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A new species of *Pygoplatys* Dallas (Heteroptera, Tessaratomidae) from the Damar agroforests in Sumatra: description, immatures and biology

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Summary.– *Pygoplatys tenangau* n. sp. is described from south Sumatra (Lampung Province, Krui area) on *Shorea javanica* Koorders& Valeton (Dipterocarpaceae), a tree locally called "damar" and exploited for resin production. Adult and all five instar nymphs are illustrated as well as male and female genitalia which are compared with those of *P. validus* Dallas. Biological observations made in the damar agroforests are reported. Adults and immatures feed on the young shoots and leaves of the trees. *P. tenangau* n. sp. exhibits maternal care of eggs and nymphs. The first instar nymphs clinging on the ventral face of the female abdomen are phoretic for at least a period of two weeks after hatching.

Résumé.– *Pygoplatys tenangau* n. sp. est décrit du sud de Sumatra (Province de Lampung, région de Krui) sur *Shorea javanica* Koorders & Valeton (Dipterocarpaceae), un arbre localement appelé «damar» exploité pour la production de sa résine. L'habitus de l'adulte et celle des immatures à tous les stades sont illustrés, ainsi que les genitalia mâles et femelles qui sont comparés à ceux de *P. validus* Dallas. Les observations biologiques faites dans les agroforêts à damar sont données. Adultes et immatures se nourrissent sur les pousses et jeunes feuilles de l'arbre. La femelle de *P. tenangau* n. sp. prend soin de ses oeufs et des jeunes de premier stade. Après l'éclosion, ceux-ci sont phorétiques pendant au moins deux semaines, cramponnés à la face ventrale de l'abdomen de la femelle.

Key-words.– Tessaratomidae, Tessaratominae, *Pygoplatys tenangau* n. sp., reproductive biology, maternal care, nymphal phoresy, *Shorea javanica*, Dipterocarpaceae, damar agroforest, Sumatra.

The present paper results from biological and ecological studies carried out by one of us (K.S.) in 2001 in south Sumatra (Lampung Province, Krui area) in agroforests based on the exploitation of resin from a local tree, *Shorea javanica* Koorders & Valeton

(Dipterocarpaceae), locally called "damar", a general Indonesian term for resin (FORESTA & BOER, 2000). The damar agroforests, also called "damar gardens", are a model of sustainable development (MICHON *et al.*, 2000). The data obtained during this investigation have been the subject of an unpublished dissertation (SMETS, 2002) and of a short communication during the 9th Benelux Congress of Zoology (SMETS *et al.*, 2002). Among the insects reported by the local farmers as having a potential negative impact on the resin production were several tessaratomid species: *Pygoplatys minax* Vollenhoven and *Pycanum rubens* (Fabricius). But the most important potential pest for the damar agroforest appeared to be a species of *Pygoplatys* Dallas very common in the agroforests, recognized as a new species.

We describe here this new species and give a summary of the main biological observations made in the damar agroforests; these data are taken from SMETS (2002). According to the catalogue of Tessaratomidae (ROLSTON *et al.*, 1994), *P. tenangau* n. sp. brings the number of species at present known in the genus *Pygoplatys* to 25.

Material and methods

The damar agroforests are located on the extreme south of the west coast of Sumatra (Indonesia), in West-Lampung, also called the "Pesisir". Annual rainfall is high, between 3000 and 4000 mm, and the dry season (July-August) is short. Temperatures are fairly constant around 28° C. The natural vegetation is the typical tropical lowland and hill rain forest. The damar agroforests are found in the western foothills of the Barisan mountains (alt. 2000 m) and cover presently at least 50 000 ha (MICHON *et al.*, 2000). This agroforestry system is based on the exploitation of resin from the indigenous dipterocarp tree, *Shorea javanica* Koorders & Valeton (damar) which is produced by the tree in response to holes cut in the trunk, and is sold for the production of paint. *Shorea javanica* is the dominant tree in the damar gardens (65% of all trees), but many other tree species (mainly fruit and timber trees) are also present, and form a closed canopy, which gives this agroforestry system a close structural similarity with natural forest. Biodiversity studies on various plant and animal groups showed relatively high biodiversity levels in mature damar gardens as compared with natural forest (MICHON & FORESTA, 1995).

Almost all the material studied in this paper was collected in 2001 (July-November) by one of us (K. S.) in damar agroforests of the Pesisir area, largely in the mature damar agroforests of the village Pahmungan near the town of Krui.

Observations on the biology and behaviour of *P. tenangau* n. sp. were done in situ in the damar agroforest on several hundred specimens. Particular feeding, mating or egg depositing sites were visited daily or twice daily. Egg deposition and guarding was observed from ca. 100 females. Mosquito-netting bags were placed in the forest around a small number of leaves with *P. tenangau* n. sp. eggs (with and without the female guarding the eggs). Most egg patches were studied without trapping the female, i.e. under natural conditions.

Collections were prospected in several institutions in order to find other specimens of the new species: BMNH, BPBM, ISNB, MNHN, MZBC, RMBR, RMNH (see below for abbreviations). The type material housed in BMNH has been examined, especialy the types of *P. validus* Dallas, 1851 and *P. merinjakensis* Distant, 1914.

