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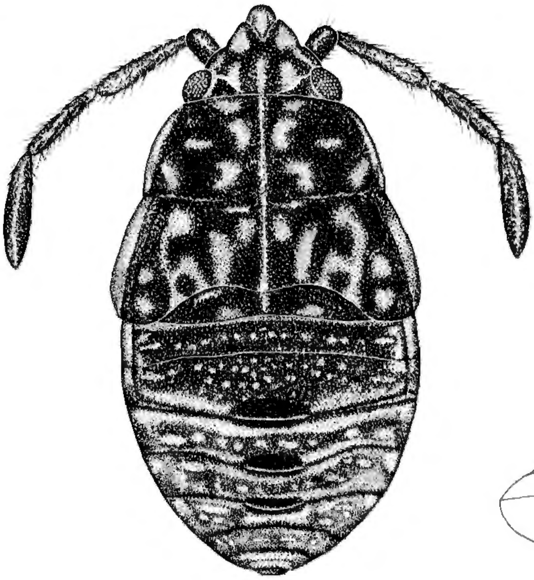

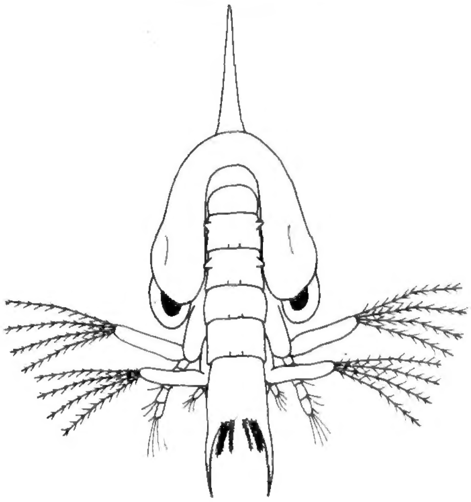

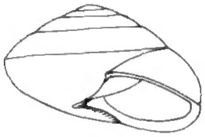

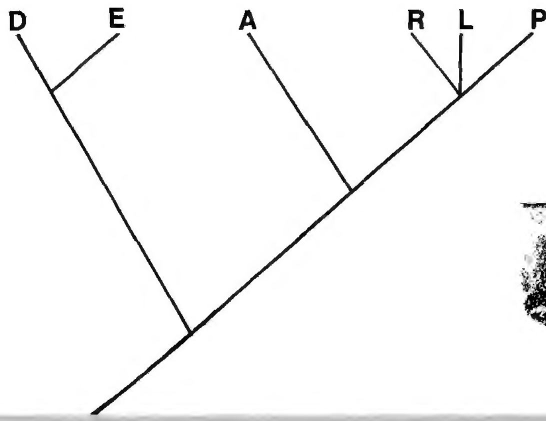

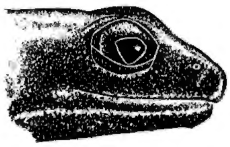

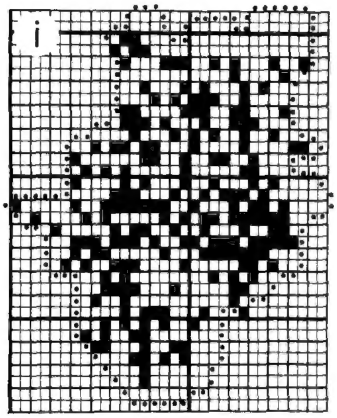

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FAUNAL SURVEY OF NEW ENGLAND. I. INTRODUCTION AND GENERAL DESCRIPTION OF THE AREA

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ABSTRACT

This paper introduces forthcoming publications on faunal surveys in the New England region of New South Wales. It provides a short description of the general features of the New England region, and briefly summarizes the more comprehensive account provided by Lea *et al.* (1977), which should be consulted for maps and more detailed commentary. In future numbers of this series of faunal surveys, specific maps of the distribution of environmental features believed to be important in the biogeography of specific animal groups will be presented and discussed in detail as appropriate. However, future numbers will not recapitulate the general topics discussed here, and the present paper and the Atlas of New England (Lea *et al.* 1977) are expected to serve as a basic background of the more specific faunal surveys to follow.

INTRODUCTION

Since 1966 various staff and students of the University of New England have been participating in a faunal survey of the New England region. The original concept of the boundaries of the region of study was the Commonwealth Electorate of New England of 1975[1], and still represents the heart of the study area. However, later collecting was also carried out in adjacent areas outside the boundary and the study area has been widened for certain animal groups. The collecting area falls within latitudes 28°50'S and 31°40'S and longitudes 150°E and 152°40'E, and is marked within the map of New South Wales in Fig. 1. Grid cells of 'quarter-cell' size (5' x 5') of the 'Australian Biogeographical Integrated Grid System' (ABIGS) will be used as units for the recording of presence/absence for taxa from all animal groups. The ABIGS system is outlined in Brook (1977).

1. Note that this is a narrower concept of New England than that of Lea *et al* . (1977), who included, in addition to the New England Electoral District, that of Gwydir and parts of Comper, Lyne and Patterson as well.

The New England region represents a climatic and geographic crossroads, with a fauna containing elements with links to almost all of the major zoogeographic regions of Australia — tropical, southern temperate, and semi-arid species, together with some high altitude forms.

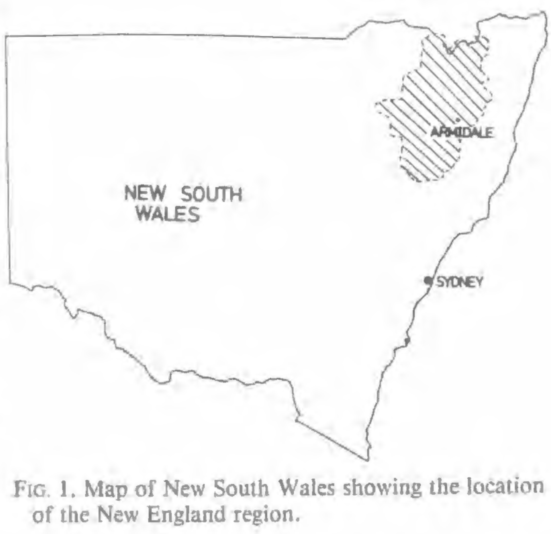

FIG. 1. Map of New South Wales showing the location of the New England region.

This diversity makes the area of great interest ecologically. The wide range of conditions should result in complex distribution patterns which, on comparison with environmental variables, can provide a good understanding of the limiting factors operating both at present and in the past. Distributional mapping and environmental correlation are important prerequisites for more detailed studies of the ecology and physiology of individual species or groups of species.

Also, the long history of farming in the New England region provides another dimension. The clearing of land, the grazing of sheep and cattle, and the growing of various crops have caused extensive habitat changes in some areas. Distributional mapping in conjunction with demarcation of farming types and intensities may elucidate any effects which agricultural practices have on fauna and would provide a background for any conservation measures.

The first few papers in this series will deal with the first groups studied (e.g. gastropods, frogs, lizards, tortoises, snakes, birds and Odonata). Collections of millipedes, centipedes, scorpions and pseudoscorpions have been assembled and have either been sent to specialists for preliminary study or are waiting distribution to some-one expressing an interest. We are beginning to collect additional groups now. Any qualified persons wishing to participate in the survey by studying particular taxa should contact one of the authors. Available specimens can be supplied and/or an effort made to collect them in the future.

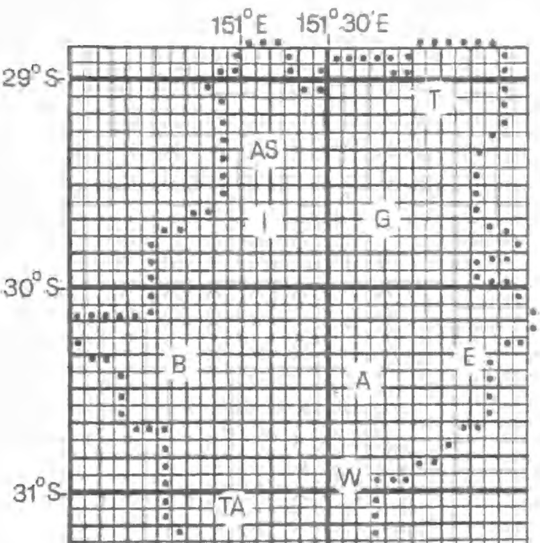

FIG. 2. Collecting grid across region of the survey which is enclosed by solid dots. AS = Ashford, A = Armidale, B = Barraba, E = Ebor, G = Glen Innes, I = Inverell, N = Nundle, TA = Tamworth, T = Tenterfield, W = Walcha.

Originally the present introductory paper was envisaged to be a large one with a number of topographic, climatic, geologic, soil and land use maps together with an extensive commentary. However, the 2-volume work 'An Atlas of New England' edited by Lea *et al*. (1977) has presented many of the relevant data in more detail than we could hope to, and the present paper is a brief summary of the aspects of importance to zoogeography. An older compilation of essays (Warner 1963) also includes material on the region's geology, soils, vegetation and their interactions. A regional bibliography is presented by Greenwood (1976). Maps presented here include adaptations from those in Lea *et al*. (1977) and original maps of certain features not covered in the Atlas of New England. In all cases, the maps have the outline of the collecting grid (Fig. 2) superimposed on them. The Atlas of New England and its included references should be consulted for more detailed information. A comprehensive study of a small part of the area, Dumaresq Shire, has been presented by Woolmington (1965).

DRAINAGE

The Great Dividing Range separates the New England area into two major drainages, the eastern and the western. In most places the divide is not conspicuous and often occurs along rather gently sloping land below the level of adjacent ridges (Walker 1977). It enters a region just north of Walcha and passes northward through the centre of the district until about Glen Innes where it veers slightly northeastward leaving the district near its northeastern corner. All of the western streams eventually lead into the Murray-Darling system.

The northwestern section is drained by (a) the Beardy and Mole Rivers which join to form the Dumaresq River leaving the region at the extreme northwestern corner, and (b) the Severn River in the northwest corner near its junction with the final major river of the northwestern section, the McIntyre River. The central part of the west is drained principally by the Gwydir River, which exits via Copeton Dam. Finally, the southern part of the western drainage is drained by the MacDonald and Peel Rivers which unite slightly downstream of Keepit Dam where they leave the area as the Namoi River.

The area of the eastern drainage included within the study region is only about one third as large as that of the western one (Fig. 3). Drainage within the extreme northeast is largely by the Timbara River and its tributaries, in the central part of the Henry, Sara, Oben and Aberfoyle Rivers, all of which drain into the Guy Fawkes River outside the region. All of these rivers eventually drain into the Clarence River. Further south, the Gara, Wollomombi and Styx Rivers eventually, in conjunction with a number of extralimital rivers, go to make up the Apsley-Macleay system. At the extreme southeastern section of the region, the rivers form part of the Manning River system.

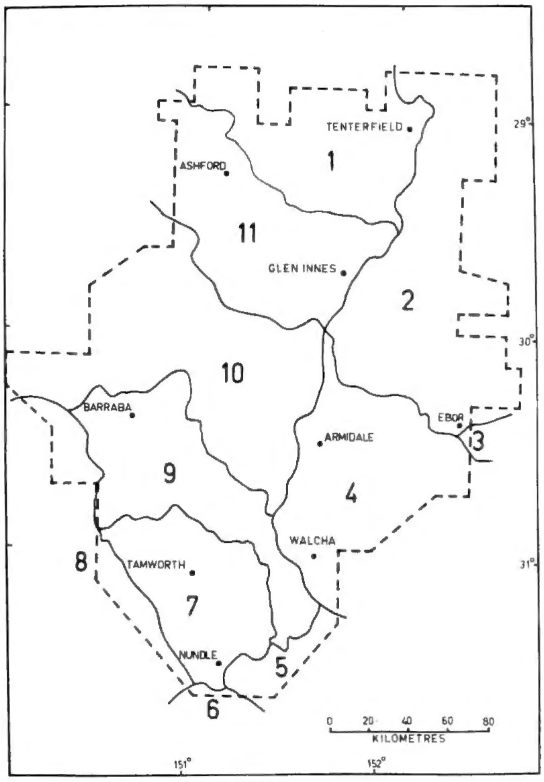

FIG. 3. Drainage Basins of the New England region. **1** = Mole, Beardy Rivers; **2** = Cataract, Timbarra, Mann, Henry, Sara Rivers — Clarence River; **3** = Bellingen River; **4** = Apsley, Macleay Rivers; **5** = Myall, Nowendoc Rivers — Manning River; **6** = Pages River; **7** = Peel River; **8** = Namoi, Mooki Rivers; **9** = Manilla, Macdonald Rivers; **10** = Copeton Dam catchment; **11** = Severn, McIntyre Rivers.

TOPOGRAPHY

Fig. 4 shows demarcations of altitude for the New England region. The area is largely an elevated tableland, the New England Plateau, bordered on the east by a precipitous scarp dropping to incised river gorges and the coastal plains, and more gradually descending on the west via the western slopes toward the western plains. Much of the tableland and its slopes are hilly or gently rolling although more contrasting relief is provided in places by the Great Dividing Range (New England Range) running north to northeast through the eastern part of the area, the Nandewar Range running northwest from the southeast part of the district, and the Moonbi Range south of and roughly parallel to the Nandewar Range. A variety of other less extensive ranges or individual mountains occur at

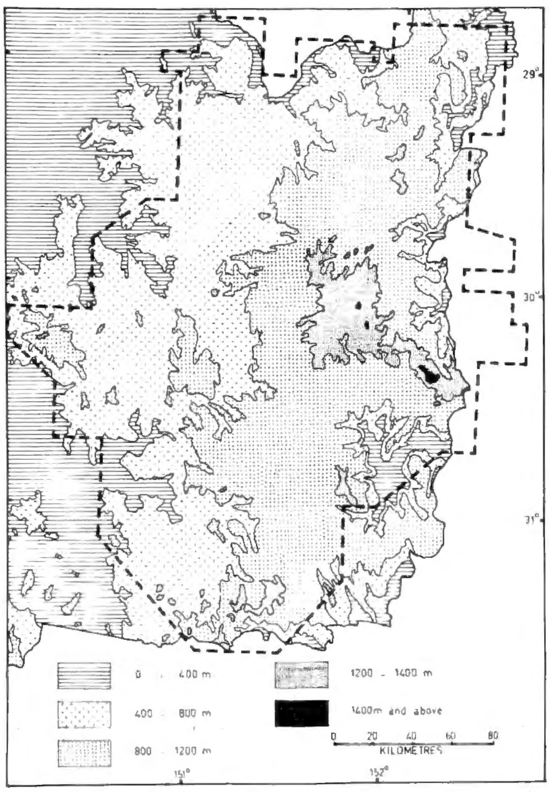

FIG. 4. Altitude — adapted from Walker (1977). (The collecting area is superimposed, inside the broken lines).

various places along the plateau (see map in Lea *et al.* 1977, volume 2, p. 1). Some of the eastern rivers are associated with steep-walled, deeply carved gorges, sometimes as much as 800 metres deep (Walker 1977).

Most of the area is characterised as having gentle to moderate slopes except the area of the ranges to which previous reference was made; these have steep slopes. Little of the study area can be generally classified as 'almost level' or 'flat' (Swan 1977).

Most of the plateau (the eastern part of the area) lies between 1000 and 1300 metres elevation, with the ranges or isolated mountains going up to more than 1500 metres. The western slopes are chiefly 600 to 1000 metres elevation with a few areas even lower, such as the northwestern corner and the Liverpool Plains along the southwestern edge. No part of the region is lower than 200 metres elevation.

CLIMATE

New England is a transition zone between the predominantly summer rainfall of the north and the predominantly winter rainfall of southern Australia. However, most rain falls in the summer under the influence of the moist summer easterlies, distant tropical cyclones, occasional low pressure areas moving down from the north and thunder storms; there is frequently a secondary, smaller winter peak associated with cold fronts from the south (Hobbs and Jackson 1977).

In general, the amount and duration of rainfall and mean annual number of days with rain are highest in the east decreasing toward the west owing to the joint effect of decreasing elevation and increasing distance from the sea. However, local topography and other variables have their effect and superimpose a somewhat more complex pattern of local variation (for maps see Lea *et al.* 1977, volume 2, pages 11 and 12).

Fig. 5 presents a summary map of mean annual rainfall for the area. However, there is considerable year to year variation and mean annual values are not necessarily indicative of rainfall for any particular year.

Evaporation, partly dependent on temperature, increases from a southeast to northwest direction. Thus not only is rainfall least in the northwestern part but evaporation is greatest there. Consequently the general moisture conditions are most favourable in the southeast and become progressively less favourable toward the northwest (for maps see Lea *et al.* 1977, volume 2, page 12).

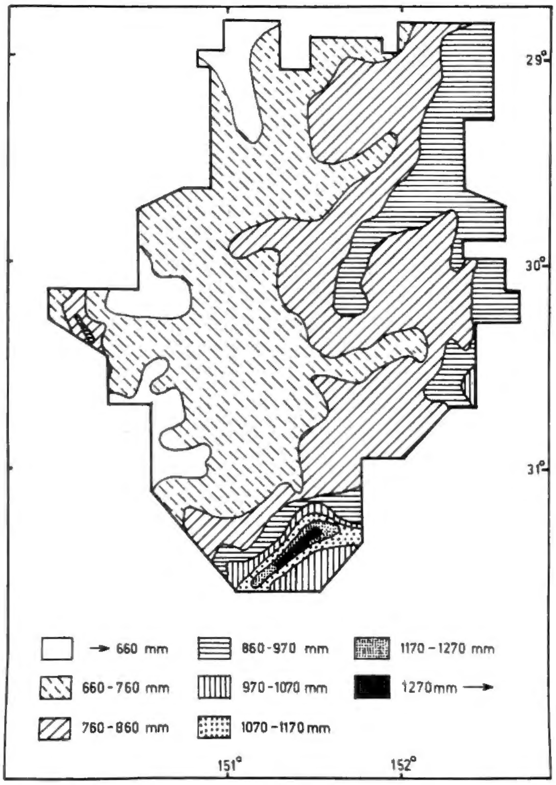

FIG. 5. Mean annual rainfall isohyets across the collecting area. (Compiled from many sources — see Reference Appendix I).

Temperature also shows regional variation within the area. Solar radiation in sunshine hours increases from southeast to northwest and consequently there is a general tendency for temperature to increase in the same direction (Hobbs and Jackson 1977). Fig. 6 shows some thermocline patterns across the region. (Further maps of temperature and sunshine are presented in Lea *et al.* 1977, vol. 2, p. 13). However, elevation, wind, type of air mass and a variety of other factors result in much local variation. The most extreme source of variation is seasonal. By Australian standards the New England region is cold in winter with a median frost period for the region as a whole exceeding 100 days per year (Hobbs and Jackson 1977) and mean daily minimum temperatures ranging from 0°-4°C during July to 12°-20°C during January. The lowest temperatures are centred over the higher altitudes along the north-south axis of the Great

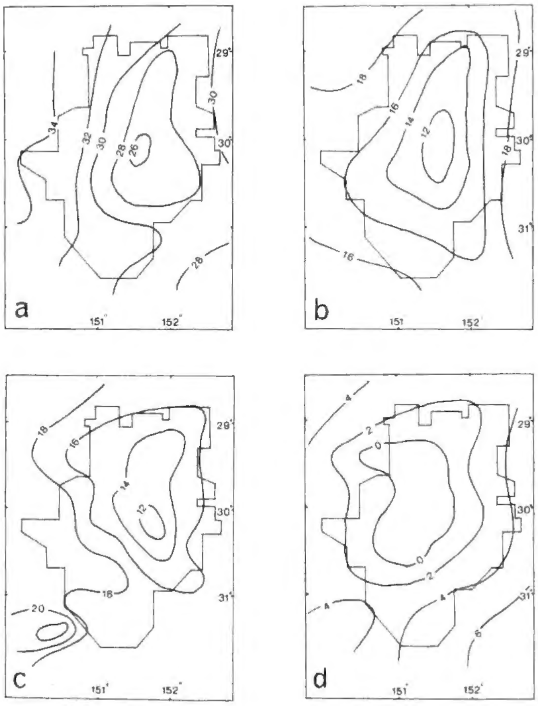

FIG. 6. Thermoclines across the New England region: (a) Mean daily maximum, January; (b) Mean daily maximum, July; (c) Mean daily minimum, January; (d) Mean daily minimum, July. (The collecting area is superimposed.)

Dividing Range in the east central part of the district, with milder ones radiating out from that area. Mean daily maximum temperatures for the area ranged from 12°-18°C in July to 28°-32°C in January. Again the colder areas are over the central part of the Great Dividing Range with hotter conditions peripherally from there. Thus the coolest, east central localities range from minima of about 0°C in winter to maxima of 28°C in summer and the warmer parts of the region from winter minima of 4°C to summer maxima of 32°C.

VEGETATION

Rain forest and wet sclerophyll forest occur only in the more humid eastern margins of the area. Even there, they do not form large continuous zones but occur rather as isolated areas interspersed with a more extensive open forest, dry sclerophyll. These forest types make up the major vegetation cover along the narrow eastern margin of the New England area but toward the west, except for scattered localities of rather extensive dry sclerophyll, rapidly give way to a preponderance of either woodland (especially in the higher elevations and on the steeper slopes) or unforested habitat. Open scrub is rare, occurring only in a small area in the southwestern region (Smith and Turvey 1977; for map see Lea *et al*. 1977, volume 2, page 32).

The vegetation has been highly modified by man's activities especially in the areas of woodland and grassland areas which have been extensively subjected to grazing and the cultivation of crops (Fig. 7). There were grasslands in the area before the advent of European Man but these have been extended at the expense of woodland and forest. Wooded areas have also given way to cultivation, except for the still predominantly forested eastern fringe (Thorpe 1977, Smith and Turvey 1977; for map see Lea *et al*. 1977, volume 2, page 30). In recent decades many eucalypt trees which survived clearance for agricultural purposes have succumbed to the syndrome of New England dieback (Heatwole and Lowman in press).

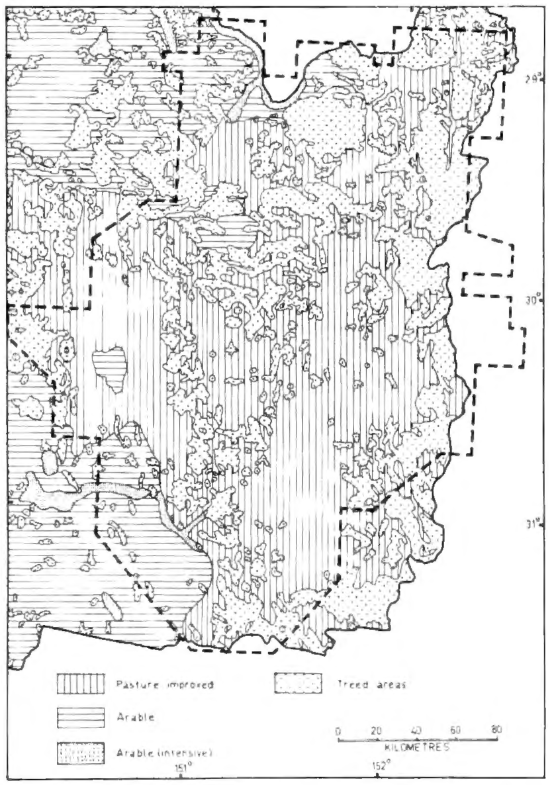

FIG. 7. Land use — adapted from Thorpe (1977). (The collecting area is superimposed, inside the broken lines).

GEOLOGY

The geology of the New England area has been described by Harrington (1977) — Fig. 8. There are late Mesozoic and Tertiary basalts with a north-south orientation running through the central part of the region but veering off to the west in the northern part of the district. On both sides of them and to the north of them, are extensive areas of granites and Paleozoic volcanics with 'granite' affinities. These collectively occupy the greater part of the New England region. The final major category of rocks is the Paleozoic basement of greywackes, cherts, volcanics and sandstones occupying the major portion of the southwestern and southern sections of the area but also well represented along the eastern and northern parts as well.

There are also small areas of serpentine and Tertiary and Quaternary alluvium in the southwest, and patches of Mesozoic sediments and volcanics in the southeast and northwest. The geological history of New England is discussed by Warner (1971), and of the Eastern Highlands of which the region is a part by Ollier (1978).

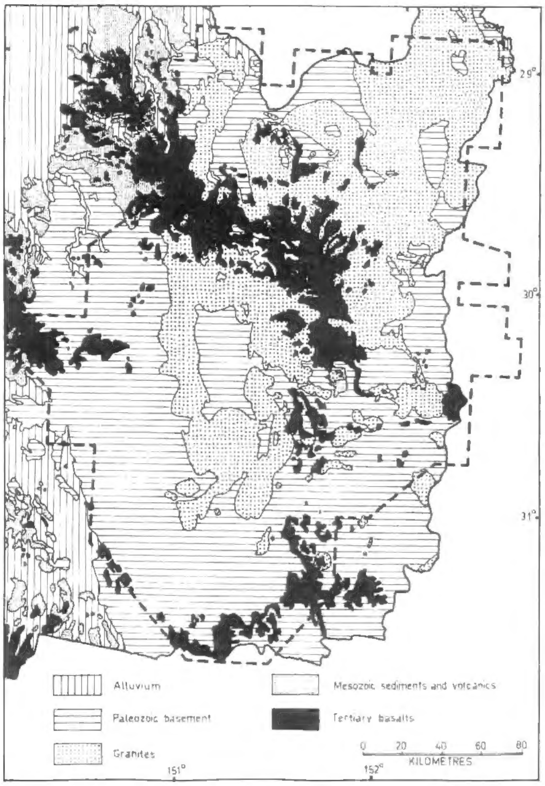

FIG. 8. Geology — adapted from Harrington (1977). (The collecting area is superimposed, inside the broken lines.)

SOILS

The soils of the New England region form a complex pattern and only a general survey of the broadest categories can be presented here. McGarity (1977) provides a more detailed summary and a general map is presented in Volume 2, page 9 by Lea *et al.* (1977). In the centre of the region is a north-south oriented region of Chocolate-Prairie soil, bounded on the north and southwest by one of the major soil associations in the area, the Yellow Solodic-Yellow Podzolic soils, occupying large areas in the north and in the centre of the region, giving way to the Yellow Podzolic Association towards the southeast. Another major category is the Yellow Podzolic-Gley Podzolic characteristically oriented in two large north-south bands, one to the east of Chocolate-Prairie soil and the other to the west of the central area of Yellow Podzolic-Gley Podzolic soil; there are also extensive areas of Yellow Podzolic-Gley Podzolic soils in the northeastern part of the region. In the extreme southwest is a large area of Red-Brown Earths intermingled with and bordered on the north, northeast and south by Non-calcic Brown soils. The extreme eastern edge of the region is characterised by a Red Podzolic soil. There are Black Earth-Euchrozem soils toward the north and northwest, and less extensive areas toward the southeast. Finally, there are small areas of Black Earth Prairie soils scattered among the various other types, especially in the central, northwestern and southwestern areas, and a small pocket of Krasnozem-Chocolate soils in the extreme south. Skeletal soils are scattered throughout much of the area.

ACKNOWLEDGEMENTS

We are indebted to the Internal Research Funds of the University of New England, the Rural Credits Development Fund and the Australian Biological Resources Survey for financial support of this project. Professor A.F. O'Farrell of the University encouraged and facilitated the research in many ways and we dedicate this paper to him on the occasion of his retirement.

Mr A. Dudatis and Ms J. Simpson assisted by way of preparation of some of the figures. Mrs Viola Watt and Ms Sandra Pont typed the manuscript.

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APPENDIX 1

SOURCES USED IN CONSTRUCTING MEAN ANNUAL RAINFALL ISOHYETS OVER THE NEW ENGLAND REGION

Commonwealth Bureau of Meteorology, Department of the Interior. (1931-1960). Average Annual Rainfall map of N.S.W.

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FAUNAL SURVEY OF NEW ENGLAND. II. THE DISTRIBUTION OF GASTROPOD MOLLUSCS

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ABSTRACT

The New England region of northeastern New South Wales (between 151°20' and 152°30'E and 28°50' and 31°40'S) was surveyed for terrestrial and freshwater gastropods. The distributions of species are related to a grid system with all components within the grid being 5' latitude by 5' longitude. Of the specimens collected, 28 were identified at the species level. The taxonomic status of the remainder is such that further separation beyond genus level based on existing criteria is virtually meaningless and, in one case (Family Charopidae), further separation into genera is doubtful. Thus, the remaining specimens were listed under 10 genera and one family. Comments are made on possible further taxonomic separation of some of these, especially in relation to distributional findings. Distribution maps are presented for 35 taxa, at either the species or genus level. Notes on habitat preferences of the molluscs and relationships between distribution of the molluscs and broad environmental divisions are included. However, it is emphasized that this survey is intended as an initial review of the gastropod fauna and more exacting interpretation of habitat or environmental limitations would require closer attention to the biology and ecology of particular species or groups.

INTRODUCTION

This study formed part of a broad survey to increase the knowledge of the distribution of a number of animal groups in the New England region. The objectives, geographical areas, animal groups, and maps of environmental features and funding of the overall work are outlined by Heatwole and Simpson (1986).

Briefly, the collecting of terrestrial and freshwater gastropods was within the bounds of: longitude 151°20' and 152°30'E and latitude 28°50'S and 31°40'S. Parts of the margins of this rectangular section were not visited as these verged into coastal areas or represented continuations of western plains.

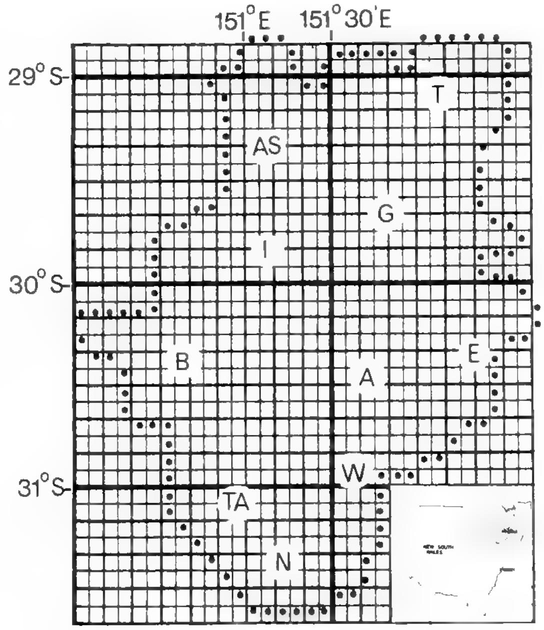

Fig. 1. Collecting grid superimposed on New England region. The area of the survey is enclosed by the solid dots. (Insert shows location of the survey region). **AS** = Ashford, **A** = Armidale, **B** = Barraba, **E** = Ebor, **G** = Glen Innes, **N** = Nundle, **TA** = Tamworth, **T** = Tenterfield, **W** = Walcha.

The region of collection in relation to northeast New South Wales is shown in Fig. 1. The area was accessible from Armidale and contained a variety of climates and habitats: sub-tropical and temperate regions, large altitudinal range of approximately 1,300 metres, differing soils and geology, and vegetation types ranging from undisturbed temperate rainforest to temperate woodland largely cleared for pastoral use.

The survey of gastropod molluscs in this region had the following aims: firstly, to obtain a record of species present in the region and secondly to relate distributional patterns of species to the types of available habitat and to broader environmental divisions across the region. This provides an initial framework for any further analysis between distribution and environment for selected species or groups.

METHODS

All records of species were mapped using the 'Australian Biogeographical Integrated Grid System' (ABIGS) which is outlined in Brook (1977). The system provides a complete grid-cell concept for the presentation of collection data for the whole Australian continent and its use will allow efficient comparisons between biotic distribution maps from different workers. On this scheme, a grid of 5' latitude by 5' longitude was superimposed across the collecting region (Fig. 1). Each one of these cells represents a 'quarter-cell' (the smallest cell) in the ABIGS system and covers approximately 76 km^2 at these latitudes. The ascending size of grid cells in the ABIGS system is designated by increasing line thicknesses on the figure. Presence of a species in any part of a 'quarter-cell' is indicated by the shading of that cell.

A few squares within the designated region were not visited, usually because of difficult accessibility, but these squares were widely scattered and did not affect the determination of distributional ranges for species across the region. In a few squares, collections were made more frequently than in the remainder, usually because personnel on other projects occasionally collected snails in accessible areas near towns. Again, such occurrences did not affect distributional patterns.

On visiting a square, collections were made in the following habitats: under logs, under stones, in flowing water, backwaters and marshes. Leaf litter was searched in the field but samples were not collected for laboratory extraction of fauna. Collecting from trees was only from loose bark, no greater than 2.5 metres high.

Maps of broad divisions of geographical and climatic features across the region are presented in the introductory paper to the New England faunal surveys (Heatwole and Simpson, 1985).

The majority of the collections from this study are housed in the Malacology Department, Australian Museum, Sydney, N.S.W. A reference collection of each species/genus is lodged at the Zoology Department, University of New England, Armidale, N.S.W. The specimens have been mainly preserved as wet collections

IDENTIFICATIONS

A key has been constructed to facilitate the identification of the terrestrial and freshwater gastropods of the New England region, for both amateur naturalists and researchers alike. Although detailed notes on the species are provided in the text, the key presents a simple method for distinguishing between the more commonly encountered forms.

Characteristics of the live animal as well as shell features are referred to in the key. Illustrations and photographs of a number of the species are presented as an additional aid to users of the key. While the main aim of the key is to simplify the task of identification, it has been necessary to make use of a number of technical terms which may be unfamiliar to readers. Explanation of these terms is provided in a glossary presented at the end of the text. For further information on land snail terminology, Smith and Kershaw (1979) is recommended as a reference.

In a departure from normal practice, habitat characteristics are also used in the key. In particular, the terrestrial and aquatic species are separated early in the key (Couplet 9).

Although every effort has been made to ensure identification to species, a number of points need to be kept in mind.

Firstly, all characters used in the key are based on average adult specimens except where stated otherwise. The number of shell whorls are usually indicative of the age of a shell. Therefore, in any comparison among species using size as a criterion, the number of shell whorls indicating adulthood (or at least when further growth is of no consequence to any comparison) should be specified. In the key, 'adult' usually refers to a shell of 4 whorls or greater. Thus, problems may arise from juvenile shells or shells which are old and excessively worn. Also, shell characters, such as size and shape, do vary within a species and some allowance should be made for this variation when using the key.

Secondly, a number of the groups are poorly known and full scale taxonomic revisions are needed before correct species determinations will be possible. In these cases no attempt has been made to proceed beyond the level of genus and in the case of the litter dwelling Charopidae, family.

Finally, the collection procedure employed during the survey did not include a thorough search of litter. This has not allowed a complete listing of the very small snails which live in this micro-habitat. The groups mainly affected are the Punctidae and Charopidae. However, this will not prevent the user of the key from obtaining the correct familial determination of these snails.

Key To The Terrestrial And Freshwater Gastropod Molluscs Of The New England Region, N.S.W.

1. No external shell, slug-like body 2
   External shell present 9
2. Body separable into visceral mass and foot at posterior end (Plate 2b) ....g. *Cystopelta*
   Body entire 3
3. Triangular mantle around pulmonary aperture. (This triangle can be coloured red, orange, or yellow. The colouring may either fill the triangle or line the edges). Adults commonly 70 mm in length. (Plate 2c) ....*Triboniophorus graeffei*
   Body with saddle-shaped mantle, respiratory orifice on right side, with internal shell 4
4. Mantle with horseshoe-shaped groove ....*Milax gagates*
   Mantle without horseshoe-shaped groove 5
5. Body with markings of leopard-like spots or continuous bands 6
   Body without these markings
6. Large, long body (commonly up to 100 mm in length). Body yellowish-white, dorsally with four or sometimes two bands, mantle spotted (Plate 1a) :........................*Limax maximus*
   Body banded or spotted 7
7. Body with dark longitudinal bands on dorsal surface, usually two sometimes three. Mantle banded. Commonly 40 mm in length. Tail has a short keel (Plate 1b) .....*Lehmannia nyctelia*
   Body spotted, without bands. Animal exuding yellowy secretion when live. Up to 100 mm in length ....*Lehmannia flava*
8. When live, exudes white secretion when disturbed. Moves slowly. Broad girth, commonly reaches 40 mm in length (Plate 1c) ....*Deroceras reticulatum*
   When live, no white secretion exuded when disturbed. Slender girth, generally shorter and more rapid in movement when compared with *D. reticulatum*........*Deroceras caruanae*
9. Terrestrial habitat (Note: some terrestrial snails may be located in recently flooded areas)...10
   Aquatic habitat 31
10. External shell reduced so that animal cannot fully withdraw. Shell thin, ear-shaped, covered to some extent by shell lobes. Animal slug-like, tail with some degree of dorsal keeling. (Several species) (Plate 2a)........... ....g. *Helicarion*
    External shell into which animal can withdraw 11

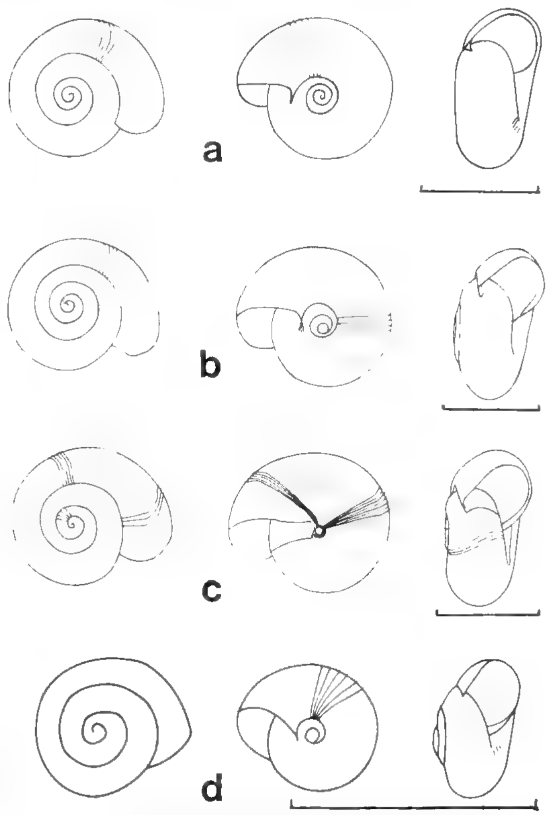

FIG. 2. **a** = Charopid sp.2, **b** = *Elsothera funera*, **c** = *Elsothera inusta*, **d** = *Paralaoma* sp. (Scale lines = 3 mm).

11. Adult shell small, less than 7 mm in diameter 12
Adult shell greater than 7 mm in diameter 14

12. Adult shell less than 4 mm in diameter, turbinate spire. Protoconch with spiral cords, adult sculpture of coarse radials. Family Punctidae 13
Shell strongly depressed to discoidal. Spire concave, flat or slightly convex. Protoconch with radial or spiral sculpture, or a combination of both. Adult sculpture of strong radial ribs. (Many species — see text) (Figs. 2a,b,c) ....Family Charopidae

13. Shell moderately depressed, widely umbilicate with coarse radial ribs (Fig. 2d) ....g. *Paralaoma*
Shell minute, conical, with closely spaced coarse radial ribs ....g. *Iotula*

14. Imperforate as adults............................15
Umbilicate as adults 20

15. Shell large, depressly conic. Angular periphery to shell in both juveniles and adults. Juveniles umbilicate (Fig. 5a) ....*Thersites novaehollandiae*
Shell globose 16

16. Shell large with marked colour pattern 17
Shell small, adults less than 10 mm in length, with fine growth lines. Spire short, body whorl inflated. No accessory colour pattern 19

17. Shell very large, with continuous brown spiral bands. Lip strongly reflected (Plate 2e) ....*Sphaerospira fraseri*
Shell large with interrupted banding 18

18. Shell fragile with conic spire and inflated body whorl. Shell surface smooth. Lip thin (Plate 2d) ....*Brazieresta larreyi*
Shell solid, globose, with alternate dark and light brown spiral bands. Radial bands of light coloured speckling. Surface malleated (Plate 2g)...........................*Helix aspersa*

19. Prominent columellar lip. Tree dwelling under bark (Fig. 3c)......*Arborcinea eucalypti*
Small columellar lip. Ground dwelling, semi-aquatic (Fig. 3b).......*Austrosuccinea nortoni*

20. Shell with widely open umbilicus 21
Shell with small umbilicus, less than 0.15 times shell diameter.............................22

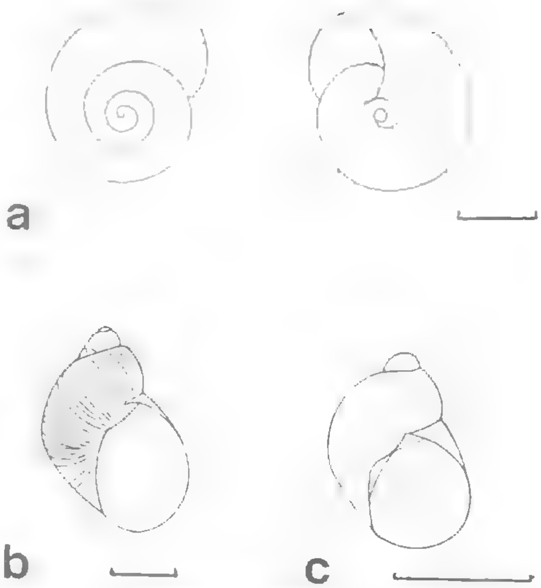

FIG. 3. a = *Saladelos urarensis*, b = *Austrosuccinea nortoni*, c = *Arborcinea eucalypti* . (Scale lines = 3 mm).

21. Shell with strong radial sculpture. Adults greater than 12 mm in diameter (Plate 2f)..... ....*Strangesta capillacea*
Shell small, yellow almost smooth with few radial growth lines. Umbilicus very wide (Fig. 3a).............................*Saladelos urarensis*

22. Shell moderately large with conical spire and prominent peripheral keel 23
Shell without prominent peripheral keel 24

23. Shell thin, somewhat transparent and shiny with fine radial growth lines. Simple lip (Fig. 4a).............................*Nitor medioximus*
Shell solid with sculpture of fine wrinkles overlying coarse radial ribs. Lip reflected. Colour reddish brown to yellow. Some forms have a dark peripheral band or dark circum-umbilical patch (Fig. 5b).......................... ....*Ventopelita mansueta*

24. Adult shell (less than 5 mm in diameter) with a turbinate spire and sculpture of fine radial ribs and fine spiral striae ....g. *Sodaleta*
Adult shell larger than 5 mm in diameter flattened or globose.............................25

25. Shell with flattened spire 26
Shell globose 28

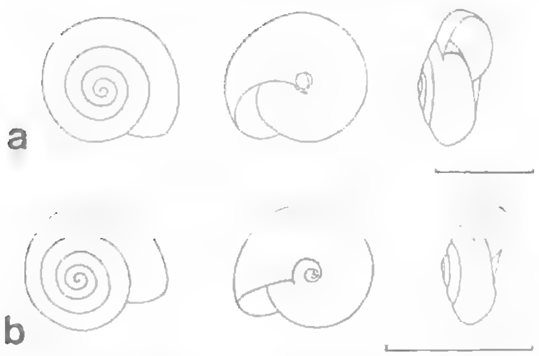

FIG. 4. a = *Nitor medioximus*, b = *Zonitoides arboreus*. (Scale lines = 5 mm).

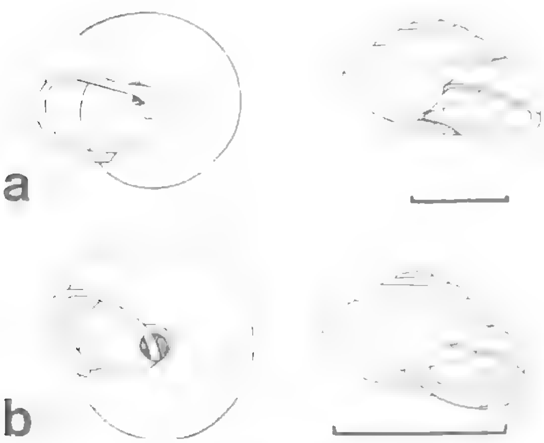

FIG. 5. a = *Thersites novaehollandiae*, b = *Ventopelita mansueta*. (Scale lines = 10 mm).

26. Shell smooth with umbilicus narrow or slightly covered by reflection of columellar lip 27

Shell shiny, with some degree of radial sculpture and open umbilicus. Colour dark brown (Fig. 4b) ....*Zonitoides arboreus*

27. Shell with narrow umbilicus, columellar edge of lip not reflected..................g. *Melocystis*

Shell with columellar edge of lip thickened and slightly reflected toward umbilicus ....g. *Expocystis*

28. Shell with hairlike bristles (Several species) (Fig. 6a).........................g. *Austrochloritis*

Shell without hairlike bristles..................29

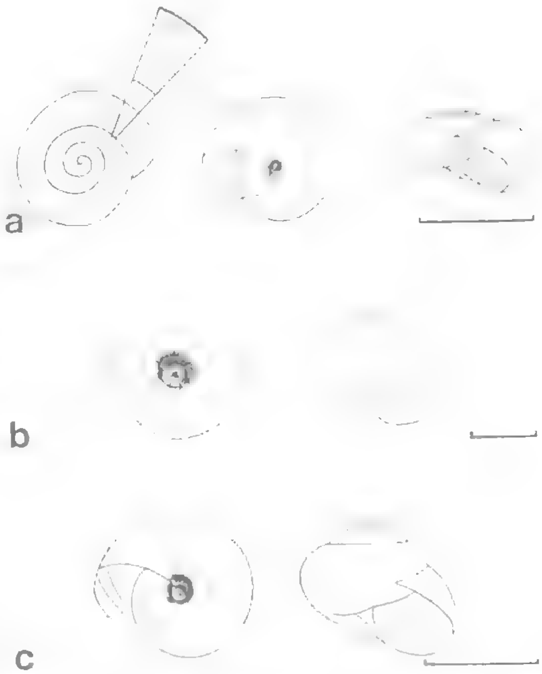

FIG. 6. a = *Austrochloritis* sp., b = *Meridolum gilberti*, c = *Galadistes liverpoolensis*. (Scale lines = 10 mm).

29. Shell greenish-grey, mainly smooth with widely separated pustules. Adults with shell diameter less than 15 mm..*Neveritis aridorum*

Shell with sculpture or wrinkles, coarse radial growth lines and closely grouped pustules. Colour dirty yellow to brown with accessory colour bands in some forms....................30

30. Adult shell large usually greater than 25 mm in diameter, sometimes with red band below suture and a red patch at the umbilicus (Fig. 6b)...........................*Meridolum gilberti*

Adult shell moderately large usually 15 mm in diameter, sometimes with chestnut band below suture and a chestnut patch around the umbilicus (Fig. 6c)...*Galadistes liverpoolensis*

31. Operculum present 32

Operculum not present..........................33

32. Whelk-like shell, strong sculpture (Fig. 7a) ....*Plotiopsis balonnensis*

Shell small, not whelk-like smooth with strongly convex whorls, and short spire (Fig. 7b) ....*Gabbia australis*

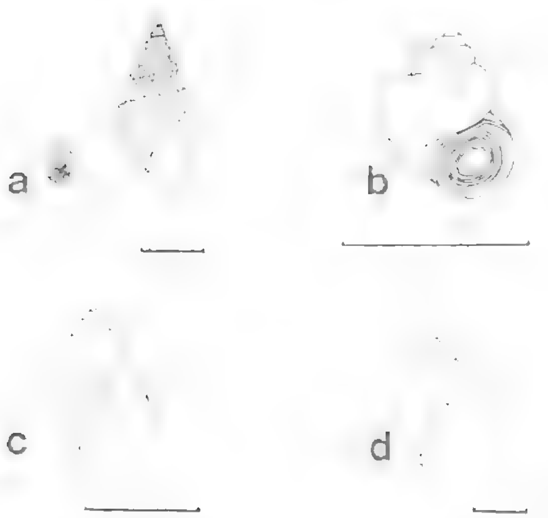

FIG. 7. a = *Plotiopsis balonnensis*, b = *Gabbia australis*, c = *Lymnaea tomentosa*, d = *Lymnaea lessoni*. (Scale lines = 5 mm).

FIG. 8. a = *Gyraulus metaurus*, b = *Pygmanisus pelorius*. (Scale lines = 2 mm).

33. Limpet-like shell, very small, less than 5 mm in length....................*Forsancylus enigma*

    Shell not limpet-like 34

34. Shell whorls in a flat plane with ram's horn shape. Adults small (less than 6 mm in diameter).......................................35

    Shells whorls not in a flat plane 36

35. Shell with angular periphery and usually light in colour. Aperture lip on left side has marked backward sweep (Fig. 8a).......... ....*Gyraulus metaurus*

    Shell with rounded periphery and usually dark in colour (Fig. 8b)..*Pygmanisus pelorius*

36. Shell dextral, animal with triangular tentacles...37

    Shell sinistral 38

37. Shell ovate, up to 12 mm in length (Fig. 7c) ....*Lymnaea tomentosa*

    Shell globose, up to 20 mm in length. Shell more fragile and body whorl very much inflated (Fig. 7d) ....*Lymnaea lessoni*

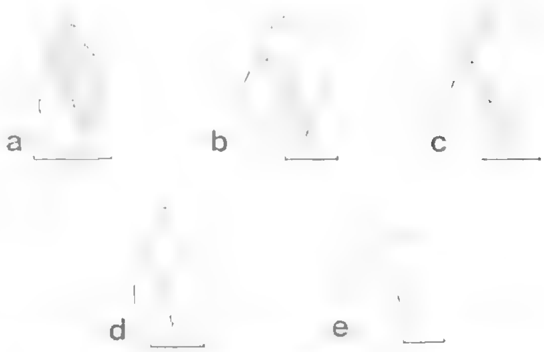

FIG. 9. a = *Glyptophysa cosmeta*, b = *Isidorella* sp., c = *Physastra* sp. 1, d = *Physastra* sp.2, e = *Physa* sp. (Scale lines = 4 mm).

38. Shell with raised spiral ribbing (Fig. 9a)..... ....*Glyptophysa cosmeta*

    Shell without raised spiral ribbing 39

39. Shell without abrupt turn in columella, commonly with periostracal hairs. Animal with pseudobranch on left hand side of body (Fig. 9b)...............................g. *Isidorella*

    Shell with abrupt turn in columella..........40

40. Animal with pseudobranch on left side of body but without digital processes on mantle. Red tinge to flesh when live (Figs. 9c,d) ....g. *Physastra*

    Animal with digital processes on mantle edge but without pseudobranch. No red tinge to flesh when live (Fig. 9e) ....g. *Physa*

DISTRIBUTION, FURTHER NOTES ON IDENTIFICATION, HABITATS

TERRESTRIAL SPECIES

Family RHYTIDIDAE

Strangesta capillacea (Ferrussac, 1882)
(Plate 2f)

REMARKS

S. capillacea was widely distributed across the New England Region (Fig. 11f). Specimens were collected from under logs and rocks and often were burrowed into the loose earth beneath the logs. Aggregations sometimes occurred but usually single specimens were found. *S. capillacea* is carnivorous and feeds on a variety of invertebrates. During collecting, specimens were sometimes found eating other snails, notably *Thersites novaehollandiae* and the introduced *Helix aspersa* .

RANGE

N.S.W., VIC.

Saladelos urarensis (Cox, 1866)
(Fig. 3a)

REMARKS

S. urarensis was mainly found in the eastern parts of the survey region (Fig. 11g). Like *Strangesta capillacea* this species is carnivorous. *S. urarensis* was collected from under logs and rocks, usually singly per site. Burrowing was not evident. (Figure 11g also includes those records of shell fragments that did not allow further separation between *Saladelos urarensis* and *Strangesta capillacea* . These are shown by crosses on the figure and it would appear, from the distribution of the two rhytidid species, that the more western records would be *Strangesta capillacea*).

RANGE

NE. N.S.W., SE.Q.

Family CARYODIDAE

Brazieresta larreyi (Brazier, 1871)
(Plate 2d)

REMARKS

B. larreyi was found at three eastern sites, two of these being at approximately 1200 m altitude. Adult specimens reach up to 35 mm in shell length.

RANGE

NE. N.S.W. (Dorrigo to the Border Ranges).

Family PUNCTIDAE

The three species occurring in the study area were assigned to the genera *Paralaoma* Iredale, 1913 and *Iotula* Iredale, 1941. However, without a revision of these groups, the assignment of specific names would be fruitless.

Paralaoma spp.

Two species appear to be present in the study area. One with an open umbilicus (Fig. 2d) and another with a narrow umbilicus.

REMARKS

Specimens of these small snails were collected from seven sites in the elevated areas of the central and southeastern parts of the region (Fig. 12d). The small size and cryptic habit of *Paralaoma* spp. made these snails difficult to find under field conditions. More detailed examination of litter samples may have shown a wider distribution pattern.

RANGE

The genus is widespread in Australia with species occuring in Tasmania, Victoria, South and Central Australia, Western Australia, New South Wales and southeast Queensland.

Iotula sp.

REMARKS

One specimen was collected at high elevation (1250 m) on the tableland proper, 14 km east of Guyra. Species referred to *Iotula* resemble *Paralaoma* but are smaller and have a more elevated spire.

RANGE

(Of the genus) NE. N.S.W., SE.Q.

Family CHAROPIDAE

Five species were distinguished in the collections. Two could be assigned to the species *Elsothera funerea* (Cox, 1868) and *Elsothera inusta* (Cox, 1868). These are shown in figures 2b and 2c respectively. The taxonomic status of the Charopidae did not allow for species designations of the other three which have been classed here as Charopid species 1, 2 and 3. (Fig. 2a = Charopid sp. 2).

REMARKS

Elsothera funerea was widely scattered over the region (Fig. 11h) while the records for *E. inusta* (Cox) were restricted to the high tablelands and the eastern areas (Fig. 11i). Distribution of the other three species encountered in the survey are shown in Figures 12a,b,c. Specimens were found under logs and stones and from litter in the field. More detailed sorting of litter would without doubt have resulted in the discovery of further species.

RANGE

The family is widespread in Australia. However, distribution limits of genera and species are poorly known. *E. funerea* and *E. inusta* are both found from central New South Wales to southern Queensland, but the exact limits of their distributions are still to be established.

Family SUCCINEIDAE

Both the succineid species taken during this survey (*A. nortoni* and *Arborcinea eucalypti*) have shell forms that closely resemble the dextral freshwater lymnacids — especially *Lymnaea tomentosa* ; that is, the final whorl is large and

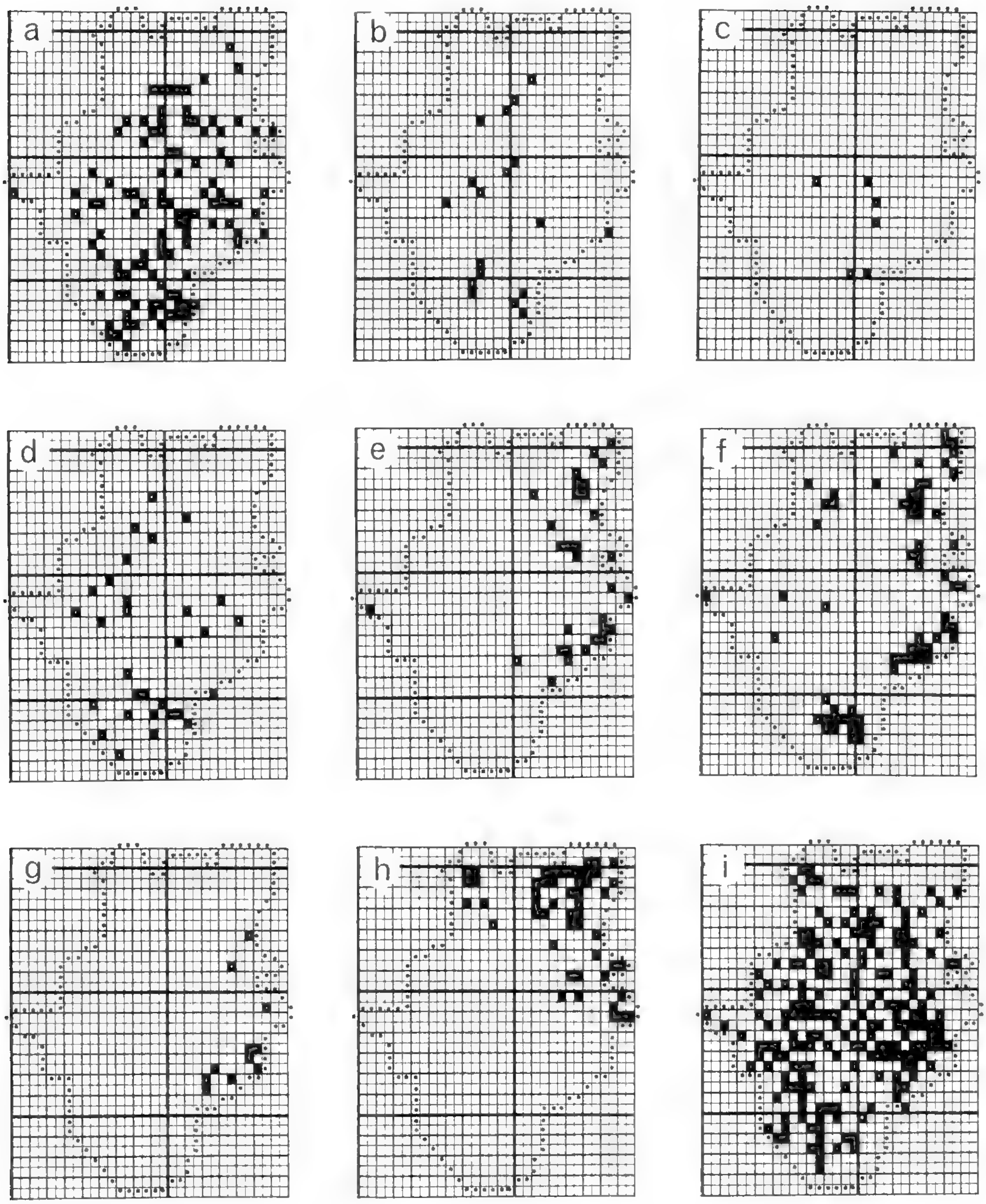

FIG. 10. Distributions of species across the New England region: **a** = *Deroceras reticulatum*, **b** = *Deroceras caruanae*, **c** = *Limax maximus*, **d** = *Lehmannia nyctelia*, **e** = *Triboniophorus graeffei*, **f** = *Austrochloritis* spp., **g** = *Thersites novaehollandiae*, **h** = *Meridolum gilberti*, **i** = *Galadistes liverpoolensis* .

deep (see Fig. 3b,c). Separation of succineids from the lymnaeids is outlined under *Lymnaea tomentosa* .

The assignment of the available material to the two species listed below is one of convenience and should not be regarded as definitive. The group is in need of revision, and is relatively poorly represented in existing museum collections.

Austrosuccinea nortoni (Cox, 1864)
(Fig. 3b)

REMARKS

Collections of *A. nortoni* showed a distribution centred around the tablelands area (Fig. 12e). *A. nortoni* was found under stones and logs. On two occasions, live specimens were taken from non-permanent swampy areas.

RANGE

Coastal and sub-coastal areas of New South Wales.

Arborcinea eucalypti (Cox, 1864)
(Fig. 3c)

REMARKS

Very few records (3 locations, all on the tablelands) were obtained for *A. eucalypti* during the survey. All specimens were collected from under bark on trees. However, systematic searching of trees was not part of the collecting strategy and, consequently, *A. eucalypti* may be more common than was found here.

RANGE

Coastal and sub-coastal area of New South Wales and southern Queensland

Family ATHORACOPHORIDAE

Triboniophorus graeffei Humbert, 1863
(Plate 2c)

REMARKS

T. graeffei was predominantly located in the east (Fig. 10e). The only far western record was in the Mt Kaputar area, a region that is higher and wetter than the surrounding countryside. The juveniles of this species differ from the brightly coloured adults. They are usually grey to cream with two dark longitudinal dorsal stripes. The slugs were generally collected under logs, often in cavities in the soil. Other common habitats were underneath tree bark, under fallen bark around the base of trees, and under artificial shelter (e.g. in refuse dumps) in wooded areas. During showery weather the slugs were often found crawling on the surface of rocks and logs. The species was almost invariably found away from domestic gardens and cleared areas with minor occurrence in partially cleared country. It was not unusual to collect four of five specimens from the one locality.

RANGE

Coastal and adjacent ranges from Wollongong, N.S.W. to Mossman, NE.Q.

Family CYSTOPELTIDAE

The relationships of this family to other groups of land snails is not known. One species was collected in the study area.

Cystopelta sp.
(Plate 2b)

REMARKS

Cystopelta sp. was collected at one site, at approximately 1200 m altitude in the eastern mountain range. The live specimen was 25 mm in length.

RANGE

Species of *Cystopelta* are known from Tasmania, southern Victoria and along the Great Dividing Range in N.S.W. The northward limit of the genus appears to be the Lamington region of the Border Ranges, south Queensland.

Family HELICARIONIDAE

The helicarionids collected during the survey are referred to three genera, *Helicarion* Ferussac, 1822; *Nitor* Gude, 1911; and *Sodaleta* Iredale, 1937. Two other genera, *Expocystis* Iredale, 1937 and *Melocystis* Iredale, 1937, although not encountered in the present survey, are known to occur in the region and are included in the key for completeness.

Helicarion spp.

Iredale (1937) assigned the helicarionids with vitriniform shells of eastern Australia to several genera — *Helicarion, Vercularion, Fastosarion* and *Parmacochlea* . Iredale (1941) added *Peloparion* and *Desidarion* and raised *Parmavitrina* (previously a sub genus of *Vercularion*) to generic rank. With the exception perhaps of *Parmacochlea* , any attempt to assign species to these groups on the basis of external characters alone, is a futile exercise. Future work on the group may establish sound anatomical criteria for generic separation. In the absence of such data, the authors have adopted a conservative approach and assigned species to the genus *Helicarion* , here used in a broad sense to include all species occurring on the east coast which possess a vitriniform shell with the exception of those species previously assigned to *Parmacochlea* .

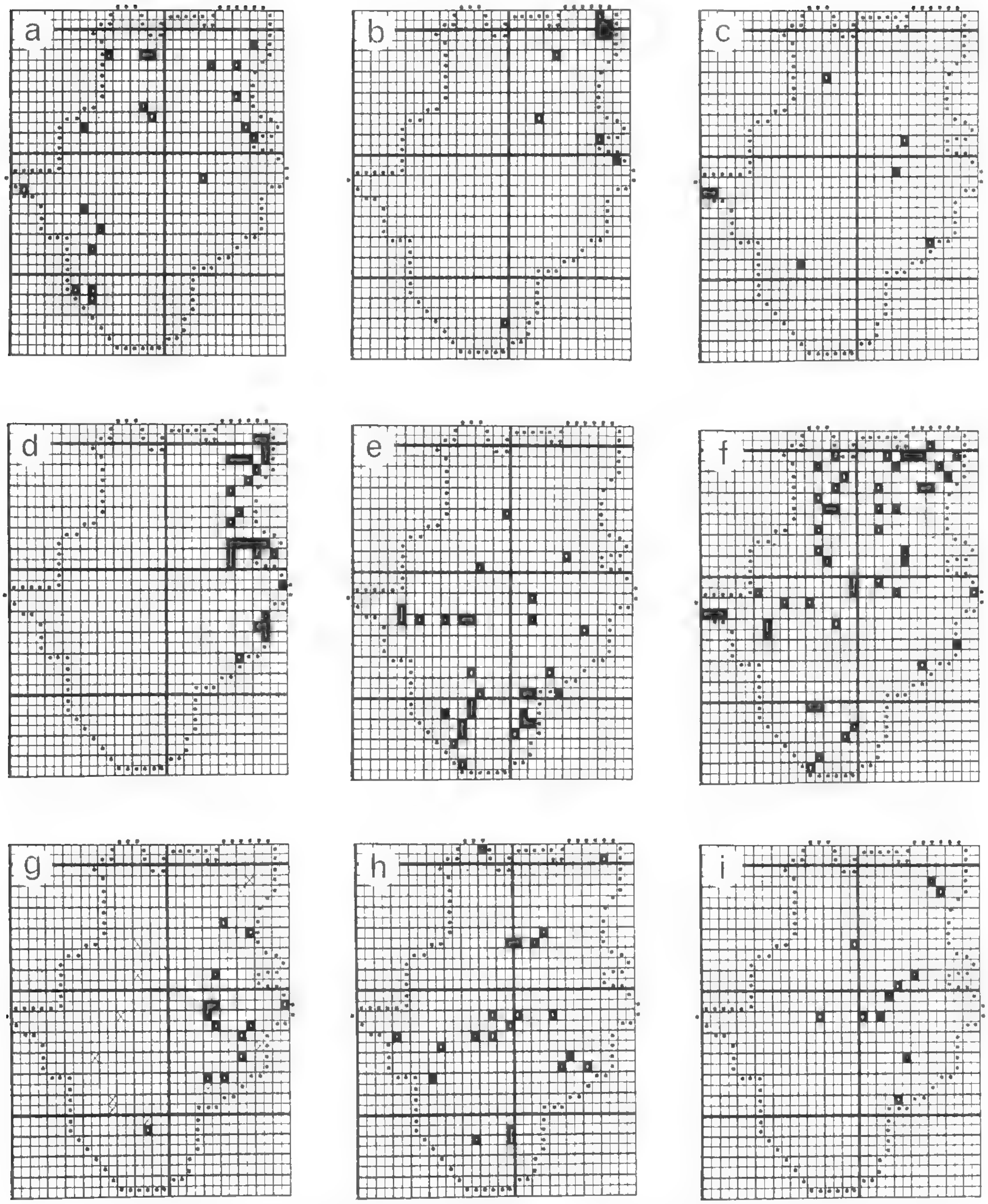

FIG. 11. Distributions of species across the New England region: **a** = *Neveritis aridorum*, **b** = *Ventopelita mansueta*, **c** = *Nitor medioximus*, **d** = *Helicarion* spp., **e** = *Helix aspersa*, **f** = *Strangesta capillacea*, **g** = *Saladelos urarensis* (and unidentified shell fragments x), **h** = *Elsothera funerea*, **i** = *Elsothera inusta* .

Several species were distinguished among the collected material. However, a large number of species are known to occur along the east coast of Australia and only a revision of the group will permit correct species identifications to be made.

REMARKS

The species had a pronounced easterly distribution in the higher, wetter areas of the New England region (Fig. 11d). Specimens were found under logs and a variety of debris, and were not common in areas cleared of trees. Numbers in the field varied from isolated specimens to 5–20 specimens under one log. A typical specimen is shown in Plate 2a.

RANGE

(Of the genus) East coast of Australia from Tasmania to Cape York (latter locality based on specimens in Queensland Museum).

Nitor medioximus Iredale, 1941
(Fig. 4a)

REMARKS

The few records from the survey were widely scattered over the region (Fig. 11c). Specimens were found in moist situations, under logs and rocks.

RANGE

New England Region and adjacent coastal areas, N.S.W.

' **Sodaleta** ' sp.

This genus is currently undergoing revision by one of the authors. The status of the genus is in some doubt and this reference should be regarded as tentative.

REMARKS

Specimens were collected at only two sites, one in an eastern mountainous area, the other on the tableland.

Family ZONITIDAE

Zonitoides arboreus (Say, 1816)
(Fig. 4b)

REMARKS

Specimens were collected from only four sites in the centre of the survey region. All collections were from under various forms of shelter in domestic gardens and yards. The distribution of *Z. arboreus* over the region was probably much wider as domestic gardens in all areas were not searched. The species was abundant where it occurred.

RANGE

N.S.W. (Sydney and New England area), QLD (Brisbane and Cairns area). Introduced.

Family MILACIDAE

Milax gagates (Draparnaud, 1801)

REMARKS

This slug was collected at only three sites, all sites being away from human habitation, on the tableland. *M. gagates* is a medium-sized slug, adults reaching about 50 mm in length. The body is darkly coloured and has a distinctive dorsal keel from the tail to the posterior edge of the mantle.

RANGE

N.S.W., VIC., TAS., S.A., SW.A. (Introduced).

Family LIMACIDAE

Van Regteren Altena and Smith (1975) revised the composition of the milacid and limacid fauna of Australia, and the treatment presented here, closely follows their presentation. Members of both families are introductions to Australia and the species are largely confined to suburban gardens and other areas modified by human settlement. Their distribution and abundance in the New England region is indicative of the disturbed nature of the area.

Limax maximus Linnaeus, 1758.
(Plate 1a)

REMARKS

Occurrences in the New England region are shown in Figure 10c. *L. maximus* was found in thick vegetation and under logs. Specimens were taken in both domestic gardens and in cleared areas. They were not found in uncleared areas. Usually, only a single specimen was found at the one collecting site.

RANGE

N.S.W., VIC., TAS., S.A. (Introduced).

Lehmannia (Lehmannia) nyctelia (Bourguignat, 1861)
(Plate 1b)

REMARKS

L. nyctelia had a scattered distribution over the New England region (Fig. 10d). Specimens were collected from under timber and rocks. It was common in gardens and in the open; it was found only in cleared areas. Generally it was in small aggregations, single specimens being collected on rare occasions.

RANGE

SE.Q, N.S.W., VIC., TAS., S.A., W.A. (Introduced).

Lehmannia (Limacus) flava (Linnaeus, 1758)

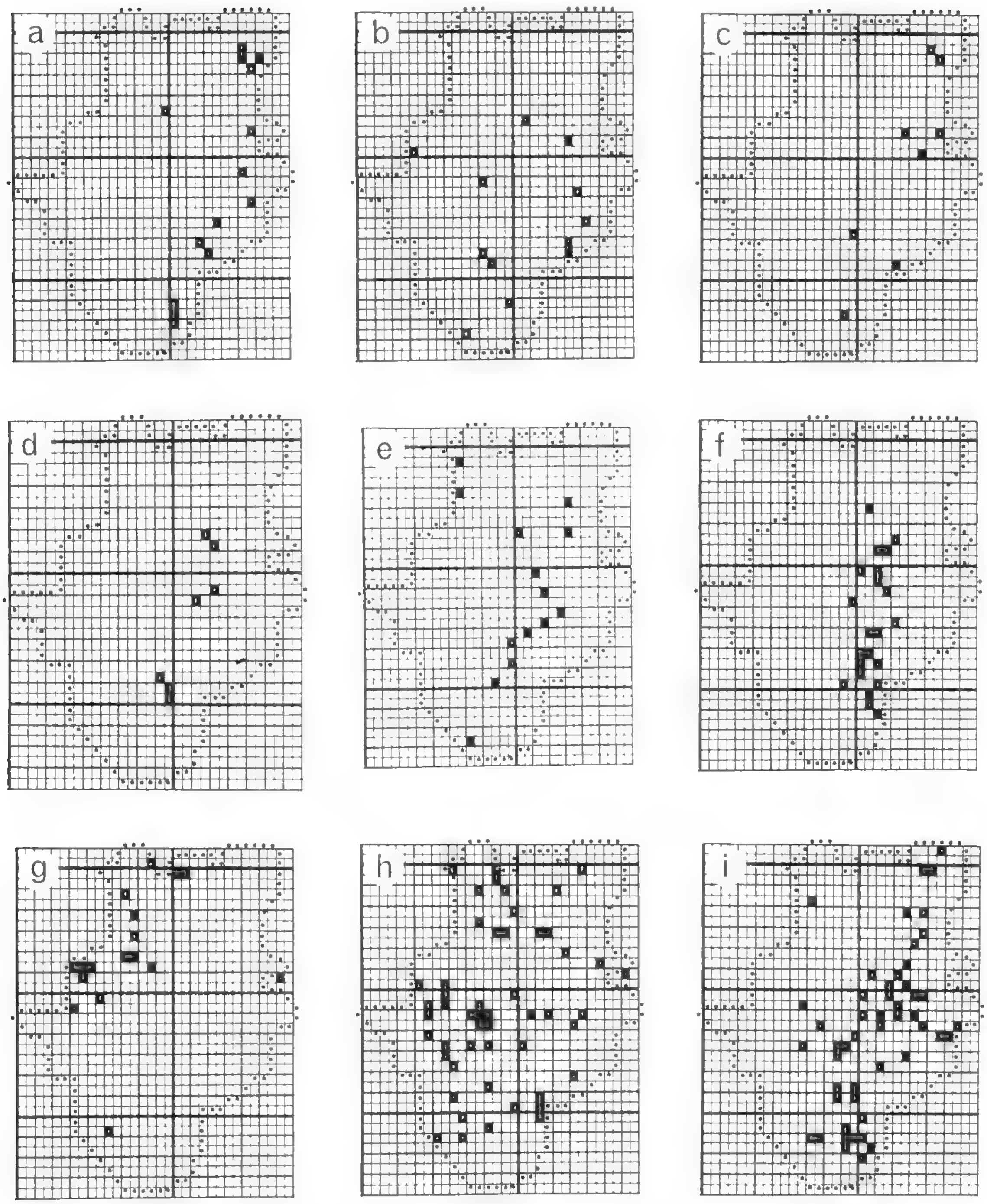

FIG. 12. Distributions of species across the New England region: **a** = Charopid sp. 1, **b** = Charopid sp.2, **c** = Charopid sp.3, **d** = *Paralaoma* spp., **e** = *Austrosuccinea nortoni*, **f** = *Gabbia australis*, **g** = *Plotiopsis balonnensis*, **h** = *Lymnaea lessoni*, **i** = *Lymnaea tomentosa* .

REMARKS

L. flava was collected only once, in a domestic garden in Armidale. Normally a large species (up to 100 mm long), the specimen collected in Armidale was only 30 mm in length.

RANGE

SE.Q. N.S.W., VIC., TAS., S.A., SW.A., (Introduced).

Deroceras Rafinesque, 1820

Van Regteren Altena and Smith (1975) suggest that two species of this genus (*D. laeve* and *D. agreste*) have been misidentified and probably have not been introduced into the Australian fauna. Two forms of *Deroceras* were collected during the New England survey and, from external characters, they match descriptions of *D. reticulatum* and *D. caruanae* (see Key). The wide range in colouration and reticulated patterning gives rise to the possibility of a third species in this group, possibly *D. agreste* . However, extensive comparisons of internal features would be required to positively assert the presence of another species.

Deroceras reticulatum (Muller, 1774)
(Plate 1c)

REMARKS

D. reticulatum was found to be very common across the New England region (Fig. 10a). *D. reticulatum* was virtually restricted to areas of human activity. It was very common in domestic gardens, occasionally being found in very large concentrations. In the open, it was common in sheltered habitats such as the underside of logs, in lush grass, and in grazed, cleared and burnt-out areas. It was rare in uncleared areas.

RANGE

N.S.W., VIC., TAS., S.A., and SW.A. (Introduced).

Deroceras caruanae (Pollonera, 1891)

REMARKS

D. caruanae was less common than *D. reticulatum* in the collections although the locations for *D. caruanae* were widespread (Fig. 10b). Typical of an introduced slug, the species again showed a distributional dependence on man's activities. It was most common in gardens and, in open habitats, it was largely restricted to areas of intense grazing and clearing. Under rocks near creek beds was the most favoured habitat away from domestic areas.

RANGE

SE.Q. N.S.W., VIC., TAS., S.A., SW.A. (Introduced).

Family CAMAENIDAE

Austrochloritis spp.

Among the many specimens of camaenids which were collected during the survey, were several belonging to the genus *Austrochloritis* Pilsbry, 1891. Species presently assigned to this genus are characterised by possessing a periostracum which is modified to produce hair-like bristles over the shell surface. In the past, they have been separated largely on the basis of bristle length and bristle spacing. Using the same criteria it was possible to distinguish several different 'types' among the material available for study. However, whether these forms represent different species or whether they are variations of one of several species, remains a matter for future investigation. Fig. 6a illustrates the shell form of the group.

REMARKS

The distribution of specimens in the collecting region was two-part with main occurrence in the wetter and higher eastern region and some additional records in the drier north and west (Fig. 10f). Specimens were usually found under logs and stones and were rare in areas cleared by man. They were not found in large numbers, usually only one or two per collecting site.

RANGE

(Of the genus): Coastal regions and adjacent ranges of eastern Australia, from Victoria to Cape York.

Thersites novaehollandiae (Gray, 1834)
(Fig. 5a)

REMARKS

All specimens were found in the eastern high country (Fig. 10g). Nearly all were collected from under logs in forested areas and the species was rare in areas affected by man's activities.

RANGE

NE. N.S.W..

Meridolum gilberti (Pfeiffer, 1846)
(Fig. 6b)

REMARKS

The distribution of *M. gilberti* showed a restriction to the far north and northeast (Fig. 10h). Specimens of *M. gilberti* were almost invariably found on soil surface under logs, which had ample cavity space underneath, particularly in the wetter areas. It was common in partly cleared areas, that is, where timbered areas were in close proximity to a clearing.

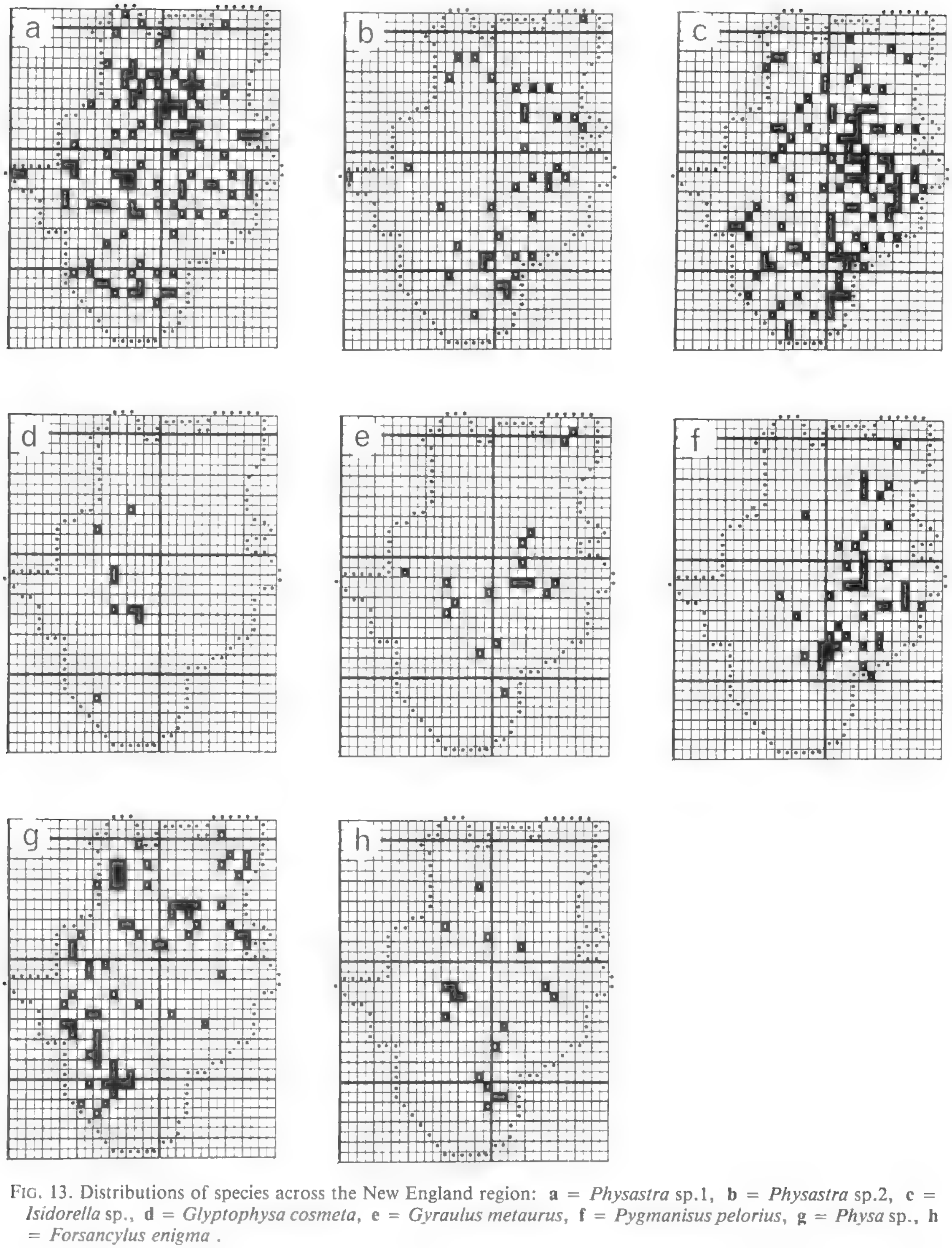

FIG. 13. Distributions of species across the New England region: **a** = *Physastra* sp.1, **b** = *Physastra* sp.2, **c** = *Isidorella* sp., **d** = *Glyptophysa cosmeta*, **e** = *Gyraulus metaurus*, **f** = *Pygmanisus pelorius*, **g** = *Physa* sp., **h** = *Forsancylus enigma* .

RANGE

NE. N.S.W., SE.Q.

Galadistes liverpoolensis (Brazier, 1872)
(Fig. 6c)

REMARKS

G. liverpoolensis was widely distributed throughout the collecting region (Fig. 10i). Specimens of *G. liverpoolensis* were typically found under logs. However, unlike *M. gilberti*, *G. liverpoolensis* often burrowed into the soil beneath the log. Specimens were less common in areas cleared by man and, in particular, were rare in areas of heavy grazing.

RANGE

NE. N.S.W. (Subcoastally).

Neveritis aridorum (Cox, 1866)

REMARKS

N. aridorum was found in the north and in the southwest (Fig. 11a). Like *G. liverpoolensis*, *N. aridorum* occurred under logs where some were found burrowed into the soil.

RANGE

NE. N.S.W..

Ventopelita mansueta (Reeve, 1854)
(Fig. 5b)

REMARKS

V. mansueta was recorded primarily from only a few sites in the northeastern parts of the collecting region (Fig. 11b). Specimens were collected from under logs and rocks in moist situations.

RANGE

NE. N.S.W., SE.Q.

Sphaerospira fraseri (Griffith and Pidgeon, 1833)
(Plate 2e)

REMARKS

S. fraseri was collected from only one site, a forested mountainous area in the east. The shell of *S. fraseri* reaches up to 60 mm in height.

RANGE

NE. N.S.W., SE.Q.

Family HELICIDAE

Helix (Cryptomphalus) aspersa (Muller, 1774)
(Plate 2g)

REMARKS

H. aspersa was found to be widespread over the region (Fig. 11e). *H. aspersa* was prevalent in domestic gardens in centres of human population. The apparent dependence on man's activities for the presence of the species was very marked. The snail uses any available shelter in gardens and surroundings. Outside domestic gardens, the species was found only in some isolated areas that had been cleared and where human and grazing activity was high.

RANGE

Widespread in major suburban areas of Australia. (Introduced).

FRESHWATER SPECIES

Family BITHYNIIDAE

Gabbia australis Tryon, 1865
(Fig. 7b)

REMARKS

G. australis was found to have an unusually compressed distribution in the survey region (Fig. 12f), being located in the mid-tablelands and lower highlands in a north - south pattern. *G. australis* was commonly found on weeds in shallow swamps and was not common in flowing water. It occasionally inhabited artificial dams. *G. australis* often had very large population sizes, single sweeps of a dip net catching up to several hundred specimens.

RANGE

N.S.W., VIC.

Family THIARIDAE

Plotiopsis balonnensis (Conrad, 1850)
(Fig. 7a)

REMARKS

Records for *P. balonnensis* in the survey region were concentrated in the western areas with one record in the east (Fig. 12g). *P. balonnensis* was collected from weed beds of permanent water bodies. Its abundance varied from plentiful (Mole River in the northwest) to an isolated specimen at other sites.

RANGE

Inland and coastal drainage systems of eastern Australia.

Family LYMNAEIDAE

Lymnaea lessoni (Deshayes, 1830)
(Fig. 7d)

REMARKS

L. lessoni was found widely distributed throughout the survey region (Fig. 12h). The species showed a strong preference for stagnant water. It was occasionally found, sparse in number, in weed beds along the margins of flowing streams. It was abundant in stagnant water bodies with floating vegetation and was often collected from the surface of the water, the animal being supported by the surface tension.

RANGE

Many Australian drainage systems.

Lymnaea tomentosa (Pfeiffer, 1855)
(Fig. 7c)

REMARKS

L. tomentosa was found to be concentrated in the tableland and eastern areas of the survey region. It was sparse in the drier, western areas (Fig. 12i). *L. tomentosa* typically occurred in springs and seepage areas, being present both in and out of the water. Specimens were also taken from very temporary ponds, generally in grassy situations. Man-made dams rarely contained *L. tomentosa* . In its preferred habitat of spring/shallow marsh areas, the species was found with densities of 150–200 per 0.1 m2. Habitat records for *Lymnaea tomentosa* during the survey were in agreement with habitat descriptions by Boray (1964, 1969).

RANGE

Eastern Australia from Tasmania to Queensland.

ECONOMIC IMPORTANCE AND IDENTIFICATION

L. tomentosa acts as an intermediate host for *Fasciola hepatica* the fluke parasite of cattle and sheep. It is the only snail in the New England area that is known to act as a host for the liver fluke. Another lymnaeid snail present in Australia, *Lymnaea columella*, also acts as a host for this parasite. However, *L. columella*, is presently confined to metropolitan areas in Australia where its presence has probably resulted from material imported with aquatic pets (Ponder 1975).

Because of its role in the transmission of *Fasciola hepatica* , a ready means of identifying *L. tomentosa* and thereby distinguishing it from other dextrally shelled snails is important.

