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The genus *Platynectes* RÉGIMBART in the Moluccas (Indonesia): taxonomy, faunistics and zoogeography (Coleoptera: Dytiscidae)

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Abstract

The genus *Platynectes* in the Moluccas is revised and the following five new taxa are described: *P. ambonensis* sp.n. [Ambon], *P. gigas* sp.n. [Seram], *P. jaechi* sp.n. [Seram], *P. manusela* sp.n. [Seram] and *P. moluccensis* sp.n. [Seram]. All eight *Platynectes* species recorded from the Moluccas are reviewed and redescriptions of *P. buruensis* ZIMMERMANN, 1926 [Buru], *P. octodecimmaculatus* (MACLEAY, 1825) [Ambon, Bacan, Seram] and *P. decastigma* RÉGIMBART, 1899 [Ternate, Tidore, New Guinea] are provided. The ecology and zoogeography of these species is briefly discussed. For the genus *Platynectes* the Manusela Reserve in Seram is pointed out as a hotspot of diversity. All species are rheobionts. Most species have black pronotum and elytron with constrasting yellow markings. These are suggested to be an adaptation to a life on gravely/sandy substrate in streamlets. The ground pattern is suggested to have included eight to ten elytral spots. Some or all of them are, however, cryptic in particular species. Important species characters (median lobes, parameres and color patterns) are illustrated.

Key words: Coleoptera, Dytiscidae, *Platynectes*, Moluccas, Indonesia, new species, zoogeography.

> "*The forests of the Moluccas offer to the naturalist a very striking example of the luxuriance and beauty of animal life in the tropics. The glorious birds and insects render the Moluccas a classic ground in the eyes of the naturalist, and characterize its fauna as one of the most remarkable and beautiful upon the globe*" (Sir Alfred Russel Wallace in "The Malay Archipelago", 1869).

Introduction

The dytiscid genus *Platynectes* RÉGIMBART, 1855 (subfamily Colymbetinae) is confined to the Neotropical, Oriental and Australasian realms and was revised by GUÉORGUIEV (1972). WATTS (1978) redescribed all Australian species and added new ones. Recently, NILSSON (1998) revised the Oriental taxa of the *Platynectes dissimilis* group sensu GUÉORGUIEV (1972) of the subgenus *Gueorguievtes* VAZIRANI, 1976. Nevertheless, the genus is currently in need of a comprehensive revision and many species or subspecies especially in Melanesia are still unnamed. Some species of *Platynectes* are rather characteristic and are readily identified. Others, which generally include the most abundant and widely distributed ones are not. In many cases species identities, ranges, subspecies boundaries and color variations are subject to confusion and misinterpretation. In short, an overall taxonomic re-evaluation based on extensive material remains badly needed.

Here we describe five new species of the *P. decempunctatus* group (GUÉORGUIEV 1972) from Ambon and Seram, raising the number of known Moluccan *Platynectes* species to eight. Furthermore, taxonomic, distributional and ecological notes on other Indomalayan species of the genus are presented.

Indomalayan *Platynectes* species inhabit springs and streams in foothill and lower mountain rainforests. Exposed streams and pools in peat- and grasslands are occupied at higher altitudes. The known altitudinal range is from 300 to 2000 m.

Most of the material dealt with in this paper was collected during a four week entomological expedition to the Moluccan Islands of Ambon and Seram by M.A. Jäch, S. Schödl and H. Schillhammer of the Vienna Natural History Museum in 1989. In addition to the Vienna material, additional specimens from Bacan, Buru, Tidore and many provinces in Irian Jaya collected and/ or provided by E. Afonin (Russia), J. Hajek (Czech Republic), V. Siniaev (Russia), and the authors from 1990 to 1999, has been examined.

From the entomological point of view the Moluccas are one of the last poorly sampled places in SE Asia. Knowledge of the water beetle fauna is extremely scattered. Therefore the recent fieldwork produced a number of undescribed species and new regional records (e.g. SCHÖNMANN 1991, WEWALKA & BISTRÖM 1993).

The study area: The Moluccas [Maluku Province, Indonesia] spread across an area of some 851.000 square kilometers, only 10 % of which is land. Geologically and biologically these 1029 islands form a part of Wallacea (Fig. 24), a zone of transition between the Sunda Shelf to the west and the Sahul Shelf to the east, both of which were exposed during the Pleistocene Ice ages. With much of the world's water tied up in ice, the level of the seas was much lower then, and land bridges connected many islands. The islands in and around New Guinea were joined to the Australian land mass, and those in western Indonesia were connected to the Asian land mass. There was never a continous land bridge through Wallacea, however, and all biological dispersal in this area required water crossings. The Moluccas therefore form a transitional zone between the Oriental flora and fauna to the west (e.g., placental mammals) and Australia to the east (e.g., marsupials). As the result of selective migrations of species and their ensuing isolation on these islands, many endemic subspecies and species occur in the Moluccas. The main islands in the north are: Ternate, Tidore, Halmahera and Morotai; in the central Moluccas: Ambon, Seram, Buru and the Bandas; and in the south: Kei Archipelago, Aru and Tanimbar (Fig. 24).

The Manusela National Park covers about 10 % of Seram, which includes a north-south cross section of the island. The park encompasses the complete spectrum of Seram forest ecosystems from coastal mangrove through to mountain rain forest, and contains five endemic mammals and 14 endemic birds, with other rare and endangered wildlife of different taxa. The park is a water catchment area for the entire central Seram region, including the more densely populated western areas near to the village of Mashi and Amahai. Most of the park remains largely untouched by human influence and has great potential for wildlife and ecotourism (MONK et al. 1997).

Material and Methods

This study is based on the examination of 600 specimens, most of them deposited in NMW and the collections of the authors. Drawings were made with an Olympus VMZ supported by SEMs for median lobe drawings and color slides for the habitus drawings. The style of the descriptive notes follows WATTS (1978) and NILSSON (1998).