Pygophore and female abdomen were dissected after clearing in cold potassium hydroxyde for several days. Phallus was inflated with the use of forceps. Examination of genitalia was conducted in glycerol using a semi-covered cavity slide as described in van DOESBURG (2004). Chlorazol black has been used for better contrast of membranous processi of phallus and spermathecal duct.

Abbreviations:

BMNH	Natural History Museum, London, UK;
BPBM	Bernice P. Bishop Museum, Honolulu, Hawaii, USA;
CWS	Carl W. Schaeffer Collection, USA;
DAR	David A Rider Collection, North Dakota State University, USA;
ISNB	Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium;
MNHN	Muséum National d'Histoire Naturelle, Paris, France;
MZBC	Museum Zoologicum Bogoriense, Cibinong, Indonesia;
NHRS	Naturhistoriska Riksmuseet, Stockholm, Sweden;
PHM	Philippe Magnien Collection, Paris, France;
RMBR	Raffles Museum of Biodiversity Research, Singapore;
RMNH	Nationaal Natuurhistorisch Museum, Leiden, The Netherlands.

***Pygoplatys tenangau* n. sp.**

HOLOTYPE ♂, Sumatra, Lampung, Krui, Pahmungan, Damar Garden, 2-X-2001 *K. Smets* leg. (MZBC).

Paratypes: 132 specimens from: "Sumatra, Lampung, Krui, *K. Smets* leg." in the following Institutions as follow:

1 ♂, 3 ♀♀, Pahmungan, Damar garden, 1-VII to 15-VII-2001 (ISNB); 1 ♂, id. (MNHN); 1 ♀, Penengahan, Damar garden 14-VII-2001 (MNHN); 1 ♂, Rata Agung, coffee garden, 18-VII-2001, on *Shorea javanica* (MZBC); 1 ♀, Pahmungan, Damar garden, 4-VIII-2001 (ISNB); 1 ♂, id. (MNHN); 1 ♀, id., on *Shorea javanica* (MZBC); 1 ♀, same locality, 10-VIII-2001, on *Lancium domesticum* (MZBC); 1 ♀, id., on *Coffea sp.* (MZBC); 1 ♀, same locality, Damar garden, 11-VIII-2001 (MZBC); 1 ♀, same locality, 12-VIII-2001, on *Lancium domesticum* (ISNB); 1 ♀, id., on *Pterospermum sp.* (MZBC); 1 ♀, id., on *Artocarpus domesticus* (MZBC); 2 ♀, same locality, 13-VIII-2001, on *Pterospermum sp.* (ISNB); 1 ♀, id., dead on ground (MZBC); 1 ♀, same locality, 14-VIII-2001, on *Pericampylus sp.* (MZBC); 1 ♀, same locality, 15-VIII-2001 (MZBC); 1 ♂, same locality, 20-VIII-2001, on *Shorea javanica* (MZBC); 1 ♀, same locality, 23-VIII-2001, on *Pterospermum sp.* (ISNB); 1 ♂, same locality, 25-VIII-2001, on *Shorea javanica* (MZBC); 1 ♀, same locality, 2-IX-2001 (MZBC); 1 ♀, same

locality, 3-IX-2001, on *Leea indica* (MZBC); 1 ♀, same locality, 4-IX-2001 (MZBC); 1 ♀, id., on *Citrus sp.* (MZBC); 1 ♂, id., dead on ground (MZBC); 2 ♀♀, same locality, 5-IX-2001 (ISNB); 1 ♀, id., on *Coffea sp.* (MZBC); 1 ♀, id., on *Vitex pinnata* (MZBC); 1 ♀, id., on *Homalorithus populneus* (MZBC); 1 ♀, id., on *Pterospermum sp.* (MZBC); 1 ♀, id., on *Leea indica* (MZBC); 2 ♀♀, same locality, 6-IX-2001 (ISNB); 1 ♀, id., on *Pterospermum sp.* (MZBC); 1 ♀, same locality, 9-IX-2001, on *Pterospermum sp.* (MZBC); 1 ♀, same locality, 18-IX-2001, on *Shorea javanica* (ISNB); 1 ♂, same locality, 20-IX-2001 (MZBC); 1 ♂, id., on grass (MZBC); 1 ♂, id., on *Piper sp.* (MZBC); 1 ♂, id., on *Erythrina sp.* (MZBC); 1 ♂, 1 ♀, same locality, 23-IX-2001 (ISNB); 1 ♀, id., on *Shorea javanica* (MZBC); 1 ♀, same locality, 26-IX-2001 (MZBC); 1 ♂, 1 ♀, same locality, 27-IX-2001 (ISNB); 1 ♀, id., on *Pithecellobium clypearia* (MZBC); 3 ♂♂, 1 ♀, same locality, 29-IX-2001 (MZBC); 2 ♀♀, same locality, 30-IX-2001 (ISNB); 1 ♂, same locality, 1-X-2001 (MZBC); 2 ♂♂, 1 ♀, id., on *Shorea javanica* (ISNB), 1 ♂, id., on *Pterospermum sp.* (MNHN); 12 ♂♂, 6 ♀♀, same locality, 2-X-2001 (ISNB); 2 ♂♂, 2 ♀♀, same locality, 2-X-2001 (MZBC); 1 ♂, 1 ♀, id. (RMNH); 1 ♂, 1 ♀, id. (NHRS); 1 ♂, 1 ♀, id. (RMBR); 1 ♀, id. (MNHN); 1 ♂, 1 ♀, id. (CWS); 1 ♂, 1 ♀, id. (DAR); 2 ♂♂, 2 ♀♀, id. (PHM); 1 ♂, 1 ♀, same locality, 4-X-2001 (ISNB); 1 ♂, id., bred from nymph (MZBC); 1 ♂, Rata Agung, Coffee-Damar garden 7-X-2001, on *Coffea sp.* (MZBC); 2 ♂♂, 1 ♀, id., on *Shorea javanica* (ISNB); 1 ♂, Sukamarga, Coffee-Damar garden 31-X-2001, on *Shorea javanica* (MZBC); 1 ♀, id. (MNHN); 1 ♀, same locality, 2-XI-2001 (MZBC); 3 ♂♂, 1 ♀, id., on *Shorea javanica* (ISNB); 1 ♂, Pahmungan, Damar garden, 5-XI-2001, dead (MZBC); 1 ♂, 1 ♀, same locality, 8-XI-2001 (MZBC); 2 ♂♂, 2 ♀♀, same locality, on *Shorea javanica*, 11-XI-2001 (ISNB); 3 ♀♀, same locality, 13-XI-2001 (ISNB); 1 ♀, same locality, 14-XI-2001 (MZBC); 2 ♀♀, Ngaras, Damar garden, 15-XI-2001 (MZBC); 1 ♂, 1 ♀, Way Jambu, Damar garden, 18-XI-2001 (ISNB); 1 ♀, Pahmungan, Damar garden 19-XI-2001 (MZBC); 2 ♀♀, id., on *Shorea javanica* (ISNB).

