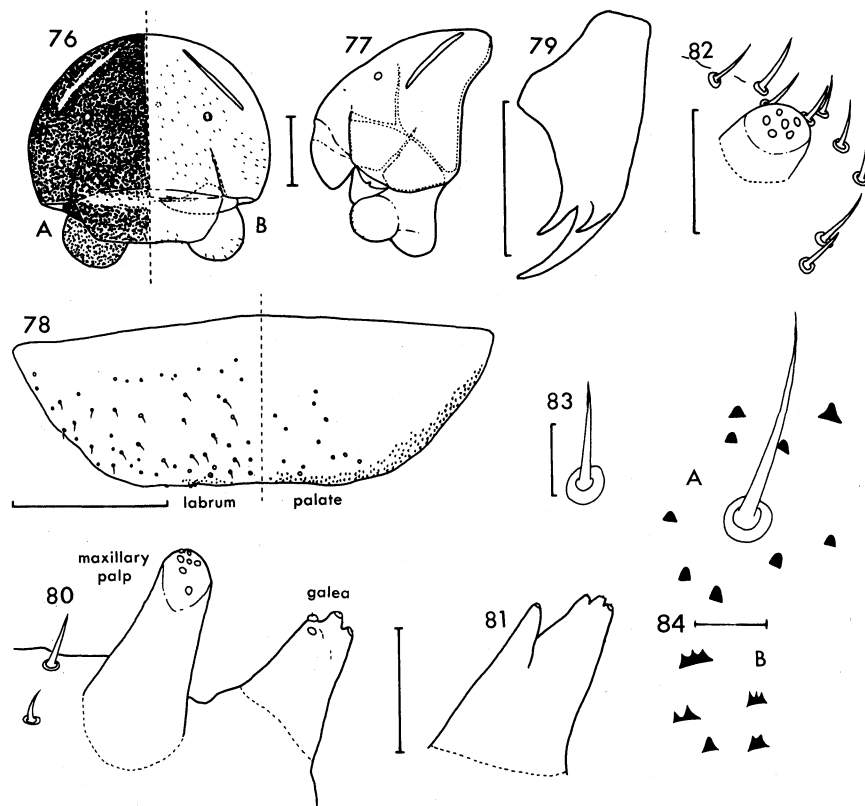
*Remarks.* Based on the adult morphology, BEQUAERT (1934) noted that *P. strigosus* is close to *P. sagittarius*. They are similar to each other also in larval morphology (for the larva of *P. sagittarius funebris* from the Philippines, see KOJIMA (1984b)). A difference is represented in the shape of galea; it is slender and simple in shape in *P. sagittarius*, but rather complicated in *P. strigosus*.

***Polistes (Nygmpolistes) tenebricosus hoplites* BEQUAERT**

(Figs. 76–84)

*Specimens examined.* Some mature larvae from a nest, Batusangkar–Padang Panjang, Sumatera Barat, 23 Oct., 1980, R. OHGUSHI leg.

*Head.* Cranium dark brown; parietal band, ecdysial sulcus and mouth parts pale brown; prementum whitish above. Integument of cranium strongly sclerotized, weakly granulate; frons, clypeus and pleurostoma sparsely punctate; the punctures bearing strong setae; gena and vertex hardly punctate. Cranium in frontal view hemispherical, about 5/4 times as wide as high, in profile slightly emarginate posteriorly. Ecdysial sulcus distinct,



Figs. 76–84. Mature larva of *Polistes (Nygmpolistes) tenebricosus hoplites*. 76. Head in front—A: Coloration; B: External structure. 77. Head in profile. 78. Labrum and palate. 79. Mandible. 80. Maxillary palp and galea. 81. Galea with a lateral lobe. 82. Labial palp and setae around it. 83. Setae on frons. 84. Setae and spicules on venter of T3 (A), and venter of A10 (B). Scale lines: 1mm (76, 77), 0.5mm (78, 79), 0.1mm (80–82), 0.02mm (83, 84).

narrow. Parietal band narrow and rather short; outer one-third weakly granulate. Frons not defined. Antenna small, flat, with 3 minute sensilla. Clypeus about half as wide as cranium, hardly emarginate ventrally. Postoccipital and hypostomal sulci narrow, moderately developed; pleurostomal sulcus very weak; parafrenal suture weak. Anterior tentorial pit small and rather weak. Labrum transverse, rectangular in outline, about 3 times as wide as high in frontal view, not emarginate ventrally, with sparse punctures (some bear setae), with a few small conical papillae and dense spicules near ventral margin; palate with several punctures and dense spicules on ventral margin and on the sides. Mandible rather thick, pointed apically, with two subsidiary teeth well set back from apex; the subsidiary teeth nearly the same in size each other. Maxilla pear-shaped, rather developed, with sparse strong setae and dense spicules on upper face. Maxillary palp slender and simple, with 6 to 8 apical sensilla, usually distinctly divided into two lobes; smaller lobe with an apical sensillum. Prementum subcircular; labial palp with 6 apical sensilla; area around palp with about 10 setae, which are not bifid; remaining portion of prementum with sparse setae. Postmentum small, with a few setae.

