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New Australian Ants of the Genus *Orectognathus*, with Summary Description of the Twenty-nine Known Species (Hymenoptera : Formicidae)

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Abstract

The new species *O. kanangra* (New South Wales), *O. alligator* and *O. coccinatus* (Queensland) are described in a supplement to the author's recent review of *Orectognathus* (*Aust. J. Zool.*, 1977, **25**, 581–612). Notes are given on variation and distribution of some previously described species. These include the first Western Australian record of the genus. *O. sarasini* Emery (New Caledonia) is illustrated, and coded descriptions of all 29 known *Orectognathus* species are presented.

Introduction

This paper supplements my recent review of *Orectognathus* (Taylor 1977) and should be used in conjunction with it. Abbreviations for measurements, citation of institutions, etc. are the same. Three species are described as new, bringing the generic total to 29. They are illustrated with micrographs prepared by the author using a J.E.O.L. JSM U3 scanning electron microscope. *O. sarasini* Emery, the sole and endemic New Caledonian species, is also figured, completing the modern illustrative coverage of all *Orectognathus* species except two from New Guinea, *O. chyzeri* Emery and *O. longispinosus* Donisthorpe. A few locality records, which considerably extend the known ranges of several previously described species, are reported. Finally, a set of coded descriptions of all 29 known species is presented, along with the necessary reference list expanding the attribute statements (Tables 1, 2). These descriptions follow the DELTA (DEscriptive Language for TAxonomy) format developed for use in computer-based studies by my colleague Dr M. J. Dallwitz. DELTA is discussed in detail elsewhere by him (1979).

New Records of Distribution and Variation

O. clarki Brown

In the east this species ranges widely from Toowoomba (27°34′S., 151°57′E.) in south-east Queensland, to Victoria and Tasmania. It is the only *Orectognathus* known from these southern states. My 1977 key listed *O. clarki* from South Australia. This record was based on two series of specimens in the ANIC, one taken *c.* 8 km inland of Victor Harbor (35°33′S., 138°37′E.), from hard clay soil in dry

sclerophyll woodland, *c.* 240 m, on 23 August 1969 by B. B. Lowery; the other collected on Mount Remarkable (32°48′S., 138°10′E.) in the Flinders Ranges, on 24 April 1977 by P. J. M. Greenslade. These are the only known collections of *Orectognathus* from South Australia.

Orectognathus can now be recorded from Western Australia for the first time. It is represented in the ANIC by specimens of *O. clarki* collected on the Castle Rock Track, Porongorup Range (34°42′S., 117°53′E.), on 12 March 1977 by W. L. Brown.

O. nanus Taylor

Some relatively dark coloured but otherwise unexceptional specimens attributed to this species were taken on the Mount Windsor Tableland (at 16°18′S., 145°05′E.) north-west of Mossman in north Queensland, from rotting wood, in primary rain forest, *c.* 850 m, on 20 March 1975 by R. W. Taylor. This record extends the known range of *nanus* by about 95 km.

O. robustus Taylor

This species also occurs on the Mt Windsor Tableland, where specimens were collected by Berlese funnel from rain forest leafmould gathered at 16°17′S., 145°05′E., *c.* 900 m, on 5 November 1976 by R. W. Taylor and T. A. Weir. The specimens have reduced mesosomal sculpture, like the Thornton Range examples discussed in my 1977 review. However, unlike them they have distinct foveae on the postpetiole.

O. sarasini Emery

This is the only *Orectognathus* species known from New Caledonia, where it is apparently endemic. It is close to *O. antennatus* Fr. Smith, which ranges in eastern Australia south from the Bunya Mountains (26°51′S., 151°34′E.), Qld, to near Wyong (33°17′S., 151°26′E.), N.S.W. *O. antennatus* also occurs on the North Island of New Zealand, where all known collections were taken north of about latitude 37°S. (Cumber 1959, 1968). *O. sarasini* and *O. antennatus* seem to make up a superspecies (which also includes *O. howensis* Wheeler of Lord Howe I. and *O. darlingtoni* Taylor of the Atherton Tableland, north Queensland). Brown (1957), following Wheeler (1927), suggests that these two nominal species could be biologically conspecific. However, they differ consistently in details of mesosomal structure, and this offers reasonable support for their nomenclatorial separation.

Brown (1957) also discussed variation in *sarasini* material collected by E. O. Wilson in December 1974. He recognized two colour forms:

(1) *Self-coloured*, represented by concolorous clear ferruginous specimens with light coloured legs. These include the types, and are known from the type-locality Mont Canala (21°36′S., 165°57′E.), Mont Mou (22°04′S., 166°20′E.) and Le Chapeau Gendarme, near Yahoué, (22°12′S., 166°30′E.).

(2) *Bicoloured*, with the dorsum and sides of the head, and the mesosoma piceous, appearing black to the naked eye, and the remaining parts ferruginous. These were collected by Wilson at Ciu (21°35′S., 165°59′E.), near Canala.

The possible significance of this variation is not understood, but it could indicate the presence of two sibling species.

New Caledonian material recently contributed to the ANIC by Philip S. Ward includes both the colour forms, as follows: *self-coloured*, from Mt Koghis (22°11'S., 166°31'E.), 450 m, 18 February 1977, ex *Nepenthes* pitchers, maquis (four workers); and from 9 km south-west of Hienghene (20°44'S., 164°52'E.), 140 m, 16 February 1977, disturbed rain forest beside stream (a single worker); the *bicoloured* form is represented by a single worker taken at Fausse Yaté River (22°10'S., 166°55'E.), 10 m, 27 February 1977, in rain forest bordering the river. The ANIC also has three *bicoloured* workers from Mt Koghis, one from a rain forest litter berlesate, 500 m, 26 September 1978, collected by S. and J. Peck; two from dead bamboo stems, 600 m, 12 October 1978, J. C. Watt. Thus both self-coloured and bicoloured specimens are known from this locality, supporting the possibility that two sibling species are present on New Caledonia. The Koghis specimens are most robust in mesosomal, petiolar and postpetiolar structure, and more heavily sculptured than the Fausse Yaté River worker.

One of the self-coloured specimens from Mount Koghis is illustrated in Figs 10–12.