Other paratypes: 1 ♂, Borneo [no other indication] (ISNB); 1 ♂, 1 ♀, Sumatra, Lampung Krui, Pahmungan, 24-VII-1987, on Shorea javanica, *A. C. Messer* leg. (BMNH); 1 ♀, Sumatra Atjeh G. Gurah., 22-III-1954, A. H. G. Alston B. M. 1954-414.

Other material examined: about 40 specimens of the same localities deposited in MNHN, MZBC and PHM were not designated as paratypes because of immaturity or difformities.

Description.– Habitus: see Plate I, A, B.

Dorsum light chocolate brown. Head paler on clypeus and at the apices of jugae. Pronotum shiny, with metallic greenish ponctuation in vivo, and tranverse paler ochraceous stripe just behind calli, extending onto anterior margin of humeral processi and reaching their apices. Hemelytra of the same hue, somewhat paler, matte. Laterotergites and 8th tergite of the background color, with dark tinges on the margins. Tergites 2 to 7 velvet like purplish red, smooth and shiny in the middle.

Underside reddish-ochraceous to brick rose, of paler hue than dorsum, shiny. Coxae and legs of the same coloration. Stigmates black.

Head. Juga concave, apices rounded surpassing widely the apex of clypeus; clypeus completely enclosed; first article of antennae almost reaching the apices of jugae, articles II and III cylindrical and subequal in length, last article fusiform and somewhat longer than II and III. Pilosity dense, hairs short. Rostrum short, slightly surpassing the anterior coxae.

