

Systematic revision of the genus *Graphelmis* (Coleoptera: Elmidae)

VI. *Graphelmis marshalli* species group

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ČIAMPOR Jr., F. 2005. Systematic revision of the genus *Graphelmis* (Coleoptera: Elmidae) VI. *Graphelmis marshalli* species group. *Entomol. Probl.* 35(1): 11–38. – The sixth new species group *Graphelmis marshalli* is designated within the genus *Graphelmis* DELEVE, 1968, comprising six known and ten new species: *G. bouchardi* (GROUVELLE, 1896), *G. consobrina* DELEVE, 1968, *G. dentipes* sp.nov., *G. elegans* sp.nov., *G. fuscicornis* sp.nov., *G. grouvellei* DELEVE, 1970, *G. schoedli* sp.nov., *G. malickyi* sp.nov., *G. marshalli* (HINTON, 1936), *G. monticola* (GROUVELLE, 1896), *G. nitida* sp.nov., *G. quadrimaculata* sp.nov., *G. robusta* sp.nov., *G. elisabethjaechae* sp.nov., *G. valida* DELEVE, 1970, *G. vietnamensis* sp.nov. Habitus and detail drawings of characteristic structures of genitalia and pregenital segments of males are given.

Key words: Coleoptera, Elmidae, *Graphelmis*, taxonomy, Southeast Asia.

Introduction

Up to now, five species groups within the genus *Graphelmis* DELEVE, 1968 were designated (ČIAMPOR Jr 2001, 2002, 2003, 2004, ČIAMPOR Jr & KODADA 2004). The *Graphelmis marshalli* species group is the sixth in sequence. With its sixteen species, it is the second largest group within the genus. The *G. marshalli* group includes six already known and ten newly described species. For such a large group, the distribution of species included in this group is limited to a relatively small area of Southeast Asia (South Vietnam, Laos, Malaysian Peninsula, Kalimantan, Sumatra, Java, Bali and two Philippine islands).

Concerning relationships in the genus, the *G. marshalli* species group is very likely a sister group to *G. labralis* species group. Species of both groups are generally very similar, and differ in only several minor characters.

Material and methods, as well as the acronyms and symbols used, follow ČIAMPOR Jr. (2001).

Diagnosis of the *Graphelmis marshalli* species group

The *G. marshalli* species group is characterized by the following features: 1) anterior margin of labrum smooth; 2) metasternum at least in males with thin longer setae; 3) male metasternum without prebasal, sublateral tubercles or tufts of setae; 4) ventral lobe of penis longer than half of the main lobe and with setose apex; phallobasis moderately long; 5) spiculum gastrale of males with anterior apodeme short and widened, accessory struts large.

Graphelmis marshalli (HINTON)

(Figs 1, 17–20)

Cylloepus marshalli HINTON, 1936: 220–224

Graphelmis marshalli DELEVE, 1968: 170

Type locality: Malaysia, Sabah (Borneo), Foot of Mt. Dulit, junction of rivers Tinjar and Lejok.

Material examined. (NMW, CKB): 4 ♂♂, 20 ♀♀: “Malaysia, Sabah, Sabalangan river in primary forest ca. 25km SE Sapulut, 26. 06. 1996, J. Kodada & F. Čiampor lgt.”; 16 ♂♂, 25 ♀♀, 5 ex. (sex not examined): “Malaysia, Sabah, Kuamut river env. near Kampung Pisang Pisang, 3. – 4. VII. 1996, 14a, shaded stream in primary forest with submerged wood”; 53 ♂♂, 65 ♀♀: “Malaysia, Sabah, Batu Punggul Resort env., 24. VI. – 1. VII. 1996, 11a, river about 10m wide, flowing in primary forest, partly shaded”; 75 ♂♂, 70 ♀♀: “Malaysia, SABAH, Kuamut river env. near Kampung Pisang Pisang, 3. – 4. VII. 1996, 14b: ca 10m wide tributary of Kuamut river in primary forest”; 1 ♂, 1 ♀: “Malaysia, Sabah, Tawau Hills Park, Tawau river in primary forest, 7. - 10. 6. 1998, J. Kodada & F. Čiampor lgt.”; 1 ♀: “Malaysia, Sabah, Gn. Antulai, ca. 5km S Sapulut, 2. 7. 1996, 13a, river about 7m wide, flowing through secondary forest”; 24 ex. (sex not examined): “MALAYSIA, Sarawak Mulu NP, Long Iman 4.3.1993, leg. Jäch (20)”; 1 ♀: “MAL., Sarawak 1993 Kelabit HL, Umg. Bario 28.2., 1000 – 1200m leg. M. Jäch (16)”; 2 ♀♀: “Malaysia, Sabah, Batu Punggul Resort env., 24. VI. – 1. VII. 1996, 11b, shaded stream 1.5–2.0m wide, flowing through dense primary forest”; 1 ♀: “Malaysia, Sabah, Batu Punggul Resort env., 24. VI. – 1. VII. 1996, 11c, vegetation debris and forest floor litter accumulated around large trees near river”;

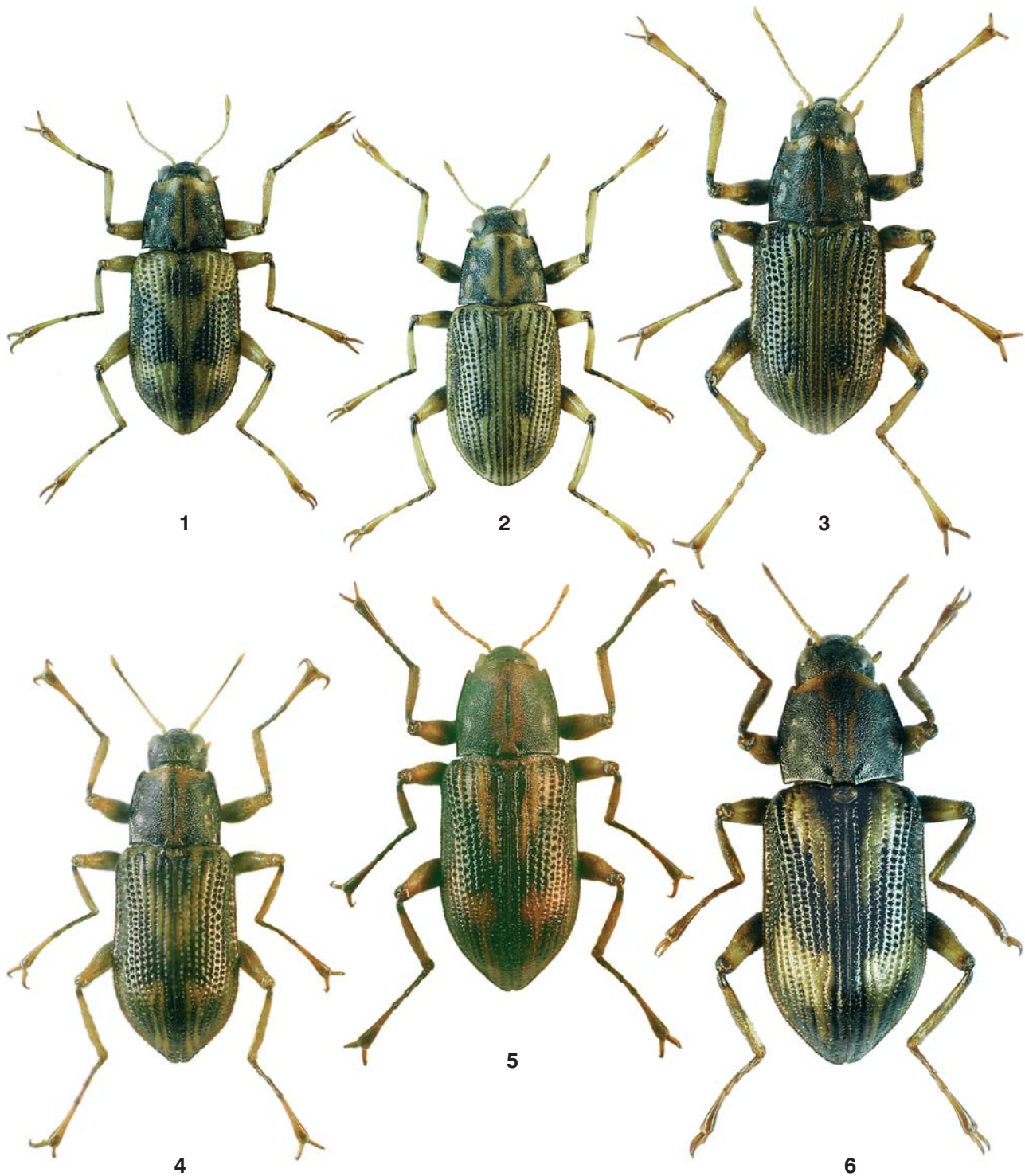
Diagnosis. Within the *G. marshalli* species group, *G. marshalli* differs as follows: 1) elytral colour pattern distinct, prebasal and apical parts of yellowish marking usually not connected by mesal yellowish stripe; 2) setae of male metasternum indistinct; 3) prebasal sublateral tubercles on pronotum distinct; 4) distal portion of prosternal disc and prosternal process microreticulate; 5) penis distinctly constricted in ventral view.

Redescription. Habitus (Fig. 1); CL in ♂♂ (2.81 – 3.50 mm, O= 3.13 ± 0.21), in ♀♀ (3.06 – 3.63 mm, O= 3.22 ± 0.17); EW in ♂♂ (1.33 – 1.62 mm, O= 1.46 ± 0.09),

in ♀♀ (1.33 – 1.59 mm, O= 1.46 ± 0.08), CL/EW in ♂♂ (2.03 – 2.35, O= 2.14 ± 0.10), in ♀♀ (2.12 – 2.34, O= 2.21 ± 0.07).

Colour pattern: pronotum with yellowish anterior margin, border along median pronotal groove widened prebasally, sublateral pronotal tubercles feebly coloured; elytra with distinct V-shaped marking in anterior half and subtriangular marking on each elytron in posterior half.

Head. HW in ♂♂ (0.62 – 0.75 mm, O= 0.68 ± 0.05), in ♀♀ (0.66 – 0.74 mm, O= 0.69 ± 0.03); ID in ♂♂ (0.34 – 0.44 mm, O= 0.38 ± 0.03), in ♀♀ (0.37 – 0.41 mm, O= 0.39 ± 0.01); ED in ♂♂ (0.29 – 0.35 mm, O= 0.33 ± 0.02), in ♀♀ (0.29 – 0.37 mm, O= 0.33 ± 0.03); HW/ID in ♂♂ (1.71 – 1.92, O= 1.80 ± 0.07), in ♀♀ (1.70 – 1.85, O= 1.79 ± 0.05). Labrum glabrous, with sparse setae; clypeus slightly shorter than labrum; frontoclypeal suture visible;

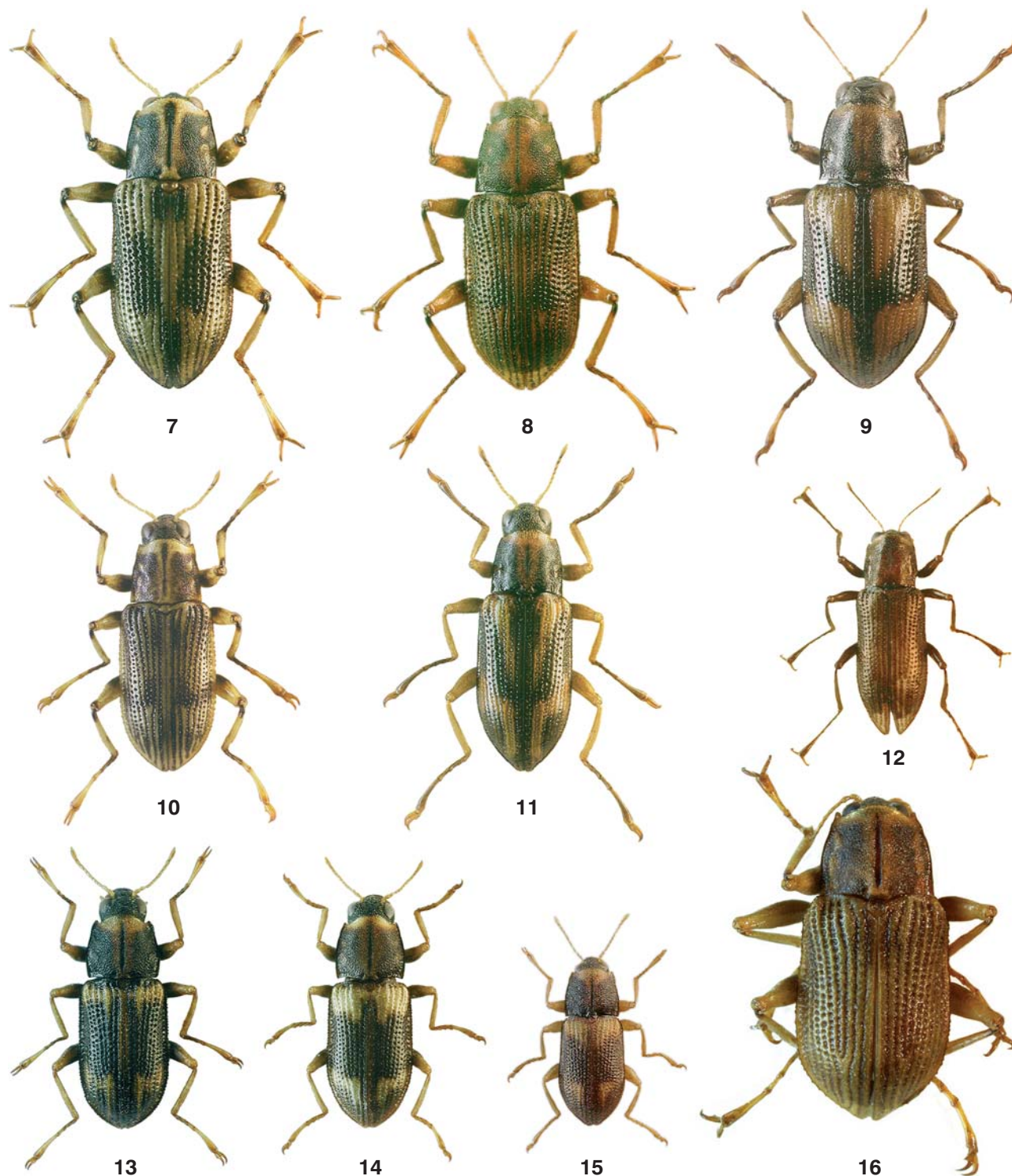


Figs 1–6 Habitus of: 1) *G. marshalli* (HINTON); 2) *G. quadrimaculata* sp.nov.; 3) *G. dentipes* sp.nov.; 4) *G. fuscicornis* sp.nov.; 5) *G. bouchardi* (GROUVELLE); 6) *G. robusta* sp.nov.

frons and vertex, as well as clypeus irregularly micro-punctured; eyes oval in lateral view and convex in dorsal view.

Thorax. Pronotum about as long as wide, widest about in middle; PL in ♂♂ (0.88 – 1.13 mm, $O = 0.98 \pm 0.08$), in ♀♀ (0.94 – 1.13 mm, $O = 1.00 \pm 0.05$); PW in ♂♂ (0.97 –

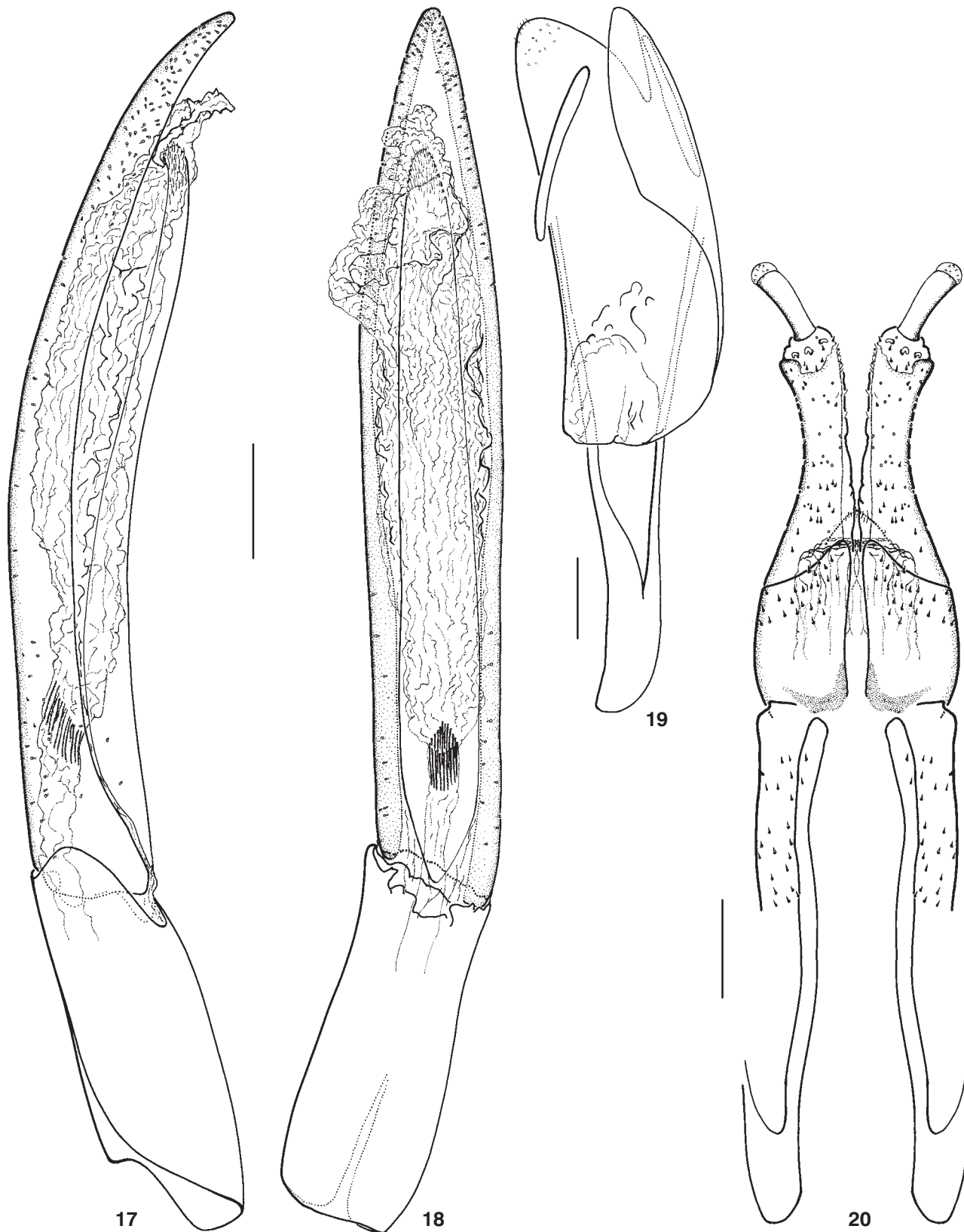
1.18 mm, $O = 1.08 \pm 0.06$), in ♀♀ (0.97 – 1.18 mm, $O = 1.08 \pm 0.07$); AP in ♂♂ (0.69 – 0.82 mm, $O = 0.75 \pm 0.04$), in ♀♀ (0.72 – 0.85 mm, $O = 0.77 \pm 0.04$); lateral margins finely explanate; anterior margin glabrous; anterior angles produced anteriorad; sublateral tubercles flat; median groove narrow, moderately deeply impressed, not reaching pronotal



Figs 7–16 Habitus of: 7) *Graphelmis malickyi* sp.nov.; 8) *G. vietnamensis* sp.nov.; 9) *G. nitida* sp.nov.; 10) *G. merkli* sp.nov.; 11) *G. elegans* sp.nov.; 12) *G. consobrina* DELEVE; 13) *G. valida* DELEVE; 14) *G. schoedli* sp.nov.; 15) *G. elisabethjaechae* sp.nov.; 16) *G. monticola* (GROUVELLE).

margins; prebasal admedian pits vestigial; surface irregularly, densely micropunctured, punctures sparser on sublateral tubercles and anterior margin. Prosternum with disc shiny; prosternal process plicate, with lateral margins

widely raised around coxae; posterior margin with median protuberance wide, feebly projected. Scutellum glabrous, subtriangular; lateral sides convex; apex rounded. Mesosternum with oblique microreticulate carinae. Metasternum



Figs 17–20 *G. marshalli* (HINTON): 17) aedeagus lateral view; 18) aedeagus ventral view; 19) spiculum gastrale and sternite 9; 20) ovipositor. Scale bars: 0.1mm.

about twice as long as mesosternum; disc almost flat, shiny, sparsely setigerous; longitudinal suture narrowly impressed; admedian prebasal punctures transverse; lateral sides of disc somewhat raised. Elytra slightly divergent in anterior two-thirds, then continuously converging toward finely produced apices; EL in ♂♂ (1.94 – 2.38 mm, O= 2.15 ± 0.14), in ♀♀ (2.13 – 2.50 mm, O= 2.22 ± 0.13); lateral margins serrate; striae punctures distinct, moderately deeply impressed. Legs glabrous; FT in ♂♂ (0.97 – 1.26 mm, O= 1.11 ± 0.08), in ♀♀ (0.94 – 1.21 mm, O= 1.06 ± 0.08); MT in ♂♂ (0.91 – 1.21 mm, O= 1.06 ± 0.08), in ♀♀ (0.88 – 1.12 mm, O= 0.99 ± 0.07); HT in ♂♂ (0.97 – 1.26 mm, O= 1.12 ± 0.08), in ♀♀ (0.94 – 1.21 mm, O= 1.07 ± 0.08); length of metatarsomere 5 subequal to combined length of segments 1–4.