L. tomentosa is a small snail with an ovate shell. The spire merges gradually into the body whorl without the abruptness shown by *L. lessoni. L. lessoni* in the adult form is larger; in the New England area, specimens often measured 20 mm in length as against 12 mm for large *L. tomentosa* . At this size *L. tomentosa* is readily distinguished from *L. lessoni* particularly because of the greatly inflated body whorl of the shell in *L. lessoni* . However, at smaller sizes, distinction by external characters is less clear. Hubendick (1951) and Boray (1969) have given more detailed accounts of how *L. tomentosa* may be distinguished from *L. lessoni* .

Overall shell shape readily separates *L. tomentosa* from the similarly sized *Gabbia australis. G. australis* has strongly convex shell whorls whereas *L. tomentosa* does not. In addition *G. australis* has an operculum and the shell is much more solid than is the case with the fragile shell of *L. tomentosa* .

Members of the succineid genus, *Austrosuccinea* , which sometimes occur in swampy habitats, may be distinguished from *L. tomentosa* by the lack of the columellar fold or twist which is present in lymnaeids. Also, for live specimens, succineid snails have rod-shaped tentacles, whereas *L. tomentosa* has triangular, flat tentacles.

Family PLANORBIDAE

The Australian planorbids are very poorly known. Although a number of generic and specific taxa have been put forward by previous workers the correct allocation of the Australian species will require a revision of the group, not only at the Australian level but also of related forms elsewhere. Thus while Iredale (1943, 1944) proposed several generic taxa for the planorbids, the present study adopts a more conservative approach and allocates the species encountered in the present survey, to fewer, more generalised groups.

Some members of the group are presently undergoing taxonomic revision by J. Walker (University of Sydney) who has provided shell and foot characters to separate the genera *Physastra, Isidorella* and *Glyptophysa* . The two other genera applicable to the New England planorbid species are *Gyraulus* (see Brown 1981) and *Pygmanisus* .

Physastra spp.

REMARKS

Based on shell shape two species of *Physastra* were considered to be present in the survey material. *Physastra* sp. 1, characterised by a relatively low spire (Fig. 9c), was widely distributed throughout the region (Fig. 13a). *Physastra* sp. 2, with a distinctly pointed apex (Fig. 9d), was more predominant on the tablelands and in the east (Fig. 13b). Both species were commonly found in flowing streams and creeks but were rare in dams.

RANGE

(Of the genus). Many Australian drainage systems.

Isidorella sp.
(Fig. 9b)

REMARKS

This species was widespread over the survey region (Fig. 13c). Unlike *Physastra* spp., *Isidorella* sp. was commonly found in dams, overflow ponds and temporary rain ponds. It was rare in flowing water.

RANGE

(Of the genus) Many Australian drainage systems.

Glyptophysa cosmeta (Iredale, 1943)
(Fig. 9a)

REMARKS

This species was only found in the western parts of the survey region (Fig. 13d). Habitats included both flowing streams and temporary ponds.

RANGE

VIC., N.S.W..

Gyraulus metaurus (Iredale, 1943)
(Fig. 8a)

REMARKS

Distribution of *G. metaurus* was predominantly in the middle and southern parts of the survey region (Fig. 13e).

RANGE

NE. N.S.W.

Pygmanisus pelorius Iredale, 1943
(Fig. 8b)

REMARKS

P. pelorius was predominantly found on the tablelands with occurrences becoming fewer in the drier, western areas (Fig. 13f). As a rule, specimens were taken from thick weed in shallow water around the margins of a larger body of water. It was also found in temporary, well-grassed seepage ponds that were also preferred habitats of *Lymnaea tomentosa* . It was often extremely abundant in some weed beds, over two hundred being caught in a few dip-net sweeps at one site.

RANGE

NE. N.S.W.

Family PHYSIDAE

This largely northern hemisphere group of sinistral freshwater snails has been recorded from several localities in Australia. It is generally considered that these occurrences are introductions. Smith and Kershaw (1979, p. 90) tentatively refer the southeast Australian specimens to *Physa acuta* Draparnaud, 1805, a European species. However, a more conservative approach is adopted in this study.

Species of this family are very difficult to separate from some members of the family Planorbidae on shell characters. Reference must be made to the animal features which are presented in the key.

Physa sp.
(Fig. 9e)

REMARKS

The species was common in both the western and north-eastern parts of the survey region (Fig. 13g). Although it was found in most habitats some preference was shown for overflow ponds of streams. When taken from strongly flowing water, it was often found on tree roots at the edge of the stream.

RANGE

(Of the genus) N.S.W., Central Victoria and South Australia (near Adelaide). Introduced.

Family ANCYLIDAE

Forsancylus enigma Iredale, 1944

REMARKS

F. enigma was widely spread over the tableland area of the survey region (Fig. 13h). Its small size and near-transparency made detection difficult during collection and it may be more abundant than the records indicate. *F. enigma* was found in streams attached to various types of vegetation.

RANGE

NE. N.S.W.

DISCUSSION

The New England Region, as defined in this survey, encompasses a wide variety of terrestrial habitat types. In the east, small pockets of sub-tropical rainforest interdigitate with bands of temperate rainforest, amidst a broad expanse of open sclerophyll forest. In the west there are large tracts of woodland and unforested areas. Human disturbance of the environment, mainly in the form of land clearing for pasture and cultivation, has affected much of the area with the exception of the more heavily timbered eastern fringe. This disturbance reaches a climax in a number of densely populated commercial centres which are scattered throughout the region.

The aquatic habitats comprise the many rivers, streams and seepages which form six drainages to the west and a smaller area of four drainages to the east (see Fig. 3 in Heatwole and Simpson 1985). In addition there are many temporary ponds and dams associated with cultivation and grazing.

The historical perspective of the area is one of a long and complex series of changes (climatic, vegetational and physiographic) contrasting with the recent but effective influence of man. The gastropod snails (terrestrial and freshwater) are a mixture of introduced and endemic forms, with distribution patterns that reflect this caricature of the New England region.

The relatively large number of introduced species found in the area is a direct result of a high level of human activity more usually associated with major coastal urban areas such as Sydney, Wollongong and Newcastle. A brief review of the history of the region shows that this activity has had long and decisive effects on the habitats of the region. The influence of European man dates from 1832 and by the late 1830's most of the area had been visited by drovers. Settlement began around 1840 with migration being from the Sydney area via the Newcastle and Upper Hunter River region. Although the area (with the exception of the eastern edge) was never known to be thickly wooded, land clearing began in the 1840's. Swamps, once widespread over the area, were drained as cultivation and grazing became more established.

The survey results show that the endemic terrestrial species are largely confined to the more heavily timbered eastern regions, in contrast to the introduced species e.g. *Helix aspersa* and *Deroceras reticulatum* which are scattered over the region but almost strictly confined to domestic gardens and cleared areas. In general, the endemic terrestrial snails of eastern Australia show a preference for moist forests. It is not surprising therefore that rainforest species such as *Helicarion* spp., *Saladelos urarensis, Thersites novaehollandiae* and *Triboniophorus graeffei* are found in the east where the pockets of temperate and sub-tropical rainforest occur.

Of the endemic species, only *Galadistes liverpoolensis* and *Strangesta capillacea* are widely and abundantly distributed over the region. Little is known about *G. liverpoolensis* . However, conchologically it does appear closely related to the *Meridolum* group which tends to be confined to the wetter coastal and sub-coastal areas from southeast Queensland to Victoria. The contrasting distributions of *G. liverpoolensis* and *Meridolum gilberti* (northeast corner of the study area) may indicate a basic ecological difference between the two groups.

The wide distribution of *S. capillacea* is further evidence of the adaptability of this species in the face of habitat disturbance. It is one of very few endemic species which survives in the domestic gardens of Sydney. Although the reasons for its success in such circumstances are not fully known, its carnivorous feeding habits may offer a clue. Whereas other endemic species are detrital feeders and thus rely on the presence of decaying vegetation for their survival, *S. capillacea* would depend more on the presence of other invertebrates. While forest clearing adversely effects the former, it does not necessarily effect the level of invertebrate prey available to *S. capillacea* . In fact, *S. capillacea* is known to prey on the introduced snail, *Helix aspersa* (Simpson 1976).

The introduced terrestrial species, although scattered throughout the region, are largely restricted to domestic gardens and cleared areas. The fact that the introduced slugs, which are not adapted for surviving in dry habitats, are able to persist in the drier western areas, indicates the presence of moist micro-habitats created by domestic activity. The relative scarcity of introduced forms in the forested eastern fringe indicates either an inability to cope with Australia's native vegetation, or the significance of man as a vector for their dispersal.

Thus while disturbances of the environment have had their effects on the distribution and composition of the terrestrial gastropods of the New England region, the results of this survey stress the importance of maintaining the timbered areas of the eastern fringe. On the one hand they form a refuge zone for the majority of the endemic species, and on the other, they show an absence of the introduced elements common elsewhere in the region.

The freshwater gastropods of the region present a slightly different picture. Their distributions are dependent on the availability of suitable aquatic habitats. In this respect man's effect of draining natural swamps has been compensated by the construction of many temporary ponds and dams. The survey results show that a number of species, e.g. *Gabbia australis, Isidorella* sp., and *Glyptophysa cosmeta*, are quite successful in these artificial habitats. Only one aquatic introduction, *Physa* sp., is known to occur in the region.

The freshwater snails *Lymnaea tomentosa* and *Pygmanisus pelorius* are particularly important as they act as intermediate hosts for two live-stock parasties — liver fluke and stomach fluke respectively. In the New England region, stomach fluke is far less serious than liver fluke. In terms of farm management, the survey confirmed the importance of swampy areas as a habitat for these two species; hence, such areas harbour the prime source of parasite infection for cattle and sheep.

During collecting of snails in the New England region, discussion with farmers established that identification of 'fluke-carrying' snails was not clear. Publications by the New South Wales Department of Agriculture, aimed at farmers, have given descriptions of the fluke snail (Dent 1968, 1974). More recently, Campbell (1977) has elaborated on this, outlining distinguishing features between *Lymnaea tomentosa* and other snails.

Both *L. tomentosa* and *P. pelorius* were more common in the wetter areas of the survey region. However, their distribution and abundance would be highly dependent on seasonal climatic conditions, considering the ephemeral nature of a number of their habitats.

In general, the freshwater species do not indicate restriction in distribution to particular drainage systems, relying primarily on the presence of suitable habitats.

The distribution patterns of some of the endemic terrestrial species can be readily aligned with diferences in altitude, temperature, and rainfall — which generally occur along an east-west gradient. Differences in other possible influences on the distribution of terrestrial gastropods (e.g. land use and geology) are more scattered across the region. (See figures for all the above environmental sub-divisions in Heatwole and Simpson 1986). The distribution patterns obtained from this survey provide a framework within which future studies on causal mechanisms of distribution and abundance of particular taxa can be made.

Many promising lines of enquiry have resulted from this survey. (a) What are the reasons for the ecological separation between *Galadistes liverpoolensis* and *Meridolum gilberti*, and within the genus *Austrochloritis* and the species *Plotiopsis balonnensis* ? (b) The climatically similar yet isolated areas around Mt Kaputar and the eastern edge of the tablelands provide an ideal field situation for the investigation of features such as adaptation and speciation in the fauna of the two areas. (c) What features of the biology and ecology of *Physastra* and *Isidorella*, both widespread genera, are suited to their marked

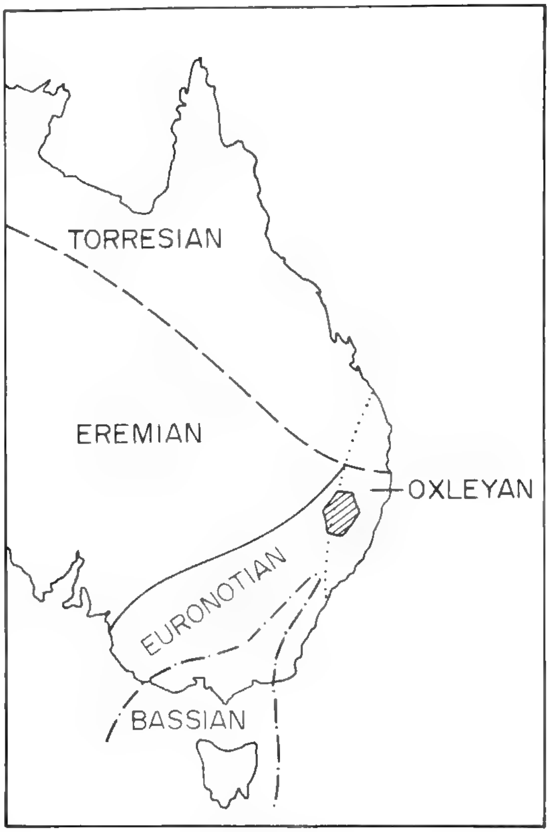

FIG. 14. The New England region (cross-hatching) in relation to the biogeographical divisions for the molluscan fauna of eastern Australia. (These divisions are modifications of those presented by Iredale 1937, 1940 and McMichael and Iredale 1959).

differences in habitat preferences (streams and gullies versus temporary ponds and stock dams, respectively)? (d) Does *Strangesta capillacea* exclusively feed on other molluscs, as indicated from the prey observed during this survey? (e) *Gabbia australis* and *Lymnaea tomentosa* both occupied swamp and spring areas, yet extensive populations of the two were not found together. Is there a marked sub-division within this aquatic habitat separating these species or is there some form of competitive reaction between them? (f) The virtual restriction of all introduced terrestrial species to areas under man's influence suggests some strong, common causal mechanism — is it the available food or the refuge areas provided by man?

The limited geographic extent of the area of this survey does not allow any biogeographical analyses to be made. However, an interesting feature of the New England region is that it is situated at the convergence of several biogeographical divisions which have been previously drawn up for the Australian molluscan fauna (Fig. 14). This is a reflection of the ecologically diverse nature of the region.

GLOSSARY OF TERMS

Aperture – The opening in a gastropod shell.
Body Whorl – Last and usually largest coil of shell.
Columella – The column around which the shell whorls are built. Seen externally as the inner edge of the shell aperture.
Conical – Cone-shaped.
Cord – Coarse rounded linear sculpture on shell surface.
Dextral – (Of coiling) right-handed.
Discoid – Disc-shaped
Globose – Spherical or globular in shape.
Imperforate – Lacking an umbilical opening.
Keel – Longitudinal ridge.
Mantle – Membranaceous covering of a mollusc.
Operculum – Horny or calcareous plate which closes the aperture when the animal retracts into the shell.
Periostracum – Thin outer covering of the shell.
Protoconch – The embryonic shell, present at the apex. Usually different in sculpture to adult shell.
Pseudobranch – A secondary gill.
Pustule – Low, small, raised knob of sculpture.
Radial – Parallel to the axis of the shell, running across the direction of the whorls.
Rib – Well defined sculptural ridge.
Shell Lobe – Extension of mantle, sometimes covering shell surface.
Sinistral – (Of coiling) left-handed.
Spiral – In the direction of shell coiling.
Spire – Whorls of a shell excluding the last or body whorl.
Striae – Fine scatched or incised lines on the surface of the shell.
Suture – The line of junction between two whorls.
Turbinate – Top-shaped, but with rounded sides.
Umbilicate – Having an umbilicus.
Umbilicus – An indentation or cavity at the base of the shell.

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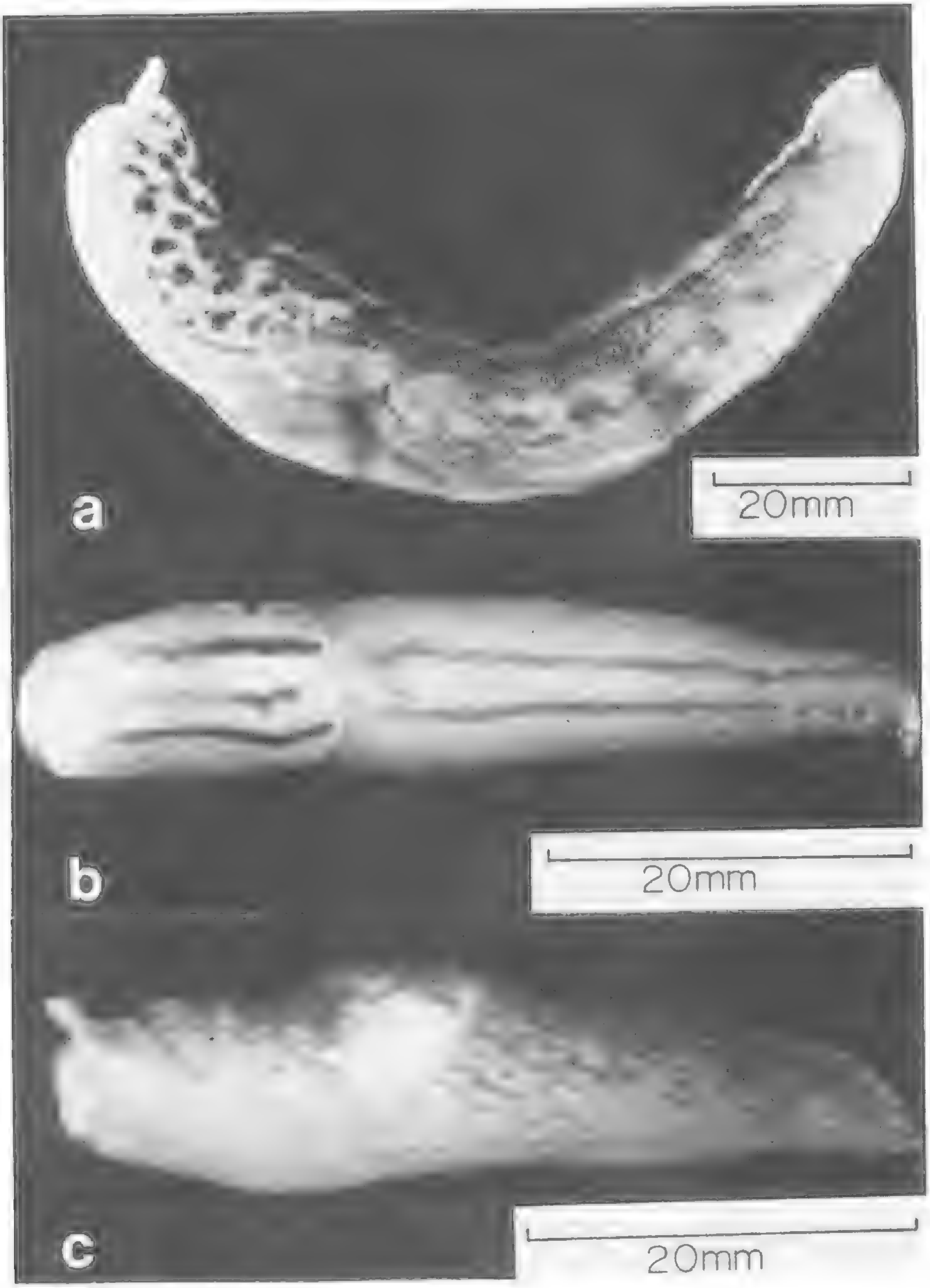
PLATE 1.

a = *Limax maximus*, **b** = *Lehmannia nyctelia*, **c** = *Deroceras reticulatum*.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b
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c
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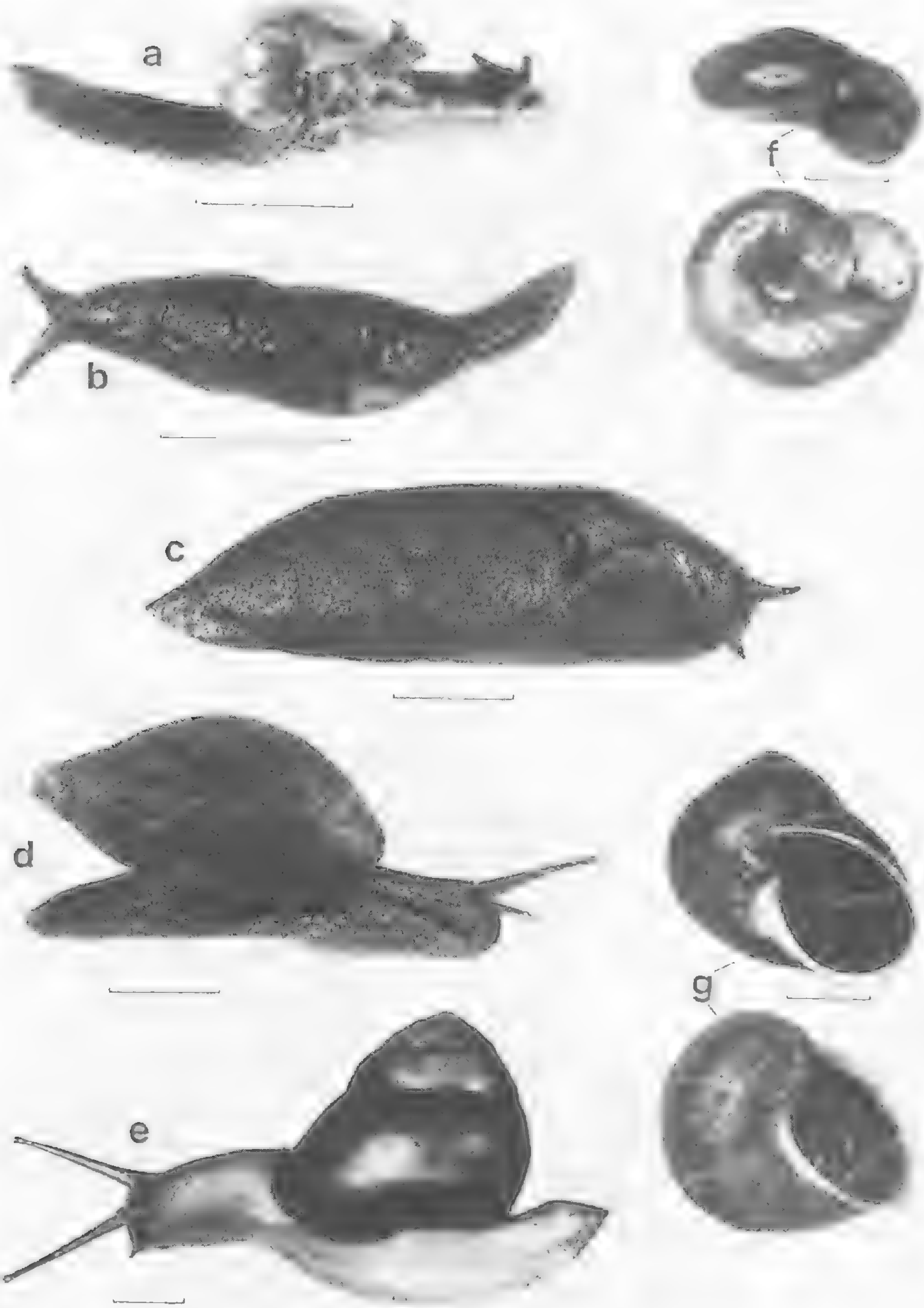
PLATE 2.

a = *Helicarion* sp., **b** = *Cystopelta* sp., **c** = *Triboniophorus graeffei*, **d** = *Brazieresta larreyi*, **e** = *Sphaerospira fraseri*, **f** = *Strangesta capillacea*, **g** = *Helix aspersa* . (Scale lines = 10 mm).


a
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TYPE, FIGURED AND MENTIONED FOSSIL PLANTS IN THE QUEENSLAND MUSEUM

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The Queensland Museum holds a small collection of plant megafossils. No palynological material is held in our collections. Most of the material referred to in this list was studied by Walkom (1924) in a paper on the Middle Triassic Esk flora. In total, seven new species of fossil plants have been described from the Museum's collections since 1911.

The material is catalogued taxonomically and the classification generally follows that of Scagel et al. (1965) and Pant (1957). Reference is made to specimens from the Museum's collection and only literature pertaining directly to those specimens is included in this list. While a comprehensive treatment of the literature concerning the Museum's material is intended, it is anticipated that there will be omissions. The author has generally avoided commenting about the taxonomic status of specimens unless it seemed expedient to do so.

Information for each specimen includes the Queensland Museum registration number, a list of chronologically arranged references, locality, and data on the age and formation from which the specimen was collected. The dating of formations follows that of Day et al. (1983). An alphabetically arranged index of taxonomic names allows reference to the specimens in this paper.

The types are treated in the same way as the other material. Nearly all specimens were labelled as types, the one exception being the partial counterparts of *Nilssonia superba* Walkom, 1924, that had been misplaced in the general collection. The holotype of *Chiropteris cuneata* (Carruthers) Seward 1903 was erroneously recorded as being in the Queensland Museum Collection (Tenison-Woods 1883; Feistmantel 1890). The specimen to which Tenison-Woods was probably referring has been included for the sake of completeness but the holotype is in the British Museum.

Division ARTHROPHYTA
Order EQUISETALES

Lelstotheca sp.

Reg. No.: F985.

Annularia stellata (Schloth.), in Walkom, 1916. pp. 233-4, pl. 25.

Loc.: 8 miles from Dunedoo, N.S.W.

Fm.: ? Age: Permian.

Remarks: Walkom (1938) compared this specimen to *Phyllotheca robusta* Feistmantel, 1880. *Phyllotheca robusta* Feistmantel 1880 was combined in *Stellotheca robusta* by Surange and Prakash (1962). The name *Stellotheca* was found to be illegimate under articles 64, 73 and 75 of the International Code of Botanical Nomenclature, and Maheshwari (1972) proposed the new genus *Lelstotheca* to accommodate plants previously referred to *Stellotheca* . Surange and Prakash (1962) and Maheshwari (1974) have both commented on the similarity of F985 to *Stellotheca* and *Lelstotheca* respectively.

The specimen figured by Walkom (1916) is similar to *Lelstotheca robusta* but differs in possessing a greater number of leaflets (18-20) per whorl. F985 is assigned to *Lelstotheca* sp. until a detailed study of the plant can be made.

Neocalamites carrerei (Zeiller) Halle, 1908

Reg. No.: F1487.

Schizoneura sp.a Seward, in Walkom, 1924. pp. 80-1.

Schizoneura sp.a Seward, in Jones and de Jersey, 1947. p. 10.

Neocalamites carrerei (Zeiller) Halle, 1908, in Rigby, 1977. p. 320, 322.

Loc.: Near Portion 42, Wivenhoe Parish, Bellevue Station, near Esk. SE.Q.

Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F1533.
Schizoneura sp. Seward, 1908, in Hill *et al.*, 1965. Pl. Tl, 4.
Loc.: Portion 39, Wivenhoe Parish, Bellevue Station near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.
Remarks: F1533 is assignable to *Neocalamites carrerei* (Zeiller) Halle, 1908.

Reg. No.: F1535.
Schizoneura sp.a Seward, in Walkom, 1924. pp. 80–1, pl. 16, fig. 2.
Schizoneura sp.a Seward, in Jones and de Jersey, 1947. p. 10.
Neocalamites carrerei (Zeiller) Halle, 1908, in Rigby 1977. pp. 320, 322.
Loc.: Portion 39, otherwise as for F1487.
Fm.: Esk Fm. Age: Middle Triassic.
Remarks: Erroneously labelled F1533 in Walkom (1924).

Reg. No.: F1554.
Schizoneura sp.a Seward, in Walkom, 1924. pp. 80–1, pl. 16, fig. 1.
Schizoneura sp.a Seward, in Jones and de Jersey 1947. p. 10.
Neocalamites carrerei (Zeiller) Halle, 1908, in Rigby, 1977. pp. 320, 322.
Loc.: Portion 42 otherwise as for F1487.
Fm.: Esk Fm. Age: Middle Triassic.

Neocalamites sp. cf. *N. carrerei* (Zeiller) Halle, 1908.

Reg. No.: F2505.
Neocalamites cf. *carrerei* (Zeiller) Halle, in Hill *et al.*, 1965. pl. Tl, 3.
Loc.: Denmark Hill, Ipswich, SE.Q.
Fm.: Ipswich Coal Measures. Age: Early late Triassic (Carnian).

Neocalamites hoerensis (Schimper) Halle, 1908.

Reg. No.: F1485 a/b.
Neocalamites hoerensis (Schimper) in Walkom, 1924. p. 79, pl. 15, fig. 1.
Neocalamites hoerensis (Schimper) Halle, in Harris, 1931. pp. 22–5.
Neocalamites hoerensis (Schimper) Halle, 1908, in Rigby, 1977. p. 320.
Loc.: Portion 32, Northbrook Parish, Bellevue Station, Near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Phyllotheca sp.

Reg. No.: F1539 a/b/c.
Schizoneura cf. *africana* Feistm., in Walkom, 1924. pp. 79–80 text fig. 1.
Phyllotheca sp., in Rigby, 1977. p. 320, 322.
Loc.: Portion 42, Wivenhoe Parish, Bellevue Station, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Division LYCOPHYTA
Order PLEUROMEIALES

pleuromeiid rhizophore

Reg. No.: F12324.
pleuromeiid rhizophore in Turner, 1984. pp. 90–3, pl. 1. Loc.: The Crater, Rewan Station, 72 kms south of Rolleston, SE.Q.
Fm.: Arcadia Fm., Rewan Group. Age: Early Triassic.

Division PTEROPHYTA
Order MARATTIALES
Family MARATTIACEAE

Asterotheca hillae (Walkom) Herbst, 1977.

Reg. No.: F1566.
Asterotheca hillae (Walkom) Herbst, 1977. p. 7.
Loc.: Bellevue Station, via Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F1579.
Asterotheca hillae (Walkom) Herbst, 1977. p. 7.
Loc.: Bellevue Station, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F1582. HOLOTYPE.
Pecopteris (?*Asterotheca*) *hillae* Walkom, 1924. pp. 82–4, pl. 17, fig. 1 A.B. 2–3.
Pecopteris (?*Asterotheca*) *hillae* Walkom, *in* Walkom, 1928. pp. 461–2.
Asterotheca hillae (Walkom) Herbst, 1977. pp. 6–7.
Asterotheca hillae (Walkom) Herbst, 1977, in Rigby, 1977. p. 320, 322.
Loc.: Bellevue Station, via Esk, Wivenhoe Parish, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F1713.
Asterotheca hillae (Walkom) Herbst, 1977. p. 7.
Loc.: Portion 42, Wivenhoe Parish, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F3955 a/b.
'Pecopteris' (Asterotheca) hillae Walkom, 1924, in Hill *et al.*, 1965. pl. T3, fig. 4.
Asterotheca hillae (Walkom) Herbst, 1977. p. 6.
Loc.: Bryden, SE.Q.
Fm.: Bryden Beds. Age: Early to Middle Triassic.

?Family MARATTIACEAE
Ogmos adinus Webb, 1983.

Reg. No.: F1481.
Taeniopteris (?Danaeopsis) crassinervis (Feistm.) in Walkom, 1924. pp. 84–5, pl. 18, fig. 2.
Taeniopteris crassinervis (Feistmantel) in Du Toit, 1927. pp. 350–1.
Taeniopteris cf. *crassinervis* (Feistmantel) Walkom, in Jones & de Jersey, 1947. p. 47.
Taeniopteris crassinervis (Feistmantel) Walkom, in Hill *et al.*, 1965. pl. T8, fig. 3.
Taeniopteris crassinervis (Feistmantel) Walkom, 1917, in Rigby, 1977. p. 321.
Ogmos adinus Webb, 1983. pp. 363–71.
Loc.: Bellevue Station, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F1530.
Ogmos adinus Webb, 1983. pp. 363–71.
Loc.: As for F1481.
Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F1558.
Ogmos adinus Webb, 1983. pp. 363–71.
Loc.: As for F1481.
Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F1562.
Ogmos adinus Webb, 1983, pp. 363–71, fig. 5b.
Loc.: As for F1481.
Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F1566.
Ogmos adinus Webb, 1983. pp. 363–71.
Loc.: As for F1481.
Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F1577.
Taeniopteris (?Danaeopsis) crassinervis (Feistm.) in Walkom, 1924. pp. 84–5, pl. 18, fig. 1.
Taeniopteris crassinervis (Feistmantel) in Du Toit, 1927. pp. 350–1.
Taeniopteris cf. *crassinervis* (Feistmantel) Walkom, in Jones & de Jersey, 1947. p. 47.
Taeniopteris crassinervis (Feistmantel) Walkom, 1917, in Rigby, 1977. p. 321.
Ogmos adinus Webb, 1983. pp. 363–71.
Loc.: Portion 42, Wivenhoe Parish, Bellevue Station, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F1578.
Ogmos adinus Webb, 1983. pp. 363–71.
Loc.: As for F1481.
Fm.: Esk Fm. Age: Middle Triassic.

Order FILICALES
Family DICKSONIACEAE
Coniopteris sp.

Reg. No.: F5693.
Coniopteris sp., in Hill *et al.*, 1966. pl. J2, fig. 2.
Loc.: Reynolds Creek, Portion 148, Fassifern Parish, SE.Q.
Fm.: Walloon Coal Measures. Age: Middle Jurassic.

Reg. No.: F5694.
Coniopteris sp., in Hill *et al.*, 1966. pl. J2, fig. 3.
Loc.: as for F5693.
Fm.: Walloon Coal Measures. Age: Middle Jurassic.

Family DIPTERIDACEAE

Dictyophyllum davidii Walkom, 1917.

Reg. No.: F1468.
Dictyophyllum rugosum L. & H. in Walkom, 1924. p. 82, pl. 21, fig. 1.
Thaumatopteris rugosa (Lindley & Hutton) Oishi & Yamasita, 1936. pp. 152–3.
Dictyophyllum davidii Walkom, 1917, in Rigby, 1977. pp. 320, 322.
Dictyophyllum davidii Walkom, 1917, in Herbst, 1979. pp. 13–4.
Dictyophyllum davidii Walkom, 1917, in Webb, 1982. pp. 85–9.
Loc.: Portion 42, Wivenhoe Parish, Bellevue Station, near Esk SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Hausmannia (Protorhipis) sp. cf. *H.* (P.) *defarrariisii* Feruglio 1937.

Reg. No.: F2901.
Hausmannia (Protorhipis) sp. cf. *H* . (P.) *defarrariisii* Feruglio, 1937, in Herbst, 1979. pp. 18–9.
Loc.: Kleinton Clay Pit, via Toowoomba, SE.Q.
Fm.: Walloon Coal Measures. Age: Middle Jurassic.

Reg. No.: F2905 a/b.
Hausmannia (*Protorhipis*) sp. cf. *H*. (*P*.) *defarrariisii* Feruglio, 1937, in Herbst, 1979. pp. 18–9.
Loc.: Near Kalbar, Fassifern Parish, SE.Q.
Fm.: Walloon Coal Measures. Age: Middle Jurassic.

Family GLEICHENIACEAE

Gleichenites wivenhoensis Herbst, 1974.

Reg. No.: F6993 a/b. HOLOTYPE.
Gleichenites wivenhoensis Herbst, 1974. pp. 79–82, pl. 9, figs 7, 8, pl. 10, fig. 11, text figs. 1, 2.
Loc.: Northern side of Wivenhoe Hill, Parish of Wivenhoe, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F7006. PARATYPE.
Gleichenites wivenhoensis Herbst, 1974. pp. 79–82, text figs. 1, 2.
Loc.: As for F6992.
Fm.: Esk Fm. Age: Middle Triassic.

Family MATONIACEAE

Phlebopteris alethopteroides Etheridge fil. 1888.

Reg. No.: F1277.
Phlebopteris alethopteroides Etheridge fil., 1888, in Walkom, 1917. p. 8, pl. 9, fig. 2.
Loc.: Fassifern, SE.Q.
Fm.: Walloon Coal Measures. Age: Middle Jurassic.

Reg. No.: F1278.
Phlebopteris alethopteroides Etheridge fil., 1888, in Walkom, 1917. p. 8, pl. 10, fig. 1.
Loc.: As for F1277.
Fm.: Walloon Coal Measures. Age: Middle Jurassic.

Family OSMUNDACEAE

Cladophlebis australis (Morris) Seward, 1904.

Reg. No.: F1582.
Cladophlebis australis (Morris), in Walkom, 1924. p. 81, pl. 17, fig. 1E.
Cladophlebis australis (Morris) Seward, 1904, in Rigby, 1977. p. 320.
Cladophlebis australis (Morris) Walkom, in Herbst, 1978. pp. 5–12.
Loc.: Wivenhoe Parish, Bellevue Station, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Lobifolia dejerseyi Retallack, 1977.

Reg. No.: F1473.
Cladophlebis lobifolia (Phillips), in Walkom, 1924. p. 81, text fig. 2.
Lobifolia dejerseyi Retallack, *et al*., 1977. pp. 88–9.
Cladophlebis sp. A, in Rigby, 1977. p. 320, 322.
Cladophlebis lobifolia (Phillips), in Herbst, 1978. pp. 19–20.
Loc.: Portion 42, Wivenhoe Parish, Bellevue Station, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.
Remarks: Both Rigby (1977) and Herbst (1978) were unsure of the status of this material from the Esk Series. Retallack et al. (1977) proposed the new species *Lobifolia dejerseyi* to accommodate these specimens from the Esk Series and others from the Nymboida Coal Measures and the Gunnee Beds of New South Wales.

Reg. No.: F1544.
Cladophlebis lobifolia (Phillips), in Walkom, 1924. p. 81, pl. 15, fig. 2, text fig. 2.
Lobifolia dejerseyi Retallack *et al*., 1977. pp. 88–9.
Cladophlebis sp. A, in Rigby, 1977. p. 322.
Cladophlebis lobifolia (Phillips), in Herbst, 1978. pp. 19–20.
Loc.: Portion 24, Esk Parish, Bellevue Station, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.
Remarks: As for F1473.

Family SCHIZEACEAE

Lygodium skottsbergii Halle, 1940.

Reg. No.: F2820.
Lygodium skottsbergii Halle, 1940, in Hill *et al*., 1970. pl. Cz X1, fig. 1.
Loc.: Clay Pit, Dinmore, SE.Q.
Fm.: Redbank Plains Fm. Age: Paleocene.
Remarks: Specimen missing.

fern (aff. *Lygodium*)

Reg. No.: F9514.
fern (aff. Lygodium ?) in Peters and Christophel, 1978. p. 3127, fig. 18.
Loc.: Lovell Downs Station, 50 kms NW of Winton, 22°12'00' S, 142°31'30' E, W.C.Q.
Fm.: Winton Fm. Age: Early late Cretaceous (Albian-Cenomanian).

Filicales incertae sedis

Chiropteris cuneata (Carruthers) Seward, 1903.

Reg. No.: F12849.

Cyclopteris cuneata Carruthers, 1872, in Tenison-Woods, 1883, p. 109.

Cyclopteris cuneata Carruthers, 1872, in Feistmantel, 1890, p. 108.

Loc.: Tivoli Coal Mine, Ipswich SE.Q.

Fm.: Ipswich Coal Measures. Age: Early late Triassic (Carnian).

Remarks: Tenison-Woods (1883), and Feistmantel (1890) referring to Tenison-Woods (1883), recorded that the holotype of *Cyclopteris cuneata* was in the Brisbane (i.e. Queensland) Museum. However, Seward (1903) indicated that the holotype of *C. cuneata* is in the British Museum. The Queensland Museum specimen, Tenison-Woods is probably referring to is similar, but smaller and less well preserved than the holotype figured by Carruthers (1872). Dr C.R. Hill (pers. comm.) has advised the author that a specimen V.4197 matching Carruthers original figure, although laterally reversed is in the British Museum (Natural History). F12849 was previously unregistered.

Division PTERIDOSPERMOPHYTA
Family CORYSTOSPERMACEAE

Dicroidium zuberi (Szajnocha) Archangelsky 1968 var. *feistmantelii* (Johnston) Gothan, 1912.

Reg. No.: F1468.

Thinnfeldia feistmanteli Johnston, in Walkom, 1924. pp. 81–2.

Zuberia sahnii Sew. sp., in Frenguelli, 1943. pp. 305–6.

Zuberia barrealensis Frenguelli, 1944. pp. 20–3.

Dicroidium feistmanteli (Johnston) Gothan, 1912, in Townrow, 1957. pp. 39–41.

Dicroidium feistmantelii (Johnston) Gothan, 1912, in Rigby, 1977. p. 320.

Dicroidium zuberi (Szajnocha) Archangelsky 1968 var *feistmantelii* (Johnston) Retallack 1977, p. 272, frames 115 – 116.

Loc.: Portion 42, Wivenhoe Parish, near Esk, SE.Q.

Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F1472.

Thinnfeldia feistmanteli Johnston, in Walkom, 1924. pp. 81–2.

Zuberia sahnii Sew. sp., in Frenguelli, 1943. pp. 305–6.

Zuberia barrealensis Frenguelli, 1944. pp. 20–3.

Dicroidium feistmanteli (Johnston) Gothan, 1912, in Townrow, 1957. pp. 39–41.

Dicroidium feistmantelii (Johnston) Gothan, 1912, in Rigby, 1977. p. 320.

Dicroidium zuberi (Szajnocha) Archangelsky 1968 var *feistmantelii (Johnston) Retallack 1977, p. 272, frames 115 – 116.*

Loc.: Bellevue, via Esk, SE.Q.

Fm.: Esk Fm. Age: Middle Triassic.

Remarks: Specimen missing.

Reg. No.: F1582.

Thinnfeldia feistmanteli Johnston, in Walkom, 1924. pp. 81–2, pl. 17, fig. 1, f.

Zuberia sahnii Sew. sp.,in Frenguelli, 1943. pp. 305–6.

Zuberia barrealensis Frenguelli, 1944. pp. 20–3.

Dicroidium feistmanteli (Johnston) Gothan, 1912, in Townrow, 1957. pp. 39–41.

Dicroidium antevsiana (Johnston) Gothan, 1912, in Anderson and Anderson, 1970. Chart 9.

Dicroidium feistmantelii (Johnston) Gothan, 1912, in Rigby, 1977. p. 320.

Dicroidium zuberi (Szajnocha) Archangelsky 1968 var *feistmantelii* (Johnston) Retallack 1977, p. 272, frames 115 – 116.

Loc.: as for F1468.

Fm.: Esk Fm. Age: Middle Triassic.

Dicroidium odontopteroides (Morris) Gothan, 1912.

Reg. No.: F1472.

Thinnfeldia lancifolia (Morris), in Walkom, 1924. p. 82.

Dicroidium odontopteroides (Morris) Gothan, 1912, in Townrow, 1957. pp. 33–9.

Loc.: Portion 42, Wivenhoe Parish, near Esk, SE.Q.

Fm.: Esk Fm. Age: Middle Triassic.

Remarks: Specimen missing.

Reg. No.: F1546.

Thinnfeldia lancifolia (Morris), in Walkom, 1924. p. 82.

Dicroidium odontopteroides (Morris) Gothan, 1912, in Townrow, 1957. pp. 33–9.

Loc.: Portion 24, Esk Parish, near Esk, SE.Q.

Fm.: Esk Fm. Age: Middle Triassic.

Pteruchus africanus Thomas, 1933.

Reg. No.: F954.

Stachyopitys annularoides Shirley, in Walkom, 1917. p. 13, pl. 4, fig. 6.

Pteruchus (Stachyopitys) annularoides in Thomas, 1933. p. 234, 241.

Pteruchus africanus Thomas, 1933 in Townrow, 1962. p. 297.

Loc.: Nundah, Brisbane, SE.Q.
Fm.: Ipswich Coal Measures. Age: Early late Triassic (Carnian).

Umkomasia sp.

Reg. No.: F1582.
gymnospermous seed in Walkom, 1924. p. 90, pl. 17. fig. 1D.
Loc.: Portion 42, Wivenhoe Parish, near Esk, SE.Q.
Fm: Esk Fm. Age: Middle Triassic.
Remarks: The cupulate form and branching habit of this fructification indicates that it belongs to the Corystospermaceae. It represents the first corystospermacid fructification to be recognized from the Esk Series and is tentatively referred to *Umkomasia* sp.

Family PELTASPERMACEAE

Lepidopteris stormbergensis (Seward) Townrow, 1956.

Reg. No.: F1583.
Thinnfeldia lancifolia (Morris), in Walkom, 1924. p. 82, pl. 15, fig. 3.
Dicroidium odontopteroides (Morris) Gothan, in Townrow, 1957. pp. 33–9.
Dicroidium lancifolia (Morris) Gothan, 1912, in Anderson & Anderson, 1970. Chart 9.
Lepidopteris stormbergensis (Seward) Townrow, 1956, in Rigby, 1977. pp. 320, 322.
Loc.: Bellevue Station, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.
Remarks: Specimen missing.

Reg. No.: F1580.
? *Sphenopteris pecten* Halle, in Walkom, 1924. p. 86.
Dicroidium superbum (Shirley) Townrow 1957, in Retallack *et al.*, 1977. p. 95.
Lepidopteris stormbergensis (Seward) Townrow, 1956, in Rigby, 1977. pp. 320, 322.
Loc.: Portion 42, Esk Parish, Bellevue Station, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F1551.
(?) *Sphenopteris superba* Shirley, in Walkom, 1924. p. 86.
Dicroidium superbum (Shirley) Townrow, 1957, in Retallack *et al.*, 1977. p. 95.
Lepidopteris stormbergensis (Seward) Townrow, 1956, in Rigby, 1977. pp. 320, 322.
Loc.: as for F1580.
Fm.: Esk Fm. Age: Middle Triassic.

Division CYCADOPHYTA
Order CYCADALES

Nilssonia mucronatum (de Vis) Walkom, 1916.

Reg. No.: F967. HOLOTYPE.
Pterophyllum mucronatum de Vis, 1911. pp. 2–3, pl. 2, figs. 1, 2.
Nilssonia mucronatum (de Vis) Walkom, 1916. pp. 231–2, pl. 24, figs. 1–3.
Nilssonia mucronatum (de Vis) Walkom, 1916, in Walkom, 1919. pp. 34–5, pl. 6, figs. 1–3.
Loc.: O'Connell Creek, Wyangarie Station, south of Richmond, C.Q.
Fm.: Allaru Mudstone. Age: Early Cretaceous (Albian).
Remarks: The precise locality for this specimen is unknown. Wyangarie Station presumably refers to Wyangarie run, part of the Richmond Downs holdings in the 1890's. Old Wyangarie Homestead in 1896 was situated approximately 5 kms southeast of Richmond. The modern Wyangarie homestead is about 25 kms west-northwest of Richmond. The holotype of *Nilssonia mucronatum* is figured here (Pl. 1, Fig. 2).

Pseudoctenis eathiensis (Richards) Seward, 1911.

Reg. No.: F1486 a/b.
Pseudoctenis eathiensis (Richards), in Walkom, 1924. p. 88, pl. 19, fig. 2.
Pseudoctenis eathiensis (Richards) Seward, 1911, in Rigby, 1977. p. 321.
Loc.: Portion 24, Esk Parish, Bellevue Station, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F1471.
Pseudoctenis eathiensis (Richards), in Walkom, 1924. p. 88.
Pseudoctenis eathiensis (Richards) Seward, 1911, in Rigby, 1977. p. 321.
Loc.: Portion 42, Wivenhoe Parish, Bellevue Station, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Order BENNETTITALES

Pterophyllum nathanii Walkom, 1924.

Reg. No.: F1479 a/b. SYNTYPE.
Pterophyllum nathani Walkom, 1924. pp. 87–8, pl. 20. fig. 2.
Pterophyllum nathani Walkom, 1924, in Hill *et al.*, 1965. pl. T7, fig. 2.

Pterophyllum nathanii Walkom, 1924, in Rigby, 1977. p. 321.
Loc.: Bellevue Station, Wivenhoe Parish, via Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F1480. SYNTYPE.
Pterophyllum nathani Walkom, 1924. pp. 87–8, pl. 20, fig. 1.
Pterophyllum nathanii Walkom, 1924, in Rigby, 1977. p. 321.
Loc.: As for F1479.
Fm.: Esk Fm. Age: Middle Triassic.

Cycadophyta Incertae sedis

Taeniopteris sp. cf. *T. lata* Oldham & Morris, 1863.

Reg. No.: F1463 a/b/c. HOLOTYPE.
(?*Nilssonia*) *superba* Walkom, 1924. pp. 86–7, pl. 19, fig. 1.
Taeniopteris sp. cf. *T. lata* Oldham & Morris, 1863, in Rigby, 1977. p. 321, 324.
Loc.: Bellevue Station, via Esk, Wivenhoe Parish, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Taeniopteris lentriculiforme (Etheridge fil.) Walkom, 1917.

Reg. No.: F12783.
Taeniopteris carruthersi Tenison Woods, in Walkom, 1924. p. 85, text fig. 3.
Taeniopteris carruthersi Tenison Woods, 1883 in Retallack *et al.*, 1977. pp. 102–3.
Taeniopteris lentriculiforme (Etheridge jr) Walkom, 1917, in Rigby, 1977. p. 321, 324.
Loc.: Portion 32, Northbrook Parish, Bellevue Station, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.
Remarks: The registration number F1486 was allocated to two specimens mentioned by Walkom (1924). To avoid possible confusion this specimen is re-registered as F12783.

Reg. No.: F1547.
Taeniopteris tenison-woodsi Etheridge Jr., in Walkom, 1924. p. 86.
Taeniopteris lentriculiforme (Etheridge jr) Walkom, 1917, in Rigby, 1977. p. 321, 324.
Loc.: Portion 42, Wivenhoe Parish, Bellevue Station, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: 1583.
Taeniopteris (?*Danaeopsis*) *crassinervis* (Feistm.) in Walkom, 1924. pp. 84–5, pl. 18, fig. 3.
Taeniopteris crassinervis (Feistmantel), in Du Toit, 1927. pp. 350–1.
Taeniopteris cf. *crassinervis* (Feistmantel) Walkom, in Jones & de Jersey, 1947. p. 47.
Taeniopteris lentriculiforme (Etheridge jr) Walkom, 1917, in Rigby, 1977. p. 321.
Loc.: Portion 24, Wivenhoe Parish, Bellevue Station, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Order PENTOXYLALES
pentoxylalean-like trunk

Reg. No.: F7078.
pentoxylalean-like trunk in Gould and Shibaoka, 1980. p. 16, 18, 20, fig. 7h.
Loc.: Miles, SE.Q.
Fm.: Walloon Coal Measures. Age: Middle Jurassic.

Division GINKGOPHYTA
Order GINKGOALES

Ginkgoites bidens (Tenison-Woods) Florin, 1936.

Reg. No.: F1470.
Baiera bidens Tenison-Woods, in Walkom, 1924. p. 90, pl. 21, fig. 2.
Baiera bidens (Ten.-Woods) Feistm. in Frenguelli, 1946. pp. 108–9.
Ginkgoites bidens (Tenison-Woods) Florin, 1936, in Rigby, 1977. p. 321.
Loc.: Portion 42, Wivenhoe Parish, Bellevue Station, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

probably *Ginkgo digitata* (Brongniart) Heer, 1877.

Reg. No.: F1553.
Ginkgoites sibirica ? Heer, in Walkom, 1924. pp. 88–9, pl. 21, fig. 4.
Ginkgoites (?) *sibirica* Heer, in Walkom, 1928. p. 466.
probably Ginkgo digitata (Brongniart) Heer, 1887, in Rigby, 1977. p. 321, 324.
Loc.: Portion 24, Esk Parish, Bellevue Station, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.
Remarks: Specimen missing.

Ginkgoites simmondsi (Shirley) Florin, 1936.

Reg. No.: F1488.
Baiera simmondsi (Shirley), in Walkom, 1924. p. 90.
Ginkgoites simmondsi (Shirley) Florin, 1936, in Rigby, 1977. p. 321.
Loc.: Portion 24, Esk Parish, Bellevue Station, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Ginkgoites sp.

Reg. No.: F1469.
Ginkgoites sp., in Walkom, 1924. p. 89, pl. 21, fig. 3B.
Loc.: Portion 42, Wivenhoe Parish, Bellevue Station, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F1582.
Ginkgoites sp., in Walkom, 1924. p. 92, pl. 17, fig. 1C.
Loc.: Wivenhoe Parish, Bellevue Station, near Esk SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Reg. No.: F1321. HOLOTYPE.
Noeggerathiopsis tryoni Shirley, 1920. pp. 82–3.
fragmentary *Ginkgo* or *Baiera* , in Walkom, 1921. p. 375.
Loc.: Petrie's Quarry, Albion SE.Q. Fm.: Ipswich Coal Measures. Age: Early Late Triassic (Carnian).
Remarks: The International Code of Botanical Nomenclature 1972, p. 42, Art. 38 states that after the 1 Jan. 1912 the description of a new taxon of fossil plants must be accompanied by a figure or illustration. Shirley's description of *Noeggerathiopsis tryoni* was not accompanied by a figure and is therefore invalid. The specimen is figured herein (Pl. 1, Fig. 1). It is referable to *Ginkgoites* sp.

Reg. No.: F1475.
Phoenicopsis elongatus (Morris), in Walkom, 1924. p. 90.
Phoenicopsis elongatus (Morris) Seward, 1903, in Rigby, 1977. p. 321.
Loc.: Portion 42, Wivenhoe Parish, Bellevue Station, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.
Remarks: The status of leaves previously referred to *Podozamites* and *Phoenicopsis* has been discussed by Retallack (1981). He erected the genus *Heidiphyllum* to accommodate these leaves. The leaves referred to *Phoenicopsis* by Walkom (1924) are poorly preserved and while it is difficult to assign them confidently to any taxon, they appear to have affinities with the Ginkgoales. F1475 is tentatively referred to *Ginkgoites* sp.

Division CONIFEROPHYTA

Order CONIFERALES

Family ARAUCARIACEAE

araucarian (?) cone

Reg. No.: F9573.
araucarian (?) cone in Peters & Christophel, 1978. p. 3127, fig. 17.
Loc.: Lovell Downs Station 50 kms NW of Winton, 22°12'00'S and 142°31'30'E, W.C.Q.
Fm.: Winton Fm. Age: Early late Cretaceous (Albian-Cenomanian).

Family PODOCARPACEAE

Podocarpus (sect. *Dacrycarpus*) sp.

Reg. No.: F2833.
Podocarpus (sect. *Dacrycarpus*) sp., in Selling, 1950. p. 555, 561. pl. 2, fig. 15.
Loc.: Clay Pit, Dinmore, SE.Q.
Fm.: Redbank Plains Fm. Age: Paleocene.

Family TAXODIACEAE

Austrosequoia wintonensis Peters & Christophel, 1978.

Reg. No.: F9509. HOLOTYPE.
Austrosequoia wintonensis Peters & Christophel, 1978. pp. 3119–28, fig. 2, 6, 13c.
Loc.: Lovell Downs Station, 50 kms NW of Winton, 22°12'00'S, 142°31'30'E, W.C.Q.
Fm.: Winton Fm. Age: Early late Cretaceous (Albian-Cenomanian).

Reg. No.: F9510. PARATYPE.
Austrosequoia wintonensis Peters & Christophel, 1978. pp. 3119–28, fig. 3, 6, 13c.
Loc.: As for F9509.
Fm.: Winton Fm. Age: Early late Cretaceous (Albian-Cenomanian).

Reg. No.: F9511. PARATYPE.
Austrosequoia wintonensis Peters & Christophel, 1978. pp. 3119–28, figs. 4, 5, 6, 13c.
Loc.: As for F9509.
Fm.: Winton Fm. Age: Early late Cretaceous (Albian-Cenomanian).

Reg. No.: F9512. PARATYPE.
Austrosequoia wintonensis Peters & Christophel, 1978. pp. 3119–28, figs. 6, 7, 13c.
Loc.: As for F9509.
Fm.: Winton Fm. Age: Early late Cretaceous (Albian-Cenomanian).

Family VOLTZIACEAE

Heidiphyllum elongatum (Morris), Retallack, 1981

Reg. No.: F1469.
Podozamites lanceolatus (?) (Lindley & Hutton), in Walkom, 1924. p. 88, pl. 21, fig. 3A.
Loc.: Portion 42, Wivenhoe Parish, near Esk.
Fm.: Esk Fm. Age: Middle Triassic.
Remarks: See remarks for *Phoenicopsis elongatus*. The '*Podozamites*' leaves figured by Walkom (1924) are probably young leaves of *Heidiphyllum elongatum* (Morris) Retallack 1981.

Coniferales incertae sedis
gymnospermous seed

Reg. No.: F1469.
gymnospermous seed in Walkom, 1924. p. 90, pl. 21, fig. 3C.
Loc.: Portion 42, Wivenhoe Parish, near Esk, SE.Q.
Fm.: Esk Fm. Age: Middle Triassic.

Division ANTHOPHYTA
Class DICOTYLEDONAE
Order MYRTALES
Family MYRTACEAE

cf. *Eucalyptus resinifera* Smith 1790

Reg. No.: F6990.
cf. *Eucalyptus resinifera* , in Wood, 1972. p. 331.
Loc.: Maroochydore, 175 feet south of BM19418, two miles west, of the present coastline and the mouth of the Maroochy River and 475 feet southwest of the Maroochydore River, SE.Q.
Fm.: Age: Holocene.

? *Eucalyptus* sp.

Reg. No.: F2866
? *Eucalyptus* sp., in Hill et al., 1970. pl. Cz 12, fig. 6.
Loc.: Clay Pit, Dinmore, SE.Q.
Fm.: Redbank Plains Fm. Age: Paleocene.

Dicotyledonae Incertae sedis

dicotyledonous leaves

Reg. No.: F2823.
dicotyledonous leaves, in Hill et al., 1970. pl. Cz 12, fig. 1.
Loc.: Clay Pit, Dinmore SE.Q.
Fm.: Redbank Plains Fm. Age: Paleocene.

Reg. No.: F6553.
dicotyledonous leaves, in Hill et al., 1970. pl. Cz 12, fig. 2.
Loc.: As for F2823.
Fm.: Redbank Plains Fm. Age: Paleocene.

angiosperm leaf

Reg. No.: F9515.
angiosperm leaf, in Peters and Christophel, 1978. p. 3127, fig. 19.
Loc.: Lovell Downs Station, 50 kms NW of Winton, 22°12'00'S, 142°31'30'E.
Fm.: Winton Fm. Age: Early late Cretaceous (Albian-Cenomanian).

ACKNOWLEDGMENTS

The helpful advice given by staff of the Queensland Museum particularly Miss Julia Findlay, Dr Mary Wade, Dr Susan Turner, Ms Tempe Lees and Dr R. Molnar is gratefully acknowledged. The photographs were taken by Mr A. Easton. I would like to thank Dr G. Playford, University of Queensland for his criticism of an earlier manuscript. Dr C.R. Hill, British Museum (Natural History) provided information on the holotype of *Chiropteris cuneata* (Carruthers).

Mr J.T. Woods (Director of the Queensland Museum, 1960–68) compiled unpublished lists of all the type, figured and mentioned material held in our palaeontological collections to about 1965. These lists are held in the Queensland Museum Library and were referred to during the preparation of this list.

My special thanks to Mr J. Rigby (Geological Survey of Queensland) who brought omissions to my notice and provided helpful comments on improving the format and coverage of this list.

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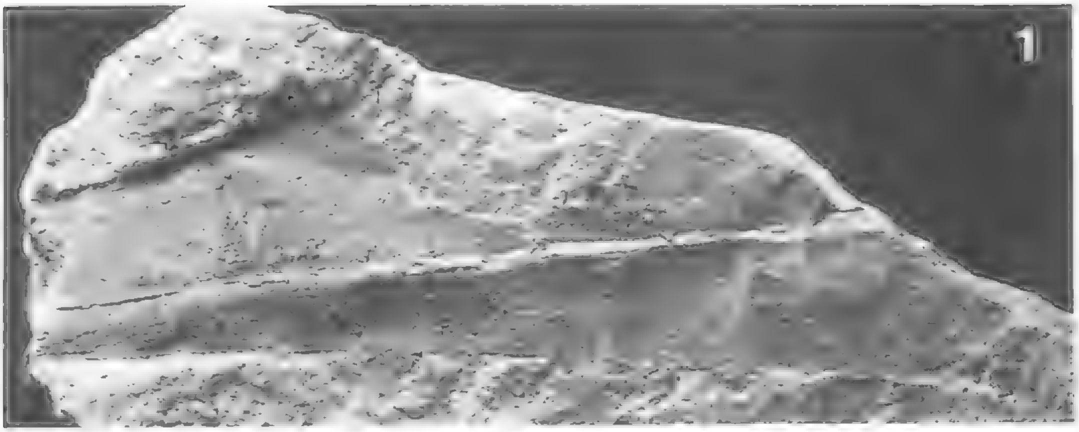
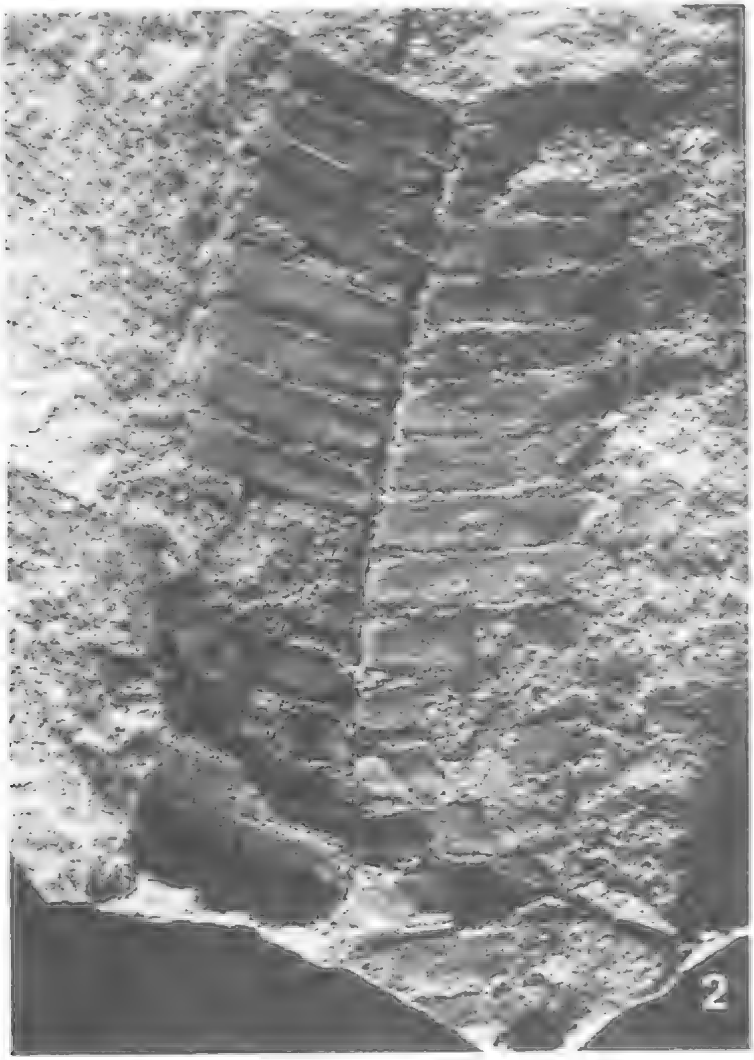
SPECIES INDEX

PLATE I

FIG. 1. Holotype of '*Noeggerathiopsis tryoni* Shirley, 1920' (X 1.5).

FIG. 2. Holotype of *Nilssonia mucronatum* (De Vis) Walkom, 1916 (X 1).
1.





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ZOEAL LARVAE OF *MACROPHTHALMUS SETOSUS* H. MILNE-EDWARDS, 1852 AND *M. PUNCTULATUS* MIERS, 1884 (DECAPODA, OCYPODIDAE).

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ABSTRACT

All five zoeal larvae of *Macrophthalmus setosus* H. MilneEdwards, 1852 and the first zoeal larva of *M. punctulatus* Miers, 1884 cultured in the laboratory are described and illustrated. Comparisons are made with previously published descriptions of macrophthalmine larvae and on the basis of larval characteristics, the taxonomic status of *M. hirtipes* (Jacquinot, 1853) is questioned.

INTRODUCTION

Barnes (1967) recorded twelve *Macrophthalmus* species from Australia. The first zoeal larvae of three of these species i.e., *M. japonicus* (by Aikawa 1929) and *M. latreillei, M. pacificus*, (by Hashmi 1969) have been described from Japan and Pakistan respectively. Larvae of the nine other species are unknown, and no *Macrophthalmus* larvae have previously been described from Australian material. The present paper describes zoeal stages of *M. setosus* and *M. punctulatus* from eastern Australia.

Snelling (1959), in her study of the Brisbane River crab fauna, recorded three *Macrophthalmus* species i.e., *M. setosus, M. punctulatus* and *M. pacificus*. Subsequently Snelling's *M. pacificus* has been reidentified as juvenile *M. setosus* (Barnes 1967).

M. setosus and *M. punctulatus* are endemic to Australia (Barnes 1967), having a rather restricted distribution on the east coast, from south of the Tropic of Capricorn to central New South Wales. Both species are relatively common in the Brisbane River estuary. *M. setosus* is numerically dominant where it occurs, and is found under stones or on damp soft mud between L.W.N. and L.W.S. from the river mouth upstream for c. 22km where salinities are c. 10–30‰. *M. punctulatus* burrows into firm mud between H.W.N. and L.W.N. from the mouth of the river upstream for c. 11km where salinities are c. 18–35‰. It seldom occurs in large numbers.

The present paper is one of a series designed to describe the brachyuran larvae of an Australian estuarine assemblage.

MATERIALS AND METHODS

Ovigerous females were collected from the banks of the Brisbane River (27°23' S, 153°9'E) during summer. Captured crabs were held individually in plastic containers (160mm square X 220mm deep) filled to a depth of 50mm with pasteurized seawater having a salinity of 20‰ and at 25°C in an artificial light/dark regime of 12/12 hours. Each container was provided with a 90mm square raft of plastic gauze which the crabs could use as a shelter and emergence platform. Water was changed twice daily until surface mud and faecal material had been lost, and then once daily.

Newly hatched zoeae were transferred to similar plastic containers in batches of c. 2000. Rearing water (salinity 20‰) was renewed each morning when larvae were fed. Initially, freshly hatched *Artemia* nauplii were provided as food, but no zoeae moulted on this diet, the *Artemia* nauplii apparently being too active for the small crab larvae to handle. A complete zoeal series of *Macrophthalmus setosus* was subsequently obtained by providing *Brachionus* sp. as food.

Samples of each larval stage were preserved in 4% neutral formalin. Dissections were made under a Wild M5 microscope and drawings were made using a Wild M20 microscope with drawing tube.

Figures of zoeal stage II and IV appendages have not been included since these appendages do not differ markedly from those of the preceding stages. If required these figures can be obtained from the authors.

Setal nomenclature is based in that used by Bookhout and Costlow (1974). Measurements of larvae and tabular presentation of appendage segmentation and setation follow that used previously by the present authors, e.g., Greenwood and Fielder (1980).

RESULTS

Macrophthalmus (Mopsocarcinus) punctulatus Miers, 1884

ZOEA I (Fig. 1A–I)

First stage zoeae have, as yet, not been reared to later stages. Size and proportional measurements are given in Table 1.

Carapace smooth and globose. Dorsal and lateral spines absent. Rostrum very short and evenly tapered. Eyes immobile.

Abdomen with five free somites, sixth fused to telson; second and third abdominal somites each with a pair of dorso-lateral projections. Postero-lateral margins of all abdominal somites without spines. Paired setules postero-dorsally on somites 2–5. Telson width similar to that of last abdominal somite, telson length (medial) c. 1.2 times width; posterior margin transverse with 3 + 3 subequal biplumose setae. Telson rami short, c. 0.5 times telson length, 2 times length of posterior setae, each ramus with two longitudinal rows of setules, but no dorsal or lateral spines.

Structure and setation of appendages as given in Fig. 1C–I and Table 2.

Macrophthalmus (Mareotis) setosus H. Milne Edwards, 1852

Five zoeal stages were reared before cultures failed. However, the well developed thoracic appendages and pleopods of the fifth zoeal stage indicate that this is the last stage before megalopal transition. Each zoeal stage was completed in c. 8 days. Size and proportional measurements of zoeae are given in Table 1. Dorsal spine and rostral lengths are 0.6 to 0.7 times the carapace length in all zoeal stages. The dorsal spine is almost equal in length to the rostrum in all zoeal stages for which multiple measurements are available.

ZOEA I (Figs 2A, B; 3A–G)

Carapace smooth and globose with dorsal and rostral but no lateral spines. Dorsal spine uniformly tapered with a slight posterior curvature. Rostrum smooth, evenly tapered and straight. Eyes immobile.

TABLE 1. DIMENSIONS OF VARIOUS FEATURES OF THE ZOEAE OF *MACROPHTHALMUS SETOSUS* AND *M. PUNCTULATUS*. ALL MEASUREMENTS ARE IN MM AND UNLESS OTHERWISE STATED, MEAN VALUES, FOR 10 INDIVIDUALS OF EACH STAGE, ARE GIVEN WITH STANDARD DEVIATION IN BRACKETS.

	Macrophthalmus setosus					*M. punctulatus*
Feature	Zoea I	Zoea II	Zoea III	Zoea IV	Zoea V*	Zoea I
Spine to spine tip	0.68 (0.02)	0.81 (0.04)	1.10 (0.15)	1.38 (0.02)	1.58	—
Range	0.64–0.72	0.76–0.86	0.96–1.30	1.36–1.40		
Carapace (A)	0.32 (0.02)	0.41 (0.01)	0.51 (0.06)	0.69 (0.02)	0.80	0.31 (0.02)
Range	0.30–0.34	0.40–0.42	0.42–0.58	0.66–0.70		0.28–0.34
Dorsal Spine (B)	0.23 (0.01)	0.24 (0.02)	0.34 (0.05)	0.46 (0.02)	0.54	—
Range	0.20–0.24	0.22–0.26	0.28–0.40	0.44–0.48		
Rostrum (C)	0.22 (0.02)	0.27 (0.02)	0.35 (0.05)	0.43 (0.01)	0.44	0.05 (0.01)
Range	0.20–0.24	0.26–0.30	0.32–0.42	0.42–0.44		0.04–0.06
Antenna	c. 0.10	c. 0.15	0.18 (0.02)	0.28 (0.01)	0.32	0.10 (0.01)
Range			0.16–0.20	0.28		0.08–0.12
Ratio B/A	0.72	0.59	0.67	0.70	0.68	—
Ratio C/A	0.69	0.66	0.69	0.62	0.55	0.17
Ratio B/C	1.05	0.89	0.97	1.07	1.23	—

* one measurement only

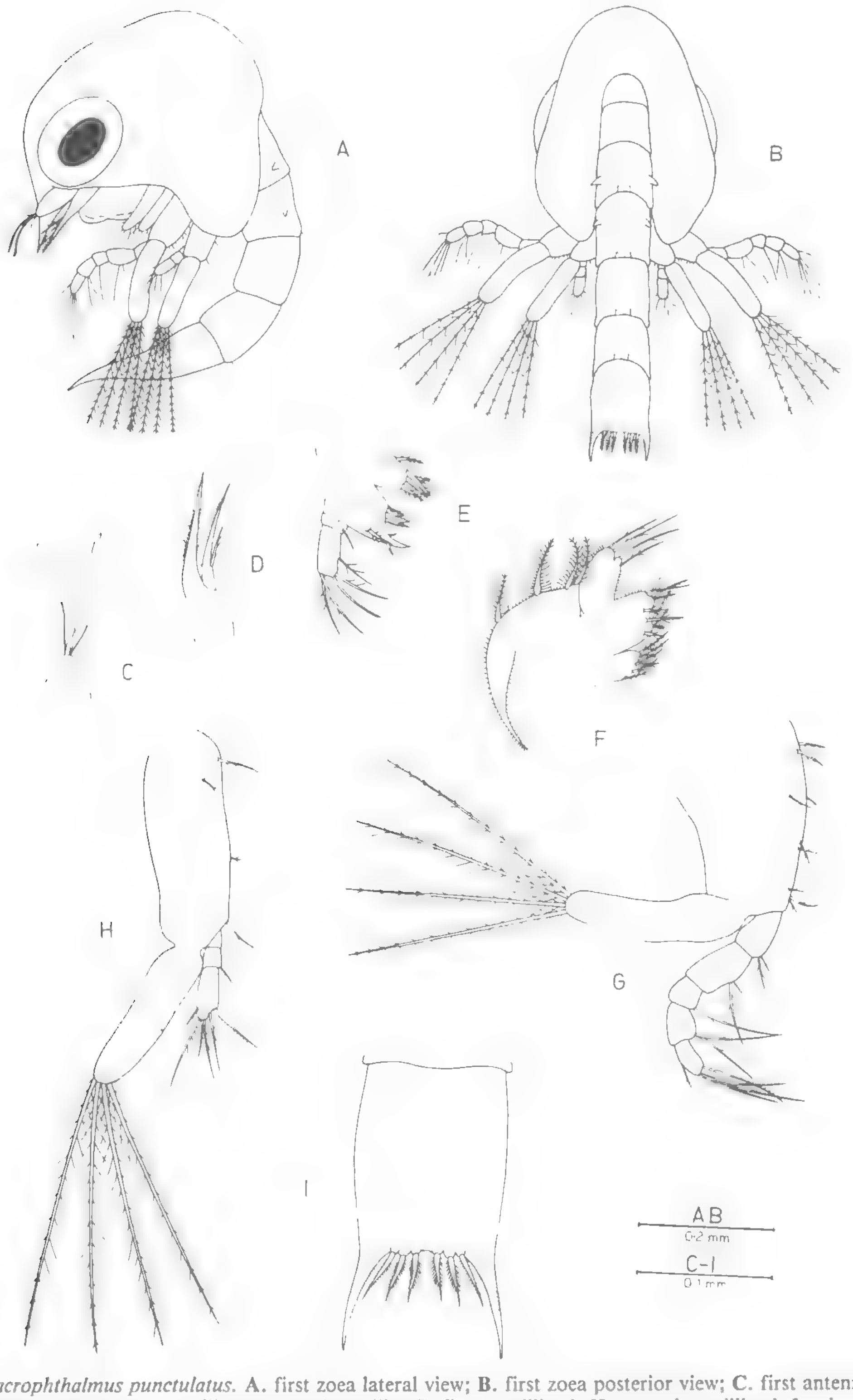

FIG. 1: *Macrophthalmus punctulatus*. **A.** first zoea lateral view; **B.** first zoea posterior view; **C.** first antenna; **D.** second antenna; **E.** first maxilla; **F.** second maxilla; **G.** first maxilliped; **H.** second maxilliped; **I.** telson.

TABLE 2. SEGMENTATION AND SETATION OF APPENDAGES OF ZOEAL STAGES OF *MACROPHTHALMUS SETOSUS* AND *M. PUNCTULATUS* (A = AESTHETE; S = SIMPLE; SP = SPARSELY PLUMOSE; P = PLUMOSE; HP = HIGHLY PLUMOSE; PD = PLUMODENTICULATE).

		Macrophthalmus setosus					*M. punctulatus*
Appendage		Zoea I	Zoea II	Zoea III	Zoea IV	Zoea V	Zoea I
ANT. I	Terminal	3A, 1S	6A	4A	5A	5A	3A, 1S
	Subterminal	0	0	0	1A	4A	0
ANT. II	Peduncle	10–15S	17–23S	18–25S	18–25S	12–17S	many S
	Exopod	1S	1S	1S	1S	1S	1PD, many S
	Endopod	—	—	—	present	present	—
MAX. I	Coxa	0	1HP	1HP	1HP, 1PD	1HP, 1PD	0
	Coxal end.	5PD	5PD	5PD	6–7PD	11PD	5PD
	Basal end.	3SP, 1PD	4SP, 3PD	4SP, 3PD	6–7PD	1–2S, 9PD	2SP, 2PD
	Endopod seg. prox.	1S	1S	1S	1S	1S	1S
	seg. 2	5PD	5PD	5PD	5PD	5PD	5PD
MAX. II	Coxal end. prox.	4PD	4PD	4PD	6PD	5HP, 2PD	4PD
	dist.	3PD	3PD	3PD	4PD	4HP, 1PD	3PD
	Basal end. prox.	5PD	5PD	5PD	6PD	7PD	5PD
	dist.	4PD	4PD	4PD	7PD	9–10PD	4PD
	Endopod	4PD	4PD	4PD	4PD	4PD	4PD
	Scaphognathite	5HP	8HP	14HP	c. 29HP	c. 30HP	5HP
MAX'PED I	Basis	9PD	9PD	9PD	10–11PD	15PD	9PD
	Endopod seg. prox.	1PD, 1S	1PD, 1S	1PD, 1S	1PD, 1S	1PD, 1S	1PD, 1S
	seg. 2	1PD, 1S	1PD, 1S	1PD, 1S	1PD, 1S	1PD, 1S	1PD, 1S
	seg. 3	1PD	1PD	1PD	2PD	2PD	1PD
	seg. 4	2PD	2PD	2PD	2PD	2PD	2PD
	seg. 5	4PD, 1S	5PD	5PD	6PD	6PD	5PD
	Exopod	4HP	6HP	8HP	10HP	10HP	4HP
MAX'PED. II	Basis	2PD, 2S	2PD, 2S	2PD, 2S	4PD	4PD	4PD
	Endopod seg. prox.	0	0	0	0	0	0
	seg. 2	1S	1PD	1PD	1PD	1PD	1PD
	seg. 3	3PD, 3S	3PD, 3S	3PD, 3S	4PD, 2S	8PD	6PD
	Exopod	4HP	6HP	8HP	10HP	10HP	4HP

Abdomen with five free somites, sixth fused to telson; second and third abdominal somites with a pair of dorso-lateral projections. Abdominal somites 2–5 with very small postero-lateral spines. Paired setules postero-dorsally on somites 2–5. Telson width similar to that of last abdominal somite, telson length (medial) c. equal to width; posterior margin with 3 + 3 biplumose setae. Telson rami c. equal to telson length, twice length of posterior setae, each ramus with two longitudinal rows of setules but no dorsal or lateral spines.

Structure and setation of appendages as given in Fig. 3A–G and Table 2.

ZOEA II (Fig. 2C)

Postero-lateral spines on somites 2–5 now pronounced. Eyes mobile, no evidence of thoracic limb buds. Sixth abdominal somite still fused to telson. Telson now with 4 + 4 biplumose setae between rami.

Setation of appendages as given in Table 2.

ZOEA III (Figs 2D, 4A–F)

Sixth abdominal somite still fused to telson.

Structure and setation of appendages as given in Fig. 4A–F and Table 2.

ZOEA IV (Fig. 2E)

Pereiopod buds not yet apparent. Sixth abdominal somite now separate from telson. Pleopod buds now present on abdominal somites 2–5, tiny uropod buds present on sixth abdominal somite.

Setation of appendages as given in Table 2.

ZOEA V (Figs 2F, 5A–F)

Third maxillipeds and pereiopods well developed but not yet setose. Pleopods and uropods well developed.

Structure and setation of appendages as given in Fig. 5A–F and Table 2.

DISCUSSION

The larvae of *M. setosus* and *M. punctulatus* have been difficult to rear. Gravid females carry large quantities of mud on their surfaces which fouls aquarium water during the first few days of captivity. They also produce large quantities of 'muddy' faeces during this period which also fouls aquarium water. Full term eggs often did not hatch or were aborted during these first days, and mortality of hatched larvae was very high. A much greater problem was posed by the small size of the first zoeae. Freshly hatched *Artemia* nauplii cannot be used as food as they are too large and too active. Hashmi (1969) did not mention zoeal stages later than the first, for the five species of *Macrophthalmus* he hatched. Apparently *Artemia* nauplii provided by Hashmi as a sole food source were also not suitable in those cases.

In the present investigation, all zoeal stages (but no megalopae) of *M. setosus* have been reared using the much smaller rotifer, *Brachionus* sp. as a food source. It has not yet been possible to rear *M. punctulatus* beyond the first zoeal stage although repeated attempts have been made using *Brachionus* as food.

Based on the rather gross features of size and carapace spination, first stage zoeae of the genus *Macrophthalmus* are quite diverse. Like those of *M. setosus* (= 0.32 mm) and *M. punctulatus* (= 0.31 mm) described here, the first zoeae of most other *Macrophthalmus* species so far described are small and have carapace lengths of less than 0.4mm, i.e., *M. depressus* = 0.38 mm (Aikawa 1929; Hashmi 1969; Rice 1975); *M. dilatatus* = 0.38 mm (Aikawa 1929); *M. crinitus* = 0.29 mm, *M. latreillei* = 0.30 mm, *M. sulcatus* = 0.34 mm, *M. pacificus* = 0.38 mm (Hashmi 1969). On the other hand the first zoeal stage carapace length of *M. hirtipes* (Wear 1968) is relatively large at 0.45 mm. The most consistent complement of carapace spines so far described is dorsal + rostral. However, two species, i.e., *M. crinitus* and *M. hirtipes* have lateral carapace spines as well and *M. punctulatus* (present study) has a rostral spine only.

Rice (1975) used the setation of maxillule, maxilla and second maxilliped endopods to separate ocypodid zoeae into distinct groups which corresponded to the accepted sub-families based on adult morphology. Rice's (l.c.) larval *Macrophthalmus* setation with corresponding setation of *M. setosus* and *M. punctulatus* is shown in Table 3. It can be seen that zoeal larvae of both species conform closely to those listed by Rice.

Based on the presence of large lateral carapace spines and the absence of dorso-lateral knobs on abdominal somite 3, Fielder and Greenwood (1985) suggested that the larvae of *M. hirtipes* were not in the mainstream of *Macrophthalmus* larvae, but were closely allied to those of *Heloecius cordiformis* (now placed in a new sub-family, Heloecinae), and that the taxonomic status of *M. hirtipes* should be investigated. This suggestion is further supported when the telson and carapace length of zoeal larvae of *M. hirtipes* (described by Wear, 1968) are compared with those of *M. setosus* and *M. punctulatus*, and other known *Macrophthalmus* larvae. The distance between the distal tips of the furcal rami

TABLE 3. Selected First Zoeal Mouthparts Setation and Dorso-lateral Abdominal Projections of the Sub family Macrophthalminae (Rice 1980), *Macrophthlamus punctulus* and *M. setosus* (This Study).

	MAX. I	MAX. II		MAX'PED I	MAX'PED II	ABDOMEN	
	Endop.	Endop.	Scaphog.	Endop. basal seg.	Endop.	Dorso-lateral knobs Som. 2	Som. 3
Macrophthalminae	1, 4/6	2 + 2	4 + 1	2	0/1, 1, 5/6	1	1
M. punctulatus	1, 5	2 + 2	4 + 1	2	0, 1, 6	1	1
M. setosus	1, 5	2 + 2	4 + 1	2	0, 1, 6	1	1

of *M. hirtipes* zoeae is c. 3.0 times the width of the telson base and the telson length from base to furcal notch is c. 0.28 times the total telson length. Comparable figures for the other *Macrophthalmus* zoeae are not more than 1.4 and not less than 0.43 respectively. *M. hirtipes* zoeae are also substantially larger than other known *Macrophthalmus* zoeae.

One other species from the sub-family Macrophthalminae has been collected from the Brisbane River (Snelling, 1959), i.e., *Australoplax tridentata*. It is intended that zoeal larvae of this species will be described in a future paper. Thus it is premature, at this time, to discuss differentiating features of species within the sub-family on a local basis.

ACKNOWLEDGEMENTS

We are most grateful to Robin Hutchings for technical assistance and to Ian Smith of New South Wales State Fisheries for providing starter cultures of *Brachionus* sp. The Australian Research Grants Committee and the University of Queensland provided research grants which we also gratefully acknowledge.

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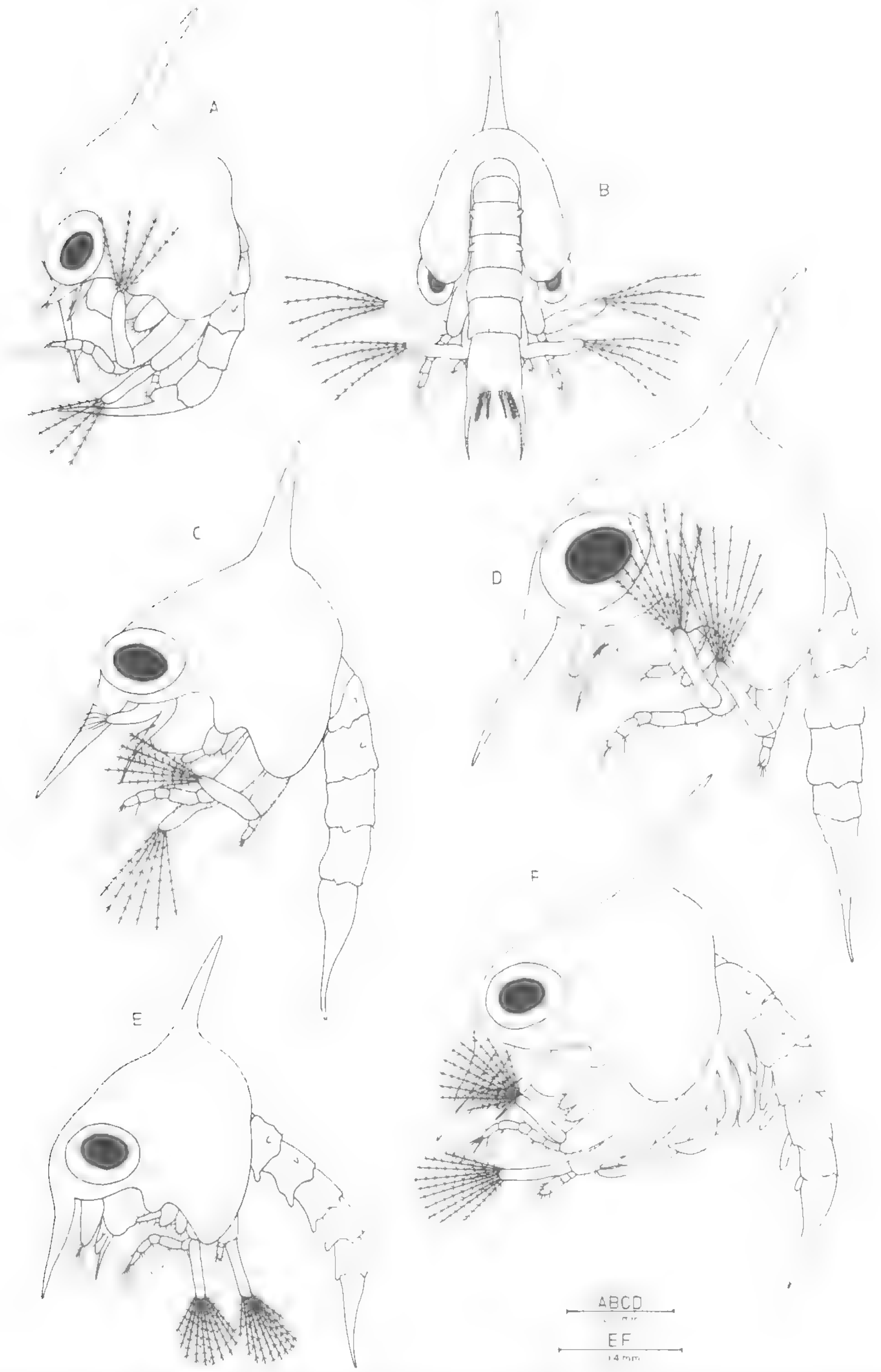

FIG. 2: *Macrophthalmus setosus*. **A.** first zoea lateral view; **B.** first zoea posterior view; **C.** second zoea; **D.** third zoea; **E.** fourth zoea; **F.** fifth zoea.

