Systematics of the Australian Longicorn Beetle Genus *Uracanthus* Hope 1833 (Coleoptera: Cerambycidae: Cerambycinae: Uracanthini)

A thesis presented in partial fulfillment of
the requirements for the degree of
Doctor of Philosophy
in
Plant Science (Entomology)
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New Zealand

Duangrat Thongphak

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CANDIDATE'S DECLARATION

I hereby declare that the dissertation, submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy and entitled "Systematics of the Australian Longicorn Beetle Genus *Uracanthus* Hope 1833 (Coleoptera: Cerambycidae: Cerambycinae: Uracanthini)", is my own work and that the thesis material has not been used in part or in whole for any other qualification.

Duangrat Thongphak

PhD Candidate

14 March 2007

SUPERVISOR'S DECLARATION

This is to certify that the research carried out in the Doctoral thesis entitled "Systematics of the Australian Longicorn Beetle Genus *Uracanthus* Hope 1833 (Coleoptera: Cerambycidae: Cerambycinae: Uracanthini)" was done by Duangrat Thongphak in the Institute of Natural Resources at Massey University, Palmerston North, New Zealand. The thesis material has not been used in part or in whole for any other qualification, and I confirm that the candidate has pursued the course of study in accordance with the requirements of the Massey University regulations.

Professor Qiao Wang
Supervisor
14 March 2007

CERTIFICATE OF REGULATORY COMPLIANCE

This is to certify that the research carried out in the Doctoral thesis entitled "Systematics of the Australian Longicorn Beetle Genus *Uracanthus* Hope 1833 (Coleoptera: Cerambycidae: Cerambycinae: Uracanthini)" in the Institute of Natural Resources at Massey University, New Zealand:

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(iii) does not exceed 100,000 words, and

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Duangrat Thongphak
PhD Candidate
14 March 2007

Professor Qiao Wang
Supervisor
14 March 2007

ABSTRACT

Uracanthus is a large group of longicorn beetles in the Australian Region. The larvae of this genus are borers of at least 31 genera of trees and parasitic plants, including some economically important crops such as citrus, litchi, peach, plum, and apricot. Several species are important pests of orchards. Adults visit flowers of various tree species and are attracted to the light. In this thesis, I undertook a thorough taxonomic revision, analysed the phylogeny using morphological and molecular characters, and appraised biogeographic distribution of the genus.

In the taxonomic revision, I redefine the scope of the genus, describe and illustrate new and previously known species, and provide a key to all species. The revised Australian *Uracanthus* includes 39 species, eight of which are established as new to science: *U. pseudogigas* sp. nov., *U. maculatus* sp. nov., *U. griseus* sp. nov., *U. bicoloratus* sp. nov., *U. perthensis* sp. nov., *U. punctulatus* sp. nov., *U. quadristriolatus* sp. nov., and *U. bistriolatus* sp. nov. Six new synonyms are proposed (senior synonyms last): *U. multilineatus* McKeown with *U. ventralis* Lea, *U. dentiapicalis* McKeown with *U. parvus* Lea, *U. marginellus* Hope and *U. inermis* Lea (not Aurivillius) with *U. bivittatus* Newman, *U. fuscostriatus* McKeown with *U. lateroalbus* Lea, and *U. daviumbus* Gressitt with *U. longicornis* Lea. Dorsal views of all species are presented as photographs, terminalia of both sexes illustrated, and distributions mapped. Brief comments are also given on the biology of this genus.

In the full morphological phylogenetic analyses of all 39 species, I use 55 informative characters and cladistic method to test the monophylies of *Uracanthus* and its species groups. My results show that the monophylies of the genus and seven species groups are confirmed. However, several species groups still need additional steps to become monophyletic and are currently considered paraphyletic. In the molecular phylogenetic studies, due to the situations beyond my control (difficulties of extracting DNA from some old species and prohibitions of extracting DNA from type specimens), I analyse only 21 species. I extract and amplify the cytochrome oxidase I (COI) region of the

mtDNA from 21 species and perform a phylogenetic analysis using molecular characters. To make the molecular phylogeny comparable to the morphological phylogeny, I also cladistically analyse the phylogeny of these 21 species using morphological and combined morphological-molecular characters. A comparison of trees obtained from morphological, mtDNA and combined data shows that the relationships of several closely related taxa remain constant, for example, the sister relationships of *U. gigas* + *pseudogigas*, *U. insignis* + *punctulatus*, and *U. acutus* + *loranthi*. However, the placement of *U. insignis* and *U. punctulatus* on the phylogenetic trees varies from the most basal in the full morphological analysis to the highly derived in the combined and molecular analyses. Considering the amount of available data is more limited in the molecular analysis than in the morphological analysis, the molecular phylogeny presented in this study should be interpreted with caution.

The *Uracanthus* fauna can be divided into five subregions: the Kosciuskan, Western and Eyrean in southern and central Australia, and the Torresian and Timorian in northern Australia. The fauna are richest with highest endemism in the Kosciuskan and Western. The Kosciuskan and Western are similar in faunal composition and closely related; the Eyrean has probably acted as a faunal exchange transit area between the Kosciuskan and Western, and the two northern Australian subregions have no endemic species. When the areas of endemism of each species are attached to the phylogenetic tree generated from the full morphological analysis, a clear picture of the distribution patterns of species groups in relation to phylogeny is obtained. It is suggested that the speciation and species radiation of *Uracanthus* may have occurred first in the Kosciuskan, then in the Western, and finally in the Eyrean, Torresian, and Timorian.

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I dedicate this thesis to Prajak Thongphak and Ma Mya Aye in memoriam.

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CHAPTER 1

GENERAL INTRODUCTION

1.1 General Background to the Project

The genus *Uracanthus* is a large group of longicorn beetles in the Australian Region, predominantly distributed on the Australian continent and Tasmania. The larvae of this genus are borers of at least 31 genera of trees and parasitic plants, including some economically important crops such as citrus, lychee (or litchi), peach, plum, and apricot (Best 1882; Olliff 1892; Dixon 1908; Froggatt 1893, 1894, 1898, 1902, 1907, 1923; French 1900, 1911; Lea 1916, 1917a, 1917b; Brimblecombe 1943; Matthews 1997; McKeown 1947; Rondonuwu & Austin 1988; Hawkeswood 2002). Adults visit flowers of various tree species and are attracted to the light. Several species are important pests of fruit trees in Australia. This genus may also be important in biosecurity for countries that trade with Australia.

Following examination of all available Australian *Uracanthus* specimens from Australian and overseas institutions and all relevant literature, however, I have found that the taxonomy of this genus was still very unsettled, species relationships and biogeographic distribution patterns unknown, and a key to all Australian species unavailable, making species identification, pest management, and pest risk analysis difficult. Therefore, it had become necessary to make a comprehensive taxonomic revision, phylogenetic analysis and biogeographic evaluation of the Australian *Uracanthus*.

Considering the significance of these insects, I decided to work on their systematics for partial fulfilment of my PhD studies. In this thesis, a thorough taxonomic revision was followed by a phylogenetic and biogeographic treatment using morphological characters and distribution records. To better understand the species relationships, I also carried out phylogenetic analyses using molecular characters and combined molecular and morphological data.

1.1.2 Taxonomic status

Thirty-seven *Uracanthus* species recognised from Australia (McKeown 1947; Rondonuwu & Austin 1988) prior to the present study are listed in Table 1.1. My examination of available *Uracanthus* specimens showed that a number of new species needed describing and several described species synonymising.

1.1.3 Relationships between species

There had been almost no work on relationship within the *Uracanthus* species apart from fragmentary comments on the relationships between some species made by Lea (1916, 1917a, 1917b), McKeown (1948), and Rondonuwu and Austin (1988). This study was the first to address the phylogeny of this genus using both morphological and molecular characters. The phylogenetic treatments made in this study would be useful for the understanding of speciation, biogeography and pest management in the genus.

1.1.4 Biogeographic distribution patterns

Distribution or collecting records of the Australian *Uracanthus* species were scattered in descriptions of individual species and reports on pests. There was no previous attempt for the analysis of biogeographic distribution patterns of this genus. My study provided all known distribution information for the genus and discussed distribution patterns in relation to phylogeny of the genus. This investigation formed the basis for work in pest quarantine and management, and the conservation of beneficial species.

Table 1.1 *Uracanthus* species recognized prior to this study

1. *U. acutus* Blackburn, 1889	20. *U. leai* McKeown, 1938
2. *U. albatus* Lea, 1916	21. *U. longicornis* Lea, 1916
3. *U. ater* Lea, 1917	22. *U. loranthi* Lea, 1916
4. *U. bivittatus* Newman, 1838	23. *U. maleficus* Lea, 1917
5. *U. corrugicollis* Lea, 1917	24. *U. marginellus* Hope, 1841
6. *U. cryptophagus* Olliff, 1892	25. *U. minatus* Pascoe, 1866
7. *U. cupressianus* Rondonuwu & Austin, 1988	26. *U. multilineatus* McKeown, 1948
	27. *U. pallens* Hope, 1841
8. *U. dentiapicalis* McKeown, 1948	28. *U. parallelus* Lea, 1916
9. *U. discicollis* Lea, 1916	29. *U. parvus* Lea, 1916
10. *U. dubius* Lea, 1916	30. *U. pertenuis* Lea, 1916
11. *U. froggatti* Blackburn, 1895	31. *U. simulans* Pascoe, 1866
12. *U. fuscocinereus* White, 1855	32. *U. strigosus* Pascoe, 1875
13. *U. fuscostriatus* McKeown, 1948	33. *U. suturalis* Lea, 1916
14. *U. fuscus* Lea, 1916	34. *U. regalis* McKeown, 1948
15. *U. gigas* Lea, 1916	35. *U. triangularis* Hope, 1833
16. *U. glabrilineatus* Lea, 1917	*U. triangularis* Var A Lea, 1916
17. *U. inermis* Aurivillius, 1917	*U. triangularis* Var B Lea, 1916
18. *U. insignis* Lea, 1916	*U. triangularis* Var C Lea, 1916
19. *U. lateroalbus* Lea, 1916	36. *U. tropicus* Lea, 1916
	37. *U. ventralis* Lea, 1917

1.1.5 Host plant and biological records

Fragmentary information on host plants and biology of the genus also occurred in various publications (Best 1882; Olliff 1892; Allen et al. 1898a, 1898b; Dixon, 1908; Brimblecombe 1943; Froggatt 1893, 1894, 1898, 1902, 1907, 1923; Lea, 1916, 1917a, 1917b; French 1900, 1911; Tillyard 1926; McKeown 1947; Duffy 1963; Matthews 1997;

1917b; French 1900, 1911; Tillyard 1926; McKeown 1947; Duffy 1963; Matthews 1997; Rondonuwu & Austin 1988; Hawkeswood 2002;). Only one species, *U. cupressianus,* has been studied in detail with regard to biology and ecology (Rondonuwu & Austin 1988). However, the general biology and pest status of this genus have not been reviewed and discussed, information of which is important for pest management and biosecurity assessment.

1.2 Aim of This Study

The general aim of this study was to make a comprehensive systematic treatment of the Australian genus *Uracanthus* with four objectives:

(1) To provide a thorough taxonomic revision of *Uracanthus,* including redefinition of the scope of the genus, evaluation of taxonomically useful characters, and a key to all species, with illustrations and descriptions of both new and previous known species.

(2) To reconstruct the phylogenetic relationships of *Uracanthus* species using morphological characters.

(3) To review and summarise the current distribution of *Uracanthus* species, define the areas of endemism, and identify faunal similarities between areas of endemism.

(4) To extract and amplify DNA for molecular characters and undertake phylogenetic analyses using molecular and combined morphological-molecular characters.

CHAPTER 2

TAXONOMIC REVISION OF THE LONGICORN BEETLE GENUS *URACANTHUS* HOPE 1833 FROM AUSTRALIA

2.1. Introduction

The genus *Uracanthus* was erected by Hope (1833) under the family Stenochoridae with *U. triangularis* as the type species (monotypic). During the nineteenth century, eleven species were described either in *Uracanthus* or in other genera and later transferred to *Uracanthus* (Boisduval 1835, Hope 1834, 1841a, 1841b, 1844, Gahan 1893, Castelneau 1840, Newman 1838, White 1855, Pascoe 1866, 1875, Blackburn 1889, 1894 & Olliff 1892).

The first half of the twentieth century saw a great activity in taxonomic work on *Uracanthus* by Aurivillius (1917), Lea, (1916, 1917a, 1917b), and McKeown (1938, 1940, 1942, 1947 & 1948). Among those workers, Lea (1916 & 1917) made the most significant contribution to the genus. In 1916, he revised the genus, described fourteen new species and provided a key to 22 known species. One year later, he added six new species to the genus. During this period, species descriptions were mainly based on the shape of the elytral apex, and the pubescence pattern on the elytral disc and prothorax.

Duffy (1963) was the first to deal with immature stages of *Uracanthus*. In 1963, he described immature stages of three species and summarised the distribution and biology of twelve species in *Uracanthus*. Rondonuwu and Austin's (1988) work was the most recent taxonomic treatment of this genus, where they described a new species, *U. cupressianus*, from South Australia. These authors used many more characters including genitalia characters.

Prior to the current study, 37 species were recognized from Australia with a number of variants proposed (Lea 1916 & 1917a, b, McKeown 1947 & 1948, Rondonuwu & Austin 1988), and four from New Guinea (Gressitt 1951 & 1959). However, the taxonomy of the genus was still confused and a thorough revision was necessary.

I have examined all available Australian *Uracanthus* species and found five synonyms need proposing and eight new species describing. I have also seen types of two New Guinean species, *U. daviumbus* Gressitt 1951 and *U. albopleuron* Gressitt 1959. The first species is found to be a synonym of *U. longicornis*. The second one appears very different from the rest of *Uracanthus* species and its generic status needs further investigation. The types of another two New Guinean species, *U. declivis* Gressitt 1951 and *U. stueberi* Gressitt 1959, could not be located, even if Gressitt (1951, 1959) indicated that the type of *U. declivis* was in Taiwan Agricultural Research Institute, and that of *U. stueberi* in LEIDEN, the Netherland. Therefore, the three New Guinean '*Uracanthus*' species were excluded in this study.

This study aims to provide a thorough taxonomic revision of the Australian *Uracanthus*, including the redefinition of the scope of the genus, descriptions and illustrations of new and previously known species, and a key to all Australian species. The revised Australian *Uracanthus* consists of 39 species, of which 31 are redescribed and eight described as new. Six new synonymies are also proposed.

2.2 Materials and Methods

2.2.1 Specimens examined

Thousands of *Uracanthus* specimens were examined during the course of this study. Types of all species and their synonyms were examined. Specimens borrowed from following institutions, abbreviations of which were shown in text:

AM	Australian Museum, Sydney
AMNH	American Museum of Natural History, New York
ANIC	Australian National Insect Collection, CSIRO, Canberra
ASCU	Agricultural Scientific Collections Unit, Orange Agricutural Institute, Orange
BMNH	The Natural History Museum, London
FCNI	Forestry Commission of New South Wales Insect Collection, Beecroft
HMO	Hope Museum, Oxford, London
MAM	Macleay Museum, Sydney
NTM	Museum and Art Gallery of the Northern Territory, Drawin
NMV	Museum of Victoria, Melbourne
QM	Queensland Museum, Brisbane
QDPI	Queensland Department of Primary Industries Insect Collection, Brisbane
SAM	South Australian Museum, Adelaide
UQIC	University of Queensland Insect Collection, Brisbane
WADA	Western Australian Department of Agriculture Insect Collection, Perth
WAM	Western Australian Museum, Perth
WINC	Waite Insect and Nematode Collection, Adelaide
VAIC	Victorian Agricultural Insect Collection, Melbourne

2.2.2 Measurement and illustrations

External morphological measurements (Fig. 2.1, p.169) were made under a stereomicroscope (Leica M212), and a digimatic-meter (Mitutoyo, Japan), and measurement of terminalia under a compound microscope (Olympus, CH), with ocular micrometers. Drawings of terminalia were made under the compound microscopes with the aid of camera lucida attachments. Dorsal view of each species was illustrated as photographs taken using a Nikon Coolpix4500® digital camera (Tokyo, Japan) attached with Nikon Coolight SL (Tokyo, Japan).

2.2.3 Dissection of terminalia

The terminalia were prepared by soaking the whole beetle in a water bath set at 80°C for 10-20 min depending on the size of the beetles. The softened beetle was then fastened on the dissecting board using insect pins, and the terminalia were carefully removed with a pair of tiny sharp forceps, without removing the abdomen. These were then cleared in 10% KOH at the room temperature for 24 hr. The terminalia were washed with distilled water and then placed on a glass slide for measurement, drawing and photographing. Dissected terminalia of all species except *U. gigas* Lea and *U. pseudogigas* sp. nov. were placed in glycerine in small plastic vials (6 mm dia x 12 mm long, BioQuip Inc., USA) pinned with the specimens from which they originated. Terminalia of *U. gigas* and *U. pseudogigas* were mounted in Euparal as permenant slides. All slides bear terminalia slide numbers that match the specimens from which they originated.

2.2.4 Geographic distribution and biological records

Distribution records were made from collection labels of each specimens examined and literature. The latitude and longitude of distribution localities were confirmed using an online Australian atlas (http://www.ga.gov.au/map/names/).

2.2.5 Terminology and descriptions

General morphological terminology in this study follows Lawrence and Britton (1991), Bense (1995), Wang (1998), Wang and Lu (2004) and Lu and Wang (2005).

Terminology for terminalia partially follows Sharp and Muir (1912), Ehara (1954) and Wang (1993, 1998).

2.3 Taxonomy

2.3.1 Genus *Uracanthus* Hope, 1833

Uracantha Hope, 1833: 64.

Uracanthus Hope, 1834: 108; Castelneau, 1840: 425; Thomson, 1860: 143, 151; 1864: 155, 413; Lacordaire, 1869: 390; Aurivillius, 1912: 147; Lea, 1916: 368; McKeown, 1947: 62. [Type species: *U. triangularis* Hope, 1833 (by monotypy)].

Diagnosis

Genae long and parallel; head with transverse wrinkles on ventral side; prothorax constricted anteriorly; elytra long, subparallel, gradually tapering towards apex, with longitudinal glabrous stripes and/or sub-basal, glabrous (or sparsely pubescent) and subtriangular marks, or with dense pubescence throughout; tibia with 2 spurs at apex; hind tarsal segment 1 as long as or longer than sum of segments 2 and 3.

Description

Body size. Male body length: 11.81–53.78 mm; *width*: 1.71–10.83 mm. *Female body length,* 11.11–60.56 mm; *width,* 1.88–12.30 mm.

Colour (Figs 8-9). Body reddish to blackish brown with golden or whitish pubescence; many species with 1 or 2 longitudinal stripes of dense pubescence on each side of pronotal disc; elytron pubescent throughout, or pubescent with 2-3 longitudinal glabrous stripes and/or a large sub-basal, glabrous (or sparsely pubescent) and subtriangular mark.

Head (Figs 2-4). Head narrower than prothorax; postclypeus very large, triangular (Fig. 2.2A) or semicircular (Fig. 2.2B) in shape, flattened to convex, with coarse punctures and pubescence; distance between lower lobes of eyes less than 2.5 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes about as long as 0.6 × or more than 0.6 × as long as distance between eyes on ventral side (Fig. 2.2C); genal length less than 0.9 × as long as head width immediately below eyes (Figs 2.2B and 2.2D). Antennae slender (Fig. 2.3), composed of 11 segments and filiform with the first segment (scape) most robust and segment 2 (pedicel) smallest; several flagellal segments may be produced at apex (Figs 2.3b and 2.4a) or fringed (Fig. 2.4b) in some species. Antennae may be longer or shorter than body. Apical 1/4 to 1/3 of segment 11 in males usually thinner than basal part, making the segment appear to be 2 segments (Fig. 2.4c).

Thorax and abdomen (Figs 2.5–2.11). Prothorax longer than wide, constricted at anterior margin in most species (Fig. 2.5); sides rounded or angular (Fig. 2.6); pronotal disc binodulose in middle and finely punctate in most species; disc and sides transversely rugose in most species (Figs 2.7 and 2.8). Elytra (Fig. 2.9) subparallel, gradually tapering towards apex, less than 7.0 × as long as prothorax and less than 5.0 × as long as shoulder width; disc with dense, fine punctures at basal half, gradually diminishing towards apex; disc of each elytron with 2-3 longitudinal carinae in most species; apex rounded, bispinose, unispined at suture, truncate or pointed (Fig. 2.9). Legs (Fig. 2.10) slender, femora slightly thickened near apical 1/3; upper surface of femora and tibia with dense pubescence; basal segment of hind tarsus as long as or longer than the sum of segments 2 and 3. Abdomen (Fig. 2.11a) slender, with dense uniform pubescence but in males of *U. albatus*, *U. ventralis* and *U. strigosus*, each sternite also with medial tuft of dense hairs (Fig. 2.11b); each segment slightly longer than width; apex of terminal segment truncate, round or round with notch.

Male terminalia (Figs 2.12–2.16). Aedeagus consisting of median lobe, median strut and internal sac (Fig. 2.12a). Apex of ventral lobe pointed (Fig. 2.12b), rounded (Fig. 2.12c), truncate (Fig. 2.12d) or emarginate (Fig. 2.12e); dorsal lobe longer or shorter than ventral lobe. Internal sac (Fig. 2.12a) divided into three regions: basal unspined region, spined region and terminal region. Spined region with 1–4 forms of spines or processes (Fig. 2.13); terminal region long and narrow, without any spine; sum of unspined and spined regions shorter than terminal region. Tegmen with two parameres (Fig. 2.14), paramere long and slender or short and robust, cylindrical in shape, apex rounded with long and short setae. Eighth sternite obliquely truncate (Fig. 2.15b) or rounded (Fig. 2.15a, c, d) at side; shallowly or strongly emarginate at apex; ventral surface with 1-2 kinds of microspines or cloud-like processes. Eighth tergite (Fig. 2.16) with 1-3 forms of spines on ventral surface; apex rounded (Fig. 2.16a), pointed (Fig. 2.16b), truncate (Fig. 2.16c) or emarginate (Fig. 2.16d).