Abdomen. Admedian keels of ventrite 1 short, not reaching middle of ventrite; abdominal intercoxal process and discs of ventrites shiny, sparsely setigerous. Sternite 9 and spiculum gastrale (Fig. 19).

Aedeagus (Figs 17, 18). Penis elongate; in lateral view slightly curved, base somewhat widened; in ventral view parallel-sided; ventral lobe subparallel, acuminate at base, apex rounded with terminal setae; membranous endophallus with prebasal more sclerotized ring; phallobasis ca. 0.4× as long as penis.

Ovipositor (Fig. 20) with terminal segment feebly curved; preterminal segment 3.4× longer than terminal, outer side concave; distal sclerite produced ventrally, ca. 0.68× as long as preterminal; basal segment ca. 1.34× longer than preterminal and distal sclerites combined; ventral fulcrum slightly sinuate.

Sexual dimorphism. No special features distinguishing males and females were found.

Distribution. Sabah, Sarawak (Malaysia).

Graphelmis quadrimaculata sp.nov.

(Figs 2, 21–24)

Type locality: Malaysia, Sarawak (Borneo), ca. 40km SE Kapit.

Material examined. Holotype ♂ (NMW): “SARAWAK (Borneo), ca. 40km SE KAPIT, 03. 1994, J. Kodada leg.”.

Paratypes (NMW, CKB): 10 ♂♂, 20 ♀♀, 7ex. (sex not examined) with the same label as holotype; 2 ♂♂, 1 ♀: “SARAWAK (Borneo), ca. 40km SE Kapit, 3. 1994, leg. J. Kodada”; 5 ♂♂, 5 ♀♀, 12ex. (sex not examined): “MAL., Sarawak 1993 80km S Kuching, 18.2. Kampung Ana Rais leg. M. Jäch (4)”; 2ex. (sex not examined): “MALAYSIA: Sarawak Mt. Penrisen, 80km S Kuching, 18.2. 1993, leg. H. Zettel (4)”; 1 ♂: “W Malaysia, Pahang, Benom Mts.: 3.53N 102.01E, 15km E Kampong, 24. III. 1998, 300–1000m a.s.l.”

Diagnosis. Generally this species resembles *G. marshalli*, from which it differs in: 1) somewhat more dorsoventrally flattened body; 2) more distinct pronotal colour pattern; 3) elytral marking consists of dark intervals, yellow interstices and two pairs of dark admedian spots; 4) admedian keels of ventrite 1 narrow, extending middle of ventrite.

Description. Habitus (Fig. 2); CL in ♂♂ (2.88 – 3.25 mm, O= 3.04 ± 0.19), in ♀♀ (3.25 – 3.63 mm, O= 3.44 ± 0.21); EW in ♂♂ (1.33 – 1.49 mm, O= 1.40 ± 0.08), in ♀♀ (1.44 – 1.67 mm, O= 1.54 ± 0.12), CL/EW in ♂♂ (2.16 – 2.19, O= 2.17 ± 0.01), in ♀♀ (2.18 – 2.26, O= 2.23 ± 0.04).

Colour pattern: pronotum with yellowish anterior margin, border along median pronotal groove distinctly widened prebasally, sublateral pronotal tubercles distinctly coloured, posterior pair reaching posterior pronotal margin; elytra with yellow intervals, dark striae and two pairs of moderately distinct dark admedian spots.

Head. HW in ♂♂ (0.66 – 0.74 mm, O= 0.69 ± 0.04), in ♀♀ (0.71 – 0.82 mm, O= 0.76 ± 0.05); ID in ♂♂ (0.35 – 0.38 mm, O= 0.36 ± 0.02), in ♀♀ (0.38 – 0.44 mm, O= 0.41 ± 0.03); ED in ♂♂ (0.31 – 0.35 mm, O= 0.33 ± 0.02), in ♀♀ (0.32 – 0.38 mm, O= 0.35 ± 0.03); HW/ID in ♂♂ (1.88 – 1.92, O= 1.90 ± 0.03), in ♀♀ (1.80 – 1.93, O= 1.87 ± 0.05). Labrum glabrous, with sparse setae; clypeus almost as long as labrum; frontoclypeal suture visible; frons and vertex, as well as clypeus irregularly micropunctured; eyes oval in lateral view and convex in dorsal view.

Thorax. Pronotum slightly wider than long, widest at base; PL in ♂♂ (0.88 – 1.00 mm, O= 0.96 ± 0.07), in ♀♀ (1.00 – 1.13 mm, O= 1.06 ± 0.07); PW in ♂♂ (1.03 – 1.13 mm, O= 1.06 ± 0.06), in ♀♀ (1.08 – 1.28 mm, O= 1.16 ± 0.10); AP in ♂♂ (0.72 – 0.77 mm, O= 0.74 ± 0.03), in ♀♀ (0.77 – 0.90 mm, O= 0.82 ± 0.05); lateral margins finely explanate; anterior margin glabrous; anterior angles produced anteriorly; sublateral tubercles flat; median groove narrow, moderately deeply impressed, not reaching pronotal margins; prebasal admedian pits vestigial; surface irregularly, densely micropunctured, interstices shiny. Prosternum with disc plicate; prosternal process wider than long, feebly raised mesally; lateral margins widely raised around coxae; posterior margin with median protuberance feebly projected. Scutellum glabrous, subtriangular; lateral sides convex, raised or with small tubercles; apex rounded. Mesosternum with oblique microreticulate carinae. Metasternum ca. twice as long as mesosternum; disc almost flat, glabrous, sparsely setigerous; longitudinal suture finely, narrowly impressed; admedian prebasal punctures shallow, transverse; lateral sides of disc somewhat raised. Elytra slightly divergent in anterior two-thirds, then continuously convergent toward apices; EL in ♂♂ (2.00 – 2.25 mm, O= 2.08 ± 0.14), in ♀♀ (2.25 – 2.50 mm, O= 2.38 ± 0.14); lateral margins serrate; striae punctures distinct, deeply impressed. Legs glabrous; FT in ♂♂ (1.00 – 1.09 mm, O= 1.06 ± 0.05), in ♀♀ (1.00 – 1.21 mm, O= 1.09 ± 0.08); MT in ♂♂ (0.91 – 1.04 mm, O= 0.99 ± 0.07), in ♀♀ (0.91 – 1.15 mm, O= 1.01 ± 0.09); HT in ♂♂ (1.00 – 1.12 mm, O= 1.07 ± 0.03), in ♀♀ (1.00 – 1.24 mm, O= 1.11 ± 0.09); metatarsomere 5 as long as combined length of segments 1–4.

Abdomen. Admedian keels of ventrite 1 narrow, extending middle of ventrite; abdominal intercoxal process and discs of ventrites shiny, sparsely setigerous. Sternite 9 and spiculum gastrale (Fig. 23).

Aedeagus (Figs 21, 22). Penis elongate, with small spines concentrated on apex; inlateral view subparallel, slightly curved; in ventral view parallel-sided; ventral lobe parallel-sided, apex rounded with dense thin setae; membranous endophallus with short, more sclerotized ring below middle; phallobasis ca. 0.4× as long as penis.

Ovipositor (Fig. 24) with terminal segment straight, preterminal segment ca. 3.5 × longer than terminal, outer side concave; distal sclerite produced ventrally, ca. 0.7× as long as preterminal; basal segment ca. 1.4× longer than preterminal and distal sclerites combined; ventral fulcrum feebly sinuate.

Sexual dimorphism. Males and females bear no special secondary sexual characters and are extremely similar each other.

Distribution. Sarawak, Pahang (Malaysia).

Etymology: referring to four dark elytral spots.

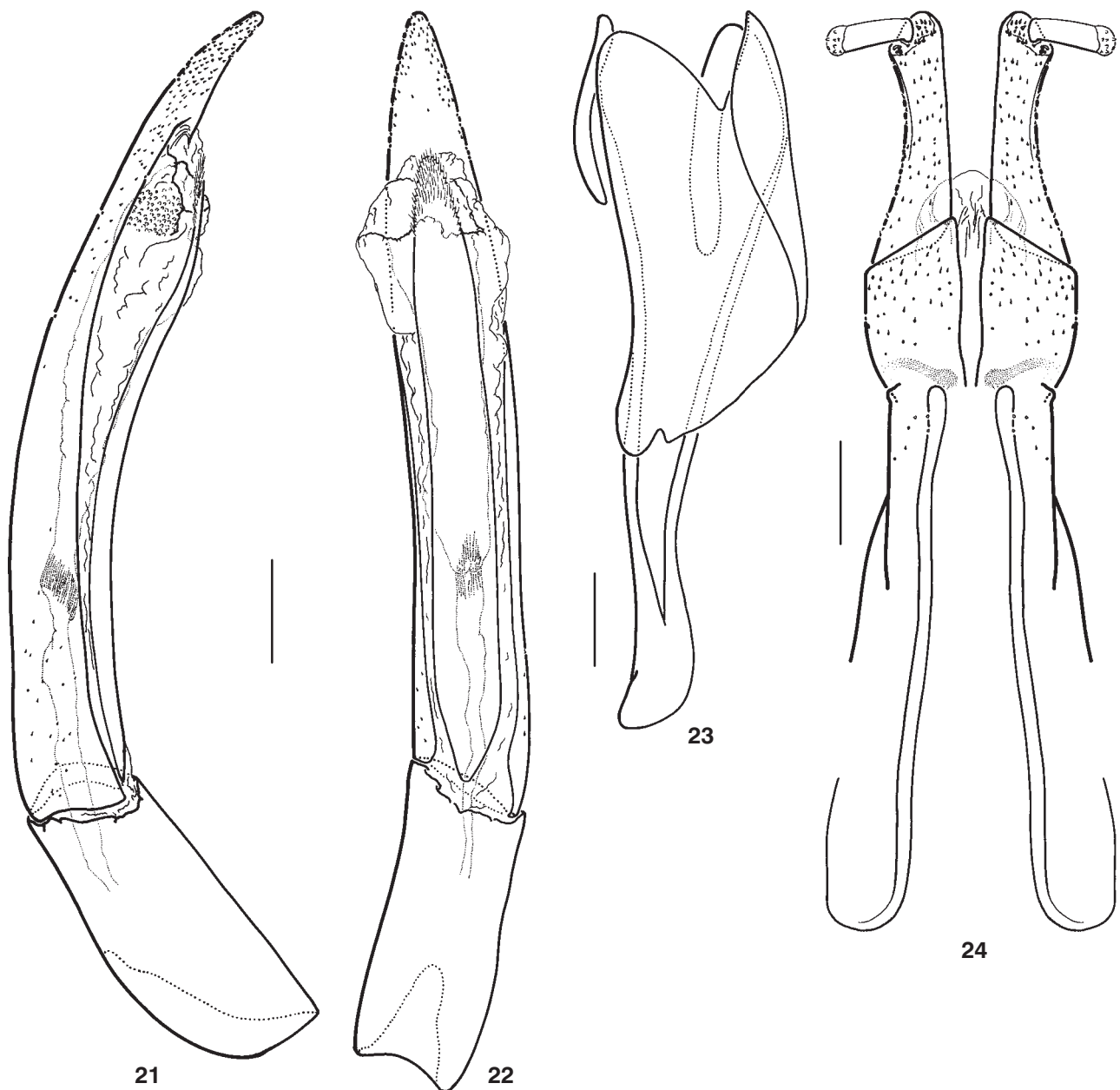
***Graphelmis dentipes* sp.nov.**

(Figs 3, 25–28)

Type locality: Malaysia, Sabah (Borneo), Batu Punggul Resort env.

Material examined. Holotype ♂ (NMW): “Malaysia, Sabah, Batu Punggul Resort env., 24. VI. – 1. VII. 1996, 11a, river about 10m wide, flowing in primary forest, partly shaded”.

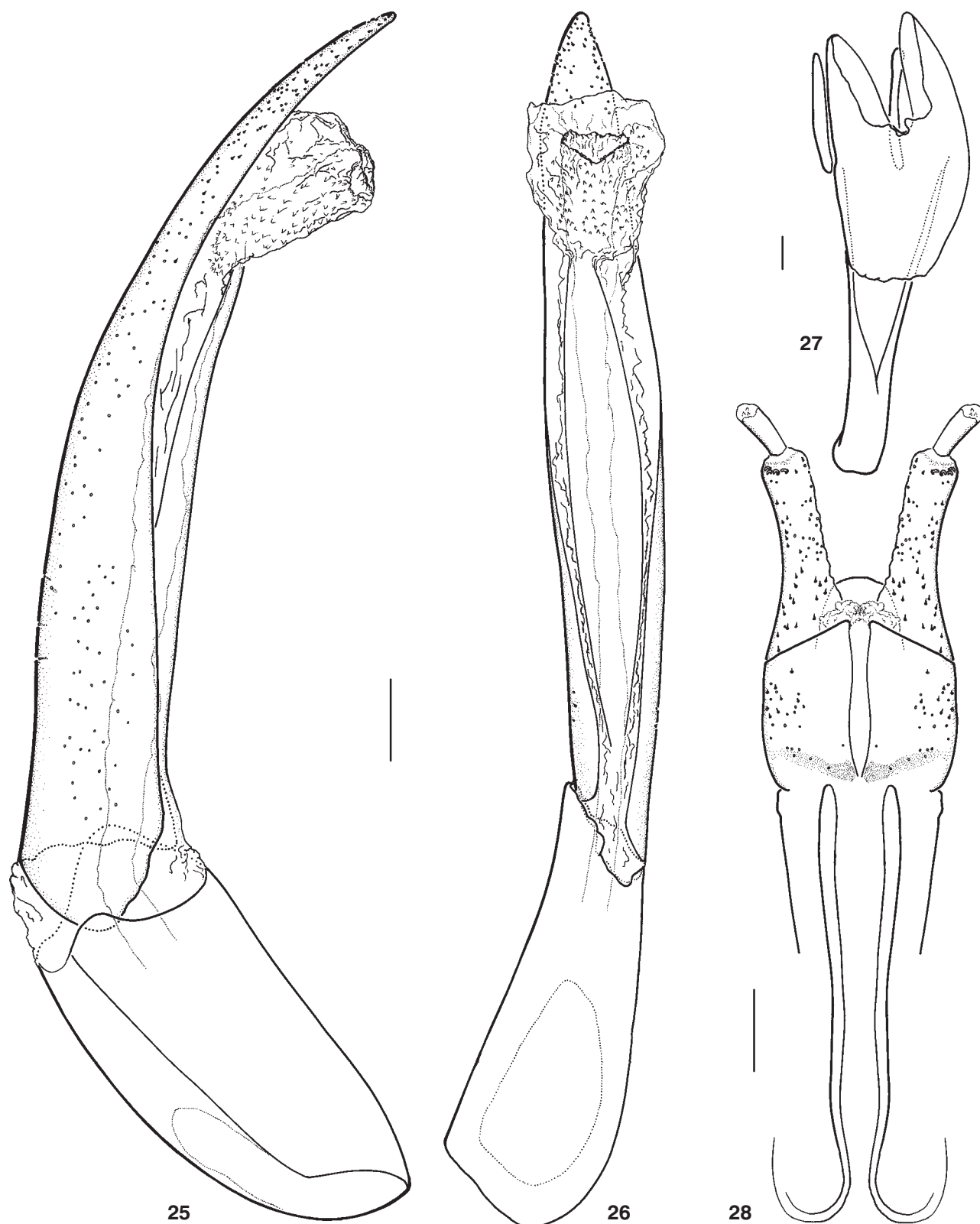
Paratypes (NMW, CKB): 6 ♂♂, 19 ♀♀ with the same label as holotype; 2 ♂♂, 10 ♀♀: “Malaysia, SABAH, Kuamut river env. near Kampung Pisang Pisang, 3. – 4. VII. 1996, 14b: ca 10m wide tributary of Kuamut river in primary forest”; 2 ♂, 6 ♀♀: “Malaysia, Sabah, Batu Punggul Resort env., 24. VI. – 1. VII.



Figs 21–24 *Graphelmis quadrimaculata* sp.nov.: 21) aedeagus lateral view; 22) aedeagus ventral view; 23) spiculum gastrale and sternite 9; 24) ovipositor. Scale bars: 0.1mm.

1996, 11c, vegetation debris and forest floor litter accumulated around large trees near river”; 1 ♂: “Malaysia, SABAH, Crocker Range, Keningau env., Taman Bandukan, 13. – 14. 6. 1998, J. Kodada & F. Ciampor lgt.”.

