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Studies on the Australian stick-insect genus *Onchestus* Stål (Phasmida: Phasmatidae)

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Abstract

Studies on the rarely reported Australian genus *Onchestus* have revealed a confusing situation where only one of the 4 species currently included, belongs to the genus. A new species from north Queensland, *Onchestus rentzi*, is described and figured, including the egg. Keys are provided.

Key words

Onchestus, *O. rentzi* new species, New South Wales, Queensland

Introduction

The genus *Onchestus* Stål 1877 has rarely been mentioned and specimens are scarce in collections. As with many phasmid genera, initial research identified various taxonomic issues in need of resolution. Our studies include research of literature records, examination of a number of museum and private collections, including type material, in addition to rearing a series of species newly described in this paper.

Stål (1877) included 2 Australian species in his new genus *Onchestus: Lopaphus gorgus* Westwood 1859 and *Cyphocrania pasimachus* Westwood 1859. Kirby (1904) added 2 further species, albeit doubtfully: *Phasma lugens* Thunberg, 1815 and *Phasma bidentatus* Thunberg, 1815.

Fortunately for researchers, many of the oldest described phasmids are present in collections (documented by Otte & Brock 2003). Thunberg's type material has, however, been mainly lost (Brock 2002) and the brief descriptions of species given, lack any measurements or locality data. It appears that Kirby (1904) provisionally placed 2 such 'lost' species in *Onchestus,* mainly because of their black and white hindwings. However *bidentatus* is described as being green (*Onchestus* are brown), with 2 teeth on the femora. Similarly, *lugens* has the wingbase reddish (black in *Onchestus*) and forewings short, 8× shorter than wings (forewings are elongate in *Onchestus*). Brunner and Redtenbacher 1906-08 omitted reference to either species. Whilst neither species in our view belong to *Onchestus*, in the absence of type material, ascertaining even the genus to which these insects belong becomes difficult. However, candidates include the Australasian genera *Acrophylla*, *Anchiale* and *Ctenomorphodes*, some species of which were known to have been collected in the late 1700s.

Redtenbacher (1908) transferred *pasimachus* to *Anchiale* Stål 1875, although he omitted it from the index to species. Vickery (1983) returned it to *Onchestus* without comment, although the elongate *pasimachus* has different genitalia to *Onchestus* species. In addition, *pasimachus* lays very differently shaped eggs, as first mentioned by Fellenberg (1993). Uncertain as to which species he referred to, Fellenberg commented 'more undescribed species exist in collections and at the present time identification of species is not possible'. Having seen the material cited by Fellenberg, these specimens appear to represent *pasimachus*. These elongate insects, typically around 195 mm in females, are known from various parts of central and western Australia; they may represent more than one species. In a separate study in progress by Brock, related genera, such as *Paronchestus* Redtenbacher 1908, are also being examined).

Abbreviations for Depositories

ANIC	Australian National Insect Collection, Canberra, Australia
BMNH	Natural History Museum, London, United Kingdom
MCZC	Museum of Comparative Zoology, Harvard University, Cambridge, USA
QMBA	Queensland Museum, Brisbane, Australia

Key to adult females of *Onchestus* (Figs 1, 6)

Robust appearance, thorax and abdomen rather broad. Head often with pair of large tuft-like protuberances (sometimes absent). Hindwings abbreviated, but exceeding combined length of head to mesonotum. Outer margin of midfemora with large sub-basal crest and a larger subapical crest. Operculum with conspicuous basal lobe. Body length 108 to 110 mm. Distribution: North Queensland (Fig. 6) . . . . . *O. rentzi sp. n.*
Robust appearance, thorax and abdomen usually broad, slightly less than in *rentzi*. Head lacking pair of large tuft-like protuberances. Hindwings abbreviated, shorter than combined length of head to mesonotum. Outer margin of midfemora with one large sub-basal crest; other dentations much smaller. Operculum with slight basal lobe. Body length 88 to 100 mm. Distribution: New South Wales, South east Queensland (Fig. 1) . . . . . *O. gorgus*

Note – the male of *O. gorgus* is not yet known.