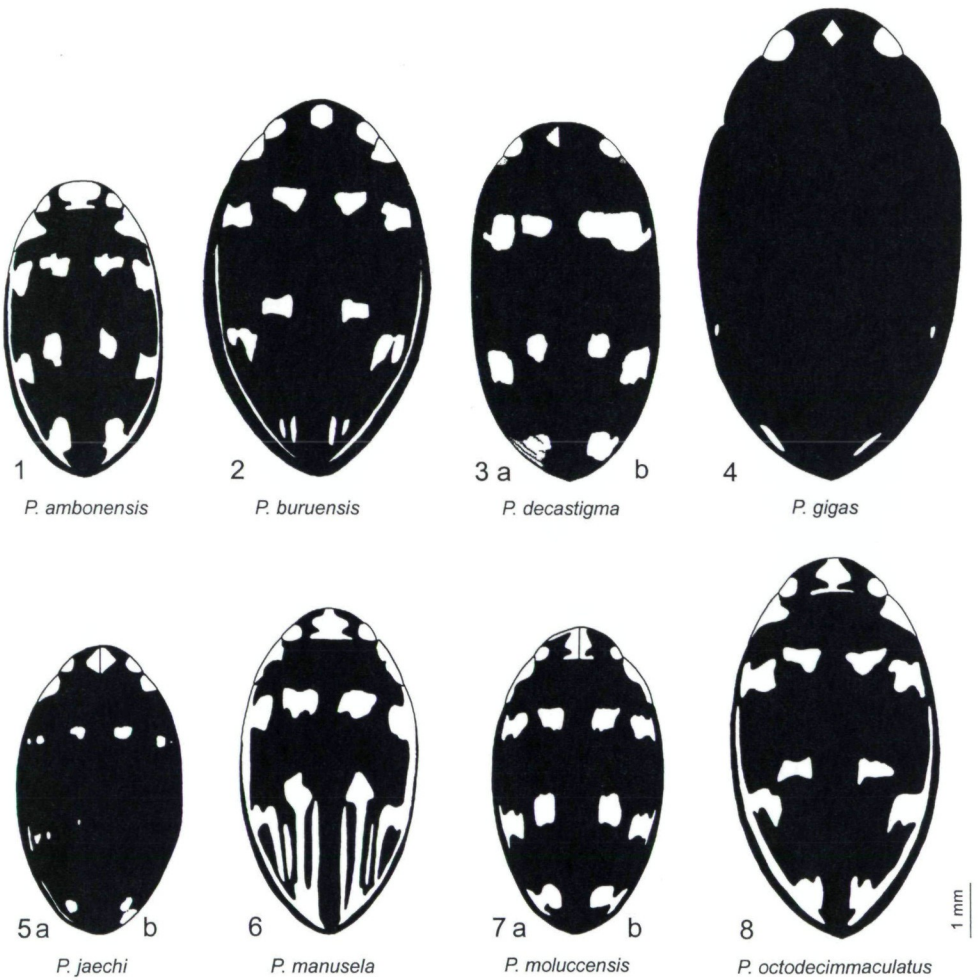
The material used for this study is deposited in the following collections:

CBH collections of Michael Balke and Lars Hendrich, Berlin, Germany
CGW collection of Prof. Dr. Günther Wewalka, Vienna, Austria
CJH collection of Jiří Hájek, Prague, Czech Republic
NMW Naturhistorisches Museum Wien, Austria
ZSM Zoologische Staatssammlung München, Germany

Taxonomy

Platynectes decempunctatus group sensu GUÉORGUIEV, 1972

The group is characterized by the acute posterior angles of the pronotum (GUÉORGUIEV 1972). In many species the elytron has a yellow fascia or two to five yellow dots and/or a narrow band of variable length along lateral margin.



Figs. 1 - 8: Habitus and color pattern of *Platynectes ambonensis* (1), *P. buruensis* (2), *P. decastigma* (3), *P. gigas* (4), *P. jaechi* (5), *P. manusela* (6), *P. moluccensis* (7) and *P. octodecimmaculatus* (8); a and b: paler and darker specimen, respectively.

The following species are distributed in the Moluccan Archipelago:

P. ambonensis sp.n.	Ambon
P. buruensis ZIMMERMANN, 1926	Buru
P. decastigma RÉGIMBART, 1899	Ternate, Tidore, New Guinea
P. gigas sp.n.	Seram
P. jaechi sp.n.	Seram
P. manusela sp.n.	Seram

P. moluccensis sp.n.	Seram
P. octodecimmaculatus (MACLEAY, 1825)	SE Asia, Australia, New Guinea, Moluccas: Ambon, Bacan, Seram, Buru

Platynectes ambonensis sp.n.

TYPE LOCALITY: Forest stream, Soya, Gunung Sirimau, Ambon, Maluku, Indonesia.

TYPE MATERIAL. **Holotype** ♂: "Ambon 2.2. Soya G. Sirimau". "INDONESIA 1989 leg. Schödl" (NMW). **Paratypes**: 5 specimens, same data as holotype (CBH, NMW); 3 ex.: "AMBON 2.2. Soya". "INDONESIA 1989 leg. Jäch (1)".

DIAGNOSIS: Body small, oval, rather flat, usually shiny, black with five yellow spots on elytron (Fig. 1).

DESCRIPTION: Measurements (n = 9): HOLOTYPE: TL = 5.3 mm, TL-H = 4.75 mm; width = 2.9 mm. PARATYPES: TL = 4.9 - 5.5 mm, TL-H = 4.3 - 4.9 mm; width = 2.6 mm - 3.05 mm.

Head black, shiny with one large yellow spot on disc reaching anterior margin. Reticulation strong, consisting of small and interrupted meshes and of minute but deep punctures. Two small and shallow clypeal grooves on disc and a shallow transverse depression beside eyes. Antennae testaceous, long; joints slender. Apical two segments reaching elytron.

Pronotum black, shiny with anterior angles broadly yellow. Posterior angles of pronotum acute. Reticulation strong, consisting of strong and interrupted meshes and of minute but deep punctures. Longitudinal median suture short and reduced to shallow groove. Anterior row of punctures coarse; punctures moderate to small and well separated. Posterior and lateral raws not visible. Lateral margins completely bordered.

Elytron black, shiny with five yellow spots and a narrow band of variable length along margin. Epipleura rufo-testaceous. Reticulation fine but visible at the usual magnification (80x), consisting of almost closed meshes and of minute but deep punctures. Elytron with a shagreened lustre posteriorly. Sutural row of punctures not visible. Discal, lateral and sublateral rows of moderate to small punctures interrupted just before anterior edge; punctures regularly distributed.

Underside rufous to rufo-piceus. Legs rufo-testaceous. Prosternal process broad, 1.5 times as long as broad, distinctly bordered at sides, and pointed out at apex. Metasternal wing very narrow. Metacoxal lines raised, well separated, a little divergent in anterior half. Metacoxal plate with deep scratches, microreticulation consisting of minute punctures. Sternites 1, 2 and 3 with a yellow spot laterally. Anal sternite narrowly microreticulate with minute punctures and with some strong oblique striations reduced to a series of punctures in some females. Posterior margin bordered and broadly rounded.

Male. Protarsus little expanded, moderately clothed with setae ventrally. Aedeagus, in lateral view, regularly curved, evenly tapered, broadened at apical third and rounded at apex (Fig. 9). Parameres narrowly elongate (as in Fig. 19).

DISTRIBUTION (Fig. 24): Ambon (Indonesia, Moluccas). So far only known from the type locality.