Diagnosis. Within the *G. marshalli* species group, *G. dentipes* sp.nov. differs as follows: 1) yellowish elytral marking indistinct; 2) ventral side of metatibiae with tooth-like projection in about middle; 3) ventral side of males



Figs 25–28 *Graphelmis dentipes* sp.nov.: 25) aedeagus lateral view; 26) aedeagus ventral view; 27) spiculum gastrale and sternite 9; 28) ovipositor. Scale bars: 0.1mm.

with sparse, long and thin setae; 4) apex of penis acuminate.

Description. Habitus (Fig. 3); CL in ♂♂ (3.88–4.25 mm, $O = 4.11 \pm 0.12$), in ♀♀ (4.25–4.75 mm, $O = 4.47 \pm 0.17$); EW in ♂♂ (1.64–1.90 mm, $O = 1.81 \pm 0.07$), in ♀♀ (1.79–2.15 mm, $O = 1.96 \pm 0.11$), CL/EW in ♂♂ (2.23–2.36, $O = 2.28 \pm 0.05$), in ♀♀ (2.20–2.37, $O = 2.29 \pm 0.05$).

Colour pattern: pronotum with yellowish anterior margin divided mesally, border along median pronotal groove indicated in posterior half or absent, sublateral pronotal tubercles weakly coloured; elytra with paler intervals and dark striae.

Head. HW in ♂♂ (0.81–0.90 mm, $O = 0.85 \pm 0.03$), in ♀♀ (0.86–1.00 mm, $O = 0.93 \pm 0.05$); ID in ♂♂ (0.38–0.48 mm, $O = 0.44 \pm 0.04$), in ♀♀ (0.48–0.55 mm, $O = 0.51 \pm 0.02$); d in ♂♂ (0.38–0.41 mm, $O = 0.39 \pm 0.01$), in ♀♀ (0.38–0.48 mm, $O = 0.42 \pm 0.04$); HW/ID in ♂♂ (1.79–2.08, $O = 1.94 \pm 0.09$), in ♀♀ (1.73–1.93, $O = 1.82 \pm 0.07$). Labrum glabrous, apical half setose; anterior margin paler; clypeus about as long as labrum; surface except glabrous anterior margin rough; frons and vertex rough; eyes large, almost rounded in lateral view and distinctly convex in dorsal view, without distinctly raised margin.

Thorax. Pronotum slightly wider than long, widest about in basal half; sides slightly converging anteriorly and finely constricted behind produced anterior angles; PL in ♂♂ (1.13–1.25 mm, $O = 1.22 \pm 0.06$), in ♀♀ (1.25–1.50 mm, $O = 1.31 \pm 0.08$); PW in ♂♂ (1.28–1.38 mm, $O = 1.35 \pm 0.04$), in ♀♀ (1.33–1.64 mm, $O = 1.45 \pm 0.10$); AP in ♂♂ (0.92–0.97 mm, $O = 0.95 \pm 0.03$), in ♀♀ (0.97–1.15 mm, $O = 1.05 \pm 0.06$); lateral margins finely explanate; anterior margin glabrous; anterior angles produced, more distinctly and acuminately in males; sublateral tubercles visible, flat, usually paler; median groove well developed, thin, almost reaching pronotal margins; prebasal admedian pits shallow; surface setose and sparsely micropunctured. Prosternum: prosternal process about as long as wide; lateral margins almost flat, finely microreticulate; posterior margin with well developed, wide median protuberance; surface of prosternum shallowly plicate, setose and shiny. Scutellum shiny, flat or with indistinct lateral tubercles. Mesosternum with well developed microreticulate carinae, sparsely setose in males; surface shiny. Metasternum about twice as long as mesosternum; disc almost flat in females, in males anterior half flat, posterior half raised to admedian prebasal tubercles, separated by depressed longitudinal suture; surface of disc shiny, in males with sparse, long thin setae; admedian prebasal punctures indistinct; sublateral carinae absent. Elytra with sides slightly diverging in about anterior two-thirds, then continuously converging toward slightly protruding apices; EL in ♂♂ (2.75–3.00 mm, $O = 2.89 \pm 0.08$), in ♀♀ (2.88–3.50 mm, $O = 3.16 \pm 0.17$); lateral margins more serrate; striae punctures shallowly depressed; intervals yellowish; striae black. Legs glabrous; anterior half of femora almost black, distal half pale; protibiae feebly longitudinally grooved; FT in ♂♂

(1.62–1.72 mm, $O = 1.67 \pm 0.04$), in ♀♀ (1.38–1.59 mm, $O = 1.50 \pm 0.06$); MT in ♂♂ (1.59–1.72 mm, $O = 1.66 \pm 0.06$), in ♀♀ (1.38–1.62 mm, $O = 1.49 \pm 0.07$); HT in ♂♂ (1.55–1.72 mm, $O = 1.64 \pm 0.07$), in ♀♀ (1.41–1.72 mm, $O = 1.57 \pm 0.09$); metatibiae ventrally with tooth-like projection in about midlength, more distinct in males; length of tarsomere 5 equal to combined length of tarsomeres 1–4; tarsomeres of the same yellowish colour.

Abdomen. Admedian keels of ventrite 1 straight, reaching half of ventrite; abdominal intercoxal process and mesal portion of remaining ventrites shiny; lateral portions of ventrites covered by plastron structures; apex of ventrite 5 with sides produced. Sternite 9 and spiculum gastrale (Fig. 27).

Aedeagus (Figs 25, 26). Penis elongate, with numerous small spines; in lateral view curved, widened toward base; apical half narrow, basal half abruptly widened; in ventral view subparallel, widest about in middle; membranous endophallus with numerous small spines; phallobasis half as long as penis.

Ovipositor (Fig. 28) with terminal segment almost straight; preterminal segment ca. 3.2× as long as terminal, outer side slightly concave; distal sclerite about 0.8× as long as preterminal; basal segment ca. 1.3× longer than preterminal and distal sclerites combined; ventral fulcrum almost straight.

Sexual dimorphism. Males are recognized by long, thin setae on ventral side, more acuminately produced anterior pronotal angles and are generally of smaller size.

Distribution. So far known only from Sabah (Malaysia).

Etymology: from Latin *dens* (tooth) *pes* (leg), in reference to the tooth-like projection on metatibiae.

Graphelmis fuscicornis sp.nov.

(Figs 4, 29–32)

Type locality: S-Vietnam, 40km NW An Khe Buon Luoi, 620–750m 14°10'N 108°30'E.

Material examined. **Holotype** ♂ (NMW): “S-VIETNAM 40km NW An Khe Buon Luoi, 620–750m 14°10'N 108°30'E 28.3.-12.4.1995 Pacholatko & Dembicky”. **Paratypes** (NMW, CKB): 30 ♂♂, 22 ♀♀ with the same label as holotype; 3 ♂: “S-VIETNAM 22.-24.4. 15km SW Bao Loc 1995 900m, 11°27'N 107°43'E Pacholatko & Dembicky”.

Diagnosis. Within the *G. marshalli* species group *G. fuscicornis* sp.nov. differs as follows: 1) yellowish elytral marking dark but distinctly V-shaped in anterior half; 2) apices of main and ventral lobes of penis acuminate; 3) antennal segment 10 darkened.

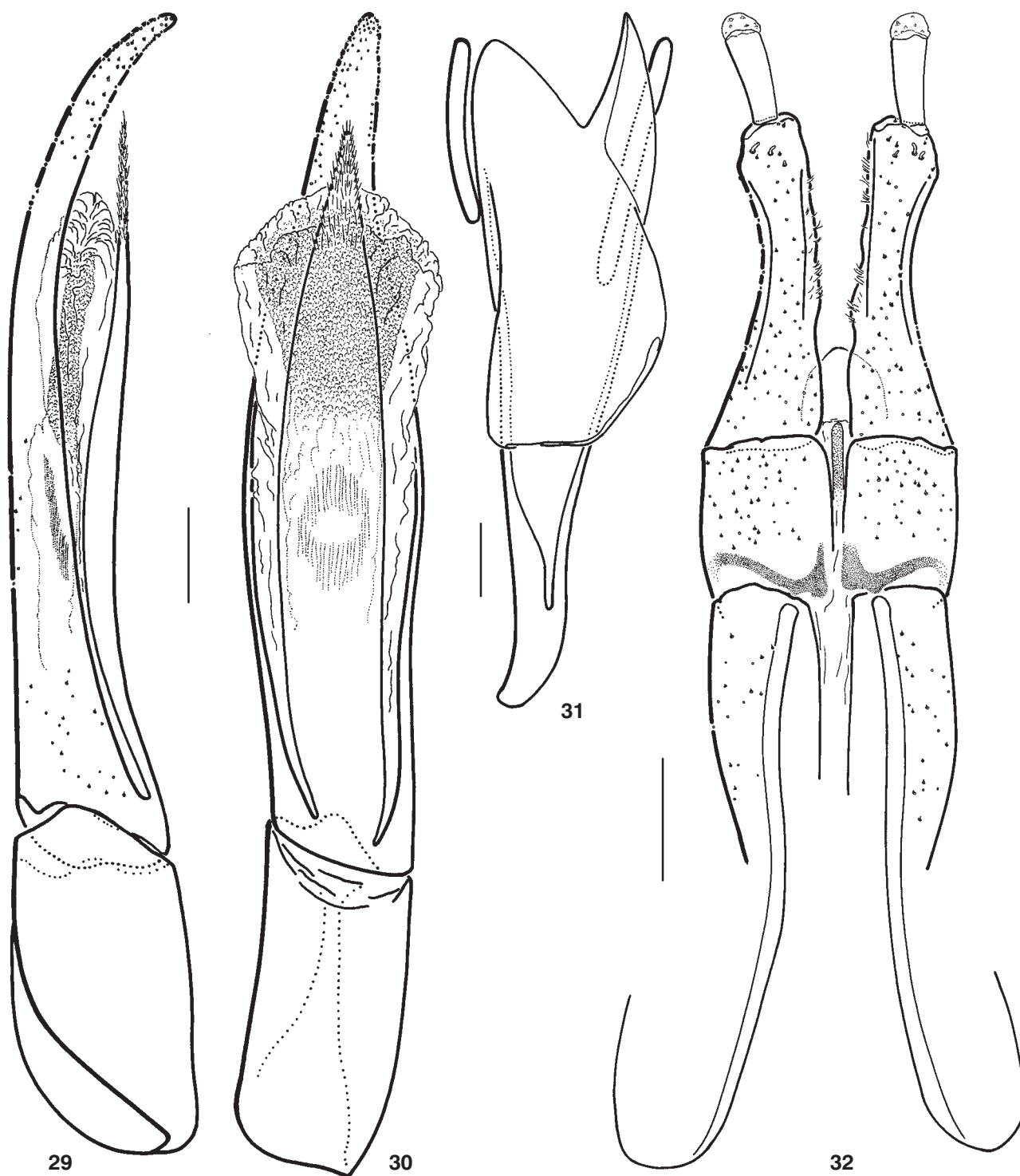
Description. Habitus (Fig. 4); CL in ♂♂ (3.63–4.00 mm, $O = 3.79 \pm 0.11$), in ♀♀ (3.69–4.06 mm, $O = 3.83 \pm 0.11$); EW in ♂♂ (1.59–1.79 mm, $O = 1.68 \pm 0.08$), in ♀♀ (1.54–1.74 mm, $O = 1.64 \pm 0.08$), CL/EW in ♂♂ (2.19–2.36, $O = 2.26 \pm 0.05$), in ♀♀ (2.26–2.40, $O = 2.34 \pm 0.04$). Pronotal and elytral marking dark but distinct.

Colour pattern dark, indistinct; pronotum with yellowish anterior margin divided mesally, border along me-

dian pronotal groove, sublateral pronotal tubercles weakly coloured; elytra with indistinct V-shaped marking in anterior half and irregular marking in posterior half.

Head. HW in ♂♂ (0.71–0.82 mm, $O=0.76 \pm 0.03$), in ♀♀ (0.71–0.82 mm, $O=0.76 \pm 0.02$); ID in ♂♂ (0.38–0.44 mm, $O=0.40 \pm 0.02$), in ♀♀ (0.38–0.44 mm, $O=0.40 \pm 0.02$); ED in ♂♂ (0.32–0.41 mm, $O=0.36 \pm 0.03$), in ♀♀ (0.34–0.38 mm, $O=0.36 \pm 0.02$); HW/ID in ♂♂

(1.79–2.00, $O=1.91 \pm 0.07$), in ♀♀ (1.79–2.00, $O=1.89 \pm 0.06$). Labrum sparsely setose; surface glabrous except finely reticulate posterior margin and postero-lateral portions; anterior margin and mesal portion paler; clypeus and frons rough and sparsely setose; vertex punctured; punctures setigerous; interstices shiny; V-shaped suture visible; eyes large, oval in lateral view and convex in dorsal view, without distinctly raised margin.



Figs 29–32 *Graphelmis fuscicornis* sp. nov.: 29) aedeagus lateral view; 30) aedeagus ventral view; 31) spiculum gastrale and sternite 9; 32) ovipositor. Scale bars: 0.1mm.

Thorax. Pronotum as long as wide, widest about in basal third; PL in ♂♂ (1.13 – 1.25 mm, O= 1.22 ± 0.06), in ♀♀ (1.13 – 1.25 mm, O= 1.16 ± 0.04); PW in ♂♂ (1.13 – 1.28 mm, O= 1.22 ± 0.06), in ♀♀ (1.13 – 1.33 mm, O= 1.22 ± 0.06); AP in ♂♂ (0.79 – 0.90 mm, O= 0.84 ± 0.04), in ♀♀ (0.82 – 0.97 mm, O= 0.88 ± 0.04); lateral margins finely explanate; anterior margin glabrous, paler; anterior angles produced; sublateral tubercles flat, almost glabrous, usually paler; median groove in about middle third, thin and shallow; prebasal admedian pits small; surface sparsely setose and micropunctured; punctures smaller and shallower toward anterior margin; interstices shiny. Prosternum: prosternal process slightly wider than long; margins widely raised, plicate; median protuberance of posterior margin short and wide; surface of prosternum shallowly plicate. Scutellum almost pentagonal with angles rounded; surface shiny, lateral tubercles more or less distinct. Mesosternum with well developed microreticulate carinae, shiny. Metasternum about twice as long as mesosternum; disc almost flat; longitudinal suture shallowly depressed in posterior half; surface of disc shiny with thin sparse setae; setae somewhat more numerous in males; admedian prebasal punctures shallow; sublateral carinae absent. Elytra with sides almost parallel in about anterior two-thirds, then continuously converging toward slightly protruding apices; EL in ♂♂ (2.50 – 2.75 mm, O= 2.63 ± 0.08), in ♀♀ (2.56 – 2.81 mm, O= 2.67 ± 0.08); lateral margins finely serrate; striae punctures deeper on sides. Legs glabrous; basal black portion of femora not reaching half of its length; protibiae feebly longitudinally grooved on outer side; FT in ♂♂ (1.15 – 1.29 mm, O= 1.23 ± 0.06), in ♀♀ (1.12 – 1.29 mm, O= 1.20 ± 0.05); MT in ♂♂ (1.09 – 1.29 mm, O= 1.21 ± 0.07), in ♀♀ (1.06 – 1.24 mm, O= 1.14 ± 0.06); HT in ♂♂ (1.18 – 1.38 mm, O= 1.29 ± 0.08), in ♀♀ (1.15 – 1.32 mm, O= 1.24 ± 0.06); metatibiae simple; length of tarsomere 5 subequal to combined length of tarsomeres 1–4.

Abdomen. Admedian keels of ventrite 1 straight, extending half of ventrite; anterior half of abdominal intercoxal process indistinctly punctured; posterior half and mesal portion of remaining ventrites shiny; lateral portions of ventrites covered by plastron structures; apex of ventrite 5 with sides rounded. Sternite 9 and spiculum gastrale (Fig. 31).

Aedeagus (Figs 29, 30). Penis elongate, with numerous small spines especially on apex; in lateral view curved, continuously widened toward base; in ventral view subparallel, mesally widened, with acuminate apex; ventral lobe with apex acuminate and densely setose; membranous endophallus with numerous small spines and more sclerotized ring; phallobasis ca 0.4× as long as penis.

Ovipositor (Fig. 32) with terminal segment almost straight, slightly widened apicad; preterminal segment ca. 3.5× as long as terminal, outer side concave; distal sclerite subquadrate, about half as long as preterminal; length of basal segment subequal to combined length of terminal, preterminal and distal sclerites; ventral fulcrum sinuate.

Sexual dimorphism. Males are hardly recognized by larger number of thin setae on disc of metasternum, but they can be ragged in older specimens.

Distribution. So far known only from South Vietnam.

Etymology. Named in reference to the darkened antennal segments.

***Graphelmis bouchardi* (GROUVELLE, 1896)**

(Figs 5, 33, 34)

Cylloepus bouchardi GROUVELLE, 1896: 44

Graphelmis bouchardi DELEVE, 1968: 170.

Type locality: Indonesia, Sumatra, Palembang.

Material examined. (NMW, CKB, Budapest): 4♂♂, 9♀♀, 3ex. (sex not examined): “Sumatra centr. Subangpass. D. Limnol. Exp., 4.III.1929, Grossen Bach, 950m, auf Holz, Coll. E. Csiki”; 2♀♀: “N-SUMATRA, 1990 (13) Nähe Prapat, ca. 1000m leg. Jäch, 17.2.”; 1♀: “N-SUMATRA, 1990 (16) Tigabinanga, Westl. Kabanjahe leg. Jäch, 21.2.”; 1♂: “INDONESIEN 1991 (28) W-Sumatra, W Danau di Atas 70km SE Padang leg. Jäch 24.2.”; 1♀: “INDONESIEN 1991 (28) W-Sumatra, W Danau di Atas 70km SE Padang leg. Schödl 24.2.”; 1ex. (sex not examined): “N-SUMATRA Labuan Hulu Aek Tarum-Fluß, 80m 99°22'31"E 2°42'18"N 21.2.1994 leg. Malicky”; 1♀: “Sumatra XI-XII. 962 Tebing-Tinggi leg. Dr. E. DIEHL”.

Diagnosis. Within the *G. marshalli* species group *G. bouchardi* differs as follows: 1) anterior V-shaped part of elytral yellowish marking divided by dark sutural interval; 2) pronotum very densely micropunctured, matt; 3) sides of pronotum convex; 4) penis distinctly widened subapically in ventral view.

Redescription. Habitus (Fig. 5); CL in ♂♂ (4.06 – 4.75 mm, O= 4.29 ± 0.25), in ♀♀ (3.81 – 4.38 mm, O= 4.07 ± 0.19); EW in ♂♂ (1.72 – 1.90 mm, O= 1.76 ± 0.07), in ♀♀ (1.59 – 1.82 mm, O= 1.71 ± 0.08), CL/EW in ♂♂ (2.36 – 2.51 mm, O= 2.44 ± 0.06), in ♀♀ (2.30 – 2.48, O= 2.39 ± 0.05).

Colour pattern: pronotum with yellowish anterior margin, parallel-sided border along median pronotal groove, sublateral pronotal tubercles weakly coloured; elytra with V-shaped marking in anterior half, divided apically by dark elytral suture and irregular marking on each elytron in posterior half.

