

Study on the Genus *Phaedis* PASCOE (Coleoptera, Tenebrionidae)

I. Seven New Species from Borneo

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Abstract Seven new species of the genus *Phaedis* are described from Borneo under the names of *P. splendens* sp. nov., *P. makiharai* sp. nov., *P. sabahensis* sp. nov., *P. blanki* sp. nov., *P. punctipudendus* sp. nov., *P. cyaneonotatus* sp. nov., and *P. kalimantanus* sp. nov.

Introduction

The genus *Phaedis* PASCOE, 1866 is widely distributed in Southeast Asia and New Guinea. Up to now 101 species and a subspecies of the genus have been known (78 species in temporal list of ANDO, 2008, and 23 species added by ANDO, 2011, 2016, 2017 a, b; ANDO & SCHAWALLER, 2015) including a doubtful species, *P. obscuripes* PIC, 1916, from Zanzibar (ANDO, 2016). For classification of the genus, ANDO (2008) briefly reviewed it and noted a relationship with the genus *Gauromaia* PASCOE, 1866, and since then several taxonomic changes were given for subgenus and species groups (ANDO, 2016, 2017 a). Nevertheless, the systematic study on the genus would be primitive due to remaining many species yet to be identified and/or described, and unnegligible taxonomic confusions are still being left. In order to clarify the diversity, delimitation, and systematic position of the genus, continuous taxonomic consideration of these unspecified species and resolving taxonomic confusions are necessary. In this series, I am going to describe unspecified species from several areas.

At the beginning of this aim, I started to study the fauna of Borneo, one of the area contained the highest species richness. Prior to this study, the Bornean fauna of *Phaedis* had been comprised 18 species described by PASCOE, 1866 (one species), KRAATZ, 1880 (one species), FAIRMAIRE, 1893 (two species), PIC, 1916 (five species), GEBIEN, 1935 (one species), and ANDO, 2008 & 2016 (eight species). More than 100 questionable specimens are however still found in my cabinet. Herein, I describe seven new species, one of which species is very peculiar for extremely brilliant structural colour of body just like a species of the genus *Camarimena* MOTSCHULSKY, 1863 and not allied to any other known congeners. The other six species are closely similar to each other in body form and pigmentation. The definitions of these new species are mainly based on the characters of mentum, prosternal process, pronotal shape, legs and male genitalia.

Materials and Methods

The specimens used in this study belong to the following institutes or private collections (acronyms are in parentheses): Ehime University Museum, Matsuyama, Japan (EUMJ); Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany (SDEI); Staatliches Museum für Naturkunde, Stuttgart (SMNS); collection of Dr. Roland GRIMM, Neuenbürg, Germany (CRGN); and the collection of Kiyoshi ANDO, Osaka, Japan (CKAO).

The body colour was observed by $\times 10$ magnifying glass under a florescent lamp because irides-

cent structural colour could not be seen under natural lighting.

Of the examined types, the attached labels are separated by double slash (//), and line brakes of the same label are demarcated by a slash (/).

Specimens were observed by a Leica MZ16 stereomicroscope. Male and female terminalia were dissected from specimens relaxed in hot water for about one hour, then cleared in hot KOH solution, neutralised with weak acetic acid, and rinsed with water. The illustrations of genitalia, ventral parts, and legs were drawn with a Leica drawing tube attached to the microscope. The terminalia were glued on a paper sheet by “Colle de poisson”. Photographs of specimens were taken by a Canon EOS 7D reflex camera with macro lens (Canon macro photo lens MP-E 65 mm or EF 100 mm), and combined using digital auto-montage software (Helicon Focus, v. 6.2.2 Lite).

Body length refers to the median length from the apex of labrum to the apices of elytra. Abbreviations of body parts in the descriptions are as follows: mCG — anterior margin of head between clypeus and genae; EL — length of elytra along midline, from anterior margin of scutellum to elytral apices; EW — maximum width of elytra; IE — distance between eyes; PL — length of pronotum along midline; PW — maximum width of pronotum; TD — transverse diameter of an eye in dorsal view.

***Phaedis splendens* sp. nov.**

(Figs. 1–8)

Type specimen. Holotype: ♀, Hutan Pipa (150 m alt.), Sungai Nangka, Kuaro, Grogot, East Kalimantan, Indonesia, 29.XII.2000, A. SAITO leg. (EUMJ).

Measurements. Body length: 11.30 mm. ♀ (n = 1): IE/TD 2.60; PW/PL 1.43; EL/EW 1.78.

F e m a l e. Oblong, moderately convex above, brilliant above. Colour dark reddish brown; dorsal side brilliant metallic green which colour is strong and deeper on head and pronotum, lighter and somewhat yellowish on elytra; head and pronotum with violet purple sheen on each marginal portion; elytra with reddish purple sheen on humeral portions; venter with metallic green sheen in part; antennae with distal five antennomeres infuscate; legs darker and mouthparts lighter.

Head semicircular, convex posteriorly and distinctly sloping forwards, with punctures fine and rather sparse; mCG weakly sinuate; clypeus weakly and unevenly convex, irregularly rugulose posteriorly, roundly produced, and feebly notched at apex in median third; fronto-clypeal suture tenuous, not angulate posteriorly; genae longer than wide, weakly convex, depressed before eyes, evenly and moderately rounded at sides; tempora short and weak, not produced, sparsely punctate; inner ocular-sulci deep and very broadened; frons weakly and unevenly depressed as in U-shape, weakly elevated in a short distance beside antero-lateral corners of eyes. Antennae short, reaching before middle of pronotum; distal five antennomeres moderately dilated and forming a loosely articulate club; 11th oval, largest. Mentum pentagonal, produced forwards, coarsely and sparsely punctate, with a broad longitudinal elevation and a pair of lateral excavations (Fig. 2). Ultimate maxillary palpomere rather small, weakly triangular.

Pronotum subquadrate, widest before middle, finely microsculptured laterally (Fig. 4); disc weakly convex, gently sloping laterally, irregularly rugulose in part, moderately sulcate along lateral margins, tenuously so along basal margin, with punctures fine and sparse, becoming larger in antero-medially and a little smaller than on frons; anterior margin gently and arcuately emarginate, evenly beaded; lateral margins rounded, weakly and roundly narrowed forwards and steeply so backwards from the widest point, weakly sinuous before base, gently beaded; basal margin thickly beaded; ante-



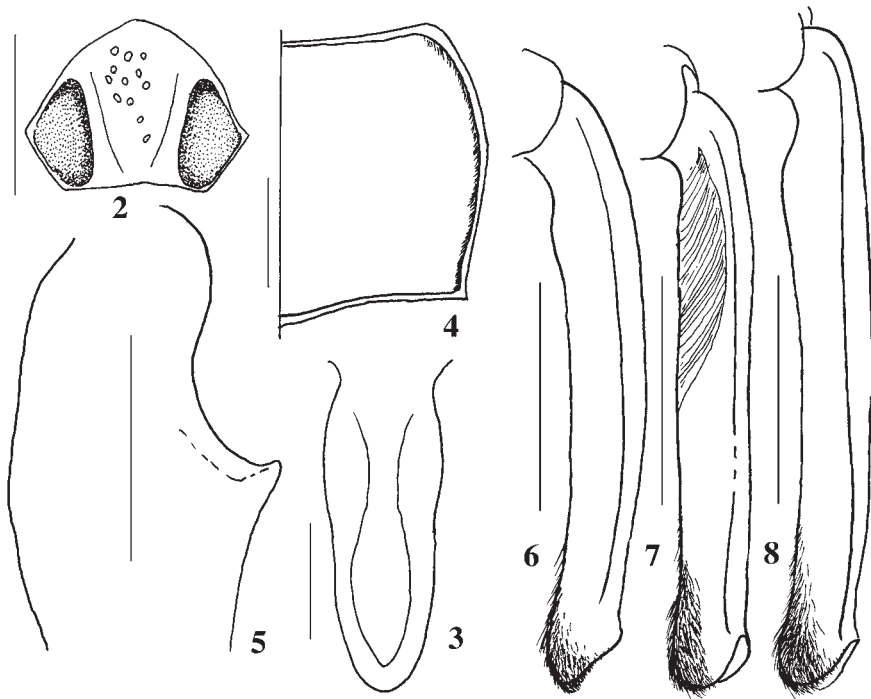
Fig. 1. *Phaedis splendens* sp. nov., holotype, ♀.

rior angles obtusely rounded and a little produced; posterior angles acute, a little produced. Scutellum triangular, flat and oblique forwards, almost smooth, with some microscopic punctures.