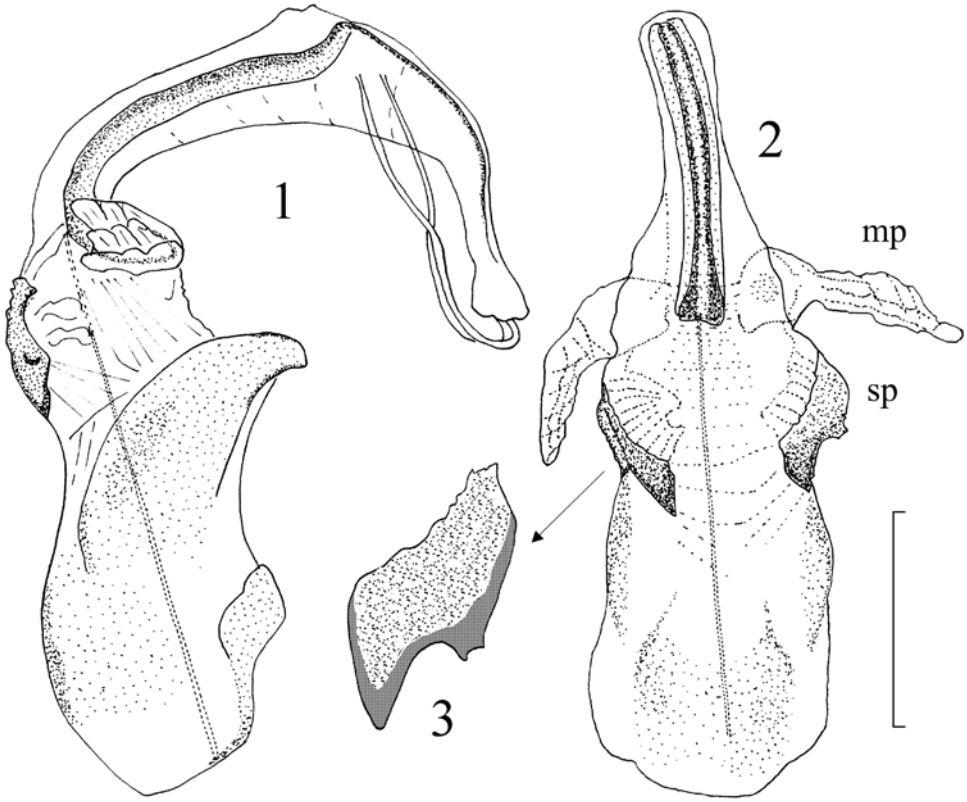

Fig. 1-6.– Male genitalia of *P. tenangau* n. sp.: 1.– phallus (everted), lateral view; 2.– idem, ventral view; 3.– detail of the stylet; 4.– right paramere; 5.– left paramere; 6.– pygophore, dorsal view. Scale bar: 0,5 mm. mp: postero-dorsal membranous processus; sp: antero-ventral sclerotized processus.

Pronotum. Humeral processi exceeding well beyond the abdomen width, margins almost parallel, slightly projected forwards, apex obliquely truncated. Width of pronotum, including humeral processi, on average slightly more than 73 % (min: 68 %, max 82 %) of the habitus length in the male, equal to 73 % (min: 67 %, max 78 %) in the female; anterior calli clearly marked; anterior margins serrulate; disk punctation strong and irregular,. Scutellum: punctation as on pronotum, triangular with apex grooved and lanceolate. Hemelytra: punctation fine and regular; membrane with five or six basal cells, nervures parallel. Sternal process long, apex blunt, reaching base of head in ventral view. Sternum punctation sparse, very coarse on prosternum.

Ventral apex of each meso- and metafemur with spines on both sides of tibiae insertion; tibiae pilosity dense and short; segment I of tarsi inflated, with brush of adhesive hairs on the ventral surface, segments II and III cylindroconical, II two times shorter than the III.

Abdomen: apex of abdomen rounded in the male, toothed with apices of 7th, 8th and 9th segments almost in line for female. Punctation on sternites fine and concolorous, coarse and blackened on lateral margins.

Genitalia. ♂. Pygophore (Fig. 6) widening posteriorly, posterior edge polygonal, with a small V-shaped notch medially; opening with a tooth at the interior margin just in front of the sensorial lobe of the paramere. Parameres (Fig. 4-5) shaped in triangular blade, regularly curved insidewards, sensorial lobe relatively small, with very long setae. Phallosoma (Fig. 1) with sclerotized lateral hook-shaped plates on each side; conjunctiva with two pairs of processes: a sclerotized pair in antero-ventral position, stylet shark tooth-shaped (Fig. 3), and a membranous pair in postero-dorsal position, as is the rule in the genus. Vesica very long, ejaculatory chamber strongly curved at base, S-shaped in the middle, strongly tapering at the apex. ♀. External genitalia as in Fig. 15. Ring sclerites obsolete or absent. Spermatheca (Fig. 13): apical receptacle ovoid connected to the intermediate part (pumping region) by a long distinctly curved tubular neck; intermediate part with proximal and distal flanges; spermathecal duct bipartite: the posterior part wide and folded, somewhat narrowed near the posterior third; the anterior part long and thin, longer than the posterior part.

Measurements [mean (min-max)]: **male**: length = 22,2 mm (19,0-24,0), width including humeral processi = 16,2 mm (13,0-18,7); **female**: length = 25,2 mm (21,8-27,6), width including humeral processi = 18,4 mm (15,3-20,2).

Derivatio nominis. From the local name 'tenangau" given by the damar farmers in the Krui area to the true bugs having a negative impact on the resin production.

Immatures.– The first- through fifth-instar nymphs of *P. tenangau* sp. are here illustrated (Fig. 16) from specimens preserved in alcohol. Nymphs are very flat in all instars. Body oval in the first and second instar, almost rectangular in the following instars. General coloration: beige to light brown, dorsally and ventrally; only the third- and fourth-instars brightly colored on the dorsal surface of abdomen and thorax: red or deep pink, with white and black pattern (Plate I, C). Outer margin of thorax and abdomen serrated and bordered by a thin dark pigmented strip in all instars. Identations of the outer margin formed by small tubercles bearing very minute setae (Fig. 16D). Same type of setae on tubercles scattered throughout the body. Lateral part of the thorax, laterotergites and laterosternites unpigmented, hyaline. Marginal "plates" on connexivum in the form of semicircular areas well delimited, usually transparent to translucent, never pigmented. Dorsal scent gland opening between terga III-IV, IV-V, V-VI; distinctly prominent in the median and posterior glands.

Host plant.– Until now, *Shorea javanica* Koorders & Valeton (Dipterocarpaceae) is the only known host plant allowing the full life cycle of the new species. On only three occasions, adults of *P. tenangau* n. sp. were seen feeding on other plants: *Pericampylus* sp. (Menispermaceae: atypical feeding on the upper side of an old leaf), *Pterospermum javanicum* (Sterculiaceae: female guarding eggs) and *Vitex pinnata* (Verbenaceae: trapped female with phoretic nymphs).

