

THE RHYSODINI OF AUSTRALIA (INSECTA:
COLEOPTERA: CARABIDAE OR RHYSODIDAE)ROSS T. BELL¹

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ABSTRACT

The Rhysodini known from Australia are illustrated and described and keys are provided. *Sloanoglymmiina*, new subtribe, and *Sloanoglymmius*, new genus, are proposed for *Rhysodes planatus* Lea. The following new species are described (type localities indicated): *Kaveinga (Angekiva) stiletto* (Queensland, Lamington National Park); *Kaveinga (Angekiva) walfordi* (Queensland, 29 km southeast of Mareeba); *Rhyzodiastes (Rhyzoarca) ovicollis* (Queensland, Ramsay's Scrub, Cooloola); *Omoglymmius (Caeconavitia) okei* (Queensland, Blue Mountains, Cape York Peninsula); *Omoglymmius (s. str.) bituberculatus* (Queensland, Boar Pocket); *Omoglymmius (s. str.) monteithi* (Queensland, West Claudie River, Iron Range). The Australian fauna contains 13 species in five subtribes, five genera and eight subgenera.

Intraspecific variation, distributions within Australia, and zoogeographic relationships with other regions are given. Rhysodini are restricted to the forests along the east coast, including nearby mountains from Cape York to Tasmania. *Sloanoglymmius* is taxonomically isolated and shares only plesiomorphic characters with *Leoglymmius*. Both are restricted to Australia. *Omoglymmius (Caeconavitia)* previously thought to be endemic to Fiji, has a species in northern Queensland. Otherwise, the new taxa do not alter the picture of Australian rhysodine zoogeography as presented in previous papers.

INTRODUCTION

The Rhysodini is a moderate-sized group of beetles which has commonly been placed in the suborder Adephaga as an independent, presumably primitive family. Bell and Bell (1962) disagreed, concluding to the contrary that it should form a tribe Rhysodini within the Carabidae. The Rhysodini represents a lineage of ground beetles which is highly modified for life within rotten wood, and for a specialized diet, presumably slime molds. At the present, the position of the group is still being debated.

We (Bell and Bell, 1978, 1979, 1982, 1985) have monographed the world fauna at the species level, and a fifth part is in preparation on the phylogeny and zoogeography of the group. However, we have previously treated the Australian fauna only superficially, since we had not seen the type specimens housed in Australia, and had studied only the limited material which had found its way into European and North American museums. A sabbatical leave (1988-89) allowed us to study the Australian species in the same detail as those of other continents, as well as to assess the zoogeographic relationship of the Australian species.

Rhysodini, in general appearance, resemble Carabidae of the tribe Scaritini, especially *Clivina*. They are similar in shape, and often in size and color. Rhysodini are easily separated from all other Carabidae by the presence of a deep median pit, often connected to a system of grooves, on the dorsal surface of the head.

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Additional features include differentiation of a narrow, condyliform "neck", fusion and elongation of the mentum so that it conceals the remaining mouthparts in ventral view, and presence in males of "calcars", anteriorly directed processes on the apices of the hind, and usually also the middle tibiae. The calcars are absent in females, and thus are a reliable means of identifying the sexes. Since all known Rhysodini look red-brown in bright light and piceous to black if seen in dimmer light, color descriptions have been omitted.

Rhysodini are limited to forested regions where there is sufficient rainfall to permit the decay of wood and the growth of slime molds. In general, they are absent from forests which have a strongly marked dry season. In Australia they seem to be restricted to wet or at least moderately wet sclerophyll and rain forest. They are difficult to find and collect. The most fruitful collection method involves the prying apart of suitable logs, stumps or roots with a screwdriver, small crowbar or similar instrument. At times, machetes, hatchets or saws are useful. Some species have been found in dead spots in recently fallen branches of live trees, in major roots as deep as three meters below the surface, or in rotten areas in the centers of large standing trees. *Rhyzodiastes mirabilis* is usually found on small sticks in forest litter (G. B. Monteith, personal communication, 1989).

Rhysodini are often gregarious, although seemingly less so in Australia. If a single specimen is found within a log, a careful dissection of the log will often reveal a large number of specimens. It is sometimes practical to take an entire log back to the laboratory for systematic searching. Members of different species have been found in the same log.

Fully-winged species are, on rare occasions, collected at light traps and flight intercept traps. This is especially likely if the trap is in forest. Some of the vestigial-winged species have been taken in pitfall traps in forest litter or in Berlese samples. There is evidence that the beetles occur on the surface of logs during or after thunderstorms.

The larvae are found in short tunnels within rotten wood. The tunnel is filled in behind the larva by wood chips, evidently cut by the larva as it extends the tunnel. The larvae have leg segmentation typical of suborder Adephaga, but the body is soft, without distinct sclerites, and the urogomphi are absent. Each body segment, or most of them, has a dorsal transverse "comb" of stout spiniform setae.

Abbreviations used in the text are: ANIC, Australian National Insect Collection, Canberra, ACT; BMNH, British Museum (Natural History), London; BPM, Barry P. Moore, private collection, Canberra, ACT; BSRI, Biosystematics Research Institute (now called Biosystematics Research Center), Ottawa; CAS, California Academy of Sciences, San Francisco; CSIRO, Commonwealth Industrial and Scientific Research Organization, Canberra, ACT; DPIB, Department of Primary Industries, Brisbane; LUN, Zoological Institute, Lund, Sweden; MCZ, Museum of Comparative Zoology, Harvard University, Cambridge, Mass.; MMUS, Macleay Museum, Sydney; MNHN, Muséum National d'Histoire Naturelle, Paris; MVIC, Museum of Victoria, Natural History, Abbotsford, VIC; QM, Queensland Museum, South Brisbane; QPIM, Department of Primary Industries, Mareeba, QLD; QUIC, University of Queensland Insect Collection, St. Lucia, QLD; SAMA, South Australian Museum, Adelaide; TM, Transvaal Museum, Pretoria; UVM, University of Vermont, Zoology Department, Burlington, Vermont; L/GW, ratio of pronotal length divided by its greatest width; ACT, Australian Capitol Territory; NSW, New South Wales; QLD, Queensland; TAS, Tasmania; VIC, Victoria.

GLOSSARY

Apical striole—a short fragment of a stria on the outer face of the apical tubercle of the elytron, appearing as a curved row of punctures arising from the marginal stria and curving back toward it distally.

Apical tubercle—an elevated region along the lateral margin of the elytron near the apex, bounded medially by the subapical impression.

Discal striole—a more or less linear anterior extension of the basal impression of the pronotum.

Frontal groove—one of a pair of grooves extending anteriorly from the frontal space, separating the median lobe from the temporal lobes.

Frontal pit—a deep depression in the dorsal surface of the head between the temporal lobes, concealed partially by the tip of the median lobe and medial angles of the temporal lobe.

Frontal space—the visible external opening of the frontal pit, bounded anteriorly by the median lobe, laterally by the temporal lobes and limited posteriorly by the medial angles of the temporal lobes.

Inner carina—the elevated ridge lying between the median groove and one of the paramedian grooves of the pronotum.

Intercalary stria—the stria laterad the parasutural stria and medial to the subapical tubercle. This terminology is used in the tribe Clinidiina where there is reduced striation.

Intratubercular stria—in Clinidiina, the stria laterad the intercalary stria, if present. It can be identified by the fact that its apex passes between the subapical and apical tubercles.

Minor setae—a group of many short setae on the antennal segments, shorter and more numerous than apical or basal setae. They are generally distributed on the cone of segment XI, but on the more proximal segments they may be grouped either as a broad irregular band (Fig. 4), a single row in an encircling subapical ring (Fig. 5) or an isolated tuft (Fig. 3).

Orbital groove—a groove on the lateral margin of the temporal lobe, just medial to the upper edge of the eye, often appearing as a posterior continuation of the antennal groove.

Outer carina—the elevated ridge between the paramedian groove and the marginal groove of the pronotum.

Parafrontal boss—an isolated convex, glabrous area lateral to the median lobe.

Paramedian groove—a groove extending from the anterior to posterior margin of the pronotum about halfway between the median groove and the lateral margin, separating the inner and outer carinae.

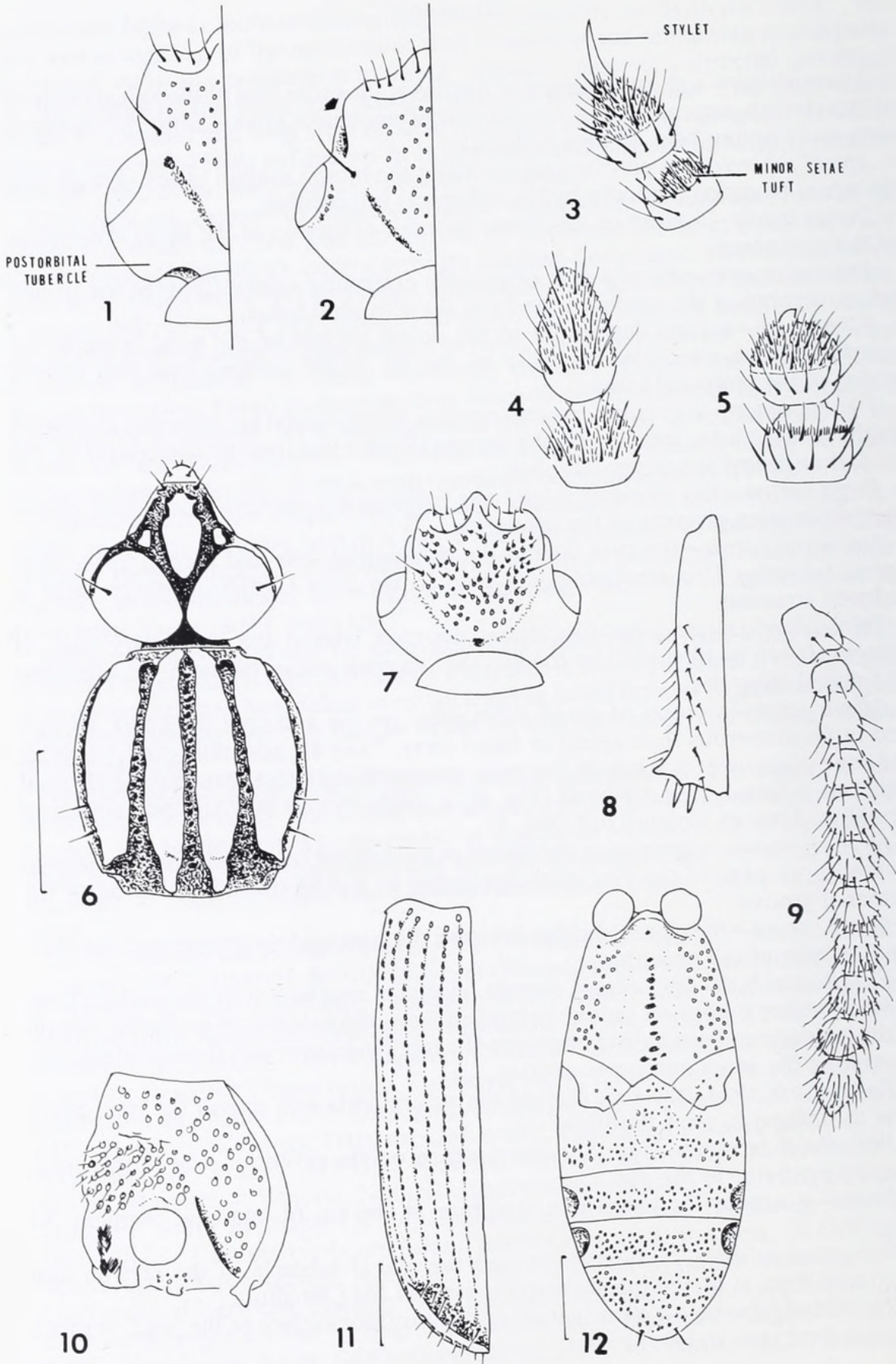
Parasutural stria—the stria laterad the sutural stria and mesad the intercalary stria as defined in the Clinidiina.

Postorbital tubercle—(Fig. 1) a prominence on the posterior side of the head, directly posterior to the eye.

Stylet—a needle- or chisel-like structure at the tip of antennal segment XI (Fig. 3).

Subapical tubercle—a tubercle mesad the apical tubercle of the elytron and separated from it by the intratubercular stria in the Clinidiina.

Suborbital tubercle—a prominence on the posterior surface of the head, ventrad the eye, best seen in lateral view.



SYSTEMATICS

Seven subtribes are now known. Five of these occur in Australia. As the remaining two subtribes are from the Southern Hemisphere, and either of them might be found in Australia in the future, all are included in the key below.

Key to Subtribes of Adult Rhysodini

- 1. Mentum separated laterally from gena by a cleft (Fig. 2) 2
- 1'. Mentum completely fused laterally to gena (Fig. 1) 3
- 2.(1.) Minor setae of outer antennal segments in broad bands (Fig. 4); pronotum with paramedian grooves narrow, complete; median groove with anterior, posterior pits; pronotum much narrower than elytra; elytral humerus not dentate *Leoglymmiina*
- 2'. Minor setae of outer antennal segments forming subapical ring on each segment (Fig. 5); pronotum with rounded basal impressions, without paramedian grooves; median groove linear, not expanded at either end to form anterior, posterior median pits; pronotum broad, almost as wide as elytra; elytral humerus dentate
..... *Sloanoglymmiina*, new subtribe
- 3.(1'.) Minor setae of outer antennal segments forming a tuft on ventral side of segment (Fig. 3) or minor setae entirely absent (except apical segment) *Clinidiina*
- 3'. Minor setae of each outer antennal segment forming a subapical ring (usually only one seta in width) (Fig. 4) 4
- 4.(3'.) Median lobe of head elongate, extending to neck constriction, widely separating temporal lobes *Rhysodina*
- 4'. Median lobe not so elongate, not separating temporal lobes 5
- 5.(4'.) Median lobe not defined; frontal pit round, porelike; frontal grooves absent or barely suggested (Africa, South America, New Zealand) ...
..... *Dhysorina*
- 5'. Median lobe defined by frontal grooves, usually deep 6
- 6.(5'.) Frontal pit absent; median grooves very shallow, meeting at neck constriction (South Africa) *Medisorina*
- 6'. Frontal pit present, overhung by tip of median lobe; frontal grooves deep in most species; if grooves are very shallow, then frontal pit is large, crescentic *Omoglymmiina*

Subtribe Leoglymmiina

Type genus.—*Leoglymmius* Bell and Bell, 1978.