Key to eggs of *Onchestus* (Figs 3, 8)

Micropylar plate deeply inset in capsule. Posterior of capsule with a distinct inverted 'v' shape in center (Fig. 8). . . . . *O. rentzi* sp. n.
Micropylar plate not deeply inset in capsule. Posterior of capsule with only a slight incision in center (Fig. 3) . . . . . *O. gorgus*

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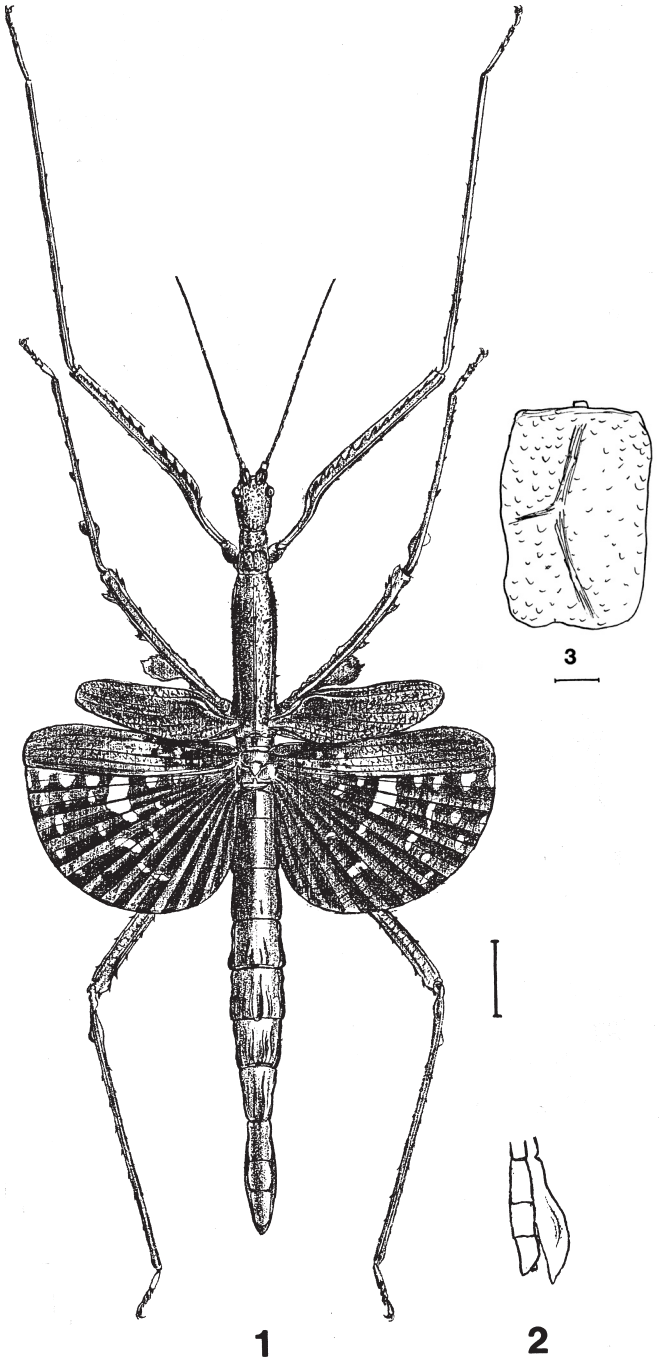


Fig. 1. *Onchestus gorgus* female (after Westwood, 1859).
Fig. 2 *Onchestus gorgus* end of abdomen in female, lateral view (after Westwood, 1859)
Fig. 3. *Onchestus gorgus* egg lateral view.
Scale line, adults = 10mm; egg = 1mm.

Onchestus Stål

Onchestus Stål 1877: 63.

Type species.— *Lopaphus gorgus* Westwood 1859, by subsequent designation of Kirby 1904.

