SPIXIANA	33	2	195–228	München, November 2010	ISSN 0341–8391

New species of the genus *Notagonum* Darlington from New Guinea related to *N. angustellum* Darlington

(Coleoptera, Carabidae, Platynini)

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Baehr, M. 2010. New species of the genus *Notagonum* Darlington from New Guinea related to *N. angustellum* Darlington (Coleoptera, Carabidae, Platynini). Spixiana 33 (2): 195-228.

The described species of the *angustellum* group of the platynine genus *Notagonum* Darlington from New Guinea (*N. angustellum* Darlington, *N. subnigrum* Darlington, *N. vile* Darlington) are reexamined and partly redescribed and the following new species related to the *angustellum* group are described: *crenulipenne*, *darlingtoni*, *devosi*, *fuscipes*, *garainae*, *gorokae*, *hamatum*, *kitchingi*, *lackneri*, *macrophthalmum*, *marginale*, *nigrinum*, *parvicolle*, *schuelei*, *skalei*, *ullrichi*.

Male genitalia of all species except *N. crenulipenne*, spec. nov., the habitus of all species, and certain special features are figured. For all species of the *angustellum* group of the genus *Notagonum* Darlington a key is provided.

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Introduction

The genus *Notagonum* was founded by P. J. Darlington (1952) in his monumental monography of the Carabidae of New Guinea for a group of species of "normal" platynine shape which do not exhibit any special character states which are so common in New Guinean Platynini: e. g. reduction or absence of tactile setae on head and/or pronotum, or on the elytra; specialized or odd body shape; metallic colour or characteristical colour patterns; absence of flying wings, etc.

Most species of the genus *Notagonum* occur in New Guinea from where so far 38 species and additional 5 subspecies are known, most of which were described by Darlington (1952, 1971). Additional species exist in Australia and on islands of the Indo-Australian insular belt. The relationships of this genus are yet unsettled, as is the case in most of the numerous platynine genera occurring in New Guinea. But the introduction of the very rich New Guinean platynine fauna into a general systematical or phylogenetical concept of the Platynini at present is barely possible, as long as not even the relationships within the Oriental platynine fauna are understood. So, in the meantime the genus *Notagonum* is a genus of convenience which covers most of the unspecialized New Guinean platynine species.

A group of species within the genus consists of rather small, narrow, more or less parallel-sided, quite depressed beetles that possess a fairly narrow pronotum which is little or even barely wider than the head, usually also very elongate antennae, and almost always a more or less densely pilose abdomen. The described species of this group are *N. angustellum* Darlington, 1952, *N. subnigrum* Darlington, 1952, and *N. vile* Darlington, 1952.

During examination of some paratypes of *N. angustellum*, and in the course of subsequent reexamination of many *angustellum*-like specimens from throughout New Guinea, all males available to me were dissected for their genitalia. This examination resulted in the discovery of a surprisingly large number of differently shaped and structured aedeagi

within the examined specimens, with different aedeagi even within the type series of *N. angustellum*, which demonstrates that a number of additional undescribed taxa are involved.

The problem in platynine genera as *Notagonum* is that most species are very similar in their external morphological characters which makes differentiation difficult, and that it needs extremely scrutinized examination of such structures as punctation of striae, degree and shape of microsculpture, pilosity of abdomen, size of eyes, and exact morphometrical measurements, to distinguish between closely related taxa exclusively from external morphological characters.

Although the keys of Darlington (1952, 1971) which only make use of characters of external morphology, allow the identification of many species, almost no male aedeagi were examined during Darlingtons study. But the aedeagi can be quite different even in species which do not show striking external morphological differences; so examination of the male genitalia is mandatory for any serious study of the very rich New Guinean platynine fauna. Moreover, Darlington as a "lumper" in his taxonomical concept combined specimens from different parts of New Guinea to the same species, even when they exhibit minor morphological differences.

In addition, Darlington when preparing his monograph, had fairly good material from certain areas in the eastern half of New Guinea (present Papua New Guinea), but rather sparse material from the western part of New Guinea, which today is called Papua Indonesia (formerly Irian Jaya or West Papua). In the meantime, however, it is well known that certain parts of New Guinea (e. g. Torricelli and Finisterre Ranges, Cyclops Mountains, Vogelkop Peninsula, Biak Island, and others) paleogeologically and hence biogeographically are quite different from the main parts of this large island. In these areas therefore a number of species exist which are different from those occurring, for example, in the Central Highlands (De Boer 1995). For all these reasons the number of actually existing species is much greater than it would be suspected from Darlington's monography (see Baehr 2009).

All newly described taxa in the present paper were given the rank of a species, even when many of these probably are very closely related. I refrained from describing subspecies, because these taxonomic units are even more difficult to characterize than species. Moreover, due to still very limited material much too less is presently known about the real distribution of the supposed taxa. Hence, no reliable information is available about potential sympatric or even syntopic occurrence of different taxa. Future examination using molecular biological methods probably can help evaluating the real taxonomical and nomenclatorial value of the described "species".

The present study is part of my ample work of identification of New Guinean Carabidae, mainly of the rich material from O. Missa's light collecting and fogging survey in 1993-1996 at Baiteta in Papua New Guinea (material in Institut Royal des Sciences Naturelles, Bruxelles), W. Ullrich's collecting in the 70ties and beginning eighties of last century, likewise in Papua New Guinea (material in Museum de l'Histoire Naturelle, Genève), the sampling activities of A. Riedel, A. Weigel, A. Skale, and M. Balke during the previous 15 years mainly in former Irian Jaya (material mostly in the working collection of the author, München), the canopy light collecting of R. Kitching in 2000 at Oomsis in Papua New Guinea (material in Queensland Museum, Brisbane, and the collection of the author), and the material sampled by T. Lackner, Rob de Vos, and other Dutch collectors in Papua Indonesia from the 90ties of last century until present (material in Zoologisch Museum der Universiteit, Amsterdam). Additional material and types were examined from Museum of Comparative Zoology, Cambridge/Mass., National Museum of Natural History Naturalis, Leiden, The Natural History Museum, London, National Museum of Natural History, Prague, and from R. W. Hornabrooks collecting in the 50ties and 60ties of last century (material in Museum of New Zealand, Wellington).

Methods

Measurements were taken using a stereo microscope with an ocular micrometer. Length has been measured from apex of labrum to apex of elytra. Body lengths, therefore, may slightly differ from those specified by Darlington (1952, 1971). Length of pronotum was measured from the most advanced parts of the apical angles to the most advanced part of the base, width of base at the widest part of basal angles. Length of elytra was measured from the most advanced part of humerus to the very apex. For estimation of the length of the antenna the 6th antennomere was measured. Attention should be paid to take the measurement at the widest part of the antennomere and to omit the pilosity.

For dissection of the male and female genitalia specimens were soaked for a night in a jar under wet atmosphere, then the genitalia were removed and subsequently cleaned for a short while in hot KOH. The habitus photographs of the new species were obtained with a digital camera using ProgRes Capture Basic and AutoMontage and subsequently were edited with Corel Photo Paint 11.

Habitus photographs and some detailed pictures of the holotypes of the three described species are also found on the webpage of the Museum of Comparative Zoology, Cambridge/Mass.

Label data are exactly noted in all specimens, including all chiffres and abbreviations. A slash (/) with a blank before and after denotes another label.

Abbreviations

BMNH The Natural History Museum, London
CBM Working collection M. Baehr in Zoologische Staatssammlung, München
IRSNB Institut Royal des Sciences Naturelles, Bruxelles
MCZ Museum of Comparative Zoology, Cambridge/Mass.
MNZ Museum of New Zealand, Wellington
MHNG Museum de l'Histoire Naturelle, Génève
NHNL National Museum of Natural History Naturalis, Leiden
NMPC National Museum of Natural History, Praha
QMB Queensland Museum, Brisbane
ZMAN Zoological Museum of the University, Amsterdam
c. central
e. eastern
n. northern
w. western

Taxonomy

Genus *Notagonum* Darlington

Darlington, 1952: 127. – Darlington 1971: 275; Lorenz 1998: 403; Baehr 2008: 60.

Type species: *Notagonum externum* Darlington, 1952, by original designation.

Diagnosis. Genus of Platynini, characterized by presence of the full set of tactile setae on head, pronotum, and elytra; absence of any metallic colour or any other colour pattern on the elytra; not or but moderately excised 4th tarsomere of the metatarsus; and "normal" platynine body shape. Apart from very few exceptions, all species of *Notagonum* possess fully developed flying wings. A more detailed diagnosis can be found in Darlington (1952: 127).

At the present status of knowledge the genus combines all unspecialized platynine species in New Guinea and surrounding areas, and it is so far characterized by the lack of any specialized features. Hence it must be regarded a genus of convenience which most probably is paraphyletic. As long as the relations between the Oriental and New Guinean platynine faunas are not settled or even examined, however, it is better to retain the genus in its present state, than to construct any premature relationships.

At present 56 species were described (Lorenz 1998, 2005; Baehr 2008), of which 38 species and additional 5 subspecies are known to occur in New Guinea (Darlington 1952, 1971; Baehr 2008). Additional 18 species occur in Australia, New Caledonia, the Bismarck Archipelago, the Moluccas, Sulawesi, and the Indonesian Insular Belt.

The *angustellum* group

This species group to which three described species belong (*N. angustellum* Darlington, *N. subnigrum* Darlington, *N. vile* Darlington), covers species which have in common usually more or less dense pilosity on the abdomen; a rather narrow, depressed pronotum with narrow lateral margins which is little wider than the head; unarmed apex of the elytra; and usually very elongate antennae. Commonly the body is depressed and the elytra are elongate and more or less parallel-sided. Darlington (1952) did not formally combine the three species to a species group, but in shape and structure they obviously differ from the bulk of the other New Guinean species of this genus, and so they cover the first four captions in Darlington's key to the New Guinean species of the genus *Notagonum* (Darlington 1952: 130).

Probable apomorphic character states of this group are the very depressed and likewise parallel-sided body shape, the remarkably narrow pronotum, and the very elongate antenna, present in most species. These character states at least suggest that the group forms a natural, probably monophyletic unit.

Additional common characters of this group which are not further mentioned in the following descriptions are: presence of the complete set of tactile setae on head (2), pronotum (2), and elytra (3) with the 1st seta on the elytra attached to the 3rd stria, both 2nd and 3rd ones attached to the 2nd stria; apically straight, 6-setose labrum; dentate mentum; impilose 1st-3rd antennomeres; complete striation of the elytra; fully developed flying wings; bisetose male and quadrisetose female terminal abdominal sternum; slender legs with impilose lower surfaces of the 5th tarsomere and wide and deeply excised 4th tarsomeres of protarsus and mesotarsus, but narrow and short, asymmetrically excised 4th tarsomere of metatarsus; and enlarged and biseriately squamose 1st-3rd tarsomeres of the male protarsus.

Although in characters of their external morphology the species of this species group are quite similar, the aedeagus in many species shows remarkable differences in size as well as in shape; hence it commonly bears the most usable characters for differentiation of the species. Usually the aedeagus is slender and elongate, rather curved, has a very elongate ostium that is situated on the upper surface, and in most species folding inside the internal sac is very simple and lacks any sclerotized pieces.

The female gonocoxites are very similar throughout the group. They only differ slightly in length of gonocoxite 2 and density and length of setae on gonocoxite 1 and on the lateral plate. Gonocoxite 2 invariably is narrow, straight, and rather elongate, has two small ventro-lateral ensiform setae and a single (rarely unilaterally two) short nematiform seta near the apex originating from a small pit.

Main differences in external morphology are in size and shape of eyes; length and colour of antenna; colour of legs; shape of pronotum, in particular width of lateral margins and structure of the basal grooves; shape of elytra; presence or absence of a depression on the elytra; degree of crenulation of elytral striae; degree of microreticulation of the dorsal surface; and density of the pilosity on the abdomen.

The species

Notagonum angustellum Darlington
Figs 1, 24, 38

Darlington, 1952: 133. – Darlington 1971: 277; Lorenz 1998: 403.

Examined types. Holotype (compared by the pictures available in the MCZ type database): ♂, "Dobodura Papua, N.G. Mar-July, 1944 Darlington / *Notagonum angustellum* Darl. / *angustellum* ♂, descr. / M.C.Z. Type 28593" (MCZ). – Paratype: 1♂, "Paratype / Dobodura Papua, N.G. Mar-July, 1944 Darlington" (BMNH).

Diagnosis. Small, elongate, parallel-sided, dorsally depressed, black species with dense pilosity on the abdomen, explanate and rugose basal grooves of the pronotum, and but moderately protruded eyes; further distinguished from similarly shaped species by the elongate apex of the aedeagus.

Partial redescription

Measurements. Length: 5.7 mm; width: 2.05 mm.

Ratios. Width/length of pronotum: 1.24; width widest diameter/base of pronotum: 1.20; width head/pronotum: 0.91; length/width of elytra: 1.71; length/width of 6th antennomere: 3.75.

Colour (Fig. 38). Dark piceous to black, lateral margins of pronotum and elytra inconspicuously reddish. Clypeus, labrum, and mandibles brown, palpi yellow, antenna yellow. Femora pale yellow, tibiae and tarsi slightly, but not contrastingly darker. Lower surface dark piceous.

Head (Figs 24, 38). Slightly narrower than prothorax. Eyes large, but laterally only moderately protruded, orbits distinct, oblique, almost one third of length of eye. Clypeal suture laterally deep and distinct, in middle indistinct, clypeus basally slightly raised. Frontal furrows irregularly oblique, moderately deep, barely reaching the eye. Mandibles rather elongate (in group), straight, but not porrect. Antenna slender and elongate, surpassing base of pronotum by about 4.5 antennomeres, median antennomeres slightly less than 4 × as long as wide. Both palpi slender and elongate. Microreticulation only on neck perceptible, surface with extremely fine and sparse, barely recognizable punctures, very glossy.

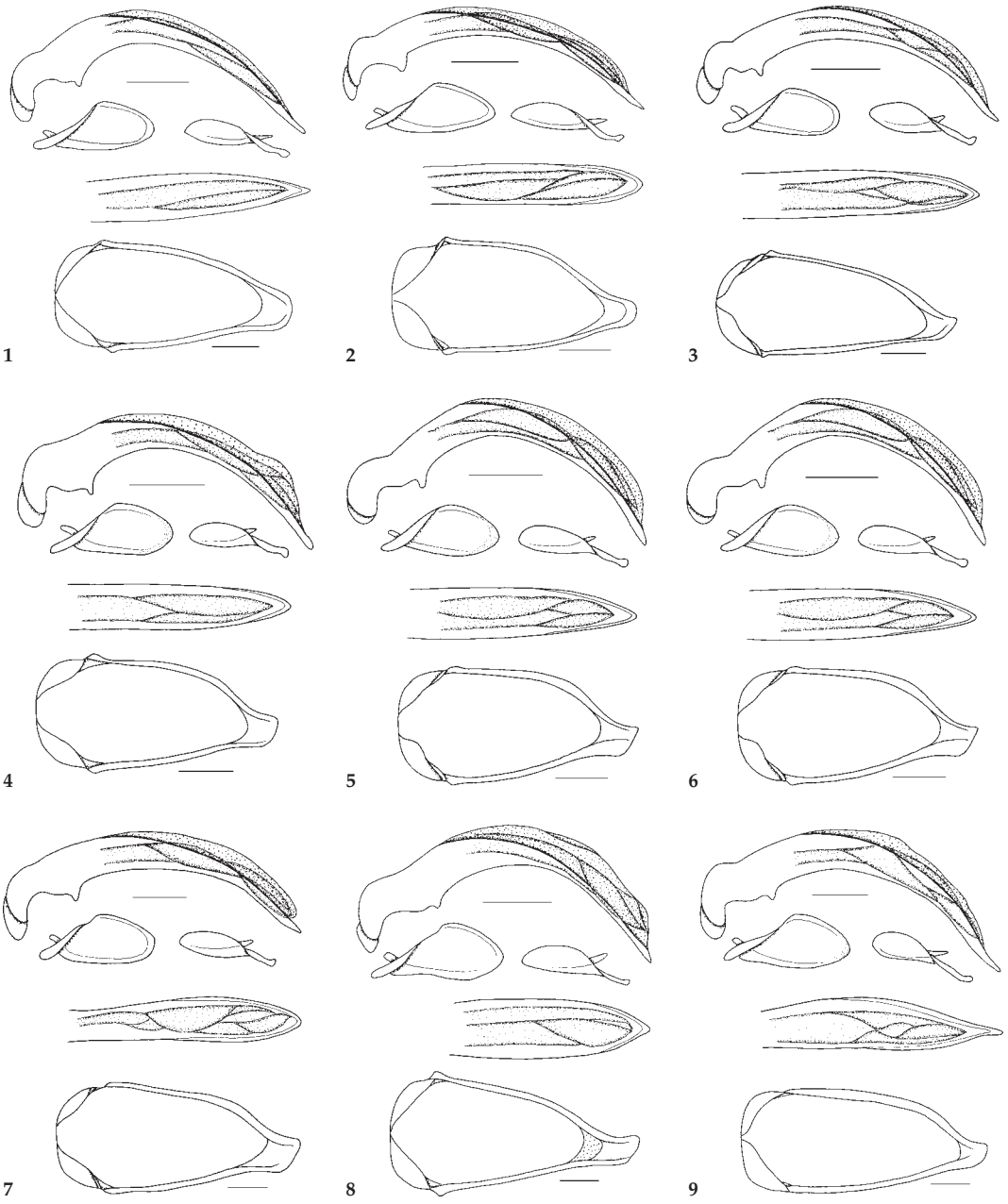
Prothorax (Fig. 38). Rather narrow (in group), cordiform, with wide basis, widest slightly behind apical fourth, laterally evenly convex, distinctly concave near base. Disk depressed, lateral margins and lateral sulcus moderately wide (in group), sulcus shallow and margins little upturned, attenuate towards base, but basal third markedly explanate. Apical margin rather concave, apical angles considerably projected, rounded. Basal angles almost rectangular, sharp, even laterally slightly protruded, base in middle straight, laterally distinctly oblique. Both apex and base laterally bordered, basal border only very narrowly interrupted in middle. Anterior and posterior transverse sulci very shallow, barely recognizable, median line well impressed. Basal grooves not perceptible, but the whole lateral part of the base explanate and markedly rugose. Disk very finely and sparsely punctate and at least with traces of extremely superficial, transverse microreticulation, very glossy.

Elytra (Fig. 38). Comparatively elongate (in group), almost parallel-sided. Dorsal surface depressed, with very shallow impression in basal half. Lateral borders almost straight, little narrowed towards humeri. Preapical sinuosity moderately deep. Widest diameter about at apical third. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, almost impunctate, intervals very slightly convex. Microreticulation and punctures absent, surface very glossy.