O. satan Brown

This intriguing north Queensland species has been previously recorded only from localities on the Atherton Tableland. A further specimen attributed to *O. satan* was taken on the Mount Windsor Tableland (at 16°17'S., 145°04'E.), *c.* 1000 m, in primary rain forest, on 4 September 1976 by R. W. Taylor and T. A. Weir. It agrees well with Atherton Tableland material, but has the mesonotal tubercles more strongly developed. [The structure here resembles that of *O. sarasini*, as illustrated in Figs 10 and 12, which should be compared with figs 7 and 8 of Taylor (1977).] In addition, the sculpturation of the head, mesosoma and nodes is more sharply and distinctly incised than in Atherton Tableland specimens. The Mt Windsor Tableland individual is similar to several in the ANIC collected on Thornton Peak (16°10'S., 145°23'E.), near Daintree, Qld, between 1000 and 4000 ft elevation, during December 1957 by P. F. Darlington. The Mt Windsor Tableland and Thornton Peak specimens could possibly represent a sibling species separate from the Atherton Tableland material, or a northern variant of *O. satan* itself.

O. sexspinosus Forel

This species was originally described from Cedar Creek, near Ravenshoe (17°36'S., 145°29'E.) in north Queensland. The only subsequent collection known to me is that of a single worker from Mount Lewis (taken at 16°33'S., 145°13'E.) about 115 km to the north. This was collected at *c.* 1010 m elevation, in primary rain forest, on 23 June 1971 by R. W. Taylor and J. E. Feehan. The specimen closely matches two syntypes in the ANIC.

Descriptions of New Species

The new species described below are all members of the group of *O. rostratus* Lowery. *O. kanangra* and *O. alligator* are both close to *O. robustus*, which is probably the least specialized member of that group. Both, however, were collected in open *Eucalyptus* woodland, very different from the rain forest habitats of *robustus* and its further close relative *O. parvispinus* Taylor. *O. kanangra* is very similar to *robustus*, and extends the range of the group southwards from just north of Brisbane to the ap-

proximate latitude of Sydney. *O. alligator* is known from two localities in north and central eastern Queensland. These are respectively not too distant from rain-forest sites where either *robustus* or *parvispinus* has been collected. This species is especially interesting because, like *parvispinus*, it has mesosomal spines of reduced size. Here the pronotals are proportionately very small in comparison to those of the other *robustus*-group species, while in *parvispinus* the propodeals are reduced. The New Guinean species of the group of *O. chyzeri* (formerly genus *Arnoldidris*) might be derived from a *robustus*-like ancestor (Taylor 1977, p. 611). They completely lack pronotal spines, and this is their major distinguishing feature. The reduced spines of *alligator* provide a morphoclinal link between the condition exemplified by *robustus*, and that of the *chyzeri* group species, perhaps supporting the possibility of real relationships between the *rostratus* and *chyzeri* groups.

Orectognathus kanangra, sp. nov.

(Figs 1–3)

Type locality. **New South Wales**: *Gingra Range*, near Kanangra Tops (at 34°00′S., 150°10′E.).

Material examined. Known only from the holotype worker, collected under a stone in dry sclerophyll woodland, *c.* 750 m, 18.iv.1976, P. S. Ward. The specimen has been gold–palladium coated.

Type deposition. In ANIC (type No. 7527).

Worker Diagnosis

Dimensions. TL *c.* 4·2; HL (max.) 1·00; HL (mid) 0·78; HW 0·77; CI 77; SL 0·71; SI 92; ML 0·60; MI 60; ThL 1·07; PL 0·46.

General features as in Figs 1–3 and the summary description of Table 2. Most diagnostic characters as in *O. robustus* [see key couplets 1*a*, 2*a*, 3*b*, 5*a* and 6*a*, pp. 585–587 of Taylor (1977)]. *O. kanangra* differs from *O. robustus* as follows:

(1) Inferior propodeal plates (on either side of the foramen receiving the petiolar articulation) thickened in dorsal view, but not inflated and subspherical as in *robustus* [compare Fig. 3 with fig. 16 of Taylor (1977)].

(2) Subpostpetiolar process present; a distinct acutely pointed structure, forwardly directed, subequal in size to the preocular denticles. No such structure is present in any other *Orectognathus* species [compare Fig. 1 with fig. 14 of Taylor 1977)].

(3) Petiolar dorsum less sharply rounded in side view, with its posterodorsal profile relatively long, more as in *O. parvispinus* [compare Fig. 1 with figs 14 and 17 of Taylor (1977)].

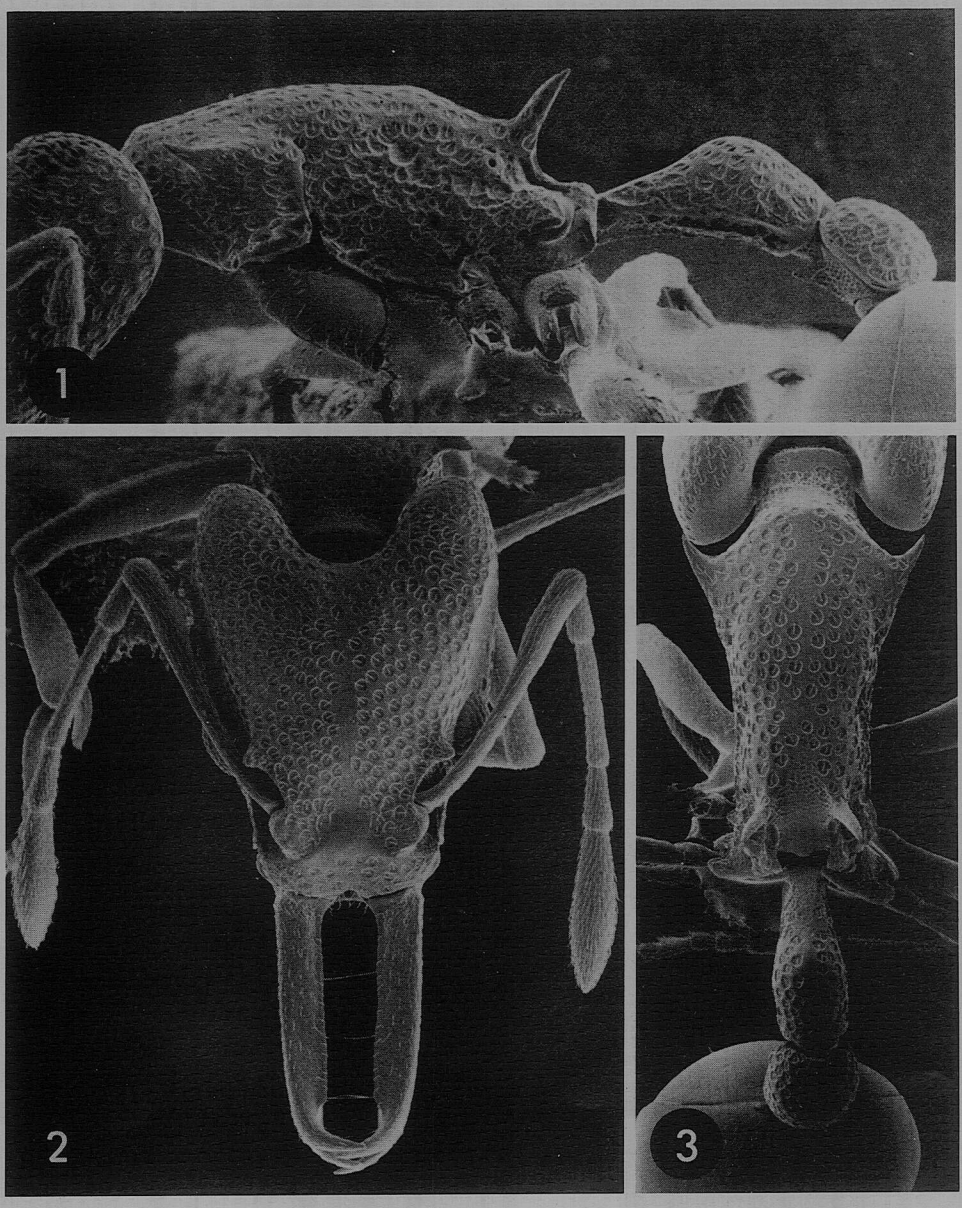
(4) Angles forming the anterior corners of the narrow inner mandibular flanges (just behind the apical teeth), somewhat vestigial [compare Fig. 2 with fig. 15 of Taylor (1977)].