Ovipositor and spermatheca (Figs 2.17–2.18). Ovipositor usually very short; styli arising terminally (Fig. 2.17). Spermatheca curved to different extent; spermathecal gland arising near (Fig. 2.18a) or at base (Fig. 2.18b).

Distribution

This group of beetles is widely distributed in all states of Australia, mainly along the coast (Fig. 2.19, p.181).

Biology

The biology of *Uracanthus* is largely unknown. According to fragmentary observations (reviewed by McKeown, 1947, Duffy, 1963, and Matthews, 1997; observed by Moore, 1972; Rondonuwu & Austin, 1988; Hawkeswood, 2002) and labels of specimens examined for this study, at least 31 genera of trees are recorded as host plants of

Uracanthus: *Acacia, Aster, Amyema, Amygdalus, Armeniaca, Banksia, Boronia, Callitris, Cassinia, Casuarina, Citrus, Correa, Corylus, Cupressus, Cytisus, Eucalyptus, Eriostemon, Grevillea, Hakea, Helichrysum, Jacksonia, Lasiopetalum, Litchi, Lomatia, Loranthus, Melaleuca, Olearia, Pittosporum, Pomaderris, Pultenaea*, and *Ulex*. Adults visit (and probably feed on) flowers of *Angophora, Eucalyptus, Leptospermum, Melaleuca* and *Xanthorrhoea*. Larvae of many species bore inside the branches and stems of living trees, and some are pests of citrus, lichi, peach, plum, and apricot.

2.3.2 Key to the species of *Uracanthus* Hope

1 Genal length at least 0.2 × as long as distance between genae 2

Genal length about 0.16 × as long as distance between genae; pubescence on elytra short and uniform; apex of elytra more or less rounded at margin and with a small spine at suture ....*U. corrugicollis* Lea (Fig. 2.54; p.156)

2(1) Each elytron with 3 or more distinct longitudinal lines of denser pubescence..............3

Elytra without such distinct pubescent lines 8

3(2) Elytral apex spined at suture and rounded at margin; body blackish; pronotal disc with white pubescence and 5 glabrous areas (2 more or less round on each side and 1 oval near base ....*U. suturalis* Lea (Fig. 2.57; p.164)

Elytral apex bispinose, if only spined at suture, then angled at margin; body reddish or reddish brown 4

4(3) Pronotal disc with 4 longitudinal stripes of dense or fairly dense pubescence 5

Pronotal disc without 4 stripes of such 6

5(4) Sides of pronotum almost rounded; each elytron with 3 raised longitudinal carinae on which pubescence is denser; males without tufts of dense brownish hairs on sternites

....*U. cryptophagus* Olliff (Fig. 2.31; p.66)

Pronotum with a strongly raised, rounded or conical process at each side; elytral disc without distinct longitudinal carinae; each of visible sternites 1-3 with a medial tuft of very dense brownish hairs in males ....*U. strigosus* Pascoe (Fig. 2.46; p.120)

6(4) Each elytron with a large subtriangular glabrous mark, extending from shoulder to basal 1/3, some part of the mark covered with sparse pubescence ....
.... *U. glabrilineatus* Lea (Fig. 2.24; p.37)

Elytra without the above subtriangular mark 7

7(6) Elytral apex distinctly bispinose ....*U. albatus* Lea (Fig. 2. 44; p.111)

Elytral apex spined at suture and angled or slightly produced at margin ....
....*U. ventralis* Lea (Fig. 2.45; p.117)

8(2) Body very large, 39-60 mm long 9

Body usually much smaller; if large, shorter than 39 mm 10

9 (8) Elytral apex bispinose or truncate with processes at both suture and margin; pronotal

disc without a ψ- or ‡-shaped glabrous mark ....*U. gigas* Lea (Fig. 2.37; p.86)

Elytral apex spinose at suture and rounded at margin; pronotal disc with a ψ- or ‡-shaped glabrous mark .... *U. pseudogigas,* sp. nov. (Fig. 2.38; p.89)

10(8) Each elytron with 1 sutural and 1 marginal longitudinal stripes of dense yellowish or whitish pubescence of elytral length, stripe width various 11

Elytra without such stripes 13

11(10) Elytral pubescent stripes narrow, sum of sutural and marginal stripes narrower than the area between stripes at mid elytron; elytral apex strongly bispinose with the spine at margin distinctly longer than that at suture ....*U. pertenuis* Lea (Fig. 2.51; p.138)

Elytral pubescent stripes wide, sum of sutural and marginal strips wider than the area between stripes at mid elytron; elytral apex not strongly biospinose 12

12(11) Pronotal disc strongly rugose transversely; each side of pronotum with 2 spots of dense yellowish pubescence; elytral apex emarginate, if weakly biospinose, then spine at suture distinctly longer than that at margin ......*U. bivittatus* Newman (Fig. 2.52; p.142)

Pronotal disc mostly smooth; each side of pronotum without 2 pubescent spots; elytral apex spined or angled at suture and rounded at margin ....
....*U. discicollis* Lea (Fig. 2.53; p.149)

13(10) Each elytron with a large glabrous or sparsely pubescent subtriangular or semicircular mark, extending from shoulder to about basal 1/3 of elytra 14

Elytra without such marks 23

14 (13) Subtriangular or semicircular marks on elytra completely or largely covered with sparse pubescence 15

Subtriangular or semicircular marks on elytra completely or largely glabrous 16

15(14) Elytral apex distinctly bispinose; body usually longer than 25 mm ....*U. dubius* Lea (Fig. 2.28; p.54)

Elytral apex emarginate or truncate with a spine or process at suture; body usually shorter than 25 mm ....*U. fuscus* Lea (Fig. 2.30; p.63)

16(14) Elytral apex with a small spine at suture ....*U. simulans* Pascoe (Fig. 2.29; p.58)

Elytral apex distinctly emarginate and bispinose 17

17(16) Apical area of elytron distinctly glabrous, margined with a distinct line of dense white pubescence 18

Apical area of elytron pubescent 19

18(17) Pronotal disc rugose transversely mainly anteriorly and posteriorly, with 2 distinct longitudinal stripes of white pubescence; prothorax more slender ....

....*U. pallens* Hope (Fig. 2.26; p.47)

Pronotal disc transversely rugose throughout, with 2 vague or less defined longitudinal stripes of white pubescence; prothorax more robust .... *U. triangularis* Hope (Fig. 2.25; p.39)

19(17) Pubescence on elytral disc uneven, with a number of denser pubescence clusters among less dense pubescence ....*U. maculatus,* sp. nov. (Fig. 2.21; p.25)

Pubescence on elytral disc more or less even, without the pubescence patterns mentioned above 20

20(19) Dorsal view of body greyish with basal half of elytra whitish 21

Dorsal view of body brownish 22

21(20) Golden or brownish pubescence present on the following areas: pronotal disc between 2 stripes of white pubescence, scutellum, and a narrow stripe along suture of elytron extending from basal 1/5 to apex ....*U. regalis* McKeown (Fig. 2.27; p.51)

Pronotum and elytra with more or less uniform whitish pubescence ....*U. griseus,* sp. nov. (Fig. 2.23; p.34)

22(20) Pronotal disc with 2 clearly defined longitudinal stripes of white pubescence and golden or brownish pubescence between the stripes; pubescence on elytral disc along suture golden or brown and that on the remaining elytra whitish .... *U. bicoloratus,* sp. nov. (Fig. 2.20; p.21)

Pronotal disc with 2 vague longitudinal stripes of white pubescence; pubescence on both pronotum and elytra whitish ....*U. perthensis,* sp. nov. (Fig. 2.22; p.32)

23(13) Pronotal disc with a wide, clearly defined longitudinal glabrous area, if this area covered with sparse pubescence, then each elytron with 4 short, longitudinal glabrous marks at base; elytral apex distinctly and strongly bispinose 24

Pronotal disc without above mentioned glabrous area; elytral apex various 28

24(23) Wide longitudinal sub-glabrous area on pronotal disc covered with sparse pale pubescence; basal 1/3 of elytra with dense white pubescence and remaining elytra with golden pubescence; each elytron with 4 basal, longitudinal glabrous marks, with the one along suture the longest .... *U. fuscocinereus* White (Fig. 2.32; p.70)

Wide longitudinal area on pronotal disc completely or almost completely glabrous 25

25(24) Anterior end of longitudinal glabrous area on pronotal disc distinctly wider than posterior end; apical area of elytra almost completely glabrous .... *U. insignis* Lea (Fig. 2.34; p.77)

Anterior end of longitudinal glabrous area on pronotal disc narrower than posterior end; apical area of elytra covered with pubescence 26

26(25) Sides of pronotum covered with dense white or pale yellowish pubescence ....

.... *U. punctulatus,* sp. nov. (Fig. 2.35; p.80)

Each side of pronotum with a more or less distinct, longitudinal glabrous stripe 27

27 (26) Pronotum wider than long; elytra much longer than 4.5 × as long as prothorax ....

....*U. maleficus* Lea (Fig. 2.36; p.83)

Pronotum longer than wide; elytra distinctly shorter than 4.5 × as long as prothorax

.... *U. quadristriolatus,* sp. nov. (Fig. 2. 33; p.74)

28 (23) Elytral apex very sharply pointed ....*U. acutus* Blackbum (Fig. 2.39; p.92)

Elytral apex rounded, truncate or emarginate, with or without spines 29

29(28) Elytral apex rounded or slightly pointed, without spines 30

Elytral apex truncate or emarginate, with or without spines 31

30(29) Elytral apex rounded; elytral disc with very dense and long golden pubescence; antennae, legs, metastemite and abdomen blackish brown and remaining body yellowish brown; ventral side of femora with dense, long golden hairs in males

.... *U. minatus* Pascoe (Fig. 2.42; p.104)

Elytral apex slightly pointed; elytral disc with fairly dense and short golden pubescence; body reddish brown in general, without above mentioned sharp colour contrast; male femora not as above ....

.... *U. cupressianus* Rondonuwu & Austin (Fig. 2.41; p.101)

31(29) Pronotum with a clearly defined longitudinal stripe of dense golden pubescence on each side of disc; elytral apex truncate or slightly emarginate ....
....*U. loranthi* Lea (Fig. 2.40; p.97)

Pronotum without clearly defined pubescent stripes mentioned above 32

32(31) Pronotal disc smooth or weakly rugose transversely......................................33

Pronotal disc strongly rugose transversely..35

33(32) Elytral apex truncate, with very dense white pubescence; pubescence on elytral disc unevenly distributed, giving an appearance of irregular clustered patterns ....

....*U. froggatti* Blackburn (Fig. 2.48; p.128)

Elytral apex emarginate, truncate or spinose but without very dense white pubescence; pubescence on elytral disc more or less evenly distributed 34

34(33) Elytral apex bispinose or truncate; each elytron with a wide submarginal, longitudinal glabrous mark ranging from shoulder to basal 1/3 – apical 1/3 of elytron, if the mark obscure or absent, then elytral apex truncate ....*U. tropicus* Lea (Fig. 2.49; p.131)

Elytral apex emarginate and bispinose; elytral shoulder with a small longitudinal glabrous mark .... *U. parallelus* Lea (Fig. 2.47; p.125)

35(32) Elytral apex emarginate and clearly bispinose, or at least with a distinct spine at margin

....36

Elytral apex truncate or slightly emarginate, with a distinct spine at suture 37

36(35) Body usually longer than 24 mm; pronotal disc binodulose ....
.... *U. bistriolatus*, sp. nov. (Fig. 2.56; p.161)

Body usually shorter than 21 mm; pronotal disc without any distinct nodules ....

.... *U. parvus* Lea (Fig. 2.50; p.134)

37(35) Elytra with relatively sparse, evenly distributed, white pubescence; each side of pronotum without a distinct longitudinal stripe of very dense white pubescence ...

....*U. ater* Lea (Fig. 2.58; p.167)

Elytra with relatively dense whitish or yellowish pubescence, clearly denser near margin; each side of pronotum near ventral side with a distinct longitudinal stripe of very dense white pubescence 38

38(37) Antennal segment 3 shorter than segment 4; basal half of elytra with dense, coarse and shallow punctures; male antennae distinctly longer than body ....
.... *U. longicornis* Lea (Fig. 2.43; p.107)

Antennal segment 3 longer than or as long as segment 4; basal half of elytra without above mentioned punctures; antennae shorter than body ....
....*U. lateroalbus* Lea (Fig. 2.55; p.158)

2.3.3 Descriptions of *Uracanthus* species

***Uracanthus bicoloratus*, sp. nov.**

(Figs 2.20, 2.59, 2.95)

Material examined

Holotype. ♂, **SA:** Wooley Lake, near Beachport, ii.1965, at MV light; terminalia tube pinned with the specimen; bearing a red holotype label (SAM).

Paratypes. 29 ♂, 40 ♀. All paratypes bear blue paratype labels. **QLD:** 1 ♀, Stanthope, xii.1964, E. Sutton, E. Sutton Collection (AM); 1 ♀, Lamington National Park, 17-12.ii.1964, G. Monteith and H. A. Rose (UQIC); 1 ♂, 1 ♀, Kilcoy Distinct, 18.ii.1954, S. Gum (QM); 1 ♀, 520 m, Wonga Hills site, 11.xii.2001, MV light, vine scrub, Monteith, Cook & Wright, Coll. no. 10257 (QM); 1 ♂, Beerwah, 20.ix.1935, H. E. Young (QDPI); 1 ♂, Brisbane, (no abdomen) (QM); 1 ♂, same locality as above but IIlidge (UQIC); 1 ♀, Biarraville, QLD, 20.i.1956, J. C. Le Souef (ANIC); 1 ♀, Carnarvon Range, 10.i.1939, N. Geary (AM). **NSW:** 1 ♂, Corong (SAM); 1 ♀, Kosciusko, i.-ii.1940, F. H. Taylor (AM); 1 ♂, Ballina, 1.ii.1894, Froggatt (ASCU); 1 ♂, Mellabulla, F. H. Taylor (AM); 1 ♀, Nation Park, 16.x.1921, A. Musgrave, Coll. no. K44380 (AM); 1 ♀, Botany, no abdomen (QM); 1 ♀, W of kyogle, Toonumbar Dam, 11-12.xii.1996, MV lamp, D. J. Scambler & J. A. Macdonald (ASCU); 1 ♂, 1420 m, Dawsons spring, Mt Kaputar National Park, 9.xii.1987, at Mercury Vapour lamp, G. R. Brown (ASCU); 1 ♂, 1180m, Bark Hut Camping area, Mt. Kaputar National Park, 10.xii.1987, at mercury vapour lamp, G. R. Brown and S & B. Underswood (ASCU); 1 ♀, Mittagong, 24.iii.1968, R. H. Mulder Coll.(AM); 1 ♂, Mt Dromedary, 23.xi.1965, Britton & Upton (ANIC); 2 ♂, 3 ♀, Mt. Kaputar, 3000 ft., 30.x.1976, at light, C. W. Frazier (ANIC); 1 ♀, Faulconbridge Ridge, 12.xii.1980, S. G. Watkins Collection (ANIC); 1 ♀, N. Wendilla, vi.1908, out of *Correa*, Dixon (NMV).

VIC: 1 ♂, Grampians, 6.ii.1956, Delly's Dell (SAM); 1 ♂, Grampians, 27.xii.1979, ex light trap, G. S. Tayloys (WINC); 1 ♂, Vic Coast, Out of *Banksia* (WINC); 1♂, 3 ♀, Mordiallac, F. E. Wilson Coll (NMV); 1 ♂, 2 ♀, same locality as above but, 15.x.1950, A. L. B. (NMV); 1 ♀, same data as above but 12.x.1950 (NMV); 1 ♂, Ferntree Gully, 8.xii.1927, A. H. Westly (UQIC); 1 ♀, same locality as above but C. Oke (NMV); 1 ♀, Moe, 27.x.1945, C. G. L. Gooding (ANIC); 1 ♀, 13 miles S of Kiata, Little Desert, 7.xi.1966, I. F. B. Common & M. S. Upton (ANIC); 1 ♂, Springvale, Vic, 1945, E. J. Harris (ANIC); 1 ♂, 1 ♀, 27 miles N of Yannac, Big Desert, Vic, 27.x.1973, H. Morton, C. F. Crasby (ANIC); 1 ♂, Kiata, Vic, 1.xi.1945, M. W. Mules (NMV); 2 ♀, Noble Park , Vic, C. Oke (NMV); 1 ♀, Cheltenham, C. Oke (NMV); 1 ♀, Deep Creek, Braybrook District, J. E. Dixon (NMV); 1 ♀, Braybrook, 28.iix.1904, in *Correa eranh*, J. E. Dixon (NMV); 1 ♂, Kororoit Creek (NMV); 2 ♂, Victoria (NMV); 1 ♀, Aspendale District, out of *Olearia (Aster) ramculoba* (NMV); 1 ♂, 1 ♀, Melbourne,v.1901, J. J. Walker (HMO); 1 ♀, Mulwala, D. ii.90 (NMV); 1 ♀, VIC (UQIC). **SA**: 1 ♂, Lake Surprise Area, Simson Desert, 13.ix.1971, T. F. Houston (SAM); 1 ♂, 1 ♀, Black Swamp, 8.vii.1963, on flower of grape tree palm, S. W. White (SAM); 1 ♂, 1 ♀, Grampian, Mt. Difficult Range, 2600 f, 7.ii.1956, N. B. Tindale (SAM); 1 ♀, 22 miles W by SW of Mundulla, 8.xi,1966, I. F. B. Common & M. S. Upton (ANIC); 1 ♂, SA, F. W. Ferguson Collection (ANIC). **WA:** 1 ♀, Nedlands, 4.x.1955, M. M. H. Wallace (ANIC); 1 ♀, 63 miles E of Esperance (33°51'S, 121°53'E), Thomas River, 20.xi.1969, Taylor & M. S. Upton (ANIC).

Other material examined. **6 ♂, 18 ♀. Locality unknown:** 1 ♀, Blackburn (SAM); 1 ♀, Coll. no. C446 (QDPI); 2 ♀, no data (NMV); 2 ♂, no data (SAM); 1 ♀, Milis geppart, 26.xii.1926, J. Masqueem (AM); 1♀, 6.xii.1966, D. A. Dooland Collection, NRPC (AM); 6 ♀, no data (NMV); 3 ♂, 4 ♀, no locality data, 27.viii.1905, ex. *Correa speciosa* (NMV);1 ?, no abdomen, *Correa ahecesa* (NMV); 2 ♀, N Mall, 20.x.1910, Bred by Dixon (NMV); 1 ♂, bred from *Helichrysum*, Eltham District (NMV).

Description

Male. Body length: 23.26–33.12 mm; *width*: 4.55–6.97 mm.

Colour (Fig. 2.20). Head, thorax, basal elytra, and legs dark reddish brown; antennae and remaining part of elytra reddish brown. Frons and clypeus with dense golden pubescence; vertex with dense white pubescence except a V shape glabrous area extending from medial frontal groove to posterior edge of vertex; legs and abdomen with fairly dense white pubescence. Pronotum with 2 distinct longitudinal stripes of dense white pubescence on each side: 1 on disc and 1 near ventral side; the remaining part of disc with fairly dense golden pubescence. Elytra with dense golden and white pubescence; each elytron with a large sub-basal triangular glabrous mark extending from shoulder to basal 1/3, margined with a very vague line of white pubescence; apical area with sparse pubescence, margined with dense white pubescence.

Head. Postclypeus from semicircular to subtriangular in shape and slightly convex, with dense coarse punctures; frontoclypeal suture deep and narrow in middle; median frontal groove wide and deep; distance between lower lobes of eyes 1.67–2.0 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.2–1.4 × as long as distance between eyes on ventral side; genal length 0.36–0.43 × as long as head width immediately below eyes. Antennae shorter than body; 5-10 flattened and produced on one side at apex.

Thorax and abdomen. Pronotum about 1.11–1.32 × as long as width, rounded with a very feeble process at each side; posterior margin about 1.16–1.33 × as wide as anterior margin; pronotal disc feebly binodulose in middle and strongly rugose transversely. Scutellum semicircular, with dense pubescence. Elytra 4.45–5.07 × as long as prothorax and 3.44–3.82 × as long as shoulder width; each elytron with three feeble longitudinal carinae; basal elytra finely punctate; apex widely emarginate and bispinose. Abdomen slender; apex of terminal sternite truncate.

Male terminalia. Apex of ventral lobe narrowly emarginate and apex of dorsal lobe pointed; dorsal lobe shorter than ventral lobe; spined region of internal sac 3.45–4.04 × as long as basal unspined region; spined region divided into 2 sections with unspined gap between sections: first section bearing dense long simple spines, with fairly dense multi-branched spines near sides; second section with sparse simple spines (Fig. 2.59a). Eighth sternite strongly obliquely truncate at side, shallowly emarginate at apex, with long and fairly long setae arising terminally; ventral side with very sparse multi-branched spines and fairly dense cloud-like processes (Fig. 2.59b). Eighth tergite rounded at apex, with fairly dense short simple spines and multi-branched spines on dorsal surface (Fig. 2.59c). Paramere short, 1.46–1.53 x as long as wide, cylindrical in shape; apex rounded with long and short setae (Fig. 2.59d).