Onchestus; Kirby 1904: 394, Redtenbacher 1908: 462, Vickery, 1983: 9, Fellenberg 1993: 117 (eggs), Rentz 1996: 255, Balderson *et al* 1998: 373, Otte & Brock 2003: 348.

Characteristics of the genus.— Medium-sized phasmids, body rugose and broad, particularly in female. Head, pronotum and mesonotum tuberculate, with some spines. Head with pair of long spine-like protuberances slanting backwards (male); sometimes with pair of large tuft-like protuberances (female), these features variable within species and may be absent. Triangular central slightly raised area between eyes. Antennae 22 to 25-segmented, reaching or exceeding length of fore femora; basal segment very broadened. Legs long, all femora with pair of apical spines. Central carina of fore femora very dentate; mid- and hind femora less dentate, but with variable number and lobes and/or crests, largest on mid femora. Forewings elongate, leaf-like. Hindwings full-sized (male), shorter than normal in females; pre-anal part of hindwings with conspicuous black base, hindwings black and white tessellated to a varying degree. Operculum elongate, just exceeding end of abdomen (male subgenital plate about half length of 9th abdominal segment). Cerci short, almost concealed in female, longer in male.

Onchestus gorgus (Westwood)
[Gorgon Stick-insect]
(Figs 1-3)

Lopaphus gorgus Westwood 1859: 102, pl. 11-4. Syntypes: 2 ♀♀, Australia: Richmond River [New South Wales]. One with acquisition no. [18]53-24: Purch[ased] Stevens (BMNH) [examined].
Onchestus gorgus; Stål 1877: 63, Kirby 1904: 394, Vickery 1983: 9, Balderson *et al.* 1998: 373, Brock, 1999: 124, pl. 37b, Otte & Brock, 2003: 348.
Anchiale gorgus; Redtenbacher 1908: 462.

Other material examined.— All AUSTRALIA: ♀, South-East Queensland, Mt. Glorious, 22km N.W. Brisbane, 635m., rainforest, A. Hiller; ♀, same data except 16.iv.1987 (both A. Hiller Coll.); female, Nat. Park, Q[ueensland]. McPherson Rge, iii.1932, 3-4000 ft. (MCZC).
Female (Figs 1-2)**:** Westwood 1859 provides an adequate description and figure. The hindwings can be more or less tessellated than shown in Fig. 1, and the degree of spination of the thorax can also vary. From material examined, the head lacks protuberances often found in *rentzi*.
Distribution: New South Wales and southeast Queensland; seldom reported.
Egg (Fig. 3): Uniform mid to dark brown. Capsule unusually shaped; with 4 sides when viewed from operculum. A dorsal view shows the capsule tapers sharply to an almost rounded posterior, which has a slight incision, clear only when viewed laterally. The lateral view also shows a slightly curved ridge that houses the micropylar plate; the opposite side of the capsule slightly incurved. The capitulum is small, on a short stalk. Capsule with numerous ridges and pits. Capsule length 5 mm, height 3.4 mm, width 2.8 mm.
Note — description based on 3 eggs attached to card in the collection of Tony Hiller (from a female *ex* Mt Glorious, southeast Queensland).

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Onchestus rentzi sp. n.
[Rentz's Stick-insect]
(Figs 4-8)

Onchestus sp. 1 Rentz 1996: 255, pl. 415-416.
Onchestus sp. Brock 1999: 126 (egg).

Male (holotype) (Figs 4-5)**:** elongate, uniform dark brown, scabrous insect with paler yellowish brown marks on long forewings and pre-anal part of hindwings. Head with pair of spine-like protuberances, pointing backwards. Mesonotum with pair of central spines. Hindwings, tessellated black and white. Body length 84 mm.

Head: Longer than broad, raised posteriorly where pair of large spine-like protuberances (1.5 mm) is present. Some small tubercles present, including posteriorly, behind spines. Eyes medium-sized; large, central, almost triangular, slightly raised area between eyes. Antennae with 24 segments, reaching half length of fore tibiae.

