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A new genus and two new species of Physocrotaphinae from New Guinea

(Insecta, Coleoptera, Carabidae)

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Schuelea, gen. nov. and two new species, *S. monstrosa* from Irian Jaya and *S. drumonti* from Papua New Guinea are described. The new genus is distinguished from all known physocrotaphine genera by its massive body shape, very short and stout legs, short and stout antenna with peculiar impressed apical antennomeres, multisetose clypeus, deeply impressed anterior transverse sulcus of the pronotum, and large, more or less tectiform elytra. Also *Pogonoglossus arfakensis* Baehr is transferred to the new genus.

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Introduction

The rather small subfamily (or tribe) Physocrotaphinae (-ini) (according to Moore 1998 this name has priority over the more commonly used name Helluodinae) is distributed in the Oriental and Australian regions from the southern and eastern parts of India, in the north-west, through Sri Lanka, Indochina, the Indonesian Archipelago to the Philippines, New Guinea, New Britain, and northern and north-eastern Australia, in the south. The subfamily includes three genera, namely the large genus *Pogonoglossus* Chaudoir that is distributed over almost the whole range of the subfamily, the monobasic *Physocrotaphus* Parry from Sri Lanka (*P. ceylonicus* Parry), and *Helluodes* Westwood with two species occurring in Sri Lanka and southern India. The gigantic *Holoponerus godeffroyi* (Fairmaire) from New Britain, although originally described as a member of the subfamily Lebiinae, probably belongs also to Physocrotaphinae. Unfortunately, the unique specimen was destroyed during World War II, so this question is not solvable as long as no new material is available.

Altogether, less than 40 physocrotaphine species were described until now (Lorenz 1998), but the number of undescribed or even unrecorded species is perhaps quite substantial, because specimens are rarely collected and most species seem to occupy rather restricted ranges. Both, the difficulties in sampling and the apparent local distribution, are perhaps caused by the rather secrete way of life, since most species of Physocrotaphinae seem to live – or at least have been found – under bark or in rotten wood of rain forest trees. A number of species, however, are only known from sampling at light, and hence, virtually nothing is known about their way of life.

From New Guinea, thus far 12 species of the most speciose genus *Pogonoglossus* Chaudoir were described (Darlington 1968, Baehr 1987, 1995), and most are yet recorded from few or even single specimens. Therefore, the detection of two additional new physocrotaphine species in New Guinea is not too surprising. In many respects, however, both new species are outstanding and not comparable to anyone of the described species of Physocrotaphinae within and outside New Guinea, except for the large *Pogonoglossus arfakensis* Baehr, and therefore a new genus is being described to accommodate this and both new species.

Fig. 1. *Schuelea monstrosa*, spec. nov. ♂ aedeagus, parameres, and genital ring. Scale: 1 mm.
Fig. 2. *Schuelea drumonti*, spec. nov. ♀ stylomeres 1 and 2. Scale: 0.5 mm.

Measurements

Measurements have been taken under a stereo microscope using an ocular micrometer. Length has been measured from tip of labrum to apex of elytra, hence measurements may slightly differ from those of other authors. Some width/length ratios have been taken in the same manner as in Baehr (1988, 1993, 1995). It should be noted that length of pronotum was measured from apex of anterior angles to the most advanced point of base.

Location of types

The unique holotypes of the three species are stored in Museum für Naturkunde der Humboldt-Universität, Berlin (MNHB), Institute Royal des Sciences naturelles de Belgique, Bruxelles (IRSNB), and in the working collection of the author in Zoologische Staatssammlung, München (ZSM-CBM).

Schuelea, gen. nov.

Diagnosis. Genus of subfamily Physocrotaphinae. In many character states similar to genus *Pogonoglossus* Chaudoir, in particular with respect to shape and structure of glossa and paraglossae. Distinguished from all other described genera by stout body, very short and stout legs, unusually short antenna bearing characteristic impressions at the base of the inner and outer surfaces of antennomeres 5-11, multisetose clypeus, small though laterally remarkably protruding eyes, short and wide, unusually massive mandibles, deep anterior transverse sulcus on pronotum, and rather tectiform elytra.

Type species. *Schuelea monstrosa*, spec. nov., by present designation.

Etymology. The new genus is named in honour of Mr. Peter Schüle, collector of one of the new species.

Distribution. New Guinea.

Schuelea monstrosa, spec. nov.
Figs 1, 3

Types. Holotype: ♂, 11.7.1996, 15, Schüle/Stüben, West Papua Fakfak, Mambuni-Buni, Garten (ZSM-CBM).