Elytra elongate, moderately convex above, widest just before apical third, narrowly beaded at sides; striae weak on 1st and 2nd ones, vestigial in the rest; striae punctures large and somewhat coarse, rather dense but irregular in density and size, finer in 6th to 8th striae and becoming minuter apically; intervals almost flat and smooth, with very sparse microscopic punctures; humeral calli oblong, weakly humped; epipleuron weakly depressed, impunctate and finely rugulose in part.

Prothoracic hypomeron weakly convex, alutaceous, sparsely punctate. Prosternum lengthened in front of coxae, densely rugose, obscurely punctate, and not beaded at apex; prosternal process lanceolate (Fig. 3), horizontal, finely and sparsely punctate, depressed in middle and obtusely pointed at apex, the depression becoming deeper posteriorly as an excavation. Mesoventral posterior ridge V-shaped, horizontal, short and thick, with anterior angles rectangular in lateral view, not produced. Metaventricle moderately gently convex, finely rugulose, with moderately dense puberulous microscopic punctures. Abdomens distinctly convex, very densely and strongly punctate in basal three ventrites, densely and finely so in apical two; 5th ventrite not depressed at apex.

Legs moderate in length. Femora slender; profemoral teeth rather small (Fig. 5), curved laterad at apices. Protibiae slightly incurved (Fig. 6), with inner margin not emarginate; mesotibiae almost



Figs. 2–8. *Phaedis splendens* sp. nov., holotype, ♀. — 2, Mentum; 3, prosternal process; 4, right half of pronotum; 5, left profemur; 6, protibia; 7, mesotibia; 8, metatibia. Scales: 0.3 mm for Fig. 2; 0.50 mm for Fig. 3; 1.00 mm for Figs. 4–8.

straight (Fig. 7), with inner margin distinctly depressed in basal half; metatibiae slender and straight (Fig. 8), with inner margin weakly tumid behind base, evenly and weakly depressed.

Male. Unknown.

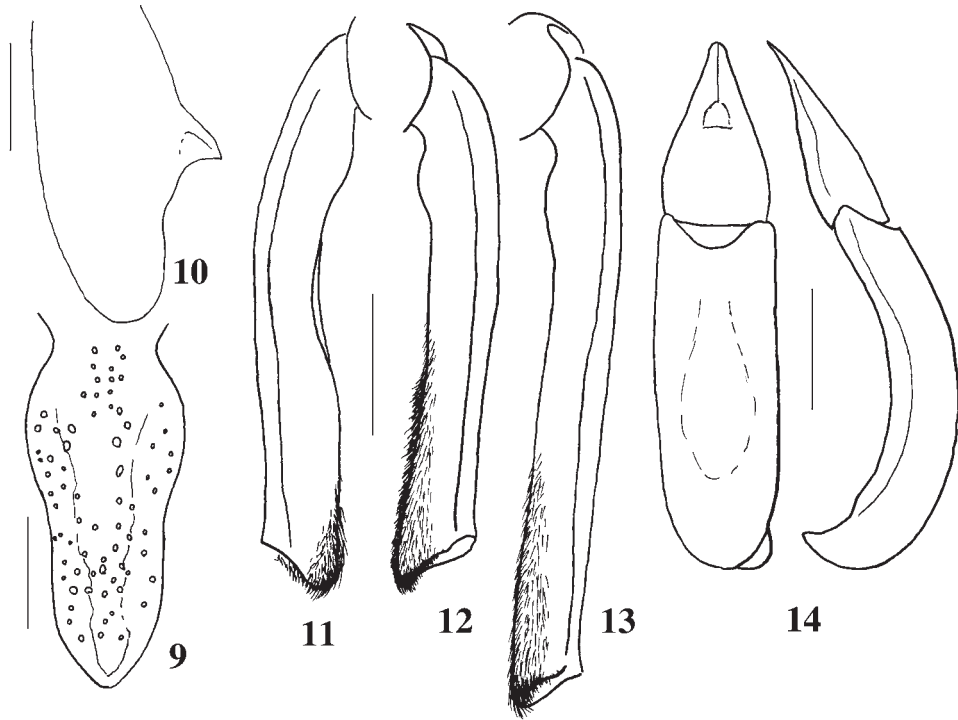
Diagnosis. This new species has peculiar characteristics in the combination of slender body, widest point of pronotum, not emarginate inner margin of protibia, and brilliant external colour. Allied species have not been known.

Etymology. The new species is named after its characteristic extremely brilliant body colour.

***Phaedis makiharai* sp. nov.**

(Figs. 9–14, 15, 21, 39)

Type series. Holotype: ♂, Indonesia: near Balikpapan, Kalimantan, 23.XI.1998, H. MAKIHARA leg. (EUMJ). Paratypes: 1 ♀, same data as for the holotype except date as 14.IX.1998 (CKAO); 1 ♀, same data as for the holotype except date as 26.X.1999 (CKAO); 1 ♂, Indonesia: Bukit, near Balikpapan, Kalimantan, 29.V.1999, H. MAKIHARA leg. (CKAO); 1 ♂, 1 ♀, ditto except for the date, 24.VIII.1998 (CKAO); 1 ♂, ditto except for the date, 20.X.1998 (CKAO); 1 ♂, ditto except for the date, 21.IX.1999 (CKAO); 2 ♂♂, ditto except for the date, 9.III.1998 (CKAO); 1 ♀, ditto except for the date, 11.I.2000 (CKAO).



Figs. 9–14. *Phaedis makiharai* sp. nov., holotype, ♂. — 9, Prosternal process; 10, right profemur; 11, protibia; 12, mesotibia; 13, metatibia; 14, male genitalia (right: lateral; left: dorsal). Scales: 0.50 mm for Fig. 9; 1.00 mm for Figs. 10–14.

Measurements. Body length: 12.3–14.9 mm. ♂ (n = 6): IE/TD 1.88–2.07; PW/PL 1.43–1.55; EL/EW 1.54–1.64. ♀ (n = 4): IE/TD 2.07–2.50; PW/PL 1.45–1.50; EL/EW 1.55–1.67.

Oblong, more or less elongate, moderately convex above, robust, and shiny. Colour black, covered with dark metallic green; head, pronotum, and most part of venter with strong coppery-purple sheen, sometimes with a pair of ambiguous dark green oval spots (1 ♂ and 1 ♀ of paratypes); elytra dark metallic green, with light reddish purple sheen in angles of view, lateral margins metallic reddish purple though elytra also coppery-purple in just single male (paratype); legs black, with strong metallic reddish purple sheen; antennae dark reddish brown, with distal five antennomeres matted; mouth-parts reddish brown.

M a l e. Head almost trapezoidal, stout; mCG not notched; clypeus moderately convex, produced forwards, steeply sloping in apical third, weakly emarginate at apex, with punctures dense and moderate, somewhat oblong in part; fronto-clypeal suture finely impressed, rounded posteriorly; genae depressed, longer than wide, similarly punctate as on clypeus, with outer margins evenly and slightly narrowed in basal two-thirds, feebly sinuate in the rest; tempora thin, roundly and a little produced laterad, strongly constricted posteriorly; inner ocular-sulci distinct, deep and broad; frons strongly and obtapezoidally depressed, strongly and longitudinally elevated laterally along inner ocular-sulci, with punctures very sparse, a little larger than on clypeus. Antennae long, reaching before base of pronotum; distal five antennomeres distinctly dilated, forming a loosely articulate club; 11th short-oval. Mentum triangular, with median elevation extremely broad, lanceolate and coarsely punc-

tate; lateral excavations narrow (Fig. 15). Ultimate maxillary palpomere rather weakly securiform, feebly and roundly produced at apex.

Pronotum trapezoidal, widest at middle (holotype and four paratypes) or at base (one paratype), with very fine microsculpture (Fig. 21); disc weakly convex, steeply and roundly descendant laterally, not sulcate along lateral margins, with punctures fine and dense, a little finer than on clypeus; anterior margin gently and arcuately emarginate, finely beaded in each lateral third; lateral margins narrowly beaded, subparallel-sided in basal half, slightly rounded and gently narrowed in apical half; anterior angles obtusely rounded, a little produced; posterior angles rectangular, not produced. Scutellum transverse (15 : 9), almost flat, with fine lineate microsculpture and a few punctures.

Elytra elongate, distinctly convex above, moderately divergent posteriorly and widest at apical third (holotype and two paratypes) or before apical third (two paratypes), otherwise at apical five-eighths (one paratype), gently beaded at sides; striae shallow, distinctly impressed though finer and weaker in apical declivity; strial punctures large and dense, much irregular in size, becoming smaller apically; intervals slightly convex, or almost flat in part, finely and sparsely punctate; humeral calli oval, distinctly humped; epipleuron flat and oblique, almost smooth, but very finely microsculptured, reaching basal third of 5th abdominal ventrite.