Description.—Minor setae of antennal segments V–X forming broad band encircling distal third of each segment; segment XI without antennal stylet (Fig. 9); median head lobe short, convex with distinct parafrontal boss on either side; temporal lobes convex, oval, strongly convergent posteriorly; eye large, circular; cleft present between mentum and gena (Fig. 2).

Fig. 1–2.—Head, right ventral aspect, diagrammatic: Fig. 1. Showing complete fusion of mentum and gena; Fig. 2. Arrow showing position of cleft between mentum and gena. Fig. 3–5.—Antennal segments X–XI, diagrammatic, showing position of minor setae. Fig. 6–12.—*Leoglymmius lignarius* (Olliff): Fig. 6. Head, pronotum, dorsal aspect; Fig. 7. Head, ventral aspect; Fig. 8. Hind tibia, male; Fig. 9. Antenna; Fig. 10. Prothorax, left ventrolateral aspect; Fig. 11. Left elytron, dorsal aspect; Fig. 12. Metasternum, abdomen, ventral aspect, female.

Paramedian grooves of pronotum complete, linear, curved, coarsely punctate (Fig. 6); prosternum densely setose near middle (Fig. 10); elytral striation complete, stria VII marginal; apical striole absent; apex of elytron with broad, opaque, flattened, densely microsculptured area, but without distinct subapical impression, since apical tubercle is poorly defined (Fig. 11); metasternum with broad punctate area along each lateral margin and line of punctures along midline; abdominal punctures numerous, shallow, in broad bands; lateral pits present on sterna IV, V, shallow, subequal in female (Fig. 12), obsolete in male; middle, hind tibiae (Fig. 8) each with two nearly equal spurs.

This subtribe contains a single genus and species, endemic to Australia.

Leoglymmius Bell and Bell, 1978

Type species.—*Rhysodes lignarius* Olliff, 1885, by original designation.

Leoglymmius lignarius (Olliff, 1885)

Rhysodes lignarius Olliff, 1885:471.

Type specimen.—Lectotype (here designated) male, labelled "*Rhysodes lignarius* Olliff, Lambing Flat" [near Yass, N.S.W.] (ANIC on permanent loan from MMUS).

Rhysodes blackburnii Grouvelle 1903:117, synonymized by Moore (1987).

Type specimens.—Lectotype (designated by Bell and Bell, 1979), male, labelled "Victoria, Australia" (MNHN). Paralectotypes: one female, same data as lectotype (MNHN); one male labelled "doit provenir d'Australie" (MNHN).

Rhysodes trichosternus Lea 1904:81, synonymized by Moore (1987).

Type specimen.—One assumed syntype, sex not recorded, labelled "Victoria" (SAMA), not studied by us.

Diagnosis.—Distinguished by the suture separating gena and mentum, broad bands of minor setae on outer antennal segments, absence of apical tubercle and indistinct basal scarp on elytron.

Description.—Length 8.1–9.7 mm. As indicated for subtribe; additional characters described by Bell and Bell (1979); male genitalia figured (Bell and Bell, 1978). The labrum is shield-shaped and has a minute pair of setae near the midline on the anterior margin, in addition to the usual large pair on the dorsal surface. Bell and Bell (1979) erroneously stated that there is only one pair of labral setae. Mentum (Fig. 7) with tiny setae in punctures, more numerous in females.

Distribution.—Forested regions of the southern two-thirds of New South Wales (from Barrington Tops, south), ACT, VIC and TAS. The geographic distribution suggests that this species is more tolerant of dry conditions than are other Rhysodini (Fig. 74, Map B).

Localities.—ACT: Boboyan Rd., 1 km N/Grassy Creek, 23 Dec 1979 (ANIC); Brindabella Mts, Blundells Cr. Rd., Nov 11, 1988, in eucalyptus log (UVM); Naas Ck, near Mt. Clear, 2 Nov, 1980 (ANIC). NSW: Barrington Tops N. Pk., 5000 ft, Feb 8, 1932 (MCZ); Mt. Canabolas, 3500–4000 ft 7 Nov. 1987 (ANIC); Cabramurra, 3-ii-1962 (BPM); Clyde Mt., 6-IV-1980 (BPM); Hampton, no date (ANIC); Monga, 11-I-1978 (BPM); Kiandra, 9-2-52 (MVIC); Macquarie Pass, 23 Dec. 1953 (MVIC). TAS: Hobart area, 20-VIII-1986, in firewood (BPM); previously reported from Hobart by Lea, 1904. VIC: Echo Flat, 27-XII-1962 (BPM); Belgrave, 20-8-32 (BPM); same locality, 21-6-36 (MVIC); Grampians, Apr 1957 (MCZ); Sherbrooke Forest, Aug. 27–31, 2000 ft (MCZ); Bendoc, Jan. 1938 (MVIC); Macedon, 15-2-49 (MVIC); Ballarat, 5-11-08 (MVIC); Warneet, Jan. 1912 (MVIC); Olinda, 19-5-40 (MVIC); Trafalgar (MVIC); Mt. Hotham, c. 6000 ft Apr. 57 (ANIC); The Gap Scenic Reserve, S/Bonang, Jan. 15, 1989 (UVM).

Subtribe Sloanoglymmiina, new subtribe

Description.—Minor setae of antennal segments V–X in circle; segment III about twice as long as II or IV; basal and apical setae present; apical setae on segments I–XI, basal setae on segments V–X; segment XI without apical stylet (Fig. 16); median head lobe shield-shaped, notched by anterior

tentorial pits; temporal lobes convex, closest together just posterior to tip of median lobe, evenly rounded posteriorly; frontal grooves narrow; frontal pit small; orbital groove extends posteriorly to posterior margin of eye, latter large, round; labrum broad, semicircular, with one pair of setae; one temporal seta; anterior part of gena separated from mentum by slit (best seen in lateral view); small setae present on mental punctures, more prominent in males (Figs. 14, 17).

Pronotum relatively broad (L/GW 1.03), basal width nearly equal to that of elytra; lateral margin sharply defined, limited by distinct lateral "bead" (less rounded than in other Rhysodini, and more like that of other tribes of Carabidae); apex narrowed; lateral margin sinuate anterior to hind angle; latter rectangular; marginal groove (or bead) with two or three lateral and one angular setae, latter slightly anterior to angle; median groove linear, without either anterior or posterior pit; both marginal and median grooves finely punctate; basal impressions wide, rounded anteriorly without any hint of discal striae (Fig. 13); prosternum densely punctate except near anterior margin (Fig. 20).

Elytron (Fig. 19) with seven striae; elytra relatively short, humerus forming sharp angle; striae fine, punctate, regular except striae I and II, each of which has double row of punctures near apex (suggesting each results from the fusion of two striae); apical striae with single row of punctures anteriorly, becoming scattered band several punctures wide posteriorly; striae effaced at base; apical tubercle and subapical depression slightly developed, depression densely punctate; stria I with 1–2 setae near apex; stria II with 3–4 setae near apex; stria IV with 4–6 evenly-spaced setae from base to apex; subapical tubercle with three setae; stria VII with 3–4 setae near apex (Fig. 19); metasternum, abdomen densely, shallowly punctate; both sexes with round pits near lateral margins of sternum IV, pit larger in female (Fig. 18); metepimeron slightly lobate, more distinct than in other Rhysodini.

Middle, hind tibiae each with two nearly equal spurs; male with middle calcar pointed; hind calcar subacute, very small (Fig. 15).

This subtribe has one genus and species, endemic to southeastern Australia.

Sloanoglymmius, new genus

Type species.—*Rhysodes planatus* Lea, 1904, here designated.

Description.—As for subtribe.

Etymology.—This genus is named for Thomas Sloane, pioneer Australian coleopterist, whose work in carabid phylogeny was ahead of its time, and has not been sufficiently appreciated.

Sloanoglymmius planatus (Lea), new combination

Rhysodes planatus Lea, 1904:82.

Type specimen.—Holotype (sex not determined), labelled "Victoria" (SAMA).

Yamatosa planata Moore, 1987:22.

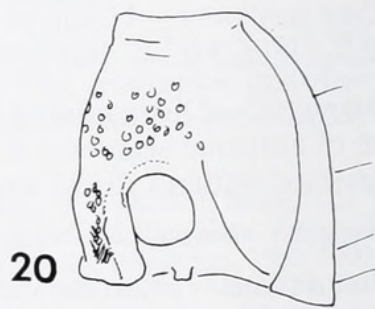
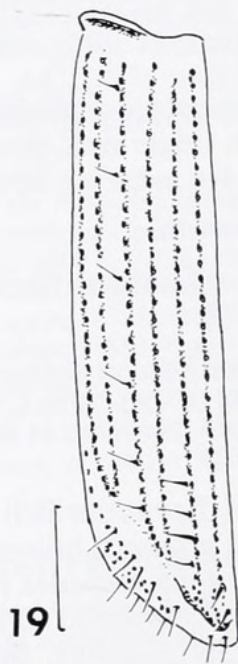
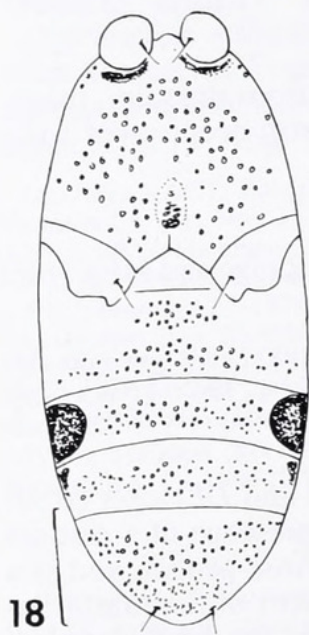
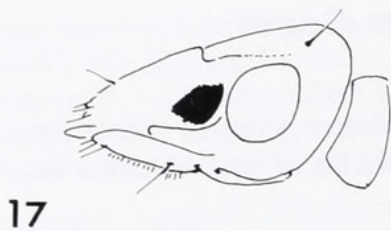
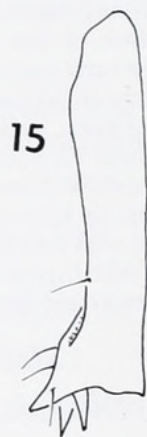
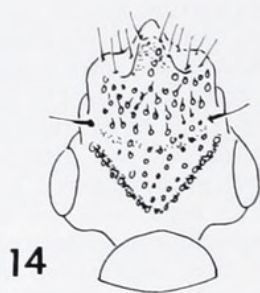
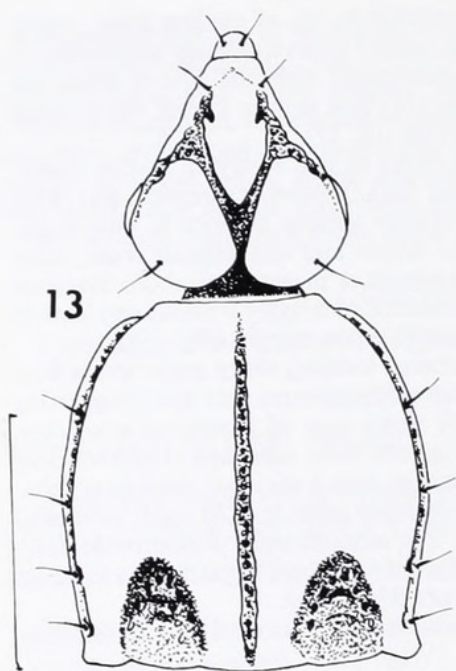
Diagnosis.—Distinguished by the suture separating gena from mentum, minor setae of antennal segments V–X in single ring, pronotum with deep round basal impression without discal striae, 4–6 setae on stria IV.

Description.—Length 7.2–8.2 mm, as for subtribe.

Distribution.—From the vicinity of Canberra (Brindabella Range and Mt. Clyde) south into Victoria (Fig. 74, Map C).

Localities.—ACT: Blundells Ck. Rd., 3.5 km E/Piccadilly Circus, 24 Oct. 1982 (ANIC); same locality and date (TM); same locality, Nov. 18, 1988 (UVM). NSW: Clyde Mt., 29 Jan. 1975 (ANIC); Clyde Mt., 6-IV-80 and 31-XII-78 (BPM); Monga S. For., Dec. 14 & 28, 1988 (UVM). VIC: Belgrave, 2-4-49 (MVIC); Whittlesea, Sep. 1944 (MVIC).

Remarks.—This genus resembles *Yamatosa* Bell and Bell and *Dhysores* Grouvelle in the absence of paramedian grooves; however, the presence of a distinct cleft between the mentum and the gena excludes it from those genera, and is a symplesiomorphy shared with *Leoglymmius*. The arrangement of the minor antennal setae separates it from the latter genus. Both genera are best placed in



monotypic subtribes, and each has features closer to those of more normal Carabidae than do other rhysodines. *Leoglymmius* is the more plesiomorphic in the distribution of minor antennal setae, while the plesiomorphic feature of *Sloanoglymmius* is seen in the sharp pronotal margin with well-defined lateral bead.

Subtribe Rhysodina Bell and Bell, 1978

Type genus.—*Rhysodes* Dalman, 1823 (Palearctic).

Description.—Minor setae of each outer antennal segment in a subapical ring; median lobe of head elongate, extending posteriorly over neck condyle, temporal lobes therefore widely separated; mentum fused to gena laterally; elytron with seven striae; middle tibia of male without calcar; hind tibia with small calcar, one spur.