Thorax: Robust, scabrous, with many tubercles and granulations dorsally, laterally and ventrally. Pronotum shorter than head, with bold central indentation and lines beneath. Mesonotum < 4 × longer than pronotum, with central pair of spines (1 mm in length) and pair of tubercles anteriorly, close to each other. Metanotum short.

Abdomen: Elongate, scabrous. Posterior of abdominal segments 6 and 7 in particular, with central raised protuberances. Cerci broad, narrowed at tip. Subgenital plate not quite rounded at tip, reaching half length of 9th abdominal segment. 8th and 9th segments rather broadened; anal segment shorter, slightly incised in center; claspers beneath with 2 short teeth.

Wings: Forewings long, leaf-like. Pre-anal part of hindwings with black basal patch, remainder mottled dark brown and yellowish, as are forewings. Hindwings almost reaching end of 6th abdominal segment, black and white tessellated.

Legs: Long, mottled in light and dark brown. All femora with pair of apical spines. All carina of fore femora with several short dentations. Inner margin of midfemora with 2 bold subapical spines and 5 smaller well-spread dentations; outer margin with large subbasal crest and smaller subapical 2-pointed lobe. Mid tibiae with basal lobe on inner margin and pair of sub-basal spaced dentations on outer margin. Outer margin of hind tibiae with small well-spread dentations, notably two bold sub-basal dentations.

Paratype Males: (9 specimens). Same as holotype except for minor size (body length 84 to 87mm) and color variation. One male dark brown except for dusting of yellowish on forewings. The paired central spines on the thorax are variable, sometimes uneven; they can be very short.

Paratype Females: (8 specimens) (Figs 6,7). Uniform dark brown, blackish-brown or pale brown, broad-bodied scabrous insects with long forewings and abbreviated hindwings, tessellated black with some white patches and spots. Body length 108 to 110 mm.

Head: Slightly longer than broad, raised posteriorly where pair of large tuft-like protuberances is present on most females, but sometimes completely absent. Many short spines or prominent tubercles present. Eyes medium-sized; large, central, almost triangular, slightly raised area between eyes. Antennae with 25 segments, reaching end of fore femora.

Thorax: Very broad, scabrous. Number of spines and tubercles varies, but often frequent dorsally, laterally and ventrally. Pronotum slightly shorter than head, with bold central indentation and lines beneath. Mesonotum > 3 × longer than pronotum; where present, spines typically *ca* 1 mm in length, in uneven pairs as follows: centrally, close to each other anteriorly, 2 pairs centrally further apart and a pair towards the posterior. Metanotum short.

Abdomen: As in male, except cerci short, rather hidden from view. Operculum long, tapered to a slightly rounded tip, just reaching end of anal segment; basal lobe conspicuous.

Wings: Forewings long, leaf-like. Hindwings abbreviated, pre-anal part with black basal patch, followed by whitish area; remainder dark brown, as are forewings. Hindwings reaching half length of 5th abdominal segment; black, tessellated with several white spots and blotches, these rather indistinct on bottom half.

Legs: As in male, except that fore femora have more pronounced dentation on central carina. Also, outer margin of mid femora have larger 2-pointed subapical crest, than the sub-basal crest.

Egg (Fig. 8): Uniform mid to dark brown. Capsule unusually shaped; with 4 sides viewed from operculum. A dorsal view shows the capsule tapers sharply to an almost rounded posterior, which has a bold inverted 'v' incision, clear when viewed laterally (Fig. 8b). The lateral view also shows a curved ridge with the micropylar plate deeply inset into the capsule; the opposite side of the capsule is incurved. The capitulum is rather small, on a short stalk. Capsule with numerous ridges and pits. Capsule length 5.5 mm, height 3.7 mm, width 3 mm. Micropylar plate short, oval, the ridge above and below this, rather heavily pitted.