Prothoracic hypomeron depressed, densely microsculptured and impunctate. Prosternum 0.42 times as long as coxa in front of coxae, obscurely punctate, weakly beaded at apex; prosternal process lanceolate (Fig. 21), obliquely sloping posteriad, shallowly sulcate in middle and weakly emarginate at sides behind middle, acutely rounded at apex, coarsely punctate. Mesoventrite coarsely rugose, with median carina densely punctate; posterior ridge V-shaped, weakly elevated and sloping forwards, with anterior angles obtusely rounded, not produced in lateral view. Abdomen densely punctate and microsculptured, irregularly rugose in basal three ventrites; 5th ventrite roundly depressed at apex.

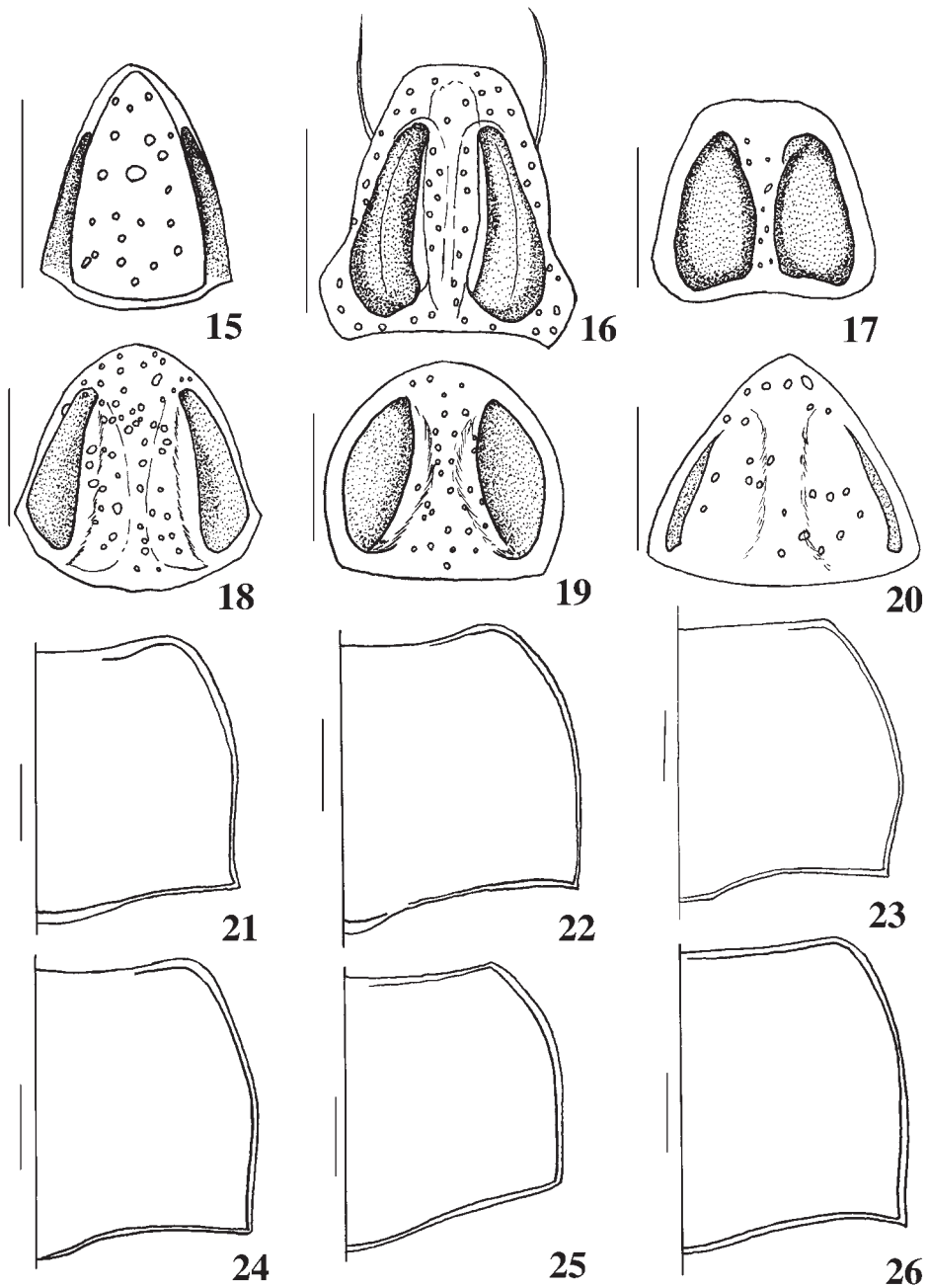
Male genitalia short and robust (Fig. 14), strongly curved at basal portion of basale; parameres strongly tumid basally, rounded at apices, with triangular ill-sclerotised part before middle.

Legs robust, moderate in length. Femora rather slender; profemora thickest than the other, with teeth distinctly curved laterad (Fig. 10). Protibiae slightly incurved (Fig. 11), with inner margin distinctly emarginate between basal third and sixth; mesotibiae slightly incurved (Fig. 12), depressed dorsally, with dense pubescence in apical four-sevenths; metatibiae straight (Fig. 13), depressed dorsally in basal half, with inner margin faintly produced behind base, decorated with fine, ordinal pubescence in apical half. Tibiae simple and slender, densely covered with pubescence ventrally. Tarsi simple, compactly articulate, with moderate pubescence ventrally.

F e m a l e. Antennae a little shorter; inter ocular space wider (IE/TD 2.07–2.50); pronotum widest at middle or basal two-thirds; elytra widest at apical third or before apical third; inner margins of mesotibiae lacking dense pubescence though present ordinal pubescence; 5th abdominal ventrite not depressed at apex.

Diagnosis. The new species resembles *Phaedis robustus* (Pic, 1927) from Sumatra, but is different from the latter in having the head large, tempora more strongly produced, inner ocular sulci broad and deeper, elytral intervals slightly convex, profemoral teeth distinctly curved outwards at apices, mesotibiae scarcely produced behind base, with even emargination of inner margin instead of slightly twisted in the latter, and pubescence of mesotibial inner margin bearing in apical four-sevenths.

Etymology. This new species is cordially dedicated to Mr. Hiroshi MAKIHARA, Chiba, who is one of the famous longicornists in Japan and collected all the type series of this species.



Figs. 15–26. Mentums and pronota of *Phaedis* spp. — 15, 21, *P. makiharai* sp. nov., holotype; 16, 22, *P. sabahensis* sp. nov., holotype; 17, 23, *P. blanki* sp. nov., holotype; 18, 24, *P. punctipudendus* sp. nov., holotype; 19, 25, *P. cyaneonotatus* sp. nov., holotype.; 20, 26, *P. kalimantanus* sp. nov., holotype. — 15–20, Mentums; 21–26, right half of pronota. Scales. 0.30 mm for Figs. 15–20; 1.00 mm for Figs. 21–26.

Phaedis sabahensis sp. nov.

(Figs. 16, 22, 27–32, 40)

Type series. Holotype: ♂, Borneo, Malaysia, Sabah, Tambunan, 500 m, 28–30.III.2007, R. GRIMM leg. (SMNS). Paratypes: 1 ♂, Bunsit Park near Keningau, Sabah, Borneo, 12.IV.1994, N. KANIE leg. (CKAO); 1 ♂, Borneo, Malaysia, Sabah, Keningau, 300 m, Lux, 26–28.I.2010, R. GRIMM leg. (CRGN); 1 ♀, nr. Keningau, Sabah, N. Bor., 7.IV.1988, M. ITO leg. (CKAO).

Measurements. Body length: 13.5–14.7 mm. ♂ (n = 3) IE/TD 2.07–2.14, PW/PL 1.54–1.64, EL/EW 1.54–1.61. ♀ (n = 1): IE/TD 2.22; PW/PL 1.58; EL/EW 1.64.