Colour generally as in the *O. robustus* type series, as described in Taylor (1977, p. 599), with the legs pale yellowish brown, not whitish as in *robustus*.

Notes

This species is clearly close to *O. robustus* but differs consistently from all specimens of the latter used in my 1977 study. *O. robustus*, defined in the broad sense

(which might 'lump' several allopatric sibling species), ranges in eastern Queensland from Iron Range (12°45′S.) southwards to near Toowoomba (27°34′S.). All documented collections are from rain forest habitats. The *O. kanangra* holotype was



Figs 1–3. *Orectognathus kanangra*, holotype worker, standard views. HW 0·77 mm; ThL 1·07 mm.

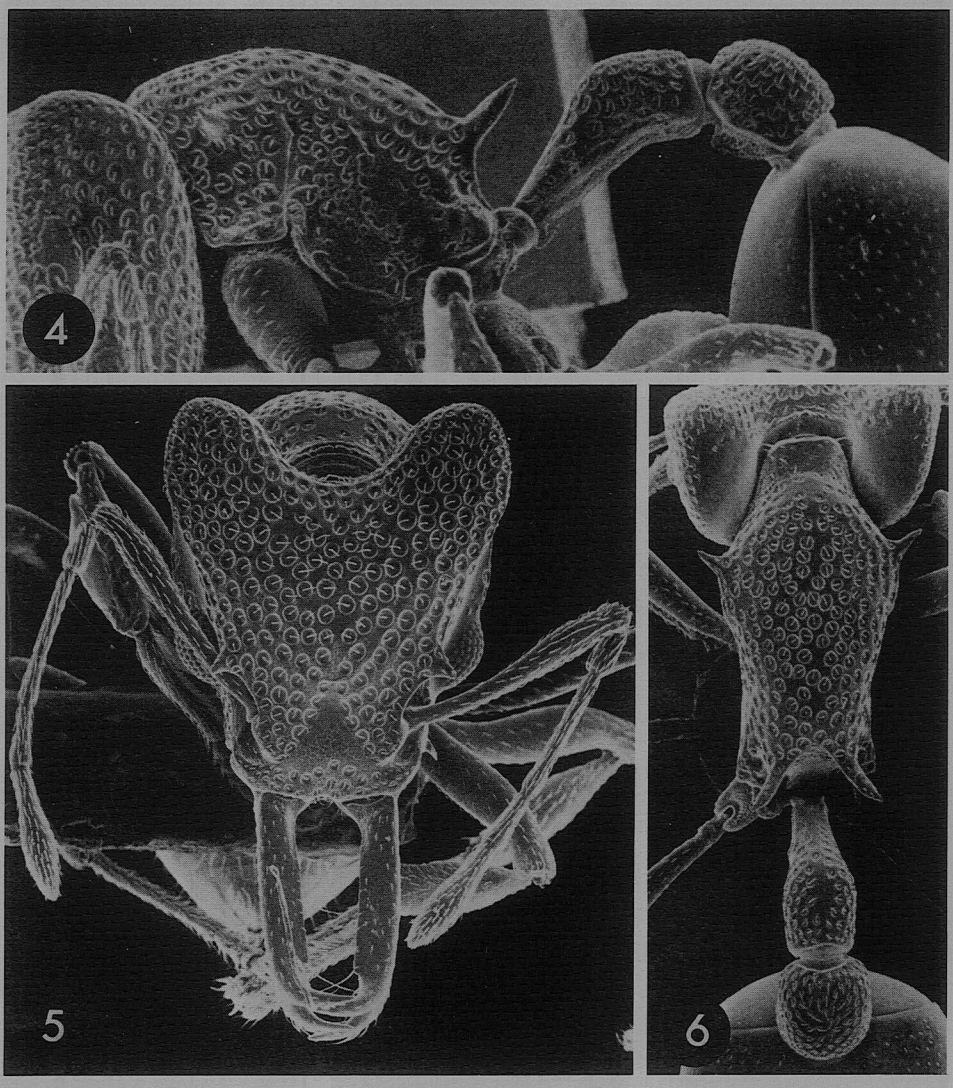
taken about 700 km south of Toowoomba, in open *Eucalyptus* woodland, indicating very different ecological conditions from those favoured by *robustus*.

A supplementary couplet to my 1977 key to *Orectognathus* species differentiating this species and the one to follow from *robustus* is given below.

Orectognathus alligator, sp. nov.

(Figs 4–6)

Type locality. **Queensland:** *Spencer Gap* (21°20′S., 148°56′E.), 20 km SW. of Walkerston.



Figs 4–6. *Orectognathus alligator*, holotype worker, standard views. HW 0·90 mm; ThL 1·12 mm.

Material examined. **Queensland:** 8 km S. of *Cardwell* (18°16′S., 146°01′E.), 2 workers, open *Eucalyptus* woodland, 15.iv.1976, P. J. M. Greenslade. *Spencer Gap*, holotype worker, 3 paratype workers, under rock, dry sclerophyll woodland, *c.* 150 m, 16.viii.1975, B. B. Lowery. The holotype has been gold–palladium coated and is mounted with a paratype which originally matched it in colour.

Type deposition. Holotype and most paratypes in ANIC (type No. 7528), paratype in QM.