Head. HW in ♂♂ (0.79 – 0.88 mm, O= 0.83 ± 0.03), in ♀♀ (0.79 – 0.88 mm, O= 0.84 ± 0.03); ID in ♂♂ (0.46 – 0.50 mm, O= 0.48 ± 0.02), in ♀♀ (0.44 – 0.50 mm, O= 0.47 ± 0.02); ED in ♂♂ (0.34 – 0.37 mm, O= 0.35 ± 0.01), in ♀♀ (0.32 – 0.38 mm, O= 0.36 ± 0.02); HW/ID in ♂♂ (1.59 – 1.81 mm, O= 1.74 ± 0.08), in ♀♀ (1.69 – 1.83, O= 1.77 ± 0.06). Labrum finely microreticulate, with sparse setae; clypeus about as long as labrum; frontoclypeal suture visible; frons and vertex, as well as clypeus irregularly micropunctured; eyes oval in lateral view and convex in dorsal view.

Thorax. Pronotum as long as wide, widest about in middle; PL in ♂♂ (1.19 – 1.31 mm, O= 1.24 ± 0.05), in ♀♀ (1.19 – 1.38 mm, O= 1.29 ± 0.07); PW in ♂♂ (1.23 – 1.44 mm, O= 1.29 ± 0.07), in ♀♀ (1.08 – 1.33 mm, O= 1.25 ± 0.09); AP in ♂♂ (0.87 – 0.95 mm, O= 0.91 ± 0.03), in ♀♀ (0.87 – 1.00 mm, O= 0.94 ± 0.05); lateral margins

convex, finely explanate; anterior angles produced anteriorly; sublateral tubercles usually almost absent; median groove narrow, about as long as one-third of PL; prebasal admedian pits small; surface densely micropunctured except of very narrow glabrous anterior margin. Prosternum: disc shallowly grooved in anterior half, plicate in posterior half; prosternal process plicate, lateral margins widely raised around coxae, posterior margin with wide median protuberance.

Scutellum subtriangular, rough; lateral sides convex with small tubercles; apex rounded. Mesosternum with oblique microreticulate carinae. Metasternum slightly more than twice as long as mesosternum; disc finely raised in anterior half; longitudinal suture widely, shallowly impressed, admedian prebasal punctures transverse; surface of disc glabrous, shiny, with sparse, minute setae. Elytra parallel in anterior two-thirds, then convergent toward acuminate apices; EL in ♂♂ (2.81 – 3.44 mm, O= 3.05 ± 0.21), in ♀♀ (2.63 – 3.00 mm, O= 2.79 ± 0.13); lateral margins finely serrate; stria punctures well impressed. Legs glabrous; FT in ♂♂ (1.18 – 1.29 mm, O= 1.23 ± 0.05), in ♀♀ (1.00 – 1.26 mm, O= 1.18 ± 0.10); MT in ♂♂ (1.15 – 1.26 mm, O= 1.21 ± 0.04), in ♀♀ (1.00 – 1.21 mm, O= 1.12 ± 0.08); HT in ♂♂ (1.26 – 1.32 mm, O= 1.30 ± 0.02), in ♀♀ (1.21 – 1.32 mm, O= 1.26 ± 0.05); metatarsomere 5 almost as long as segments 1 – 4 combined.

Abdomen. Admedian keels of ventrite 1 distinct, reaching middle of ventrite; abdominal intercoxal process and discs of ventrites glabrous.

Aedeagus (Figs 33, 34). Penis elongate; in lateral view subparallel, slightly curved, apex more distinctly curved; in ventral view widened subapically, then parallel-sided; ventral lobe slightly widened subapically, with dense apical setae; membranous endophallus with small spines and grooves in apical portion; phallobasis ca. 0.45× as long as penis.

Sexual dimorphism. Both sexes are extremely similar and hardly distinguishable.

Distribution. Sumatra (Indonesia).

***Graphelmis robusta* sp.nov.**

(Figs 6, 35–38)

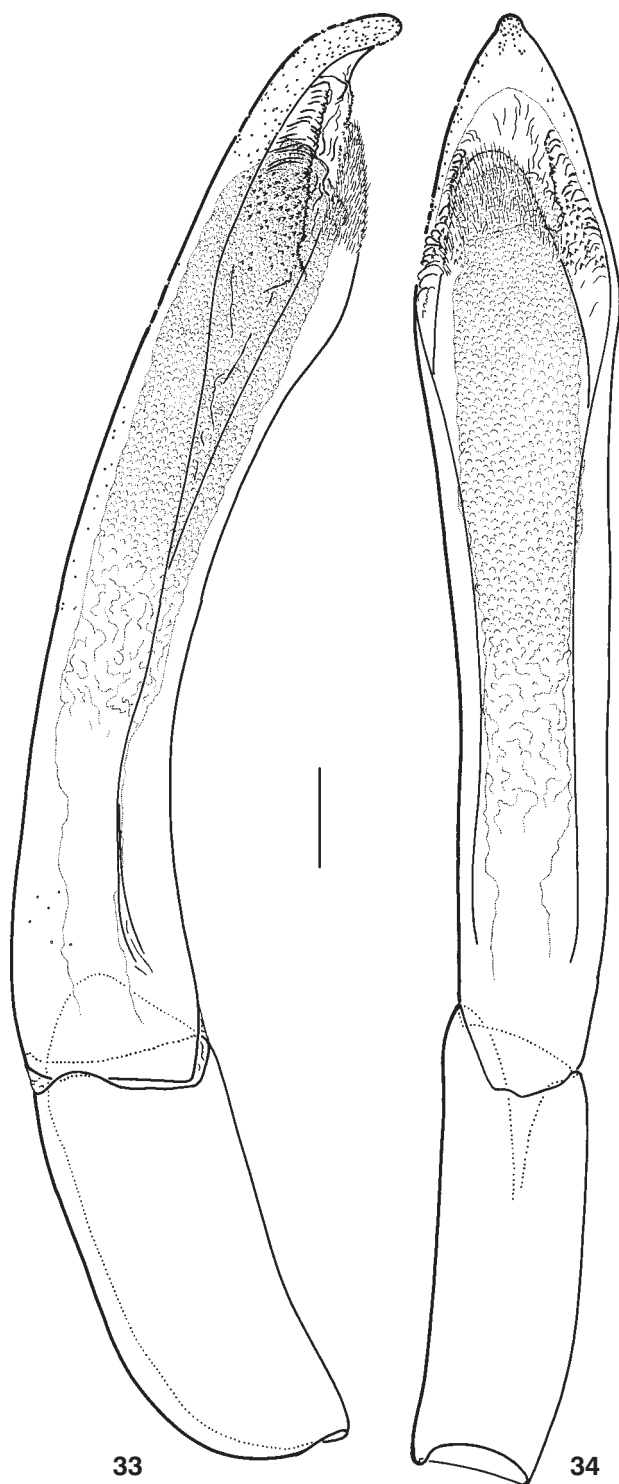
Type locality: Indonesia, E-Java, 50km SE Probolinggo, Gg. Argapuro, 1000m.

Material examined. **Holotype** ♂ (NMW): “E-JAVA: 8.10.1995 50km SE Probolinggo, Gg. Argapuro, 1000m, leg. Schillhammer (13)”. **Paratypes** (NMW, CKB): 26♂♂, 9♀♀ with the same label as holotype.

Diagnosis. Within the *G. marshalli* species group *G. robusta* sp.nov. differs as follows: 1) largest body size; 2) eyes relatively small and widely separated; 3) scutellum rough; 4) widened subapical portion of penis about twice as wide as base.

Description. Habitus (Fig. 6); CL in ♂♂ (4.56 – 4.88 mm, O= 4.71 ± 0.12), in ♀♀ (4.63 – 4.94 mm, O= 4.78 ± 0.11); EW in ♂♂ (1.90 – 2.05 mm, O= 1.97 ± 0.06), in ♀♀ (1.90 – 2.15 mm, O= 2.02 ± 0.08), CL/EW in ♂♂ (2.31 – 2.44, O= 2.39 ± 0.05), in ♀♀ (2.26 – 2.54, O= 2.37 ± 0.08).

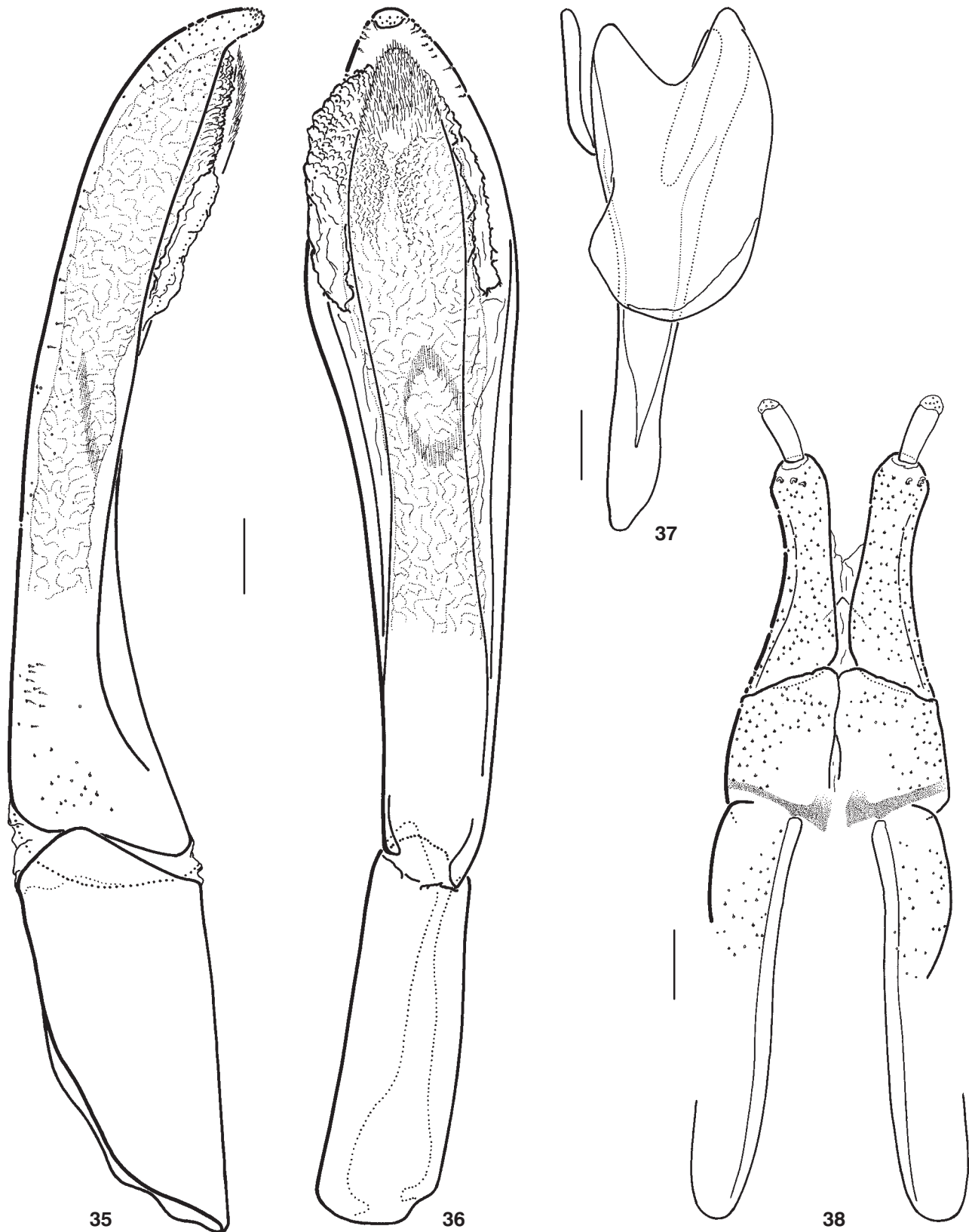
Colour pattern: pronotum with yellowish narrow anterior margin, anteriorly widened border along median pronotal groove narrow, sublateral pronotal tubercles indistinctly coloured; elytra with V-shaped marking apically widely divided by dark sutural interval and first stria and irregular marking on each elytron in posterior half.



Figs 33–34 *Graphelmis bouchardi* (Grouvelle): 33) aedeagus lateral view; 34) aedeagus ventral view. Scale bar: 0.1mm.

Head. HW in ♂♂ (0.88 – 0.94 mm, O= 0.92 ± 0.02), in ♀♀ (0.91 – 1.00 mm, O= 0.95 ± 0.03); ID in ♂♂ (0.53 – 0.59 mm, O= 0.55 ± 0.02), in ♀♀ (0.50 – 0.62 mm, O= 0.57 ± 0.03); ED in ♂♂ (0.38 – 0.44 mm, O= 0.41 ± 0.02),

in ♀♀ (0.38 – 0.44 mm, O= 0.42 ± 0.02); HW/ID in ♂♂ (1.60 – 1.72, O= 1.67 ± 0.03), in ♀♀ (1.62 – 1.82, O= 1.67 ± 0.07). Labrum glabrous, sparsely setose; anterior margin slightly paler; clypeus shorter than labrum; surface



Figs 35–38 *Graphelmis robusta* sp.nov.: 35) aedeagus lateral view; 36) aedeagus ventral view; 37) spiculum gastrale and sternite 9; 38) ovipositor. Scale bars: 0.1mm.

rough; frons and vertex densely micropunctured; eyes small, oval in lateral view and convex in dorsal view, without distinctly raised margin.

Thorax. Pronotum slightly wider than long, widest about in middle; PL in ♂♂ (1.38 – 1.50 mm, O= 1.47 ± 0.04), in ♀♀ (1.44 – 1.56 mm, O= 1.49 ± 0.04); PW in ♂♂ (1.44 – 1.59 mm, O= 1.53 ± 0.07), in ♀♀ (1.44 – 1.64 mm, O= 1.53 ± 0.07); AP in ♂♂ (1.00 – 1.13 mm, O= 1.06 ± 0.04), in ♀♀ (1.05 – 1.15 mm, O= 1.10 ± 0.04); lateral margins finely explanate; anterior margin paler; anterior angles produced; sublateral tubercles indistinct; median groove narrow; prebasal admedian pits shallow; surface densely micropunctured. Prosternum: prosternal process about as long as wide, mesally raised in females; lateral margins raised around coxae; posterior margin with well developed median protuberance; surface of prosternum shallowly plicate. Scutellum rough, with more or less distinct lateral tubercles. Mesosternum with oblique finely microreticulate carinae; surface shiny. Metasternum about twice as long as mesosternum; disc almost flat except depressed portion behind anterior margin; surface shiny, in males with sparse short setae; admedian prebasal punctures shallow; sublateral carinae absent; median longitudinal suture finely depressed in posterior half. Elytra with sides parallel about in anterior two-thirds, then continuously converging toward rounded apices; EL in ♂♂ (3.13 – 3.38 mm, O= 3.24 ± 0.10), in ♀♀ (3.19 – 3.38 mm, O= 3.29 ± 0.07); lateral margins densely serrate; striae punctures small and shallowly depressed; intervals glabrous. Legs glabrous; tibiae longitudinally grooved at least on outer side; FT in ♂♂ (1.32 – 1.44 mm, O= 1.37 ± 0.04), in ♀♀ (1.32 – 1.44 mm, O= 1.38 ± 0.04); MT in ♂♂ (1.29 – 1.44 mm, O= 1.39 ± 0.05), in ♀♀ (1.26 – 1.44 mm, O= 1.36 ± 0.05); HT in ♂♂ (1.44 – 1.59 mm, O= 1.52 ± 0.06), in ♀♀ (1.38 – 1.59 mm, O= 1.50 ± 0.07); length of tarsomere 5 equal to combined length of tarsomeres 1–4.

Abdomen. Admedian keels of ventrite 1 short, not reaching half of ventrite; abdominal intercoxal process rough; mesal portion of remaining ventrites glabrous; lateral portions of ventrites covered by plastron structures; apex of ventrite 5 with sides distinctly produced. Sternite 9 and spiculum gastrale (Fig. 37).

Aedeagus (Figs 35, 36). Penis elongate, with numerous small spines especially on apex; in lateral view almost straight except curved apex; basal portion finely widened; in ventral view abruptly widened subapically, then narrowed posteriad; ventral lobe with densely setose apex; membranous endophallus well developed; phallobasis less than half as long as penis.

Ovipositor (Fig. 38) with terminal segment almost straight; preterminal segment almost 4x as long as terminal, outer side slightly concave; distal sclerite subquadrate, ca. 0.7x as long as preterminal; basal segment about as long as terminal, preterminal and distal sclerites combined; ventral fulcrum almost straight.

Sexual dimorphism. Males are very similar to females and could be distinguished by sparse short setae on metasternum and not raised prosternal process.

Distribution. So far known only from the type locality.

Etymology: from Latin *robustus* – robust, referring to the largest body size within the genus.

Note. There are three specimens of the genus *Graphelmis* from Bali (Bali, Baturiti, Coll. Csiki, Jäch) in the material, which morphologically resemble *G. bouchardi* and *G. robusta*. Except several minor differences, they differ distinctly in colouration. Since there are only three specimens available, it is not possible to identify them without doubt.

***Graphelmis malickyi* sp.nov.**

(Figs 7, 39–42)

Type locality: Indonesia, Sumatra, 15km N Sindar RayaSimarito, 3°05'N 98°53'E 400m.

Material examined. Holotype ♂ (NMW): “SUMATRA: 15.4.1997 15km N Sindar RayaSimarito, 3°05'N 98°53'E 400m, leg. Malicky”. **Paratypes** (NMW, CKB): 1 ♀ with the same label as holotype; 2 ♂♂: “SUMATRA: 4.4.1997 2°49'N 99°18'E Kebun Sei Kopas, 200m, leg. Malicky”; 1 ♀: “SUMATRA: Labuan Hulu Aek Tarum-Fluß, 80m 99°22'31"E 2°41'18"N 21.2.1994 leg. Malicky”.

Diagnosis. Within the *G. marshalli* species group *G. malickyi* sp.nov. differs as follows: 1) lateral sides of pronotum convex; 2) elytra with 3 distinct black spots; 3) median black stripe along pronotal groove widened anteriad; 4) penis parallel-sided in ventral view.

Description. Habitus (Fig. 6); CL in ♂♂ (3.56 – 3.75 mm), in ♀♀ (3.44, 3.63 mm); EW in ♂♂ (1.54 – 1.64 mm), in ♀♀ (1.44, 1.19 mm), CL/EW in ♂♂ (2.29 – 2.36), in ♀♀ (2.39, 2.44).