Lower surface. Metepisternum > 2.5 × as long as wide at apex. Pilosity of abdomen dense, on terminal sternum even denser.

Male genitalia (Fig. 1). Rather large as compared with the genitalia of the other species. Genital ring rather narrow, slightly asymmetrical, apex wide, obtusely rounded. Aedeagus elongate, depressed, narrow, almost parallel, lower surface markedly concave. Apex rather elongate, straight, depressed, regularly narrowed to the angulate tip. Folding of internal sac simple and not sclerotized. Both parameres elongate, right paramere with obtusely angulate apex, left paramere triangular with obtusely rounded apex.

Variation. Unknown.



Figs 1-9. Male aedeagus, left side and lower surface, left and right parameres, genital ring. **1.** *Notagonum angustellum* Darlington. **2.** *N. darlingtoni*, spec. nov. **3.** *N. macrophthalmum*, spec. nov. **4.** *N. nigrinum*, spec. nov. **5.** *N. parvicolle*, spec. nov. **6.** *N. gorokae*, spec. nov. **7.** *N. devosi*, spec. nov. **8.** *N. subnigrum* Darlington. **9.** *N. schuelei*, spec. nov. Scale bars: 0.25 mm.

Distribution. So far known from the northern part of Papua Peninsula, eastern Papua New Guinea. Known only from type locality.

Collecting circumstances. According to Darlington (1952) collected under stones and in pebble near streams.

Relationships. In its external as well as male genitalic morphology most similar to *N. darlingtoni*, spec. nov.

Notagonum darlingtoni, spec. nov.
Figs 2, 25, 39

Types. Holotype: ♂, "Hollandia Dutch N.G. July-Sept, 1944 Darlington / Paratype *Notagonum angustellum* Darl. / *Notagonum angustellum* Darl. Det. Darlington" (NMPC). – Paratype: 1♀, "Hollandia Dutch N.G. July-Sept, 1944 Darlington / Paratype *Notagonum angustellum* Darl. / *Notagonum angustellum* Darl. Det. Darlington" (NMPC).

Etymology. The name is a patronym in honour of the unestimable collector, carabid taxonomist, and biogeographer Philip Darlington who, with his monumental work on the New Guinean Carabidae, laid the basis for any further work on this beetle group in New Guinea.

Diagnosis. Species of the *angustellum* group sensu Darlington (1952), characterized by dense pilosity of the abdomen, explanate and rugose basal grooves of the pronotum, and moderately protruded eyes; further distinguished from most similar *N. angustellum* Darlington by shorter apex of the aedeagus; from the three following species by lesser, laterally less protruded eyes.

Description

Measurements. Length: 5.9-6.8 mm; width: 2.15-2.45 mm.

Ratios. Width/length of pronotum: 1.32-1.33; width widest diameter/base of pronotum: 1.22-1.24; width head/pronotum: 0.89; length/width of elytra: 1.70-1.72; length/width of 6th antennomere: 4.0-4.1.

Colour (Fig. 39). Dark piceous to black, lateral margins of pronotum and elytra inconspicuously reddish. Clypeus, labrum, and mandibles brown, palpi yellow, antenna slightly infucate. Femora pale yellow, tibiae and tarsi slightly, but not contrastingly darker. Lower surface dark piceous.

Head (Figs 25, 39). Slightly narrower than prothorax. Eyes large, but laterally only moderately protruded, orbits distinct, oblique, about one quarter of length of eye. Clypeal suture laterally deep and distinct, in middle indistinct, clypeus basally slightly raised. Frontal furrows irregularly oblique, moderately deep, barely reaching the eye. Mandibles rather elongate (in group), straight, but not porrect. Antenna slender and elongate, surpassing base of pronotum by almost 5 antennomeres, median antennomeres c. 4 × as long as wide. Both palpi slender and elongate. Microreticulation very superficial, but still perceptible, surface with extremely fine and sparse, barely recognizable punctures, very glossy.

Prothorax (Fig. 39). Comparatively wide (in group), gently cordiform, with wide basis, widest about at apical third, laterally evenly convex, slightly concave near base. Disk depressed, lateral margins and lateral sulcus moderately wide (in group), sulcus shallow and margins little upturned, attenuate towards base, but basal third markedly explanate. Apical margin rather concave, apical angles distinctly projected, rounded. Basal angles almost rectangular, rather sharp, base in middle straight, laterally distinctly oblique. Both apex and base laterally bordered, basal border only very narrowly interrupted in middle. Anterior and posterior transverse sulci very shallow, barely recognizable, median line well impressed. Basal grooves not perceptible, but the whole lateral part of the base explanate and markedly rugose. Disk very finely and sparsely punctate and at least with traces of extremely superficial, transverse microreticulation, very glossy.

Elytra (Fig. 39). Comparatively elongate (in group), almost parallel-sided. Dorsal surface depressed, without perceptible impression. Lateral borders almost straight, little narrowed towards humeri. Preapical sinuosity moderately deep. Widest diameter about at apical third. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, almost impunctate, intervals very slightly convex. Microreticulation extremely superficial, consisting of very fine transverse lines, barely perceptible, punctures apparently absent, surface very glossy.

Lower surface. Metepisternum c. 2.5 × as long as wide at apex. Pilosity of abdomen dense, on terminal sternum even denser.

Male genitalia (Fig. 2). Rather small as compared with the genitalia of the other species. Genital ring moderately wide, asymmetrical, apex moderately wide, obtusely rounded. Aedeagus elongate, depressed, narrow, almost parallel, lower surface markedly concave. Apex moderately elongate, straight, depressed, shortly narrowed to the obtuse tip. Folding of internal sac simple and without any sclerotized pieces. Both parameres elongate, right paramere with angulate apex, left paramere triangular with obtusely rounded apex.

Female genitalia. Very similar to those of *N. macrophthalmum*, spec. nov.

Variation. Very little variation noted.

Distribution. Extremely north-eastern part of Papua Indonesia. Known only from type locality.

Collecting circumstances. Probably similar to those of *N. angustellum* Darlington.

Relationships. In its external as well as male genitalic morphology most similar to *N. angustellum* Darlington.

Notagonum macrophthalmum, spec. nov.
Figs 3, 19, 26, 40

Types. Holotype: ♂, "Irian Jaya, Nabire-Dist. Wondiwoi Mts Yeratua, 560 m, 8.9.1998, leg. M. Balke" (CBM). – Paratypes: 2♂♂, 1♀, same data (CBM); 12♂♂, 11♀♀, "06°30S 146°48.00E Oomsis, Morobe, PNG Light Trap Ground 1-3 26 July 2000 R. L. Kitching" (CBM, QMB); 2♂♂, 1♀, same locality, "Light Trap Canopy 22 July 2000" (QMB); 1♀, same locality "Light Trap Canopy 24 July 2000" (QMB); 7♀♀, same locality, "Light Trap Canopy 26 July 2000" (QMB); 2♀♀, "INDONESIA Irian Jaya Asori N Somyangga 02°87'S 136°13'E KÜ 07.I.1999, leg. A. Weigel" (CBM); 2♂♂, 1♀, 21IV79 PNG/EHProv. Umg. Goroka Watabung / Papua Nlle. Guinée W.G. Ullrich (CBM, MNHG); 1♂, "PAPUA – N.Guinea Mainyanda I.1980 25 km W Bulolo W.G. Ullrich 600 m" (MNHG).

Etymology. The name refers to the large, protruded eyes of this species.

Diagnosis. Species of the *angustellum* group sensu Darlington (1952), characterized by dense pilosity of the abdomen, explanate and rugose basal grooves of the pronotum, and very large, markedly protruded eyes; further distinguished from the most similar species *N. nigrinum*, spec. nov. and *N. parvicolle*, spec. nov. by almost reduced orbits, more cordiform pronotum, slightly shorter elytra, and less concave lower surface of the aedeagus.

Description

Measurements. Length: 6.0-6.8 mm; width: 2.2-2.45 mm.

Ratios. Width/length of pronotum: 1.33-1.35; width widest diameter/base of pronotum: 1.23-1.27; width head/pronotum: 0.92-0.94; length/width of elytra: 1.71-1.76; length/width of 6th antennomere: 3.9-4.2.

Colour (Fig. 40). Dark piceous to black, lateral margin of pronotum inconspicuously reddish, lateral margin of elytra even less distinctly reddish. Clypeus, labrum, and mandibles reddias or brown, palpi yellow, antenna more or less distinctly infuscate, but 1st antennomere yellow, 2nd and 3rd antennomeres yellow at least at base. Legs yellow, tibiae and tarsi barely darker. Lower surface piceous to black.

Head (Figs 26, 40). Slightly narrower than prothorax. Eyes large, almost semicircularly protruded, orbits extremely short, barely perceptible. Clypeal suture distinct, laterally fairly deep, in middle shallow, clypeus basally slightly raised. Frontal furrows irregularly oblique, moderately impressed, not reaching the eyes. Mandibles moderately elongate (in group), straight, not porrect. Antenna slender and elongate, surpassing base of pronotum by about five antennomeres, median antennomeres c. 4 × as long as wide. Both palpi slender and elongate. Microreticulation more or less superficial, isodiametric, surface with very fine and sparse punctures, glossy.

Prothorax (Fig. 40). Wide (in group), cordiform, with moderately wide basis, widest slightly behind apical fourth, laterally evenly convex, distinctly concave near base. Disk depressed, lateral margins and lateral sulcus moderately wide (in group), sulcus shallow and margins little upturned, attenuate towards base, but basal third markedly explanate. Apical margin slightly concave, apical angles more or less distinctly projected, rounded. Basal angles rectangular, sharp, laterad even slightly protruded, base in middle straight, laterally distinctly oblique. Both apex and base laterally bordered, basal border only very narrowly interrupted in middle. Anterior and posterior transverse sulci very shallow, barely recognizable, median line well impressed. Basal grooves not perceptible, but the whole lateral part of the base explanate and markedly rugose. Disk very finely and sparsely punctate and at least with traces of extremely superficial, transverse microreticulation, glossy.

Elytra (Fig. 50). Comparatively elongate (in group), almost parallel-sided. Dorsal surface remarkably depressed, without impression. Lateral borders almost straight, little narrowed towards humeri. Preapical sinuosity moderately deep. Widest diameter about at apical third. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, almost impunctate, intervals perceptibly convex. Microreticulation and punctures absent, surface very glossy.

Lower surface. Metepisternum > 2.5 × as long as wide at apex. Pilosity of abdomen dense, on terminal sternum even denser.

Male genitalia (Fig. 3). Rather small as compared with the genitalia of the other species. Genital ring narrow, gently triangular, slightly asymmetrical, apex narrow, obliquely rounded, laterally acute. Aedeagus elongate, depressed, narrow, parallel, lower surface moderately concave. Apex fairly elongate, straight, depressed, convexly narrowed to the slightly obtuse tip. Folding of internal sac simple and without any sclerotized pieces. Both parameres moderately elongate, right paramere with obtusely rounded apex, left paramere triangular with obtusely rounded apex.

Female genitalia (Fig. 19). Gonocoxite 2 narrow and elongate, straight, with rather acute apex; with

two small ventro-lateral ensiform setae, a very short nematiform seta raising from a small pit on the dorso-median surface close to apex, but without a dorso-median ensiform seta. Apex of stylomere 1 on ventral surface with 7-8 comparatively elongate setae. Lateral plate multisetose at and near margin, setae comparatively elongate.

Variation. Rather little variation noted.

Distribution. Widely distributed in New Guinea, but not yet recorded from Papua Peninsula in the east, Vogelkop Peninsula in the west, and from the central highlands.

Collecting circumstances. Labelled specimens sampled in light traps. All records apparently from rather low altitude.

Relationships. In its external as well as male genitalic morphology most similar to *N. nigrinum*, spec. nov. and to *N. parvicolle*, spec. nov.

Notagonum nigrinum, spec. nov.
Figs 4, 27, 41

Types. Holotype: ♂, "INDONESIA Papua, Kecamatan Abenaho, PASS VALLEY 3°51'S 139°03'E, 18.-25. ii.2005 1700-2250 m, dist.mtn.rainforest leg. T. Lackner" (ZMAN). – Paratypes: 1♀, same data (CBM); 1♂, "INDONESIA Papua Kecamatan Abenaho PASS VALLEY 1950 m 3°51'S 139°05'E 11-17.ii.2005" (CBM); 1♀, "INDONESIA Papua Kecamatan Nipsan WALMAK 1800 m 4°07'S 139°36'E 18-25.ii.2005, 1700-2250 m leg. T. Lackner" (ZMAN).

Etymology. The name refers to the dark colouration, including the appendages, of this species.

Diagnosis. Species of the *angustellum* group sensu Darlington (1952), characterized by dense pilosity of the abdomen, explanate and rugose basal grooves of the pronotum, and the dark colour of antenna and legs; further distingished from *N. macrophthalmum*, spec. nov. by less protruded eyes, slightly longer elytra, and more concave lower surface of the aedeagus; and from *N. parvicolle*, spec. nov. by wider pronotum with narrower base and slightly shorter apex of the aedeagus.

Description

Measurements. Length: 6.4-7.2 mm; width: 2.3-2.55 mm.

Ratios. Width/length of pronotum: 1.31-1.34; width widest diameter/base of pronotum: 1.22-1.24; width head/pronotum: 0.92-0.96; length/width of elytra: 1.74-1.79; length/width of 6th antennomere: 4.4-4.6.

Colour (Fig. 41). Black, lateral margins of pronotum and elytra dark, only at apical angles of pronotum inconspicuously paler. Clypeus, labrum, and mandibles reddish or brown, palpi yellow, antenna completely dark (in mature specimens). Femora brown, tibiae and tarsi black (in mature specimens). Lower surface black.

Head (Figs 27, 41). Slightly narrower than prothorax. Eyes large, laterally conspicuously but not semicircularly protruded, orbits short, but still perceptible, oblique. Clypeal suture more or less distinct, laterally fairly deep, in middle shallow or indistinct, clypeus barely raised. Frontal furrows irregular, anteriorly straight, then irregularly oblique, moderately impressed, not reaching the eyes. Mandibles moderately elongate (in group), straight, not porrect. Antenna very slender and elongate, surpassing base of pronotum by about five antennomeres, median antennomeres c. 4.5 × as long as wide. Both palpi slender and elongate. Microreticulation very superficial, isodiametric, barely perceptible, surface with very fine and sparse punctures, glossy.

Prothorax (Figs 27, 41). Fairly wide (in group), cordiform, with rather wide basis, widest slightly behind apical fourth, laterally evenly convex, distinctly concave near base. Disk depressed, lateral margins and lateral sulcus moderately wide (in group), sulcus shallow and margins little upturned, attenuate towards base, but basal third markedly explanate. Apical margin rather concave, apical angles distinctly projected, rounded. Basal angles almost rectangular, sharp, even laterally slightly protruded, base in middle straight, laterally distinctly oblique. Both apex and base laterally bordered, basal border only very narrowly interrupted in middle. Anterior and posterior transverse sulci very shallow, barely recognizable, median line well impressed. Basal grooves not perceptible, but the whole lateral part of the base explanate and markedly rugose. Disk very finely and sparsely punctate and at least with traces of extremely superficial, transverse microreticulation, glossy.

Elytra (Fig. 41). Markedly elongate (in group), almost parallel-sided. Dorsal surface remarkably depressed, without impression. Lateral borders almost straight, barely narrowed towards humeri. Preapical sinuosity moderately deep. Widest diameter about at middle. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, almost impunctate, intervals perceptibly convex. Microreticulation absent, some individuals with extremely fine, sparse punctures, surface very glossy.

Lower surface. Metepisternum > 2.5 × as long as wide at apex. Pilosity of abdomen dense, on terminal sternum even denser.

Male genitalia (Fig. 4). Small as compared with body size and with the genitalia of the other species. Genital ring rather narrow, very gently triangular, slightly asymmetrical, apex wide, obliquely rounded. Aedeagus elongate, rather depressed, narrow, almost parallel-sided, lower surface markedly and regularly concave. Apex fairly elongate, straight, depressed, convexly-triangularly narrowed, but slightly asymmetrical. Folding of internal sac simple and without any sclerotized pieces. Both parameres but moderately elongate, right paramere with rounded apex, left paramere triangular with rounded apex, but the very apex hyaline.

Female genitalia. Very similar to those of *N. macrophthalmum*, spec. nov.

Variation. Very little variation noted.

Distribution. Central Papua Indonesia.

Collecting circumstances. Sampled in montane rain forest at median altitude between 1700 and 2250 m.

Relationships. In its external as well as male genitalic morphology most similar to *N. parvicolle*, spec. nov. of Papua New Guinea, also rather similar to *N. macrophthalmum*, spec. nov.

Notagonum parvicolle, spec. nov.
Figs 5, 28, 42

Types. Holotype: ♂, "V 79 PNG/EHProv. Umg. Rintebe / Paua Nlle. Guinée W.G. Ullrich" (MNHG). – Paratypes: 1♂, same data (CBM); 1♀, "21IV79 PNG/EHProv. Umg. Goroka Watabung / Papua Nlle. Guinée W.G. Ullrich" (MNHG).

Etymology. The name refers to the remarkably narrow pronotum of this species.

Diagnosis. Species of the *angustellum* group sensu Darlington (1952), characterized by dense pilosity of the abdomen, explanate and rugose basal grooves of the pronotum, and the narrow pronotum; further distingished from *N. macrophthalmum*, spec. nov. by less protruded eyes, slightly longer elytra, and more concave lower surface of the aedeagus; and from *N. nigrinum*, spec. nov. by relatively larger head, relatively wider base of the pronotum, and slightly longer apex of the aedeagus.

Description

Measurements. Length: 6.45-6.6 mm; width: 2.35-2.4 mm.

Ratios. Width/length of pronotum: 1.24-1.25; width widest diameter/base of pronotum: 1.18-1.21; width head/pronotum: 0.95-0.99; length/width of elytra: 1.75-1.80; length/width of 6th antennomere: 4.0-4.1.

Colour (Fig. 42). Black, but pronotum in all available specimens very slightly paler, dark piceous; lateral margin of pronotum dark, only on the apical angles inconspicuously reddish, lateral margin of elytra dark. Clypeus, labrum, and mandibles reddish or brown, palpi yellow, antenna more or less distinctly infuscate, but the base of 1st-3rd antennomeres yellow. Femora yellow, tibiae and tarsi darker. Lower surface dark piceous to black.