COLLECTING NOTES: All specimens of *P. ambonensis* were collected in slow flowing semi-shaded primary forest streams and their protected embayments. The bottom consisted of gravel, stones and rotten leaves (Jäch and Schödl, pers. com.). No other *Platynectes* species were obtained at the type locality. But *P. ambonensis* is sympatric with *P. octodecimmaculatus* which has been collected near Soya, too.

AFFINITIES: This species is very similar to *P. buruensis* from Buru and *P. moluccensis* from Seram. From *P. buruensis* it can easily be distinguished by its smaller size and the more elongate body shape. From the latter it differs clearly by the form of the median lobe.

Platynectes buruensis ZIMMERMANN, 1926

Platynectes buruensis ZIMMERMANN, 1926: 97-98 (orig. descr.); GUÉORGUIEV 1972: 55 (tax. rev.).

MATERIAL EXAMINED: **Lectotype** ♂ (here designated): "Buru, Station 4, 15.IV.1921". "L.J. Toxopeus". "Type". "Samml. A. Zimmermann". "Holotypus Platynectes buruensis Zimmermann Zool. Staatssammlung München". "Zool. Staatsslg. München" (ZSM). **Paralectotypes**: 5 specimens, same data as holotype (ZSM).

We decided to designate a lectotype here to create the basis for a dependable taxonomy of this difficult group. The lectotype is described in detail here to clarify the status of this species.

DIAGNOSIS: Body small, broadly oval, rather flat, shiny, black with five yellow markings on elytron (Fig. 2).

DESCRIPTION: Measurements (n = 6): LECTOTYPE: TL = 5.75 mm, TL-H = 5.25 mm; width = 3.5 mm. PARALECTOTYPES: TL = 5.8 - 6.3 mm, TL-H = 5.3 - 5.6 mm; width = 3.4 - 3.6 mm.

Head black, semi-matt, with one central large yellow spot reaching anterior and posterior margin. Microreticulation invisible. Reticulation strong, consisting of small meshes and of minute but deep punctures. Two small and shallow clypeal grooves on disc and a shallow transverse depression beside eyes. Antennae testaceous, long; joints slender. Apical two segments reaching elytron.

Pronotum black, shiny with anterior angles and lateral margin yellow. Posterior angles of pronotum acute. Reticulation strong, consisting of strong and interrupted meshes and of minute but deep punctures. Longitudinal median suture visible but very short. Anterior row of punctures coarse; punctures moderate to small and well separated. Posterior and lateral raws not visible. Lateral margins completely bordered.

Elytron black, shiny with five yellow spots coalescing apically and a narrow yellowish band of variable length along the margin. Epipleura rufo-testaceous. Reticulation fine but visible at the usual magnification (80x), consisting of almost closed meshes and of minute but deep punctures. Sutural row of punctures not visible. Discal, lateral and sublateral rows of small punctures interrupted just before anterior edge; the punctures irregularly distributed.

Underside rufous to rufo-piceus. Legs rufo-testaceous. Prosternal process broad, 1.5 times as long as broad, distinctly bordered at sides, and pointed out at apex. Metasternal wing very narrow. Metacoxal lines raised, well separated, a little divergent in anterior half. Metacoxal plate with few narrow scratches, microreticulation consisting of minute punctures. Sternites 1, 2 and 3 lateral with a yellow spot. Anal sternite narrowly microreticulate with minute punctures and with some strong oblique striations reduced to a series of punctures in some females. Posterior margin bordered and broadly rounded.

Male. Protarsus little expanded, moderately clothed with setae ventrally. Aedeagus, in lateral view, regularly curved, evenly tapered, broadened at apical third and rounded at apex (Fig. 10). Parameres as in Fig. 19, narrow, elongate.

AFFINITIES: A species very near to the widespread *P. octodecimmaculatus* s.l. and to *P. moluccensis* from Seram. From both it differs by its broad oval body and the form of the median lobe. Furthermore, it can be easily distinguished from *P. octodecimmaculatus* by its smaller size.

DISTRIBUTION (Fig. 24): Buru (Indonesia, Moluccas).

Platynectes decastigma RÉGIMBART, 1899

Platynectes decastigma RÉGIMBART, 1899: 286-287, fig. 40 (orig. descr.); GUÉORGUIEV 1972: 54 (tax. rev.).

MATERIAL EXAMINED: 110 ex.: Irian Jaya/ Cyclops Mts. 4 km north of Sentani, 600 m, 8.-13.IX.1990 / IR 7, leg. Balke & Hendrich (CBH, NMW); 125 ex.: Irian Jaya, Paniai Province, road Nabire Ilaga km 54, 700 m, 22.-25.IX.1990 / IR 11, leg. M. Balke & L. Hendrich (CBH); 44 ex.: Irian Jaya, Paniai Province, road Nabire Ilaga km 54, 750 – 800 m, 16.-27.VII.1991 / IR 19, leg. M. Balke & L. Hendrich (CBH); 4 ex.: Irian Jaya, Manokwari, Ransiki, Mayuby Benyas, ca. 300 – 400 m, 27.-28.IX.1990, leg. A. Riedel (CBH); 1 ♀: Indonesia, Moluccas, Tidore Island, Kampung Gurabunga, 700 m, 14.VII.1981, leg. A.C. Messer (CGW).

DIAGNOSIS: Body medium sized, subparallel, rather flat, usually shiny, black with four or five yellow markings on elytron (Figs. 3 a, b, 20).

DESCRIPTION: Measurements (n = 10): TL = 6.0 - 6.3 mm, TL-H = 5.45 - 5.75 mm; width = 3.15 - 3.30 mm.

Head black, semi-matt, with one small rufous spot on disc. Microreticulation invisible. Reticulation strong, consisting of small meshes and of minute punctures. Two shallow clypeal grooves on disc and a shallow transverse depression beside eyes. Antennae rufo-testaceous, long; joints slender. Apical two segments reaching elytron.

Pronotum black, shiny with anterior angles rufo-testaceous. Posterior angles of pronotum acute. Reticulation strong, consisting of strong and interrupted meshes and of minute but deep punctures. Longitudinal median suture hardly visible and very short. Anterior row of punctures coarse; punctures moderate to small and well separated. Posterior raw consisting of small punctures, lateral raw not visible. Lateral margins completely bordered.

Elytron black, shiny with four to five yellow spots. The populations in Irian Jaya (Paniai Prov. and Cyclops Mts.) have two coalescing basal spots. The specimens from Ternate (see RÉGIMBART 1899) and Vogelkop Peninsula have two well separated basal spots. Epipleura rufo-testaceous. Reticulation fine but visible at the usual magnification (80x), consisting of almost closed meshes and of minute punctures. Sutural, row not visible. Discal, lateral and sublateral rows of small punctures interrupted just before anterior edge; the punctures irregularly distributed.