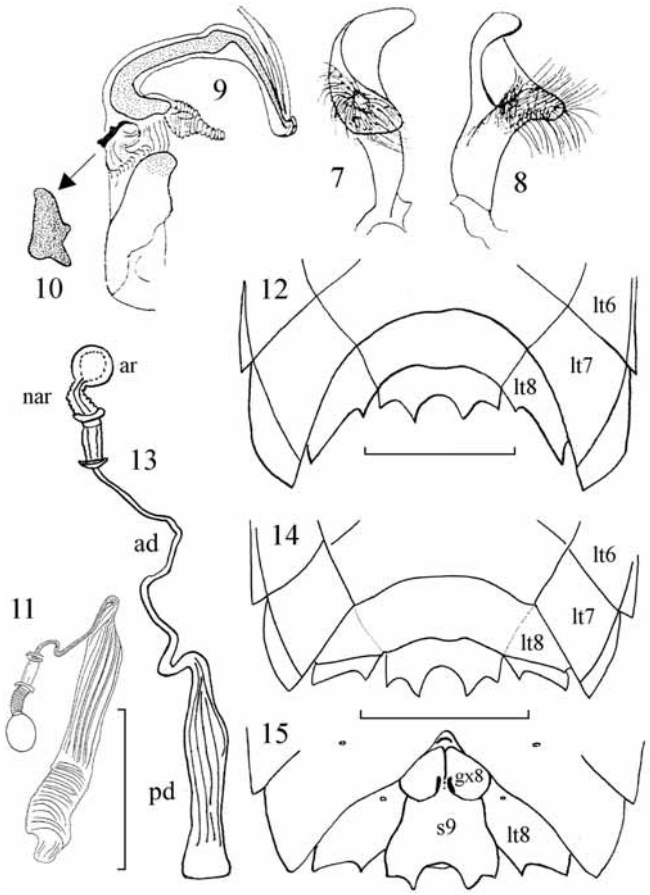

Fig. 7-12.– Male and female genitalia of *P. validus* (after Kumar & Ghauri, 1970): 7.– right paramere; 8.– left paramere; 9.– phallus, lateral view; 10.– detail of the stylet; 11.– spermatheca; 12.– apex of the female abdomen, dorsal view.

Fig. 13-15.– Female genitalia of *P. tenangau* n. sp.: 13.– spermatheca; 14.– apex of abdomen, dorsal view; 15.– id., ventral view. Scale bars: 2,5 mm (Fig. 13); 5 mm (Fig. 12, 14-15). ad: anterior part of the spermathecal duct; ar: apical receptacle; gx8: gonocoxite 8; lt 6, 7, 8: laterotergite 6, 7, 8; nar: neck of apical receptacle; pd: posterior part of the spermathecal duct.; S 9: 9th segment.

Distribution.– *P. tenangau* n. sp. is known with certainty only from Sumatra and Borneo. Apart from the only male specimen from Borneo and one female from Aceh Province, all specimens mentioned in this paper originate from the Krui region, encompassing the whole Pesisir area, from Rata Agung near the Province of Bengkulu in the north, to Sukamarga in the south. Therefore the distribution seems to include at least the entire west coast of Sumatra and an undetermined region of Borneo.