Head (Figs 28, 42). Almost as wide as the prothorax. Eyes large, laterally conspicuously but not semicircularly protruded, orbits short, but still perceptible, oblique. Clypeal suture more or less distinct, laterally fairly deep, in middle shallow or indistinct, clypeus barely raised. Frontal furrows irregularly oblique, anteriorly wide, rather shallow, not reaching the eyes. Mandibles moderately elongate (in group), straight, not porrect. Antenna very slender and elongate, surpassing base of pronotum by more than five antennomeres, median antennomeres c. 4 × as long as wide. Both palpi slender and elongate. Microreticulation barely perceptible, surface with extremely fine and sparse punctures, very glossy.

Prothorax (Figs 28, 42). Narrow (in group), slightly cordiform, with wide basis, widest at apical third, laterally slightly convex, distinctly concave near base. Disk depressed, lateral margins and lateral sulcus moderately wide (in group), sulcus shallow and margins little upturned, attenuate towards base, but basal third markedly explanate. Apical margin rather concave, apical angles distinctly projected, rounded. Basal angles almost rectangular, sharp, laterad even slightly protruded, base in middle straight, laterally distinctly oblique. Both apex and base laterally bordered, basal border only very narrowly interrupted in middle. Anterior and posterior transverse sulci very shallow, barely recognizable, median line well impressed. Basal grooves not perceptible, but the whole lateral part of the base explanate and rather rugose. Disk very finely and sparsely punctate and here and there with traces of extremely superficial, transverse microreticulation, very glossy.

Elytra (Fig. 41). Markedly elongate (in group), almost parallel-sided. Dorsal surface remarkably depressed, without impression. Lateral borders almost straight, barely narrowed towards humeri. Preapical sinuosity moderately deep. Widest diameter about at middle. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, almost impunctate, intervals perceptibly convex. Microreticulation absent, some intervals with ex-

tremely fine, sparse, barely recognizable punctures, surface very glossy.

Lower surface. Metepisternum > 2.5 × as long as wide at apex. Pilosity of abdomen dense, on terminal sternum even denser.

Male genitalia (Fig. 5). Rather small as compared with the genitalia of the other species. Genital ring moderately wide, asymmetrical, apex moderately wide, oblique, more or less angulate. Aedeagus elongate, depressed, narrow, almost parallel, lower surface markedly concave, even slightly more curved down in apical fifth. Apex moderately elongate, straight, depressed, triangularly, but very slightly asymmetrically narrowed to the slightly obtuse tip. Folding of internal sac simple and without any sclerotized pieces. Right paramere elongate, rather parallel-sided, with rounded apex, left paramere triangular with evenly rounded apex, the apical margin little sclerotized.

Female genitalia. Very similar to those of *N. macrophthalmum*, spec. nov.

Variation. Very little variation noted.

Distribution. Eastern Highland Province, central Papua New Guinea. So far known only from a limited area.

Collecting circumstances. Little known, probably sampled at median altitude.

Relationships. In its external as well as male genitalic morphology most similar to *N. nigrinum*, spec. nov. of central Papua Indonesia, also rather similar to *N. macrophthalmum*, spec. nov.

Notagonum gorokae, spec. nov.
Figs 6, 43

Types. Holotype: ♂, "21 IV 79 PNG/EHProv. Umg. Goroka Watabung / Papua Nlle. Guinée W.G. Ullrich" (MNHG). – Paratype: 1♀, "21 IV 79 PNG/EHProv. Umg. Goroka / Papua Nlle. Guinée W.G. Ullrich" (CBM).

Etymology. The name refers to the type locality of this species.

Diagnosis. Species of the *angustellum* group sensu Darlington (1952), characterized by dense pilosity of the abdomen, explanate and rugose basal grooves of the pronotum, and the dark colour of antenna and legs; further distinguished from all species of the *angustellum* group (*N. angustellum* Darlington to *N. parvicolle*, spec. nov.) by large size, the apically conspicuously curved aedeagus, and the presence of a tridentate sclerite in the internal sac.

Description

Measurements. Length: 7.85-8.1 mm; width: 2.8-2.9 mm.

Ratios. Width/length of pronotum: 1.32-1.35; width widest diameter/base of pronotum: 1.29-1.31; width head/pronotum: 0.89-0.91; length/width of elytra: 1.80-1.82; length/width of 6th antennomere: 4.0-4.1.

Colour (Fig. 43). Black, including clypeus, labrum, and mandibles, only apical half of lateral margins of pronotum inconspicuously paler. Palpi reddish, antenna completely dark. Femora dark brown, tibiae black, tarsi reddish. Lower surface black.

Head (Fig. 43). Distinctly narrower than prothorax. Eyes large, laterally conspicuously but not semicircularly protruded, orbits short, but still perceptible, oblique. Clypeal suture distinct, laterally fairly deep, in middle shallow, clypeus barely raised. Frontal furrows irregular, short, anteriorly straight, then irregularly oblique but barely impressed, not reaching the eyes. Mandibles moderately elongate (in group), straight, not porrect. Antenna very slender and elongate, surpassing base of pronotum by almost five antennomeres, median antennomeres > 4 × as long as wide. Both palpi slender and elongate. Frons inside of frontal furrows with a few short, irregularly transverse strioles. Finest traces of isodiametric microreticulation only perceptible near the eyas, surface with sparse and extremely fine punctures, glossy.

Prothorax (Fig. 43). Wide (in group), very cordiform, with narrow basis, widest about at apical third, laterally evenly convex, towards base distinctly concave. Disk depressed, lateral margins and lateral sulcus rather narrow (in group), sulcus shallow and margins little upturned, attenuate towards base, but basal third markedly explanate. Apical margin straight, apical angles very slightly projected, rounded. Basal angles angulate, though about 120°, laterally very slightly protruded, base in middle straight, laterally remarkably oblique. Both apex and base laterally bordered, in middle not bordered. Anterior and posterior transverse sulci very shallow, barely recognizable, median line distinct though very shallow. Basal grooves not perceptible, but the whole lateral part of the base explanate and markedly rugose. Disk very finely and sparsely punctate and here and there with traces of extremely superficial, transverse microreticulation, glossy.

Elytra (Fig. 43). Markedly elongate (in group), almost parallel-sided. Dorsal surface depressed, without impression. Lateral borders almost straight, barely narrowed towards humeri. Preapical sinuosity moderately deep. Widest diameter about at or slightly behind middle. Humeri wide, rounded, apex

rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, almost impunctate, intervals perceptibly convex. Microreticulation extremely inconspicuous and perceptible only at very high magnification, consisting of very fine and highly superficial, transverse lines, surface also with extremely fine, sparse punctures, very glossy.

Lower surface. Metepisternum > 2.5 × as long as wide at apex. Pilosity of abdomen dense, on terminal sternum even denser.

Male genitalia (Fig. 6). Large as compared with body size and with the genitalia of the other species. Genital ring rather narrow, very gently triangular, slightly asymmetrical, apex wide, obliquely rounded. Aedeagus elongate, rather depressed, narrow, almost parallel-sided, lower surface in basal half gently concave, towards apex very concave, but the very apex slightly upturned. Apex rather short, depressed, triangularly narrowed, but slightly asymmetrical, at tip obtuse. Folding of internal sac rather simple, but with a slightly denticulate fold in apical part and with a small, tridentate sclerite on upper side of apical part. Both parameres elongate, right paramere with rounded apex, left paramere gently triangular with rounded apex.

Female genitalia. Very similar to those of *N. macrophthalmum*, spec. nov.

Variation. Very little variation noted. The holotype has slighly lighter antenna and legs that the paratype.

Distribution. Central Papua New Guinea. Known only from type locality.

Collecting circumstances. Not recorded, but perhaps collected in median altitude.

Relationships. In its external as well as male genitalic morphology rather similar to *N. nigrinum*, spec. nov. and *N. parvicolle*, spec. nov., also quite similar to *N. devosi*, spec. nov.

Notagonum devosi, spec. nov.
Figs 7, 29, 44

Types. Holotype: ♂, "Birdshead Peninsula WARKAPI (nr. Breie) primary lowland forest 500 m, at light 12.XI.1993 / INDONESIA Irian Jaya A. J. de Boer, A.L.M. Rutten & R. de Vos" (ZMAN). – Paratypes: 3♂♂, 4♀♀, same data (CBM, ZMAN).

Etymology. The name is a patronym in honour of one of the collectors, Rob de Vos, who made available to me the important samples of New Guinean carabids in the Amsterdam Museum.

Diagnosis. Species of the *angustellum* group sensu Darlington (1952), characterized by dense pilosity of the abdomen, explanate and rugose basal grooves of the pronotum, and the wide pronotum; further distingished from the five species above by the large and near apex widened aedeagus; from *N. subnigrum* Darlington by much larger aedeagus, and from *N. schuelei*, spec. nov. by the narrow base of the pronotum.

Description

Measurements. Length: 6.9-8.0 mm; width: 2.5-3.0 mm.

Ratios. Width/length of pronotum: 1.32-1.36; width widest diameter/base of pronotum: 1.30-1.33; width head/pronotum: 0.89-0.92; length/width of elytra: 1.70-1.73; length/width of 6th antennomere: 4.5-4.7.

Colour (Fig. 44). Black, lateral margin of pronotum dark, only at the apical angles inconspicuously reddish, lateral margin of elytra dark. Clypeus, labrum, and mandibles reddish or brown, palpi yellow, antenna more or less distinctly infuscate, but the bases of 1st-3rd antennomeres yellow. Femora yellow, tibiae contrastingly darker, tarsi reddish. Lower surface dark piceous to black.

Head (Figs 29, 44). Slightly narrower than the prothorax. Eyes large, laterally conspicuously but not semicircularly protruded, orbits short, but still perceptible, oblique. Clypeal suture more or less distinct, laterally fairly deep, in middle shallow or indistinct, clypeus barely raised. Frontal furrows irregularly oblique-convex, anteriorly wide, rather shallow, not reaching the eyes. Mandibles moderately elongate (in group), straight, not porrect. Antenna very slender and elongate, surpassing base of pronotum by more than five antennomeres, median antennomeres c. 4.5 × as long as wide. Both palpi slender and elongate. Microreticulation very superficial but perceptible, isodiametric, surface with very fine and sparse punctures, glossy.

Prothorax (Figs 29, 44). Rather wide (in group), slightly cordiform, with remarkable narrow basis, widest at or behind apical third, laterally very convex, concave near base. Disk depressed, lateral margins and lateral sulcus rather narrow (in group), sulcus shallow and margins little upturned, attenuate towards base, but in basal third of pronotum markedly explanate. Apical margin barely concave, apical angles very little projected, rounded. Basal angles angular but far less than rectangular, not sharp, base in middle straight, laterally distinctly oblique. Apex only laterally bordered, base completely bordered. Anterior and posterior transverse sulci very shallow, barely recognizable, median line well impressed.

Basal grooves not perceptible, but the whole basal part laterally explanate and remarkably rugose, even with several transverse strioles. Disk very finely and sparsely punctate and with more or less well recognizable traces of superficial, transverse microreticulation, rather glossy.

Elytra (Fig. 44). Elongate (in group), almost parallel-sided to slightly widened towards apex. Dorsal surface depressed, without impression. Lateral borders very gently oblique, barely narrowed towards humeri. Preapical sinuosity moderately deep. Widest diameter about at apical third. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, almost impunctate, intervals perceptibly convex. Microreticulation comparatively distinct though extremely fine, consisting of very dense, transverse lines, intervals with extremely fine, sparse, barely recognizable punctures, surface glossy.

Lower surface. Metepisternum c. 2.5 × as long as wide at apex. Pilosity of abdomen dense, on terminal sternum even denser.

Male genitalia (Fig. 7). Large as compared with body size and size of genitalia of related species. Genital ring elongate and rather narrow, slightly asymmetrical, apex rather wide, obliquely truncate. Aedeagus elongate, depressed, perceptibly widened shortly behind apex, then narrowed, lower surface but moderately concave, near apex slightly turned down, but the very apex slight turned up. Apex rather short, depressed, wide, triangular and regularly narrowed to the obtuse tip. Folding within internal sac barely sclerotized. Both parameres comparatively short and wide, right paramere with obtusely rounded apex, left paramere with wide, obliquely transverse apex.

Female genitalia. Very similar to those of *N. macrophthalmum*, spec. nov.

Variation. Some variation noted in length and relative width of the aedeagus and in width of genital ring, but very little variation noted in external morphology.

Distribution. Eastern Part of Vogelkop Peninsula, western Papua Indonesia. Known only from type locality.

Collecting circumstances. Sampled at light at rather low altitude in lowland rain forest.

Relationships. Although rather similar to the five species above, a morphologically somewhat isolated species.

Notagonum subnigrum Darlington
Figs 8, 45

Darlington, 1952: 134. – Darlington 1971: 277; Lorenz 1998: 403.

Examined types. Holotype (compared by the pictures available in the MCZ type database): ♂, "Dobodura Papua, N.G. Mar-July, 1944 Darlington / *subnigrum* ♂ descr. / *Notagonum subnigrum* Darl. / M.C.Z. Type 28594" (MCZ). – Paratype: 1♀, "Dobodura Papua, N.G. Mar-July, 1944 Darlington / Paratype *Notagonum subnigrum* Darl. / *Notagonum subnigrum* Darl. Det. Darlington" (NMPC).

Diagnosis. Species of the *angustellum* group sensu Darlington (1952), characterized by relatively large size and dense pilosity of the abdomen; further distinguished from similarly shaped species by the very dark colour of the body and its appendages and the compact aedeagus with short, triangular apex.

Partial redescription

Measurements. Length: 7.4-7.7 mm; width: 2.75-2.85 mm.

Ratios. Width/length of pronotum: 1.26-1.27; width widest diameter/base of pronotum: 1.21-1.24; width head/pronotum: 0.88; length/width of elytra: 1.65-1.67; length/width of 6th antennomere: 4.0-4.1.

Colour (Fig. 45). Deep black, lateral margins of pronotum only at the apical angles inconspicuously reddish, lateral margin of elytra dark. Clypeus, labrum, and mandibles brown, palpi reddish, antenna black. Femora dark brown, tibiae almost black, tarsi brown. Lower surface dark piceous to black.

Head (Fig. 45). Distinctly narrower than the prothorax. Eyes large, but laterally only moderately protruded, orbits short, but still perceptible, oblique. Clypeal suture moderately distinct, in middle shallow, clypeus barely raised. Frontal furrows irregularly oblique-convex, narrow and rather deep, not reaching the eyes. Mandibles moderately elongate (in group), straight, not porrect. Antenna slender and elongate, surpassing base of pronotum by slightly less than five antennomeres, median antennomeres c. 4 × as long as wide. Both palpi slender and elongate. Microreticulation very superficial but perceptible, isodiametric, surface with very fine and sparse punctures, glossy.

Prothorax (Fig. 45). Moderately wide (in group), cordiform, with fairly wide basis, widest at apical third, laterally convex, distinctly concave near base. Disk gently convex, lateral margins and lateral sulcus narrow (in group), sulcus shallow and margins little upturned, attenuate towards base. Apical margin gently concave, apical angles little projected, rather

angulate, though with rounded tip. Basal angles almost rectangular, sharp, base in middle straight, laterally slightly oblique. Both apex and base laterally bordered, basal border in middle shortly interrupted. Anterior and posterior transverse sulci very shallow, barely recognizable, median line deeply impressed. Basal grooves deep and wide, explanate, rather rugose. Disk very finely and sparsely punctate and with more or less well recognizable traces of superficial, transverse microreticulation, glossy.

Elytra (Fig. 45). Moderately elongate (in group), slightly widened towards apex. Dorsal surface depressed, with a very shallow impression in apical half. Lateral borders gently convex, barely narrowed towards humeri. Preapical sinuosity moderately deep. Widest diameter about at apical third. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, distinctly though finely punctate-crenulate, intervals depressed. Microreticulation extremely fine, though perceptible, consisting of very dense, transverse lines, intervals with extremely fine, sparse, barely recognizable punctures, surface glossy.

Lower surface. Metepisternum slightly less than 2.5× as long as wide at apex. Pilosity of abdomen moderately sparse, on terminal sternum even sparser.

Male genitalia (Fig. 8). Rather small as compared with the genitalia of the other species. Genital ring rather narrow, triangular, slightly asymmetrical, apex elongate, obliquely rounded. Aedeagus moderately elongate, comparatively stout and wide, posteriad narrowed, lower surface very concave. Apex short, straight, slightly depressed, shortly, triangularly narrowed to the acute tip. Folding of internal sac simple and without any sclerotized pieces. Both parameres moderately elongate, right paramere with obtusely angulate apex, left paramere triangular with very obtusely rounded apex.

Female genitalia. Very similar to those of *N. macrophthalmum*, spec. nov.

Variation. Very little variation noted.

Distribution. So far known from the northern part of Papua Peninsula, and Goodenough Island, off the north-eastern coast of Papua Peninsula, eastern Papua New Guinea.

Collecting circumstances. Labelled specimens sampled in pebble and under debris and rocks near streams.

Additional material. 1♂, Dobodura Papua N.G. Mar-Jul, 1944 Darlington / *subnigrum* Darl. Det. Darlington (NMPC); 1♂, Managalase Plateau Northern District Papua Nov. 1072 R. Hornabrook (CBM); 1♀, PAPUA NEW GUINEA Goodenough Is. Bolu Bolu April 28, 1982 Coll. J. Strazanac nerar stream under rocks (CBM).

Relationships. A rather isolated species with respect to external morphological as well as male genitalic characters.

Notagonum schuelei, spec. nov.

Figs 9, 30, 46

Types. Holotype: ♂, "29.7.1996 35 Schüle/Stüben West Papua 1400 m Nabire nach Mapia km 177 Ugida" (CBM). – Paratypes: 1♂, 4♀♀, same data (CBM).

Etymology. The name is a patronym in honour of the friend and collector of this species, Peter Schüle.

Diagnosis. Species of the *angustellum* group sensu Darlington (1952), characterized by sparse pilosity of the abdomen, explanate but not rugose basal grooves of the pronotum, and the wide pronotum; further distingished from both *N. subnigrum* Darlington and *N. ullrichi*, spec. nov. by the much larger aedeagus.

Description

Measurements. Length: 6.3-7.65 mm; width: 2.3-2.8 mm.

Ratios. Width/length of pronotum: 1.32-1.36; width widest diameter/base of pronotum: 1.21-1.25; width head/pronotum: 0.93-0.97; length/width of elytra: 1.71-1.74; length/width of 6th antennomere: 4.4-4.6.

Colour (Fig. 46). Black, lateral margins of pronotum only at the apical angles inconspicuously reddish, lateral margin of elytra dark. Clypeus, labrum, and mandibles brown, palpi reddish, antenna more or less infuscate, in some specimens almost black. Femora yellow, tibiae contrastingly dark, tarsi brown. Lower surface piceous to black.