Underside rufous to rufo-piceous. Legs rufo-testaceous. Prosternal process broad, 1.5 times as long as broad, distinctly bordered at sides, and pointed out at apex. Metasternal wing very narrow. Metacoxal lines raised, well separated, a little divergent in anterior half. Metacoxal plate with few scratches, microreticulation consisting of minute punctures. Sternites 1, 2 and 3 lateral with a rufous spot. Anal sternite narrowly microreticulate with minute punctures and with some strong oblique striations Posterior margin bordered and broadly rounded.

Male. Protarsus little expanded, moderately clothed with setae ventrally. Aedeagus, in lateral view, regularly curved, evenly tapered, broadened at apical third and rounded at apex (Fig. 11). Parameres as in Fig. 19, narrow, elongate.

DISTRIBUTION (Fig. 24): Indonesia: Irian Jaya (Vogelkop; Paniai Province and Cyclops Mountains close to Sentani); Moluccas: Ternate, Tidore, Wetar (?) and Philippines (?) (RÉGIMBART 1899, GUÉORGUIEV 1972).

COLLECTING NOTES: The specimens from Irian Jaya (Cyclops Mts. and Paniai Province) were collected in slow flowing, shaded and closed primary foothill forest streams and their protected embayments at an altitude from 400 to 800 m. The bottom consisted of gravel, stones and rotten leaves. In Paniai Province the species sometimes co-occurs with some rheobiont *Copelatus* (*Papuadytes*) and *Philaccolilus* species (Figs. 21 - 23).

AFFINITIES: A distinct species, separated from all others by its subparallel habitus in dorsal view.

Platynectes gigas sp.n.

TYPE LOCALITY: Forest streams between Hatuolo and Manusela, Seram, Maluku, Indonesia.

TYPE MATERIAL. **Holotype** ♂: "SERAM, 16.2. Hatuolo - Manusela 600 - 700m". INDONESIA 1989 leg. Jäch" (NMW). **Paratypes**: 4 specimens, same data as holotype (NMW); 7 ex.: "INDONESIA 1989 leg. Jäch (15)". "SERAM, 16.2. Hatuolo - Manusela 600 - 700m" (NMW, CBH); 12 ex.: "INDONESIA 1989 leg. Jäch (16)". "SERAM, 16.2. Hatuolo - Manusela 700 - 900m" (NMW, CBH).

DIAGNOSIS: Body broadly oblong and subparallel sided, shiny, almost black with yellow spot on disc of head. Elytron with 1 or 2 very small sublateral yellowish spots behind middle (Fig. 4).

DESCRIPTION: Measurements (n = 10): HOLOTYPE: TL = 9.3 mm, TL-H = 8.3 mm; width = 5.1 mm. PARATYPES: TL = 8.1 - 9.2 mm, TL-H = 7.3 - 8.25 mm; width = 4.2 - 5.1 mm.

Head black, shiny with two elongate basal reddish spots and 1 large rhomboid yellow spot on disc. Reticulation strong, consisting of rather large and interrupted meshes and of minute but deep punctures. Six small clypeal grooves on disc and a transverse depression beside eyes. Antennae testaceous, long; joints slender. Apical two segments reaching elytron.

Pronotum black, shiny with anterior angles reddish. Posterior angles of pronotum acute. Reticulation strong, consisting of large and interrupted meshes and of minute but deep punctures. Longitudinal median suture short but well impressed. Anterior and lateral rows of punctures coarse; punctures large and strongly coalescent. Lateral margins completely bordered.

Elytron black, shiny with one or two very small sublateral yellowish spots behind middle. Epipleura black to reddish. Reticulation fine but visible at the usual magnification (80x), consisting of interrupted meshes and of minute but deep punctures. Elytron with a shagreened lustre posteriorly. Sutural row of punctures not visible. Discal, lateral and sublateral rows of large and strong punctures interrupted just before anterior edge; the punctures irregularly distributed.

Underside rufous to rufo-piceous. Legs rufo-testaceous. Prosternal process broad, 1.5 times as long as broad, distinctly bordered at sides, and pointed out at apex. Metasternal wing relatively narrow. Metacoxal lines raised, well separated, a little divergent in anterior half. Metacoxal plate with some punctures and scratches, microreticulation consisting of very small meshes and of minute punctures. Sternites 1, 2 and 3 lateral with a yellow spot. Anal sternite of male almost smooth, narrowly microreticulate with some strong oblique striations reduced to a series of punctures in some females. Posterior margin bordered and broadly rounded.

Male. Protarsus little expanded, moderately clothed with setae ventrally. Aedeagus, in lateral view, regularly curved, evenly tapered and rounded at apex (Fig. 12). Parameres elongate, narrow, strongly sclerotised, apex hook like in the left paramere (Fig. 17).

DISTRIBUTION (Fig. 24): Seram (Indonesia, Moluccas). So far only known from the type locality.

COLLECTING NOTES: All specimens of *P. gigas* were collected in slowly flowing shaded and closed primary forest streams and their protected embayments at an altitude of 600 to 900 m. The bottom consisted of gravel, stones and rotten leaves (Jäch pers. com.). The species co-occurs with *P. jaechi*, *P. manusela*, *P. moluccensis* and *P. octodecimmaculatus*.

AFFINITIES: A distinct species, separated from all others by its large size, the almost unicolorous black color, the broad and subparallel sided outline, and the characteristic median lobe.

Platynectes jaechi sp.n.

TYPE LOCALITY: Forest streams between Hatuolo and Manusela, Seram, Maluku, Indonesia.

TYPE MATERIAL. **Holotype** ♂: "SERAM, 16.2. Hatuolo - Manusela 600 - 700m". "INDONESIA 1989 leg. Jäch (15)" (NMW). **Paratypes**: 7 specimens, same data as holotype (CBH, NMW); 2 ex.: "INDONESIA 1989 leg. Jäch (16)". "SERAM, 16.-18.2. Hatuolo - Manusela 700 - 900m" (NMW).

DIAGNOSIS: Body small, oval, rather flat, usually shiny, almost black with 3 to 5 very small yellow spots on elytron (Figs. 5 a, b).

DESCRIPTION: Measurements (n = 10): HOLOTYPE: TL = 5.4 mm, TL-H = 4.9 mm; width = 3.0 mm. PARATYPES: TL = 4.8 - 5.4 mm, TL-H = 4.3 - 4.85 mm; width = 2.7 - 3.0 mm.

Head black, semi-matt with one central large yellow spot reaching anterior and posterior margin. Microreticulation fine; reticulation strong, consisting of small meshes and of minute but deep punctures. Two small and shallow clypeal grooves on disc and a shallow transverse depression beside eyes. Antennae testaceous, long; joints slender. Apical two segments reaching elytron.

Pronotum black, shiny with anterior angles broadly yellow. Posterior angles of pronotum acute. Reticulation strong, consisting of small meshes and of minute but deep punctures. Longitudinal median suture reduced to puncture. Anterior row of punctures coarse; punctures moderate to small and well separated. Posterior and lateral raws not visible. Lateral margins completely bordered.

