

## Three further new species of the genus *Dicraspeda* CHAUDOIR, 1862 from New Guinea

(Coleoptera, Carabidae, Odacanthinae)\*

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### Abstract

The odacanthine ground-beetle species *Dicraspeda denticulata*, sp.n., *D. intermedia*, sp.n., and *D. laticollis*, sp.n. from Irian Jaya are described and an updated key to the New Guinean species of the genus *Dicraspeda* CHAUDOIR, 1862 is presented. The recorded distributions of the species of the *bispinosa*-group are mapped.

### Introduction

Within a sample of Carabid beetles, collected recently by A. RIEDEL (München) in Irian Jaya (New Guinea), a further new species of the Oriental-Australian genus *Dicraspeda* CHAUDOIR, 1862 was found that is closely related to the species of the *bispinosa*-group (former genus *Philemonia* LIEBKE) mentioned in my recent paper (BAEHR 1996). At the same time, P. SCHÜLE and P. STÜBEN (Düsseldorf) collected two additional new species of the genus *Dicraspeda* in western Irian Jaya and on Japen Island. Including the new species described herein, in New Guinea this species-group now comprises 7 species of very close relationships. They are mainly characterized by convex body, relatively large size, reduction or absence of microreticulation on the upper surface, and denticulate or spinose sutural angle, though at most angulate but not spinose lateral angle of elytra.

### Measurements

Measurements were made with a stereo microscope using an ocular micrometer. Length has been measured from apex of labrum to tip of elytra including spines. Hence, measurements may slightly differ from those of other authors, especially DARLINGTON (1968).

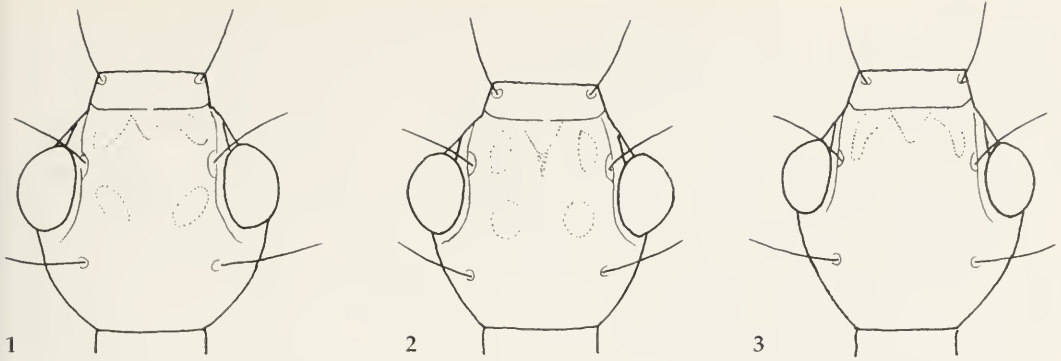
### Location of types

The holotypes of the new species are donated to the Zoologische Staatssammlung, München, but are kept as permanent loan in the working collection of the author (ZSM-CBM). One paratype is kept in the collection of the author (CBM).

\* In part results of the entomological explorations of A. RIEDEL in New Guinea in 1995/96.