Diagnosis. Large species, distinguished from both, *S. arfakensis* (Baehr) and *S. drumonti*, spec. nov. by angulate orbits, basally deeply excised external margin of left mandible, less short and wide pronotum with wider base, acute, markedly projecting anterior angles and characteristically upturned lateral parts of anterior margin, and decidedly tectiform elytra.

Description

Measurements. Length: 15.5 mm; width: 5.5 mm. Ratios. Width/length of pronotum: 1.33; base/apex of pronotum: 1.12; width of pronotum/width of head: 1.26; width of pronotum/width of elytra: 0.86; length/width of elytra: 1.68; length/width of 10th antennomere: 1.2.

3

4

Figs 3, 4. Habitus. **3.** *Schuelea monstrosa*, spec. nov. Length: 15.5 mm. **4.** *Schuelea drumonti*, spec. nov. Length: 14.5 mm.

Colour. Glossy black, only the anterior margins of clypeus and labrum, and the tips of the palpi reddish.

Head. Large and massive, but slightly narrower than pronotum, very wide between eyes. Frons with two deep, elongate, irregularly sinuate impressions, neck separated from frons by a very deep sulcus, thus upper surface very uneven. Eyes small, semicircular, laterally remarkably projecting. Orbits slightly shorter than eyes, obtusely angulate, posteriorly bordered by a ridge, behind which is a very coarsely punctate sulcus. Anterior supraorbital seta situated near inner margin of eye at about middle of eye, posterior supraorbital seta posteriomedially removed from eye and situated at anterior margin of transverse sulcus. Clypeus with four to five elongate setae on either side, in addition to the erect pilosity. Labrum 7-setose, one of the paramedian setae apparently doubled at the right side, the lateral seta far longer than the inner setae. Mandibles comparatively short and wide, massive, inner border almost straight for a long distance, only near apex incurved. Lower lateral margin of left mandible deeply excised at a short distance from base, here scrobe absent. Lateral margin above excision with a very faint ridge. Right mandible without such excision, but both mandibles with a short, triangular excision immediately near base. Palpi rather short and stout, with sparse and extremely short pilosity. Mentum with triangular tooth, with 3 elongate setae on either side. Submentum with a transverse row of six elongate setae. Lateral and lower surface of orbits shortly setose. Glossa rather short, apically transverse, bisetose, paraglossae apically separated from glossa, membraneous, very narrow, just slightly surpassing glossa. Lacinia massive, elongate, with a dense row of very elongate teeth. Galea narrow, inner surface slightly concave.

Antenna short, just surpassing base of pronotum, pilose from basal antennomere, scapus rather short and stout, 3rd and 4th antennomeres moderately elongate. Antennomeres 5-11 little longer than wide, oval-shaped, depressed. Upper and lower rim with a narrow, remarkably chagreened field on either side that is rather densely pilose. The broad sides characteristically bi-impressed at base. Upper surface of head with some rugosities and coarse punctures, apparently devoid of microreticulation, rather sparsely pilose, surface fairly glossy.

Pronotum. Large, though comparatively narrow, little wider than head, widest at anterior third. Apex very deeply excised, anterior angles markedly angulate and projecting. Apical excision laterally with a large, upright, about quadrangular plate that conspicuously interrupts the excision. Apical margin without any pilosity. Lateral borders anteriorly strongly convex, in posterior third with elongate sinuation. Base wider than apex, in middle slightly concave, laterally straight though oblique. Basal angles angulate, almost rectangular, with a tiny denticle. Apex not bordered, base laterally bordered. Anterior marginal seta situated just behind anterior third, at margin, posterior marginal seta situated at basal angle. Lateral explanation wide and deep, lateral margin conspicuously upturned. Median line faintly impressed, neither attaining apex nor base. Anterior transverse sulcus deep, about semicircular. Basal grooves deep, circular, in middle near base with a rather deep transverse furrow. Surface remarkably convex on either side. Puncturation and pilosity fairly sparse, microreticulation absent, surface rather glossy.

Elytra. Fairly elongate, laterally absolutely parallel, without any sinuation in anterior third. Humerus evenly rounded, barely projecting. Apex gently sinuate, with wide membraneous area. Surface remarkably tectiform, in particular towards apical third. Marginal channel very narrow throughout. Striae lightly impressed, impunctate, intervals gently convex, with sparse, irregularly uni- to bipunctate puncturation and pilosity. 3rd interval with three setiferous punctures, setae erect and distinctly longer than pilosity. Microreticulation extremely superficial and fine, visible only under high magnification, consisting of rather transverse meshes. Surface rather glossy. Lateral border not serrate, sparsely pilose. Marginal setae elongate. Fully winged.