Distribution.—New Zealand, New Caledonia, Australia, west to Mindanao and Celebes, and Palearctic from Japan to Europe. One of the three genera occurs in Australia.

Kaveinga Bell and Bell, 1978

Type species.—*Rhysodes abbreviatus* Lea, 1904.

Description.—Median lobe not sublinear; humeral tubercles distinct. For a more extensive description see Bell and Bell (1979).

Distribution.—Mindanao and Celebes through New Guinea to Santa Cruz islands and New Caledonia, south to New Zealand, Australia and Tasmania. Two of the four subgenera are found in Australia.

Key to Australian Subgenera of Adult *Kaveinga*

- 1. Paramedian grooves linear, slightly sinuate; pollinosity of paramedian grooves largely or entirely limited to punctures *Angekiva* Bell and Bell
- 1'. Paramedian grooves broad, deep, entirely pollinose, not visibly punctate
..... *Kaveinga* sensu stricto

Subgenus *Angekiva* Bell and Bell, 1979

Type species.—*Rhysodes frontalis* Grouvelle, 1903.

Description.—Antennal stylet present or absent; antennae not pollinose; median groove of pronotum coarsely punctate; paramedian grooves more or less curved, linear except at extreme base, complete, coarsely to sparsely punctate, pollinosity restricted to punctures or nearly so; angular seta present or absent; marginal seta absent; prosternum coarsely punctate, punctures either generally distributed or restricted to margins of precoxal carinae; elytral striae glabrous; femora glabrous, middle tibia without lateral serrulation or lateral setae.

Distribution.—Endemic to eastern Australia from northern Queensland to Tasmania.

Fig. 13–20.—*Sloanoglymmius planatus* (Lea): Fig. 13. Head, pronotum, dorsal aspect; Fig. 14. Head, ventral aspect; Fig. 15. Hind tibia, male; Fig. 16. Antenna; Fig. 17. Head, left lateral aspect; Fig. 18. Metasternum, abdomen, ventral aspect, female; Fig. 19. Left elytron, dorsal aspect; Fig. 20. Prothorax, left ventrolateral aspect.

Key to Adults of Species of Subgenus Angekiva

1. Antenna with apical stylet; both sexes with ventral tooth on anterior femur; angular seta at or very near hind angle of pronotum, the angle distinct *Kaveinga stiletto*, new species
- 1'. Antenna without apical stylet; femoral tooth absent in female, present or absent in male; angular seta either displaced anteriorly or absent; hind angles rounded 2
- 2.(1') Marginal groove of pronotum nearly complete; angular seta present, displaced anteriorly; male with profemoral tooth *Kaveinga frontalis* (Grouvelle)
- 2'. Marginal groove absent; angular seta absent; male without profemoral tooth *Kaveinga walfordi*, new species

Kaveinga (Angekiva) stiletto, new species

Type specimens.—Holotype male, labelled "Lamington N.P., 28. 14S-153.08E, (O'Reilly's) Q, 22-27 Oct. 1978, Lawrence & Weir" (ANIC). Paratypes: QLD: one male, 2 females, same data as holotype (ANIC); one male, one female, same locality as holotype, 2-4 March, 1980, J.F. Lawrence (ANIC); one male, Nat. Park, Q, McPherson Rge., Mar. 1932, 3-4000 ft Darlington (MCZ); one female, Lamington Binna Burra, 16-11-82, Endrödy-Younga (TM); 2 females, Lamington Nat. Prk., ii-1964, G. Monteith (QUIC), 5 males, 5 females, same locality & collector, 4-IX-1966 (QUIC); one female, Lamington Nat. Prk., 23-V-62, T. Brooks (QUIC), same locality, one female, 23-5-45, A. Gardner, one male, 14-20:2:1958, I. C. Yeo (both QUIC); one male, one female, Bald Mt. area via Emu Vale, 3-4000 ft, 22-27-i-1971, D.L. Hancock (QUIC); one female, Emu Vale, 25-7-23, no coll. (QUIC); one male, Cunningham Gap, 24-i-1966, B. Cantrell (QUIC); one male, Tamborine Mt., 17-iii-1964, G. Monteith (QUIC); one male, Mt. Glorious, 3-IV-1966, B. Cantrell (QUIC); one female, 2 undet. gender, MacPherson Rge., 1923 (DPIB); one male, one female, Levers Plateau via Rathdowny, 22-IV-67, B. Franzmann (DPIB); one male, Emu Vale, 25-7-33, #3640 (DPIB); one male, one female, Mt. Tamborine, E. Sutton (MVIC); 2 females (same mount), Mt. Tamborine (SAMA). NSW: one male, Richmond River (MNHN); one female, N/Dunoon, Apr. 58, Darlingtons (MCZ); one male, one female, Bruxner Park, 200 m, Coffs Harbor, Jul 1978, S. & J. Peck (ANIC); one male, Brindle Ck., 800 m.n.r. Kyogle, Wiangaree S.F., 20 Jun 78, S. & J. Peck (ANIC); one male, Wiangaree S. For., 600 m, Sheepstation Ck., 29-ii-3-iii-1980, A. Newton & M. Thayer (ANIC); one male, Dorriggo N.P., 700 m, ii Jul 1978, S. & J. Peck (ANIC); one male, one female, Carrai Plateau via Kempsey, 3-5-1967, G. Monteith (QUIC); 2 females, Tooloom Plateau via Woodenbong, 30-XII-1966, G. Monteith (QUIC); 2 females, Illawarra, H. W. Cox, H. S. Carter, 20-4-22 (MVIC); one male, Comboyne, H. S. Carter, 20-4-22 (MVIC); 2 males, Richmond River (SAMA). Also one female labelled "E.W. Ferguson", no locality (ANIC) and one female labelled "Qld., Nat. Park, Jan. 1928, Nicholson" (ANIC).

The last two specimens were labelled as *R. lignarius* Olliff by Lea, and the Richmond River specimen from MNHN was so labelled by Grouvelle, accounting for the fact that the true *R. lignarius* (now in *Leoglymmius*) was renamed by both of these authors.

Etymology.—This species derives its name from the presence of the acute stylet on antennal segment XI which is unique for the genus *Kaveinga*.

Diagnosis.—Distinguished by the acute stylet on antennal segment XI; angular seta at or near hind angle of pronotum; temporal lobes separated by long, nearly parallel-sided median lobe of head.

Description.—Length 5.8–7.4 mm; antennal segment XI with small, conical, acute stylet (Fig. 26); ring of minor setae present on antennal segments VI–X; basal setae on segments VI–XI; median lobe of head relatively narrow, margins nearly parallel; parafrontal bosses sharply separated from median lobe; well-defined orbital groove extending to posterior margin of eye; one large temporal seta (Fig. 21); eye large, oval; labrum pointed, with one pair of setae; mentum with two pairs of major setae (Fig. 22).

Pronotum rather elongate; L/GW 1.16; lateral margins slightly sinuate anterior to hind angles, latter nearly rectangular; median groove narrow, punctate; paramedian grooves complete, vaguely punctate; marginal grooves complete; angular seta present, located very near hind angle (Fig. 21); prosternum with precoxal carinae; prosternum, propleuron with coarse, relatively sparse punctures, glabrous except for pollinosity near anterior margin (Fig. 23).

Elytron with one seta near apex of stria IV, several in depression at apex of stria II and one on subapical striole, approximately eight in apical portion of stria VII; metasternum, abdomen coarsely punctate, female with small lateral pit on sternum IV (Fig. 24); both sexes with ventral tooth on anterior femur; hind calcar small, slightly bent upwards (Fig. 25).

Distribution.—Subtropical forest of southern Queensland and coastal New South Wales from Mount Glorious, north of Brisbane, to vicinity of Sydney (Illawarra) (Fig. 74, Map B).

Kaveinga (Angekiva) frontalis (Grouvelle)

Rhysodes frontalis Grouvelle, 1903:104.

Type specimen.—Holotype male, labelled “Tasmania” (MNHN).

Kaveinga frontalis: Bell and Bell, 1978:59.

Kaveinga (Angekiva) frontalis: Bell and Bell, 1979:394.

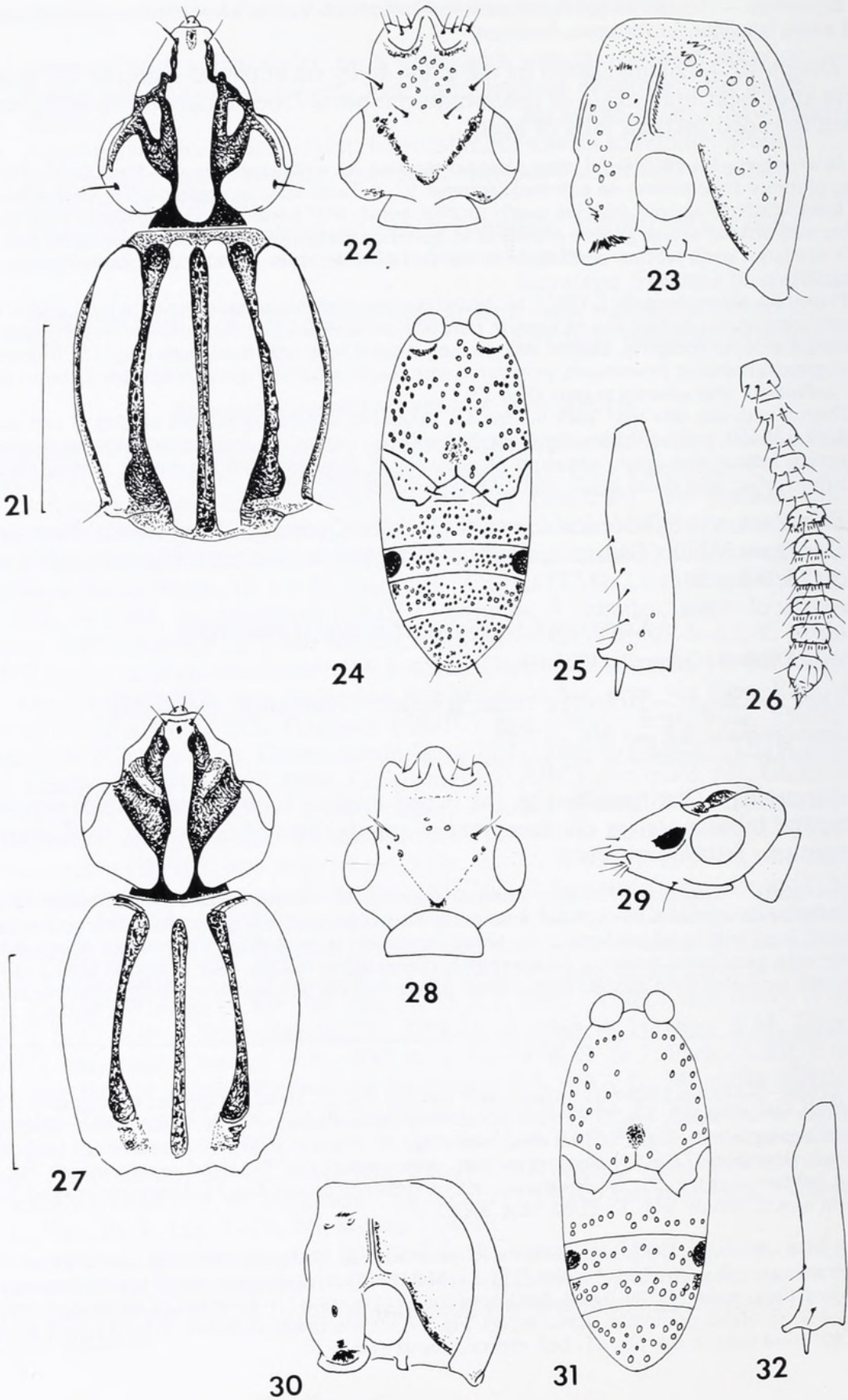
Diagnosis.—Distinguished by the broad median lobe of head which separates temporal lobes; anterior displacement of angular seta of pronotum, oval shape of pronotum; four labral setae.

