

Review of the *Pericalus guttatus*-complex

(Insecta, Coleoptera, Carabidae, Lebiinae)

Martin Baehr

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The *guttatus*-complex within the nominate subgenus of the carabid genus *Pericalus* Macleay is reviewed and a new species, *P. imitator*, spec. nov. from Malaysia is described. *P. guttatus violaceus* Andrewes is raised to full specific status. The subgenus *Pericalus* s. str. is now known to occur east of Wallace's line, too, and the *guttatus*-complex is distributed from the Asian mainland (Malayan Peninsula) through the Greater Sunda Islands and the western part of the Lesser Sunda Islands southeastwards to Sulawesi (Celebes).

Dr. Martin Baehr, Zoologische Staatssammlung, Münchhausenstr. 21, D-81247 München, Germany.

Introduction

The Oriental ground beetle genus *Pericalus* Macleay includes about 30 species, of which 12 belong to the nominate subgenus *Pericalus* s. str. which is characterized by the wide, rather explanate lateral margins of the pronotum, and by generally wide, depressed elytra. The species of the genus are distributed throughout South Asia, from India to Taiwan, and south to New Guinea and New Britain. However, thus far no species of *Pericalus* s. str. had been recorded south and east of Java, Borneo, and Palawan.

Pericalus guttatus Chevrolat has been regarded until now a polymorphic species of the subgenus *Pericalus* s. str. Apart from the nominate form which has black elytra with yellow spots, there is a blue or violaceous form that had been originally described as var. *violaceus* Andrewes. *P. guttatus* s. l. was recorded so far from Sumatra and Java. *P. funestus* Andrewes from Sumatra is a very similar species that certainly is very closely related to *P. guttatus*.

Recently collected material at my disposal revealed that this complex has a far wider geographic distribution, and, on the other hand, that it includes an additional undescribed taxon. Hence, a general investigation of this complex was made to distinguish the taxa and fix their taxonomic status and level. Whereas *P. funestus* immediately was given full specific rank by its describer, this was not done in the taxon *violaceus* that had been described as a variation of *guttatus*. In the meantime, Lorenz (1998) raised it to subspecific status. However, there are distinct and consistent differences between the form *violaceus* and the nominate form *guttatus*, and, moreover, both taxa occur in the same area. Hence, *violaceus* is raised to full specific rank, because it is sympatric and probably even syntopic with *guttatus*. The description of an additional, distinctive taxon brings the number of closely related forms to four, and, mainly on heuristic reasons, they all are regarded as species. Further work may prove this opinion or may demonstrate that all or some are merely subspecies of a species, or taxa of a widespread superspecies. However, this can be only assured by more specialized and non-morphological methods.

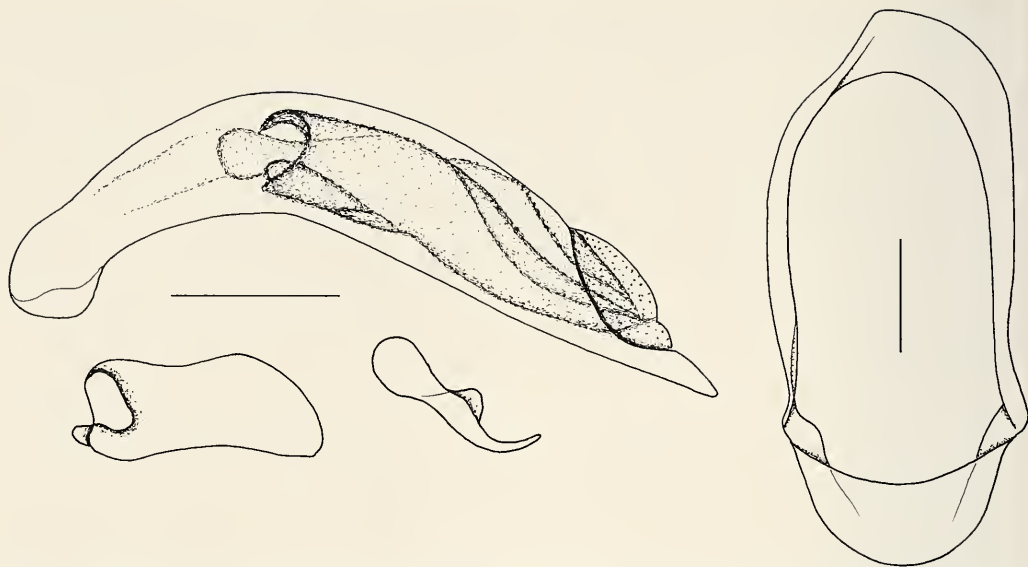


Fig. 1. *Pericalus guttatus* Chevrolat. ♂ genitalia. Aedagus, right and left parameres, and genital ring. Scale: 0.5 mm.