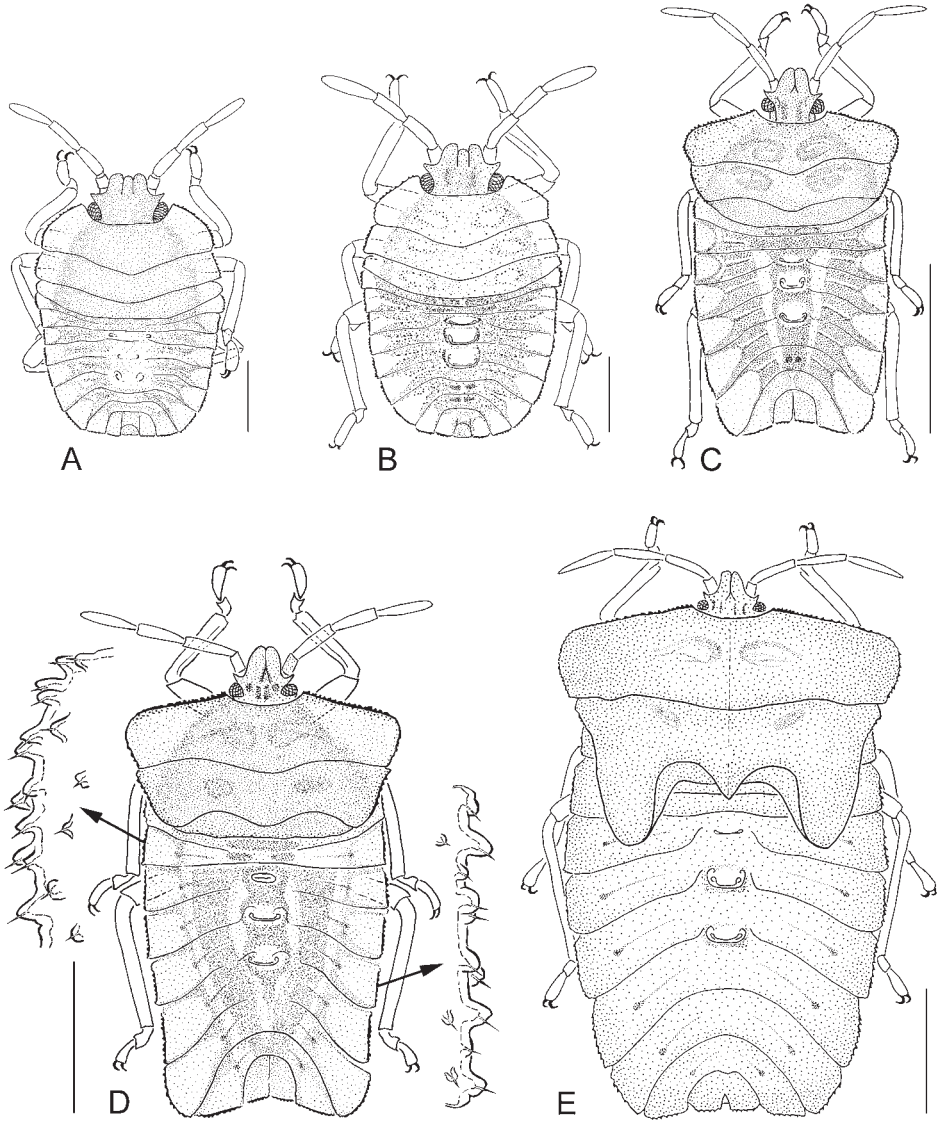

Fig. 16.– Immatures of *P. tenangau* n. sp.: first- (A), second- (B), third- (C), fourth- (D) (with detail of the lateral margin), and fifth-instar nymphs (E). Scale bars: 1 mm (A, B); 5 mm (C, D, E).

The presence of *P. tenangau* n. sp., suspected from Peninsular Malaysia and North Borneo (Sarawak), needs confirmation, as old female specimens from these localities preserved in several institutions (BMNH, MNHN, RMNH, ISNB) could not be formally identified.

Biological observations.– Adults and nymphs of different instars have been seen feeding on young shoots and leaves of damar (*Shorea javanica*) trees. The feeding occurs usually on the midribs and leaf stalks of very young (still folded and hanging) leaves and shoots, while the bugs sit on the underside of the leaf or on the twig. It could be observed on young damar trees from about one to five meters high. We did not attempt observations higher up in the canopy, but during sudden gusts of wind, many nymphs fell from the canopy of damar trees, suggesting they also feed on large trees. Feeding was observed continuously during the whole of the observation period (i.e. from July to November 2001).

Mating usually takes place on the feeding site (young damar leaves and shoots), and lasts for several hours, male and female being in the end-to-end position. Very often at least one of the bugs feeds during mating.

Eggs are laid on a wide variety of plants in the understorey (on *Shorea javanica* as well as many others), mostly on the upper side of the leaves. Over 40 different plant species were recorded for ovipositing. Eggs are laid continuously during two or three days and glued on the leaf in usually hexagonal clusters of about 70 to 120 eggs.

The female *P. tenangau* n. sp. sits on the leaf covering the eggs with her body, even after egg laying is finished. The females stay on the eggs and defend them under all circumstances. When approached too closely, almost all project a spurt of defensive liquid towards the attacker. Some also buzz their wings. When held by hand, they hold on to the leaf with their claws and have to be taken away from their eggs by force. Slightly yellowish, soon turning white (after ± 1 day), then pink, the eggs begin to darken further after four to five days and hatch in about nine to eleven days.

Hatching was observed in the early morning hours. The nymphs hatch and crawl up under the abdomen of the female in a matter of minutes. Newly hatched nymphs are yellow-orange, turning red after about an hour and eventually black with markings. They hold on to the abdominal segments of the female or to each other. After all the nymphs have hatched (a process of up to 3-4 days), the female bears a large compact cluster of phoretic nymphs under the abdomen from the apex of the abdomen to just behind the posterior coxae. This allows the female to still walk and usually also to fly. After hatching is finished, it stays on the leaf for a period of up to two days before crawling or flying away with the nymphs. Some females were observed flying straight up into the upper storey of the damar agroforest.

Phoretic nymphs in the damar garden were able to stay alive for more than two weeks in mosquito-netting bags. They were observed staying under the abdomen of the female for at least 17 days. Hatched nymphs in the laboratory were unable to survive for more than 4-5 days. They stay together for a few days in a compact ball on, or near, the egg

cluster. When the female was taken with them, they stay phoretic as long as the female is alive.

Many nymphs of different stages were observed in the damar agroforest feeding on *Shorea javanica*, crawling around the ground or on plants, sitting on the leaves, moulting on and under leaves. Nymphs were sometimes seen racing up plant stems and tree trunks. They crawl up the tree trunk at a speed of 1 to 2 m/min and disappear into the canopy. Aggregations of last instar nymphs were observed in certain areas of the damar agroforest. The last three instar nymph seem to be able to direct their ejection of defensive fluid by moving their abdomen in the direction of the attacker.

It can be deduced from the field observations of beginning of egglaying and first eclosion of adult that the postembryonic development lasts at least two months.