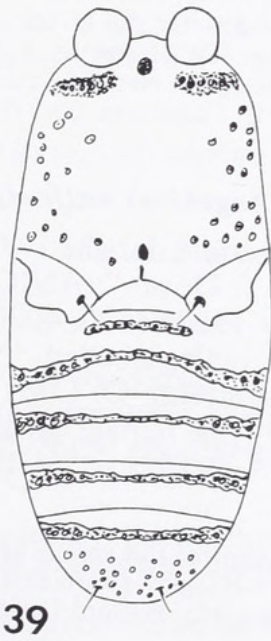
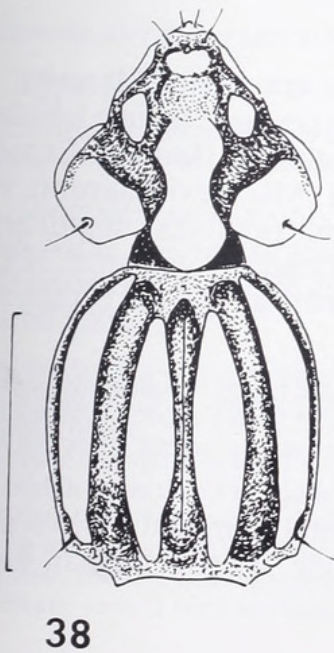
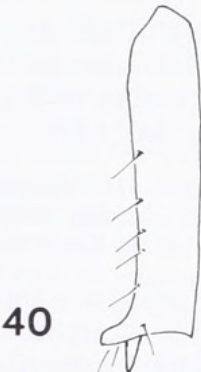
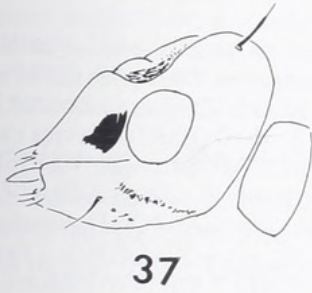
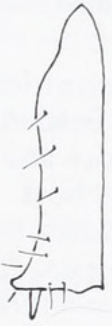
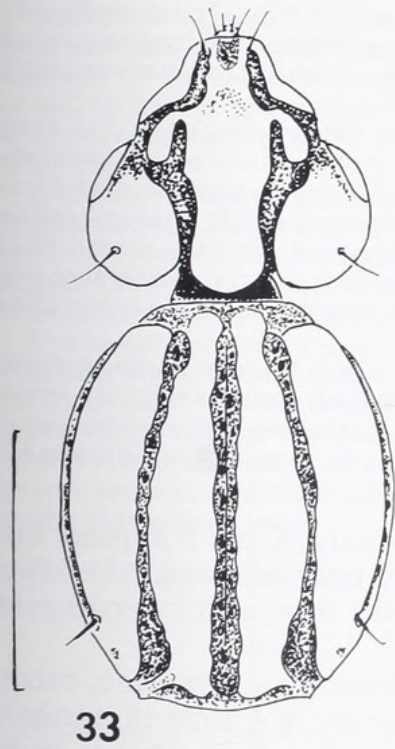
Description.—Length 5.1–7.6 mm; antennal segment XI without apical stylet; complete rings of minor setae on segments VI–X; basal setae present on segments VI–XI; labrum with four (two pairs) of setae; median lobe of head relatively broad, narrowest at level of anterior margin of eye, dilated posteriorly; parafrontal bosses at least narrowly connected to median lobe; temporal lobes rounded, narrowly separated from median lobe; orbital groove well defined but short, ending opposite middle

→

Fig. 21–26.—*Kaveinga (Angekiva) stiletto*, new species: Fig. 21. Head, pronotum, dorsal aspects; Fig. 22. Head, ventral aspect; Fig. 23. Prothorax, left ventrolateral aspect; Fig. 24. Metasternum, abdomen, ventral aspect, female; Fig. 25. Hind tibia, male; Fig. 26. Antenna. Fig. 27–32.—*Kaveinga (Angekiva) walfordi*, new species: Fig. 27. Head, pronotum, dorsal aspect; Fig. 28. Head, ventral aspect; Fig. 29. Head, left lateral aspect; Fig. 30. Prothorax, left ventrolateral aspect; Fig. 31. Metasternum, abdomen, ventral aspect, female; Fig. 32. Hind tibia, male.

Fig. 33–37.—*Kaveinga (Angekiva) frontalis* (Grouvelle): Fig. 33. Head, pronotum, dorsal aspect; Fig. 34. Prothorax, left ventrolateral aspect; Fig. 35. Metasternum, abdomen, ventral aspect, female; Fig. 36. Hind tibia, male; Fig. 37. Head, left lateral aspect. Fig. 38–41.—*Kaveinga (Kaveinga) abbreviata* (Lea): Fig. 38. Head, pronotum, dorsal aspect; Fig. 39. Metasternum, abdomen, ventral aspect, female; Fig. 40. Hind tibia, male; Fig. 41. Left elytron, dorsal aspect.





of eye; one temporal seta located posterior and medial to orbital groove (Fig. 33); eye moderately large, oval (Fig. 37) becoming pigmented in some, probably older specimens (our erroneous report [Bell and Bell, 1979] that the eye is reduced was based on the holotype, which has it almost completely obscured by pigment); mentum with one pair of major setae.

Pronotum elongate, L/GW 1.18; lateral margins strongly curved, base scarcely wider than apex; lateral margin not sinuate posteriorly, hind angles scarcely distinct; median groove narrow, punctate, dilated at anterior pit, slightly so at posterior pit; paramedian grooves complete, punctate, dilated into small pits at anterior ends, and into narrow basal impressions at posterior ends; marginal groove nearly complete, but ended posteriorly at angular seta, which is displaced anteriorly about 15% of pronotal length; small pit present between angular seta and pronotal base (Fig. 33); prosternum with precoxal carinae; prosternum, propleuron with coarse, rather sparse punctures, glabrous except along anterior margin (Fig. 34).

Elytron without setae in subapical impression, with 1–2 in apex of stria IV, none on apical striole, approximately four in apex of stria VII; metasternum, abdomen coarsely punctate (Fig. 35); female with moderately deep lateral pit on abdominal sternum IV, male pit shallow; male with very small ventral tooth on anterior femur; female without profemoral tooth; hind calcar very small, triangular, pointed (Fig. 36).

Variation.—Material is not sufficient for complete analysis, but it appears that north Queensland specimens differ from more southern ones in having a shallower groove between the parafrontal boss and the temporal lobe, and a broader attachment between the lobe and the boss.

Distribution.—This, the most widely distributed Australian rhyssodine, occurs in both tropical and temperate forests, from the vicinity of Cairns in northern Queensland south to Leongatha, Victoria, and, if the holotype label is to be believed, also in Tasmania. It has not been found on the Cape York Peninsula (Fig. 74, Map D).

Localities.—NSW: Lorient Wildlife Refuge, Lansdowne via Taree, 6–11 Jan. 1987, malaise trap (ANIC); Richmond River, no date or collector (ANIC). VIC: Leongatha, 28-11-59 (BPM). QLD: Tinaroo Lk. nr. Kairi, 700 m, 8-XI-1962 (CAS); Malanda, XI-6/7-50 (MCZ); Ravensbourne, 26 mi. N/Toowoomba, 20-VI-1975 (BSRI); Black Mt. Rd., Kuranda, Jan. 2, 1970 (BSRI); Davies ck., Nov. 2, 1969 (BSRI); 29 km S/Mareeba, c.1100 m, 14/15 Dec. 1982 (ANIC); Mt. Finnigan via Helenvale, 760 m, Jul. 20–27, 1974 (QM); Bellenden Ker Rge. 1 km s/Cable Tower 6, Oct. 17–Nov. 5, 1981, 500 m (QM); Herberton Rge., 7–10 km NW/Herberton, 17/18 Dec. 1982 (ANIC); Ravenshoe, 5-3-39 (ANIC); Mt. Spec, 2/71 (ANIC); Ringrose Nat. Prk. via Atherton, 9-xii-1966 (QM); Crater Nat. Prk. via Ravenshoe, 8 Aug. 1968 (QM); Tingaburra, 20-VIII-1966 (QM); 7 km NW/Paluma, 31-14-II-1989, malaise trap (QPIM).

Kaveinga (Angekiva) walfordi, new species

Type specimens.—Holotype male, labelled “QLD, 29 km. SE of Mareeba, c. 1100 m., 14/15/ Dec. 1982, J.T. Doyen” (ANIC). Paratypes: one female labelled “Mount Spurgeon, N.Q., July 1932, 3500–4000 ft. Australian Harvard Exped., coll. Darlington” (MCZ); one male, labelled “N.E. Qld, Mt. Lewis summit via Julatten, 10 Sept. 1981, G. Monteith, D. Cook, 1200 m., rainforest, log debris, Q.M. Berlesate No. 287” (QM); one female, labelled “Bellenden Ker Range, N.Q., summit TV sta., 1560 m., 17 Oct.–Nov. 5, 1981, Earthwatch/Qld. Museum” (QM).

Etymology.—Barry Moore first recognized this species as new. We are happy to follow his original intention to name it for Allan Walford-Huggins, a naturalist and collector from Yeppoon, Queensland and to acknowledge the generous help Mr. Walford-Huggins gave us on our recent collecting trip through his area.

Diagnosis.—Distinguished by the absence of a pronotal marginal groove and absence of temporal and angular setae of pronotum; long, narrow median head lobe separating temporal lobes.

Description.—Length 5.1–5.6 mm, antennal segment XI obtuse at tip, without stylet; rings of minor setae and basal setae on segments VI–X (in Mt. Spurgeon specimen, minor setae slightly irregular on segments IX–X); two labral setae; median lobe of head relatively narrow, narrowest opposite middle of eye, tip dilated, spatulate; parafrontal bosses narrow, oblique, depressed; orbital grooves absent; temporal setae absent (Fig. 27); eye relatively small, round (Fig. 29); mentum with one pair of major setae (Fig. 28).

Pronotum relatively long, narrow, L/GW 1.06; lateral margins strongly curved; base only slightly wider than apex; margin shallowly sinuate at hind angle; median groove dilated both anteriorly and posteriorly, constricted at middle; paramedian grooves curved, complete; marginal groove absent; angular seta absent (Fig. 27); prosternum with precoxal carinae; faint punctures confined to margins of precoxal carinae, postpleural sulcus (Fig. 30).

Elytron with one seta in apex of stria IV, about six setae in apical part of stria VII; mestasternum with sides coarsely punctate, disc impunctate or nearly so; coarse punctures on abdominal sterna in one transverse row on sterna III, IV, irregular on sterna V, VI; setae on sternum VI apparently absent; female with lateral pits of sternum IV very shallow (Fig. 31); male pits obsolete.

Male without a ventral tooth on anterior femur but with an indistinct angle in its place; female with anterior femur unmodified; male with very small, narrow hind calcar, latter truncate at tip (Fig. 32); middle tibia without calcar.

Distribution.—A small area in northern Queensland, near Mareeba (Fig. 74, Map B).

Subgenus *Kaveinga* Bell and Bell, 1979

Description.—Antennal stylet absent; antennal segment I pollinose dorsally; ring of minor setae present on segments VI–X; parafrontal boss either distinct or fused to median lobe; 1–3 temporal setae; paramedian grooves of pronotum broad, deep, entirely pollinose, open both anteriorly and posteriorly; marginal groove complete; angular seta present or absent; 0–3 marginal setae; prosternum, propleuron impunctate; precoxal setae absent; elytral setae and pollinosity variously developed; sternum IV of female without enlarged lateral pits; anterior femur without ventral tooth in either sex; femora in most species with dorsal and ventral pollinose strips; middle tibia with row of closely-spaced lateral setae, pits of setae forming serrulate margin in anterior or posterior aspect.

Distribution.—Centered in New Guinea, where there are many species, extending eastward to the Solomon and Santa Cruz islands and the Bismark Archipelago, and west to Celebes and Mindanao. There are about 16 species, of which one occurs in northern Queensland.

Kaveinga (*Kaveinga*) *abbreviata* (Lea)

Rhysodes abbreviatus Lea, 1904:79.

Type specimens.—Syntypes, two, sex unrecorded, labelled “Cairns” (SAMA).

Kaveinga abbreviata: Bell and Bell, 1978:59.

Kaveinga (sensu stricto) abbreviata: Bell and Bell, 1979:400.

Diagnosis.—The only member of the subgenus in Australia, distinguished by the wide, pilose paramedian grooves, inner carinae abbreviated anteriorly by pollinosity; transverse grooves of ventral abdomen in one continuous pilose punctured row.

Description.—(a more complete description is in Bell and Bell, 1979:400–401). Length 5.2–6.7 mm, parafrontal bosses widely separated from median lobe; orbital groove attaining level of posterior margin of eye.

Pronotum short, broad, L/GW 1.10, widest near middle; paramedian grooves deep, pollinose; width at middle more than half width of outer carina; glabrous areas of carinae strongly abbreviated anteriorly; marginal grooves broad; angular seta present (Fig. 38).

Elytron broad, slightly flattened, humeral tubercle slightly exserted; striae deep, pollinose; intervals narrow, convex; base of elytron with setiferous tubercle opposite stria II (Fig. 41); outer striae subcarinate; stria II with one basal, one apical seta; stria IV with six setae along its length; several setae

in apex of stria VII; abdominal sterna III–VI each with an entire transverse, pollinose sulcus (Fig. 39); hind tibia of male with truncate calcar (Fig. 40); male genitalia figured in Bell and Bell (1978:57, Fig. 26).

Distribution.—Northern Queensland from vicinity of Daintree to Millaa Millaa and Babinda (Fig. 74, Map B).

Localities.—QLD: Cairns, 1952 (CAS), same locality (ANIC, MVIC, QM); Upper Little Mulgrave River, SW/Cairns, several dates, VII–VIII 1969 (CAS); Little Mulgrave River (SAMA); Upper Mulgrave R. via Gordonvale, 26/27-xii-1967 (QUIC); Danbulla St. For., 13 km NE/Yungaburra, 21-12/86–13 Jan. 87, intercept trap (QPIM); Tully Falls St. For., 18 km SSW/Ravenshoe, 7-12/87–7/1/88, 730 m, intercept trap (QPIM); Shipton's Flat, 17–19 Oct. 1980 (ANIC); Millaa Millaa (ANIC); 9 mi. N/Daintree, 2/9/69 (ANIC); Gap Creek, 5 mi. N/Bloomfield R., 1001 m (QUIC); Graham Range via Babinda, 9–10 Apr. 1979 (QM); Atherton, Dec. 1962 (MVIC); Kuranda, 19-1-50 (MVIC).

Subtribe Clinidiina

Type genus.—*Clinidium* Kirby, 1835 (Holarctic and Neotropical).

Description.—Minor setae confined to ventral side of antennal segments, forming a narrow crescent-shaped, oval or circular tuft or entirely absent; antennal stylet present; median head lobe short, not extended to neck; frontal grooves complete or nearly so; elytron without apical striole.

Distribution.—Almost cosmopolitan, but absent from Africa (although represented by an endemic genus in Madagascar).

Genus *Rhyzodiastes* Fairmaire, 1895

Type species.—*Rhyzodiastes parumcostatus* Fairmaire, 1895 (Brazil).

Description.—Eyes reduced and modified, hind wings vestigial, paramedian grooves of pronotum complete, elytron with 4–6 striae.

Distribution.—South America, southeast Asia, New Guinea, Australia, New Zealand, Fiji and intervening islands.

There are five subgenera, of which two are found in Australia.