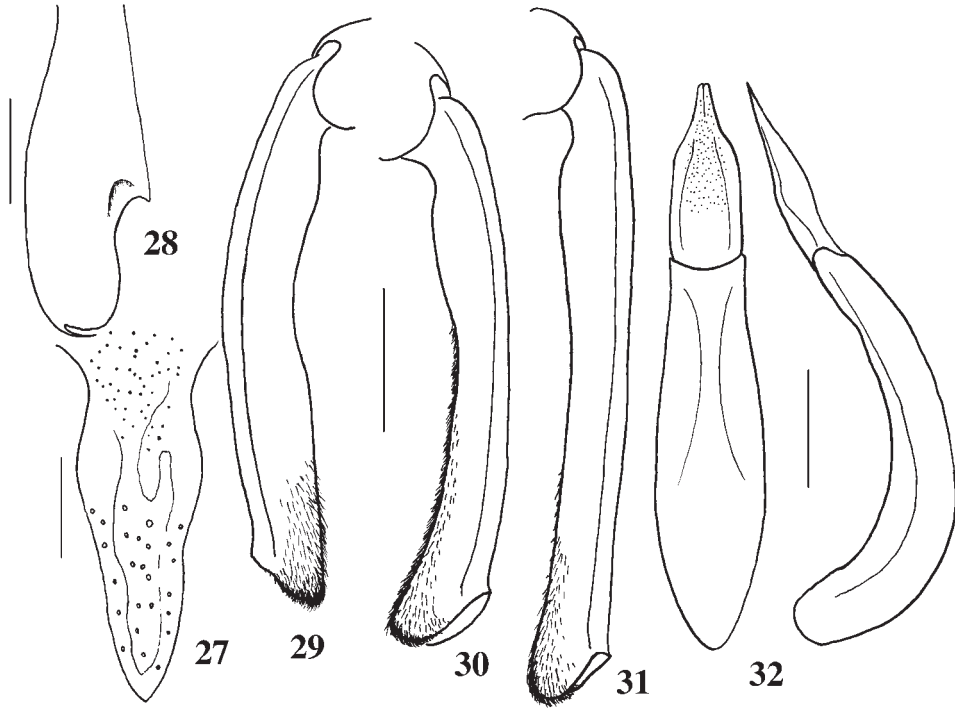
Oblong, robust, moderately convex above, and shiny. Colour almost similar to the preceding species, but coppery-purple sheen of the preceding species changed into purplish coppery in one male (holotype), and the other male (paratype) changed into violet.

Male. Head transversely hexagonal, weakly convex above, finely and densely punctate, the punctures somewhat oblong though large, sparse and not oblong on those of frons; mCG not sinuate; clypeus distinctly convex in median third, depressed at sides, very slightly emarginate at apex; fronto-clypeal suture tenuous, distinctly impressed, roundly angulate posteriorly; genae large, weakly convex, nearly as long as wide, with outer margins evenly rounded; frons flattened, with lateral elevations very weak; eyes distinctly convex; inner ocular-sulci rather shallow and broad; tempora coarsely punctate, roundly and weakly produced laterad. Antennae long, reaching bases of elytra or just before base of pronotum; distal five antennomeres weakly dilated and forming a loose club; 11th oval. Mentum slender trapezoidal, longer than wide, widely elevated in middle and longitudinally excavate at sides, densely microsculptured and sparsely, coarsely punctate, with a long hairs at each lateral margin behind apex (Fig. 16). Ultimate maxillary palpomere weakly securiform, rounded at sides.

Pronotum transversely trapezoidal (Fig. 22), widest point being various, widest at middle or basal two-thirds, otherwise at base and basal fourth; disc gently convex, moderately sloping laterally, narrowly depressed and finely microsculptured along lateral margins, very finely and densely punctate, the punctures smaller than on clypeus and mingled with very fine microsculpture; anterior margin gently and arcuately emarginate, moderately beaded in each lateral third; lateral margins gently rounded, very feebly sinuate before base, and strongly convergent in apical third, thinly beaded; basal margin moderately beaded; anterior angles obtusely rounded, not produced; posterior angles rectangular, not produced. Scutellum a little wider than long (18 : 15), sparsely punctulate and finely microsculptured, acutely pointed at apex.

Elytra oblong, gently divergent posteriorly, widest at apical third, distinctly beaded at sides; striae weakly impressed, rudimental apically; striae punctures moderate in size and rather dense though irregular in density, and becoming constantly minuter apically; intervals almost flat, slightly convex on 7th to 9th ones (although in one paratype slightly convex throughout), moderately to densely, and microscopically punctate; humeral calli oblong, distinctly humped; epipleuron unevenly flat, distinctly oblique, reaching before apex of 5th abdominal ventrite, with fine, sparse and microscopic punctures.

Prothoracic hypomeron weakly convex, covered with fine microsculpture, sparsely and microscopically punctate. Prosternum finely microsculptured and irregularly rugulose, not beaded at apex; punctures sparse and obscure, puberulous in lateral portions; prosternal process narrow, cuneiform (Fig. 27), oblique inwards, shallowly sulcate in middle and acute at apex, with punctures fine, dense anteriorly and sparse posteriorly. Posterior ridge of mesoventrite V-shaped, almost horizontal, uneven by coarse punctures, with anterior two angles obtusely angulate in lateral view. Abdomen densely punctate; the punctures puberulous in part, coarse and large in basal three ventrites and very fine in apical two ones; 5th ventrite scarcely depressed.



Figs. 27–32. *Phaedis sabahensis* sp. nov., holotype, ♂. — 27, Prosternal process; 28, right profemur; 29, protibia; 30, mesotibia; 31, metatibia; 32, male genitalia (right: lateral; left: dorsal). Scales: 0.50 mm for Fig. 27; 1.00 mm for Figs. 28–32.

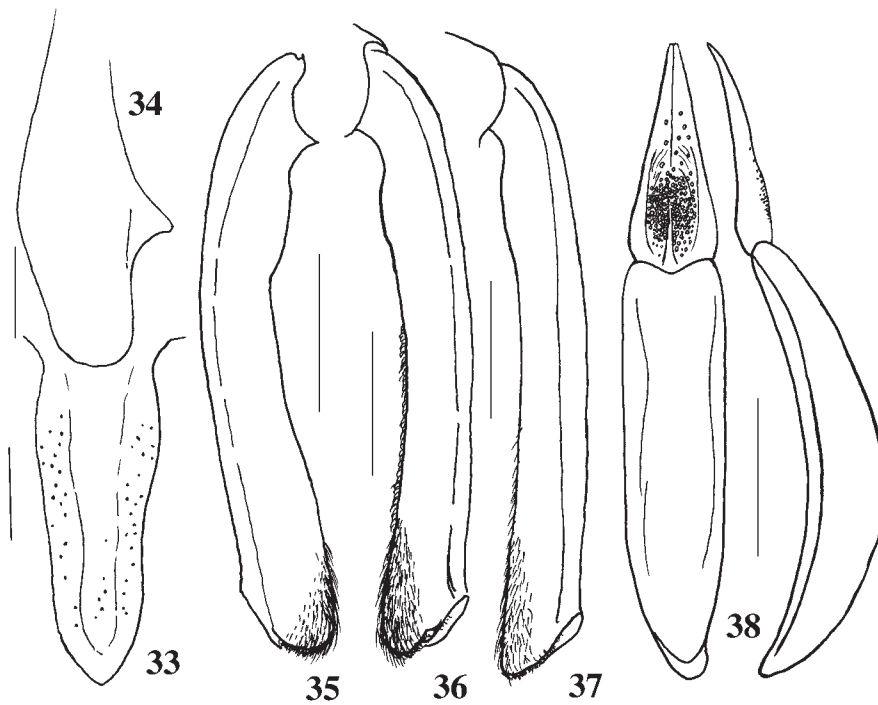
Male genitalia slender (Fig. 32), strongly curved ventrad near base of basale; parameres microscopically punctate in middle, weakly and evenly tapering towards apices, suddenly and strongly narrowed at apical third, thence arcuately narrowed towards apices which are subtruncate.

Legs robust. Femora slender, rather weakly pedunculate; profemoral teeth distinctly oblique laterad (Fig. 28), with endo-lateral margin straight and exo-lateral margin strongly arcuate. Protibiae weakly incurved (Fig. 29), with inner margin weakly emarginate between basal sixth and middle; mesotibiae gently incurved (Fig. 30), with inner margin very weakly bent at basal two-fifths, weakly produced behind base and densely pubescent in apical three-fifths; metatibiae straight (Fig. 31), inner margins slightly produced behind base, with ordinal pubescence in apical third.

F e m a l e. Antennae distinctly shorter; IE/TD 2.22; pronotum widest at basal two-fifths; inner margins of mesotibiae only with ordinal pubescence.

Diagnosis. The new species is similar to *Phaedis makiharai* sp. nov., but readily separable from the latter in having entirely and constantly different shape of profemoral teeth (see Fig. 28); mentum trapezoidal instead of triangular in the latter; frons flattened, without distinct obtapezoidal depression; inner ocular-sulci shallower; emargination of protibial inner margin weaker; mesotibiae with inner margin very weakly bent at basal two-fifths; and different shape of parameres.

Etymology. The specific name of the new species is derived from Sabah State, East Malaysia, where the type specimens were collected.