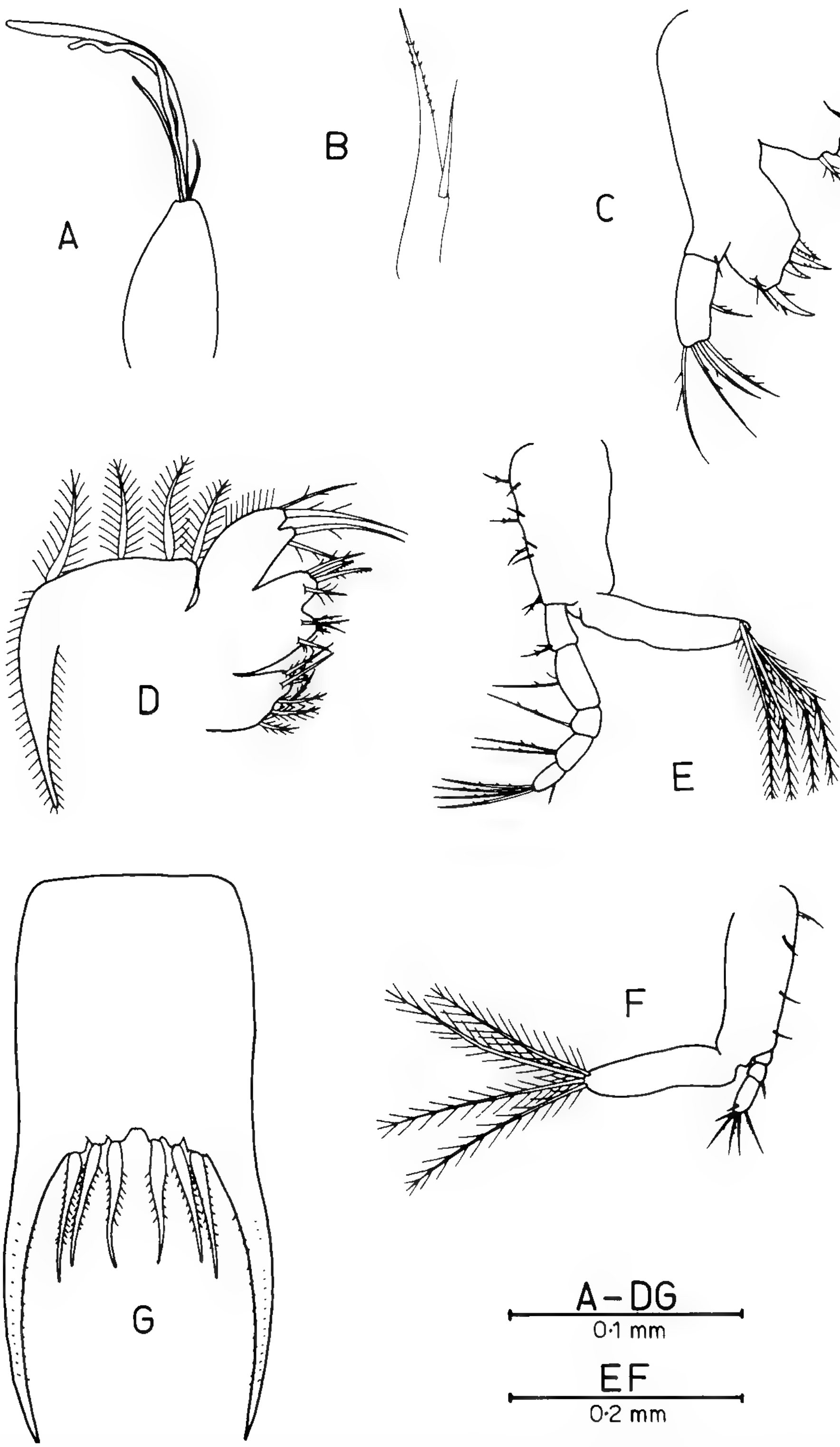

FIG. 3: *Macrophthalmus setosus* first zoea appendages. **A**. first antenna; **B**. second antenna; **C**. first maxilla; **D**. second maxilla; **E**. first maxilliped; **F**. second maxilliped; **G**. telson.

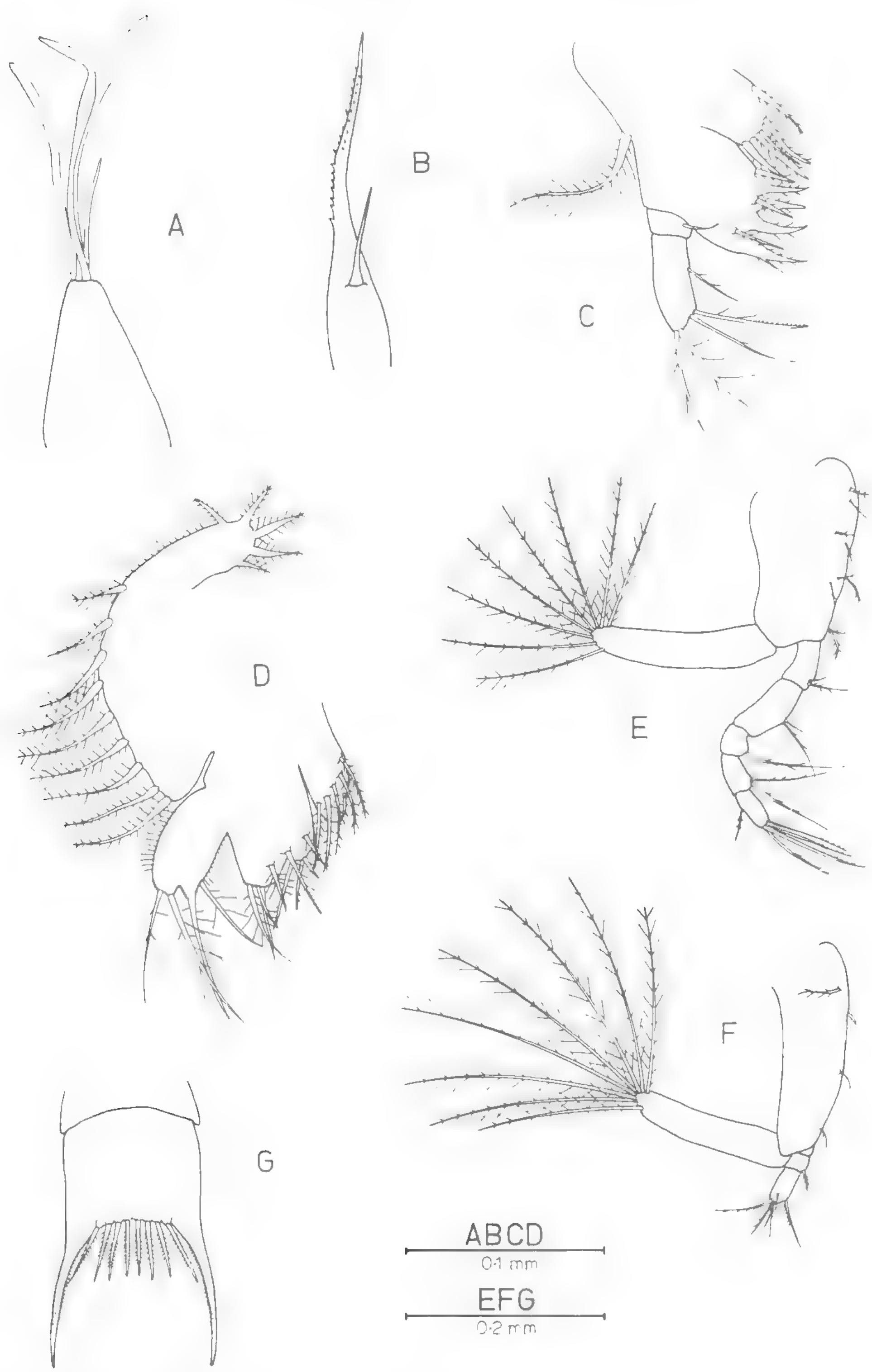

FIG. 4: *Macrophthalmus setosus* third zoea appendages. **A**. first antenna; **B**. second antenna; **C**. first maxilla; **D**. second maxilla; **E**. first maxilliped; **F**. second maxilliped; **G**. telson.

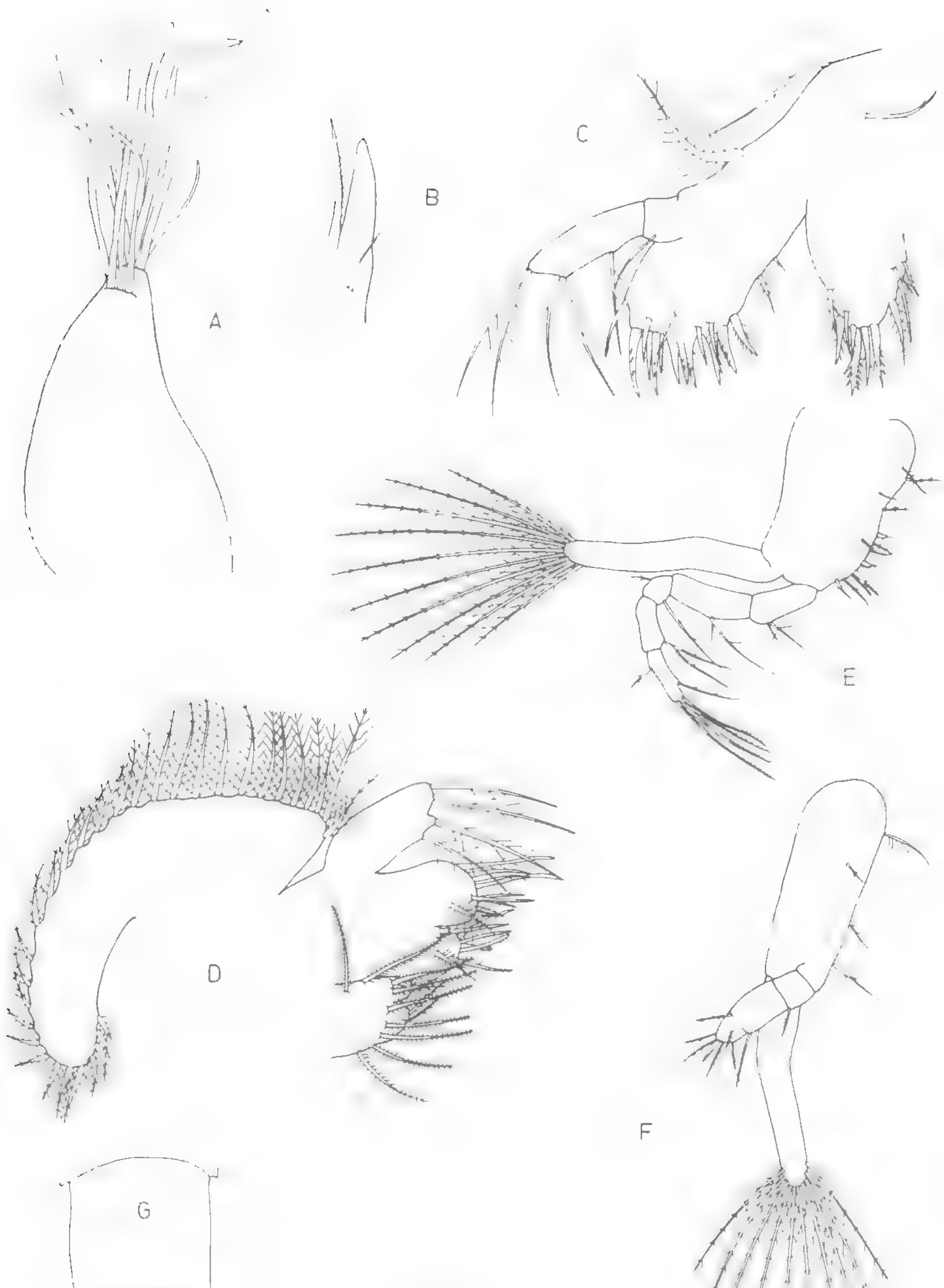

FIG. 5: *Macrophthalmus setosus* fifth zoea appendages. **A.** first antenna; **B.** second antenna; **C.** first maxilla; **D.** second maxilla; **E.** first maxilliped; **F.** second maxilliped; **G.** telson.

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A NEW AUSTRALIAN GENUS OF BITTACIDAE (MECOPTERA)

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ABSTRACT

Symbittacus scitulus gen. nov., sp. nov. is described from tropical rainforest in Queensland. It is most closely related to the E. Australian genus *Tytthobittacus* and the neotropical genera *Nannobittacus* and *Issikiella*, but differs particularly in details of wing venation. A key to the Australian genera of Bittacidae is given.

INTRODUCTION

Bittacidae are the most widespread family of Mecoptera, with species in tropical and temperate regions of every continent. Generic diversity is greatest in tropical South and Central America (6 genera). Both Australia and North America have four genera, those in Australia being wholly endemic. To these may be added the new genus described below. QM Queensland Museum.

Symbittacus gen. nov.

Generally similar in appearance to *Tytthobittacus* Smithers of eastern Australia and to the neotropical genera *Nannobittacus* Esben-Peterson and *Issikiella* Byers but differing particularly in details of wing venation. Wing slender in basal one-third; base to origin of M (divergence of M from $M+Cu_1$) 33% of total length in front wing, 29% in hind wing. Subcosta joins costa well beyond first fork of Rs in front wing. Two pterostigmal cross-veins. Basal sections of R and $M+Cu_1$ closely approximated or in contact from near base of wing to shortly before origin of M, where they diverge abruptly. Vein Cu_2 in front wing ends far beyond first fork of M; in hind wing Cu_2 lies alongside and in contact with marginal vein from about level of origin of Rs basad to level of humeral cross-vein (h). Vein 1A ends well before origin of M, 2A extending beyond h, in front wing; 1A apparently represented by very short cross-vein near level of h, 2A by short, diagonal cross-vein near wing base, in hind wing. One pair of stout, black setae on fourth tarsomere of hind legs. Compound eyes convergent anteriorly below antennal bases; frons between eyes less than width of ocellar triangle.

It is anticipated that further generic characters will be found when males are available for examination.

Type species: *Symbittacus scitulus* , sp. nov.

ETYMOLOGY

The name of the genus (Greek, *sym* = together, + *Bittacus*) refers to the extended contact of Cu_2 and the posterior marginal vein in the hind wings and of R and $M+Cu_1$ in both the front and hind wings.

KEY TO AUSTRALIAN GENERA OF BITTACIDAE

1\. Hind basitarsus only about as long as fourth tarsomere; vein 1A in hind wing extending beyond level of origin of Rs; body colour black or reddish brown to dark orange-brown and black (6 species, Queensland, New South Wales, Victoria, South Australia, Western Australia, Tasmania)............ *Harpobittacus* Gerstaecker

Hind basitarsus 2-3 times as long as fourth tarsomere; vein 1A in hind wing extending only to level of origin of M or slightly beyond, usually in form of cross-vein from Cu_2 to marginal vein; body color light reddish brown to brown or dark grayish brown 2

2\. In hind wing, vein Cu_2 in contact with marginal vein along approximately three-fourths of length of former; apical section of 1A an extremely short cross-vein near level of h (1 species, Queensland). *Symbittacus* , gen. nov.

Vein Cu_2 in hind wing distinctly separated from marginal vein; 1A fused basally with Cu_2, its apical section appearing as a transverse or diagonal cross-vein 3

3. Apical section of 1A in hind wing diagonal between Cu_2 and margin; two cross-veins between 1A and 2A in front wing (1 species, Queensland)............... *Austrobittacus* Riek

   Apical section of 1A in hind wing transverse (rarely absent); one cross-vein between 1A and 2A in front wing 4

4. Wings tinged with yellowish brown, without pattern; stigma slightly darker brown; in male, cerci shorter than paired, subtriangular, nearly vertically oriented epiandrial lobes of deeply divided ninth abdominal tergum (1 species, Queensland)............ .... *Edriobittacus* Byers

   Wings lightly tinged with brown with faint shading of grayish brown at apex and along both series of cross-veins in disc of wing; stigma reddish; in male, cerci nearly twice length of broad, flattened, shallowly notched ninth abdominal tergum (1 species, New South Wales) .... *Tytthobittacus* Smithers

Symbittacus scitulus sp. nov.

Material Examined

Holotype: QM T8887; ♀; 1 km south of Cable Tower 6, Bellender-Ker Range, 40 km S of Cairns, N.Q. (17°16'S, 145°53'E); Malaise trap, mesophyll-vine forest, 500 m elevation; Earthwatch-Queensland Museum Expedition; 17.x.1981–5.xi.1981.

Description

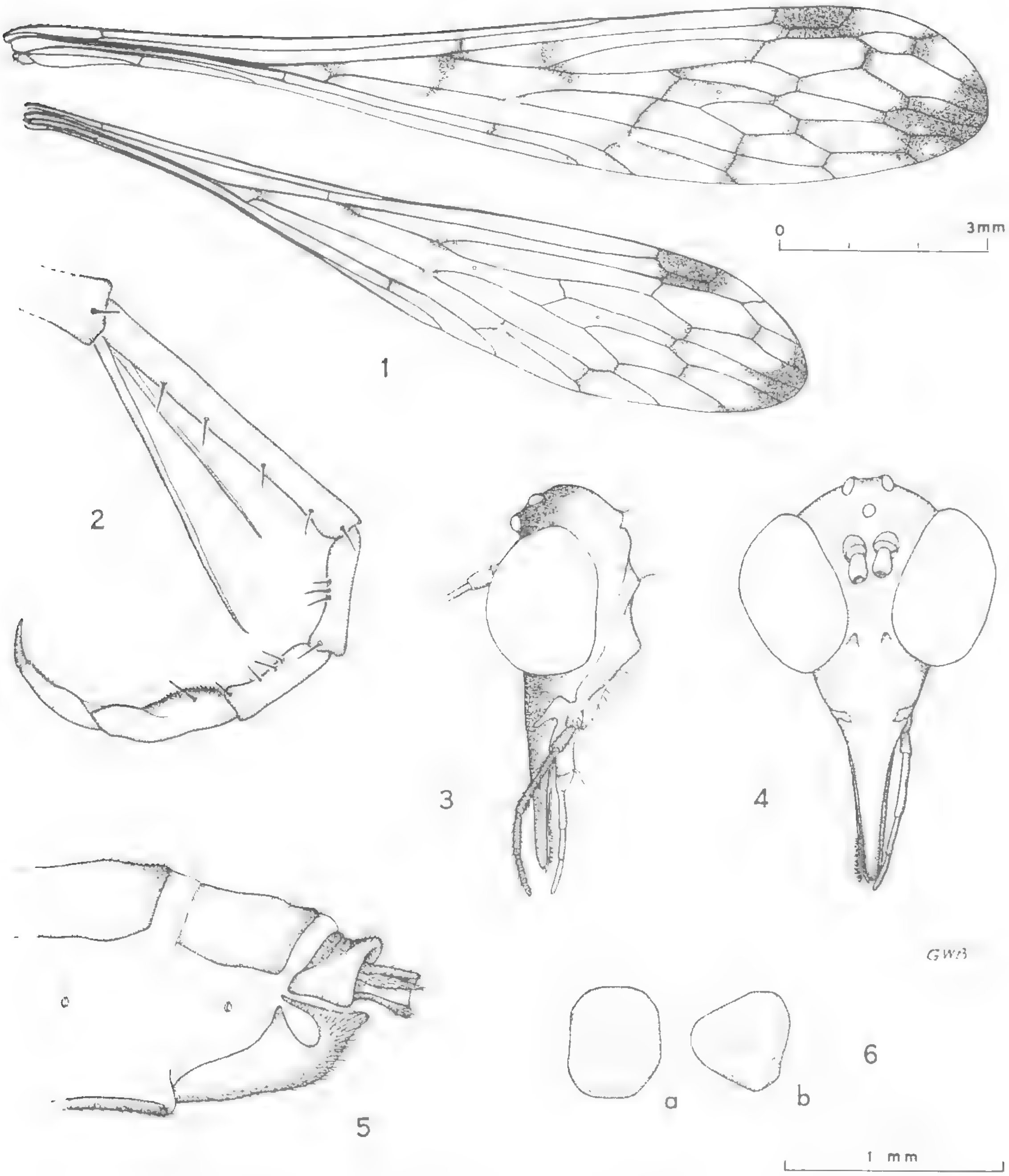
Based on one female, preserved in alcohol.

Head: Vertex, frons above antennal sockets and anterior surface of clypeus dark blackish brown, grading through brown to pale yellowish brown on occiput, postgenae and at sides of clypeus; frons including antennal sockets pale yellowish brown; apical half of labrum brown, basal half dark brown. Rostrum about 2.9 times as long as its basal width; maxillary palps mostly dark brown, paler near base; labium including labial palps pale yellowish brown. Terminal segment of maxillary palp as long as fourth segment. Eyes large, widest diameter (dorsoventral) about 39% of total length of head, protruding forward (Fig. 3) and conspicuously convergent below antennal bases (Fig. 4), separated by less than (about 83%) width of ocellar triangle. Ocelli of uniform diameter; upper frons concave below median ocellus. Antennae short, about 4.1 mm, comprising short cylindrical scape, ovoid pedicel and 18 slender flagellomeres (segmentation indistinct beyond ninth flagellomere). Hairs on flagellomeres short, about 2–3 times diameter of respective flagellomere.

Thorax: Pronotum dark brown, darkest along anterior margin, with scattered short hairs especially medially but no prominent setae. Mesonotum and metanotum brown to dark brown, darkest on more elevated parts of scutum and on scutellum, yellowish brown along impressed suture lines, on postscutellum and on scutum adjacent to wing attachments; hairs short, most dense near mid-line. Pleural surfaces generally pale yellowish, but brown on proepisternum and light brown on anterior surface of first coxa, anepisternum and preepisternum of mesothorax, making a vertical dark band below base of front wing, and on posterior surface of mesothoracic meron. Adjacent black spots on posterodorsal corner of mesothoracic meron and posteroventral corner of epimeron. Sparse hairs on anterior surfaces of coxae and anepisterna. Femora mostly yellowish brown, paler at base, abruptly darker brown near apex; tibiae yellowish brown except brown near apex. Spurs of front tibia subequal in length, about 0.4 as long as elongate, slender basitarsus. Spurs of hind tibia (Fig. 2) of unequal length, one longer than basitarsus, the other slightly shorter than basitarsus. Tarsi yellowish brown, claws reddish brown; hind tarsi about twice diameter of front tarsi but only about 0.6 as long; a single strong, black seta on each side of fourth tarsomere of hind tarsus.

Wings: (Fig. 1) highly iridescent, faintly tinged with brown and clouded with brown along most cross-veins, near forks of major veins and at apex. Pterostigma dark brown. Subcosta extending to level of first fork of Rs (FRs) in hind wing, beyond FRs in front wing. Subcostal cross-vein (Scv) just beyond origin of Rs (ORs) in front wing, just before ORs in hind wing. In front wing, vein 1A joins hind margin just before level of divergence of R and $M+Cu_1$, 2A extends slightly beyond level of h; no cross-vein between 1A and Cu_2. In hind wing, neither 1A nor 2A distinct due to close approximation of Cu_2 and marginal vein, but 1A may be represented by short cross-vein between Cu_2 and hind margin near level of h, and 2A by a short, diagonal cross-vein near wing base. Two pterostigmal cross-veins.

Abdomen of female: Terga 2–5 grayish brown with black antecostal borders; corresponding sterna slender, elongate, pale. Terga 6–9 dark brown with black antecostal borders; sterna 6–7



FIGS. 1–6. *Symbittacus scitulus* , new species, details of structure, female holotype. **1.** Right wings. **2.** Left hind tarsus, lateral aspect. **3.** Head, left lateral aspect. **4.** Head, frontal aspect to show convergence of eyes; right maxillary palp omitted. **5.** Terminal abdominal segments, left lateral aspect. **6.** Egg, side view (a) and end view (b). Upper scale, Fig. 1; lower scale, Figs. 2–6.

brown, 8 blackish brown. Tenth segment recessed beneath ninth tergum (in holotype); short, pale cerci and segment 11 protruding caudad (Fig. 5). Segments 2–4 slender, 5–6 enlarging posteriorly, 7 about same diameter as caudal end of 6, segment 8 of slightly smaller diameter. Eighth sternum completely divided by narrow membranous zone along ventral mid-line; each separate sternal plate deeply incised dorsolaterally, indicating division between sternum and its posterior prolongations forming lower valves of ovipositor (Fig. 5). Tergum and sternum 11 both truncate at apex.

Nearly mature egg dissected from abdomen subtriangular at ends (Fig. 6), with flattened surfaces shallowly impressed. Eggs confined to segments 5–8. Spermatheca not examined.

Body length, female (holotype), 13.0 mm, excluding antennae. Front wing 14.1 mm.

Remarks

Symbittacus scitulus resembles *Tytthobittacus macalpinei* Smithers (from New South Wales) in having the wings darkened apically and along certain cross-veins, as well as in the short 1A ending before the level of the divergence of M from Cu_1 and the basal approximation of R and $M+Cu_1$. *Symbittacus* , however, has three unevenly alternated series of cross-veins in the radial-medial field of the wing, while *Tytthobittacus* has but two series, each in much more nearly transverse alignment. In *Tytthobittacus* , Cu_2 in the hind wing is distinctly separated from the marginal vein throughout its length, with 1A appearing as a cross-vein near the level of origin of M, whereas in *Symbittacus* Cu_2 lies against the marginal vein for three-fourths of its length.

Etymology

The specific name *scitulus* (Latin, beautiful) refers to the patterned, iridescent wings and the varicolored head, thorax and abdomen.

ACKNOWLEDGEMENTS

For permission to examine and describe the single specimen upon which *Symbittacus scitulus* is based, I am indebted to Dr G.B. Monteith, of the Queensland Museum. He not only sent the specimen soon after it was captured but made repeated attempts to collect further individuals at the same remote locality. I also thank the U.S. National Science Foundation for support of my study of Mecoptera, currently by grant DEB 80-22342. The Earthwatch organization (Boston, Massachusetts) provided funds and volunteer labor to the expedition that collected this specimen.

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A REVISION OF THE INDO-AUSTRALIAN SMICROMORPHINAE (HYMENOPTERA : CHALCIDIDAE)

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ABSTRACT

The taxonomic relationships, biology and distribution of the Smicromorphinae are discussed. Species of the only genus *Smicromorpha* Girault are believed to be parasites of the larvae of the Indo-Australian weaver ant *Oecophylla smaragdina* (Fabricius). *S. doddi* Girault and *S. minera* Girault (from Australia) and *S. keralensis* Narendran (from southern India) are redescribed; *S. eudela* sp. nov. (from Australia) and *S. banksi* sp. nov. (from Australia and New Guinea) are described. Lectotypes are selected for *S. doddi* and *S. cadaverosa* Girault (= *S. doddi*, syn. nov.). *Smicromorphella* Girault is synonymized with *Smicromorpha* .

INTRODUCTION

The Smicromorphinae is the least known and perhaps the most bizarre subfamily of chalcidid wasps. All species have ophionoid facies (Gauld and Huddleston 1976), and an elongate, tail-like metasoma inserted high on the propodeum (Fig. 1), as in Gasteruptiidae. Girault (1913) proposed a monotypic tribe for *Smicromorpha doddi* Girault, a parasite of the weaver (= green tree) ant *Oecophylla smaragdina* (Fabricius) in north-eastern Queensland, and subsequently described two additional species and a second genus (Girault 1914, 1915, 1926, 1930). Narendran (1979) described a species from India and elevated the tribe to subfamily status. For nearly 50 years Smicromorphinae have been represented in collections by a handful of specimens, most of which were in poor condition. However, long series recently collected in various northern Australian localities now permit a re-evaluation of the status of the group and of the described species.

Terminology generally follows Bouček (1974), along with Bohart and Menke (1976) for the mesopleural carinae; Copland and King (1972) for the ovipositor; and Eady (1968) for microsculpture.

The following abbreviations and symbols are used: (1) *Morphological terms* (see Figs 10, 20–27, 32, 38): a, aedeagus; aa, aedeagal apodeme; ah, anterior horn of ovipositor; ap, anterior petiole; b, basal ring; bt, basitarsus; c, cercus; d, digitus; F1, F2, flagellar segments 1, 2,; f, hind tibial furrow; fp, fulcral plate; fs, fulcral plate spines; FW, minimum distance between compound eyes, measured across frons; ip, inner ovipositor plate; lb, laminated bridge; LF, minimum distance between lower margins of antennal toruli and clypeo-labral suture; li, ligament; lm, lamina; M, minimum distance between compound eye and oral fossa; m, metanotum; MAE, maximum diameter of compound eye; OD, maximum diameter of lateral ocellus; op, outer ovipositor plate; OOL, distance between lateral ocellus and compound eye; OS, minimum distance between median ocellus and antennal scrobes; ph, phragma; POL, distance between lateral ocelli; pp, posterior petiole; pr, propodeum; S1, S2, metasomal sternites 1, 2; sp, semicircular plate; SW, maximum width of antennal scrobe; T1, T2, metasomal tergites 1, 2; t, propodeal teeth; ts, tibial spur; UF, minimum distance between lower margins of antennal toruli and anterior margin of median ocellus.

(2) *Collections*: AMNH, American Museum of Natural History, New York, USA (Ms M. Favreaux); ANIC, Australian National Insect Collection, CSIRO, Canberra (Dr I.D. Naumann); BMNH, British Museum (Natural History), London, UK (Dr J.S. Noyes; Dr Z. Bouček, CIE); BPBM, Bernice P. Bishop Museum, Honolulu, Hawaii, USA (Mr G. Nishida); NTAS, Entomology Section, Division of Agriculture and Stock, Department of Primary Production, Darwin (Mr A. Allwood); QDPI, Department of Primary Industries, Entomology Branch, Brisbane (Dr I.D. Galloway); QM,

Queensland Museum, Brisbane (Mr E.C. Dahms); UQIC, Department of Entomology, University of Queensland, Brisbane (Ms M. Schneider); USNM, United States National Museum of Natural History, Washington D.C., USA (Dr E. Grissell, USDA).

Subfamily SMICROMORPHINAE Girault

Smicromorphini Girault, 1913, p. 70; Narendran, 1979, p.908.
Smicromorphinae Narendran, 1979, p.910.

DESCRIPTION

FEMALE. Body: 4.0–5.9 mm long. Head, mesosoma, and petiole strongly sclerotized; gaster weakly sclerotized. Integument predominantly translucent, yellow to orange in colour, occasionally with brown to black markings, non-metallic. Pubescence short, fine, silvery, inconspicuous.

Head: Hypognathous, slightly broader than pronotum. Vertex and frons finely sculpured, without prominent carinae or projections; posterior surface of head smooth. Compound eye moderate-sized to very large, bare, inner margin entire. Ocelli moderate-sized to very large. Occipital carina absent, occipital suture dorsally distinct; temple short, dorsally rounded, ventrally carinate; posterior surfaces of head concave, closely appressed to pronotum. Subocular suture indistinct, weak or distinct. Antennal scrobes deep, margins usually carinate, OS/OD more than 0.5, without median carina. Torulus slightly above or slightly below level of ventral margin of compound eye, never near to anterior tentorial pit. Anterior tentorial pit and frontoclypeal suture indistinct. Anterior margin of clypeus very weakly emarginate, not produced. Labrum exposed, small, wider than long, distal margin convex. Mandibles (Fig. 8) asymmetrical: right mandible with inner, rounded, weakly sclerotized lobe and outer, elongate, acute, strongly sclerotized tooth; left mandible with inner, stout, acute, strongly sclerotized tooth and outer, weakly sclerotized process. Labio-maxillary complex small. Maxilla: cardo present; stipes elongate, with 2 apical lobes (1 with single strong seta); palp absent. Labium: glossa represented by broad, setose lobe; paraglossa small, setose; palp absent. Antenna: very short, 9-segmented, with short, inconspicuous pubescence; scape 3.6–4.8 times as long as wide; pedicel swollen; flagellum fusiform or filiform (distal segments often collapsed in dried material), F1 1.0–1.5 X as long as wide, sometimes much shorter than F2; clava unsegmented, hardly differentiated.

Mesosoma: Short, broad, generally more coarsely sculptured than head. Pronotum: medially very short, without transverse carinae; dorsolaterally usually with transverse carina; lateral panel short, with rounded anterior margin; anterior surfaces more-or-less flat, neck represented by narrow rim. Mesoscutum: notaulix distinct, percurrent; parapsidal furrow absent. Mesoscutellum broad; axilla differentiated, separated from supra-alar area by fine, longitudinal carina; frenum not differentiated. Tegula elongate-oval, not spatulate, not reaching pronotum. Prepectus minute, scale-like, moveable, at anterior end of tegula. Mesopleuron with deep ventral depression to receive reflexed mid femur; upper mesopleuron not subdivided; omaulus and acetabular carina present or absent, subomaulus weak, short. Metanotum medially very short and unsculptured; dorsellum absent; laterally sculptured. Metapleuron not defined. Propodeum rugose-punctate, without carinae or plicae; spiracle reniform, spiracular sulcus variable; petiolar foramen situated anteriorly, separated from metanotum by very narrow rim which gives rise to phragma (Fig. 23).

Legs: Fore coxa slender, slightly more than 0.5 x length of fore femur. Trochantellus absent from all legs. Fore femur slender. Fore tibia with single, small, minutely bifid, apical spur; apical tooth absent. Mid coxa globular, less than 0.5 x length of mid femur. Mid femur slender. Mid tibia slender, straight, with single, small, apical spur. Hind coxa subcircular in cross-section, almost as long as hind femur, coriaceous to granulate. Hind femur greatly enlarged, its outer ventral margin usually with comb of fine teeth; without additional longitudinal carinae or inner teeth; coriaceous, setigerous punctures dense and conspicuous. Hind tibia shorter, stouter than fore and mid tibiae; strongly curved; dorsoapically with furrow (Fig. 10) for reception of reflexed basitarsus; ventrally with percurrent inner and outer longitudinal carinae; ventroapically produced into a spine slightly longer than basitarsus; with small spur near apex of spine; without additional external longitudinal carinae. Tarsi 5-segmented; fore and mid tarsi more slender than hind tarsus; claws minute; arolia large.

Wings: Dorsally and ventrally densely pubescent; pubescence sparser proximally, but not forming distinct rows or bands. Fore wing: submarginal vein long, parallel to costal margin, usually with distal swelling (stump of basalis); marginal vein short, at most about as long as stigmal vein; basal cell area without sclerotized spot; Rs, median vein and Cu_2 suggested by indistinct brown colouration. Hind wing: submarginal vein 0.6 x as long as wing; with 1 straight and 2 hook-shaped hamuli.

Metasoma: Elongate, slender (Fig. 1), T1 and S1 fused to form a petiole (Fig. 21); segments 2–4 depressed, subcylindrical; segments 5–8 laterally compressed. Anterior petiole with strong dorsal condyle providing major articulation with propodeum (Figs 22, 24); posterior petiole defined anterolaterally and anteroventrally by transverse lamina (rarely ventrally interrupted), posteriorly slightly overlapping T2 and S2. T2 shorter than S2; with 2 anterolateral articulations with petiole. S2 elongate, extending dorsally between T2 and T3 to form weakly sclerotized tube. T3 and S3 each of equal length and deeply telescoped into S2. T4, S4 and T5, S5 not deeply telescoped into preceding segments. S6 longer than T6, medially divided into 2 hemisternites. T7 large; 2 laterotergites present internally. T8 (epipygium) divided medially into two hemitergites (Fig. 26); cercus short, not articulated, with 4 short setae, recessed in depression near posterior margin. Spiracles absent from all segments. Petiole, T2, S2–S4 bare, T3–T8 setose. Anterior margins of only T2 and S2 thickened. Anterior margins of T2 convex, of S2 straight, of T3–T7 and S3–S5 emarginate. Posterior margins of T2–T6 straight, of T7 convex. Ovipositor concealed at rest; inner ovipositor plate without articulated palp, posteriorly plates connected by transverse, sclerotized bridge; 11 fulcral plate spines present; fulcral plate articulations and ligaments as in Fig. 27; ramus spines indistinguishable.

Male. Differs from female as follows.

Antenna: With 7–9 segments. F1 0.7–1.4 x as long as wide.

Metasoma: Tergites and sternites as in Fig. 20. T6–T8 each elongate, differentiated into an anterior, bare, reticulate-sculptured portion concealed by preceding tergite and an exposed, posterior, setose portion. T8 undivided; cercus on posterior margin. S6–S8 small, undivided. Anterior margins of T6–T8 very weakly emarginate, of S3–S8 emarginate. Posterior margins of tergites convex, of sternites more-or-less straight. Genitalia (Fig. 25): basal ring elongate, unspecialized; cuspis with 3 setae; digitus elongate, bidentate; aedeagus slender, unspecialized; parameres absent.

Remarks on Morphology and Classification of Smicromorphinae

It is beyond the scope of the present paper to analyse comprehensively the phylogenetic relationships among the subfamilies of Chalcididae. However, it is clear that the species here assigned to the Smicromorphinae comprise a monophyletic group of chalcidid wasps and a group which cannot be related closely to any other subfamily of Chalcididae.

Several synapomorphic metasomal characters (the high insertion of the petiole on the propodeum, the tubulose second metasomal sternite, the division of T8 into hemitergites in females) indicate the monophyly of the group. The structure of the hind leg (large coxa, large and usually toothed femur, curved tibia) suggests that the Smicromorphinae should be classified within the Chalcididae. The hind femur is similarly enlarged and toothed in Leucospidae, some monodontomerine Torymidae (see Bouček, 1978), and some cleonymine Pteromalidae, as well as in Chalcididae. However the species of Smicromorphinae can be excluded from these non-chalcidid groups (which do not show close affinities with each other) and included in the Chalcididae by their having the following combination of characters: small, unsculptured prepectus; relatively short marginal vein; unfolded fore wing; metasomal characters as listed above.

The Smicromorphinae are unique among the Chalcididae in that the petiole is inserted very high on the propodeum (i.e. the anterior margin of the petiolar foramen is very close to the metanotum). In Smicromorphinae the foramen is separated from the metanotum by only a narrow rim which gives rise to a phragma. Convergently the petiole is inserted relatively high on the propodeum in several unrelated, extant groups of Hymenoptera – Labeninae (Ichneumonidae), Paxylommatidae and cenocoeliine Helconinae (Braconidae), Liopteridae, *Asoka* Bouček (Pteromalidae), Evaniidae, Aulacidae and Gasteruptiidae. Only in Gasteruptiidae is the petiolar foramen as closely adjacent to the metasoma as in the Smicromorphinae.

Steffan (1957) established that the structure of the petiole (first metasomal segment) and its articulations with the propodeum and the second metasomal segment are characteristic for each subfamily of Chalcididae.

In Smicromorphinae the tergite and sternite of the first metasomal segment are fused to form a solid, more-or-less cylindrical petiole. A transverse lamina divides the petiole into a short anterior position and an elongate posterior portion (Figs 22, 24). The lamina does not participate in the articulation with the propodeum. The major articulation is dorsal, through a smoothly convex condyle which occupies the width of the anterior petiole. This condyle is probably homologous with the 'rotule' of Steffan (1957). The articulation surface is more smoothly convex and undifferentiated than in any other Chalcididae figured by Steffan (1957). In the Smicromorphinae, the lamina is usually laterally and ventrally distinct, but dorsally absent. A lamina is present elsewhere in the Chalcididae only in the Chalcidinae, where it is dorsally continuous. Burks (1940) regarded the lamina as characteristic of the Chalcidinae and its presence in the Smicromorphinae suggests that the two subfamilies are related.

The posterior petiole differs from that of Brachymeriinae in that it does not enter the propodeal foramen, and from that of the Haltichellinae in that it does not partially enclose the propodeum. The posterior petiole is elongate in Epitraninae, Chalcidinae, and some Haltichellinae, as well as in Smicromorphinae. There is no petiolar spiracle in Smicromorphinae as there is in many Chalcididae (e.g. *Chalcis* Fabricius). The posterior petiole slightly encloses the anterior margins of T2 and S2. The latter are slightly thickened. A pair of small, transverse folds on T2 (and to a lesser extent on S2) serve as pivots. The posterior articulation of the petiole is most similar to that in Chalcidinae. It is unlike that of Epitraninae in which T2 encloses a sliding process from the posterior portion of the petiole and unlike that of Dirhininae in which S2 is fused to the petiole.

Thus, the morphology of the petiole suggests that the Smicromorphinae are not closely related to any other subfamily of Chalcididae, except perhaps the Chalcidinae.

Smicromorphinae are unique among the Chalcididae in that the lateral margins of S2 extend dorsally and are fused along the midline to produce a weakly sclerotized tube. T2 covers only the anterior part of this tube into which metasomal segment 3 is deeply telescoped. In females, T8 (the epipygium) is divided medially into two hemitergites, a condition unique within the Chalcididae, but approached within the Leucospidae. The absence of metasomal spiracles is also unique within the Chalcididae.

Other distinctive features of the Smicromorphinae include: (1) the ophionoid facies (large compound eyes and ocelli; pale yellow to orange colour); (2) the mandibles, with their unusual combination of teeth, weakly sclerotized processes and lobes; (3) the absence of palps; (4) the short antenna, which in a least two species has a variable number of flagellar segments in males; (5) the very reduced pronotal collar; and (6) the slender, tail-like metasoma.

Biology

Smicromorpha doddi Girault is reported to be parasitic upon the larvae of the green tree or weaver ant *Oecophylla smaragdina* (Formicinae) (Girault 1913). Workers of *O. smaragdina* construct aerial nests of leaves bound together by the silk produced by their larvae. During nest construction the workers hold larvae in their mandibles and apply them to the leaf edges which are to be bound. According to the late F.P. Dodd, the wasp oviposits on the ant larva during nest construction (Girault 1913).

Specimens of Smicromorphinae have been collected near nests of *O. smaragdina* on several occasions, but none has been reared from nests. *O. smaragdina* is abundant in all areas from which Smicromorphinae have been collected in Australia.

At least four species of Smicromorphinae are known to be attracted to light and are therefore probably nocturnal; certainly one of these species is crepuscular. The ophionoid facies occurs within subfamilies of Ichneumonidae, Braconidae, Sphecidae, and Pompilidae, and in these groups also is correlated 'almost invariably' with nocturnal habits (Gauld and Huddleston, 1976: Naumann, unpub.).

The biological significance of most of the distinctive morphological features of the Smicromorphinae is unknown. The reduced mouthparts could be correlated with surface feeding or drinking, or with an absence of feeding. The slender metasoma is almost certainly highly mobile and telescopic, and is probably an adaption to oviposition on or in a relatively inaccessible or mobile host.

Distribution

Outside Australia Smicromorphinae are known from New Guinea, the Philippines (Riek unpub.), southern India (Narendran, 1979) and central Africa (Bouček unpub.). This distribution parallels that of the two extant *Oecophylla* spp. *O. smaragdina* is distributed from India to the Solomon Islands and throughout northern Australia; and *O. longinoda* (Latreille) occurs in tropical Africa. Fossil species of *Oecophylla* are known from Europe (Eocene–Miocene) and eastern Africa (Miocene) (Wilson and Taylor 1964; Burnham 1979).

At present, *Smicromorpha keralensis* Narendran is known only from southern India, *S. banksi* sp. nov. is known from northeastern Australia and New Guinea. *S. doddi*, *S. minera* Girault and *S. lagynos* sp. nov. are widely distributed throughout northern Australia (Fig. 2) and *S. eudela* sp. nov. is known only from the 'Top End' of the Northern Territory. The distribution of *Smicromorpha* spp. in northern Australian corresponds closely with the distribution of *O. smaragdina*. Both *Smicromorpha* spp. and *O. smaragdina* are restricted to lowland rainforest and sclerophyll habitats and are absent or very rare at altitudes above 300m.

SMICROMORPHA Girault

Smicromorpha Girault, 1913, p.89; Girault, 1914, p.461; Girault, 1915, p.354; Gahan and Fagan, 1923, p.133; Narendran, 1979, p.908. (Type-species *Smicromorpha doddi* Girault, by original designation and monotypy.)

Smicromorphella Girault, 1930:[2]; de Santis, 1961, p.165. (Type-species *Smicromorphella minera* Girault, by monotypy.) Syn. nov.

DESCRIPTION

As for subfamily description.

RELATIONSHIPS OF SPECIES OF *SMICROMORPHA*

S. minera, *S. keralensis*, *S. lagynos*, and *S. banksi* are morphologically similar, especially with respect to the compound eye, ocelli, antennal scrobes and mesopleural carinae. *S. doddi*, with a very large compound eye and large ocelli, and *S. eudela*, with a reflexed stigmal vein, weakly developed femoral comb and non-carinate antennal scrobes are each morphologically isolated.

KEY TO INDO-AUSTRALIAN SPECIES OF *SMICROMORPHA*

1. Margins of antennal scrobes not carinate (Fig. 42); stigmal vein reflexed (Figs 15, 16), longer than marginal vein; hind femur without comb of small black teeth, distally with only 3 or 4 pale-coloured teeth.............. *eudela* sp. nov.

   Margins of antennal scrobes carinate (Fig. 38); stigmal vein more or less perpendicular to costal margin (Fig. 17), approximately as long as marginal vein; hind femur with well-developed comb of small black teeth 2

2. OD greater than OOL (Fig. 28); ventral mesopleuron transversely strigose (Fig. 31); acetabular carina absent or very weakly indicated but never continuous with omaulus; hind femur with small, ventral process bearing basal 1 or 2 black teeth of comb................................ *doddi* Girault

   OD less than OOL (Fig. 34); ventral mesopleuron reticulate-rugose to transversely strigose; acetabular carina usually present and continuous with omaulus, if not then hind femur without process......................3

3. Hind femur with both long, sparse, sub-erect setae and short, dense, appressed setae (Figs 35, 37); hind femur without blunt process at proximal end of row of teeth (Fig. 37) and antennal clava longer than wide .... *minera* Girault

   Hind femur with only short, dense, appressed setae (as in Fig. 33); either hind femur with blunt process at proximal end of row of teeth (as in Fig. 1) or antennal clava wider than long 4

4. Sternaulus present (Fig. 49); OS equal to diameter of median ocellus; frons without distinct, longitudinal groove between medial ocellus and antennal scrobes......... *keralensis* Narendran

   Sternaulus absent (Fig. 45); OS greater than diameter of median ocellus; frons with distinct, longitudinal groove between median ocellus and antennal scrobes (Fig. 46).........5

5. Petiole of female ventrally distinctly swollen (Fig. 18), less than 3.7 × as long as high, transverse lamina indistinct; antennal clava longer than wide; F1 of female less than 0.7 × as long as F2................ *lagynos* sp. nov.

   Petiole of female ventrally not distinctly swollen (Fig. 19), more than 4.0 × as long as high; transverse lamina distinct; antennal clava wider than long; F1 of female 0.8 × as long as F2 .... *banksi* sp. nov.

Smicromorpha doddi Girault

(Figs 1–5, 8–12, 17, 20–33)

Smicromorpha doddi Girault, 1913, p.89; Girault, 1914, p.461; Girault, 1915, p.355; Gahan and Fagan, 1923, p.133; Narendran, 1979, p.908.

Smicromorpha cadaverosa Girault, 1914, p.461; Girault, 1915, p 355; Narendran, 1979, p.908. Syn. nov.

MATERIAL EXAMINED

SYNTYPES: *S. doddi*: 1♀, 1♂ (♀ here designated as LECTOTYPE), in QM. Lectotype ♀: thorax, fore and hind legs, anterior segments of metasoma, on micropin through pith block; pith block on macropin, with the following labels: (i) '4489', in red ink in Girault's handwriting; (ii) '*Smicromorpha doddi* ♂ and ♀ Gir', in unrecognized handwriting, 'Types' in Girault's handwriting; (iv) 'LECTOTYPE *Smicromorpha doddi* Girault designated by I.D. Naumann 1981', on fluorescent red card; (v) 'PARALECTOTYPE *Smicromorpha doddi* Girault designated by I.D. Naumann 1981', on fluorescent blue card; head (crushed), antenna, hind leg, on slide with the following labels: (i) 'Type HY/3432 A.A. Girault'; (ii) 'Genotype, Queensland Museum, *Smicromorpha doddi* Girault, ♂ [crossed out], ♀', in unrecognized handwriting, '4489' in Girault's handwriting; (iii) 'Selected as LECTOTYPE, I.D. Naumann 1981'. Paralectotype ♂: thorax, hind legs, wings, petiole on micropin through triangular card; head, scapes, fore legs glued to same card; card on same macropin as lectotype (see above). Type locality: Darwin, Northern Territory (Girault 1913).

SYNTYPES: *S. cadaverosa*: 1♀, 1♂ (♂ here selected as LECTOTYPE), in QM. Lectotype ♂: in fair condition (minus head) on triangular card, with the following labels: (i) '4488', in red ink in Girault's handwriting; (ii) '*Smicromorpha cadaverosa* Gir, ♂, ♀ types', in Girault's handwriting; (iii) '*Smicromorpha cadaverosa* Gir' in unrecognized handwriting, 'Type', in Girault's handwriting; (iv) 'LECTOTYPE *Smicromorpha cadaverosa* Girault designated by I.D. Naumann 1981', on fluorescent red card; (v) 'PARALECTOTYPE *Smicromorpha cadaverosa* Girault designated by I.D. Naumann 1981', on fluorescent blue card; head (crushed), antenna (one attached to head), on slide, with the following labels: (i) 'TYPE HY/3433 A.A. Girault'; (ii) 'Queensland Museum *Smicromorpha cadaverosa* ♂♀ Gir' (in unrecognized handwriting), '4488' in Girault's handwriting; (iii) 'PARALECTOTYPE (ringed) and LECTOTYPE selected by I.D. Naumann 1981.' Paralectotype ♀: fore femur and mid leg (minus coxa) on apex of same card as lectotype; head (crushed), antennae (one attached to head), ringed, on same slide as lectotype. Type locality: Nelson (now Gordonvale), Queensland (28 July 1913, A.P. Dodd) (Girault 1914).

OTHER MATERIAL EXAMINED. Northern Territory: 1 ♀, Darwin, 25.vi.1972, M.S. Upton, in ANIC; 1 ♀, 12°28'S 132°52'E, Jabiluka Lagoon, 14 km N of Mudginbarry HS, 14.xi.1972, J.C. Cardale, in ANIC; 1 ♀, 1 ♂, 12°31'S 132°54'E, 9 km N by E of Mudginbarry HS, 10-11.vi.1973, J.C. Cardale, in ANIC; 2 ♀, 12°43'S 132°54'E, Mt Brockman, 14 km S by E of Mudginbarry HS, 11-12.vi.1973, J.C. Cardale, in ANIC; 5 ♀, 3 ♂ 12°48'S 132°42'E, Nourlangie Ck, 8 km N of Mt Cahill, 26.x.-20.xi.1972 and 16-17.vi.1973, J.C. Cardale and D.H. Colless, in ANIC; 1 ♀, Baroalba Ck, Noranda, via Jim Jim, 16.xi.1972, in NTAS; 1 ♂ 12°50'S 132'51'E, 16 km E by N of Mt Cahill, 13.vi.1973, J.C. Cardale, in ANIC; 2 ♀, 2 ♂, 12°52'S 132°46'E, Nourlangie Ck, 6 km E of Mt Cahill, 17-18.xi.1972, J.C. Cardale, in ANIC: 1 ♀, Koongarra, 15 km E of Mt Cahill, 15.xi.1972, D.H. Colless, in ANIC, 1 ♀, ♂, 12°57'S 132°33'E, Jim Jim Ck, 19 km WSW of Mt Cahill, 17.vi.1973, J.C. Cardale, in ANIC.

Queensland: 10 ♀, Lockerbie, 10 miles (16 km) WSW of Somerset, 20-30.vi.1948, G.M. Tate, in AMNH; 7 ♀, 1 ♂, same locality, 13-27.iv.1973, G.B. and S.R. Monteith, in ANIC, QM, UQIC; 1 ♀, Bamaga, 3-6.vi.1969, G.B. Monteith, in ANIC; 1 ♀, Iron Range, 1-9.vi.1971, S.R. Monteith, in ANIC; 1 ♀, same locality, G.B. Monteith, in ANIC; 1 ♀, '11-Mile Scrub', 19 km N of Moreton, 1-2.vii.1975, G.B. Monteith, in ANIC; 1 ♀, Moreton Telegraph Station, 30.vi.1975, G.B. Monteith, in ANIC; 1 ♂, Brown's Ck, Pascoe R., 13.vi.1948, G.M. Tate, in AMNH; 3 ♀, Capsize Ck, 64 km N of Archer R. crossing, 29-30.vi.1975, G.B. Monteith, in QM, ANIC, UQIC; 1 ♀, Wenlock, 27.vii.1948, G.M. Tate, in AMNH; 1 ♀, Pat Ck, 11 km N of Archer R. crossing, 28-29.vi.1975, G.B. Monteith, in ANIC; 1 ♀, 15 km S of Yarraden, Coen district, 27-28.vi.1975, S.R. Monteith, in ANIC; 3 ♀, Christmas Ck, 15 km W of Fairview, via Laura, 26-27.vi.1975, G.B. Monteith, in UQIC, ANIC; 1 ♀, 15°03'S 145°09'E, 3 km NE Mt Webb, 30.iv.-3.v.1981, I.D. Naumann, in ANIC; 2 ♀, 1 ♂, 15°04'S 145°07'E, Mt Webb National Park, 28-30.xi.1980, J.C. Cardale, in ANIC; 1 ♀, same locality, 11-14.vii.1976, G.B. and S.R. Monteith, ANIC; 2 ♀, McIvor R. crossing, 40 km N of Cooktown, 15-18.vii.1976, G.B. and S.R. Monteith, in ANIC; 1 ♀, 15°14'S 145°07'E, 7 km N of Hope Vale Mission, 4.x.1980, J.C. Cardale, in ANIC; 1 ♀, 1 ♂, 15°16'S 144°59'E, 14 km W by N of Hope Vale Mission, 8-10.x.1980, J.C. Cardale, in ANIC; 2 ♀, 3 ♂, same locality, 7-10.v.1981, I.D. Naumann, in ANIC; 1 ♀, 15°29'S 145°16'E, Mt Cook National Park, Cooktown, 11-12.x.1980, J.C. Cardale, in ANIC; 14 ♀, 4 ♂, 15°41'S 145°12'E, Annan R., 3 km W by S of Black Mt, 27.ix.1980, J.C. Cardale, in ANIC, BMNH, USNM, QM; 1 ♀, same locality, 26-27.iv.1981, I.D. Naumann, in ANIC; 1 ♀, 15°47'S 145°17'E, Moses Ck, 4 km N by E of Mt Finnigan, 14-16.x.1980, J.C. Cardale, in ANIC; 13 ♀, 8 ♂, 15°47'S 145°14'E, Shipton's Flat, 16-18.v.1981, I.D. Naumann, in ANIC, QDPI; 1 ♂, 15°50'S 145°20'E, Gap Ck, 5 km ESE of Mt Finnigan, 13-16.v.1981, I.D. Naumann, in ANIC; 1 ♂ (det. as *S. cadaverosa* by Girault), Cairns, Jan. 1920, in QM; 1 ♀ (det. as *S. cadaverosa* by Girault), Gordonvale, Jan. 1920, in QM.

DESCRIPTION

FEMALE. Length: body 4.7-5.9 mm; fore wing, 2.6-3.1 mm.

Colour: Body pale yellow to orange. Mesoscutum, axilla, hind coxa distally, hind femur dorsally, sometimes with red-brown to black markings as in Figs 11, 12. Femoral teeth black.

Pubescence: Head and mesosoma with short setae. Hind femur with short, depressed setae. Flagellar setae long, sub-erect (Fig. 3).

Head: Width/length 1.8-2.1. Compound eyes very large, in dorsal view margins anteriorly convergent as in Fig. 28. Ocelli very large, POL/OOL 6.5-14.0, OD/OOL 13.0-29.0. OS less than OD, frons excavate anterior to median ocellus. Subocular suture indistinct, M/MAE 0.1–0.2. Antennal scrobes deep, margins carinate, lateral margin very close to compound eye (Fig. 9), SW/FW 0.7–1.0, UF/LF 2.3–2.8. Vertex and upper frons minutely reticulate-punctate; lower frons and clypeus at least in part transversely striate. Antenna: F1, F2, clava 1.0–1.5, 1.0–1.6, 2.4–4.4 x as long as wide respectively. F1 0.6–1.0 x as long as F2. Flagellum weakly fusiform.

Mesosoma: Pronotal collar laterally carinate (Figs 1, 29). Mesoscutum, mesoscutellum reticulate-punctate (Figs 28, 30). Omaulus present, acetabular carina absent or at most very weakly indicated and not continuous with omaulus, sternaulus absent. Upper mesopleuron rugose-punctate, mesopleural depression strigose to reticulate-rugose, ventral mesopleuron transverse-strigose, pre-omaular area finely reticulate-coriaceous. Propodeum posteriorly convex, with very weak concavity dorsal to hind coxae; spiracular sulcus indistinct. Hind leg: coxa 3.7–5.3 x as long as wide. Femur 1.6–1.9 x as long as wide, with ventral process and well-developed comb of fine teeth distad of process (Fig. 33). Tibia slender, dorsal furrow approximately 0.3 x as long as segment. Apical tarsal segment slender, less than 0.5 x as wide as long. Fore wing: shape normal (Fig. 1). Stigmal vein shorter than marginal vein, forming a right or slightly obtuse angle with it (Fig. 17). Stump of basalis present.

Petiole: Length/width 4.5–5.6, length/height 4.1–5.5. Dorsally minutely reticulate-punctate to rugose; transverse lamina distinct, continuous, not extending posteroventrally to midlength to petiole; lateral margin not distinctly carinate in posterior 0.5.

Male. Differs from female as follows. Length: body 4.1–5.1 mm; fore wing 2.1–2.6 mm.

Head: Width/length 1.9–2.3. Compound eye smaller (Fig. 32). Ocelli smaller, POL/OOL 1.2–2.0 OD/OOL 1.4–2.2. Lateral margin of antennal scrobes more widely separated from compound eye, SW/FW 0.4–0.6, UF/LF 2.4–2.7. Antenna: with 7 or 8 segments (Figs 4, 5). F1, F2, clava 1.0–1.3, 1.0–1.5, 1.7–2.4 x as long as wide respectively. If F2 and F3 fused (Fig. 5), F1 approximately 0.4 x as long as following compound segment.

Legs: Hind coxa 2.8–3.4 x as long as wide.

Remarks

Girault originally confused the sexes of *doddi,* but corrected his error in the following year (see Girault 1913, 1914, 1915).

The colour of the mesoscutum and mesoscutellum is variable. Most commonly these sclerites are entirely pale yellow or orange. Conspicuous red-brown to black markings (as shown in Figs 11, 12) may be present, particularly in individuals from localities in north-eastern Queensland. Individuals from these localities also tend to have darker markings on the dorsal margins of the hind femur.

Smicromorpha minera Girault

(Figs 2, 14, 34–39)

Smicromorpha minera Girault, 1926, p.70; Narendran, p.908.

Smicromorphella minerva Girault, 1930 [3]; de Santis, 1961, p.165; Dahms (1984), pp. 816, 817 (unjustified emendation of original spelling).

Material Examined

Holotype: ♀ in QM, in fair condition, on triangular card, head and fore legs mounted separately, with following labels: (i) '4491', in red ink in Girault's handwriting; (ii) 'HOLOTYPE', printed on red card; (iii) '*Smicromorpha minerva* Gir, ♀ type' in Girault's handwriting. Type locality: Meringa, Queensland (November) (Girault 1926).

Other Material Examined. Northern Territory: 1 ♂, 12°48'S 132°42'E, Nourlangie Ck, 8 km N of Mt Cahill, 16–17.vi.1973, J.C. Cardale, in ANIC. Queensland: 1 ♀, 15°16'S 144°59'E, 14 km W by N of Hope Vale Mission, 7–10.v.1981, I.D. Naumann, Field Note 81/14, in ANIC; 1 ♂, 15°47'S 145°17'E, Moses Ck, 4 km N by E of Mt Finnigan, 14–16.s.1980, J.C. Cardale, in ANIC; 3 ♂, Cape Hillsborough, MEQ, Hidden Valley Track, 16.vi.1979, E. Dahms, in QM, ANIC; 1 ♂, Knob Ck, Byfield, MEQ, 27.iv.1979, E. Dahms, rainforest, in QM.

Description

Female. Length: body 3.9–4.0 mm; fore wing approximately 1.9 mm.

Colour: Predominantly pale yellow to orange. Vertex posteriorly red-brown; mesoscutum and mesoscutellum dark red-brown as shown in Fig. 14; hind coxa and hind femur predominantly or entirely red-brown to black. Metasoma pale red-brown, petiole sometimes entirely dark brown. Femoral teeth black.

Pubescence: Head and mesosoma with long, sparse setae. Hind femur with long, suberect setae and short, depressed setae (Figs 35, 37). Flagellar setae moderately long, suberect, curved.

Head: Width/length approximately 1.8. Compound eye moderately large (Figs 34, 36, 38). Ocelli moderately large, POL/OOL 0.7–0.8, OD/OOL 0.5–0.7. OS greater than OD, frons between median ocellus and scrobes with weak longitudinal groove. Subocular suture continuous, distinct, M/MAE 0.4–0.5. Antennal scrobes deep, margins carinate, lateral margin widely separated from compound eye, SW/FW 0.4–0.5, UF/LF 3.3–3.4. Vertex and upper frons minutely reticulate-punctate, lower frons and clypeus at least in part transversely striate. Antenna: F1, F2, clava 0.6–1.0, 0.5–0.9, 1.1–1.4 x as long as wide respectively. F1 0.7–0.9 x as long as F2. Flagellum fusiform.

Mesosoma: Pronotal collar laterally carinate. Mesoscutellum reticulate-punctate (Fig. 39). Omaulus present, acetabular carina distinct and continuous with omaulus, sternaulus absent. Upper mesopleuron rugose-punctate, mesopleural depression strigose to reticulate-rugose, ventral mesopleuron reticulate-rugose to transverse-strigose, pre-omaular area finely reticulate-coriaceous. Propodeum posteriorly convex; spiracular sulcus indistinct. Hind leg: coxa 3.0–4.0 x as long as wide. Femur 1.6–1.8 x as long as wide, without ventral process, with well-developed comb of fine teeth. Tibia slender, dorsal furrow 0.3–0.5 x as long as segment. Apical tarsal segment slender, less than 0.5 x as wide as long. Fore wing: shape normal. Stigmal vein very slightly shorter than marginal vein, forming a very slightly obtuse angle with it. Stump of basalis present.

Petiole: Length/width 4.0–4.8, length/height 4.7–4.8. Dorsally minutely reticulate-punctate; transverse lamina distinct, continuous, not extending posteroventrally to midlength of petiole; lateral margin not distinctly carinate in posterior 0.5.

MALE. Differs from female as follows. Length: body 4.1–4.4 mm; fore wing 2.2–2.4 mm.

Colour: Pale yellow to orange, without red-brown or black markings.

Pubescence: Setae of head and mesosoma less conspicuous.

Head: Width/length 1.9–2.0. Subocular suture sometimes indistinct. M/MAE 0.6–0.7. SW/FW 0.3–0.4, UF/LF 2.9–3.2. Antenna: 7–8 segmented. F1, F2, clava 1.0–1.4, 0.7–0.9, 1.3–1.5 x as long as wide respectively. F1 0.8–1.2 as long as F2.

Mesosoma: Acetabular carina sometimes indistinct. Pre-omaular slightly more rugose. Hind leg: coxa and femur 2.7–2.9 and 1.6–1.9 x as long as wide respectively. Fore wing: stigmal veing approximately as long as marginal vein or slightly shorter.

Petiole: Length/height 4.1–4.8.

REMARKS

One female of *S. minera* was collected in the late afternoon as it hovered near a nest of *O. smaragdina* on the margin of rainforest. The nest had been broken artificially, and the alarmed ants were repairing the damage.

On the label attached to the holotype, the specific name is written in Girault's hand as '*minerva*'. The spelling '*minera*' accompanied the original published description of the species, but Girault adopted the spelling '*minerva*' in a 1930 paper and in his later, unpublished manuscript. Under the International Code of Zoological Nomenclature, the emendation is unjustified.

Smicromorpha eudela, sp. nov.

(Figs 2, 7, 15, 16, 40–43)

MATERIAL EXAMINED

HOLOTYPE: ♂, Nourlangie Creek, 8 km N of Mt Cahill, 26 October 1972, D.H. Colless, in ANIC (Type No. 7590).

DESCRIPTION

FEMALE. Unknown.

MALE. Length: body approximately 4.1 mm; fore wing approximately 2.2 mm.

Colour: Pale Yellow to orange, without red-brown or black markings. Femoral teeth pale orange.

Pubescence: Head and mesosoma with short setae. Hind femur with short, appressed setae. Flagellar setae very short, straight, appressed (Fig. 6).

Head: Width/length approximately 1.9. Compound eye moderately large, in dorsal view as in Figure 40. Ocelli moderately large. POL/OOL approximately 1.3, OD/OOL approximately 0.7, frons between median ocellus and scrobes with longitudinal groove. Subocular suture absent, M/MAE 1.2. Antennal scrobes deep, margins not carinate, lateral margin widely separated from compound eye, SW/FW 0.4–0.5, UF/LF 1.3–1.4. Vertex minutely reticulate-punctate; frons striate to strigose as in Figure 42. Antenna (Fig. 7): with 9 segments. F1, F2, clava 0.8–0.9, 1.5–1.6, 1.5–1.6 x as long as wide respectively. F1 0.3–0.4 x as long as F2. Flagellum filiform.

Mesosoma: Pronotal collar laterally not carinate. Mesoscutellum sculptured as in Fig. 43. Omaulus, acetabular carina, sternaulus, all absent (Fig. 41). Upper mesopleuron striate to very finely rugose-punctate; mesopleural depression and ventral mesopleuron striate. Propodeum posteriorly broadly concave; spiracular sulcus distinct. Hind leg: coxa 2.0 x as long as wide. Femur approximately 2.3 x as long as wide, ventral process absent, distally with 3 or 4 sharp teeth but without comb of fine teeth.

Tibia distally broad, dorsal furrow less than 0.3 x as long as segment. Apical tarsal segment broad, 0.6 x as wide as long. Fore wing: truncate (Fig. 15). Stigmal vein longer than marginal vein, reflexed (Fig. 16). Stump of basalis absent.

Petiole: Length/width 4.0, length/height 4.6–4.7. Dorsally longitudinally strigose; transverse lamina distinct, extending posteroventrally to midlength of petiole, discontinuous midventrally; lateral margin distinctly carinate in posterior 0.5.

ETYMOLOGY

The specific name is derived from the Greek and means very distinct.

Smicromorpha lagynos sp. nov.

(Figs 2, 13, 18, 44–47)

MATERIAL EXAMINED

HOLOTYPE: ♀, 15°14'S 145°07'E, 7 km N of Hope Vale Mission, 4 October 1980, J.C. Cardale, in ANIC (Type No. 7591).

PARATYPES: Northern Territory: 1 ♀, 12°06'S 133°04'E, Cooper Ck, 19 km E by S of Mt Borradaile, 5-6.vi.1973, J.C. Cardale, in ANIC; 1 ♂, 12°35'S 132°52'E, Magela Ck, 2 km N of Mudingbarry HS, 14–15.xi.1972, J.C. Cardale, in ANIC. Queensland: 2 ♀, 1 ♂, 15°29'S 145° 16'E, Mt Cook National Park, 10–12.v.1981, I.D. Naumann, in ANIC, QM; 1 ♀, Bramston Beach, near Innisfail, 30.iv.1967, D.H. Colless, open savannah, in ANIC.

DESCRIPTION

FEMALE. Length: Body 4.6–4.9 mm; fore wing approximately 2.4 mm.

Colour: Predominantly pale yellow to orange. Mesoscutum and mesoscutellum (as in Fig. 13) petiole, coxa externally and femur dorsally and dorso-externally red-brown to black. Femoral teeth black. In some specimens, vertex within ocellar triangle, posterior surface of head and mesoscutum entirely red-brown to black.

Pubescence: Head, mesosoma, hind femur with short, appressed setae. Flagellar setae moderately long, suberect (Fig. 6).

Head: Width/length 1.9–2.0. Compound eye moderately large (Figs 44, 46). Ocelli moderately large, POL/OOL 0.8–0.9, OD/OOL 0.6–0.7, OS greater than OD, frons between median ocellus and scrobes with distinct longitudinal groove. Subocular suture continuous, distinct M/MAE 0.4–0.5. Antennal scrobes deep, carinate, lateral margin widely separated from compound eye, SW/FW 0.4–0.5, UF/LF 3.3–3.4. Vertex and upper frons minutely reticulate-punctate, lower frons and clypeus at least in part transversely striate. Antenna (Fig. 6): F1, F2, clava 0.7–1.0, 1.0–1.2, 2.1–3.2 x as long as wide respectively. F1 0.4–0.7 x as long as F2. Flagellum fusiform.

Mesosoma: Pronotal collar laterally carinate (Fig. 47). Omaulus present, acetabular carina distinct and continuous with omaulus, sternaulus absent (Fig. 45). Upper mesopleuron rugose-punctate, mesopleural depression strigose to reticulate-rugose, ventral mesopleuron transverse-strigose, pre-omaular area finely reticulate-coriaceous. Propodeum posteriorly convex; spiracular sulcus indistinct. Hind leg: coxa 3.3–4.2 x as long as high. Femur 1.5–1.7 x as long as high, with a weak ventral process and well-developed comb of fine teeth. Tibia slender, dorsal furrow 0.3–0.5 x as long as segment. Apical tarsal segment slender, less than 0.5 x as wide as long. Fore wing: shape normal. Stigmal vein shorter than marginal vein; angle between stigmal and marginal veins slightly obtuse. Stump of basalis present.

Petiole: Length/width 3.2–3.3, length/height 3.2–3.7 (Fig. 18). Dorsally minutely reticulate-punctate; tranverse lamina indistinct, not extending posteroventrally to midlength of petiole; lateral margins not distinctly carinate in posterior 0.5.

MALE. Differs from female as follows. Length: body 4.5–4.6 mm; forewing 2.3–2.4 mm.

Colour: Uniformly pale yellow to orange with at most small, pale brown markings on mid lobe (near pronotum) and lateral lobe of mesoscutum, axilla, hind femur basally, petiole and second metasomal segment ventrally.

Antenna: F1, F2, clava 0.8–1.3, 1.0–1.4, 2.0–2.3 x as long as wide respectively. F1 0.6–0.8 x as long as F2.

Mesosoma: Hind coxa 3.1–3.4 x as long as high. Hind femur 1.5–1.7 x as long as high.

Petiole: Length/width 3.8–4.6, length/height 4.5–5.2. Transverse lamina usually distinct.

ETYMOLOGY

The specific name is from the Greek meaning flask-shaped and refers to the shape of the petiole.

Smicromorpha banksi sp. nov.

(Figs 2, 19)

MATERIAL EXAMINED

HOLOTYPE: ♀, 15°30'S 145°16'E, 1 km SE of Mt Cook, Cooktown, 13 October 1980, J.C. Cardale, in ANIC (Type No. 7592).

PARATYPE: ♀, Kar Kar Island, Kurum, New Guinea, Aug. 1968, N.L.H. Krauss, 0-100 m, in BPBM.

DESCRIPTION

FEMALE. Length: body 3.8–4.2 mm; fore wing 2.2–3.3 mm.

Colour: Uniformly pale yellow to orange, without red-brown or black markings. Femoral teeth black.

Pubescence: Head, mesosoma, hind femur with short, depressed setae. Flagellar setae moderately long, suberect, curved.

Head: Width/length 1.9–2.0. Compound eye moderately large. Ocelli moderately large, POL/OOL 0.8–0.9, OD/OOL 0.6–0.7. OS greater than OD, frons between median ocellus and scrobes with distinct longitudinal groove. Subocular continuous, distinct. M/MAE 0.4–0.5. Antennal scrobes deep, margins carinate, lateral margin widely separated from compound eye, SW/FW 0.4–0.5. UF/LF 3.3–3.4. Vertex and upper frons minutely reticulate-punctate, lower frons and clypeus transversely striate. Antenna: F1, F2, clava 0.8, 0.7–0.8, 0.8 x as long as wide respectively. F1 0.8 x as long as F2. Flagellum fusiform.

Mesosoma: Pronotal collar laterally carinate. Omaulus present, acetabular carina distinct and continuous with omaulus, sternaulus absent. Upper mesopleuron rugose-punctate, mesopleural depression strigose to reticulate-rugose, ventral mesopleuron reticulate-rugose, pre-omaular area finely reticulate-coriaceous. Propodeum posteriorly convex, spiracular sulcus indistinct. Hind leg: coxa 4.5–4.6 x as long as wide. Femur 1.7–1.8 x as long as wide, without ventral process, with well-developed comb of fine teeth. Tibia slender, dorsal furrow 0.3–0.5 x as long as segment. Apical tarsal segment slender, less than 0.5 x as wide as long. Fore wing: shape normal. Stigmal vein shorter than marginal vein; stigmal and marginal veins form a right angle. Stump of basalis present.

Petiole: Length/width and length/height 4.5 (Fig. 19). Dorsally minutely reticulate-punctate to rugose; transverse lamina distinct, continuous, not extending posteroventrally to midlength of petiole; lateral margin not distinctly carinate in posterior 0.5.

MALE. Unknown.

REMARKS

S. banksi is the only species of *Smicromorpha* known to occur in both Australia and New Guinea.

ETYMOLOGY

The species is named for Sir Joseph Banks who collected near the type locality in 1770.

Smicromorpha keralensis Narendran

(Figs 48–49)

Smicromorpha keralensis Narendran, 1979, p. 908.

MATERIAL EXAMINED

HOLOTYPE: ♂, in good condition, on micropin, with following labels: (i) 'Holotype'; (ii) 'Thenhippalam, Kerala, INDIA, J.C. Narendran, 25-7-1977'; (iii) '*Smicromorpha keralensis* ♂ det. Narendran 1978' in BMNH.

DESCRIPTION

FEMALE. Unknown.

MALE. Length: body 4.3 mm; fore wing 2.4 mm.

Colour. Upper face, vertex, gena, posterior surface of head, U-shaped macula on mid lobe of mesoscutum, mid lobe of mesoscutellum except posteromedially, macula on upper mesopleuron, most of propodeum, apical 1–3 segments of fore and mid tarsi, most of hind femur, all of hind tibia and tarsus, parts of metasoma, all pale yellow to orange. Basal 2–4 segments of fore and mid tarsi, hind femur dorsally and dorso-externally (as in Narendran, 1979, fig. 5) red-brown. Lower face, clypeus, labrum, mandible, antenna, most of mesosoma, legs (except tarsi, hind femur, and hind tibia), anterior 0.3 of petiole, all black.

Pubescence: Head, mesosoma, hind femur with short, dense, appressed setae. Flagellar setae moderately long, suberect, curved.

Head: Width/length approximately 1.9. Compound eye moderately large. Ocelli moderately large, POL/OOL 1.0, OD/OOL 0.8-0.9. OS equal to OD, frons between median ocellus and scrobes convex. Subocular suture continuous, distinct, M/MAE 0.6. Antennal scrobes deep, margins carinate, widely separated from compound eye, SW/FW 0.4. Vertex of upper frons reticulate-punctate, lower frons in part and clypeus transverse-striate. Antenna: 9-segmented. F1, F2, clava 1.2, 1.5, 2.0 x as long as wide respectively. F1 0.6–0.7 x as long as F2. Flagellum sub-fusiform.

Mesosoma: Pronotal collar angulate, laterally weakly emarginate. Mesoscutum, mesoscutellum sculptured as in Figure 48. Omaulus present, acetabular carina distinct and continuous with omaulus, sternaulus present (Fig. 49). Upper mesopleuron rugose-punctate, mesopleural depression strigose to reticulate-rugose, ventral mesopleuron reticulate-rugose, pre-omaular area finely reticulate-coriaceous. Propodeum posteriorly convex with weak, median groove in posterior 0.5; spiracular sulcus indistinct. Hind leg: coxa 3.3–3.4 x as long as wide. Femur 2.3–2.4 x as long as wide, with weak ventral process and well-developed comb of fine teeth. Tibia slender, dorsal furrow 0.3–0.5 x as long as segment. Apical tarsal segment slender, less than 0.5 x as wide as long. Fore wing: shape normal. Stigmal vein shorter than marginal vein, perpendicular to it. Stump of basalis present.

Petiole: Length/width and length/height approximately 4.4. Dorsally minutely reticulate-punctate; transverse lamina distinct, continuous, not extending posteromedially to mid length of petiole; lateral margin not distinctly carinate in posterior 0.5.

REMARKS

Figure 2 of Narendran (1979) incorrectly shows the compound eye as contiguous with the oral fossa. The mesonotum is more extensively black than indicated by Narendran's Figure 4.

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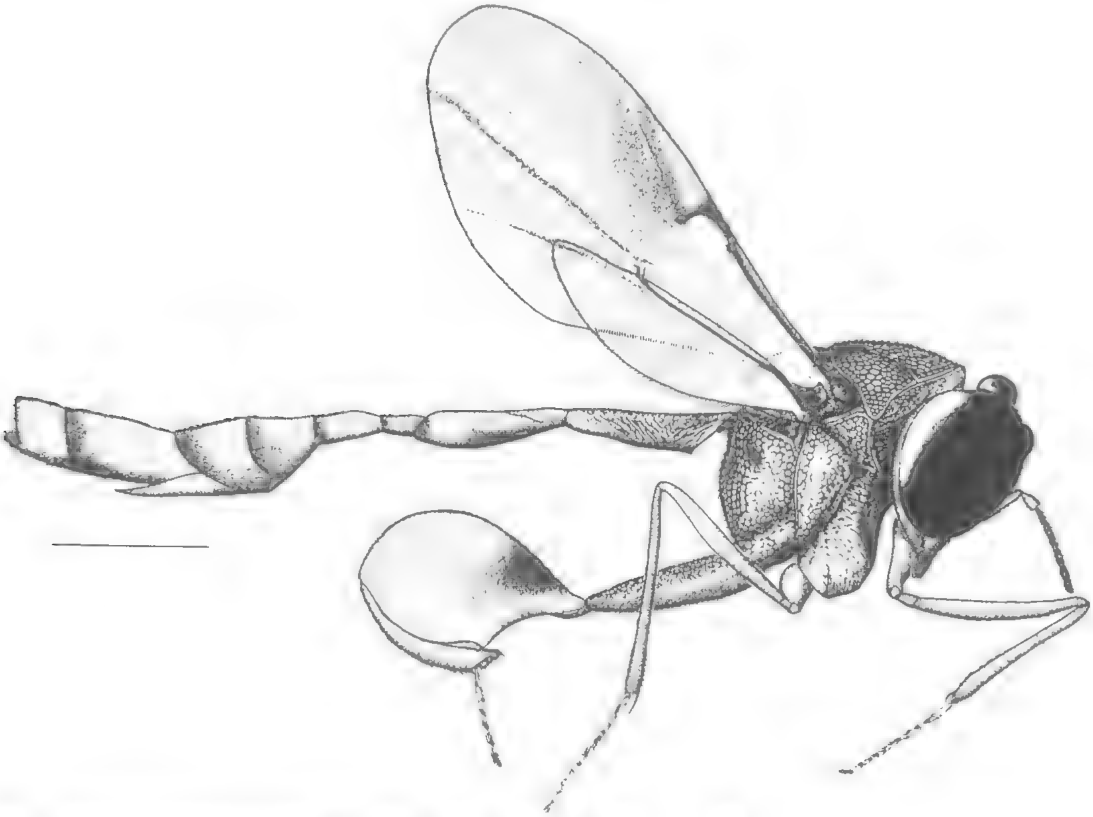

FIG. 1. *Smicromorpha doddi* Girault, female. Scale line = 0.5 mm.

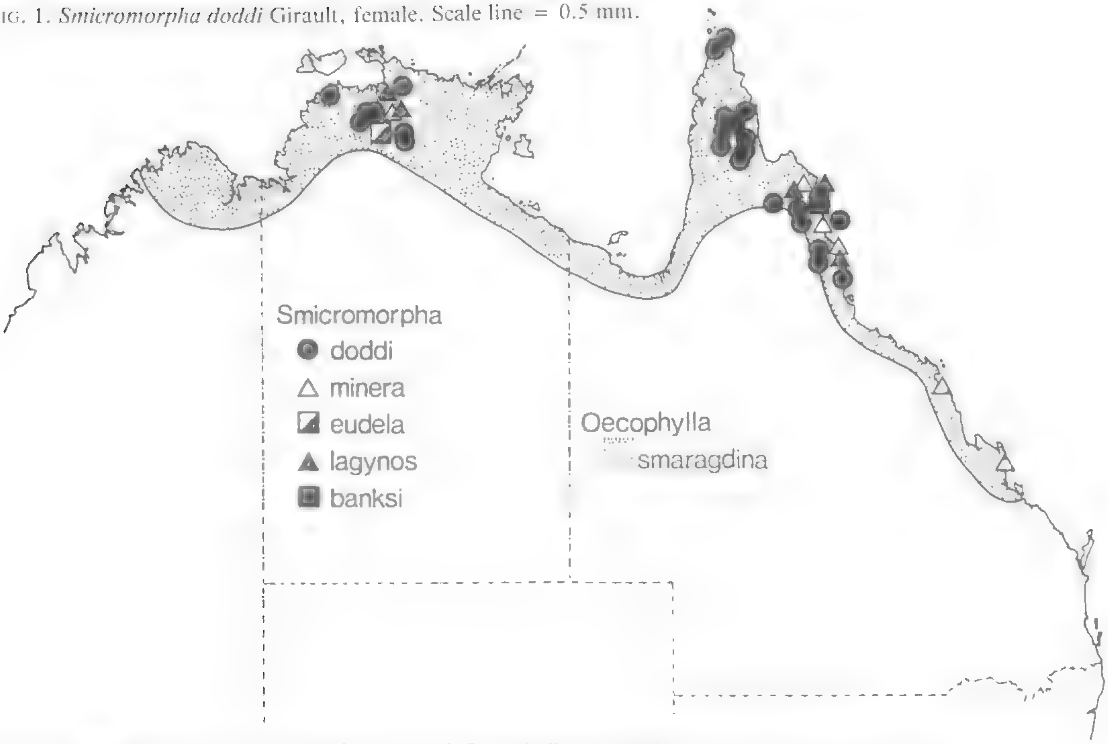

FIG. 2. Distribution of *Smicromorpha* spp. and *Oecophylla smaragdina* (Fabricius) in Australia.