Elytron black, shiny with three to five very small yellow spots. Epipleura testaceous. Reticulation fine but visible at the usual magnification (80x), consisting of almost closed meshes and of minute but deep punctures. Elytron with a shagreened lustre posteriorly. Sutural row of punctures not visible. Sutural row of shallow irregularly distributed punctures. Discal, lateral and sublateral rows of moderate to small punctures interrupted just before anterior edge; punctures regularly distributed.

Underside rufous to rufo-piceous. Legs rufo-testaceous. Prosternal process broad, 1.5 times as long as broad, distinctly bordered at sides, and pointed out at apex. Metasternal wing very narrow. Metacoxal lines raised, well separated, a little divergent in anterior half. Metacoxal plate with narrow scratches, microreticulation consisting of minute punctures. Sternites 1, 2 and 3 yellowish laterally. Anal sternite narrowly microreticulate with minute punctures and with some strong oblique striations reduced to a series of punctures in some females. Posterior margin bordered and broadly rounded.

Male. Protarsus little expanded, moderately clothed with setae ventrally. Aedeagus, in lateral view, regularly curved and rounded at apex (Fig. 13). Parameres as in Fig. 19, narrow, elongate.

ETYMOLOGY: Dedicated to our friend Dr. Manfred A. Jäch (NMW) who collected four new species (including this one) during a physically and mentally most tiresome expedition across Seram.

DISTRIBUTION (Fig. 24): Seram (Indonesia, Moluccas). So far only known from the type locality.

COLLECTING NOTES: All specimens of *P. jaechi* were collected in slow flowing shaded and closed primary forest streams and their protected embayments at an altitude of 600 to 900 m. The bottom consisted of gravel, stones and rotten leaves (Jäch and Schödl pers. com.). The species co-occurs with *P. gigas*, *P. manusela*, *P. moluccensis* and *P. octodecimmaculatus*.

AFFINITIES: This species is very similar to *P. moluccensis* sp.n. from Seram. It can easily be distinguished by its almost black color pattern, and by the form of the median lobe.

Platynectes manusela sp.n.

TYPE LOCALITY: Forest streams between Hatuolo and Manusela, Seram, Maluku, Indonesia.

TYPE MATERIAL. **Holotype** ♂: "INDONESIA 1989 leg. Jäch (16)". "SERAM, 16.-18.2. Hatuolo - Manusela 700 - 900m" (NMW). **Paratypes**: 1 specimen, same data as holotype (NMW); 3 ex.: "INDONESIA 1989 leg. Jäch (15)". "SERAM, 16.2. Hatuolo - Manusela 600 - 700m" (CBH, NMW); 1 ex.: "SERAM, 16.-18.2. Umg. Manusela 700 - 900m 15". "INDONESIA 1989 leg. Schödl" (NMW).

DIAGNOSIS: Body medium sized, oval, rather flat, usually shiny, black with various yellow markings on elytron (Fig. 6).

DESCRIPTION: Measurements (n = 6): HOLOTYPE: TL = 6.0 mm, TL-H = 5.4 mm; width = 3.3 mm. PARATYPES: TL = 5.6 - 6.1 mm, TL-H = 5.2 - 5.5 mm; width = 3.1 - 3.4 mm.

Head black, semi-matt, with one central large yellow spot reaching anterior and posterior margin. Microreticulation invisible. Reticulation strong, consisting of small meshes and of minute but deep punctures. Two small and shallow clypeal grooves on disc and a shallow transverse depression beside eyes. Antennae testaceous, long; joints slender. Apical two segments reaching elytron.

Pronotum black, shiny with anterior angles and lateral margin yellow. Posterior angles of pronotum acute. Reticulation strong, consisting of strong and interrupted meshes and of minute but deep punctures. Longitudinal median suture visible but very short. Anterior row of punctures coarse; punctures moderate to small and well separated. Posterior and lateral raws not visible. Lateral margins completely bordered.

Elytron black, shiny with five yellow spots coalescing apically and a narrow yellowish band of variable length along margin. Epipleura testaceous. Reticulation fine but visible at the usual magnification (80x), consisting of almost closed meshes and of minute but deep punctures. Sutural row of punctures not visible. Discal, lateral and sublateral rows of small punctures interrupted just before anterior edge; the punctures irregularly distributed.

Underside rufous to rufo-piceous. Legs rufo-testaceous. Prosternal process broad, 1.5 times as long as broad, distinctly bordered at sides, and pointed out at apex. Metasternal wing very narrow. Metacoxal lines raised, well separated, a little divergent in anterior half. Metacoxal plate with few narrow scratches, microreticulation consisting of small meshes and minute punctures. Sternites 1, 2 and 3 lateral with a yellow spot. Anal sternite narrowly microreticulate with minute punctures and with some strong oblique striations reduced to a series of punctures in some females. Posterior margin bordered and broadly rounded.