Measurements

Measurements have been taken using an ocular micrometer. Length of body has been measured from tip of labrum to apex of elytra including the elytral spines. Hence, measurements may slightly differ from those in the literature. To accommodate the measured ratio of width/length of the prothorax with the optical impression, length of prothorax has been measured from tip of anterior angles to apex of posterior angles, not along midline!

Material

Altogether, c. 60 specimens of the *guttatus*-complex were available, including, unfortunately, only the two specimens of the type series of *Pericalus funestus* Andrewes.

Pericalus funestus Andrewes

Andrewes, 1926: 284; Csiki 1932: 1369; Lorenz 1998: 430.

Types. Holotype: ♂, Type/ W. Sumatra E. Jacobson B.M. 1926-2./ Gunung Singgalang (Sumatra's Westkust) 1.800 M leg. E. Jacobson 1925/ *Pericalus funestus* Andr. Type H. E. Andrewes det. (BMNH). – Paratype: 1♀, same data / *Pericalus funestus* Andr. Cotype H. E. Andrewes det. (BMNH).

Diagnosis. Easily distinguished from the other species of the *guttatus*-complex by the rounded sutural angle of the elytra, the distinct incision of the lateral border at anterior third, and the remarkably wide, explanate lateral margin behind this incision.

Distribution. Thus far recorded from Sumatra only.

Pericalus guttatus Chevrolat

Figs 1, 4

Chevrolat, 1832: Cl. IX, Pl. 46; Csiki 1932: 1369; Jedlicka 1963: 378; Lorenz 1998: 430 (*guttatus guttatus*).

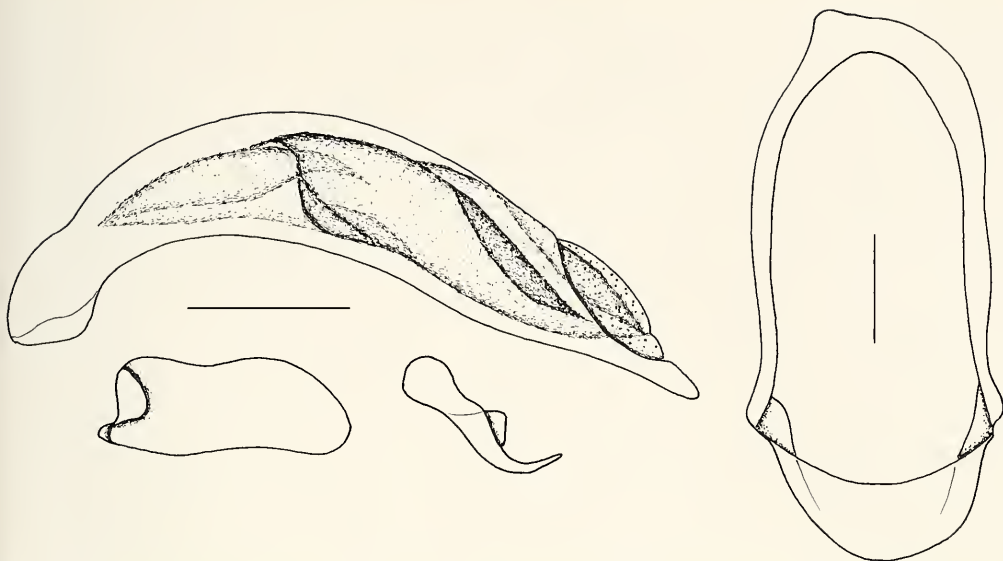


Fig. 2. *Pericalus violaceus* Andrewes. ♂ genitalia. Aedagus, right and left parameres, and genital ring. Scale: 0.5 mm.

Types. Syntype(s) (possibly not seen). Presumably in the Oxford University Museum.

Diagnosis. Distinguished from the other species of the *guttatus*-complex by angulate sutural angle of the elytra, black colour of first basal antennomere only, black colour of elytra with distinctly divided light spots of the anterior fascia, irregular sulci on head, and not markedly raised frons.

Distribution. A well known species, first described from Java, thus far recorded from Sumatra and Java. New records are now available from the island of Bali. It seems to be restricted to the mentioned islands.