Holotype ♂, Australia: Polly Creek, Garradunga, north Queensland, 15 xi 2001, J. Hasenpusch (QMBA). **Paratypes:** All AUSTRALIA: ♂, ♀, NEQ. lat 17°13′S, long 145°25′E, 3km W of Bones Knob, 1100m, 10 xii 1995, Monteith, Cook & Thompson; ♂, lat 16°34′S, long 145°16′E, Mt Lewis, 16 km from Bushy Creek, 900 m, 20 iv 1997, Monteith, Russell & Ovenden; ♂, NEQ lat 17°23′S, long 145°26′E, Upper Plath Rd, 1100m, 9 xii 1995. Monteith, Cook & Thompson; ♂, Upper Boulder Creek, 850 m, 11 km NNW of Tully, N.Qld. 16-19 xi 1994. Cook, Monteith & Thompson; ♀, 3 km SW Mt Halifax, 580 m, 8 v.1991, D. Cook & F. Savage, creek side, rainforest; ♀, Head of Roots Creek, 12 km WNW Mossman, NQ. 28-29 xii 1989, 1200 m., ANZSES Expedition; ♀, Queensland (NEQ), Windsor Tableland, via Mt Carbine, i 1981, I. Fanning (all QMBA), ♂, ♀, Polly Creek, Garradunga, north Queensland, 12 xi 2001, J. Hasenpusch, also 2 eggs; 2 ♂♂, 2 ♀♀, Polly Creek, Garradunga, north Queensland, 18 i 2002

Table 1. Measurements of *O. rentzi* (mm).

	♂ (holotype)	♂ (paratypes)	♀ (paratypes)
Body length	84	84 to 87	107 to 110
Head	4	4	7
Antennae	41	35 to 41	24
Pronotum	3	3 to 3.5	6
Mesonotum	11	11 to 12	20 to 20.5
Metanotum	4	4	6
Median Segment	4	4	6.5
Forewings	14	13 to 14	26 to 27
Hindwings	46	45 to 46	36 to 37
Fore Femora	28	28 to 31	31 to 32
Mid Femora	17	17 to 19	20
Hind Femora	23	23 to 26	26 to 27
Fore Tibiae	35	35 to 37	37 to 38
Mid Tibiae	20	20 to 21	23 to 24
Hind Tibiae	30	30 to 31	35 to 36
Cerci	2	2	1.5