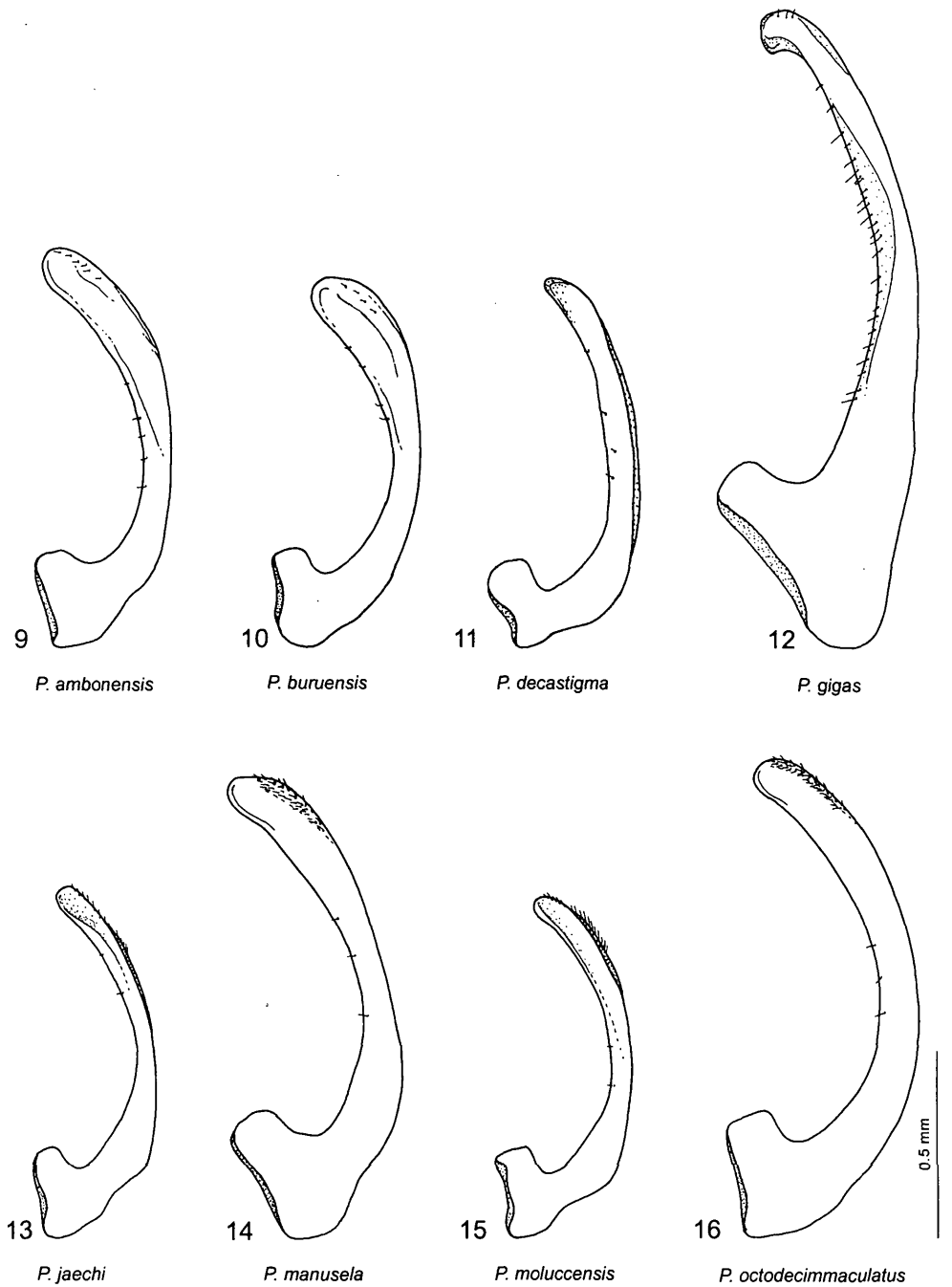
Male. Protarsus little expanded, moderately clothed with setae ventrally. Aedeagus, in lateral view, regularly curved, evenly tapered, broadened at apical third and rounded at apex (Fig. 14). Parameres broad (Fig. 18).

ETYMOLOGY: Named after Manusela Reserve.

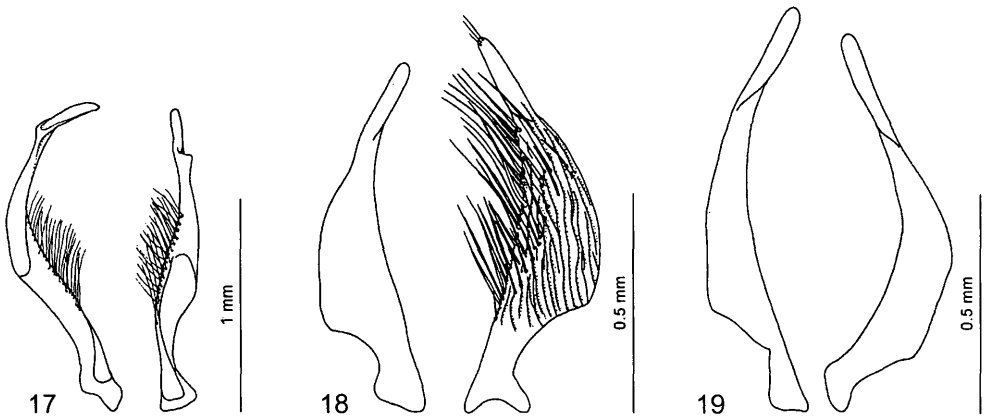
DISTRIBUTION (Fig. 24): Seram (Indonesia, Moluccas). So far only known from the type locality.

COLLECTING NOTES: All specimens of *P. manusela* were collected in streams and their protected embayments at an altitude of 600 to 900 m. The bottom consisted of gravel, stones and rotten leaves (Jäch pers. com.). The species co-occurs with *P. gigas*, *P. jaechi*, *P. moluccensis* and *P. octodecimmaculatus*.

AFFINITIES: This species is very near to *P. buruensis* from Buru. It can easily be distinguished by its color pattern, coalescing yellow spots on apical part of elytron, and by the more elongate median lobe.



Figs. 9 - 16: Median lobes of aedeagi in ventral view of *Platynectes ambonensis* (9), *P. buruensis* (10), *P. decastigma* (11), *P. gigas* (12), *P. jaechi* (13), *P. manusela* (14), *P. moluccensis* (15) and *P. octodecimmaculatus* (16).



Figs. 17 - 19: Parameres of *P. gigas* (17), *P. manusela* (18) and *P. octodecimmaculatus,* setae omitted (19).

Platynectes moluccensis sp.n.

TYPE LOCALITY: River at Manusela village, Seram, Maluku, Indonesia.

TYPE MATERIAL. **Holotype** ♂: "INDONESIA 1989 leg. Jäch (16)". "SERAM, 16.-18.2. Umg. Manusela 700 - 900m" (NMW). **Paratypes**: 8 specimens, same data as holotype (CBH, NMW); 14 ex.: "INDONESIA 1989 leg. Jäch (15)". "SERAM, 16.2. Hatuolo - Manusela 600 - 700m" (CBH, NMW); 2 ex.: "SERAM, 16.-18.2. Umg. Manusela 700 - 900m 15". "INDONESIA 1989 leg. Schödl" (NMW).

DIAGNOSIS: Body small, oval, rather flat, shiny, black with five yellow markings on elytron (Figs. 7 a, b).

DESCRIPTION: Measurements (n = 10): HOLOTYPE: TL = 5.1 mm, TL-H = 4.6 mm; width = 2.9 mm. PARATYPES: TL = 4.8 - 5.4 mm, TL-H = 4.4 - 4.8 mm; width = 2.7 - 3.0 mm.

Head black, shiny with one central large yellow spot reaching anterior and posterior margin. Reticulation strong, consisting of small meshes and of minute but deep punctures. Two small and shallow clypeal grooves on disc and a shallow transverse depression beside eyes. Antennae testaceous, long; joints slender. Apical two segments reaching elytron.

Pronotum black, shiny with anterior angles lateral margins yellow. Posterior angles of pronotum acute. Reticulation strong, consisting of strong small meshes and of minute but deep punctures. Longitudinal median suture short. Anterior row of punctures coarse; punctures moderate to small and well separated. Posterior and lateral raws not visible. Lateral margins completely bordered.

Elytron black, shiny with five yellow spots. The two basal spots often coalescing. Epipleura testaceous. Reticulation fine but visible at the usual magnification (80x), consisting of almost closed meshes and of minute but deep punctures. Sutural row of punctures not visible. Discal, lateral and sublateral rows of small punctures interrupted just before anterior edge; the punctures irregularly distributed.