Pericalus violaceus Andrewes (stat. nov.)

Figs 2, 5

Andrewes, 1926: 284 (*guttatus* var. *violaceus*); 1929: 313; Csiki 1932: 1369; Jedlicka 1963: 378; Lorenz 1998: 430 (*guttatus* ssp. *violaceus*).

Types. Lectotype (by present designation): ♂, Co-type/ Fort de Kock W. Sumatra E. Jacobson B.M.1927-48./ *Pericalus guttatus* Chevr. v. *violaceus* And. H. E. Andrewes det. (BMNH). – Paralectotypes: 1♂, Co-type/ Fort de Kock (Sumatra) 920 M. leg. E. Jacobson. 1926/ H. E. Andrewes Coll. B.M.1947-97. (BMNH); 1♂, Co-type/ Holländ. Indien/ Ex Mus. Buitenzorg/ H. E. Andrewes Coll. B.M.1947-97. (BMNH).

Note. The type series includes two additional cotypes that, however, belong to the following new species.

Diagnosis. Distinguished from the other species of the *guttatus*-complex by the angulate sutural angle of the elytra, black colour of first basal antennomere only, comparatively short and wide, blue-violaceous elytra with broadly contiguous light spots of the anterior fascia, regular sulci on head with rather smooth centre of frons, and not markedly raised frons.

Distribution. First described from Sumatra, now recorded from Sumatra, Java, Borneo (Sabah), and Sulawesi (Celebes).



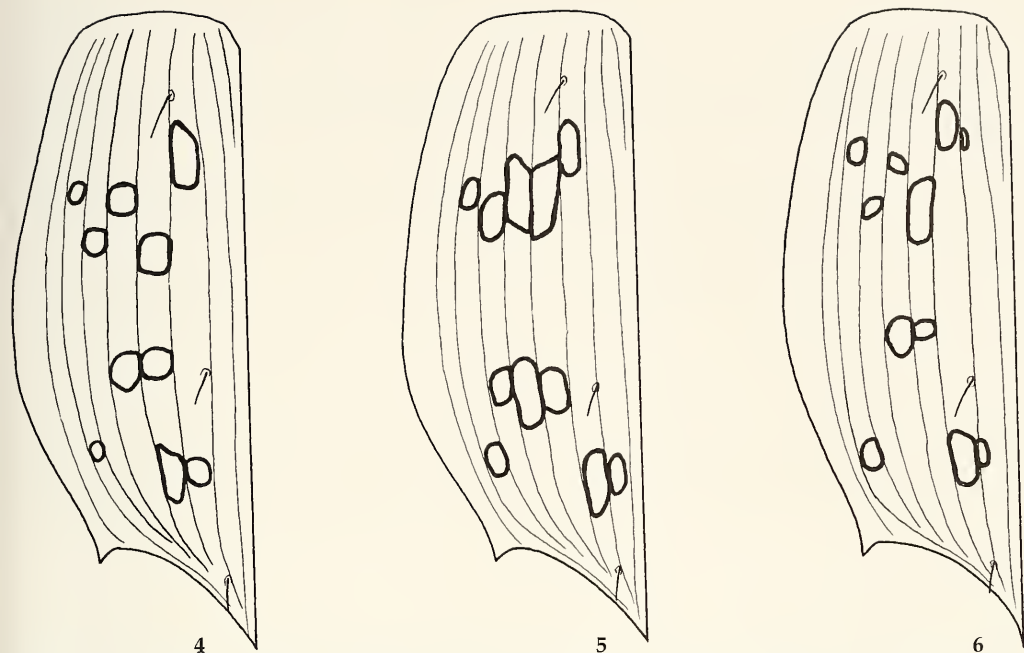
Fig. 3. *Pericalus imitator*, spec. nov. ♂ and ♀ genitalia. Aedagus, right and left parameres, genital ring, and stylomeres 1 and 2. Scale for ♂ genitalia: 0.5 mm; for ♀ genitalia: 0.25 mm.

Pericalus imitator, spec. nov.