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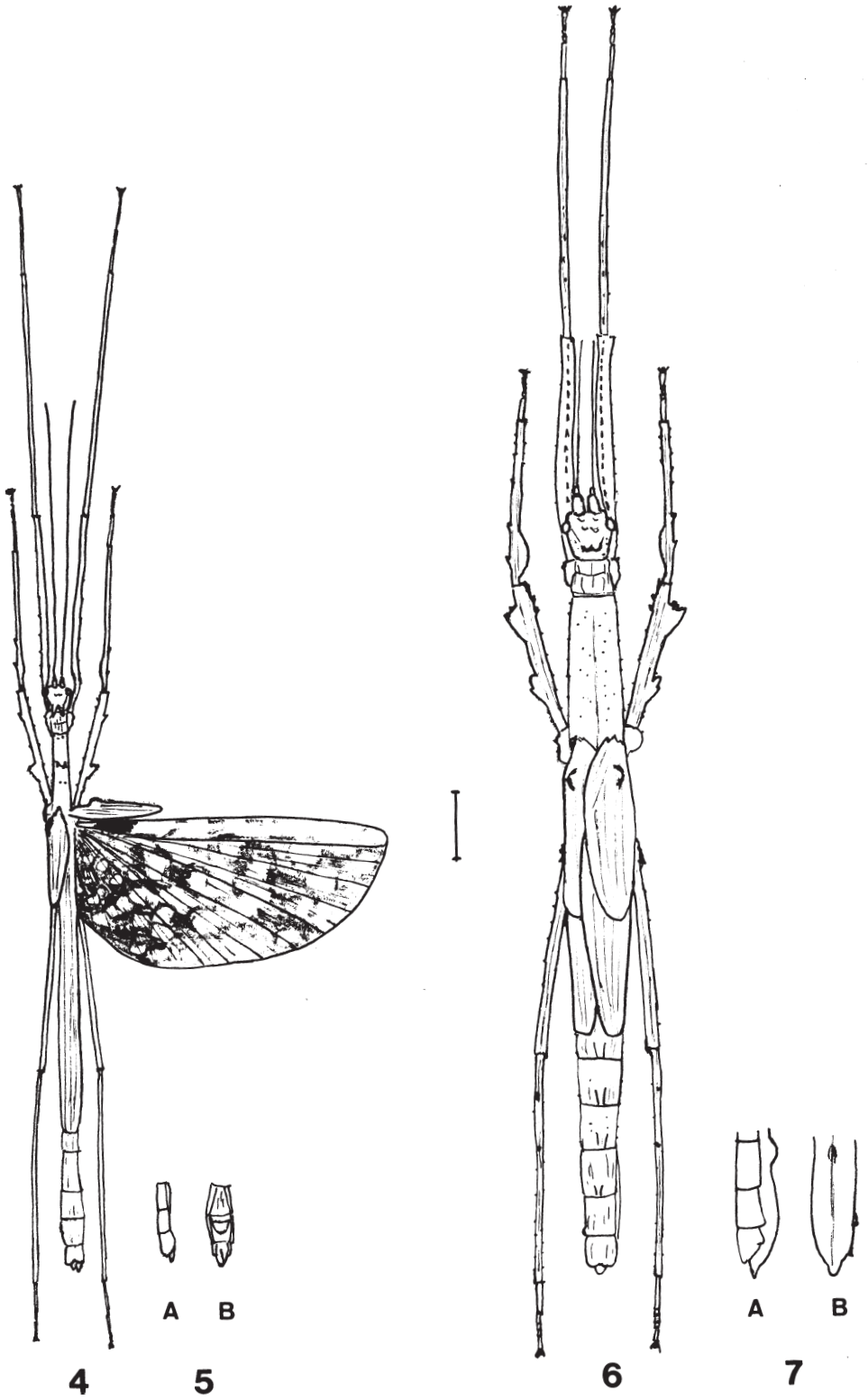


Fig. 4. *Onchestus rentzi,* holotype male.
Fig. 5. *Onchestus rentzi,* end of abdomen in male a) lateral b) ventral.
Fig. 6. *Onchestus rentzi,* female.
Fig. 7. *Onchestus rentzi,* end of abdomen in female a) lateral b) ventral.

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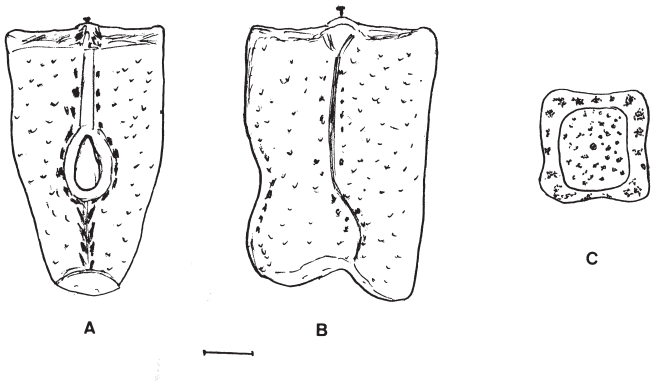


Fig. 8. *Onchestus rentzi* egg views a) dorsal b) lateral c) from top. Scale line = 1mm.

(BMNH), 2 ♂♂, ♀, Polly Creek, Garradunga, north Queensland, (2 x 2001 [f], 9 xi 2001 [2 x m]), J. Hasenpusch (P. Brock coll.). Reared specimens were observed for variation, but have not been retained as paratypes.

Distribution.— Found in rainforest in parts of northeast Queensland.

