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## *Herculagonum atlas*, gen. et spec. nov. from Papua New Guinea

(Insecta, Coleoptera, Carabidae, Platyninae)

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*Herculagonum atlas*, gen. et spec. nov. is described from mountains in central Papua New Guinea. The large species is closely related to *Montagonum anax* Darlington and *M. anassa* Darlington, but is distinguished from both by wider, basally much more constricted prothorax. The three very large, bulky species are removed from the genus *Montagonum* Darlington and a new genus *Herculagonum*, gen. nov. is erected to accommodate the striking differences of the three species in certain structural characters of shape and chetotaxy.

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### Introduction

The carabid fauna of the high mountains of New Guinea is particularly rich in remarkably differently shaped and structured, commonly flightless ground beetles of the subfamily Platyninae. Within this group, some genera stand out through very large size and remarkably massive shape of the bodies of their species, and in some species also of extremely massive built of the head. Examples are to be found within the genus *Idiagonum* Darlington (Baehr 2000) and in the genus *Montagonum* Darlington. The latter, however, is a genus of convenience that most probably is not monophyletic. It includes a group of species that are characterized by very large body size (20 mm or larger), remarkably massive head with very small eyes, very elongate, decussate mandibles, slender and delicate palpi and antennae, absence of the basal border of elytra, and loss of a number of fixed setae on pronotum and elytra. The three species, *Montagonum anax* Darlington,

*M. anassa* Darlington, and the new species described herein, for that reason are removed from the genus *Montagonum* (that was originally erected for a rather *Calathus*-like species from Irian Jaya of much more delicate built and with complete set of fixed setae on the elytra), and a new genus *Herculagonum* is erected to accommodate their close relationships and, at the same time, their rather remote relationship to the remaining species of the genus *Montagonum*.

Probably it would be also necessary to remove all other species apart from the type species (*M. toxopeanum* Darlington) from the genus *Montagonum*, but this will be postponed to the proposed description of additional species from other species-groups within this genus. At present, however, the genus "*Montagonum*" only includes species from mountains in Papua New Guinea, except for the mentioned type species that is known so far from the Snow Mountains in Irian Jaya.

Through courtesy of Drs. I. Löbl and G. Cuccodoro of the Muséum d'histoire naturelle

de Genève (MHNG) I received a sample of carabid beetles collected by G. Cuccodoro in central Papua New Guinea in 1992, which, *inter alia*, includes a single specimen of a remarkable, very large, new species of the genus "*Montagonum*" that is described herein.

### Material and methods

For dissection of the male genitalia the holotype was soaked in a wet jar for a night, then the genitalia were cleaned for a short while in hot 4% KOH. For the description normal taxonomic methods have been used.

### Measurements

Measurements were taken using a stereo microscope with an ocular micrometer. Length has been measured from apex of labrum to apex of elytra. Therefore, measurements may slightly differ from those of Darlington (1956, 1971). Length of pronotum was measured along midline, width of pronotum at widest part, width of base of pronotum at beginning of curvature of the rounded basal angles.

### Genus *Herculagonum*, gen. nov.

**Diagnosis.** Genus of subfamily Platyninae, distinguished by the following character states: Large, bulky species with atrophied inner wings, very stout head, extremely small eyes, and very elongate, decussate mandibles. Palpi and galea very slender and elongate. Mental tooth emarginate, mentum and submentum polysetose. Glossa wide, quadrate, quadrisetose, paraglossae membranous, narrow, very elongate, by far surpassing glossa, with dense fringe of extremely short hairs at median border. Lacinia elongate, with dense fringe of long stiff hairs. Both supraorbital setae present, posterior seta situated far behind eye. Pronotum anteriorly wide, more or less cordiform, with obtusely rounded basal angles. Both, apex and base not margined. Basal marginal seta present or wanting, anterior lateral seta present, sometimes doubled. Lateral margin wide, upturned. Elytra connate, ovoid, convex, basal margin obsolete, scutellar seta present, discal setae absent, marginal setae almost uninterrupted. Metepisternum quadrate. Abdominal sterna

deeply sulcate immediately in front of apical margin. Terminal abdominal sternum in male bisetose, in female quadrisetose. Legs very slender and elongate, 5<sup>th</sup> tarsomeres asetose beneath. Male aedeagus (known only from *H. atlas*, spec. nov., that of *H. anax* Darlington according to Darlington "not fully hardened and too distorted to draw") shorter and more compact than in other "*Montagonum*", with very long, almost symmetric orificium and moderately dissimilar, oval-shaped parameres. Internal sac with a slightly sclerotized fold at left side of apex.