Underside rufous to rufo-piceous. Legs rufo-testaceous. Prosternal process broad, 1.5 times as long as broad, distinctly bordered at sides, and pointed out at apex. Metasternal wing very

narrow. Metacoxal lines raised, well separated, a little divergent in anterior half. Metacoxal plate with few narrow scratches, microreticulation consisting of minute punctures. Sternites 1, 2 and 3 lateral with a yellow spot. Anal sternite narrowly microreticulate with minute punctures and with some strong oblique striations. Posterior margin bordered and broadly rounded.

Male. Protarsus little expanded, moderately clothed with setae ventrally. Aedeagus, in lateral view, regularly curved and rounded at apex (Fig. 15). Parameres as in Fig. 19, narrow, elongate.

DISTRIBUTION (Fig. 24): Seram (Indonesia, Moluccas). So far only known from the type locality.

COLLECTING NOTES: All specimens of *P. moluccensis* were obtained from a fast flowing river at an altitude of 700 m. The species co-occurs with *P. gigas*, *P. jaechi*, *P. manusela* and *P. octodecimmaculatus*.

AFFINITIES: This species is very similar to *P. jaechi* and *P. ambonensis* from Ambon and Seram. From *P. ambonensis* it can easily be distinguished by its median lobe, the smaller size and the more elongate and flattened body shape. From the latter it differs clearly by the color and the form of the median lobe.

Platynectes octodecimmaculatus (MACLEAY, 1825) s.l.

Colymbetes octodecimmaculatus MACLEAY 1825: 31 (orig. descr.).
Platynectes octodecimmaculatus (MACLEAY, 1825): SHARP 1882: 763; GUÉORGUIEV 1972: 49-51 (tax. rev., syn.), and references therein.

MATERIAL EXAMINED: 6 ex.: "SERAM, 21.-23.2. Umg. Tehoru". "Indonesien leg. Jäch 1989"; 4 ex.: "SERAM, 20.2. N Hatumete ca. 100-700m". "Südhang der Merkele Ridge". "Indonesia 1989 leg. Schödl"; 6 ex.: "SERAM, 20.2. N Hatumete". "INDONESIA 1989 leg. Jäch (18)"; 3 ex.: "SERAM, 16.-18.2. Umg. Manusela 700 - 900m". "INDONESIA 1989 leg. Jäch (16)"; 1 ex.: "SERAM, 16.-18.2. Umg. Manusela 700 - 900m 15". "INDONESIA 1989 leg. Schödl"; 3 ex.: "INDONESIA 1989 leg. Jäch (15)". "SERAM, 16.2. Hatuolo - Manusela 600 - 700m" (CBH, NMW); 3 ex.: "Maluku, AMBON, Laihatu, Soya 11.-12.9.1998, S. Bilý leg." (CJH).

ADDITIONAL MATERIAL (near to *P. octodecimmaculatus*): 231 ex.: "N. Moluccas/BACAN Isl. Mt. Sibela, 14 km SE Labuha, primary forest, 2-13.2.1996, 0°38' S Lat. 127°32' E Long H=400m, leg. V.Siniaev & E.Afonin" (CBH).

DIAGNOSIS: Body medium sized, oval, rather flat, usually shiny, black with various yellow markings on elytron (Fig. 8).

DESCRIPTION: Measurements (n = 20): TL = 6.2 - 6.8 mm, TL-H = 5.5 - 6.1 mm; width = 3.5 - 3.8 mm.

Head black, dull, with one central large yellow spot reaching anterior and posterior margin. Microreticulation invisible. Reticulation strong, consisting of small meshes and of minute but deep punctures. Two small and shallow clypeal grooves on disc and a shallow transverse depression beside eyes. Antennae testaceous, long; joints slender. Apical two segments reaching elytron.

Pronotum black, shiny with anterior angles and lateral margin yellow. Posterior angles of pronotum acute. Reticulation strong, consisting of strong and interrupted meshes and of minute but deep punctures. Longitudinal median suture visible but very short. Anterior row of punctures coarse; punctures moderate to small and well separated. Posterior and lateral rows not visible. Lateral margins completely bordered.

Elytron black, shiny with five yellow spots coalescing apically and a narrow yellowish band of variable length along margin. Epipleura testaceous. Reticulation fine but visible at the usual magnification (80x), consisting of almost closed meshes and of minute but deep punctures.

Sutural row of punctures not visible. Discal, lateral and sublateral rows of small punctures interrupted just before anterior edge; the punctures irregularly distributed.

Underside rufous to rufo-piceous. Legs rufo-testaceous. Prosternal process broad, 1.5 times as long as broad, distinctly bordered at sides, and pointed out at apex. Metasternal wing very narrow. Metacoxal lines raised, well separated, a little divergent in anterior half. Metacoxal plate with few narrow scratches, microreticulation consisting of minute punctures. Sternites 1, 2 and 3 lateral with a yellow spot. Anal sternite narrowly microreticulate with minute punctures and with some strong oblique striations reduced to a series of punctures in some females. Posterior margin bordered and broadly rounded.

Male. Protarsus little expanded, moderately clothed with setae ventrally. Aedeagus, in lateral view, regularly curved, evenly tapered, broadened at apical third and rounded at apex (Fig. 16). Parameres narrow, elongate (Fig. 19).

AFFINITIES: A widespread and very variable species. After GUÉORGUIEV (1972) near to *P. decempunctatus* (FABRICIUS, 1775) and *P. semperi* RÉGIMBART, 1899 which occur in Australia and New Guinea (WATTS 1978). From both species mentioned above *P. octodecimmaculatus* differs by its larger, broadly oval body, the more expanded yellow spots on the elytron, and the form of the median lobe. But *P. octodecimmaculatus* shows a wide variation in body color pattern, size and shape. The further examination and morphometric studies of additional material from other islands (e.g. Bacan, Halmahera) may reveal the presence of more undescribed species or subspecies in the Moluccas.

DISTRIBUTION (Fig. 24): Indonesia: Sunda Islands, Kalimantan, Sulawesi, Timor, Moluccas (Ambon, Bacan ?, Buru, Seram), Irian Jaya (Bird's Head); Papua New Guinea, Australia (GUÉORGUIEV 1972).

Discussion

Diversity: Species of *Platynectes* are frequently collected in SE Asia. In places, *Platynectes* species occur in huge numbers.

Generally, few species occur in a given region. GUÉORGUIEV (1972) reported only three species in Indonesia and the Philippines.

Recent fieldwork in SE Asia has confirmed this relative paucity of species (Fig. 24).

An extraordinary exception is Seram, which, according to our account, features five species, four of them being endemic (Fig. 24).

Much more fieldwork in the Moluccas is needed to provide a sufficient data base for a biogeographical and evolutionary analysis of the water beetle faunas.