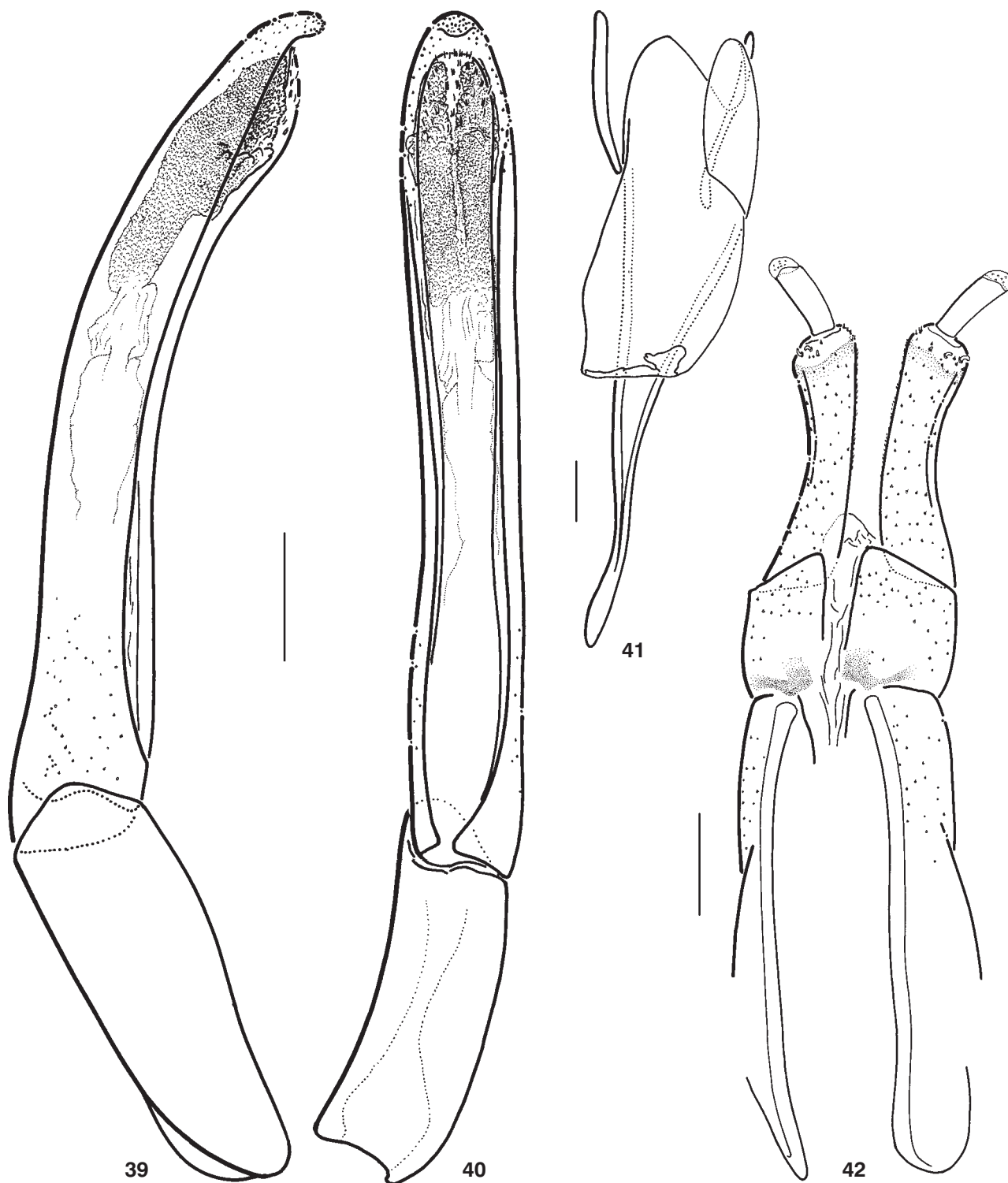
Colour pattern: pronotum with yellowish anterior margin, border along median pronotal groove slightly widened prebasally, sublateral pronotal tubercles weakly coloured; elytra with yellowish elongated V-shaped marking in anterior ca. two-thirds and entire posterior third on elytra.

Head. HW in ♂♂ (0.74 – 0.76 mm), in ♀♀ (0.74, 0.75 mm); ID in ♂♂ (0.38 – 0.41 mm), in ♀♀ 0.41 mm; ED in ♂♂ (0.32 – 0.35 mm), in ♀♀ 0.32 mm; HW/ID in ♂♂ (1.86 – 1.92), in ♀♀ (1.79, 1.82). Labrum setose, mesally glabrous; lateral portions finely microreticulate; anterior margin slightly paler; clypeus about as long as labrum, rough; frons and vertex rough; eyes large, oval in lateral view and convex in dorsal view, with slightly raised margin.

Thorax. Pronotum about as wide as long, widest about in middle; lateral sides convex in dorsal view; PL in ♂♂ 1.13 mm, in ♀♀ (1.06, 1.13 mm); PW in ♂♂ (1.13 – 1.18 mm), in ♀♀ (1.13, 1.18 mm); AP in ♂♂ (0.82 – 0.87 mm), in ♀♀ (0.82, 0.85 mm); lateral margins finely explanate; narrow anterior margin paler; anterior angles produced; sublateral tubercles distinct, paler and shiny; anterior pair smaller and somewhat transverse; posterior tubercles almost rounded; median groove more distinct in basal half, narrow, parallel-sided; prebasal admedian pits

shallow; surface densely micropunctured; punctures more sparse on anterior margin. Prosternum: prosternal process wider than long, parallel-sided; lateral margins raised around coxae; posterior margin with distinctly projected median protuberance in middle third; surface of prosternum shallowly plicate and shiny. Scutellum glabrous, with distinct lateral tubercles. Mesosternum with oblique microreticulate carinae; surface shiny. Metasternum about

twice as long as mesosternum; disc almost flat, only slightly raised in about middle; surface shiny with sparse, short setae; setae longer and more distinct in males; admedian prebasal punctures shallow; sublateral carinae absent; median longitudinal suture finely depressed in posterior half. Elytra with sides subparallel about in anterior two-thirds, then continuously converging toward slightly produced apices; EL in ♂♂ (2.44 – 2.63 mm), in ♀♀ (2.38, 2.50



Figs 39–42 *Graphelmis malickyi* sp.nov.: 39) aedeagus lateral view; 40) aedeagus ventral view; 41) spiculum gastrale and sternite 9; 42) ovipositor. Scale bars: 0.1mm.

mm); lateral margins more or less densely serrate; striae punctures small and shallowly depressed; intervals glabrous. Legs glabrous; tibiae very finely longitudinally grooved on outer side; FT in ♂♂ (1.06–1.15 mm), in ♀♀ (1.00, 1.06 mm); MT in ♂♂ (1.03–1.12 mm), in ♀♀ (0.97, 1.03 mm); HT in ♂♂ (1.09–1.18 mm), in ♀♀ (1.03, 1.12 mm); length of tarsomere 5 equal to combined length of tarsomeres 1–4.

Abdomen. Admedian keels of ventrite 1 short, not reaching anterior third of ventrite; abdominal intercoxal process and mesal portion of remaining ventrites glabrous; lateral portions of ventrites covered by plastron structures; apex of ventrite 5 with sides produced. Sternite 9 and spiculum gastrale (Fig. 41).

Aedeagus (Figs 39, 40). Penis elongate, with numerous small spines especially on apex; in lateral view subparallel, finely curved; apex arched; ventral lobe convex apically. Penis in ventral view parallel-sided; apex of ventral lobe rounded with inconspicuous setae; membranous endophallus well developed, with numerous small spines in apical portion; phallobasis ca. half as long as penis.

Ovipositor (Fig. 42) with terminal segment slightly curved; preterminal segment ca. 3.4× as long as terminal, finely arched; outer side concave; distal sclerite about 0.56× as long as preterminal mesally produced anteriorly; basal segment ca. 1.3× longer than preterminal and distal sclerites combined; ventral fulcrum finely curved in anterior portion, then straight.

Sexual dimorphism. Males are very similar to females and could be distinguished by more distinct setae on metasternum.

Distribution. So far known only from Sumatra (Indonesia).

Etymology. Named for the collector of this species, world-famous Trichoptera expert Hans Malicky.

Graphelmis vietnamensis sp.nov.

(Figs 8, 43–46)

Type locality: S-Vietnam, 15km SW Bao Loc, 900m, 11°27'N 107°43'E.

Material examined. **Holotype** ♂ (NMW): “S-VIETNAM: 22.–24.4., 15km SW Bao Loc 1995, 900m, 11°27'N 107°43'E, Pacholatkó & Dembický”. **Paratypes** (NMW): 1 ♀ with the same label as holotype.

Diagnosis. *G. vietnamensis* sp.nov. mostly resembles *G. quadrimaculata* sp.nov. and *G. merkli* sp.nov., from which differs in combination of following characters: 1) larger body size; 2) less dorsoventrally flattened body; 3) yellowish border along median pronotal groove widened in posterior half; 4) prebasal elytral dark spots indistinct; 5) slender aedeagus.

Description. Habitus (Fig. 8); CL in ♂ 3.38 mm, in ♀♀ 3.56 mm; EW in ♂ 1.44 mm, in ♀♀ 1.49 mm, CL/EW in ♂ 2.35, in ♀♀ 2.40.

Pronotal yellowish marking consists of: wide anterior margin, sublateral tubercles (posterior ones reaching

posterior pronotal margin), borders along median groove (widened in posterior half); elytral marking consists of: more or less distinctly coloured intervals and two pairs of weak admedian dark spots.

Head. HW in ♂ 0.74 mm, in ♀♀ 0.76 mm; ID in ♂ 0.35 mm, in ♀♀ 0.41 mm; ED in ♂ 0.35 mm, in ♀♀ 0.37 mm; HW/ID in ♂ 2.08, in ♀♀ 1.86. Labrum almost glabrous, setose; anterior margin and mesal portion slightly paler; clypeus about as long as labrum, irregularly micropunctured; frons and vertex densely irregularly micropunctured and sparsely setose; eyes large, oval in lateral view and convex in dorsal view, with raised margin on inner side.

Thorax. Pronotum about as long as wide, widest at base; PL in ♂ 1.00 mm, in ♀♀ 1.13 mm; PW in ♂ 1.13 mm, in ♀♀ 1.13 mm; AP in ♂ 0.77 mm, in ♀♀ 0.82 mm; lateral margins finely explanate; anterior angles produced; sublateral tubercles indistinct; median groove narrow, shallowly depressed; prebasal admedian pits vestigial; surface densely micropunctured, punctures sparser on tubercles and anterior margin. Prosternum with disc glabrous in anterior half and plicate in posterior half; prosternal process plicate; lateral margins raised, more densely plicate than disc; posterior margin with feebly projected, wide median protuberance. Scutellum subtriangular, flat; surface finely micropunctured. Mesosternum plicate, with narrow microreticulate carinae. Metasternum about twice as long as mesosternum; disc flat, almost glabrous with anterior and sublateral portions finely plicate; lateral margins of disc somewhat raised; admedian prebasal punctures indistinct; median longitudinal groove narrow, shallowly depressed, reaching metasternal margins. Elytra with sides parallel in anterior two-thirds, then continuously converging toward apices; EL in ♂ 2.38 mm, in ♀♀ 2.44 mm; lateral margins serrate; striae punctures distinct, moderately deeply impressed. Legs glabrous; anterior third to half of femora almost black; tibiae finely longitudinally grooved on outer side; FT in ♂ 1.16 mm, in ♀♀ 1.15 mm; MT in ♂ 1.09 mm, in ♀♀ 1.09 mm; HT in ♂ 1.18 mm, in ♀♀ 1.16 mm; metatibiae simple; length of tarsomere 5 equal to combined length of tarsomeres 1–4; tarsomeres 1–3 (4) darker than tarsomere 5.

Abdomen. Admedian keels of ventrite 1 nearly reaching middle of ventrite; abdominal intercoxal process and mesal portion of remaining ventrites shiny; lateral portions of ventrites covered by plastron structures; apex of ventrite 5 with sides finely produced. Sternite 9 and spiculum gastrale (Fig. 45).

Aedeagus (Figs 43, 44). Penis elongate, slender, with numerous small spines; in lateral view subparallel; apex slightly curved; in ventral view parallel-sided; ventral lobe narrow, parallel-sided, with apex rounded with a few setae; membranous endophallus with sparse small spines in apical portion and short subapical sclerotized ring; phallobasis about half as long as penis.

Ovipositor (Fig. 46) with terminal segment almost straight; preterminal segment ca. 3.7× as long as terminal, outer side concave; distal sclerite subquadrate, ca. 0.6× as long as preterminal; basal segment ca. 1.1× longer than

preterminal and distal sclerites combined; ventral fulcrum slightly sinuate.

Sexual dimorphism. Males are almost identical to females and thus very hardly distinguishable.

Distribution. So far known only from the type locality in South Vietnam.

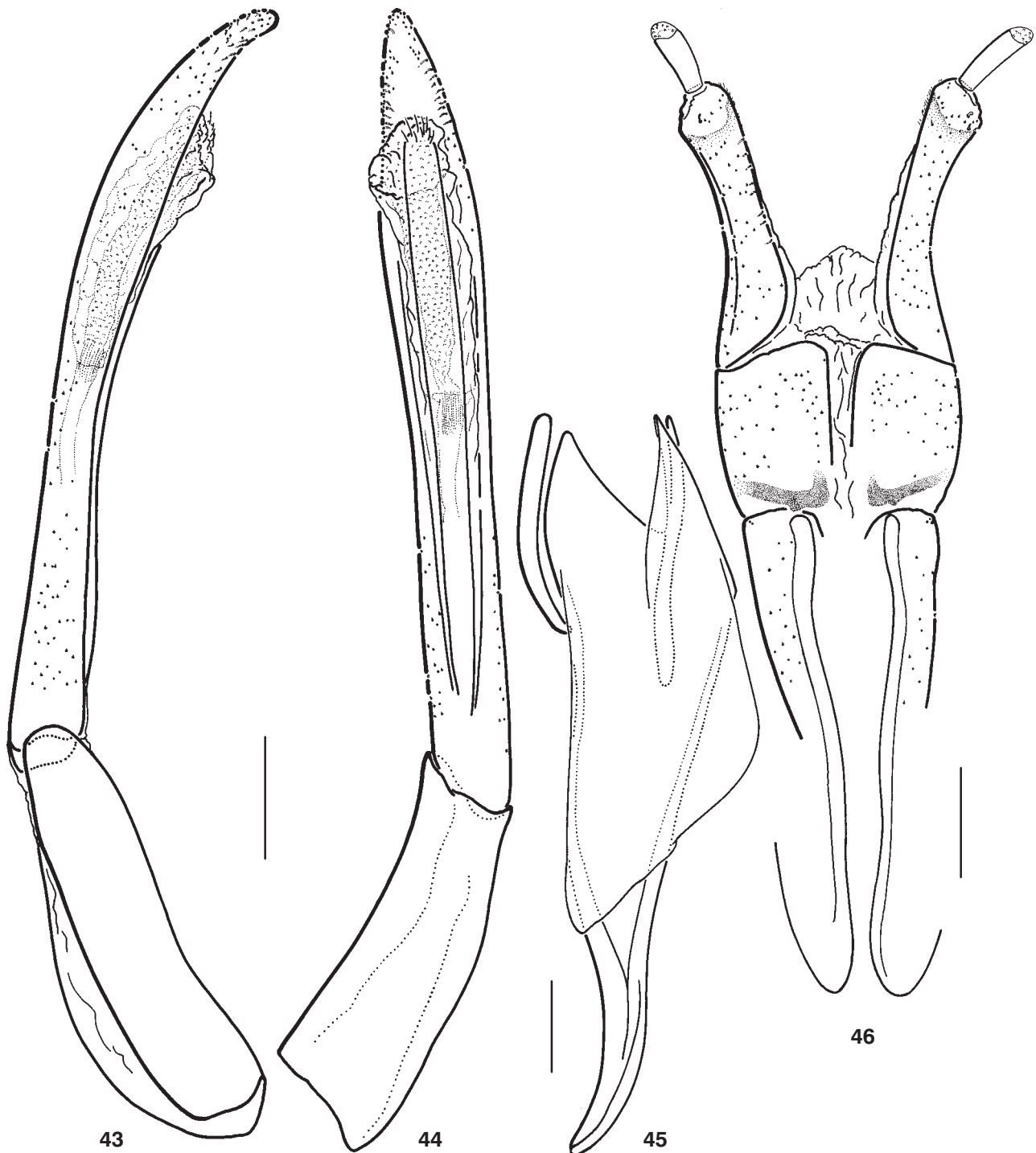
Etymology. Named in reference to the geographical distribution.

***Graphelmis nitida* sp.nov.**

(Figs 9, 47–50)

Type locality: Malaysia, Sarawak (Borneo), Kelabit HL, 5km E BarioPa Ukat, 1000m.

Material examined. Holotype ♂ (NMW): “MAL., Sarawak 1993Kelabit HL, 5km E BarioPa Ukat, 27.2., 1000m, leg. M.Jäch (15)”. **Paratypes** (NMW, CKB): 1 ♀ with the same



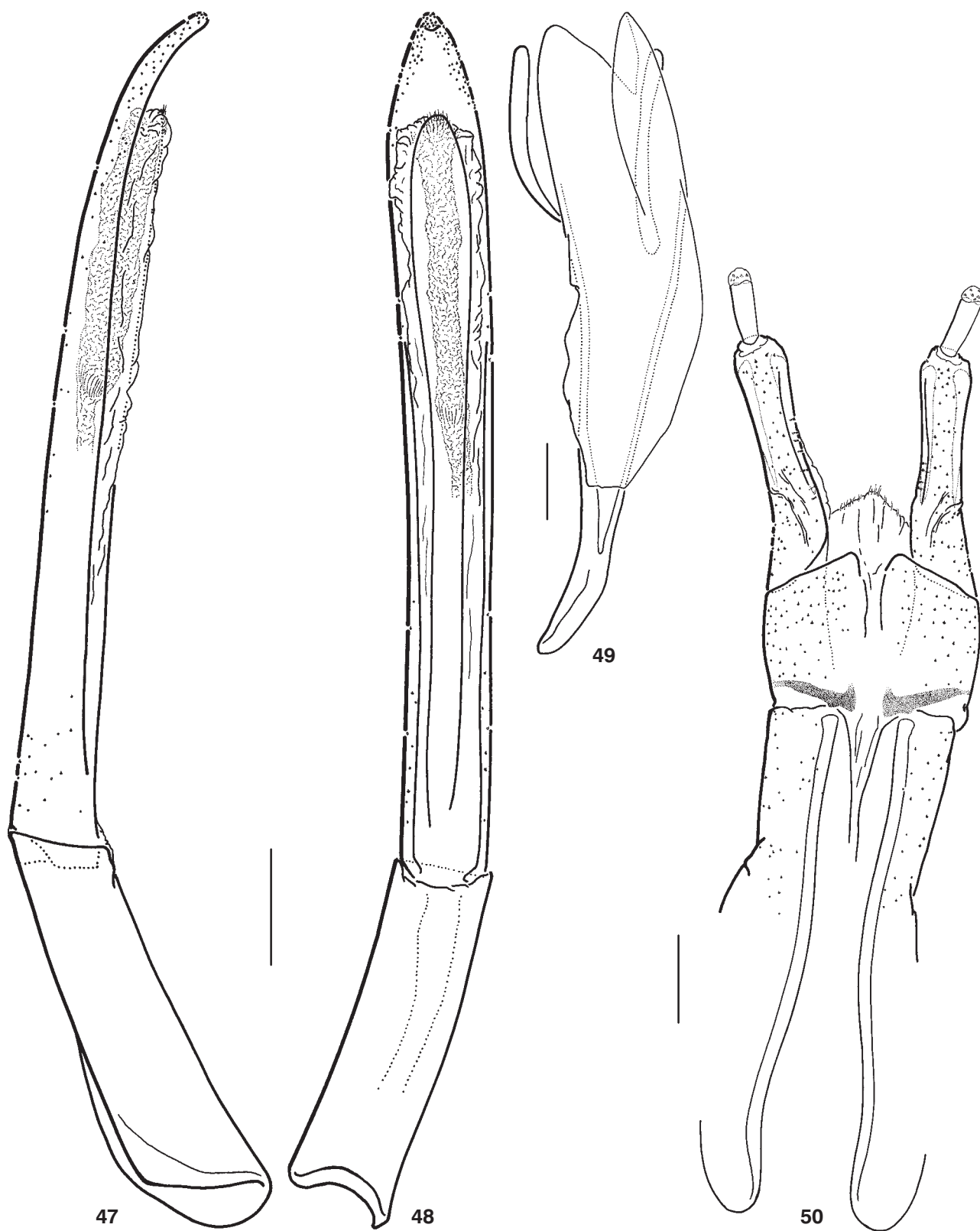
Figs 43–46 *Graphelmis vietnamensis* sp.nov.: 43) aedeagus lateral view; 44) aedeagus ventral view; 45) spiculum gastrale and sternite 9; 46) ovipositor. Scale bars: 0.1mm.

label as holotype; 3 ♀♀: “MAL., Sarawak 1993 Kelabit HL, 5km E BarioPa Ukat, 1.3., 1000m, leg. M.Jäch (17)”.