Lower surface. Thorax comparatively sparsely punctate and setose, abdomen with denser pilosity. Metepisternum elongate, more than twice as long as wide. Terminal sternite in male on either side with 3-4 elongate setae near margin.

Legs. Remarkably short and stout. Protibia sulcate on upper surface. Apart from 1st and 5th tarsomeres of median and posterior tarsi, tarsomeres almost as wide as long. Especially on lower surface and at apex tibiae densely setose. Upper surface of tarsi rather sparsely pilose, lower surface of anterior four tarsomeres densely pilose, 5th tarsomere setose underneath. Male protarsus without special vestiture.

♂ genitalia (Fig. 1). Genital ring oval shaped, slightly asymmetric, very strongly sclerotized. Aedegus rather stout, gently curved, lower surface concave with several irregular shallow, transverse sulci. Orificium elongate, almost symmetric, situated on upper side, bearing two elongate, sclerotized ligulae at upper surface. Inner sac simply folded, rather symmetric. Left paramere large, with obliquely cut apex. Right paramere with small, narrow sclerotized upper part and elongate, little sclerotized base.

♀ genitalia. Unknown.

Variation. Unknown.

Distribution. Western part of Irian Jaya (now 'Papua'), New Guinea. Known only from type locality.

Collecting circumstances. Largely unknown, though the specimen was collected in 'garden', presumably at low altitude.

Etymology. The name refers to the outstanding shape of the anterior angles of the pronotum.

Schuelea drumonti, spec. nov.

Figs 2, 4

Types. Holotype: ♀, Coll. I.R.Sc.N.B. Canopy mission P.N.G. Madang province, Baiteta, FOG AR 3-10 4.V. 1995, Leg. Olivier Missa (IRSNB).

Diagnosis. Large species, distinguished from *S. monstrosa*, spec. nov. by rounded orbits, barely excised external margin of left mandible, shorter and wider pronotum with narrower base, rounded and far less projecting anterior angles and normal shaped anterior margin, and less tectiform elytra. Mainly distinguished from similar and closely related *S. arfakensis* (Baehr) by longer, more tectiform, and less densely pilose elytra, and slightly narrower base of pronotum.

Description

Measurements. Length: 14.5 mm; width: 5.2 mm. Ratios. Width/length of pronotum: 1.57; base/apex of pronotum: 0.90; width of pronotum/width of head: 1.17; width of pronotum/width of elytra: 0.83; length/width of elytra: 1.70; length/width of 10th antennomere: 1.2.

Colour. Glossy piceous-black, labrum, anterior

margin of clypeus, tips of the palpi reddish, elytra slightly lighter than fore body.

Head. Large and massive, slightly narrower than pronotum, very wide between eyes. Frons with two deep, short, irregularly circular impressions, neck separated from frons by a very deep sulcus, thus upper surface very uneven. Eyes small, semicircular, laterally remarkably projecting. Orbits slightly shorter than eyes, evenly convex, posteriorly gently surpassing into neck without any ridge or sulcus. Anterior supraorbital seta situated near inner margin of eye at about middle of eye, posterior supraorbital seta posterio-medially removed from eye and situated at anterior margin of transverse sulcus. Clypeus with four elongate setae on either side, in addition to the erect pilosity. Labrum 6-setose, the lateral seta far longer than the inner setae. Mandibles comparatively short and wide, massive, inner border almost straight for a long distance, only near apex incurved. Lower lateral margin of left mandible gently bi-excised at a short distance from base, scrobe here narrow. Lateral margin above excision with a conspicuous, elongate ridge. Right mandible without such excision, but both mandibles with a short, triangular excision immediately near base. Palpi rather short and stout, with sparse and extremely short pilosity. Mentum with triangular tooth, with 3 elongate setae on either side. Submentum with a transverse row of six elongate setae. Lateral and lower surface of orbits shortly setose. Glossa rather short apically transverse, bisetose, paraglossae apically separated from glossa, membraneous, very narrow, but slightly surpassing glossa. Lacinia massive, elongate, with a dense row of very elongate teeth. Galea narrow, inner surface slightly concave. Antenna short, just surpassing base of pronotum, pilose from basal antennomere, scapus rather short and stout, 3rd and 4th antennomeres moderately elongate. Antennomeres 5-11 little longer than wide, oval-shaped, depressed. Upper and lower rim with a narrow, remarkably chagreened field on either side that is rather densely pilose. The broad sides characteristically bi-impressed at base. Upper surface of head with some rugosities and coarse punctures, apparently devoid of microreticulation, rather sparsely pilose, surface glossy.