# Updated key to the New Guinean species of *Dicraspeda* CHAUDOIR

- 1 Apex of elytra not denticulate or spinose ..... 2
- Apex of elytra denticulate or spinose ..... 4
- 2 4th tarsomere of metatarsus emarginate for c. 1/3 of its length only ..... 3
- 4th tarsomere of metatarsus emarginate for more than 2/3 of its length ..... *longiloba* (LIEBKE)
- 3 Surface of elytra microreticulate, striae distinctly impressed, apex barely excised; aedeagus sinuate, apex not widened ..... *brunnea* CHAUDOIR
- Surface of elytra not microreticulate, striae not impressed, apex distinctly excised; aedeagus not sinuate, apex widened ..... *obsoleta* BAEHR
- 4 Apex of elytra denticulate or spinose at sutural angle only ..... 5
- Apex of elytra bispinose, with spines at sutural and lateral angles ..... 11
- 5 Body size smaller, length usually <7.5 mm; 4th tarsomere of metatarsus emarginate for <1/2 of its length only; eyes large, slightly longer than orbits; sutural angle of elytra denticulate, lateral angle sharply angulate ..... *dubia* (GESTRO)
- Body size larger, length usually >8.0 mm; 4th tarsomere of metatarsus emarginate for almost 2/3 of its length; eyes smaller, shorter than orbits; sutural angle of elytra denticulate or spinose, lateral angle sharply or obtusely angulate ..... 6
- 6 Eyes not protruding, lateral margin of head including eye evenly convex; aedeagus compact, large near apex, apex turned up, angle between lower surface of aedeagus and apex inconspicuous ..... *ullrichi* BAEHR
- Eyes protruding, lateral margin of head including eyes not evenly convex; aedeagus narrower near apex, apex not distinctly turned up, angle between lower surface of aedeagus and apex conspicuous or not, or aedeagus unknown ..... 7
- 7 Sutural angle of elytra denticulate and lateral angle obtuse (Fig. 4); in ♀ base of elytra not microreticulate and elytra stout, ratio l/w c. 1.65 ..... *denticulata*, sp.n.
- Sutural angle of elytra spinose or denticulate, but when denticulate, lateral angle sharply angulate; in ♀ base of elytra microreticulate or not, but when not microreticulate, elytra narrower and longer, ratio l/w c. 1.75 ..... 8
- 8 Elytra piceous, distinctly lighter than fore body ..... 9
- Elytra black, not lighter than fore body ..... 10
- 9 Sutural spines elongate; microreticulation of elytra in ♀ complete, in ♂ distinct at least in apical half, intervals barely convex; aedeagus wider at apex, lower surface markedly bisinuate, angle between lower surface and apex conspicuous, lateral surface rough ..... *bispinosa* DARLINGTON
- Sutural spines shorter; microreticulation of elytra in ♀ visible only in apical half, in ♂ almost completely absent, intervals distinctly convex; aedeagus narrower at apex, lower surface evenly concave, angle between lower surface and apex barely indicated, lateral surface smooth ..... *lobli* BAEHR
- 10 Eyes larger, laterally more protruding (Fig. 2); pronotum slightly longer than wide; elytra narrower and longer, more parallel-sided, ratio l/w >1.75, in ♀ base not microreticulate ..... *intermedia*, sp.n.
- Eyes smaller, laterally less protruding (Fig. 3); pronotum wider than long; elytra shorter and wider, posteriorly distinctly widened, ratio l/w <1.65, in ♀ base distinctly microreticulate ..... *laticollis*, sp.n.
- 11 Colour black; tarsi sulcate-carinate above ..... *quadrispinosa* (CHAUDOIR)
- Colour green-purple; tarsi not sulcate-carinate above ..... *violacea* (SLOANE)



Figs 1-3: Head. 1. *Dicraspeda denticulata*, sp.n.; 2. *D. intermedia*, sp.n.; 3. *D. laticollis*, sp.n.

*Dicraspeda denticulata* sp.n.

Figs 1, 4, 7, 11

**Types:** Holotype: ♀, Irian Jaya, Panai-Pr. Epomani, km 165, 700-800m, 17.1.1996, leg. A. RIEDEL (ZSM-CBM).

**Diagnosis:** Rather narrow, convex species with denticulate sutural apex of elytra, distinguished from related species by obtuse lateral angle of elytra, uniformly black colour of surface, comparatively small punctures of elytral striae, and in ♀ not microreticulate base of elytra.

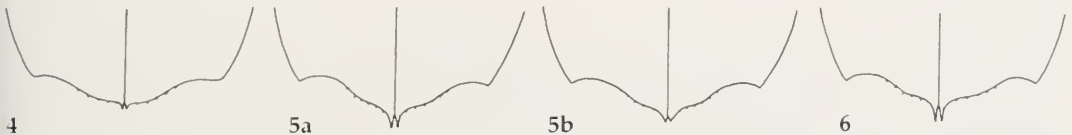
**Description.**

Measurements. Length: 8.0 mm. Ratios. Width/length of pronotum: 0.98; width of head/width of pronotum: 1.19; length/width of elytra: 1.65.

**Colour.** Upper and lower surfaces of body uniformly deep black, only basal part of abdomen dark piceous. Labrum, mandibles, palpi, and antenna reddish. Legs black, except tarsi and tibiae in apical portion contrastingly light reddish.