Figs. 33–38. *Phaedis blanki* sp. nov., holotype, ♂. — 33, Prosternal process; 34, right profemur; 35, protibia; 36, mesotibia; 37, metatibia; 38, male genitalia (right: lateral; left: dorsal). Scales: 0.50 mm for Fig. 33; 1.00 mm for Figs. 34–38.

***Phaedis blanki* sp. nov.**

(Figs. 17, 23, 33–38, 41)

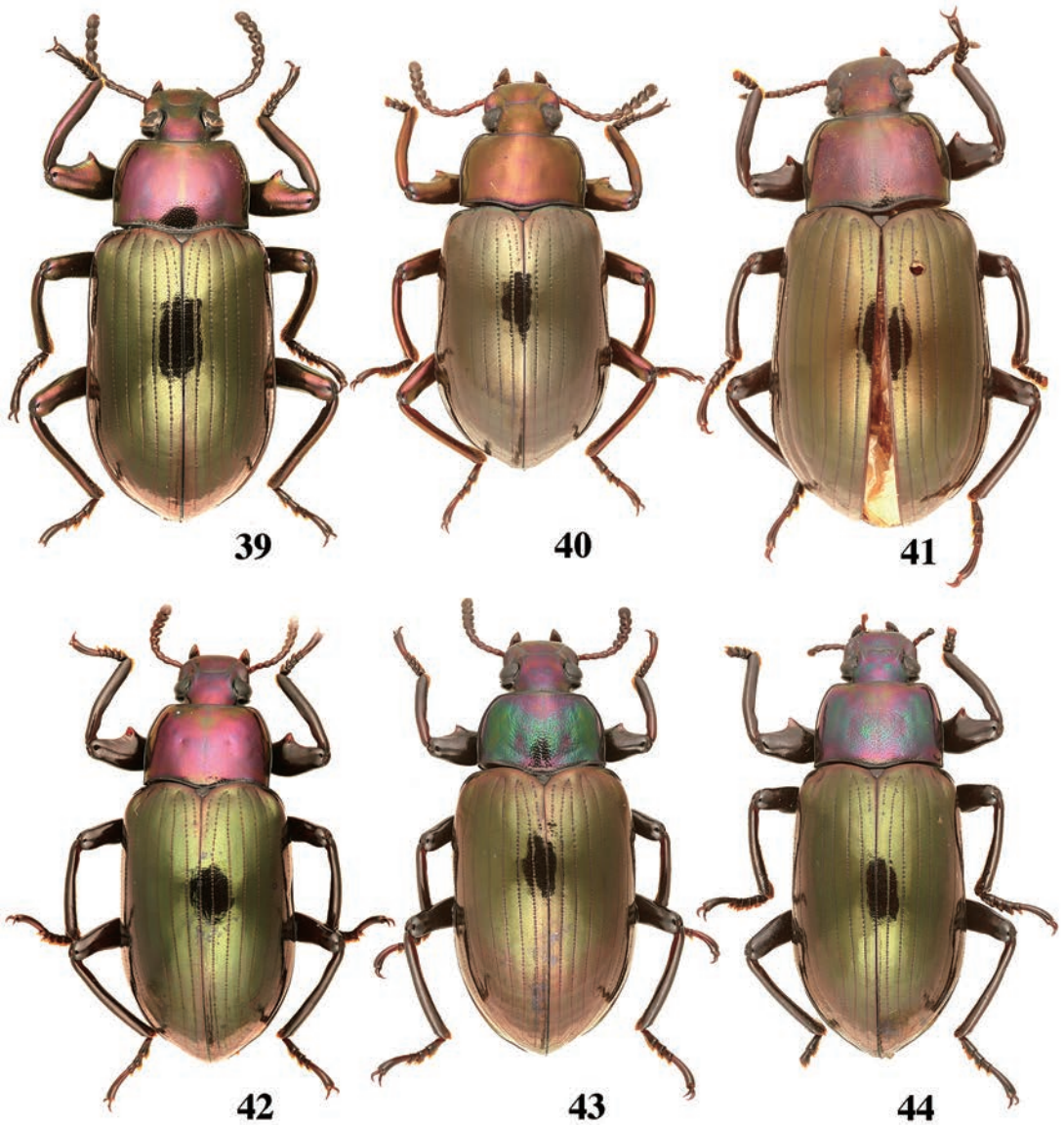
Type specimen. Holotype: ♂, Borneo, Coll. KRAATZ, DEI Müncheberg, Col-04801 (SDEI).

Measurements. Body length: 15.00 mm. ♂ (n = 1): IE/TD 2.73; PW/PL 1.49; EL/EW 1.57.

Male. Oblong-elongate, rather weakly convex above, shiny. Colour similar to *Phaedis makiharai* sp. nov., but elytral light reddish purple sheen is seen only along marginal portions.

Head weakly hexagonal, with punctures dense and somewhat coarse, a little sparser on frons; mCG weakly sinuous; clypeus produced forwards, moderately convex in middle and sloping laterad, weakly emarginate at apex in median three-fifths; fronto-clypeal suture fine and tenuous, rounded posteriorly; genae depressed, longer than wide, weakly elevated on supra-antennal insertions, with outer margins not rounded, evenly narrowed in basal half and steeply so in apical half; tempora distinctly produced laterad, shallowly and broadly sulcate in front, impunctate on surface; frons broad, weakly convex, not depressed, distinctly elevated in a short distance along antero-lateral corners of eyes; inner ocular-sulci rather shallow and weak. Antennae slender, reaching before middle of pronotum; distal five antennomeres weakly dilated, forming a club; 11th transversely semicircular. Mentum subtrapezoidal, distinctly produced forwards, distinctly carinate in middle and deeply excavate at sides, coarsely punctate and not pubescent (Fig. 17). Ultimate maxillary palpomere moderately securiform.

Pronotum subtrapezoidal, widest behind middle, finely microsculptured in lateral portions (Fig. 23); disc gently convex, steeply sloping laterally, tenuously sulcate before basal margin and not so



Figs. 39–44. *Phaedis* spp., habitus of holotypes, ♂. — 39, *P. makiharai* sp. nov.; 40, *P. sabahensis* sp. nov.; 41, *P. blanki* sp. nov.; 42, *P. punctipudendus* sp. nov.; 43, *P. cyaneonotatus* sp. nov.; 44, *P. kalimantanus* sp. nov.

along lateral margins, with punctures dense and fine, a little larger than on head, but becoming smaller laterally and behind anterior margin; anterior margin evenly and very weakly emarginate, barely beaded in each lateral sixth; lateral margins weakly roundly narrowed posteriad, and steeply, evenly narrowed forwards from the widest point, faintly sinuate before base, finely beaded; basal margin finely beaded; anterior angles obtusely rounded and posterior angles rectangular, both angles not produced. Scutellum transverse, depressed, densely microsculptured and microscopically punctate.

Elytra oblong, gently convex above, distinctly divergent posteriorly, widest at apical third, with lateral margins rather broadly deplanate; striae fine, weakly impressed though obscure in apical portions; strial punctures dense, a little larger than the corresponding stria, becoming minuter and sparser in the apical declivity; intervals slightly convex in inner five ones, weakly so on 6th to 9th, finely and sparsely punctate; humeral calli small and oval, weakly humped; epipleuron flat and finely microsculptured, somewhat oblique, with very fine and sparse transverse rugosities.

Prothoracic hypomeron finely alutaceous, feebly rugulose in part, impunctate. Prosternum obscurely punctate, irregularly rugose, finely beaded at apex; prosternal process lanceolate (Fig. 33), sloping and weakly tapering posteriad, shallowly sulcate in middle and rounded at apex. Mesoventral posterior ridge broad V-shaped, rather short, slightly sloping forwards in lateral view, with anterior angles obtusely angulate. Punctures of abdomens dense on basal three ventrites, each with very short microscopical hair, fine and devoid of short hair on apical two ones.

Male genitalia weakly curved ventrad (Fig. 38); parameres almost evenly tapering towards pointed apices, weakly excavate at middle in inverted U-shape, and weakly carinate in median fused area before base, with punctures oblong, dense and coarse.

Legs moderate in length. Femora rather slender; profemora tumid medially, with anterior teeth produced forwards and a little directed laterad at apices (Fig. 34). Tibiae slender; protibiae weakly incurved (Fig. 35), with inner margin weakly bent at basal third; mesotibiae slightly incurved (Fig. 36), inner margins very weakly produced behind base, with short fine cirrate pubescence in apical two-thirds; metatibiae long and slender (Fig. 37), almost straight, with inner margin bearing long sparse pubescence in apical half.

F e m a l e. Unknown.