Worker diagnosis

Dimensions (smallest Spencer Gap specimen, holotype (which is the largest Spencer Gap specimen), smallest Cardwell specimen, largest Cardwell specimen). TL *c.* 3·6, 4·3, 3·5, 4·6; HL (max.) 0·94, 1·00, 0·88, 1·04; HL (mid) 0·72, 0·79, 0·68, 0·81; HW 0·81, 0·90, 0·77, 0·95; CI 86, 90, 88, 91; SL 0·64, 0·67, 0·59, 0·67; SI 79, 74, 77, 70; ML 0·54, 0·57, 0·50, 0·57; MI 57, 57, 57, 55; ThL 1·00, 1·12, 0·95, 1·20; PL 0·47, 0·52, 0·45, 0·50.

General features as in Figs 4–6 and the summary description in Table 2. Most diagnostic characters shared with *O. robustus*, to which this species keys in Taylor (1977) (through couplets 1*a*, 2*a*, 3*b*, 5*a* and 6*a*, pp. 585–7). *O. alligator* differs from *O. robustus* in many details, the salient ones being:

(1) Mandibles and scapes relatively short: MI 55–57 versus 61–71; SI 70–79 versus 81–95.
(2) Pronotal spines very reduced; pronotal dorsum almost entirely convex, lacking the transverse flattened anterior portion present in *O. robustus* and *O. parvispinus*.
(3) Mesosomal dorsal profile more strongly convex; dorsal petiolar profile less sharply rounded, much as in *O. parvispinus* or *O. kanangra*.
(4) Other details of shape and sculpturation as illustrated.

Notes

O. alligator runs with *O. kanangra* to the *O. robustus* terminus in my 1977 key to *Orectognathus* species. These three species may be distinguished by the following supplementary couplets to that key.

6(A)6.	*a*	Spines of pronotal humeri very small, scarcely larger than anteocular denticles (Figs 4–6). Central E. Queensland ..... *O. alligator*, sp. nov.
	b	Pronotal spines not markedly reduced in size 6B
6B(6A)	*a*	Subpostpetiolar process present (Figs 1–3). Central E. N.S.W. ..... *O. kanangra*, sp. nov.
	b	Subpostpetiolar process lacking (Taylor, 1977, figs 14–16). E. Queensland ..... *O. robustus* Taylor

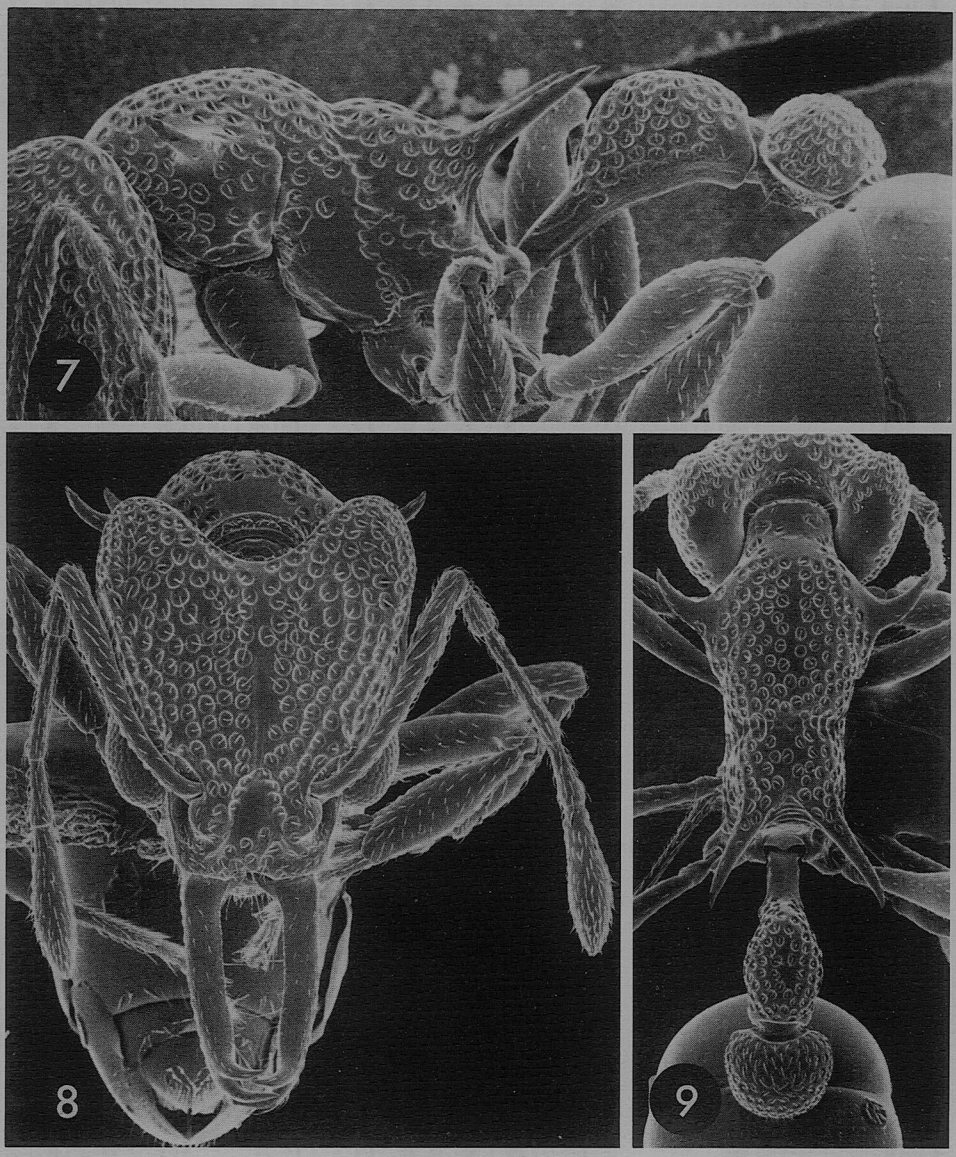
Orectognathus coccinatus, sp. nov.

(Figs 7–9)

Type locality. **Queensland:** *Byfield* (22°51′S., 150°39′E.), near Yeppoon.

Material examined. **Queensland:** *Byfield*, 34 workers, 11 females, plus eggs, larvae and pupae. These were collected from 3 colonies (accessions 76.197, 76.209, 76.210) all located within a radius of about 30 m in disturbed rain forest, *c.* 60 m, 26.x.1976, R. W. Taylor and T. A. Weir. All colonies were nesting in small rotting sticks on the forest floor. The holotype nest series (acc. 76.210; 14 workers, 3 females) are designated *nidoparatypes*, the remainder *paratypes*. The holotype has been gold-palladium coated and is mounted with a paratype which originally matched it in colour.

Type deposition. Holotype and most paratypes, including females, in ANIC (type No. 7529); worker paratypes in BM(NH), GM, MCZ, MNB, QM.