*Body.* Whitish yellow in color, integument not granulate. Venter of T1 with apically rounded spicules on the posterior margin, with sparse strong setae in the middle; that of T2–A2 with sparse rather long setae and densely covered with spicules, most of which are rounded apically; spicules on venter of A3–A6 much sparse; A7–A9 almost without spicules; venter of A10 with sparse setae, without spiculae. Dorsum of each segment similar to its ventral surface, but dorsum of T1 covered with dense, apically rounded spicules over the surface; some spicules on abdominal segments ridge-like and/or dentate apically; dorsum of A10 with sparse spicules, which are pointed apically and sometimes contiguous to form short rows. First spiracle slightly larger than the rest; atrium bare; primary tracheal opening distinctly smaller than atrial opening. Leg and wing bud plates, and subgenital plates small, distinct even without staining.

*Remarks.* The larva of *P. tenebricosus hoplites* is the same as that of *P. t. nigrosericans* from the Philippines (KOJIMA, 1984b) except the following details: cranium in frontal view more transvers in *nigrosericans*; labrum is broadly and shallowly emarginate ventrally in *nigrosericans*, while not emarginate in *hoplites*; one of the setae around the labial palp is bifid in *nigrosericans*, while no bifid setae are observed in *hoplites*.

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## Appendix

### List of species of Old World and Oceanian Polistinae whose larvae are described and/or illustrated in the literature

WHEELER & WHEELER (1979) listed the species of eusocial wasps and bees of the world, whose larvae had been described and/or illustrated. Their list seems to well cover the New World polistine species. However, some Old World species were overlooked, and the larvae of more than 20 additional species have been described thereafter. Here, we present a list of Old World and Oceanian polistine species for which the larval morphology is more or less known.

### Genus *Polistes*

This large cosmopolitan genus consists of about 150 species which are assigned to 11 subgenera (RICHARDS, 1971, 1973). Of these, six subgenera (ca. 75 species) are distributed in and endemic to the Old World. Among the Old World species, none of the subgenera *Stenopolistes* and *Gyrostoma* has been described for the larvae. A closely allied social-parasitic genus, *Sulcopolistes*, has not been known for its larval morphology.

The mature larvae of the following species have been described.

#### Subgenus *Polistes*

*biglumis* (LINNAEUS). \* YAMANE, 1976: figs. 8–11 (Hokkaido, Japan).

*gallicus* (LINNAEUS). GIORDANI-SOIKA, 1934: 340, fig. 10; PELTRERA, 1935: 133–138, 2 pls.; REID, 1942: 305–306, figs. 67–68; PARKER, 1943: 619–624, figs. 1–10 (France).

#### Subgenus *Polistella*

*adustus* BINGHAM. YAMANE & YAMANE, 1979: 25–26, fig. 9 (Nepal).

*bambusae bambusae* RICHARDS. RICHARDS, 1978b: 10–11, in key (New Guinea).

*bernardi bernardi* LE GUILLOU. RICHARDS, 1978b: 10–11, in key (Australia).

*bernardi comis* CHEESMAN. RICHARDS, 1978b: 10–11, in key (New Guinea).

*humilis humilis* (FABRICIUS). RICHARDS, 1978b: 10–11, in key (Australia).

*manillensis* SAUSSURE. KOJIMA, 1984b: 357–359, figs. 18–27 (Luzon I., the Philippines).

*sagittarius funebris* BEQUAERT. KOJIMA, 1984b: 355–357, figs. 10–17 (Luzon I., the Philippines).

*stigma* (FABRICIUS). Present study (Sumatra).

*strigosus* BEQUAERT. Present study (Sumatra).

*P. spec.* YAMANE & OKAZAWA, 1981: 68–69, fig. 3 (New Guinea).

#### Subgenus *Megapolistes*

*olivaceus* (DEGEER). RICHARDS, 1978b: 10–11, in key; YAMANE & OKAZAWA, 1981: 65–67, fig. 1 (Fiji).

*rothneyi iwatai* VAN DER VECHT. YAMANE, 1976: fig. 12 (Japan).

*tepidus tepidus* (FABRICIUS). RICHARDS, 1978b: 10–11, in key.

*tepidus malayanus* CAMERON. YAMANE & OKAZAWA, 1981: 67–68, fig. 2 (New Guinea).

#### Subgenus *Nygmopolistes*

*tenebricosus hoplites* BEQUAERT. Present study (Sumatra).

*tenebricosus nigrosericans* BEQUAERT. KOJIMA, 1984b: 353–355, figs. 1–9 (Luzon I., the Philippines).

### Genus *Parapolybia*

The genus is distributed in Iran in the west to Japan, the Philippines, and New

\* This may be a new form closely allied to *P. nimpha*.