Diagnosis. Within the *G. marshalli* species group *G. nitida* sp.nov. differs as follows: 1) yellowish elytral mark-

ing very distinct and sharply drawn; 2) pronotal groove absent; 3) pronotum shiny, only with very sparse and indistinct punctures; 4) elytral punctures very shallow.

Description. Habitus (Fig. 9); CL in ♂ 3.25 mm, in



Figs 47–50 *Graphelmis nitida* sp.nov.: 47) aedeagus lateral view; 48) aedeagus ventral view; 49) spiculum gastrale and sternite 9; 50) ovipositor. Scale bars: 0.1mm.

♀ ♀ (3.44–3.69 mm, $O = 3.55 \pm 0.11$); EW in ♂ 1.44 mm, in ♀ ♀ (1.56–1.59 mm, $O = 1.58 \pm 0.01$), CL/EW in ♂ 2.26, in ♀ ♀ (2.16–2.32, $O = 2.24 \pm 0.06$). Pronotal marking darker, along anterior margin and in the middle; elytral marking distinct, with sharp edges.

Colour pattern: pronotum with wide yellowish anterior margin, border along median pronotal groove at least in anterior half; elytra with sharp triangular spots in anterior half and wide irregular patches in posterior third.

Head. HW in ♂ 0.68 mm, in ♀ ♀ (0.74–0.76 mm, $O = 0.75 \pm 0.01$); ID in ♂ 0.32 mm, in ♀ ♀ 0.38 mm, $O = 0.38 \pm 0.00$; ED in ♂ 0.29 mm, in ♀ ♀ (0.32–0.35 mm, $O = 0.34 \pm 0.01$); HW/ID in ♂ 2.09, in ♀ ♀ (1.92–2.00, $O = 1.96 \pm 0.03$). Labrum glabrous, setose; anterior margin and mesal portion slightly paler. Clypeus about as long as labrum; surface almost glabrous, setose; lateral portions rough; frons and vertex micropunctured except glabrous interocular portion; eyes large, almost oval in lateral view and convex in dorsal view, without distinctly raised margin.

Thorax. Pronotum about as long as wide, widest behind middle; sides almost convex; PL in ♂ 1.00 mm, in ♀ ♀ (1.13 mm, $O = 1.13 \pm 0.00$); PW in ♂ 1.03 mm, in ♀ ♀ (1.13–1.18 mm, $O = 1.16 \pm 0.02$); AP in ♂ 0.72 mm, in ♀ ♀ (0.79–0.85 mm, $O = 0.82 \pm 0.02$); lateral margins finely explanate; anterior margin glabrous, paler; anterior angles finely produced; sublateral tubercles indistinct; median groove absent, replaced with black line; prebasal admedian pits indistinct; surface setose and very sparsely micropunctured; interstices coarser than punctures diameter, shiny. Prosternum: prosternal process slightly longer than wide; lateral margins almost flat; posterior margin with feebly delimited, wide median protuberance; surface of prosternum shiny. Scutellum almost rounded, flat or with indistinct lateral tubercles; surface shiny. Mesosternum with thin, microreticulate carinae; surface shiny. Metasternum about twice as long as mesosternum; disc almost flat; surface shiny; admedian prebasal punctures somewhat transverse, shallow; sublateral carinae absent. Elytra with sides subparallel in anterior two-thirds, then continuously converging toward apices; EL in ♂ 2.25 mm, in ♀ ♀ (2.31–3.56 mm, $O = 2.42 \pm 0.11$); lateral margins finely serrate; striae punctures very shallow, almost absent in prebasal portion of disc. Legs glabrous; anterior third of femora almost black; protibiae feebly longitudinally grooved on outer side; FT in ♂ 1.06 mm, in ♀ ♀ (1.09–1.12 mm, $O = 1.11 \pm 0.01$); MT in ♂ 1.00 mm, in ♀ ♀ (1.00–1.06 mm, $O = 1.04 \pm 0.03$); HT in ♂ 1.15 mm, in ♀ ♀ (1.12–1.15 mm, $O = 1.14 \pm 0.01$); metatibiae simple; length of tarsomere 5 equal to combined length of tarsomeres 1–4; tarsomeres 1–4 darker than metatarsomeres.

Abdomen. Admedian keels of ventrite 1 indistinct; abdominal intercoxal process and mesal portion of remaining ventrites shiny; lateral portions of ventrites covered by plastron structures; apex of ventrite 5 with sides rounded. Sternite 9 and spiculum gastrale (Fig. 49).

Aedeagus (Figs 47, 48). Penis elongate, slender, with numerous small spines especially in apical portion; in lateral view subparallel; apex curved; in ventral view paral-

lel-sided; ventral lobe with apex rounded with a few setae; membranous endophallus with indistinct sclerotized ring; phallobasis about half as long as penis.

Ovipositor (Fig. 50) with terminal segment almost straight; preterminal segment ca. $3.9\times$ as long as terminal, outer side slightly concave; distal sclerite subquadrate, mesally slightly produced; basal segment ca. $1.4\times$ longer than preterminal and distal sclerites combined; ventral fulcrum sinuate.

Sexual dimorphism. Males are almost identical to females and thus very hardly distinguishable.

Distribution. So far known only from Sarawak (Malaysia).

Etymology: from Latin *nitidus* – shiny, in reference to the shiny dorsal surface.

Graphelmis grouvellei DELEVE, 1970

(Figs 10, 51–54)

Graphelmis grouvellei DELEVE, 1970: 251–253, Fig. 14

Type locality: Sumatra (Palembang).

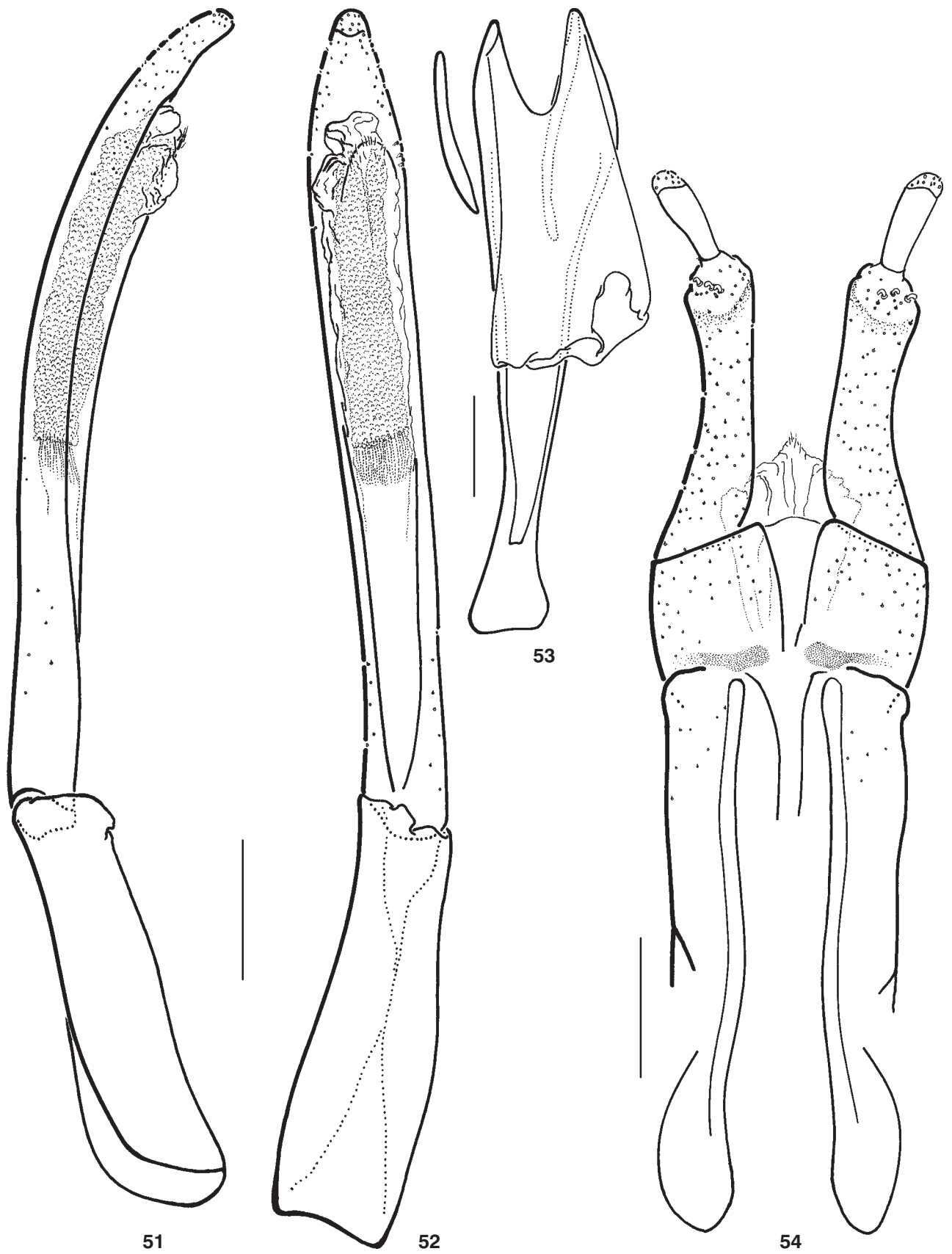
Material examined. Holotype ♂ (MNHN): “Sumatra (Palembang)”; **Paratypes** 4♂♂, 4♀♀, 4ex. (sex not examined) (MNHN) with the same locality. **Other material** (NMW, CKB, CBB, Budapest). 4♂♂, 4♀♀: “Indonesia/Kalimantan W. Tanga Sarawai env. Tontang 24.7–2.8. J. Schneider lgt. 1993”; 5ex. (sex not examined): “INDONESIA, Kalimantan Barat, Bayas logging area above Samanja, 1°13’S, 110°6’E, clearing of lowland rainforest, at light, No. 23, 27.VII.1993, O. Merkl”; 121ex. (sex not examined): “INDONESIA, Kalimantan Barat, Gunung Palung Nat.Park, Gabang Panti research site, 1°13’S, 110°7’E, lowland rainforest, at light, No. 9, 18–26.VII.1993, O. Merkl”.

Diagnosis. *G. grouvellei* is most similar to *G. vietnamensis* sp. nov. but differs in: 1) smaller size; 2) more slender body shape; 3) yellowish margin of median pronotal groove narrow, not widened posteriorly; 4) punctures on pronotum coarser, interstices shiny; 5) scutellum constricted prebasally.

Description. Habitus (Fig. 10); CL in ♂♂ (2.94–3.47 mm, $O = 3.15 \pm 0.25$), in ♀♀ (3.01–3.53 mm, $O = 3.25 \pm 0.23$); EW in ♂♂ (1.21–1.50 mm, $O = 1.32 \pm 0.13$), in ♀♀ (1.21–1.50 mm, $O = 1.35 \pm 0.12$), CL/EW in ♂♂ (2.31–2.46, $O = 2.40 \pm 0.07$), in ♀♀ (2.35–2.50, $O = 2.41 \pm 0.07$).

Yellowish marking: pronotum with wide anterior margin, sublateral tubercles (posterior ones reaching posterior angles), borders along median groove narrow, not widened in posterior half; elytra with coloured intervals and two pairs of weak admedian dark spots.

Head. HW in ♂♂ (0.62–0.75 mm, $O = 0.68 \pm 0.06$), in ♀♀ (0.65–0.81 mm, $O = 0.71 \pm 0.07$); ID in ♂♂ (0.28–0.35 mm, $O = 0.32 \pm 0.03$), in ♀♀ (0.29–0.37 mm, $O = 0.32 \pm 0.03$); ED in ♂♂ (0.32–0.37 mm, $O = 0.35 \pm 0.02$), in ♀♀ (0.35–0.38 mm, $O = 0.36 \pm 0.01$); HW/ID in ♂♂ (2.04–2.21, $O = 2.13 \pm 0.07$), in ♀♀ (2.05–2.29, $O = 2.18 \pm 0.10$). Labrum almost glabrous, with sparse setigerous punctures; anterior margin paler; clypeus slightly



Figs 51–54 *Graphelmis grouvellei* DELEVE sp.nov.: 51) aedeagus lateral view; 52) aedeagus ventral view; 53) spiculum gastrale and sternite 9; 54) ovipositor. Scale bars: 0.1mm.

shorter than labrum, as well as frons and vertex densely irregularly micropunctured and sparsely setose; frons slightly paler; eyes large, oval in lateral view and convex in dorsal view, with raised margin on inner side.

Thorax. Pronotum wider than long, widest in about middle; PL in ♂♂ (0.82–0.94 mm, $O = 0.87 \pm 0.06$), in ♀♀ (0.87–0.97 mm, $O = 0.92 \pm 0.05$); PW in ♂♂ (0.88–1.12 mm, $O = 0.97 \pm 0.10$), in ♀♀ (0.88–1.15 mm, $O = 1.01 \pm 0.11$); AP in ♂♂ (0.65–0.76 mm, $O = 0.71 \pm 0.05$), in ♀♀ (0.69–1.00 mm, $O = 0.82 \pm 0.13$); lateral margins finely explanate; anterior angles produced; sublateral tubercles elongate; median groove narrow, shallowly depressed; prebasal admedian pits vestigial; surface irregularly micropunctured, punctures sparser on tubercles, anterior margin and along median groove; interstices shiny. Prosternum with disc glabrous; prosternal process feebly plicate; lateral margins raised, microreticulate; posterior margin with moderately projected, wide median protuberance. Scutellum subpentagonal, flat, constricted prebasally; surface glabrous. Mesosternum glabrous, with narrow, oblique microreticulate carinae. Metasternum about twice as long as mesosternum; disc flat, glabrous, with sparse pale setae in males; lateral margins of disc somewhat raised; admedian prebasal punctures indistinct; median longitudinal groove narrow, shallowly depressed. Elytra with sides parallel in anterior ca. 0.6, then continuously converging toward feebly produced apices; EL in ♂♂ (2.12–2.53 mm, $O = 2.29 \pm 0.19$), in ♀♀ (2.15–2.56 mm, $O = 2.33 \pm 0.18$); lateral margins distinctly serrate; striae punctures distinct, more deeply impressed on sides. Legs glabrous; tibiae finely longitudinally grooved on outer side; FT in ♂♂ (0.91–1.09 mm, $O = 0.99 \pm 0.08$), in ♀♀ (0.85–1.03 mm, $O = 0.93 \pm 0.08$); MT in ♂♂ (0.85–1.03 mm, $O = 0.93 \pm 0.09$), in ♀♀ (0.74–0.97 mm, $O = 0.85 \pm 0.10$); HT in ♂♂ (0.94–1.15 mm, $O = 1.02 \pm 0.10$), in ♀♀ (0.85–1.07 mm, $O = 0.95 \pm 0.10$); metatibiae simple; length of tarsomere 5 equal to combined length of tarsomeres 1–4; tarsomeres almost equally coloured.

Abdomen. Admedian keels of ventrite 1 extending middle of ventrite in females, shorter in males; abdominal intercoxal process and mesal portion of remaining ventrites shiny; lateral portions of ventrites covered by plastron structures; apex of ventrite 5 with sides produced. Sternite 9 and spiculum gastrale (Fig. 53).

Aedeagus (Figs 51, 52). Penis elongate, slender, with numerous small spines; in lateral view subparallel, finely curved; in ventral view parallel-sided; ventral lobe with apex rounded with a few setae; membranous endophallus with dense small spines in apical portion and short subapical sclerotized ring; phallobasis about half as long as penis.

Ovipositor (Fig. 54) with terminal segment almost straight, slightly widened apically; preterminal segment ca. 3.3× as long as terminal, outer side slightly concave; distal sclerite subquadrate, ca. 0.6× as long as preterminal; basal segment ca. 1.3× longer than preterminal and distal sclerites combined; ventral fulcrum slightly sinuate.

Sexual dimorphism. Males are characterized by pale setae on metasternum and shorter admedian keels of ventrite 1.

Distribution. Sumatra, Kalimantan (Indonesia).

***Graphelmis elegans* sp.nov.**

(Figs 11, 55–58)

Type locality: S-Laos, Prov. Champasak ca. 40km E Muang Paksong, ca. 800m.

Material examined. **Holotype** ♂ (NMW): “S-LAOS: Prov. Champasak ca. 40km E Muang Paksong 25.6.1996, ca. 800m, leg. Schillhammer (7)”. **Paratypes** (NMW, CKB): 3♂♂, 5♀♀: “N-LAOS: Prov. Lg. Nam Tha ca. 5km S Muang Sing, 650m Huay Giulom riv., 10.6.1996, leg. Schillhammer (21)”; 1♂: “N-LAOS: Prov. Lg. Nam Tha ca. 20km SE Muang Sing, 12./13.6.1996, 950m, leg. Schillhammer (25)”.

Diagnosis. Within the *G. marshalli* species group *G. elegans* sp.nov. differs as follows: 1) yellowish elytral marking sharply drawn; 2) anterior V-shaped marking of elytra widely divided by sutural interval and first stria; 3) tarsomeres almost black; 4) main lobe of penis distinctly narrowed apically; 5) antennal segment 10 darkened; 6) distal end of femora and base of tibiae yellow.

Description. **Habitus** (Fig. 11); CL in ♂♂ (3.00–3.19 mm, $O = 3.05 \pm 0.09$), in ♀♀ (2.94–3.25 mm, $O = 3.05 \pm 0.15$); EW in ♂♂ (1.21–1.28 mm, $O = 1.24 \pm 0.03$), in ♀♀ (1.23–1.33 mm, $O = 1.26 \pm 0.05$), CL/EW in ♂♂ (2.44–2.49, $O = 2.46 \pm 0.03$), in ♀♀ (2.39–2.49, $O = 2.42 \pm 0.05$).