Head (Figs 30, 46). Very little narrower than the prothorax. Eyes large, but laterally not semicircularly protruded, orbits short, but still perceptible, oblique. Clypeal suture moderately distinct, in middle shallow, clypeus basally slightly raised. Frontal furrows very short, shallow, irregularly oblique-convex,. Mandibles moderately elongate (in group), straight, not porrect. Antenna very slender and elongate, surpassing base of pronotum by slightly more than five antennomeres, median antennomeres c. 4.5× as long as wide. Both palpi slender and elongate. Microreticulation very superficial but perceptible, isodiametric, surface with very fine and sparse punctures, glossy.

Prothorax (Figs 30, 46). Rather wide (in group), cordiform, with fairly wide basis, widest slightly in front of apical third, laterally convex, distinctly con-

cave near base. Disk gently convex, lateral margins and lateral sulcus narrow (in group), sulcus shallow and margins little upturned, attenuate towards base. Apical margin gently concave, apical angles little projected, rounded. Basal angles almost rectangular, fairly sharp, base in middle straight, laterally distinctly oblique. Apex laterally bordered, base almost completely bordered. Anterior and posterior transverse sulci very shallow, barely recognizable, median line well impressed. Basal grooves deep and wide, explanate, rather rugose, medially with an elongate, basally straight, anteriorly curved linear impression that reaches almost to middle of pronotum. Disk very finely and sparsely punctate and with more or less well recognizable traces of superficial, transverse microreticulation, glossy.

Elytra (Fig. 46). Elongate (in group), almost parallel-sided. Dorsal surface depressed, without any impression. Lateral borders almost straight, barely narrowed towards humeri. Preapical sinuosity moderately deep. Widest diameter about at middle. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, impunctate, intervals depressed. Microreticulation not visible, intervals with extremely fine, sparse, barely recognizable punctures, surface very glossy.

Lower surface. Metepisternum > 2.5 × as long as wide at apex. Pilosity of abdomen sparse, on terminal sternum even sparser.

Male genitalia (Fig. 9). Large as compared with the genitalia of the other species. Genital ring rather narrow, in basal half parallel, slightly asymmetrical, apex moderately wide, obliquely rounded, laterally angulate. Aedeagus elongate, moderately depressed, in middle conspicuously widened, lower surface markedly but somewhat irregularly concave. Apex elongate, straight, depressed, very narrow, slightly upturned, elongately narrowed to the very acute tip. Folding of internal sac simple and without any sclerotized pieces. Both parameres elongate, right paramere with obliquely transverse apex, left paramere triangular with obtusely rounded apex, with a small, not sclerotized area at apex.

Female genitalia. Very similar to those of *N. macrophthalmum*, spec. nov.

Variation. Slight variation noted only in the relative shape of the pronotum.

Distribution. Western Papua Indonesia near Mapia. Known only from type locality.

Collecting circumstances. Largely unknown. Type series sampled at median altitude.

Relationships. A morphologically rather isolated species, most similar to *N. devosi*, spec. nov.

Notagonum ullrichi, spec. nov.

Figs 10, 20, 47

Types. Holotype: ♂, "25V79 PNG/EHProv. Umg. Kainantu Onerunka / Papua Nlle. Guinée W.G. Ullrich" (MNHG). – Paratypes: 5♂♂, 10 ♀♀, same locality and collector, "IV79, 13VI79, VI79, 21.VIII79, 10IX79, 19IX79, 1X79" (CBM, MNHG); 7♂♂, 16♀♀, "PAPUA N. GUINEA Onerunka VI79, X79 nr. Kainantu W.G. Ullrich" (CBM, MNHG); 1♂, "PAPUA N. GUINEA Rintebe I.1979 30 km E. Goroka W.G. Ullrich" 1700 m (MNGH); 1♀, "13VI79 PNG/EHProv. Umg. Sonofi / Papua Nlle. Guinée W.G. Ullrich" (MNHG); 1♀, "27-7-75 KASSEM PASS North East New Guinea R. HORNABROOK" (MNZ); ♀, "Papua New Guinea: Enga, Anji, 1900 m, 6.xii.2006, 05.42.109S 143.55.6635E, Balke & Kinibel (PNG 129)" (CBM).

Etymology. The name is a patronym in honour of the collector W. Ullrich who collected large numbers of carabids in Papua New Guinea during the 70ties of last Century.

Diagnosis. Species of the *angustellum* group sensu Darlington (1952), characterized by moderately dense pilosity of the abdomen and the deep, at bottom rugose basal grooves of the pronotum; further distinguished from the next related *N. marginale*, spec. nov. by less protruded eyes, narrower pronotum, and the very narrow, not widened aedeagus.

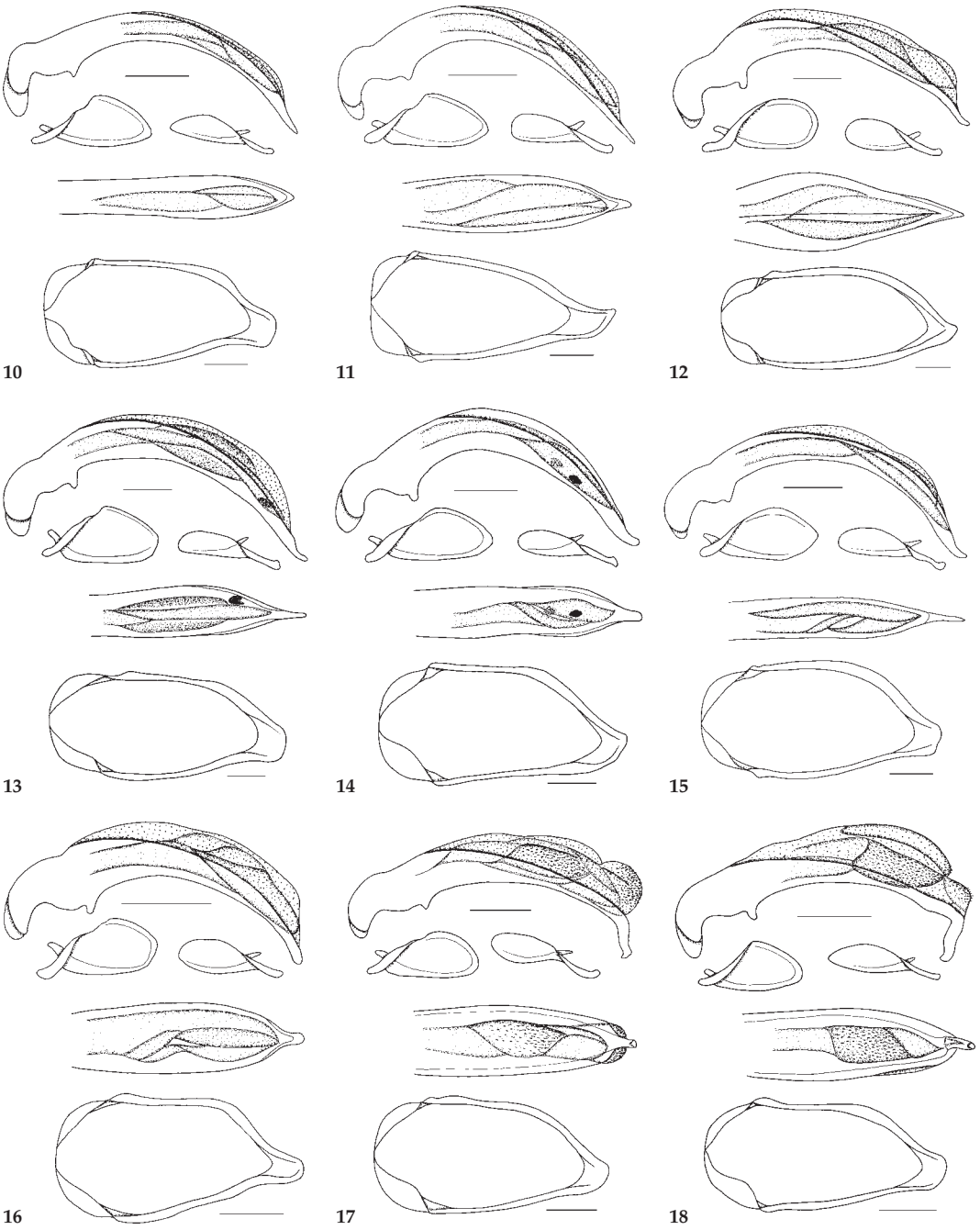
Description

Measurements. Length: 6.2-6.7 mm; width: 2.3-2.4 mm.

Ratios. Width/length of pronotum: 1.28-1.34; width widest diameter/base of pronotum: 1.22-1.28; width head/pronotum: 0.86-0.89; length/width of elytra: 1.66-1.71; length/width of 6th antennomere: 3.1-3.6.

Colour (Fig. 47). Piceous to black, lateral margins of pronotum distinctly, margins of the elytra inconspicuously light reddish. Clypeus, labrum, and mandibles brown, palpi yellow, antenna more or less infuscate, commonly even almost completely yellow. Either the whole legs yellow, or femora yellow, tibiae and tarsi slightly, but not contrastingly darker. Lower surface piceous.

Head (Fig. 47). Considerably narrower than prothorax. Eyes moderately large, comparatively little protruded, orbits elongate, > ⅓ of length of eyes, oblique. Clypeal suture distinct, laterally deep, in middle slight shallower, clypeus basally slightly raised. Frontal furrows rather regularly, obliquely curved, fairly deep,almost reaching the eyes. Mandibles rather elongate (in group), straight, but not porrect. Antenna slender and elongate, but less so than in most other species, surpassing base of pronotum by about four antennomeres, median antennomeres at most 3.5 × as long as wide. Both



Figs 9-18. 10. *N. ullrichi*, spec. nov. **11.** *N. marginale*, spec. nov. **12.** *N. skalei*, spec. nov. **13.** *N. garainae*, spec. nov. **14.** *N. kitchingi*, spec. nov. **15.** *N. fuscipes*, spec. nov. **16.** *N. lackneri*, spec. nov. **17.** *N. vile* Darlington. **18.** *N. hamatum*, spec. nov. Scale bars: 0.25 mm.

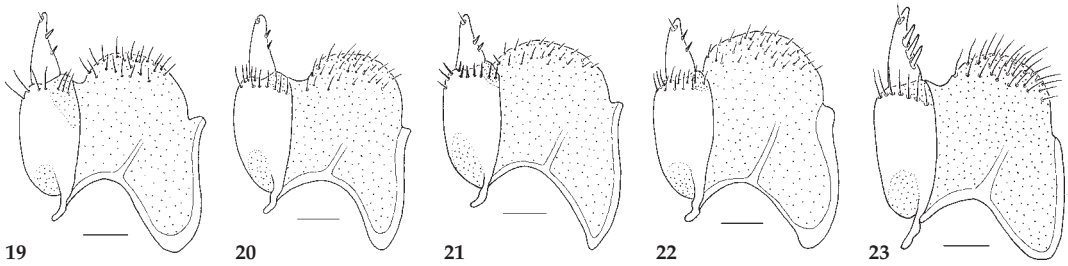


Fig. 19-23. Female gonocoxites. **19.** *Notagonum macrophthalmum*, spec. nov. **20.** *N. ullrichi*, spec. nov. **21.** *N. lackneri*, spec. nov. **22.** *N. vile* Darlington. **23.** *N. crenulipenne*, spec. nov. Scale bars: 0.1 mm.

palpi slender and elongate. Microreticulation absent, surface with extremely fine, scattered punctures, very glossy.

Prothorax (Fig. 47). Rather wide (in group), cordiform, with fairly wide basis, widest at apical third, laterally evenly convex, deeply concave near base. Disk comparatively convex, lateral margins and lateral sulcus comparatively wide (in group), sulcus deep and margins upturned, even near base not explanate. Apical margin deeply concave, apical angles well projected, angulate though rounded at tip. Basal angles rectangular, sharp, laterad protruded, base in middle straight, laterally slightly oblique. Apex only laterally bordered, in middle not bordered, base completely bordered. Anterior and posterior transverse sulci very shallow, though perceptible, median line shallow though distinct. Basal grooves wide and deep, at bottom rugose, medially with an elongate, basally straight, anteriorly curved linear impression that reaches almost to middle of pronotum. Disk very finely punctate and very glossy, with finest and extremely superficial traces of transverse microreticulation in some areas, recognizable only at very high magnification.

Elytra (Fig. 47). Rather elongate (in group), only very slightly widened towards apical third. Dorsal surface moderately convex, without perceptible impression. Lateral borders in middle straight to very slightly oblique. Preapical sinuosity moderately deep. Widest diameter about at apical third. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, very finely punctate, intervals very slightly convex. Microreticulation absent, intervals with extremely fine punctures, surface very glossy.

Lower surface. Metepisternum < 2.5× as long as wide at apex. Pilosity of abdomen moderately dense, on the terminal sternum slightly denser.

Male genitalia (Fig. 10). Rather small as compared with the genitalia of the other species. Genital ring moderately wide, slightly asymmetrical, apex rather wide, obtusely rounded. Aedeagus very narrow and elongate, depressed, almost parallel but perceptibly widened in apical fifth, lower surface markedly concave. Apex moderately elongate, straight, depressed, very slightly turned up at the very tip, convexly, triangularly narrowed to the slightly obtuse tip. Folding of internal sac simple and without any sclerotized pieces. Both parameres fairly elongate, right paramere somewhat triangular, with obtusely angulate apex, left paramere markedly triangular with obtusely angulate apex.

Female genitalia (Fig. 20). Very similar to those of *N. macrophthalmum*, spec. nov., but gonocoxite 2 slightly shorter with more obtuse apex, and gonocoxite 1 with c. 10 setae at apical rim. Rarely gonocoxite 2 unilaterally has two short nematiform setae near the apex.

Variation. Rather little variation noted in relative shape of the pronotum.

Distribution. Eastern central Papua New Guinea.

Collecting circumstances. Little recorded. Those specimens bearing information about altitude sampled in between 1700-1900 m.

Relationships. Most similar to *N. marginale*, spec. nov.

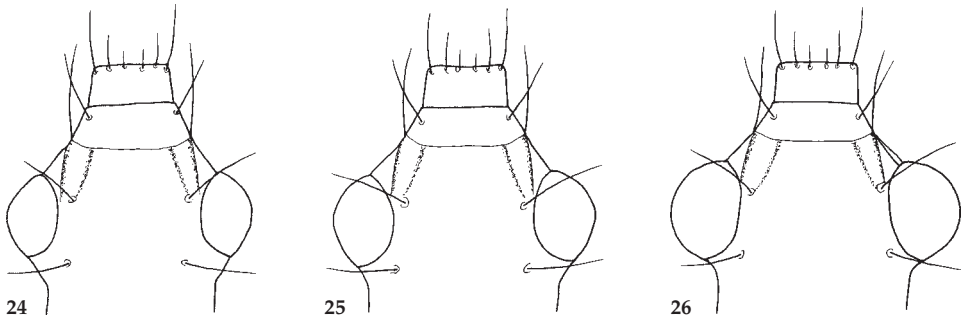
Notagonum marginale, spec. nov.

Figs 11, 31, 48

Types. Holotype: ♂, "Irian Jaya, Nabire-Dist. Wondiwoi Mts. Yeratua, 560 m, 8.9.1998, leg. M. Balke" (CBM).

Etymology. The name refers to the relatively wide marginal channel (in group) of the pronotum.

Diagnosis. Species of the *angustellum* group sensu Darlington (1952); characterized by rather sparse pilosity of the abdomen and the deep, at bottom rugose basal grooves of the pronotum; further distinguished from the next related *N. ullrichi*, spec. nov. by more protruded eyes, wider pronotum, and the distinctly widened aedeagus.



Figs 24-26. Head. **24.** *Notagonum angustellum* Darlington. **25.** *N. darlingtoni*, spec. nov. **26.** *N. macrophthalmum*, spec. nov.

Description

Measurements. Length: 6.0 mm; width: 2.25 mm. Ratios. Width/length of pronotum: 1.42; width widest diameter/base of pronotum: 1.28; width head/pronotum: 0.89; length/width of elytra: 1.64; length/width of 6th antennomere: 4.0.

Colour (Fig. 48). Black, lateral margin of pronotum narrowly yellowish. Clypeus, labrum, and mandibles brown, palpi yellow, antenna infuscate, but 1st antennomere yellow, 2nd and 3rd antennomeres mostly yellow, only the apex infuscate. Femora pale yellow, tibiae and tarsi slightly, but not contrastingly darker. Lower surface black.

Head (Figs 31, 48). Slightly narrower than prothorax. Eyes large, but moderately protruded (in group), orbits short though perceptible, oblique. Clypeal suture distinct, laterally deep, clypeus basally raised. Frontal furrows oblique, running from clypeal suture to median border of eye. Mandibles moderately elongate (in group), straight, but not porrect. Antenna slender and elongate, surpassing base of pronotum by more than five antennomeres, median antennomeres c. 4× as long as wide. Both palpi slender and elongate. Microreticulation absent, no punctures visible, surface glossy.

Prothorax (Figs 31, 48). Very wide (in group), slightly cordiform, with wide basis, widest at apical fourth, laterally evenly convex, distinctly concave near base. Disk comparatively convex, lateral margins and lateral sulcus comparatively wide (in group), sulcus deep and margins upturned, only near base slightly explanate. Apical margin very slightly concave, apical angles barely projected, rounded. Basal angles rectangular, sharp, base almost straight. Both apex and base only laterally bordered, in middle not bordered. Anterior and posterior transverse sulci very shallow, median line shallow though distinct. Basal grooves wide, with deep, slightly rugose impression on either side, which mediad forms a short, straight linear impression. Disk impunctate and very glossy, with finest and extremely superficial traces of transverse microreticulation in some areas, recognizable only at very high magnification.

Elytra (Fig. 48). Comparatively short and wide (in group), slightly widened towards apical third. Dorsal surface moderately convex, with very slight impression in front of middle. Lateral borders in middle straight to very slightly oblique. Preapical sinuosity moderately deep. Widest diameter about at apical third. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, almost impunctate, intervals perceptibly convex. Microreticulation and punctures absent, surface very glossy.

Lower surface. Metepisternum >2.5× as long as wide at apex. Pilosity of abdomen rather sparse, on the terminal sternum slightly denser.