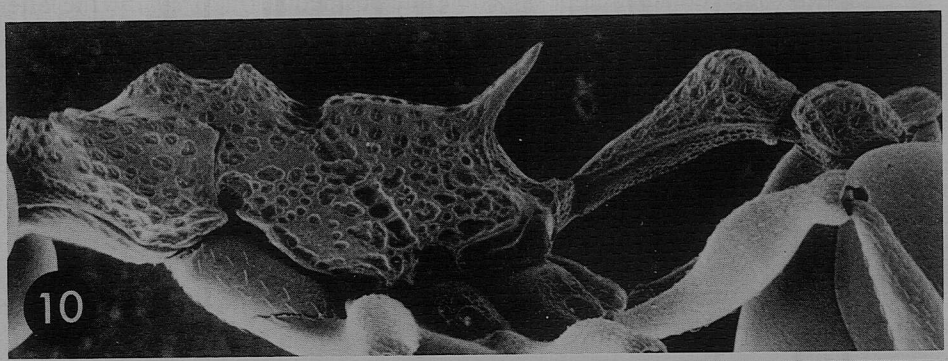
Figs 7–9. *Orectognathus coccinatus*, holotype worker, standard views. HW 0·74 mm; ThL 1·02 mm.

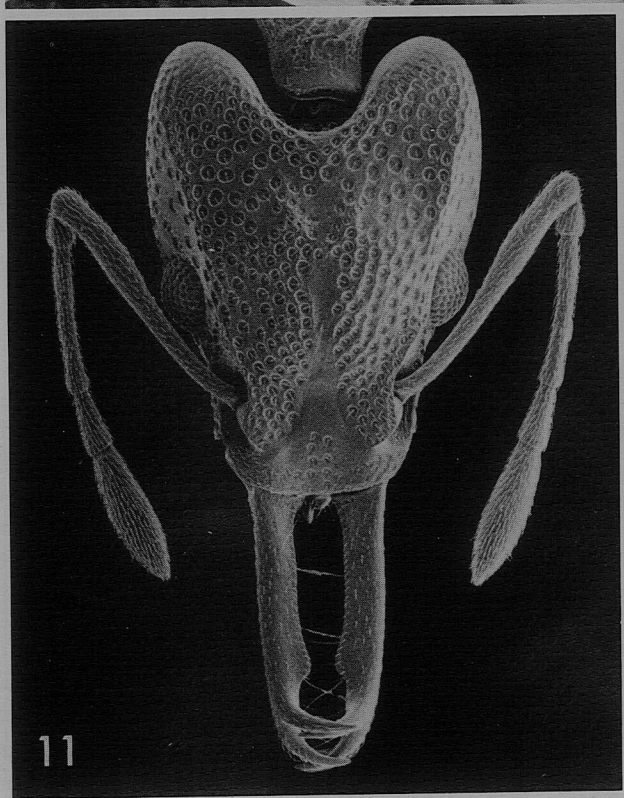
Worker Diagnosis

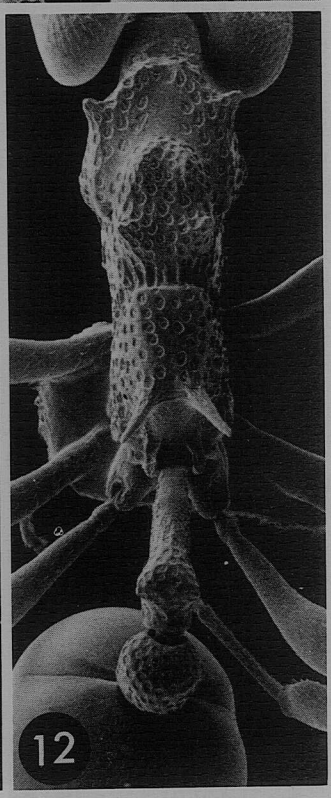
Dimensions (holotype, smallest paratype, largest paratype). TL *c.* 4·0, 3·8, 4·2; HL (mas.) 0·85, 0·80, 0·90; HL (mid) 0·69, 0·64, 0·72; HW 0·74, 0·69, 0·79; CI 87, 86, 88; SL 0·61, 0·59, 0·65; SI 82, 86, 82; ML 0·49, 0·46, 0·51; MI 58, 58, 56; ThL 1·02, 0·94, 1·07; PL 0·55, 0·49, 0·59.

General features as in Figs 7–9 and the summary description of Table 2. Most diagnostic features shared with the closely related species pair *O. rostratus* and *O.*

nanus, as in key couplets 1*a*, 2*b*, 3*b* and 5*b*, pp. 585–7 of Taylor (1977). *O. coccinatus* may be distinguished from *rostratus* and *nanus* as follows [compare Figs 7–9 with figs 20–23 of Taylor (1977)]:







Figs 10–12. *Orectognathus sarasini* Emery, worker, Mt Koghis, New Caledonia, standard views. HW 0·94 mm; ThL 1·36 mm.

(1) Size larger: HW 0·69–0·79 mm versus 0·60–0·67 in *rostratus* and 0·55–0·65 in *nanus*. (Note however that the standard indices CI, SI and MI have almost identical ranges in the three species.)

(2) Erect pilosity lacking on head, pronotum and waist nodes. Such pilosity is distinctively developed in *rostratus* and *nanus*.

(3) By many details of body structure, best appreciated by comparing the illustrations mentioned above. Salient characters involve differences in development of the apical mandibular teeth, degree of occipital emargination, profile of mesosomal dorsum, shape of petiole and postpetiole (in *coccinatus* the latter is broader than long in dorsal view), etc.

Strikingly bicoloured. Head, mesosoma and nodes dark piceous, almost black; Gaster rich golden brown; sides of clypeus, apices of frontal lobes, mesosomal spines, posterior parts of petiole, and entire postpetiole infuscated reddish brown; mandibles antennae and legs generally reddish brown, coxae piceous, middle sections of tibiae more lightly coloured, femora somewhat darker than apical segments.

Female Diagnosis

Females differ from workers in the usual features. The smallest and largest available specimens have the following dimensions:

TL *c.* 4·1, 4·5; HL (max.) 0·86, 0·90; HL (mid) 0·69, 0·71; HW 0·75, 0·78; CI 87, 87; SL 0·60, 0·62; SI 80, 79; ML 0·48, 0·50; MI 56, 55; ThL 1·07, 1·10; PL 0·57, 0·60.

Ocelli are present, but these are not strongly developed, being no larger than the sculptural foveae surrounding them. Females of *O. rostratus* have distinctly larger ocelli. All specimens are dealate except one in acc. 76.209, which has lost one forewing. The remaining wing is truncated just beyond the pterostigma, to produce a spatulate structure, subequal in length to the mesosoma. The hindwing is also truncated at an equivalent point. The terminal margins of both wings are approximately transverse and concave.