Key to Adults of Australian Subgenera of Rhyzodiastes

1. Paramedian grooves closer together at middle than at base or apex; outer carina much wider at middle than at either end; tufts of minor setae on antennal segments VI–X or VII–X *Rhyzoarca* Bell and Bell
- 1'. Paramedian grooves closer together at ends; outer carina not widened at middle; tufts of minor setae (Australian species) on segments V–X
..... *Temoana* Bell and Bell

Subgenus *Rhyzoarca* Bell and Bell, 1985

Type species.—*Rhyzoarca montrouzieri* Chevrolat, 1875 (New Caledonia).

Description.—Tufts of minor setae present on antennal segments VI–X or VII–X, clypeal setae absent, eyes narrowly crescentic, pronotum with outer carinae expanded at middle, so that paramedian grooves are expanded into anterior and posterior pits, narrowed and more or less incurved between pits, pronotal setae absent, marginal and submarginal grooves of pronotum absent, male anterior femur either dentate or tuberculate ventrally (see Bell and Bell, 1985, for full description).

Distribution.—Southeastern Australia, New Zealand, New Caledonia. Two Australian species known.

Key to Adults of Species of Subgenus Rhyzoarca

1. Side of pronotum sinuate anterior to hind angle, latter obtusely denticulate; metasternum with median sulcus *Rhyzodiastes (Rhyzoarca) burnsi* (Oke)
- 1'. Side of pronotum not sinuate anterior to hind angle, latter rounded; metasternum without median sulcus *Rhyzodiastes (Rhyzoarca) ovicollis*, new species

Rhyzodiastes (Rhyzoarca) burnsi (Oke)

Rhysodes burnsi Oke, 1932:148.

Type specimen.—(Sex not recorded) labelled "Mt. Wilson, N.S.W." (MVIC).

Rhyzodiastes burnsi: Bell and Bell, 1978:61.

Rhyzodiastes (Rhyzoarca) burnsi: Bell and Bell, 1985:9.

Diagnosis.—Distinguished by sinuate hind angle of pronotum, metasternum with median sulcus, absence of pronotal marginal groove, tufts of minor setae on antennal segments VI–X.

Description.—Length 6.5–7.0 mm; antennal tufts on segments VI–X; median head lobe moderately long, ending opposite eye; temporal lobes rounded posteriorly; pronotum moderately elongate, L/GW 1.14; front angles obtuse; lateral margin sinuate anterior to hind angle, latter obtusely denticulate; base of pronotum relatively broad, median groove distinctly impressed (Fig. 42).

Elytron with three striae; sutural and parasutural striae coarsely punctate; parasutural stria forms medially-directed scarp near apex; intratubercular stria abbreviated posteriorly; elytral setae absent (Fig. 43); metasternum with median sulcus; abdominal sterna transversely sulcate, interrupted at midline, each sulcus with medial and lateral pit; sternum VI with divided transverse basal sulcus, connected laterally to submarginal sulcus, latter pollinose laterally but becoming row of coarse punctures medially, no punctures anteriorly to submarginal sulcus; sternum VI with two or four setae (Fig. 44).

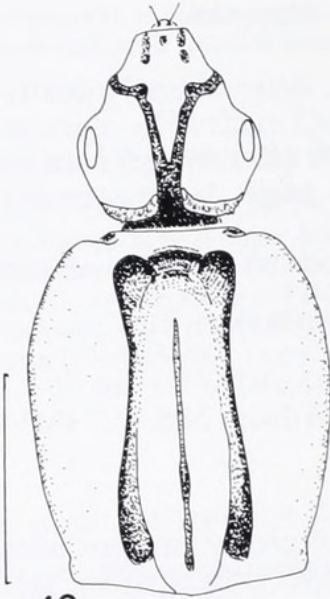
Male anterior trochanter with ventral tooth; male anterior femur with ventral carina with about eight tubercles (Fig. 45); hind trochanter of male rounded; middle calcar curved, cultrate, raised above level of spurs; hind calcar triangular, acute, shorter than middle one, not notched proximally (Fig. 46). Ventral surface of female not studied (for full description, see Bell and Bell, 1985:9).

Distribution.—Known from Mount Wilson, NSW, inland from Sydney, and from Myrtle Mountain, near Eden, suggesting a range in the coastal mountains from the Sydney area nearly to the Victoria border (Fig. 74, Map D).

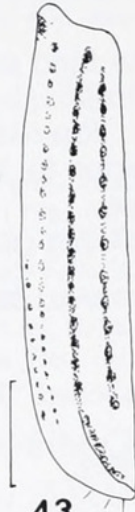
Localities.—NSW: Mt. Wilson (type locality); 2 males from Myrtle Mt., 8 km N/Wyndham, in log, Aug. 1979 (ANIC).

Variation.—We refer an additional specimen from far northern NSW with doubt to this species. It is a male labelled "Dawsons Spring, Mt. Kaputar, NE. NSW, 30.16.30 S, 150.09.30 E, 1300 m., 18 Nov. 1983, ABRS, AM/QM.RF" (QM). The locality is in the Nandewar Range, east of Narriabri, NSW. In most respects it resembles the specimens described above, but differs in the following particulars: length 7.8 mm, pronotum relatively broader, L/GW 1.25; antennal stylet more elongate, chisel-like, truncate; elytron with a conspicuous patch of pollinosity just posterior to the humerus; hind trochanter of male pointed (rather than round); tubercles on ventral side of male anterior femur perhaps more prominent; middle calcar elongate, longer than hind one, not raised above level of spurs, bounded proximally by minute notch; hind calcar more bluntly pointed.

This specimen may be an atypical example of *R. burnsi*. In view of the number



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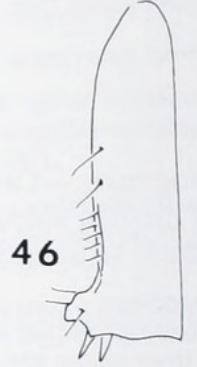
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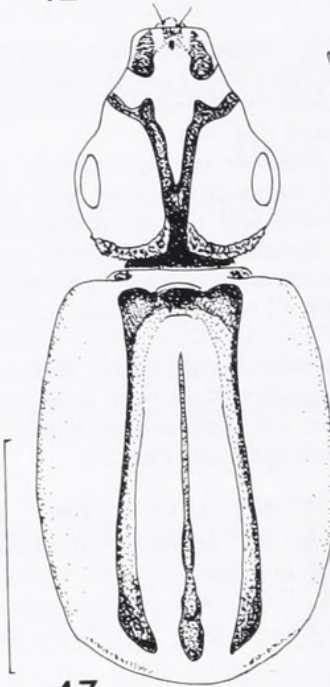
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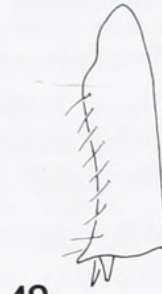
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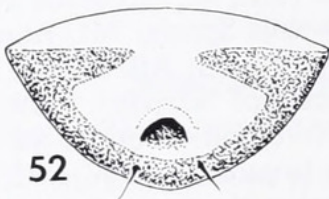
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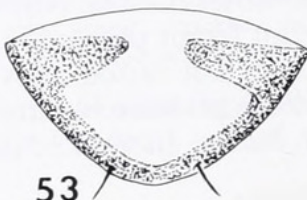
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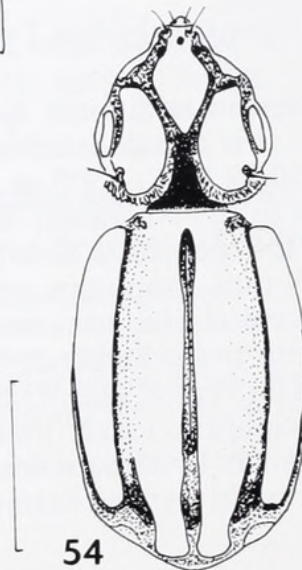
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of small differences and the fact that Mount Kaputar is a very isolated locality, it seems possible that it may represent a distinct taxon. Naming it must await capture of an adequate series of specimens.

***Rhyzodiastes (Rhyzoarca) ovicollis*, new species**

Type specimen.—Holotype male, labelled "Ramsay's Scrub, Cooloola, S. QLD, Dec. 1975, M. Hockings, pitfall trap, rain forest" (QUIC).

Etymology.—This species is named for the oval shape of the pronotum.

Diagnosis.—Distinguished by more oval shape of pronotum; absence of metasternal median sulcus; absence of pronotal marginal groove; tufts of minor setae on antennal segments VII–X.

Description.—Length 6.7 mm; antennal tufts on segments VII–X; median head lobe relatively long, narrow, ending opposite posterior margin of eye; temporal lobes rounded posteriorly; pronotum elongate, L/GW 1.43, oval, front and hind angles both rounded; hind angle not distinct, margin not sinuate; median groove lightly impressed; posterior median pit distinct (Fig. 47).

Elytron with parasutural striae, impressed and with coarse punctures; intratubercular stria finely punctured, abbreviated posteriorly; marginal stria represented by row of fine punctures in posterior portion; elytral setae absent; metasternum without median sulcus; abdominal sterna with transverse sulci broadly interrupted at midline, each sulcus with three pits; sternum VI with widely divided transverse sulcus at base, submarginal sulcus indistinct, represented near midline by irregular row of coarse punctures; disc of sternum VI with scattered punctures anterior to submarginal sulcus; sternum VI with two setae (Fig. 50).

Male anterior and posterior trochanters rounded, without tooth, male anterior femur with slight carina with suggestion of minute points formed by notches (Fig. 48); middle tibia with small, acute calcar, slightly turned up at tip, not raised above level of spurs, latter unusually small; calcar of hind tibia similar to that of middle tibia, but shorter, less upturned (Fig. 49). Female unknown.

Distribution.—Known only from the type locality, near the Queensland coast, east of Gympie (Fig. 74, Map C).

Subgenus *Temoana* Bell and Bell, 1985

Type species.—*Clinidium spissicorne* Fairmaire, 1985 (Malaya).

Description.—Apical stylet of antenna present; tufts of minor setae on antennal segments IV–X or V–X; clypeal setae present; compound eye narrow, crescentic; genae glabrous ventrad to eye; inner carinae of pronotum sloped gradually to paramedian groove; paramedian grooves straight or slightly convergent to base and apex; outer carina not greatly broadened in middle; intercalary stria of elytron absent. Twenty-five or more species.

Distribution.—From the Caroline and Solomon islands, westward to the Andaman Islands, extreme eastern India and Formosa, south into northern Queensland but absent from New Zealand, New Caledonia, and Fiji. One species known from Australia.

***Rhyzodiastes (Temoana) mirabilis* (Lea)**

Rhysodes mirabilis Lea, 1904:80.

Fig. 42–46.—*Rhyzodiastes (Rhyzoarca) burnsi* (Oke): Fig. 42. Head, pronotum, dorsal aspect; Fig. 43. Left elytron, dorsal aspect; Fig. 44. Metasternum, abdomen, ventral aspect, male; Fig. 45. Trochanter and profemur, male; Fig. 46. Hind tibia, male. Fig. 47–50.—*Rhyzodiastes (Rhyzoarca) ovicollis*, new species: Fig. 47. Head, pronotum, dorsal aspect; Fig. 48. Trochanter and profemur, male; Fig. 49. Hind tibia, male; Fig. 50. Metasternum, abdomen, ventral aspect, female. Fig. 51–55.—*Rhyzodiastes (Temoana) mirabilis* (Lea): Fig. 51. Left elytron, dorsal aspect; Fig. 52–53. Sternum VI, ventral aspect, female; Fig. 54. Head, pronotum, dorsal aspect; Fig. 55. Hind tibia, male.

Type specimen. — Holotype, labelled "Cairns, Queensland" (MMUS) (not seen).

Rhyzodiastes mirabilis: Bell and Bell, 1978:61.

Rhyzodiastes (Temoana) mirabilis: Bell and Bell, 1985:30.

Diagnosis. — Distinguished by the wide inner carina which slopes gradually into the paramedian groove, the presence of tufts of minor setae on antennal segments V–X.

Description. — Length 5.0–8.0 mm; antennal stylet short, somewhat compressed; tufts of minor setae on antennal segments V–X; basal setae of antenna absent; temporal lobes rounded medially, closest together just posterior to tip of median lobe; one temporal seta (Fig. 54).

Pronotum elongate, L/GW 1.56, widest at middle with sides curved; apex less narrowed than base; median groove narrow, deep; inner carinae together forming convex surface; outer carinae broad, 0.5 as wide as inner carinae, not narrowed anteriorly; pronotal setae absent; marginal groove complete, visible in lateral but not dorsal view (Fig. 54).

Elytron with sutural stria impressed, straight; parasutural stria entire; intratubercular stria entire, pollinose; marginal stria narrow, pollinose; setae absent from sutural, parasutural, intratubercular striae; subapical tubercle with 5–6 setae; marginal stria with 5–7 setae near apex (Fig. 51).

Metasternum not sulcate; female with lateral pit of sternum IV large, deep; male with hind trochanter pointed, anterior trochanter toothed; hind calcar triangular (Fig. 55); middle calcar triangular but smaller than hind one; front femur tubercular ventrally.

Distribution. — A limited area in northern Queensland, from 30 km south of Cooktown (Shipton's Flat) to the vicinity of Innisfail (Fig. 74, Map D).