**Head** (Fig. 1). Large, slightly wider than pronotum, upper surface slightly convex, though rather uneven. Eyes rather small, distinctly shorter than orbits, laterally markedly projecting, considerably interrupting the lateral curve of head. Orbits convex,  $<1.5 \times$  as long as eye, forming a very wide angle with neck. Distance between eyes  $>2 \times$  as wide as diameter of eye. Clypeus separated by a fine suture that is shortly interrupted in middle. Labrum large, anteriorly faintly concave, 6-setose. Mandibles and palpi of average size, mandibles anteriorly suddenly incurved. Labium with narrow, very elongate tooth. Medially of eye with a strong ridge. Frons in middle near clypeal suture with a shallow horseshoe-shaped impression, laterally on either side with a strongly sinuate, irregular furrow that ends in a deep, elongate groove close to the supraorbital ridge. Medially of this groove frons with a deep, circular impression on either side. Neck separated from vertex by a shallow, transverse furrow. Posterior supraorbital seta situated far behind posterior margin of eye. Antenna elongate, surpassing base of pronotum by about  $1 \frac{1}{2}$  antennomeres, median antennomeres c.  $3.5 \times$  as long as wide. Surface of head apart from labrum without microreticulation, impunctate and impilose, highly glossy.

**Prothorax.** Slightly longer than wide, sides subparallel, surface rather convex. Widest part slightly in front of middle, margin gently rounded, posteriorly faintly concave. Lateral border prominent, raised



Figs 4-6: Apex of elytra. 4. *Dicraspeda denticulata*, sp.n.; 5. *D. intermedia*, sp.n., a. ♂ holotype. b. ♀ paratype; 6. *D. laticollis*, sp.n.

throughout and with deep channel. Proepipleura and proepisternum narrowly visible from above. Apex almost straight, unbordered, anterior angles rounded off, barely visible. Base straight, unbordered, posterior angles right though obtuse. Median line deeply impressed, not attaining apex, anterior sulcus shallow, v-shaped, transverse basal sulcus barely impressed, both sulci coarsely punctate. Both marginal setae absent. Surface without microreticulation, impunctate, only anterior and posterior sulcus, lateral channel, and basal third with scattered coarse punctures, in middle with some weak transverse striae, glossy.

Elytra (Fig. 4). Large in comparison with fore body, fairly elongate, posteriorly slightly widened, lateral margin in anterior third faintly compressed. Surface convex. Humeri wide, almost evenly rounded, with very small, obtuse angle. Marginal channel narrow. Apex oblique, deeply concave though bisinuate, minutely denticulate. Lateral apical angle obtuse, sutural angle shortly denticulate, apex with coarse border line. Striae deeply impressed, very regularly punctate with comparatively fine punctures, intervals distinctly convex. 3rd interval with three setiferous punctures, the anterior one more close to 3rd stria, the median and apical ones adjacent to 2nd stria, the median puncture situated at posterior third of elytra. Surface in ♀ with highly superficial microreticulation only in apical half, microreticulation consisting of irregular, transverse meshes. Intervals impunctate and impilose, glossy. Wings fully developed.

Lower surface. Proepisternum and mesothorax in parts with coarse punctures. Metepisternum elongate, c.  $2.5 \times$  as long as wide. Metathorax and abdominal sterna impunctate and impilose apart from a pair of ambulatory setae each segment. Terminal sternum in ♀ in middle slightly excised, with two pairs of ambulatory setae.

Legs. Elongate. 5th tarsomer setose on lower surface. 4th tarsomer deeply ( $> \frac{1}{2}$  of length) excised. ♂ anterior tarsus unknown.

♂ genitalia. Unknown.

♀ genitalia (Fig. 7). Stylomere 2 fairly elongate, slightly curved, with rather acute apex; with 4 rather short ventral ensiform setae, a rather large dorsal ensiform seta, and a short nematiform seta raising from a groove in apical third. Base of stylomere 1 medio-laterally with 7-8 stout ensiform setae, laterally with an additional, more slender, almost nematiform seta.

Variation. Unknown.