Pronotum. Large, comparatively short and wide, though but little wider than head, widest in front of anterior third. Apex rather deeply excised, anterior angles rounded, not much projecting. Apical excision without any special characters. Apical margin laterally with short pilosity. Lateral borders anteriorly rather convex, in posterior third with fairly shallow, elongate sinuation. Base narrower than apex, in middle slightly concave, laterally straight though oblique. Basal angles angulate, almost rectangular, with a small though distinct denticle. Apex not bordered, base laterally bordered. Anterior marginal seta situated just behind anterior third, at margin, posterior marginal seta situated at basal angle. Lateral explanation fairly wide and deep, lateral margin rather upturned. Median line faintly impressed, neither attaining apex nor base. Anterior transverse sulcus deep, about semicircular. Basal grooves deep, circular, in middle near base with a rather deep transverse furrow. Surface remarkably convex on either side. Puncturation and pilosity fairly sparse, microreticulation absent, surface highly glossy.

Elytra. Fairly elongate, laterally absolutely parallel, without any sinuation in anterior third. Humerus evenly rounded, barely projecting. Apex gently sinuate, with wide membraneous area. Surface fairly convex though little tectiorm, not even in apical third. Marginal channel very narrow throughout. Striae moderately impressed, impunctate, intervals fairly convex, with sparse, though rather coarse, irregularly uni- to bipunctate puncturation and pilosity. 3rd interval with three setiferous punctures, setae erect but short, difficult to recognize within the pilosity. Microreticulation extremely superficial and fine, barely recognizable even under high magnification, consisting of rather transverse meshes. Surface glossy. Lateral border not serrate, sparsely pilose. Marginal setae elongate. Fully winged.

Lower surface. Thorax comparatively sparsely punctate and setose, abdomen with denser pilosity. Metepisternum elongate, more than twice as long as wide. Terminal sternite in female on either side with 3-4 elongate setae near margin.

Legs. Remarkably short and stout. Protibia sulcate on upper surface. Apart from 1st and 5th tarsomeres of median and posterior tarsi, tarsomeres almost as wide as long. Especially on lower surface and at apex tibiae densely setose. Upper surface of tarsi rather sparsely pilose, lower surface of anterior four tarsomeres densely pilose, 5th tarsomere setose underneath. Vestiture of male protarsus unknown.

♂ genitalia. Unknown.

♀ genitalia (Fig. 2). Stylomere 1 triangular, with 2-3 nematiform setae at median side of apical rim. Stylomere 2 of semilunar shape, ventro-lateral margin slightly serrate, with four very small ensiform setae along margin. Median surface near apex with an elongate groove from which a rather short nematiform seta arises. Also with one or two nematiform seta arising from median surface near base. Lateral plate with rather sparse, very elongate nematiform setae

Variation. Unknown.

Distribution. North-eastern Papua New Guinea. Known only from type locality.

Collecting circumstances. The holotype was captured by 'canopy fogging' in rain forest, probably in lowland. It is not known, however, whether the specimen actually was fogged from the upper canopy, or from lower branches, or from the trunk of a tree.

Etymology. Named in honour of Mr. Alain Drumont of IRSNB, Brussels who kindly made accessible to me a large sample of New Guinean ground beetles which includes the new species.

Schuelea arfakensis (Baehr), comb. nov.

Pogonoglossus arfakensis Baehr, 1987: 363; Lorenz 1998: 483.

Types. Holotype: ♀, Arfakgeb. Siwi, 800 m, 4.6.28, E. MAYR S. G. (MNHB).

Note. Due to its shape and structure, this large species also belongs to the new genus *Schuelea* and it is herewith transferred to this genus. Apparently, the holotype still is the single recorded specimen.

Diagnosis. Large species, distinguished from *S. monstrosa*, spec. nov. by rounded orbits, barely excised external margin of left mandible, shorter and wider pronotum with narrower base, rounded and far less projecting anterior angles and normal shaped anterior margin, and less tectiform elytra. Mainly distinguished from similar and closely related *S. drumonti*, spec. nov. by shorter, barely tectiform, and more densely pilose elytra, and slightly wider base of pronotum. Some measurenemts and ratios are included in the table below.