Notes

O. coccinatus has peculiar rostrate head shape and enlarged prospicient eyes, like *O. rostratus* and *O. nanus*. It stands intermediate between them and the less derived *O. robustus* in various details [compare Figs 7–9 with figs 14–16 and 20–23 of Taylor (1977)]. The apical mandibular teeth are less reduced than in *rostratus*, the mandibles less strongly convergent, and the occipital emargination deeper. Although *coccinatus* workers lack erect pilosity on the head, mesosoma and nodes, some females have a few sub-erect to erect hairs on the mesosomal dorsum. The existence of *coccinatus* nicely supports the assumption of relationship between *robustus*, *rostratus* and *nanus* implied by their classification together in the *rostratus* group (Taylor 1977).

The rain forest area from which *coccinatus* was collected is very small and somewhat isolated. It is of special significance as the most southerly locality known for several north Queensland insects, and is close to the southern limit of others, such as the 'green tree ant' *Oecophylla smaragdina* (Fabricius).

It is not known whether the reduced wings, described above from a single female, are normal and characteristic of *O. coccinatus*. However, the observed structure, with the multiple presence of dealate females in colonies, and the small ocelli, implies that the reproductive biology of this species might be unusual, perhaps in adaptation to very small population size and restricted available habitat.

Coded Descriptions of *Orectognathus* Species

Table 2 presents in summary form descriptions of all 29 known *Orectognathus* species. These are written in DELTA format (Dallwitz 1979), in which characters are

indicated by numbers and their appropriate states by letters, the two separated by a comma. The descriptions are read by matching each coded entry against the plain language list of attributes given in Table 1. For example 2,A in the description of *O. alligator* expands to 'Shafts of closed mandibles' (character 2) 'more or less parallel, apical teeth not notably reduced' (state A). Attributes involving real numbers, such as those of character 1 'Maximum head length (mm)' are stated directly (e.g. 1,0·88–1·04 for *O. alligator*). Qualifying notes are inserted between angle brackets (e.g. < difference slight >). When two or more states are given under a single character the separators between them translate as follows: & represents 'and', – represents 'to', and / represents 'or'. Examples are 1,0·88–1·04 and 26,A&D in the description of *O. alligator*, and 3,A/B in that of *O. satan*. Entries of the form 15, – (as under *O. alligator*) indicate that the character is inappropriate to the species being described. This is usually because some of the structures involved in the character description are not present. Character 15 refers to details of mesonotal complexity which are not applicable to species with attribute 14,A ('Mesonotal profile simple'). Omitted characters (e.g. No. 16 in all species except *O. antennatus* and *O. sarasini*) have not been scored for the species concerned because they involve special details distinguishing closely similar species but unnecessary in describing others. The text of the tables is reproduced from computer-generated camera-ready copy.

These descriptions considerably increase the easily available taxonomic information about *Orectognathus* species. Their publication essentially elevates my earlier review, complete with this supplement, to a monograph, deficient only in its generalization of distribution records, minimal discussion of female and male characters, and lack of details of measurements and indices [some of which are available elsewhere in the papers of Brown, Lowery, or Taylor and Lowery (references in Taylor 1977, pp. 611–12)].

Coded descriptions of the sort presented here might be criticized as being difficult to use (which is not really true). However, it must be acknowledged that many pages of text are saved by their use, enabling publication of data which would otherwise be prohibitively expansive. Moreover, the contents of Tables 1 and 2 can be easily transposed, as they stand, into a computer data bank, and manipulated in various ways, using the DELTA system (Dallwitz 1979) and associated programs (e.g. Higgins 1979). Expanded plain language descriptions and keys of various sorts (Dallwitz 1974) can be generated rapidly and inexpensively, and the data bank itself adjusted to include descriptions of new species, additional characters or further qualifying notes.

I have demonstrated elsewhere (Taylor 1978) some possibilities accessible through the use of computer-based techniques in the generation of taxonomic publications from input data of the kind embodied in Tables 1 and 2. *Orectognathus* is the subject of that pilot study, which is published fully in microfiche edition, with the most essential parts available also in printed form. Full plain-language descriptions of all species expanded from data identical with that of Tables 1 and 2 are given there, in the microfiche edition. A full key to the species, including those described here, is published with both versions.

A coded description, published with a set of illustrations of the kind used in this paper and in my 1977 review, provides its users with concise taxonomic information as near complete and easily accessible as is possible.

Table 1. Descriptions of characters and states used in the DELTA format species descriptions of Table 2.

See text for explanation

#1. Maximum head length/
mm/
#2. Shafts of closed mandibles/
A. more-or-less parallel, apical teeth not notably reduced/
B. converging apically, apical teeth reduced in size/
#3. Each inner mandibular border, just basad of apical teeth,/
A. with its marginal flange forming a strong tooth-like process, acute to subacute at tip/
B. with its marginal flange expanded as a rounded process, not tooth-like/
C. with a minute subacute angle or denticle forming the apical corner of its narrow marginal flange/
D. without armament (marginal flange if present following contour of jaw, but not itself expanded)/
#4. Basal two-thirds of inner mandibular borders/
A. not concave (straight, feebly convex or feebly sinuous)/
B. shallowly but distinctly concave/
#5. Eyes/
A. of normal size, placed behind level of antennal fossae/
B. enlarged, displaced forwards to about level of antennal fossae/
#6. Anteocular denticles/
A. present, distinct, sharply pointed/
B. represented by low rounded tumosities, about as high as frontal lobes/
C. lacking/
#7. Frons/
A. with dense, large foveae, average spacing less than their mean diameter/
B. with scattered, weakly impressed foveae, interspaces strongly shining/
C. smooth and shining, lacking foveae/
D. densely shagreened, opaque, macrosculptural foveae few, weakly impressed/
#8. Median frontal teeth/
A. present/
B. lacking/
#9. Occipital emargination/
A. exceptionally deep, its sides enclosing an angle of less than 25 degrees/
B. neither exceptionally deep nor shallow, its sides enclosing an angle within the range 50 to 90 degrees/
C. exceptionally shallow, its sides enclosing an angle of around 100 degrees/
#10. Apices of occipital lobes/
A. broadly rounded/
B. each drawn to a blunt point but not spinose/
C. each bearing an acute spine/
#11. Pronotal humeri/
A. armed/
B. rounded, lacking armament/
#12. Pronotal spines/
A. distinctly larger than anteocular denticles/
B. at most barely larger than anteocular denticles/
#13. Ventrolateral margins of pronotum/
A. broadly rounded/
B. with strong salient angles/
#14. Mesonotal profile/
A. simple/
B. complex/