Female. Body length, 17.17–34.18 mm; *width,* 3.24–7.19 mm

Similar to male but differs in having shorter antennae and legs, and more robust abdomen; apex of terminal sternite rounded; elytra 3.50--3.97 × as long as shoulder width and 4.42–5.17 × as long as prothorax.

Ovipositor and spermatheca. Ovipositor short; styli arising terminally with short hairs (Fig. 2.59e). Spermatheca clearly curved; spermathecal gland long and arising near base of spermatheca (Fig. 2.59f).

Distribution

This species is widely distributed from southeastern Australia (Fig. 2.95).

Variation

Body colour varies from reddish brown to blackish brown. The sub-basal glabrous mark may be variable in size, either reduced or expanded.

Biology

Banksia, Correa, Olearia and *Helichrysum* were recorded as host plants of this species. Adults were collected from October to April, May to July and attracted to MV light traps.

Comments

Lea (1916) considered this new species as a variant (Var A) of *U. triangularis.* Having examined all available specimens, we found that the 'var A' is different from *U. triangularis* at species level. It resembles *U. triangularis* but differs in having the sub-basal glabrous marks on elytra without a distinct marginal line of white pubescence; apical areas of elytra covered with sparse pubescence, and dorsal lobe of aedeagus shorter than ventral lobe.

***Uracanthus maculatus*, sp. nov.**

(Figs 2.21, 2.60, 2.95)

Material examined

Holotype. ♂. **NSW:** Galore, 26.xii.1893; bearing a red holotype label (VAIC).

Paratypes. 109 ♂, 42 ♀. All paratypes bear blue paratype labels. **QLD:** 1 ♂, Stanthorpe, xii.1964, E. Sutton, E. Sutton Coll. (AM); 1 ♂, same locality as above but 18.xi.1925 (QDPI); 1 ♂, same locality as above but 15.x.1927, J. Henderson (QDPI); 1 ♂, Bunya Mt, 20.xi.1930, E. Sutton, E. Sutton Coll. (QM); 1 ♂, 320m Isla Gorge National Park (25°11'S, 149°58'E), 2.x.1992, MV lamp, G. Daniels (NMV); 1 ♂, Toowoonan Mt, viii.1963, R. Ridge (UQIC). 1 ♂, Rokehurst, ID by McKeown (WAM); 1 ♂, Toowoomba, QLD, 10.ii.1975, J. Macqueen (ANIC); 1 ♀, same data as above but 12.xi.1974 (ANIC); 1 ♂, same data as above but 26.x.1974 (ANIC). **NT:** 1 ♀, Plenty River Salt Lakes, Simpson Desert, 18.ix.1992, MV light, L. Archibald (NTM); 1 ♀, Tennants Creek, xi.1949, F. A. (ANIC); 1 ♂, nr Reedy Rock hole, Amdeus Basin (32°36'S, 149°35'E), 17.viii.1962, P. Ranford (ANIC). **NSW**: 1 ♀, Mt Kaputar, Bull Creek, 27.xi.1984, G. Hangay (MAM); 2 ♂, Rope's Creek (MAM); 1 ♂, Kangaroo (SAM); 1 ♂, Broken Hill, 22.x.1944, C. E. Chadwick (VAIC); 1 ♀, Wilton, 12.i.1966, V. J. Robinson (VAIC); 1 ♀, Crackenback Range, 9.i.1968, Q. M. Williams (VAIC); 1 ♂, Ashfield, 6.xi.1980, D. A. Dooland, D. A. Dooland Collection (AM); 1 ♂, Pillagascrub (30°56'S, 149°23'E), 10.ii.1997, M. S & B. J. Moulds (AM); 1 ♀, West Pymble, near Sydney, 26.xii.1986, at black light, D. J. Scambler (AM); 1 ♂, Murrumbidgee R., Angle Crossing, 22.xii.1966 (ANIC); 1 ♀, 4 mi SW of Mudgee (32°36'S, 149°35'E), 18.xi.1968, Britton & Misko (ANIC); 1 ♀, Eyres, Coll. no. 1828, ID by Lea (AM); 1 ♂, same data as above but Lea (MAM). **ACT:** 1 ♀, Canberra, 1-5. xii.1999, at light, A. Szito (WADA); 1 ♀, Kambah, Carberon, ACT, 30.xii.1978 (ANIC). **VIC:** 1 ♂, 1 ♀, Bendigo, 18.ix, 1917, ex *Cassinia* (NMV); 1 ♀, Donvale, xii.1951, C. I. R. J. (ASCU); 1 ♂, Frankston, 10.xi.1927 (NMV); 1 ♀, Ferntree Gully, 18.xii.1931, A. W. Westley (NMV); 2 ♀, Gyyos Lands (WADA); 1 ♀, Victoria (MAM); 1 ♂, Blackwaterhole, 25.x.1971, J. C. Le Souef (ANIC); 1 ♀, Dromana, 16.x.1971, J. C. Le Souef (ANIC); 1 ♂, 17 miles Orbost, 8.xii.1956, E. F. Riek (ANIC); 1 ♀, Maldon, xii.1921, J. C. Gondic (NMV); 1 ♂, Mordialloc, 4.xii.1950, A. L. Brown (NMV); 1 ♀, same locality as above but (NMV); 1 ♂, same data as above but iv.1950 (NMV); 1 ♂, 1 ♀, Yinnar, Victoria, i.1956, A. L. Brown (NMV); 1 ♀, same data as above but 10.xi.1951 (NMV); 1 ♀, same data as above but 13.xi.1955 (NMV); 1 ♀, same data as above but iii.1955 (NMV); 1 ♀, same data as above xii.1952 (NMV); 1 ♀, Inglewood, 7.xi.1933, A. L. Brown (NMV); 1 ♂, Mt. Evelyn, 7.xi.1933, A. L. Brown (NMV); 1 ♀, Seaford, ex *Acacia* (NMV); 1 ♂, 4 miles N by NE of Nelson, Glenelg River, 25.xi.1966, Neboise (NMV); 1 ♀, Launching Place, C. Oke (NMV); 1 ♂, 1 ♀, Frankston, C. Oke (NMV); 2 ♂, Carrum, C. Oke (NMV); 1 ♂, Healesville, C. Oke (NMV); 1 ♂, Beechworth, i.1914, C. Oke (NMV); 1 ♂, Aspendale, larva feed in *Olearia ramulosa* (NMV); 1 ♂, Youyang, ex *Aster,* Coll. no. 250, dept by Lea (NMV); 1 ♂, Koroite Creek, bred in *Correa speciosa* var *mormalis* (NMV); 1 ♂, Tarago River, ii.1930, larva in wood, J. C. Gondic, bred from *Helichrysum ferrugineum* (NMV); 2 ♂, 2 ♀,Victoria (NMV); 1 ♂, Murchison R., ix.1956, at light, A. Douglas (WAM). **TAS:** 1 ♀, LiffeyValley, TAS, 16.i.1985, S. Feari (ANIC); 1 ♂, Erith Islands, Bass strait, i.1963, J. Murray & Smith (NMV). **SA:** 1 ♂, Murray R, H. S. Cope (SAM); 1 ♂, Purmons near Mesrong R, S. W. Falton, 20.vi.1911 (NMV); 1 ♂, 1 ♀, Eyres, Petch (SAM); 1 ♂, Yalana (SAM); 1 ♂, 1 ♀, Franklin Island, 20.iv.1980, C. Kalf (SAM); 4 ♂, same locality as above but 27.x.1983, C. Watts (SAM); 2 ♂, Athelstone, 12.xii.1979, at light, J. J. H. Szent & Ivancy (SAM); 1 ♂, Lyntton, 3.xi.1970, UV light trap, R. Fisher (SAM); 1 ♂, as above but xi.1970 (SAM); 1 ♂, as above but xii.1970 (SAM); 1 ♂, Murray Bridge, G. H. Dutton (SAM); 1 ♂, 850 ft, Blackwood, 30.i.1965, MV light, N. McFarland (SAM); 1 ♂, as above but 5.xi.1957 (SAM); 1 ♂, 1♀, Yorktown (SAM); 1 ♀, Flinders Island, T. D. Campbell (AM); 1 ♂, Wardang Island, 9.viii.1910, M. W. Mules, F. E. Wilson Collection (NMV); 1 ♂, SA, by inference ex. Capt. White Collection (SAM); 1 ♂, SA (SAM); 1 ♂, Yeelanna det. by Lea (ANIC); 6 ♂,1 ♀, Reevesby Island, SA, xii.1936, J. Clark, McCoy Soc. Expect. Sir Jos. Banks Group. SA, xii.1936 – i.1937 (NMV); 1 ♀, Blairgowire Park, 23.xi.1970, J. C. Le Souef (ANIC); 1 ♂, 1 ♀, Giffordlands (NMV); 1 ♂, same locality as above but out of *Helichrysum ferrugineum* (NMV). **WA:** 1 ♂, Dorre Island, 1959, A. Douglas (WAM); 1 ♂, Kalbarri, 12.v.1965, R. Hismphries (WAM); 1 ♀, Dumbleyung, 27.ii.1962, H. Udell (WAM); 1 ♂, same locality as above but xii.1966 (WAM); 1 ♂, 400 m, Lillian Stake Rock Frank Hann National Park (33°04'064"S 120°05'827"E), 5.xi.1996, at light, Schun & Classic, Coll. no. 196-661 (AM); 1 ♂, Pilachilpna Well, Pilbara dist., 7.xi.1953, N. B. Tindale (SAM); 5 ♂, Barrow Island, 1.vi.1964, W. H. Butter (WAM); 1 ♂, 20 km N of

Leeman (29°45'S, 114°58'E), Gum Tree Bay Ca., 7-12.x.1994, R. P. McMillan (WAM); 1 ♂, 1 ♀, Theveanard Island, 8.iv.1966, G. Bostack (WAM); 1 ♂, TVL, Sand area adjacent to main camp, 25.v. 1990, 4.00 pm, *Acacia coriacea,* Dominant, M. R. White (WAM); 1 ♂, Simaon Gums, Coll. no. 41-1036 (WAM); 1 ♂, 1 ♀, Carnac Island of perth, (32°07'S 115°39'E), 15.i.1983, T. F. Houson (WAM); 1 ♂, Dudinin, Coll. no. 30-731 (WAM); 1 ♂, Roy Hill, Coll. no. 53-1493 (WAM); 1 ♂, WA, 5xi.1908, C. French's Coll. no. 265 (NMV); 2 ♂, 11.xi.1918, C. French's Coll. (NMV). 1 ♂, 101 km E of Esperance (33°51'S, 121°53'E), Thomas River, 20.xi,1969, Taylor & M. S. Upton (ANIC); 2 ♂, 63 miles E of Esperance (33°51'S, 121°53'E), Thomas River, 20.xi,1969, Taylor & M. S. Upton (ANIC); 9 ♂, 23 km NW by W of Mt. Arid, Thomas River, 4- 7.xi.1977, J. F. Lawrence (ANIC); 1 ♂, 23 miles W of Fraser Range HS (32°04'S, 122°24'E), 7.xi,1969, M. S. Upton (ANIC); 1 ♂, 7 miles E by N of Balladonia HS, 13.x,1968, Britton, Upton & Balderson (ANIC); 1 ♂, Deepdene, Karridale, 17.i,1967, M. S. Upton (ANIC); 1 ♂, 13 miles NE by E of Caiguna, 14.x.1968, no abdomen, Britton, Upton & Balderson (ANIC); 2 ♂, 6 miles N of Mandurah, 24.i.1967, M. S. Upton (ANIC); 1 ♂, 11 km N of Geraldton, 10.xii.1972, at MV light, N. McFarland (ANIC); 1 ♂, Montebello Island, 14.xi.1953, T. G. Campbell (ANIC).

Other material examined. **11** ♂, 18 ♀. **Locality unknown**: 1 ♂, Aust old Coll., Coll. no. k40693 (AM); 1 ♀, same data as above but (AM); 1 ♂, C. French (QDPI); 1 ♀, 20.iv.1922, H. J. Carter collection (NMV); 1 ♀, no data; 1 ♀, Coll. no. K10943 (AM); 1 ♀, Longicorn of mandarin tree, L. Gallard Collection (AM); 1 ♂, L. C. Haines Collection (AM); 1 ♀, SA & WA (SAM); 1 ♂, no locality label, 12.v.1982 (SAM); 1 ♂, Victorian Margas (French) (AM); 1 ♀, Coll. no. 34667, Roltnest (WAM); 1 ♂, Colleslac, Coll. no. 45-872 (WAM); 1 ♂, Coll. no. 48-919, W. Henoom (WAM); 1 ♀, Rose Beev(?), 3.vi.1942, found in *Eriostemon lanceolatus* roots, Froggatt (ANIC); 1 ♀, no data, ex C. French Coll. (HMO); 1 ♂,1 ♀, no data under Hope/Westwood Coll. (HMO); 1 ♀, no locality data, 5.xi.1908, C. French Collection (NMV); 1 ♀, no locality data, x.907, ex *Aster ramulosus* (NMV); 1 ♀, no locality data, xi, 1908, ex *Aster ramulosus* (NMV); 2 ♀, no locality data, xii, 1908, ex *Aster ramulosus* (NMV); 1 ♂, xii, 1907, ex *Aster ramulosus* (NMV); 1 ♀, no data (NMV); 1 ♂, no locality, ix.1918, Coll. no. 597 (NMV); 1 ♀, no data Coll no. 40

(NMV); 1 ♀, no data, Coll. no. 07 (NMV); 1 ♂, 18.ix.1917, ex *Aster* sp. (NMV); 1 ?, no data, Coll. no. 350, no abdomen (NMV).

Description

Male. Body length, 18.28–30.36 mm; *width*, 3.14–6.23 mm.

Colour (Fig. 2.21). Head, thorax, basal 2/5 and apical 1/10 of elytra dark reddish brown to blackish brown; antennae, legs and the remaining part of elytra reddish brown. Frons and clypeus with mixed dense golden and white pubescence; vertex with dense white pubescence except a V-shape glabrous area extending from medial frontal groove to posterior edge of vertex. Pronotum with fairly dense pale yellow pubescence; 2 longitudinal stripes of dense white pubescence on each side: 1 on disc and 1 near ventral side. Each elytron with a subtriangular mark glabrous mark extending from shoulder to basal 1/3, and margined with a line of dense white pubescence; some areas of the mark sometimes covered with sparse white pubescence; apical area with sparse white pubescence margined with a narrow line of dense white pubescence; the remaining part of elytral disc with pubescence of different density, giving an appearance of clustered denser pubescence among less dense pubescence.

Head. Postclypeus semicircular and slightly convex, with dense large coarse punctures; frontoclypeal suture deep and narrow in middle; median frontal groove narrow and deep, terminating near posterior edge of vertex; distance between lower lobes of eyes 1.7–1.75 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 2.3–2.38 × as long as distance between eyes on ventral side; genal length 0.34–0.36 × as long as head width immediately below eyes. Antennae slightly shorter than body; segments 5-10 flattened and produced on one side at apex.

Thorax and abdomen. Pronotum 1.15–1.55 × as long as width, rounded with a very feeble process at each side; posterior margin 1.10–1.33 × as wide as anterior margin; pronotal disc binodulose in middle, and rugose transversely near anterior and posterior margins. Scutellum semicircular, with dense pubescence. Elytra 3.95–4.48 × as long as prothorax and 3.38–4.07 × as long as shoulder width; each elytron with 3 very feeble longitudinal carinae; basal elytra finely punctate; apex widely emarginate and bispinose. Abdomen slender, apex of terminal sternite notched.

Male terminalia. Apex of ventral median lobe more or less rounded with a very shallow notch and apex of dorsal lobe rounded; ventral lobe longer than dorsal lobe; spined region of internal sac 4.9-5.2 × as long as basal unspined region; spined region divided into 2 sections with an unspined gap between sections: first section bearing dense long simple spines with fairly dense multi-branched spines near sides; second section with sparse simple spines (Fig. 2.60a). Eighth sternite (Fig. 2.60b) strongly obliquely truncate at sides, shallowly emarginate at apex, with long and fairly long setae arising terminally; ventral surface with multi-branched spines and cloud-like processes. Eighth tergite (Fig. 2.60c) emarginate at apex, with dense short simple spines and multi- branched spines on dorsal surface. Paramere 1.75–1.84 × as long as wide, cylindrical in shape; apex rounded with long and short setae (Fig. 2.60d).

Female. Body length, 15.99–29.39 mm; *width*, 2.93–6.03 mm.

Similar to male but differs in having shorter antennae and legs and more robust abdomen; apex of terminal sternite rounded; elytra 3.16-3.95 × as long as shoulder width and 4.17–4.90 × as long as prothorax.

Ovipositor and spermatheca. Ovipositor short; styli arising terminally with short hairs (Fig. 2.60e). Spermatheca heavily curved; spermathecal gland long and arising near base (Fig. 2.60f).

Distribution

This new species is distributed in southern, southeastern and western coasts of Australia and central Australia (Fig. 2.95).

Variation

The subtriangular mark on elytra may be reduced or expanded. Body may vary from dark brown to brown. Longitudinal pubescent stripes on pronotal disc are sometimes disappearing before posterior margin.

Biology

Acacia coriacea, Aster ramulosus, Cassinia sp., *Citrus sp.*, *Correa speciosa* var *mormalis, Eriostemon lanceolatus, Helichrysum ferrugineum* and *Olearia ramulosa* were recorded as hosts of this species. Adults were collected from June to February.

Comments

This new species was described as a variant (Var. B) of *U. triangularis* by Lea (1916). However, after having carefully examined all specimens available, we believe that it should be a new species. This new species resembles *U. triangularis* but differs in having pubescence more uneven; the subtriangular mark and apical areas on elytra covered with pubescence; apex of ventral lobe of aedeagus much longer than dorsal lobe, apex of ventral lobe more or less pointed; apex of eighth tergite emarginate and ventral surface of eighth sternite with simple spines.

Uracanthus perthensis, sp. nov.

(Figs 2.22, 2.61, 2.95)

Material examined

Holotype. ♂. **WA:** Perth; bearing a red holotype label (NMV).

Paratype. 1 ♂. **WA:** Perth, iii.1916; bearing a blue paratype label (WAM).

Description

Male. Body length, 17.57–21.61 mm; *width*, 3.23–4.84 mm.

Colour (Fig. 2.22). Head, thorax, basal elytra dark reddish brown; antennae, legs and the remaining part of elytra reddish brown. Head (except a longitudinal glabrous area on vertex), legs, and abdomen with fairly dense white pubescence. Prothorax covered with short white pubescence except glabrous median longitudinal line and 2 raised nodules on disc; pronotum with 2 vague longitudinal stripes of dense white pubescence on each side: 1 on disc and 1 near ventral side. Elytra covered with fairly dense short white pubescence; each elytron with a large subtriangular glabous mark, extending from shoulder to basal 1/3, margined with a very vague line of dense white pubescence; apical areas with relatively sparse short white pubescence.

Head. Postclypeus semicircular and slightly convex, with dense coarse punctures; frontoclypeal suture deep and narrow in middle; distance between lower lobes of eyes 1.82–1.83 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.1–1.2 × as long as distance between eyes on ventral side; genal length 0.48–0.55 × as long as head width immediately below eyes.

Thorax and abdomen. Pronotum 1.11–1.20 × as long as width; rounded and with a feeble process at each side; posterior margin 1.25–1.36 × as wide as anterior margin; pronotal disc binodulose in middle, and rugose transversely near anterior and posterior margins. Scutellum semicircular, with dense pubescence. Elytra 4.71–4.72 × as long as prothorax and 3.41–3.69 × as long as shoulder width; each elytron with 3 feeble longitudinal carinae; basal elytra finely punctate and smooth; apex widely emarginate and bispinose, sutural spine longer and more acute than marginal one. Apex of terminal sternite truncate.

Male terminalia. Apex of ventral median lobe more or less truncate with a very shallow notch and apex of dorsal lobe rounded; ventral lobe much longer than dorsal lobe; spined region of internal sac 4.98–5.12 × as long as basal unspined region; spined region divided into 2 sections with an unspined gap between sections: first section much longer than unspined gap and second section, with dense long simple spines; second section with sparse simple spines (Fig. 2.61a). Eighth sternite obliquely truncate at sides, shallowly and widely emarginate at apex, with long and fairly long setae arising terminally (Fig. 2.61b); ventral surface with very sparse multi-branched spines and fairly dense cloud-like processes. Eighth tergite slightly emarginate (almost truncate) at apex (Fig. 2.61c), with fairly dense short simple spines and multi-branched spines on dorsal surface. Paramere long, 1.86–2.04 × as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.61d).

Female. Unknown.

Distribution

Western Western Australia (Fig. 2.95)

Variation

No significant variation was observed.

Biology

Hosts are unknown. Adults were collected March.

Comments

This new species was treated as Var. C of *U. triangularis* by Lea (1916). It resembles *U. maculatus*, sp. nov. but differs in having pubescence on elytral disc more or less even; elytral apex more deeply emarginate, and sutural apical spine longer.

***Uracanthus griseus*, sp. nov.**

(Figs 2.23, 2.62, 2.95)

Material examined

Holotype. ♂. **SA:** Marray R., H. S. Cape; bearing a red holotype label (SAM).

Paratypes. 6 ♂. All paratypes bear blue paratype labels. **VIC:** 5 ♂, 7.3 km SW of Wemen, 25.x-3.xi.1988, T. Weir, J. Lawrence & M. Hansen (ANIC); 1 ♂, Yanacy, 5xi.1978, J. C. Le Souef (ANIC).

Description

Male. Body length, 23.51–27.95 mm; *width,* 4.69–5.86 mm.