Male genitalia (Fig. 11). Rather small as compared with the genitalia of the other species. Genital ring rather narrow, gently triangular, slightly asymmetrical, apex narrow, obtusely rounded, laterally acute. Aedeagus elongate, rather depressed, moderately wide, in middle considerably widened, lower surface markedly concave. Apex elongate, straight, depressed, regularly and triangularly narrowed to the acute tip. Folding of internal sac simple and not sclerotized. Both parameres but moderately elongate, right paramere with obtusely transverse apex, left paramere triangular with obtusely rounded apex.

Female genitalia. Unknown.

Variation. Unknown.

Distribution. Wondiwoi Mountains at the north coast of western Papua Indonesia. Known only from type locality.

Collecting circumstances. Unknown. Holotype sampled at median altitude.

Relationships. Most similar to *N. ullrichi*, spec. nov.

Notagonum skalei, spec. nov.
Figs 12, 32, 49

Types. Holotype: ♂, "W-Papua Manokwari Prov. Snaimboy (Warmare), small stream, 01°00"S, 134°53"E 24.II. 2007 leg. A. Skale" (CBM).

Etymology. The name is a patronym in honour of the collector Andre Skale, keen collector of New Guinean beetles who collected the holotype of this species.

Diagnosis. Species of the *angustellum* group sensu Darlington (1952); characterized by sparse pilosity of the abdomen and the deep, at bottom rugose basal grooves of the pronotum; further distinguished from the nearest related species *N. marginale*, spec. nov. and *N. ullrichi*, spec. nov. by more protruded eyes, the narrow pronotum bearing narrow lateral margins, and the very large, in middle remarkably widened aedeagus.

Description

Measurements. Length: 6.2 mm; width: 2.4 mm.

Ratios. Width/length of pronotum: 1.22; width widest diameter/base of pronotum: 1.20; width head/pronotum: 0.90; length/width of elytra: 1.63; length/width of 6th antennomere: 4.25.

Colour (Fig. 49). Black, including lateral margins of pronotum and elytra. Clypeus, labrum, and mandibles brown, palpi yellow, antenna infuscate, but 1st antennomere yellow. Femora pale yellow, tibiae and tarsi slightly, but not contrastingly darker. Lower surface black.

Head (Figs 32, 49). Distinctly narrower than prothorax. Eyes large, considerably, but not semicircularly protruded, orbits extremely short, barely perceptible. Clypeal suture shallow, in middle indistinct, clypeus basally slightly raised. Frontal furrows irregular, shallow, wide, not reaching eyes. Mandibles very elongate (in group), straight, almost porrect. Antenna slender and elongate, surpassing base of pronotum by more than five antennomeres, median antennomeres >4× as long as wide. Both palpi slender and elongate. Microreticulation absent, no punctures visible, surface very glossy.

Prothorax (Figs 32, 49). Very narrow (in group), slightly cordiform, with wide basis, widest at apical fourth, laterally gently convex, slightly concave near base. Disk comparatively convex, lateral margins and lateral sulcus narrow (in group), sulcus shallow, margins but slightly upturned, only near base slightly explanate. Apical margin moderately concave, apical angles faintly projected, rounded. Basal angles almost rectangular, sharp, base straight, but laterally slightly oblique. Both apex and base laterally bordered, in middle not bordered. Anterior and posterior transverse sulci very shallow, median line shallow though distinct. Basal grooves wide, with deep, slightly rugose impression on either side, which mediad forms a rather elongate, straight linear impression. Disk without any microreticulation, impunctate, very glossy.

Elytra (Fig. 49). Comparatively short and wide (in group), slightly widened towards apical third, slightly narrowed towards humerus. Dorsal surface moderately convex, with very slight impression in front of middle. Lateral borders in middle straight to very slightly oblique. Preapical sinuosity moderately deep. Widest diameter about at apical third. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, finely punctate-crenulate, intervals almost depressed. Microreticulation and punctures absent, surface very glossy.

Lower surface. Metepisternum c. 2.5× as long as wide at apex. Pilosity of abdomen very sparse, the terminal sternum impilose.

Male genitalia (Fig. 12). Very large as compared with body size and size of genitalia of related species. Genital ring elongate and rather narrow, slightly asymmetrical, apex narrow, obliquely angulate. Aedeagus elongate, moderately depressed, remarkably widened towards middle, lower surface in middle rather carinate, surface moderately concave, near apex slightly turned down, but the very apex slight turned up. Apex moderately elongate, depressed, triangular, regularly narrowed to the acute tip. Some folds within the internal sac slightly sclerotized at their margins. Both parameres comparatively short and wide, right paramere with rounded apex, left paramere triangular with wide, obtusely rounded apex.

Female genitalia. Unknown.

Variation. Unknown.

Distribution. Warmare area in Vogelkop Peninsula, western Papua Indonesia. Known only from type locality.

Collecting circumstances. Apparently sampled "near small stream".

Relationships. Rather unique species, but in its external as well as male genitalic morphology most similar to to *N. marginale*, spec. nov. and *N. ullrichi*, spec. nov.

Notagonum garainae, spec. nov.
Figs 13, 33, 50

Types. Holotype: ♂, "ca. 10 km S Garaina Saueri, 1600 m, 24.III.1998 PAPUA N.G. Morobe Prov. leg. A. Riedel" (CBM).

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Figs 27-32. Pronotum and posterior part of head. **27.** *Notagonum nigrinum*, spec. nov. **28.** *N. parvicolle*, spec. nov. **29.** *N. devosi*, spec. nov. **30.** *N. schuelei*, spec. nov. **31.** *N. marginale*, spec. nov. **32.** *N. skalei*, spec. nov.

Etymology. The name refers to the type locality of this species.

Diagnosis. Species of the *angustellum* group sensu Darlington (1952); characterized by impilose abdomen and the cordiform pronotum with linear basal grooves; further distinguished from the nearest related species *N. kitchingi*, spec. nov. and *N. fuscipes*, spec. nov. by longer antenna, narrower base of pronotum, and the narrow and elongate, slightly upturned apex of the aedesgus.

Description

Measurements. Length: 6.8 mm; width: 2.6 mm.

Ratios. Width/length of pronotum: 1.25; width widest diameter/base of pronotum: 1.28; width head/pronotum: 0.88; length/width of elytra: 1.62; length/width of 6th antennomere: 4.25.

Colour (Fig. 50). Black, lateral margin of pronotum reddish, lateral margin of elytra very inconspicuously reddish. Clypeus, labrum, and mandibles brown, palpi yellow, antenna yellow, but 2nd-4th antennomeres very slightly infuscate at apex. Legs yellow, tibiae and tarsi barely darker. Lower surface black.

Head (Figs 33, 50). Distinctly narrower than prothorax. Eyes large, almost semicircularly protruded, orbits extremely short, barely perceptible. Clypeal suture laterally distinct, in middle very shallow, clypeus basally slightly raised. Frontal furrows oblique, anteriorly deep and wide, not reaching the eyes. Mandibles rather elongate (in group), straight, but not porrect. Antenna slender and elongate, surpassing base of pronotum by more than five antennomeres, median antennomeres > 4 × as long as wide. Both palpi slender and elongate. Microreticulation very superficial, isodiametric, no punctures visible, surface very glossy.

Prothorax (Figs 33, 50). Narrow (in group), cordiform, with rather narrow basis, widest at apical third, laterally evenly convex, with fairly deep concavity in front of base. Disk moderately depressed, lateral margins and lateral sulcus rather narrow (in group), sulcus moderately deep and margins slightly upturned, only near base slightly explanate. Apical margin very slightly concave, apical angles barely projected, rounded. Basal angles rectangular, sharp, laterally even slightly projected, base almost straight. Both apex and base laterally bordered, in middle not bordered. Anterior and posterior transverse sulci very shallow, median line well impressed. Basal grooves deep, linear, elongate, lateral part of base slightly convex, not rugose. Disk here and there with finest traces of transverse microreticulation, impunctate, very glossy.

Elytra (Fig. 50). Comparatively short and wide (in group), distinctly widened towards apical third, considerably narrowed towards humerus. Dorsal surface moderately convex, with very slight impression in front of middle. Lateral borders slightly convex throughout. Preapical sinuosity moderately deep. Widest diameter about at apical third. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, almost impunctate, intervals perceptibly convex. Microreticulation and punctures absent, surface very glossy.

Lower surface. Metepisternum c. 2.5 × as long as wide at apex. Abdomen impilose.

Male genitalia (Fig. 13). Very large as compared with body size and with the genitalia of the other species. Genital ring rather narrow, rather parallel, slightly asymmetrical, apex wide, obtusely rounded. Aedeagus elongate, moderately depressed, moderately wide, in middle distinctly widened, lower surface markedly concave, shortly turned up to the tip of the apex. Apex elongate, straight but turned up at tip, very narrow, almost parallel-sided, depressed. Internal sac with some slightly sclerotized folds and a heavily sclerotized tooth at left side near apex. Both parameres but moderately elongate, right paramere with rounded apex, left paramere triangular with obtusely oblique apex.

Female genitalia. Unknown.

Variation. Unknown.

Distribution. Garaina, eastern central Papua New Guinea. Known only from type locality.

Collecting circumstances. Most probably collected by sifting litter in montane rainforest at medium altitude.

Relationships. Most similar to *N. kitchingi*, spec. nov. and *N. fulcipes*, spec. nov. which possess a similarly shaped and structured pronotum.

Notagonum kitchingi, spec. nov.

Figs 14, 34, 51

Types. Holotype: ♂, "06°30S 146°48.00E Oomsis, Morobe, PNG Light Trap Canopy 1 26 July 2000 R.L. Kitching / *Notagonum* sp. nov. 2. det. M. Baehr'07" (QMT 156301). – Paratypes: 2♀♀, same data "*Notagonum* sp. nov. 2. det. M. Baehr'07" (QMB); 1♂, same locality and collector, "Light Trap Ground 2 22 July 2000 / *Notagonum* sp. nov. 2. det. M. Baehr'07" (CBM); 1♂, "PAPUA NEW GUINEA Canopy Mission Madang Province Baiteta Light M 1 17-V-1993 Leg. Olivier Missa" (IRSNB); 1♂, "Papua NG, Morobe-Pr. Garaina, 700 m Lux, 21.3.1998 leg. A. Riedel" (CBM); 2♀♀, "Irian Jaya, Nabire-Dist. Nabire-Ilaga km54, 750 m, IV.1998, leg. M. Balke" (CBM); 1♀, "Irian Jaya, Panai-Pr. Nabire, Pusppensaat, km54 500-700 m, 13.-16.8.1991 leg. A. Riedel" (CBM); 1♀, "INDONESIA, Irian Jaya Debra, x.2000 leg. Loc. (lost Mohagan)" (CBM).

Etymology. The name is a patronym in honour of the collector and ecologist Roger Kitching, who made available to me the very interesting samples made through his light collecting activities in New Guinea and in neighbouring countries.

Diagnosis. Species of the *angustellum* group sensu Darlington (1952); characterized by very sparse pilosity of the abdomen and the cordiform pronotum with rather linear basal grooves; further distinguished from the most similar *N. fuscipes*, spec. nov. mainly by the shorter and wider apex of the aedeagus and the presence of one or two sclerotized teeth in the internal sac.

Description

Measurements. Length: 6.0-6.5 mm; width: 2.3-2.6 mm.

Ratios. Width/length of pronotum: 1.27-1.35; width widest diameter/base of pronotum: 1.14-1.22; width head/pronotum: 0.88-0.92; length/width of elytra: 1.58-1.65; length/width of 6th antennomere: 2.8-3.4.

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Figs 33-37. Pronotum and posterior part of head. **33.** *N. garainae*, spec. nov. **34.** *N. kitchingi*, spec. nov. **35.** *N. vile* Darlington. **36.** *N. hamatum*, spec. nov. **37.** *N. crenulipenne*, spec. nov.

Colour (Fig. 51). Dark piceous to black, lateral margins of pronotum and elytra, and in some specimens, also suture of elytra indistinctly reddish. Clypeus, labrum, and mandibles brown, palpi yellow, antenna piceous. Legs piceous or femora paler than tibiae. Lower surface dark piceous.

Head (Figs 34, 51). Distinctly narrower than prothorax. Eyes large, almost semicircularly protruded, orbits very short, but still perceptible. Clypeal suture distinct, laterally deep, in middle shallow, clypeus basally very slightly raised. Frontal furrows fairly regular, obliquely convex, fairly deep, almost reaching the eyes. Mandibles elongate (in group), straight, but not porrect. Antenna moderately slender and elongate, surpassing base of pronotum by less than five antennomeres, median antennomeres about 3.5 × as long as wide. Both palpi slender and elongate. Microreticulation superficial but distinct and complete, isodiametric, no punctures visible, surface rather glossy.

Prothorax (Figs 34, 51). Rather narrow (in group) but various, cordiform, with wide basis, widest at apical third, laterally evenly convex, distinctly concave near base. Disk comparatively convex, lateral margins and lateral sulcus comparatively narrow (in group), sulcus shallow and margins little upturned, towards base explanate. Apical margin very slightly concave, apical angles barely projected, rounded.

Basal angles rectangular, sharp, base almost straight. Both apex and base laterally bordered, in middle not bordered. Anterior and posterior transverse sulci very shallow, median line shallow though distinct. Basal grooves elongate, linear, straight. Base laterally of basal grooves depressed but slightly convex, not rugose but microreticulate. Disk with very superficial, slightly transverse microreticulation which is more distinct laterad, almost impunctate, glossy.

Elytra (Fig. 51). Comparatively short and wide (in group), distinctly widened towards apical third. Dorsal surface moderately convex, with very slight impression in anterior half or near middle. Lateral borders in middle slightly oblique, gently oblique towards humerus. Preapical sinuosity moderately deep. Widest diameter about at apical third. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, barely punctate, intervals depressed. Microreticulation extremely superficial, very transverse, punctures absent, surface glossy.

Lower surface. Metepisternum < 2.5 × as long as wide at apex. Pilosity of abdomen very sparse, on the terminal sternum absent.

Male genitalia (Fig. 14). Medium sized as compared with the genitalia of the other species. Genital ring rather narrow, in basal half parallel, asymmetrical, apex moderately wide, obliquely rounded, laterally angulate. Aedeagus moderately elongate, moderately depressed, rather narrow, in middle slightly narrowed, lower surface markedly but somewhat irregularly concave. Apex moderately elongate, straight, depressed, rather narrow, slightly upturned at tip, elongately narrowed to the obtuse tip. Folding of internal sac simple and little sclerotized, without or with one or two sclerotized teeth at bottom in apical part. Both parameres rather short, right paramere with rouinded apex, left paramere triangular with obtusely rounded apex.

Female genitalia. Very similar to those of *N. ullrichi*, spec. nov.

Variation. This widespread species seems as variable in structure of the aedeagus as in shape and relative width of pronotum and elytra. The two male specimens from Oomsis have one respectively two sclerotized teeth in their internal sacs, while the single male from Baiteta has none. Unfortunately all available specimens from Papua Indonesia (Nabire Province) are females. Hence the taxonomy of or within this species (if it is one species) will remain unsettled as long as no males from those localities in western New Guinea are available.

Distribution. So far recorded from central Papua New Guinea and north-western Papua Indonesia.

Collecting circumstances. All specimens from Papua New Guinea sampled at light, those from Papua Indonesia probably collected from litter. Specimens with data on altitude sampled at rather low altitudes.

Relationships. Very similar and probably closely related to *N. fuscipes*, spec. nov.

Notagonum fuscipes, spec. nov.

Figs 15, 52

Types. Holotype: ♂, "INDONESIA Papua, Kecamatan Abenaho, PASS VALLEY 3°51'S, 139°03'E, 18.-25. ii.2005 1700-2250 m, dist.mtn.rainforest leg. T. Lackner" (ZMAN). – Paratypes: 1♂, same data (CBM); 2♂♂, "INDONESIA Papua Kecamatan Nipsan WALMAK 4°07'S 139°36'E 18-25.ii.2005, 1700-2250 m leg. T. Lackner" (CBM, ZMAN).

Etymology. The name refers to the dark legs of this species.

Diagnosis. Species of the *angustellum* group sensu Darlington (1952); characterized by very sparse pilosity of the abdomen and the cordiform pronotum with rather linear basal grooves; further distinguished from the most similar *N. kitchingi*, spec. nov. mainly by the longer and narrower apex of the aedeagus and absence of any sclerotized teeth in the internal sac.

Description

Measurements. Length: 6.5-6.55 mm; width: 2.5-2.55 mm.

Ratios. Width/length of pronotum: 1.24-1.26; width widest diameter/base of pronotum: 1.21-1.22; width head/pronotum: 0.89-0.91; length/width of elytra: 1.62-1.64; length/width of 6th antennomere: 3.7-3.8.

Colour (Fig. 52). Dark piceous to black, lateral margins of pronotum and elytra, and suture of elytra indistinctly dark reddish. Clypeus, labrum, and mandibles brown, palpi yellow, antenna piceous. Legs puiceous. Lower surface dark piceous.

Head (Fig. 52). Distinctly narrower than prothorax. Eyes large, considerably but not semicircularly protruded, orbits short, but still perceptible. Clypeal suture distinct, laterally deep, in middle shallow, clypeus basally very slightly raised. Frontal furrows fairly regular, obliquely convex, fairly deep, almost reaching the eyes. Mandibles elongate (in group), straight, but not porrect. Antenna slender and elongate, surpassing base of pronotum by about five antennomeres, median antennomeres slightly less than 4 × as long as wide. Both palpi slender and elongate. Microreticulation superficial but distinct

and complete, isodiametric, no punctures visible, surface rather glossy.

Prothorax (Fig. 52). Rather narrow (in group), cordiform, with wide basis, widest at apical third, laterally evenly convex, distinctly concave near base. Disk comparatively convex, lateral margins and lateral sulcus comparatively narrow (in group), sulcus shallow and margins little upturned, towards base explanate. Apical margin very slightly concave, apical angles barely projected, rounded. Basal angles rectangular, sharp, base almost straight. Both apex and base laterally bordered, in middle not bordered. Anterior and posterior transverse sulci very shallow, median line shallow though distinct. Basal grooves elongate, linear, straight. Base laterally of basal grooves depressed, not rugose but microreticulate. Disk with very superficial, slightly transverse microreticulation which is more distinct laterad, almost impunctate, glossy.

Elytra (Fig. 52). Comparatively short and wide (in group), distinctly widened towards apical third. Dorsal surface moderately convex, with very slight impression about at middle. Lateral borders in middle slightly oblique, gently oblique towards humerus. Preapical sinuosity moderately deep. Widest diameter about at apical third. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, faintly punctate, intervals depressed. Microreticulation extremely superficial, very transverse, punctures absent, surface glossy.

Lower surface. Metepisternum < 2.5 × as long as wide at apex. Pilosity of abdomen very sparse, on the terminal sternum absent.