#15. Mesonotum/
A. armed with two pairs of raised tubercles, the posterior pair the larger, acutely subdentate/
B. armed with two pairs of very low rounded tumosities, subequal in size and convexity/
C. armed only with a pair of strong erect spines, lacking traces of anterior tubercles/
#16. Humeral and anterior mesonotal tubercles/
A. relatively poorly developed/
B. relatively well developed/
#17. Propodeal spines/
A. very reduced, much smaller than pronotals and no larger than anteocular denticles/
B. not smaller than pronotals/
#18. Petiolar node/
A. rounded above, without transverse crest or dorsolateral armament/
B. prismatic, with transverse crest and distinct dorsolateral corners/
C. distinctly dorsolaterally bidentate/
#19. Postpetiole/
A. distinctly longer than broad in dorsal view/
B. not longer than broad in dorsal view/
#20. Subpostpetiolar process/
A. present, acutely digitate/
B. lacking/
#21. Dorsal profiles of mesosoma, petiole and postpetiole/
A. broken by numerous fine, short, erect hairs/
B. broken by few, if any, erect hairs/
#22. /
A. Head and mesosoma brownish red, gaster brownish yellow/
B. Head and mesosoma black or piceous, gaster yellow/
#23. /
A. Distinct soldier caste present additional to "normal" workers/
B. Distinct soldier caste not differentiated/
#24. Distribution/
A. New Guinea/
B. New Zealand (North Island)/
C. New Caledonia/
D. Australia/
#25. /
A. Lord Howe Island/
B. Far Northeast Queensland (Iron Range)/
C. Northeast Queensland (base of peninsula)/
D. Central Eastern Queensland/
E. Southeast Queensland/
F. Northeast New South Wales/
G. Central Eastern New South Wales/
H. Southeast New South Wales/
I. Victoria/
J. Tasmania/
K. Southeast South Australia/
L. Southwest Western Australia/
#26. Illustrated in/
A. ANIC micrograph file/
B. Taylor, 1977 (Aust. J. Zool. 25, 581–612.)/
C. Taylor, 1979 (this paper)./
D. Taylor & Lowery, 1972 (J. Aust. Entomol. Soc. 11, 306–310.)/
E. Brown, 1957 (Psyche 64, 17–29.)/
F. Lowery, 1967 (J. Aust. Entomol. Soc. 6, 137–140.)/
#27. Comments:/

Table 2. DELTA format summary descriptions of all 29 known *Orectognathus* species

See Table 1 for translation data, and text for explanation

1.01 # ALLIGATOR TAYLOR SP. NOV./
1.02 1,0.88-1.04 2,A 3,C 4,A 5,A 6,A 7,A 8,B 9,B 10,A 11,A 12,B 13,B 14,A
1.03 15,- 17,B<difference slight> 18,A 19,B 20,B 21,B 23,B 24,D 25,C&D 26,A&C

2.01 # ANTENNATUS FR. SMITH/
2.02 1,1.31-1.60 2,A 3,B 4,A 5,A 6,C 7,A 8,B 9,B 10,A 11,A 12,- 13,A 14,B
2.03 15,A 16,A<compared to sarasini> 17,B 18,B 19,B 20,B 21,B 23,B 24,B&D
2.04 25,E&F&G 26,B

3.01 # BIROI SZABO/
3.02 1,1.43-1.46 2,B 3,D 4,A 5,A 6,C 7,C 8,B 9,B 10,B<tending to rounded>
3.03 11,B 12,- 13,A 14,A 15,- 17,- 18,A 19,A 20,B 21,B 22,A 23,B 24,A 26,B

4.01 # CHYZERI EMERY/
4.02 1,1.19<n=1> 2,B 3,D 4,A 5,A 6,C 7,B 8,B 9,B 10,B 11,B 12,- 13,A 14,A
4.03 15,- 17,- 18,A 19,B 20,B 21,B 23,B 24,A

5.01 # CLARKI BROWN/
5.02 1,1.16-1.52 2,A 3,D 4,B 5,A 6,A 7,A<tending to rugosity> 8,B 9,B 10,A
5.03 11,A 12,A<difference slight> 13,A 14,B 15,A 17,B<difference slight> 18,B
5.04 19,B 20,B 21,B 23,B 24,D 25,E&F&G&H&I&J&K&L 26,B

6.01 # COCCINATUS TAYLOR SP. NOV./
6.02 1,0.80-0.90 2,B 3,D 4,A 5,B 6,A<small> 7,A 8,B 9,B 10,A 11,A 12,A 13,A
6.03 14,A 15,- 17,B<difference slight> 18,A 19,B 20,B 21,B 23,B 24,D 25,D
6.04 26,A&C

7.01 # CZIKII SZABO/
7.02 1,1.22<cephalic index 84 (n=1)> 2,A 3,C<denticle> 4,A 5,A 6,A 7,A 8,A
7.03 9,B<about 65 degrees> 10,A 11,A 12,A 13,A 14,B 15,C 17,B 18,C 19,B 20,B
7.04 21,A 23,B 24,A 26,D

8.01 # DARLINGTONI TAYLOR/
8.02 1,1.34-1.53 2,A 3,D 4,A 5,A 6,C<sometimes vestigial> 7,A 8,B 9,B 10,A
8.03 11,A 12,- 13,A 14,B 15,A<anterior pair relatively low > 17,B 18,B 19,A
8.04 20,B 21,B 23,B 24,D 25,C 26,A&B

9.01 # ECHINUS TAYLOR & LOWERY/
9.02 1,1.64-1.90<cephalic index 56-62> 2,A 3,A 4,A 5,A 6,A 7,A 8,A 9,A 10,A
9.03 11,A 12,A 13,A 14,B 15,C 17,B<difference slight> 18,C 19,A<not greatly
9.04 so> 20,B 21,A 23,B 24,A 26,A&D

10.01 # ELEGANTULUS TAYLOR/
10.02 1,1.04-1.18 2,A 3,D 4,A-B 5,A 6,A<small, obtuse> 7,A 8,B 9,B 10,A 11,A
10.03 12,A 13,A 14,B 15,A 17,B 18,A 19,B 20,B 21,B 23,B 24,D 25,E&F 26,A&B

11.01 # HORVATHI SZABO/
11.02 1,1.14<n=1> 2,B 3,D 4,A 5,A 6,C 7,C 8,B 9,B 10,C<drawn out from apex>
11.03 11,B 12,- 13,A 14,A 15,- 17,- 18,A 19,A 20,B 21,B 23,B 24,A 26,B

12.01 # HOWENSIS WHEELER/
12.02 1,1.24-1.42 2,A 3,A 4,A 5,A 6,C 7,A 8,B 9,B 10,A 11,A 12,- 13,A 14,B
12.03 15,A 17,B 18,B 19,B 20,B 21,B 23,B 25,A 26,B