Localities. — QLD: Shipton's Flat (S/Cooktown), June '58 (MCZ); Upper Little Mulgrave R., 3-VIII-69 (CAS); Bellenden Ker (LUN); Redlynch, 12–20, VIII-1938 (BMNH); Kuranda, Jan. 2, 1970 (BSRI); Mt. Lewis Rd., 2M above Bushey Ck., 23-9-66 (ANIC); Daintree, 9/69 (ANIC); Mossman Gorge, 27-X-66 (ANIC); W. slopes of Seymour Rge., Dinner Ck. Rd. nr. Innisfail, at light (ANIC); Babinda, 11/50 (ANIC); Moses Ck., 4 km NE, Mt. Finnigan, 14/16 Oct. 1980 (ANIC); 29 km SE/Mareeba, 100 m, 14/15 Dec. 1982 (ANIC); 30 m Cape Tribulation, Bloomfield Tr., 14 July 1982 (ANIC); 7 mi. SE Yungaburra, 19 Sept. 1972 (BPM); 2 km SE Mt. Spurgeon via Mt. Carbine, 20/21 Dec. 1988, 1100 m (QM); Lamb Range, 19 km SE Mareeba, 11 Dec. 1988, 1100–1200 m (QM); Bloomfield Rd. via Helenvale, July 20–27, 1974 (QM); Graham Range via Babinda, 9/10 Apr. 1979 (QM); Kirrama Range via Kennedy, 700 m, 2/3 Oct. 1980 (QM); Windsor Tableland Rd., 13/1–5/3, 1986, intercept trap (QPIM); Gap. Ck., 5 M. N/Bloomfield River, 8/9-V-1970, 500 ft (QUIC); Cooper Crk., 18 M. N/Daintree River, 20–22-VI-1969 (QUIC); Mt. Edith, 2 mi. N/Tinaroo Dam, 3500 ft 2-VI-1972 (QUIC); Churchill Ck., Mt. Lewis Rd. via Julatten, 27-XI-1969 (QUIC); "The Boulders", Babinda, 15-XII-1966 (QUIC); Noah Ck., S/Cape Tribulation, 13-VIII-71 (UVM); Davies Ck. St. For., Mareeba, 20 Jan 1970 (UVM).

Variation. — Some females have a deep median pit in sternum VI while others lack it (Fig. 52, 53). We can discern no geographic pattern in this variation and we did not see two corresponding types of males. We conclude tentatively that this is polymorphism. Similar variation is known in *Rhyzodiastes (Rhyzostrix) davidsoni* Bell and Bell of Brazil and *Clinidium (Arctoclinidium) veneficum* Lewis of Japan.

Subtribe Omoglymmiina

Type genus. — *Omoglymmius* Ganglbauer, 1892.

Description. — Minor setae of antenna forming subapical ring on each outer segment; median lobe of head short, not extended to neck or separating temporal lobes; latter with distinct medial angle in most species; elytral striation complete (seven striae); apical stria distinct in most species.

Distribution. — Almost cosmopolitan, but absent from Madagascar and New Zealand, and poorly represented in Australia, Africa and South America. Only one genus in Australia.

Genus *Omoglymmius* Ganglbauer, 1892

Type species.—*Rhysodes germari* Ganglbauer, 1892.

Description.—Pronotum without angular seta; paramedian grooves, deep, complete; middle, hind tibiae each with single spur.

Distribution.—As given for subtribe. Two of eleven subgenera occur in Australia.

Key to Adults of Australian Subgenera of Omoglymmiina

- 1. Antennal segment XI with apical stylet; eye small, less than 0.3 of depth of head; medial margin of subapical tubercle aligned with stria II *Caeconavitia* Bell and Bell
- 1'. Antennal segment XI without apical stylet; eyes large, more than 0.5 of depth of head; medial margin of subapical tubercle aligned with stria IV *Omoglymmius*

Subgenus *Caeconavitia* Bell and Bell, 1982

Type species.—*Omoglymmius (Nitiglymmius) zimmermani* Bell and Bell, 1978.

Description.—Antennal stylet present; basal setae of antenna absent; clypeal setae absent; eye small, about 0.3 depth of head; medial angles of temporal lobes without translucent areas; postorbital tubercle absent; each gular groove with enlarged pit; marginal groove of pronotum entire; elytral striae impressed; punctures of abdominal sterna in single transverse row on each sternum; medial margin of subapical tubercle aligned with apex of stria II.

The discovery of an Australian member of this subgenus is a considerable surprise, as the only previously known member of the subgenus is found in Fiji. The two species may be separated by the following couplet:

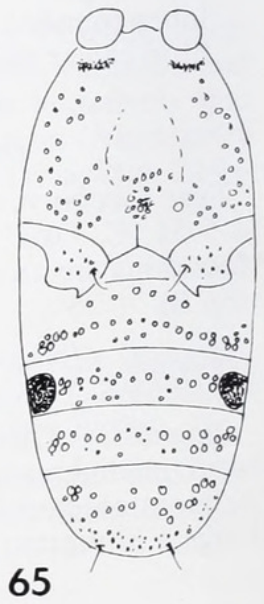
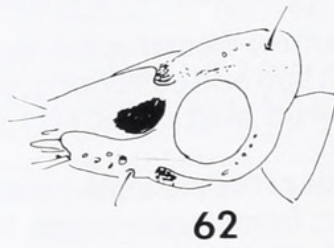
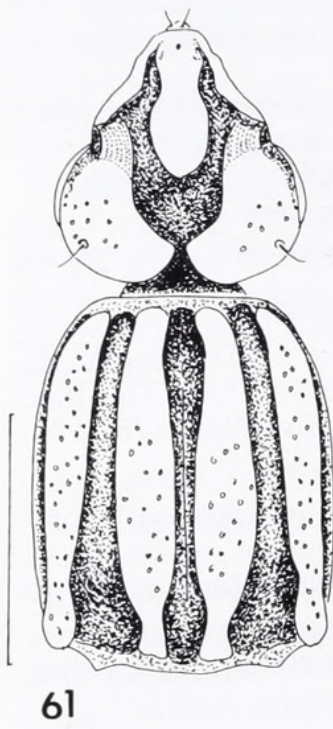
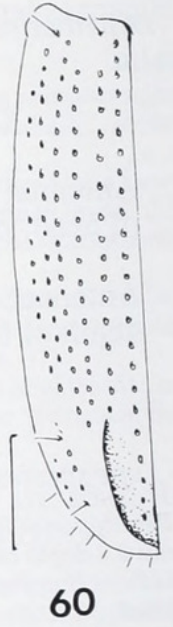
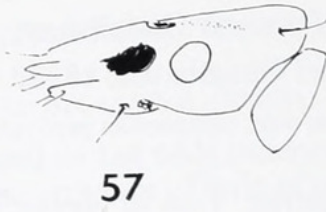
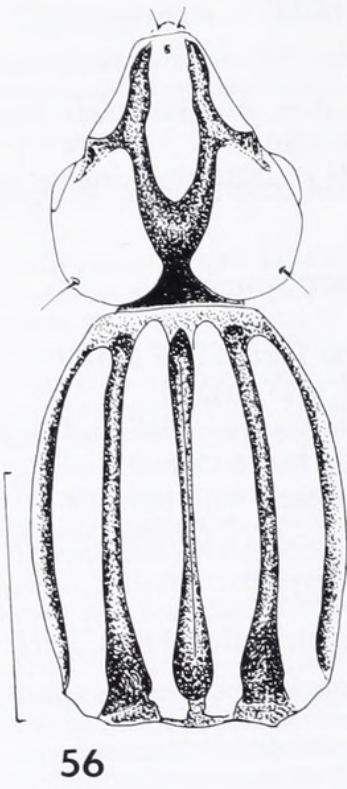
- 1. Frontal grooves linear, very narrow; frontal space very small; temporal lobe sinuate opposite median pit and also posteriorly, so medial, posterior angles both well defined; male with hind calcar very small obtuse; male with lateral pit on sternum IV *Omoglymmius (Caeconavitia) zimmermani* Bell and Bell
- 1'. Frontal grooves not linear, wider; frontal space larger, V-shaped; temporal lobes rounded medially; medial, posterior angles not defined; male with hind calcar short, truncate; male without lateral pits on sternum IV *Omoglymmius (Caeconavitia) okei*, new species

Omoglymmius (Caeconavitia) okei, new species

Type specimen.—Holotype male, labelled “Blue Mtns., n. QLD, Cape York, 18-5-51, C. Oke” (MVIC). The type locality is at 13.34S-143.13E. The Blue Mountains are an outlier of the McIlwraith Range near the Iron Range (Fig. 74, Map B).

Etymology.—This species is named after Charles Oke, an Australian entomologist, the describer of *Rhyzodiastes burnsi*.

Diagnosis.—Distinguished by the presence of antennal stylet; eye round, reduced; medial margin of subapical tubercle aligned with apex of stria II; punctures of abdominal sterna few in number, arranged in one transverse row across sternum; elongate pronotum; carinae impunctate.



Description.—Length 6.2 mm; form elongate; ventral surface without opalescence; stylet slender, acute, head with median lobe triangular, apex of latter rounded, opposite middle of eye; frontal grooves moderately wide; orbital groove absent; frontal space V-shaped; medial, posterior angles of temporal lobe rounded; temporal lobe impunctate; one temporal seta (Fig. 56); eye slightly oval, about 0.33 depth of head (Fig. 57); mentum with about eight very coarse punctures; gular grooves dilated posteriorly to form pair of gular pits at base of mentum.

Pronotum relatively long, narrow, L/GW 1.40; margins curved evenly into apex ("collar" absent); inner, outer carinae of nearly even width; all carinae impunctate; median groove deep, posterior part expanded; both sides of paramedian grooves deep, abrupt; lateral margin of pronotum distinctly sinuate anterior to hind angles (Fig. 56); epipleuron with a few indistinct punctures; prosternum with intercoxal pit deep, dilated posteriorly.

Elytron moderately elongate, sides curved; greatest width posterior to middle; humeral tubercles prominent; striae punctate, scarcely impressed; subapical impression deep, limited to first, second intervals; striae III, IV, V ending anterior to subapical impression (Fig. 60); apical striole distinct; stria VI obsolete; two setae in apical striole, about five in apex of stria VII; metasternum with a few coarse punctures along anterior, lateral margins and in midline; sternum IV of male without lateral pits (Fig. 59); profemur of male not dentate; ventrally hind calcar small but well defined, truncate (Fig. 58); female unknown.

Subgenus *Omoglymmius* Ganglbauer, 1892

Description.—Antennal segment XI without a stylet; basal setae of antennal segments absent; clypeal setae absent; frontal grooves deep; temporal setae 0–4; eye deeper than long, in most species fully developed; marginal groove of pronotum complete; spur of middle tibia with tip curved anteriorly; lateral pits present on sternum IV in female, usually suggested in male; hind wing fully developed in most species.

Distribution.—Centered in New Guinea, which has many species, extending to the Caroline Islands in the east and to Europe in the west. Only three species are known from Australia. Each is restricted to northern Queensland, and each is closely related to a species in New Guinea.

Key to Adults of Australian Species of Omoglymmius sensu stricto

1. Postorbital tubercle present, visible in dorsal view
..... *Omoglymmius (Omoglymmius) monteithi* new species
- 1'. Postorbital tubercle absent 2
- 2.(1'.) Posterior margin of temporal lobe evenly curved; eye barely visible in dorsal view (although large, evident in lateral view); one temporal seta *Omoglymmius (Omoglymmius) ichthycephalus* (Lea, 1904)
- 2'. Posterior margin of temporal lobe bisinuate, forming two projecting lobes in addition to medial angles; eyes relatively prominent, plainly visible in dorsal view; 2–4 temporal setae
..... *Omoglymmius (Omoglymmius) bituberculatus* new species

Omoglymmius (Omoglymmius) ichthycephalus (Lea), new combination

Rhysodes ichthycephalus Lea, 1904:79.

Fig. 56–60.—*Omoglymmius (Caeconavitia) okei*, new species: Fig. 56. Head, pronotum, dorsal aspect; Fig. 57. Head, left lateral aspect; Fig. 58. Hind tibia, male; Fig. 59. Metasternum, abdomen, ventral aspect, male; Fig. 60. Left elytron, dorsal aspect. Fig. 61–65.—*Omoglymmius (Omoglymmius) ichthycephalus* (Lea): Fig. 61. Head, pronotum, dorsal aspect; Fig. 62. Head, left lateral aspect; Fig. 63. Prothorax, left ventrolateral aspect; Fig. 64. Hind tibia, male; Fig. 65. Metasternum, abdomen, ventral aspect, female.

Type specimen.—Holotype (presumed) from Cairns, Queensland, sex not recorded (SAMA).

Omoglymmius ichthyocephalus: Moore, 1987:22.

Diagnosis.—Distinguished by absence of postorbital tubercle; temporal lobe reniform, medial margin curved; outer carinae slightly narrower than inner carinae, parallel sided; one temporal seta.

Description.—Length 6.0–7.6 mm; antennal segments I–IV coarsely punctate, V–X more sparsely, finely so; XI impunctate; head longer than wide; median lobe short, oval, impunctate, its tip rounded; frontal space slightly broader than long, margins shallowly curved; medial angles obtuse, slightly separated; posterolateral margin nearly evenly rounded; occipital angle rounded, scarcely evident; orbital groove narrow, traceable about to middle of eye; anterior portion of temporal lobe a convex, pollinose ridge, glabrous part of temporal lobe thus widely separated from antennal lobe; temporal lobe with about 12 punctures; one temporal seta (Fig. 61); postorbital, suborbital tubercles absent (Fig. 62); eye large, round, but flat, scarcely visible in dorsal view.

Pronotum rather short, subquadrate, L/GW 1.13; base slightly narrowed, apex more distinctly narrower, lateral margins slightly curved, margins not sinuate anterior to hind angle; outer carina about 0.67 as wide as inner carina at middle; medial margin of outer carina scarcely sinuate; outer carina widest at middle, narrowed at apex; inner carina narrowed nearly to base, but dilated at extreme base; outer carina with about 35 fine punctures, inner carina with 10–15 fine punctures; pronotum without setae (Fig. 61); prosternum extensively pollinose anteriorly, without precoxal carinae (Fig. 63).

Elytron relatively long, narrow; striae impressed, coarsely punctate; transverse basal scarp pollinose; base of stria IV with very short, longitudinal pollinose scarp; stria IV with one seta near apex; apical striole with one seta; stria VII with several setae near apex; metasternum entirely, coarsely punctate; abdominal sterna III–V coarsely punctate, punctures becoming coarser, confluent laterally; posterior punctures of each sternum notably finer than anterior ones; lateral pit present on sternum IV in both sexes (Fig. 65); male with ventral tooth on profemur; middle calcar obtuse, slightly concave dorsally; hind calcar obtuse, triangular, with several setae (Fig. 64).