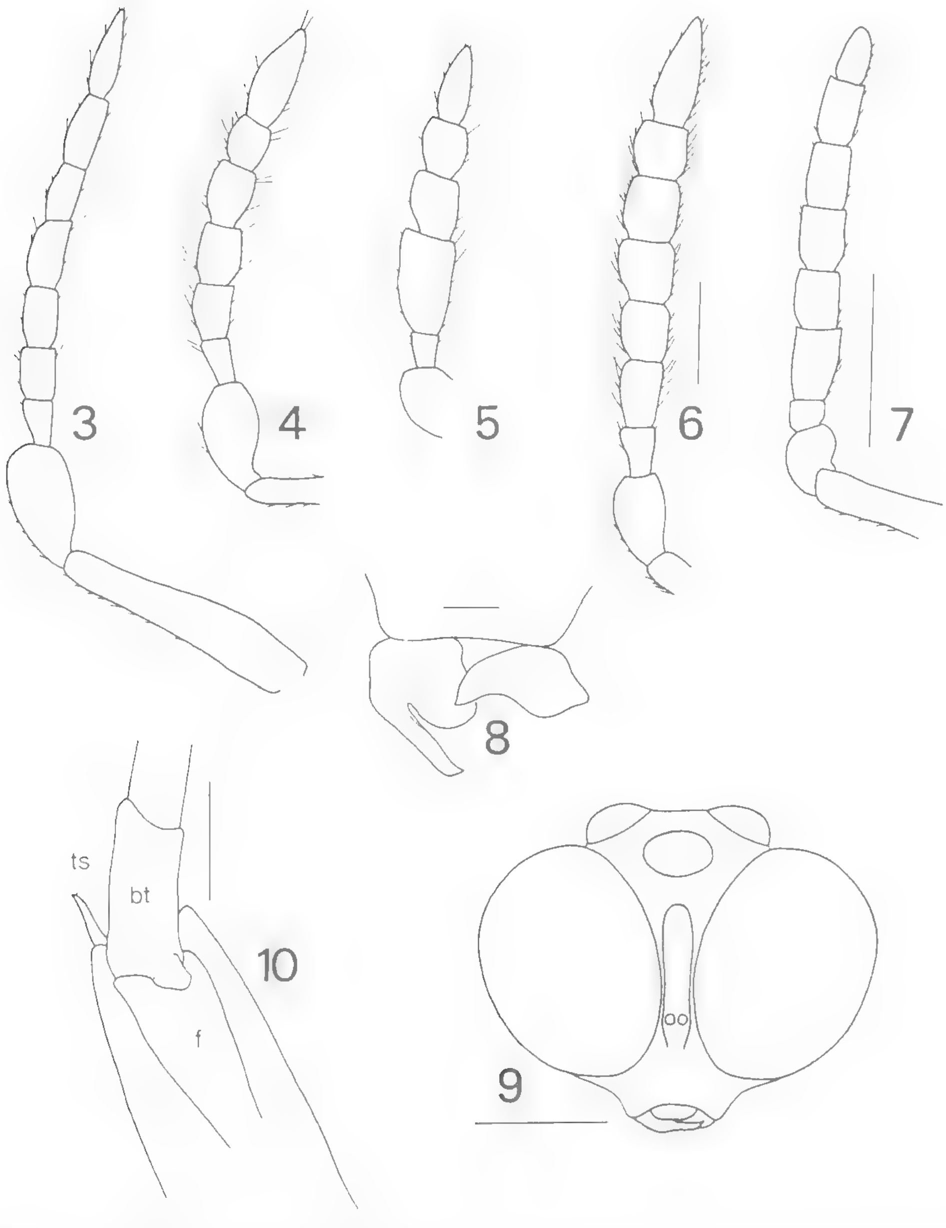

FIG. 3-10. *Smicromorpha* spp., 3, 8, 9, 10, *S. doddi* Girault, female; 4, 5, *S. doddi,* male; 6, *S. lagynos* sp. nov., paratype male; 7, *S. eudela,* sp. nov., holotype male; 3-7, antennae (apex of scape only shown in 4, 6, 7, apex of pedicel only shown in 5); 8, mandibles, frontal view; 9, head, frontal view; 10, hind tibial groove, dorsal view. Scale lines = 0.5 mm for 6, 8 and 10; = 0.1 mm for 7 and 9; 3-6 to same scale.

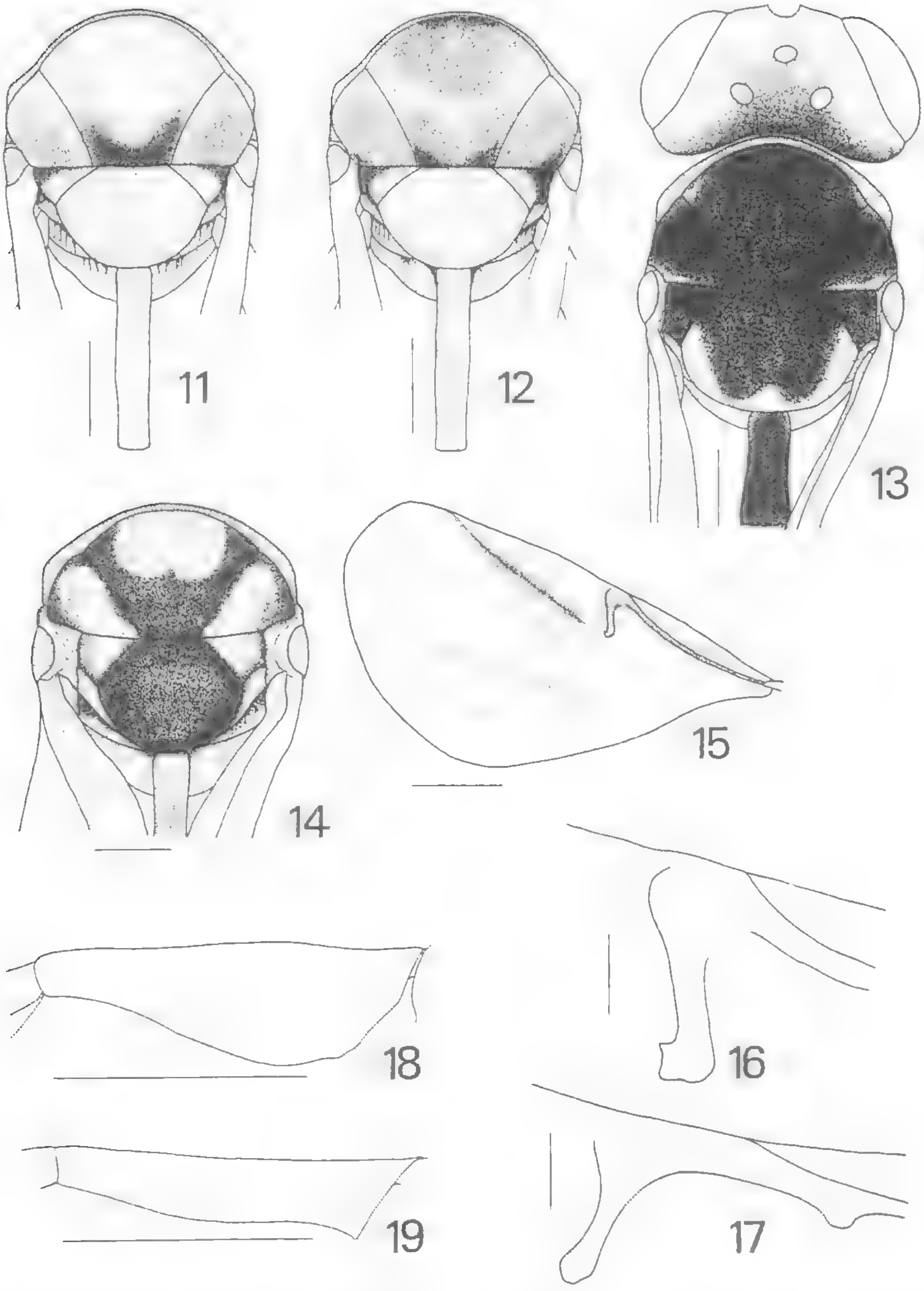

FIG. 11-19. *Smicromorpha* spp. 11, 12, *S. doddi* Girault, female, Lockerbie; 13, *S. lagynos*, sp. nov., paratype female; 14, *S. minera* Girault, holotype female; 15, 16, *S. eudela*, sp. nov., holotype male; 17, *S. doddi*, female; 18, *S. lagynos*, holotype female; 19, *S. banksi*, sp. nov., holotype female; 11, 12, 13, 14, colour patterns of dorsal mesosoma; 15, 16, 17, fore wing venation; 18, 19, lateral view of petiole. Scale lines = 0.5 mm for 11-17, =0.1 mm for 18, 19.

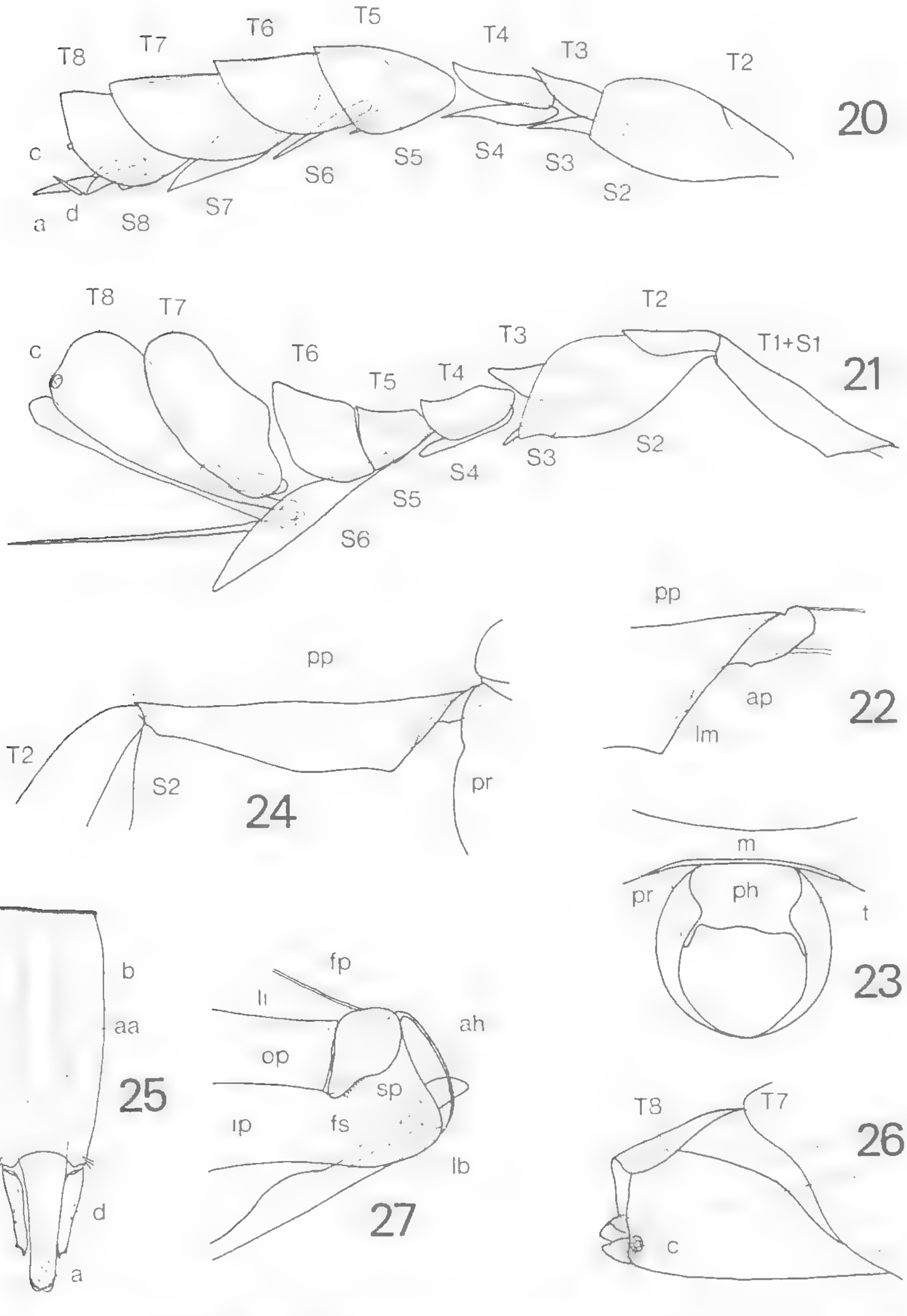

FIG. 20-27. *Smicromorpha doddi* Girault. 20, lateral view, male metasoma, petiole (= T1 + S1) omitted; 21, lateral view, female metasoma; 22, lateral view, anterior articulation of petiole; 23, anterior view, petiolar foramen of propodeum; 24, lateral view, petiole; 25, ventral view, male genitalia; 26, dorsolateral view, posterior extremity of female metasoma; 27, lateral view, anterior ovipositor sclerites (ovipositor retracted). See text for explanation of abbreviations.

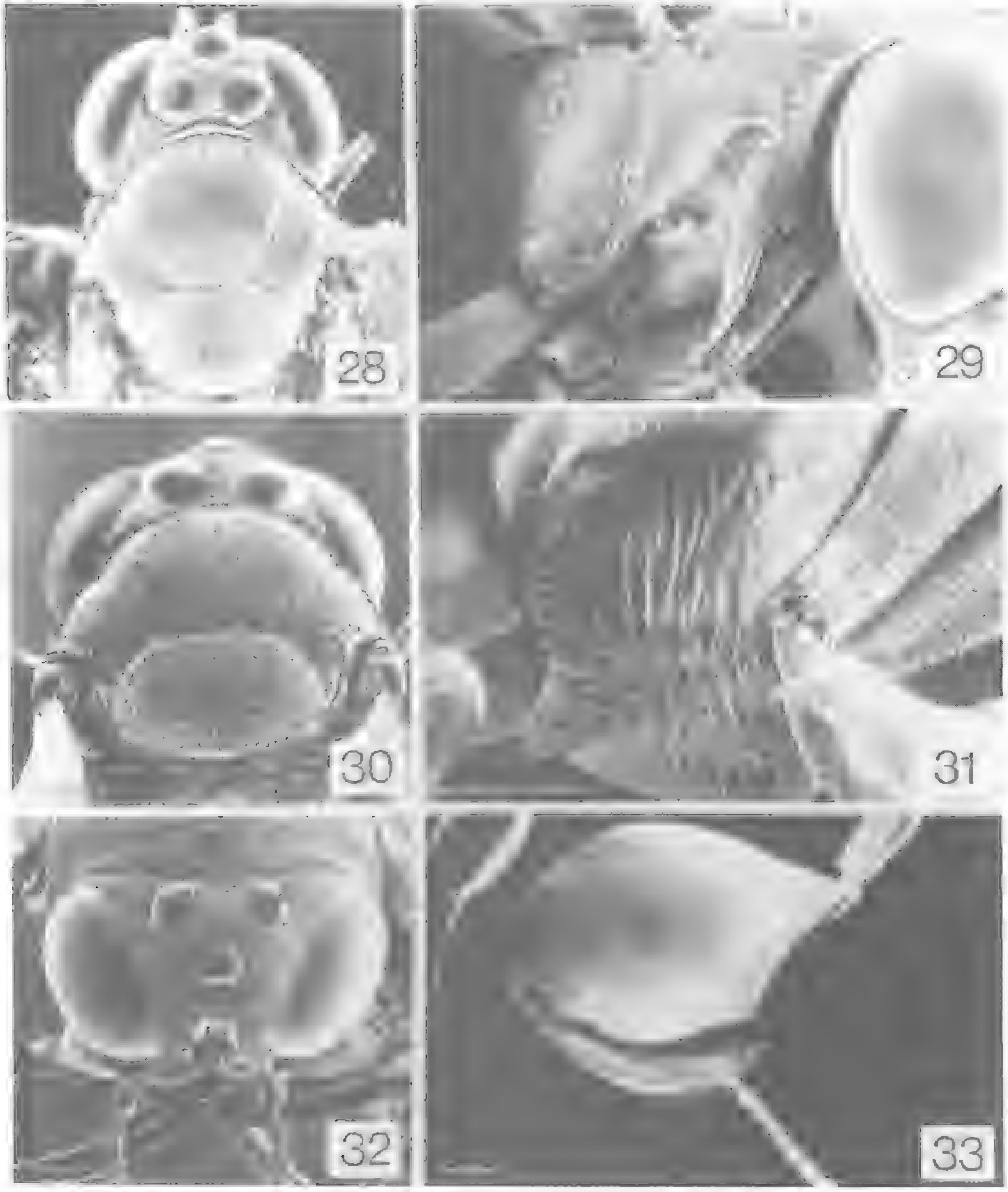

FIG. 28-33. *Smicromorpha doddi* Girault 28-31, 33, female; 32, male. 28, dorsal view, head and mesosoma; 29, lateral view, head and mesosoma; 30, posterodorsal view, head, mesosoma and petiole; 31, ventrolateral view, mesothorax; 32 dorsal view, head; 33, lateral view, hind leg. Scale line = 0.2 mm. See text for explanation of abbreviations.

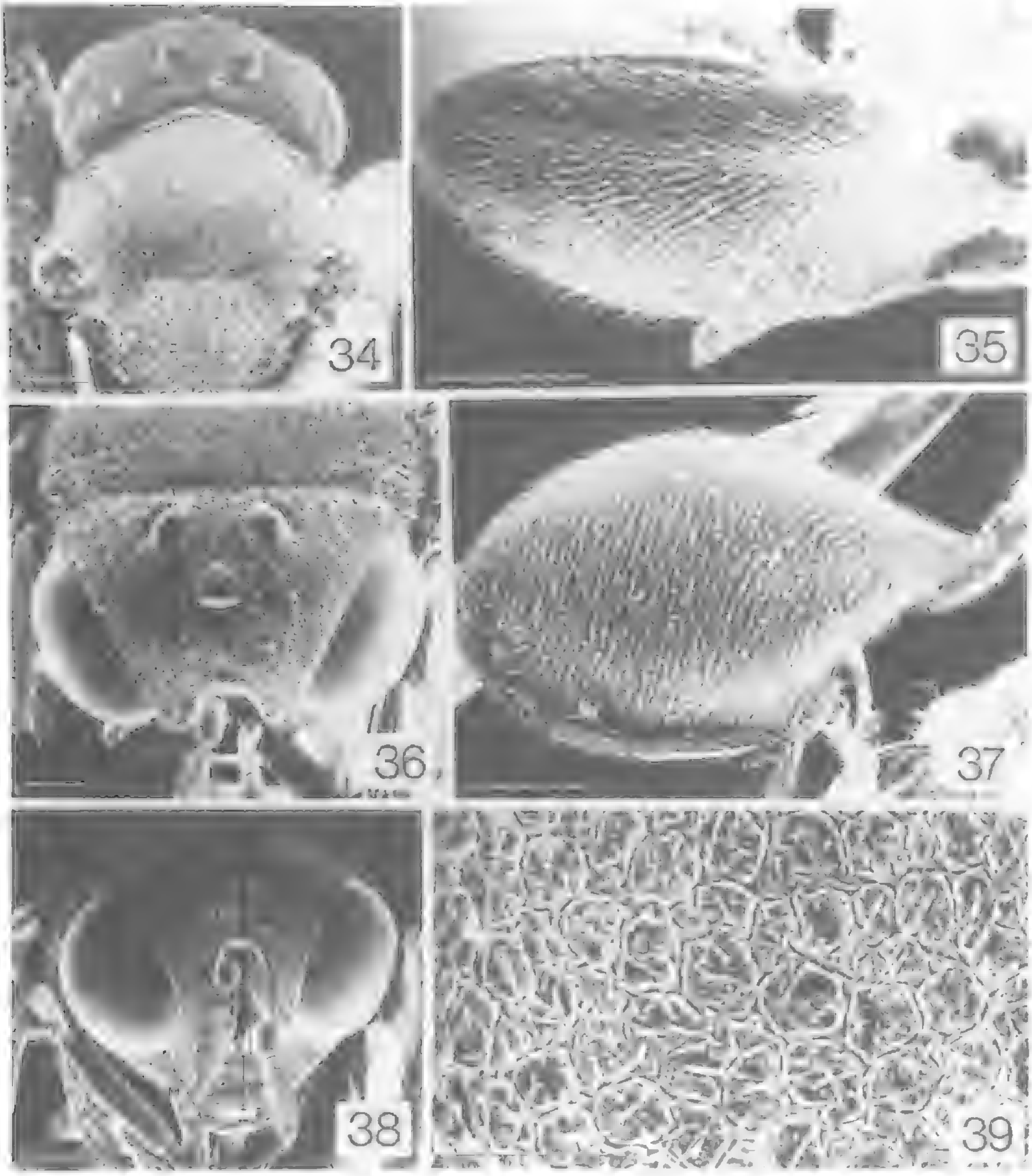

FIG. 34-39. *Smicromorpha minera* Girault, female. 34, dorsal view, head and mesosoma; 35, dorsal view, hind leg; 36, dorsal view, head; 37, lateral view, hind leg; 38, frontal view, head; 39, detail, mesoscutal microsculpture. Scale line = 0.2 mm for 34-38, = 0.1 mm for 39. See text for explanation of abbreviations.

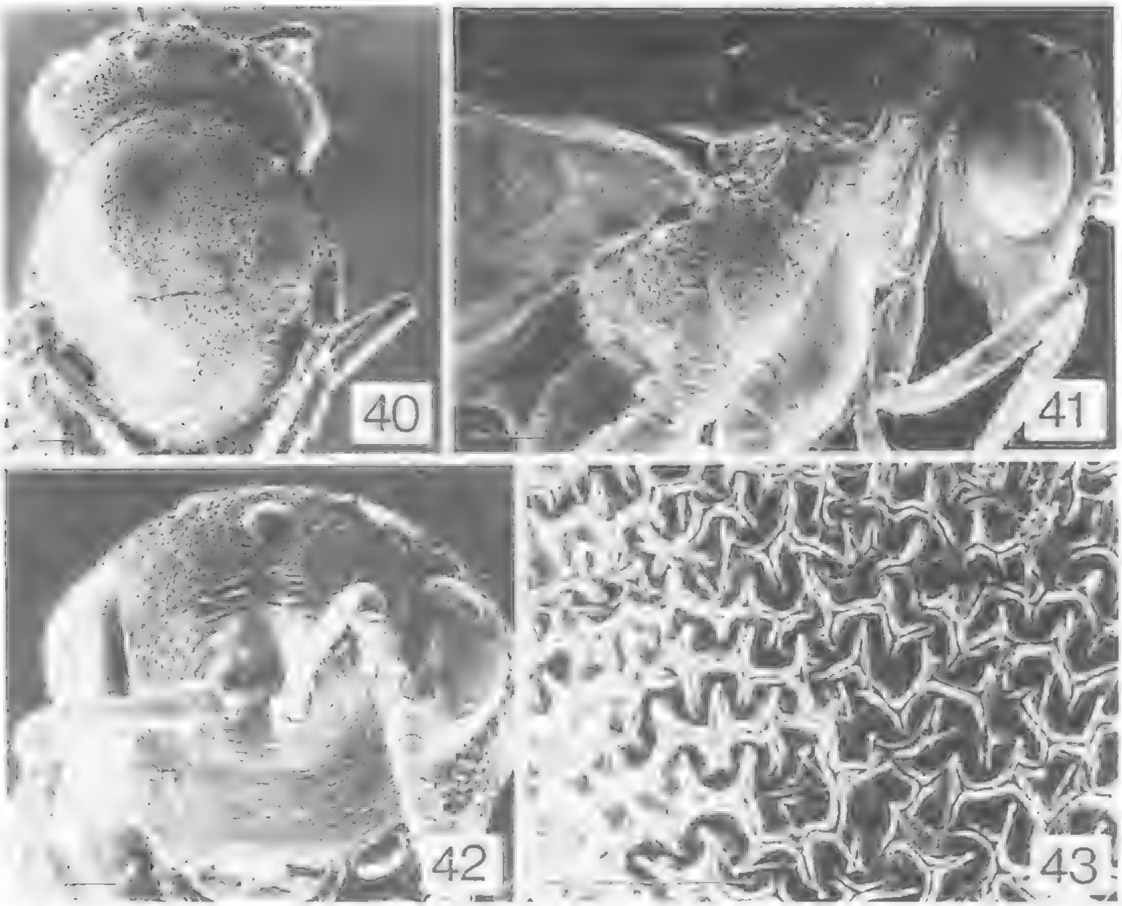

FIG. 40-43. *Smicromorpha eudela*, sp. nov., holotype male. 40, dorsal view, head and mesosoma; 41, lateral view, head and mesosoma; 42, frontal view, head; 43, detail, mesoscutal microsculpture. Scale line = 0.2 mm for 40-42, = 0.1 mm for 43.

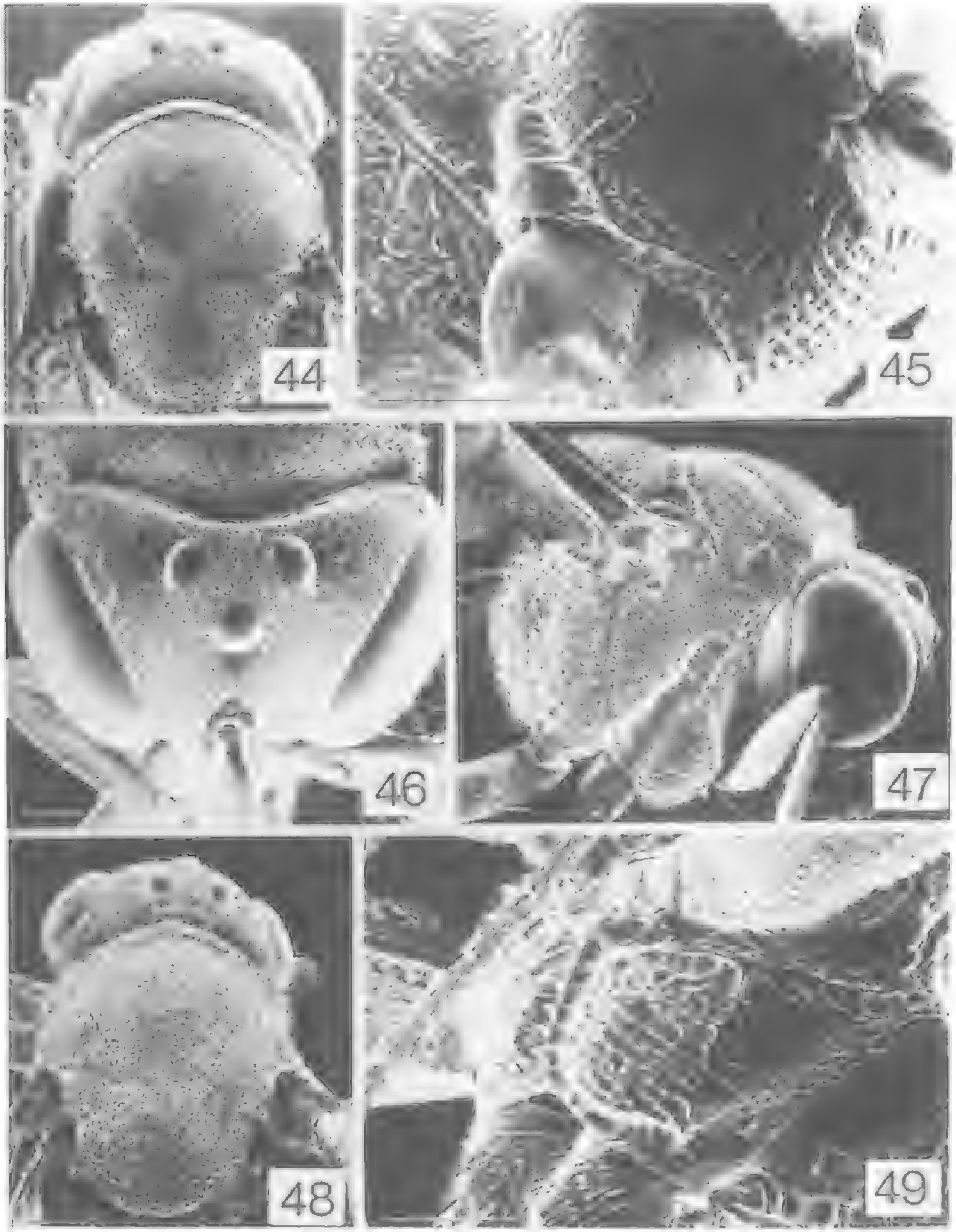

FIG. 44–49. *Smicromorpha* spp. 44–47, *S. lagynos*, sp. nov., paratype female; 48, 49, *S. keralensis* Narendran, holotype male. 44, dorsal view, head and mesosoma; 45, ventrolateral view, mesothorax; 46, dorsal view, head; 47, lateral view, head and mesosoma; 48, dorsal view, head and mesosoma; 49, ventrolateral view, mesothorax. Scale line = 0.2 mm.

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A NEW FLIGHTLESS MONTANE SPECIES OF *LACHNOPHOROIDES* DISTANT (HETEROPTERA : LYGAEIDAE) FROM NORTH QUEENSLAND

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ABSTRACT

Lachnophoroides frerei sp. nov., a brachypterous, flightless species from high altitudes on Mt Bartle Frere, North Queensland, is described and compared with its macropterous sister-species, *L. thompsoni* Woodward. A pair of fossae on the fourth abdominal sternum of the male of both species appears not to have been recorded from any other genus of Lygaeidae The third and fourth nymphal instars of *L. frerei* are described. Additional morphological and distributional data are given for *L. thompsoni* .

INTRODUCTION

Lachnophoroides Distant (Rhyparochrominae : Targaremini) has 3 species described from New Caledonia and 1 species from Queensland, all known only in the macropterous form (Woodward 1977). Dr G.B. Monteith organised and led collecting expeditions by an Earthwatch team and staff of the Queensland Museum, on Bellenden Ker Range, north Queensland, and nearby areas. Among many other species of lygaeids, mostly new records for this region, are 4 flightless, brachypterous specimens of *Lachnophoroides* from altitudes of 1440–1620 m on Mt Bartle Frere. In most external features, except those commonly associated with brachyptery, these specimens are very similar to the eastern Queensland species, *L. thompsoni* Woodward. Their dissection, however, reveals several differences in genitalia and other abdominal structures. They are thus considered to represent a new species, described below, and to be the sister group of *L. thompsoni*, adapted to wet, high altitude conditions. Specimens of *L. thompsoni* were also collected by this expedition in the Bellenden Ker region but at much lower altitudes.

'Pyrethrum knockdown' refers to collections made after spraying with a pyrethrum extract and Dr Monteith informs me that on the summit of Mt Bartle Frere it applies to knockdown from logs or tree trunks.

† Tom Woodward died on 22 November 1985.

Abbreviations: QM = Queensland Museum, Brisbane; UQ = University of Queensland Insect Collection, Brisbane.

In the following accounts all measurements are in millimetres.

Lachnophoroides thompsoni Woodward
(Figs 4, 8; Plate 1, Fig. 1)

Lachnophoroides thompsoni Woodward, 1977, p. 64.

MATERIAL EXAMINED

[Additional to that listed by Woodward (1977)]

Queensland: 1 ♀, Herberton, 17.vi.1971, coll. G.B Monteith (UQ); 1 ♂, 2 ♀, Russell R. at Bellenden Ker Landing, 5 m, 1-9.xi.1981, Earthwatch/Qld Mus. (QM); 1 ♂, same data, Q.M. Berlesate No. 361, 17°16S, 145°57E, palm swamp, moss on tree trunks (QM); 1 ♂, Bellenden Ker Range, Cableway Base Stn, 100 m, 17.x.-9.xi.1981, Earthwatch/Qld Museum, 'pyrethrum knockdown' (QM); 1 ♀, Bellenden Ker Range, 1 km S. of Cable Tower 6, 17.x.-5.xi.1981, 500 m, Earthwatch/Qld Museum: 1 ♂, same data plus 'pyrethrum knockdown' (QM); 1 ♀, Emerald Ck, Lamb Range, 11.x.1982, 950 m, coll. G. Monteith, D. Yeates, G. Thompson, pyrethrum knockdown, RF [rainforest] (QM).

VARIATION

One ♂ and 1 ♀ from the Bellenden Ker region are a little longer than any specimens previously examined (total body length 4.0). However, all other measurements fall within the ranges noted by Woodward (1977). The female from Lamb Range has the right antenna oligomerous; length of segments I 0.44, II 0.79, III 0.79.

DISTRIBUTION

This species is now known from coastal southeast Queensland and from northeast Queensland from near sea level to 950 m altitude.

Lachnophoroides frerei sp. nov.
(Figs. 1–3, 5–7, 9, 10; Plate 1, Fig. 2)

MATERIAL EXAMINED

HOLOTYPE ♂, T8883, 1 PARATYPE ♀, T8884, Mt Bartle Frere, South Peak Summit, 1620 m, 6–8.xi.1981, Earthwatch/Qld Museum, pyrethrum knockdown (QM); 1 PARATYPE ♂, T8886, 1 3rd instar, 2 4th instar nymphs, Mt Bartle Frere, summit creek, 24.ix.1981, coll. G. Monteith and D. Cook, QM Berlesate No. 304, rainforest, 1500 m, sieved litter (QM); 1 PARATYPE ♀, T8885, Mt Bartle Frere, NW Peak, 1440 m, pyrethrum on mossy rocks, 24.ix.1981, coll. G. Monteith (QM).

DESCRIPTION

Measurements of holotype given first.

COLORATION: Head reddish brown, ventrally between eyes red, anteclypeus and paraclypei yellowish to reddish brown. Eyes dark reddish brown. Antennal segments I–III yellowish to reddish brown, IV more or less fuscous brown. Labial segments yellowish brown, IV brownish black except at apex. Pronotum with anterior lobe yellowish brown or orange-brown with a thin dark median stripe; posterior lobe marked with yellowish brown and dark brown; anterior collar-like area and lateral carinae, at least anteriorly, yellow, former reddish brown laterally; punctures, extreme lateral margins of carinae, and a small lateral patch before posterolateral angles, dark brown. Scutellum reddish brown with a dark median area posteriorly; apex and posterior part of lateral margins creamish yellow. Corium brown with off-white streaks and patches; apical margin mostly black. Punctures of scutellum and corium dark brown. Membrane brown with two or three pale streaks. Ventrolateral surface of thorax blackish brown; dorsal margin, supracoxal areas, anterior part of prothorax and metapleural evaporative area lighter brown; scent-gland peritreme dark brown. Legs yellowish brown; coxae reddish brown. Abdomen with ventral surface reddish brown, dorsal surface red or reddish brown.

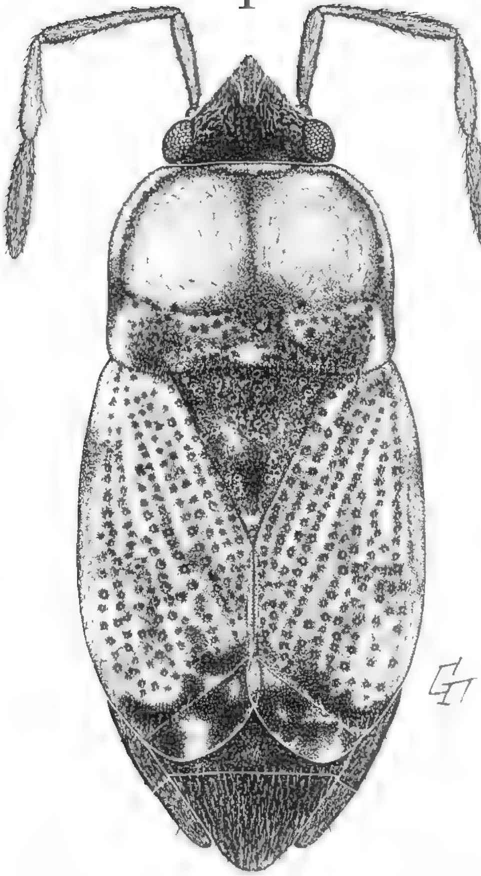
Body length 3.7 (♂ 3.7, ♀ 3.9); maximum width 1.45 (♂ 1.45, ♀ 1.76).

HEAD: Structure similar to that of *L. thompsoni*, except ocelli vestigial and eyes relatively smaller than interocular space 3.5–3.6 x eye width in ♂, 3.8–3.9 x in ♀ (♂, ♀ 2.3–3.0 x in *L. thompsoni*). Width across eyes 0.81 (♂ 0.82, ♀ 0.82–0.87); interocular space 0.52 (♂ 0.52, ♀ 0.54–0.57); length 0.71. Length antennal segments I 0.46 (0.46), II 0.71 (♂ 0.65, ♀ 0.68–0.71), III 0.56 (♂ 0.54, ♀ 0.56), IV 0.57 (♂ 0.56, ♀ 0.56–0.59). Length labial segments I 0.63 (♂ 0.62, ♀ 0.62–0.63), II 0.63 (♂ 0.62, 0.62–0.63), III 0.38 (♂ 0.37, ♀ 0.40), IV 0.35 (♂ 0.33, ♀ 0.34).

THORAX: Pronotum similar to that of *L. thompsoni*, except lateral carinae narrower, only 2/3 maximum width of antennal segment I, and posterior lobe relatively shorter, with median length about 1/3 that of anterior lobe excluding anterior collar in ♂, about 1/2 in ♀ (in *L. thompsoni* about 1/2 in ♂, about 2/3 in ♀). Median length of pronotum 0.97 (♂ 0.97, 0.89–0.94); posterior width 1.35 (♂ 1.35, ♀ 1.35–1.51). Scutellum: length 0.83 (♂ 0.79, ♀ 0.86–0.89); anterior width 0.71 (♂ 0.71, ♀ 0.71–0.76). Hemelytron coleopteroid (*sensu* Slater 1975, p. 53), differing from that of *L. thompsoni* as follows: clavus completely fused with corium, with no trace of claval suture; in claval area, punctures of each of second and third rows and of basal half of first row (nearest scutellum) mostly not contiguous, but about 1–3 puncture-widths apart, only 13–17 punctures in third row; distance between apex of scutellum to apex of anal margin of corium 0.62 (♂ 0.59; ♀ 0.65–0.71), much longer than claval commissure of *L. thompsoni*; membranes reduced to opaque, almost semicircular areas, very slightly overlapping, reaching to about anterior margin of abdominal tergum VI in mid-line and posterior quarter of this tergum distally. Hind wings reduced to small triangular flaps not extending beyond metanotum (fully developed in *L. thompsoni*). Ventral surface of thorax and spination of fore femur as in *L. thompsoni*. Ventral surface of fore tibia of ♂ with numerous denticles throughout length, larger than in *L. thompsoni*

ABDOMEN: Submedian trichobothria and trichobothrial areas of sterna III and IV much reduced and inconspicuous compared with those of *L. thompsoni*, on sternum III arranged in 2 triangular series, on sternum IV in 2 transverse linear series (all triangularly arranged in *L. thompsoni* (Plate 1, Fig. 1)). As in *L. thompsoni*, spiracle of sternum IV situated very close to dorsolateral margin, and middle trichobothrium of sterna V closer to posterior than to anterior trichobothrium. MALE: Sternum IV, behind the 2 trichobothrial areas, with a pair of ovoid fossae each with a tuft of setae and with anterior margin raised into a thickened black rim (Plate 1, Fig. 2) (similar fossae present in ♂ of *L. thompsoni* but

1



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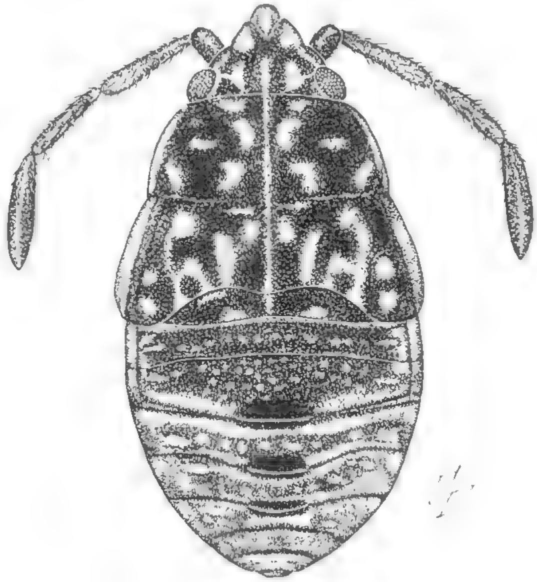
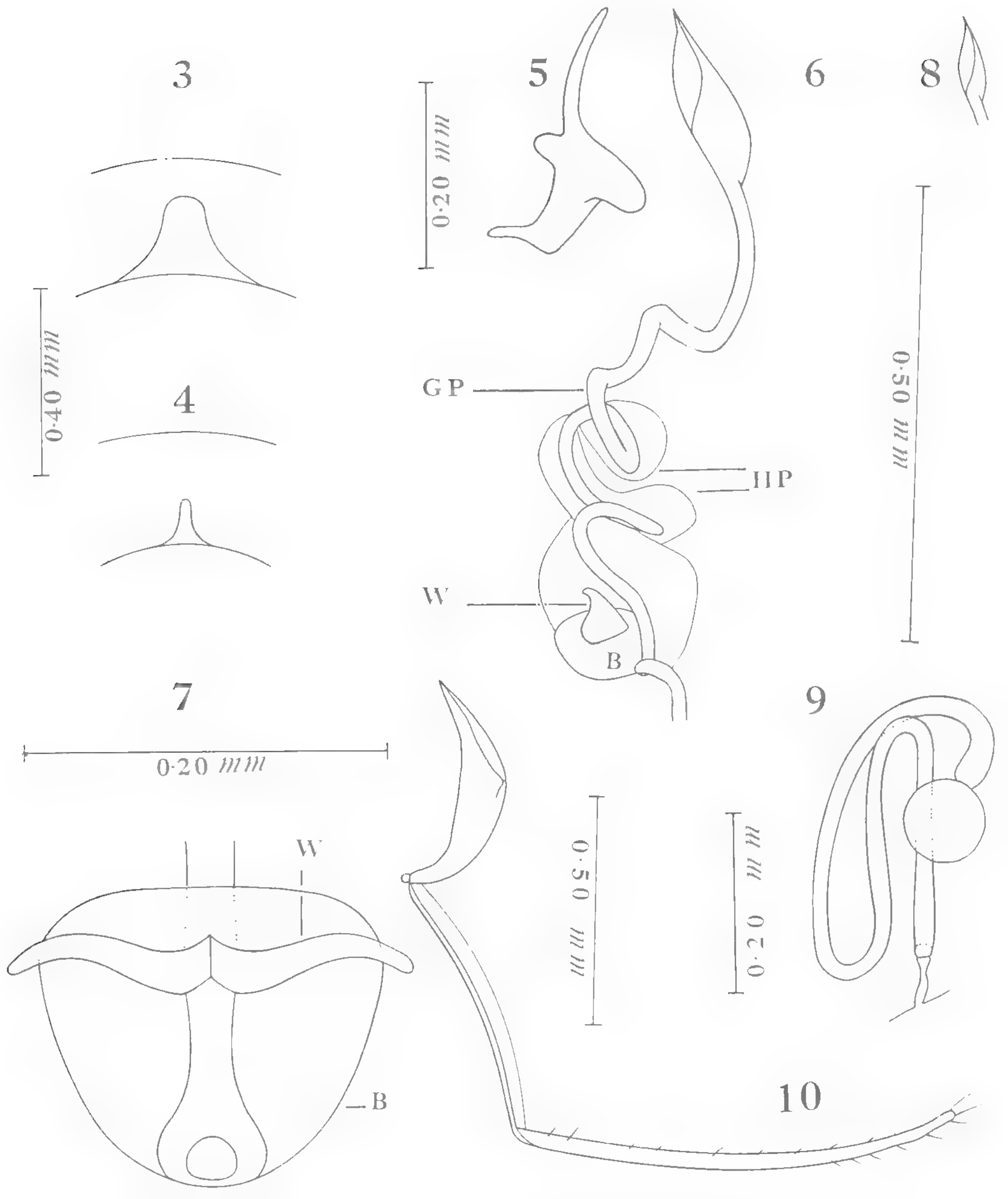


FIGS 1, 2: *Lachnophoroides frerei*, dorsal aspect. 1, paratype male; 2, nymph, 4th instar.

anterior rim much less developed (Plate 1, Fig. 1); sterna V, VI and VII on each side with an extensive area of fine pores, less numerous and less close-set than in *L. thompsoni*. Median apodeme from anterior margin of sternum 7 (Fig. 3) much wider than in *L. thompsoni* (Fig. 4). Parameres (Fig. 5) with smaller process more broadly rounded and larger than in *L. thompsoni* (Woodward 1977, Fig. 4). Aedeagus (Fig. 6) resembling that of *L. thompsoni* in having wings of ejaculatory reservoir large, curved, with bases set close together (Fig. 7); helicoid process with 2 coils; gonoporal process distal to helicoid process not enclosed in a prominent inflatable lobe, with 2 turns, distal end widened, then tapered to a fine, acute termination; differing from that of *L. thompsoni* (Fig. 8) in distal portion of gonoporal process being larger and broader. FEMALE: Paired setose fossae of sternum IV and pore areas of sterna V–VII lacking (absent also in ♀ of *L. thompsoni*). Genitalia similar to those of *L. thompsoni:* spermatheca (Fig. 9) with short, narrow proimal and long, wide distal divisions of duct, latter with 2 loops, and with a well developed spherical bulb; ovipositor: gonapophysis I with ramus extending to about distal 1/5; apex of gonapophysis II narrowly rounded and slightly curved, with 2 long distal setae (Fig. 10).

COMMENTS

The female from South Peak Summit is somewhat teneral, with rather crumpled hemelytral membranes and a paler body, the pronotum having the anterior collar, lateral carinae and posterior lobe mostly creamish white, the scutellum being extensively white, the corium mostly off-white with a few light brown streaks, and the abdomen ventrally mostly yellowish brown and dorsally streaked with red and yellow.



FIGS 3–10: *Lachnophoroides* spp. 3, 4, median apodeme from anterior margin of abdominal sternum 7 of male: 3, *L. frerei*, holotype; 4, *L. thompsoni*, paratype. 5–7, male genitalia, *L. frerei*, holotype: 5, right paramere, dorsal aspect; 6, ejaculatory reservoir and vesica of aedeagus, lateral aspect; 7, ejaculatory reservoir, dorsal aspect. 8, distal end of gonoporal process of *L. thompsoni*, paratype. 9, 10, female genitalia of *L. frerei*, paratype: 9, spermatheca; 10, gonapophysis II. **B**, body; **GP**, gonoporal process; **HP**, helicoid process; **W**, wing.

DISCUSSION

As noted above, *L. frerei* is considered to be the montane sister species of *L. thompsoni*. The specific differences, apart from those commonly associated with degree of wing development (size of the eyes and ocelli, slight differences in the structure of the pronotum, and possibly the different punctation of the clavus), are those of colour and the differences in abdominal structures already described.

G.B. Monteith (pers. comm.) has pointed out that it is significant that *L. frerei* was not taken on Mt. Bellenden Ker, a larger massif than Bartle Frere, of comparable height (1560 m) and only 10 km distant, despite much more intensive sampling there by the Earthwatch party than on Bartle Frere. He also drew attention to the paper by Covacevich (1984) describing the lizard *Leiolopisma jigurru*, also restricted to Bartle Frere, and discussing the distribution of this and other animal taxa.

The setiferous fossae of sternum IV of the male, so far as the author is aware, have not been recorded in any other genus of Lygaeidae. The abdomen of the male paratype of *L. frerei* was immersed overnight in cold 10% KOH solution. Upon separation of the sternal region, two bulky, subglobular and contiguous tissue masses became apparent, each overlying and closely attached to the internal wall of each fossa and about 0.32 mm in diameter. These appear to be a pair of compound glands, evidently ectodermal since their intima, although thin, remained intact after KOH treatment and because, scattered near the surface of each mass, were small black capsules, apparently the sclerotised and heavily pigmented thecae of the component glands. Similar structures occur in males of *L. thompsoni*. Their restriction to males suggests the secretion of a sex pheromone, dispersed by the long setae of the fossae; this possibility is to be tested.

NYMPHS OF *L. FREREI*

Nymphs of this species resemble those of *L. thompsoni* in the characters given by Woodward (1977, p.66) distinguishing the latter from nymphs of other Australian Targaremini, except for two features linked with adult brachyptery: the greater interocular space : eye width ratio and the very reduced eyes of the third instar specimen being remote from the pronotum. Those of the 2 fourth instar specimens reach or nearly reach the pronotum, as in *L. thompsoni*.

Other similarities between the nymphs of the two species are the red eyes and the brown thoracic pleura and abdominal scent gland areas.

Nymphs of *L. frerei* are readily distinguished from those of *L. thompsoni* by the much more variegated colour pattern of the head and thorax, the smaller eyes, the shorter antennal segment I and the proportionally shorter pronotum.

THIRD INSTAR

Body length 2.1; abdominal width 1.0.

COLORATION: Dorsal surface of head and thorax variegated in yellow and brown. Head with epicranial suture, paraclypei, anteclypeus, and most of median part of crown anterior to epicranial suture yellow; the following brown: junctions of anteclypeus and paraclypei (very narrow suture lines anteriorly, broader bands posteriorly), 2 longitudinal bands on crown between epicranial suture and anteclypeus forming an irregular inverted Y with short anterior stem, lateral margins of paraclypei, and vertex behind arms of epicranial suture. Ventral surface of head brown; ventral ecdysial lines and base in middle yellow; red anteromedially. Antennifers brown with red tinges; antennae brown. Labial segments I-III yellowish brown; IV brown. Thorax above with yellow median ecdysial line bordered by 2 irregular longitudinal brown bands. Pronotum with 6 irregular yellow patches: 2 anterior submedian and 4 smaller posterior, 2 submedian, 2 sublateral; lateral carinae yellowish brown; remainder brown. Mesonotum with the following yellow: median ecdysial line (wider than on pronotum), 2 small submedian spots near anterior 1/3, more laterally 2 broad oblique bands in posterior 2/3, and 2 irregular sublateral bands; lateral carinae yellowish brown; remainder brown. Metanotum yellowish brown with reddish tinges, especially posteriorly and on lateral carinae; most of anterior margin and inner and outer margins of carinae brown. Thoracic pleura brown, brownish red posteriorly; ventral surface of thorax yellow. Legs brown, with distal ends of femora, proximal and distal ends of tibiae, and basitarsi, except at extreme proximal end, pale yellow. Abdominal terga I-III mostly brown, with small yellow spots and a yellow band along posterior margin of III on each side of first scent gland area; tergum IV yellow with broken transverse brown band; tergum V similar to IV in median 1/2, lateral parts mainly brown; VI and VII, behind third scent gland area, narrowly yellow with a transverse brown band, laterally brown with obscure yellow markings; VIII yellow in middle, brown laterally, IX yellow; proctiger ringed with dark brown; Y-suture and intertergal sutures red. Venter of abdomen reddish brown, with a small brown median sclerite on each segment.

HEAD: Length 0.52; width across eye 0.56; interocular space 0.36; eyes remote from anterolateral pronotal angles (eye length 0.13, postocular length 0.08). Length of antennal segments I 0.17, II 0.30, III 0.25, IV 0.35; segment I with only about distal 1/4 surpassing apex of head. Frontal sutures gradually curved. Length of labial segment I 0.35, II 0.32, III 0.25, IV 0.27; I reaching to behind level of posterior margins of eyes.

THORAX: Pronotum: median length 0.33; posterior width 0.79. Mesonotum: median length 0.24; posterior margin nearly straight; wing pads not developed.

ABDOMEN: Anterior scent gland area wider than second and third, these subequal in width.

FOURTH INSTAR (Fig. 2)

Body length 2.4; abdominal width 1.2.

COLORATION: Similar to that of third except: head with a discrete brown bar near anteromesial border of each eye; antennal segment II paler at distal end; pro- and mesonotal carinae mostly yellow, former brown anteriorly and near inner margin, latter extensively so posteriorly and diffusely so anteriorly; wing buds mottled with brown and yellow; visible part of metanotum brown except for pale ecdysial line and an off-yellow spot on each side of it.

HEAD: Length 0.52; width across eyes 0.52; 0.56; interocular space 0.40; eyes touching or close to anterolateral pronotal angles; eye length 0.16; length of antennal segments I 0.24, II 0.41, III 0.38, IV 0.56; segment I with about distal 1/3 surpassing apex of head. Frontal sutures angled well before reaching eyes. Length of labial segments I 0.41, II 0.37, III 0.33, IV 0.29; I reaching to about level of posterior margins of eyes.

THORAX: Pronotum: median length 0.43; posterior width 0.90, 0.97. Mesonotum: median length 0.25, 0.30; posterior margin between wings pads slightly convex; wing pads reaching posterior margin of mesonotum, length 0.44, 0.51.

ABDOMEN: Scent gland areas similar in relative width to those of third instar.

ACKNOWLEDGEMENTS

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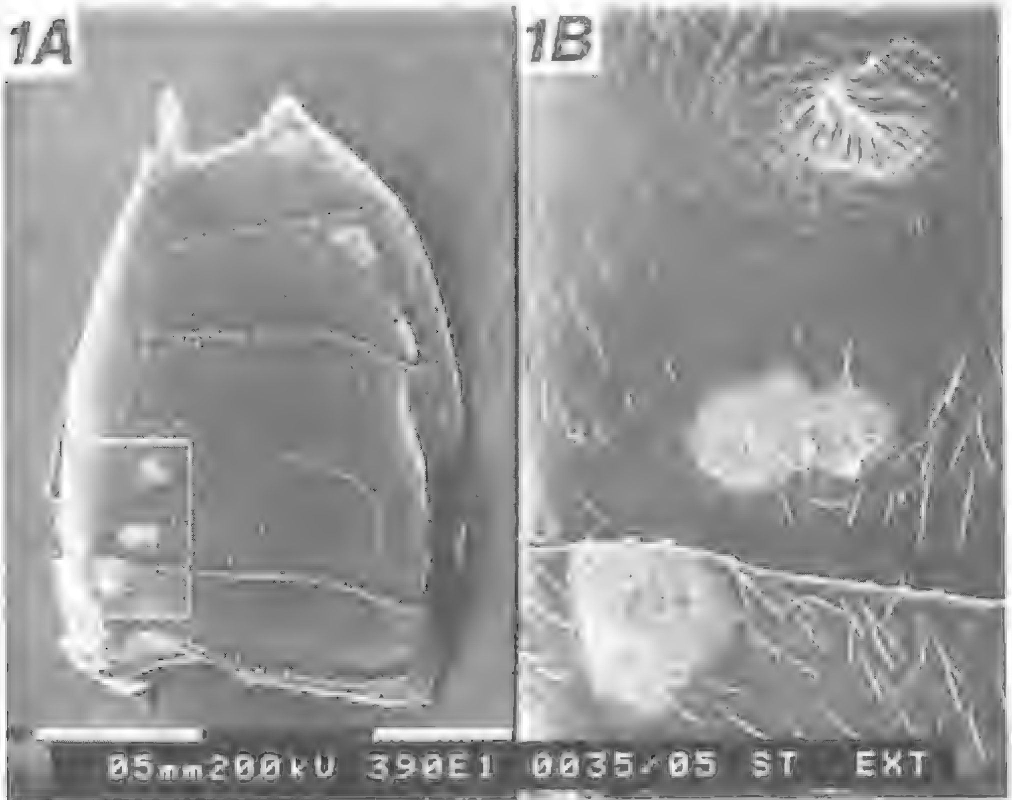
PLATE 1

FIG. 1: *Lachnophoroides thompsoni*, paratype male. **A**, external ventrolateral aspect of abdomen, anterior margin at bottom of figure; rectangle includes right trichobothrial area of sternum 3 and right trichobothrial area and right setose fossa of sternum 4. **B**, enlarged view of rectangle.

FIG. 2: *Lachnophoroides frerei*, paratype male: one of the pair of setose fossae of abdominal sternum 4.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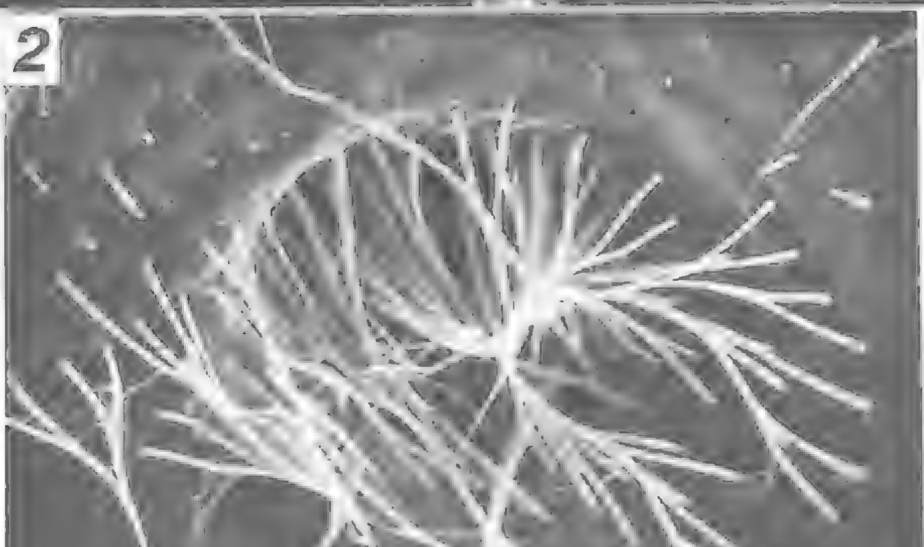
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A NEW FLIGHTLESS SPECIES OF *AULACOPRIS* WHITE FROM NORTH QUEENSLAND (COLEOPTERA : SCARABAEIDAE : SCARABAEINAE)

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Department of Primary Industries, Mareeba, Queensland

ABSTRACT

Aulacopris matthewsi sp. nov. is described from mountains behind Cape Tribulation in northern Queensland. Its nearest relatives are in southeastern Queensland. The species is the smallest in the genus and is flightless. Individuals engaged in ball making and ball rolling activities in the laboratory.

INTRODUCTION

The genus *Aulacopris* White includes the largest Australian Scarabaeinae. Matthews (1974) recognized two species, the type species *reichei* White and a new species, *maximus*. Both species are winged and known from coastal areas of southeastern Australia — *reichei* from *Casuarina* coastal forest on sandy soil from Sydney south to Mallacoota in north eastern Victoria, and *maximus* in montane localities from Barrington Tops in central New South Wales north to Eumundi in southern Queensland (Matthews 1974), with *reichei* being taken recently near Warburton in southern Victoria (T. Weir, pers. comm.). This paper describes a third, much smaller, flightless species from northern Queensland, about 1350 km north of the previous northern record for the genus.

QM = Queensland Museum.

Aulacopris White

Aulacopris White 1859, *Proc. zool. soc. Lond.* p.118.

Type species: *Aulacopris reichei* White, 1859.

Aulacopris matthewsi sp. nov.
(Figs. 1-3).

Material Examined

Holotype: QM T8720 ♂, 3.5 km W of Cape Tribulation, 680 m (site 7), NE Qld., i. 1983, G.B. Monteith.

Allotype: QM T8721 ♀. Same data as holotype.

Paratypes (42): Same data as holotype, (15 ♂♂, 19 ♀♀); same locality 23.ix.-7.x.1982, Monteith, Yeates and Thompson, (2 ♂♂, 2 ♀♀); same locality 20-23.iv.1983, G.B. Monteith and D.K. Yeates, (2 ♀♀). 3.0 km W of Cape Tribulation, 500 m (site 6), 5-9.i.1983, G.B. Monteith, (1 ♂), 4.0 km W of Cape Tribulation, 720 m (site 8), 5-9.i.1983, G.B. Monteith, (1 ♂).

(Paratypes in Queensland Museum, ANIC Canberra, British Museum (Natural History) London, South Australian Museum, Queensland DPI, Colls. R.I. Storey, Mareeba; H.F. Howden, Ottawa; A. Walford-Huggins, Julatten; P. Allsopp, Toowoomba; G. Williams, Taree).

Description

Total length 7.9-11.2 mm, colour uniformly piceous, surface sericeous except where noted.

Male

Head: Clypeal teeth short, acute, broadly emarginate between, rest of margin feebly convex to genal angles which are quadrate, apices rounded. Surface covered with large, indistinct, shallow, ocellate punctures, regularly spaced, separated by 1 diameter or less, each with a short recurved seta. Small nitid area in front of clypeal teeth with simple punctures. Dorsal portion of eyes about 10 facet rows wide, separated by about 10 eye widths.

Pronotum: Anterior angles quadrate, apices rounded, posterior margin in major male with a long narrow, almost parallel sided process, the tip of which is bifurcate, reduced to a slight point in minor males, posterior and laternal margins feebly serrate. Lateral margins flattened, disk strongly convex, anteriorly humped, the hump with a strong elongate central tumescence, flanked by a pair of rounded, slightly anterior tumescences in major male, the central one very nitid, impunctate, the lateral ones nitid, punctate, a shallow, lanceolate depression in front of process on posterior margin. Surface of disk with

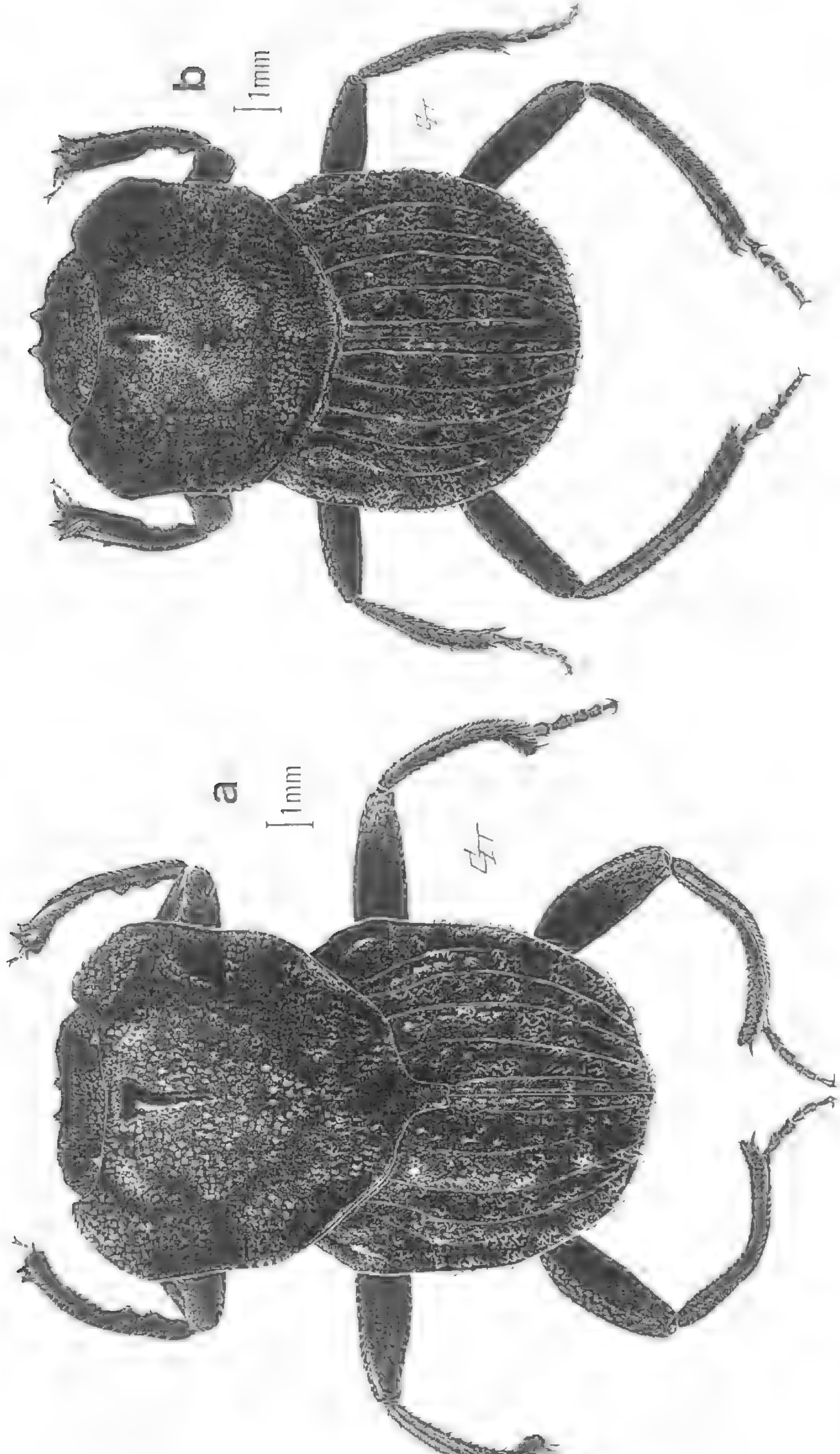

FIG. 1: *Aulacopris matthewsi* sp. nov. (a) paratype male (b) paratype female.

ocellate punctures scattered irregularly over surface, separated by 1–4 diameters, each puncture with a short recurved seta.

Elytra: Surface convex, uneven, raised near bases of 3rd, 5th and 7th intervals, shallow depressions at bases of 1st and 5th intervals. Pseudepipleura outside 7th stria carinate, reduced to about 1/4 the length of the elytra, a slight swelling near apex of 5th and 6th intervals. Striae fine, superficial, numbers 6–9 largely effaced though sections distinct. Odd numbered intervals with a few small tubercles, the apices of which are nitid, all intervals with groups of fine punctures, each with a short recurved seta.

Hind wings: Reduced to 2/3 length of elytra.

Sterna: Mesosternum about 4 times as wide as long, with scattered indistinct, ocellate punctures with short setae. Metasternum of major male with prominent fossa, starting at the mesometasternal suture, directed dorsally and backwards for about half the length of the metasternum and a quarter of the way through the beetle. The posterior edge of this pit is pulled up and curled back to form a prominent protuberance with a truncate and feebly bifurcate apex. Pit and protuberance reduced to a shallow nitid depression and low tubercle in minor males. Rest of surface of metasternum with scattered indistinct ocellate punctures and recurved setae.

Legs: Fore femur broad, width about 1/2 length at maximum, anterior margin bluntly serrate with a strong broad tooth about 2/3 of distance to tibia, fore tibia narrow and curved inwards for last 1/3, outer margin with 2 strong teeth near apex, plus a much smaller more posterior one, distal edge with a sharp downward facing tooth, inner margin bluntly serrate, with a triangular tooth 1/3 of distance from base and a sharp tooth at apex, apex nitid, fore spur long, narrow, pointed, about length of short tarsi. Mid tibia narrowed with inner apex slightly flattened, rounded, nitid. Hind tibia long, narrow, curved inward in apical 1/3, inner apex lengthened, flattened, nitid. Mid and hind tarsal segments widened towards apex, 1st segment longer than 2nd, 3rd or 4th, almost length of 5th.

Abdomen: Pygidium slightly convex, with ocellate punctures and recurved setae. Ventrites compressed, 6th being almost as wide in middle as first 5 combined, with ocellate punctures and recurved setae on basal edge of each ventrite, over most of surface of 6th. Aedeagus with parameres asymmetrical, as in Fig. 3.

FEMALE

Clypeal teeth closer together, more prominent, punctures more distinct. Hind edge of pronotum not produced into a parallel sided process, anterior hump indistinct, lateral tumescences of pronotal disk effaced though feebly nitid. Metasternum flat, unsculptured with numerous ocellate punctures with short setae, anterior central section nitid with fine puncutres and setae. Tooth on for femur longer and narrower, fore tibia straight, apical 2/3 wide, parallel sided, basal 1/3 of inner margin concave, bluntly serrate with a short wide blunt tooth just before base, inner apical tooth and downward facing tooth absent, teeth on outer margin slightly more prominent. Mid and hind tibiae without inner apices modified, mid tibia slightly wider and hind tibia less curved than in male. Abdomen not as compressed. Otherwise as in male.

COMMENTS

This unusual species is known only from the type locality, an eastern ridge of Mt. Sorrow, behind Cape Tribulation, about 100 km north of Cairns in north Queensland. All 44 specimens were obtained in a survey of ten sites, from sea level to close to 800 m, along a transect running through continuous rainforest from the Cape to Mt. Pieter-Botte, about 7 km inland (Fig. 4). This survey, undertaken by Dr G.B. Monteith of the Queensland Museum, involved sampling for insects using various techniques. All specimens of *A. matthewsi* were taken in dung baited pitfall traps. Only sites 6, 7 and 8, at altitudes between 500 m and 720 m, yielded *matthewsi*, all but two specimens being from site 7. The rainforest at these sites is described by Tracey and Webb (1975) as Simple Microphyll Vine-Fern Thicket.

Difficulty may be experienced in running *matthewsi* to *Aulacopris* in Matthews' (1974) key to the genera of Australian Scarabaeini due to the reduction of the pseudepipleura and elytral tubercles and the lack of pronotal carinae. However, both the pseudepipleura and tubercles are present on the elytra, and the eye canthus is complete, a combination which eliminates all other genera. Other differences from Matthew's synopsis of the genus are: small size (7.9–11.2 mm as opposed to 16–30 mm); reduction in hindwings resulting in flightlessness; 1st segment of mid and hind tarsi longer than 2nd; abdomen compressed and shortened. A modified version of Matthews' (1974) key separates the three species.

KEY TO THE SPECIES OF *AULACOPRIS*

1. Pronotum without prominent, sharp carinae. First segment of mid and hind tarsi longer than second. Flightless species, total length 7.9-11.2 mm. N. Queensland............... ....*matthewsi* sp. nov.


a


b

Pronotum with prominent, sharp carinae. First segment of mid and hind tarsi shorter than second. Fully winged species, total length 16-30 mm. SE Australia 2

2. Basal half of inner edge of fore tibia simple. Clypeal teeth separately produced, the edge to either side of them convex. Pronotal carinae and elytral tubercles very prominent. Elytral striae distinct, even-numbered intervals with irregular surface. Total length 16-21 mm. Victoria, New South Wales...... ....*reichei* White

Basal half of inner edge of fore tibia with 2 prominent teeth enclosing a large rounded excision. Clypeal teeth not separately produced, the edge to either side of them straight. Pronotal carinae and elytral tubercles less prominent, striae obsolescent, even-numbered intervals plane. Total length 22-30 mm, N. New South Wales, S. Queensland ....*maximus* Matthews

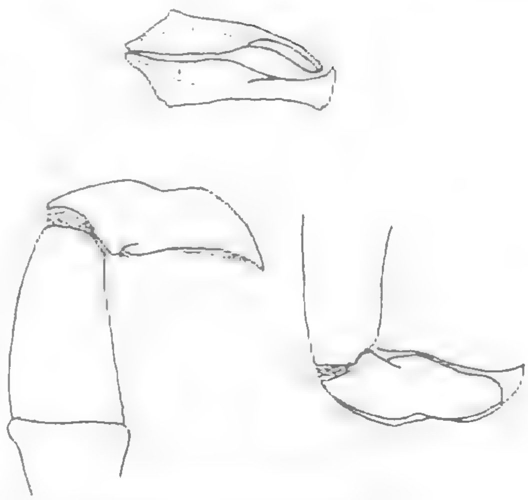

FIG. 3: Aedeagus, *A. matthewsi* sp. nov.

ETYMOLOGY

The species is named after Dr E.G. Matthews, without whose work on the taxonomy of Australian Scarabaeinae, none of the current work would be possible.

BALL FORMATION AND BALL ROLLING BEHAVIOUR

Nine specimens (1 ♂, 8 ♀♀) of *A. matthewsi* from the January, site 7 collection were returned alive to the laboratory in Mareeba for behavioural studies. These were kept alive for about one month in a large container with about 10 cm of soil in the bottom and were fed fresh horse dung at weekly intervals. The beetles took readily to the dung, feeding on its surface, making balls and rolling these around the container. However, they made no effort to fashion nests of any sort, either directly in the soil or under pieces of wood and leaf litter provided. The balls were merely abandoned, the beetles spending the remaining time walking around the container or usually buried in the soil beneath the dung. The soil was changed at one stage from the original sand/peat mixture to a local red volcanic type with no resulting change in behaviour. The single male was very inactive taking no interest in either ball formation or the females. According to Dr Monteith, some at least of the beetles came to traps in the daylight hours and all observations in the laboratory were made during these hours. Many balls were made overnight, however, so it is likely the beetles are active at all hours that food is available.

Typical ball formation was as follows: the beetle stands on top of the dung mass, and starts to press back with the forelegs on a section of dung while pushing outwards with the edge of the clypeus. The beetle slowly rotates until a rough ball about 2/3 the length of the beetle is formed and pinched off. Ball and beetle fall to the ground where the beetle continues to work on the ball, compressing it with the forelegs and removing larger bits of undigested grass. The beetle then starts enlarging the ball by dragging more material off the main dung mass and pressing it into the ball. At completion the ball is spherical and slightly larger than the beetle. This process takes about 2 hours.

Individuals rolled these balls around the enclosure and did the same with small cylindrical ones made by the author. Rolling is done using a head down position, balancing on the side of the ball with the mid and hind legs while stretching out and pushing on the substrate with the head and occasionally the forelegs, thereby rolling the ball a few millimetres backwards. After relaxing the body to the unstretched condition it walks further round the ball to get closer to the substrate. This combination of walking forward over the ball and pushing with the head results in a very slow progress backward.

FIG. 2: *Aulacorpris matthewsi* sp. nov. (a) major male, side view (b) major male, ventral view.

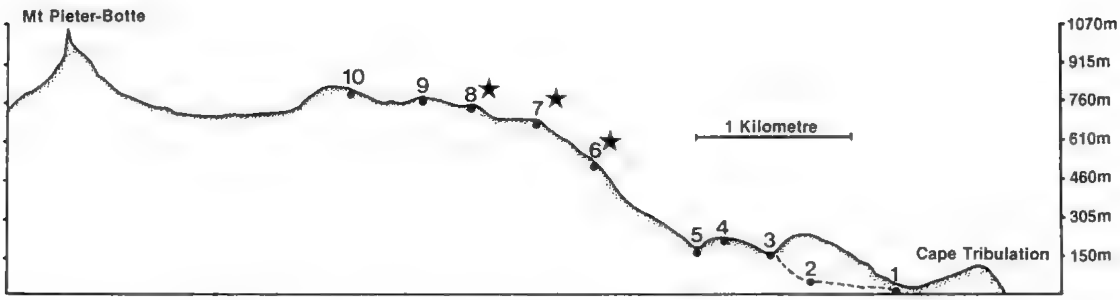

FIG. 4: Cape Tribulation sampling transect showing position of collecting sites. Asterisks indicate sites at which *A. matthewsi* was collected.

DISCUSSION

Aulacopris matthewsi sp. nov. is the second species of a 'southern' genus of the tribe Scarabaeini discovered recently on north Queensland mountain tops, the first being *Aptenocanthon monteithi* Storey found somewhat to the south of *matthewsi*, on the Bellenden-Ker Range and nearby mountains (Storey 1984). Like *Aptenocanthon, Aulacopris* is included in the mentophiline group of genera within the subtribe Canthonina, which can be distinguished from other Australian canthonines by the presence of pseudepipleura on the elytra and simple tarsal claws. The importance of southern genera of Scarabaeini being found in mountainous areas of north Queensland was discussed in that paper and will not be repeated here.

A. matthewsi is the first known flightless member of the genus *Aulacopris*. Wing reduction is relatively common in Australian Scarabaeini with close to 50% of known species being flightless and 14 of the 16 genera containing flightless species. Matthews (1974) discusses wing reduction of Australian Scarabaeini in some detail, attributing the relatively high occurrence to environmental stability and limitation of habitat area and this is undoubtedly the situation in *matthewsi*.

One of the most remarkable features of *A. matthewsi* is the massive sternal fossa and associated tubercle in the major male. This fossa displaces much of the internal volume of the mesothorax in extreme examples. It is difficult to speculate on the purpose, if any, of this structure at present. Similar though much less developed features are found on males of *A. reichei* and *A. maximus*.

Dung beetles of the tribe Scarabaeini have a unique method of utilizing dung as a food supply. In nearly all species studied, a small portion of dung is taken from a larger mass, formed into a ball and rolled, using either a pulling (Position I) or pushing (Position II) position, to a place well away from the original source (Halffter and Matthews 1966). Here the ball is usually buried and either consumed by the beetle or used in the manufacture of brood balls. Little has been recorded on the behaviour of Australian genera, however, other than the enigmatic *Cephalodesmius* which was studied in detail by Monteith and Storey (1981). Matthews, at the time of his revision (1974) had not seen any of the mentophilines fashion balls from a dung mass, in spite of observations both in the field and in captivity on several of the genera, including *Aulacopris* (*reichei*). This prompted him to speculate that this primitive group of genera was at a stage of evolution preceding ball making. However, Waite (1898) reported *A. maximus* (cited as *reichei*) as having made brood balls from bat guano, found containing immatures at various stages of development. Since then *maximus* has been seen to construct balls from human faeces used as bait in pitfall traps set at Mt. Glorious in southern Queensland (A. Hiller, pers. comm.). *A. matthewsi* is quite adept at ball formation in a manner essentially like that described by Halffter and Matthews (1966) as typical of the tribe, although the time taken (120 minutes) is somewhat longer than that recorded by those authors as normal (12–40 minutes). The genus *Cephalodesmius* uses the same method of ball formation until the rough ball is pinched off the mass, but does not undertake smoothing and enlarging before transport (Monteith and Storey 1981). The genus *Canthonosoma* (*castelnaui* Harold) has been observed by the author near

Blackbutt in southeastern Queensland to congregate on bovine dung, fashioning balls and rolling these away though no detailed notes were made on the procedure at the time.

Matthews (1974) observed the West Australian mentophiline genera *Mentophilus* and *Coproecus* rolling marsupial pellets using Position II, which is that recorded here for *A. matthewsi*. Halffter and Matthews (1966) described the normal 'pushing' position as head down with most pushing on the ground being done by the forelegs, occasionally the middle pair. *A. matthewsi* differs in primarily using the head to push on the ground, occasionally the forelegs. This is similar to that described for *Sisyphus* by those two authors.

It would seems from these few observations that detailed field studies of some of the common mentophiline genera will be necessary before further conclusions can be drawn on the behavioural antiquity of the group.

Some comment should be made on the apparent highly localised nature of the population of *A. matthewsi*. Extensive trapping for dung feeding beetles by a number of collectors has been undertaken in northern Queensland in recent years, from Bloomfield south to Paluma. It seems highly unlikely that such a conspicuous species, which is really quite common at the type locality and apparently active most of the year, would be missed elsewhere, if present. It is possible that *A. matthewsi* could be found in similar habitat about 40 km to the south in the mountains behind Mossman which have as yet received little close study. However, until evidence to the contrary is obtained, we can only conclude that this species has one of the most restricted distributions of any Australian scarabaeine, comparable to some of the larger pterostichine carabids (*Nurus* etc.). It is indeed fortunate therefore that the site is protected within Cape Tribulation National Park.

ACKNOWLEDGEMENTS

The author wishes to thank Mr Geoff Thompson and Miss Gudrun Sarnes of the Queensland Museum for the drawings in Figure 1 and scanning electron micrographs in Figure 2 respectively, Dr Geoff Monteith, Queensland Museum and Mr Tom Weir of CSIRO, Canberra for loan of specimens and comments on the manuscript, Professor Henry Howden, Ottawa and Dr Eric Matthews, Adelaide for their comments on the taxonomic relationships of the species discussed, and Mr Tony Hiller, Brisbane for his observations on *A. maximus*.

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STUDIES ON TROPICAL PHOLCIDAE II: REDESCRIPTION OF *MICROMERYS GRACILIS* BRADLEY AND *CALAPNITA VERMIFORMIS* SIMON (ARANEAE, PHOLCIDAE) AND DESCRIPTION OF SOME RELATED NEW SPECIES.

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ABSTRACT

Micromerys gracilis Bradley, ♂♀, and *Calapnita vermiformis* Simon, ♂♀, are redescribed and figured and a neotype is erected for *M. gracilis*. Diagnoses are given for the genera *Micromerys* Bradley, *Calapnita* Simon, *Leptopholcus* Simon and *Panjange* Deeleman-Reinhold. *Calapnita* is sufficiently distinct to justify reestablishing it as a separate genus. Descriptions and figures are presented of *Micromerys daviesae* n.sp., ♂♀, from northeastern Queensland, *Leptopholcus borneensis* n.sp., ♀, and *Calapnita phasmoides* n.sp., ♂♀, from Kalimantan (Borneo), *Calapnita phyllicola* n.sp., ♂♀, from Kalimantan, Malay Peninsula and Sumatra, *Calapnita subphyllicola* n.sp., ♂♀, from Mindanao and of *Panjange mirabilis* n.sp., ♂♀, from northeastern Queensland. These spiders appear to have passed through parallel morphological transformations as an adaptation to life on leaves in tropical forests. In the *Micromerys* species treated here, small median anterior eyes or pigment specks may be present or absent in the same species. Their absence can not serve to distinguish this genus from *Leptopholcus*. On the basis of the genital organs, all the spiders described here are quite distinct from the alleged *Micromerys* species from Africa and the New World.

INTRODUCTION

The genus *Micromerys* Bradley accommodates a variety of palecoloured pholcids with flat carapace, six eyes in two triads on the sides of the head and a thin, elongate abdomen. Representatives of this genus have been reported from Australia, Asia, Africa and the Americas.

In his 'Histoire Naturelle des Araignées', Simon (1893) placed the monotypic genus *Calapnita* Simon, described one year previously from the Philippines, in synonymy of *Micromerys* on the basis of similarity of body shape and eye constellation. At the same time he created the Leptopholceae, comprising *Micromerys* and *Leptopholcus* Simon, which shows the same peculiarities in body form and eye pattern. Subsequent authors (Pickard-Cambridge, Petrunkevitch, Mello-Leitao) added new species from the New World tropics to the genus *Micromerys*. Recently, two authors (Timm 1976, Brignoli 1980) expressed their doubt about the validity of this classification.

The type species of *Micromerys, M. gracilis* Bradley was described superficially from the female only and without illustration. Dr Valerie Todd Davies of the Queensland Museum informed me that the type specimens of *M. gracilis* are lost, but she was able to provide a female specimen from Lake Boronto, Cape York, close to the type locality and agreeing in all respects with the original description. The discovery of new species referable to this genus was incentive to erect a neotype to stabilize the genus and assess differences from related genera.

Calapnita Simon is considered a valid genus, and three new species from the Malay Archipelago are assigned to it here, whereas one new species from Kalimantan is placed in *Leptopholcus* Simon.

One new species from Cape York Peninsula, belonging to a recently described, related genus (*Panjange* Deeleman) is also described in this paper.

A male and female type specimen of each new species has been deposited either in the Queensland Museum (QM) or in the Rijksmuseum van Natuurlijke Historie, Leiden (RMNH), The Netherlands; other material is in the author's collection.

Micromerys Bradley, 1877

Micromerys Bradley, 1877 *Proc. Linn. Soc. N.S. Wales* **2** : 118.

Type species: Micromerys gracilis Bradley.

DIAGNOSIS

Carapace and abdomen unicoloured, pale green to yellow. Carapace flat, thoracic groove and radiating striae very shallow. Eye triads on the anterior corners of the head, in the male sometimes raised; am eyes very small or absent. Male chelicerae with lateral protrusion. Sternum obtusely rounded behind (Fig. 24), maxillar section of anterior margin with right angle adjacent to coxa I. Abdomen very long and thin, worm-shaped, spinnerets in prolongation of it. Legs very long and thin, metatarsi and tarsi filiform. Three tarsal claws on onychium, those on tarsi I–III of equal size, upper pair curved, with 2–3 ventral teeth or none, those on tarsi IV very small, flat. Male palpal organs long and slender, tarsal appendage with articulating side branch, bulb elongate, embolus large and sclerotized, bulbal apophysis reduced. Shape of tarsal appendage and embolus diagnostic for the species. Female palp with four apical toothless claws (Fig. 6) and a hyaline cone. Epigyne bulging, lacking a chitinized plate and tongue, internal surface of epigynal lip with membranous valves, diagnostic for the species.

REMARKS

The taxonomic position of *M. conica* Simon and *M. debilis* Thorell is uncertain; *Micromerys tipula* and *M. dalei* Petrunkevitch belong to the genus *Leptopholcus*. *Micromerys delicata* Cambridge, and *M. occidentalis* (Mello-Leitao) do not belong to *Micromerys* and may constitute a genus of their own.

Thus the genus is, according to present data, only known from Australia with an unedited species from West Irian.

Micromerys gracilis Bradley
(Figs 1–9, 60)

M. gracilis Bradley, 1877, *Proc. Linn. Soc. N.S. Wales* **2** : 118—Cape York, Queensland, Australia (♀).

MATERIAL EXAMINED

NEOTYPE: 1 ♀, QM S885, Lake Boronto near Somerset, 5 km south of Cape York, 10°46'S, 146°30'E, 3—4.ii.'75, R. Raven.

OTHER: 2 ♀, QM S886, Gordon Creek, Iron Range 12°43'S, 143°19'E, in mesophyll vine forest, 24-30.vi.'76, R. Raven and V. Davies; 1 ♂, 1 ♀, QM S887, 1 ♂, QM S891, Shiptons Flat, 15°48'S, 145°15'E, complex notophyll vine forest on basalt, 16–21.xi.'75, R. Monroe and V. Davies.

DESCRIPTION

NEOTYPE: ♀ : carapace, sternum and abdomen pale yellow, chelicerae, legs and palps straw yellow with a brown area on the prolateral face of femora I and II; distal ends of tibiae and proximal and distal ends of metatarsi darkened. am eyes lacking, instead one very small black speck visible (Fig. 5). Measurements in mm : carapace 1.05 × 0.82, abdomen 6.40; leg measurements are given in Table 1.