Wing-and seta formula: -w, ++, +-+, ---.

**Type species.** *Herculagonum atlas*, spec. nov., by present designation.

**Etymology.** The name is a combination of *Hercules*, the giant of the Greek mythos, and *Agonum*. The gender is neuter.

**Distribution.** Mountains of eastern central Papua New Guinea. So far three species known: *H. atlas*, spec. nov., and *H. (former Montagonum) anax* Darlington and *anassa* Darlington.

**Note.** The species of this genus either seem to be very rare, or their secret behaviour prevents them from being more commonly sampled, since of all recorded species only the holotypes are known.

### *Herculagonum atlas*, spec. nov.

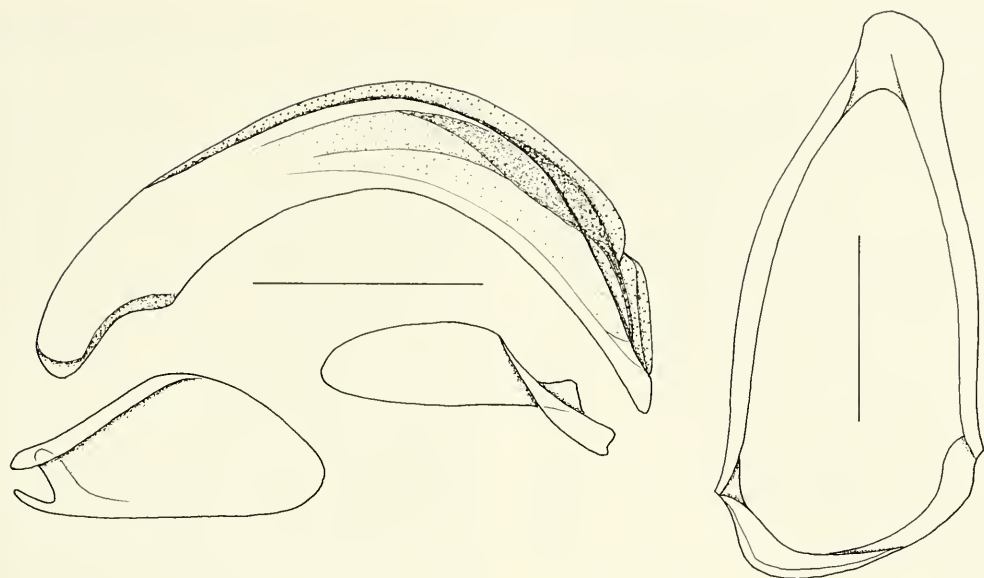
Figs 1, 2

**Types.** Holotype: ♂, PAPUA NG: Morobe Biaru Rd, Mt. Kolorong 2200 m, 01-11.VI.1992 G. Cuccodoro #BRFS (MHNG).

**Diagnosis.** Very large, bulky, black species, with extremely stout head, remarkably elongate, straight mandibles, and very small eyes. It is further characterized by absence of the basal marginal seta of pronotum and absence of any discal elytral setae. Distinguished from both other known species by considerably wider, posteriorly more constricted pronotum that bears markedly produced anterior angles; from *H. anassa* (Darlington) also by absence of additional pronotal setae.

### Description

Measurements. Length: 20.3 mm; width: 6.7 mm. Ratios. Width head/prothorax: 0.79;



**Fig. 1.** *Herculagonum atlas*, gen. nov., spec. nov. Male genitalia: aedeagus, parameres, and genital ring. Scales: 1 mm.

width/length of prothorax: 1.34; width base/apex of prothorax: 0.60; with elytra/prothorax: 1.19; length/width of elytra: 1.46.