Colour (Fig. 2.23). Head, thorax, legs, antennae, and basal elytra blackish brown; abdomen and remaining part of elytra reddish brown. Head with dense white pubescence except median frontal groove and a longitudinal glabrous area on vertex. Pronotum with 2 longitudinal stripes of dense white pubescence on each side: 1 narrow on disc and 1 wide near ventral side; remaining part of pronotum covered with short white pubescence, pubescence on middle disc sparser. Each elytron with a blackish, subtriangular, more or less glabous mark, extending from shoulder to basal 1/3, margined with a very vague line of white pubescence; anterior region of mark usually covered with sparse short white pubescence; remaining part of elytral disc with fairly dense mixture of short white and pale golden pubescence; apical area with relatively sparse white pubescence. Meso- and metasterna, abdomen, and legs covered with dense white pubescence.

Head. Postclypeus semicircular and slightly convex, with dense coarse punctures; frontoclypeal suture deep and wide in middle; distance between lower lobes of eyes 1.52–1.82 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.06–1.10 × as long as distance between eyes on ventral side; genal length 0.43–0.55 × as long as head width immediately below eyes. Antennae slightly longer than body; segments 4-10 slightly flattened and produced on one side at apex; apical ¼ of segment 11 distinctly thinner than basal ¾.

Thorax and abdomen. Pronotum 1.15–1.29 × as long as width, with a distinct process at each side; posterior margin 1.11–1.19 × as wide as anterior margin; pronotal disc binodulose in middle and rugose transversely near anterior and posterior margin. Scutellum semicircular, with dense pubescence. Elytra 4.09–4.63 × as long as prothorax and 3.35–3.71 × as long as shoulder width; each elytron with 3 feeble longitudinal carinae; basal elytra finely punctate and smooth; apex widely emarginated and bispinose. Apex of terminal sternite truncate.

Male terminalia. Apex of ventral median lobe distinctly emarginate and apex of dorsal lobe pointed; ventral lobe longer than dorsal lobe; spined region of internal sac 5.12 – 5.23 × as long as basal unspined region; spined region divided into 2 sections with an unspined gap between sections: first section with dense long simple spines; second section with sparse simple spines (Fig. 2.62a). Eighth sternite strongly obliquely truncate at sides, strongly emarginate at apex, with long and fairly long setae arising terminally; ventral surface with cloud-like processes (Fig. 2.62b). Eighth tergite rounded to slightly pointed at apex, with fairly dense short simple spines and multi- branched spines on dorsal surface (Fig. 2.62c). Paramere long, 1.86–2.04 × as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.62d).

Female. Unknown.

Distribution

Northern Victoria and southern South Australia (Fig. 2.95).

Variation

No significant variation was observed.

Biology

Hosts are unknown. Adults were collected in October and November.

Comments

This new species closely resembles with *U. perthensis* sp. nov. but differs in having body darker in colour; apical spines of elytra shorter and thicker.

Uracanthus glabrilineatus **Lea, 1917**

(Figs 2.24, 2.95)

Uracanthus glabrilineatus Lea, 1917a: 737. –McKeown, 1947: 64.

Material examined

Holotype. ♂. **WA:** Mullewa, 18.v.1823, Miss J. F. May, bearing a name label on which 'TYPE' was written in red (SAM)

Description

Male. Body length, 25.35 mm; *width*, 5.48 mm.

Colour (Fig. 2.24). Head, thorax, femora, and basal elytra dark reddish brown; rest of elytra reddish brown. Head (particularly frons and vertex) with dense pale yellowish pubescence except median frontal groove and a longitudinal glabrous area on vertex. Pronotal disc with fairly dense pale yellowish pubescence without distinct longitudinal pubescent stripes; ventral side of prothorax with very dense pale yellowish pubescence. Each elytron with a vague subtriangular glabrous mark, extending from shoulder to basal 1/3, without distinct margin; some part of mark covered with sparse pubescence; disc of each elytron with 4 longitudinal lines of dense pale yellowish pubescence interspaced with glabrous longitudinal carinae. Meso- and metasterna, abdomen, and legs covered with fairly dense white pubescence.

Head. Postclypeus semicircular and slightly convex, with dense coarse punctures; frontoclypeal suture deep and narrow in middle; distance between lower lobes of eyes 1.55 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.42 × as long as distance between eyes on ventral side; genal length 0.40 × as long as head width immediately below eyes. Antennae slightly shorter than or as long as body; segments 4-10 flattened and produced on one side at apex; apical ¼ of segment 11 suddenly becoming thinner.

Thorax and abdomen. Pronotum 1.35 × as long as width, with an angular process at each side; posterior margin 1.16 × as wide as anterior margin; pronotal disc binodulose in middle and rugose transversely near anterior and posterior margins. Scutellum semicircular, with dense pubescence. Elytra 3.53 × as long as prothorax and 3.32 × as long as shoulder width; each elytron with 3 feeble longitudinal carinae; basal elytra moderately punctate; apex narrowly emarginate and bispinose, sutural spine longer than marginal one. Abdomen slender; apex of terminal sternite truncate.

Male terminalia. Unknown. The unique male specimen (holotype) has not been dissected.

Female. Unknown

Distribution

Southwestern Western Australia (Fig. 2.95).

Biology

Unknown

Comments

This species resembles *U. perthensis* sp.nov. but differs in having elytra with glabrous longitudinal lines; pronotal disc without distinct longitudinal stripes of dense pubescence.

***Uracanthus triangularis* Hope, 1833**

(Figs 2.25, 2.63, 2.96)

Uracanthus triangularis Hope, 1833: 64. –Hope, 1834: 108; Lacordaire, 1869: 391; Best, 1882: 35; Tepper, 1887: 38; Froggatt, 1893: 29, 1902: 710, 1923: 112; Gahan, 1893: 182; French, 1900: 135; Gurney, 1911: 58; Aurivillius, 1912: 147; Gallard, 1916: 113; Tillyard, 1926: 223; McKeown, 1947: 66; Duffy, 1963:112.

Stenochorus angustatus Boisduval, 1835: 475.-Gahan, 1893: 182 (synonymy).

Mallocera angustata. –Castelneau, 1840: 425.

Material examined

Holotype. ♀. **New Holland (= Australia)**; no data; type coll. 1767; bearing a red type label with Hope's hand writing (HMO).

Other material examined. 114 ♂, 118 ♀. **QLD:** 1 ♂, 1 ♀, Stanthorpe (28°39'S, 151°56'E), i.1961, C. Watts (SAM); 1 ♂, same locality but Sivian (AM); 1 ♂, same locality but Von Weildt (QM); 1 ♀, same locality but Dr. K. K. Spence (AM); 2 ♀, same locality but 30.iii.1963, P. Kerridge (UQIC); 1 ♀, same locality but 2.xi.1927, S. M. Watson (QDPI); 3 ♀, same locality but xii.1964, E. Sutton Coll. (QM); 1 ♀, as above but 2.iv.1926 (QM); 1 ♂, 70 km SW of Greenvale (19°00'S, 144°58'E), 16-28.i.1995, A. J. Watts (SAM); 1 ♀, Bowarrady Creek (25°07'S, 153°08'E), Fraser Island, 5.x.1989, L. D. Buddle (AM); 2 ♀, Kuranda (16°49'S, 145°38'E), F. P. Dodd (SAM); 2 ♂, Moreton Island (27°11'S, 153°24'E), Ben Ewa Campground, 22.iii.1998, at light, J. & A. Skevington (UQIC); 1 ♂, Oranmore Range, 5.iii.1958, A. R. Briay (QDPI); 1 ♂, Archer River X-ring (13°25'S, 142°56'E), 11.v.1989, MV lamp, G. & A. Daniels (UQIC); 1 ♀, 320 m of Isla Gorge National Park (25°11'S, 149°58'E), 3.x.1992, MV lamp, G. Daniels (UQIC); 1 ♂, 26 km of W. Fairview (15°35'S, 144°04'E), 24.v.1989, MV lamp, G. & A. Daniels (UQIC); 1 ♂, 1 ♀, 10 km N of Caboolture (27°04'S, 152°58'E), Elimbah, 11.iv.1984, C. E. Hagan (UQIC); 1 ♀, Eclipse Island, Coll. no. 39-1785 (WAM); 1 ♂, QLD, 1.viii.1964, A. W. Asjary (UQIC); 1 ♂, Wyberba, 5-7.xi.1969, at light, E. C. Dahms (QM); 3 ♂, 1 ♀, Cooloola Forestry Area, camp milo, iv.1978, at light, I. D. Galloway & E. Gympie (QDPI); 1 ♂, 1 ♀, same locality but *Banksia* dom, 3.iii.1970, open forest to light, E. Dahms (QM); 2 ♀, Glen Aplin, SQ,1946, S. R. E. Brock Collection (ANIC); 3 ♂, same locality as above but 1957, A. Gemmell, S. R. E. Brock Collection (ANIC); 2 ♀, same locality as above but 1912-1954, A. Gemmell, G. G. L. Gooding Collection (ANIC); 2 ♂, 2 km N by NW Jawalbinna (15°45'S, 144°15'E), 17.i.1994, at light, P. Zborowski & E. D. Edwards (ANIC); 1 ♂, 4 km W by S of Cooktown, 21.v.1977, I. F. B. Common & E. D. Edwards (ANIC); 1 ♂, 24 km E by N of Ravenshoe, Palmerston Nation Park (17°35'S, 145°43'E), 17.xi.1981, J. Balderson (ANIC); 1 ♂, South Dunmore SF (27°38'S, 150°58'E), 26.xii.1998, at MV light, S. G. Watkins Collection (ANIC); 1 ♂, 13 km N by NW of Longreach (23°135'S, 144°04'E), Darr River, 7.iv.1976, J. F. Feehan (ANIC); 1 ♀, Toowoomba, i.1980, C. Brook (NMV). **NT:** 2 ♂, Daly Waters (16°16'S, 133°22'E), 20.i.1971, T. Weir & A. Allwood (NTM);1 ♂, October Creek (16°28'S, 135°09'E), 100 m E of Dally Water, 21.iii.1972, on Borroloola Rd, N. W. Forester (NTM); 1♀, NT, Cattle Creek (16°32' S, 136°10'E), 54 km S byW of

Borroloola, 27.x.1975, M. S. Upton (ANIC). **NSW:** 1 ♂, Engadine (34° 03' S, 151° 01' E), 10.i.1974, R. H. Mulder Collection (AM); 1 ♂, as above but 14.xii.1974 (AM); 1 ♂, as above but 17.xii.1958, H. Hughes (AM); 1 ♀, as above but 10.i.1958 (AM); 1 ♀, as above but 14.xii.1974 (AM); 1 ♀, as above but 28.xi.1968 (AM); 1 ♀, as above but 14.xii.1974 (AM); 1 ♀, as above but 10.i.1970 (AM); 1 ♀, as above but 6.iii.1955 (AM); 1 ♀, as above but 12.x.1960, (AM); 2 ♂, 1♀, 5mi, S. Mendooran (31° 47'S, 149° 17'E), 19.ii.1972, MV lamp, G. Daniels (AM); 2 ♀, same locality but 17.ii.1972 (AM); 2 ♂, 1 ♀, Helensburgh (34°11'S, 150°58'E), xi.1961, H. Osborne (ASCU); 1 ♀, same data but xii.1961 (ASCU); 1 ♀, same data but xii.1962 (ASCU); 1 ♂, same data but xii.1963 (ASCU); 1 ♂, West Pymble (33°45'S, 151°07'E), near Sydney, 6.iii.1986, D. J. Scambler (AM); 1 ♂, Goonoo state forest (32°04' S, 148°54'E), 5 mi S. Mendooran, 24.iv.1974, D. K. McAlpine (AM); 1 ♂, same data but 23.iv.1974 (AM); 1 ♀, Budthingeroo Ceek (33°53'S, 150°00'E), Kanangra Boyd National Park, 24.xii.1977, G. Daniels (AM); 1 ♀, Kuringgal Chase National Park (33°36'S, 151°12'E), 16.x.1971, MV lamp, G. Daniels (AM); 1 ♀, same locality, N. C. Llayd (ASCU); 1 ♂, same locality but 5.iv.1973, A. B. Rose (MAM); 2 ♀, New Castle (33°55'S, 151°00'E), i.1988, Coll.no. K36095 (AM); 1 ♀, Round Hill Reserve (33°00'S, 146°10'E), 23-29.iv.1968, R. Lossin (AM); 2 ♂, 2 ♀, Sydney (33°51'S, 151°12'E) (MAM); 1 ♂, 1 ♀, same locality but (SAM); 1 ♂, same locality but xii.1938 (no abdomen) (MAM); 1 ♀, same locality (SAM); 1 ♂, same locality but W. du Boulay, E. F. du Boulay Collection (SAM); 1 ♂, same locality but 9.iii.1907, W. B. G (ASCU); 1 ♂, same locality but Dean (UQIC); 1 ♂, same locality but Coll. no. K36095 (AM); 1 ♀, same locality but xi.1911, C. Gibbons (AM); 1 ♂, 1 ♀, Blue Mountain Nation Park (33°36'S, 150°25'E), 15.xii.1984, on *Leptospermum,* G. R. Brown (ASCU); 1 ♀, Blue Mountain Nation Park (33°44'S, 150°30'E), 1.xii.1947 (SAM); 1 ♀, Billy Blue Mountain Nation Park (34°02'S, 149°27'E), 30.i.1980, N. W. Rodd (AM); 1 ♀, Mt. Tomah (33°32' S, 150°25'E), 22.xi.1980, N. W. Rodd (AM); 1 ♂, 1 ♀, Mt. Wilson (33°59'S, 149°21'E), 27.xi.1980, D. A. Doolan, D. A. Doolan Collection (AM); 1 ♂, same locality but 6.xi.1923, Carno rear, A. Musgrave & T. Carepbull (AM); 1 ♂, National park, 16.x.1921, A. Musgrave, Coll. no. K 44380 (AM); 1 ♀, 1.5 mile E. of Freshwater River, Lluka district, 17.i.1971, D. K. McAlpine & A. Hughes (AM); 1 ♀, Mosman (33°13'S, 150°50'E),1923, E. Balton, Coll. no. K47516 (AM);

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1 ♂, Lane Cove (33°48'S, 151°10'E), 12.xii.1943, N. W. Rodd (AM); 1 ♂, same as above but 7.iv.1973, G. R. Brown (ASCU); 1 ♂, Dorrigo (30°19'S, 152°43'E), 7.x.1973, D. A. Doolan, D. A. Doolan Collection (AM); 1 ♀, North Ryde (33°47'S, 151°07'E), 17.i.1967, D. A. Doolan, D. A. Doolan Collection (AM); 1 ♂, Bobbin Head, 23.iv.1969, K. Ayers (MAM); 1 ♂, Wahroonga, 8.xii.1969, A. B. Rose (MAM); 1 ♂, Oranmore, Hokas, 9.xii.1968, S. Barker (SAM); 1 ♀, near Rivertree (28°37'S, 152°18'E), 15-19.xii.1969, E. Dahms (QM); 1 ♂, Bardwell Park (33°56'S, 151°08'E), 21.i.1943, C. E. Chadwick (ASCU); 1 ♀, Wahroonga, 26.xi.1952, R. Dobson (NMV);1 ♂, same data as above (NMV); 1 ♀, Sublime land, 15.xi.1902 (ASCU); 1 ♂, Hornsby, 3.iii.1978, A. Beattic (ASCU); 1 ♀, Wilton, 12.i.1966, V. J. Robinson (ASCU);1 ♂, as above (ASCU); 1 ♂, Good Friday Mountain, 7.i.1968, on Fire trail, V. J. Robinson (ASCU); 1 ♂, London Falls, 12.xii.1948, on *Leptospermum flavescens* flowers, C. E. Chadwick (ASCU); 1 ♀, Botany, 13.xi.1994, Damagein (ASCU); 2 ♂, 1 ♀, Gibralter Range (29°33'S, 152°17'E), 3,000 ft. via Glen Inners, 27-29.xii.1972, open forest, G. B. Monteith (UQIC); 1 ♀, Bundjalung, National Park near lluka, 12.iv.1981, M. J. Fletcher & G. R. Brown (ASCU); 1 ♂, Canberra, 29.ii.1967, light trap, BCP (WINC); 1 ♀, 8 km S of Mendooran (31°50'S, 149°06'E), 28.i.1987, G. & A. Daniels (UQIC); 1 ♂, NSW (SAM); 1 ♂, as above (WADA); 1 ♂, same locality but I. D by Lea (WADA); 1 ♀, same locality (MAM); 1 ♀, same locality (MAM); 1 ♀, same locality but 26.xi.1952, Nat Mus, R. Dobson (NMV); 1 ♀, same locality but 15.xii.1977, Rear Beach, A. D. Austin (WINC); 1 ♀, Hornby, xi.1910, G. Gibbons (AM); 1 ♀, Vaucluse, 19.ii.1920, J.M. , Coll. no. K63681 (MAM); 1 ♂, North Sydney, 11.viii.1946, P. Hadlington (FCNI); 1 ♂, Lucas Heights, Sydney, NSW, 23.xi.1979, on *Angophora* bloom, D. C. Carne (ANIC); 1 ♀, Sydney, NSW, R. W. Ferguson Collection (ANIC); 1 ♂, Ebenezer, Sydney, 5.iii.1987, MV light, J. C. Keast (FCNI); 1 ♂, Bonnet Bay, Sydney, 28.ii.1987, at light, L. S. William (FCNI); 1 ♀, Bargo, 8.xii.1987, adult on *Kunzea ambigua* foliage, G. A. Webb (FCNI); 1 ♂, Tubbamurra Creek, Barrington Tops, 4100 ft, 11.i.1956, K. D. Fairrey (FCNI); 1 ♂, Heathcote, 10.xii.1979, S. Watkins, S. G. Watkins Collection (ANIC); 1 ♀, same data as above but 2.xii.1978 (ANIC); 1 ♂, same data as above but 4.xii.1977 (ANIC); 2 ♂, 3 km N of Mt. Victoria,, 22.xii.1978, on *Xanthorrhoea*, S. G. Watkins Collection (ANIC); 1 ♂, Mt. York, NSW,

30.xi.1977, S. Watkins, S. G. Watkins Collection (ANIC); 1 ♀, same data as above but 28.xi.1979 (ANIC); 1 ♂, 50 miles S of Singleton, 5.i.1956, I. F. B. Common (ANIC); 2 ♀, 20 miles NW of Upper Colo, 8.xi.1955, T. G. Campbell (ANIC); 1 ♀, Mt Boyce, 16.xii.1972, S. Watkins, S. G. Watkins Collection (ANIC); 1 ♂, 9 km N by NE of Coonabarabran, 24.x.1980, E. Britton (ANIC); 1 ♀, Berkshire Park, 19.xi.1972, S. Watkins, S. G. Watkins Collection (ANIC); 1 ♀, Hartley Vale, 27.xi.1977, S. Watkins, S. G. Watkins Collection (ANIC); 1 ♀, Waterfall, NSW, 26.xii.1974, S. Watkins, S. G. Watkins Collection (ANIC); 1 ♀, Kiata, 8.xii.1964, N. Dobrotworsky (ANIC); 1 ♀, Wahroonga, H. J. Carter (ANIC); 1 ♀, Toganmain, 4.x.1966, I. Rawley (ANIC); 1 ♂, 1 ♀, National Park, xi.1952, J. G. Brook (ANIC); 1 ♀, NSW, H. E. Cox Collection, present 1916 by Mrs Cox (HMO);1 ♀, Richmond R., New Holland, Miers Collection, presented 1880 by W. Miers (HMO); 1 ♂, Glebe Park, 11.iv.1936, E. Sutton (QM); 1 ♀, Mittagong, 20.iv.1922, H. J. Carter Coll. (NMV). **ACT:** 2 ♂, 3 ♀, Black Mountain, 14.ii.1966, at light trap, P. B. Carne (ANIC); 2 ♂, 2 ♀, same locality as above but xi.1965 – ii.1966, E. B. Britton (ANIC); 1 ♂, same locality as above but 28.ii.1969, at light trap (ANIC); 1 ♂, same locality as above but 25-26.xii.1964, I. F. B. Common (ANIC); 1 ♂, same locality as above but 16.ii.1968, M. S. Upton (ANIC); 1 ♂, same locality as above but 15.ii.1936, A. D. Butcher (NMV); 1 ♀, same data as above but 27.i.1936 (NMV); 2 ♀, Lees Creek near Picadilly circus, 8.ii.1984, Calder & Stevens (ANIC). **VIC:** 1 ♂, 3 km S. Murchison, 8.i.1979, N. W. Rodd (AM); 1 ♂: Mt. Difficult (37°00'S, 142°26'E), Grampians, 2600 ft., 7.ii.1956, N. B. Tindaale (SAM); 1 ♀, Melbourne, 9.xi.1932, F. E. Wilson Collection (NMV); 2 ♂, 10 miles N of Wingan Inlet, 3.xi.1969, I. F. B. Common (ANIC); 1 ♀, 17 miles NW Orbost , 8.xii.1956, E. F. Riek (ANIC); 1 ♂, Beechworth, C. Oke (NMV); 1 ♀, Abbeyard, 27.ix.1960 (NMV); 1 ♂, Mordialloc (no abdomen) (NMV); 1 ♂, Victoria (WADA); 1 ♂, Victoria (AM). **WA:** 1 ♀, Denmark (34°58'S, 117°21'E), i.1997, M. & L. Jone (WAM); 1 ♀, same data but i.1998 (WAM); 1 ♂, same locality but 24.xi.1999, R. P. McMillan (WAM); 1 ♂, Haker sterm, Turle Rock, Muckenburra, 16.x.1979, R. P. McMillan (WAM); 1 ♂, Esperance (33°51'S, 121°53'E), 26.ix.1970, A. V. Thomas (WAM); 1 ♀, Wurarga (28°24'S, 116°17'E), Coll. no. 37-4439 (WAM); 1 ♀, Karridale (34°12'S, 115°06'E), 18.xii.1964, L. M. Olkalloran (QDPI); 1 ♀, WA (WADA). **Locality**

Unknown: 1 ♂, E. C. Vallis Bequest, Don. vii.1965 (QM); 1 ♂, National Park, T. Mec. 13.x.1911 (ASCU); 1 ♂, Nation Pk., T. Mec. 13.x.1911 (ASCU); 1 ♂, R. R. McMillan Collection (WAM); 1 ♂, Coll. no. 2926 (SAM); 1 ♂, 10.ii.1920, Coll. no. K63681 (AM); 1 ♀, no data (NMV); 1 ♀, Relton Bequest, Coll. no. 3455 (QM); 1 ♀, no data (ASCTO); 1 ♀, no data (WADA); 1 ♀, 11.x.1915, bred from *Lomatia longifolia,* J. C. Dixon (NMV); 1 ♀, A. H. Elston collection (AM); 1 ♀, 29.iii.1967, D. A. Doolan, D. A. Doolan Collection (AM); 1 ♀, N. RPC, 17.iv.1967, D. A. Doolan Collection (AM); 1 ♂, 1 ♀, K. G. Sound (MAM); 1 ?, no data (no abdomen) (SAM); 1 ♂, Deewhy, ii.1928 (ANIC); 1 ♀, ? Park Coll, 1924, WWF (ANIC); 1 ♀, no locality label, S. R. E. Brock Collection (ANIC); 1 ♀, ix.1907, ex *Acacia mollissima* (NMV); 1 ♂, Slud Park (?), *Acacia mollissima*, x.1907 (NMV); 1 ♀, i.1908, *Acacia* (NMV); 2 ♀, ix.1913, *Acacia* (NMV); 1 ♂, xii., *Acacia* (NMV); 1 ♀, out of black wattle (*Acacia mearnsii*), S. Park (WINC); 1 ♀, same as above but (NMV); 1 ♂, 2 ♀, no label (NMV).