Remarks.—This species is most closely related to *Omoglymmius oroensis* Bell and Bell of New Guinea, and would key to that species in the general key of Bell and Bell (1982:180–187). In *O. oroensis*, the median lobe has a few punctures; the temporal lobes are less rounded, the medial angles are more separated; the orbital groove is better developed; the pronotum is more narrowed anteriorly; the outer carina is less narrowed at its base; both carinae have fewer punctures and the calcars differ in shape.

Distribution.—Northern Queensland from Cape York, south to Cairns (Fig. 74, Map C).

Localities.—QLD: 11 km ENE/Mt. Tozer, 11–16, July 1986 (ANIC); Somerset (SAMA, ANIC, MVIC); Iron Range, Cape York pen., 1–9 June 1971, 5–10 May 1988 (QUIC); Locherbie, Cape York, 6–10-VI-1969 (QUIC).

***Omoglymmius (Omoglymmius) bituberculatus*, new species**

Type specimens.—Holotype male, labelled “Boar Pkt., N.Q., 12/69, J.G. Brooks, M.470” (ANIC). Paratypes: one female, labelled “Cleveland Bay”, (ANIC), (on permanent loan from MMUS); two females, labelled “2 km. N by E, Mt. Tiptree, 17.03S–144.37E, 1 Apr. 1984, A. Calder, T. Weir” (ANIC); one male, labelled “Tribulation Area, 16.03S to 16.05S, 145.28E, 21–28 Mar 1984, A. Calder & T. Weir” (ANIC); one male, labelled “Queensland” (MNHN).

Etymology.—The name of this species is based on the presence of two small tubercles on the posterior margin of the temporal lobes.

Diagnosis.—Distinguished by absence of postorbital tubercles; posterior margins of temporal lobes bisinuate to form two projecting lobes; 3–5 temporal setae.

Description.—Length 5.8–7.1 mm; antennal segment I coarsely punctate, somewhat pollinose; segments II–X faintly punctate; segment XI impunctate; head longer than wide; median lobe moderately long, shield-shaped, obtusely angled to rounded at apex, impunctate; frontal space longer than broad, U-shaped; margins strongly curved; medial angles well defined; posterior margin bisinuate, defining two projecting lobes; orbital groove short, ill-defined; anterior portion of temporal lobe glabrous, separated from antennal lobe by narrow groove; temporal lobe with 20–30 punctures; temporal setae 3–4 (Fig. 66); postorbital, suborbital tubercles absent (marginal tubercles mentioned above are dorsad to eye); eye large, round, more protruding than in other members of subgenus (Fig. 67).

Pronotum slightly longer than wide; L/GW 1.17; margins curved, base moderately narrowed, apex more strongly so; margin not sinuate anterior to hind angles; outer carina slightly wider than inner one at middle; outer carina widest at middle, tapering to sharp angle anteriorly, truncate posteriorly; inner carina narrowed near base but dilated at extreme base; outer carina with about 38–47 moderately coarse punctures; inner carina with 1–10 very fine punctures; pronotal setae absent (Fig. 66); prosternum punctate, anterior margins pollinose; precoxal carina absent.

Elytron moderately elongate, striae shallow, finely punctate; lateral striae more coarsely punctate than medial ones; outer intervals convex; basal transverse scarp glabrous; base of stria IV with shallow longitudinal pollinose scarp; stria IV with one seta at apex; apical striole without setae; stria VII with several setae near apex; metasternum entirely finely punctate; abdominal sterna III–V entirely finely punctate; both sexes with deep lateral pit on sternum IV (Fig. 68); male with small ventral tooth on profemur, female without such tooth; middle calcar of male acute, small; hind calcar large, tip obtuse, lobate (Fig. 69).

Remarks.—This species is related to *O. aristeus* Bell and Bell of New Guinea, which also has more than one temporal seta but has the temporal lobe evenly rounded.

Distribution.—Northern Queensland from Cairns to Townsville and possibly Dorrigo, NSW (Fig. 74, Map C) (see Variation).

Localities.—QLD: Davies ck. via Mareeba, 8-10-1989 (QPIM); Tinaroo Ck. Rd., Atherton T'land, 15-XII-1989 (UVM).

Variation.—A female specimen labelled “Dorrigo, NSW, Jan. 1931, C. Oke” (MVIC), listed by Oke as *Rhysodes ichthycephalus*, agrees with the type series except that it has the marginal tubercles of the temporal lobe much smaller. We refer it to this species with doubt and it may well represent a distinct taxon.

Omoglymmius (Omoglymmius) monteithi, new species

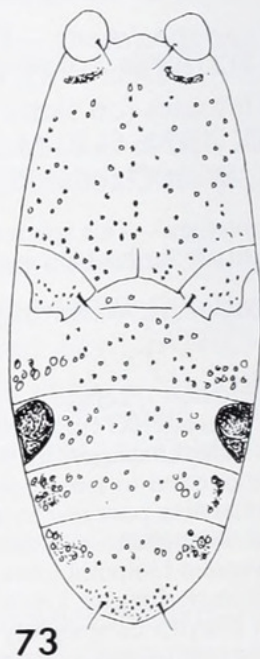
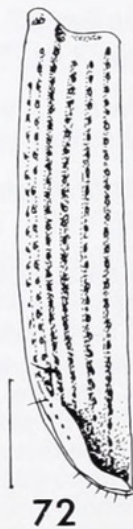
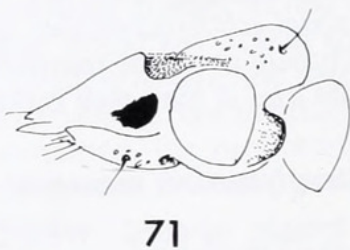
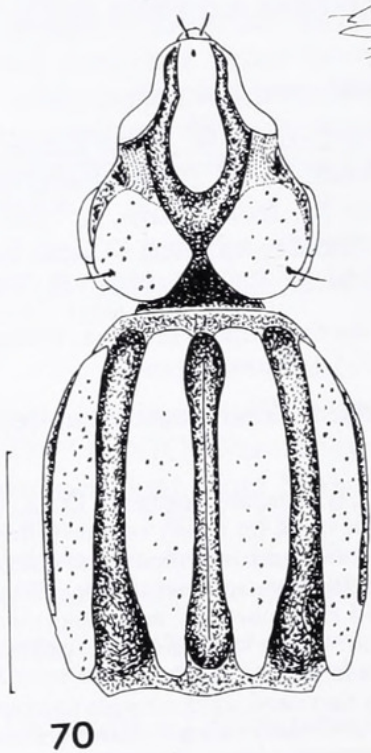
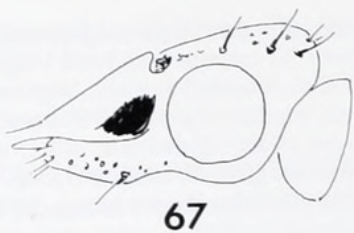
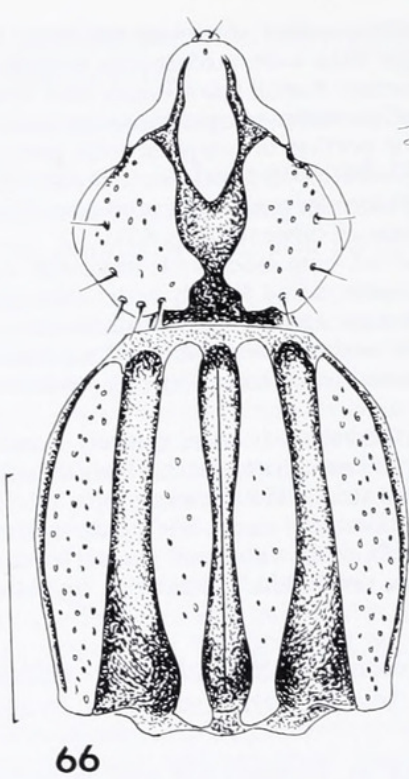
Type specimens.—Holotype female, labelled “West Claudie R., Iron Range, n. Qld, 3–10 Dec. 1985, G. Monteith & D. Cook, rainforest, 50 m” (QM). Paratypes: two females (on same mount), labelled “West Claudie R., Iron Range, n. Qld 29/30-IX-1974, G.B. Monteith, rainforest” (QM); one female, labelled “Cape York Pen., West Claudie R., Iron Range, Oct. 2, 1974, coll. M.S., B.S. Moulds” (UVM).

Etymology.—This species is named for Dr. G. B. Monteith of the Queensland Museum, Brisbane, in gratitude for his help with this project.

Diagnosis.—Distinguished by presence of postorbital tubercle, visible in dorsal view.

Description.—Length 6.8–7.0 mm; antennal segments I–VIII finely punctate; segments IX, X very finely punctate, XI impunctate; head longer than wide; median lobe oval, tip nearly rounded; frontal space wide, U-shaped, its lateral margin curved; medial angles obtuse, narrowly separated; antennal lobe connected to temporal lobe by pilose ridge; orbital groove indistinct, represented by pollinose area extending posterior to middle of eye; temporal lobe with 12–15 fine punctures, area along medial margin impunctate; one temporal seta (Fig. 70); postorbital tubercle visible in dorsal view, pollinose; width across temporal lobes slightly less than that across eyes, eye large, round (Fig. 71).

Pronotum elongate, L/GW 1.22, widest near middle; base slightly narrowed; apex strongly narrowed; lateral margins only slightly curved posteriorly, more strongly so anteriorly; margin scarcely sinuate anterior to hind angle; outer carina slightly narrower than inner one at middle; medial margin of outer



carina not angled or scarcely angled near base; outer carina slightly narrowed posteriorly, strongly so anteriorly; inner carina narrowly subtruncate at apex; outer carina with 22–26 fine punctures; inner carina with 11–18 fine punctures; pronotum without setae (Fig. 70); prosternum without precoxal carina.

Elytron rather narrow, elongate; striae not impressed, rather coarsely punctate, base of stria IV with short longitudinal pilose scarp; basal transverse scarp pollinose from stria IV to suture; one seta near apex of stria IV, one seta in apical striole; 4–5 setae near apex of marginal stria (Fig. 72); metasternum entirely punctate; abdominal sterna III–V with coarse, scattered punctures partly coalescent laterally on V, VI; female with large lateral pits on sternum IV (Fig. 73); male unknown.

Remarks.—The presence of postorbital tubercles easily separates this species from other known Australian *Omoglymmius* s. str. It is most similar to *Omoglymmius sus* Bell and Bell, 1982 among the New Guinean species, which it resembles in having the metasternum entirely punctate and in having a narrow, pollinose ridge connecting the antennal and temporal lobes. However, the postorbital tubercles of *O. sus* are larger, the width across them exceeding the width across the eyes.

Distribution.—Rain forests of the Iron Range on Cape York Peninsula (Fig. 74, Map D).

Variation.—A female specimen labelled “Iron Range, Cape York Pen. n. QLD, June 30–July 4, 1977, G. B. Monteith” (QM) differs from the type series in having two temporal setae. It will probably prove to be a variant of this species.

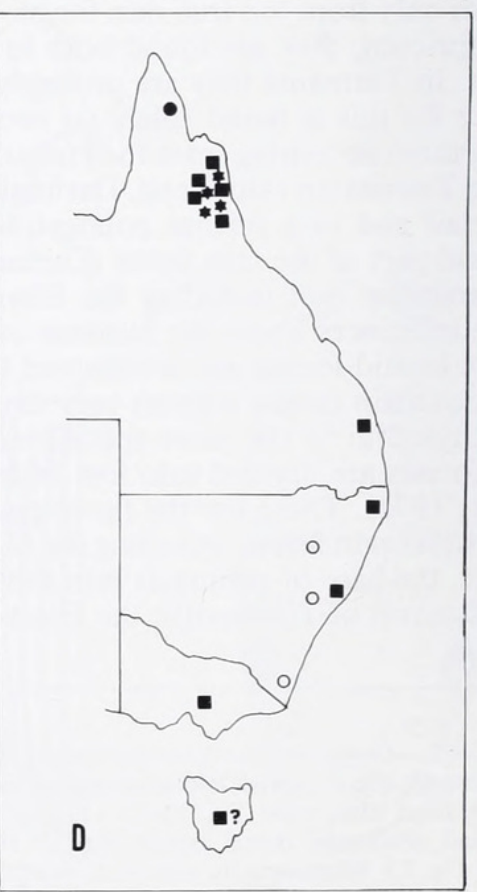
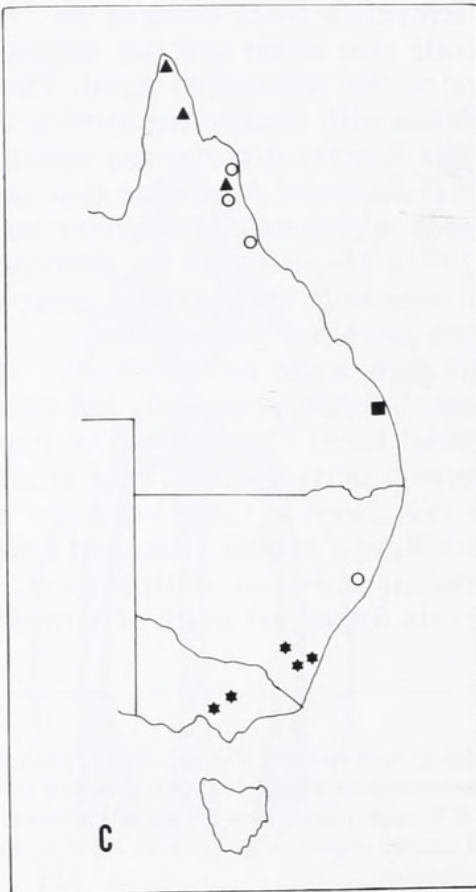
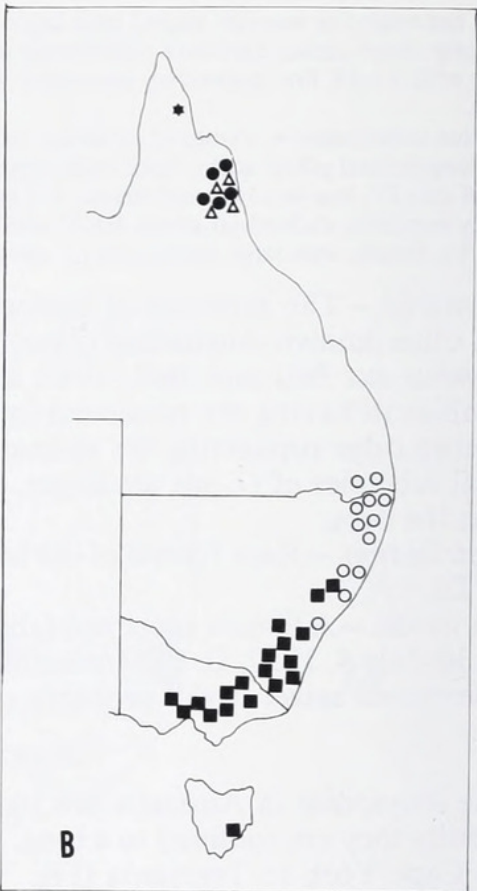
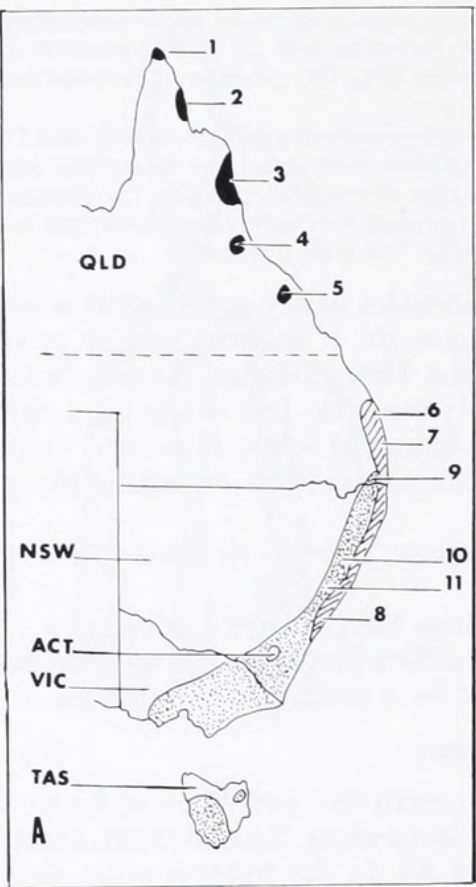
ZOOGEOGRAPHY