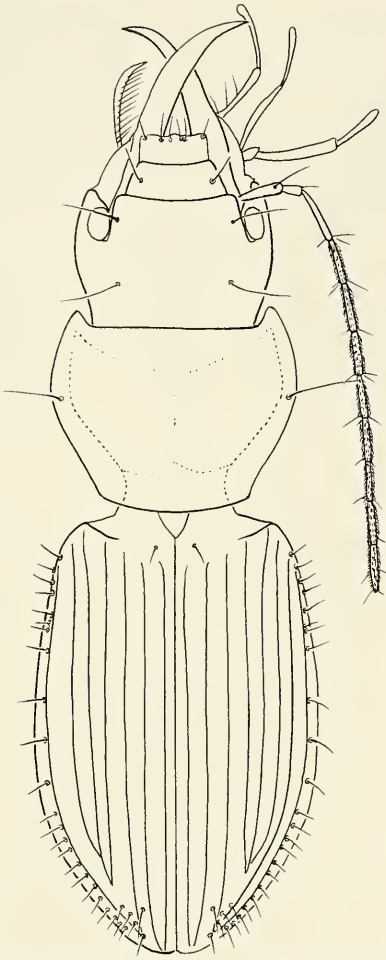
**Colour.** Upper and lower surfaces, mandibles, and legs black, palpi and antennae reddish-piceous, outer antennomeres reddish.

**Head.** Large, very bulky, convex, though narrower than prothorax. Eyes very small, about half as long as orbits, depressed, situated rather on upper surface than at lateral margin of head. Orbits large, gently convex. Anterior supraorbital seta situated about at middle of eye, posterior seta situated far behind eyes rather dorsally. Neck sulcus moderate. Clypeal suture weakly impressed. Frons without any impressions or furrows. Labrum transverse, slightly emarginate, with produced lateral angles, 6-setose. Mandibles narrow, very elongate, straight, apically slightly curved, with very short scrobe. Antenna narrow and elongate, surpassing posterior border of pronotum, 7<sup>th</sup> and 8<sup>th</sup> antennomeres c. 3× as long as wide, pilose from 4<sup>th</sup> antennomere. Dorsal surface impunctate, with extremely fine and superficial, isodiametric microreticulation, rather glossy. Mentum with distinct, apically excised tooth, polysetose, submentum likewise polysetose, setae elongate. Basal part of galea and basal palpomeres very slender.

**Pronotum.** Large, wide, remarkably cordiform, considerably wider than long, widest about at anterior third. Apical angles markedly produced, apex straight, lateral margins in anterior half gently convex, then almost straight, even faintly concave, and very oblique. Base by far narrower than apex. Basal angles obtusely rounded, base straight. Neither apex nor base margined. Disk gently convex, marginal channel deep, widened towards base, lateral margin wide, markedly upturned. Anterior and posterior transverse sulci very shallow, median line indistinct, basal grooves deep, circular, smooth. Anterior lateral seta situated at widest part, in marginal channel. Posterior lateral seta absent. Surface impunctate, almost devoid of any striae, with extremely fine and superficial, isodiametric microreticulation, rather glossy.

**Elytra.** Short and wide, somewhat oviform, dorsal surface markedly convex, widest diameter slightly behind middle. Humeri obtusely rounded, lateral margin gently, somewhat obliquely curved to middle, in posterior half rather convex. Basal margin obsolete towards middle. Striae almost complete, deeply impressed, very faintly crenulate, obsolete only near apex. Scutellary striae very short, inconspicuous, situated mediad of 1<sup>st</sup> interval. Intervals markedly convex. Marginal channel rather wide, de-





**Fig. 2.** *Herculagonum atlas*, gen. nov., spec. nov. Habitus. Length: 20.3 mm.

planate. Scutellary puncture and seta present. Disk asetose, though at end of 3<sup>rd</sup> interval with a setiferous puncture and at end of 7<sup>th</sup> interval with a row of 4 setiferous punctures. 22 marginal punctures present, in an almost uninterrupted row. All elytral setae short. Intervals impunctate, with extremely fine and highly superficial, remarkably transverse microreticulation. Surface rather glossy, not iridescent. Inner wings absent.

Lower surface. Impunctate, finely microreticulate. Metepisternum quadrate. Abdominal sterna near base deeply sulcate. Sternum VII in male bisetose.

Legs. Slender and elongate. Three basal tar-

someres of male anterior tarsus but slightly expanded, ventral surface with few squamose hairs at median side.