**Distribution** (Fig. 11): Western part of Irian Jaya. Known only from type locality.

**Collecting circumstances:** Presumably collected by sieving ground litter in rain forest at median altitude. This is probably a ground-living, not hygrophilous species.

**Etymology:** The name refers to the denticulate apex of the elytra.

**Relationships:** This species and both species described below belong to the *bispinosa*-group of the genus in the sense of DARLINGTON (1968) and would belong to *Philemonia* LIEBKE if the genus *Dicraspeda* would be acknowledged in its restricted sense. *D. denticulata* is perhaps most closely related to *D. intermedia*, sp.n. (see below) from which it is mainly distinguished by stouter body and rather obtuse lateral angles of elytra.

### *Dicraspeda intermedia* sp.n.

Figs 2, 5, 8, 10, 11

**Types:** Holotype: ♂, 9.7.1996, 10, SCHULE/STUBEN, West Papua 10 km nördl. Fakfak, Rankendak, Garten/Sek.wald (ZSM-CBM). – Paratype: 1♀, 11.7.1996, 15, SCHULE/STUBEN, West Papua Fakfak, Mambuni-Buni, Garten (CBM).

**Diagnosis:** Narrow, convex species with denticulate to shortly spinose sutural apex of elytra, distinguished from related species by sharp lateral angle of elytra, uniformly black colour of surface, comparatively small punctures of elytral striae, in ♀ not microreticulate base of elytra, and markedly knobbed apex of aedeagus.

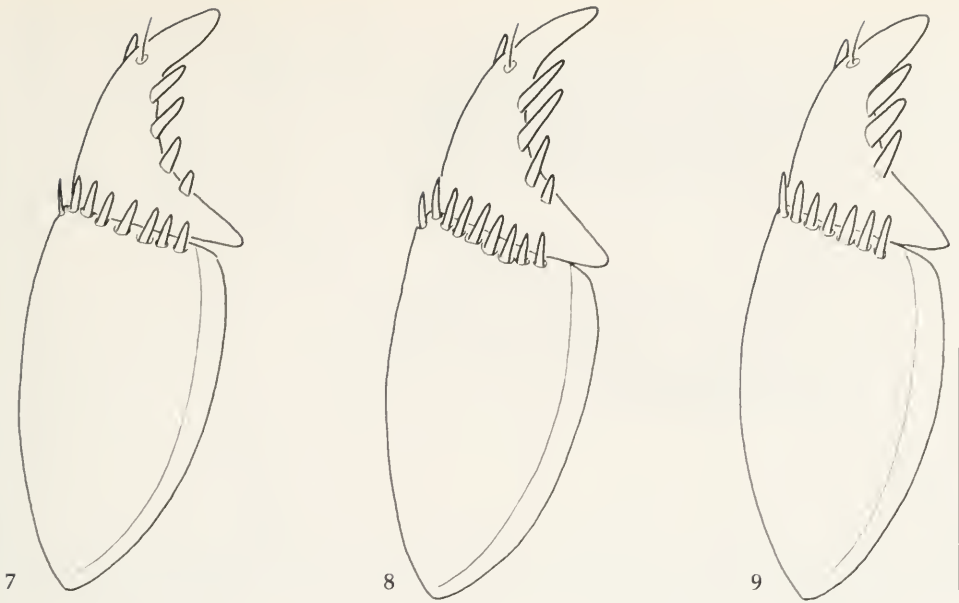
### **Description.**

**Measurements.** Length: 8.0-8.1 mm. Ratios. Width/length of pronotum: 0.95-0.96; width of head/width of pronotum: 1.18; length/width of elytra: 1.74-1.75.

**Colour.** Upper and lower surfaces of body uniformly deep black, only basal part of abdomen dark piceous. Labrum, mandibles, palpi, and 1st-3rd antennomeres and basal half of 4th antennomere reddish, apical part of antenna darker. Legs black, except tarsi and tibiae in apical portion reddish.