Male genitalia (Fig. 15). Large as compared with the size of the genitalia of related species. Genital ring rather short and wide, laterally slightly convex, slightly asymmetrical, apex moderately wide, obliquely angulate. Aedeagus elongate, moderately depressed, parallel, lower surface markedly concave, near apex slightly turned up. Apex elongate, depressed, very narrow, acute. Folding of internal sac simple and without any sclerotized pieces. Both parameres moderately elongate, right paramere with obtusely angulate apex, left paramere triangular with obtusely triangular apex.

Female genitalia. Unknown.

Variation. Very little variation noted.

Distribution. Central Papua Indonesia.

Collecting circumstances. Sampled at median altitude between 1700 m and 2250 m in montane rain forest.

Relationships. Very similar and probably closely related to *N. kitchingi*, spec. nov. of which it seems to represent the montane sister species.

Notagonum lackneri, spec. nov.

Figs 16, 21, 53

Types. Holotype: ♂, "INDONESIA Papua, Kecamatan Abenaho, PASS VALLEY 3°51'S 139°03'E, 18.-25. ii.2005 1700-2250 m, dist.mtn.rainforest leg. T. Lackner" (ZMAN). – Paratypes: 2♂♂, 11♀♀, same data (CBM, ZMAN); 2♂♂, 2♀♀, "INDONESIA Papua Kecamatan Nipsan WALMAK 1800 m 4°07'S 139°36'E 18-25. ii.2005, 1700-2250 m leg. T. Lackner" (CBM, ZMAN); 2♂♂, "INDONESIA Papua Kab. Yahukimo WALMAK (distr. Nipsan) 4°07'S 138°36'E 1710 m 24-29.x.2008 leg. Herlina Menufandu" (ZMAN); 1♂, 6♀♀, "INDONESIA Papua Star Mountains ABMISIBIL 1950-2200 m 4°38'S 140°33'E 29.i.-09.ii.2005 leg. T. Lackner" (CBM, ZMAN).

Etymology. The name is a patronym in honour of the collector Tomas Lackner who recently collected important carabid material in Papua Indonesia.

Diagnosis. Species of the *angustellum* group sensu Darlington (1952); characterized by rather dense pilosity of the abdomen and deep basal grooves of the pronotum; distinguished from all other species by the deep impression on the elytra, indistinct apical sinuosity of the elytra, and very small aedeagus.

Description

Measurements. Length: 5.8-6.2 mm; width: 2.25-2.4 mm.

Ratios. Width/length of pronotum: (1.19)1.32-1.34; width widest diameter/base of pronotum: 1.22-1.23; width head/pronotum: 0.80; length/width of elytra: 1.65-1.66; length/width of 6th antennomere: 3.0-3.2.

Colour (Fig. 53). Black, lateral margin of pronotum distinctly reddish, margins of elytra more narrowly and inconspicuously reddish. Clypeus, labrum, and mandibles light brown, palpi yellow, antenna reddish. Legs reddish, but femora slightly darker than tibiae. Lower surface piceous to black.

Head (Fig. 53). Considerably narrower than prothorax. Eyes large, but moderately protruded, orbits short, though still perceptible. Labrum in middle slightly produced. Clypeal suture distinct, laterally deep, clypeus basally slightly raised. Frontal furrows rather regular, fairly deep, obliquely convex, almost reaching the eyes. Mandibles very elongate (in group), straight, almost porrect. Antenna moderately slender and elongate, surpassing base of pronotum by less than five antennomeres, median slightly more than 3 × as long as wide. Both palpi slender and elongate. Microreticulation absent, extremely fine and very sparse punctures visible only at very high magnification, surface very glossy.

Prothorax (Fig. 53). Wide (in group), slightly cordiform, with rather wide basis, widest behind

third, laterally evenly convex, distinctly concave near base. Disk moderately convex, lateral margins and lateral sulcus comparatively wide (in group), sulcus moderately deep and margins slightly upturned, near base explanate. Apical margin moderately concave, apical angles slightly projected, rounded. Basal angles rectangular, sharp, base in middle straight, laterally slightly oblique. Both apex and base laterally bordered, in middle not bordered. Anterior and posterior transverse sulci shallow though distinct, median line welli mpressed. Basal grooves deep and fairly wide, barely rugose but with a short linear impression. Disk with very sparse and extremely fine punctures and very glossy, with finest and extremely superficial traces of transverse microreticulation.

Elytra (Fig. 53). Moderately elongate (in group), almost parallel-sided. Dorsal surface fairly convex, with a deep impression in front of middle. Lateral borders in middle straight, border barely narrower to humerus. Preapical sinuosity barely indicated. Widest diameter about at middle. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, very finely punctate-crenulate, intervals perceptibly convex. Microreticulation and punctures absent, surface very glossy.

Lower surface. Metepisternum < 2.5× as long as wide at apex. Pilosity of abdomen moderately sparse, on the terminal sternum slightly denser.

Male genitalia (Fig. 16). Very small as compared with body size and size of genitalia of the other species. Genital ring wide, asymmetrical, apex rather narrow, obtusely rounded at tip. Aedeagus comparatively short and stout, not much depressed, rather wide, laterally slightly convex, lower surface moderately concave, near apex slightly turned down. Apex short, narrow, depressed, slightly spatulate, with obtuse tip. Folding of internal sac simple and without any sclerotized pieces. Both parameres comparatively short, right paramere with obtusely rounded apex, left paramere triangular with wide, obliquely rounded apex.

Female genitalia (Fig. 21). Very similar to those of *N. macrophthalmum*, spec. nov., but gonocoxite 2 shorter and wider, gonocoxite 1 with c. 10 comparatively shorter setae, and aletaral plate with sparser and shorter setae.

Variation. Little variation noted, except for a single specimen with extraordinarily narrow pronotum.

Distribution. Central Papua Indonesia.

Collecting circumstances. Sampled at median altitude, between 1700 m and 2250 m, in montane rain forest.

Relationships. A morphologically quite isolated species in this group, as well with respect to certain characters of the external morphology, as to size and shape of the aedeagus.

Notagonum vile Darlington
Figs 17, 22, 35, 54

Darlington, 1952: 135. – Darlington 1971: 278; Lorenz 1998: 403.

Examined types. Holotype: ♂, "Dobodura Papua, N.G. Mar-July, 1944 Darlington / *vile* ♂ descr. / *Notagonum vile* Darl. / M.C.Z. Type 28595" (MCZ). – Paratype: 1♀, "Dobodura Papua, N.G. Mar-July, 1944 Darlington / Paratype *Notagonum vile* Darl. / *Notagonum vile* Darl. Det. Darlington" (NMPC).

Diagnosis. Species of the *angustellum* group sensu Darlington (1952), characterized by the conspicuously bent apex of the aedeagus; distinguished from the closely related *N. hamatum* spec. nov. by larger body size, distinct reddish margins of pronotum and elytra, distinctly rugose basal grooves of pronotum, and obliquely bent, symmetrical apex of the aedeagus.

Redescription

Measurements. Length: 6.3-7.4 mm; width: 2.5-2.85 mm.

Ratios. Width/length of pronotum: 1.27-1.34; width widest diameter/base of pronotum: 1.16-1.27; width head/pronotum: 0.85-0.91; length/width of elytra: 1.57-1.65; length/width of 6th antennomere: 3.5-3.9.

Colour (Fig. 54). Dark piceous to black, lateral margin of pronotum distinctly reddish yellow or reddish, lateral margin of elytra narrowly reddish. Clypeus, labrum, and mandibles brown, palpi yellow or slightly infuscate, antenna more or less infuscate, but 1st antennomere usually yellow. Legs yellow, tibiae and tarsi usually not darker. Lower surface piceous to black.

Head (Figs 35, 54). Distinctly narrower than prothorax. Eyes large, considerably but not semicircularly protruded, orbits very short, though still perceptible, oblique. Clypeal suture shallow, in middle indistinct, clypeus basally barely raised. Frontal furrows irregularly oblique, wide, moderately impressed, not reaching the eyes. Mandibles moderately elongate (in group), straight, not porrect. Antenna slender and elongate, surpassing base of pronotum by about five antennomeres, median antennomeres slightly less than 4× as long as wide. Both palpi slender and elongate. Microreticulation

extremely superficial, barely recognizable, about isodiametric, no punctures visible, surface very glossy.

Prothorax (Figs 35, 54). Rather wide (in group), but varied, slightly cordiform, with more or less wide basis, widest at apical third, laterally evenly convex, slightly concave near base. Disk comparatively depressed, lateral margins and lateral sulcus comparatively narrow (in group), sulcus shallow and margins barely upturned, near base explanate. Apical margin very slightly concave, apical angles little projected, rounded. Basal angles almost rectangular, sharp, base in middle straight, laterally slightly oblique. Both apex and base laterally bordered, in middle not bordered. Anterior and posterior transverse sulci very shallow, median line shallow though distinct. Basal grooves shallow, wide, slightly rugose due to very distinct microreticulation, mediad with a short, straight linear impression. Disk impunctate or extremely finely and sparsely punctate, glossy, with finest and extremely superficial traces of transverse microreticulation in some areas, recognizable only at very high magnification.

Elytra (Fig. 54). Comparatively short and wide (in group), but varied, distinctly widened towards apical third, considerably narrower towards humerus. Dorsal surface rather convex, with very slight impression in front of middle. Lateral borders slightly convex throughout. Preapical sinuosity moderately deep. Widest diameter about at apical third. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, almost impunctate, intervals usually depressed, but see under "Variation". Microreticulation extremely fine and superficial, sometimes barely recognizable even at high magnification, consisting of dense transverse lines; punctures absent, surface very glossy.

Lower surface. Metepisternum c. 2.5 × as long as wide at apex. Pilosity of abdomen rather sparse, on the terminal sternum absent or extremely sparse.

Male genitalia (Fig. 17). Medium sized as compared with the genitalia of the other species. Genital ring moderately wide, slightly asymmetrical, apex fairly wide, obtusely rounded. Aedeagus moderately elongate, wide, laterally slightly convex, lower surface gently concave. Apex elongate, obliquely bent down, with a short hook at tip. Folding of internal sac simple, with a large, finely denticulate fold in apical part. Both parameres moderately elongate, right paramere with rounded apex, left paramere triangular, with rounded apex.

Female genitalia (Fig. 22). Very similar to those of *N. macrophthalmum*, spec. nov., but gonocoxite 2 shorter and wider and gonocoxite 1 with c. 12 setae at apical rim.

Variation. According to the available material a quite varied species, in particular with respect to body size and relative shape of pronotum and elytra. The male aedeagus, however, is quite similarly shaped and structured in all dissected males.

The single unlocalized male from Western New Guinea (probably from the central part of former Dutch New Guinea) differs by less protruded eyes and distinctly convex elytral striae, but the aedeagus is quite similar.

A single female specimen from the Panai Province in north-western Papua Indonesia differs in its less cordiform pronotum, shorter and dorsally more convex elytra, perceptibly convex elytral intervals, and even shorter antenna. It may be representative of a separate taxon, but any decision has to be postponed until males from this area are available.

Distribution. Central Papua New Guinea, apparently also central Papua Indonesia, perhaps also north-western Papua Indonesia.

Collecting circumstances. Largely unknown. The specimens from Oomsis were collected at light on the ground of rain forest.

Additional material. 1♂, "vic. Nadzab, Brit. N. G. July 1944 Darlington / *vile* Darl. Det. Darlington" (MNPC); 1♂, "Goroka Beira New Guinea R. Hornabrook 16/2/71" (MNZ); 5♂♂, 6♀♀, "XI 78 PNG/Morobe Umg. Kaiapit / Papua Nlle. Guinée W.G. Ullrich" (CBM, MNHG); 1♂, 2♀♀, "8 V 79 PNG/Morobe Kassam Pass Kung Creek / Papua Nlle. Guinée W.G. Ullrich" (CBM, MNHG); 1♀, "Papua Nlle Guinée Morobe II 80 env. Gurakor W.G. Ullrich" (MNHG); 1♂, 1♀, "06°30S 146° 48.00E Oomsis, Morobe, PNG Light Trap Ground 1 26 July 2000 R.L. Kitching" (CBM, QMB); 1♂, "Z. Nieuw-Guinea Versteeg. 1912/13 Kloofs. (? unreadable) y/10" (ZMAN); 1♀, "Irian Jaya, Panai-Pr. Nabire-Pusppensaat km 60, 200 m, 15.8. 1991 leg. A. Riedel" (CBM).

Notagonum hamatum, spec. nov.

Figs 18, 36, 55

Types. Holotype: ♂, "Irian Jaya, Nabire Dist. Cemara River 150 m, 8.1998 leg. M. Balke" (CBM).

Etymology. The name refers to the remarkably hook-shaped apex of the aedeagus.

Diagnosis. Species of the *angustellum* group sensu Darlington (1952), characterized by the conspicuously bent apex of the aedeagus; distinguished from the closely related *N. vile* Darlington by lesser body size, dark margins of pronotum and elytra, far less rugose basal grooves of pronotum, and rectangularly bent and asymmetrical apex of the aedeagus.

Description

Measurements. Length: 5.9 mm; width: 2.35 mm.

Ratios. Width/length of pronotum: 1.32; width widest diameter/base of pronotum: 1.22; width head/pronotum: 0.92; length/width of elytra: 1.57; length/width of 6th antennomere: 3.6.

Colour (Fig. 55). Black, lateral margins of pronotum and elytra dark. Clypeus, labrum, and mandibles brown, palpi yellow, antenna slightly infuscate, but 1st antennomere yellow, 2nd and 3rd antennomeres only infuscate at apex. Legs yellow, tibiae and tarsi not darker. Lower surface black.

Head (Figs 36, 55). Distinctly narrower than prothorax. Eyes large, considerably but not semicircularly protruded, orbits very short, though still perceptible, oblique. Clypeal suture shallow, in middle indistinct, clypeus basally slightly raised. Frontal furrows oblique, wide, rather impressed, not reaching the eyes. Mandibles moderately elongate (in group), straight, not porrect. Antenna slender and elongate, surpassing base of pronotum by about 4.5 antennomeres, median antennomeres c. 3.5 × as long as wide. Both palpi slender and elongate. Microreticulation extremely superficial, barely recognizable, about isodiametric, no punctures visible, surface very glossy.

Prothorax (Figs 36, 55). Moderately wide (in group), slightly cordiform, with fairly wide basis, widest at apical third, laterally evenly convex, slightly concave near base. Disk comparatively depressed, lateral margins and lateral sulcus comparatively narrow (in group), sulcus shallow and margins barely upturned, near base explanate. Apical margin slightly concave, apical angles little projected, rounded. Basal angles almost rectangular, sharp, base slightly convex throughout. Both apex and base laterally bordered, in middle not bordered. Anterior and posterior transverse sulci very shallow, median line shallow though distinct. Basal grooves shallow, wide, slightly rugose due to moderately distinct microreticulation, mediad with a short, straight linear impression. Disk impunctate, glossy, with finest and extremely superficial traces of transverse microreticulation in some areas, recognizable only at very high magnification.

Elytra (Fig. 55). Comparatively short and wide (in group), distinctly widened towards apical third, considerably narrower towards humerus. Dorsal surface rather convex, without perceptible impression. Lateral borders slightly convex throughout. Preapical sinuosity moderately deep. Widest diameter about at apical third. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, very shallow, barely deepened towards apex, absolutely impunctate, intervals depressed. Microreticulation extremely fine and superficial, but recognizable at high magnification, consisting of dense transverse lines; punctures absent, surface very glossy.

Lower surface. Metepisternum < 2.5 × as long as wide at apex. Pilosity of abdomen very sparse, on the terminal sternum absent.

Male genitalia (Fig. 18). Rather small as compared with the genitalia of the other species. Genital ring moderately wide, asymmetrical, apex moderately wide, obtusely rounded. Aedeagus rather short, wide, laterally convex, lower surface gently concave, near apex very slightly convex. Apex elongate, rectangulary bent down, with a short hook at tip. Folding of internal sac simple, with a large, finely denticulate fold in apical part. Right paramere rather elongate, lancet-shaped, with acute apex, left paramere short, triangular, with rounded apex.

Female genitalia. Unknown.

Variation. Unknown.

Distribution. North-western part of Papua Indonesia, close to the coast. Known only from type locality.

Collecting circumstances. Not specified, but holotype collected in lowland forest. Probably this is a ground living species.

Relationships. In its external as well as male genitalic morphology most similar to *N. vile* Darlington.

Notagonum crenulipenne, spec. nov.

Figs 23, 37, 56

Types. Holotype: ♀, "Birdshead Peninsula WARKAPI (nr. Breie) primary lowland forest 500 m, at light 12.XI.1993 / INDONESIA Irian Jaya A. J. de Boer, A. L. M. Rutten & R. de Vos" (ZMAN).

Etymology. The name refers to the distinctly crenulate elytral intervals of this species.

Diagnosis. Species of the *angustellum* group sensu Darlington (1952); characterized by large size, impilose abdomen, distinctly punctate elytra striae, and the narrow, cordiform pronotum which bears elongate, conspicuously linear basal grooves.

Description

Measurements. Length: 7.6 mm; width: 2.9 mm.

Ratios. Width/length of pronotum: 1.25; width widest diameter/base of pronotum: 1.20; width head/pronotum: 0.88; length/width of elytra: 1.65; length/width of 6th antennomere: 4.0.

Colour (Fig. 56). Black, lateral margin of pronotum very indistinctly reddish. Clypeus, labrum, and

mandibles brown, palpi yellow, antenna infuscate, but 1st antennomere yellow, 2nd and 3rd antennomeres yellow at base. Femora pale yellow, tibiae and tarsi slightly, but not contrastingly darker. Lower surface black.

Head (Figs 37, 56). Slightly narrower than prothorax. Eyes large, almost semicircularly protruded, orbits extremely short, barely perceptible. Clypeal suture distinct, laterally deep, clypeus basally slightly raised. Frontal furrows irregular, anteriorly striaght, then oblique but barely impressed. Mandibles elongate (in group), straight, but not porrect. Antenna slender and elongate, surpassing base of pronotum by about five antennomeres, median antennomeres c. 4× as long as wide. Both palpi slender and elongate. Microreticulation absent, no punctures visible, surface very glossy.

Prothorax (Figs 37, 56). Narrow (in group), narrowly cordiform, with wide basis, widest at apical fourth, laterally evenly convex, with shallow but elongate concavity in front of base. Disk comparatively convex, lateral margins and lateral sulcus narrow (in group), sulcus fairly deep and margins slightly upturned, only near base slightly explanate. Apical margin very slightly concave, apical angles barely projected, rounded. Basal angles almost rectangular, sharp, base almost straight. Both apex and base laterally bordered, in middle not bordered. Anterior and posterior transverse sulci very shallow, median line shallow though distinct. Basal grooves deep, linear, elongate, lateral part of base almost not rugose. Disk without any microreticulation, impunctate, remarkably glossy.