Damage.– The defensive secretions of nymphs as well as adults cause browning and necrosis on young shoots and very young leaves after one day. The amount of production loss estimated by farmers varies from 20% to 60% less damar resin production until new leaves have grown. The defensive secretions can cause staining and burning of human skin, and severe burning of human eyes. Since the repugnatorial fluid is discharged in a strong horizontal backward jet, and does not have the typical bug smell, it is likely that it is not discharged from the scent glands of the bugs (adult metathoracic glands and nymphal dorso-abdominal glands), but instead from the rectum. However, the exact source of the fluid has not been verified in detail.

Enemies.– Predation by different species of ants was observed on nymphs trying to climb back on the trees. Ant predation was also observed on eggs, but only after the adult females were disturbed or removed. This latter observation seems to confirm the benefits of the maternal care against predation of eggs, although if in a few cases, undisturbed females have been found guarding empty eggs, which suggests that some predators are capable of stealing eggs even when the female is guarding them.

However, probably the most important factor in controling the bug populations is *Ooencyrtus* sp. n. near *caurus* Huang & Noyes, 1994 (Hymenoptera, Encyrtidae; det. J. Noyes, BMNH), which has often been observed ovipositing on the eggs of *P. tenangau* n. sp., undisturbed by the guarding female. *O. caurus* is very close but differs in a slightly narrower frontovertex and much deeper sculpture on the scutellum (J. Noyes, pers. comm. 2006). Voucher specimens of this undescribed species of *Ooencyrtus* have been deposited in BMNH, ISNB and MZB. The population of this wasp increased as the breeding season of the bug advanced.

Discussion

Pygoplatys tenangau n. sp. is a member of a group of species characterized by strong humeral processes having a straight apical truncature. This group includes up to now *P. validus* Dallas, 1851 and *P. merinjakensis* Distant, 1914. The latter, known only by the

type female, is a very curious stout species, which cannot be mistaken with any other species.

Pygoplatys tenangau n. sp. can be separated from *P. validus* by: (1) a significantly smaller size, the average being 22 (♂♂) and 25 mm (♀♀), never reaching 28 mm, whereas the size of *P. validus* is about 30 mm; (2) shorter humeral processi, just reaching the level of the anterior margin of pronotum in *P. tenangau* n. sp., exceeding the head in *P. validus*; (3) the posterior margin of the laterotergites 7 and 8 in the female: not prominent in *P. tenangau* n. sp. (Fig. 14) as it is the rule in all other species of the genus, markedly protruding posteriorly in *P. validus* (Fig. 12).

Differences are also observed in the genitalia between *P. tenangau* n. sp. and *P. validus*. In the male, the most obvious is the shape of the lateral sclerotized plates of the phallosoma: its apex is sharp, hook-like in *P. tenangau* n. sp. (Fig. 1), wide and rounded in *P. validus* (Fig. 9). In the female, the spermatheca presents some minor differences: – the length of anterior part of the spermathecal ductus is longer than that of posterior part in *P. tenangau* n. sp. (Fig. 13), whereas it is much shorter in *P. validus*; also the neck of the apical receptacle is somewhat more curved in *P. tenangau* n. sp. than in *P. validus*.

All nymphal instars are here illustrated for the first time for any *Pygoplatys* species. In other representatives of Tessaratomini, immatures are known within the Tessaratomaria only for some species of *Tessaratoma* Berthold (see for instance SCHOUTEDEN, 1905; KERSHAW, 1907; FALKENSTEIN, 1931) and within the Eusthenaria, in *Eusthenes*, *Mattiphus* and *Pycanum* (MILLER, 1934). All nymphs exhibit great similarities, including flattened body, serrated lateral margins, and warningly coloured abdomen.

Pygoplatys tenangau n. sp. is the only known tessaratomine species whose host is a Dipterocarpaceae tree. Tessaratomidae have been recorded from several plant families (SCHAEFER & AHMAD, 1987; MONTEITH, 2006); among them, Sapindaceae (and the order Sapindales) was thought to be an early food group for the Tessaratomid family. *Pygoplatys tenangau* n. sp. seems to be very well adapted to *Shorea javanica* trees growing in the agrosystem of damar gardens where apparently very good reproductive conditions exist. The species was not found in the adjacent primary forest of the Bukit Barisan Selatan National Park, where *Shorea javanica* also occurs, albeit in much lower proportions. Possible reasons are the lack of young *Shorea javanica* trees which can be easily checked for *Pygoplatys* bugs in the primary forest, and the limited amount of time that was spent in the primary forest. As some other tessaratomids, the bug can be considered a minor pest but, despite its very high fertility, it is unlikely that it will become a serious pest. The fact that *P. tenangau* n. sp. also occurs on the island of Borneo, where *Shorea javanica* is not present, indicates other possible host plants.

The maternal care of the eggs, exhibited by *P. tenangau* n. sp., although complex and dramatic, is not unexpected. Parental care is widely distributed in Heteroptera (TALLAMY & SCHAEFER (1997) cited egg-guarding in 19 families) and is particularly widespread in the Tessaratomidae. MONTEITH (2006) reviewed the different cases of maternal care in oncomerine Tessaratomidae and reported this behaviour with a range of complexity in five genera.