**Head** (Fig. 2). Large, considerably wider than pronotum, upper surface slightly convex, though rather uneven. Eyes rather small, considerably shorter than orbits, laterally markedly projecting, distinctly





Figs 7-9: ♀ stylomeres 1 and 2. 7. *Dicraspeda denticulata*, sp.n.; 8. *D. intermedia*, sp.n.; 9. *D. laticollis*, sp.n. Scale: 0.2 mm.

interrupting the lateral curve of head. Orbits moderately convex, rather oblique,  $<1.5\times$  as long as eye, forming a very wide angle with neck. Distance between eyes well  $>2\times$  as wide as diameter of eye. Clypeus separated by a fine suture that is shortly interrupted in middle. Labrum large, anteriorly faintly concave, 6-setose. Mandibles and palpi of average size, mandibles anteriorly suddenly incurved. Labium with narrow, very elongate tooth. Medially of eye with a strong ridge. Frons near clypeal suture on either side with a strongly sinuate, irregular furrow that ends in a deep, elongate groove close to the supraorbital ridge. Medially of this groove with a deep, circular impression on either side. Neck separated from vertex by a shallow, transverse furrow. Posterior supraorbital seta situated far behind posterior margin of eye. Antenna elongate, surpassing base of pronotum by about 2 antennomeres, median antennomeres  $>3.5\times$  as long as wide. Surface of head apart from labrum without microreticulation, impunctate and impilose, highly glossy.

Prothorax. Distinctly longer than wide, sides subparallel, surface rather convex. Widest part slightly in front of middle, margin gently rounded, posteriorly faintly concave. Lateral border prominent, raised throughout and with deep channel. Proepipleura and proepisternum narrowly visible from above. Apex almost straight, unbordered, anterior angles rounded off, barely visible. Base straight, unbordered, posterior angles right though obtuse. Median line deeply impressed, not attaining apex, anterior sulcus superficial, v-shaped, transverse basal sulcus barely impressed, both sulci coarsely punctate. Both marginal setae absent. Surface without microreticulation, impunctate, only anterior and posterior sulcus, lateral channel, and basal third with scattered coarse punctures, in middle with some weak transverse striae, glossy.

Elytra (Fig. 5). Large in comparison with fore body, though comparatively narrow and elongate, posteriorly faintly widened, rather parallel, lateral margin in anterior third faintly compressed. Surface convex. Humeri wide, almost evenly rounded, with almost completely rounded angle. Marginal channel narrow. Apex oblique, deeply concave though bisinuate, minutely denticulate. Lateral apical angle sharply angulate, sutural angle denticulate to shortly spinose, apex with coarse border line. Striae more or less distinctly impressed, very regularly punctate with comparatively fine punctures, intervals moderately convex. 3rd interval with three setiferous punctures, the anterior one more close to 3rd stria, the median and apical ones adjacent to 2nd stria, the median puncture situated in front of or behind posterior third of elytra. Surface in both sexes with highly superficial microreticulation only in apical half, microreticulation consisting of irregular, transverse meshes. Intervals impunctate and impilose, glossy. Wings fully