Here we provide some ideas why there are so many *Platynectes* species on Seram:

1.) Seram, as part of the Moluccas, lies in the transition zone between Oriental and Australian/ New Guinea faunas. *Platynectes* species inhabit running waters. Other running water Dytiscidae are unknown from the Moluccas while there are several in SE Asia and New Guinea. In SE Asia, these are *Neptosternus* SHARP and *Microdytes* BALFOUR-BROWNE; in New Guinea *Philaccolilus* GUIGNOT and *Copelatus* (*Papuadytes*) BALKE. Experience from field work in New Guinea for example shows that *Platynectes* species usually do not co-occur with *Philaccolilus*- and/ or *Copelatus* (*Papuadytes*)-species.

Absence of other running water Dytiscidae may be one clue to the successful evolution of a species rich *Platynectes* fauna on Seram (and possibly other Moluccan islands).

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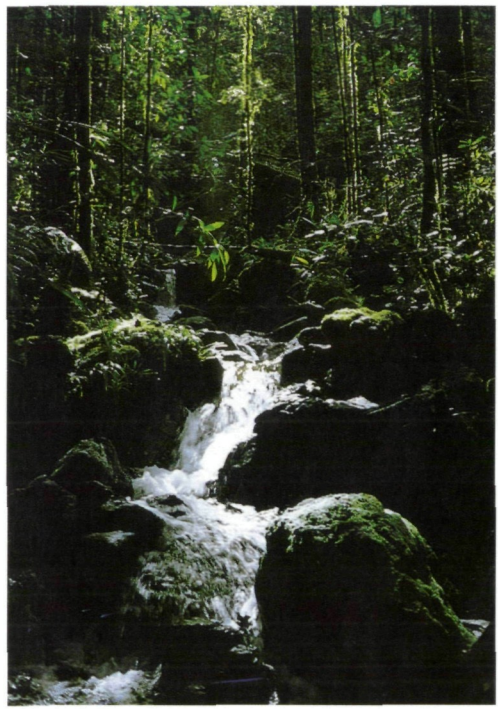

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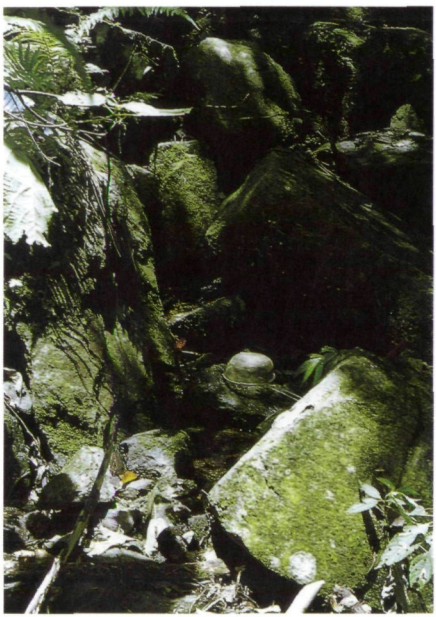

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Fig. 20: Habitus of *Platynectes decastigma*, Cyclops Mountains, Irian Jaya, Indonesia.

Figs. 21 - 23: Habitats of *Platynectes decastigma*. Shaded, slow flowing forest streams in primary foothill forests. Fig. 21 situated in Paniai Province, Irian Jaya, Indonesia. Figs. 22 and Fig. 23 situated in Cyclops Mountains, Irian Jaya, Indonesia.

2.) Seram is an island of comparably large size, high altitudes (up to 3027 m), and thus features many different stream systems.

3.) Seram, though never connected with other land masses, lies close enough to potential source areas such as New Guinea to receive colonizers (Fig. 24).

4.) Though its actual age is still subject to discussion, it is believed that Seram, as part of the Sahul Shelf, emerged some 5 mybp. It is believed that its centre area was not seriously altered by environmental catastrophes such as volcanic eruptions. Thus, a stable environment would be another factor supporting the evolution of a diverse fauna (DE JONG 1998).

Coloration: The species studied have a contrasting black / yellow surface making the beetles inconspicuous against the ground (GALEWSKI 1971; LARSON 1996). The ground pattern of the genus includes eight to ten yellow spots. Within the Dytiscidae, the variegated color pattern has evolved convergently several times, especially among lotic species. The dark surface color combined with contrasting yellow pattern may help to disrupt the body outline of beetles when viewed by visually hunting predators such as birds specializing on aquatic invertebrate prey (SVENSSON 1991), frogs and fish. A similar color pattern is also present in some lotic Laccophilinae (e.g. *Neptosternus*, *Philaccolilus*, some species of *Laccophilus* LEACH, see HENDRICH & BALKE 1997; BALKE, LARSON & HENDRICH in press) and lentic Dytiscinae such as *Sandracottus*.

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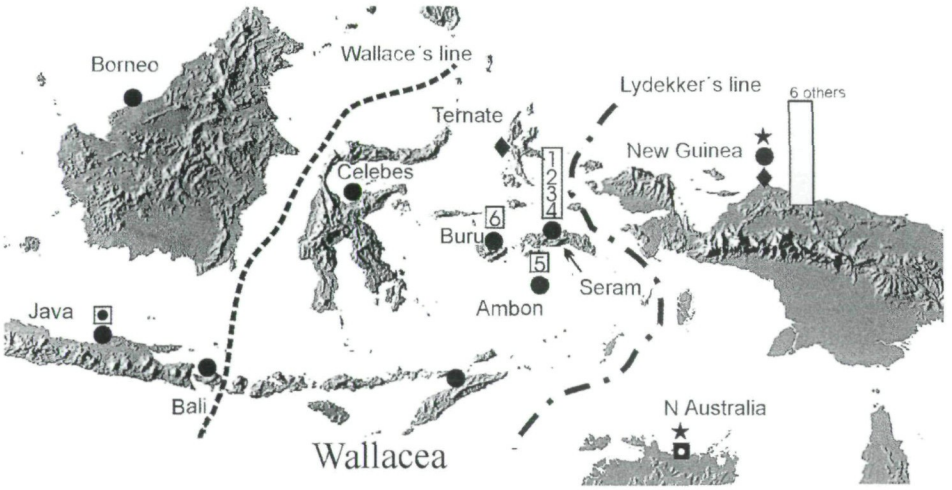

Fig. 24: Distribution of the genus *Platynectes* in the Wallacean Region and adjacent areas: *P. octodecimmaculatus* s.l. (black dots); *P. javanus* NILSSON (white square with black dot); *P. decastigma* (black diamonds); *P. gigas* (1), *P. jaechi* (2), *P. manusela* (3), *P. moluccensis* (4), *P. ambonensis* (5), *P. buruensis* (6); *P. decempunctatus* (black stars); *P. monostigma* HOPE (black square with white circle).

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