Figs 3, 6

Types. Holotype: ♂, W-MALAYSIA, Pahang Tanah Rata, Gn. Jasar, Cameron Highlands, 19.-25.6.1995, lgt. S. Becvar (ZSM). – Paratypes: 2♂♂, 3♀♀, same data (CBM, ZSM); 1♂, WEST MALAYSIA, Pahang, C. Highlands, Tanah Rata, 20.-25.1.1995, Gn. Jasar, 14-1500m, lgt. S. Becvar J. & S. (CBM); 4♂♂, 1♀, MALAYSIA: Pahang, Cameron Highlands, Umg, Tanah Rata, 1500m, 27.-31.7.1993, lg. Schuh (NHMW); 1♂, MALAYSIA, Pahang, Cameron Highlands, Parit Falls, degraded rainforest/ from fungus-grown stumps at night, No. 91. 27.III.1995. O. Merkl (NHMW); 1♀, MALAYSIA, Pahang, Cameron Highlands, 2 km S Tanah Rata on Tapah Road/ montane rainforest at light, Nr. 93. 29.III.1995. O. Merkl & I. Szikossy (NHMW); 1♀, Co-type/ 350/ PERAK, F.M.S. Batang Padang, Jor Camp 1800 ft. Jan: 22nd 1925 H. M. Pendlebury./ H. E. Andrewes Coll. B.M.1947-97./ Det. Cotype *Pericalus guttatus* Chev. v. *violaceus* Andrewes (BMNH); 1♂, Co-type/ Malay Penin. mm. Cameron/ H. E. Andrewes Coll. B.M.1947-97./ Det. Cotype *Pericalus guttatus* Chev. v. *violaceus* Andrewes (BMNH).

Diagnosis. Distinguished from the other species of the *guttatus*-complex by the spinose sutural angle of the elytra, black colour of four basal antennomeres, comparatively elongate, blue-violaceous elytra with widely separated light spots of the anterior fascia, remarkably raised frons, and distinctly convex lower margin of aedeagus.



Figs 4-6. Colour pattern of elytra. 4. *Pericalus guttatus* Chevrolat. 5. *P. violaceus* Andrewes. 6. *P. imitator*, spec. nov. All same size.

Description

Measurements. Length: 10.2-11.0 mm; width: 4.1-4.5 mm. Ratios. Width/length of pronotum: 1.07-1.11; width base/apex of pronotum: 0.87-0.88; width of pronotum/width of head: 1.03-1.10; length/width of elytra: 1.96-1.98; width elytra/pronotum: 1.29-1.40.

Colour. Head, Pronotum, lower surface, legs, and four basal antennomeres black. Elytra bluish with violaceous lustre in middle of either elytron. Mouth parts and outer antennomeres piceous.

Head. Large and wide, slightly wider than pronotum. Eyes semicircular, laterally very far projecting. Labrum and mandibles, and palpi of average size. Medially of eye with a remarkably deep sulcus, frons markedly raised above head and eye sulcus, distinctly raised above eye when seen from laterally. Also anteriorly of raised frons with a weak transverse sulcus. Surface remarkably irregularly sulcate, especially on frons. Surface superficially microreticulate.

Pronotum. Comparatively wide, remarkably cordiform, widest behind anterior third. Base distinctly wider than apex. Apex deeply excised, straight. Anterior angles far produced, very broadly rounded. Lateral border remarkably convex in anterior two thirds, then concave towards basal angles. Lateral margins widely explanate, slightly upturned. Basal angles less than rectangular, dentiform, laterally considerably produced, base almost straight, laterally slightly oblique. Apex not margined, base coarsely margined. Anterior transverse sulcus fairly distinct, median line shallow, basal transverse sulcus very deep, bisinuate. Anterior lateral seta situated at anterior third, in front of widest diameter, posterior marginal seta situated just in front of basal angle. Surface very densely rugose-striolate and densely microreticulate, microsculpture more superficial only in middle of disk.

Elytra. Apart from colour and pattern very similar to those of *P. guttatus* and *P. violaceus*. Lateral margin not incised, little explanate in anterior third. Intervals convex, 3rd interval with three setiferous punctures, the anterior one in basal sixth, adjacent to 3rd stria, the posterior two behind middle and close to apex, both adjacent to 2nd stria. Sutural angle with comparatively elongate spine.

Lower surface. As in related species.

Legs. As in related species.

Male genitalia (Fig. 3). Genital ring moderately wide, at apex almost evenly rounded. Aedeagus rather large, comparatively short, lower surface markedly convex near apex, then slightly concave.

Apex comparatively short, straight, rather acute at tip. Internal sac without any sclerotizations within. For parameres see fig. 3.

Female genitalia (Fig. 3). Very similar to those described for the subgenus *Coeloprosopus* (see Baehr 1994). Stylomere 1 apparently without setae at apex. Stylomere 2 very slender and elongate, apically curved, with 3 ventral ensiform setae, a short, preapical dorsal ensiform seta, but without nematiform setae.