♂ genitalia (Fig. 1). Genital ring rather symmetric, with wide apex. Aedeagus moderately elongate, remarkably curved. Apex fairly short and compact, obtuse at tip. Orificium very elongate, situated on upper surface, near apex slightly turned to right side. Internal sac simply folded, at left side near apex with a slightly more distinctly sclerotized fold. Parameres fairly dissimilar, left considerably larger than right, both about oval-shaped, asetose.

♀ genitalia. Unknown.

Variation. Unknown.

**Distribution.** Eastern central Papua New Guinea. Known only from type locality.

**Collecting circumstances and habits.** Largely unknown. Holotype collected at median altitude, probably in montane rain forest.

**Etymology.** The name is a noun and refers to the heavy built as exemplified by the Giant of the Greek myth.

**Remarks.** Apparently the three species of the new genus are restricted to a rather small area in central eastern Papua New Guinea. However, in spite of several very keen recent collectors the montane insect fauna of this large and extremely rugged island is yet so little explored, that nothing can be said at present about the number of actually existing species, their distribution, and their biogeographic history. It is noteworthy, however, that New Guinea is especially rich in large, bulky, flightless, montane platynine species that rather remind large pterostichines which, for example, are numerous in montane rain forests of the Oriental and Australian regions. The only other large pterostichines occurring in New Guinea are several species of the Oriental genus *Lesticus* Dejean which, however, include some species capable of flight that live rather in low country, and the endemic genus *Rhytiferonia* Darlington, the few species of which are flightless, ground dwelling beetles most of which, however, are rather inhabitants of alpine grasslands than montane rain forests (Baehr 2001). Why platynines rather than pterostichines in New Guinea have occupied the niche of large, ground dwelling predatory beetles that in the Oriental and Austral-

ian regions is mainly occupied by pterostichines, still is a matter of discussion. Darlington (1971) who was the first to recognize this striking difference between the montane rain forest dwelling carabid faunas of Australia and New Guinea, thought that the relatively recent origin of a large part of the New Guinean beetle fauna might be responsible for this.

Certainly, the central mountain chain of New Guinea is of rather young geological origin and it was almost always separated from the rain forests of Southeast Asia and from those of Australia by either large water bodies or extensive stretches of low country grown with more or less open forest. Hence, neither from the north or northwest, nor from Australia in the south elements of the comparatively old, ground dwelling faunas of largely flightless pterostichines were able to immigrate in the uprising mountains of those fragments that later have combined to what is present New Guinea. The niche that in other regions is occupied by large, flightless pterostichines therefore was vacant and has been filled by means of the enormous taxonomic radiation that the more "modern" platynines in New Guinea underwent during a relatively short period. So, it is not too surprising why in New Guinea platynines evolved that in external shape and structure look strikingly similar to certain large Oriental and Australian pterostichines. Although we do not know anything about habits, life histories, and diet of any of these large platynines in New Guinea, we could argue that they probably live in the same manner as their Oriental and Australian pterostichine counterparts that forage for a variety of worms, insects and snails. Some of these also construct small burrows in the ground – as exemplified in the Australian genus *Nurus*, some species of which very much resemble species of *Herculagonum* in their bulky shape, presence of elongate mandibles and small eyes.

One goal of the present paper is, therefore, to direct future collectors in New Guinea to this rich ground dwelling beetle fauna, and to draw their attention to the probably very restricted ranges of most species which, in turn, probably means that we presumably know only a very small part of the actually existing number of species.

### Key to the species of the genus *Herculagonum*, gen. nov.

Because the flightless species probably are very locally distributed, the localities of the holotypes (single known specimens in all three species!) are added.

1. Pronotum with posterior lateral seta and a second anterior lateral seta. Mt. Yule, PNG ..... *anassa* Darlington
- Pronotum without posterior lateral seta and without a second anterior lateral seta. Distribution different ..... 2.
2. Prothorax basally wide, not markedly cordiform, ratio base/apex c. 0.8; apical angles of pronotum little produced. Murray Pass, PNG ..... *anax* Darlington
- Prothorax basally remarkably narrow, rather cordiform, ratio base/apex c. 0.6; apical angles of pronotum markedly produced (Fig. 2). Biaru, Mt. Koolorong, PNG ..... *atlas*, spec. nov.

### Acknowledgements

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