Description

Male. *Body length*, 21.68–33.13 mm; *width,* 4.24–6.47 mm.

Colour (Fig. 2.25). Body reddish brown to blackish brown with head and thorax darker. Head with dense white or yellowish pubescence except median frontal groove and a longitudinal glabrous area on vertex. Pronotum with 2 longitudinal stripes of white pubescence on each side: 1 on disc, vague, and 1 near ventral side, distinct. Each elytron with a large clearly defined subtriangular glabrous mark, extending from shoulder to basal 1/3, clearly margined with dense white pubescence; apical area glabrous, margined with a distinct line of dense white pubescence; remaining part of elytral disc with dense and fairly long pubescence.

Head. Postclypeus semicircular and slightly convex, with dense coarse punctures; distance between lower lobes of eyes 1.5–1.85 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.0–1.25 × as long as distance between eyes on ventral side; genal length 0.35–0. 44 × as long as head width immediately below eyes. Antennae about as long as body; segments 5-10 flattened and produced on one side at apex; apical ¼ of segment 11 slightly thinner than basal ¾.

Thorax and abdomen. Pronotum 1.14–1.46 × as long as width, rounded at side; posterior margin 1.07–1.36 × as wide as anterior margin; pronotal disc binodulose in middle and rugose transversely throughout. Scutellum semicircular, with sparse pubescence. Elytra 4.1–5.07 × as long as prothorax and 3.7–4.15 × as long as shoulder width; each elytron with 3 very feeble carinae; basal half of elytra with sparse coarse punctures; apex widely emarginate and bispinose. Abdomen slender; apex of terminal stemite truncate or slightly rounded.

Male terminalia. Apex of ventral median lobe narrowly emarginate, and apex of dorsal lobe rounded; ventral lobe slightly longer than or as long as dorsal lobe. spined region of intemal sac about 2.1–2.5 × as long as basal unspined regions; spined region divided into 2 sections with an unspined gap between sections; first section longer than unspined gap with dense long simple spines; second section with sparse short simple spines (Fig. 2.63a). Eighth stemite obliquely truncate at sides, shallowly emarginate at apex, with long and fairly long setae arising terminally; ventral surface with cloud-like processes (Fig. 2.63b). Eighth tergite truncate or shallowly emarginate at apex, with fairly dense short simple spines and multi-branched spines on dorsal surface (Fig. 2.63c). Paramere 1.5–1.67 × as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.63d).

Female. Body length, 17.17–34.19 mm; *width*, 3.05–6.97 mm

Similar to males but differs in having antennae and legs distinctly shorter, more robust abdomen; elytra slightly longer and wider, 3.75–4.4 × as long as shoulder width and × 4.09–5.13 as long as prothorax. Apex of terminal stemite rounded.

Ovipositor and spermatheca. Ovipositor short; styli arising terminally with short hairs (Fig. 2.63e). Spermatheca clearly curved; spermathecal gland long and arising at base (Fig. 2.63f).

Distribution

Widely distributed along northern, eastern, and southwestern coast of Australia (Fig. 2.96).

Variation

Body colour varies from reddish brown to blackish brown. The glabrous mark on elytra are may be reduced or expanded from the basic pattern.

Biology

The following were recorded as the plants of this species: *Acacia decurrens*, *A. mearnsii [=A. mollissima]*, *A. penninervis*, *A. pycnantha*, *A. sophorae [= A. longifolia var. sophorae]*, *Acacia* spp., *Boronia pinnata*, *Eriostemon australasius [=E. lanceolatus]*, *Banksia ericifolia*; *B. integrifolia*, *Banksia* spp., *Hakea gibbosa*, *H. nodosa*, *H. serice* and *Lomatia longifolia*. Adults were found on *Leptospermum flavescens* and *Angophora* sp. flowers and *Kunzea ambigua* on *Xanthorrhoe* sp. foliage. Eggs are deposited in small branches of the host trees. Adults emerge from September to December although eclosion occurs as early as in June. They were collected from October to April. Adults are attracted to MV light.

Comments

This species closely resembles *U. pallens* but differs in having pronotal disc rugose transversely throughout; elytral apex more widely emarginate and more strongly and acutely spinose, and the subtriangular marks on elytra broader.

Uracanthus pallens **Hope, 1841**

(Figs 2.26, 2.64, 2.97)

Uracanthus pallens Hope, 1841a: 53. –Hope, 1841b: 65, 1844: 198; Aurivillius, 1912:147; Lea, 1916: 385; McKeown, 1947: 65; Duffy, 1963: 115.

Material examined

Holotype. ♂. **Van Diemen's Land (= TAS):** no data; type coll. 1768; bearing a white label with Hope's hand writing of the species name, and a red label with hand written sericus olim Van Diemans Land (HMO).

Other material examined. 10 ♂, 7 ♀. **QLD:** 1 ♂, Archer River X-ring (13°25'S, 142°56'E), 11.iv.1989, MV lamp, G. A. Daniels (UQIC). **NSW:** 1 ♀, Crowndy Bay Nation Park, 15.x.1990, S. G. Watkins Collection (ANIC); 1 ♂, 3 miles S of Cresent Head, 27.iii.1965, I. F. B. Comon & M. S. Upton (ANIC); 1 ♂, Hellenburgh, x.1962, H. E. Osborne (ANIC). 1 ♀, Sydney, Ftio, W. Ferguson Coll. (ANIC); 2 ♀, Mt Kaputar, 3000ft, 30.x.1967, at light, C. W. Frazier (ANIC); 1 ♀, Engadine, 10.i.1970, R. H. Mulder Collection (AM); 1 ♀, same data as above but 12.i.1960 (AM); 1 ?, Wahroonga, no abdomen, H. J. Carter (ANIC); 1 ♂, Vaucluse, 9.ii.1920, Coll. no.K44380 (AM). **ACT:** 1

♂, Black Mt., Canberra, 22.i.1952, L. J. Chinnick (ANIC). **VIC:** 1 ♂, Delleys Dell, Grampians, 6.ii.1956, N. B. Tindale (SAM). **TAS:** 2 ♂, 1 ♀, Freycinet National Park, 28.i.1963, I. F. B. Common & M. S. Upton (ANIC); 1 ♂, Melaleuca (43°25'S, 146°09'E), 19.ii.1990, E. S. Nielson & P. C. McQuillan (ANIC). **Locality unknown:** 1 ♂, no data, E. F. du Boulay Collection (WAM).

Description

Male. Body length, 19.21–26.27 mm; *width*, 3.73–4.55 mm.

Colour (Fig. 2.26). Body reddish brown with head, thorax, femora, and basal elytra darker. Head with dense golden pubescence except median frontal groove and a glabrous area on vertex. Pronotum with 2 distinct longitudinal stripes of white pubescence on each side: 1 on disc and 1 near ventral side; the remaining of pronotal disc with golden pubescence. Each elytron with a narrow, long, subtriangular glabrous mark, starting from shoulder and ending at almost ½ of elytra, margined with a distinct line of dense white pubescence; apical area glabrous, margined with a distinct line of dense white pubescence; remaining elytral disc with fairly dense golden pubescence.

Head. Postclypeus triangular and convex, with dense coarse punctures; frontoclypeal suture deep and wide in middle; distance between lower lobes of eyes 1.69–1.88 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.07–1.28 × as long as distance between eyes on ventral side; genal length 0.31–0.48 × as long as head width immediately below eyes. Antennae usually slightly shorter than body; segments 4-10 flattened and produced on one side at apex; apical ¼ of segment 11 slightly thinner than basal ¾.

Thorax and abdomen. Pronotum 1.15–1.42 × as long as width, rounded at sides; posterior margin 1.09–1.15 × as wide as anterior margin; disc binodulose in middle and rugose transversely anteriorly and and 1/3 posteriorly. Scutellum semicircular, with dense pubescence. Elytra 3.88–4.80 × as long as prothorax and 3.65–4.19 × as long as shoulder width; each elytron with 3 feeble longitudinal carinae; basal elytra with coarse punctures, decreasing in size towards apex; apex narrowly emarginate and bispinose. Abdomen slender, ventral surface covered with dense pubescence; apex of terminal sternite truncate or slightly emarginate.

Male terminalia. Apex of ventral median lobe slightly emarginate and apex of dorsal lobe pointed; ventral lobe about as long as dorsal lobe; spined region of internal sac about 5.2–5.4 × as long as basal unspined region; spined region divided into 2 sections with an unspined gap between sections; first section longer than unspined gap with dense long simple spines; second section with sparse short simple spines (Fig. 2.64a). Eighth sternite strongly obliquely truncate at side, shallowly emarginate at apex, with long and fairly long setae arising terminally; ventral surface with cloud-like processes (Fig. 2.64b). Eighth tergite rounded at apex, with fairly dense simple spines on dorsal surface (Fig. 2.64c). Paramere 1.5–1.67 × as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.64d).

Female. Body length, 15.47–26.63 mm; *width,* 2.65–4.85 mm.

Similar to male but differs in having antennae and legs shorter, abdomen more robust, elytra 3.96–4.09 × as long as shoulder width and 4.36–4.49 × as long as prothorax.

Ovipositor and spermatheca. Ovipositor short; styli arising terminally with short hairs (Fig. 2.64e). Spermatheca heavily curved; spermathecal gland arising near base (Fig. 2.64f).

Distribution

Northern Queensland, northeastern and eastern New South Wales, northern Australian Capital Territory, central Victoria and eastern & southern Tasmania (Fig. 2.97).

Variation

The glabrous marks on elytra may be reduced to expanded to some extent.

Biology

Known host is *Callitris hugelii*. Larvae attack and kill the half of regeneration of the host plant. Attack appears to be intiated near the tip of the stem, and then the larva works down below the bark in a single longitudinal channel. At about half way down the stem from the ground level, it girdles the stem. Tops of plants break off readily at this point, and sometime fall to the ground. The larva continues to feed in the dead tops. Adults were collected in October and March to April, and attracted to MV light trap.

Comments

This species closely resembles *U. triangularis* but differs in having the elytral apex relatively narrowly emarginate; the glabrous marks on elytra narrower and longer, and the pronotal disc less strongly rugose transversely.

Uracanthus regalis McKeown, 1948

(Figs 2.27, 2.65, 2.98)

Uracanthus regalis McKeown, 1948: 54.

Material examined

Holotype. ♀. **WA:** Denmark (34°58'S, 117°21'E), Coll. no. K67661, bearing a red holotype label; 2 segments of left antenna missing (AM).

Other material examined. 15 ♂, 18 ♀. **WA:** 1 ♂, South Perth (31°58'S, 115°51'E), 3.ii.1975, K. T. Richard (WADA); 1 ♂, same locality but 12.xii.1904, H. M. Giles (NMV); 1 ♂, same locality as above but H. M. Giles, F. E. Wilson Collection (NMV); 1 ♀, Yanchep, 17.ix.1970, at light, S. J. Curry (WADA); 1 ♂, same data as above but 15.iii.1970 (WADA); 1 ♂, Denmark (34°58'S, 117°21'E), ii.2002, M. L. & S. Jone (WAM); 1 ♂, Lockwood Spring (27°46'S, 114°28' E), Kalbaroi, 6.vii.1940, K. Youngson & R. Johnane (WAM); 1 ♀, Kalamunda (31°58'S, 116°03'E), 24.x.1962, J. Dell (WAM); 1 ♀, Bateman, 11.x.1998, hand collecting, P. R. Davis (WADA); 1 ♀, Kukerin, 8.xii.1993, UV light trap, A. Szito (WADA); 2 ♂, Woodridge, intercept trap, 20-30.x.1996, H. Demarz (WADA); 1 ♀, same data as above but (ANIC); 1 ♀, Esperance, 31.x.1951, E. F Wilson Collection, W. L. Brown (NMV); 1 ♂, 16 km NW of Eneabba, 9-12.ix.1987, at gas light, at night, T. F. Huston (WAM); 1 ♂, Mukcain (WAM); 1 ♀, Dianella, in Shopping Center, 25.ix.1995, A. Szito (WADA); 1 ♂, Moore River National Park (31°10'S, 115°40'E), 3-4.iv.1991, at gas light, at night, T. F. Huston (WAM); 1 ♀, 40 km N of Badgingarra, 15.iii.1995, UV light, A. Szito (WADA); 1 ♀, in *Banksia*, C446 (QDPI); 1 ♂, Maylands, 28.iii.1974, on door, J. T. Curry (WADA); 1 ♂, North Tarin Rock Nature Reserve (32°59'S, 118°14'E), 16-18.x.1985, T. F. Houston, Coll. no.618-1 (WAM); 1 ♂, 2 ♀, Swan River, J. Clark (WADA); 1 ♀, Onslow,14.iii.1965, B. G. Muir (WAM). 1 ♀, Albany (NMV); 1 ♀, 2 miles S by SW of Mt Ragged, 13.xi.1969, M. S. Upton (ANIC); 1 ♀, 25 km N Eneabba (29°36'S, 115°15'E), 24–25.x.1984, A. A. Calder (ANIC); 1 ♂, 5 km W of Quairading, 1.x.1992, E. D. Edward & E. S. Nieson (ANIC). **Locality unknown**: 1 ♀, E. F. du Boulay Collection, det by K. C. McKeown as *U. sp.* (WAM); 2 ♀, no data, H. J. Carter Collection (NMV); 1 ♀, no data, Hope/Westwood Collection (HMO).

Description

Male. Body length, 17.19–35.69 mm; *width,* 3.28–7.6 mm.

Colour (Fig. 2.27). Body blackish brown with head, thorax, femora, and basal elytra darker. Head with dense white pubescence except median frontal groove and a glabrous area on vertex. Pronotum with 2 wide longitudinal stripes of white pubescence on each side: 1 on disc and 1 near ventral side; remaining part of pronotum with golden pubescence. Each elytron with a large subtriangular glabrous mark starting from shoulder and ending at about basal 1/3 of elytra, margined with a vague line of dense white pubescence; disc of each elytron with 4 vague, longitudinal lines of dense white pubescence interspaced with lines of sparse pubescence.

Head. Postclypeus triangular, convex and finely dense punctate; frontoclypeal suture wide and deep in middle; distance between lower lobes of eyes 1.75–2.0 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.20–1.30 × as long as distance between eyes on ventral side; genal length 0.48–0.62 × as long as head width below eyes. Antennae slightly shorter than body; segments 5-10 flattened and slightly produced on one side at apex; apical ¼ of segment distinctly thinner than basal ¾.

Thorax and abdomen. Pronotum 1.11–1.39 × as long as width, rounded at side; posterior margin 1.33–1.43 × as wide as anterior margin; disc smooth and finely punctate with 2 small nodules in middle; disc and side strongly rugose transversely. Scutellum semicircular, with dense pubescence. Elytra 4.37–4.92 × as long as prothorax and 3.27–

3.79 × as long as shoulder width; each elytron with 3 feeble longitudinal carinae; apex narrowly emarginate and bispinose, sutural spine larger than marginal one. Apex of terminal sternite truncate.

Male terminalia. Apex of ventral median lobe narrowly emarginate and apex of dorsal lobe slightly pointed; ventral lobe longer than dorsal lobe; spined region of internal sac 7.0–7.2 × as long as basal unspined regions; spined region divided into three sections: first section with dense clustered long simple spines; no unspined gap between first and second sections; second section with sparse short simple spines; a wide unspined gap between second and third sections; third section with very sparse short simple spines (Fig. 2.65a). Eighth sternite strongly obliquely truncate at sides, apex strongly emarginate and V-shape, with fairly dense setae arising terminally; ventral surface with dense cloud-like process present and fairly dense short simple spines (Fig. 2.65b). Apex of eighth tergite more or less rounded and sometimes slightly emarginated; dorsal surface with dense simple spines and multi-branched spines (Fig. 2.65c). Paramere 1.7–1.98 × as long as wide, cylindrical in shape; apex rounded with long and short setae (Fig. 2.65d).

Female. Body length, 18.21–35.69 mm; *width,* 3.28–7.6 mm.

Similar to males but differs in having more robust body and shorter antennae; elytra slightly longer and wider, 3.36–3.82 × as long as shoulder with and 4.12–4.84 × as long as prothorax; apical ¼ of antennal segment 11 slightly thinner than basal ¾; apex of terminal sternite rounded.

Ovipositor and spermatheca. Ovipositor short; styli arising terminally with short hairs (Fig. 2.65e). Spermatheca clearly curved; spermathecal gland long and arising at base (Fig. 2.65f).

Distribution

Western and southwestern Western Australia (Fig. 2.98).

Variation

Body colour varies from blackish brown to reddish brown. The subtriangular glabrous marks on elytra may be slightly reduced or expanded.

Biology

The known host is *Banksia* sp. Adults were collected from August to February and attracted to light.

Comments

This species resembles *U. dubius* but differs in having the body more robust and the subtriangular mark on elytra broader and more distinct; elytra with fewer and wider longitudinal lines of white pubescence, and elytral apex very narrowly emarginate.

Uracanthus dubius **Lea, 1916**

(Figs 2.28, 2.66, 2.98)

Uracanthus dubius Lea, 1916: 371. –McKeown, 1947: 64.

Material examined

Holotype. ♂. **SA:** Fowlers Bay (31°58'S, 132°28'E), Coll. no. 5482, bearing a name label on which 'TYPE' was written in red (SAM).

Paratypes. 3 ♀, 1 ♂. **SA:** 2 ♀, 1 ♂, same data as above (SAM); 1 ♀, no data (SAM).

Other material examined. 19 ♂, 8 ♀. **NSW:** 1 ♂, 16 km W of Euabalong West, 27.x.1992, M. S. & B. J. Moulds (AM). **SA:** 1 ♂, Ceduna (32°07'S, 133°40'E), 29.xii.1957, P. Aitken (SAM); 1 ♀, 5 km S by E of Ceduna (32°10'S, 133°41'E), 10.x.1968, M. S. Upton & J. E. Feehan (ANIC); 5 ♂, Yumbarra National Park, 11.xi.1975, at light, J. A. Herridge (SAM); 1 ♂, same data as above but Inila Rock Waters (13°46'S, 133°25'E), 20-30.ii.1995, pitfall, H. Owen (SAM); 2 ♂ , Yalata, 4.x.1989, P. R. B. Det. 1971 by E. G Matthews (WINC); 2 ♂, Wittelee Point, 10 km SE Ceduna, 1.iii.1975, at light, J. A. Herridge (SAM); 1 ♀ , Calpatanna, W. H. Cons Pk. Wedina Well, Eyre Pen., 30.xi.1986, at light, J. A. Forrest (SAM); 2 ♀, 10 mi E by SE of Koonalda HS, SA, 19.x.1968, no abdomen, Britton, Upton & Balderson (ANIC). **WA:** 2 ♂, Eucla, 5.xi.08, C. French's Collection (NMV); 1 ♀, Officer Basin, N. E. of Stretch Mound Great Vict Desert, 24-28.ix.1991, R. P. Mcmillan (SAM); 2 ♂, 1 ♀, Warbla, 9.i.1960, at light, P. Aitken (SAM); 1 ♂, 7 mi E by N of Balladonia HS, 13.x.1968, Britton, Upton & Balderson (ANIC); 2 ♀, WA (ANIC). **Locality unknown:** 1 ♂, Australia (SAM); 1 ♂, S & W Australia (QM).

Description

Male. Body length, 25.08–36.08 mm; *width*, 4.91–7.19 mm.