Elytra (Fig. 56). Comparatively short and wide (in group), distinctly widened towards apical third, considerably narrowed towards humeri. Dorsal surface comparatively convex, without a perceptible impression. Lateral borders convex throughout. Preapical sinuosity moderately deep. Widest diameter about at apical third. Humeri wide, rounded, apex rounded and slightly incurved towards suture. Striae complete, well impressed, slightly deepened towards apex, finely but distinctly punctate-crenulate, intervals perceptibly convex. Microreticulation and punctures absent, surface very glossy.

Lower surface. Metepisternum c. 2.5× as long as wide at apex. Abdomen impilose.

Male genitalia. Unknown.

Female genitalia (Fig. 23). Gonocoxite 2 narrow and elongate, straight, with rather acute apex; with three moderately large ventro-lateral ensiform setae, a comparatively elongate nematiform seta raising from a small pit on the dorso-median surface close to apex, but without a dorso-median ensiform seta. Apex of stylomere 1 on ventral surface with 7 markedly elongate and stout setae. Lateral plate multisetose at and near margin, setae elongate.

Variation. Unknown.

Distribution. Vogelkop Peninsula, western Papua Indonesia. Known only from type locality.

Collecting circumstances. Holotype sampled at light in lowland rain forest at medium altitude.

Relationships. Uncertain. Probably a systematically rather isolated species, but the relationships remain unknown as long as no males are available.

Key to the species of the *angustellum* group of the genus *Notagonum* Darlington

1. Abdomen densely pilose **and** basal grooves of pronotum shallow and punctate-chagreened **and** elytra elongate with ratio lengt/width > 1.7 (Figs 38-43) **and** antenna elongate, 6th antennomere > 3.8× as long as wide **and** aedeagus comparatively small, narrow, parallel-sided, and with straight apex (Figs 1-6). .....2.
– Not all these character states present..... 7.
2. Eyes but moderately projected, orbit c. ⅓ as long as eye (Fig. 24); antenna and legs unicolourous yellow; aedeagus with elongate apex (Fig. 1). ne. Papua New Guinea. ..... *angustellum* Darlington
– Eyes markedly projected, orbit small, far less than ⅓ as long as eye (Figs 25, 26); at least 4th antennomere and tibiae more or less infuscate; aedeagus with shorter apex (Figs 2-6). ..... 3.
3. Eyes very large and markedly protruded, orbits barely recognizable (Fig. 26); at least 1st antennomere yellow; aedeagus very slender and elongate, with moderately elongate apex, lower surface but moderately concave (Fig. 3). New Guinea. .....*macrophthalmum*, spec. nov.
– Eyes less protruded, orbits recognizable (Fig. 25); 1st antennomere usually infuscate; aedeagus either with shorter, more obtuse apex (Fig. 2), or lower surface more concave (Figs 4-6)..... 4.
4. Very large species, body length > 7.8 mm; pronotum wide in relation to head, ratio width pronotum/head > 1.29 (Fig. 43); aedeagus in apical part very concave, with a small, tridentate sclerite in apical part of the internal sac (Fig. 6). c. Papua New Guinea. .....*gorokae*, spec. nov.
– Smaller species, body length < 7.2 mm; pronotum narrower in relation to head, ratio width pronotum/head < 1.24; aedeagus in apical part not more concave, internal sac without any sclerotized pieces (Figs 2, 4, 5)..... 5.

5. Head narrower as compared with pronotum, ratio width of head/width of pronotum < 0.9; lower surface of aedeagus less concave, apex shorter, more obtuse (Fig. 2). ne. Papua Indonesia. .....*darlingtoni*, spec. nov.

– Head wider as compared with pronotum, ratio width of head/width of pronotum > 0.92; lower surface of aedeagus more concave, apex longer, less obtuse (Figs 4, 5). ..... 6.

6. Pronotum narrower, ratio width/length < 1.25, with relatively wider base, ratio widest diameter/width of base 1.18-1.21 (Fig. 28); antenna and legs less dark; lower surface of aedeagus slightly more concave, apex more acute and slightly asymmetrical (Fig. 5). ec. Papua New Guinea... ..... *parvicolle*, spec. nov.

– Pronotum wider, ratio width/length > 1.30, with relatively narrower base, ratio widest diameter/width of base 1.22-1.24 (Fig. 27); antenna and legs darker; lower surface of aedeagus slightly less concave, apex symmetrical and less acute (Fig. 4). c. Papua New Guinea, c. Papua Indonesia. ..... *nigrinum*, spec. nov.

7. Abdomen densely pilose **and** basal grooves of pronotum shallow and punctate-chagreened **and** antenna elongate, ratio length/with of 6th antennomere > 4.0. .....8.

– Not all these characters present. ..... 10.

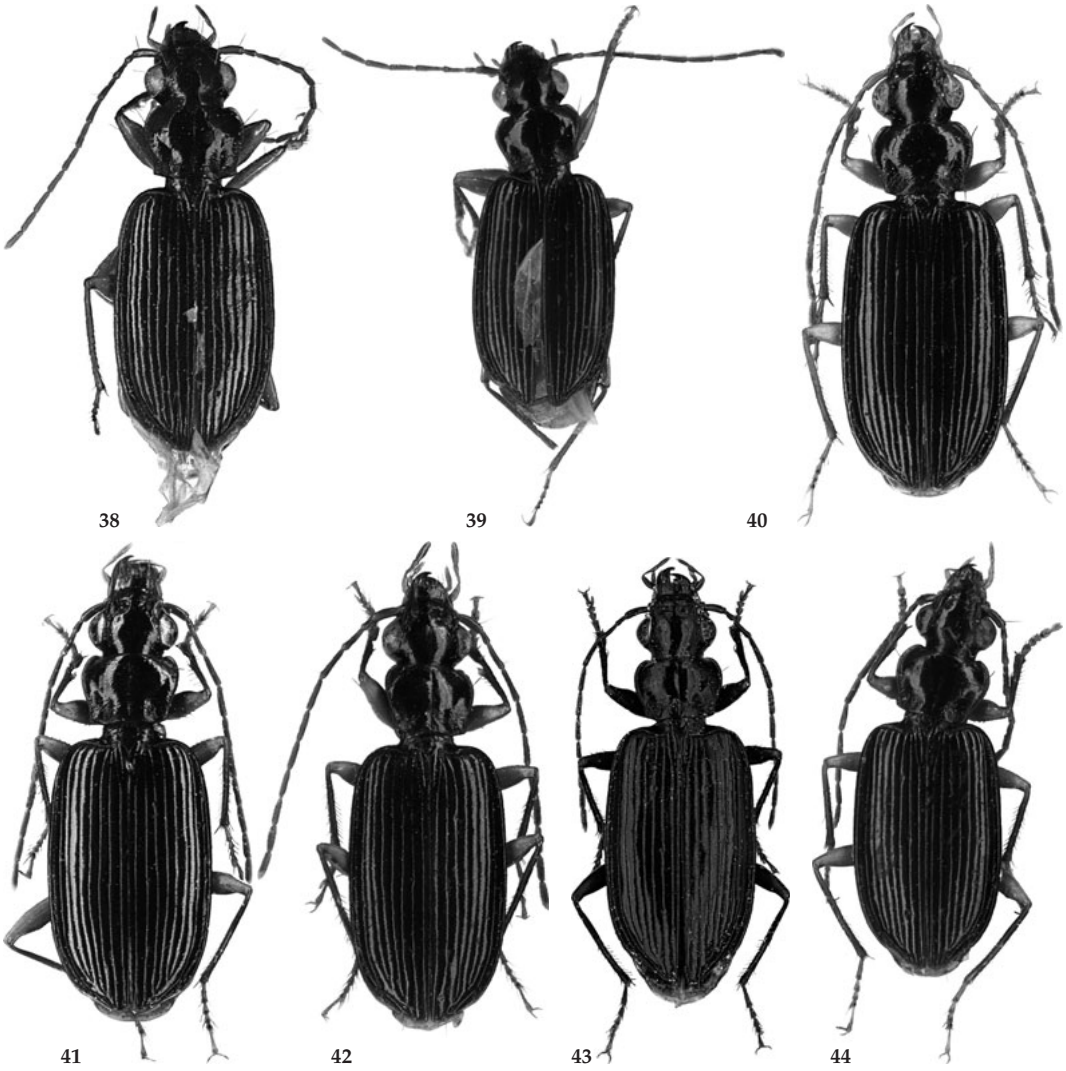
8. Antenna and legs uniformly black; elytra shorter and perceptibly oval-shaped, ratio length/width < 1.67 (Fig. 45); antenna shorter, 6th antennomere c. 4 × as long as wide; aedeagus small, but rather compact and wide, lower surface markedly concave, with short, straight, triangular apex (Fig. 8). ne. Papua New Guinea. ....*subnigrum* Darlington

– At least femora yellow, commonly also 1st antennomere; elytra longer and almost parallel-sided, ratio length/width > 1.70 (Figs 44, 46); antenna longer, 6th antennomere > 4.4 × as long as wide; aedeagus larger: **either** rather slender, with far less concave lower surface and less triangular apex (Fig. 7), **or** aedeagus remarkably widened in middle, with very elongate, slightly upturned, very acute apex (Fig. 9). ... 9.

9. Pronotum with narrower base, ratio widest diameter/width of base > 1.30, with shallower, more explanate basal grooves (Fig. 29); aedeagus rather slender, with less concave lower surface and shorter, not upturned, and less acute apex

Table 1. Measurements and ratios of the taxa of the *Notagonum angustellum* group. Abbreviations: **N**, number of measured specimens; **l**, body length in mm; **w/l pr**, ratio width/length of pronotum; **dia/b pr**, ratio width of widest diameter/width of base of pronotum; **hd/pr**, ratio width of head/width of pronotum; **l/w el**, ratio length/width of elytra; **l/w 6th**, ratio length/width of 6th antennomere.

	N	l	w/l pr	dia/b pr	hd/pr	l/w el	l/w 6th
angustellum	1	5.7	1.24	1.20	0.91	1.71	3.8
darlingtoni	2	5.9-6.8	1.32-1.33	1.22-1.24	0.89	1.70-1.72	4.0-4.1
macrophthalmum	8	6.0-6.8	1.33-1.35	1.23-1.27	0.92-0.94	1.71-1.76	3.9-4.2
nigrinum	4	6.4-7.2	1.31-1.34	1.22-1.24	0.92-0.96	1.74-1.79	4.4-4.6
parvicolle	3	6.45-6.6	1.24-1.25	1.18-1.21	0.95-0.99	1.75-1.80	4.0-4.1
gorokae	2	7.85-8.1	1.32-1.35	1.29-1.31	0.89-0.91	1.80-1.82	4.0-4.1
devosi	6	6.9-8.0	1.32-1.36	1.30-1.33	0.89-0.92	1.70-1.73	4.5-4.7
subnigrum	2	7.4-7.7	1.26-1.27	1.21-1.24	0.88	1.65-1.67	4.0-4.1
schuelei	4	6.3-7.65	1.32-1.36	1.21-1.25	0.93-0.97	1.71-1.74	4.4-4.6
ullrichi	8	6.2-6.7	1.28-1.34	1.22-1.28	0.86-0.89	1.66-1.71	3.1-3.6
marginale	1	6.0	1.42	1.28	0.89	1.64	4.0
skalei	1	6.2	1.22	1.20	0.90	1.63	4.25
garainae	1	6.8	1.25	1.28	0.88	1.62	4.25
kitchingi	6	6.0-6.5	1.27-1.35	1.14-1.22	0.88-0.92	1.58-1.65	2.8-3.4
fuscipes	4	6.5-6.55	1.24-1.26	1.21-1.22	0.89-0.91	1.62-1.64	3.7-3.8
lackneri	8	5.8-6.2	1.19-1.34	1.22-1.23	0.80	1.65-1.66	3.0-3.2
vile	8	6.3-7.4	1.27-1.34	1.16-1.27	0.85-0.91	1.57-1.65	3.5-3.9
vile ? (♀ Panai-Pr.)	1	6.8	1.30	1.21	0.89	1.53	3.3
hamatum	1	5.9	1.32	1.22	0.92	1.57	3.6
crenulipenne	1	7.6	1.25	1.20	0.88	1.65	4.0



Figs 38-44. Habitus. Body length in brackets. **38.** *Notagonum angustellum* Darlington (5.7 mm). **39.** *N. darlingtoni*, spec. nov. (6.8 mm). **40.** *N. macrophthalmum*, spec. nov. (6.5 mm). **41.** *N. nigrinum*, spec. nov. (7.2 mm). **42.** *N. parvicolle*, spec. nov. (6.6 mm). **43.** *N. gorokae*, spec. nov. (8.1 mm). **44.** *N. devosi*, spec. nov. (7.4 mm).

(Fig. 7). Vogelkop Peninsula, w. Papua Indonesia. ..... *devosi*, spec. nov.

– Pronotum with wider base, ratio widest diameter/ width of base <1.25, with deeper, less explanate basal grooves (Fig. 30); aedeagus more compact, with more concave lower surface and very elongate, slightly upturned, very acute apex (Fig. 9). Nabire Prov., w. Papua Indonesia. .... *schuelei*, spec. nov.

10. Basal grooves of pronotum wide and deep, more or less punctate at bottom, lateral margin laterad of the groove markedly upturned (Figs 31, 32). ..... 11.

– Basal grooves of pronotum either narrow and linear (Figs 33, 37) **or** shallow and explanate, but lateral margin laterad of the groove not or but feebly upturned (Figs 34-36)..... 14.

11. Elytra with distinct depression in basal half, apical margin of elytra barely sinuate (Fig. 53); aedeagus very small but remarkably compact and wide, with short, spatulate apex (Fig. 16). c. Papua Indonesia. ..... *lackneri*, spec. nov.

– Elytra at most with faint depression in basal half; apical margin of elytra distinctly sinuate (Figs 47-49); aedeagus larger and less compact, with gently sloping or triangular, but not spatulate apex (Figs 10-12). ..... 12.

12. Eyes but moderately projected, orbit c. ⅓ as long as eye (Fig. 47); antenna short, 6th antennomere < 3.5 × as long as wide; legs and antenna yellow; aedeagus narrow and elongate, with gently sloping apex (Fig. 10). c. Papua New Guinea. .... *ullrichi*, spec. nov.

– Eyes markedly projected, orbit very short (Fig. 48); antenna elongate, 6th antennomere > 4.0 × as long as wide; tibiae and antenna except 1st antennomere infuscate; aedeagus wider and less elongate, with more triangular apex (Figs 11, 12). ..... 13.

13. Pronotum wider and more cordiform, ratio width/length 1.42, base narrower, ratio widest diameter/width of base 1.28 (Fig. 31); margin of pronotum wider and yellow; aedeagus less wide in middle, lower surface more concave, with shorter apex (Fig. 11). Wondiwoi Mts. w. Papua Indonesia. .....*marginale*, spec. nov.

– Pronotum narrower and less cordiform, ratio width/length 1.22, base wider, ratio widest diameter/width of base 1.20 (Fig. 32); margin of pronotum narrow and dark; aedeagus very wide in middle, lower surface less concave, with elongate, markedly triangular apex (Fig. 12). e. Vogelkop Peninsula. w. Papua Indonesia. ....*skalei*, spec. nov.

14. Head and pronotum without any traces of microreticulation, very glossy **and** antenna elongate, 6th antennomere 4 × as long as wide **and** elytral striae perceptibly crenulate **and** basal grooves of pronotum linear and remarkably deep (Figs 37, 56); aedeagus unknown. e. Vogelkop Peninsula, w. Papua Indonesia. ....*crenulipenne*, spec. nov.

– Head and pronotum usually at least with traces of microreticulation, less glossy; not all characters together present. ..... 15.

15. Antenna elongate, 6th antennomere > 4 × as long as wide; pronotum markedly cordiform, with rather narrow base, ratio widest diameter/width of base 1.28; basal grooves linear, laterally little explanate (Fig. 33); aedeagus moderately slender, slightly widened in apical third, with a single sclerotized tooth at bottom of left side near apex of internal sac; apex of aedeagus elongate and very narrow, slightly upturned (Fig. 12). ec. Papua New Guinea. ..... *garainae*, spec. nov.

– Antenna shorter, 6th antennomere < 3.9 × as long as wide, usually shorter; pronotum less cordiform, with wider base, ratio widest diameter/width of base < 1.27, usually less; basal grooves linear, but laterally explanate (Figs 34-36); aedeagus differently shaped, with or without sclerotized tooth or teeth at bottom of left side near apex of internal sac (Figs 14, 15) **or** apex of aedeagus suddenly bent down (Figs 17, 18). .... 16.

16. Basal grooves of pronotum more linear, laterad less explanate or even slightly convex, not or barely rugose (Fig 34); aedeagus narrow and elongate, regularly curved, at the very apex slightly turned up (Figs 14, 15). .....17.

– Basal grooves of pronotum less linear, laterad explanate, finely rugose (Figs 35, 36); aedeagus compact, with suddenly bent down apex (Figs 17, 18). ..... 18.

17. Elytral striae finely crenulate; antenna longer, 6th antennomere > 3.7 × as long as wide; aedeagus with narrow and elongate, acute apex, internal sac without sclerotized teeth (Fig. 15). c. Papua Indonesia. ..... *fuscipes*, spec. nov.