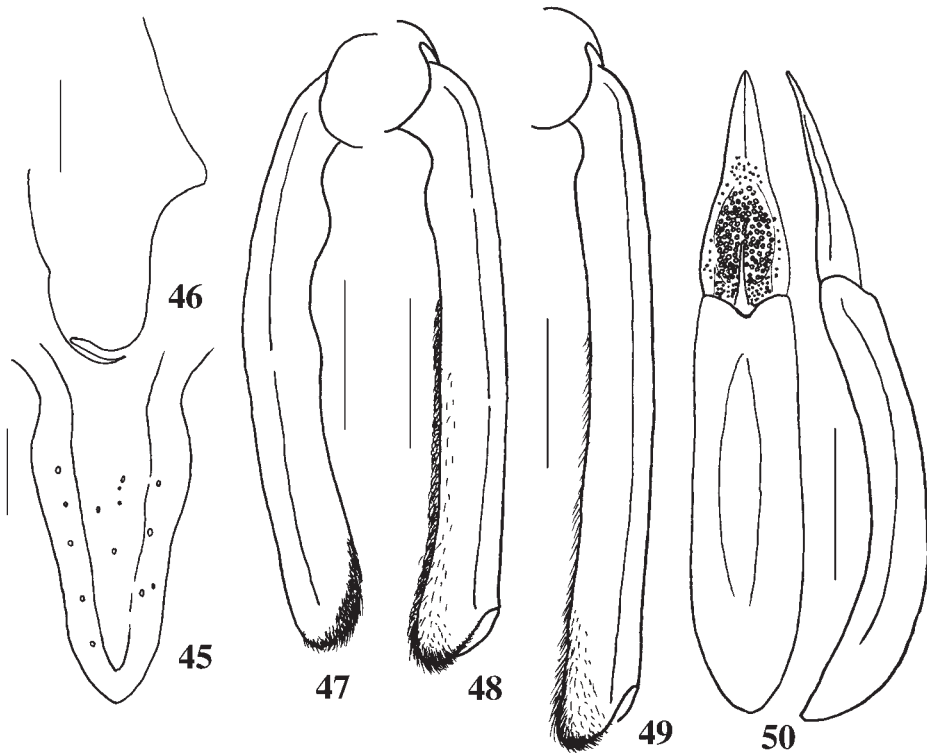
Diagnosis. This new species resembles *Phaedis makiharai* sp. nov., but is easily distinguishable from the latter by having inner ocular-sulci weak and shallow; IE/TD 2.73 instead of IE/TD 1.88–2.07 in the latter; mentum subtrapezoidal, not triangular; antennae shorter, with dense sensory setae; depression of frons very weak; genae gently rounded anteriorly, not produced laterad; pronotum very shallowly emarginate at apex instead of weakly so in the latter; elytral striae shallow, weakly impressed; elytral intervals slightly to weakly convex; humeral calli weakly humped; quite different shape and sculpture of parameres; and inner margins of metatibiae hardly dilated behind base.

Etymology. The specific name of this new species is cordially dedicated to Dr. Stephan BLANK, who is a curator of Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany (SDEI), and gently offered KRAATZ Collection in SDEI for my study.

***Phaedis punctipudendus* sp. nov.**

(Figs. 18, 24, 42, 45–50)

Type series. Holotype: ♂, Bukit Bangkirai near Balikpapan, Kalimantan, Indonesia, 1.II.2000, H. MAKIHARA leg. (EUMJ). Paratypes: 2 ♀♀, Indonesia: Bukit, near Balikpapan, Kalimantan, 10.V.1999 & 9.XI.1998, H. MAKIHARA leg. (CKAO); 1 ♀, Indonesia: near Balikpapan, Kalimantan, 16.XI.1999,



Figs. 45–50. *Phaedis punctipudendus* sp. nov., holotype, ♂. — 45, Prosternal process; 46, right profemur; 47, protibia; 48, mesotibia; 49, metatibia; 50, male genitalia (right: lateral; left: dorsal). Scales: 0.50 mm for Fig. 45; 1.00 mm for Figs. 46–50.

H. MAKIHARA leg. (CKAO).

Measurements. Body length: 14.7–15.6 mm. ♂ (n = 1): IE/TD 2.73; PW/PL 1.48; EL/EW 1.63. ♀ (n= 3): IE/TD 2.00–2.14, PW/PL 1.46–1.57, EL/EW 1.51–1.65.

Oblong, moderately convex above, robust, and shiny. Colour dark reddish brown; pigmentation and conformations are very similar to those of *Phaedis makiharai* sp. nov.

Male. Head transversely hexagonal, gently convex above, finely and moderately densely punctate, the punctures sparser on frons and mid of clypeus, becoming larger in apical half of clypeus; mCG slightly sinuate; clypeus distinctly convex in middle and gently sloping laterally, weakly emarginate at apex; fronto-clypeal suture finely and distinctly engraved throughout, arcuate posteriorly; genae longer than wide, obliquely depressed, with outer margins weakly and evenly narrowed in basal two-thirds, steeply so in a straight line in apical third; tempora moderately tumid, distinctly and roundly produced laterad until just before lateral peak of eyes, with obscure sulcus before anterior margin; frons weakly convex, not depressed, with a short rib on each antero-lateral corner; eyes short and strongly transverse in dorsal view, with very broad inner margins; inner ocular-sulci deep and narrow, exceeding beyond tempora. Antennae slightly loosely articulate, reaching behind middle of pronotum; distal five antennomeres weakly dilated and forming a club; 11th trapezoidal. Mentum linguiform, broadly and weakly elevated in middle, longitudinally excavate at sides, rounded at apex,

coarsely and densely punctate (Fig. 18). Ultimate maxillary palpomere long, weakly securiform.

Pronotum transversely trapezoidal, widest at basal two-fifths, very finely microsculptured (Fig. 24); disc weakly convex, very finely sulcate along basal margin, faintly sulcate along lateral margins, though the lateral sulcate areas filled with different kind of microsculpture; punctures fine and moderately dense, becoming finer apically, nearly as large as on clypeus; anterior margin evenly and very shallowly emarginate, moderately beaded in each lateral two-fifths; lateral margins evenly narrowed forwards and subparallel-sided backwards from the widest point, therefore, not sinuate before base, narrowly beaded throughout; anterior angles obtuse, not produced; posterior angles a little more acute than rectangular, not produced. Scutellum transverse, distinctly depressed, pointed at apex, sparsely punctate, with dense microsculpture.

Elytra oblong, distinctly convex above, gently divergent posteriorly and widest at apical third, rather weakly beaded at sides; striae narrow and weak, tenuous in the apical declivity, 7th striae reaching peak of humeral calli; strial punctures dense and irregular, but not contact with each other, becoming minuter apically; intervals flat, depressed in part, sparsely and very finely covered with microscopic punctures; humeral calli oblong, distinctly humped; epipleuron flattened, depressed in part, almost smooth, with very fine and sparse microscopic punctures.

Prothoracic hypomeron weakly convex, finely microsculptured, with punctures very sparse and fine, becoming larger and denser inwards. Prosternum short before coxae, nearly 0.43 times as long as coxa, densely microsculptured and obscurely punctate, not beaded at apex; prosternal process lanceolate (Fig. 45), sloping weakly and tapering posteriad, gently sulcate in middle and roundly pointed at apex. Mesoventral posterior ridge V-shaped, almost horizontal, with anterior angles rectangular, a little produced forwards in lateral view. Metaventricle roundly depressed before middle of posterior margin, obliquely rugose and scarcely punctate. Abdomen weakly convex, densely and coarsely punctate in basal three ventrites, finely and moderately so in apical two ones; 5th ventrite not depressed at apex.

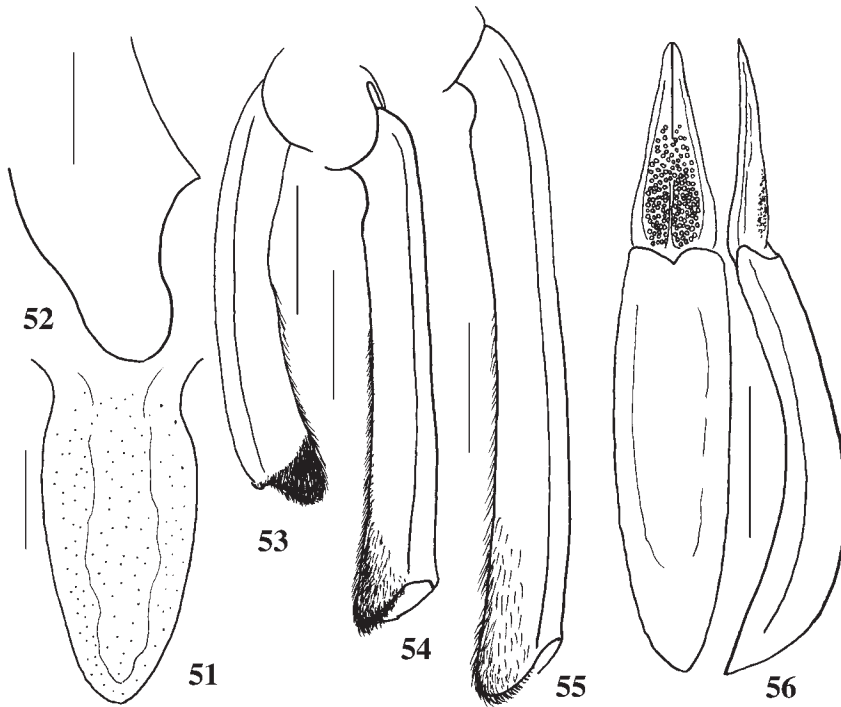
Male genitalia slender, weakly curved ventrad (Fig. 50); parameres gently tapering from base to acutely pointed apices, with a median oval depression and a longitudinal baso-median carina, area within oval depression and around it coarsely and very closely punctate.