Colour (Fig. 2.28). Body reddish brown to blackish with head, thorax, femora, and basal elytra darker. Head covered with dense white pubescence except median frontal groove and a longitudinal glabrous area on vertex. Pronotum with 2 longitudinal stripes of dense white pubescence on each side: 1 on disc, narrow and vague, and 1 near ventral side, wide and distinct; remaining prothorax with fairly dense white pubescence. Each elytron with an indistinct subtriangular mark covered with sparse, short, white pubescence, starting from shoulder and extending to basal 1/3, and the mark margined with dense white pubescence; remaining part of elytra covered with dense white pubescence arranged like several longitudinal lines.

Head. Postclypeus triangular, convex and finely dense punctate; frontoclypeal suture wide and deep in middle; distance between lower lobes of eyes 1.77 – 1.9 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.05 – 1.09 × as long as distance between eyes on ventral side; genal length 0.38 – 0.46 × as long as head width below eyes. Antennae slightly shorter than body, segments 5-10 flattened and distinctly produced on one side at apex; apical ¼ of segment 11 clearly thinner than basal ¾.

Thorax and abdomen. Pronotum 1.17–1.34 × as long as wide, with a very small angular process at each side; posterior margin 1.13–1.33 × as wide as anterior margin; disc finely punctate with 2 small nodules on disc; disc and sides strongly rugose transversely. Scutellum semicircular, with dense pubescence. Elytra 4.05–4.55× as long as prothorax and 3.38–3.60 × as long as shoulder width; each elytron with 3 feeble longitudinal carinae; apex widely emarginate and strongly bispinose. Apex of terminal sternite truncate.

Male terminalia. Apex of ventral lobe strongly and widely emarginate and apex of dorsal lobe rounded or weakly pointed; ventral lobe much longer than dorsal lobe; spined region of internal sac 5.3–5.42 × as long as basal unspined regions; spined region divided into two sections without unspined gap between sections: first section with dense clustered long simple spines and fairly dense multi-branched spines; second section with sparse short simple spines (Fig. 2.66a). Eighth sternite rounded or slightly obliquely truncate at sides, very shallowly emarginate at apex, with long and fairly long setae arising terminally; ventral surface with cloud-like processes (Fig. 2.66b). Eighth tergite with a small notch at apex; dorsal surface with dense simple spines and multi-branched spines (Fig. 2.66c). Paramere 2.0–2.3 × as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.66d).

Female. Body length, 25.27–38.04 mm; *width*, 5.07–8.17 mm.

Similar to males but differs in having more robust body and shorter antennae; elytra 3.46–3.69 × as long as shoulder width and 4.03–4.75 × as long as prothorax; apical ¼ of antennal segment 11 slightly thinner than basal ¾.

Ovipositor and spermatheca. Ovipositor short; styli arising terminally with short hairs (Fig. 2.66e). Spermatheca heavily curved; spermathecal gland very long and arising near base (Fig. 2.66f).

Distribution

Southeastern Western Australia, southwestern South Australia and central New South Wales (Fig. 2.98).

Variation

Body colour varies from blackish brown to reddish brown. Elytral apex may be widely or narrowly emarginate.

Biology

Hosts are unknown. Adults were collected by light trap during September–January and pitfall trap in Febuary.

Comments

This species resembles *U. regalis* but differs in having the subtriangular mark on elytral disc almost completely covered with sparse short pubescences; elytra with more longitudinal lines of dense white pubescences.

Uracanthus simulans **Pascoe, 1866**

(Figs 2.29, 2.67, 2.99)

Uracanthus simulans Pascoe, 1866: 92. –Best, 1882: 35; Tepper, 1887: 38; French, 1911: 67; Aurivillius, 1912: 147; Lea, 1916: 383; McKeown, 1947: 66; Duffy, 1963: 117.

Material examined

Holotype. ♀. **SA:** no data; type Pascoe Coll. 93-60; bearing a circular type label, and with Pascoe's handwriting of the species name (BMNH).

Other material examined. 47 ♂, 20 ♀. **QLD:** 1 ♂, Eulo (28°09'S, 145°02'E), 24.ix.1991, at light, G. Daniels (UQIC). **NT:** 1 ♂, Plenty River, Salt Lake, Simpson Desert (24°09'S, 136°41'E), 14.ix.1992, L. Archhold (NTM); 1 ♂, Daly Waters (13°18'S, 130°15'E), 18-21.i.1972, T. Weir & A. Allwood (NTM). 1 ♂, 2 ♀, Nr Reedy Rockhole, Amadeus Basin (24°20'S, 131°35'E), 16.ix.1962, P. Ranford (ANIC); 1 ♂, same data as above but 1.x.1962 (ANIC); 1 ♂, 1 ♀, 9 km of Kulgera (25°46'S, 133°18'E), 1.x.1972, J. Upton (ANIC). **NSW:** 1 ♂, Narwarre sta., 33 miles SE of Louth, 1949, E. E. Mitchell (ANIC); 1 ♂, Broken Hill, 22.x.1944, C. E. Chadwick (ASCU); 1 ♂, 1 ♀, near Visitors

Center, Mootwingee Historic Site (30°58'S, 142°04'E), 7.xi.1984, at mercur vapour lamp, G. R. Brewn & H. M. Holmes (ASCU); 1 ♀, NSW (NMV). **VIC:** 1 ♀, Mildura (NMV); 1 ♀, Yanac, 5.xi.1978, J. C. Le Souef (ANIC). **SA:** 1 ♂, Wharminda Wells, E Side Hinks Conservative Park, Eyre Peninsular, 5.xii.1986, at light, J. A Forrest (SAM); 1 ♂, 8 km N of SW Carrllin HS, Sand End of Formby Bay, York Peninsular, 4.x.1965, N. McFarland (SAM); 1 ♂, Clere (UQIC); 1 ♀, no data, SA (MAM); 1 ♂, SA, Coll. no. K36089 (AM); 1 ♂, Parachilna (31°07'S, 138°23'E), Flinders Range, Nat. Hist. Exp. (SAM); 1 ♀, Ouldea, SA, R. T. Muaurice (SAM); 1 ♀, Hiltaba (32°07'S, 135°03'E), Gawler Ranges, ix.1972, Field Nat. Soc (SAM); 1 ♀, 132 km N. of Cook (30°36'S, 130°24'E), 18.iix.1980, at light, J. A. Forret (SAM); 1 ♂, Winbring, det by Lea (WADA); 3 ♂, 10km N by NE Mt. Woodroofe (26°14'55″S, 131°47'36″E), Musgrave Ra, NGO1, 13.x.1994, at light, Pitjantjatjaral Lands survey (SAM); 1 ♀, 24 km N Mt Serle inbed of Frome Creek, 9.xi.1976, at light, M. Minchino (SAM); 1 ♂, N of Roxby Downs, Woodland, SA, 25.x.1976, at light in camp, *Acacia sowdenii*, L. D. Williams (SAM); 1 ♂, 17 miles S of Mt Finke, 29.x.1974, P. Aiken (SAM); 1 ♀, SA, Port Lincoln, Seaford Bay area, iv –v.1964, J. G. Casavara (SAM); 1 ♀, SA, Blackburn Collection, Coll. no. 5479 (SAM).1 ?, SA, no abdomen (ANIC). **WA:** 1 ♀, South Perth, 7.iii.1904, H. M. Giks, dept by Lea (NMV); 1 ♂ , Kalgoorlie, det by K. C. McKeown (ASCU); 1 ♂, Binnu (28°02'S, 114°40'E), 8.iii.1965, H. de Graaf (WAM); 3 ♂, same data as above but 26.iii.1965 (WAM); 2 ♂, Laverton (28°14'S, 122°33'E), 25.iii.1924, det by McKeown (WAM); 2 ♂ , 1 ♀, Mullewa (28°32'S, 115°30'E), WA, Miss F. May (SAM); 2 ♂, same data but det by Lea, F. E. Wilson Collection (NMV); 1 ♂ , same locality but 23.iii.1939, det by McKeown (WAM); 1 ♂, Kalgoorlie (30°45'S, 121°27'E), 20.iv.1922, J. H. Welez and J. Carter Coll. det by Lea (NMV); 1 ♂, same locality as above but 10.iii.1911, W. du Boulay, det by Lea (NMV); 1 ♂ , same locality as above but det by Lea (NMV); 1 ♂, Thevenard Island, 8.x.1966, G. Bostock (WAM); 1 ♂, Beverley, WA, F. H. du Boulay (SAM); 3 ♂, Norseman, WA, 23.iii.1971, M. S. Upton (ANIC); 1 ♂, Ravensthorpe, 25.ii.1971, K. T. Richards (WADA); 2 ♂, 15 km N by NE of Ajana, Murchison (27°49'S, 114°41'E), 27.iii.1971, M. S. Upton (ANIC); 1 ♂, 42 km S of Moorine Rock, WA, 13.i.1980, K. & S. Carnaby (ANIC); 1 ♂, Coolgardie, i.1948, W. du Boulay (WAM); 1 ♂, Geraldton (SAM). **Locality unknown:** 1

♀, Australia Old Collection det by Lea, F. E. Wiston Collection (NMV); 1 ♀, Australia Old Collection det by Lea (QM); 1 ♀, JR. (?), Hope/ Westwood Coll. Cab2, d.27 (HMO); 1 ♀, Australia Old Coll. from SAM (NMV); 1 ♂, Coll. no. K39083 (AM).

Description

Male. Body length, 15.89–29.26 mm; *width,* 3.00–5.85 mm.

Colour (Fig. 2.29). Body reddish to blackish brown with head, thorax, femora, and basal elytra darker. Head with dense pale yellowish pubescence. Pronotum with 2 wide longitudinal stripes of very dense pale yellowish pubescence on each side: 1 on disc and 1 near ventral side; remaining part of pronotum with less dense pale yellowish pubescence; median line on pronotal disc more or less glabrous. Each elytron with a subtriangular glabrous mark, extending from shoulder to basal 1/3, without distinct margin; some areas of the mark sometimes covered with sparse short pale yellowish pubescence; remaining part of elytron with short dense yellowish or pale pubescence.

Head. Postclypeus semicircular, flattened, and coarsely punctate; frontoclypeal suture wide and deep in middle; distance between lower lobes of eyes 1.42–1.53 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.67–1.72 × as long as distance between eyes on ventral side; genal length 0.33–0.41 × as long as head width immediately below eyes. Antennae slightly shorter than body; segments 5-10 flattened and distinctly produced on one side at apex.

Thorax and abdomen. Pronotum 1.26–1.47 × as long as wide, with a small rounded process at each side; posterior margin 1.07–1.36 × as wide as anterior margin; pronotal disc finely punctate with 2 very weakly raised nodules in middle area; disc and side strongly rugose transversely. Scutellum semicircular, with dense pubescence. Elytra 3.54–4.15 × as long as prothorax and 3.40–3.77 × as long as shoulder width; basal elytra coarsely punctate;

apex slightly emarginate or truncate, with a small spine at suture and small process or rounded at margin. Apex of terminal sternite truncate or slightly emarginate.

Male terminalia. Apex of ventral lobe emarginate and apex of dorsal lobe rounded or slightly pointed; ventral lobe about as long as dorsal lobe; spined region of internal sac 2 × as long as basal unspined region; spined region divided into two sections with an unspined gap between sections: first section with dense clustered long simple spines on sides with an unspined area in middle; second section with sparse short simple spines (Fig. 2.67a). Eighth sternite obliquely truncate or slightly at side, shallowly and widely emarginate at apex, with long and fairly long setae arising terminally; ventral surface with simple spines (Fig. 2.67b). Eighth tergite rounded or slightly emarginate at apex with long and short setae; dorsal surface with fairly dense simple spines and multi-branched spines (Fig. 2.67c). Paramere 1.78–1.8 × as long as wide, cylindrical in shape; apex rounded with long and short setae (Fig. 2.67d)

Female. Body length, 18.87–31.48 mm; *width,* 3.64–6.99 mm.

Similar to male but differs in having broader body and shorter antennae; elytra slightly longer and wider, 3.19–3.66 × as long as shoulder width and 3.08–4.53 × as long as prothorax.

Ovipositor and spermatheca. Ovipositor short; styli arising terminally with short hairs (Fig. 2.67e). Spermatheca slightly curved; spermathecal gland arising near base (Fig. 2.67f).

Distribution

Northern and southern Northern Territory, southern Queensland, western & northern New South Wales, northwestern Victoria, southern and southwestern South Australia, and western and southern Western Australia (Fig. 2.99).

Variation

Elytral apex may be almost rounded at margin; glabrous mark on the elytron may be longer or shorter; body colour may be lighter than the above described.

Biology

Hosts are *Banksia australis* (Best, 1882), *Helichrysum ferrugineum* and *Acacia sp.* (French, 1911) and *Acacia longifolia* (Pierce, 1917) and *Acacia sowdenii*. Adults emerge during December and April (French, 1911). Adults were collected from October to March, and attracted to light.

Comments

This species resembles *U. triangularis* Hope but differs in having the subtriangular mark on the elytra smaller and narrower, elytra without glabrous areas on apical areas, and the elytral apex usually with only 1 spine at suture.

Uracanthus fuscus Lea, 1916

(Figs 2.30, 2.68, 2.99)

Uracanthus fuscus Lea, 1916: 372. –McKeown, 1947: 64.

Material examined

Holotype. ♂. **SA:** Coll. no. 5698, bearing a name label on which 'TYPE' was written in red (SAM).

Paratypes. 4 ♂. **SA:** 3 ♂, South Australia, Australia old collection (SAM); 1 ♂, no locality data, Australia old collection (SAM).

Other material examined. 38 ♂, 3 ♀. **QLD:** 1 ♂, Queensland (NMV). **SA:** 5 ♂, Uro Bluff, W. of Lake Torrens, 2.x.1971, H. Mincham (SAM); 2 ♂, 20 km Wirraminma Stn., 2.xi.1975, at light, J. A. Herridge (SAM); 1 ♂ , same locality as above but 27.x.1953, N. B. Tindale (SAM); 1 ♂, Kingoonya, 12.x.1977, at light, G. F. Gross (SAM); 1 ?, no abdomen, same locality as above but R. Harvey (SAM); 2 ♂, SA, Rev. A. E. Burgess (SAM); 2 ♂, Middleback Station (32°57'S, 137°24'E), at light, 26.x.1983, J. Woddell (SAM); 1 ♂, Yalpara Station, 27.x.1970, at light, P. R. B. (WINC); 1 ♂, 18 mile NE of Derraroo (32°33'S, 138°49'E), Yalpara Station, 22.xi.1969, at light, P. R. B. (WINC); 1 ♂, Penong, 18.x.1996, J. W. G. (WINC); 1 ♂, Tarcoola (NMV); 1 ♂, SA (MAM); 10 ♂, 2 ♀, Reevesby Island, SA, xii.1956, D. J. Mahony, McCoy Soc. Exped Sir Jos. Banks Groups, xii 1963 – i. 1937 (NMV); 1 ♂, Port Lincoln, SA, i.1951, ex *Acacia,* C. Oke (NMV); 1 ♀, Hammond SA, i.1948, V. H. Mincham (AM); 1 ♂, North Flinders Range, SA, A. H. Collection (AM); 1 ♂, Kingoonya, SA, R. Harvey (AM); 1 ♂, Beverley, W. D. V. Firdub (AM); 1 ♂, SA, Koonalda, 5.i.1986, P. Aitken (SAM). **WA:** 2 ♂, WA, C. French Collection (NMV). **Locality unkown.** 1 ♂, no data, I.d by John Davidson (WINC); 1 ♂, 20 miles W of ? Uenluing Rocks, i.1909, Mu Chandu Rec 26.v.1909 (NMV); 1 ♂, no data (WINC).

Description

Male. *Body length,* 14.45–23.70 mm; *width,* 2.95–4.98 mm.

Colour (Fig. 2.30). Body blackish brown with head, thorax and basal elytra darker. Head (particularly frons and vertex) covered with dense white pubescence except a narrow longitudinal glabrous area on vertex. Pronotal disc with a wide longitudinal stripe of very dense white pubescence on each side; remaining prothorax covered with dense white pubescence. Each elytron with a very vague subtriangular mark covered with relatively sparse hairs, starting from shoulder and extending at about basal 1/3, without any margin; the remaining of elytra with fairly dense white pubescence. Meso- and meta-sterna, abdomen, and legs covered with dense white pubescence.

Head. Postclypeus semicircular and slightly convex, with dense coarse punctures; frontoclypeal suture deep and narrow in middle; distance between lower lobes of eyes 1.82–2.0 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.3–1.67 × as long as distance between eyes on ventral side; genal length 0.25–0.32 × as long as head width immediately below eyes. Antennae shorter than body; segments 5-10 strongly flattened and produced on one side at apex.

Thorax and abdomen. Pronotum 1.05–1.54 × as long as width, with a weak and rounded process at each side; posterior margin 1.16–1.69 × as wide as anterior margin; pronotal disc binodulose in middle area; disc and sides strongly rugose transversely near anterior and posterior margins. Scutellum semicircular, with dense pubescence. Elytra 2.97–3.86 × as long as prothorax and 3.25–3.44 × as long as shoulder width; each elytron with 3 feeble longitudinal carinae; basal elytra finely punctate; apex more or less truncate with a small process or spine at suture. Segment 1 of hind tarsus 0.66–0.68 × as long as sum of segments 2+3. Apex of terminal sternite truncate.

Male terminalia. Apex of ventral lobe strongly emarginate and apex of dorsal lobe rounded or slightly pointed; ventral lobe as long as dorsal lobe; spined region of internal sac 4.89 – 5.12 × as long as basal unspined regions; spined region divided into two sections without unspined gap between sections; first section with dense clusters of long simple spines and fairly dense multi-branched spines at lateral sides; second section with sparse multi-branched spines and fairly dense simple spines (Fig. 2.68a). Eighth sternite obliquely truncate or nearly rounded at sides, shallowly emarginate at apex, with long and fairly long setae arising terminally; ventral surface with fairly dense cloud-like processes (Fig. 2.68b). Eighth tergite rounded at apex, with fairly dense simple spines and multi-branched spines near base (Fig. 2.68c). Paramere robust, 1.98 – 2.1 × as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.68d).

Female. Body length, 18.48–26.43 mm; *width,* 3.69–5.46 mm.

Ovipositor and spermatheca. Ovipositor very short; styli arising terminally with short hairs (Fig. 2.68e). Spermatheca distinctly curved; spermathecal gland arising near middle (Fig. 2.68f).

Distribution

Southern and southeastern South Australia (Fig. 2.99). One specimen was collected in Queenslands but exact locality is unknown.

Variation

This species varies in body colour from blackish brown to blackish.

Biology

Known host is *Acacia* sp. Adults were collected in October to November by light trap.

Comments

This species resembles *U. simulans* but differs in having body more slender in shape; the triangular mark on basal elytron vague.

Uracanthus cryptophagus Olliff, 1892

(Figs 2.31, 2.69, 2.100)

Uracanthus cryptophagus Olliff, 1892: 896. –Froggatt, 1907:193; Aurivillius, 1912: 147; Tillyard, 1926: 233; Brimblecombe, 1943: 37; McKeown, 1947: 63; Duffy, 1983:114.

Uracanthus cryptophaga. –Allen, Blunno, Froggatt & Guthrie, 1898b: 1216; Froggatt, 1919: 262; 1923:96.

Material examined

Holotype. ♀. **NSW:** Richmond R. (28°47'S, 153°16'E), 5.vii.1892, Coll. no. k36086, bearing a red holotype label; 2 segments of right antenna missing (AM).

Paratypes. 1 ♂, 1 ♀. **NSW:** 1 ♂, same locality as above but Coll. no. 5480 (SAM); 1 ♀, same locality as above but Coll. no. 630 (SAM).

Other material examined. 25 ♂, 30 ♀. **QLD:** 1 ♂, Brisbane, R. IIlidge (SAM); 1 ♀, same as above but (UQIC); 1 ♂, same data as above but (ANIC); 1 ♂, Bucasia, Nth QLD, 9.xii.1990, K. J. Sandery (SAM); 1 ♂, same data as above but 17.xi.1990 (ANIC); 1 ♀, same data as above but 9.xii.1990 (SAM); 1 ♂, Oakview (26°07'S, 152°20'E) SE Barracks 15.i.2002, MV light, Monteith & Thompson, Coll. no. 10349 (QM); 1 ♂, Mackay, 5.xi.1908, C. French (NMV); 1 ♂, Montville, L. Smith (UQIC); 1 ♂, National Park, R. IIlidge (UQIC); 1 ♂, K'roy, 8.xii.1985, larval tunneling in citrus trunk, J. Wessels (QDPI); 1 ♀, Macpherson's Range (22°17'S, 146°18'E), Deane (UQIC); 1 ♂, Imbil (26°27'S, 152°40'E), 1931, host Scrub, RB (QDPI); 1 ♀, Gayndah (25°37'S, 151°36'E), 5.x.1941, A. May (QDPI); 1 ♂, 2 ♀, Yeppoon, QLD, 26.xi.1965, J. C. Le Souef (ANIC); 1 ♂, 2 m Elimbah, 6.ix.1966, x Citrus, J. H. B (QDPI); 1 ♂, 3 km N of Mourangee, at light, Scrub (ANIC); 1 ♂, Homebush, xii.1940, S. R. E. Brook Collection (ANIC). **NSW:** 1 ♀, Tweed R. (28°13'S, 153°33'E), xii.1909, E. C. Bons (UQIC); 1 ♀, same locality but (MAM); 2 ♀, same locality but (WADA); 1 ♂, 1 ♀, same locality but (QM); 1 ♀, same locality but (AM); 1 ♀, Richmond R. (28°47'S, 153°16'E), 5.vii.1892, H. J. Carter Collection (NMV); 2 ♀, same locality but (AM); 1 ♂, same locality but (SAM); 1 ♀, same locality but (VAIC); 1 ♀, same locality but (ASCU); 2 ♀, same locality but 5.i.1892 (ANIC); 1 ♀, same locality but 5.vii.1892, Froggatt Collection (HMO); 1 ♂, 1 ♀, Alstonville (28°49'S, 153°26'E), 5.xii.1978, W. E. Wright (AM); 1 ♂, Don (23°57'S, 149°51'E), xii.1964, E. Sutton Collection (QM); 1 ♀, Tambourine Mt (33°49'S, 151°09'E), 8.i.1912, E. Sutton Collection (QM); 1 ♀, Green Pigeon via Kyogle (28°45'S, 153°00'E), iix.1940, boring in orange, E. B. H (ASCU); 1 ♀, Grafton (30°05'S, 152°24'E), x.1909 (ASCU); 1 ♂, 1 ♀, same locality but xii.1909, Citrus tree (NMV); 1 ♀, Lismore, xi.1953, A. L. Brown (NMV); 1 ♀, same data as above but 20.xi.1954 (NMV); 1 ♂, Dorrigo National Park, 3.i. 1968, at light, C. W. Frazier (ANIC); 1 ♂, NSW, 5.xi.1908, C. French Collection (NMV); 1 ♂, NSW, F. E. Collection (NMV). 1 ♀, NSW (WADA). **Locality unknown:** 1 ♀, N Coast, i.1936, Citrus (ASCU); 1 ♂, H. Binore, H. J. Carter Collection (NMV); 1 ♂, Losinore 5-33 wells

(ASCU); 1 ♂, WA, 6.iix.1956, in Mandarin branch (QDPI); 1 ♀, A. S. B Coll. no. 544 (QDPI).