Food Plants.— *Macaranga subdentata* (Euphorbiaceae), *Calliandra tiemorensis** (Mimosaceae), *Psidium guajava**, *Rhodamnia sessiliflora* (Myrtaceae), raspberry *Rubus idaeus** (Rosaceae) [* denotes an exotic species].

Behaviour.— Well camouflaged on low-growing foliage, sometimes observed at rest on the ground or on logs. When disturbed, both sexes flash and hold their wings open in an effort to startle a predator, and then quickly walk away.

Etymology.— Named after David Rentz, one of the world's leading orthopterists, with notable major works on Australian orthopteroid insects.

Discussion

The relatively few records in the literature indicate that *Onchestus* species may be uncommon in Australia (Fig. 13); however, many Australian phasmids are known from only a handful of records. This is true even of some species well known as culture stocks. This apparent scarcity often relates to limited interest in phasmids, and/or the fact they are nocturnal and rarely searched for at night.

A main taxonomic problem in Phasmida is that variation can be extreme. *Onchestus* is another genus with considerable variation within species, including the presence or absence of tufts on the head in *O. rentzi*, a feature that would be regarded as important in distinguishing some phasmid species. As referred to in the keys, there are some consistent features in adults and eggs which enable the northeast Queensland and southeast Queensland/New South Wales species to be differentiated.

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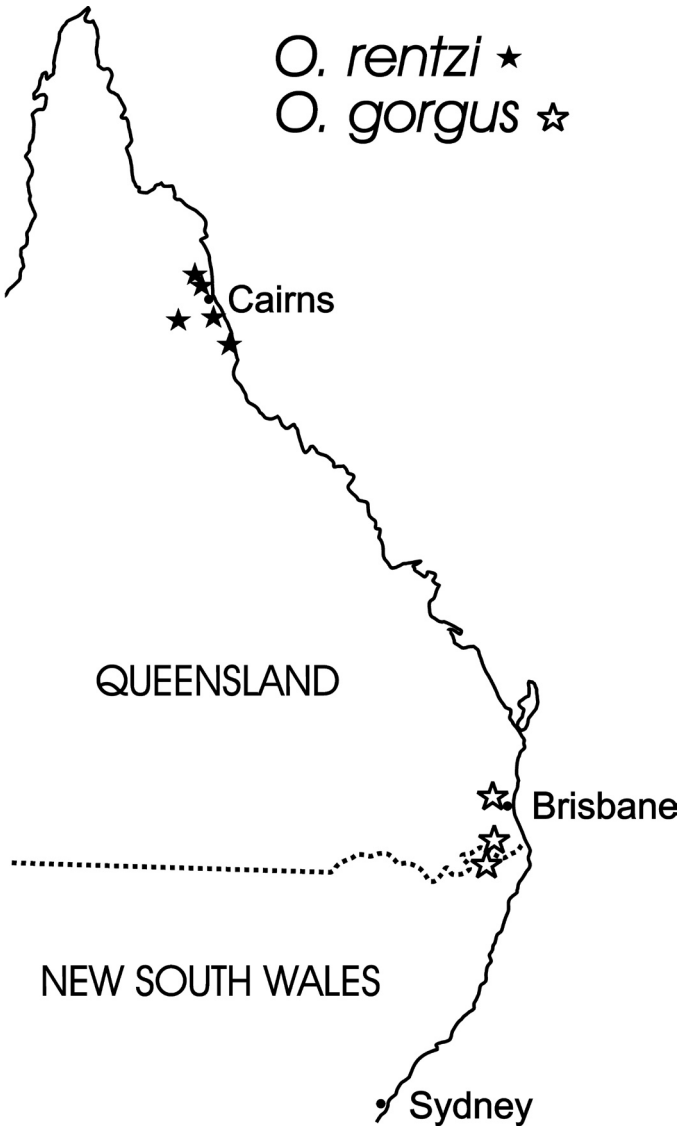


Fig. 9. Distribution of *Onchestus* in Australia.

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