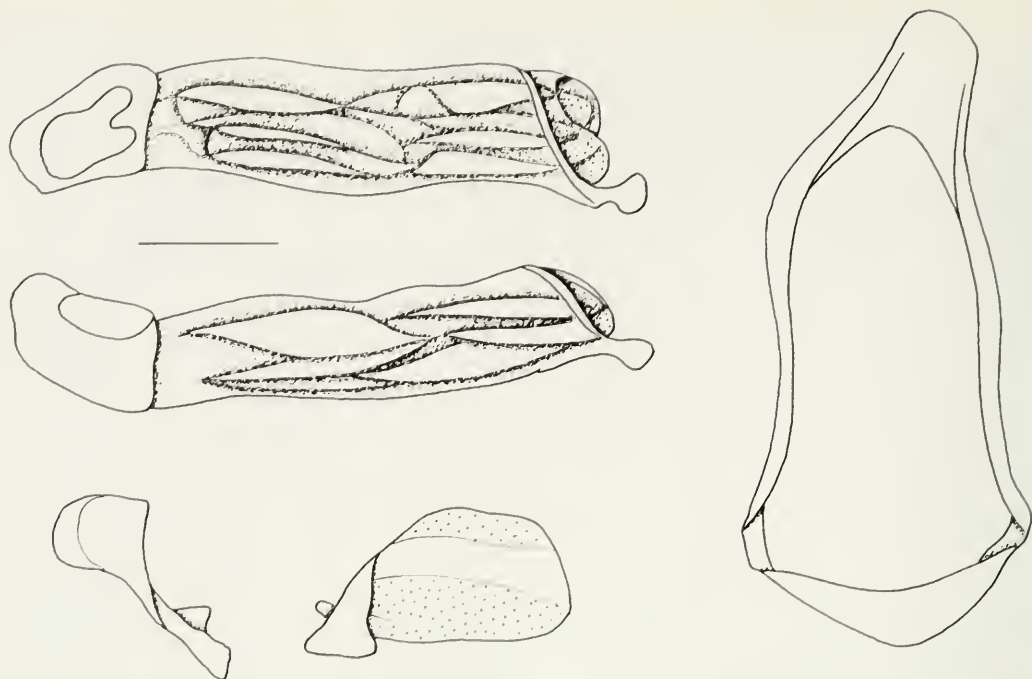


Fig. 10: *Dicraspeda intermedia*, sp.n. Genital ring, left side and lower surface of aedeagus, right and left parameres. Scale: 0.5 mm.

developed.

Lower surface. Proepisternum and mesothorax in parts with coarse punctures. Metepisternum elongate, almost  $3 \times$  as long as wide. Metathorax and abdominal sterna impunctate and impilose apart from a pair of ambulatory setae each segment. Terminal sternum in middle in ♂ with deep, in ♀ with shallow excision, in ♂ with one, in ♀ with two pairs of ambulatory setae.

Legs. Elongate. 5th tarsomer setose on lower surface. 4th tarsomer deeply ( $> \frac{1}{2}$  of length) excised. ♂ anterior tarsus not enlarged, with a double row of adhesive hairs on 1st-3rd tarsomeres.

♂ genitalia (Fig. 10). Genital ring very elongate, rather narrow, markedly asymmetric, strongly narrowed to the rather elongate, rounded apex. Aedeagus elongate, laterally rather sinuate, lower surface distinctly bisinuate, left side in basal half impressed, lower border of impression sharply keeled. Apex short, narrow, knob-like, distinctly upturned but barely turned left, lower surface with short excision on lower surface just in front of apex. Orificium very short, with large sclerite on right side. Apex of aedeagus smooth. Parameres dissimilar, left one much larger than right one, see fig. 10.

♀ genitalia (Fig. 8). Stylomere 2 elongate, slightly curved, with acute apex; with 4 elongate ventral ensiform setae, a rather large dorsal ensiform seta, and a short nematiform seta raising from a groove in apical third. Base of stylomere 1 medially with c. 8 stout ensiform setae, laterally apparently without additional slender setae.

Variation. Some (sexual?) variation noted in shape of elytra (posteriorly more widened in the ♀ paratype), and in shape of the sutural angle which is shortly spined in the ♂ holotype, but only denticulate in the ♀ paratype.

**Distribution** (Fig. 11): Central western part of Irian Jaya. Known only from a restricted area around type locality.

**Collecting circumstances:** Largely unknown, both known specimens collected in "garden or garden/secondary forest", presumably at low altitude. This is perhaps also a ground-living, not hygrophilous species.



Fig. 11: Distribution of the species of the *bispinosa*-group of the genus *Dicraspeda* CHAUDOIR, according to DARLINGTON (1968), BAEHR (1996), and material at hand: *D. bispinosa* DARLINGTON: ■ ; *D. denticulata*, sp.n.: x ; *D. dubia* GESTRO: ● ; *D. intermedia*, sp.n.: ▲ ; *D. laticollis*, sp.n.: + ; *D. loebli* BAEHR: ◆ ; *D. ullrichi* BAEHR: ▼ . Scale: 250 km.

**Etymology:** The name refers to the intermediate status in view of body shape between *D. loebli* BAEHR and *D. denticulata*, sp.n.

**Relationships:** This species is perhaps most closely related to *D. denticulata*, sp.n. (see above) from which it is mainly distinguished by narrower body and sharply angulate lateral apical angles of elytra.

### *Dicraspeda laticollis* sp.n.

Figs 3, 6, 9, 11

**Types:** Holotype: ♀, 6.-10.8.1996, 42, SCHULE/STÜBEN, West Papua, 1000 m, Japen Ambeidiru, Prim.wald/Carten (ZSM-CBM).