Description

Male. Body length, 24.17–38.73 mm; *width*, 4.15–7.47 mm.

Colour (Fig. 2.31). Body reddish brown to blackish brown with head, prothorax, basal and marginal elytra, and legs often darker. Body covered with dense golden pubescence. Pronotal disc with 4 narrow longitudinal stripes of dense golden pubescence; each side with a wide longitudinal stripe of dense pubescence near ventral side. Each elytron with a very vague subtriangular basal mark covered with short golden pubescence and obvious darker than other part, without any margin; remaining elytron covered with very dense golden pubescence, arranged in 4 longitudinal lines.

Head. Postclypeus semicircular, slightly convex, finely punctate; frontoclypeal suture wide and deep in middle; distance between lower lobes of eyes 1.35–1.55 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.17–1.36 × as long as distance between eyes on ventral side; genal length 0.55–0.63 × as long as head width immediately below eyes. Antennae slightly shorter than body, with dense short pubescence; segments 5-10 flattened, and produced on one side at apex.

Thorax and abdomen. Pronotum 1.27–1.45 × as long as wide, rounded at side; pronotal disc binodulose in middle area and finely punctate; disc and side distinctly rugose transversely. Scutellum semicircular, with dense pubescence. Elytra 4.01–4.70 × as long as prothorax and 3.79–4.11 × as long as shoulder width; each elytron with 3 feeble longitudinal carinae; basal elytra with fairly dense punctures; apex bispinose. Abdomen with dense pubescence; apex of terminal sternite truncate.

Male terminalia. Apex of ventral median lobe widely emarginate, dorsal median lobe rounded; dorsal lobe shorter than ventral lobe; spined region of internal sac about 3 × as long as basal unspined regions; spined region divided into 2 sections; first section with mixture of dense large and long simple spines and fairly dense multi-branched spines; second section with fairly dense simple spines (Fig. 2.69a). Eighth sternite obliquely truncate at terminal sides, strongly emarginate at middle area with long and fairly long setae arising terminally; ventral surface with sparse basally-forked spines in middle and sparse simple spines near sides (Fig. 2.69b). Eighth tergite almost truncate at apex, basal area with simple spines (Fig. 2.69c). Paramere 1.82–1.85 × as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.69d).

Female. Body length, 32.33–43.79 mm; *width,* 5.72–8.56 mm.

Antennae and legs distinctly shorter and body more robust; elytra 3.83–4.15 × as long as shoulder width and 4.00–4.87 × as long as prothorax; apex of terminal sternite truncate or slightly emarginate.

Ovipositor and spermatheca. Ovipositor short; styli arising laterally with both long and short hairs (Fig. 2.69e). Spermatheca heavily curved and C- shaped; spermathecal gland very long and arising at basal 1/3 (Fig. 2.69f).

Distribution

Eastern and northeastern New South Wales and southeastern Queensland (Fig. 2.100). One specimen was collected in Western Australia but exact locality is unknown.

Variation

Body colour may vary from reddish brown to blackish brown. The pubescence on the basal mark of the elytron varies from very sparse to dense.

Biology

Host plants are orange, native finger lemon (*Citrus australasica*), mandarin, and lychee. Eggs and larvae were found in the smaller branches of citrus trees. Adults were collected in January, July, August, and during September to December and attracted to MV light.

Comments

This species differs from other species of *Uracanthus* in having pronotal disc and each elytron covered with very dense long pubescence, arranged in four longitudinal lines.

***Uracanthus fuscocinereus* White, 1855**

(Figs 2.32, 2.70, 2.101)

Uracanthus fuscocinereus White, 1855: 330. –Aurivillius, 1912: 147; Lea, 1916: 384; McKeown, 1940: 309; McKeown, 1947: 64.

Material examined

Holotype. ♀. **New Holland (= Australia)**: no data; specimen no. 52-32; bearing a White's hand written label of the species name, and a circular type label of BMNH; right legs and terminal 6-7 segments of antennae missing (BMNH).

Other material examined. 17 ♂, 21 ♀. **QLD:** 8 ♂, 2 ♀, Stanthorpe (28°39'S, 151°56'E), xii.1964 (QM); 1 ♀, same as above but (ANIC); 1 ♀, same locality as above but xi.1925 (QDPI); 1 ♀, same locality as above but 4.xii.1922 (QDPI); 1 ♂, same locality as above but 22.xi.1923 (UQIC); 1 ♂, same locality as above but H. Jarvis and F. E. Wilson (NMV); 1 ♀, same data as above but S. Watkins Collection (ANIC); 1 ♀, Fletcher, 29.xii.1932, E. Sutton (QM). **NSW**: 2 ♂, 2 ♀, Sydney (MAM); 1 ♀, same locality as above but xi.1913, C. Gibbons (AM); 1 ♀, North Sydney, 12.iix.1976, H. J. Carter (NMV); 1 ♀, Collaroy, x.1947, T. O. B (WINC); 1 ♂, 1 ♀, Fairlight near Penrith, 12.xi.1979 (AM); 1 ♂, Iwanly, E. P. du Boulay Coll. (WAM); 1 ♀, Sackville, 22.xi.1983, S. Watkins (ANIC); 1 ♂, Waterfall, 11.xi.1981, S. Watkins (ANIC); 1 ♂, 1 ♀, Narabeen, C. Oke (NMV). **VIC:** 1 ♀, Heathcote, 9.xii.1923, Nicholson (SAM); 1 ♀, same locality as above but, 20.xii.1978, S. Watkins (ANIC). **Locality unknown:** 1 ♀, 5.xi.1908, C. French Coll. (NMV); 1 ♀, Coll. no. K36087 (AM); 1 ♂, Coll. no. K36087 (AM); 1 ♀, no data (QDPI); 1 ♀, no locality label, S. R. E. Brock Collection (ANIC).

Description

Male. Body length 26.94–31.01 mm; *width,* 2.85–5.90 mm.

Colour (Fig. 2.32). Head, thorax, and basal elytra blackish brown; remaining elytra, legs, and antennal segments reddish brown; palpi and anteclypeus yellowish. Head with dense pale yellow pubescence except a glabrous subtriangular area on vertex. Pronotum with 2 wide longitudinal stripes of dense golden pubescence on each side: 1 on disc and 1 near ventral side; remaining pronotum with sparse pale pubescence. Each elytron with 4 basal glabrous marks: 1, long and narrow at margin; 1, robust at shoulder, 1, smallest, short and narrow between suture and shoulder, and 1, longest at suture starting at base and extending towards basal 1/5 of elytra; basal 1/3 of elytra with dense white pubescence; remaining elytra with golden pubescence. Meso- and metasterna with white pubescence; femora and abdomen with golden pubescence.

Head. Postclypeus triangular and convex, finely punctate; frontoclypeal suture wide and deep in middle; distance between lower lobes of eyes 1.65–1.77 × as long as distance between upper lobe of eyes; distance between upper lobes of eyes 1.05–1.10 × as long as distance between eyes on ventral side; genal length 0.50–0.62 × as long as head width immediately below eyes. Antennae slightly shorter than body, with uniform and short pubescence; antennal segment 3 cylindrical, and segments 4-10 flattened, slightly produced on one side at apex.

Thorax and abdomen. Pronotum 1.27–1.35 × as long as width, rounded or slightly produced at side; posterior margin slightly wider than anterior margin; disc binodulose in middle area and finely punctate; disc and side strongly rugose transversely throughout. Scutellum semicircular, with dense pubescence. Elytra 4.28–4.92 × as long as prothorax and 3.60–4.26 × as long as shoulder width; with fairly dense punctures in basal part; each elytron with 3 feeble longitudinal carinae on disc; apex widely emarginate and bispinose. Abdomen with short dense pubescence; apex of terminal sternite truncate or slightly emarginate.

Male terminalia. Apex of ventral median lobe pointed and apex of dorsal median lobe rounded; ventral lobe shorter than dorsal lobe; spined region of internal sac much longer than basal unspined region; spined region divided into two sections without unspined gap between sections: first section with mixture of dense large and long simple spines, fairly dense multi-branched spines and dense scale-like processes; second section with dense long simple spine and fairly dense short simple spines (Fig. 2.70a). Eighth sternite obliquely truncate or slightly rounded at sides; apex emarginate, with fairly dense setae arising terminally; ventral surface with sparse short simple spines and cloud-like processes (Fig. 2.70b). Eighth tergite almost truncate at sides, slightly emarginate at apex with long and short setae; mid area with dense simple spines and multi-branched spine (Fig. 2.70c). Paramere 2 × as long as wide, cylindrical in shape, apex rounded with long dense setae (Fig. 2.70d).

Female. Body length, 21.32–32.13 mm; *width,* 3.92–6.94 mm.

Antennae and legs distinctly shorter, body broader with robust abdomen. Elytra slightly longer and wider, 3.36–3.97 × as long as shoulder width and 4.17–4.48 × as long as prothorax; apex of terminal sternite more or less truncate or slightly emarginate.

Ovipositor and spermatheca. Ovipositor relatively long; styli relatively large, arising terminally with short hairs (Fig. 2.70e). Spermatheca slightly curved; spermathecal gland arising at basal 1/3 (Fig. 2.70f).

Distribution

Southeastern Queensland, northeastern New South Wales and southern Victoria (Fig. 2.101).

Variation

No significant variation was observed.

Biology

Hosts are unknown. Adults were collected in August and from October to December.

Comments

This species closely resembles *U. quadristriolatus* sp. nov. but differs in having middle area of pronotal disc always covered with some pubescence; each elytron with 4 glabrous marks at base.

***Uracanthus quadristriolatus*, sp. nov.**

(Figs 2.33, 2.71, 2.101)

Material examined

Holotype. ♂. **NSW:** Dorrigo Natural Park, xi.1971, MV light, R. Hardie; bearing a red holotype label (ANIC).

Paratypes. 2 ♀. **NSW:** 1 ♀, Armidale, C. F. Deuquet (AM). **QLD**: 1 ♀, Black Mt., 2m N Kuranoa, N QLD, 4.xi.1976, at light, J. G. Brooks (ANIC).

Description

Male. Body length, 30.00 mm; *width*, 5.49 mm.

Colour (Fig. 2.33). Body dark reddish brown, with head, thorax and basal elytra darker. Head with dense, long, pale orange pubescence; vertex with a large and long longitudinal triangular hairless mark. Pronotum with 2 wide, clearly defined stripes of very dense pale orange pubescence on each side: 1 on disc and 1 near ventral side; the remaining pronotum hairless. Each elytron with 3 small basal glabrous marks: 1 on shoulder, largest, 1 between shoulder and suture, smallest and narrowest, and 1 at suture, rest of elytra covered with uniformly dense short pale yellow pubescence.

Head. Postclypeus triangular and convex, finely punctate, and sparsely pubescence; frontoclypeal suture wide and deep in middle; distance between lower lobes of eyes 1.75 × as long as distance between upper lobe of eyes; distance between upper lobes of eyes 1.0 × as long as distance between eyes on ventral side; genal length 0.53 × as long as head width immediately below eyes. Antennae shorter than body, covered with uniform short pubescence; antennal segment 3 cylindrical, segments 4 to 10 flattened, slightly produced on one side at apex.

Thorax and abdomen. Pronotum 1.42 × as long as width, with a small rounded process at each side; posterior margin wider than anterior margin; disc binodulose near middle area; disc and sides heavily rugose transversely throughout. Scutellum semicircular, with sparse pubescence. Elytra 4.27 × as long as prothorax and 3.94 × as long as shoulder; basal elytra sparsely punctate; apex bispinose with spine at suture shorter than that at margin. Abdomen with dense short pubescence, apex of terminal sternite truncate with a shallow notch.

Male terminalia. Apex of ventral median lobe pointed; dorsal median lobe rounded, ventral lobe longer than dorsal lobe. Spined region of internal sac more than 4 × as long as basal unspined regions; spined region divided into two sections: first section with mixture of dense large and long simple spines, fairly dense multi-branched spines and dense scale-like processes; second section with dense long simple spines, becoming sparser towards the end of this section (Fig. 2.71a). Eighth sternite obliquely truncate at sides, apex widely emarginate with fairly dense setae; ventral surface with sparse cloud-like processes (Fig. 2.71b). Eighth tergite almost truncate at sides, slightly emarginate at apex with long and short setae, with dense simple spines and multi-brancheds spine in mid and basal area (Fig. 2.71c). Paramere 2.2 × as long as wide, cylindrical in shape, apex rounded with long dense setae (Fig. 2.71d).

Female. Body length, 23.98–27.09 mm; width, 4.34–4.69 mm.

Similar to males but antennae and legs distinctly shorter; body broader with robust abdomen; elytra slightly longer and wider, 3.97–4.19 × as long as shoulder width and 4.02–4.28 × as long as prothorax.

Ovipositor and spermatheca. Ovipositor relatively long; styli arising terminally with short hairs (Fig. 2.71e). Spermatheca curved; spermathecal gland arising at base (Fig. 2. 71f).

Distribution

Northeastern New South Wales and northern Queensland (Fig. 2.101).

Variation

No significant variation was observed.

Biology

Hosts are unknown. Specimens were collected November.

Comments

This species resembles to *U. fuscocinereus* but differs in having elytra covered with uniform dense pale yellowish pubescence; middle area of pronotal disc without hair; the base of each elytron with only 3 glabrous marks.

Uracanthus insignis Lea, 1916

(Figs 2.34, 2.72, 2.102)

Uracanthus insignis Lea, 1916: 370.-McKeown, 1942: 87; 1947: 64.

Material examined

Holotype. ♂. **NSW:** Narara (33°20'S, 151°22'E), Coll. no. I. 5691, W. du Bouday, bearing a name label on which 'TYPE' was written in red (SAM).

Paratype. 1 ♂. **NSW:** same data as above but bearing a blue paratype label; last segment of abdomen missing (AM).

Other material examined. 8 ♂, 6 ♀. **QLD:** 4 ♂, 30 km NE of Coen (13°32'S, 143°29'E), 500 m McIlwraith Range, Leo Creek Road., 29.vi-4.vii.1976, G. B & S. R. Monteith (QM); 1 ♂, 15 km W Catain Billy Creek (11°40'S, 142°45'E), Dividing Range, Cape York Penisular, 4-9.vii.1975, G. B. Monteith (QM); 1 ♀, Lam National Park, 4.ii.1966 (UQIC); 1 ♀, Paluma (15°00'S, 146°12'E), 900m, 10.ii.1980, D. W. Frith (ANIC); 2 ♂, 8 km W by N of Bald Hill (13°45'S, 143°22'E), Mcllwraith Range, 500 m upper Leo Creek site, 27.v-12.1989, at light, T. A. Weir (ANIC); 1 ♀, Eungella, C of QLD, i.1976, G. B (ANIC); 1 ♂, Mt. Spec (18°57'S, 146°11'E), i.1964, G. B (ANIC). **NSW:** 1 ♀, Comboyne, 1973 (AM); 1 ♀, Newport, 5.ii.1964, R. H. Mulder Collection (AM); 1 ♀, NSW, Caparra, 1.iv.1992, S. G. Waitkins Collection (ANIC).

Description

Male. *Body length,* 23.58–28.1 mm; *width,* 4.27–4.99 mm.

Colour (Fig. 2.34). Head, thorax, basal 1/3 and apical 1/10 of elytra, and elytral suture blackish brown; remaining body yellowish to reddish brown. Frons, vertex, antennae and legs covered with fairly dense golden pubescence. Pronotum with a large longitudinal glabrous area on disc, wider at anterior edge and becoming narrower at posterior edge, and margined by a narrow line of dense white pubescence at each side of glabrous area; each side of pronotum with a wide longitudinal stripe of dense white pubescence near ventral side; area between narrow pubescent line on disc and wide pubescent stripe near ventral side, with dense yellowish brown pubescence; ventral surface of prothorax sparsely pubescent or almost glabrous. Basal 1/3 suture behind scutellum and margin of elytron with white pubescence; elytral apex and suture from basal 1/3 to apex sparsely pubescent or glabrous, and blackish brown; remaining part of elytra with dense short yellowish pubescence. Meso- and metasterna, and sternites with short yellowish pubescence.

Head· Postclypeus triangular, convex, sparsely and coarsely punctate; frontoclypeal suture wide and deep in middle; frons and vertex finely punctate; distance between lower lobes of eyes 2.27–2.4 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.0–1.1 × as long as distance between eyes on ventral side; genal length 0.63–0.79 × as long as head width immediately below eyes. Antennae shorter than body, thin with dense short pubescence and fine punctures; segments 5-10 flattened and produced on one side at apex.

Thorax and abdomen. Pronotum 1.19–1.29 × as long as width, rounded at side; posterior margin 1.16–1.34 × as wide as anterior margin; pronotal disc binodulose in middle; disc and side with distinct transverse rugae. Scutellum semicircular, with dense pubescence. Elytra 4.12–4.66 × as long as prothorax and 3.9–4.04 × as long as shoulder; apex bispinose. Apex of terminal sternite truncate.

Male terminalia. Apex of ventral lobe rounded with a very shallow notch; apex of dorsal lobe pointed; ventral lobe distinctly shorter than dorsal lobe; spined region of internal sac much longer than basal unspined region, divided into 2 sections: first section with mixture of dense simple spines and multi-branched spines; second section with fairly dense multi-branched spines (Fig. 2.72a). Eighth sternite strongly obliquely truncate at sides, widely emarginate at apex, with fairly dense long setae arising terminally; ventral surface with cloud-like processes (Fig. 2.72b). Eighth tergite parallel at sides and truncate at apex with long and short setae, mainly arising terminally, and dorsal surface with dense simple spines, and multi-branched spines (Fig. 2.72c). Paramere short and robust, 1.80–1.83 × as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.72d).

Female. Body length, 23.77–39.14 mm; *width,* 4.11–7.40 mm

Body more robust and broader, antennae and legs shorter. Elytra slightly longer and wider, 3.83–4.09 × as long as shoulder width and 4.38–5.29 × as long as prothorax.

Ovipositor and spermatheca. Ovipositor relatively long; styli arising terminally with short hairs (Fig. 2.72e). Spermatheca slightly curved; spermathecal gland short and arising at base (Fig. 2.72f).

Distribution

Northern andn eastern Queensland and northeastern New South Wales (Fig. 2.102).

Variation

Body and apical elytra colour varies from blackish brown to reddish brown.

Biology

Hosts are unknown. Adults were collected from January to July by MV light trap.

Comments

This species closely resembles *U. punctulatus,* sp. nov. but differs in having white pubescent lines on pronotal disc, and elytral suture from basal 1/3 to apex and apical area sparsely pubescent or glabrous, and blackish brown.

Uracanthus punctulatus, **sp. nov.**

(Figs 2.35, 2.73, 2.102)

Material examined

Holotype. ♂. **NSW:** Port Macquarie, vi.1982, K. R. Pullen; bearing a red holotype label (ANIC).

Paratypes. 4 ♂, 2 ♀. All specimens bear blue paratype labels. **QLD:** 1 ♂, Mt Glorious (27°20'S, 152°46'E), 23.x.1971, B. Camtrell (UQIC); 1 ♂, QLD, Relton Bequest, Coll.no. 3455 (QM); 1 ♂, Imbil (26°27'S, 152°40'E) (AM). **NSW:** 1♀, Tuncurry (32°05'S, 152S°30'E), i.1930 (AM); 1 ♀, Bruxner Park (29°02'S, 152°01'E) near Coffs Harbour, 22.i.1971, D. K. McAlpine (AM). **Locality unknown:** 1 ♂, no data (ANIC).

Description

Male. Body length, 28.03–39.96 mm; *width,* 5.19–7.83 mm.

Colour (Fig. 2.35). Body blackish brown, covered with dense and thick pale or pale yellow pubescence; pronotal disc with a large longitudinal glabrous area, wider at posterior edge and becoming slightly narrower at anterior edge; punctures on basal half of elytra more or less exposed, giving an appearance of a number of small blackish dots in pubescence on basal elytra.

Head. Postclypeus subtriangular, slightly convex, sparsely and coarsely punctate; frontoclypeal suture wide and deep in middle; distance between lower lobes of eyes 1.75-2 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 0.7–0.85 × as long as distance between eyes on ventral side; genal length 0.8–0.85 × as long as head width immediately below eyes. Antennae shorter than body, segments 4-10 flattened and produced on one side at apex.