Maternal care of the young nymphs including nymphal phoresy seems less common. Such behaviour was reported by GOGALA *et al.* (1998) in three different *Pygoplatys* spp. in Southeast Asia (*P. acutus* Dallas, *P. lancifer* Walker and an unidentified species). We observed nymphal phoresy in *P. tenangau* n. sp. (this paper) and *P. minax* (SMETS, 2002). In the collection of the RMNH, a specimen of *P. subrugosus* Vollenhoven from Buru was found with a note saying "nymphs under the belly of the female", while in the BMNH collection, nymphs and partly hatched eggs are conserved with a female specimen of *P. longiceps* Stål from the Philippines. This seems to corroborate the suggestion of GOGALA *et al.* (1998) that maternal care could be a characteristic behaviour for the genus *Pygoplatys*, as it has now been observed in up to seven *Pygoplatys* species. The very large egg clutch size of *Pygoplatys* species, as compared to that of oncomerine Tessaratomidae cited in MONTEITH (2006), could indicate that *Pygoplatys* females invest all of their reproductive effort into one single egg cluster, which explains their persistent protection of this egg cluster.

SINCLAIR (2000) and MONTEITH (2006) report nymphal phoresy in three oncomerine species (*Garceus fidelis* Distant, *Cumare pallida* Blöte and *Peltocopta crassiventris* (Bergroth)). Nymphal phoresy is also known in the South-American family Phloeidae (Pentatomoidea) (BRIEN, 1923; LENT & JURBERG, 1966; GUILBERT, 2003). This behaviour could be a mere convergence in both families; however it should be remembered that Tessaratomidae and Phloeidae share several morphological characters and possible synapomorphies (LESTON, 1954).

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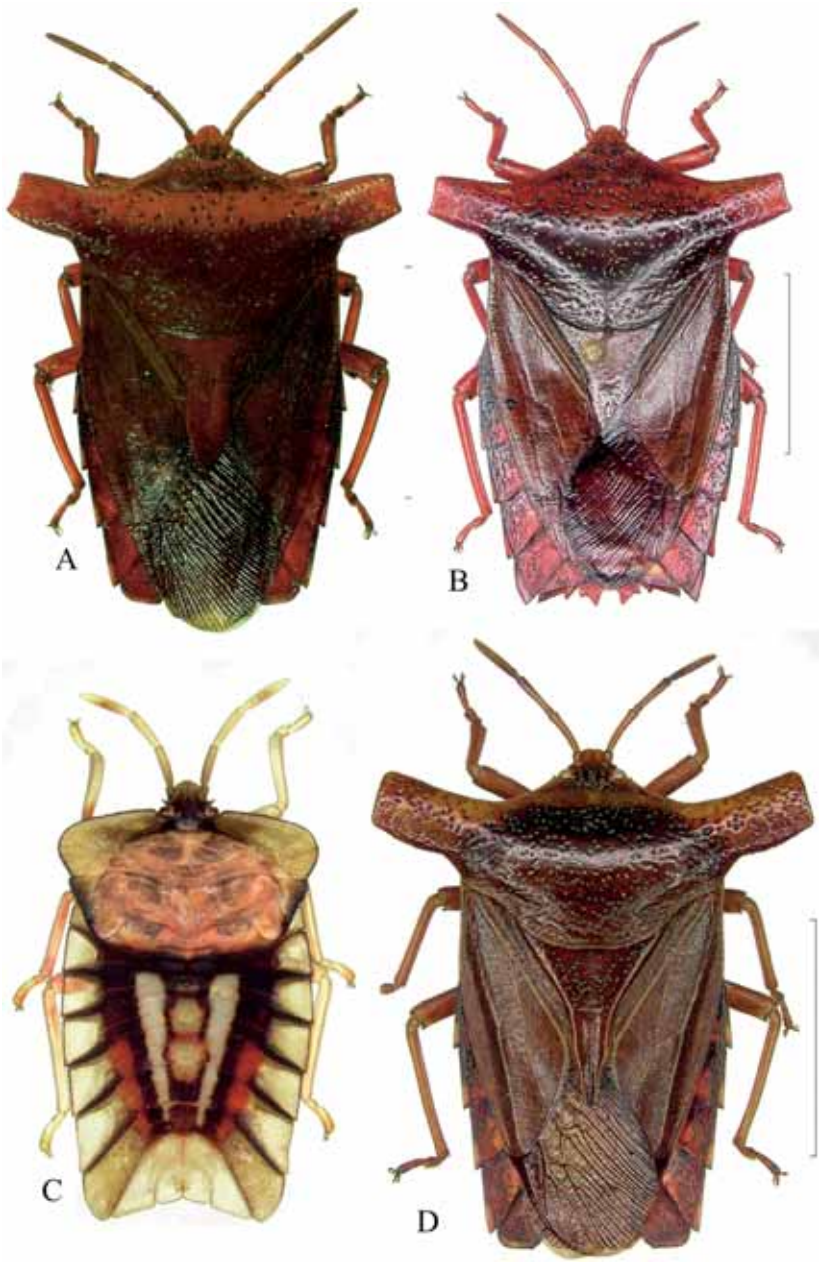

Plate I.– *P. tenangau* n. sp.: A.– habitus male; B.–female; C.– 4th nymph instar. D.– *P. kerzhneri* n. sp., male (type). Scale bars: 10 mm.