Guinea in the east, and contains only three known species (VAN DER VECHT, 1966). Though YAMANE & OKAZAWA (1981) examined the larvae of *P. varia* FABRICIUS and *P. indica* SAUSSURE in the course of study on the larval characters of the Old World polistine species, no detailed description of larval morphology of this genus has been given.

#### Genus *Polybioides*

The genus is distributed in Africa and Indo-Malayan regions, consisting of six described species (VAN DER VECHT, 1966). The larval morphology has been briefly mentioned in the key to polistine genera by RICHARDS (1978a), and in the discussion on phylogenetic relations among the Old World genera by YAMANE & OKAZAWA (1981).

#### Genus *Belonogaster*

Up to the present 69 species are described in this genus. All species except *B. juncea* are confined to Africa (RICHARDS, 1982). The larval morphology is more or less known in the following species.

*clypeata* KOHL. DU BUYSSON, 1909: figs. 9, 10 in pl. 2.

*juncea* (FABRICIUS). ROUBAUD, 1916: fig. 33-1.

*juncea colonialis* KOHL. KOJIMA & KEEPING, in press (South Africa)

*lateritia* GERSTAECKER. WHEELER & WHEELER, 1979: 4, fig. 2 (Kenya).

*petiolata* (DEGEER). KOJIMA & KEEPING, in press (South Africa).

*vasseae* DU BUYSSON. DU BUYSSON, 1909: fig. 8 in pl. 2.

#### Genus *Ropalidia*

The genus is widely distributed in tropical and subtropical Old World and Oceania, consisting of probably more than 120 species. The genus is divided into six subgenera. The only subgenus for which nothing is known for the larval morphology is *Paraicaria*.

Species of which larvae have been described and/or illustrated are as follows.

##### Subgenus *Ropalidia*

*maculiventris* GUÉRIN. KOJIMA, 1984b: 359-361, figs. 28-33 (New Guinea).

##### Subgenus *Polistratus*

*bambusae* RICHARDS. RICHARDS, 1978b: 65, in key (New Guinea).

*melania* RICHARDS. RICHARDS, 1978b: 65, in key (New Guinea).

##### Subgenus *Anthreneida*

*erythrospila* (CAMERON). Present Study (Sumatra).

*latebaleata* (CAMERON). Present Study (Sumatra).

*sumatrae sumatrae* (WEBER). Present study (Sumatra).

##### Subgenus *Icariola*

*cineta* (LEPELETIER). WHEELER & WHEELER, 1979: 7-9, fig. 6 (Kenya).

*cyathiformis* (FABRICIUS). KOJIMA, 1984a: 50-52, fig. 1 (Luzon I., the Philippines).

- fasciata* (FABRICIUS). KOJIMA, 1984a: 53, fig. 3 (Palawan I., the Philippines); present study (Sumatra).
- gregaria* (SAUSSURE). RICHARDS, 1978b: 65, in key (Australia); KOJIMA, 1984a: 52–53, fig. 2 (Luzon I., the Philippines).
- horni* SONAN. KOJIMA, 1984a: 53–55, fig. 4 (Palawan I., the Philippines).
- jacobsoni* DU BUYSSON. Present study (Sumatra).
- kurandae* RICHARDS. RICHARDS, 1978b: 65, in key (New Guinea).
- marginata jucunda* (CAMERON). RICHARDS, 1978b: 65, in key (New Guinea); YAMANE & OKAZAWA, 1981: 69, fig. 4 (New Guinea).
- marginata sundaica* VAN DER VECHT. KOJIMA, 1984a: 55–56, fig. 5 (Luzon I., the Philippines).
- mathematica binotata* VAN DER VECHT. Present study (Java).
- plebeiana* RICHARDS. RICHARDS, 1978b: 65, in key (Australia).
- stigma stigma* (SMITH). Present study (Sumatra).
- stigma rufa* VAN DER VECHT. YAMANE & YAMANE, 1979: 9, fig. 2 (Nepal).
- turneri* RICHARDS. RICHARDS, 1978b: 65, in key (Australia); YAMANE & OKAZAWA, 1981: 69–71, fig. 5 (New Guinea).
- variegata variegata* (SMITH). YAMANE & YAMANE, 1979: 13, fig. 2 (Nepal).

#### Subgenus *Icarielia*

- bensoni* RICHARDS. RICHARDS, 1978b: 65, in key (New Guinea).
- extrema* VAN DER VECHT. KOJIMA, 1982b: 114, 116, figs. 31, 34, 36–40, 42 (Luzon I., the Philippines).
- flavobrunnea lapiniga* KOJIMA. KOJIMA, 1982b: 122, fig. 33 (Leyte I., the Philippines).
- flavobrunnea iracunda* KOJIMA. KOJIMA, 1982b: 123 (Mindanao I., the Philippines).
- flavopicta flavopicta* (SMITH). Present study (Sumatra).
- nigrescens* VAN DER VECHT. KOJIMA, 1982b: 118, figs. 32, 35, 41 (Luzon I., the Philippines).
- romandi cabeti* (SAUSSURE). RICHARDS, 1978b: 65, in key (Australia).