TABLE 1: Leg measurements (mm) of *Micromerys gracilis* (Neotype, ♀)

Legs:	femur	patella	tibia	meta-tarsus	tarsus
I	7.70	0.40	6.25	10.10	3.12
II	5.75	0.40	5.00	7.68	1.25
III	4.32	0.40	3.12	4.55	0.72
IV	7.00	0.40	6.00	8.60	1.20
palp:	0.20	0.10	0.20	—	0.14

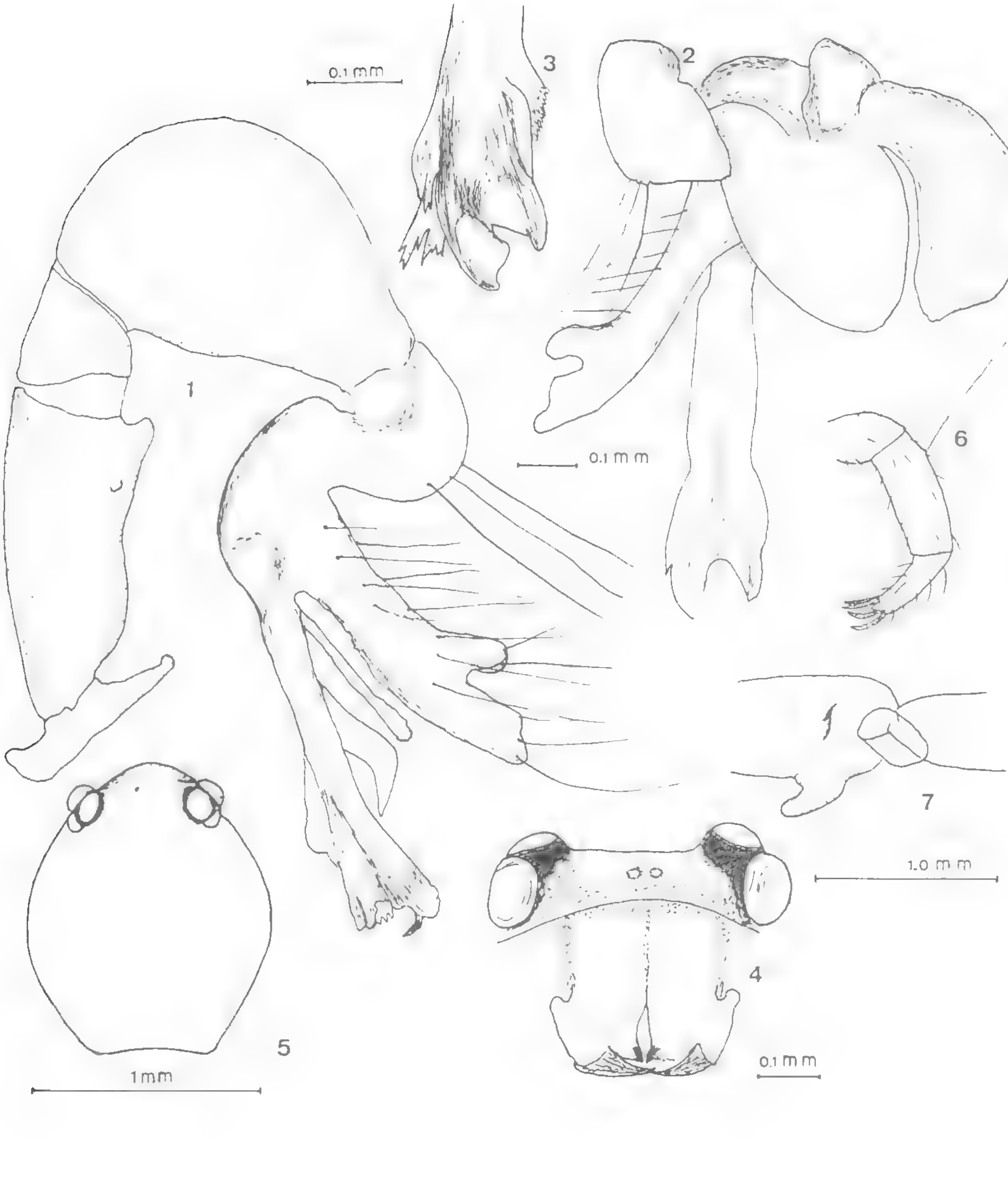
Genital organ (Figs. 8, 9): epigyne entirely unsclerotized. Anteriorly, a grey, horseshoe-shaped area (locking valves of uterus externus) appears through the tegument. On the interior (dorsal) surface of the epigynal lip there are two transverse lamellar valves, the edges of which are sclerotized and partly apparent near the distal margin of the epigynal lip.

OTHER FEMALES: in both specimens from Iron Range there are two minute specks in the area of the anterior median eyes; in the Shiptons Flat specimen there are two black interconnected rings. They all show the dark area on the anterior femora. There are no relevant differences in vulval structure. Measurements : Iron Range, carapace 1.10 × 0.95, and 1.20 × 0.96; Shiptons Flat, carapace 1.00 × 0.72.

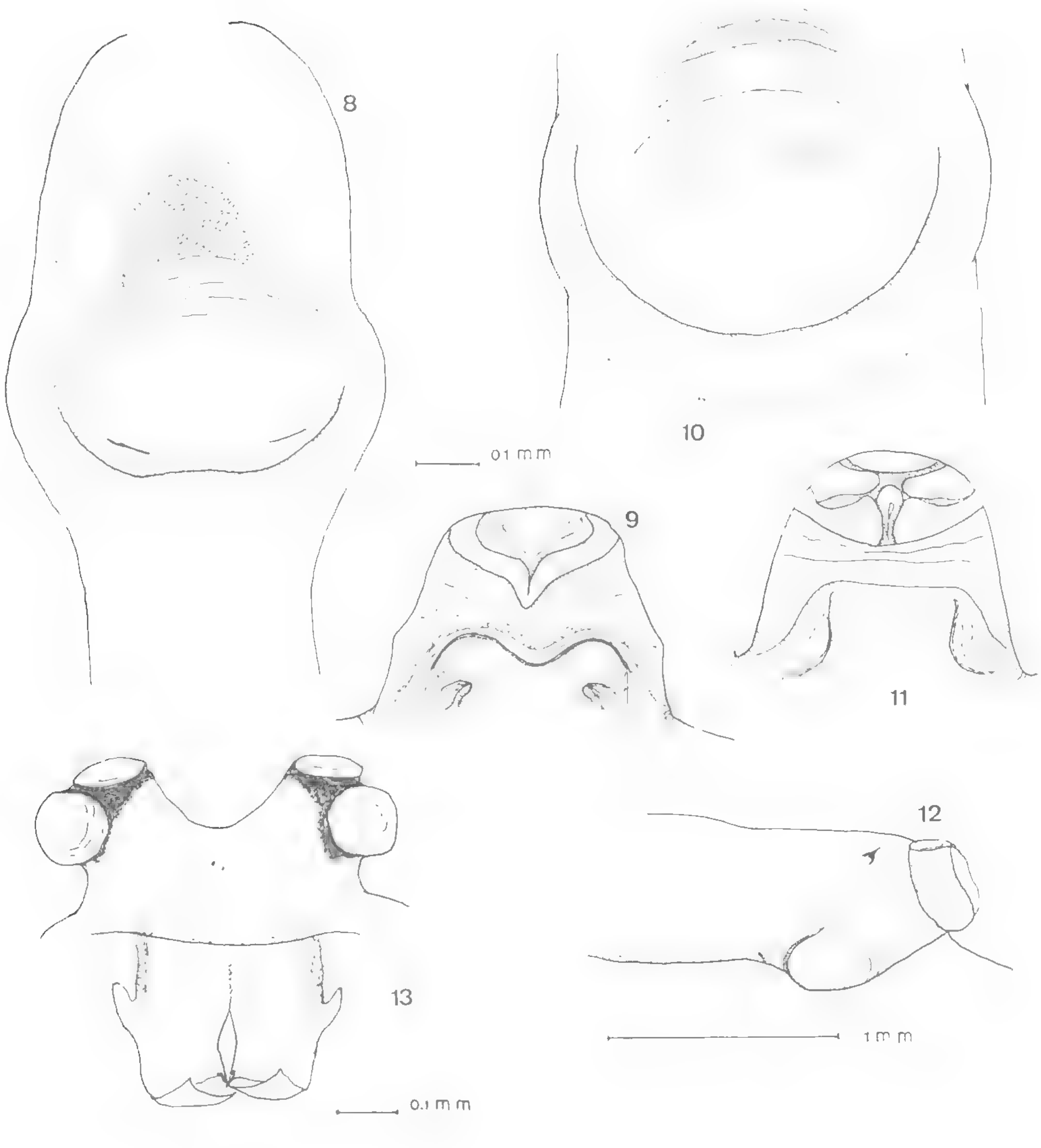
MALES: QM S891 colour as in the ♀, but dark areas on the anterior femora lacking, apex of all femora and patellae orange. Eye groups not raised; between the eye groups in the place of the am eyes there are two tiny interconnected black rings, but no lens is apparent. Chelicerae with obtuse horn laterally (Fig. 4). Anterior femora thinner than in the ♀. Measurements in mm : carapace 1.00 × 0.80, abdomen, 6.50; leg measurements (QM S891) are given in Table 2.

Other ♂ (QM S887) : carapace 1.05 × 0.85, abdomen 5.40; measurements of the first leg are: 7.90, 0.38, 6.82, 11.55, 1.60.

Male palp (Figs. 1–3): femur with small distal apophysis; basal part of tarsal appendage with V-shaped bend; lateral branch provided with



FIGS 1–7: *Micromerys gracilis Bradley*. Figs. 1–4; ♂(QM S891) Shiptons Flat. **1.** right palp, lateral; **2.** id., mesal; **3.** tip of tarsal appendage, mesal; **4.** head and chelicerae, front. Figs 5–7; ♀ neotype (QM S885) Lake Boronto; **5.** carapace; **6.** palp; **7.** anterior part of abdomen, lateral.



FIGS 8–13: Figs 8–9; *Micromerys gracilis* Bradley, ♀ Lake Boronto. **8.** anterior part of abdomen, ventral; **9.** interior (dorsal) view of epigynal lip, turned up. Figs 10–13, *Micromerys daviesae* n.sp. **10.** ♀ Finch Hatton, anterior part of abdomen, ventral; **11.** id., interior (dorsal) view of epigynal lip, turned up; **12.** id. anterior part of abdomen, lateral; **13.** ♂ Finch Hatton, head and chelicerae, front.

TABLE 2: Leg measurements (mm) of *Micromerys gracilis* (QM S891, ♂)

Legs:	femur	patella	tibia	meta-tarsus	tarsus
I	7.35	0.35	7.32	13.64	—
II	7.28	0.35	6.30	10.00	1.57
III	5.25	0.35	3.67	5.77	1.05
IV	7.87	0.35	6.63	11.02	1.60

various membranous processes. Shape of tarsal appendage and embolus diagnostic.

REMARKS

Anterior median eyes : the neotype female from Lake Boronto, the northernmost locality, shows only one minute pigment speck, hardly perceptable. Both the female specimens from Iron Range have two such tiny dots, whereas the female and two male specimens from the southernmost locality, Shiptons Flat (see Fig. 60) are provided with distinct pigment rings. A lens is never apparent.

Lake Boronto, the neotype locality is only 5 miles from the northernmost tip of Cape York Peninsula. The type locality 'Cape York' probably refers to this area, because Macleay, who led the 1875 'Chevert' expedition to New Guinea that obtained the type specimen, wrote from Somerset : 'Cape York, the northernmost point of Australia lies about 3 miles west of us' (cited in Fletcher J.J. 1929, *Proc. Linn. Soc. N.S.W.* **54** : 245).

Micromerys daviesae nov. spec.
(Figs 10–17, 24, 59d, 60)

MATERIAL EXAMINED

HOLOTYPE: 1 ♂, QM S888, Finch Hatton, ME.Q., 21°09'S, 148°38'E, complex notophyll vine forest, in tangled web under leaves, 10.iv.1975, R. Kohout, V. Davies.

PARATYPE: 1 ♀, QM S888, same data as Holotype.

OTHER: 1 ♂, QM S889, Brandy Creek, east of Proserpine, NE.Q., 20°20'S, 148°38'E, complex notophyll vine forest, 24.iv.1975, R. Monroe, V. Davies; 1 ♂ 1 ♀, QM S890, Rundle Range, southeast of Gladstone, SE.Q., 23°40'S, 151°00'E, coastal vine thicket, on trees, 24-31. iii.1975, R. Kohout and V. Davies.

DESCRIPTION

HOLOTYPE: ♂, colour (in alcohol) pale straw yellow with dark edges on carapace and sternum, legs yellow, apical portion of femora, whole patellae, basal and apical part of tibiae and base of metatarsi darkened. Eye triads on stalks (Fig. 13), in place of the am eyes a pair of minute dark specks, cheliceral lateral horns larger than in *gracilis*. Measurements in mm : carapace 1.15 × 1.05, abdomen 5.40; leg measurements are given in Table 3.

TABLE 3: Leg measurements (mm) of *Micromerys daviesae* (Holotype, ♂)

Legs:	femur	patella	tibia	meta-tarsus	tarsus
I	7.47	0.52	8.05	11.50	2.30
II	9.90	0.52	9.95	10.90	1.72
III	4.60	0.52	—	—	—
IV	8.05	0.52	7.45	12.07	1.07

Palp (Figs 15–17) : femur with basal apophysis; tarsal appendage with U-shaped bend, membranous processes lacking; embolus slightly longer than bulb, and longer than in *gracilis*.

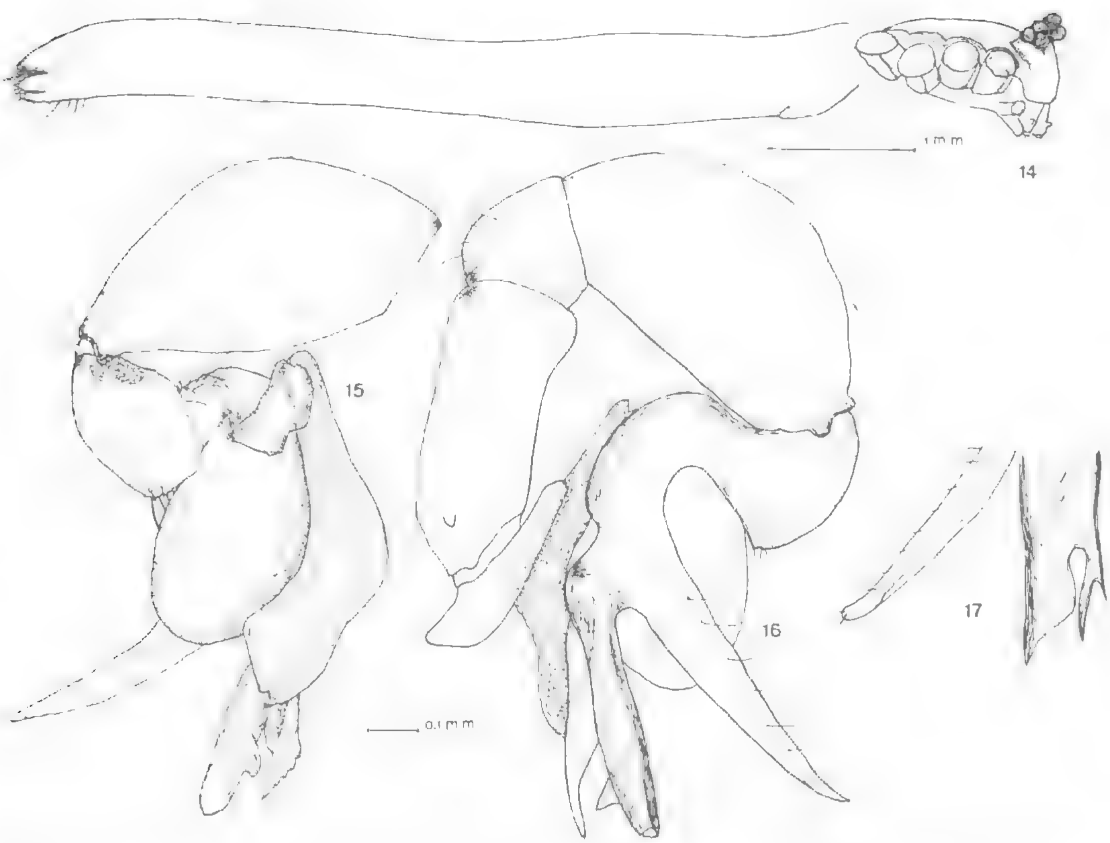
FEMALE (Finch Hatton) : patellae and adjacent segment parts only slightly darkened, tibia-metatarsal joints deep brown, the anterior femora bear a dark brown area on the prolateral surface; eye triads not raised. Halfway between the eye groups one minuscule black speck. Chelicerae lack the lateral horn, in other respects similar to the ♂. Measurements in mm : carapace 1.10 × 1.05, abdomen 6.40; leg measurements given in Table 4.

TABLE 4: Leg measurements (mm) of *Micromerys daviesae* (Paratype, ♀)

Legs:	femur	patella	tibia	meta-tarsus	tarsus
I	7.00	0.50	6.50	10.55	—
II	5.00	0.50	5.40	8.15	1.70
III and IV are lost.					
palp:	0.27	0.12	0.20	—	0.15

Genital organ (Figs 10–12): anterior horseshoe valve of uterus externus not so apparent as in *gracilis*, covered by the epigyne. Sculpture of the internal surface (Fig. 11, upper part) distinctly different from that in *gracilis*. Both the larger valves (lower part in Fig. 11) are weakly sclerotized at their margin, some smaller, transverse ridges in the middle are entirely membranous. Schematic longitudinal section see Fig. 59d.

VARIABILITY: The Brandy Creek male has a light brown pattern on the head and clypeus. The males from Rundle Range and Brandy Creek conform with the type in genital characters and in



FIGS 14–17 : *Micromerys daviesae* n.sp. **14.** ♂ Rundle Range, lateral; **15.** ♂ Finch Hatton, right palp, mesal; **16.** id., lateral; **17.** id., tip of tarsal appendage, mesal.

the absence of dark areas on the anterior femora, whereas the Rundle Range female conforms with the paratype as regards colouring and internal epigynal sculpture. Some variability occurs in the am eyes; in the Brandy Creek male one minute speck is all there is to be found, in both the Rundle Range specimens there is nothing left at all.

Leptopholcus Simon, 1893.

Leptopholcus Simon, 1893, *Ann. Soc. Ent. France* **62** : 319.

Type species : *Leptopholcus signifer* Simon—Congo (♂♀).

DIAGNOSIS General appearance as *Micromerys*, am eyes usually present; eye triads not or little raised in the ♂. Male chelicerae with one small basal apophysis or none. Sternum truncated behind, maxillar section of anterior margin with obtuse angle adjacent to coxa I. Tarsi as in *Micromerys*, but claws of tarsi IV curved (in the Asian species), with 1–2 denticles. Male palpal organ as in *Pholcus*, two branches of the bulbal apophysis straddling the small membranous embolus. Female genital area not covered by a chitinous plate, but with internal chitinized valves in the uterus externus (atrium); epigynal lip without membranous valves on the inside, there may be depressions distally. Porous plates large, elongate.

Distinction of females of *Leptopholcus* and *Micromerys* is difficult and can only be made by examination of the uterus externus.

REMARKS

Species of *Leptopholcus* are known from Africa, Madagascar and Borneo, and there are unedited species from Sri Lanka and Sulawesi.

Leptopholcus borneensis nov. spec.
(Figs 18–23, 59f)

MATERIAL EXAMINED

HOLOTYPE: 1♀ RMNH 9576, Indonesia, Eastern Kalimantan, Sepaku, 1°00'S, 116°54'E, 40 km north of Balikpapan, primary lowland dipterocarp rainforest, on the underside of leaves, 16.vii. 1979, P.R. Deeleman.

OTHER: 3 juvs, same data as holotype.

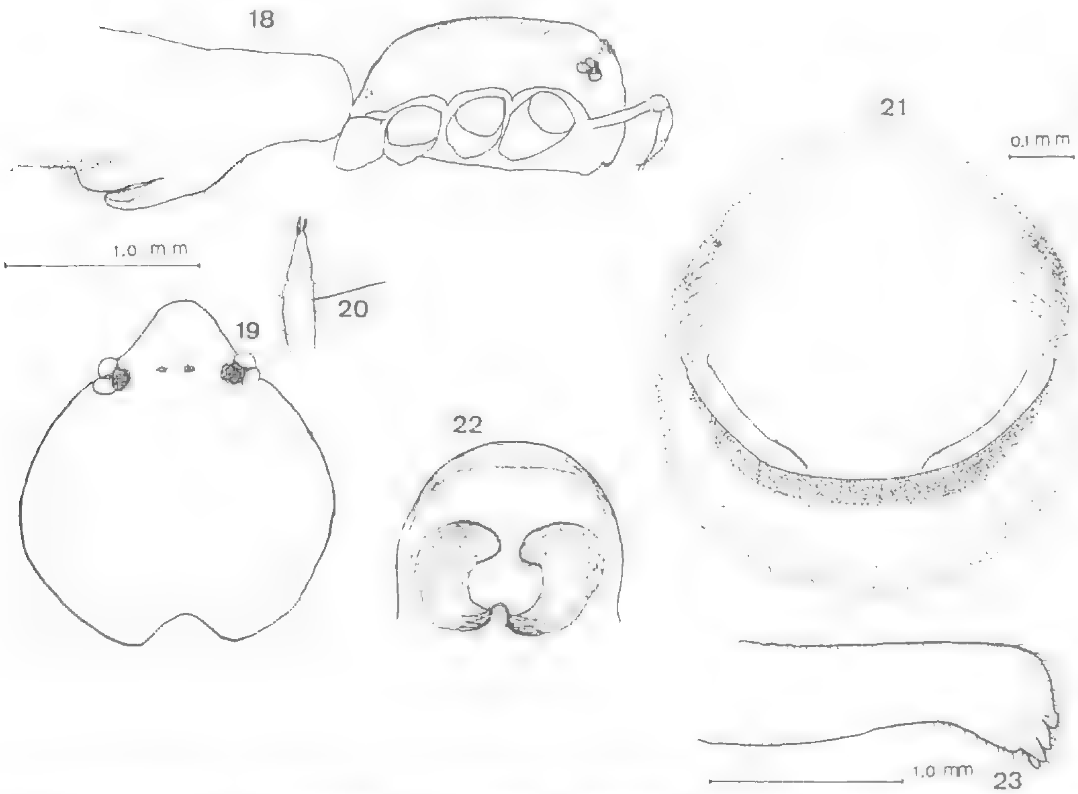
DESCRIPTION

HOLOTYPE: ♀ : all parts pale yellow without any markings; all legs missing in the holotype, in the juveniles legs with slightly darkened patellae; tips of tibiae and bases of metatarsi dark brown. am eyes punctiform (Fig. 19), 3–4 d from each other and much more from the al eyes. Clypeus slightly slanting. Sternum as in Fig. 25. Abdomen rather more voluminous than in the other species; abdomen tip as in Fig. 23. Measurements in mm : carapace 1.20 × 1.20, abdomen 8.40. Legs missing. Palp : 0.21, 0.10, 0.15, 0.17. Measurements of the largest juvenile : carapace 0.98 × 0.96, abdomen 6.50. Leg I : 6.85, 0.33, 6.37, 9.80, 1.95; femur II 5.95, femur III 3.92, femur IV 6.03.

Genital organ (Figs 21, 22) : distal border of genital area slightly sclerotized; basal part of epigynal lip internally with a pair of reniform plates (Fig. 22). Longitudinal section see Fig. 59f.

REMARKS

The type locality was visited in 1979, 1980 and 1982. Between 1979 and 1980, some of the biggest trees were cut down; after that, logging was abandoned. *L. borneensis* was taken in 1979, together with *Calapnita phasmoides* n.sp., *C. phyllicola* n.sp., and *C. vermiformis* Simon. In 1980 and 1982 however, in spite of intensive searching for several days, *L. borneensis* could not be found again and the same was true for *C. phasmoides*. On the contrary, *C. vermiformis* and especially *C. phyllicola* remained abundant.



FIGS 18–23 : *Leptopholcus borneensis* n.sp., , holotype. **18.** anterior part of body, lateral; **19.** carapace, dorsal; **20.**. tip of palp, dorsal; **21.** epigyne, ventral; **22.** internal (dorsal) view of epigynal lip, turned up; **23.** posterior part of abdomen, lateral.

Calapnita Simon, 1892.

Calapnita Simon, 1892, *Ann. Soc. Ent. France* 61: 42.
Micromerys Simon, 1893, *Hist. Nat. Araign.* 1 (2): 474 (Partim).

Type species : *Calapnita vermiformis* Simon.

DIAGNOSIS

General appearance as in *Micromerys*, but usually paler in colour and slenderer. am eyes lacking in all known species, eye triads on the sides of the head, not raised in the male. Male chelicerae with basally a lateral horn and distally an anterior tooth. Three tarsal claws, upper pair of leg I–III curved, with 5–6 teeth and much larger than unpaired claw (except in *vermiformis*), claws of leg IV very small, flat, with only some minute teeth or none.

Abdomen as in *Micromerys*. Male palpal elements long and slender, trochanter with spur; femora and patellae show various degrees of lengthening and thinning. Tarsal appendage without articulating side branch, bulb elongate with long, tubular embolus and one lanceolate apophysis. Female genital organ of specialized structure ; uterus externus (atrium) an elongate pouch with narrow opening, epigyne not sclerotized, prolonged into a lobe which is either replicated (*vermiformis*) or extended over the opening of the uterus externus to encase a 'vestibulum' (*phyllicola, subphyllicola* and *phasmoides*) (Fig. 59c, e), bearing a small tongue apically. Abdomen and legs as in *Micromerys*.

REMARKS

The genus can be subdivided into two groups : that of *vermiformis* (*C. vermiformis* only) has a replicate epigynal lobe and the sternum has a distinct angle in the anterior margin between the maxillar and the coxa I section; the other group comprises the species described here as new, in which the epigynal lobe is prolonged to form a vestibulum and the anterior margin of the sternum shows no distinct angle between the maxillar and the coxa I section.

Distribution: Malay Archipelago.

Calapnita vermiformis Simon
(Figs 26-31, 59a)

Calapnita vermiformis Simon, 1892 *Ann. Soc. Ent. France* 61: 42—Luzon (♂).

MATERIAL EXAMINED

HOLOTYPE: 1 ♂, Luzon, Philippines, 'Cueva de Calapnita', Mus. N.H. Paris.

OTHER: Quezon National Park, Atimonan, 14°00'N, 121°52'E, 200 m a.s., 1 ♂, 4 ♀, underside of Araceae leaves, 12–13.x.'79, P.R. Deeleman. Mindanao : Mt. Apo National Park, 6°53'N, 125°16'E, 800 m a.s., secondary forest, 1 ♀, juvs., under palmate leaves, 26.iv.'82, P.R. Deeleman. Indonesia, southwest Sulawesi : 23 km west of Camba, 5°00'S, 119°45'E, low forest on karst, 3 ♂, 5 ♀, underside of leaves of various plants, 1–2 m above the ground, 9 + 14.vii.'80, P.R. and C.L. Deeleman. East Kalimantan : Sepaku, 1°00'S, 116°54'E, 40 km north of Balikpapan, primary lowland dipterocarp rainforest, 1 ♀, 16.vii.'79, 1 ♂, 1 ♀, 5–8.viii.'80, 1 ♂, 3 ♀, 21–22.vii.'82, underside of leaves, P.R. and C.L. Deeleman; Santan, 0°3'S, 117°7'E, sea level, 1 ♂, 2 ♀, (Burke Museum, Seattle), 3.vii.'76, J.R. Thomson. North Sumatra : Bohorok Orang Utan Rehabilitation Centre, 3°29'N, 98°7'E, 90 km west of Medan, primary dipterocarp rainforest, 1 ♂, 2 ♀, 12–19.ii.'83, P.R. Deeleman and Suharto Djojosudharmo.

DESCRIPTION

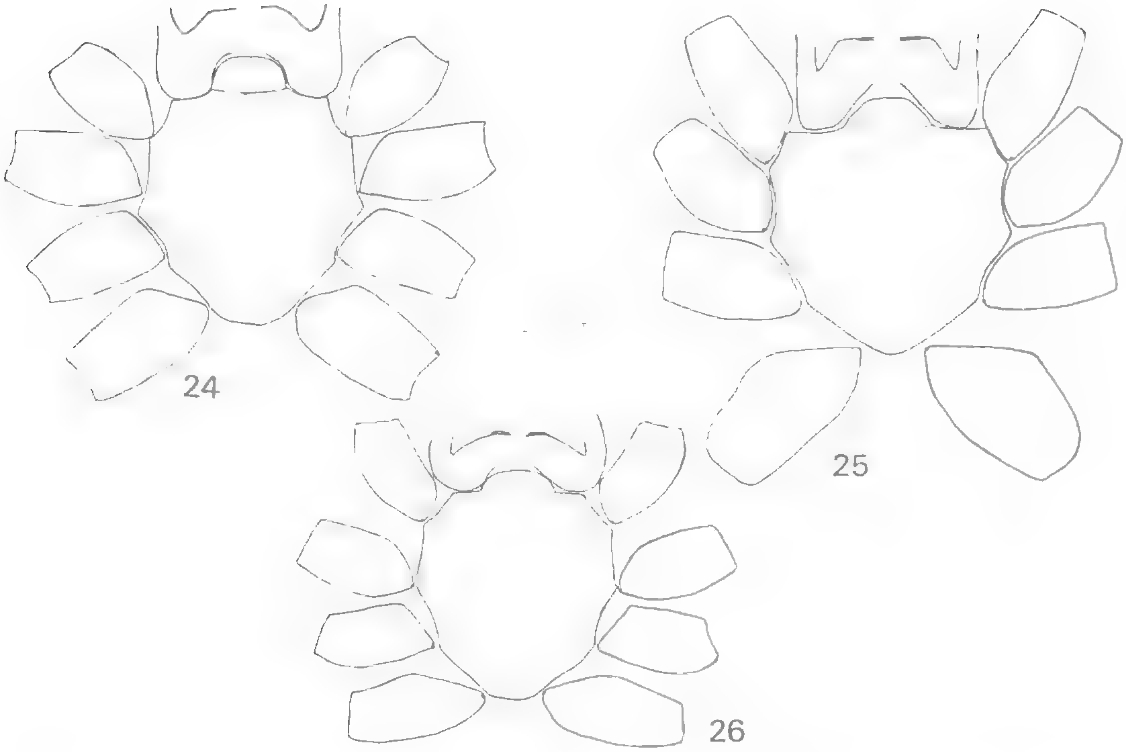
MALE (Quezon Nat. Park): all parts pale yellow, no markings on carapace or abdomen; legs with darkened femoral apex, patella, base and apex of tibia and base of metatarsus. al eyes slightly smaller than posterior eyes. Chelicerae as in Fig. 27, the anterior tooth with two tines. Sternum (Fig. 26) a little longer than wide, roundly truncated behind, coxa I section of anterior margin at a distinct approx. 90° angle with maxillar section. Measurements in mm : carapace 0.91 × 0.82, abdomen 5.05; leg measurements are given in Table 5.

TABLE 5: Leg measurements (mm) of *Calapnita vermiformis* (♂)

Legs:	femur	patella	tibia	metatarsus	tarsus
I	7.65	0.33	7.80	13.10	2.80
II	6.55	—	—	—	—
III	4.32	0.33	3.35	5.28	0.86
IV	6.72	0.33	6.66	10.08	1.30

Palp (Figs 28, 29) : spur of trochanter bent like a walking stick; femur ventrally with a series of three knobs, the most proximal of which sticks out proximally to the femoral-trochanter joint, bulb elongate, with a slender, transparent apophysis reaching just beyond the bulbal apex, with a wider, sclerotized base, the much longer embolus is provided with a subapical pore and the tip is crowned with 5 bristles.

FEMALE (Quezon Nat. Park): similar to the ♂, chelicerae unmodified. Measurements in mm : carapace 1.00 × 0.91, abdomen 5.50; leg measurements are given in Table 6.



FIGS 24–26 : sternum and coxae, ventral. **24.** *Micromerys daviesae* n.sp. ♀ Finch Hatton; **25.** *L. borneensis* n.sp. ♀; **26.** *Calapnita vermiformis* Simon ♀ Quezon Nat. Park.

TABLE 6: Leg measurements (mm) of *Calapnita vermiformis* (♀)

Legs:	femur	patella	tibia	meta-tarsus	tarsus
I	7.40	0.33	7.20	12.70	2.90
II	6.70	0.33	4.56	9.12	1.80
III	4.32	0.33	3.36	5.40	0.95
IV	7.20	0.33	6.20	10.10	1.45
palp:	0.23	0.10	0.14	—	0.21

Genital organ (Figs 30, 31) : epigyne prolonged into a smooth, V-shaped lobe with chitinized margins, folded back. It overlies the slitlike opening of the uterus externus, at the bottom of which the crescent locking valve ('Verschluss', cf. Wiehle 1967, p. 185) appears through the tegument. Schematic longitudinal section, see Fig. 59a.

The material from Mindanao, Sulawesi, Sumatra and Kalimantan does not show any relevant differences.

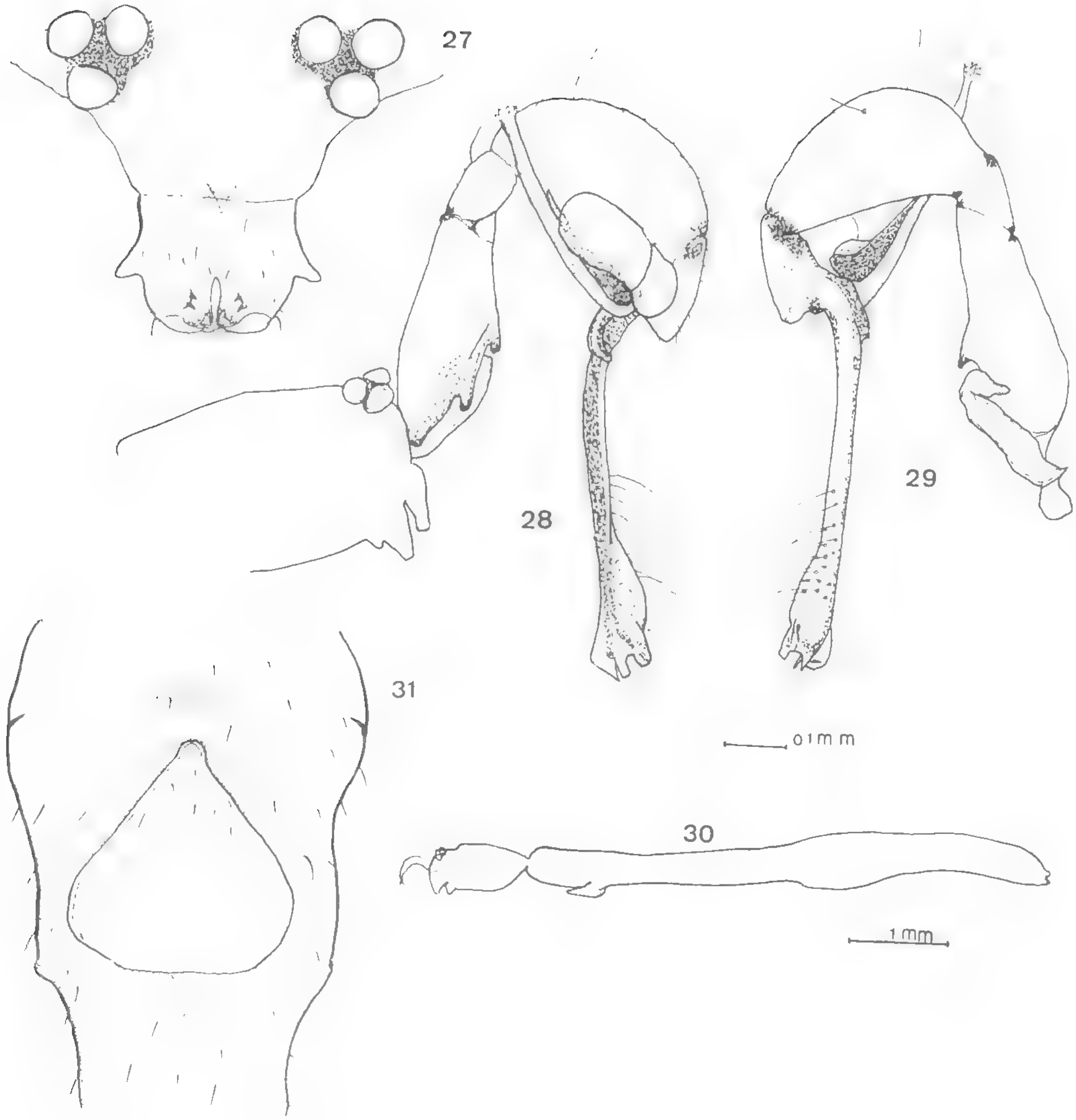
REMARKS

In the field, all individuals were found sitting on the underside of large leaves with outstretched legs, apparently without a web. Some specimens from Sulawesi were taken alive to The Netherlands and kept in glass jars on young palm plants, where they lived for several weeks. Here, between the leaves, they constructed flat webs, very delicate structures of silk, so thin as to be almost invisible. The spiders stayed in their webs upside down in the fashion of *Pholcus phalangioides* Fuesslin. Some of the females held an elongate bunch of eggs in their chelicerae, up to half their body length, which was held in front of them like a sateh stick, in prolongation of the body.

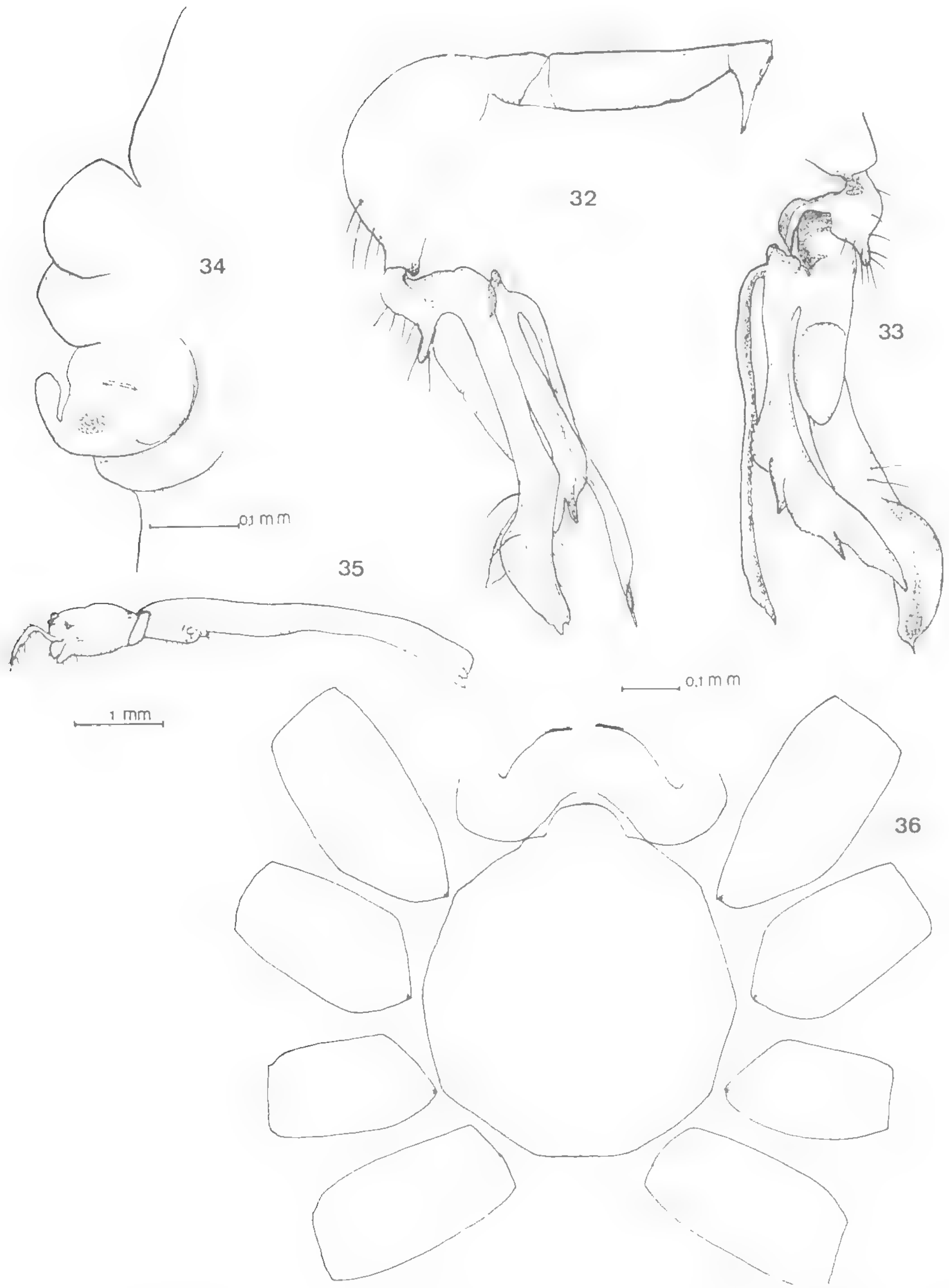
Calapnita phyllicola nov. spec.
(Figs 32–39, 59c)

MATERIAL EXAMINED

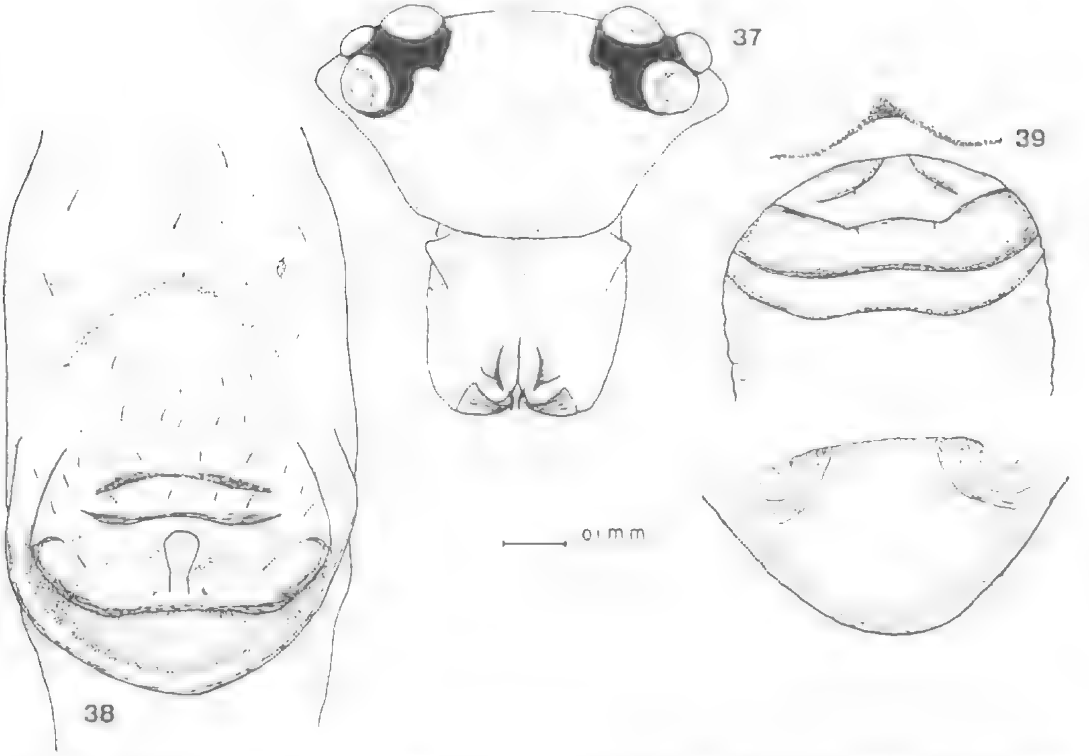
HOLOTYPE: 1 ♂, RMNH 9573, Sepaku, East Kalimantan, Indonesia, 1°00'S, 116°54'E, 40 km N.



FIGS 27–32 : *Calapnita vermiformis* Simon, Quezon Nat. Park. **27.** ♂, head and chelicerae, front; **28.** ♂, cephalothorax and left palp, mesal; **29.** left palp, lateral; **30.** ♀ lateral; **31.** epigyne and part of abdomen, ventral.



FIGS 32–36 : *Calapnita phyllicola* n.sp., Balikpapan. **32.** ♂, left palp, lateral; **33.** id., mesal; **34.** epigyne, lateral; **35.** ♀, lateral **36.** ♀, sternum and coxae, ventral.



FIGS 37-39 : *Calapnita phyllicola* n.sp., Balikpapan. 37. ♂, head and chelicerae, front; 38. abdomen and epigyne, ventral; 39. internal (dorsal) view of epigynal lip, turned up.

Balikpapan, primary lowland dipterocarp rainforest, on the underside of large leaves (mostly palm leaves) in dark sheltered places, part of series collected 14–16.vii.1979, 5–8.viii.1980 and 21–22.vii.1982, P.R. and C.L. Deeleman.

PARATYPES: 5 ♂, 7 ♀, same data as Holotype, 1 ♀ deposited with Holotype (RMNH 9573), others in authors collection.

OTHER MATERIAL: Malay Peninsula: Genting Highlands, little valley on the border of a small stream, 2 ♂, 1 ♀, juvs., underside of large leaves by the stream, 29.vii.'80, P.R. Deeleman. North Sumatra: Bohorok Orang Utang Rehabilitation Centre, 3°29'N, 98°7'E, 90 km west of Medan, primary dipterocarp rainforest, 2 ♀, 1 ♂ subad., 12–19.ii.'83, P.R. Deeleman and Suharto Djojosudharmo; Rimba Panti, 0°7'N, 103°5'E, rainforest, 1 ♂, 1♀, underside of hirsute leaves, 3+4.vii.'82, P.R. and C.L. Deeleman.

DESCRIPTION

HOLOTYPE: ♂, colour in life pale green, in alcohol whitish, legs pale, femur-patellar and tibia-metatarsal joints darkened. Male chelicerae, see Fig. 37; sternum (Fig. 36): posterior tip obtusely rounded, angle between maxillar section and coxa I section of the anterior margin very obtuse. Abdominal tip slightly slanting down, dorsally with a more of less obtuse angle (Fig. 35). Legs longer than in any other species, particularly the metatarsi I. Measurements in mm : carapace 0.90 × 0.82, abdomen 4.00; leg measurements are given in Table 7.

TABLE 7: Leg measurements (mm) of *Calapnita phyllicola* (Holotype, ♂)

Legs:	femur	patella	tibia	metatarsus	tarsus
I	8.40	0.40	8.16	16.32	1.92
II	6.00	0.40	5.76	10.00	1.30
III	4.05	0.40	4.40	5.30	0.85
IV	6.20	0.40	5.30	8.15	1.30

Palp (Figs 32, 33) : femur and patella long and cylindrical, tibia swollen, tip of tarsus tubiform; bulbal apophysis very characteristic, with two large, evenly spaced tines along the margin; embolus a straight tube with tapering tip, the inner margin finely and irregularly serrated, almost twice as long as bulb.

Description of the ♀ paratype : similar to the ♂ but chelicerae unmodified. Measurements in mm : carapace 0.81 × 0.77, abdomen 3.85; leg measurements are given in Table 8.

TABLE 8: Leg measurements (mm) of *Calapnita phyllicola* (Paratype, ♀)

Legs:	femur	patella	tibia	metatarsus	tarsus
I	7.20	0.35	7.45	13.70	1.95
II	5.30	0.35	5.05	8.16	1.06
III	3.60	0.35	3.60	4.80	0.77
IV	5.76	0.35	8.40	11.00	1.10
palp:	0.18	0.07	0.14	—	0.15

Genital organ (Figs 38, 39) : genital opening overshot by a voluminous, extensible lobe with 3–4 deep, transverse folds, distally a small tongue. This lobe forms, together with the caudal crescent wall on the abdomen, a 'vestibulum' in the proximal half of which is situated the slitlike opening into the uterus externus. The whole organ is practically colourless except for a pair of dumb-bell shaped ridges on the inner (dorsal) side of the lobe, apparent on the outside, and the domed sclerotized locking valves of the anterior of the uterus externus. Due to different degrees of sclerotization, the pattern in ventral aspect may vary. No essential differences were observed between the specimens from Balikpapan and those from the Malay Peninsula and Sumatra.

REMARKS

The remarks made for *vermiformis* apply to this species too. No webs were visible with the spiders in the field, but possibly webs of very fine texture were extended from the leaf margins. As in *vermiformis*, elongate egg parcels were held in front of the head like a stick.

Calapnita subphyllicola nov. spec.
(Figs 40–44)

MATERIAL EXAMINED

HOLOTYPE: 1 ♂, RMNH 9575, Davao, Mindanao, Philippines, outside Langub cave, 7°05'N, 125°32'E, in woodland, on underside of large palmate leaves, 25.iv.1982, P.R. Deeleman.

PARATYPES: 1 ♀, RMNH 9575, 2 ♂, 2 ♀, in author's collection, same data as Holotype.

DESCRIPTION

HOLOTYPE: ♂, whole body whitish, legs pale yellow green, joints of legs not darkened. Chelicerae as in Fig. 41. Eyes, sternum and abdomen as in *phyllicola*. Measurements in mm : carapace 0.90 × 0.85, abdomen 5.00; leg measurements are given in Table 9.

TABLE 9: Leg measurements (mm) of *Calapnita subphyllicola* (Holotype, ♂)

Legs:	femur	patella	tibia	metatarsus	tarsus
I	8.10	0.32	8.20	14.85	1.80
II	6.07	0.32	6.10	10.35	1.20
III	4.05	0.32	3.37	5.40	0.75
IV	6.07	0.32	5.51	8.77	1.24

Palp (Fig. 40) : similar to *phyllicola*, but femur and patella shorter and thicker, embolus and bulbal apophysis shorter, barely longer than bulb, embolus lacking the serrations, tines of the apophysis closer to each other.

FEMALE: similar to the ♂, chelicerae unmodified. Measurements in mm : carapace 0.95 × 0.90, abdomen 4.85; leg measurements are given in Table 10.

TABLE 10: Leg measurements (mm) of *Calapnita subphyllicola* (Paratype, ♀)

Legs:	femur	patella	tibia	metatarsus	tarsus
I	7.20	0.33	6.75	12.45	1.80
II	5.40	0.33	4.95	8.10	1.20
III	4.05	0.33	3.51	4.72	0.82
IV	5.85	0.33	5.17	7.87	1.12
palp:	0.26	0.12	0.14	—	0.17

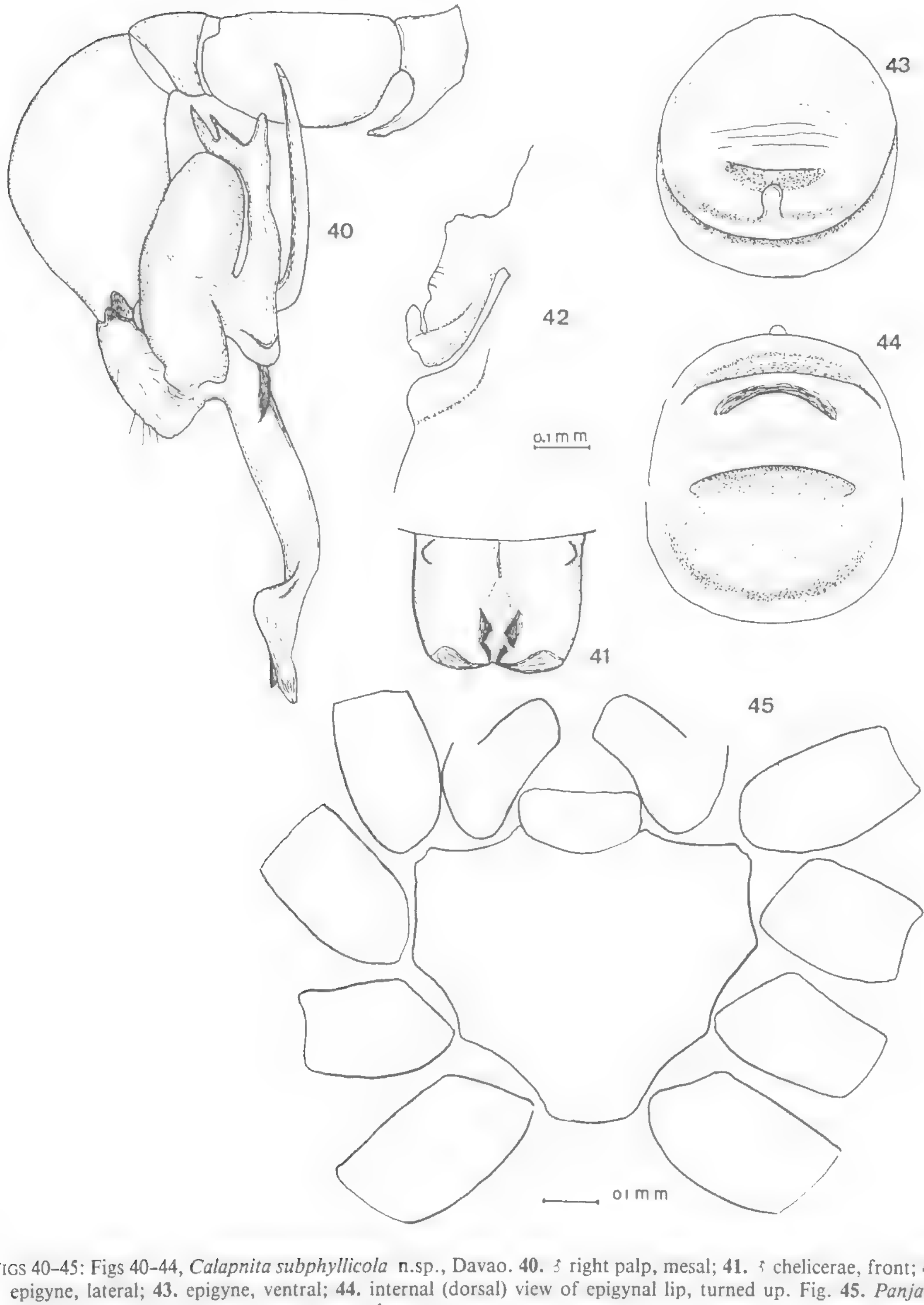
Genital organ (Figs 50, 51) : similar to that of *phyllicola*, but shorter, almost round, folds less profound, allowing little extension of the lobe; there is a crescentic transverse ridge on the inner surface of the lobe, apparent through the tegument in the otherwise colourless and rather featureless organ.

Calapnita phasmoides nov. spec.
(Figs 46–51, 59e).

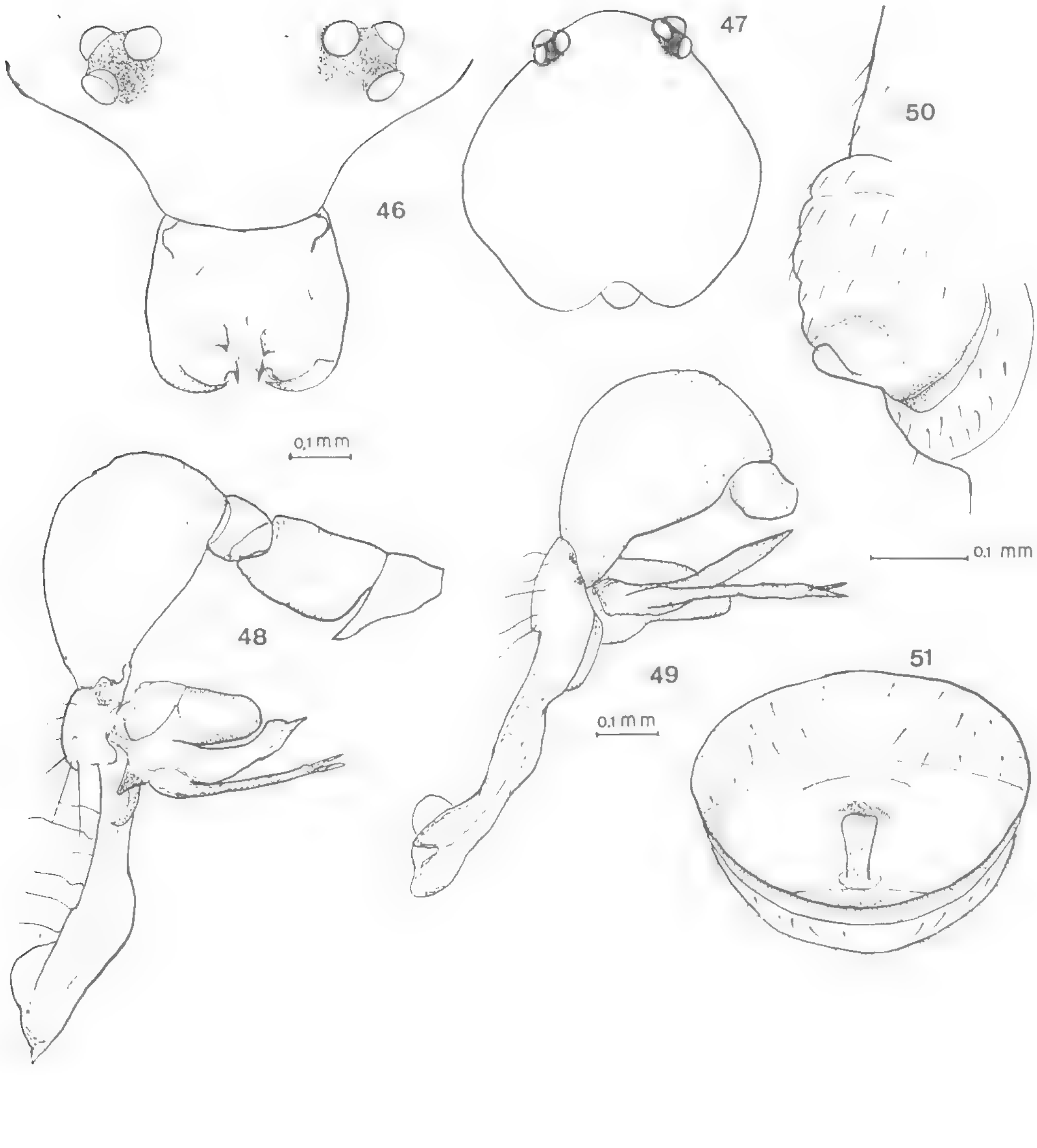
MATERIAL EXAMINED

HOLOTYPE: 1 ♂, RMNH 9574, Sepaku, East Kalimantan, Indonesia, 40 km N. Balikpapan, 1°00'S, 116°54'E, primary lowland dipterocarp rainforest, on the underside of large leaves, 14–16.vii.1979, P.R. Deeleman.

PARATYPE: 1 ♀, RMNH 9574, same data as Holotype.



FIGS 40–45: Figs 40–44, *Calapnita subphyllicola* n.sp., Davao. **40.** ♂ right palp, mesal; **41.** ♂ chelicerae, front; **42.** epigyne, lateral; **43.** epigyne, ventral; **44.** internal (dorsal) view of epigynal lip, turned up. Fig. **45.** *Panjange mirabilis* n.sp., Iron Range, ♀, sternum and coxae.



FIGS 46–51 : *Calapnita phasmoides* n.sp, Balikpapan. **46.** ♂, head and chelicerae, front; **47.** ♂, carapace; **48.** right palp, mesal; **49.** left palp, lateral; **50,** epigyne, lateral; **51.** epigyne, ventral.

DESCRIPTION

HOLOTYPE: ♂, colour pale yellow to whitish, patellae not darkened, only the tibia-metatarsal joints slightly darkened in some legs. Chelicerae as in Fig. 46. Eyes, sternum and abdomen as in *phyllicola*. Measurements in mm : carapace 0.96 ×0.82, abdomen 3.60. Anterior legs missing; other measurements given in Table 11.

TABLE 11: Leg measurements (mm) of *Calapnita phasmoides* (Holotype, ♂)

Legs:	femur	patella	tibia	meta-tarsus	tarsus
III	3.60	0.30	3.03	5.00	0.72
IV	5.30	0.30	4.80	7.40	1.15

Male palp (Figs 48, 49) : femur and patella considerably shorter than in *phyllicola* and thicker. The very thin embolus is equipped with a subapical needle, the bulbal apophysis is slightly shorter, flat and sickle-shaped.

FEMALE: similar to the male, chelicerae not modified. Measurements in mm : carapace 0.82 × 0.80. Abdomen damaged. Leg measurements given in Table 12.

TABLE 12: Leg measurements (mm) of *Calapnita phasmoides* (Paratype, ♀)

Legs:	femur	patella	tibia	meta-tarsus	tarsus
I	missing				
II	4.80	0.35	4.55	7.05	1.15
III	3.60	0.35	2.90	4.20	0.72
IV	5.05	0.35	4.55	7.70	1.10
palp:	0.15	0.10	0.14	—	0.18

Genital organ (Figs 50, 51) : similar in structure to *phyllicola*, but lobe with more (5–6) and shallower folds, distally, the lobe is truncated at right angles. The organ is colourless except for a central longitudinal band at the base of the tongue. See also section Fig. 59e.

REMARKS

See remarks under *L. borneensis*.

Panjange Deeleman-Reinhold and Deeleman, 1983.

Panjange Deeleman-Reinhold and Deeleman, 1983, *Zool. Mededel* **57** (14): 123.

Type species : *Panjange lanthana* Deeleman-Reinhold, — Luzon, Philippines (♂♀).

DIAGNOSIS

Pale coloured spiders, usually with a pattern on carapace and spots on abdomen. Six eyes in two compact groups on the sides of the head, in the ♂ on turrets; carapace flat or somewhat domed. Abdomen at least three times longer than carapace, truncated or excavated behind. Epigynal lip folded like a concertina. Male palpal femur, patella and tibia cylindrical, tarsal appendage with transverse ridges, bulb elongate, with one lanceolate apophysis.

The genus is known to occur in the Philippines, Sulawesi, Borneo, West Irian and the tip of Cape York Peninsula, Australia.

Panjange mirabilis nov. spec.
(Figs 45, 52–58, 59g, 60).

MATERIAL EXAMINED

HOLOTYPE: ♂, QM S883, Gordon Creek, Iron Range, NE.Q., in mesophyll vine forest, 24–30.vi.1976, R. Raven, V. Davies.

PARATYPE: ♀ QM S884, same data as Holotype

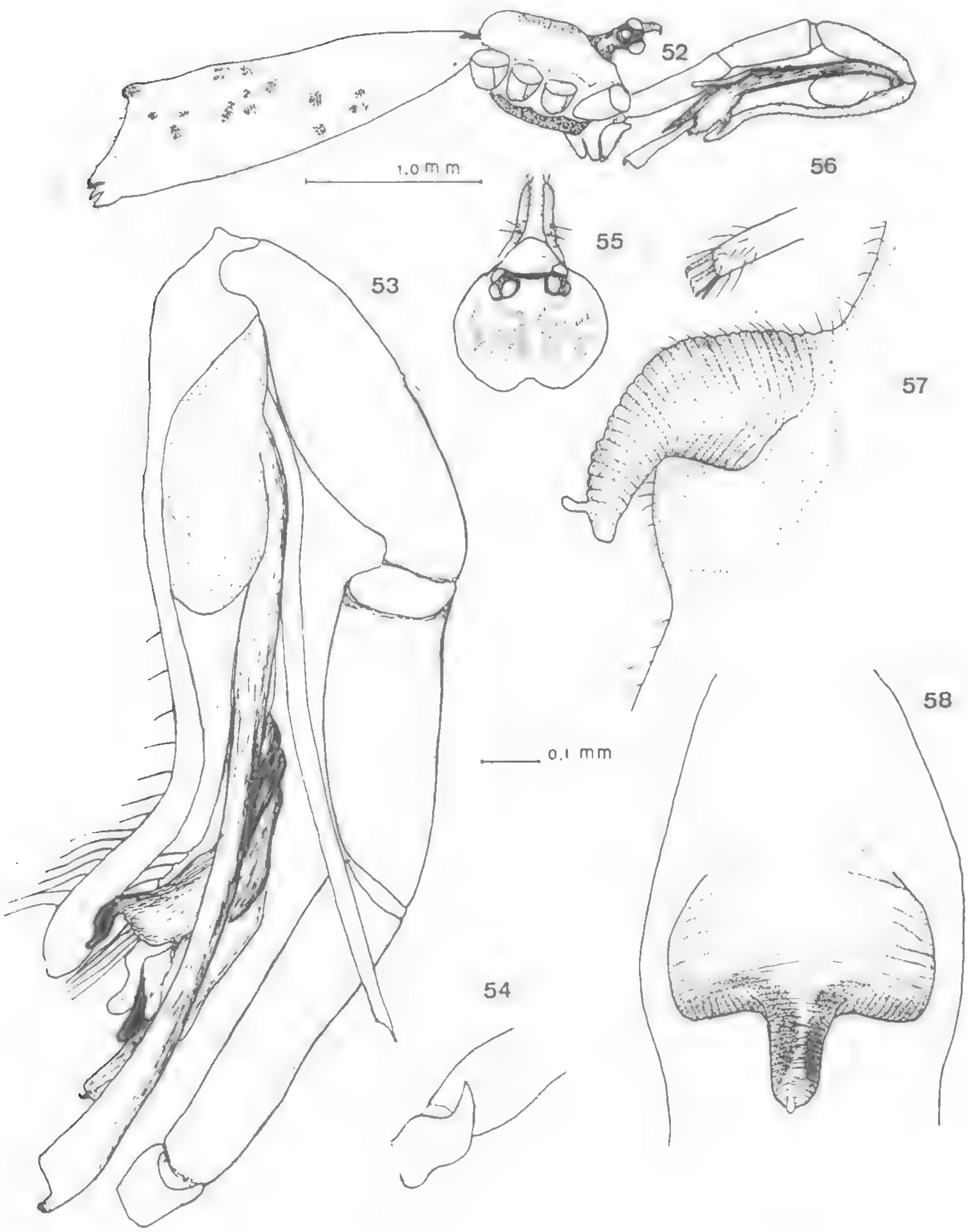
DESCRIPTION

HOLOTYPE: ♂, pale yellow, with pale brown pattern on the carapace (Fig. 55); sternum, ventral side of coxae and trochanters, apical end of femora, patellae, base and apex of tibiae and base of metatarsi brown, a few spots on abdomen brown.

Carapace slightly domed, dorsal plateau flat, without median groove, 6 eyes in two triads, al eyes a little larger than the posteriors. Eyes raised on a stalk (Fig. 52), the mesal margin of which is prolonged into a spike. Clypeus long and slanting. Chelicerae with rounded apophysis near the base, distal apophysis lacking. Sternum as in Fig. 45, wider than long, obtusely rounded behind. Abdomen 3 × length of carapace, distally widening, obliquely truncated (Fig. 52). Measurements in mm : carapace 0.77 × 0.81; leg measurements given in Table 13.

TABLE 13: Leg measurements (mm) of *Panjange mirabilis* (Holotype, ♂)

Legs:	femur	patella	tibia	meta-tarsus	tarsus
I	missing				
II	5.45	0.33	4.62	8.08	1.30
III	3.46	0.33	3.46	4.62	0.75
IV	5.80	0.33	4.30	7.00	1.15



FIGS 52–58: *Panjange mirabilis* n.sp., Iron Range. **52.** ♂, from side; **53.** ♂, right palp, mesal; **54.** ♂ palpal trochanter and part of femur, lateral; **55.** ♀, carapace and palps dorsal; **56.** ♀, tip of palp, lateral; **57.** epigyne, lateral; **58.** epigyne, ventral.

Palp (Figs. 53, 54) : femur, patella and tibia long and cylindrical, not enlarged. Tarsus with a long, vermiform prolongation with claviform tip. Tarsal appendage straight and thin, nearly as long as femur, patella and tibia together, distally widening and branching into three apophyses of various shapes; the middle one is decorated with three parallel transverse ridges. Bulb twice as long as wide, embolus filiform, transparent, as long as tarsus, bulbal apophysis extremely long, longer than tarsal appendage, colourless but for the clawlike tip.

FEMALE: similar to the ♂, eyes not raised, chelicerae unmodified. Distance between the eye groups about 1.5 d. Abdomen with rectangular truncation posteriorly. Measurements in mm : carapace 0.76 × 0.77; leg measurements given in Table 14.

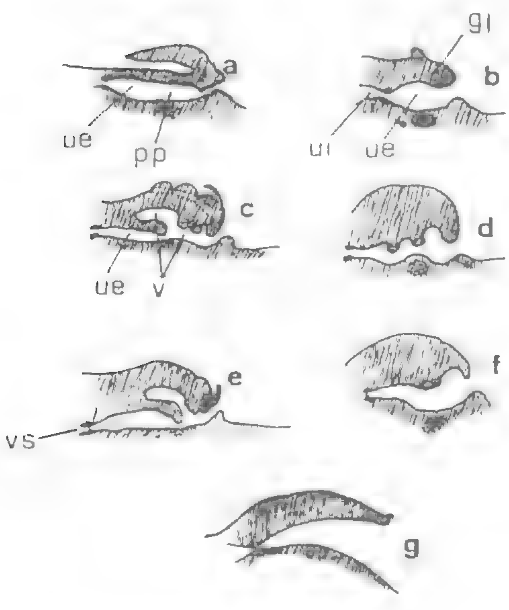


FIG 59. Diagrammatic longitudinal section of female genital organ, ventral suface uppermost. a. *Calapnita vermiformis* Simon; b. *Pholcus phalangioides* Fuesslin; c. *Calapnita phyllicola* n.sp.; d. *Micromerys daviesae* n.sp.; e. *Calapnita phasmoides* n.sp.; f. *Leptopholcus borneensis* n.sp.; g. *Panjange mirabilis* n.sp. ue: uterus externus; ui: uterus internus; pp: porous plate; el: epigynal lip; v: vestibulum; vs: 'Verschluss'.

TABLE 14: Leg measurements (mm) of *Panjange mirabilis* (Paratype, ♀)

Legs:	femur	patella	tibia	meta-tarsus	tarsus
I	6.84	0.33	7.10	9.75	—
II	missing				
III	3.80	0.33	3.00	4.62	0.80
IV	4.65	0.33	4.75	8.00	1.25

Palpal tarsus (Fig. 56) : with four apical claws, no hyaline cone. Epigynal projection (Figs. 57, 58) very wrinkled over the whole width, V-shaped, base only a little wider than tip. A wide, extensible opening leads into the uterus externus, at the entrance of which a pair of large porous plates are apparent.

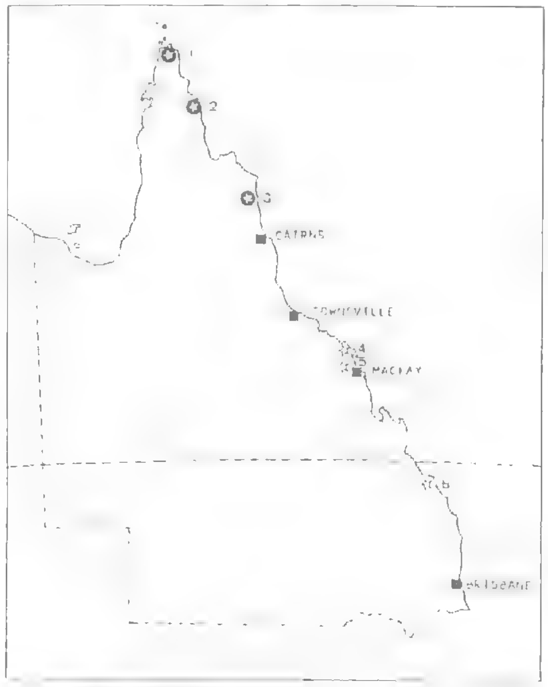


FIG. 60. Locations of *Micromerys* spp. in Queensland, Australia. *M. gracilis* Bradley. 1. Cape York; 2. Iron Range; 3. Shiptons Flat. *M. daviesae* n.sp. 4. Brandy Creek; 5. Finch Hatton; 6. Rundle Range.

KEY TO THE GENERA OF INDO-AUSTRALIAN LEAF-DWELLING PHOLCIDAE

The following key to the pholcid genera is based partly on my own unpublished material. The two genera *Belisana* Thorell and *Uthina* Simon have been rarely discussed in the literature and have never been well defined — they are included here for the sake of completeness.

1. Abdomen globular or angular, less than 2 × carapace length; 6 eyes in two triads, am absent 2
   Abdomen at least 2 × carapace length; 6 eyes in two triads, am small or absent 3

2. Distance between triads 1–2 d ....*Spermaphora* Hentz
   Distance between triads 3 d or more ....*Belisana* Thorell

3. Abdomen truncated posteriorly 2–4 × carapace length; carapace and abdomen in most cases with faint pattern or dark spots; carapace more or less domed; in the ♂: eye groups raised, in the ♀: distance between pm eyes 1-2 d 4
   Abdomen worm-shaped, 5 × or more carapace length, distally tapering, spinnerets in prolongation of it; carapace flat; in the ♂: eye groups not or only a little raised, in the ♀: distance between pm eyes 3 d or more....... 6

4. am eyes absent; in the ♂: eye groups on stalks; epigyne posteriorly produced into a wrinkled 'trunk' with apical tongue; male palpal elements slender, tarsal appendage with transverse ridges, bulbal apophysis simple, lanceolate ....*Panjange* Deeleman
   am eyes present or absent, in ♂ ocular area raised or eyes on stalks; ♀ genital area chitinized, epigyne with tongue; ♂ palp bulgy, 2 chitinized branches of bulbal apophysis astride embolus 5

5. am eyes present ....*Pholcus* Walckenaer
   am eyes absent .... *Uthina* Simon

6. Epigyne posteriorly prolonged and folded; ♂ chelicerae with 2 apophyses, ♂ eye groups not raised .... *Calapnita* Simon
   Epigyne posteriorly not prolonged, without tongue, but with internal valves, ♂ chelicerae with 0 or 1 apophysis 7

7. Male palpal elements long and slender, embolus large and sclerotized, flat, bulb elongate, bulbal apophyses reduced......... ....*Micromerys* Bradley
   Male palp of the Pholcus type : elements short and bulgy, bulb round, 2 chitinized branches of apophysis straddling the embolus ....*Leptopholcus* Simon

DISCUSSION

From the study of the material described here, some interesting points emerge. The species in the genera *Micromerys*, *Calapnita* and *Panjange* differ from other pholcids by the lengthened and slender male palpal elements and the absence of a chitinized plate on the epigyne. The first two genera share profound changes in the body form and eye position with *Leptopholcus*. This transformation is probably related to their mode of life : they have abandoned residence in near-ground webs and adopted a leaf-dwelling existence in tropical rainforests, where they construct much reduced webs close to the undersurface of the leaf or attached to the leaf margin. In the pholcids of the genus *Belisana* Thorell, similar but independent transformations of carapace shape and eye position have taken place; these spiders too are found on the underside of leaves.

I do not consider slender palps primitive and suggest that they were derived from pholcid ancestors having shortened, expanded palpal elements. The loss of volume would be expected, considering the tendency of the whole spider to become cryptic and sticklike. Usually these pale green or yellow spiders are found in daytime on the underside of leaves with exposed veins. The long, thin body looks like the midrib of a leaf, with the legs stretched out laterally in pholcid fashion like side veins, perfectly blending with the background of the leaf. Rounded swollen palps would be conspicuous in this situation. The females' habit of carrying her eggs in front of her head in a stringlike bunch reinforces the sticklike appearance of the animal.

In the genus *Micromerys*, individuals with and without vestigial anterior median eyes may occur within the same species. This means that reduction of these eyes has occurred recently or is still in progress in this genus. The same phenomenon was observed in African *Leptopholcus* species by Brignoli (1980). As Simon's distinction between *Leptopholcus* and *Micromerys* was based on the presence or absence of these eyes, division on this character is invalid. However, genital organs in *Micromerys* and *Calapnita* described in this paper differ from those in *Leptopholcus* not only by being longer and thinner, but also in basic structure and composition of their components. In tropical Africa and Central America, species with elongate bodies, flat carapaces and a shifted eye position, which have been placed in the genus

Micromerys, must have evolved from local lineages.

In conclusion, evidence is accumulating that the taxonomic unit 'Leptopholceae' based on body form, rests on convergence as an adaptation to a particular way of life. On the basis of genital organs, *Micromerys* is quite distinct from both *Leptopholcus* and *Calapnita* and unrelated to Central American species incorrectly placed in *Micromerys. Panjange* is not so strongly adapted, but in this genus some remarkable novelties in the genital organs of both males and females were developed.

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TYPE SPECIMENS OF SPIDERS (ARANEAE) IN THE QUEENSLAND MUSEUM

VALERIE TODD DAVIES
JULIE A. GALLON

Queensland Museum

ABSTRACT

The type collection of spiders comprises 64 species of mygalomorphs and 70 species of araneomorphs. Four new synonymies and 3 new combinations are recognised. *Cyrtophora albopunctata* Rainbow and *Cyrtophora simoni* Rainbow are synonymised with *Cyrtophora moluccensis* (Dolesch.), *Uloborus flavolineatus* Rainbow with *Psechrus argentatus* (Dolesch.), and the ♀ syntype of *Araneus transversus* Rainbow with *Gea theridioides* (L. Koch). *Argyrodes argentiopunctata* Rainbow and *Argyrodes nigrinodosa* Rainbow are transferred to *Thwaitesia* and *Meta argentiopunctata* Rainbow is transferred to *Mesida* .

INTRODUCTION

Ninety-eight new type specimens have been added to the collection since Monroe's (1972) list of 36 species. As he indicated, many of the early types are in a poor condition. Some of Rainbow's types which were designated mature have been found to be immature. The species are arranged alphabetically by specific name within families and sub-orders. The senior author takes full responsibility for the new synonymies and combinations.

MYGALOMORPHAE

BARYCHELIDAE

sordida Rainbow
1898 *Idiommata sordida* Rainbow — *Proc. Linn. Soc. N.S.W.* 23: 330-1.
QM W3503 (1 ♀ holotype) — Neneba, New Guinea.

CTENIZIDAE

babindaensis Main
1969 *Cataxia babindaensis* Main — *J. Aust. Ent. Soc.* 8: 203–5. Figs 6, 27.
QM W3125 (1 ♀ holotype) — 'The Boulders' Nat. Pk, Babinda, Qld.

eungellaensis Main
1969 *Cataxia eungellaensis* Main — *J. Aust. Ent. Soc.* 8: 205–6. Figs 7, 28.
QM W3126 (1 ♀ holotype) — Eungella Nat. Pk, Clarke Ra., Qld.
QM W3127 (1 ♀ paratype) — Eungella Nat. Pk, Clarke Ra., Qld.

spinipectoris Main
1969 *Cataxia spinipectoris* Main — *J. Aust. Ent. Soc.* 8: 201–3. Figs 2, 8.
QM W2876 (1 ♀ holotype) — Toowoomba, Qld.

DIPLURIDAE

afoveolata Raven
1984 *Carrai afoveolata* Raven — *Aust. J. Zool. Suppl. Ser.* 93: 25–7. Figs 4, 9, 19, 37, 40, 113–21. Table 9.
QM S581 (1 ♂ holotype) — Carrai State Forest, N.S.W.
QM S582 (1 ♀ paratype) — Carrai State Forest, N.S.W.

australiensis Raven
1984 *Stenygrocercus australiensis* Raven — *Aust. J. Zool.* Suppl. Ser. 93: 63–5. Figs 6, 12, 30, 32, 37, 215–24. Table 26.
QM S591 (♀ paratype) — Cann River Valley Forest, East Gippsland, Vic.
QM S592 (4 ♀ paratypes) — Cann River Valley Forest, East Gippsland, Vic.

barina Raven
1982 *Ixamatus barina* Raven — *Aust. J. Zool.* 30: 1041–44. Figs 1, 9–11, 12, 19, 28, 38, 39, 52, 61, 72. Tables 1, 2.
QM S600 (1 ♂ holotype) — Baldy Mt., Qld.
QM S602 (1 ♀ paratype) — Majors Mt., Qld.
QM S601 (2 ♂, 1 ♀ paratypes) — Baldy Mt., Qld.

QM S603 (4 ♀ paratypes) — Majors Mt., Qld.
QM S604 (1 ♀ paratype) — Boonjee, Qld.
QM S605 (6 ♀ paratypes) — Malaan State Forest, Qld.
QM S606 (1 ♀ paratype) — Mt Fisher, Qld.

bicuspidata Raven
1984 *Australothele bicuspidata* Raven — *Aust. J. Zool.* Suppl. Ser. **93:** 10–11. Figs 14, 40, 47, 62, 94. Table 3.
QM S578 (1 ♀ holotype) — Point Lookout, New England Nat. Pk, N.S.W.

brisbanensis Raven
1984 *Namea brisbanensis* Raven — *Aust. J. Zool.* Suppl. Ser. **96:** 12–5. Figs 4, 26, 36, 48, 71, 91, 104. Table 2.
QM S767 (1 ♂ holotype) — Brookfield, Brisbane, Qld.
QM S768 (1 ♀ paratype) — Mt Coot-tha, Brisbane, Qld.
QM S210 (1 ♀ paratype) — Rochedale, Brisbane, Qld.
QM S769, S770 (2 ♂, 1 ♀ paratypes) — Brookfield, Brisbane, Qld.
QM S771 (2 ♂ paratypes) — Ashmore Village, near Southport, Qld.
QM S772 (1 ♂ paratype) — Booloumba Ck, Conondale Ra., Qld.
QM S773 (1 ♂ paratype) — Colvin Scrub, via Canungra, Qld.
QM S774 (1 ♂ paratype) — Mt Glorious, Qld.
QM S775 (1 ♀ paratype) — Mt Mee, Qld.
QM S776 (1 ♀ paratype) — Mt Nebo, Qld.
QM S777 (1 ♂ paratype) — Palmwoods, Qld.
QM S778, S779 (2 ♀ paratypes) — Rochedale State Forest, Qld.

bulburin Raven
1981 *Xamiatus bulburin* Raven — *Aust. J. Zool.* **29:** 349–52. Figs 21, 25, 31, 37, 39. Table 4.
QM S714 (1 ♂ holotype) — Bulburin State Forest, Qld.
QM S715 (1 ♂ paratype) — Mt Bauple, Qld.

bunya Raven
1984 *Namea bunya* Raven — *Aust. J. Zool.* Suppl. Ser. **96:** 15–6. Figs 57, 81. Table 3.
QM S780 (1 ♂ holotype) — Bunya Mts, Qld.
QM S781 (1 ♂ paratype) — Bunya Mts, Qld.
QM S782 (1 ♂ paratype) — Deer Reserve, via Kilcoy, Qld.
QM S785 (2 ♂ paratypes) — Mt Mee, Qld.
QM S786 (1 ♂ paratype) — The Palms, via Cooyar, Qld.
QM S787 (1 ♂ paratype) — Ravensbourne Nat. Pk, Qld.
QM S788 (1 ♂ paratype) — Upper Yarraman State Forest, Qld.
QM S789 (1 ♂ paratype) — Wrattens Camp, Qld.

calcaria Raven
1984 *Namea calcaria* Raven — *Aust. J. Zool.* Suppl. Ser. **96:** 16–9. Figs 10, 21, 38, 43, 68, 79, 103, 108, 120, 124, 127. Table 4.
QM S790 (1 ♂ holotype) — Bulburin State Forest, Qld.
QM S791 (1 ♀ paratype) — Bulburin State Forest, Qld.
QM S792 (1 ♂ paratype) — Amamoor Ck, Qld.
QM S793 (1 ♂ paratype) — Brooyar Fire Tower, via Glastonbury, Qld.
QM S794 (2 ♂ paratypes) — Eurimbula Ck, Qld.

caldera Raven
1982 *Ixamatus caldera* Raven — *Aust. J. Zool.* **30:** 1049–51. Figs 2, 11, 15, 21, 29, 34, 47, 50, 54, 60, 71. Tables 1, 3.
QM S626 (1 ♂ holotype) — Bar Mt., N.S.W.
QM S627 (1 ♀ paratype) — Bar Mt., N.S.W.
QM S628 (2 ♀ paratypes) — Bar Mt., N.S.W.
QM S629, S630 (6 ♂, 1 ♀ paratypes) — Tweed Lookout, N.S.W.
QM S631 (1 ♂ paratype) — Mt Bithongabel, Qld.
QM S632, S633 (2 ♂, 1 ♀ paratypes) — Repeater Stn, Springbrook, Qld.
QM S634 (1 ♀ paratype) — Lamington Nat. Pk, Qld.
QM S635 (1 ♀ paratype) — Cedar Ck, Mt Tamborine, Qld.
QM S645 (2 ♀ paratypes) — Whian Whian State Forest, N.S.W.

callemonda Raven
1984 *Namea callemonda* Raven — *Aust. J. Zool.* Suppl. Ser. **96:** 19–22. Figs 7, 27, 34, 51, 61, 89, 96, 109, 121, 126, 131. Table 5.
QM S795 (1 ♂ holotype) — Bulburin State Forest, Qld.
QM S796 (1 ♀ paratype) — Bulburin State Forest, Qld.

candidus Raven
1982 *Ixamatus candidus* Raven — *Aust. J. Zool.* **30:** 1051–4. Figs 11, 14, 22, 30, 35, 42, 51, 55, 63, 68, 73. Tables 1, 4.
QM S640 (1 ♂ holotype) — Poverty Point, N.S.W.
QM S642 (1 ♀ paratype) — Poverty Point, N.S.W.
QM S641 (2 ♂ paratypes) — Poverty Point, N.S.W.
QM S643 (1 ♂ paratype) — Victoria Pk, N.S.W.
QM S644 (1 ♂ paratype) — 'The Head', nr Killarney, Qld.

capricornia Raven
1984 *Namea capricornia* Raven — *Aust. J. Zool.* Suppl. Ser. **96:** 10–2. Figs 15, 25, 31, 45, 56, 72, 73, 102, 114, 123. Table 1.
QM S760 (1 ♂ holotype) — Crediton, Qld.
QM S761 (1 ♀ paratype) — Crediton, Qld.
QM S762, S763 (6 ♂, 2 ♀ paratypes) — Crediton, Qld.
QM S764 (1 ♂ paratype) — Mt Macartney, Cathu State Forest, Qld.

curcurbita Raven
1984 *Namea curcurbita* Raven — *Aust. J. Zool.* Suppl. Ser. **96:** 22–4. Figs 13, 39, 69, 88, 119. Table 6.
QM S797 (1 ♂ holotype) — Wrattens Camp, via Widgee, Qld.
QM S798 (1 ♂ paratype) — Chevallum, Qld.
QM S799 (1 ♂ paratype) — Mt Tenison Woods, Qld.

daemeli Raven
1984 *Cethegus daemeli* Raven — *Aust. J. Zool.* Suppl. Ser. **93:** 37–9. Figs 24, 122, 128, 133, 144, 153, 160, 163, 164. Table 14.
QM S456 (1 ♂ holotype) — Line Hill, nr Lockhart R. Mission, Cape York, Qld.
QM S457 (1 ♀ paratype) — Line Hill, nr Lockhart R. Mission, Cape York, Qld.
QM S458, S460, S461, S463, S465–469, S472–475, S477 (3 ♂, 19 ♀ paratypes) — Line Hill, nr Lockhart R. Mission, Cape York, Qld.

dahmsi Raven
1984 *Namea dahmsi* Raven — *Aust. J. Zool.* Suppl. Ser. **96:** 24–6. Figs 17, 20, 40, 50, 62, 90, 99, 110. Table 7.
QM S800 (1 ♂ holotype) — Calamvale, Brisbane, Qld.
QM S801 (1 ♀ paratype) — Calamvale, Brisbane, Qld.
QM S802 (1 ♂ paratype) — Cabarlah, Crows Nest, Qld.
QM S803, S804 (2 ♂ paratypes) — Mt Nebo, Qld.
QM S805 (2 ♀ paratypes) — Teviot Brook, nr Boonah, Qld.

dicalcaria Raven
1984 *Namea dicalcaria* Raven — *Aust. J. Zool.* Suppl. Ser. **96:** 26–9. Figs 9, 23, 41, 46, 53, 65, 80, 86, 87, 92, 106, 118. Table 8.
QM S806 (1 ♂ holotype) — Mt Nardi, N.S.W.
QM S807 (1 ♀ paratype) — Mt Nardi, N.S.W.
QM S808 (2 ♂ paratypes) — Mt Nardi, N.S.W.
QM S809, S810 (2 ♂ paratypes) — Rotary Park, Lismore, N.S.W.
QM S811 (1 ♂ paratype) — Tregeagle, 10 km SE Lismore, N.S.W.
QM S812 (1 ♂ paratype) — Whian Whian State Forest, N.S.W.

earthwatchorum Raven
1984 *Aname earthwatchorum* Raven — *J. Arachnol.* **12:** 184–7. Figs 1, 2, 6, 10, 17, 23, 26, 32, 38, 39. Table 2.
QM S1207 (1 ♂ holotype) — Mt Bellenden Ker, Qld.
QM S1208 (1 ♀ paratype) — Mt Bellenden Ker, Qld.
QM S1209 (1 ♀ paratype) — Mt Bellenden Ker, Qld.
QM S1210 (1 ♂ 2 ♀ paratypes) — Mt Bellenden Ker, Qld.
QM S1211 (1 ♂ 1 ♀ paratype) — Mt Bellenden Ker, Qld.
QM S1212 (2 ♂ paratypes) — Mt Bellenden Ker, Qld.
QM S1213 (1 ♂ paratype) — Mt Bellenden Ker, Qld.
QM S1214 (1 ♂ paratype) — Mt Bellenden Ker, Qld.
QM S1215 (1 ♂ paratype) — Mt Bartle-Frere, Qld.
QM S1216 (1 ♀ paratype) — Mt Bartle-Frere, Qld.
QM S1217 (1 ♀ paratype) — Mt Lewis, Qld.
QM S1218 (1 ♀ paratype) — Mt Fisher, Qld.
QM S1219 (2 ♀ paratypes) — Malaan State Forest, Qld.
QM S1220 (1 ♀ paratype) — North Bell Park, Qld.

elegans Raven
1984 *Cethegus elegans* Raven — *Aust. J. Zool.* Suppl. Ser. **93:** 40–2. Figs 26, 123, 125, 130, 141, 147, 157, 172, 173. Table 15.
QM S495 (1 ♂ holotype) — Forty Mile Scrub, SW of Mt Garnet, Qld.
QM S496 (1 ♀ paratype) — Forty Mile Scrub, SW of Mt Garnet, Qld.
QM S755 (2 ♀ paratypes) — Forty Mile Scrub, SW of Mt Garnet, Qld.

eungella Raven
1984 *Namirea eungella* Raven — *Aust. J. Zool.* Suppl. Ser. **93:** 56–7. Figs 38, 190, 194, 212. Table 22.
QM S523 (1 ♀ holotype) — Homevale, Qld.
QM S524 (1 ♀ paratype) — Finch Hatton, Qld.
QM S531 (1 ♀ paratype) — Eungella Nat. Pk, Qld.

excavans Raven
1984 *Namea excavans* Raven — *Aust. J. Zool.* Suppl. Ser. **96:** 29–31. Figs 16, 29, 58, 59, 82, 83, 111. Table 9.