Variation. Very little variation of size, colour, and elytral pattern noted. Centre of head in some specimens rather smooth, also centre of pronotum commonly fairly glossy.

Distribution. Cameron Highlands and vicinity, Perak District, Malaysia.

Collecting circumstances. One specimen from the type series was collected in montane rainforest at light, another in "degraded rainforest/from fungus-grown stumps at night".

Habits. A trunk and log inhabiting rainforest species, like the related species.

Etymology. The name refers to the high external similarity with the other species of the *guttatus*-complex.

Relationships. Unique within the *guttatus*-complex by its markedly spinose instead of angulate elytral apices and the remarkably raised frontal part of the head. Probably it is more closely related to *guttatus* and *violaceus* than to *funestus*, though less closely related to both *guttatus* and *violaceus* than either two.

Appendix

Summary of measurements and ratios for all species of the *Pericalus guttatus*-complex.

For better recognition of the species measurements and ratios for all species of the *guttatus*-complex are compiled in the following table. Of *P. funestus* only two specimens of the type series were available.

	body length (mm)	ratio width/length pronotum	ratio width base/apex pronotum	ratio width head/pronotum	ratio length/width elytra	ratio width elytra/pronotum
<i>funestus</i>	10.2-11.4	1.18-1.21	0.91-0.93	1.13-1.15	1.85-1.91	1.27-1.35
<i>guttatus</i>	10.6-11.2	1.15-1.17	0.96-1.02	1.12-1.16	1.86-1.90	1.26-1.28
<i>violaceus</i>	10.1-11.0	1.13-1.16	0.98-1.01	1.16-1.21	1.72-1.77	1.30-1.34
<i>imitator</i>	10.2-11.0	1.07-1.11	0.87-0.88	1.03-1.10	1.96-1.98	1.29-1.40

Key to the species of the *Pericalus guttatus*-complex

1. Sutural angle of elytra clearly rounded; lateral border of elytra distinctly incised at basal third, margin behind incision remarkably explanate. Sumatra *funestus* Andrewes
- Sutural angle of elytra angulate or spinose; lateral border of elytra not incised at basal third, margin less explanate 2.
2. Light spots of anterior elytral fascia broadly contiguous (Fig. 5); sulci on head rather regular, centre of frons rather smooth, and frons not markedly raised. Sumatra, Java, Borneo (Sabah), Sulawesi *violaceus* Andrewes
- Light spots of anterior elytral fascia more or less widely separated (Figs 4, 6); either sulci on head rather irregular and covering centre of frons, or frons markedly raised above eye sulcus 3.
3. Elytra black; only 1st antennomere black, remainders brown; frons convex though not markedly raised above eye sulcus; sutural angle of elytra angulate or shortly spinose (Fig. 4); lower surface of aedeagus almost straight (Fig. 1). Sumatra, Java, Bali *guttatus* Chevrolat
- Elytra bright blue-violaceous; 1st-4th antennomeres black; frons markedly raised above eye sulcus; sutural angle of elytra markedly spinose (Fig. 6); lower surface of aedeagus distinctly convex near apex (Fig. 3). Malaysia (Cameron Highlands) *imitator*, spec. nov.

Remarks

So far the species of the *guttatus*-complex were recorded from the Greater Sunda Islands only. Newly collected material now demonstrates that the species of this complex occupy a vast range and cover the whole area from the Malayan Peninsula on mainland Asia through the Greater Sunda Islands, the westernmost of the Lesser Sunda Islands, to Sulawesi in the Moluccas. The Sulawesi record of *P. violaceus* also is the first record of a species of the nominate subgenus *Pericalus* s. str. from east of Wallace's Line, which is contrary to the opinion expressed by me few years ago (Baehr 1994). This is evidence that species of the nominate subgenus were as well able to cross this biogeographically important border line as were species of the subgenus *Coeloprosopus*. Nevertheless, this crossing most probably occurred quite recently, because the population on Sulawesi was not yet able to develop into a separate taxon.

The record of *P. imitator* in Malaysia also is the first record of a species of the *guttatus*-complex from mainland Asia.

The occurrence of three very closely related species of the *guttatus*-complex in Sumatra (*funestus*, *guttatus*, and *violaceus*) raises the question of the innidation of the three species on this island. Unfortunately, much too less is known about the habits, or even the exact collecting circumstances of the species, for example altitude range, forest type etc. Hence, such questions must be left open, until more exact information is available.

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Autor(en)/Author(s): Baehr Martin

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