Colour pattern: pronotum with yellowish anterior margin and parallel-sided border along median pronotal groove; elytra with narrow V-shaped marking in anterior half, mesally divided by dark sutural interval and first stria and broken stripes in posterior third.

Head. HW in ♂♂ (0.71–0.82 mm, $O = 0.76 \pm 0.03$), in ♀♀ (0.62–0.68 mm, $O = 0.64 \pm 0.03$); ID in ♂♂ (0.32–0.35 mm, $O = 0.34 \pm 0.02$), in ♀♀ (0.32–0.37 mm, $O = 0.35 \pm 0.02$); ED in ♂♂ (0.28–0.29 mm, $O = 0.29 \pm 0.01$), in ♀♀ (0.26–0.29 mm, $O = 0.28 \pm 0.01$); HW/ID in ♂♂ (1.79–2.00, $O = 1.91 \pm 0.11$), in ♀♀ (1.83–1.91, $O = 1.86 \pm 0.03$). Labrum sparsely setose; surface glabrous except finely microreticulate posterior margin and posterolateral portions; clypeus sparsely setose with anterior margin and lateral portions microreticulate, mesally glabrous; frons rough and sparsely setose; vertex punctured, punctures setigerous; interstices shiny; eyes large, oval in lateral view and distinctly convex in dorsal view, with slightly raised margin.

Thorax. Pronotum about as long as wide, widest at base; PL in ♂♂ (0.88–0.94 mm, $O = 0.89 \pm 0.03$), in ♀♀ (0.88–1.00 mm, $O = 0.92 \pm 0.06$); PW in ♂♂ (0.87–0.97 mm, $O = 0.92 \pm 0.04$), in ♀♀ (0.82–0.97 mm, $O = 0.90 \pm 0.06$); AP in ♂♂ (0.67–0.69 mm, $O = 0.67 \pm 0.01$), in ♀♀ (0.64–0.74 mm, $O = 0.68 \pm 0.04$); lateral margins finely explanate; anterior margin glabrous; anterior angles slightly produced; sublateral tubercles flat, glabrous and paler; median groove developed in about middle third, widest in middle; prebasal admedian pits indistinct; surface sparsely setose and micropunctured, punctures coarser on sides; interstices shiny. Prosternum: prosternal process as long



Figs 55–58 *Graphelmis elegans* sp.nov.: 55) aedeagus lateral view; 56) aedeagus ventral view; 57) spiculum gastrale and sternite 9; 58) ovipositor. Scale bars: 0.1mm.

as wide; raised margins very wide; median protuberance of posterior margin wide and feebly demarcate; surface of prosternum almost glabrous, shiny. Scutellum subpentagonal with angles rounded; surface shiny. Mesosternum shiny with microreticulate carinae. Metasternum about twice as long as mesosternum; disc almost flat; longitudinal suture shallowly depressed in posterior half; surface of disc shiny with thin sparse setae (longer in males); admedian prebasal punctures shallow; sublateral carinae absent. Elytra with sides subparallel in about anterior two-thirds, then continuously converging toward slightly produced apices; EL in ♂♂ (2.13 – 2.25 mm, O= 2.16 ± 0.06), in ♀♀ (2.06 – 2.25 mm, O= 2.13 ± 0.09); lateral margins finely serrate; striae punctures finely depressed on disc, deeper on sides. Legs glabrous; typical black colouration of distal end of femora and basal end of tibiae absent; FT in ♂♂ (0.88 – 0.97 mm, O= 0.91 ± 0.04), in ♀♀ (0.81 – 0.97 mm, O= 0.87 ± 0.07); MT in ♂♂ (0.85 – 0.94 mm, O= 0.89 ± 0.04), in ♀♀ (0.79 – 0.94 mm, O= 0.85 ± 0.06); HT in ♂♂ (0.94 – 1.03 mm, O= 0.96 ± 0.04), in ♀♀ (0.79 – 1.06 mm, O= 0.90 ± 0.11); metatibiae simple; tarsi darker than tibiae; length of tarsomere 5 subequal to combined length of tarsomeres 1–4.

Abdomen. Admedian keels of ventrite 1 straight and narrow, reaching middle of ventrite; intercoxal process and mesal portion of remaining ventrites shiny, feebly setose; lateral portions of ventrites covered by plastron structures; apex of ventrite 5 with sides rounded. Sternite 9 and spiculum gastrale (Fig. 57).

Aedeagus (Figs 55, 56). Penis elongate, slender, with several small spines especially on apex; in lateral view almost straight, with apex slightly arched; in ventral view distinctly narrowed apically; base incised; ventral lobe feebly sclerotized; phallobasis ca 0.4x as long as penis.

Ovipositor (Fig. 58) with terminal segment almost straight, slightly widened apically; preterminal segment ca 4x as long as terminal, outer side concave; distal sclerite subquadrate, about half as long as preterminal; basal segment ca 1.3x longer than preterminal and distal sclerites combined; ventral fulcrum straight.

Sexual dimorphism. Males are recognized by long thin setae on disc of metasternum, but they can be ragged in older specimens.

Distribution. So far known only from South Laos (Champasak, Nam Tha).

Etymology: from Latin *elegans* – gracious, charming, referring to distinct yellowish colouration.

Graphelmis consobrina DELEVE, 1968

(Fig. 12)

Graphelmis consobrina DELEVE, 1968: 173-174

Type locality: N-Vietnam, Prov. Nghe-An forestiere Quy-châ, 200m.

Material examined. Paratype: ♂ (Budapest): “VIETNAM, Prov. Nghe-An forestiere Quy-châ 200m, a la lumiere, foret pluv. trop. semidecid., 26.VIII. 1963, T. PÓCS”.

Diagnosis. Unfortunately, only one male of *G. consobrina* without genitalia* was available within this study. Since the shape of aedeagus is very important, it could be concluded only from drawings of Deleve (1968) that this species belongs to the *G. marshalli* species group. It differs very significantly by the: 1) elongated, slender body shape; 2) very weak colour pattern; 3) rounded margins of median pronotal groove.

Redescription. Habitus (Fig. 12); CL in ♂ 2.77 mm; EW in ♂ 0.90 mm; CL/EW in ♂ 3.09.

Colour pattern indistinct, consists of: slightly paler pronotal margin, border along median pronotal groove, sublateral pronotal tubercles and elytral intervals.

Head. HW in ♂ 0.53 mm; ID in ♂ 0.26 mm; ED in ♂ 0.26 mm; HW/ID in ♂ 2.00. Labrum finely microreticulate on sides, sparsely setose; clypeus about as long as labrum; frons and vertex as well as clypeus densely irregularly micropunctured; eyes large, oval in lateral view and convex in dorsal view.

Thorax. Pronotum longer than wide, widest about in middle; PL in ♂ 0.92 mm; PW in ♂ 0.67 mm; AP in ♂ 0.54 mm; lateral margins finely explanate; anterior angles slightly produced; sublateral tubercles flat, anterior ones transverse, almost reaching lateral margins; median groove wide, shallow, widest in middle, densely micropunctured; prebasal admedian pits visible; surface except of sublateral tubercles irregularly micropunctured, punctures sparser on anterior margin and along median groove. Prosternum almost flat, glabrous; prosternal process wide, with margins widely raised; posterior margin with wide median protuberance; surface plicate. Scutellum almost rounded, anterior margin straight; surface shiny with few setae. Mesosternum with microreticulate carinae. Metasternum about twice as long as mesosternum; disc flat; median longitudinal suture narrow; surface of disc in males with long pale setae; admedian prebasal punctures shallow. Elytra with sides subparallel in about anterior 0.7, then continuously converging toward apices; EL in ♂ 1.85 mm; lateral margins smooth; striae punctures moderately deeply impressed. Legs glabrous; tibiae very finely longitudinally grooved on outer side; FT in ♂ 0.74 mm; MT in ♂ 0.72 mm; HT in ♂ 0.76 mm; tarsomeres not paler; length of tarsomere 5 equal to combined length of tarsomeres 1–4.

Abdomen. Admedian keels of ventrite 1 very short; abdominal intercoxal process and mesal part of ventrites 1–4 glabrous; lateral portions of ventrites 1–4 and ventrite 5 covered by plastron structures; apex of ventrite 5 with sides distinctly produced.

Aedeagus. Penis elongate, parallel-sided; in lateral view slightly curved in basal half; phallobasis almost 0.3x as long as penis.

Distribution. Vietnam.

* Genitalia were dissected by Deleve and stored separately as a permanent transparency slides. Unfortunately during my visit in Natural History Museum in Budapest, despite all our efforts, we were unable to find them.

***Graphelmis schoedli* sp.nov.**

(Figs 13, 59–62)

Type locality: Philippines, Mindoro, 20km W Calapan, Hidden Paradise.

Material examined. **Holotype** ♂ (NMW): “PHILIPPINEN - Mindoro 20km W Calapan, 1992, Hidden Paradise (10a), leg. Preuler 20.-21. 11.”; **Paratypes** (NMW, CKB): 4 ♂♂, 2 ♀♀ with the same label as holotype; 1 ♂, 1 ♀: “Philippines, Mindoro Hidden Paradise, Baco, 1. 12. 1992, leg. Jäch”; 10 ♂♂, 8 ♀♀: “PHILIPPINEN - Mindoro 20km W Calapan, 1992, Hidden Paradise, 20.-21. 11. leg. Jäch (10)”; 2 ♂♂, 2 ♀♀: “PHILIPPINEN - Mindoro 20km W Calapan, 1992, Hidden Paradise, 20.-21. 11. leg. Schillhammer (10)”; 2 ♂♂, 6 ♀♀: “PHILIPPINEN - Mindoro 20km W Calapan, 1992, Hidden Paradise (21), leg. Jäch 1. 12.”.

Diagnosis. Within the *G. marshalli* species group *G. schoedli* sp.nov. differs as follows: 1) smaller body size; 2) well developed, deep, sagittiform pronotal groove; 3) yellowish elytral marking weak.

Description. **Habitus** (Fig. 13); CL in ♂♂ (2.45 – 2.77 mm, O= 2.62 ± 0.12), in ♀♀ (2.51 – 2.87 mm, O= 2.69 ± 0.15); EW in ♂♂ (1.00 – 1.13 mm, O= 1.06 ± 0.05), in ♀♀ (0.97 – 1.18 mm, O= 1.08 ± 0.07), CL/EW in ♂♂ (2.41 – 2.58, O= 2.47 ± 0.06), in ♀♀ (2.43 – 2.58, O= 2.49 ± 0.06).

Colour pattern: pronotum with yellowish anterior margin, border along median pronotal groove, sublateral pronotal tubercles weakly coloured; elytra with prebasal transverse stripe, paler sutural interval at least in middle and irregular marking in posterior third.

Head. HW in ♂♂ (0.53 – 0.59 mm, O= 0.57 ± 0.02), in ♀♀ (0.55 – 0.62 mm, O= 0.58 ± 0.03); ID in ♂♂ (0.26 – 0.31 mm, O= 0.29 ± 0.02), in ♀♀ (0.28 – 0.33 mm, O= 0.30 ± 0.02); ED in ♂♂ (0.26 – 0.28 mm, O= 0.27 ± 0.01), in ♀♀ (0.26 – 0.31 mm, O= 0.28 ± 0.02); HW/ID in ♂♂ (1.89 – 2.07, O= 1.95 ± 0.07), in ♀♀ (1.83 – 2.00, O= 1.92 ± 0.07). Labrum glabrous, sparsely, regularly setose; anterior half slightly paler; clypeus shorter than labrum with anterior margin microreticulate; rest of clypeus as well as frons and vertex rough; eyes large, oval in lateral view and convex in dorsal view, without distinctly raised margin.

Thorax. Pronotum about as long as wide, widest about in posterior third; lateral sides sinuate; PL in ♂♂ (0.76 – 0.87 mm, O= 0.79 ± 0.04), in ♀♀ (0.77 – 0.92 mm, O= 0.83 ± 0.05); PW in ♂♂ (0.79 – 0.92 mm, O= 0.86 ± 0.06), in ♀♀ (0.82 – 0.97 mm, O= 0.88 ± 0.05); AP in ♂♂ (0.56 – 0.67 mm, O= 0.63 ± 0.04), in ♀♀ (0.62 – 0.72 mm, O= 0.66 ± 0.04); lateral margins finely explanate; anterior margin paler; anterior angles produced; sublateral tubercles almost invisible; median groove well developed with sharp edges, widest in middle; prebasal admedian pits indistinct; surface densely micropunctured, punctures shallower and sparser on anterior margin. Prosternum: prosternal process as long as wide; lateral margins finely raised around coxae; posterior margin with distinct median protuberance; surface plicate. Scutellum almost

rounded, anterior margin straight; surface shiny, sparsely setose. Mesosternum with microreticulate carinae. Metasternum about twice as long as mesosternum; disc almost flat except shallow depression along median longitudinal suture; surface of disc very sparsely setose, shiny; narrow anterior portion shallowly plicate or punctured; lateral portions covered by plastron structures; admedian prebasal punctures shallow; sublateral carinae absent. Elytra with sides parallel in about anterior two-thirds, then continuously converging toward apices; EL in ♂♂ (1.69 – 1.95 mm, O= 1.82 ± 0.10), in ♀♀ (1.74 – 2.00 mm, O= 1.86 ± 0.11); lateral margins explanate and serrate; apices rounded; striae punctures shallow; interval 3 somewhat widened and raised prebasally. Legs glabrous; tibiae very finely longitudinally grooved on outer side; FT in ♂♂ (0.69 – 0.79 mm, O= 0.74 ± 0.04), in ♀♀ (0.66 – 0.90 mm, O= 0.77 ± 0.08); MT in ♂♂ (0.62 – 0.72 mm, O= 0.68 ± 0.03), in ♀♀ (0.59 – 0.79 mm, O= 0.70 ± 0.07); HT in ♂♂ (0.69 – 0.83 mm, O= 0.76 ± 0.03), in ♀♀ (0.69 – 0.93 mm, O= 0.79 ± 0.08); length of tarsomere 5 equal to combined length of tarsomeres 1–4.

Abdomen. Admedian keels of ventrite 1 indistinct or absent; abdominal intercoxal process shallowly punctured; mesal portion of remaining ventrites shiny; lateral portions of ventrites covered by plastron structures; apex of ventrite 5 with sides distinctly produced. Sternite 9 and spiculum gastrale (Fig. 61).

Aedeagus (Figs 59, 60). Penis elongate, with numerous small spines especially on apex and at the base; in lateral view curved and widened posteriad; ventral lobe more arched subapically. Penis in ventral view widened in apical 0.15, then subparallel; apex of ventral lobe rounded with few setae; membranous endophallus well developed; phallobasis less than half as long as penis.

Ovipositor (Fig. 62) with terminal segment finely curved; preterminal segment ca. 2.9× as long as terminal, outer side slightly concave, apex oblique; distal sclerite about half as long as preterminal, ventro-apical angle rounded; basal segment slightly shorter than preterminal and distal sclerites combined; ventral fulcrum slightly sinuate.

Sexual dimorphism. Males and females are extremely similar and thus are very hardly to distinguish sex without examining genitalia.

Distribution. So far known only from the type locality.

Etymology. This species is named in honour of Stefan Schödl, well known Austrian coleopterologist, who unfortunately died this year.

***Graphelmis elisabethjaechae* sp.nov.**

(Figs 14, 63–66)

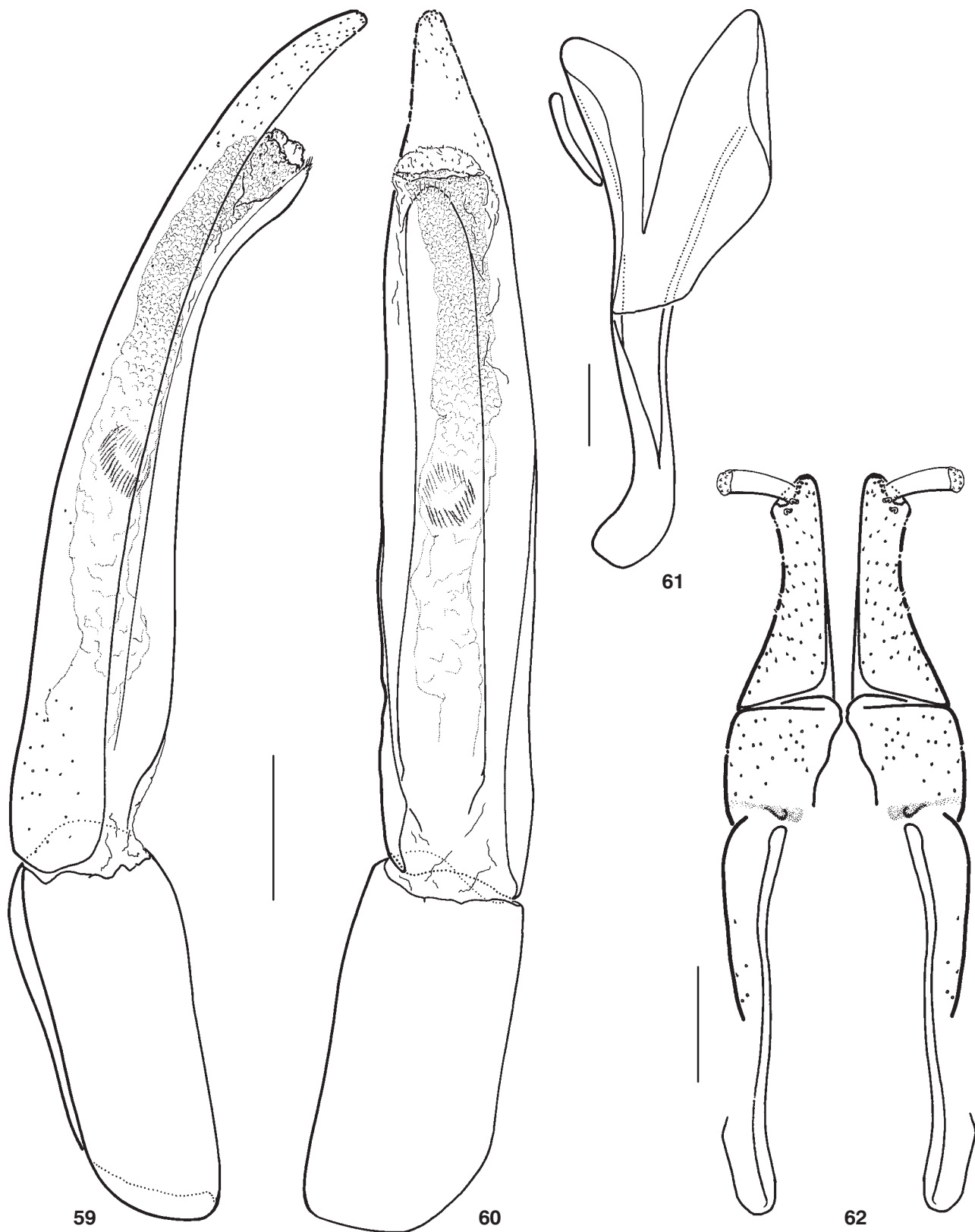
Type locality: Philippines, Luzon, 30km E Lucena City, Quezon NP.