QM S813 (1 ♂ holotype) — Mt Glorious, Qld.
QM S814, S815 (2 ♂ paratypes) — Mt Glorious, Qld.
QM S830 (1 ♂ paratype) — Neurum Ck, Mt Mee, Qld.

fischeri; Raven
1982 *Ixamatus fischeri* Raven — *Aust. J. Zool.* **30:** 1055–8. Figs 3, 7, 11, 16, 23, 31, 36, 43, 44, 56, 65, 70. Tables 1, 5.
QM S727 (1 ♂ holotype) — Mt Banda Banda Beech Res., N.S.W.
QM S728 (1 ♀ paratype) — Mt Banda Banda Beech Res., N.S.W.

giraulti Rainbow
1914 *Chenistonia giraulti* Rainbow — *Rec. Aust. Mus.* **10:** 243–7. Figs 52–7.
QM W22, W23 (2 ♀ paratypes) — Nelson, Qld. = *Selenocosmia* sp. - V.T.D.

hanni Raven
1984 *Cethegus hanni* Raven — *Aust. J. Zool.* Suppl. Ser. **93:** 45-6. Figs 122, 134, 150, 178. Table 17.
QM S483 (1 ♀ holotype) — Near Hann R., Qld.

hickmani Raven
1984 *Aname hickmani* Raven — *J. Arachnol.* **12:** 187–9. Figs 5, 8, 18, 19, 27, 35, 42. Table 3.
QM S1221 (1 ♂ holotype) — Bruxner Park, near Coffs Harbour, N.S.W.
QM S1222 (2 ♂ paratypes) — Bruxner Park, near Coffs Harbour, N.S.W.

ilara Raven
1982 *Xamiatus ilara* Raven — *Mem. Qd Mus.* **20** (3): 475–8. Figs 1, 5–12. Table 2.
QM S741 (1 ♂ holotype) — Blackdown Tableland, Qld.
QM S742 (1 ♀ paratype) — Blackdown Tableland, Qld.
QM S743 (5 ♀ paratypes) — Blackdown Tableland, Qld.

insularis Raven
1984 *Namirea insularis* Raven — *Aust. J. Zool.* Suppl. Ser. **93:** 59–61. Figs 40, 186, 187, 192, 193, 200, 203, 204, 208, 213. Table 24.
QM S519 (1 ♂ holotype) — Burleigh Heads, Qld.
QM S520 (1 ♀ paratype) — Burleigh Heads, Qld.
QM S521, S522 (1 ♂, 1 ♀ paratypes) — Burleigh Headland, Qld.

jamiesoni Raven
1984 *Australothele jamiesoni* Raven — *Aust. J. Zool.* Suppl. Ser. **93:** 11–5. Figs 1, 2, 7, 33, 34, 39, 40, 44, 46, 53, 59, 69, 75, 81–91. Table 4.
QM S550 (1 ♂ holotype) — Little Yabba Ck, Conondale Ra., Qld.
QM S551 (1 ♀ paratype) — Amamoor, Qld.
QM S552 (1 ♀ paratype) — Blackbutt, Qld.
QM S553, S554 (2 ♂, 2 ♀ paratypes) — Foot of Blackbutt Ra., Qld.
QM S555 (1 ♀ paratype) — Boombana Nat. Pk, Qld.
QM S556 (4 ♀ paratypes) — Newmarket, Brisbane, Qld.
QM S557–560, S750 (2 ♂, 19 ♀ paratypes) — Bunya Mtns, Qld.
QM S561 (1 ♀ paratype) — Conondale Ra., Qld.
QM S562, S566 (2 ♂ paratypes) — Little Yabba Ck, Conondale Ra., Qld.
QM S563, S564 (2 ♀ paratypes) — Cunninghams Gap, Qld.
QM S565 (1 ♀ paratype) — Jimna State Forest, Qld.
QM S567, S568 (3 ♂, 5 ♀ paratypes) — Mistake Mtns, Qld.
QM S569 (1 ♀ paratype) — Cedar Ck Falls Rd, Mt Nebo, Qld.
QM S570 (1 ♀ paratype) — Mt Nebo, Qld.
QM S571 (1 ♂, 1 ♀ paratypes) — Toonumbar State Forest, N.S.W.
QM S753 (3 ♀ paratypes) — Mt Brisbane, Qld.

jimna Raven
1984 *Namea jimna* Raven — *Aust. J. Zool.* Suppl. Ser. **96:** 35–7. Figs 6, 22, 35, 52, 54, 55, 77, 78, 100, 113, 122. Table 11.
QM S821 (1 ♂ holotype) — Mt Cabinet, via Jimna, Qld.
QM S822 (1 ♀ paratype) — Mt Cabinet, via Jimna, Qld.
QM S828, S829 (2 ♀ paratypes) — Mt Cabinet, via Jimna, Qld.
QM S823 (4 ♂ paratypes) — Booloumba Ck, Conondale Ra., Qld.
QM S824, S825 (1 ♂, 1 ♀ paratypes) — Conondale Ra., Qld.
QM S826 (1 ♀ paratype) — Little Yabba Ck, Conondale Ra., Qld.
QM S827 (5 ♂, 1 ♀ paratypes) — Mt Bauple, Qld.
QM S831–3 (6 ♂, 5 ♀ paratypes) — Tungi Ck, Jimna, Qld.

kia Raven
1981 *Xamiatus kia* Raven — *Aust. J. Zool.* **29:** 358–61. Figs 20, 26, 32, 36, 40. Table 6.
QM S719 (1 ♂ holotype) — Newee Ck Rd, via Macksville, N.S.W.

kirrama Raven
1984 *Aname kirrama* Raven — *Aust. J. Zool.* Suppl. Ser. **96:** 47–9. Figs 18, 30, 67, 85, 107, 125. Table 16.
QM S1186 (1 ♂ holotype) — Kirrama, via Kennedy, Qld.

macgregori Rainbow
1898 *Antrochares macgregori* Rainbow — *Proc. Linn. Soc. N.S.W.* **23:** 332–3. Pl. vii. Figs 2, 2a.
QM W3575 (1 ♀ holotype) — Neneba, New Guinea.
1979 *Masteria macgregori* (Rainbow) Raven — *Aust. J. Zool.* **27:** 629–30. Figs. 6, 7, 11, 15.

maculata Raven
1984 *Australothele maculata* Raven — *Aust. J. Zool.* Suppl. Ser. **93:** 7–10. Figs 13, 39, 40, 42, 45, 54, 58, 64, 70, 79, 80, 95–7, 110, 111. Table 2.
QM S541 (1 ♂ holotype) — Nr Lamington Nat. Pk, Qld.
QM S752 (1 ♀ paratype) — Nr Lamington Nat. Pk, Qld.
QM S542–6 (7 ♀ paratypes) — Nr Lamington Nat. Pk, Qld.
QM S547 (1 ♂ paratype) — Mt French, Qld.
QM S548, S549 (2 ♀ paratypes) — Flinders Peak, Qld.

magna Raven
1984 *Australothele magna* Raven — *Aust. J. Zool.* Suppl. Ser. **93:** 15–7. Figs 3, 8, 15, 39, 43, 50, 55, 57, 67, 72, 78, 101–5. Table 5.
QM S572 (1 ♂ holotype) — Wrattens Camp, via Widgee, Qld.
QM S573 (1 ♀ paratype) — Yarraman, Qld.
QM S574 (1 ♀ paratype) — Yarraman, Qld.
QM S575 (1 ♀ paratype) — Yarraman State Forest, Qld.
QM S576 (1 ♀ paratype) — Nanango Hospital excavation, Qld.
QM S577 (2 ♀ paratypes) — Marlaybrook, Qld.
QM S754 (1 ♀ paratype) — Junction View, Qld.

magnificus Raven
1981 *Xamiatus magnificus* Raven — *Aust. J. Zool.* **29:** 352–8. Figs 9, 23, 28, 33–5, 42, 52. Table 5.
QM S717 (1 ♂ holotype) — Crater Nat. Pk, Qld.
QM S718 (1 ♀ paratype) — Majors Mt., Qld.

montana Raven
1984 *Aname montana* Raven — *J. Arachnol.* **12:** 189–90. Figs 7, 11, 12, 28, 29, 31, 40, 43. Table 4.
QM S1223 (1 ♂ holotype) — 13 km from Beechwood, N.S.W.
QM S1224 (1 ♀ paratype) — 13 km from Beechwood, N.S.W.
QM S1225 (4 ♂ paratypes) — Bruxner Park, N.S.W.
QM S1226 (3 ♂ paratypes) — Never Never, Dorrigo National Park, N.S.W.

montana Raven
1984 *Australothele montana* Raven — *Aust. J. Zool.* Suppl. Ser. **93:** 17–9. Figs 16, 40, 49, 61, 98–100. Table 6.
QM S579 (1 ♀ holotype) — New England Nat. Pk, N.S.W.
QM S580 (1 penult. ♂ paratype) — New England Nat. Pk, N.S.W.

montislewisi Raven
1984 *Namirea montislewisi* Raven — *Aust. J. Zool.* Suppl. Ser. **93:** 61–3. Figs 29, 31, 38, 123, 188, 191, 214. Table 25.
QM S527 (1 ♀ holotype) — Mt Lewis, Qld.
QM S528 (2 ♀ paratypes) — Mt Lewis, Qld.
QM S529, S530 (3 ♀ paratypes) — Mt Finnigan, Qld.

multispinosus Raven
1984 *Cethegus multispinosus* Raven — *Aust. J. Zool.* Suppl. Ser. **93:** 46–8. Figs 122, 132, 151, 177. Table 18.
QM S481 (1 ♀ holotype) — 80 km N of Musgrave, Qld.

musgravei Raven
1982 *Ixamatus musgravei* Raven — *Aust. J. Zool.* **30:** 1058–61. Figs 4, 11, 17, 25, 32, 37, 45, 46, 57, 62, 66, 74. Tables 1, 6.
QM S729 (1 ♂ holotype) — Point Lookout, New England Nat. Pk, N.S.W.
QM S730 (1 ♂, 1 ♀ paratypes) — Point Lookout, New England Nat. Pk, N.S.W.

nebulosa Raven
1984 *Namea nebulosa* Raven — *Aust. J. Zool.* Suppl. Ser. **96:** 38–41. Figs 11, 19, 47, 60, 76, 98, 101, 117, 128. Table 12.
QM S834 (1 ♂ holotype) — Cable Tower 3, Mt Bellenden-Ker, Qld.
QM S835 (1 ♀ paratype) — Mt Bellenden-Ker, Qld.
QM S836–9 (18 ♂, 1 paratypes) — Mt Bellenden-Ker, Qld.

nothofagi Raven
1984 *Australothele nothofagi* Raven — *Aust. J. Zool.* Suppl. Ser. **93:** 21–4. Figs 18, 39, 41, 48, 56, 63, 65, 66, 71, 76, 92, 93, 109, 112. Table 8.
QM S532 (1 ♂ holotype) — Mt Bithongabel, Lamington Nat. Pk, Qld.
QM S533 (1 ♂ paratype) — Mt Bithongabel, Lamington Nat. Pk, Qld.
QM S534 (1 ♀ paratype) — Mt Hobwee, Qld.
QM S535, S536 (3 ♀ paratypes) — Nr Lamington Nat. Pk, Qld.
QM S537 (1 ♂ paratype) — Lower Albert River, Qld.

QM S538 (1 ♀ paratype) — Springbrook, Qld.
QM S539 (1 ♂, 1 ♀ paratypes) — Border Fence, Levers Plateau, N.S.W.
QM S540 (1 ♀ paratype) — Border Fence, Philp Farm, Levers Plateau, N.S.W.

olympus Raven
1984 *Namea olympus* Raven — *Aust. J. Zool.* Suppl. Ser. **96:** 41–2. Figs 8, 37, 63, 94, 115. Table 13.
QM S1163 (1 ♂ holotype) — Mt Bartle-Frere, Qld.
QM S1164 (1 ♂ paratype) — Mt Bartle-Frere, Qld.

pallipes Raven
1984 *Cethegus pallipes* Raven — *Aust. J. Zool.* Suppl. Ser. **93:** 48–9. Figs 23, 122, 135, 154, 182, 183. Table 19.
QM S484 (1 ♀ holotype) — Mt Cook, Cooktown, Qld.
QM S485 (1 ♀ paratype) — Mt Cook, Cooktown, Qld.
QM S486 (4 ♀ paratypes) — Amos Bay, nr Cooktown, Qld.

planipes Raven
1984 *Namirea planipes* Raven — *Aust. J. Zool.* Suppl. Ser. **93:** 52–5. Figs 5, 11, 28, 39, 40, 108, 185, 189, 196, 197, 199, 202, 206, 207, 209–11. Table 21.
QM S498 (1 ♂ holotype) — Rochedale State Forest, Qld.
QM S515 (1 ♀ paratype) — Mt Nebo, Qld.
QM S499, S500 (1 ♂, 3 ♀ paratypes) — Rochedale State Forest, Qld.
QM S501 (1 ♀ paratype) — Amamoor, Qld.
QM S502 (1 ♂ paratype) — Deer Reserve, via Kilcoy, Qld.
QM S503 (1 ♂ paratype) — Hotham Ck Rd, nr Pimpama, Qld.
QM S504, S505 (1 ♂, 1 ♀ paratypes) — Mt Cainbable, Lamington Nat. Pk, Qld.
QM S506 (1 ♂ paratype) — Lamington Nat. Pk, Qld.
QM S507–9 (6 ♀ paratypes) — Mt Coot-tha, Brisbane, Qld.
QM S510 (1 ♀ paratype) — Mt Gillies, Qld.
QM S511 (1 ♀ paratype) — Mt Lindsay, Qld.
QM S512–4, S516, S517 (4 ♂, 4 ♀ paratypes) — Mt Nebo, Qld.
QM S518 (1 ♀ paratype) — Mt Tamborine, Qld.

robustus Raven
1984 *Cethegus robustus* Raven — *Aust. J. Zool.* Suppl. Ser. **93:** 50–1. Figs 27, 123, 138, 152, 175, 176, 179–81. Table 20.
QM S489 (1 ♀ holotype) — Chillagoe, Qld.
QM S490 (4 ♀ paratypes) — Chillagoe, Qld.

rubrifrons Raven
1981 *Xamiatus rubrifrons* Raven — *Aust. J. Zool.* **29:** 344–9. Figs 17, 18, 24, 29, 38, 41, 43, 51, 57, 62, 66–8. Table 3.
QM S704 (1 ♂ holotype) — Conondale Ra., Qld.
QM S706 (1 ♀ paratype) — Conondale Ra., Qld.
QM S705 (2 ♂, 1 ♀, 1 juv. paratypes) — Conondale Ra., Qld.
QM S707 (1 ♂ paratype) — 6 km NW Mt Nebo, Qld.
QM S708–10 (2 ♂, 1 ♀ paratypes) — Mt Nebo, Qld.

salanitri Raven
1984 *Namea salanitri* Raven — *Aust. J. Zool.* Suppl. Ser. **96:** 42–5. Figs 3, 28, 33, 42, 66, 84, 97, 116, 129. Table 14.
QM S1166 (1 ♂ holotype) — Mt Mee, Qld.
QM S1167 (1 ♀ paratype) — Mt Mee, Qld.
QM S1175–7 (3 ♂, 2 ♀ paratypes) — Mt Mee, Qld.
QM S1168, S1169 (2 ♂, 1 ♀ paratypes) — Bald Mt., via Emuvale, Qld.
QM S1170 (1 ♂ paratype) — Border Fence, Levers Plateau, Qld.
QM S1171 (1 ♂ paratype) — Philp Farm, Levers Plateau, Qld.
QM S1172, S1173 (1 ♂, 1 ♀ paratypes) — Mistake Mtns, Qld.
QM S1174 (3 ♂ paratypes) — Mt Bithongabel, Qld.
QM S1178 (1 ♂ paratype) — Mt Superbus, Qld.
QM S1179 (4 ♂ paratypes) — Mt Tenison Woods, Qld.
QM S1180–82 (7 ♂, 1 ♀ paratypes) — Plateau S of 'The Head', via Killarney, Qld.
QM S1183 (2 ♂ paratypes) — Mt Clunie, N.S.W.

saundersi Raven
1984 *Namea saundersi* Raven — *Aust. J. Zool.* Suppl. Ser. **96:** 45–7. Figs 5, 32, 64, 74, 75. Table 15.
QM S1184 (1 ♂ holotype) — Mt Spec Nat. Pk, Qld.
QM S1185 (1 ♂ paratype) — Mt Spec Nat. Pk, Qld.

toddae Raven
1979 *Masteria toddae* Raven — *Aust. J. Zool.* **27:** 630–5. Figs 2, 8, 9, 12, 13, 16, 17, 18–29.
QM S198 (1 ♂ holotype) — Home Rule, Qld.
QM S199 (5 ♂, 1 ♀ paratypes) — Home Rule, Qld.
QM S200 (1 ♂ paratype) — Shiptons Flat, Qld.
QM S201 (1 ♂, 1 ♀, 4 juv. paratypes) — Twelve Mile Scrub, Qld.
QM S202 (1 ♀, 1 juv. paratypes) — Spear Ck, Qld.

QM S203 (1 ♀, 2 juv. paratypes) — Mt Finlay, Qld.
QM S204 (4 juv. paratypes) — Gordon Ck, Iron Ra., Qld.
QM S206 (2 ♂, 1 ♀ paratypes) — Majors Mt., Qld.

tropica Raven
1984 *Aname tropica* Raven — *J. Arachnol.* **12:** 192. Figs 13, 30. Table 5.
QM S1227 (1 ♀ holotype) — Lamond Hill, Iron Range, Qld.

webbae Raven
1982 *Ixamatus webbae* Raven — *Aust. J. Zool.* **30:** 1062–6. Figs 6, 8, 11, 18, 26, 27, 48, 49, 58, 59, 75. Tables 1, 7.
QM S731 (1 ♂ holotype) — Lamington Nat. Pk, Qld.
QM S732 (1 ♀ paratype) — Lamington Nat. Pk, Qld.
QM S734 (1 ♂ paratype) — Lamington Nat. Pk, Qld.
QM S733 (1 ♂ paratype) — Mt Bithongabel, Qld.
QM S735 (1 ♀ paratype) — Springbrook, Qld.
QM S736 (3 ♀ paratypes) — Mt Hobwee, Qld.
QM S737 (1 ♀ paratype) — Binna Burra, Qld.
QM S738 (6 ♂ paratypes) — Broken Head, N.S.W.

HEXATHELIDAE

boycei Raven
1978 *Bymainiella boycei* Raven — *Aust. J. Zool.* Suppl. Ser. **65:** 16–22. Figs 1, 6, 13, 14, 19, 20, 44, 52, 53, 66–8.
QM W4869 (1 ♂ holotype) — Boyce Reserve, Toowoomba, Qld.
QM W4870, W6008 (2 ♀ paratypes) — Boyce Reserve, Toowoomba, Qld.
QM W6006 (1 ♀ paratype) — Bunya Mts Nat. Pk, Qld.

cannoni Raven
1978 *Bymainiella cannoni Raven* — *Aust. J. Zool.* Suppl. Ser. **65:** 34–9. Figs 1, 10, 35–8, 48, 49, 60, 61.
QM W6014 (1 ♂ holotype) — Lamington Nat. Pk, Qld.
QM W6015 (1 juv. ♀ paratype) — Mt Cainbable, Qld.

lugubris Raven
1978 *Bymainiella lugubris* Raven — *Aust. J. Zool.* Suppl. Ser. **65:** 56–2. Figs 1, 93, 94, 99–101, 110, 113, 114, 120.
QM W6016 (1 ♂ holotype) — New England Plateau, N.S.W.
QM W6017–6023 (7 ♀ paratypes) — New England Plateau, N.S.W.
QM W6024–6027 (4 ♀ paratypes) — New England Plateau, N.S.W.

monteithi Raven
1978 *Bymainiella monteithi* Raven — *Aust. J. Zool.* Suppl. Ser. **65:** 62–6. Figs 1, 95, 96, 102–5, 111, 115, 116, 121.
QM W6029 (1 ♂ holotype) — Cunninghams Gap, Qld.
QM W6030 (1 ♀ paratype) — Cunninghams Gap, Qld.
QM W6031–33 (2 ♂, 1 ♀ paratypes) — Lower Ck, N.S.W.
QM W6034 (1 ♀ paratype) — Mistake Mts, Qld.

montisbossi Raven
1978 *Bymainiella montisbossi Raven* — *Aust. J. Zool.* Suppl. Ser. **65:** 42–6. Figs 1, 12, 18, 41–3, 51, 64, 65, 74.
QM W6036 (1 ♂ holotype) — Mt Banda Banda Beech Res., N.S.W.
QM W6037, W6038 (2 ♂ paratypes) — 2.8 km from Beechwood, N.S.W.
QM W6039, W6040 (2 ♀ paratypes) — Nr summit Mt Boss, N.S.W.
QM W6041–3 (3 ♀ paratypes) — Mt Boss region, N.S.W.

terraereginae Raven
1976 *Hexathele terraereginae* Raven — *Proc. R. Soc. Qd* **87:** 53–7. Figs. 1A–H, 2A–D, G–L. Tables 1–3.
QM W4849 (1 ♂ holotype) — Lamington Plateau, Qld.
QM W4850–8 (2 ♂, 7 ♀ paratypes) — Lamington Plateau, Qld.
QM W4859–65 (3 penult. ♂, 4 ♀ paratypes) — Lamington Nat. Pk, Qld.
1978 *Bymainiella terraereginae* Raven — *Aust. J. Zool.* Suppl. Ser. **65:** 72–4. Type species of gen. nov.

MIGIDAE

cunicularius Main
1983 *Homogona cunicularius* Main — *J. Aust. Ent. Soc.* **22:** 89–91. Figs 6, 13–6, 20–3.
QM W2472 (1 ♀ holotype) — North Cedar Ck, Qld.
QM W5654 (1 ♂ paratype) — Mt Finlay, Qld.

terraereginae Raven
1984 *Heteromigas terraereginae* Raven — *Aust. J. Zool.* **32:** 386–9. Figs 14–22, Table 2.
QM S1232 (1 ♂ holotype) — Mt Goonaneman, Qld.
QM S1233 (1 ♀ paratype) — Mt Goonaneman, Qld.
QM S1234 (3 ♂ 3 ♀ paratypes) — Mt Goonaneman, Qld.

variapalpus Raven
1984 *Migas variapalpus* Raven — *Aust. J. Zool.* **32:** 381-5. Figs 1-10. Table 1.
QM S1228 (1 ♂ holotype) — O'Reilly's Guest House, Lamington Nat. Pk, Qld.
QM S1229 (1 ♀ paratype) — O'Reilly's Guest House, Lamington Nat. Pk, Qld.

ARANEOMORPHAE

AMAUROBIIDAE

agrestis Davies
1976 *Dardurus agrestis* Davies — *Mem. Qd Mus.* **17** (3): 407-8. Figs 19f, 21.
QM W4900 (1 ♀ holotype) — Black Duck Ck, nr Junction View, Qld.
QM W4901 (1 penult. ♂, 2 juv. paratypes) — Black Duck Ck, Qld.

nemoralis Davies
1976 *Dardurus nemoralis* Davies — *Mem. Qd Mus.* **17** (3): 405-7. Figs 16-8, 19d.
QM W4896 (1 ♀ holotype) — Mt Tamborine, Qld.
QM W4897 (2 ♂, 2 ♀ paratypes) — Mt Tamborine, Qld.

saltuosus Davies
1976 *Dardurus saltuosus* Davies — *Mem. Qd Mus.* **17** (3): 407. Figs 19e, 20.
QM W4898 (1 ♀ holotype) — Yabbra State Forest, Richmond Ra., N.S.W.
QM W4899 (1 ♂, 1 juv. paratypes) — Yabbra State Forest, Richmond Ra., N.S.W.

silvaticus Davies
1976 *Dardurus silvaticus Davies* — *Mem. Qd Mus.* **17** (3): 403-4. Figs 11-3, 19c. Pl. 59B, 60A.
QM W4890 (1 ♀ holotype) — Mt Glorious, Qld.
QM W4891, W4892 (2 ♂, 2 ♀ paratypes) — Mt Glorious, Qld.

spinipes Davies
1976 *Dardurus spinipes* Davies — Mem. Qd Mus. **17** (3): 400-3. Figs 1-10, 19a. Pl. 59A, 60B.
QM W4877 (1 ♀ holotype) — Fig Tree Pocket, Brisbane, Qld.
QM W4878-4887 (8 ♂, 1 penult. ♂, 17 ♀, 3 juv. paratypes) — Fig Tree Pocket, Brisbane, Qld.
QM W4888, W4889 (1 ♂, 10 ♀, 2 juv. paratypes) — Conondale Ra., Qld.

tamborinensis Davies
1976 *Dardurus tamborinensis* Davies — *Mem. Qd Mus.* **17** (3): 404-5. Figs 14, 15, 19b.
QM W4893 (1 ♀ holotype) — Mt Tamborine, Qld.
QM W4894, W4895 (3 ♂, 1 ♀ paratypes) — Mt Tamborine, Qld.

woolowa Davies
1984 *Pitonga woolowa* Davies — *Mem. Qd Mus.* **21** (2): 261-269. Figs 1-17.
QM S1300 (1 ♀ holotype) — Flying Fox Is., East Alligator R., N.T.
QM S1301, S1302 (1 ♂, 2 juv. paratypes) — East Alligator R., N.T.
QM S1303 (1 juv. paratype) — Port Farewell, East Alligator R., N.T.

ANAPIDAE

burra Forster
1959 *Pseudanapis burra* Forster — *Trans. R. Soc. N.Z.* **86** (3, 4): 309-10. Figs 82-7.
QM S97 (1 ♂ holotype) — Binna Burra, Qld.
QM S98 (1 ♀ paratype) — Binna Burra, Qld.

darlingtoni Forster
1959 *Pseudanapis darlingtoni* Forster — *Trans. R. Soc. N.Z.* **86** (3, 4): 312-3. Figs 92-7.
QM S99 (1♀ paratype) — Mt Spurgeon, Qld.

grossa Forster
1959 *Pseudanapis grossa* Forster — *Trans. R. Soc. N.Z.* **86** (3, 4): 313-5. Figs 98-105.
QM S100 (1 ♂ holotype) — Ramu-Purari Divide, Gomanigu Valley, New Guinea.

octocula Forster
1959 *Pseudanapis octocula* Forster — *Trans. R. Soc. N.Z.* **86** (3, 4): 310-1. Figs 88-91.
QM S101 (1 ♂ holotype) — Binna Burra, Qld.
QM S102 (1 ♀ paratype) — Sunnybank, Brisbane, Qld.

ARANEIDAE

albopunctata Rainbow
1898 *Cyrtophora albopunctata* Rainbow — *Proc. Linn. Soc. N.S.W.* **23:** 339-40. Pl. vii. Fig. 5.
QM W3516 (1 ♀ holotype) — Neneba, Mt Scratchley, New Guinea. = *Cyrtophora moluccensis* (Dolesch.) n. syn. — V.T.D.

biapicata Koch
1980 *Eriophora biapicata* (Koch) — Davies, V. Todd. *Mem. Qd Mus.* **20** (1): 128.
QM S361 (1 ♂ neotype) — 64 km W of Westmar, Qld.

bituberculata Lamb
1911 *Dolophones bituberculata* Lamb — *Ann. Qd Mus.* **10:** 172-3. Fig. 3.
QM W2121 (1 ♀ holotype) — Stafford-on-Kedron, Brisbane, Qld.

depressus Rainbow
1898 *Araneus depressus* Rainbow — *Proc. Linn. Soc. N.S.W.* **23:** 340-2. Pl. vii. Figs 6, 6a.
QM W3517 (1 ♀, 1 juv. syntypes) — Neneba, New Guinea.

1942 *Araneus depressatulus* Roewer — *Katalog der Araneae.* **1:** 826; *depressus* praeocc., nom. nov. for *depressus* Rainbow.

katherina Levi
1983 *Argiope katherina* Levi — *Bull. Mus. comp. Zool.* **150** (5): 300–2. Figs 211–6. Map 4.
QM S904 (1 ♀ holotype) — Katherine Gorge, N.T.
QM S905 (1 ♂, 1 juv. paratypes) — Katherine Gorge, N.T.

loricata Davies
1980 *Malkara loricata* Davies — *Proc. 8 Int. Congr. Arach. Vienna:* 377–82. Figs 1–4, 7–17.
QM S682 (1 ♀ holotype) — Mt Coot-tha, Qld.
QM S683-9 (5 ♂, 2 ♀ paratypes) — Mt Coot-tha, Qld.

maculata piscatorum De Vis
1911 *Nephila maculata piscatorum* De Vis — *Ann. Qd Mus.* **10:** 167–8.
QM W2120 (1 ♀ holotype) — Dunk Is., Qld.
1958 *Nephila maculata* (Fabricius) — Bonnet, P. *Bibliographia Araneorum* **1:** 3077.

notandus Rainbow
1912 *Araneus notandus* Rainbow — *Mem. Qd Mus.* **1:** 196. Figs 7–9.
QM W2122 (1 ♀ holotype) — Blackall Ra., Qld.

quadrispina Lamb
1911 *Gasteracantha quadrispina* Lamb — *Ann. Qd Mus.* **10:** 171. Fig. 2.
QM W2118 (1 ♀ holotype) — Eumundi, Qld.
1942 *Gasteracantha quadrispinosa* Cambridge — Roewer, C.F., *Katalog der Araneae.* **1:** 947.

radon Levi
1983 *Argiope radon* Levi — *Bull. Mus. comp. Zool.* **150** (5): 318–20. Figs 317–23. Map 5.
QM S906 (1 ♀ holotype) — Radon Ck, N.T.
QM S907 (1 ♀, 2 ♂, 2 juv. paratypes) — Radon Ck, N.T.

simoni Rainbow
1898 *Cyrtophora simoni* Rainbow — *Proc. Linn. Soc. N.S.W.* **23:** 337–9. Pl. vii. Figs 4, 4A.
QM W3508-15 (6 ♀, 2 juv. syntypes) — Mt Scratchley, Neneba, New Guinea. = *Cyrtophora moluccensis* (Dolesch.) n. syn. — V.T.D.

transversus Rainbow
1912 *Araneus transversus* Rainbow — *Mem. Qd Mus.* **1:** 197–8. Figs 10–14.
QM W2123, W2126 (1 ♂, 1 ♀ syntypes) — Blackall Ra., Qld. ♀ = *Gea theridioides* (L. Koch) n. syn. — V.T.D.

ARCHAEIDAE

daviesae Forster & Platnick
1984 *Austrarchaea daviesae* Forster & Platnick — *Am. Mus. nat. Hist.* **178** (1): 22–3. Figs 66–8, 70–5.
QM S1091 (1 ♂ holotype) — Majors Mt., Atherton Tbld, Qld.
QM S1092 (1 ♀ paratype) — Malaan State Forest, Atherton Tbld, Qld.

nodosa Forster
1956 *Archaea nodosa* Forster — *Mem. Qd Mus.* **13:** 151–4. Figs 1–7.
QM W1955 (1 ♀ holotype) — Tallawallal, Qld.
1984 *Austrarchaea nodosa* (Forster) — Forster, R.R. & Platnick, N.I. *Am. Mus. nat. Hist.* **178** (1): 21. Type species for gen. nov.

CLUBIONIDAE

giulianetti Rainbow
1898 *Clubiona giulianetti* Rainbow — *Proc. Linn. Soc. N.S.W.* **23:** 348–50. Pl. vii. Figs 11, 11a.
QM W3527 (4 ♂, 1 penult. ♂, 1 ♀ syntypes) — Neneba, New Guinea.

CTENIDAE

devisi Rainbow
1898 *Argoctenus devisi* Rainbow — *Proc. Linn. Soc. N.S.W.* **23:** 350–1. Pl. vii. Fig. 12.
QM W3525 (1 ♀ holotype) — Mambare R., Tamatava Stn, New Guinea.
QM W3526 (1 juv. paratype) — Mambare R., Tamatava Stn, New Guinea.

CYATHOLIPIDAE

silvestris Davies
1978 *Teemenaarus silvestris* Davies — *Symp. zool. Soc. Lond.* **42:** 293–302. Figs 1–20.
QM S1 (1 ♀ holotype) — Bulburin State Forest, Qld.
QM S2-11 (7 ♂, 4 ♀, 3 juv. paratypes) — Bulburin State Forest, Qld.

GNAPHOSIDAE

beattyi Platnick
1977 *Prodidomus beattyi* Platnick — *Bull. Br. arach. Soc.* 4 (2): 72–3. Figs 1–4.
QM S51 (1 ♂ holotype) — Shoal Bay Rd, NE of Darwin, N.T.
QM S52 (1 ♀ paratype) — Shoal Bay Rd, NE of Darwin, N.T.

HETEROPODIDAE

similaris Rainbow

1898 *Sarotes similaris* Rainbow — *Proc. Linn. Soc. N.S.W.* **23:** 346–7. Pl. vii. Fig. 10.

QM W3522, W3523 (1 penult. ♀, 1 juv. syntypes) — Mt Scratchley, Neneba, New Guinea.

1957 *Heteropoda similaris* (Rainbow) — Bonnet, P., *Bibliographia Araneorum.* **2:** 2195.

LINYPHIIDAE

montanus Rainbow

1912 *Bathyphantes montanus* Rainbow — *Mem. Qd Mus.* **1:** 194–5. Figs 5, 6.

QM W2125 (1 juv. holotype) — Blackall Ra., Qld. = *Argiope sp. — V.T.D.*

LYCOSIDAE

glarea McKay

1979 *Trochosa glarea* McKay — *Mem. Qd Mus.* **19** (3): 296. Figs 4H, 4J.

QM S25 (1 ♀ holotype) — Big Tuan Ck, nr Boonooroo, Hervey Bay, Qld.

lapidosa McKay

1974 *Lycosa lapidosa McKay — Mem. Qd Mus.* **17** (1): 13–5. Figs 3 a,b,e–j.

QM W3865 (1 ♀ holotype) — Black Duck Ck, nr Junction View, Qld.

QM W3864 (5 ♂, 6 ♀, 4 penult. ♀ paratypes) — Black Duck Ck, nr Junction View, Qld.

QM W3866 (3 ♂, 6 ♀ paratypes) — Blackfellows Ck, Junction View, Qld.

QM W3867 (1 ♀ paratype) — Booloumba Ck, Kenilworth State Forest, Qld.

QM W3868 (2 ♂, 6 ♀, 3 penult. ♀ paratypes) — Pike Ck Dam, Texas, Qld.

QM W3869 (1 ♀ paratype) — Clarence R., 30 miles down from Tabulam, N.S.W.

snelli McKay

1974 *Lycosa snelli* McKay — *Mem. Qd Mus.* **17** (2): 313–6. Figs 1a–g, 2a–e.

QM W4021 (1 penult. ♂, 1 ♀ paratypes) — 18 km S Barradale, W.A.

QM W4022 (1 penult. ♂, 1 ♀, 3 juv. paratypes) — Marilla Stn, W.A.

QM W4023 (2 penult. ♂, 1 ♀ paratypes) — Yannarie R., nr Barradale, W.A.

woonda McKay

1979 *Lycosa woonda* McKay — *Mem. Qd Mus.* **19** (3): 269–71. Figs 10C,D,E, 11A–E, 12I.

QM S34 (1 ♂ holotype) — Albion Downs, Wiluna, W.A.

QM S35-37 (5 ♀ paratypes) — Albion Downs, Wiluna, W.A.

QM S38 (1 ♀ paratype) — Moorine Rock, W.A.

QM S39 (1 penult. ♂, 1 ♀, 2 penult. ♀ paratypes) — Kalgoorlie, W.A.

wundurra McKay

1979 *Trochosa wundurra* McKay — *Mem. Qd Mus.* **19** (3): 296–7. Figs 4I, 4J.

QM S96 (1 ♀ holotype) — Hyden Lake, Hyden, W.A.

yalkara McKay

1979 *Lycosa yalkara* McKay — *Mem. Qd Mus.* **19** (3): 271–3. Figs 12A–H, 12J, 12K.

QM S40 (1 ♂ holotype) — 40 km S Mt Magnet, W.A.

QM S41 (1 ♂, 1 ♀ paratype) — Paynes Find, W.A.

QM S42, S44 (1 ♂, 2 ♀ paratypes) — Mt Gibson, W.A.

QM S43 (1 ♂ paratype) — 2 km S of Cue, W.A.

METIDAE

argentiopunctata Rainbow

1916 *Meta argentiopunctata* Rainbow — *Rec. Aust. Mus.* **11:** 85–6. Pl. xxi. Figs 6–8.

QM W24 (1 ♂, 3 ♀ syntypes) — Gordonvale, Qld. = *Mesida argentiopunctata* (Rainbow) n. comb. — V.T.D.

MIMETIDAE

bulburinensis Heimer

1984 *Arcys bulburinensis* Heimer — *Ent. Abh. Mus. Tierk. Dresden.* **47** (9): 162–4. Figs 4–6.

QM S859 (1 ♀ paratype) — Binna Burra, Lamington Nat. Pk, Qld.

gracilis Heimer

1984 *Arcys gracilis* Heimer — *Ent. Abh. Mus. Tierk. Dresden.* **47** (9): 166–7. Figs 10, 11.

QM S857 (1 ♂ holotype) — Nagarigoon, Lamington Nat. Pk, Qld.

QM S858 (1 ♀ paratype) — Nagarigoon, Lamington Nat. Pk, Qld.

MYSMENIDAE

woodwardi Forster

1959 *Mysmena woodwardi* Forster — *Trans. R. Soc. N.Z.* **86** (3, 4): 306. Figs 167–71.

QM S103 (1 ♀ holotype) — Nondugl, Al Valley, New Guinea.

PISAURIDAE

amicabilis Davies

1982 *Inola amicabilis* Davies — *Mem. Qd Mus.* **20** (3): 479–80. Figs 1–9, 18–20. Table 1.

QM S860 (1 ♀ holotype) — The Granites Track, nr Home Rule, Qld.

QM S861–868 (3 ♂, 5 ♀ paratypes) — The Granites Track, nr Home Rule, Qld.
QM S870–873 (7 ♂, 5 ♀ paratypes) — Intake Falls, nr Home Rule, Qld.
QM S881 (3 ♂, 1 ♀, 4 juvs. paratypes) — Mt Finlay, Qld.
QM S882 (1 ♂, 2 ♀, 4 juv. paratypes) — Mt Cook, Qld.

cracentis Davies
1982 *Inola cracentis* Davies — *Mem. Qd Mus.* **20** (3): 480–2. Figs 10–2, 16–7, 21–2.
QM S874 (1 ♀ holotype) — Boonjee, Qld.
QM S875–877 (2 ♂, 1 ♀, 1 juv. paratypes) — Boonjee, Qld.

subtilis Davies
1982 *Inola subtilis Davies* — *Mem. Qd Mus.* **20** (3): 482. Figs 13–5.
QM S878 (1 ♀ holotype) — Redlynch, Qld.
QM S879 (1 ♀, 1 juv. paratypes) — Redlynch, Qld.
QM S880 (1 ♀, 5 juv. paratypes) — Crystal Cascades, Qld.

trux Lamb
1911 *Dolomedes trux* Lamb — *Ann. Qd Mus.* **10:** 173–4. Fig. 4.
QM G55 (1 ♀ holotype) — Ithaca Ck, Brisbane, Qld.
1980 *Megadolomedes australianus* (Koch) — Davies, V.T. & Raven, R.J., *Mem. Qd Mus.* **20:** 136.

Salticidae

acuminatus Rainbow
1912 *Menemerus acuminatus* Rainbow — *Mem. Qd Mus.* **1:** 201–2. Figs 15, 16.
QM W2127 (1 ♀ holotype) — Blackall Ra., Qld.

albopilosus Rainbow
1898 *Attus albopilosus* Rainbow — *Proc. Linn. Soc. N.S.W.* **23:** 352–4. Pl. vii. Fig. 13.
QM W3524 (1 ♂ holotype) — Tamatava Stn, Mambare R., New Guinea.

ferreus Griswold
1984 *Coccorchestes ferreus* Griswold — *Bull. Br. arachnol. Soc.* **6** (4): 147–8.
QM S1355 (1 ♀ holotype) — Iron Ra., Qld.

gibbosus Wanless
1981 *Cocalus gibbosus* Wanless — *Bull. Br. Mus. nat. Hist. (Zool.)* **41** (5): 258. Figs 4A–D.
QM S846 (1 ♂ holotype) — Lockerbie, Qld.

jucunda Rainbow
1912 *Mollika jucunda Rainbow* — *Mem. Qd Mus.* **1:** 208–9. Fig. 3.
QM W2129–32, W2139 (1 ♂, 4 juv. syntypes) — Roper R., N.T.

Segestriidae

octospinata Lamb
1912 *Macedonia octospinata* Lamb — *Ann. Qd Mus.* **10:** 169–170. Fig. 1.
QM W2119 (1 ♀ holotype) — Stafford-on-Kedron, Brisbane, Qld.
1916 *Ariadna octospinata* (Lamb) — Rainbow, W.J., *Rec. Aust. Mus.* **11:** 39.

Symphytognathidae

australia Forster
1959 *Anapistula australia* Forster — *Trans. R. Soc. N.Z.* **86** (3,4): 321. Figs 128–32.
QM S104 (1 ♀ holotype - slide) — Camp Mt., Qld.

marplesi Forster
1959 *Patu marplesi* Forster — *Trans. R. Soc. N.Z.* **86** (3, 4): 320–1. Figs 124–7.
QM S105 (1 ♂ holotype) — Upolu, Malololelei, Western Samoa.

woodwardi Forster
1959 *Patu woodwardi* Forster — *Trans. R. Soc. N.Z.* **86** (3, 4): 318–20. Figs 118–23.
QM S106 (1 ♀ holotype) — Lae, New Guinea.
QM S107 (1 ♂ paratype– 2 slides) — Benaga, New Guinea.

Tetragnathidae

lepida Rainbow
1916 *Tetragnatha lepida* Rainbow — *Rec. Aust. Mus.* **11:** 81–3. Pl. xxi. Figs 1–3.
QM W20 (1 ♂, 1 ♀ syntypes) — Gordonvale, Qld.

Textricellidae

complexa Forster
1959 *Textricella complexa* Forster — *Trans. R. Soc. N.Z.* **86** (3, 4): 277–9. Figs 4–9.
QM S108 (1 ♂ holotype) — Royal Nat. Pk, N.S.W.
QM S108 (1 ♀ paratype) — Royal Nat. Pk, N.S.W.

hickmani Forster
1959 *Textricella hickmani* Forster — *Trans. R. Soc. N.Z.* **86** (3, 4): 280–1. Figs 14–9.
QM 109 (1 ♂ holotype) — Mt Wellington, Tasmania.
QM 109 (1 ♀ paratype) — Mt Wellington, Tasmania.

lamingtonensis Forster
1959 *Textricella lamingtonensis* Forster — *Trans. R. Soc. N.Z.* **86** (3, 4): 281–3. Figs 20–2.
QM S110 (1 ♀, + 1 abdomen paratypes) — Lamington Nat. Pk, Qld.

tropica Forster
1959 *Textricella tropica* Forster — *Trans. R. Soc. N.Z.* **86** (3, 4): 295–7. Figs 58–63.
QM S111 (1 ♂ holotype) — Daulo Pass, Central Highlands, New Guinea.
QM S111 (1 ♀ paratype) — Daulo Pass, Central Highlands, New Guinea.

THERIDIIDAE

argentiopunctata Rainbow
1916 *Argyrodes argentiopunctata* Rainbow — *Rec. Aust. Mus.* **11:** 51–2. Pl. xv. Figs 25–7.
QM W18 (1 penult. ♂, 1 ♀ syntypes) — Gordonvale, Qld. = *Thwaitesia argentiopunctata (Rainbow) n. comb. — V.T.D.*

flavipes Rainbow
1916 *Argyrodes flavipes* Rainbow — *Rec. Aust. Mus.* **11:** 53. Pl. xv. Figs 29, 30.
QM W19 (1 ♂, 1 ♀ syntypes) — Gordonvale, Qld.

nigronodosa Rainbow
1912 *Argyrodes nigronodosa* Rainbow — *Mem. Qd Mus.* **1:** 193–4. Figs 3,4.
QM W2124 (1 penult. ♂ holotype) — Blackall Ra., Qld. = *Thwaitesia nigronodosa* (Rainbow) n. comb. — V.T.D.

wau Levi, Lubin & Robinson
1982 *Achaearanea wau* Levi, Lubin & Robinson — *Pacif. Insects* **24** (2): 110–1. Figs 14–9.
QM S908 (2 ♀ paratypes) — Morobe Prov., Wau, New Guinea.

THOMISIDAE

bipunctata Rainbow
1898 *Misumena bipunctata* Rainbow — *Proc. Linn. Soc. N.S.W.* **23:** 342–3. Pl. vii. Fig. 7.
QM W3519 (1 ♀ holotype) — Neneba, New Guinea.

colcloughi Rainbow
1912 *Diaea colcloughi* Rainbow — *Mem. Qd Mus.* **1:** 205, 206. Figs 1, 2.
QM W2192 (1 ♀ holotype) — Roper R., N.T.

obscurus Rainbow
1898 *Xysticus obscurus* Rainbow — *Proc. Linn. Soc.* **23:** 345–6. Pl. vii. Fig. 9.
QM W3521 (1 ♀ holotype) — Neneba, New Guinea.
1901 *Xysticus rainbowi* Strand — *Zool. Anz.* **24:** 66; *obscurus* praeocc., nom. nov. for *obscurus* Rainbow.

ocellata Rainbow
1898 *Diaea ocellata* Rainbow — *Proc. Linn. Soc. N.S.W.* **23:** 344. Pl. vii. Figs 8, 8a.
QM W3520 (1 ♀ holotype) — Neneba, New Guinea.

ULOBORIDAE

congregabilis Rainbow
1916 *Uloborus congregabilis* Rainbow — *Aust. Zool.* **1:** 59–60. Figs 1, 2.
QM W12 (2 ♀ syntypes) — Parramatta, N.S.W.

flavolineatus Rainbow
1898 *Uloborus flavolineatus* Rainbow — *Proc. Linn. Soc. N.S.W.* **23:** 333–4. Pl. vii. Figs 3, 3a.
QM W3504 (1 ♀ holotype) — Boirave, New Guinea.
QM W3505–7 (3 ♀ paratypes) — Boirave, New Guinea. = *Psechrus argentatus* (Dolesch.) n. syn. — V.T.D.

ZODARIIDAE

variepes Rainbow
1912 *Storena variepes* Rainbow — *Mem. Qd Mus.* **1:** 192–3. Figs 1, 2.
QM W2128 (1 ♀ holotype) — Blackall Ra., Qld.
1985 *Supunna picta* (L. Koch) — Davies, V. Todd, *Zoological Catalogue of Australia.* 3. *Araneae:* 117.

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NEW AUSTRALIAN SPECIES OF *OTIRA* FORSTER & WILTON, 1973 AND *STORENOSOMA* HOGG, 1900 (ARANEAE : AMAUROBIIDAE)

VALERIE TODD DAVIES
Queensland Museum

ABSTRACT

Two new *Otira* species from the high altitude rainforest on Mt Bellenden Ker, NE.Q. are described; previously the only known species were from New Zealand and Tasmania. *Storenosoma lycosoides* Hogg, 1900 is redescribed and figured; two new species of *Storenosoma* from Lamington National Park, SE.Q. and one from northern N.S.W. are described. Males of all species have stridulatory elements located on the palpal trochanter and prolateral surface of coxa 1.

INTRODUCTION

Otira was established and 6 species described from New Zealand by Forster & Wilton (1973). It is confined to the west coast of the South Island and the Wellington region of the North Island. Hickman (1981) extended its range when he described *O. affinis* from southwestern Tasmania. Two *Otira* spp. from the high altitude rainforest on Mt Bellenden Ker Range, in northern Queensland (Fig. 1) are described here. They are examples of species of Gwondanan origin surviving in the moist relict rainforest above 1000m on mountains of tropical Queensland. *Otira* has been found nowhere else in Queensland. In SE.Q. and further south its place appears to be taken by closely allied *Storenosoma*, first described by Hogg (1900) from Victoria. The type species, *S. lycosoides* , is redescribed and figured. Two species from the Lamington Plateau in southern Queensland and one from northern New South Wales are described. Forster & Wilton (1973) illustrated (Figs. 816, 820–23) but did not describe or name a species from the Blue Mountains N.S.W., calling it only an 'Australian ecribellate amaurobiid'. As well as this, there are probably several more species to be described.

Otira Forster & Wilton, 1973

O. satura Forster and Wilton, 1973, type sp.

Small ecribellate spiders. Both rows of eyes strongly procurved. Tarsal rod on all tarsi. Posterior spinnerets reduced. Colulus present. Legs 4123. Preening combs on metatarsi II–IV. Retroventral stridulatory spur(s) on ♂ palpal trochanter. Palpal bulb with median tegular process.

Otira summa sp. nov.

MATERIAL EXAMINED

HOLOTYPE: Litter, mossy microphyll forest, 1560m Bellenden Ker Ra., NE.Q. Earthwatch/Queensland Museum Expedition, 1–7.xi.1981, 1 ♀, QM S1365.

PARATYPES: Same locality and collectors, 25–31.x.1981, 1 ♂, QM S1366; 17–24.x.1981, 1 ♀, QM S1367.

DESCRIPTION

FEMALE

CL = 2.3, CW = 1.3, AL = 2.3, AW = 1.4.

Brownish yellow carapace with black between eye rows (Fig. 2), abdomen with indistinct chevron pattern. Eyes, 2.4.2. (Fig. 3). Ratio AME:ALE:PME:PLE is 2:7:10:16. Two retromarginal teeth and 2 promarginal teeth on chelicera. Serrula on maxillae. Labium wider than long 1:0.73. Sternum truncated anteriorly, pointed posteriorly, slightly longer than wide 1:0.93. Dorsal spines on all femora and on posterior tibiae and metatarsi; ventral and lateral spines on all tibiae and metatarsi. Preening combs with 4–5 tines. Dorsal tarsal rod about 1/3 distance from base of all tarsi (Figs. 27, 28, 38). Four trichobothria of increasing length distal to rod; bothrium grooved (Fig. 39). Epigynum (Figs. 4, 5).

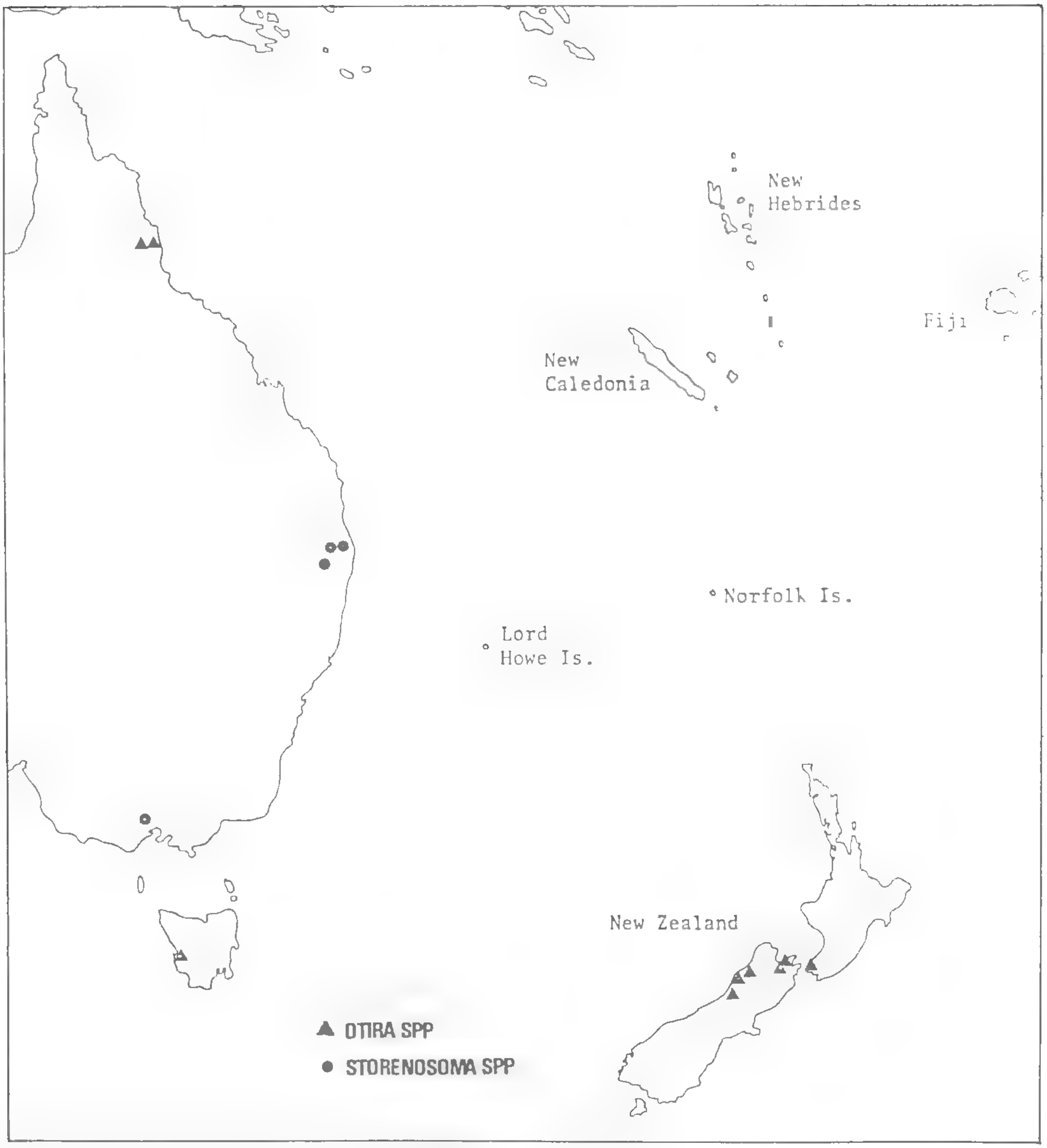


FIG. 1: Map showing distribution of *Otira* spp. and *Storenosoma* spp.

MALE

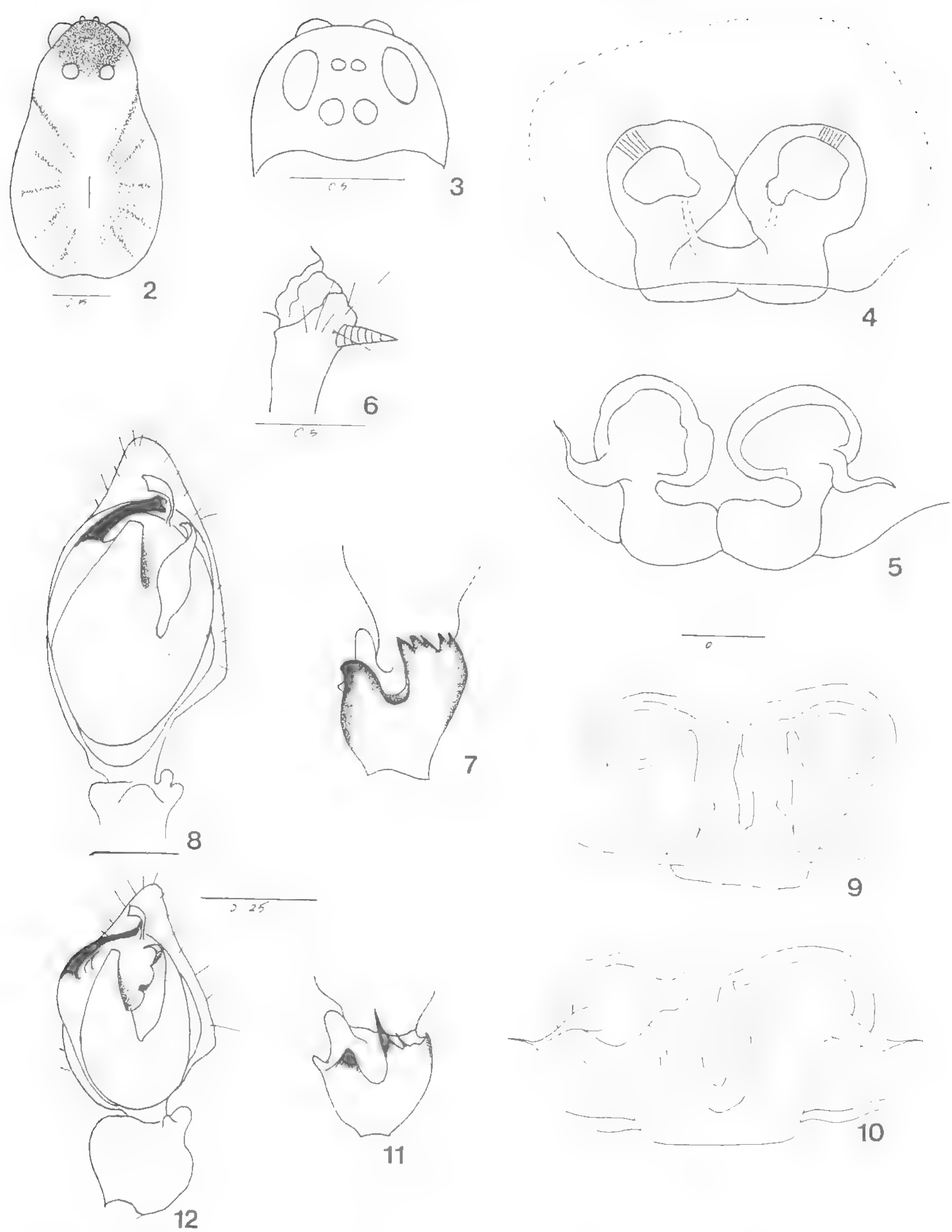
CL = 2.3, CW = 1.4, AL = 1.7, AW = 1.1. Metatarsi I sparsely scopulate and slightly swollen ventrally. Palpal trochanter with a retroventral spur (Fig. 6). Complex tibial apophysis (Fig. 7); sclerotised median apophysis, small membranous conductor, stout rigid embolus (Figs 8, 29, 30). Cymbial border asymmetrical with angular bulge retrolaterally.

Otira aquilonaria sp. nov.

MATERIAL EXAMINED

HOLOTYPE: Litter, simple notophyll forest, 1054m Bellenden Ker Ra., NE.Q. Earthwatch/Queensland Museum Expedition, 17-24.x.1981. 1 ♀, QM S1368.

PARATYPES: Same data. 2 ♀, QM S1369, 1 ♀, 1 ♂, QM S1370; pitfall traps, 1054m. Bellenden Ker Range, NE.Q. Earthwatch/Queensland Museum Expedition, 25-31.x.1981, 1 ♀, 1 ♂, QM S1371.



FIGS 2–8: *Otira summa* sp. nov. Fig. 2, ♀, carapace. Fig. 3, eyes from front. Figs 4–5, epigynum. Fig. 4, external. Fig. 5, internal. Fig. 6, stridulatory spur on ♂ palpal trochanter. Fig. 7, ♂ tibial apophysis, retrolateral. Fig. 8, ♂ palp, ventral. FIGS 9–12: *Otira aquilonaria* sp. nov. Figs 9–10, epigynum. Fig. 9, external. Fig. 10, internal. Fig. 11, ♂ tibial apophysis, retrolateral. Fig. 12, ♂ palp, ventral.

DESCRIPTION

FEMALE

CL = 1.7, CW = 1.1, AL = 2.0, AW = 1.4. Small. Eyes, chelicerae, spines similar to *O. summa*. Preening combs with 3-5 tines. Epigynum (Figs 9, 10).

MALE

CL = 1.7, CW = 1.1, AL = 1.3, AW = 1.0. Metatarsi I scopulate and slightly swollen ventrally. Palpal trochanter with a retroventral spur. Complex tibial apophysis (Fig. 11). Palp (Figs 12, 31).

REMARKS

O. aquilonaria is smaller than *O. summa* and may be distinguished from it by the shape of ♂ tibial and median apophyses.

The tarsal rod is distal in the New Zealand species and proximal in all the Australian species. If it is homologous with the tarsal organ the distal position must be considered plesiomorphic. There are 2 trochanteral spurs on the ♂ palp in the New Zealand and Tasmanian species, a single spur in the Queensland species. The latter is considered to be the derived state.

Storenosoma Hogg, 1900

S. lycosoides Hogg, 1900, type sp.

Medium-large ecribellate spiders. Both rows of eyes strongly procurved. Anterior spinnerets largest. Colulus present. Legs 4123. Preening combs on metatarsi II-IV. Two retroventral stridulatory spurs on ♂ palpal trochanter. Cymbial border asymmetrical with angular bulge retrolaterally. Epigynum with lateral teeth. There is a photograph (Fig. 816) of *Storenosoma* sp. in Forster & Wilton (1973).

Storenosoma lycosoides, Hogg, 1900

MATERIAL EXAMINED

LECTOTYPE: Macedon, Victoria, 1 ♀. BMNH 1907.2.24.34-37 (part).

PARALECTOTYPES: Macedon, Victoria. 1 ♂, 2 ♀ BMNH 1907.2.24.34-37 (part).

OTHER MATERIAL: Macedon, Victoria. 1 penult. ♂. British Museum 1924.3.1.1425.

DESCRIPTION

FEMALE

CL = 4.3, CW = 3.0, AL = 5.5, AW = 3.8. Large spider. Carapace brown with darker brown outlines of cephalic and thoracic regions. Abdomen grey brown with indistinct chevron pattern. Dark pigmented bands on femurs ventrally. Ratio AME:ALE:PME:PLE is 5:10:10:17. Clypeus is narrow, less than diameter ALE. Chelicerae geniculate, 2 retromarginal and 2 promarginal teeth. Serrula on maxillae. Labium wider than long 1:0.94. Sternum truncated anteriorly, pointed posteriorly, longer than wide 1:0.88. Anterior spinnerets largest and longest. Dorsal spines on all femora and on posterior tibiae and metatarsi, strong paired ventral spines and lateral spines on tibiae and metatarsi. Preening combs on metatarsi II and paired combs on metatarsi II and IV; tines 5-7. Epigynum with lateral teeth (Fig. 13).

VARIATION: The females examined varied in length between 7.3-9.0.

MALE

Legs I and II on right side and leg I on left side entire; rest missing or detached. Palp on right side missing.

CL = 3.5, CW = 2.5, AL = 3.0, AW = 1.7. (abdomen shrivelled).

Medium-sized spider. Similar in colouring to female. Chelicerae not geniculate. Clypeus less than diameter ALE. Palpal trochanter with 2 distal retrolateral spurs. Complex tibial apophysis (Fig. 14) and median apophysis. Small membranous conductor, stout rigid embolus and small tegular process (Fig. 15). In the other ♂ *Storenosoma* sp. with Hogg's syntypes the clypeus is more than x 1.5 ALE and the palp is less complex.

REMARKS

Hogg had 5 syntypes, 3 ♀ and 2 ♂ from Macedon, Victoria. He described and gave measurements for only the largest of the females. This specimen has several of the legs detached so one of the other females has been chosen as the lectotype. The two males are not con-specific. One is *S. lycosoides*, the other ♂ *Storenosoma* sp. is not described here.

Storenosoma terranea sp. nov.

MATERIAL EXAMINED

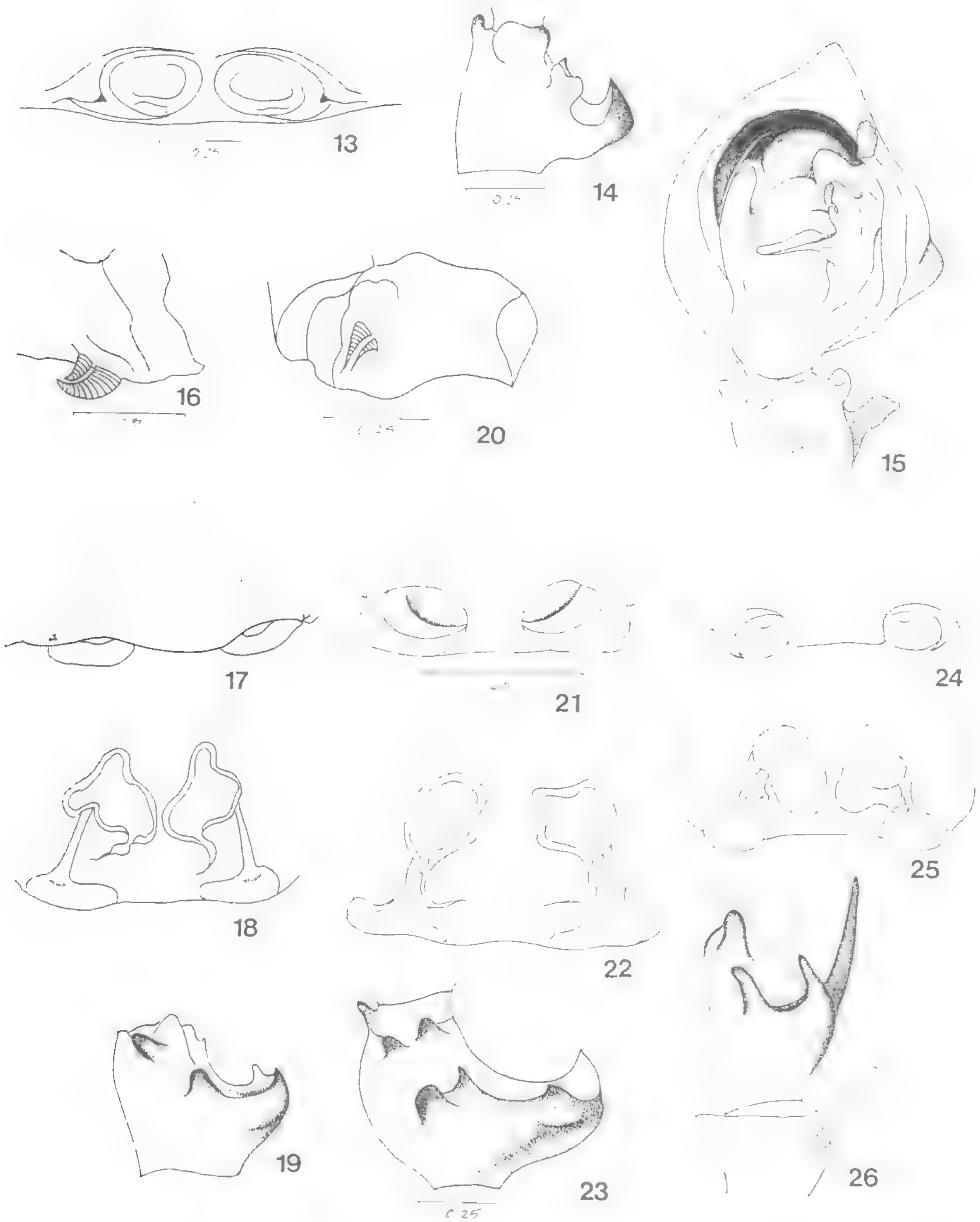
HOLOTYPE: Litter, complex notophyll vine forest, Binna Burra, 860m, Lamington National Park, SE.Q., R. Raven, 10.vii.1977, 1 ♀, QM S1372.

PARATYPES: same data, 1 ♂, QM S1373; 1 ♀, QM S1374; same locality, R. Raven, 13.iv.1974, 1 ♀, QM S1375; same locality, R. Raven, 22.vi.1973, 1 ♀, QM S1376; same locality R. Raven, V. Davies, 6.iv.1976, 1 ♀, QM S1377.

DESCRIPTION

FEMALE

CL = 4.7, CW = 3.8, AL = 7.7, AW = 5.7. Large spider. Similar in colouring to *S. lycosoides* with dark pigmented bands on legs. Ratio AME:ALE:PME:PLE is 5:10:10:17. Clypeus narrow, less than ALE. Two



FIGS 13–15: *Storenosoma lycosoides* Hogg. Fig. 13, epigynum, external. Fig. 14, ♂ tibial apophysis, retrolateral. Fig. 15, ♂ palp, ventral. FIGS 16–19: *Storenosoma terranea* sp. nov. Fig. 16, distal, retroventral, stridulatory spurs on ♂ palpal trochanter. Figs 17–18, epigynum. Fig. 17, external. Fig. 18, internal. Fig. 19, ♂, tibial apophysis, retrolateral. FIGS 20–23: *Storenosoma superna* sp. nov. Fig. 20, spurs on ♂ palpal trochanter. Figs 21–22, epigynum. Fig. 21, external. Fig. 22, internal. Fig. 23, ♂, tibial apophysis, retrolateral. FIGS 24–26: *Storenosoma alta* sp. nov. Figs 24–25, epigynum. Fig. 24, external. Fig. 25, internal. Fig. 26, ♂ tibial apophysis, retrolateral.

retromarginal and 2 promarginal teeth on geniculate chelicerae. Labium wider than long 1:0.88. Sternum truncated anteriorly, pointed posteriorly, longer than wide 1:0.94. Anterior spinnerets largest. Dorsal spines on all femora and on posterior tibiae and metatarsi, strong paired ventral spines and lateral spines on all tibiae and metatarsi. Preening combs on metatarsi II and paired combs on metatarsi III and IV; tines 3–7. Four-5 tarsal trichobothria of increasing length distally; bothrium grooved (Fig. 41). Tarsal organ (Fig. 40) distal to trichobothria. Epigynum with tiny lateral teeth (Fig. 17, 18).

MALE

CL = 4.3, CW = 3.3, AL = 3.8, AW = 2.8. Palpal trochanter with 2 retroventral stridulatory spurs (Fig. 16, 33, 34) opposed to prolateral grooved area on coxa I (Fig. 32). Complex tibial apophysis (Fig. 19). Cymbium extended proximally into a swelling bearing 2–3 long spines (Fig. 35). Complex sclerotised median apophysis, membranous conductor, stout rigid embolus. Tegular process very reduced.

Storenosoma superna sp. nov.

MATERIAL EXAMINED

HOLOTYPE: Pitfall traps, mossy microphyll forest with *Nothofagus*, Mt Hobwee, 1140m, Lamington National Park, SE.Q. R. Raven, V. Davies, 7.iv.1976, 1 ♀, QM S1378.

PARATYPES: Same data, 1 ♂, QM S1379; 3 ♂, 3 juvs, QM S1380; litter, same locality, 1 ♀, 9 juvs, QM S1381; 1 ♂, QM S1382.

DESCRIPTION

FEMALE

CL = 3.3, CW = 2.3, AL = 3.5, AW = 2.3. Medium-sized spider otherwise similar to *S. terranea*. Epigynum (Figs 21, 22).

MALE

CL = 3.0, CW = 2.3, AL = 2.6, AW = 2.7. ♂ Palp (fig. 36). Trochanter with 2 retroventral spurs (Fig. 20). Tibial apophysis (Fig. 23). Cymbium normal shape; no tegular process.

Storenosoma alta sp. nov.

MATERIAL EXAMINED

HOLOTYPE: Pitfall trap, litter, Poverty Point, 1160m, nr Tenterfield, N.S.W. 29.05S x 152.17E. G.B. Monteith, 2.x.1978 – 21.ii.1979, 1 ♂, QM S1383.

PARATYPES: Same data, 1 ♂, QM S1384, 1 ♀, QM S1385, 1 2j QM S1386.

DESCRIPTION

FEMALE

CL = 3.5, CW = 2.7, AL = 4.9, AW = 3.5. Legs with contrasting dark pigmented bands. Posterior spinnerets reduced. Epigynum with well defined lateral teeth (Figs. 24,25).

MALE

CL = 3.6, CW = 2.7, AL = 3.1, AW = 2.2. Palpal trochanter with 2 retroventral stridulatory spurs. Tibial apophysis complex; long spine on patella (Fig. 26). Large median apophysis with long posterior extension (Fig. 37).

DISCUSSION

The strongly procurved rows of eyes, the presence of metatarsal preening combs, the complex ♂ tibial apophysis, the large sclerotised median apophysis, the small membranous conductor and the trochanteral stridulatory spurs on the ♂ palps link the ecribellate genera, *Otira* (New Zealand and Australia), *Storenosoma* (Australia), and *Pakeha* (New Zealand). Forster & Wilton (1973) placed these genera with several others in the family Amaurobiidae, the diagnostic characters of which were a simple tracheal system and a sclerotised, plate-like median apophysis.

Amaurobius fenestralis, the only *Amaurobius* sp. examined, has a complex ♂ tibial apophysis, tegular process (present in *Otira* and reduced in *Storenosoma*), membranous conductor, preening combs on legs III and IV and a simple epigynum with lateral teeth (present in *Storenosoma* and Pakeha) so that Forster and Wilton's placement is justified.

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Plate 1

FIGS 27-30: *Otira summa* sp. nov. Fig. 27, tarsus, tarsal rod, scale line 63 um. Fig. 28, tarsal rod, short scale line 6.3 um. Figs 29-30, ♂ r. palp. Fig. 29, scale line 63 um. Fig. 30, scale line 47 um. c, conductor; e, embolus; m.a., median apophysis; t.p., tegular process.

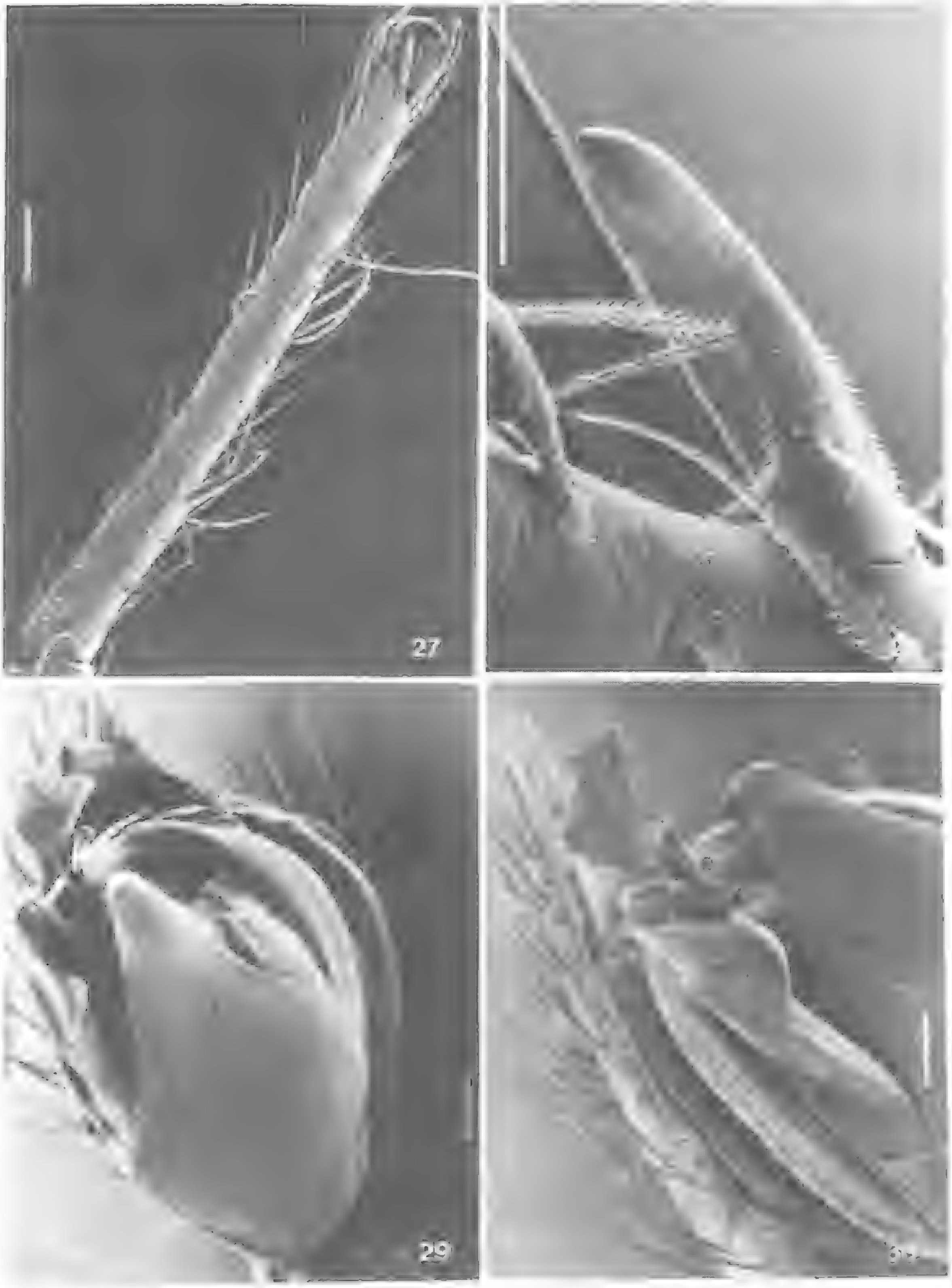
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Plate 2

FIG. 31: *Otira aquilonaria* sp. nov. ♂ l. palp.

FIGS 32–34: ♂ *Storenosoma terranea* sp. nov. Fig. 32, ♂ coxa I, prolateral, stridulatory surface. Figs 33–34, stridulatory spurs on palpal trochanter, scale lines 50 um.


31
32

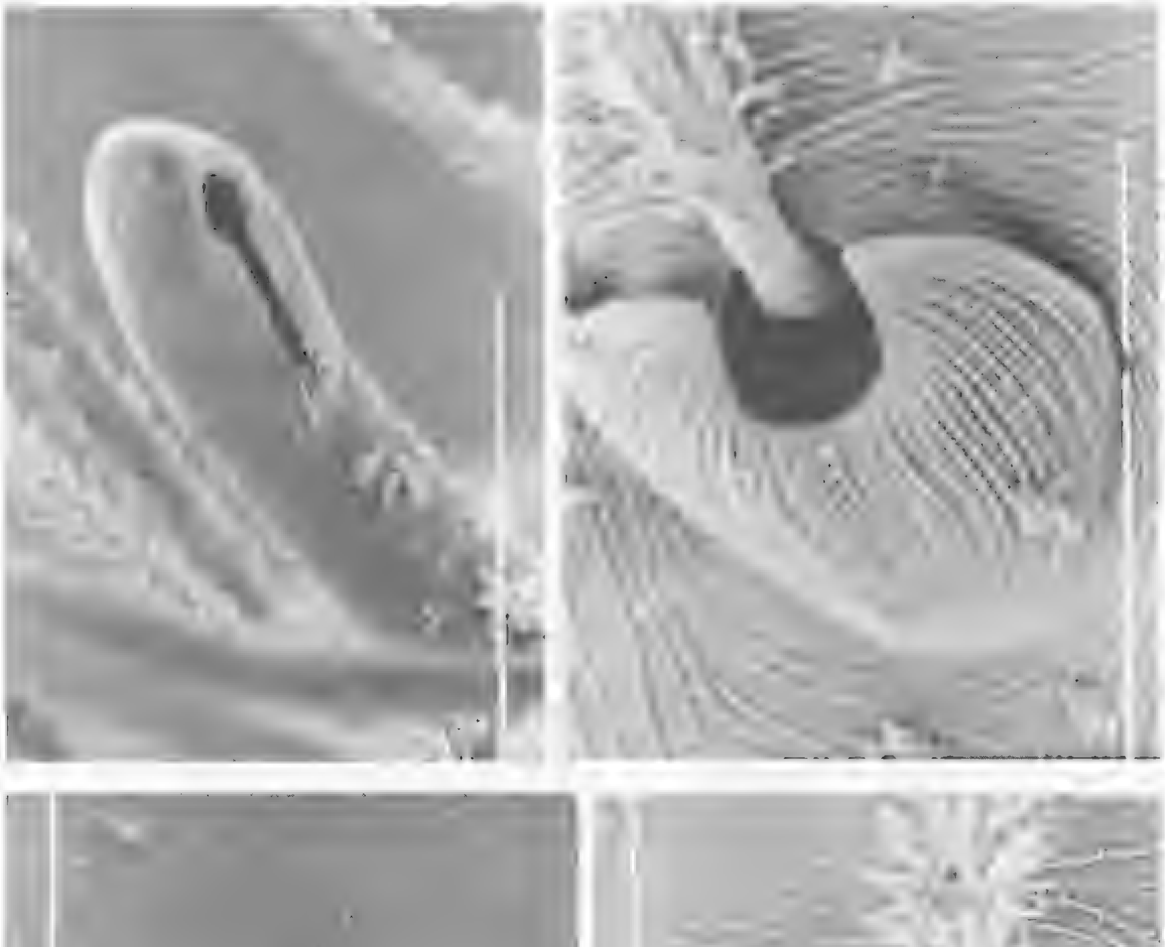
Plate 3

FIGS 35-37: l. ♂ palps. Fig. 35, *Storenosoma terranea* sp. nov. c, conductor; cy, cymbium; e, embolus; m.a., median apophysis. Fig. 36, *Storenosoma superna* sp. nov. Fig. 37, *Storenosoma alta* sp. nov. Scale lines 50 um.


Cy
35

Plate 4

FIGS 38–39: *Otira summa* sp. nov. Fig. 38, tip of tarsal rod. Fig. 39, trichobothrial base. Short scale lines 5.25 um.
FIGS 40–41: *Storenosoma terranea* sp. nov. Fig. 40, tarsal organ. Fig. 41, trichobothrial base. Short scale lines 5.25 um.