Comparison of measurements and ratios in the genus *Schuelea*

(w: width, l: length, b: base, a: apex, pr: pronotum, h: head, el: elytra)

	N	length (mm)	w/l pr	b/a pr	w pr/h	w pr/el	l/w el
arfakensis	1	16.8	1.58	0.94	1.14	0.79	1.60
drumonti	1	14.5	1.57	0.90	1.17	0.83	1.70
monstrosa	1	15.5	1.33	1.12	1.26	0.86	1.68

Key to the species of the genus *Schuelea*

1. Orbits angulate; lateral margin of left mandible near base deeply excised; anterior angles of pronotum acute, much projecting, base wider than apex, apical margin laterally conspicuously blade-like upturned; elytra markedly tectiform. Western Irian Jaya ..... *monstrosa*, spec. nov.

– Orbits rounded; lateral margin of left mandible near base barely excised; anterior angles of pronotum rounded, far less projecting, base narrower than apex, apical margin laterally not upturned; elytra more depressed ..... 2.

2. Larger and wider species, ratio l/w of elytra 1.6; pronotum with slightly wider base; elytra depressed, barely tectiform, median intervals in apical half irregularly bipunctate and -pilose. Vogelkop, western Irian Jaya *arfakensis* (Baehr)

– Smaller and narrower species, ration l/w of elytra 1.7; pronotum with slightly narrower base; elytra less depressed, perceptibly tectiform, median intervals in apical half irregularly unipunctate and -pilose. North-eastern Papua New Guinea ..... *drumonti*, spec. nov.

Remarks

Although the three species clearly belong to the subfamily Physocrotaphinae, they differ from most other species in their stout, even bulky body shape and the short legs and antennae. Whereas *S. arfakensis* (Baehr) and *S. drumonti*, spec. nov. in certain characters do not exhibit exceptional morphological states, *S. monstrosa* at the first glance stands out by its very strange shape of the prothorax, but also by its tectiform elytra and the remarkably angulate orbits. Certainly, *S. arfakensis* and *S. drumonti* are still closely related, whereas *S. monstrosa* exhibits a very strange and highly aberrant morphological development.

Together with the two new species, now 14 physocrotaphine species are recorded from New Guinea and this island more and more proves as one of the strongholds of the subfamily. Originally, as Baehr (1988) and Moore (1998) stated, Physocrotaphinae is an Oriental subfamily that probably originated somewhere in southern Asia and so far had its highest degree of taxonomic diversity in Sumatra and Java (Bouchard 1903, Andrewes 1937), whereas the Asiatic mainland and also Borneo and the Philippine islands apparently are much less speciose (Jedlicka 1963, Stork 1986). However, these statements are based on quite limited knowledge and have to be regarded with some reservation.

According to the opinion of Moore (1998) which was supported by larval characters, a sister-group relation exists between Physocrotaphinae and Anthiinae which means that both tribes are next related and probably stem from a common ancestor. Because Anthiinae are an African group of quite clear Gondwanan origin, this would imply that the strictly Oriental-Australian Physocrotaphinae likewise belong to the old Gondwanan faunal element and probably originated on one of the previous terranes of Gondwanan origin that subsequently were attached to the Laurasian continent. Future phylogenetic examinations should clarify which physocrotaphine genus is the most plesiotypic one which, in turn, could suggest on which landmass of Gondwanan origin this subfamily originated. Dependent on the phylogenetic status of the genera, those terranes that developed either into Sri Lanka (Ceylon) and/or southern India, or into later Sumatra and/or Java would come into question.

Certainly, physocrotaphine stocks subsequently migrated or drifted to the southeast to reach those island arcs that later combined to what is present New Guinea, and eventually they also reached northern and northeastern Australia. The high taxonomical and morphological diversity of Physocrotaphinae in the Papuan-Australian area demonstrates that this immigration must have occurred rather early, or that the taxonomic diversification at least has proceeded rather rapidly. Only the colonisation of Australia probably was a rather recent event which is demonstrated by the occurrence of still identical species in New Guinea and northern Australia (Baehr 1988).

Due to the still lacking knowledge of the phylogenetic relations within Physocrotaphinae, at present it is impossible to decide with which New Guinean or even extra-New Guinean species or species-group of the genus *Pogonoglossus Schuelea* is next related, if it is closely related to this genus at all. In view of the very incomplete knowledge of the New Britain *Holoponerus* we only can speculate about a possible relationship with this enigmatic genus.

Unfortunately, no sampling circumstances are recorded for either species of *Schuelea*, so their habits are completely unknown. In view of the unique, bulky body shape and their unusually short mandibles it may be speculated, however, that ecology and behaviour of the species of *Schuelea* in one or another way deviate from those of the species of *Pogonoglossus*.

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