Legs robust, moderate in length. Femora robust and rather long; profemoral teeth produced forwards (Fig. 46), with apex not pointed, a little curved laterad. Protibiae weakly incurved (Fig. 47), with inner margin depressed, weakly emarginate between basal third and sixth; mesotibiae slightly incurved (Fig. 48), inner margin slightly produced behind base, with two rows of fine and compact pubescence in apical two-thirds; metatibiae almost straight (Fig. 49), inner margin a little produced behind base, with sparse and medium length pubescence in apical two-thirds. Tibiae simple and slender, densely covered with pubescence ventrally.

F e m a l e. Antennae a little longer; frons distinctly depressed in scutiform; IE/TD 2.00–2.14; pronotum widest at middle, with lateral margins slightly sinuate before base; inner margins of protibiae more shallowly emarginate between middle and basal sixth; mesotibiae with inner margin without rows of fine and compact pubescence.

Diagnosis. The new species is similar to *Phaedis makiharai* sp. nov., but distinctly different from the latter in the following characteristics: more elongate body and different shape of pronotum in profile (Figs. 21 & 24); male pronotum very shallowly emarginate at apex; pubescence on mesotibial inner margin very fine; profemoral teeth directed forwards, not sharp at apices; elytral intervals entirely flat or depressed; and entirely different parameres (Figs. 14 & 50) and mentum (see Figs. 15 & 18).

Etymology. The specific name is derived by connecting two Latin words, puncti (= punctate) and pudendus (= genitalia), showing densely punctate parameres of male genitalia.



Figs. 51–56. *Phaedis cyaneonotatus* sp. nov., holotype, ♂. — 51, Prosternal process; 52, right profemur; 53, protibia; 54, mesotibia; 55, metatibia; 56, male genitalia (right: lateral; left: dorsal). Scales: 0.50 mm for Fig. 51; 1.00 mm for Figs. 52–56.

***Phaedis cyaneonotatus* sp. nov.**

(Figs. 19, 25, 43, 51–56)

Type series. Holotype: ♂, Indonesia: Bukit, near Balikpapan, Kalimantan, 5.IV.1999, H. MAKIHARA leg. (EUMJ). Paratypes: 1 ♂, Bukit Bangkirai near Balikpapan, Kalimantan, Indonesia, 1. II.2000, H. MAKIHARA leg. (CKAO); 1 ♀, Borneo, Malaysia, Sabah, Tambunan, 500 m, 28–31. III.2007, R. GRIMM leg. (CRGN).

Measurements. Body length: 15.50–16.80 mm. ♂ (n = 2): IE/TD 2.73–3.00; PW/PL 1.42–1.52; EL/EW 1.63–1.67. ♀ (n = 1): IE/TD 2.73; PW/PL 1.52; EL/EW 1.70.

Oblong, moderately convex above, robust and shiny. Colour dark reddish brown to blackish brown; head violet-purple, with metallic green tint in part, pronotum also violet-purple, with a pair of metallic blue ambiguous spots, the spots large but irregular in size, not margined, free from lateral margins; elytra dark metallic green, covered with copper-purple sheen; venter with metallic green tint in part; antennae dark reddish brown, with distal five antennomeres infuscate.

M a l e. Head transversely hexagonal, robust, well produced forwards, with punctures coarse and dense, a little sparser on frons; mCG not sinuate; clypeus distinctly convex, sloping along anterior margin, irregularly rugulose, shallowly emarginate at apex; fronto-clypeal suture fine, obscure in middle of posterior portion, roundly arcuate posteriorly; genae flat, longer than wide, weakly oblique in

front of eyes, with lateral margins weakly rounded in basal half and steeply narrowed forwards in apical half in a straight line; tempora thick, distinctly produced laterad, not reaching lateral peak of eyes, with broad sulcus along anterior margin; frons flat and broadened, sloping forwards, finely rugulose anteriorly, distinctly elevated in antero-lateral portions; inner ocular-sulci moderately deep, not broad, gradually becoming shallower posteriorly. Antennae short, reaching apical third of pronotum; distal five antennomeres thick and dilated, forming a club; 11th oval. Mentum short linguiform, triangularly and distinctly elevated in middle, deeply excavate at sides, coarsely punctate (Fig. 19). Ultimate maxillary palpomere weakly securiform, rounded at sides and truncate at apex.

Pronotum subtrapezoidal, widest at base or basal third, with fine isodiametric microsculpture (Fig. 25); disc weakly convex, distinctly sloping laterally, finely and irregularly rugulose, devoid of sulci along lateral and basal margins; punctures dense and coarse, irregular in size, larger than on head and minute within lateral spots; anterior margin almost straight, moderately beaded; lateral margins gently rounded, weakly narrowed in basal half and strongly so in apical half, narrowly beaded; basal margin tenuously beaded; anterior angles obtuse, and posterior angles obtusely angulate, these angles not produced. Scutellum transverse, strongly depressed, compactly microsculptured and sparsely punctate, acutely pointed at apex.

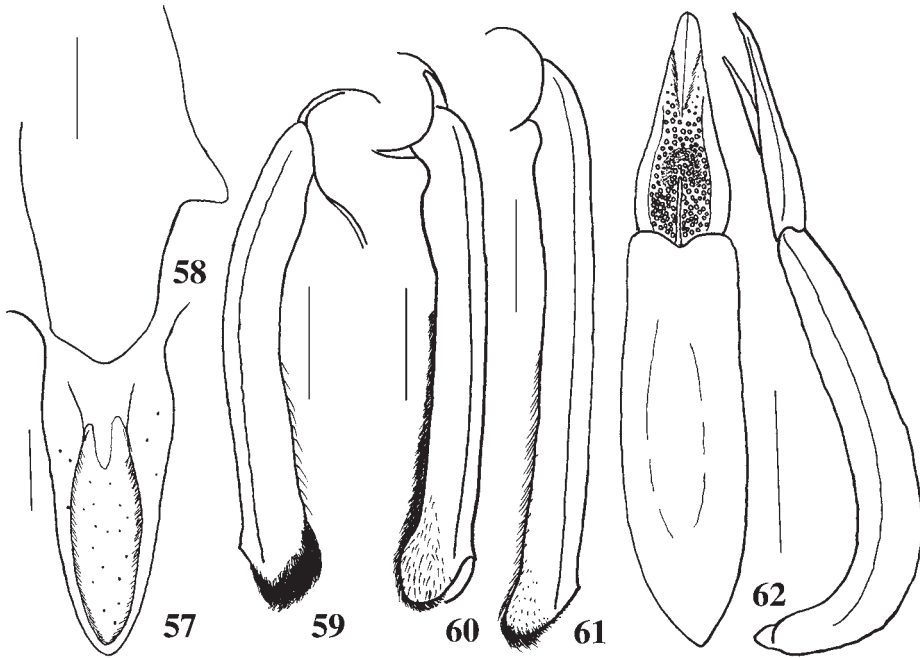
Elytra oblong, moderately convex above, distinctly divergent posteriorly, widest at apical third, weakly tumid along basal margin and narrowly beaded at sides; striae weakly impressed throughout, 7th striae not reaching the peak of humeral calli; strial punctures dense, irregular in size, not contact with each other, becoming minuter in apical declivity; intervals almost flat, slightly convex on inner three intervals and the apical declivity, finely and sparsely punctate; humeral calli oblong, distinctly humped; epipleuron weakly depressed, strongly oblique, finely microsculptured, with punctures sparse and microscopical.