**Diagnosis:** Rather short and wide, convex species with shortly spinose sutural angle of elytra, distinguished from related species by sharp lateral apical angle of elytra, uniformly black colour of surface, comparatively small punctures of elytral striae, and in ♀ distinctly microreticulate base of elytra.

### Description.

**Measurements.** Length: 8.0 mm. Ratios. Width/length of pronotum: 1.05; width of head/width of pronotum: 1.05; length/width of elytra: 1.62.

**Colour.** Upper and lower surfaces of body uniformly deep black, only basal part of abdomen dark piceous. Labrum, mandibles, palpi, and antenna light reddish. Legs black, except tarsi and tibiae in apical portion reddish.

**Head (Fig. 3).** Large, slightly wider than pronotum, upper surface rather convex, fairly uneven. Eyes small, considerably shorter than orbits, laterally but slightly projecting, moderately interrupting the lateral curve of head. Orbits convex, almost  $2 \times$  as long as eye, forming a very wide angle with neck. Distance between eyes  $>2.5 \times$  as wide as diameter of eye. Clypeus separated by a fine suture that is shortly interrupted in middle. Labrum large, anteriorly faintly concave, 6-setose. Mandibles and palpi of average size, mandibles anteriorly suddenly incurved. Labium with narrow, very elongate tooth. Medially of eye with a strong ridge. Frons in middle near clypeal suture with a shallow, triangular impression, laterally on either side with a strongly sinuate, irregular furrow that ends in a deep, elongate groove close to the supraorbital ridge. Neck separated from vertex by a shallow, transverse furrow. Posterior supraorbital seta situated far behind posterior margin of eye. Antenna elongate, surpassing base of pronotum by about  $1 \frac{1}{2}$  antennomeres, median antennomeres c.  $3.5 \times$  as long as wide. Surface of head apart from labrum without

microreticulation, impunctate and impilose, glossy.

Prothorax. Short, distinctly wider than long, sides convex, surface rather convex. Widest part slightly in front of middle, margin gently rounded, posteriorly faintly concave. Lateral border prominent, raised throughout and with deep channel. Proepipleura and proepisternum rather broadly visible from above. Apex almost straight, unbordered, anterior angles rounded off, barely visible. Base straight, unbordered, posterior angles right though obtuse. Median line deeply impressed, not attaining apex, anterior sulcus shallow, v-shaped, transverse basal sulcus barely impressed, both sulci coarsely punctate. Both marginal setae absent. Surface without microreticulation, impunctate, only anterior and posterior sulcus, lateral channel, and basal third with scattered coarse punctures, glossy.

Elytra (Fig. 6). Large in comparison with fore body, short and wide, posteriorly considerably widened, lateral margin in anterior third faintly compressed. Surface convex. Humeri wide, almost evenly rounded, with almost completely rounded angle. Marginal channel narrow. Apex oblique, deeply concave though bisinuate, minutely denticulate. Lateral apical angle sharply angulate, sutural angle shortly spinose, apex with coarse border line. Striae moderately impressed, very regularly punctate with comparatively fine punctures, intervals distinctly convex. 3rd interval with three setiferous punctures, the anterior one more close to 3rd stria, the median and apical ones adjacent to 2nd stria, the median puncture situated about at posterior third of elytra. Surface in ♀ with distinct though fairly superficial microreticulation on whole elytra, microreticulation consisting of irregular, transverse meshes. Intervals impunctate and impilose, glossy. Wings fully developed.

Lower surface. Proepisternum and mesothorax largely covered by coarse punctures. Metepisternum elongate, c.  $2.5 \times$  as long as wide. Metathorax and abdominal sterna impunctate and impilose apart from a pair of ambulatory setae each segment. Terminal sternum of ♀ in middle with shallow excision, with two pairs of ambulatory setae.

Legs. Elongate. 5th tarsomer setose on lower surface. 4th tarsomer deeply ( $> \frac{1}{2}$  of length) excised. ♂ anterior tarsus unknown.

♂ genitalia. Unknown.