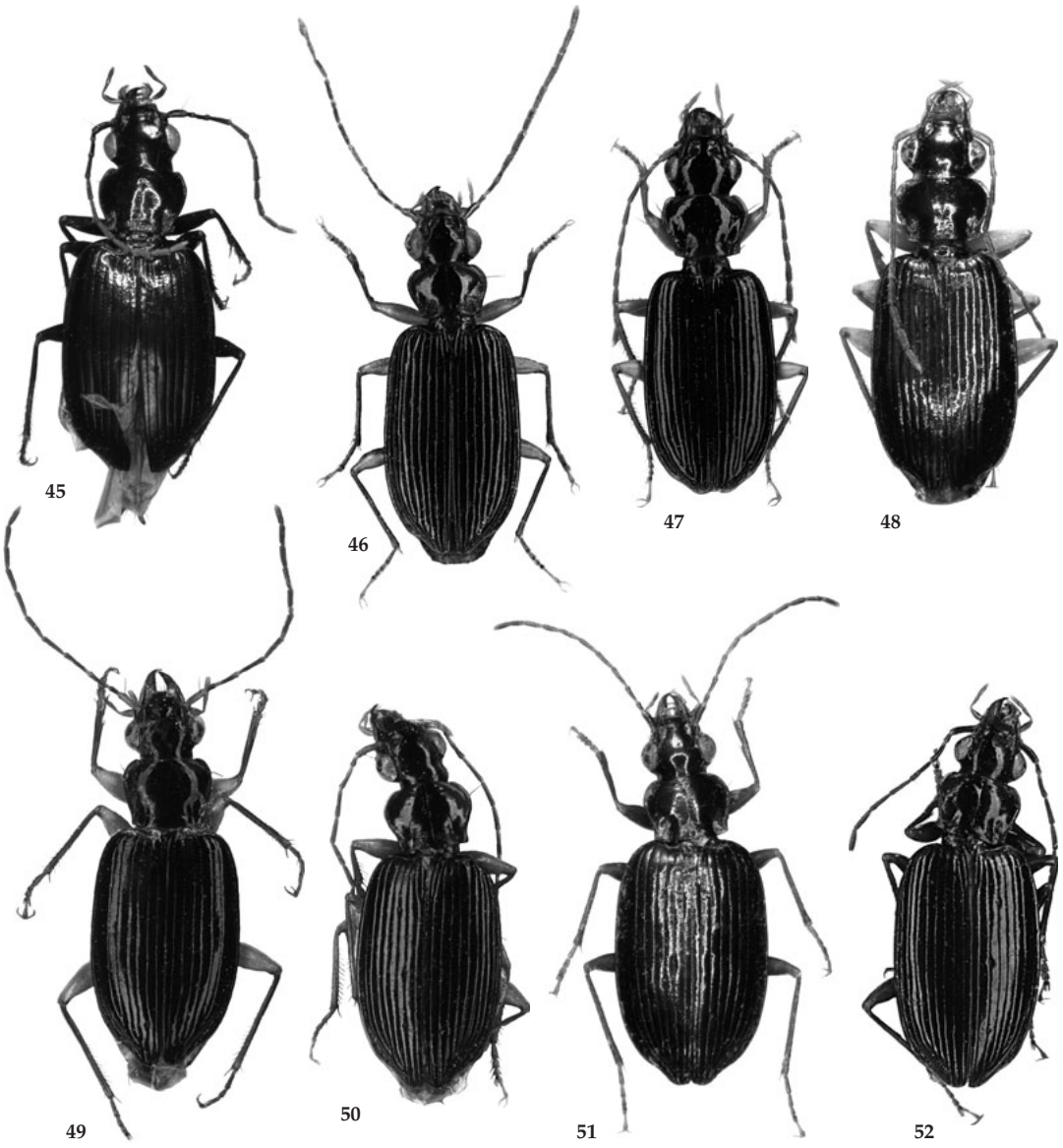
– Elytral striae not perceptibly crenulate; antenna shorter, 6th antennomere < 3.5 × as long as wide, usually even shorter; aedeagus with shorter and wider, obtuse apex, internal sac with one or two sclerotized teeth at bottom of apical part of internal sac (Fig. 14). Papua New Guinea and nw. Papua Indonesia. ..... *kitchingi*, spec. nov.

18. Larger species, length > 6.3 mm; lateral margin of pronotum distinctly pale, basal grooves more distinctly rugose (Fig. 35); apex of aedeagus obliquely bent, almost symmetrically inserted (Fig. 17). Papua New Guinea and c. Papua Indonesia (a single ♀ specimen from w. Papua Indonesia doubtful).....*vile* Darlington

– Smaller species, length 5.9 mm; lateral margin of pronotum dark, basal grooves barely rugose (Fig. 36); apex of aedeagus rectangularly bent, asymmetrically inserted (Fig. 18). nw. Papua Indonesia. ..... *hamatum*, spec. nov.

Remarks

The present revision of the species of the *angustellum* group of the genus *Notagonum* has demonstrated that the examination of the male genitalia is mandatory for the species differentiation in this group, but also that, with this framework available, a number of external morphological character states will become



Figs 45-52. Habitus. Body length in brackets. **45.** *N. subnigrum* Darlington (7.4 mm). **46.** *N. schuelei*, spec. nov. (7.3 mm). **47.** *N. ullrichi*, spec. nov. (6.4 mm). **48.** *N. marginale*, spec. nov. (6.0 mm). **49.** *N. skalei*, spec. nov. (6.2 mm). **50.** *N. garainae*, spec. nov. (6.8 mm). **51.** *N. kitchingi*, spec. nov. (6.4 mm). **52.** *N. fuscipes*, spec. nov. (6.5 mm).

evident which likewise can be used for characterization and differentiation of the taxa.

Although the aedeagi of a couple of species are quite similar in shape and even more similar in their very simple internal structure, almost always slight differences are present which, together with differences in characters of the external morphology, allow reasonably easy identification of species. The most promising features of the external morphology are: colour of antenna and legs; size of eyes, in combination with relative width of head as compared with the width of the pronotum; length of antenna; shape of pronotum; structure of the basal grooves of the pronotum; shape of elytra, in particular relative length, and convexity of the dorsal surface; presence or absence of an impression on the elytra; degree of punctation of elytral striae; degree of the pilosity on the abdomen. In those groups which possess a very

similarly shaped aedeagus, it is one or several of these external features which allow species identification; but, vice versa, commonly different structure of the aedeagus allows easier differentiation of morphologically very similar species.

By means of this exemplary group which so far was believed to be well known, the present paper also demonstrates how numerous the platynine fauna of New Guinea actually is. It is to be expected that other platynine genera in New Guinea will reveal a comparative richness in species when examined in a similar manner. See, for example, Baehr (1992, 1995, 1998, 2000, 2001).

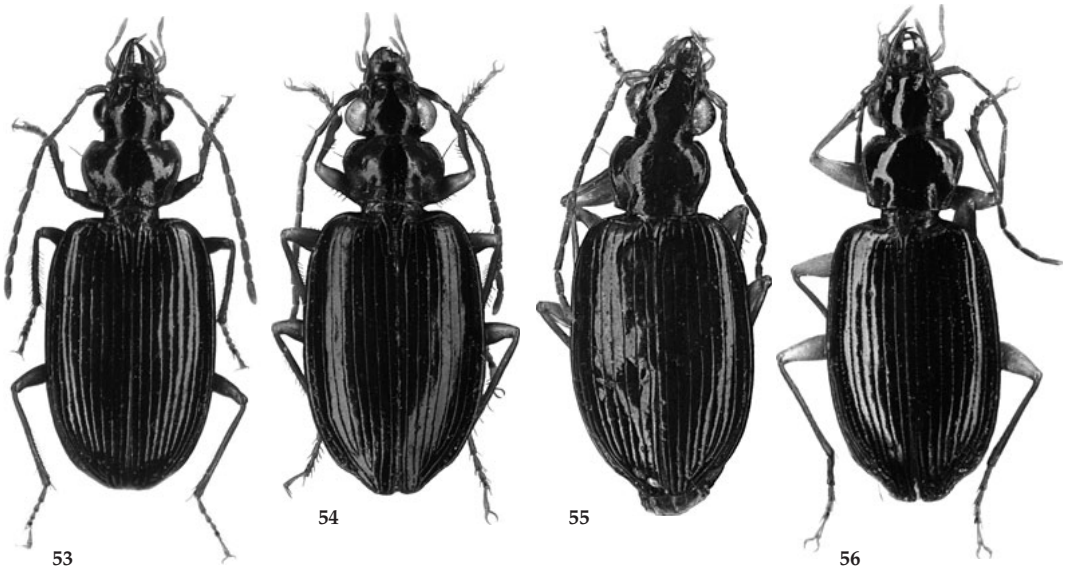
It has been already emphasized that most species of the *angustellum* group still are very similar in external and genitalic characters, and probably are closely related which means that they generally should be of rather recent origin. It seems that species-pairs exist which are extremely similar in their external and genitalic morphology and probably are closely related, that possess separated ranges either in eastern and western New Guinea (e. g. *parvicolle*/*nigrinum*, *vile*/*hamatum*), or in mainland Papua Indonesia and Vogelkop Peninsula (e. g. *schuelei*/*devosi*), or in lowland and montane areas (e. g. *kitchingi*/*fuscipes*). In view of the rather recent uprising of most of New Guinea from the ocean which dates only about five millions of years ago (De Boer 1995), it is not too surprising that the carabid fauna generally is young. Although Darlington (1971) suggested that most of the New Guinean platynine fauna should have had their origin in south-east Asia, this is doubtful for the genus *Notagonum* (if this actually forms a monophyletic group!), because the genus is widespread (but not rich in species) in Australia, but to the north of New Guinea it was so far recorded only from Sulawesi and the Moluccas.

However, recently Liang & Kavanaugh (2005) tentatively transferred two species from Borneo and the Philippines from the genus *Onycholabis* Bates, 1873 to *Notagonum.* This would mean that the genus *Notagonum* has a wider distribution in the Oriental Region, but the actual status of both mentioned species still is somewhat doubtful. From the description and the figure in Liang & Kavanaugh (2005) it seems that *Notagonum luzonensis* (Jedlicka, 1935) could belong to the main group of the genus *Notagonum*, e. g. close to *N. margaritum* Darlington, 1952, and others. But *Notagonum macrops* (Louwerens, 1955) from Borneo and *Sternodelus arrowi* (Jedlicka, 1935) from the Philippines, according to the figures in Liang & Kavanaugh (2005) and for *N. macrops* also from the picture in the Harvard University type catalogue, in their body shape are quite similar to species of the *angustellum* group as used in the present paper. Further examination of external features, but also of the male genitalia, are required to fix the taxonomic status of these species.

In this connection it must be stressed that it is still uncertain whether or not the genus *Notagonum*, as presently used, actually is a monophyletic genus, whether it is purely an assemblage of more or less generalized platynine species which are just united into a genus, because they lack those apomorphic characters that are present in the various other platynine genera present in New Guinea and in the southern Oriental region. This opinion was already expressed by Darlington (1971), and, because no thorough taxonomic or even phylogenetic survey of the Oriental-Papuan Platynines has been undertaken so far, *Notagonum* for the present will remain a genus of convenience and of uncertain limits. Therefore, at present it is impossible to decide whether the genus is a monophyletic unit, or rather a paraphyletic assemblage of similarly structured species which in future needs to be divided into monophyletic units.

As mentioned before, the bulk of species of the genus *Notagonum* occur in New Guinea (54 species at present, including those described herein, plus additional 5 subspecies). This raises the question why so many species could evolve on this island – many more than in Australia and in the northern extra-New Guinean range, together. The apparent taxonomical radiation probably is due to two different reasons: (1) the agglomeration of what today is New Guinea from a number of terranes of quite different origin and provenance which perhaps brought with them separate stocks (De Boer 1995); and (2) the quick uplifting of the central mountain ranges which formed the extremely rugged montane character of large parts of present New Guinea. The latter process may have been mainly responsible for the apparent dismembering of ranges of formerly more widespread species and subsequently for the extreme richness of probably still closely related but today allopatric species.

In spite of the number of specimens available for examination, very little is known about habits and ecology of this group. Unfortunately, the labels of specimens bear little information about collecting circumstances, some not even bear any information about the altitude where the specimens were sampled. From Darlington's (1952, 1971) notes about those species which he collected himself, we know that species of *Notagonum* occur from lowland to the highest mountains (Baehr 2008). This is also true for the species of the *angustellum* group, although a couple of specimens were collected in lowland. Most specimens of the three species of the *angustellum* group which Darlington sampled *(N. angustellum*, *N. subnigrum*, *N. vile)* were collected under stones, in



Figs 53-56. Habitus. Body length in brackets. **53.** *N. lackneri*, spec. nov. (6.0 mm). **54.** *N. vile* Darlington (6.7 mm). **55.** *N. hamatum*, spec. nov. (5.9 mm). **56.** *N. crenulipenne*, spec. nov. (7.6 mm).

pebble, and in grass, near streams. Many of the newly described species, however, apparently were rather collected in closed forest, but it is uncertain whether all are ground-living species, whether specimens have been collected from logs or even from trunks of standing trees. Certainly the structure of the tarsi suggests rather ground-living habits, but it should be mentioned that certain species of *Notagonum* in eastern Australia are regularly collected from the bark of standing trees.

At several localities two or even three species of the *angustellum* group occur together, and commonly have been collected together. Examples are:

Dobodura: *angustellum*, *subnigrum*, *vile*
Watabung: *gorokae*, *macrophthalmum*, *parvicolle*
Oomsis: *kitchingi*, *macrophthalmum*, *vile*
Pass Valley: *fuscipes*, *lackneri*, *nigrinum*
Kassem Pass: *ullrichi*, *vile*
Rintebe: *parvicolle*,*ullrichi*
Warkapi: *crenulipenne*, *devosi*
Wondiwoi Mts: *macrophthalmum*, *marginale*
Pusppensaat: *kitchingi*, *vile*

Due to future additional collecting efforts this list most probably will be further increased. The common occurrence in identical environments and probably at the same spots raises the question, in which way these extremely similar species avoid competition for resources and likewise avoid interbreeding with related species. Again much too less is known about ecological preferences and ethological habits of all species, to even discuss these questions. Moreover, at several localities probably additional species of the genus *Notagonum* occur, which, however, belong to other species groups within the genus, and which in some ways may deviate in their habits from the species of the *angustellum* group.

It must be once more stressed that the present paper can give only a preliminary account of the systematics and distribution of the species of the *angustellum* group. Much more sampling would be needed for a better knowledge of variation and distribution, but even of the pure species inventory. In particular in the western half of New Guinea sampling still was extremely unsystematic and erratic, and, as a consequence, of certain species at present only the holotype is known. In this connection it should be mentioned that almost all material available for this paper (except those specimens collected by Darlington himself) was sampled by non-carabidologists, usually as by-products of their own more or less specialized collecting. Their results are of remarkable value, but systematic collecting by carabidologists using specialized methods, as sifting ground litter, fogging as well canopy as tree trunks and logs, light collecting on the ground and in the canopy, systematic collecting by hand in gravel and pebble near streams and rivers, pitfall traps, Malaise traps, etc. would be needed to receive a more satisfactory knowledge about taxonomy and distribution.

Alphabetical checklist of the species of the *angustellum* group with information about their recorded distribution

angustellum Darlington	e. Papua New Guinea
crenulipenne, spec. nov.	Vogelkop Pen., w. Papua Indonesia
darlingtoni, spec. nov.	ne. Papua Indonesia
devosi, spec. nov.	Vogelkop Pen., w. Papua Indonesia
fuscipes, spec. nov.	c. Papua Indonesia
garainae, spec. nov.	c. Papua New Guinea
gorokae, spec. nov.	c. Papua New Guinea
hamatum, spec. nov.	nw. Papua Indonesia
kitchingi, spec. nov.	c. Papua New Guinea, nw. Papua Indonesia
lackneri, spec. nov.	c. Papua Indonesia
macrophthalmum, spec. nov.	c. Papua New Guinea, w. Papua Indonesia
marginale, spec. nov.	w. Papua Indonesia
nigrinum, spec. nov.	c. Papua Indonesia
parvicolle, spec. nov.	c. Papua New Guinea
schuelei, spec. nov.	w. Papua Indonesia
skalei, spec. nov.	Vogelkop Pen., w. Papua Indonesia
subnigrum Darlington	e. Papua New Guinea
ullrichi, spec. nov.	c. Papua New Guinea
vile Darlington	whole New Guinea

Acknowledgements

I am greatly indebted to the following curators and collectors for their kind loan or gift of important material: F. van Assen (Leiden), M. Balke (München), B. Brugge (Amsterdam), S. Cover (Cambridge/Mass.), G. Cuccudoro (Génève), A. Drumont (Bruxelles), C. Gillett (London), J. Hajek (Prague), R. Hornabrook (Wellington), R. L. Kitching (Brisbane), G. B. Monteith (Brisbane), P. D. Perkins (Cambridge/Mass.), A. Riedel (Karlsruhe), A. Skale (Bayreuth), R. de Vos (Amsterdam), A. Weigel (Pössneck). For the habitus photographs I am indebted to Mrs. M. Müller of ZSM (München).

References

Baehr, M. 1992. On some agonine beetles of the genus *Fortagonum* Darlington from New Guinea (Coleoptera, Carabidae, Agoninae). Mitteilungen der Münchner Entomologischen Gesellschaft 82: 73-81.

– – 1995. New species and new records of the genera *Fortagonum* Darlington and *Collagonum*, gen. nov. from New Guinea (Insecta, Coleoptera, Carabidae, Agoninae). Spixiana 18: 15-43.

– – 1998. New species of the genus *Fortagonum* Darlington from western New Guinea (Insecta, Coleoptera, Carabidae, Agoninae). Spixiana 21: 11-20.

– – 2000. Revision of the genus *Idiagonum* Darlington from New Guinea (Carabidae, Agoninae). Coleoptera 4: 55-92.

– – 2001. Further new species of the genera *Fortagonum* Darlington and *Collagonum* Baehr from New Guinea (Insecta, Coleoptera, Carabidae, Agoninae). Spixiana 24: 53-72.

– – 2008. New agonine species from New Guinea (Coleoptera: Carabidae: Agonini). Folia Heyrovskyana 16: 55-76.

– – 2009. The ground beetles (Coleoptera: Carabidae) of Papua Indonesia. www.papua-insects.nl/insect orders/Coleoptera/Carabidae/Carabidae.htm

Darlington, P. J. Jr. 1952. The carabid beetles of New Guinea. Part 2. The Agonini. Bulletin of the Museum of Comparative Zoology 107: 89-252.

– – 1971. The carabid beetles of New Guinea. Part 4. General considerations; analysis and history of fauna; taxonomic supplement. Bulletin of the Museum of Comparative Zoology 142: 129-337.

De Boer, A. J. 1995. Island and cicadas adrift in the West-Pacific. Biogeographic patterns related to plate tectonics. Tijdschrift voor Entomologie 138: 169-244.

Liang, H. & Kavanaugh, D.H. 2005. A review of the genus *Onycholabis* Bates (Coleoptera: Carabidae: Platynini) with description of a new species from western Yunnan, China. Coleopterist's Bulletin 59 (4): 507-520.

Lorenz, W. 1998. Systematic list of extant ground beetles of the world (Insecta Coleoptera "Geadephaga": Trachpachidae and Carabidae incl. Paussinae, Cicindelinae, Rhysodidae). 502 pp., Tutzing, Germany (published by the author).

– – 2005. Systematic list of extant ground beetles of the world (Insecta Coleoptera "Geadephaga": Trachpachidae and Carabidae incl. Paussinae, Cicindelinae, Rhysodidae). 2nd ed., 530 pp., Tutzing, Germany (published by the author).