The Rhysodini in Australia are limited to relatively wet types of forest; consequently they are confined to a long, narrow strip along the east coast, extending from Cape York to Tasmania (Fig. 74, Map A). In the tropical zone, they are known only from the true rain forest. In the temperate zone, south of the Tropic of Capricorn, they are found both in temperate rain forest and wet sclerophyll forest. In Tasmania they are probably limited to wet sclerophyll forest. The evidence for this is based solely on two specimens with insufficient locality data, citing them as coming from the Hobart area. We failed to discover any specimens in the Tasmanian rain forest. Darlington (1961) discussed Australian rain forests in detail and in a further publication included additional information on the tropical part of the rain forest (Darlington, 1971). He also used the distribution of Carabidae (not including the Rhysodini), especially the flightless groups, to make inferences about the histories of separate patches of rain forest.

The humid forests are interrupted by many gaps, some very extensive, where the mountain ranges support only dry sclerophyll forest, apparently not suitable for Rhysodini or the more specialized terrestrial forest Carabidae. The tropical rain forests are divided into five widely separated units, mapped by Darlington (1961, 1971). These are the tip-of-peninsula rain forest at Cape York, the mid-peninsular rain forest, including the McIlwraith Range, Mount Tozer and the Iron Range, the base-of-peninsula rain forest, extending from just south of Cooktown to just north of Townsville, the Elliot Range rain forest just south of Townsville

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Fig. 66–69.—*Omoglymmius* (*Omoglymmius*) *bituberculatus*, new species: Fig. 66. Head, pronotum, dorsal aspect; Fig. 67. Head, left lateral aspect; Fig. 68. Metasternum, abdomen, ventral aspect, female; Fig. 69. Hind tibia, male. Fig. 70–73.—*Omoglymmius* (*Omoglymmius*) *monteithi*, new species: Fig. 70. Head, prothorax, dorsal aspect; Fig. 71. Head, left lateral aspect; Fig. 72. Left elytron, dorsal aspect; Fig. 73. Metasternum, abdomen, ventral aspect, female.



and the Eungella Range rain forest, inland from Mackay. According to Darlington, the flightless Carabidae support the conclusion that each of these islands of rain forest has been separated sufficiently long to have developed an endemic fauna. The midpeninsular forest has been separated for a very long time from the base-of-peninsula forest. The tip-of-peninsula forest is a relatively small area with an impoverished fauna, suggesting that it evolved *in situ* by accumulation of relatively few immigrants from other areas of rain forest. The winged Carabidae of this area and the midpeninsular forest include many Carabidae shared with New Guinea and others only slightly differentiated from New Guinean relatives, but this element is entirely absent from the flightless Carabidae. Darlington concluded that the Pleistocene land connection between the two land masses did not include continuous rain forest, thus forming a barrier to flightless Carabidae.

Subtropical rain forest occupies the Coastal Plain and nearby mountains in southeastern Queensland and northern and central New South Wales, from about the vicinity of Gympie, Qld. south to Sydney and beyond, becoming more attenuated at the southern end of the range. Enclaves of temperate rain forest occur in the higher mountains as far north as the Mount Lamington area, just north of the Queensland-New South Wales border and in the Dorrigo Plateau, with scattered areas farther south, and more extensive areas in East Gippsland, the most eastern part of Victoria. Cold temperate rain forest occupies most of the southwestern part of Tasmania, in addition to a smaller area in the northeastern sector. The subtropical and temperate rain forests and wet sclerophyll forests are interrupted by areas of drier forest, but these barriers are neither as broad nor apparently as old as those in the tropical rain forest, and show less clear-cut relationships to rhysodine distributions.

Among the rhysodines in Australia, only *Kaveinga* (*Angekiva*) *frontalis* is widely distributed, from the base-of-peninsula rain forest in Queensland, south through subtropical and temperate rain forests to Victoria and probably Tasmania. Of the tropical rain forests, only the base-of-peninsula forest has been adequately collected. Six species are known: *Kaveinga* (*Angekiva*) *stiletto*, *Kaveinga* (*A.*) *frontalis*, *Kaveinga* (*Kaveinga*) *abbreviata*, *Rhyzodiastes* (*Temoana*) *mirabilis*, *Omoglymmius* (*Omoglymmius*) *ichthyocephalus* and *O.* (*O.*) *bituberculatus*. Three species are known from the midpeninsular rain forest: *Omoglymmius* (*Omoglymmius*) *ichthyocephalus*, shared with the preceding forest and two not found there: *Omoglymmius* (*Caeconavitia*) *okei* and *Omoglymmius* (*Omoglymmius*) *monteithi*. In

Fig. 74.—Eastern Australia showing distribution of humid forests (adapted from Darlington, 1961) and distribution of species. Map A. Dark shading, tropical rain forests; diagonal lines, subtropical rain forests; dotted areas, general zone of temperate rain forest and wet sclerophyll (forests are discontinuous and zones are generalized). 1. Cape York tip-of-peninsula rain forest. 2. Iron Range, midpeninsular rain forest. 3. Cairns area, base-of-peninsula rain forest. 4. Elliot Range. 5. Eungella Range. 6. Coolool National Park. 7. Brisbane. 8. Sydney. 9. Lamington National Park. 10. Dorrigo Plateau. 11. Barrington Tops National Park. Horizontal dashed line represents the Tropic of Capricorn. Map B. Black squares, *Leoglymmius lignarius*; open circles, *Kaveinga* (*Angekiva*) *stiletto*; black circles, *Kaveinga* (*Kaveinga*) *abbreviata*; open triangles, *Kaveinga* (*Angekiva*) *walfordi*; star, *Omoglymmius* (*Caeconavitia*) *okei*. Map C. Stars, *Sloanoglymmius planatus*; open circles, *Omoglymmius* (*Omoglymmius*) *bituberculatus*; black triangles, *Omoglymmius* (*Omoglymmius*) *ichthyocephalus*; black square, *Rhyzodiastes* (*Rhyzoarca*) *ovicollis*. Map D. Black squares, *Kaveinga* (*Angekiva*) *frontalis*, question mark denotes unspecific locality; open circles, *Rhyzodiastes* (*Rhyzoarca*) *burnsi*; stars, *Rhyzodiastes* (*Temoana*) *mirabilis*; black circle, *Omoglymmius* (*Omoglymmius*) *monteithi*.

the tip-of-peninsula forest only *Omoglymmius* (*Omoglymmius*) *ichthyocephalus* has been recorded. However, neither the tip nor midpeninsular forests have been adequately collected, as they are remote and difficult of access. No rhyrodines have yet been collected in the Elliot or Eungella ranges, although they would be expected there.

In the subtropical forests, three species have been recorded: *Kaveinga* (*Angekiva*) *frontalis*, *Kaveinga* (*A.*) *stiletto*, and *Rhyzodiastes* (*Rhyzoarca*) *ovicollis*. In the temperate forests, including small patches of wet sclerophyll in otherwise drier mountains, are *Sloanoglymmius planatus* and *Leoglymmius lignarius*, the latter being more widespread and apparently doing better in dry areas. Probably *Kaveinga* (*Angekiva*) *frontalis* should also be included among the temperate species, although known records are near the coast. *Rhyzodiastes* (*Rhyzoarca*) *burnsi* appears to be a warm temperate species on the basis of two known localities.

The Australian rhyrodine fauna is still inadequately known and several important questions, both taxonomic and zoogeographic, remain to be answered. For instance, it is not clear whether or not *Rhyzodiastes* (*Rhyzoarca*) *burnsi* and *R. (R.) ovicollis* are really allopatric, as it appears on the basis of the few known specimens, and whether the one specimen from Mount Kaputar, in northern New South Wales, is *Rhyzodiastes* (*R.*) *burnsi* or another, closely related species. The specimen tentatively attributed to *Omoglymmius* (*Omoglymmius*) *bituberculatus* from the Dorriggo Plateau of New South Wales might prove to be a distinct taxon, or may have an erroneous locality label. Neither of the two records from Tasmania is entirely satisfactory. The type specimen of *Kaveinga* (*Angekiva*) *frontalis* lacks a specific locality, name of collector and date, and might possibly have been collected on the adjacent mainland. The specimen of *Leoglymmius lignarius* was collected in firewood from the Hobart area. The wood was certainly from Tasmania, but the exact source is unknown.

The world distribution of Rhyrodini has been discussed previously (Bell, 1979). The present paper does not materially alter the picture, which will be summarized here. The relationship of the Australian rhyrodines to those of the rest of the world shows suggestive analogies to the distributions of terrestrial mammals. *Leoglymmius* and *Sloanoglymmius* have plesiomorphic features not found in other rhyrodines and are found only in Australia. In both respects they resemble the monotreme mammals (platypus and echidna). Like the latter group, these genera are probably relics of an ancient East Gondwanian fauna (Antarctica and Australia, before the land masses separated). *Rhyzodiastes* (subtribe Clinidiina) is shared with South America, but not with other continents, suggesting a history similar to that of the marsupials (a spread into East Gondwana via a land bridge from South America). *Rhyzodiastes* differs from the marsupials in that it occurs also in New Zealand, New Caledonia and Fiji, extending farther west through the Indonesian islands to Formosa and the Indochina Peninsula. *Omoglymmius* is the only genus in the widespread subtribe Omoglymmiina which reaches Australia. *Omoglymmius* thus corresponds to the muroid rodents among terrestrial placental mammals. Australian representatives of *Omoglymmius* (*Omoglymmius*) are members of a subgenus which ranges from Eurasia to the Caroline Islands. It is represented by a great number of species in New Guinea and undescribed species are still being discovered. The few Australian species appear to be relatively recent immigrants from New Guinea. An older immigrant perhaps is *Omoglymmius* (*Caeconavitia*) *okei* with its only close relative in Fiji.

The most enigmatic subtribe is Rhyrodina, with *Kaveinga* widespread in the

southwest Pacific from Mindanao and Celebes to Fiji, New Caledonia, New Zealand and Australia, *Kupeus* in New Zealand and *Rhysodes* in the Palearctic, with one species in northern Europe and the other in Siberia and Japan. *Kaveinga* has four subgenera, *Kaveinga* (*Kaveinga*) occurs from the Solomon Islands, New Guinea, and Mindanao to Celebes and is represented by one species in northern Queensland. Subgenus *Angekiva* is endemic to Australia, including Tasmania. Of the two remaining subgenera, one is confined to New Zealand, the other is shared by New Zealand and New Caledonia. The richness of Rhysodina in the southwestern Pacific and their near absence elsewhere suggests an origin in this region with rafting of some species to islands farther west. The presence of *Rhysodes* in the Palearctic Realm is a puzzle. Perhaps, like *Leoglymmius* and *Sloanoglymmius*, the ancestor of the subtribe was a member of an ancient Gondwanian fauna. The ancestor of *Rhysodes* may have rafted westward until it reached the Asian mainland. The absence of any Rhysodina from South America suggests that the subtribe did not come from that continent. Its absence from North America suggests that late arrival in the Palearctic may have prevented access via the Bering land bridge in the Pleistocene. *Rhysodes* is the most cold tolerant of all Rhysodini, being found as far north as southern Sweden and southeastern Siberia, so it otherwise would have been expected to have a good chance to cross the land bridge.

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