♀ genitalia (Fig. 9). Stylomere 2 rather elongate, slightly curved, with fairly acute apex; with 3 rather stout and elongate ventral ensiform setae, a large dorsal ensiform seta, and a short nematiform seta raising from a groove in apical third. Base of stylomere 1 medio-laterally with c. 7 stout ensiform setae, apparently without additional slender setae.

Variation. Unknown.

**Distribution** (Fig. 11): Japen Island, Irian Jaya. Known only from type locality.

**Collecting circumstances:** Largely unknown, holotype collected in "primary forest/garden", at median altitude. This is perhaps also a ground-living, not hygrophilous species.

**Etymology:** The name refers to the short and wide pronotum.

**Relationships:** This species is perhaps most closely related to *D. denticulata*, sp.n. and *D. intermedia*, sp.n. (see above) and is distinguished from both by wider body, even smaller, less projecting eyes, and completely microreticulate elytra in the ♀.

## Remarks

The genus *Dicraspeda* sensu latu is widely distributed throughout the Oriental and Australian Regions, though especially those species with denticulate or spinose elytral apices that belong to the *bispinosa*- and *quadrispinosa*-groups (former subgenera *Philemonia* LIEBKE and *Macrocentra* CHAUDOIR) almost exclusively occur in the Papuan subregion. It is unknown, why denticulate or spinose elytra are so common among Carabidae in New Guinea. They likewise occur in several other genera of Odacanthinae, but are also scattered through surprisingly many other subfamilies of Carabidae in New Guinea.

Of the genus *Dicraspeda*, the most highly evolved species-groups almost exclusively occur in New Guinea, where a surprisingly large number of species coexists. This is astonishing, because the species – in particular those of the *bispinosa*-group – are extremely similar in appearance and structure. Furthermore, they are winged and are known to fly regularly to light, and they mainly occur in the lowlands. As a consequence, these species are likely to have wide ranges. At the present state of knowledge, however, most species seem to possess rather restricted ranges (Fig. 11), and, probably, the actual number of existing though yet undescribed species is even larger than presently known.



A possible explanation of the large number of similarly shaped species in New Guinea is the apparent way of life of the species of the *bispinosa*-group. Although most odacanthine beetles are hygrophilous and live between and on reeds and grass near water and in swamps, or at least on wet ground near the shore of rivers and lakes, many odacanthine species in New Guinea seem to have changed their way of life now being forest floor dwellers in rain forest where they live in leaf litter or under debris or timber far away from water. Hence, they are no longer hygrophilous insects, but belong to the mesophilous forest floor community. Members of this community, however, are known to possess more restricted ranges than hygrophilous insects generally have. Therefore, the ecological shift of the mentioned species per se may account for the species diversification of the New Guinean *Dicraspeda*.

The map (Fig. 11) shows the presently recorded distribution of the species of the *bispinosa*-group in New Guinea. Only one species (*D. dubia* GESTRO) has a wide distribution throughout almost the whole of New Guinea, whereas the six other species – at least at the present state of knowledge – have rather restricted ranges or are only known from a single locality.

Presumably *D. dubia* is the most primitive member of the *bispinosa*-group according to the presence of several plesiomorphic characters: e. g. lesser size, small head, large eyes, short apical elytral spines, less excised 4th tarsal segments. Indeed, *D. dubia* still exhibits some plesiomorphic character states that are likewise present in the species of the primitive *brunnea*-group of *Dicraspeda* (former nominate subgenus *Dicraspeda* s. str.), although *D. dubia* shares some characters of body shape and structure with the apotypic species of the *bispinosa*-group.

With respect to phylogenetic status and pattern of distribution, thus a scenario is conceivable in which from a *dubia*-like ancestor, in different parts of New Guinea, various apotypic species with still restricted ranges arose. Indeed, a short view to the map demonstrates that all apotypic species of the *bispinosa*-group occur at the western, or eastern margins of the range of *D. dubia*, respectively, whereas almost the whole central part of New Guinea – at least at the present state of knowledge – lacks any apotypic species and is purely populated by the widespread *D. dubia*. So it seems that evolution of the *bispinosa*-group in New Guinea proceeded by virtue of various and repeated events of parapatric speciation at the margins of the range of a widely spread ancestor.

### Acknowledgements

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### Literature

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