13.01 # HYSTRIX TAYLOR & LOWERY/
13.02 1,1.38–1.54 2,A 3,A 4,A 5,A 6,A<small> 7,B<foveae vestigial> 8,B 9,B
13.03 10,C<freestanding> 11,A 12,A 13,A 14,B 15,C 17,B<difference slight> 18,C
13.04 19,A 20,B 21,B 23,B 24,A 26,A&D

14.01 # KANANGRA TAYLOR SP. NOV./
14.02 1,1.00<n=1> 2,A 3,C<vestigial> 4,A 5,A 6,A 7,A 8,B 9,B 10,A 11,A 12,A
14.03 13,B<subdentate> 14,A 15,– 17,B<difference slight> 18,A 19,B 20,A 21,B
14.04 23,B 24,D 25,G 26,A&C

15.01 # LONGISPINOSUS DONISTHORPE/
15.02 1,1.20–1.48 2,B 3,D 4,A 5,A 6,C 7,C 8,B 9,B 10,B 11,B 12,– 13,A 14,A
15.03 15,– 17,– 18,A 19,A 20,B 21,B 22,B 23,B 24,A

16.01 # MJOBERGI FOREL/
16.02 1,1.22–1.50 2,A 3,D 4,A 5,A 6,B 7,A 8,B 9,B 10,A 11,A 12,– 13,A<tending
16.03 to obtusely angled> 14,B 15,A 17,B 18,B 19,B 20,B 21,B 23,B 24,D
16.04 25,C&D&E&F 26,B

17.01 # NANUS TAYLOR/
17.02 1,0.64–0.74 2,B 3,D 4,A 5,B 6,A<small, sometimes vestigial> 7,A 8,B 9,C
17.03 10,A 11,A 12,A 13,A 14,A 15,– 17,B<difference slight> 18,A 19,B 20,B
17.04 21,A 23,B 24,D 25,C 26,A&B

18.01 # NIGRIVENTRIS MERCOVICH/
18.02 1,1.01–1.25 2,A 3,D 4,A–B 5,A 6,A 7,B 8,B 9,B 10,A 11,A 12,A 13,A 14,B
18.03 15,A 17,B<difference slight> 18,C 19,B 20,B 21,B<usually a few on
18.04 mesonotum, and elsewhere in occasional specimens> 23,B 24,D 25,G&H 26,E

19.01 # PARVISPINUS TAYLOR/
19.02 1,0.96–1.10 2,A 3,C 4,A 5,A 6,A 7,A 8,B 9,B 10,A 11,A 12,A 13,B 14,A
19.03 15,– 17,A 18,A 19,B 20,B 21,B 23,B 24,D 25,D 26,A&B

20.01 # PHYLLOBATES BROWN/
20.02 1,0.96–1.12 2,A 3,D 4,B 5,A 6,A 7,C<scattered fine to coarse point
20.03 punctures present> 8,B 9,B 10,A 11,A 12,A 13,A 14,B 15,A<posterior pair
20.04 relatively small> 17,B<difference slight> 18,C 19,B 20,B 21,A 23,B 24,D
20.05 25,E&F 26,E

21.01 # ROBUSTUS TAYLOR/
21.02 1,0.85–1.05 2,A 3,C 4,A 5,A 6,A 7,A 8,B 9,B 10,A 11,A 12,A 13,B 14,A
21.03 15,– 17,B<difference slight> 18,A 19,B 20,B 21,B 23,B 24,D 25,B&C&E
21.04 26,A&B

22.01 # ROOMI TAYLOR/
22.02 1,1.58<n=1> 2,A 3,A 4,A 5,A 6,C<slight vestiges present> 7,D 8,B 9,B
22.03 10,C<freestanding> 11,A 12,– 13,A 14,B 15,C 17,B<difference slight> 18,C
22.04 19,A 20,B 21,B 23,B 24,A 26,A&B

23.01 # ROSTRATUS LOWERY/
23.02 1,0.70–0.79 2,B 3,D 4,A 5,B 6,A<small, sometimes vestigial> 7,B 8,B 9,C
23.03 10,A 11,A 12,A 13,A<tending to obtusely angled> 14,A 15,– 17,B 18.A 19,B
23.04 20,B 21,A 23,B 24,D 25,E&F 26,F

24.01 # SARASINI EMERY/
24.02 1,1.07–1.26 2,A 3,B 4,A 5,A 6,C 7,A 8,B 9,B 10,A 11,A 12,– 13,A 14,B
24.03 15,A 16,B<compared to antennatus> 17,B 18,B 19,B 20,B 21,B 23,B 24,C
24.04 26,A&C

25.01 # SATAN BROWN/
25.02 1,1.36–1.57 (<excluding occipital spines> 2,A 3,A/B<intermediate> 4,A 5,A
25.03 6,C 7,A 8,B 9,B<approaching 90 degrees> 10,C<drawn out from apex>
25.04 11,A<with weak tubercles> 12,– 13,A 14,B 15,A/B<geographically variable>
25.05 17,B 18,C 19,B 20,B 21,B 23,B 24,D 25,C 26,B 27<populations with 15,A
25.06 also have 11,A (with strong tubercles)>

26.01 # SEXSPINOSUS FOREL/
26.02 1,1.20–1.24<n=3> 2,A 3,D 4,A 5,A 6,A<small> 7,B 8,B 9,B 10,A 11,A 12,A
26.03 13,A 14,B 15,A<anterior pair weak, rounded; posterior pair erect spines>
26.04 17,B 18,A 19,A 20,B 21,A 23,B 24,D 25,C 26,B

27.01 # SZENTIVANYI (BROWN)/
27.02 1,1.31–1.43 2,B 3,D 4,A 5,A 6,C 7,C 8,B 9,B 10,A 11,B 12,– 13,A 14,A
27.03 15,– 17,– 18,A 19,A 20,B 21,B 23,B 24,A 26,E

28.01 # VELUTINUS TAYLOR/
28.02 1,1.26–1.32<n=2> 2,B 3,D 4,A 5,A 6,C 7,D 8,B 9,B 10,C<a flattened
28.03 triangle, freestanding> 11,B 12,– 13,A 14,A 15,– 17,– 18,A 19,B 20,B
28.04 21,B 23,B 24,A 26,A&B

29.01 # VERSICOLOR DONISTHORPE/
29.02 1,1.16–2.12<including majors> 2,A 3,D 4,A 5,A 6,A<obtusely so>
29.03 7,A<tending to rugosity> 8,B 9,B 10,A 11,A 12,A 13,A 14,B 15,A 17,B 18,B
29.04 19,B 20,B 21,B 23,A 24,D 25,D&E&F&G&H 26,B

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