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A REVIEW OF THE OPHIDIID FISH GENUS *SIREMBO* WITH A NEW SPECIES FROM AUSTRALIA

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ABSTRACT

A revised diagnosis is presented for the Indo-West Pacific fish genus *Sirembo*, and three species are recognised. *S. metachroma* n.sp. from Queensland and Western Australia has about 12 oblique scale rows between the dorsal fin and the lateral line and has the lateral line marked by a bold to faint brown line. The previously unreported young stage of the Australian ophidiid *Dannevigia tusca* is superficially similar in color pattern to *Sirembo metachroma*. *S. jerdoni* (junior syn. *Umalius philippinus*) has been caught from the E. China Sea to the Red Sea (including Western Australia) and has 6–7 oblique scale rows between the lateral line and the dorsal fin and three or four broad, oblique bands on the head and anterior part of the body. *S. imberbis* (junior syn. *S. everriculi*) found from Japan to Western Australia (including Queensland) has 6–8 oblique scale rows between the lateral line and dorsal fin and one or more rows of spots or horizontal bands along the body.

INTRODUCTION

Fishes assigned to the Indo-West Pacific ophidiid genus *Sirembo* may be divided into three groups based on well-marked colour patterns, which we treat as species or possible species groups. In this paper, we describe one new species and present synonymies for the other two, as well as discussing variation.

Sirembo Bleeker

The following diagnosis is an emendation of the one presented by Cohen and Nielsen (1978). Pelvic fins immediately adjacent to each other, each with a single ray inserted beneath or immediately behind the level of the eye. No spines on preopercle. Spine on opercle short, not reaching rear margin of opercle. Eyes well developed. Deepest part of fish well posterior to head. Developed gill rakers on first arch 4. Pseudobranch large, with 15–28 or more filaments. A single median basibranchial tooth patch. Abdominal vertebral centra 13–15. Developed gill rakers 0+1+3. Branchial cavity and palate dusky to quite dark.

KEY TO SPECIES OF *SIREMBO*

1. Three or four broad oblique bands on head and anterior part of body, which connect over predorsal and head to similar marks on opposite side .... *S. jerdoni*

   No oblique bands on fore part of body..........2

2. Ground color light brown or yellow-brown. Lateral line marked by a bold to faint brown line .... *S. metachroma*

   Body usually with one or more horizontal stripes or rows of blotches............ *S. imberbis*

Sirembo metachroma sp. nov.
Plate 1A, 1B

MATERIAL EXAMINED

HOLOTYPE: QM No. I3005; 171 mm SL; Queensland, 7 miles NW off Cape Moreton, 60 fms; 27 Feb. 1975; coll. R.J. McKay.

PARATYPES: QM I.19500 (4 spec.), data as for holotype; WAM P25739-005 (1 spec.), data as for holotype.

NON-TYPE: All from Western Australia; WAM P22339 (1 spec.), Cape Cuvier; WAM 25836-003 (1 spec.), off Bernier Id.; USNM 226483 (1 spec.), 22°52'S, 113°26'E, 136–178 m.

DIAGNOSIS

Ground colour pale brown or yellow-brown. Lateral line marked by a dark-brown line or a pale line. Scale rows between lateral line and dorsal fin about 12. Anal fin rays 72–74. Abdominal centra 14 or 15.

DESCRIPTION

Counts are summarized in Table 1, measurements in Table 2.

Body compressed, relatively long, but not attenuate. Head about one-half preanal length. Snout bluntly rounded, lower jaw included. Upper jaw terminating near level of rear margin of eye. Rear of maxillary expanded, partly sheathed dorsally. Eye with an elliptical spectacle, about equal in horizontal diameter to the snouth length. Posterior nostril a simple pore close to mid-level of anterior margin of eye; anterior nostril with a raised rim, located near mid-length of snout.

Small cycloid scales cover the entire body. The median fins are covered with thick, scaleless skin. The pectoral has a fleshy, scale-covered patch near its base. There are at least 12 rows of scales in an oblique line between the dorsal fin and the lateral line and about 115–135 rows of scales along the side of the body (difficult to count at rear of tail).

Head pores present along the supraorbital, infra-orbital, lateral, and preoperculo-mandibular canal series; consistent counts not possible. Second pore in the mandibular series near lower jaw tip a larger, median, apparently fused structure. Lips, snout tip and lower jaw tip covered with densely distributed papillae.

Branchiostegal rays 8. Granular teeth in bands on dentary and palatines. Premaxillary with somewhat larger teeth along outer margins. Vomerine tooth patch with a rounded anterior margin and flaring arms.

Pectoral fin broadly rounded, reaching about one-half the distance from its own origin to anal fin origin. Ventral fins originate close to level of rear margin of eye and of upper jaw.

The color pattern is different in the five smaller specimens from Queensland and the three larger ones from Western Australia. The smaller fish have a light brownish-yellow ground color, beneath which lie three or four very faint, darker transverse areas. The lateral line is marked by a narrow, dark brown line that stops short of the end of the tail section of the body. In the largest of the small specimens (holotype, 171 mm), the lateral line alternates very dark segments over the darker, transverse areas with paler segments. Median fins darker, set off by narrow pale margins; three or four darker blotches along the dorsal. Bottom of head, pelvics and snout tip pale. Western Australian specimens with a light-brown ground color over faint remnants of slightly darker transverse areas. Lateral line marked by a faint brown line. A bold dark band extends obliquely across the cheek from the rear margin of the preopercle to the posteroventral segment of the eye; a narrow extension outlines the ventral margin of the eye. Median fins about same color as body, with remnants of narrow pale margin. Dorsal fin with two dark blotches. Belly, bottom of head, and snout tip pale. In fish from both regions, the branchial chamber is dusky, and the entire palate is dark brown and contrasts with the pale area distal to the palatines and vomer.

DISTRIBUTION AND VARIATION

Known from five Queensland specimens (SL 134–171 mm) taken at one locality, which have the color pattern shown in Fig. 1A and three Western Australian specimens (SL 236–317 mm) taken at three localities, and with the color pattern shown in Fig. 1B and described above. In addition to having a different color pattern, the Queensland fish have smaller heads, shorter jaws, narrower maxillaries, slenderer bodies and shorter ventral fins (data for all of these are summarized in Table 2). We interpret these differences in color pattern and proportions as size-related and consider the two samples conspecific. Only the study of specimens intermediate in size will verify our interpretation. We note, however, that in the largest Queensland fish, segments of the darkbrown line of pigment over the lateral line are slightly faded. Perhaps this condition represents the onset of color pattern transition.

We call attention to another difference, not size related. Western Australian specimens have 72 anal fin rays; Queensland ones have 73 or 74. The sample size is too small to recognize separate species on the basis of the character.

ETYMOLOGY

The name *metachroma* is taken from the Greek *meta*, implying change, and *chroma*, color, in reference to the apparent ontogenetic change in color pattern in this species.

SIMILARITY IN COLOR PATTERN OF *S. METACHROMA* AND YOUNG *DANNEVIGIA TUSCA*

A related genus and species, *Dannevigia tusca*, which is caught along the southern shores of

TABLE 1: SELECTED COUNTS FOR THREE SPECIES OF *SIREMBO*.

	imberbis				*metachroma*		*jerdoni*			
	Jap.	Phil.	Qld.	W.A.	Qld.	W.A.	Phil.	Thai.	Red Sea	W.A.
Dorsal fin rays										
89	1	2					1			
90	1	2		1			—			
91	1	2	1	—			1			
92	1	2	1	—			6			
93	1	2	1	1			—		2	
94			1		1		3	1		
95			1		—		1			
96			—		—					
97			1		2	3				
98					—	1				
99					—					
100					1					
Anal fin rays										
64							3			
65							2			
66							2	1	1	
67		2					3		1	
68	1	1					2			
69	—	6								
70	3			1						
71	1		3	—						
72			2	1		4				
73			1		1					
74					3					
Pectoral fin rays										
21			1							
22	3	1	—				5			
23	2	1	2		1		4		1	
24	1	2	1	1	3	2	4		1	1
25		2	2	1	1	2				
Pseudobranch filaments										
15		1								
16		—								
17		2	2							
18	1	—	—	1						
19		—	—							
20		1	1							
21		—	2		2		2		1	
22		—			—		1			
23		2			1		2			
24					1	2	1			
25					1	—	1			
26						2	1	1		1

TABLE 2: PROPORTIONS, EXPRESSED AS PERCENT OF STANDARD LENGTH, FOR THREE SPECIES OF *SIREMBO*.

	Standard Length mm	Head Length N, $\bar{x}$ (Range)	Snout Length	Eye Diameter	Jaw Length
imberbis					
Japan	126-164	5, 20.0(19.0-20.8)	5, 4.1(3.5-4.4)	5, 5.9(5.2-6.1)	5, 9.7(9.3-10.2)
Philippines	79.4-200	6, 22.8(21.7-24.0)	6, 4.6(4.0-5.3)	6, 6.2(5.7-6.7)	6, 11.2(10.6-12.0)
Queensland	143-169	5, 20.7(19.9-21.7)	4, 4.8(3.8-5.3)	5, 5.4(4.9-5.8)	5, 9.9(9.1-10.8)
W.A.	158-167	2, 21.9, 22.5	2, 4.6, 5.3	2, 5.3, 5.7	2, 10.1, 11.2
metachroma					
Queensland	134-171	4, 22.5(22.1-22.8)	4, 5.9(5.3-6.9)	4, 5.6(5.4-6.0)	4, 11.3(10.8-11.5)
W.A.	160	1, 23.4	1, 5.8	1, 6.1	1, 11.2
W.A.	236-317	3, 24.7 (24.4-24.9)	3, 6.5(6.0-7.4)	3, 5.6(5.6-5.7)	3, 12.6(12.5-12.7)
jerdoni					
Philippines	101-143	11, 22.0(20.9-23.4)	11, 4.8(3.8-5.4)	11, 5.8(4.9-6.3)	11, 10.7(9.5-11.9)
Red Sea	139-167	2, 22.9, 23.2	2, 4.7, 5.0	2, 5.3, 5.9	2, 10.9, 11.4

	Maxillary Width	Predorsal Length	Preanal Length	Body Depth at Vent
imberbis				
Japan	2, 3.3, 3.5	5, 21.6(19.7-23.9)	3, 43.3(41.3-45.1)	4, 14.9(13.7-16.6)
Philippines	6, 4.3(3.9-4.9)	6, 24.8(23.9-27.0)	6, 45.4(43.6-49.1)	6, 16.1(14.2-17.2)
Queensland	5, 3.7(3.6-4.0)	5, 23.0(22.0-24.6)	4, 44.4(43.0-46.6)	5, 16.3(15.3-17.1)
W.A.	2, 4.3, 4.4	2, 24.1, 25.6	2, 46.0, 47.0	2, 16.9, 18.5
metachroma				
Queensland	4, 4.0(3.9-4.1)	4, 23.1(22.2-23.7)	4, 44.4(43.6-45.2)	4, 18.5(17.1-20.3)
W.A.	1, 4.5	1, 22.0	1, 45.7	1, 18.2
W.A.	3, 4.9(4.8-5.1)	3, 24.2(22.3-25.2)	3, 46.2(43.5-49.2)	3, 22.1(20.2-24.4)
jerdoni				
Philippines	10, 4.1(3.5-4.6)	11, 22.4(19.3-23.7)	11, 46.0(43.5-50.1)	10, 17.5(15.5-19.9)
Red Sea	—	2, 22.0, 23.2	2, 44.9, 46.9	2, 16.5, 16.8

	Pectoral Fin Length	Ventral Fin Length
imberbis		
Japan	5, 12.4(12.0-12.9)	5, 13.1(11.5-14.0)
Philippines	6, 11.6(9.5-14.4)	5, 14.7(12.0-17.3)
Queensland	4, 11.9(10.8-12.4)	5, 12.9(12.2-14.7)
W.A.	2, 11.2, 12.3	2, 11.5, 15.4
metachroma		
Queensland	4, 11.4(10.7-12.1)	4, 14.7(14.2-15.3)
W.A.	1, 11.1	1, 14.4
W.A.	3, 11.2(11.1-11.4)	3, 16.6(15.5-17.5)
jerdoni		
Philippines	11, 11.2(9.7-12.6)	11, 14.5(12.2-16.7)
Red Sea	2, 11.2, 11.2	2, 12.0, 13.2

Australia and grows large enough to be landed commercially, has a previously unreported young stage with a color pattern that might be confused with Western Australian *S. metachroma.* The ground color is pale brown, and there are several indistinct transverse dusky bars across the body and dark blotches on the dorsal fin, and one on the anal fin as well (Plate 1C). Several obvious ways in which the two species differ are the presence in *Dannevigia* of two rays rather than one in each ventral fin and of short spines at the lower angle of the preopercle rather than no spines, and of the absence of an oblique band across the cheek and of a prominent median-fused pore near the tip of the lower jaw. The above account is based on USNM 227946, 205 mm SL, 33°38'S, 125°38'E, 114–120 m. The statement by Cohen and Nielsen (1978) that *Dannevigia* has, 'No dark spots on dorsal fin' applies to adults only.

Sirembo imberbis (Temminck and Schlegel)
Plate 2A

Brotula imberbis Temminck and Schlegel, 1846, p. 253 (original description, Japan).

Sirembo imberbis; Bleeker, 1858, p. 22 (new combination)

Brotella maculata Kaup, 1858, p. 92 (*nomen novum* for *Brotula imberbis* Temminck and Schlegel).

Sirembo everriculi Whitley, 1936, p. 47 (original description, Queensland).

MATERIAL EXAMINED

JAPAN: RNHL 3469a (Holotype), RNHL 3469b–c (2 Paratypes), Bay of Oomura; USNM 174750 (2 spec.), Wakanoura; USNM 71220 (1 spec.), Nagasaki market. PHILIPPINES: USNM 99060 (1 spec.), Taebus Pt.; USNM 226477 (1 spec.), Visayan Sea, vicinity of Samar and Leyte; USNM 226485 (1 spec.), 11°38'N, 123°53'E, 90 m; USNM 226484 (23 spec.), 11°29'N, 123°46'E, 70 m. QUEENSLAND: QM I.16390 (4 spec.), Torres Straits near Keats Islet; QM 12546 (1 spec.), off Cairns; QM I.16475 (1 spec.), Torres Straits N of Sand Cay; QM I.16391 (1 spec.), Torres Straight near Aureed Island. AM I.A. 6564 (Holotype of *S. everriculi*), off Shaw Island, Cumberland Group, N Queensland, 10 fms. WESTERN AUSTRALIA: WAM P26294-005 (1 spec.), 18°05'S, 119°45'E; USNM 226479 (1 spec.), 26°37'S, 112°42'E, 170–175 m; CSIRO uncat. (1 spec.), 19°44'S, 116°E, 100 m.

DIAGNOSIS

Body with one or more rows of spots or horizontal stripes (sometimes faded). Oblique scale rows between lateral line and dorsal fin 6–8. Anal fin rays 67–73. Abdominal centra 13.

DESCRIPTION

Counts are summarized in Table 1, measurements in Table 2. About 80–95 rows of scales along the side of the body (difficult to count along rear of tail).

Branchiostegal rays 7 (4 specimens) or 8 (8 specimens). Premaxillary teeth evenly granular, outer series not enlarged. Dentition otherwise similar to that of *S. metachroma.*

The color pattern is variable and apparently fades readily, even in specimens that are not abraded; however, it may be best characterized as having one or more horizontal rows of dusky blotches along the side, the most dorsal of which, immediately beneath the dorsal fin, is in some fused into a poorly defined stripe. The anal fin usually bears a dark stripe along all or part of its length. The dorsal fin carries a series of blotches which may be more or less coalesced. Variation in color pattern seems not to be co-ordinated with size or geographical distribution. The branchial chamber and the rear (only) of the palate are dusky.

DISTRIBUTION AND VARIATION

S. imberbis is apparently widely distributed in the tropical western Pacific from Japan, the East China Sea, the Philippines, Queensland (as *S. everriculi*), and Western Australia (new record). Measurements and counts presented in Tables 1 and 2, which are based on rather small samples, show differences between Philippine and Queensland samples in anal fin ray counts, head length, eye diameter, and jaw length. Japanese and Philippine fishes differ in jaw length and predorsal length. On the basis of our limited material, however, there is insufficient reason for recognizing more than a single species.

Sirembo jerdoni (Day)
Plate 2B

Brotula jerdoni Day, 1888, p. 804 (original description, Madras).

Sirembo imberbis; Rahimullah (not Temminck and Schlegel), 1943, p. 55 (misident.).

Sirembo jerdoni; Menon and Rama Rao, 1970, p. 47 (new combination).

Umalius philippinus Herre and Herald, 1951, p. 312 (original description, Philippines).

Umalius heraldi Herre, 1953, p. 818 (new name proposed for misident. of this species as *Lepophidium marmoratum* by Umali, 1935).

Sirembo philippinus; Cohen and Nielson, 1978, p. 20 (new combination).

MATERIAL EXAMINED

PHILIPPINES: USNM 22648 (8 spec.), 11°29'N, 123°46'E, 70 m; USNM 112107 (holotype of *Umalius philippinus*), Manila market, USNM 226478 (1 spec.), 11°28'N, 123°24'E; USNM 226480 (3 spec.), 11°38'N, 123°59'E, 80 m; USNM 226481 (2 spec.), 11°38'N, 123°56′E, 75 m. WESTERN AUSTRALIA: USNM 226482 (1 spec.), 19°30′S, 116°34′E, 90–99 m; CSIRO uncat. (1 spec.), 19°44′S, 116°38′E, 57–60 m, GULF OF THAILAND: CAS uncat. (1 spec.), Naga stat. 60–340. RED SEA: USNM 216444 (1 spec.), Gulf of Suez; MNHN 1966-466 (1 spec.), Gulf of Suez.

DIAGNOSIS

Three or four broad, oblique bands on the head and anterior part of the body; bands horizontal posteriorly. Scale rows between lateral line and dorsal fin 6 or 7. Anal fin rays 64–68.

DESCRIPTION

Counts are summarized in Table 1, measurements in Table 2. About 80–95 rows of scales along side of body (difficult to count along rear of tail).

Branchiostegal rays 7 (1 specimen) or 8 (8 specimens). Premaxillary teeth slightly larger along outer margin of band. Vomerine tooth patch triangular.

The color pattern is highly distinctive, and even though it tends to fade, the anterior oblique bands that meet over the top of the head are unique and readily perceived. Several dark blotches on the dorsal fin and dark bands on the rear of the dorsal fin and on the anal fin. Good illustrations have been published by Herre and Herald (1951), Menon and Rama Rao (1970), and Visweswara Rao (1972). The branchial chamber is dusky, as is the entire palate posterior to the head of the vomer.

DISCUSSION

Although Day's original description of *S. jerdoni* was based on an unpublished illustration by Jerdon rather than on a specimen, the written description of the color pattern leaves no doubt as to the identity of specimens of this species, no matter what name by which they are called. The dorsal and anal ray counts of 126 and 95 respectively given in the original description are far higher than those of any known *Sirembo*. Inasmuch as they were taken from an illustration, we consider them to be incorrect.

DISTRIBUTION AND VARIATION

S. jedoni is known from the East China Sea, the Philippines, Western Australia (new record), the Gulf of Thailand (new record), the Bay of Bengal, and the Red Sea (new record). Although our samples are limited, we find no reason to recognize more than a single species.

ACKNOWLEDGEMENTS

We thank all of the following for the loan or gift of specimens or for help in various other ways. Australian Museum (AM), J. Paxton; California Academy of Sciences (CAS), P. Sonoda; CSIRO, P. Kailola; Museum National d'Histoire Naturelle (MNHN), M.L. Bauchot; Queensland Museum (QM), R.J. McKay; Rijksmuseum van Natuurlijke Historie, Leiden (RNHL), M. Boeseman; U.S. National Museum of Natural History (USNM), L. Knapp; Western Australian Museum (WAM), G. Allen, B. Hutchins. We are particularly grateful to J. Russo for the photographs illustrating this paper.

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PLATE 1

A. *Sirembo metachroma*, QM I.19500, Paratype, 160 mm SL.
B. *S. metachroma*, WAM P22339, 255 mm SL.
C. *Dannevigia tusca*, USNM 227946, 205 mm SL.

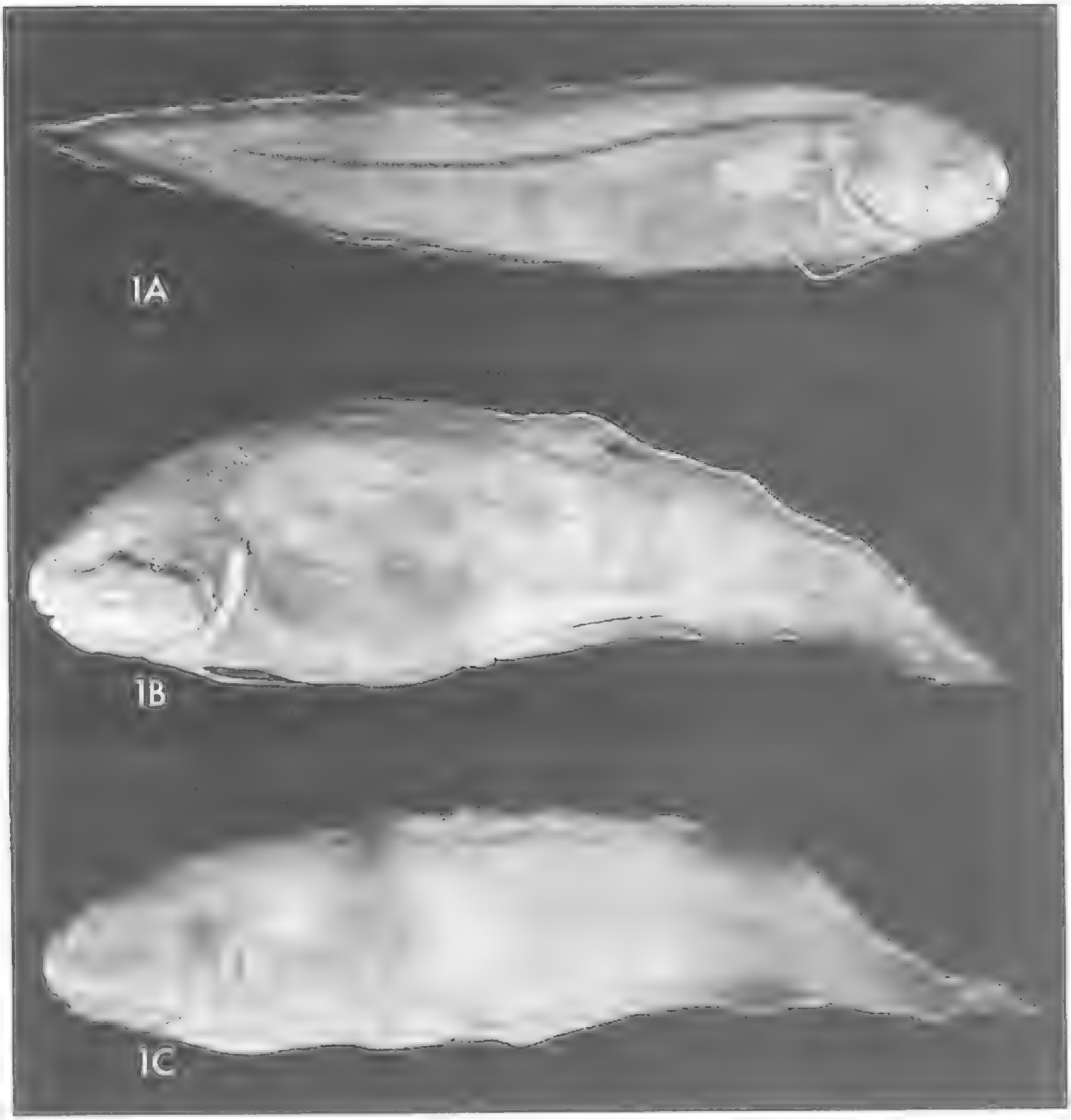
1A
1B
1C

PLATE 2

A. *Sirembo imberbis,* WAM P26294-005, 167 mm SL.
B. *Sirembo jerdoni,* USNM P226486, 130 mm SL.


2A
2B

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CATALOGUE OF TYPE, FIGURED AND MENTIONED FOSSIL FISH, AMPHIBIANS AND REPTILES HELD BY THE QUEENSLAND MUSEUM

TEMPE LEES
Queensland Museum

ABSTRACT

A taxonomically arranged list of the type, figured and mentioned fossil fish, amphibians and reptiles held by the Queensland Museum is presented. For each specimen the following information is provided: reference list; age; formation; and locality of collection.

INTRODUCTION

The Queensland Museum holds a substantial collection of fossil fish, amphibians and reptiles, and many papers have been published on this material. This catalogue has the dual purpose of: (a) collating the literature to provide readily accessible information about our specimens; and (b) to clarify the identity of some specimens which have previously not had registration numbers cited.

The foundations of this list were 'A Catalogue of Fossil Fish in Queensland' (Turner 1982b) and 'A Catalogue of Fossil Amphibians and Reptiles in Queensland' (Molnar 1982). These catalogues had the shortcoming of not making clear in which papers specimens were described. This is clarified here by providing each type, figured or mentioned specimen with chronological references. In addition material collected from other states and therefore not mentioned in the catalogues of Turner (1982b) and Molnar (1982) is included here.

Those papers from which specimens could not be identified with certainty have been omitted, but otherwise the reference lists provided are as complete as possible. Information about casts is listed if they represent material in private collections or important Queensland material held overseas.

The age, locality, and formation from which material was collected are stated for each specimen. Where several specimens of the same species have been collected from one locality this information is given only once, following the references for the last specimen listed. More detailed locality information (e.g. grid references) is available for some specimens, but has not been included in order to protect valuable fossil sites from indiscriminate collecting. Such information, where available, can be obtained from the Queensland Museum.

An alphabetically arranged index containing all published names is provided for each part of the catalogue.

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ABBREVIATIONS

AM — Australian Museum; BM(NH) — British Museum (Natural History); GSQ — Geological Survey Queensland; Lst. — Limestone; Mdst. — Mudstone; QM — Queensland Museum; Ss. — Sandstone.

SPECIES INDEX

FISH

AMPHIBIANS

REPTILES

FISH

SC. ACANTHODII

O. CLIMATIIDA

F. GYRACANTHIIDAE

Gyracanthides murrayi Woodward, 1906

QM F6663

Gyracanthides murrayi : Olgers, 1972, p. 42; Turner, 1982b, p. 601.

Loc.: N. of Bogantungan, Qld.
Fm.: Star Beds, Ducabrook Fm. Age: L. Carboniferous.

SC. ELASMOBRANCHI ?

O. BRADYODONTI

F. COCHLIODONTIDAE

Deltodus ? *australis* Etheridge jun., 1892

HOLOTYPE

Deltodus ? *australis* Etheridge, *in* Jack & Etheridge, 1892, pp. 93, 296, pl. 39, fig. 11; Turner, 1982b, p. 602.
? *Deltodus australis* : Chapman, 1914, p. 261.
Deltodus australis : Hills, 1958, p. 93.

Loc.: Rockhampton Distr., Qld.
Fm.: Gympie Series. Age: Permian.
Remarks: This unregistered specimen is believed to be in the Queensland Museum as it was collected by De Vis, during his time as Director (Turner 1982b). It could not however, be located.

O. HYBODONTIFORMES ?

F. HYBODONTIDAE ?

Hybodus ? *incussidens* De Vis, 1911

QM F12194 HOLOTYPE

Hybodus incussidens De Vis, 1911, p. 18, pl. 2, fig. 3; Wade, 1931, pp. 121, 142; Hills, 1958, p. 99.
Hybodus ? *incussidens* : Turner, 1982b, p. 603.

Loc.: O'Connell Ck, nr Richmond, Qld.
Fm.: Rolling Downs Gp. Age: L. Cretaceous.
Remarks: Turner (1982b, p. 603) states 'This tooth probably belongs to a modern shark genus.'

O. GALEIFORMES (LAMNIFORMES)

F. CARCHARIIDAE (ODONTASPIDIDAE)

Carcharias sp.

QM F2265

Carcharias sp. : Hill, Playford & Wood, 1968, pl. K12(4); Turner, 1982b, p. 603.

Loc.: Aramac, Qld.
Fm.: Toolebuc Fm.? Age: L. Cretaceous, Albian.

F. ISURIDAE

Lamna daviesi Etheridge jun., 1888

QM F1021 HOLOTYPE

Lamna daviesii Etheridge jun., 1888, p. 159, pl. 4, fig. 2–3; Woodward, 1889, p. 410; 1894, p. 444; Etheridge & Woodward, 1892, p. 2; Jack & Etheridge, 1892, p. 503; Chapman, 1909, p. 452; 1914, p. 267; David, 1914, p. 284; Howchin, 1928, p. 317; Wade, 1931, p. 121; Hills, 1958, p. 99; Hill, Playford & Woods, 1968, pl. K12(5).
Lamna daviesi : Turner, 1982b, p. 603.

Loc.: Flinders R., Richmond Downs Stn, Qld.
Fm.: Toolebuc Fm.? Age: L. Cretaceous, Albian.

SC. ACTINOPTERYGII

O. POLYPTERIFORMES

F. SAURICHTHYIDAE

Saurichthys sp. cf. *S. gigas* (Woodward, 1890)

QM F11942

Saurichthys sp. cf. *S. gigas* : Turner, 1982a, pp. 545–51, fig. 2, pl. 1; 1982b, p. 602.

Loc.: N.E. flank of The Crater, Rewan Stn, Qld.
Fm.: Arcadia Fm. Age: L. Triassic.

O. ASPIDORHYNCHIFORMES

F. ASPIDORHYNCHIDAE

Belonostomus sweeti Etheridge jun. & Woodward, 1892

QM F5660

Belonostomus sweeti : Hill, Playford & Woods, 1968, pl. K12(3); Turner, 1982b, p. 604.

Loc.: Pelican bore, W. of Dunraven Stn, nr Hughenden, Qld.
Fm.: Toolebuc Fm. Age: L. Cretaceous, Albian.

O. BOBASTRANIFORMES

F. BOBASTRINIDAE

Ebenaqua ritchiei Campbell & Phuoc, 1983

QM F10135 PARATYPE

Ebenaqua ritchiei : Campbell & Phuoc, 1983, pp. 38, 43, 46, 54, fig. 1–2.

Loc.: Utah coal mine, Blackwater, Qld.
Fm.: Rangal Coal Measures. Age: L. Permian.

O. ICHTHYODECTIFORMES

F. ICHTHYODECTIDAE

Xiphactinus australis (Woodward, 1894)

QM F1016

Xiphactinus australis : Hill, Playford & Woods, 1968, pl. K12(1); Turner, 1982b, p. 605.

Loc.: 9.6 km NE. of Richmond, Qld.
Fm.: Toolebuc Fm. Age: L. Cretaceous, Albian.

Ichthyodectid gen. et. sp. indet.

QM F6139

vertebrae of small teleost : Etheridge, 1885, p. 8.
Teleostean vertebrae, *Cladocyclus sweeti*?: Woodward, 1894, p. 447, pl. 10, fig. 7.
Chirocentridian : De Vis, 1911, p. 11.
unnamed vertebrae : Longman, 1932, p. 95.
Ichthyodectid gen. et sp. indet. : Turner, 1982b, p. 605.

Loc.: Station Ck, Afton Downs Stn, nr Richmond, Qld.
Fm.: Rolling Downs Gp? Age: L. Cretaceous.

O. ELOPIFORMES

F. PACHYRHIZODONTIDAE

Pachyrhizodus marathonensis (Etheridge jun., 1905)

QM F355

Pachyrhizodus marathonensis : Hill, Playford & Woods, 1968, pl. K12(2); Bartholomai, 1969, p. 259, pl. 15; Turner, 1982b, p. 605.

Loc.: Flinders R., nr Hughenden, Qld.
Fm.: Toolebuc Fm. Age: L. Cretaceous, Albian.

QM F3349

Pachyrhizodus marathonensis : Bartholomai, 1969, p. 250, fig. 47-8; Turner, 1982b, p. 605.

Loc.: Springvale Stn, nr Boulia, Qld.
Fm.: Toolebuc Fm. Age: L. Cretaceous, Albian.

QM F5687

Pachyrhizodus marathonensis : Bartholomai, 1969, p. 250, pl. 14; Turner, 1982b, p. 605.

QM F5688-90

Pachyrhizodus marathonensis : Bartholomai, 1969, p. 250; Turner, 1982b, p. 605.

Loc.: Boree Park Stn, nr Richmond, Qld.
Fm.: Toolebuc Fm. Age: L. Cretaceous, Albian.

QM F5691

Pachyrhizodus marathonensis : Bartholomai, 1969, p. 250; Turner, 1982b, p. 605.

Loc.: Sylvania Stn, nr Hughenden, Qld.
Fm.: Toolebuc Fm. Age: L. Cretaceous, Albian.

QM F5692

Pachyrhizodus marathonensis : Bartholomai, 1969, p. 250; Turner, 1982b, p. 605.

Loc.: Astell's tank, Dinga Ding Stn, nr McKinlay, Qld.
Fm.: Toolebuc Fm. Age: L. Cretaceous.

QM F5705

Pachyrhizodus marathonensis : Bartholomai, 1969, p. 250; Turner, 1982b, p. 605.

Loc.: Boree Pk, nr Richmond, Qld.
Fm.: Toolebuc Fm. Age: L. Cretaceous, Albian.

F. ELOPIDAE ?

Flindersichthys denmeadi Longman, 1932

QM F2210 HOLOTYPE

Flindersichthys denmeadi Longman, 1932, p. 89, figs 1-3, pls 10-11; Hills, 1958, p. 99; Bardack, 1962, p. 388; Turner, 1982b, p. 605.

Loc.: Old golf links, Richmond, Qld.
Fm.: Tambo Series. Age: L. Cretaceous, U. Albian.

O. OSTEOGLOSSIFORMES

F. OSTEOGLOSSIDAE

Phareoides queenslandicus (Hills, 1934)

QM F2357 HOLOTYPE

Phareodus queenslandicus Hills, 1934, pp. 160-4, pl. 18; Hill, Playford & Woods, 1970, pl. CZ7(2).
Phareoides queenslandicus : Taverne, 1973, p. 497; 1978, pp. 25-32, figs 15, 17-19; Turner, 1982b, p. 607.

QM F2358

Phareodus queenslandicus : Hills, 1934, pp. 160-4, fig. 7b.
Phareoides queenslandicus : Turner, 1982b, p. 607.

QM F2359

Phareodus queenslandicus : Hills, 1934, pp. 160-4, figs 5-6.
Phareoides queenslandicus : Turner, 1982b, p. 607.

Loc.: Redbank Plains, Qld.
Fm.: Redbank Plains Series. Age: U. Eocene/Oligocene?

O. GONORHYNCHIFORMES

F. GONORHYNCHIDAE

Notogoneus parvus Hills, 1934

QM F2364 HOLOTYPE

Notogoneus parvus Hills, 1934, pp. 164-6, pl. 20, figs 8c-9; Hill, Playford & Woods, 1970, pl. CZ7(3); Turner, 1982b, p. 607.

QM F2362

Notogoneus parvus : Hills, 1934, p. 165, fig. 8b; Turner, 1982b, p. 607.

QM F2365

Notogoneus parvus : Hills, 1934, p. 165, fig. 8a; Turner, 1982b, p. 607.

Loc.: Redbank Plains, Qld.
Fm.: Redbank Plains Series. Age: U. Eocene/Oligocene?

O. SILURIFORMES

F. PLOTOSIDAE

Tandanus sp.

QM F1180

Tandanus sp. cf. *T. tandanus* : Longman, 1929, p. 249; Turner, 1982b, p. 607.

Loc.: Chinchilla, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pleistocene?

QM F2120

Tandanus sp. cf. *T. tandanus* : Longman, 1929, p. 249; Turner, 1982b, p. 607.

Loc.: Brigalow, Qld.
Fm.: Unnamed; recovered while sinking a well. Age: Pleistocene?

O. PERCIFORMES

F. PERCICHTHYIDAE (MORONIDAE)

Maccullochella macquariensis Cuvier & Valenciennes, 1829

QM F2122

Oligorus macquariensis : Longman, 1929, p. 249.
Maccullochella macquariensis (?) ; Turner, 1982b, p. 607.

Loc.: Brigalow, Qld.
Fm.: Unnamed; recovered while sinking a well. Age: Pleistocene?

QM F2732

Maccullochella macquariensis : Hills, 1946, pp. 381–5.

Loc.: Baradine, Warrumbungle Mts., N.S.W.
Fm.: Diatomaceous earth. Age: Tertiary.
Remarks: The author was unable to locate QM F2122.

'*Percalates*' *antiquus* Hills, 1934

QM F2370 HOLOTYPE

Percalates antiquus Hills, 1934, pp. 166–8, pl. 21; Turner, 1982b, p. 607.

QM F2366, 2374–80

Percalates antiquus Hills 1934; Turner 1928b.
QM F2366 : Hills, 1934, pl. 24, fig. A, text fig. 11c; Turner, 1982b, p. 607.
QM F2374 : Hills, 1934, pl. 23, fig. B, text fig. 10; Turner, 1982b, p. 607.
QM F2375 : Hills, 1934, text fig. 13; Turner, 1982b, p. 607.
QM F2376 : Hills, 1934, pl. 22; Turner, 1982b, p. 607.
QM F2377 : Hills, 1934, text fig. 12b; Turner, 1982b, p. 607.
QM F2378 : Hills, 1934, pl. 24, figs B, C, text fig. 11b; Turner, 1982b, p. 607.
QM F2379 : Hills, 1934, text figs 12a, c; Turner, 1982, p. 607.
QM F2380 : Hills, 1934, pl. 23, fig. A, text fig. 11a; Turner, 1982b, p. 607.

Loc.: Redbank Plains, Qld.
Fm.: Redbank Plains Series. Age: U. Eocene/Oligocene?
Remarks: 'The generic status is uncertain : modern species of *Percalates* are now referred to *Macquaria* .' (Turner 1982b, p. 607).

'*Percalates*' sp.

QM F6565

Percalates sp. : Hill, Playford & Woods, 1970, pl. CZ 7(1); Turner, 1982b, p. 607.

Loc.: Brittain's Quarry, Darra, Qld.
Fm.: Darra Fm. Age: L. Tertiary.

F. THERAPONIDAE

Theraponid gen. et. sp. undet.

QM F12060

Theraponid : Turner, 1981, p. 40; 1982b, p. 608.

Loc.: Rundle, Qld.
Fm.: Rundle Oil Shale Fm. Age: Eocene.

SC. SARCOPTERYGII

O. DIPNOI

F. CERATODONTIDAE

Ceratodus wollastoni Chapman, 1914.

QM F10313

Ceratodus wollastoni : Kemp & Molnar, 1981, p. 212, fig. 6; Turner, 1982b, p. 604.

Loc.: Winton, Qld.
Fm.: Winton Fm. Age: L. Cretaceous.

Neoceratodus palmeri (Krefft, 1874)? = *N. forsteri* (Krefft, 1870)

QM F10537 HOLOTYPE

Ceratodus palmeri Krefft, 1874, p. 293; Kemp & Molnar, 1981, p. 212.
Ceratodus forsteri : De Vis, 1884, p. 42, 2 pls; Woodward, 1891, p. 274; Jack & Etheridge, 1892, p.646–7.
Neoceratodus palmeri ? = *N. forsteri* : Turner, 1982b, p. 606.

Loc.: Darling Downs, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pliocene or Pleistocene.

QM F1146

Ceratodus palmeri : De Vis, 1884, p. 42–3; Kemp & Molnar, 1981, p. 212, pl. 1, fig. 2.
Neoceratodus palmeri ? = *N. forsteri* : Turner, 1982b, p. 606.

QM F1147

Ceratodus palmeri : De Vis, 1884, p. 42–3; Kemp & Molnar, 1981, p. 212.
Neoceratodus palmeri ? = *N. forsteri* : Turner, 1982b, p. 606.

Loc.: King Ck, Darling Downs, Qld.
Fm.: Chinchilla Sand. Age: Pliocene.

QM F1148

Ceratodus forsteri : Jack & Etheridge, 1892, p. 647.
Neoceratodus palmeri ? = *N. forsteri* : Turner, 1982b, p. 606.

Loc.: Eight Mile Plains, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pliocene or Pleistocene.

QM F6564

Neoceratodus forsteri : Hill, Playford & Woods, 1970, pl. CZ7(4).

Loc.: Adjacent to Chinchilla rifle range, Qld.
Fm.: Chinchilla Sand. Age: Pliocene.

QM F10540

Ceratodus palmeri : Kemp & Molnar, 1981, p. 212.
Neoceratodus palmeri ? = *N. forsteri* : Turner, 1982b, p. 606.

Loc.: Darling Downs, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pliocene or Pleistocene.

Neoceratodus denticulatus (Hills, 1934)

QM F2347 HOLOTYPE

Epiceratodus denticulatus Hills, 1934, p. 157, figs 1–2.
Epiceratodus : Hills, 1958. p. 103; Hill & Denmead, 1960, p. 346.
Neoceratodus denticulatus : Turner, 1982b, p. 606.

Loc.: Redbank Plains, Qld.
Fm.: Redbank Plains Series. Age: U. Eocene/Oligocene?

Neoceratodus forsteri Krefft, 1870

QM F10237-9 — casts

Neoceratodus forsteri : Kemp & Molnar, 1981.
QM F10237 : pp.211, 213, 215, pl. 1, figs 17, 20.
QM F10238 : pp. 211, 213, pl. 1, figs 19, 21.
QM F10239 : pp. 211, 213, pl. 1, fig. 13.

Loc.: Lars Forsberg mine, 3-mile field, Lightning Ridge, N.S.W.
Fm.: Griman Creek Fm. Age: L. Cretaceous.
Remarks: The original material is held in a private collection.

Neoceratodus eyrensis (White, 1925)

QM F10312

Neoceratodus eyrensis : Kemp & Molnar, 1981, p. 213, pl. 1, figs 9–10.

Loc.: Frome Downs Stn., Lake Pinpa, S.A.
Fm.: Etadunna Fm. Age: L. Cretaceous.

Neoceratodus gregoryi (White, 1925)

QM F11024

Neoceratodus gregoryi : Kemp & Molnar, 1981, p. 212, pl. 1, fig. 8.

QM F12866

Neoceratodus gregoryi : Kemp & Molnar, 1981, p. 212, pl. 1, fig. 4.

Loc.: Frome Downs Stn, Lake Pinpa, S.A.
Fm.: Etadunna Fm. Age: Miocene.

AMPHIBIA

O. TEMNOSPONDYLI

F. BRACHYOPIDAE

Xenobrachyops allos Howie, 1971

QM F6572 HOLOTYPE

Brachyops allos Howie, 1971, pp. 268–77, figs 1–3, pls 14–15; Warren, 1972, p. 281, fig. (second); 1981, pp. 278–80, 283–4, 286, figs 8–9; 1981a, pp. 285–9, fig. 1, pl. 1; 1982, p. 150, fig. 1; 1984, p. 300, fig. 2; Molnar, 1982, p. 614.
Xenobrachops allos : Warren & Hutchinson, 1983, pp. 25, 57, 59.

QM F10118

Brachyops allos : Warren, 1981, figs 8B–D, 9B–D; 1981a, pp. 285–7; 1982, p. 150.
Xenobrachops allos : Warren & Hutchinson, 1983, p. 59.

QM F10119

Brachyops allos : Warren, 1981, table 1; 1981a, pp. 285–9, fig. 1, pl. 1; 1982, p. 150.
Xenobrachops allos : Warren & Hutchinson, 1983, p. 59.

Loc.: Duckworth Ck, nr Bluff, Qld.
Fm.: Arcadia Fm., Rewan Gp. Age: L. Triassic.

Austropelor wadleyi Longman, 1941

QM F2628 HOLOTYPE

Austropelor wadleyi Longman, 1941, pp. 29–32, pl. 5; de Jersey, 1960, in Cameron et al. p. 291; Hill, Playford and Woods, 1966, pl. J15(3); Colbert, 1967, pp. 35–42, pl. 6; Warren, 1977, p. 437; Molnar, 1980a, p. 131; 1982, p. 616–7; Warren & Hutchinson, 1983, pp. 49–5, fig. 32.
Australopelor : von Huene, 1956, p. 97.
Austrapelor : Konzhukova, 1964, p. 63; Tatarinov, 1964. p. 57.
Austropelor : Laseron & Brunnschweiler, 1969, p. 177; Molnar, 1980c, p. 50; 1984, p. 333; Warren, 1982, p. 158.

Loc.: Brisbane R. about 1 ml SW of Lowood Railway Stn, Qld.
Fm.: Marburg Ss. Age: Jurassic.

F. CHIGUTISAURIDAE

Keratobrachyops australis Warren, 1981

QM F10115 HOLOTYPE

Keratobrachyops australis Warren, 1981, pp. 272–88, figs 1, 2, 5a, 6a, 7, 10, 11; 1984, p. 300; Molnar, 1982, p. 614; Warren & Hutchinson, 1983, pp. 19, 25, 40–41.

QM F10116

Keratobrachyops australis Warren, 1981, pp. 273–88, figs 3, 4, 5b, 6b; 1982, p. 156, fig. 5.

QM F10117

Keratobrachyops australis Warren, 1981, pp. 273–88, figs 8a, 9a; 1982, p. 156, fig. 5.

Loc.: Duckworth Ck, nr Bluff, Qld.
Fm.: Arcadia Fm., Rewan Gp. Age: L. Triassic.

Siderops kehli Warren & Hutchinson, 1983

QM F7882 HOLOTYPE

Kolane amphibian : Warren, 1977, pp. 436–7, fig. 1; 1982, p. 156, fig. 6.
labyrinthodont : Milner, 1977, p. 402.
brachyopid labyrinthodont : Molnar, 1980a, p. 131.
Kolane labryinthodont : Molnar, 1980c, p. 50; 1982, p. 617; 1984, p. 333.
labyrinthodont : Thulborn & Warren, 1980, p. 224.
Siderops kehli Warren & Hutchinson, 1983, p. 2–60, pl. 1, 2, figs 1–23, 28–31, 33–34.

Loc.: Kolane Stn, nr Wandoan, Qld.
Fm.: Evergreen Fm. Age: Jurassic, U. Liassie.
Remarks: Warren & Hutchinson (1983) p. 3 give the following number QM F7822 when refering to *Siderops kehli* . This is thought to be a typing error as the correct number is QM F7882.

F. CAPITOSAURIDAE

Parotosuchus gunganj Warren, 1980

QM F10114 HOLOTYPE

Parotosuchus gunganj Warren 1980, pp. 29–32, figs 3–7; 1984, p. 300; Molnar, 1982. p. 614.

Loc.: The Crater, Rewan Stn, Qld.
Fm.: Arcadia Fm., Rewan Gp. Age: L. Triassic.

Parotosuchus rewanensis Warren, 1980

QM F6571 HOLOTYPE

Parotosuchus rewanensis Warren, 1980, pp. 26–9, figs 1–2, 5; 1984, p. 300; Molnar, 1982, p. 614.

Loc.: The Crater, Rewan Stn, Qld.
Fm.: Arcadia Fm., Rewan Gp. Age: L. Triassic.

F. INDOBRACHYOPIDAE

Rewana quadricuneata Howie, 1972

QM F6471 HOLOTYPE

Rewana quadricuneata Howie, 1972, pp. 50–64, figs 1–6, pl. 1.; Warren, 1972, p. 281; 1982, p. 150; 1984, p. 300; Cosgriff & Zawiskie, 1979, pp. 20–1, fig. 11c; Molnar, 1980c, p. 48, fig. 3; 1982, p. 614.

Loc.: The Crater, Rewan Stn, Qld.
Fm.: Acadia Fm., Rewan Gp. Age: L. Triassic.

F. PLAGIOSAUROIDAE

Plagiobatrachus australis Warren, 1985

QM F12267–70

Plagiobatrachus australis Warren, 1985.
QM F12267 : HOLOTYPE, pp. 236–241, figs 1(1), 2(1).
QM F12268 : pp. 236–241, figs 1(2), 2(2).
QM F12269 : pp. 236–241, figs 3(2), 4(2).
QM F12270 : pp. 236–241, figs 3(1), 4(1).

Loc.: The Crater, Rewan Stn, Qld.
Fm.: Arcadia Fm., Rewan Gp. Age: L. Traissic.

F. RHYTIDOSTEIDAE

QM F10121 Holotype

Arcadia myriadens Warren & Black, 1986, pp. 303, 314–24, figs 1–9, 10B, 11.

Loc: Duckworth Ck, nr Bluff, Qld.
Fm.: Arcadia Fm., Rewan Gp. Age. L. Triassic.

F. TEMATOSAURIDAE

Incertae sedis

QM F12271

long snouted temnospondyl, *incertae sedis* : Warren, 1985a, pp. 293–5, figs 2, 3.

Loc.: The Crater, Rewan Stn, Qld.
Fm.: Arcadia Fm., Rewan Gp. Age: L. Triassic.

QM F12272

long snouted temnospondyl, *incertae sedis* : Warren, 1985a, pp. 293–5, fig. 1.

Loc.: Moolayember Dip, Canarvon Range, halfway between Injune and Rollestone, Qld.
Fm.: Glenidal Fm., Clematis Gp. Age: L. Triassic – M. Triassic.

Indeterminate & unidentified labyrinthodont and thecodont material.

QM F1342

Crocodilia : Jensen, 1926, p. 144.
unident. labyrinthodont and thecodont material : Molnar, 1982, p. 614.

QM F6734

labyrinthodont : Bartholomai & Howie, 1970, p. 1063, fig. 1.

Loc.: The Crater, Rewan Stn, Qld.
Fm.: Arcadia Fm., Rewan Gp. Age: L. Triassic.

QM F10122

Indet. labyrinthodont : Warren & Hutchinson, 1983, p. 41–3, fig. 25.

QM F10123

Indet. labyrinthodont : Warren & Hutchinson, 1983, p. 42–3, fig. 26.

Loc.: Kolane Stn, nr Wandoan, Qld.
Fm.: Evergreen Fm. Age: Jurassic, U. Liassic.
Remarks: Molnar (1982, p. 614) states 'This material (QM F1342) is referable to labyrinthodont amphibians (not further identifiable) and a thecodont (probably *Kalisuchus*).'

O. ANURA

F. Hylidae

Australobatrachus ilius Tyler, 1976

QM F9150

Australobatrachus ilius : Tyler, 1982, p. 102.

QM F9151

Australobatrachus ilius : Tyler, 1982, p. 102, fig. 1a.

Loc.: L. Palankarinna, Etadunna Stn, S.A.
Fm.: Etadunna Fm. Age: Tertiary.

F. Leptodactylidae

Limnodynastes archeri Tyler, 1982

QM F9148 Paratype

Limnodynastes archeri : Tyler, 1982, pp. 101–3.

QM F9149 Paratype

Limnodynastes archeri : Tyler, 1982, pp. 101–3.

Loc.: L. Palankarinna, Etadunna Stn, S.A.
Fm.: Etadunna Fm. Age: Tertiary.

REPTILIA

O. COTYLOSAURIA

F. Procolophonidae

Procolophonid

QM F6735

? paliguanid reptiles : Bartholomai & Howie, 1970, p. 1063, fig. 2.
Procolophonid : Molnar, 1982, p. 614.

Loc.: The Crater, Rewan Stn, Qld.
Fm.: Arcadia Fm, Rewan Gp. Age: L. Triassic.

O. CHELONIA

F. Chelidae

Chelodina sp. (*Chelodina insculpta* De Vis, 1897)

QM F1107

Chelodina insculpta De Vis, 1897, pp. 5–6, fig. 5.
Chelodina : Gaffney, 1981, pp. 16–7.
Chelodina sp. ('*Chelodina insculpta*') : Molnar, 1982, p. 623.

QM F1109 Lectotype

Chelodina insculpta De Vis, 1897, pp. 5–6, fig. 6.
Chelodina : Gaffney, 1981, pp. 16–7, fig. 13B. (Lectotype proposed)
Chelodina sp. ('*Chelodina insculpta*): Molnar, 1982, p. 623.

Loc.: Darling Downs?, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pliocene or Pleistocene.

Chelodina sp.

QM F1510

Chelodina insculpta : Longman, 1924, p. 26 (Questionable reference).
Chelodina sp. : Gaffney, 1981, pp. 12–14, fig. 8; Molnar, 1982, p. 623.

Loc.: Head of Tara Ck, tributary of Clarke R., nr Maryvale Ck.
Fm.: Unnamed fluviatile deposit. Age: Pliocene (?)

Emydura sp.

QM F7034

Emydura sp. : Gaffney, 1981, p. 11, fig. 6; Molnar, 1982, p. 623.

QM F7035

Emydura sp. : Gaffney, 1981, p. 11; Molnar, 1982, p. 623.

QM F9038

Emydura sp. : Gaffney, 1981, p. 12, fig. 7B; Molnar, 1982, p. 623.

QM F9039

Emydura sp. : Gaffney, 1981, p. 12, fig. 7A; Molnar, 1982, p. 623.

Loc.: Chinchilla Rifle Range, Qld.
Fm.: Chinchilla Sand. Age: Pliocene.
Remarks: The author was unable to locate QM F9038 and QM F9039.

Chelid (*Chelymys arata* De Vis, 1897)

QM F1099

Chelymys arata De Vis, 1897, p. 5, pl. 4, figs B, C, D, E; 1907, p. 6.
Chelidae : Gaffney, 1981, pp. 15–6, fig. 12A, B, E & F.
Chelid (= '*Chelymys arata*'): Molnar, 1982, p. 623.

Loc.: Darling Downs, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pliocene or Pleistocene.

QM F1100 Lectotype

Chelymys arata De Vis, 1897, p. 5, pl. 4, figs A & F; 1907, p. 6.
Chelidae : Gaffney, 1981, pp. 15–6, fig. 12C–D. (Lectotype proposed)

Loc.: Warburton R. Qld.

Fm.: Unnamed fluviatile deposit. Age: Pliocene or Pleistocene.
Remark: The caption to Fig. 12, Gaffney (1981) is incorrect. The specimen labelled E is QM F1099, not QM F1100. No caption is given for Fig. 12F, which is in fact QM F1100. The number 16 quoted by Gaffney (e.g. QM F16 1100) refers to the year of registeration.

Chelid (*Chelymys uberrima* De Vis, 1897)

QM F1104

Chelymys uberrima De Vis, 1897, pp. 3–4, pl. 1.
Chelidae : Gaffney, 1981, pp. 14–5, fig. 9.
Chelid (= '*Chelymys uberrima*') : Molnar, 1982, p. 623.

QM F1105

Chelymys uberrima De Vis, 1897, pp. 3–4, pl. 2.
Chelidae : Gaffney, 1981, pp. 14–5, fig. 13A.
Chelid (= '*Chelymys uberrima*'): Molnar, 1982, p. 623.

Loc.: Darling Downs, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pliocene or Pleistocene.

QM F2119

Emydura uberrima : Longman, 1929, p. 248.
Chelid (= '*Chelymys uberrima*') : Molnar, 1982, p. 623.

Loc.: Brigalow, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pliocene or Pleistocene.

QM F9040 LECTOTYPE

Chelymys uberrima De Vis, 1897, pp. 3–4, pl. 1.
Chelidae : Gaffney, 1981, pp. 14–5, figs 9–10. (Lectotype proposed).
Chelid (= '*Chelymys uberrima*') : Molnar, 1982, p. 623.

Loc.: Darling Downs, Qld.
Fm.: Unnamed fluviatile deposits. Age: Pliocene or Pleistocene.
Remarks: Gaffney (1981) p. 15 designates QM F9040 as the lectotype for *Chelymys uberrima*. However on p. 17 in the caption for figure 13 he names QM F1105 as the lectotype. Gaffney (pers. comm. 1984) intends the specimen mentioned in the text, QM F9040, to be the lectotype, the caption for figure 13 showing QM F1105 as the lectotype is an error.

Chelid

QM F1108

Chelidae : Gaffney, 1981, p. 31; Molnar, 1982, p. 623.

Loc.: Warburton R, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pliocene or Pleistocene.
Remarks: Gaffney (1981, p. 21) gives QM F10569 as a specimen of Chelidae. This number is incorrect; the museum does not have a turtle specimen bearing this number.

F. CHELONIIDAE

Notochelone costata (Owen 1882)

QM F2174

Notochelone costata : Longman, 1935, p. 239; Gaffney, 1981, p. 7; Molnar, 1982, p. 619.

Loc.: Wyangarie Stn, nr Hughenden, Qld.
Fm.: Toolebuc Fm (?) Age: L. Cretaceous, Albian.

QM F2249

Notochelone costata : Gaffney, 1981, pp. 6–7, fig. 3; Molnar, 1982, p. 619.

Loc.: Parish of Hilton, nr Julia Ck, Qld.
Fm.: Toolebuc Fm. Age: L. Cretaceous.

QM F5793

Notochelone costata : Gaffney, 1981, p. 7; Molnar, 1982, p. 619.

Loc.: Boree Park Stn, nr Richmond, Qld.
Fm.: Toolebuc Fm. Age: L. Cretaceous.

QM F6587

Notochelone costata : De Vis, 1911, pl. 4; Zangerl, 1960, p. 309; Gaffney, 1976, p. 326; 1981, p. 7; Molnar, 1982, p. 619.

QM F12816

Notochelone costata : De Vis, 1911, pl. 3.

Loc.: O'Connell Ck, Wyangarie Stn, nr Hughenden, Qld.
Fm.: Toolebuc Fm (?). Age: L. Cretaceous.
Remarks: QM F12816 is a previously unregistered specimen which was found to match pl. 3, De Vis, 1911 and consequently was registered. Gaffney (1981) gives the following numbers QM F1555, QM F5469, QM F12994, QM F24132 when referring to *N. costata*. These numbers are incorrect. The Queensland Museum does not hold any specimens of *N. costata* bearing these numbers.

cf. *Notochelone*

QM F10619

cf. *Notochelone* : Gaffney, 1981, p. 8; Molnar, 1982, p. 619.

Loc.: Warra Stn, nr Boulia, Qld.
Fm.: Toolebuc Fm. Age: L. Cretaceous, Albian.

F. MEIOLANIIDAE

Meiolania oweni Woodward, 1888

QM F2553

Meiolaniidae : Gaffney, 1981, p. 19; Molnar, 1982, p. 623.

Loc.: Sandhurst Ck, nr Fernless Rlwy Stn, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pliocene or Pleistocene.

QM F9034

Meiolaniidae : Gaffney, 1981, p. 19; Molnar, 1982, p. 623.

Loc.: Armour Stn, Condamine R., nr Macalister, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pleistocene.

F. TRIONYCHIDAE

Trionychid (*Trionyx australiensis* De Vis, 1894)

QM F1101 HOLOTYPE

Trionyx australiensis De Vis, 1894, pp. 125–7, pl. 1; Hill, Playford & Woods, 1970, pl. CZ7(8).
Trionychidae : Gaffney & Bartholomai, 1979, pp. 1354–9, pl. 1; Gaffney, 1981, pp. 18–9.
Trionychid (= '*Trionyx australiensis*') : Molnar, 1982, p. 624.

Loc.: Darling Downs, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pliocene or Pleistocene.

Trionychids

QM F2324

Trionychidae : Gaffney & Bartholomai, 1979, p. 1356, pl. 2, figs 1–2; Molnar, 1982, p. 624.

QM F2326

Trionychidae : Gaffney & Bartholomai, 1979, p. 1356; Molnar, 1982, p. 624.

QM F2566

Trionychidae : Gaffney & Bartholomai, 1979, p. 1356; Molnar, 1982, p. 624.

QM F9035

Trionychidae : Gaffney & Bartholomai, 1979, p. 1356, pl. 2, figs 3 & 4; Molnar, 1982, p. 624.

Loc.: Boat Mt., nr Murgon, Qld.
Fm.: Oakdale Ss. (?) Age: Tertiary.

QM F9036

Trionychidae : Gaffney & Bartholomai, 1979, p. 1359; Gaffney, 1981, p. 20; Molnar, 1982, p. 624.

Loc.: Leichhardt R., Floraville crossing (?), Qld.
Fm.: Unknown. Age: Pliocene or Pleistocene.

QM F9037

Trionychidae : Gaffney & Bartholomai, 1979, p. 1359, pl. 2, fig. 5; Gaffney, 1981, p. 11; Molnar, 1982, p. 624.

Loc.: Fairy Meadow, Chinchilla, Qld.
Fm.: Chinchilla Sand. Age: Pliocene.

F. TESTUDINIDAE

Testudines Indeterminate

QM F7796

Chelodina : Archer & Wade, 1976, p. 384.
Testudines Indet : Gaffney, 1981, p. 11; Molnar, 1982, p. 624.

Loc.: Bluff Downs Stn, nr Charters Towers, Qld.
Fm.: Allingham Fm. Age: Pliocene.

QM F9041

Testudines Indet : Gaffney, 1981, pp. 9–11; Molnar, 1982, p. 624.

Loc.: Epimoff's property, Runcorn, nr Brisbane, Qld.
Fm.: Corinda Fm. Age: Tertiary.

F. UNCERTAIN

Chelymys antiqua De Vis, 1897

QM F1106A–D HOLOTYPE

Chelymys antiqua De Vis, 1897, pp. 4–5, pl. 3.
Testudines indet : Gaffney, 1981, p. 15, fig. 11.
'*Chelymys antiqua*' : Molnar, 1982, p. 624.

Loc.: Darling Downs, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pliocene or Pleistocene.

Pelocomastes ampla De Vis, 1897

QM F1102 LECTOTYPE

Pelocomastes ampla De Vis, 1897, pp. 6–7, pl. 7; 1907, p. 6.
Testudines Indet : Gaffney, 1981, pp. 17–8, fig. 14. (Lectotype proposed).
'*Pelocomastes ampla*' : Molnar, 1982, p. 624.

QM F1103

Pelocomastes ampla De Vis, 1897, pp. 6–7, pl. 8; 1907, p. 6.
Testudines Indet : Gaffney, 1981, pp. 17–8.
'*Pelecomastes ampla*' : Molnar, 1982, p. 624.

Loc.: Darling Downs, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pliocene or Pleistocene.

Cratochelone berneyi Longman, 1915

QM F550 HOLOTYPE

Cratochelone berneyi Longman, 1915, pp. 24–9, figs 1–2, pls 12–3; Zangerl, 1960, p. 309; Gaffney, 1981, pp. 4–5; Molnar, 1982, p. 618.
Cratochelone : Bergounioux, 1955, p. 515.

Loc.: Sylvania Stn, nr Hughenden, Qld.
Fm.: Toolebuc Fm? Age: L. Cretaceous, Albian

Unidentified chelonian material

QM F12413

turtle shell : Molnar, 1984a, p. 334.

Loc.: Ayrshire Downs, nr Winton, Qld.
Fm.: Winton Fm. (?) Age: L. Cretaceous, Albian

O. SQUAMATA

F. AGAMIDAE

? *Amphibolurus* sp.

QM F8342

? *Amphibolurus* sp. : Archer, 1978, p. 69; Molnar, 1982, p. 624.

Loc.: Russenden Cave, Texas Caves, Qld.
Fm.: Unnamed cave breccia. Age: Pleistocene.

Unidentified Agamid

QM F7812

Agamidae : Archer & Wade, 1976, p. 384, pl. 54i.
? Agamid : Molnar, 1982, p. 626.

Loc.: Bluff Downs Stn, nr Charters Towers, Qld.
Fm.: Allingham Fm. Age: Pliocene.

F. BOIDAE

? *Morelia* sp.

QM F7775

? *Morelia* sp. : Archer & Wade, 1976, pp. 383, 385, fig. 54K; Molnar, 1982, p. 626.

Loc.: Bluff Downs Stn, nr Charters Towers, Qld.
Fm.: Allingham Fm. Age: Pliocene.
Remarks: The author was unable to locate this specimen.

F. ELAPIDAE

Unidentified Elapid

QM F7826

Elapidae : Archer & Wade, 1976, p. 385, fig. 54g.
? Elapid : Molnar, 1982, p. 626.

Loc.: Bluff Downs Stn, nr Charters Towers, Qld.
Fm.: Allingham Fm. Age: Pliocene.
Remarks: The author was unable to locate this specimen.

F. PALIGUANIDAE

Kudnu mackinlayi Bartholomai, 1979

QM F9181 HOLOTYPE

Kudnu mackinlayi Bartholomai, 1979, pp. 231–3, figs 5–6; Molnar, 1980c, p. 48, fig. 4; 1982, p. 615; 1982b, p. 176, fig. 10; 1984, p. 332; Warren, 1984, p. 300.

QM F9182

Kudnu mackinlayi : Bartholomai, 1979, p. 231.

Loc.: The Crater, Rewan Stn, Qld.
Fm.: Arcadia Fm., Rewan Gp. Age: L. Triassic.

F. PROLACERTIDAE

Kadimakara australiensis Bartholomai, 1979

QM F6710 HOLOTYPE

Kadimakara australiensis Bartholomai, 1979, pp. 226–31, figs 1, 3, 4; Molnar, 1980c, p. 48, fig. 5; 1982, p. 615; 1982b, p. 176, fig. 11; 1984, p. 332.

QM F6676

Kadimakara australiensis : Bartholomai, 1979, p. 226, fig. 2.

Loc.: The Crater, Rewan Stn, Qld.
Fm.: Arcadia Fm., Rewan Gp. Age: L. Triassic.

F. SCINCIDAE

Tiliqua sp.

QM F10178

Tiliqua sp. : Molnar, 1978b, p. 157; 1982, p. 625.

Loc.: Tea Tree Cave, Chillagoe, Qld.
Fm.: Unnamed cave breccia. Age: Pleistocene.

F. VARANDIAE

Megalania prisca Owen, 1858

QM F865

Notiosaurus dentatus : De Vis, 1885, pp. 25–32. pl. 1, fig. 1, pl. 2, fig. 1; Howchin, 1930, p. 658.
Megalania prisca : Fejervary, 1918, pp. 445–6; 1935, p. 4; Hecht, 1975, p. 242; Molnar, 1982, p. 625.

QM F866

Notiosaurus dentatus : De Vis, 1885, pp. 25–32, pl. 3, fig. 1; Howchin, 1930, p. 658.
Megalania prisca : Fejervary, 1918, pp. 445–6; 1935, p. 4; Molnar, 1982, p. 625.

Loc.: Unknown.
Fm.: Unknown. Age: Pleistocene (?)

QM F867

Megalania prisca : Owen, 1860, pp. 43–8; Hecht, 1975, p. 243; Molnar, 1982. p. 625.
Megalania : De Vis, 1889, pp. 94–6, pl. 4.

Loc.: Pilton, Darling Downs, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pleistocene.

QM F870

Megalania prisca : Hecht, 1975, p. 241; Molnar, 1982, p. 625.

QM F871

Megalania prisca : Hecht, 1975, p. 242; Molnar, 1982, p. 625.

QM F872

Notiosaurus dentatus : De Vis, 1885, pl. 3, fig. 2; Howchin, 1930, p. 658.

Megalania prisca : Fejervary, 1918, pp. 445-6; 1935, p. 4; Molnar, 1982, p. 625.

Loc.: Darling Downs?, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pliocene or Pleistocene.

QM F873 HOLOTYPE

Varanus dirus De Vis, 1889, p. 98, pl. 4; Howchin, 1930, p. 658.
Megalania prisca : Fejervary, 1918, pp. 359-61, 412-3, fig. 15; Hecht, 1975, p. 245; Molnar, 1982, p. 625.

Loc.: King Ck, Darling Downs, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pleistocene.

QM F874

Varanus dirus : De Vis, 1900, p. 6, pl. 3; Fejervary, 1918, pp. 412-6, fig. 16; Hill, Playford & Woods, 1970, pl. CZ7(10).
Megalania prisca : Hecht, 1975, p. 245; Molnar, 1982, p. 625.

Loc.: Chinchilla, Darling Downs, Qld
Fm.: Unnamed fluviatile deposit. Age: Pliocene.

QM F877

Megalania prisca : Hecht, 1975, p. 243; Molnar, 1982, p. 625.

QM F886

Megalania prisca : Hecht, 1975, p. 243; Molnar, 1982, p. 625.

QM F2477

Megalania prisca : Hecht, 1975, p. 244-5; Molnar, 1982, p. 625.

QM F6562

Megalania prisca : Hill, Playford & Woods, 1970, pl. CZ7(9); Hecht, 1975, p. 246, pl. 17, fig. 3; Molnar, 1982, p. 625.

Loc.: Darling Downs, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pliocene or Pleistocene.
Remarks: Hecht (1975) mentions QM F2947 (p. 243, 246); this number is incorrect; the Queensland Museum does not hold a specimen of *M. prisca* bearing this number. Hecht also refers to QM F870, QM F877 and QM F886 as QM F14/870, QM F14/877 and QM F14/886 respectively. The 14 refers to the year 1914 in which these specimens were registered.

Megalania sp.

QM C20

the Pliocene species : Hecht, 1975, p. 246.
Megalania sp. : Molnar, 1982, p. 625.

Loc.: Chinchilla, Qld.
Fm.: Chinchilla Sand. Age: Pliocene.

QM C106

the Pliocene species : Hecht, 1975, p. 246.
Megalania sp. : Molnar, 1982, p. 625.

Loc.: Chinchilla, Qld.
Fm.: Chinchilla Sand. Age: Pliocene.
Remarks: These numbers refer to bulk registrations. As Hecht did not figure the specimens he referred to it is difficult to determine the exact specimens in question.

Varanus emeritus De Vis, 1889

QM F875 HOLOTYPE

Varanus emeritus De Vis, 1889, pp. 98-9, pl. 4; Jack & Etheridge, 1892, p. 651; Fejervary, 1918, pp. 416-8; Howchin, 1928, p. 658; Molnar, 1982, p. 625.

Loc.: King Ck., Darling Downs, Qld
Fm.: Unnamed fluviatile deposit. Age: Pleistocene.

Varanus sp.

QM F7774

Varanus sp. : Archer & Wade, 1976, pp. 384-5, fig. 54j; Tyler, 1979, p. 85; Molnar, 1982, p. 626.

QM F7777

Varanus sp. : Archer & Wade, 1976, pp. 384-5; Tyler, 1979, p. 85; Molnar, 1982, p. 626.

QM F7813

Varanus sp. : Archer & Wade, 1976, pp. 384-5, fig. 54h; Tyler, 1979, p. 85; Molnar, 1982, p. 626.

Loc.: Bluff Downs Stn, nr Charters Towers, Qld.
Fm.: Allingham Fm. Age: Pliocene.
Remarks: The author was unable to locate these specimens.

Unidentified or indeterminate squamatan material

QM F1733

ophidian : Longman, 1925, pp. 111-2.
extinct python : Chapman, 1934, p. 55.
snake : David, 1950, p. 644.
unident. or indet. squamatan : Molnar, 1982, p. 626.

Loc.: Marmor, Qld.
Fm.: Unnamed cave breccia. Age: Tertiary.

QM F8363

snake indet : Archer, 1978, p. 70.
unident. or indet. squamatan : Molnar, 1982, p. 626.

Loc.: Russenden Cave, Texas Caves, Qld.
Fm.: Unnamed cave breccia. Age: Pleistocene.
Remarks: The author was unable to locate F1733.

O. SAUROPTERYGIA

F. Elasmosauridae

Woolungasaurus glendowerensis Persson, 1960

QM F3567 Holotype

Woolungasaurus glendowerensis Persson, 1960, pp. 11–6, pls 1–3; Welles, 1962, pp. 47–8; Hill, Playford & Wood, 1968, pl. K12(6–7); Molnar, 1982, p. 619.

Woolungasaurus : Persson, 1963, p. 22.

QM F3568

Woolungasaurus glendowerensis : Persson, 1960, p. 12.

Loc.: Glendower Stn, nr Prairie, Qld.

Fm.: Wallumbilla Fm., probably Doncaster Mem. Age: L. Cretaceous, Aptian.

Woolungasaurus cf. *W. glendowerensis* Persson, 1960

QM F11050, QM F 12216–19

Woolungasaurus cf. *W. glendowerensis* : Persson, 1982.

QM F11050 : pp. 647–55, pl. 1.

QM F12216–19 : pp. 647–55.

Loc.: Yamborra Ck, nr Nelia, Qld.

Fm.: Toolebuc Fm. (?) Age: L. Cretaceous, Albian.

Remarks: The specimens listed above were not collected by the Queensland Museum but were obtained from other institutions. The following is a list of their previous registeration numbers. QM F11050: anterior portion of skull, previously AM F60056, posterior portion of skull, previously GSQF10552; QM F12216 previously GSQ F10550b; QM F12217 previously GSQ F10551; QM F12218 previously GSQ F10550a. The author was unable to locate QM F12217.

Woolungasaurus sp.

QM F2634

Woolungasaurus sp. : Persson, 1960, pp. 16–17; 1963, p. 39; Molnar, 1982, p. 620.

Loc.: Rainscourt Stn., nr Richmond, Qld.

Fm.: Not recorded. Age: L. Cretaceous, Albian.

Unidentified or indeterminate plesiosaur material

QM F983

Plesiosaurus : Etheridge, 1889b, pp. 410–13, pl. 8; Molnar, 1982, p. 620.

Loc.: Walsh R., Qld.

Fm.: Toolebuc Fm? Age: L. Cretaceous.

QM F2085

Plesiosaur : Longman, 1935, p. 238; Persson, 1963, p. 39; Molnar, 1982, p. 620.

Loc.: Flinders R., Richmond, Qld.

Fm.: Toolebuc Fm? Age: L. Cretaceous.

QM F2100

Plesiosaur : Longman, 1935, pp. 238–9; Molnar, 1982, p. 620.

Loc.: Caithness Stn, nr Dartmouth, Qld.

Fm.: Unknown. Age: L. Cretaceous.

F2176

Plesiosaur : Longman, 1935, pp. 238–9; Molnar, 1982, p. 620.

Loc: Mt Abundance, nr Muckadilla, Qld.

Fm.: Wallumbilla Fm. Age: L. Cretaceous, Albian

QM F2178

Plesiosaur : Longman, 1935, p. 238.

Loc.: Ashgrove Stn, nr Barcaldine. Qld.

Fm.: Allaru Mdst. Age: L. Cretaceous, Albian.

QM F2329

Plesiosaur : Longman, 1935, pp. 238–9; Molnar, 1982, p. 620.

Loc.: Baneda Stn, nr Augathella, Qld.

Fm.: Wallumbilla Fm. Age: L. Cretaceous, Albian.

QM F2386

Plesiosaur : Persson, 1963, p. 39; Molnar, 1982, p. 620.

Loc.: Amby Stn, nr Roma, Qld.

Fm.: Wallumbilla Fm. Age: L. Cretaceous.

QM F2448

Plesiosaur : Longman, 1935, pp. 238–9; Molnar, 1982, p. 620.

Loc.: Telemon Stn, nr Muckadilla, Qld.

Fm.: Unknown. Age: L. Cretaceous.

QM F3307

Plesiosaur : Persson, 1963, p. 39; Molnar, 1982, p. 620.

Loc.: Wetherby Stn, nr Richmond, Qld.

Fm.: Mackunda Fm. Age: L. Cretaceous.

QM F10440

Plesiosaur : Thulborn & Warren, 1980, pp. 224–5, fig 1a; Molnar, 1982, p. 617; Warren & Hutchinson, 1983, p. 3.

QM F10441

Plesiosaur : Thulborn & Warren, 1980, pp. 224–5, fig. 1b; Molnar, 1982, p. 617; Warren & Hutchinson, 1983, p. 3.

Loc.: Kolane Stn, nr Wandoan, Qld

Fm.: Evergreen Fm. Age: Jurassic, U. Liassic.

Remarks: Molnar (1982) gave an incorrect number (QM F2086) for QM F2085. He also quotes QM F2299 in error as a plesiosaur mentioned by Longman (1935). This specimen is an ichthyosaur: the plesiosaur mentioned by Longman (1935) is QM F2178. QM F2176 was originally numbered QM F2242.

F. Pliosauridae

Kronosaurus queenslandicus Longman, 1924

QM F1609 Holotype

Kronosaurus queenslandicus Longman, 1924, pp. 24–8, pl. 4; 1930, pp. 1–7, text figs 1–4; 1932a, p. 98; 1935, p. 237; Molnar, 1982, p. 619.

Loc.: Hughenden, Qld.
Fm.: Unknown. Age: L. Cretaceous.

QM F2137

Kronosaurus queenslandicus : Longman, 1930, pl. 1; 1935, p. 237; Molnar, 1982, p. 619.

Loc.: 3.2 kms S. of Hughenden, Qld.
Fm.: Wallumbilla Fm. Age: L. Cretaceous.

QM F2446

Kronosaurus queenslandicus : Longman, 1935, p. 237; Molnar, 1982, p. 619; 1982b, p. 186, fig. 9.

Loc.: Telemon Stn, nr Muckadilla, Qld.
Fm.: Toolebuc Fm? Age: L. Cretaceous.

F. Rhomaleosauridae

? *Leptocleidus* sp.

QM F3983–4036

Leptocleidus : Bartholomai, 1966b, p. 437; Molnar, 1980c, p. 54.
Plesiosaurian : Playford & Cornelius, 1967, pp. 84, 91.
? *Leptocleidus* : Molnar, 1982, p. 617; 1984, p. 333.

Loc.: Mt. Morgan, Qld.
Fm.: Razorback beds. Age: L. Jurassic.
Remarks: The redating of the Razorback beds from L. Cretaceous to L. Jurassic suggests that this specimen is certainly not *Leptocleidus*. See Molnar (1982) for further comment.

O. ICHTHYOPTERYGIA

F. Stenopterygiidae

Platypterygius australis (McCoy 1867)

QM F551

Ichthyosaurus australis : Longman, 1922, pp. 246–56, figs 1–2, pls 15–6; Howchin, 1928, p. 318, fig. 142.
Platypterygius australis : McGowan, 1972, p. 15; Wade, 1984, p. 99, 104, 105, 106, 109, fig. 1C.

Loc.: Galah Ck, nr Hughenden, Qld.
Fm.: Wallumbilla Fm? Age: L. Cretaceous.

QM F1448 Holotype

Ichthyosaurus marathonensis Etheridge, 1889a, pp. 405–9; Howchin, 1928, p. 318.
Platypterygius australis : Molnar, 1982, p. 621; Wade, 1984, p. 99.

Loc.: Marathon Stn, nr Marathon, Qld.
Fm.: Allaru Fm. Age: L. Cretaceous.

QM F1500

Ichthyosaurus australis : Longman, 1943, p. 104.

Loc.: Western Queensland.
Fm.: Unknown. Age: L. Cretaceous?

QM F2297

Platypterygius australis : McGowan, 1972, pp. 15–7, pl. 4E.

Loc.: Marathon Stn, nr Marathon, Qld.
Fm.: Allaru Fm. Age: L. Cretaceous.

QM F2299

Platypterygius australis : Wade, 1984, p. 104, fig. 3A–I.

Loc.: Brixton Stn, nr Barcaldine, Qld.
Fm. Allaru Fm. Age: L. Cretaceous, Albian.

QM F2451

Ichthyosaurus australis : Longman, 1943, p. 101.

QM F2453

Ichthyosaurus australis : Longman, 1935, p. 236; 1943, p. 101, pl. 10.
Platypterygius australis : McGowan, 1972, pp. 15–7, pls 4A–C; Wade, 1984, p. 103, 104, 105, 107, 109, figs 1A, B; 2B.

Loc.: Telemon Stn, nr. Muckadilla, Qld.
Fm.: Unknown. Age: L. Cretaceous.

QM F2573

Platypterygius australis : Wade, 1984, p. 108, fig. 6.

Loc.: Lydia Downs Stn, nr Nelia, Qld.
Fm.: Unknown. Age: L. Cretaceous.

QM F3348

Myopterygius australis : Hill, Playford & Woods, 1968, pl. K12(8).
Platypterygius australis : McGowan, 1972, pp. 15–7, pl. 4D; Wade, 1984, p. 103, fig. 2C.

QM F3389

Platypterygius australis : Wade, 1984, p. 109.

Loc.: Stewart Park Stn, nr Richmond, Qld.
Fm.: Toolebuc Fm. or Allaru Mdst. Age: L. Cretaceous.

QM F10686

Platypterygius australis : Wade, 1984, p. 104, 107, 108, 109, fig. 2A; 4C.

Loc.: Anabranch of the Flinders R., Boree Park Stn, nr Richmond, Qld.
Fm.: Toolebuc Fm. Age: L. Cretaceous, Albian.

QM F12313

Platypterygius australis : Wade, 1984, p. 106.

Loc.: Big hole, Flinders R., Boree Park Stn, nr Richmond, Qld.
Fm.: Toolebuc Fm. Age: L. Cretaceous, Albian.

QM F12314

Platypterygius australis : Wade, 1984, p. 103, 106, 108, 109.

Loc.: Kilterry Stn., nr Julia Ck, Qld.
Fm.: Unknown. Age: L. Cretaceous.

QM F12317

Platypterygius australis : Wade, 1984, p. 106, fig. 4A.

Loc.: Big hole, Flinders R., Boree Park Stn, nr Richmond, Qld.

Fm.: Toolebuc Fm. Age: L. Cretaceous.

O. THECODONTIA

F. PROTEROSUCHIDAE

Kalisuchus rewanensis Thulborn, 1979

QM F8998 HOLOTYPE

Kalisuchus rewanensis Thulborn, 1979, pp. 331–44, pl. 1, pl. 2, fig. A, B; 1980, p. 246; Molnar, 1980c, pp. 48–9; 1982, p. 615; 1982b, p. 195, fig. 14; 1984, p. 332; Warren, 1984, p. 300.

QM F9521–47

Kalisuchus rewanensis : Thulborn, 1979. F9521, p. 333, figs 1A–B; F9522, p. 333, fig. 1C; F9523, p. 336, figs 1D–E; F9524 p. 336, figs 1G–H; F9525, fig. 1F; F9526, pp. 333, 335, pl. 2, figs, C–D; F9527, pp. 333, 335, pl. 3, figs A–C; F9528, pp. 333, 334, 335, pl. 3, figs D–F; F9529, p. 335, pl. 3, fig. G; F9530, p. 335, pl. 3, fig. H; F9531, p. 333, pl. 3, fig. I; F9532, p. 335, pl. 3, fig. J; F9533, p. 335, pl. 3, figs K–M; F9534, p. 335, pl. 3, figs N–O; F9535, p. 336, pl. 3, fig. P; F9536, p. 336, pl. 3, fig. Q; F9537, p. 336, pl. 3, fig. R; F9538, p. 336, pl. 4, figs A–B; F9539, p. 336, pl. 4, figs C–F; F9540, p. 336, pl. 4, fig. G; F9541, p. 336, pl. 4, figs H–K; F9542, p. 336, pl. 5, figs A–B; F9543, p. 336, pl. 5, figs C–G; F9544, p. 336, pl. 5, figs H–I; F9545, p. 336, pl. 5, fig. J; F9546, p. 336, pl. 5, figs K–L, Thulborn, 1980, p. 195, fig. 5b; F9547, pl. 4, fig. L.

Loc.: The Crater, Rewan Stn, Qld.

Fm.: Arcadia Fm., Rewan Gp. Age: L. Triassic.

O. CROCODILOMORPHA

F. CROCODYLIDAE

Crocodylus porosus Schneider, 1801

QM F1150

Pallimnarchus pollens : De Vis, 1886, pp. 184–6, pl. 12(?).

Crocodylus porosus : Molnar, 1982, p. 626; 1982a, p. 658.

Loc.: Unknown.

Fm.: Unknown. Age: Unknown.

QM F1512

Crocodilus nathani Longman, 1924, pp. 23–5, pl. 3, fig. 1.

Crocodylus nathani : Molnar, 1982a, pp. 663–6, pl. 2E, F.

Crocodylus porosus : Molnar, 1982, p. 626.

QM F1513 HOLOTYPE

Crocodilus nathani Longman, 1924, pp. 23–5, pl. 3, fig. 2.

Crocodylus nathani : Molnar, 1982a, pp. 663–5, pl. A–B, fig. 7A & B.

Crocodylus porosus : Molnar, 1982, p. 626.

QM F1514

Crocodilus nathani Longman, 1924, pp. 23–5.

Crocodylus nathani : Molnar, 1982a, pp. 663–5, fig. 6.

Loc.: Head of Tara Ck, tributary of Clarke R., by Maryvale Ck, Qld.

Fm.: Unknown. Age: Pliocene.

QM F1752

Pallimnarchus pollens : Longman, 1925, pp. 103–8, pls 25–6.

Crocodylus porosus : Molnar, 1982, p. 626; 1982a, pp. 661–2, 665, fig. 5.

Loc.: Landsdowne Stn, nr Tambo, Qld.

Fm.: Unknown. Age: Pliocene.

QM F9229

Crocodylus porosus : Molnar, 1979, pp. 357–9, pls 1B, 2B, 3B; 1982, p. 626; 1982a, p. 665.

Loc.: Bluff Downs Stn, nr Charters Towers, Qld.

Fm.: Allingham Fm. Age: Pliocene.

QM F11609

Crocodilus nathani Longman, 1924, pp. 23–5.

Crocodylus nathani : Molnar, 1982a, pp. 663–5.

Crocodylus porosus : Molnar, 1982, p. 626.

Loc.: Tara Ck, tributary of Clarke R., by Maryvale Ck, Qld.

Fm.: Unknown. Age: Pliocene.

QM F11611

Crocodylus porosus : Molnar, 1982, p. 626; 1982a, p. 665.

Loc.: Armour Stn, nr Macalister, Qld.

Fm.: Allingham Fm. Age: Pliocene.

QM F11623

Crocodylus porosus : Molnar, 1982, p. 626; 1982a, p. 665.

Loc.: Bluff Downs Stn, nr Charters Towers, Qld.

Fm.: Allingham Fm. Age: Pliocene.

QM F11626

Crocodylus porosus : Molnar, 1982, p. 626; 1982a, p. 665.

Loc.: Condamine R., nr Warra, Qld.