Prothoracic hypomeron weakly convex, rugulose along marginal portions, very finely microsculptured, decorated with large obscure punctures. Prosternum short in front of coxae, 0.40 times as long as coxa, finely punctate, feebly beaded at apex; prosternal process short, lanceolate (Fig. 51), finely punctate, weakly sloping posteriad, deeply sulcate in middle and roundly acute at apex. Mesoventral posterior ridge broadened V-shaped, weakly raised and almost horizontal, with anterior angles angulate and a little obtuse than rectangular in lateral view. Metaventricle very finely and moderately punctate. Abdomen gently convex in middle, with punctures dense, coarse in basal three ventrites and fine in apical two ones; 5th ventrite weakly convex, not depressed at apex.

Male genitalia slender, weakly curved ventrad (Fig. 56); parameres evenly narrowed towards roundly acute apices, dorsally with drop-shaped depression in middle and longitudinal narrow median carina before base, extremely coarse and dense punctures bearing within the drop-shaped depression.

Legs robust. Femora rather long; profemora strongly pedunculate, with teeth weak, directed laterad (Fig. 52). Protibiae moderately incurved (Fig. 53), gently dilated apicad, with inner margins gently arcuate and not emarginate; mesotibiae almost straight (Fig. 54), inner margins not produced behind base, with fine semi-recumbent pubescence in apical three-fifths; metatibiae slender, slightly incurved (Fig. 55), with inner margin sparsely pubescent in apical two-thirds. Tarsi simple, with venter more sparsely pubescent than that in *P. punctipudendus* sp. nov.

F e m a l e. IE/TD 2.73, PW/PL 1.52, EL/EW 1.70; pronotum very slightly emarginate at apex, widest at base; profemoral teeth larger and longer; inner margins of protibiae distinctly emarginate between basal two-fifths and sixth, and with sparse somewhat cirrate long pubescence in apical half, and covered with short and compact very dense pubescence at terminal; inner margins of mesotibiae sparsely pubescent apically, without fine semi-recumbent pubescence.



Figs. 57–62. *Phaedis kalimantanus* sp. nov., holotype, ♂. — 57, Prosternal process; 58, right profemur; 59, protibia; 60, mesotibia; 61, metatibia; 62, male genitalia (right: lateral; left: dorsal). Scales: 0.50 mm for Fig. 57; 1.00 mm for Figs. 58–62.

Diagnosis. The new species resembles *Phaedis brevipennis* (Pic, 1916) from Banguay, but is different from the latter in having tempora well developed; inner margins of mesotibiae pubescent but not emarginate; genae long and well developed; elytra with strial punctures coarse, elytral intervals with much finer punctures; and different shape of prosternal process.

Etymology. The specific name is derived from ambiguous pronotal metallic blue spots.

***Phaedis kalimantanus* sp. nov.**

(Figs. 20, 26, 44, 57–62)

Type specimen. Holotype: ♂, Indonesia: Bukit, near Balikpapan, Kalimantan, 12.X.1999, H. MAKIHARA leg. (EUMJ).

Measurements. Body length: 15.8 mm. ♂ (n = 1): IE/TD 3.00; PW/PL 1.42; EL/EW 1.73.

Male. Oblong, moderately convex above, robust, and shiny. Colour dark reddish brown; pigmentation and conformations are almost same as those of the preceding species, but head without metallic green tint, elytral copper-purple sheen very weak; a pair of metallic blue spots on pronotum more ambiguous.

Head transversely hexagonal, weakly convex above, finely and rather densely punctate, sparsely so on frons; mCG slightly sinuate; clypeus weakly convex in middle, weakly depressed at sides, shallowly emarginate at apex; fronto-clypeal suture very fine, obtusely rounded at posterior corners; genae

narrow, longer than wide, depressed except for supra-antennal insertions, with outer margins subparallel-sided in basal half and evenly convergent in apical half; tempora moderately tumid, strongly produced laterad, distinctly sulcate in front along anterior margin; frons weakly convex, sloping forwards, obtriangularly depressed in middle, distinctly elevated at sides in a short distance along antero-lateral corners of eyes; inner ocular-sulci deep anteriorly and shallow posteriorly, not broadened. Antennae missing from 5th to 11th, so that peculiar characters are not mentioned. Mentum triangular, longitudinally carinate in middle and shallowly excavate at sides, roundly acute at apex, finely punctate (Fig. 20). Ultimate maxillary palpomere thick, weakly securiform, feebly arcuate at apex.

Pronotum trapezoidal, widest at basal third, with very fine isodiametric microsculpture (Fig. 26); disc gently convex, steeply descendant laterally, obscurely sulcate along lateral margins and not so before basal margin, finely and densely punctate, the punctures larger than on head, becoming minuter laterally and anteriorly behind anterior margin; anterior margin evenly and very weakly emarginate, moderately beaded throughout; lateral margins weakly rounded, weakly narrowed anteriorly and posteriorly from the widest point, narrowly beaded though thickly so behind anterior angles, not sinuate before base; basal margin finely beaded; anterior angles obtuse, scarcely produced; posterior angles rectangular, not produced. Scutellum flat, a little wider than long, pointed at apex, densely microsculptured and sparsely punctate.

Elytra oblong-elongate, distinctly convex above, gently divergent posteriorly, widest at apical third, weakly beaded at sides; striae fine and distinct, tenuous in the apical declivity, 7th striae not reaching humeral calli; strial punctures dense and rather fine, irregular in size and density, minuter apically and vestigial in the apicalmost portions; intervals almost flat, slightly convex in part, weakly so on 8th and 9th intervals and the apical declivity, very sparsely and microscopically punctate; humeral calli oblong, strongly humped; epipleuron oblique unevenly depressed, reaching before apex of 5th abdominal ventrite, finely and sparsely punctate, and very finely microsculptured.

Prothoracic hypomeron weakly convex, somewhat rugulose, very finely microsculptured and impunctate. Prosternum short in front of coxae, 0.43 times as long as coxa, irregularly rugulose and impunctate, finely beaded at apex; prosternal process cuneiform (Fig. 57), gently sloping posteriad, finely punctate, broadly sulcate in middle and acutely rounded at apex, the sulcus covered with dense isodiametric microsculpture. Mesoventral posterior ridge V-shaped, broad and low, with anterior angles acutely pointed in lateral view. Abdomen finely rugulose in basal three ventrites, densely and coarsely punctate, the punctures minuter in apical half of 5th ventrite which is not depressed at apex.

Male genitalia robust, weakly curved ventrad (Fig. 62), strongly so near base; parameres gently tapering towards rounded apices, depressed and densely, coarsely punctate dorsally, with an inverted U-shaped median excavation behind middle and a longitudinal low median carina before base.

Legs robust, moderate in size. Femora robust, strongly pedunculate in profemora, slender in meso- and metafemora; profemoral teeth distinctly directed laterad (Fig. 58). Tibiae slender; protibiae weakly incurved (Fig. 59), inner margin weakly emarginate between basal sixth and apical third, with sparse, somewhat cirrate long pubescence in apical half, and covered with short and compact very dense pubescence at terminal; mesotibiae slightly incurved (Fig. 60), inner margins weakly emarginate, weakly produced behind base, with two rows of compact tufts of pubescence in apical two-thirds; metatibiae almost straight (Fig. 61), inner margin slightly tumid behind base, with sparse and irregular pubescence in apical five-sevenths. Tarsi long and slender.

F e m a l e. Unknown.

Diagnosis. The new species is very similar to the preceding species, but is readily separable from the latter in having different shape of pronotum (see Figs. 25 & 26); mentum triangular instead

of short linguiform in the latter; emarginate basal portion of protibial inner margin; inner margins of mesotibiae with distinct two rows of compact tufts of pubescence; different shape of prosternal process and IE/TD 3.00 in male.

Etymology. The new species is named after its type locality, Kalimantan of Indonesia.

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要 約

安藤清志：カタビロキマワリ属の研究(鞘翅目ゴミムシダマシ科)——I. ボルネオ産7新種の記載。——
カタビロキマワリ属の種は東南アジアからニューギニアに至る各地に分布するが、ボルネオ島ではこれまで18種が知られている。しかし、手許の標本を見る限り、既知種の数をはるかに超える未記載種が存在すると思われる。今回記載した7新種のうち1種は、*Camarimena*属の種に見られるような極端に強い緑色光沢と細い体形を持ち、本属の既知種にはない特徴をそなえる。他の6新種は相互にきわめて類似した外見を持ち、共通して金属光沢のある暗緑色の鞘翅をそなえるが、精査の結果それぞれを新種と認め、以下の通り命名記載した。*Phaedis splendens* sp. nov., *P. makiharai* sp. nov., *P. sabaensis* sp. nov., *P. blanki* sp. nov., *P. punctipudendus* sp. nov., *P. cyaneonotatus* sp. nov., *P. kalimantanus* sp. nov.

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