Material examined. **Holotype** ♂ (NMW): “PHILIPPINEN – Luzon, 30km E Lucena City, Quezon NP, 23. 11. 1992, leg. Preuler (11a)”. **Paratypes** (NMW, CKB): 1 ♀ with the same label as holotype; 1 ♀: “PHILIPPINEN – Luzon, 30km E Lucena City, Quezon NP, 23. 11. 1992, leg. Jäch (11)”.

Diagnosis. *G. elisabethjaechae* sp.nov. is very similar to *G. schoedli* sp.nov., from which differs in having: 1) more distinct elytral yellowish marking; 2) pronotal yellowish marking absent or indistinct; 3) shorter aedeagus.

Description. Habitus (Fig. 14); CL in ♂ 2.36 mm, in ♀♀ (2.62, 2.67 mm); EW in ♂ 1.00 mm, in ♀♀ (1.03, 1.08 mm), CL/EW in ♂ 2.36, in ♀♀ (2.48, 2.55).

Colour pattern: pronotum with yellowish anterior mar-



Figs 59–62 *Graphelmis schoedli* sp.nov.: 59) aedeagus lateral view; 60) aedeagus ventral view; 61) spiculum gastrale and sternite 9; 62) ovipositor. Scale bars: 0.1mm.

gin, border along median pronotal groove, sublateral pronotal tubercles indistinctly coloured or dark; elytra with distinct basal subquadrate spots, narrowly connected mesally and transverse patches in posterior third.

Head. HW in ♂ 0.53 mm, in ♀♀ (0.57, 0.59 mm); ID in ♂ 0.26 mm, in ♀♀ (0.26, 0.29 mm); ED in ♂ 0.24 mm, in ♀♀ (0.26, 0.26 mm); HW/ID in ♂ 2.00, in ♀♀ (2.00, 2.17). Labrum almost glabrous, paler, anteriorly setose; clypeus shorter than labrum, as well as frons and vertex

rough; eyes large, oval in lateral view and convex in dorsal view, without distinctly raised margin.

Thorax. Pronotum about as long as wide, widest behind middle; lateral sides somewhat convex; PL in ♂ 0.72 mm, in ♀♀ (0.82, 0.82 mm); PW in ♂ 0.77 mm, in ♀♀ (0.82, 0.87 mm); AP in ♂ 0.57 mm, in ♀♀ (0.63, 0.65 mm); lateral margins finely explanate; anterior angles feebly produced; sublateral tubercles vestigial; median groove acuminate anteriorly, almost reaching pronotal margins,



Figs 63–66 *Graphelmis elisabethjaechae* sp. nov.: 63) aedeagus lateral view; 64) aedeagus ventral view; 65) spiculum gastrale and sternite 9; 66) ovipositor. Scale bars: 0.1mm.

widest in middle; prebasal admedian pits small; surface densely micropunctured, posterior margin glabrous; interstices shiny. Prosternum: prosternal process as long as wide; lateral margins feebly raised around coxae; posterior margin with wide median protuberance; surface shiny with fine plication. Scutellum almost rounded, anterior margin straight; surface shiny, sparsely setose. Mesosternum with microreticulate carinae. Metasternum about twice as long as mesosternum; disc flat; median longitudinal suture feebly depressed; surface of disc very sparsely setose, shiny; narrow anterior portion shallowly plicate or punctured; lateral portions covered by plastron structures; admedian prebasal punctures shallow; sublateral carinae absent. Elytra with sides parallel in anterior two-thirds, then continuously converging toward apices; EL in ♂ 1.64 mm, in ♀ ♀ (1.79, 1.85 mm); lateral margins explanate and serrate; apices slightly produced; stria punctures shallowly impressed; interval 3 somewhat widened and raised prebasally. Legs glabrous; tibiae very finely longitudinally grooved on outer side; FT in ♂ 0.65 mm, in ♀ ♀ (0.68, 0.71 mm); MT in ♂ 0.60 mm, in ♀ ♀ (0.62, 0.65 mm); HT in ♂ 0.68 mm, in ♀ ♀ (0.71, 0.71 mm).

Abdomen. Admedian keels of ventrite 1 absent; abdominal intercoxal process shallowly punctured; mesal portion of remaining ventrites shiny; lateral portions of ventrites covered by plastron structures; apex of ventrite 5 with sides produced. Sternite 9 and spiculum gastrale (Fig. 65).

Aedeagus (Figs 63, 64). Penis elongate; in lateral view curved and slightly constricted prebasally; in ventral view subparallel, slightly widened subapically; ventral lobe with apex rounded, setose; membranous endophallus well developed with numerous spines and more sclerotized ring; phallobasis almost half as long as penis.

Ovipositor (Fig. 66) with terminal segment straight; preterminal segment ca. 3.4× as long as terminal, outer side slightly concave, apex rounded; distal sclerite about twice as long as terminal; basal segment about as long as terminal, preterminal and distal sclerites combined; ventral fulcrum slightly sinuate.

Sexual dimorphism. Males and females are extremely similar and thus are very hardly to distinguish sex without examining genitalia.

Distribution. So far known only from the type locality.

Etymology. Named for Elisabeth Jäch (maiden name: Preuler), who collected the only male known so far.

***Graphelmis monticola* (GROUVELLE, 1896)**
(Fig. 15)

Helmis monticola GROUVELLE, 1896: 45.

Graphelmis monticola DELEVE, 1970: 253-254, Fig. 15.

Type locality: Indonesia, Sumatra, Palembang.

Material examined. **Lectotype** ♂ (MNHN): "Sumatra (Palembang)"; **Paralectotypes** 5♂♂, 6♀♀, 31ex. (sex not examined) (MNHN) with the same locality as lectotype. **Other material** (NMW, CKB): 2 ex.: "Sumatra centr. Subangpass. D.

Limnol. Exp., 4.III.1929, Grossen Bach (950m), auf Holz, Coll. E. Csiki"; 3 ex.: "Sumatra centr. Subangpass. D. Limnol. Exp., 4.III.1929, Grossen Bach, auf Holz, Coll. E. Csiki"; 4 ex.: "Grouvelle 1901 Palembang Sumatra"; 1 ex.: "INDONESIEN 1991 (1) N-Sumatra, Tobasee Samosir, 1550m leg. Schödl 2.2."; 1 ex.: "INDONESIEN 1991 (2) N-Sumatra, S-Tapanuli Padangsidempuan-Sipirok 1000m, leg. Jäch 4.2."; 1 ex.: "N-SUMATRA, 1990 Samosir/Tomok 5.2. ca. 1200m, leg. Jäch (3)"; 7 ex.: "N-SUMATRA, 1990 (4) 15km S Tarutung leg. Jäch 7.2."; 15 ex.: "INDONESIEN 1991 (8) W-Sumatra, Maninjau 550m, leg. Jäch 8.2."; 4 ex.: "INDONESIEN 1991 (9) W-Sumatra, Maninjausee leg. Schödl 8.2."; 1 ex.: "INDONESIEN 1991 (10) W-Sumatra, Maninjau 450m, leg. Jäch 9.2."; 2 ex.: "N-SUMATRA, 1990 (13) Nähe Prapat, ca. 1000m, leg. Schödl 17.2."; 1 ex.: "N-SUMATRA, 1990 (14) Lumban Julu, ca. 1200m, leg. Jäch 18.2."; 1 ex.: "SUMATRA-Aceh, 1990 Umg. Kutacane, Alas river (17) leg. Schödl, 21.2."; 1 ex.: "INDONESIEN 1991 (18) W-Sumatra, Bungus Beach, 10m leg. Jäch 14.2.+23.2."; 2 ex.: "INDONESIEN 1991 Bungus Beach (18) leg. Schödl 14.2."; 11 ex.: "INDONESIEN 1991 (18) W-Sumatra, Bungus Beach, 10m leg. Schödl 14.2.+23.2."; 14 ex.: "INDONESIEN 1991 (28) W-Sumatra, W Danau di Atas 70km SE Padang leg. Jäch 24.2."; 14 ex.: "INDONESIEN 1991 (30) W-Sumatra, 1050m 30km W Padang leg. Jäch 25.2."; 82 ex.: "MALAYSIA 27.I.1992 PENANG: Botan. Garten leg. Jäch (9)"; 74 ex.: "MALAYSIA 27.I.1992 PENANG: Botan. Garten leg. Preuler (9a)"; 10 ex.: "MALAYSIA 4.II.1992 PERAK: Lewin, S Gerik leg. Jäch (25)"; 1 ex.: "MALAYSIA 3.II.1992 KELANTAN: 100km Ö Gerik leg. Jäch (21)"; 2 ex.: "MALAYSIA 26.I.1992 PENANG: Penang Isl.Teluk Bahang leg. Jäch (8)"; 2 ex.: "MALAYSIA 2.II.1992 KEDAH: 60km Ö Gerik Ö Temergor Stausee leg. Jäch (19)"; 1 ex.: "MALAYSIA 4.II.1992 PERAK: ÖPadang Gerus leg. Jäch (26)"; 6 ex.: "MALAYSIA 30.I.1992 KEDAH: Langkawi leg. Jäch (16)"; 8 ex.: "MALAYSIA 22.8.88 Cameron Highl. leg. S. Schödl (8)"; 3 ex.: "MALAYSIA: Perak Kuala Woh 10km NE Tapah 1.8.1993 leg. Schuh"; 9 ex.: "MALAYSIA: Selangor Hutan Kanching 20km N Kuala Lumpur 16.8.1993 leg. Schuh"; 30 ex.: "Malaysia, Pahang, Taman Negara, Nusa Camp env., Tabong river, 13.VI. 2001, J. F. Kočiam lgt.".

Diagnosis. Within the *G. marshalli* species group, *G. monticola* (GROUVELLE), differs in: 1) small body size; 2) feebly convex eyes; 3) lateral portions of metasternal disc with sparse shallow punctures; 4) elytral apices produced; 5) discs of ventrites irregularly shallowly punctured; 6) basal portion of pronotum shiny.

Redescription. Body form obovate (Fig. 15); CL in ♂♂ (2.09 – 2.29 mm, O= 2.22 ± 0.07), in ♀♀ (2.37 – 2.62 mm, O= 2.51 ± 0.08); EW in ♂♂ (0.85 – 0.97 mm, O= 0.93 ± 0.04), in ♀♀ (0.96 – 1.06 mm, O= 1.01 ± 0.03), CL/EW in ♂♂ (2.29 – 2.48, O= 2.40 ± 0.07), in ♀♀ (2.42 – 2.56, O= 2.48 ± 0.04).

Colour pattern: pronotum with yellowish anterior margin widened mesally, indistinct border along median pronotal groove; anterior 0.2 of elytra and more or less distinct subtriangular marking in posterior elytral third.

Head. HW in ♂♂ (0.44 – 0.49 mm, O= 0.47 ± 0.01), in ♀♀ (0.50 – 0.54 mm, O= 0.53 ± 0.03); ID in ♂♂ (0.25 – 0.29 mm, O= 0.28 ± 0.02), in ♀♀ (0.29 – 0.32 mm, O= 0.31 ± 0.01); ED in ♂♂ (0.16 – 0.21 mm, O= 0.18 ± 0.02),

in ♀♀ (0.18 – 0.24 mm, O = 0.22 ± 0.02); HW/ID in ♂♂ (1.60 – 1.76, O = 1.68 ± 0.05), in ♀♀ (1.62 – 1.80, O = 1.70 ± 0.06). Labrum almost glabrous, sparsely setose; anterior half slightly paler; clypeus shorter than labrum, as well as frons and vertex densely micropunctured; eyes small, oval in lateral view and slightly convex in dorsal view, without raised margin.

Thorax. Pronotum slightly wider than long, widest in posterior third; lateral sides convex, slightly constricted behind anterior angles; PL in ♂♂ (0.65 – 0.71 mm, O = 0.69 ± 0.02), in ♀♀ (0.75 – 0.82 mm, O = 0.78 ± 0.02); PW in ♂♂ (0.71 – 0.79 mm, O = 0.76 ± 0.03), in ♀♀ (0.78 – 0.88 mm, O = 0.83 ± 0.03); AP in ♂♂ (0.51 – 0.56 mm, O = 0.54 ± 0.02), in ♀♀ (0.59 – 0.63 mm, O = 0.61 ± 0.01); lateral margins finely explanate; anterior angles finely produced; sublateral tubercles reduced, forming indistinct short carinae; median groove widest in middle, moderately deeply impressed, with sharp edges; prebasal admedian pits indistinct; surface densely micropunctured, except of shiny prebasal portion. Prosternum plicate; prosternal process with lateral margins raised around coxae; posterior margin with distinct median protuberance. Scutellum subtriangular or almost rounded, anterior margin straight; surface shiny with few tiny setae. Mesosternum plicate, with feebly raised oblique carinae. Metasternum with disc almost flat, longitudinal suture widely shallowly depressed in posterior half to two-thirds; anterior, posterior and median portions of disc glabrous or finely grooved, with sparse setae (longer in males); lateral portions of disc covered by plastron structures with sparse punctures; admedian prebasal punctures transverse, shallow; sublateral carinae absent. Elytra with sides subparallel in about anterior two-thirds, then continuously converging toward more or less distinctly produced apices; EL in ♂♂ (1.44 – 1.59 mm, O = 1.53 ± 0.05), in ♀♀ (1.62 – 1.79 mm, O = 1.73 ± 0.06); lateral margins slightly explanate and very indistinctly serrate; striae punctures well impressed. Legs glabrous; tibiae very finely longitudinally grooved on outer side; FT in ♂♂ (0.59 – 0.63 mm, O = 0.61 ± 0.02), in ♀♀ (0.60 – 0.71 mm, O = 0.64 ± 0.03); MT in ♂♂ (0.53 – 0.62 mm, O = 0.59 ± 0.03), in ♀♀ (0.59 – 0.68 mm, O = 0.63 ± 0.03); HT in ♂♂ (0.60 – 0.68 mm, O = 0.66 ± 0.03), in ♀♀ (0.68 – 0.76 mm, O = 0.70 ± 0.03); length of tarsomere 5 equal to combined length of tarsomeres 1–4.

Abdomen. Admedian keels of ventrite 1 short in males, longer, extending middle of ventrite in females; abdominal intercoxal process and mesal portion of remaining ventrites shallowly punctured, punctures diminishing toward abdominal apex; lateral portions of ventrites covered by plastron structures; apex of ventrite 5 with sides slightly produced.

Aedeagus. Penis elongate, parallel-sided, apex curved; phallobasis ca. 0.4× as long as penis.

Sexual dimorphism. Males are usually recognized by smaller body size, short admedian keels of ventrite 1 and slightly longer pale setae on disc of metasternum.

Distribution. Malaysia, Sumatra (Indonesia).

Graphelmis valida DELEVE, 1970

(Fig. 16)

Graphelmis valida DELEVE, 1970: 258–260, Fig. 19

Type locality: Indonesia, Sumatra, Palembang.

Material examined. Holotype ♂ (MNHN): “Sumatra (Palembang)”.

Diagnosis. Within the *G. marshalli* species group, *G. valida* differs in: 1) robust obovate body; 2) elytra yellowish, without distinct colour pattern; 3) eyes relatively small; 4) yellowish sublateral pronotal tubercles almost fused.

Redescription. Body form obovate (Fig. 16); CL in ♂ 3.73 mm; EW in ♂ 1.79 mm, CL/EW in ♂ 2.08.

Colour pattern: pronotum with yellowish anterior margin slightly widened mesally, border along median pronotal groove and sublateral elongated tubercles; elytra yellowish without distinct yellow-dark brown pattern.

Head. HW in ♂ 0.79 mm; ID in ♂ 0.35 mm; ED in ♂ 0.38 mm; HW/ID in ♂ 2.26. Labrum subglabrous, sparsely setose; clypeus shorter than labrum; eyes relatively small, oval in lateral view and slightly convex in dorsal view.

Thorax. Pronotum wider than long, widest at base; lateral sides convex; PL in ♂ 1.05 mm; PW in ♂ 1.23 mm; AP in ♂ 0.88 mm; lateral margins finely explanate; anterior angles produced; sublateral tubercles longitudinally elongate, flattened; median groove equally wide, well impressed, almost reaching pronotal margins; prebasal admedian pits indistinct; surface densely micropunctured. Scutellum subpentagonal with lateral angles rounded, anterior margin straight; surface shiny with few tiny setae. Elytra with sides parallel in about anterior two-thirds, then roundly converging toward indistinctly produced apices; EL in ♂ 2.68 mm; lateral margins slightly explanate, serrate; striae punctures deeply impressed. Legs glabrous, shiny; FT in ♂ 1.29 mm; MT in ♂ 1.24 mm; HT in ♂ 1.29 mm; length of tarsomere 5 equal to combined length of tarsomeres 1–4.

Female unknown.

Aedeagus. Penis robust, parallel-sided, slightly curved in lateral view; phallobasis ca. 0.4× as long as penis.

Distribution. Sumatra (Indonesia).

Note. Unfortunately, during the examination of holotype in the Natural History Museum in Paris, I was not allowed to remove the specimen from the card, so the redescription does not include characteristic of ventral side.

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References

- ČIAMPOR Jr., F. 2001. Systematic revision of the genus *Graphelmis* (Coleoptera: Elmidae) I. Redescription of the genus and description of four new species. *Entomological Problems* 32(1): 17–32.
- ČIAMPOR Jr., F. 2002. Systematic revision of the genus *Graphelmis* (Coleoptera: Elmidae) II. *Graphelmis bandukanensis* species group. *Entomological Problems* 32(2): 149–161.
- ČIAMPOR Jr., F. 2003. Systematic revision of the genus *Graphelmis* (Coleoptera: Elmidae) III. *Graphelmis labralis* species group. *Entomological Problems* 33(1–2): 31–44.
- ČIAMPOR Jr., F. 2004. Systematic revision of the genus *Graphelmis* (Coleoptera: Elmidae) IV. *Graphelmis clermonti* species group. *Entomological Problems* 34(1–2): 1–20.
- ČIAMPOR Jr., F. & Kodada, J. 2004. Systematic revision of the genus *Graphelmis* (Coleoptera: Elmidae) V. *Graphelmis picta* species group. *Entomological Problems* 34(1–2): 55–102.
- DELEVE, J. 1968. Dryopidae et Elminthidae (Coleoptea) du Vietnam. *Annales historico-naturales musei nationalis Hungarici*, Tomus 60, Pars. Zoologica, pp. 149–181.
- DELEVE, J. 1970. Contribution a l'étude des Dryopoidea. XXI. Elminthidae (Coleoptera) peu ou mal connus de l'Indonésie et du Vietnam. *Bulletin et Annales de la Société Royale Entomologique de Belgique*, Vol. 106, pp. 236–272.
- GROUVELLE, A. 1896. Potamophilides, Dryopides, Helmides et Heterocerides des Indes Orientales. *Storia naturale di Genova*. Ser. 2a, Vol. XVII, pp. 32–56.
- HINTON, H.E. 1936. Results of the Oxford University Expedition to Borneo, 1932. Dryopidae (Coleoptera) Part I. *The Annals and Magazine of Natural History*, Vol. XVIII, 10. Series, pp. 89–224.

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