Fm.: Unnamed fluviatile deposit. Age: Pliocene.

Remarks: Molnar, 1982, synonymised *C. nathani* with *C. porosus*. QM F11609 originally was thought to be part of QM F1512. However, it is not demonstrably the same as QM F1512 and so has been renumbered QM F11609. The author was unable to locate QM F11623 and QM F11626.

'Crocodilus' selaslophensis

QM F9507

cast procelus crocodile : Molnar, 1980, p. 66, 67, fig. 1; 1980a, p. 133, fig. 2.

QM F10240

cast *'Crocodilus'* selaslophensis : Molnar, 1980, p. 67.

Loc.: Lightning Ridge, N.S.W.

Fm.: Griman Creek Fm. Age: L. Cretaceous, Albian.

Remarks: The original specimens are held in a private collection. Two incorrect registration numbers (QM F9057, QM F8507) are quoted in Molnar (1980) for specimens QM F9507.

'Gavialis' papuensis

QM F406 SYNTYPE

Gavialis papuensis De Vis, 1905, pp. 30–1, pl. 11, figs A, B, C.

'Gavialis' papuensis : Molnar, 1982, pp. 675–85, pl. 1.

QM F340 SYNTYPE

Gavialis papuensis De Vis, 1905, pp. 30–1, pl. 13, figs 3 & 4.

'Gavialis' papuensis : Molnar, 1982, pp. 675–85, pl. 2, figs A, B, C.

QM F341 SYNTYPE

Gavialis papuensis De Vis, 1905, pp. 30–1.

'Gavialis' papuensis : Molnar, 1982, pp. 675–85, pl. 2, figs D, E.

Loc.: Burai, Colemans Ck, Woodlark Is., P.N.G.

Fm.: Unknown. Age: Quaternary (?).

Pallimnarchus pollens De Vis, 1886

QM F1149 LECTOTYPE

Pallimnarchus pollens De Vis, 1886, pp. 181–3, pl. 10, fig. 1; Molnar, 1982, p. 626; 1982a, p. 658, fig. 8A, pl. 1, figs A–B. (Lectotype proposed).

Loc.: Unknown.

Fm.: Unknown. Age: Pliocene or Pleistocene.

QM F1151

Pallimnarchus pollens De Vis, 1886, pp. 186–7, pl. 13, fig. 1; Molnar, 1982, p. 626; 1982a, pp. 659–62, fig. 3.

Loc.: Eastern Downs?, Qld.

Fm.: Unnamed fluviatile deposit. Age: Pleistocene?

QM F1154

Pallimnarchus pollens : Molnar, 1982, p. 626; 1982a, p. 662.

Loc.: Chinchilla, Qld.

Fm.: Chinchilla Sand. Age: Pliocene.

QM F1155

Pallimnarchus pollens De Vis, 1886, pl. 11, fig. 1; Hill, Playford & Woods, 1970, pl. CZ7(5); Molnar, 1982, p. 626; 1982a, p. 659, pl. 11, fig. 1.

Loc.: Eastern Downs?, Qld.

Fm.: Unnamed fluviatile deposit. Age: Pleistocene?

QM F1160

Pallimnarchus pollens De Vis, 1886, pl. 11, fig. 2; Molnar, 1982, p. 626; 1982a, pp. 659–60, 662, pl. 2, fig. J.

Loc.: Eastern Downs?, Qld.

Fm.: Unnamed fluviatile deposit. Age: Pleistocene?

QM F1165

Pallimnarchus pollens : Molnar, 1982, p. 626; 1982a, p. 659.

Loc.: Chinchilla, Qld.

Fm.: Chinchilla Sand. Age: Pliocene.

QM F1166

Pallimnarchus pollens : Molnar, 1982, p. 626; 1982a, p. 659, pl. 1, figs G & H.

Loc.: Chinchilla, Qld.

Fm.: Chinchilla Sand. Age: L. Pliocene.

QM F1538

Pallimnarchus pollens : De Vis, 1907, pp. 6–7.

Pallimnarchus pollens : Molnar, 1982, p. 626; 1982a, p. 659. pl. 2, figs C & D.

Loc.: Floraville Crossing, Leichhardt R, Qld.

Fm.: Unnamed fluviatile deposit. Age: Pleistocene.

QM F2025

Pallimnarchus pollens : Longman, 1926, pp. 158–9, pl. 18, figs 1, 4; Molnar, 1982, p. 626; 1982a, pp. 659, 662, fig. 5.

Loc.: Armour Stn, nr Macalister, Qld.

Fm.: Unknown. Age: Pleistocene?

QM F3303

Pallimnarchus pollens De Vis, 1886, p. 187, pl. 14, fig. 2; Molnar, 1982, p. 626; 1982a, pp. 660–1, fig. 2.

QM F11610

Pallimnarchus pollens De Vis, 1886, pl. 10, fig. 2; Molnar, 1982, p. 626; 1982a, p. 658, pl. 2, fig. 1.

Loc.: Unknown.

Fm.: Unknown. Age: Pliocene or Pleistocene.

QM F11612

Pallimnarchus pollens : Molnar, 1982, p. 626; 1982a, p. 659, pl. 1C & D.

Loc.: Condamine R., Chinchilla, Qld.

Fm.: Chinchilla Sand. Age: Pliocene.

Remarks: QM F11610 was originally numbered QM F1149, however as it is not demonstrably the same as QM F1149 it was renumbered. The author was unable to locate QM F1149.

Quinkana sp.

QM F7898

Xiphodont crocodilian : Hecht & Archer, 1977, p. 383, fig. 1; Tyler, 1979, p. 98.
sebecosuchian : Archer, 1978, p. 70.
Quinkana sp. : Molnar, 1981, pp. 809–11, figs 6–9; 1982, p. 627.

Loc.: The Joint, Texas Caves, Qld.
Fm.: Unnamed cave breccia. Age: Pleistocene.
Remarks: Hecht & Archer (1977) quote the number incorrectly as QM F7988.

Unidentified or indeterminate ziphodont crocodilian material

QM F1152

Pallimnarchus pollens : De Vis 1886, pp. 187, 189–91, pls 14, fig. 1.
ziphodont ; Molnar, 1981, p. 813, figs 11–2; 1982, p. 627.

Loc.: Chinchilla, Qld.
Fm.: Unnamed fluviatile deposit. Age: Pliocene.

QM F9220

ziphodont : Molnar, 1981, pp. 811–3; 1982, p. 627.

QM F9226

ziphodont : Molnar, 1981, pp. 811–3; 1982, p. 627.

QM F9225

ziphodont : Molnar, 1981, pp. 811–3; 1982, p. 627.

QM F10141

ziphodont : Molnar, 1981, pp. 811–3, fig. 10; 1982, p. 617.

Loc.: Alehvale Stn, nr Croydon, Qld.
Fm.: Pond deposit. Age: Pleistocene (?)

QM F10204

ziphodont : Molnar, 1981, p. 813, fig. 13(1); 1982, p. 627.

QM F10205

ziphodont : Molnar, 1981, p. 813, fig. 13 (2 & 3); 1982, p. 627.

Loc.: Chinchilla rifle range, Qld.
Fm.: Chinchilla Sand. Age: Pliocene.

QM F10517

ziphodont : Molnar, 1981, p. 813, fig. 13(4); 1982, p. 627.

Loc.: Glen Garland Stn, Qld.
Fm.: Unnamed localized swamp deposit. Age: Pleistocene.
Remarks: The author was unable to locate QM F10141.

Unidentified of indeterminate crocodilian material

QM F1515

Crocodilus nathani ; Hill, Playford & Woods, 1970, pl. CZ7(7).
unident. or indet. crocodile : Molnar, 1982, p. 627.

Loc.: Head of Tara Ck, tributary of Clarke R., by Maryvale Ck, Qld.
Fm.: Unknown. Age: Pliocene.

QM F6563

Pallimnarchus pollens : Hill, Playford & Woods, 1970, pl. CZ7(6).
unident. or indet. crocodile : Molnar, 1982. p. 627.

Loc.: Chinchilla rifle range, Qld.
Fm.: Chinchilla Sand. Age: Pliocene.

QM F7767

Pallimnarchus sp. : Archer & Wade, 1976, p. 384, pl. 54C.
unident or indet crocodile : Molnar, 1982, p. 627.

Loc.: Bluff Downs Stn., nr Charters Towers, Qld.
Fm.: Allingham Fm. Age: Pliocene.

QM F11625

the Murgon crocodile : Molnar, 1982a, pp. 666–7, pl. 2, fig. G, H.

Loc.: Boat Mt., Murgon, Qld.
Fm.: Oakdale Ss. (?) Age: Mid-Tertiary, Miocene (?).

O. PTEROSAURIA

F. ORNITHOCHEIRIDAE (sensu lato)

aff. *Ornithocheirus* sp.

QM F10612–10614

aff. *Ornithocheirus* sp. : Molnar & Thulborn, 1980, pp. 361–3, fig. 1; Molnar, 1982, p. 621.
pteranodontid pterosaur : Molnar, 1980c, p. 51, fig. 10.

Loc.: Warra Stn, nr Hamilton Hotel, Qld.
Fm.: Toolebuc Fm. Age: L. Cretaceous, Albian.

O. SAURISCHIA

F. ANCHISAURIDAE

Agrosaurus macgillivrayi Seeley, 1891

QM F11614

cast of tibia of type BM(NH)4984. *Agrosaurus macgillivrayi* : Seeley, 1891, pp. 164–5.
Thecodontosaurus macgillivrayi : Galton & Cluver, 1976, p. 142–3, figs 11H–J.
Agrosaurus macqillivrayi : Molnar, 1980c, pp. 49–50; 1982, p. 615; 1984, p. 332.

Loc.: NE. Queensland Coast (?), Qld.
Fm.: Unknown. Age: U. Triassic (?).

F. CETIOSAURIDAE ?

Austrosaurus mckillopi Longman, 1933

QM F2316 HOLOTYPE

Austrosaurus mckillopi Longman, 1933, pp. 131–43, figs 2–3, pl. 15–7; Steel, 1970, pp. 81–2; Molnar, 1980a, p. 132; 1982, p. 622; 1982b, pp. 200–1; Coombs & Molnar, 1981, p. 358.

Austrosaurus : Bartholomai, 1966a, p. 150; Laseron & Brunnschweiler, 1969, p. 192; Molnar, 1984, p. 333.

Loc.: Clutha Stn, nr Maxwelton, Qld.

Fm.: Allaru Mdst. Age: L. Cretaceous, Albian.

Austrosaurus sp.

QM F3390

Austrosaurus sp. : Molnar, 1980c, p. 54, fig. 12; 1982, p. 622; Coombs & Molnar, 1981, pp. 351–60, pl. 3D, E, I, J; pl. 5A, B, G, H; pl. 6L–Q; Glut, 1982, p. 282.

Loc.: Alni Stn, nr Winton, Qld.

Fm.: Winton Fm. Age: U. Cretaceous, Albian/Cenomanian.

QM F6737

Austrosaurus sp. : Coombs & Molnar, 1981, pp. 351–60, pl. 1 A[1]–C[1], A[2]–C[2], F–J; pl. 2D, E; pl. 3F–H; Glut, 1982, p. 282; Molnar, 1982, p. 622.

QM F7291

Austrosaurus sp. : Coombs & Molnar, 1981, pp. 360–1, pl. 2F, G; pl. 5C, D, I, J; pl. 6D–E; Glut, 1982, p. 283; Molnar, 1982, p. 622.

Loc.: Lovelle Downs Stn, nr Winton, Qld.

Fm.: Winton Fm. Age: U. Cretaceous, Albian/Cenomanian.

QM F7292

Austrosaurus sp. : Coombs & Molnar, 1981, pp. 360–1, pl. 1D, E, K–S, T[1]–Y[1], T[2]–Y[2]; pl. 2B, C; pl. 3A–C; pl. 4A–E; pl. 6A–C, F–K, R, S; Glut, 1982, p. 283; Molnar, 1982, p. 622.

QM F7880

Austrosaurus sp. : Coombs & Molnar, 1981, pp. 360–1, pl. 2A; pl. 5E, F; Glut, 1982, p. 282; Molnar, 1982, p. 622.

Loc.: Elderslie Stn, nr Winton, Qld.

Fm.: Winton Fm. Age: U. Cretaceous, Albian/Cenomanian.

Remarks: Glut (1982) incorrectly refers to QM F5737 as QM F637. Additionally the captions to the figures showing QM F7291 & QM F7880 have been reversed, in error. Thus QM F7291 is actually QM F7880 and vice versa.

F. MEGALOSAURIDAE

Rapator ornitholestoides von Huene, 1932

QM F10935

cast of type BM(NH) 3718. *Rapator ornitholestoides* von Huene, 1932, p. 70.

Rapator ornitholestoides : Molnar, 1980a, p. 134; 1980c, p. 54.

Loc.: Lightning Ridge, N.S.W.

Fm.: Griman Creek Fm. Age: L. Cretaceous, Albian.

Walgettosuchus woodwardi von Huene, 1932

QM F10934

cast type BM(NH)3717. *Walgettosuchus woodwardi* von Huene, 1932, p. 69.

Walgettosuchus woodwardi : Molnar, 1980c, p. 54.

Loc.: Lightning Ridge, N.S.W.

Fm.: Griman Creek Fm. Age: L. Cretaceous, Albian.

F. UNCERTAIN

Rhaetosaurus brownei Longman, 1926

QM F1659 HOLOTYPE

'a dinosaurus' : Jensen, 1926a, p. 49.

Rhoetosaurus brownei Longman, 1926, pp. 183–94, pls 29–33; 1927, pp. 1–18, figs 1–4, pls 1–5; 1929, pp. 249–50, pl. 29 (reconstruction); von Huene, 1932, pp. 255–6; Rozhdestvenskii, 1964, p. 544; Steel, 1970, p. 66; Coombs & Molnar 1981, p. 358; Molnar, 1980a, p. 131, 136; 1982, p. 617; 1982b, p. 200; 1984, p. 333.

Rhaetosaurus brownei : David, 1950, p. 468; Hill, Playford, & Woods, 1966, pl. J15(1); Laseron & Brunnschweiler, 1969, pp. 175–6; Gould, 1974, p. 35.

Rhoetosaurus : de Lapparent & Lavocat, 1955, p. 821; von Huene 1956, p. 500.

Rhaetosaurus : Laseron & Brunnschweiler, 1969, pp. 175–6.

Loc.: nr Eurombah Ck, Taloona Stn, nr Roma, Qld.

Fm.: probably Injune Ck beds. Age: M. Jurassic, Bajocian/Aalenian.

Remarks: Longman (1926) states that this specimen was collected from Durham Downs Stn. This property has since been divided into two stations, Taloona and Durham Downs. Molnar (1982b, p. 200) numbered *R. brownei* as QM F1695, in error. Also the holotype material has been numbered QM F1751 in error.

PALAEOPOD TRACKS

F. ANCHISAURIDAE

Plectropterna sp.

QM F12220

perhaps flying reptile : Williams, 1966, p. 15.

Plectropterna sp. : Molnar, 1982, p. 615–6, fig. 1A; 1982b, pp. 212–5, fig. 270.

Loc.: Bergin Hill Quarry, Goodna, Qld.

Fm.: Blackstone Fm. Age: U. Triassic.

THEROPOD TRACKS

Changpeipus bartholomaii Haubold, 1971

QM F5700 HOLOTYPE

dinosaur footprints : Bartholomai, 1966a, fig. (third p. 149).

Theropod footprint : Hill, Playford & Woods, 1966, pl. J15(4).
dinosaur footprints : Cameron, 1970, p. 9 (in list only).
Changpeipus bartholomaii Haubold, 1971, p. 79; Molnar, 1982, p. 618; 1982b, pp. 212-5, fig. 27G.

QM F12221
Changpeipus bartholomaii : Molnar, 1982, p. 618.
Loc.: Westvale No. 5 colliery, Rosewood, Qld.
Fm.: Walloon Gp. Age: Jurassic.

Skartopus australis Thulborn & Wade, 1983

QM F10321
Skartopus australis : Thulborn & Wade, 1983, p. 427.

QM F10322
Skartopus australis : Thulborn & Wade, 1983, p. 427, pl. 10, figs B, D; pl. 12; pl. 13, figs A, B; pl. 14; pl. 15, fig. A; pl. 16.

QM F10330 HOLOTYPE
Skartopus australis Thulborn & Wade, 1983, pp. 427-31, pl. 7, figs B, C.
Loc.: Lark Quarry, SW of Winton, Qld.
Fm.: Winton Fm. Age: U. Cretaceous, Albian/Cenomanian.

QM F12265
Skartopus australis Thulborn & Wade, 1983, p. 427, pl. 1, figs C, D.
Loc.: Seymour Quarry, SW of Winton, Qld.
Fm.: Winton Fm. Age: U. Cretaceous, Albian/Cenomanian.

Wintonopus latomorum Thulborn & Wade, 1983

QM F10319 HOLOTYPE
Wintonopus latomorum Thulborn & Wade, 1983, pp. 421-6, pl. 7, fig. A; Molnar, 1984a, p. 155.

QM F10320
Wintonopus latomorum Thulborn & Wade, 1983, p. 421, pl. 11, fig. A.

QM F10322
Wintonopus latomorum Thulborn & Wade, 1983, p. 421, pls 8-10; pl. 11, figs B, C, D; pl. 13, fig C; pl. 14, fig. A; pl. 16, figs B, C.

QM F12264
Wintonopus latomorum Thulborn & Wade, 1983, p. 421, pl. 1, figs A, B.
Loc.: Lark Quarry, SW of Winton, Qld.
Fm.: Winton Fm. Age: U. Cretaceous, Albian/Cenomanian.

cf. *Tyrannosauropus* sp.

QM F10322
cf. *Tyrannosauropus* : Thulborn & Wade, 1983, p. 419-21.
Loc.: Lark Quarry, S.W. of Winton, Qld.
Fm.: Winton Fm. Age: U. Cretaceous, Albian/Cenomanian.

Unidentified, undetermined or indeterminate Saurischian material

QML349
sauropod : Molnar, 1980a, p. 132; 1980c, p. 54, fig. 12; 1982, p. 622.
Loc.: Silver Hills Stn, nr Hughenden, Qld.
Fm.: Unknown. Age: L. Cretaceous.

QM F6142
very large sauropod : Bartholomai & Molnar, 1981, p. 319; Molnar, 1982, p. 622.
brachiosaur (?) : Molnar, 1984, p. 333.
Loc.: Pelican bore, Stewart Ck, Dunraven Stn, nr Hughenden, Qld.
Fm.: Unknown. Age: L. Cretaceous.

Unidentified or indeterminate theropod tracks

QM F3278
dinosaur footprints : Anon, 1951, p. 583.
dinosaur footprints : Anon, 1952a, p. 107, one fig.
dinosaur footprints : Anon, 1952b, pp. 949–50, three figs.
beast of the *Iguanodon* type : Laseron & Brunnschweiler, 1969, p. 175.
large theropod : Molnar, 1980a, p. 131; 1982, p. 618; 1982b, Fig. 27F.
Loc.: Balgowan Colliery, Balgowan, Qld.
Fm.: Walloon Coal measures. Age: L. Jurassic.

QM F5474
probably large bipedal theropod : Staines & Woods, 1964, p. 55, fig. 1.
theropod footprint : Hill, Playford & Woods, 1965, pl. T13(5).
Rhondda dinosaur : Bartholomai, 1966a, p. 148, fig. (second).
theropod track : Molnar, 1982, p. 615.
Loc.: Rhondda colliery, Dinmore, nr Ipswich, Qld.
Fm.: Blackstone Fm. Age: U. Triassic.

QM F5701
? stegosaurian footprint : Hill, Playford & Woods, 1966, pl. J15(5).
quadrupedal dinosaur : Molnar, 1982, p. 618; 1982b, fig. 27E.

QM F5702
theropod dinosaur : Bartholomai, 1966a, p. 148.
? coelurosaurian footprint : Hill, Playford & Woods, 1966, pl. J15(6).
dinosaur footprint : Brooks, 1970, p. 21, fig. 31.
small theropod : Molnar, 1982, p. 618; 1982b, fig. 27D.
Loc.: Balgowan Colliery, Balgowan, Qld.
Fm.: Walloon Coal measures. Age: L. Jurassic.

QM F12991
'bird-like theropod' : Molnar, 1984, p. 334.

QM F12992
'bird-like theropod' : Molnar, 1984, p. 334.
Loc.: Warra Stn, nr Boulia, Qld.

Fm.: Toolebuc Fm. Age: L. Cretaceous, Albian.
Remark: QM F5702, may well be a sauropod as stegosaurs are not known from Jurassic Gondwanaland but sauropods are.

O. ORNITHISCHIA

F. IGUANODONTIDAE

Muttaburrasaurus langdoni Bartholomai & Molnar, 1981

QM F6140 HOLOTYPE

bipedal herbivorous dinosaur : Bartholomai, 1966a, p. 150.
iguanodontid : Hill, Playford & Woods, 1968, pl. K12(10).
perhaps *Iguanodon* : Colbert, 1973a, p. 407.
Iguanodon : Colbert, 1973b, p. 182, 184.
large ornithopod : Molnar, 1980a, p. 132.
Muttaburrasaurus langdoni Bartholomai & Molnar, 1981, pp. 319–49, figs 1–13, pls 1–2; Molnar, 1982, p. 621; 1982b, p. 205, figs 20–5; 1984, p. 333; 1984a, p. 155.

Loc.: Rock Hole, Rosebery Downs Stn, nr Muttaburra, Qld.
Fm.: Mackunda Fm. Age: L. Cretaceous, Albian.
Remarks: This specimen has been numbered QM F6095 in error.

F. HYPSILOPHODONTIDAE

Fulgurotherium australe Von Huene, 1932

QM F10936

cast of type BM(NH)3719 *Fulgurotherium australe* von Huene, 1932, p. 69.
Fulgurotherium australe : Molnar, 1980a, p. 134, fig. 4; 1982, p. 54.

Loc.: Lightning Ridge, N.S.W.
Fm.: Griman Creek Fm. Age: L. Cretaceous, Albian.

Hypsilophodont indet.

QM F9505

cast Hypsilophodont indet : Molnar, 1980a, p. 134, 135, fig. 56.

Loc.: Lightning Ridge, N.S.W.
Fm.: Griman Creek Fm. Age: L. Cretaceous, Albian.

F. NODOSAURIDAE ?

Minmi paravertebra Molnar, 1980

QM F10329 HOLOTYPE

small ankylosaur : Molnar, 1980a, p. 132.
Minmi paravertebra Molnar, 1980b, pp. 77–87, figs 1–2, pl. 1; 1980c, p. 51, figs 8–9; 1982, p. 621; 1982b, p. 205, fig. 26; 1984, p. 333; 1984a, p. 151.

Loc.: Injune rd, 6 km N. of Roma, Qld.
Fm.: Bungil Fm., Minmi Mem. Age: L. Cretaceous, Aptian.

Unidentified or indeterminate ornithischian material

QM F10942

Ornithopod : Molnar, 1980a, p. 132; 1982, p. 622; 1984a, p. 154.

Loc.: Iona Stn, nr Hughenden.
Fm.: Allaru Mdst. Age: L. Cretaceous.

QM F (unnumbered)

Ankylosaur : Molnar, 1980a, p. 132; 1982, p. 622.

Loc.: Boulia, Qld.
Fm.: Toolebuc Fm. Age: L. Cretaceous, Albian.
Remarks: The original locality for QM F10942 was Redcliffe Stn, however this property has now been divided into two stations, Iona and Redcliffe. The ankylosaur specimen is on loan to the BM(NH).

O. THERAPSIDA

F. KANNEMEYERIIDAE

Indeterminate dicynodont cf. *Kannemeyeria*

QM F12178

indet. dicynodont cf. *Kannemeyeria* ; Thulborn, 1983, pp. 330–1, fig. 1a, b.
mammal-like reptile : King, 1983, p. 209.
dicynodont indet. : Thulborn, 1983a, p. 209.

Loc.: The Crater, Rewan Stn, Qld.
Fm.: Arcadia Fm. Age: L. Triassic.

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SKINKS OF THE *CTENOTUS SCHEVILLI* SPECIES GROUP

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ABSTRACT

Ctenotus astarte sp. nov. and *Ctenotus serotinus* sp. nov. are described from specimens collected in the Diamantina River drainage of southwestern Queensland. These new species are members of the *Ctenotus schevilli* species group as defined herein. The related species *Ctenotus schevilli* (Loveridge) is redescribed. Superficially similar species, *Ctenotus tanamiensis* Storr, *Ctenotus hebetior* Storr and members of the *Ctenotus grandis* group, are distinguishable on details of colouration, in midbody scale counts, or nature of the supracilliary scales.

INTRODUCTION

The *Ctenotus* fauna of western Queensland is dominated by members of three species-groups (*sensu* Storr, Smith and Johnstone 1981). These are the *C. leonhardii, C. schomburgkii* and *C. lesueurii* species-groups. With the exception of some members of the *C. lesueurii* group (*inornatus* subgroup), all these skinks show well defined colour patterns, consisting of stripes with or without spots.

Specimens of a moderately large (adult SVL, 59-81 mm) and a smaller (adult SVL, 50 mm) *Ctenotus* recently collected in the eastern Diamantina drainage system proved of interest as they exhibited a complex dorsal pattern consisting of dark blotches with small whitish spots and dashes. Examination revealed that these specimens represented undescribed skinks closely related to *C. schevilli* (Loveridge) and that redescription of the latter was required. Furthermore, these skinks share a number of morphological characters which enables recognition of a distinct species group to accommodate them. This group (*C. schevilli* species group) is the subject of the following contribution.

Abbreviations used in text are as follows: ANWC — Australian National Wildlife Collection; NMV — National Museum of Victoria; QM — Queensland Museum; QNPWS — Queensland National Parks and Wildlife Service; SVL — snout to vent length. All measurements are recorded in millimetres. Terminology follows Storr, Smith and Johnstone (1981).

SYSTEMATICS

Ctenotus schevilli species group

Medium (SVL 50 mm) to moderately large *Ctenotus* (SVL 60 mm) with a complex dorsal

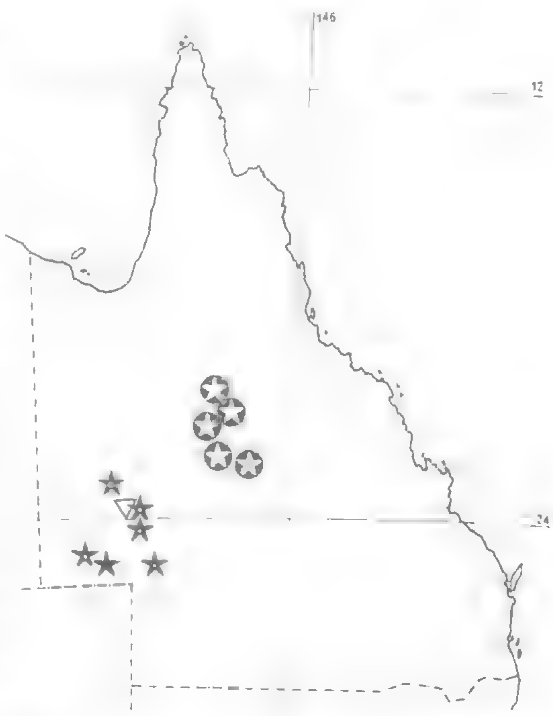

Fig. 1. Distribution of skinks of the *Ctenotus schevilli* species group (closed stars – *C. schevilli*, open stars – *C. astarte*, inverted triangle – *C. serotinus*).

pattern consisting of small pale spots or flecks with blotches of blackish pigment, with or without a dark vertebral line and lateral pattern of white spots on light brown ground colour. Three supraoculars in contact with frontal, the first two widest (subequal). First three and last two supraciliaries enlarged, first three largest. First loreal narrow, second wider and rounded anteriorly. Presuboculars usually two, sometimes three. Upper labials usually 8. Midbody scale rows 29–44. Subdigital lamellae narrowly callose to obtusely keeled.

Ctenotus schevilli (Loveridge)
(Plate 1A,B, Fig. 1)

Sphenomorphus schevilli Loveridge, 1933, p. 96. Army Downs, 55 km N. of Richmond, Queensland. Holotype QM J5805.

Sphenomorphus schevilli Mittleman, 1952, p. 30; Worrell, 1970, p. 55.

Lygosoma (*Sphenomorphus*) *schevilli* Worrell, 1963, p. 58, p. 177.

Ctenotus schevilli Cogger, 1975, p. 275; Storr, 1978, p. 325–6; Cogger, 1979, p. 275.

Material Examined

QM J5805 (Holotype); AM R62331, 80.1 km N. of Muttaburra on Hughenden Road; R62453, 62.4 km N. of Muttaburra; NMV D14784, 25.7 km SW. of Muttaburra; D13899-901, 57.9 km NW. of Aramac.

Diagnosis

A moderately large *Ctenotus* (SVL 62–85 mm) with 40 or more midbody scale rows; nasals usually in contact; subdigital lamellae 22–25; ear lobules subacute; pattern consisting mainly of white lateral spots and dark mid-dorsal blotches, forelimbs more or less uniformly pale brown; temple with numerous white spots but no dorsolateral streak; upper labials with little or no pattern.

Description

SVL: (adult) 62.4–85.2 (N = 6, mean 73.1), (juvenile) 50.0. Length of appendages (%SVL): forelimb 24–33 (N = 7, mean 27.1); hindlimb 37–48 (N = 7, mean 42.5); tail 134–172 (N = 7, mean 157.2).

Snout rounded, somewhat blunt in profile. Nasals usually in contact. Nasal groove absent. Prefrontals moderately large, separate or in narrow contact. Supraoculars 4, first three in contact with frontal. Second supraocular largest or subequal with first. Supraciliaries 8–10 (N = 7, mean 9.0), first three and last two largest. Palpebrals 12–15 (N = 7, mean 13.8). Second loreal 0.7–1.4 (N = 7, mean 0.90) times as high as wide. Presuboculars 2, rarely 3. Upper labials 8, rarely 9. Temporals 2 + 2 (N = 3) or 1 + 2 (N = 4). Ear lobules 5–7 (N = 7, mean 6.2); usually subacute; central lobules largest. Nuchals 0–6 pairs. Midbody scale rows 40–44 (N = 7, mean 40.8). Paravertebral scales slightly larger than adjacent series. Lamellae under fourth toe 22–25 (N = 7, mean 23.7), slightly compressed, moderately callose.

Dorsally pale reddish brown or olive brown. Median dorsal zone of blackish spots which may coalesce to form irregular vertebral stripe, extending to proximal third of tail. Rarely blocks of dark pigment laterodorsally. Remainder of dorsum with pale flecks. No indication of pale dorsolateral lines. Upper labials with little or no pattern. A series of short white dashes below eye. Temples and flanks and base of tail covered with white dots; dots of upper lateral zone, and sometimes in paler lower lateral zone, arranged in more or less vertical series. Forelimbs with no pattern; hindlimbs with little or no pattern. Ventrally white.

Habitat

Black soil plains and adjacent habitats.

Distribution

Semi-arid central Queensland from the Richmond district south to the Muttaburra and Aramac districts (Fig. 1).

Ctenotus astarte sp. nov.
(Plate 1C–D, Fig. 1)

Material Examined

Holotype: QM J26499 Cuddapan airstrip, Cuddapan Station, southwestern Queensland. Collected 9–23 September 1976 by J. Covacevich and C. Tanner.

Paratypes: ANWC R0742 Paton Downs via Boulia; R3133 Cuddapan Station airstrip; NMV D56609 Davenport Downs Station, juvenile; QM J39580 Durrie Station via Birdsville (formerly QNPWS N48119); J40182 Diamantina Lakes (formerly N48152); J40183 Diamantina Lakes (formerly N48153), juvenile; J41603 Benditoota Waterhole, Durrie Station (formerly N18387); J41796 Durrie Station (formerly N18388).

Diagnosis

A moderately large *Ctenotus* (SVL 60–82 mm) with 33–37 midbody scale rows; nasals usually separated; 25–27 subdigital lamellae; ear lobules usually acute; pattern complex consisting of short dashes and small dots and dark mid-dorsal blotches; short white loreal streak present and narrow, dark-edged, pale dorsolateral streak from above eye to above ear opening present. Upper labials with pale fawn or white blotches.

DESCRIPTION

SVL (adult) 59.8–81.2 (N = 7, mean 71.1), (juvenile) 35.5–45.6 (N = 2, mean 40.6). Length of appendages (% SVL); forelimb 25–35 (N = 9, mean 29.8); hindlimb 45–58 (N = 9, mean 50.8); tail 155–203 (N = 4, mean 184.3).

Snout sloping, slightly pointed in profile. Nasals separated or just contacting. Nasal groove absent. Prefrontals, moderately large, separated. Supraoculars, 4, rarely 5, first three in contact with frontal. First and second supraoculars widest, subequal. Supraciliaries 8–9 (mean 8.5) first three (sometimes four) largest, last two enlarged. Palpebrals 12–15 (N = 9, mean 13.2). Second loreal 0.5–0.9 (N = 9, mean 0.70) times as high as wide. Presuboculars 2, rarely 3. Upper labials 8 (N = 7) or 9 (N = 2), posterior pair largest. Temporal 1 + 2 (N = 8) or 2 + 2 (N = 1), upper secondary largest, rather triangular in shape. Ear opening vertically elliptical, lobules 4 to 6 (N = 9, mean 4.8), acute or subacute. Nuchals 1 to 6 pairs. MBS 32–37 (N = 9, mean 34.5). Paravertebral scales larger than adjacent series. Toes compressed. Lamellae under fourth toe, 25–27 (N = 9, mean 22.6), narrowly callose or obtusely keeled.

COLOUR

Dorsal and upper lateral surfaces greyish-brown to buffy brown. Complex dorsal pattern consisting of irregular, transverse or mid-dorsal blackish blotches and pale spots and dashes. Little or no indication of dark vertebral stripe. In some adults and juveniles dorsal pale dashes may align to form discontinuous paravertebral line. A narrow, pale dorsolateral line may be present, usually outermost white spots simply aligned dorsolaterally. Pale, dark-edged, dorsolateral streak always present from above eye to above ear opening. Upper lateral zone with numerous white dots which tend to align vertically. A short dark posterior streak may be associated with some of these; lower lateral surfaces greyish with some white spots. Short white, loreal steak present. Upper labials with pale fawn or whitish blotches posteriorly. Large whitish spots in temporal region. Legs pale, buffy brown with paler, indistinct, longitudinal stripes. Ventral surface white. The largest specimens (QM J39580, ANWC R0742) show fading of colour pattern with age. In these specimens light and dark areas tend to coalesce, forming indistinct blocks of dark and light colour.

ETYMOLOGY

Astarte was a Babylonian-Phoenician goddess and a counterpart of Diana. The name was arbitrarily chosen.

HABITAT

The holotype was collected from a sand dune-ashy downs interface. When disturbed the skink sought shelter in a soil crevice (J. Covacevich pers. comm.). The specimens from Durrie Station were collected on gravelly downs while the Diamantina Lakes specimens were found on stony downs (G. Porter pers. comm.).

DISTRIBUTION

Arid western Queensland; particularly eastern Diamantina River drainage between Boulia and Diamantina Lakes in the north to Durrie and Cuddapan Stations in the south (Fig. 1).

Ctenotus serotinus sp. nov.
(Plate 2, Fig. 1)

MATERIAL EXAMINED

HOLOTYPE: QM J43313, 17 km SE. of Spring Valley homestead, southwestern Queensland. Collected 10–12 May, 1984 by G.V. Czechura, D. Knowles and N.W. Longmore.

PARATYPE: QM J40185 Diamantina Lakes.

DIAGNOSIS

A medium sized *Ctenotus* (adult SVL 50 mm) with 29–33 midbody scale rows; nasals in narrow contact or narrowly separated; prefrontals narrowly separated; subdigital lamellae 22–27; ear lobules usually rounded; pattern complex consisting of pale edged dark vertebral stripe from nape to base of tail, unbroken, dorsolateral stripe with commences from first supraciliary and vertically aligned white upper lateral stripe. Upper labials white with dark posterior patches.

DESCRIPTION

SVL (adult) 49.6, (juvenile) 35.5. Length of appendages (% SVL); forelimb 31.4, 30.14; hindlimb 52.8, 55.8; tail (adult) 173.2.

Snout sloping, slightly rounded in profile. Nasals narrowly separately or in narrow contact. Nasal groove absent. Prefrontals moderately large, narrowly separated. Supraoculars 4, first three in contact with frontal. Second supraocular subequal to first. Supraciliaries 8 or 9, first four largest and last two enlarged. Palpebrals 16. Second loreal 0.8–0.9 times as high as wide. Presuboculars 2, rarely 3. Upper labials 8, posterior three largest. Temporals, 1 + 2, upper secondary largest, rather triangular in shape. Ear opening obliquely elliptical, lobules 4 or 5, subacute to rounded. Nuchals 4 pairs. Midbody scale rows 33 (adult), 29 (juvenile). Narrowly to widely callose subdigital toe lamellae; 27 (adult), 22 (juvenile) below fourth toe. Toes slightly compressed.

COLOUR

Adult colouration: ground colour of dorsum olive-brown with ragged edged blackish vertebral line from nape to base of tail. Vertebral line narrowly edged by very narrow, pale paravertebral lines. A few widely scattered small white spots along outer edge of dorsal zone. Pale laterodorsal and dorsolateral stripes almost in contact, giving impression of broad pale band. Laterodorsal stripe commences above forelimb. Dorsolateral stripe commences from first supraciliary. Both stripes form broad diffuse band behind hindlimb. Upper lateral zone olive-brown with series of white spots more-or-less vertically aligned. Short, dark posterior streaks may be associated with these. Lower lateral surfaces greyish, merging with white ventral colour. Some indication of a broad, diffuse mid-lateral stripe. Temporal region olive. Short white loreal streak present. Upper labials white with dark pigment posteriorly (olive with fine black peppering). Limbs light brown indistinctly striped with dark brown.

Juvenile colouration: similar to adult but more sharply patterned. Vertebral line sharply edged with distinct paravertebral stripes. Dorsolateral line broad incorporating laterodorsal line. Midlateral stripe from midbody to tail, a series of white spots between ear opening and midlateral line. Whitish stripe from nostril to ear opening.

ETYMOLOGY

Serotinus is latin for 'late happening', thus serving as an allusion to *C. serotinus* being the most recently discovered member of the complex.

HABITAT

The holotype was collected from a gravelly downs and sand-dune interface. The paratype was collected on a sandhill.

DISTRIBUTION

Arid western Queensland in the vicinity of Diamantina Lakes. (Fig 1).

COMMENTS

The only species of *Ctenotus* which may be confused with *C. astarte, C. serotinus* and *C. schevilli* are *C. tanamiensis* Storr, *C. hebetior* Storr (both members of the *C. leonhardii* species-group) and members of the *C. grandis* species-group.

The former species, *C. tanamiensis* , does not occur in Queensland (Storr 1970; Storr, Smith and Johnstone 1981). It is separable from both *C. schevilli* and *C. astarte* by the presence of vertebral and paravertebral stripes as well as a lower (28–32) midbody scale count. *C. tanamiensis* may be distinguished from *C. serotinus* easily by colour pattern, as the vertebral line extends beyond the base of the tail, regularly spaced light dorsal spots may be present and the dorsolateral line is broken. The ground colour of the former species is brown while the latter is olive-brown.

Ctenotus hebetior Storr is readily distinguishable by the presence of five dark stripes dorsally and reddish rather than olive-brown or grey-brown colouration (Storr 1978). *C. hebetior* occurs in sympatry with *C. astarte, C. serotinus*, and possibly *C. schevilli* in some areas.

Skinks of the *C. grandis* species group (*C. g. grandis* Storr, *C. g. titan* Storr and *C. hanloni* Storr) are all distinguishable by their dorsal pattern of five dark stripes and fourth to penultimate supraciliaries noticeably smaller than the rest (Storr 1980). These skinks do not occur in Queensland.

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PLATE 1.

Colour variation in member of the *Ctenotus schevilli* species group. Scales in millimetres.

A–B *Ctenotus schevilli* (Loveridge).

A. (AM R62453, 62.4 km N. of Muttaburra). Note indistinct, dark, transverse bars across vertebral region. **B.** (AM R62331, 80.1 km N. of Muttaburra). Note concentration of dark pigment along vertebral line.

C–D *Ctenotus astarte* sp. nov.

C. (QM J26499, Cuddapan airstrip, Cuddapan Station, Holotype). Note presence of pale series of dorsolateral spots forming indistinct stripe. This 'stripe' is continuous with dorsolateral streak above temporal region. The distinct pattern is typical of smaller individuals. **D.** (QM J39480, Durrie Station via Birdsville, Paratype). Note indistinct pattern typical of larger individuals and indication of dorsolateral streak and series of spots.

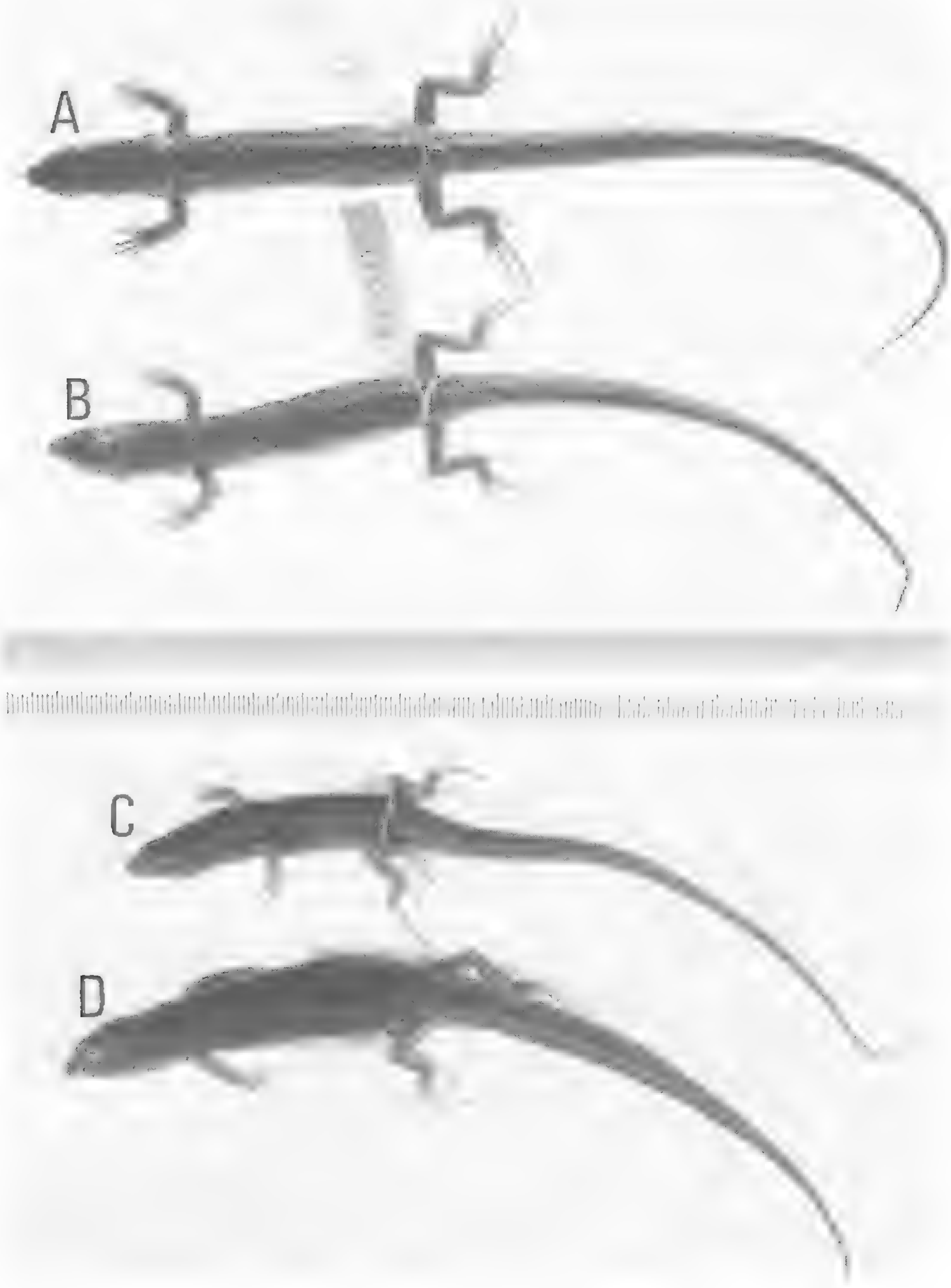
A
B
C
D

PLATE 2

Ctenotus serotinus sp. nov. QM J43313 (Holotype), 17 km SE. of Spring Valley homestead, SW. Queensland. (Photo D. Knowles).

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A NEW SPECIES OF *TAUDACTYLUS* (MYOBATRACHIDAE) FROM SOUTHEASTERN QUEENSLAND, AUSTRALIA

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Queensland Museum

ABSTRACT

Taudactylus pleione sp. nov. is described from Kroombit Tops, near Gladstone, southeastern Queensland. It is most closely related to the cryptic species *T. liemi* (from mideastern Queensland) and *T. rheophilus* (from northeastern Queensland).

INTRODUCTION

Myobatrachid frogs of the genus *Taudactylus* Straughan and Lee occur in association with upland and montane rainforests of eastern Queensland (Liem and Hosmer 1973, Ingram 1980). Two species (*T. rheophilus* and *T. acutirostris*) are found in northeastern Queensland and two (*T. eungellensis* and *T. liemi*) in mideastern Queensland. The remaining species, *T. diurnus* , is known from the Blackall, Conondale and D'Aguilar Ranges near Brisbane (Czechura 1975, 1984, Ingram 1980) in southeastern Queensland.

During the December 1983 Queensland Naturalists Club annual campout held at Kroombit Tops (24°27', 150°26'), near Gladstone, frog calls, resembling those of some species of *Taudactylus* , were heard in rainforest at the headwaters of Kroombit Creek. A single specimen of one of these frogs was later obtained. Subsequent visits to this area resulted in the collection of further specimens of this taxon along with information concerning its natural history. Examination of these specimens established that the Kroombit Tops frog represented a previously undescribed species of *Taudactylus*, which is the subject of the following contribution.

Measurements are in millimetres and ratios are expressed as percentages. Abbreviations follow Liem and Ingram (1977) and Ingram (1980). All specimens are held in the Queensland Museum (QM) herpetological collection.

Taudactylus pleione sp. nov.
(Figs 1, 4, Plate 1)

Material Examined

Holotype: J42392, adult female, headwaters Kroombit Creek, Kroombit Tops via Calliope (24°27', 150°26'), coll. G.B. Monteith, 6–10 February, 1984.

Paratypes: J42137, same locality as holotype, coll. G.B. Monteith, 11 December, 1983; J42388–91, same data as holotype (J42390, cleared specimen); J42422–3, same locality as holotype, coll. G.V. Czechura and S. Wilson, 23 February 1984.

Diagnosis

Distinguishable from *T. diurnus* and *T. eungellensis* by very small discs on fingers and toes; from *T. acutirostris* by the absence of dorsolateral skin folds and snout shape in profile (rounded *vs* wedge-shaped); from *T. rheophilus* by less robust build (HW/SVL 31–34 *vs* 37–42), absence of a continuous dark lateral band from the eye to groin and snout shape in profile (rounded *vs* vertical); from *T. liemi* by rounded rather than acuminate head shape when viewed from above, relatively deeper and blunter snout profile *vs* sloping, somewhat pointed profile of *T. liemi* , grey or bluish grey ground colouration *vs* grey-brown or light to dark brown dorsal ground colour, broad interorbital bar of more-or-less uniform width in *T. pleione* (not triangular-shaped and widest along midline) and darker, more intense ventral pigmentation *vs* cream ventral surface with variable amounts of light brown speckling. Ingram (1980) reports that some *T. liemi* may possess intense brown speckling ventrally, however comparison of these individuals with specimens of *T. pleione* , reveals that this speckling in *T. liemi* is much paler than even the palest ventral speckling of *T. pleione* specimens.

Description of Holotype

SVL 28.5, TL 13.8, TL/SVL 53, HW 9.6,

HW/SVL 34, ED 3.3, ED/HW 34, EN 2.2, IN 3.3, EN/IN 67.

Dorsal aspect of head rounded; snout profile blunt, rounded and barely overlapping lower jaw. Loreal region sloping. Canthus rostral is distinct, rounded, curved between eye and naris, then smoothly converging anteriorly to form a rounded snout. Pupil horizontal, oval. Tympanum concealed. Tongue hinged in front, more or less oval in shape, but slightly wider posteriorly. Vomerine teeth absent. Fingers cylindrical not webbed, slightly expanded distally, length from shortest to longest 1-2-4-3. Large rounded tubercles at base of fingers; outer palmar tubercle rounded, slightly larger than oval inner palmar tubercle. Toes not webbed but distinctly fringed with slight distal expansion; length of toes from shortest to longest 1-2-5-3-4. Low rounded tubercles at base of toes with smaller tubercles distally on third, fourth and fifth toes; a small oval inner metatarsal tubercle. Skin smooth. Cloacal opening directed posteriorly at midlevel of thighs.

Dorsal ground colour grey with small patches of darker grey, grey-brown and some yellowish suffusion latero-dorsally. A broad, curved black interorbital bar of more or less uniform width directed posteriorly. A blackish 'X'-shaped marking over shoulder region. Paired, irregular, elongated dark patches over inguinal region directed somewhat anteriorly towards midline. Two prominent crossbars and seven to eight prominent crossbars on front and hindlimbs respectively, paler less defined greyish crossbars may be placed between these. Fingers and toes barred with grey. Lateral surfaces greyish brown; a dark line from loreal region through eye and enclosing tympanum then curving downwards forward of hind limb. Side of face darker grey. Short dark bar above forelimb which may contact

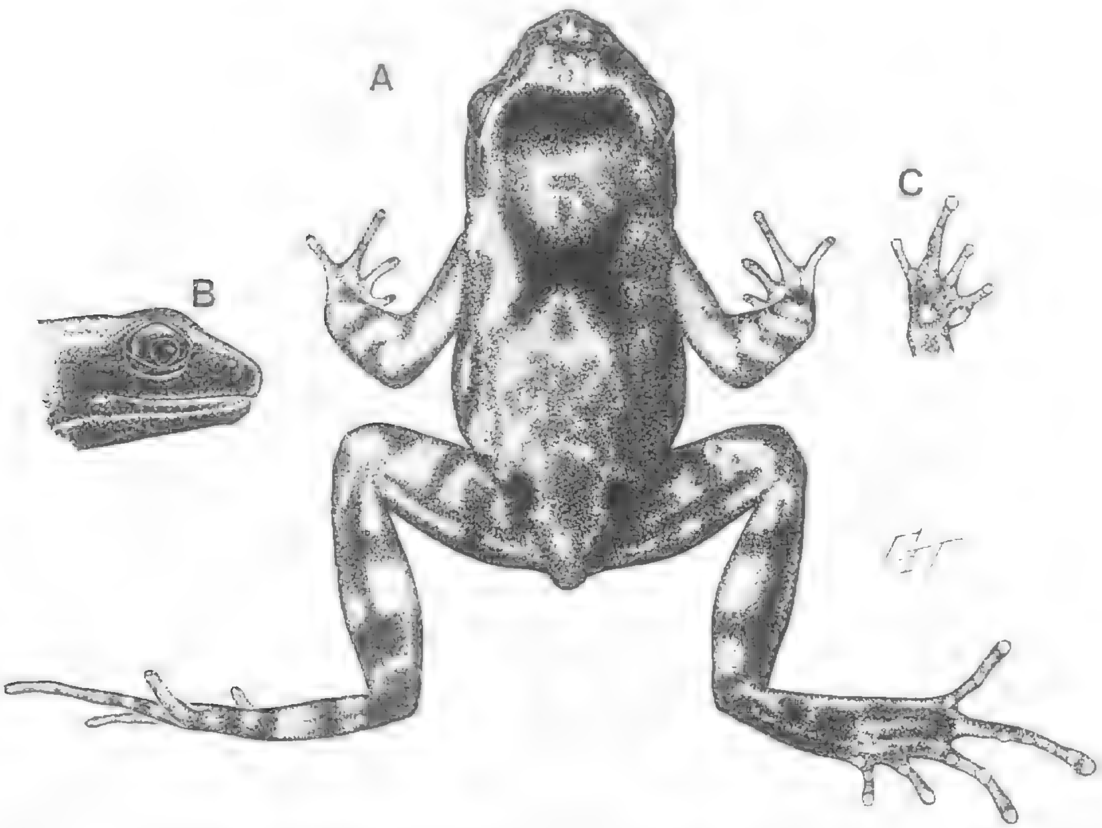

FIG. 1: *Taudactylus pleione*. A, Dorsal view including ventral aspect of hind foot; B, Lateral view of head; C, Ventral aspect of hand.

another dark bar which commences in the axillary region, this latter bar narrows posteriorly and continues dorsolaterally to the knee. Posterior surface of thighs dirty yellow, barred and speckled with brown. Ventral surface dirty cream extensively mottled and speckled with grey brown.

Description of Paratypes

SVL 24.8–26.4 (N 7, mean 25.9), TL 12.4–13.8 (N 7, mean 13.1), TL/SVL 49–53 (N 7, mean 51), HW 7.7–8.6 (N 7, mean 8.5), HW/SVL 31–34 (N 7, mean 33), ED 3.0–3.4 (N 7, mean 3.2), ED/HW 34–4 (N 7, mean 38), EN 1.8–2.1 (N 7, mean 1.9), IN 2.8–3.4 (N 7, mean 3.1), EN/IN 56–75 (N 7, mean 62).

Dorsal colouration greyish (or even somewhat bluish-grey) with markings similar to the holotype. The interorbital bar is prominent in all specimens, although it may be curved or straight and is of more or less uniform width. In darker specimens the shoulder markings may be less prominent than either the interorbital bar or inguinal blotches; the shape of the shoulder marking is variable, forming either two triangles (apices directed towards midline), an hourglass or 'X'-shaped marking but is never continuous with the interorbital bar. The inguinal markings also variable in size. Lateral markings similar to holotype, except that the short bar located above the forelimb may become enclosed by the posterior marking. The dark marking which passes through side of face to tympanum is never continuous with the posterior band commencing at the forelimb. All specimens with dense brown or greyish brown mottling and speckling on ventral surfaces, in some specimens there is evidence of pale medial stripe in the throat region.

Vocal sacs present in males. Nasal bones narrow, widely separated not contacting either maxillary or sphenethmoid; frontoparietal fontanelle moderately large with posterior expansion (Fig. 1A), zygomatic rami of squamosal longer than otic rami; omosternum present; sternum rounded; terminal phalanges T-shaped.

Habitat

Rocky streams and their environs in montane rainforest or rainforest/wet sclerophyll forest transition. Usually found around or under rocks near permanent or semi-permanent pools and running water. Also may be encountered in leaf-litter nearby.

Distribution

Known only from the headwaters of Kroombit Creek, Kroombit Tops, SE.Q. (Fig. 4).

Field Notes

During periods of low activity, these frogs shelter deep within rock crevices, under large boulders or within rock piles in the vicinity of permanent pools or running water. Their presence at these times may only be indicated by occasional calls.

Activity seems to be initiated by the first heavy falls of rain during the spring-summer period. When active these frogs may also be found in leaf-litter or under stones along the watercourses where ephemeral pools and soaks form. Males call during the day and well into the evening and early night. Calling is most intense during early evening. The mininum distance between calling males is about 1.5 metres. There was little activity noted during the December 1983 visit to the area. Most activity seems to have occurred in early February (when the holotype, a gravid female was collected). By late February, activity seems to have declined, certainly no females were encountered although males were still calling. No basking or obvious diurnal behaviour was recorded. Synchronosympatric species, *Litoria barringtonensis, Adelotus brevis* and *Mixophyes fasciolatus.*

Call

The following description is based on a recording made at Kroombit Tops on 23 February 1984. To the ear, the call consists of a series of rapidly repeated metallic 'tinks' which are given at regular intervals. Each series of 'tinks' may consist of 2–14 separate notes (usually 8–10). The interval between notes slows towards the end of a series, being most conspicuous when a large series of 'tinks' is given. Each series may last from 2–4 seconds and is repeated at intervals from 3–10 seconds. Captive specimens held in plastic bags have also been heard making a short 'click' resembling a call of *Pseudophryne major.*

Etymology

Named for Pleione, mother of the Pleiades in Greek mythology. The star Pleione is thought to be the 'missing' bright star of the Pleiades cluster (Clark 1983).

Comments

Discovery of *T. pleione* in the northern part of southeastern Queensland raised questions concerning the identity of a specimen assigned to *T. acutirostris* which was collected at Mundubbera (25°31, 151°18'). This specimen (British Museum [Natural History] 1938.7.2.1.) was first reported by Parker (1940). Although Liem and Hosmer (1973) did not examine this specimen, they report that an examination of the specimen at the Bristish Museum indicated 'that the specimen ties with *acutirostris* better than with the other three taxa recognized here' (Grandison *in* Liem and Hosmer 1973, p. 450).

Examination of this specimen was warranted in view of the proximity of Kroombit Tops to Mundubbera. BMNH 1938.7.2.1. is badly faded and in poor condition, however it is clearly not assignable to *T. pleione*. The Mundubbera *Taudactylus* is distinguishable by virtue of the following features; small toes discs, evidence of a dorsolateral skinfold, presence of dark ventral markings most prominent below the throat, presence of an apparently complete dark lateral band, no indication of a dark interorbital bar or triangle, blunt snout when viewed from above (shape in profile no longer discernable), dark pigment along posterior surface of thighs and a high EN/IN ratio (136 vs 62 in *T. pleione*). Consequently, the earlier decision (Liem and Hosmer 1973) to assign this specimen to *T. acutirostris* is upheld.

T. acutirostris is presently only known to occur in northeastern Queensland between Mt Hartley and Tully Falls (Ingram 1980). This species has not been collected in the rainforests between Tully Falls and Mundubbera (e.g. Cardwell Range — Mt Spec, Mt Elliot, Clarke Range — Eungella, Conway Range). Apart from BMNH 1938.7.2.1. there have been no other collection of *T. acutirostris* from southern Queensland. Attempts by Liem and Hosmer to obtain specimens of *Taudactylus* in the Mundubbera area proved unsuccessful (Liem and Hosmer 1973) as have all subsequent investigations.

All species of *Taudactylus* are found in association with watercourses in upland (above 300 m a.s.l.) rainforest (Liem and Hosmer 1973, Ingram 1980, herein). In contrast, the Mundubbera area supports little rainforest vegetation, apart from some patches of dry 'vinescrub', and is of low relief, most of the area is less than 200 m a.s.l. The absence of further collections of *T. acutirostris* from Mundubbera and the unsuitability of habitat here indicate that the provenance of BMNH 1938.7.2.1. is in error.

RELATIONSHIPS

Ingram (1980) recognized two sister groups within the genus *Taudactylus* — the *T. diurnus* complex (*T. diurnus* and *T. eungellensis*) and the *T. acutirostris* complex (*T. acutirostris, T. rheophilus, T. liemi*). Comparison of *T. pleione* with its congeners using the character states employed by Ingram (*op. cit.*) clearly establishes *T. pleione* as a member of the *T. acutirostris* complex. Recognition of *T. pleione* as a member of this species complex necessitates a reappraisal of intra-group relationships.

In terms of behaviour, the most aberrant member of the *T. acutirostris* complex is *T. acutirostris* itself. This species, in common with members of the *T. diurnus* complex, engages in conspicuous diurnal and basking activity. In contrast *T. rheophilus, T. liemi* and *T. pleione* are all cryptic and rather crepuscular in their activity. *T. acutirostris* also differs from the other three species in external morphology (wedge-shaped snout in profile, rather narrow snout and presence of dorsolateral skin folds) and osteology, particularly of the skull and pectoral girdle (Table 1). Furthermore, *T. acutirostris* is unique amongst *Taudactylus* spp. in its possession of an elongate sternum (Fig. 2D), presence of coccygeal tubercles and dorsolateral skinfolds. In contrast, differences in behaviour and skeletal features between *T. rheophilus, T. liemi* and *T. pleione* are slight. Comparative data on the skeletons were obtained from Lynch (1971), Liem and Hosmer (1973), Ingram (1980) and inspection of cleared specimens of *T. liemi* (QM J32618) and *T. pleione* (QM J42390).

TABLE 1: COMPARISON OF SKELETAL FEATURES WITHIN THE *TAUDACTYLUS ACUTIROSTRIS* COMPLEX (*SENSU* INGRAM 1980).

Character	*rheophilus-liemi-pleione*	*acutirostris*
frontoparietal fontanelle	distinct posterior expansion (Fig. 2A)	posterior expansion weak or absent (Fig. 2B)
condition of sternum	rounded (Fig. 2C)	elongate (Fig. 2D)
condition of squamosal a. zygomatic ramus	posterior broadly expanded (Fig. 2E)	posterior narrowly expanded (Fig. 2F)
b. anterior process of otic ramus	long, pointed (Fig. 2E)	short, pointed (Fig. 2F)

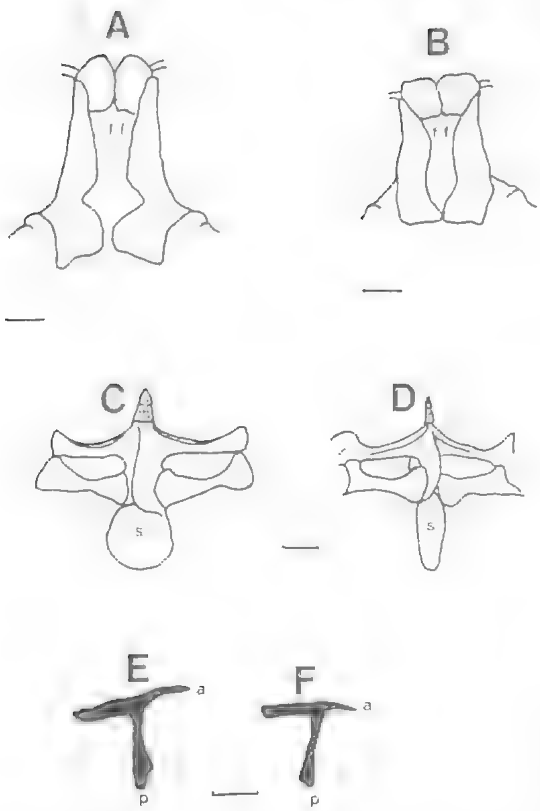

FIG. 2: Selected skeletal features of *Taudactylus* spp. A–B, dorsal view of frontal region of skull. C–D, pectoral gridle. E–F, squamosal. (Scale equals one millimetre : abbreviations; ff — frontoparietal fontanelle, s — sternum, a — anterior process of otic ramus, p — posterior of zygomatic ramus). See text for explanation.

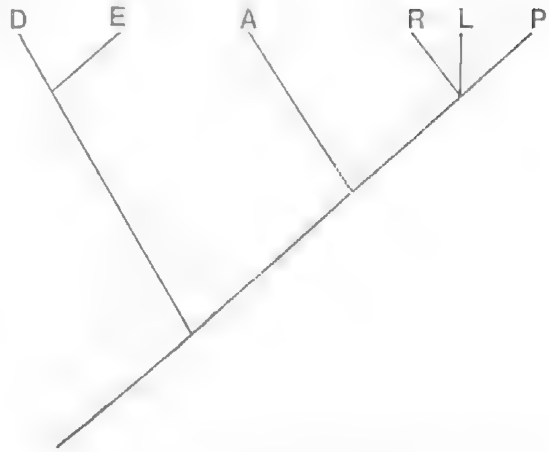

FIG. 3: Relationships of the species of *Taudactylus*. (D *T. diurnus*, E *T. eugellensis*, A *T. acutirostris*, R *T. rheophilus*, L *T. liemi*, P *T. pleione*).

In view of these differences, it is suggested that two complexes should be recognized to accommodate the four species. The first complex, the *T. acutirostris* complex, is composed of only *T. acutirostris* while the second, the *T. rheophilus* complex, is composed of the three cryptic species (*T. rheophilus, T. liemi* and *T. pleione*). The intra-generic relationships of *Taudactylus* spp. are shown in Fig. 3. The greater closure of the frontoparietal fontanelle, elongate sternum, coccygeal tubercles, dorsolateral skinfolds and diurnal behaviour of the *T. acutirostris* complex indicate that it is the more specialised of the two new complexes recognized here. The status of the *T. diurnus* complex remains unchanged.

BIOGEOGRAPHY

The biogeographical and evolutionary patterns within *Taudactylus* have been interpreted using an allopatric model of speciation (Ingram 1980). This model was based on alternate expansions and contractions of rainforest in eastern Queensland. The current study supports this scenario with slight modification. The ancestral *Taudactylus* stock is assumed to have been similar to members of the extant *T. rheophilus* complex. Cryptic habits and crepuscular (or even nocturnal) activity were presumably shared by both the *T. rheophilus* complex and the ancestral stock. The activity pattern of the ancestral stock probably bore some resemblance to those exhibited by extant small, cryptic microhylid and myobatrachid frogs.

Contractions of rainforest presumably produced five isolates of the ancestral *Taudactylus* stock. Three of these isolates Mt Lewis — Thornton Peak — Mt Bellenden Ker, Eungella Plateau, Kroombit Tops) retained crepuscular activity and cryptic habits and remained restricted to these montane refugia (*T. rheophilus* complex). It seems that members of the *T. rheophilus* complex have been unable to take advantage of subsequent rainforest expansions to successfully establish themselves widely.

The remaining isolates (southern southeastern Queensland and southern Atherton Tableland) independently evolved diurnal activity and behaviour (ancestral *T. diurnus* complex stock and *T. acutirostris* stock). Subsequent rainforest expansions led both groups to expand their ranges. In the south, further rainforest contractions led to the isolation and differentiation of *T. diurnus* (Blackall — Conondale — D'Aguilar Ranges) and *T. eungellensis* (Eungella Plateau — Clarke Range). In northeastern Queensland expansions of rainforest led to a northward dispersal of *T. acutirostris* into the area occupied by *T. rheophilus*. Later rainforest contractions in northeastern Queensland have been insufficient to produce further differentiation within the *T. acutirostris* complex (See Fig. 4).

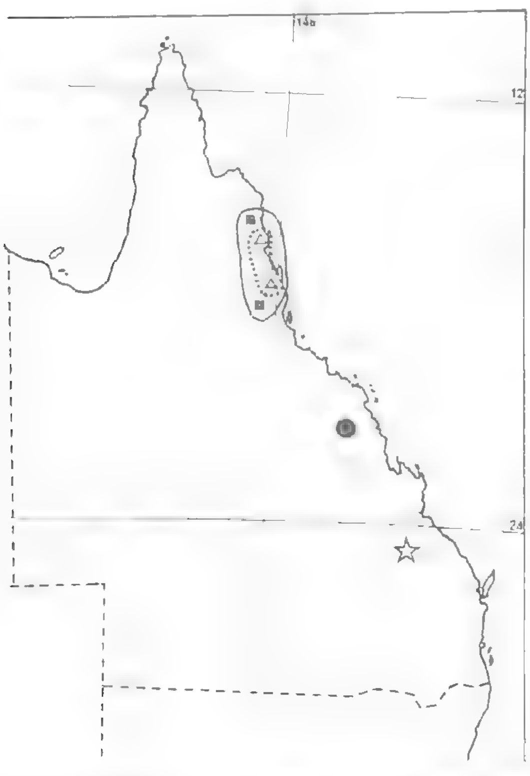

FIG. 4: Distribution of members of the *Taudactylus rheophilus* species group (triangules - *T. rheophilus*, closed circle - *T. liemi*, star - *T. pleione*) and *Taudactylus acutirostris* species group (closed squares - *T. acutirostris*). The northern and southern limits are used to define the boundaries of the *T. rheophilus* and *T. acutirostris* distributions of NE. Queensland.

ACKNOWLEDGEMENTS

I particularly wish to thank Geoff Monteith for his assistance during this study. Robin Czechura and Matthew Bliss aided me in the field. Steve Wilson provided field assistance and photographs. Geoff Thompson provided the illustrations shown in Fig. 1. Jeanette Covacevich, Allen Greer and Glen Ingram provided comments on the manuscript. Permits to traverse the area with kindly supplied by the Queensland Department of Forestry, Monto forestry district.

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PLATE 1

Taudactylus pleione sp. nov. in life. Holotype QM J42392 headwaters of Kroombit Creek, Kroombit Tops via Calliope, SE.Q.

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A LIST OF SPECIMENS OF THE ORDER CETACEA IN THE QUEENSLAND MUSEUM

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INTRODUCTION

Three suborders are recognised in the Order Cetacea. They are the Archaeoceti, which are extinct and not represented in the Queensland Museum collection, the Mysticeti and the Odontoceti. Jaggard (1884) and de Vis (1884) first reported details of cetacean specimens in the Queensland Museum. The present review of the collection has been prepared in the centenary year of its establishment. The Queensland coastline lies between latitudes 10°S and 28°S and the collection is dominated by species which frequent tropical and temperate coastal waters.

The sequence of classification follows that suggested by Fraser and Purves (1960) and adopted by Watson (1981). The family Ziphidae is presented according to Moore (1968). Common names currently used in Australia precede those recommended by Watson (1981). Details of each specimen are listed as follows: registration number, date of registration, donor or collector (if known), collection site, method of discovery, material present. The abbreviation QM is used for the Queensland Museum.

Sub-Order MYSTICETI (baleen whales)
Family Balaenopteridae

Balaenoptera musculus Linnaeus, 1785
Blue whale

J4807, 16.10.1928, W.K. Cleeve, Couti Uti (22°20'S, 150°07'E), stranding, baleen.

Balaenoptera acutorostrata Lacépède, 1804
Minke or Piked whale

J21708, 27.9.1971, QM staff, Currimundi (26°48'S, 153°08'E), stranding, complete skeleton.

Balaenoptera borealis Lesson, 1828
Sei whale

J21713, 6.10.1971, QM staff, Tin Can Bay Inlet (25°51'S, 153°02'E), stranding, complete skeleton.

Balaenoptera edeni Anderson, 1878
Bryde's or Tropical whale

JM4386, 12.5.1983, QM staff, Great Sandy Strait (25°38'S, 152°57'E), stranding, complete skeleton.

Megaptera novaeangliae Borowski, 1781
Humpback whale

J3343, 1.10.1919, T. Welsby, Amity Point (27°24'S, 153°26'E), stranding, skull; J4135, 23.9.1924, T.W. Murray, Jumpinpin (27°35'S, 153°27'E), stranding, radius; J6201, 1.6.1937, Hage & Perry, Jumpinpin (27°35'S, 153°27'E), stranding, auditory bones; J13166, 20.4.1959, C. Wendt, Tangalooma (27°12'S, 153°22'E), whaling operations, auditory bone; J13167, 20.4.1959, C. Wendt, Tangalooma (27°12'S, 153°22'E), whaling operations, auditory bone; JM4398, 25.6.1983, Cooloola (26°12'S, 153°05'E), stranding, pectoral fin bones. The collection of J3343 was described in detail by Welsby (1931). The complete skeleton was deposited in the QM but the skull appears to be the only surviving material.

Sub-Order ODONTOCETI (toothed whales)
Family Ziphidae

Ziphius cavirostris Cuvier, 1823
Cuvier's beaked or Goosebeak whale

J3262, 11.2.1919, E. Jensen, Nikenbah (25°19'S, 152°48'E), stranding, skull and one intervertebral disc. The specimen was described by Longman (1919 and 1926).

Indopacetus pacificus Longman, 1926
Longman's beaked or Indopacific beaked whale

J2106, 18.1.1915, E.W. Rawson, Mackay (21°09'S, 149°11'E), stranding, skull. This specimen is the holotype of the species and was described by Longman (1926) who named it *Mesoplodon pacificus.* Moore (1968) confirmed it as a separate species, noted that he had seen photographs of a similar skull forwarded from Somalia and renamed it *Indopacetus pacificus*. The latter skull was described by Azzoroli (1968). This species, known only from these two skulls, is the world's rarest living whale.

Mesoplodon densirostris de Blainville, 1817
Blainville's beaked or Dense beaked whale

J4056, 31.3.1924, E. Beaman, Yeppoon (23°08'S, 150°44'E), stranding, skull; J5330, 13.5.1932, L.S. Williams, Sarina (21°24'S, 149°19'E), stranding, skull; J13600, 14.4.1966, H. Hurst, Whitsunday Group (20°10'S, 149°05'E), skull; JM4399, 27.10.1983, L.G. Nash, Moreton Island (27°12'S, 153°22'E), stranding, skull.

Mesoplodon layardii Gray, 1865
Straptooth beaked whale

J2105, 18.1.1915, W.N. Jaggard, Emu Park (23°16'S, 150°50'E), stranding, skull and seven cervical vertebrae; J3280, 15.4.1919, Southport (28°00'S, 153°26'E), stranding, vertebrae. J2105 was described by Jaggard (1884) and Longman (1926). The specimen J3280, discussed by de Vis (1884), was displayed as a fully mounted skeleton in the QM for many years. The vertebrae appear to be the only surviving material.

Family PHYSETERIDAE

Physeter macrocephalus Linnaeus, 1758
Great sperm whale

J4684, 9.11.1927, Daily Mail Ltd., Burleigh Heads (28°05'S, 153°27'E), stranding, mandible; J20422, 13.11.1970, D. Barry, Fraser Island (25°31'S, 153°08'E), stranding, incomplete skull, remainder of skeleton almost complete; JM4360, 8.2.1983, V. Bushing, Moreton Island (27°09'S, 153°25'E), stranding, incomplete skull; JM4406, 16.12.83, M. Simmons and S.M. Van Dyck, Cape Capricorn (23°29'S, 151°14'E), stranding, incomplete skull; JM4420, 30.4.1984, R.A. Paterson and S.M. Van Dyck, Dundowran (25°18'S, 152°46'E), stranding, incomplete skull, vertebrae, ribs and pectoral fin bones; JM4421, 30.4.1984, B.J. Kelly, Dundowran (25°18'S, 152°46'E), incomplete mandible. The immature skeletal elements of specimens J20422, JM4360 and JM4406 together with measurements and photographs held in the QM indicate that the whales were juveniles and it is possible that they were recently born. Specimens JM4420 and JM4421 are from the only recorded mass stranding of sperm whales in Queensland, that of ten whales which stranded at Dundowran on 16.10.1969. The collection also includes some Great sperm whale teeth (J3406, J3837, J6407) said to have originated from the south-west Pacific region. J6407 is an example of scrimshaw.

Kogia breviceps de Blainville, 1838
Pygmy sperm whale

J5288, 26.2.1932, W.C. Thompson, Caloundra (26°48'S, 153°08'E), stranding, mandible; J5463, 2.6.1933, Brighton (27°20'S, 153°04'E), stranding, complete skeleton; JM4387 12.5.1983, Queensland National Parks and Wildlife Service, Woodgate (25°07'S, 152°34'E), stranding, skull.

Family STENIDAE

Sousa chinensis Osbeck, 1757
Indopacific humpback dolphin

J7443, 31.10.1949, M. Cross, Moreton Bay (27°26'S, 153°14'E), stranding, skull; J21718, 14.10.1971, T. Baird, North Stradbroke Island (27°35'S, 153°27'E), stranding, skull; JM1337, 15.4.1976, Gold Coast (28°00'S, 153°26'E), 'Sea World' dolphinarium, skull; JM2149, 24.2.1977, M.M. Bryden, Gold Coast (28°00'S, 153°26'E), shark net, complete skeleton; JM4377, 19.4.1983, V. Bushing, Moreton Island (27°12'S, 153°22'E), stranding, complete skeleton. There is an unregistered specimen of *Sousa chinensis* in the collection comprising a skull and upper cervical vertebrae.

Family GLOBICEPHALIDAE

Globicephala melaena Traill, 1809
Longfin pilot whale

J4480, 25.6.1926, T. Welsby, Point Lookout (27°26'S, 153°33'E), stranding, skull.

Globicephala macrorhynchus Gray, 1846
Shortfin pilot whale

J2104, 18.1.1915, Queensland coast (precise location not recorded), skull; J3820, 7.6.1923, N.D. Allom, Fraser Island (25°22'S, 153°07'E), stranding, skull and four vertebrae. Longman (1926) described both J2104 and J3820 as *Globicephalus melas* Traill. There are another two unregistered specimens of *Globicephala macrorhynchus* in the collection with no details as to their origin. One is a complete skeleton and the other a skull.

Pseudorca crassidens Owen, 1846
False killer whale

J937, 21.3.1913, J.H. Stevens, Townsville (19°16'S, 146°49'E), stranding, skull; J6614, 15.8.1939, J.L. Schuster, Tallebudgera (28°10'S, 153°23'E), stranding, skull; J14210, 18.2.1966, QM staff, Booral (25°17'S, 152°54'E), stranding, complete skeleton.

Feresa attenuata Gray, 1875
Pygmy killer whale

JM825, 6.11.1975, J. Evans and M.M. Bryden, Kingscliff (28°15'S, 153°36'E), stranding, complete skeleton. The specimen was described by Bryden (1976).

Peponocephala electra Nishiwaki & Norris, 1966
Melonhead whale

JM762, ?.5.1975, R. Lanham and M.M. Bryden, Tugun (28°09'S, 153°30'E), stranding, complete skeleton (skull registered JM1338, 15.4.1976); JM2032, 25.1.1977, QM staff, Moreton Island (27°11'S, 153°24'E), stranding, complete skeleton; JM2144, 24.2.1977, QM staff, Moreton Island (27°11'S, 153°24'E), stranding, skull; JM2145, 24.2.1977, QM staff, Moreton Island (27°11'S, 153°24'E), stranding, skull; JM2146, 24.2.1977, QM staff, Moreton Island (27°11'S, 153°24'E), stranding, skull; JM2147, 24.2.1977, QM staff, Moreton Island (27°11'S, 153°24'E), stranding, complete skeleton; JM2148, 24.2.1977, QM staff, Moreton Island (27°11'S, 153°24'E), stranding, complete skeleton. JM762 was described by Bryden, Dawbin and Heinsohn (1977) together with two other specimens of *Peponocephala electra* recovered from the north Queensland and New South Wales coasts. Shortly after those three specimens were described a mass stranding of fiftythree Melonhead whales occurred on Moreton Island and the measurements of one of them (JM2147) were described by Bryden, Harrison and Lear (1977).

Family DELPHINIDAE

Lagenodelphis hosei Fraser, 1956
Fraser's or Shortsnout dolphin

JM2749, 5.11.1979, M.M. Bryden and D.H. Barry, Fraser Island (25°22'S, 153°07'E), stranding, skull. The specimen was described by Bryden and Barry (1980)

Grampus griseus Cuvier, 1812
Risso's or Grey dolphin

J6317, 23.12.1937, V.M. Rooke, Cape Capricorn (23°29'S, 151°14'E), stranding, skull, sternum and flipper bones; JM3858, 25.11.1982, V. Bushing, Moreton Island (27°02'S, 153°28'E), stranding, skull.

Orcaella brevirostris Gray, 1866
Irrawaddy or Snubfin dolphin

J14263, 12.7.1966, R.K. Bryson, Townsville (19°16'S, 149°49'E), shark net, complete skeleton; JM511, 27.9.1974, S. Adams, Mackay (21°09'S, 149°11'E), shark net, complete skeleton.

Stenella coeruleoalba Meyen, 1833
Striped dolphin

JM3859, 25.11.1982, V. Bushing, Moreton Island (27°09'S, 153°25'E), stranding, skull.

Delphinus delphis Linnaeus, 1758
Common dolphin

J2776, 23.6.1916, J.H. Stevens, Moreton Bay (27°25'S, 153°20'E), stranding, skull; JM2033, 25.1.1977, M.M. Bryden, Gold Coast (28°00'S, 153°26'E), shark net, complete skeleton; JM2094, 17.2.1977, skull and flipper bones. J2776 was briefly described by Longman (1926).

Tursiops truncatus Montagu, 1821
Bottlenose dolphin

J2412, 9.7.1915, J.H. Stevens, Bustard Head (24°01'S, 151°46'E), stranding, mandible; J2647, 21.12.1915, Moreton Bay (27°25'S, 153°20'E), stranding, skull; J3849, 17.7.1923, J. Cowan, Burleigh Heads (28°05'S, 153°27'E), stranding, skull; J4155, 24.10.1924, J. Peiniger, Townsville (19°16'S, 146°49'E), stranding, skull; J5653, 27.6.1934, E.V. Stevens, Bribie Island (27°03'S, 153°10'E), stranding, skull; J6421, 25.7.1938, K. Jackson, Point Lookout (27°26'S, 153°33'E), stranding, skull; J6678, 3.6.1940, F. Eager, Mooloolaba (26°39'S, 153°06'E), stranding, head; J7015, 24.5.1944, R. Wright and E.R. Gericke, Bundaberg (24°46'S, 152°24'E), stranding, skull; JM1230, 6.2.1976, R. Dallas, Moreton Bay (27°25'S, 153°20'E), meshed during trawling, complete skeleton.

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ANNALS OF THE QUEENSLAND MUSEUM: BIBLIOGRAPHY AND INDEX OF NEW TAXA.

G.J. INGRAM
Queensland Museum

INTRODUCTION

The *Annals of the Queensland Museum* were published by the Queensland Museum during the years 1891 to 1911. Copies are rare in book collections and it is little known today. To taxonomists, however, this organ is still of great moment. Hundreds of new species of Australian Fauna — particularly vertebrates, insects, and fossils — were described within its pages.

The publication of the *Annals* was not without travail. On 19 November, 1889, the Under Secretary of the Department of Public Instruction gave approval for the first part of the *Annals* to be printed by the Government Printer. Seventeen days later, on 6 December, the approval was withdrawn. This change of mind was affected by direct intervention of the Colonial Secretary. He had been lobbied by the Master Printers Association. The Association was concerned that work for its members was being lost by unfair use of the Government Printer. They argued that the *Annals* was a non-government publication. They succeeded in convincing the Colonial Secretary and a fiat was issued declaring that 'in future all work of a non- or semi-official character should be placed in the hands of private firms .....' Needless to say, the Board of Trustees could not afford to go ahead with the printing, and it was delayed for two years.

Difficulty was experienced in obtaining any information about the early days of the *Annals*. The journal was rarely mentioned in the archives of the Museum except for acknowledgments of its receipt from learned societies and other institutions. The publication of the first issue of the *Annals* in 1891 was a significant event in the history of natural science in Queensland. Very few learned journals were printed in the Colony at that time. Most natural history papers were submitted to the Royal Society of Queensland for publication in its *Proceedings* or to the weekly newspaper, the *Queenslander*. Newspapers did not have scientific respectability, and the *Proceedings* could not accommodate all the papers written. The *Annals* gave the promise of valuable and respectable printed space.

The journal did not live up to this promise because of the vicissitudes of the depression of that decade and the early part of this century. Whether an issue was printed depended on whether the Department of Public Instruction, on submission, voted the monies to meet the cost. Often there was no money. Few authors could chance a long delay. These circumstances placed the Curator (later the Director), C.W. de Vis, in the best position to exploit the *Annals* as a publication outlet. Of the forty papers which appeared, twenty-five were his.

The *Annals* were superceded by the *Memoirs of the Queensland Museum* in 1912. This change of title ended the embarassment of not publishing an annals annually. During the twenty-one years of its existence, it appeared only ten times.

The dates of publication of the ten issues were:-

No. 1. Jul, 1891 (before 22nd)
No. 2. May, 1892 (before 6th)
No. 3. Jul, 1897 (before 19th)
No. 4. Jan, 1898 (before 31st)
No. 5. Jan, 1901 (before 26th)
No. 6. Sep, 1905 (before 30th)
No. 7. 7 Jun, 1907
No. 8. 23 Mar, 1908
No. 9. 14 Oct, 1908
No. 10. 1 Nov, 1911

The dates for Numbers 7 to 10 were printed on the frontispiece of each issue. Number 6 had 'Sept., 1905' hand-written on all the issues I saw. This date was confirmed in the minutes of the Board of Trustees of 30th September, 1905. Numbers 1 to 5 have only the year of publication printed on the frontispiece. The more precise dates for these issues were elucidated from archival material. The dates for Numbers 2 and 5 were taken from the minutes of the Board of 6 May, 1892 and 26 January, 1901 respectively. The dates for Numbers 1, 3, and 4 were assumed from the earliest acknowledgement of receipt from outside organizations. These should be accurate because most organizations quickly acknowledged donations.

The dates given here for Numbers 4 and 5 are different years to those printed on their frontispieces (1897 and 1900 respectively). For the purposes of priority for taxonomic nomenclature, however, the differences are of little import. Where only the year of publication is known, the 'International Code of Zoological Nomenclature' stipulates the last day of that year as the publication date.

The bibliography is an alphabetical list by author of all papers which appeared in the *Annals*. The index is divided into two categories, 'Fossil Taxa' and 'Recent Taxa'. Within these categories all new genera, species and subspecies are listed under major group headings. No new families were designated.

I made no decisions about the validity of names. Names are listed even if they were *nomina sp.*. The new names in the two papers of Volume 2 are included although they were predated by the nearly identical papers in the *Annual Report on British New Guinea* 1890-1891.

The authors of the names can be accessed simply if needed. De Vis authored all the fossils and recent birds, mammals and reptiles. He also described one fish (*Enoplosus serotinus*) and one spider (*Nephila maculata piscatorum*). Lamb authored all the amphibia and spider names except for the one spider by de Vis. Ogilby authored all the fish except for the one species by de Vis. The Coleoptera were all described by Carter, the Hemiptera by Tryon, and the one cestode by Johnston. The Lepidoptera were authored by Turner except for those from Volume 1 which were by Miskin.

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