Thorax and abdomen. Pronotum 1.18–1.39 × as long as width, side rounded with a feeble process; posterior margin 1.24–1.46 × as wide as anterior margin; pronotal disc binodulose in middle area, with distinct transverse rugae throughout. Scutellum semicircular, with sparse pubescence. Elytra 4.45–4.83 x as long as prothorax and 3.67–4.01 × as long as shoulder width; basal 2/3 of elytra with coarse punctures; apex more or less truncate with 2 sharp spines. Apex of terminal sternite truncate or slightly emarginate.

Male terminalia. Apex of ventral and dorsal median lobes rounded; ventral lobe shorter than dorsal lobe; unspined region of internal sac very short: spined region divided into 2 sections: first section with dense scale-like processes near base and dense large and long simple spines in most part; second section with fairly dense multi-branched spines (Fig. 2.73a). Eighth sternite obliquely truncate at sides, strongly emarginate at apex, with long and fairly long setae arising terminally (Fig. 2.73b). Eighth tergite more or less truncate and slightly emarginate at apex (Fig. 2.73c). Paramere short, 2.0–2.3 × as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.73d).

Female. Body length, 35.41–37.56 mm; *width,* 7.14–7.32 mm

Body more robust and broader; antennae and legs shorter; elytra 3.61–3.82 × as long as shoulder width and 4.23–4.79 × as long as prothorax; apex of terminal sternite truncate.

Ovipositor and spermatheca. Ovipositor short; styli arising terminally with sparse long and short hairs (Fig. 2.73e). Spermatheca slightly curved; spermathecal gland arising at base (Fig. 2.73f).

Distribution

Northeastern New South Wales and southeastern Queensland (Fig. 2.102).

Variation

No significant variation was observed.

Biology

Hosts are unknown. Adults were collected during October–December

Comments

This new species was wrongly identified as females of *U. insignis* by previous workers. The new species resembles *U. insignis* but differs in having a body covered with uniform pubescence without white pubescent lines on pronotal disc and elytral suture not glabrous.

Uracanthus maleficus Lea, 1917

(Figs 2.36, 2.74, 2.103)

Uracanthus maleficus Lea, 1917a: 739.–McKeown, 1947: 65; Duffy, 1963: 117.

Material examined

Holotype. ♂. **TAS:** Sprent (41°16'S, 146°09'E), Coll. no. 12588, bearing a name label on which 'TYPE' was written in red (SAM).

Paratypes. 1♂, 2♀. **TAS:** 1 ♂, same data as above but reared from hazelnut tree, Coll. no. 5705 (SAM); 1 ♀, Ulverstone (41°09'S, 146°10'E), reared from hazelnut tree (SAM); 1 ♀, same data as above but (AM).

Other material examined. 12 ♂, 5 ♀. **TAS:** 1 ♂, Tasmania, A. Simson, Coll. no.3648 (UQIC); 1 ♂, Strahan (13°32'S, 143 °19'E), ii.1924, G. H. Hardy, F. E. Wilson Collection (UQIC); 1 ♀, Ulverstone (41°09'S, 146°10'E), reared from Hazelnut tree, 11.xii.1918, C. French (NMV); 2 ♂, Melaleuca (43°25'S, 146°09'E), 17.ii.1990, E. S. Nielsen & P. B. McQuillan (ANIC); 3 ♂, same locality as above but nr Bathurst Harbour, 18 – 21.ii.1991, at light, A. Calder & W. Dressler (ANIC); 1 ♂, Claytons (43°23'S, 146°08'E), Bathurst Harbour, Tas, 14.ii.1990, E. S. Nielsen & P. B. McQuillan (ANIC); 1 ♂, same locality as above but 16.iii.1991, M. Horak (ANIC); 1 ♀, same locality as above but 12.iv.1991, E. D. Edwards (ANIC); 1 ♂, 4 km W Orford, (42°33'S, 147°52'E), 27.i.1983, at light, J. C. Cardale Collection (ANIC); 1 ♀, Commandant Creek (42°28'S, 145°25'E), 15.ii.1971, A. Neboiss (NMV); 1 ♀, Arve River (43°08'S, 146°48'E), 23.ii.1963, I. F. B. Common & M. S. Upton (ANIC). 1 ♀, no locality label, TAS (NMV). **Locality unknown**: 1 ♂, 11.xii.1918, C. French (NMV); 1 ♂, no data (SAM).

Description

Male. *Body length*, 22.12–26.38 mm; *width*, 4.92–6.26 mm.

Colour (Fig. 2.36). Body light reddish to blackish brown. Head with dense golden pubescence. Pronotum with 2 wide longitudinal stripes of dense golden pubescence on each side: 1 on disc and 1 near ventral side; remaining pronotum almost hairless; ventral surface of prothorax with fairly dense golden pubescence. Elytra covered with dense, short golden pubescence.

Head. Postclypeus semicircular, with dense large coarse punctures; frontoclypeal suture deep and narrow in middle; distance between lower lobes of eyes 2.20–2.36 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 0.75–0.78 × as long as distance between eyes on ventral side; genal length 0.25–0.30 × as long as head width immediately below eyes. Antennae much longer than body; segments 5-10 flattened and produced on one side at apex.

Thorax and abdomen. Pronotum 0.83–0.95 × as long as width, rounded at side; posterior margin 1.27–1.62 × as wide as anterior margin; pronotal disc smooth and weakly binodulose. Scutellum semicircular, with dense pubescence. Elytra 4.62–5.61 × as long as prothorax and 3.23–3.47 × as long as shoulder width; each elytron with 2 slightly raised longitudinal carinae on disc; basal 1/3 of elytra coarsely punctuate; apex of elytron bispinose with sutural spine significantly larger. Abdomen pararell; apex of terminal sternite truncate.

Male terminalia. Apex of ventral median lobe rounded; ventral lobe slightly longer than or as long as dorsal lobe; spined region of internal sac much longer than basal unspined region; spined region with dense long simple spines throughout except a short unspined terminal area (Fig. 2.74a). Eighth sternite rounded at side, shallowly emarginate at apex, with long and fairly long setae arising terminally; ventral surface with simple spines and cloud-like processes (Fig. 2.74b). Eighth tergite emarginate at apex, with fairly dense basally-forked spines on dorsal surface (Fig. 2.74c). Paramere long, 2.8–2.9 × as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.74d).

Female. Body length, 29.07–32.20 mm; *width*, 6.66–7.23 mm.

Abdomen more robust and broader, antennae and legs shorter. Elytra longer and wider, 3.32–3.60 × as long as shoulder width and 6.03–6.55 × as long as prothorax.

Ovipositor and spermatheca. Ovipositor short; styli arising terminally with short hairs (Fig. 2.74e). Spermatheca C-shaped; spermathecal gland short and arising at base (Fig. 2.74f).

Distribution

This species is only found in Tasmania (Fig. 2.103).

Variation

No significant variation was observed.

Biology

Known host is hazelnut (*Corylus* spp.). Adults were collected from December to April and attracted to light.

Comments

This species resembles *U. pseudogigas* sp. nov. but differs in smaller size, pronotal disc having 2 longitudinal stripes of dense pubescence and surface of disc smooth; elytral apex bispinose.

Uracanthus gigas **Lea, 1916**

(Figs 2.37, 2.75, 2.103)

Uracanthus gigas Lea, 1916: 372. –McKeown, 1947: 64.

Material examined

Holotype. ♂. **QLD:** Kingaroy (26°32'S, 151°50'E), French Collection (NMV)

Paratypes. 1 ♂, 1 ♀. **QLD:** 1 ♀, same data as above but Coll. no. 18529 (SAM). **WA**: 1 ♂, locality unknown (NMV).

Other material examined. 31 ♂, 6 ♀. **QLD:** 1 ♂, Brialow Res. Site 1 (28°48'S, 149°45'E), softwood scrub, 160m, 18.xi.2000, at MV light, A. Ewart, Coll. no. 9595 (QM); 1 ♂, East of Wonga Hill, 20 m, site 3 (26°04'S, 150°49'E), 11.xii.2001, vine scrub, at MV light, Cook & Wright (QM); 1 ♂, Coomooboolaroo (23°54'S, 149°30'E), C. Bainara (SAM); 1 ♀, Edungalba (23°43'S, 149°50'E), 1939, E. E. Adams, terminalia slide no. f-030414-3 (QM); 1 ♂, N Taroom (25°36'S, 149°46'E), 2.x.1991, MV light, G. Danniels (UQIC); 1 ♂, Muttaburra, E. Monteith, terminalia slide no. m-030414-5 (UQIC); 1 ♀, Hughenden RW, Bommbrick snap stack, 19.v.1934, terminalia slide no. f-030414-1

(UQIC); 1 ♂, Coroorok R (UQIC); 2 ♂, SE by E of Lifracombe, 17.iii.1971, R. A. H. Davis (ANIC); 1 ♂, same data as above but 19.iii.1971 (ANIC); 1 ♀, Edungalba, hatched from brigalow, i.1946, A. & B. Smith (ANIC). 1 ♀, same locality as above but 1944 (ANIC). **WA:** 1 ♂, Wadgingarra (WAM); 1 ♂, Gullewa (WAM); 1 ♀, same data as above but (QM); 1 ♂, Boologooro HS (24°39'S, 113°42'E), 27–29.iix.1980, C. A. Howard & T. F. Houston (WAM); 1 ♂, same data as above but terminalia slide no. m-030414-7 (WAM); 1 ♂, Mooka stn upper Gasecoyne, 10.x.1971; P. Bridge & M. Thomas, terminalia slide no. m-030414-4 (WAM); 1 ♂, Forrest, iix.1873 (WAM); 1 ♂, Middalya, 4.ii.1904, T. Weir (NMV); 1 ♂, Carnarvon, Yalbalgo stn., 12.ix.1950, A. Snell (WADA); 1 ♂, same data as above but terminalia slide no. m-030414-6 (WADA); 1 ♀, same data as above but 21.iix.1950, terminalia slide no. f-030414-2 (WADA); 1 ♂, Carnarvon, Jimba Jimba, ix.1949, A. Snell (WADA); 4 ♂, N by E Singlatan Mt. (29°21'S, 117°20'E), 28.ix.1981, J. C. Cardale (ANIC); 8 ♂, NE Ninghan HS, 26 m, nr Lake Moore, 23.x.1963, at light, A. V. Williamson (ANIC).

Description

Male. Body length, 40.61–53.78 mm; *width,* 8.87–10.25 mm.

Colour (Fig. 2.37). Head, prothorax, legs and elytra blackish brown to black; head and thorax with fairly long golden or pale hairs and the remaining body with fairly dense short white pubescence.

Head. Postclypeus semicircular or subtriangular, with fairly dense punctures; frontoclypeal suture deep and narrow in middle; frons and vertex with fairly coarse punctures; distance between lower lobes of eyes 2.0–2.09 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 2.09–2.1 × as long as distance between eyes on ventral side; genal length 0.31–0.36 × as long as head width immediately below eyes. Antennae longer than body; segments 4-10 slightly produced on one side at apex.

Thorax and abdomen. Pronotum 0.83–0.89 × as long as width, rounded at side; posterior margin 1.34–1.52 × as wide as anterior margin; pronotal disc and sides uneven but no obvious nodules on disc. Scutellum semicircular, with dense pubescence. Elytra 5.16–6.74 × as long as prothorax and 3.11–4.01 × as long as shoulder width; each elytron with 3-4 raised longitudinal carinae; elytra with fairly dense, fine punctures throughout; elytral apex bispinose. Apex of terminal sternite truncate or slightly emarginate.

Male terminalia. Apex of ventral median lobe rounded; ventral lobe slightly longer than or as long as dorsal lobe; internal sac with dense long simple spines almost throughout except short basal and terminal areas (Fig. 2.75a). Eighth sternite obliquely truncate, side sharply pointed and apex heavily emarginated, with dense long setae; ventral surface with sparse simple spines and cloud-like processes (Fig. 2.75b). Eighth tergite round at sides and rounded or slightly truncate at apex, with fairly dense basally-forked spines on dorsal surface (Fig. 2.75c). Paramere long, 2.8–2.9 × as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.75d).

Female. Body length, 31.65–60.56 mm; *width,* 11.10–12.30 mm

Body broader with robust abdomen; antennae and legs shorter. Pronotum 0.78–0.91 × as long as width. Elytra 3.28–4.04 × as long as shoulder width and 6.45–7.06 × as long as prothorax.

Ovipositor and spermatheca. Ovipositor relatively long; styli arising terminally with short hairs (Fig. 2.75e). Spermatheca relatively short and robust, moderately curved; spermathecal gland arising at base (Fig. 2.75f).

Distribution

Western Western Australia and eastern Queensland (Fig. 2.103).

Variation

Body colour may be brighter in female in some specimens.

Biology

Known hosts are brigalow (*Acacia* spp.). Adults were attracted to MV light and were collected during May to December, and February to March.

Comments

This species resembles *U. pseudogigas* sp. nov. but differs in having elytral apex bispinose and ventral median lobe of aedeagus rounded.

Uracanthus pseudogigas, sp. nov.

(Figs 2.38, 2.76, 2.103)

Material examined

Holotype. ♂. **SA:** Mulgathing HS, on bushes forming a hedge, F. & S. Aslin, terminalia slide no. m-040529-1 (SAM).

Paratypes. 24 ♂. **SA:** 1 ♂, Roxby Downs, from camp site, 26.x.1976, L. Williams (SAM); 1 ♂, Woodland, H of Roxby, 25.x.1978, at light, *Acacia sowdenii*, L. D. Williams (SAM); 1 ♂, S Moonaree HS , 32 km, Gawler Ra, 4.x.1988, at light, J. A. Forrest (SAM); 1 ♂, same data as above but terminalia slide no. m-040529-2 (SAM); 1 ♂, S Pimba, 106 km, 22.ix.1960, Austa (SAM); 1 ♂, Arcoona W May Hill, 4–9.xi.1996, pitfall (SAM); 1 ♂, Wirraminna, 27.x.1953, W. B. Tindale, E. S. J. (SAM); 1 ♂, HW of SA, H. Basedow & M. W. Grace (SAM), terminalia slide no. m-040529-3 (SAM); 1 ♂, SW Table Hill, 7.2 km, Innamincka, 4 – 9 .xi.1996, Slony D. S (SAM); 1 ♂, Hast bluff, C. A, 5.ix.1957, N. B. Tindale (SAM). **WA:** 1 ♂, Gill pinnacle, Mural cres, 10.xi.1963, at light, P. Aitken & N. B. Tindale (SAM); 1 ♂, Lauviam, Kalgoolve, 1898 (SAM); 1 ♂, E of Terhan RH, 11 mile, 15.x.1960, Chinnick, McCade, Corby (ANIC). **NT:** 2 ♂, 4 mile S of Levin Mt., 20.ix.1963, P. Ranford (ANIC); 1♂, S by 41 km E of Alice Spring area , 4.x.1978, Upton & Barret (ANIC); 6 ♂, 60 km Hamilton Downs Sin. NW Alice Spring, 11.x.1976, at light, G. Griffin (ANIC); 1 ♂, Alice Spring, vii – ix.1957, N. Mollett, terminalia slide no. m-040529-4 (SAM). **Locality unknown:** 1 ♂, no data (NMV).

Description

Male. Body length, 35.86–49.88 mm; *width*, 8.27–10.83 mm.

Colour (Fig. 2.38). Head, prothorax, legs and basal 1/10 elytra dark reddish brown to blackish brown; remaining elytra pale yellowish brown; antennae reddish brown. Head and thorax with dense, long, pale yellowish pubescence except a glabrous ψ-shaped or ‡-shaped mark on pronotal disc; elytra and abdomen with dense, short, pale yellowish pubescence.

Head. Postclypeus semicircular, flattened, with fairly dense punctures; frontoclypeal suture deep and narrow in middle; distance between lower lobes of eyes 1.48–1.69 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.04–1.17 × as long as distance between eyes on ventral side; genal length 0.40–0.42 × as long as head width immediately below eyes; Antennae longer than body; segments 4 to10 flattened , produced on one side at apex.

Thorax and abdomen. Pronotum 1.02–1.53 × as long as width, with a small rounded process at each side; posterior margin 1.19–1.29 × as wide as anterior margin; pronotal disc finely punctate with two slightly raised nodules in middle. Scutellum semicircular and glabrous. Elytra 4.15–5.44 × as long as prothorax and 3.16–3.46 × as long as shoulder width; each elytron with distinctly raised 4 longitudinal carinae; apex with an acute spine at suture. Apex of terminal sternite truncate.

Male terminalia. Apex of ventral median lobe widely emarginate and apex of dorsal lobe pointed; ventral lobe slightly shorter than dorsal lobe; internal sac with long simple spines throughout except short areas at base and terminal (Fig. 2.76a); Eighth sternite rounded at side, emarginate at apex, with long and fairly long setae arising terminally; ventral surface with fairly dense short setae and dense cloud-like processes (Fig. 2.76b). Eighth tergite emarginate at apex; basal surface with fairly dense simple and multi-branched spines (Fig. 2.76c). Paramere 3.8–4.0 × as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.76d).

Female. Unknown.

Distribution

Southeastern Western Australia, southern Northern Territory and southern and eastern South Australia (Fig. 2.103).

Variation

The ψ-shaped glabrous mark on pronotal disc may be complete or incomplete.

Biology

Known host is *Acacia sowdenii*. Adults were collected by pitfall and light traps during September-November.

Comments

This new species resembles *U. gigas* but differs in having elytral apex with only one spine at suture; ventral median lobe of aedeagus emarginate. The species was considered a variant of *U. gigas* by Rondonuwu and Austin (1988).

Uracanthus acutus Blackburn, 1889

(Figs 2.39, 2.77, 2.104)

Uracanthus acutus Blackburn, 1889: 451. –Froggatt, 1898: 46; Allen, Blunno, Froggatt and Guthrie, 1898a: 1038; Dixon, 1908:77; Aurivillius, 1912: 147; McKeown, 1947: 62; Duffy, 1963:117.

Material examined

Paratypes. 1 ♂, 1 ♀. **VIC:** 1 ♀, Victoria, Coll. no. I. 5488 (SAM); 1 ♂, locality unknown, abdomen and left antennae missing, Coll. no. 2909 (SAM).

Other material examined. 84 ♂, 19 ♀. **QLD:** 1 ♂, Gap Creek, 6 mile N of Bloomfield R., N of QLD, 13-14.xi.1965, G. Monteith (QM); 1 ♂, Bunya Mt (26°50'S, 151°33'E), 5 km NW of Mt Mowbullan, 3350 ft. 8.i.1970, at light, Britton, Hollyway &

Misko (ANIC); 1 ♀, Brisbane, 3.ii.1962, B. F. Stone (UQIC); 1 ♂, QLD (NMV). **NSW:** 2 ♂, Pt. Lookout via Ebour, Nothofagus Forest, 22.i.1967, B. Cantrell (UQIC); 1 ♀, Jeolan Caves, 18.i.1985, George Hangry (ANIC); 1 ♂, Wiangaree state Forest, via Kyogle, 28.xi.1970, G. Monteith (UQIC); 2 ♂, West Pymble, near Sydney, 5.xi.1985, at black light, D. J. Scambler, (AM); 1 ♂, same as above but 10.xi.1987 (AM); 1 ♂, Willousby, Sydney, 10.xi.1986, D. K. McAlpine (AM); 2 ♂, Ashfield, 26.x.1980, D.A. Doolan (AM); 1 ♂, National Park, i.1965, MV light, D. K. McAlpine (AM); 1 ♂, Pydalmere, 16.xi.1976, at light trap, G. R. Brown (ASCU); 1 ♂, same locality as above but 27.x.1971, at mercury vapour light (ASCU); 1 ♂, Prospect, 11.xii.1911 (AM); 1 ♂, Arrawarra, H. J. Carter (NMV); 1 ♂, Beecroft (33°44'S, 151°03'E), 12.xii.1967, at mercury vapour light, O. M. Williams (ASCU); 1 ♂, Clovelly, 2.xi.1956, on *Eucalyptus* foliage, W. E. Wright (ASCU); 1 ♂, same locality as above but 15.xi.1953 (ASCU); 6 ♂, Kaima, xi.1958, L. Cady, (ASCU); 2 ♂, same locality as above but xi.1959 (ASCU); 1 ♂, same data as above as above but xi.1960 (ASCU); 1 ♂, same locality as above but 5.xi.1921, Allowire (MAM); 2 ♂, Minnamema Falls, xii.1968, C. E. Chadwick (ASCU); 1 ♂, Mt. Keira, 23.ii.1966, at mercury vapour light, V. J. Robinson (ASCU); 1 ♂, Sydney, xi.1937, A. Musgrave (AM); 1 ♂, Sydney (MAM); 1 ♂, same locality as above but (NMV); 1 ♂, same locality as above but 10.xi.1968, C. E. Chadwick (ASCU); 1 ♂, no data, NSW (MAM); 2 ♂, same as above but (NMV). **ACT:** 2 ♀, Black Mt., Canberra, ACT, 25.i.1968, M. S. Upton (ANIC); 1 ♀, same as above but 11.i.1972, K. R. Pollen (ANIC); 1 ♂, same as above but 16.i.1952, no abdomen, L. J. Chimick (ANIC). **VIC:** 4 ♀, Red Hill, 10.ii.1970, Dr. Holmes (ANIC); 1 ♂, Kiata, x.1938, F. E. Wilson (NMV); 1 ♀, Melton, xii.1937, bred ex *Loranthus,* F. E. Wilson (ANIC); 1 ♂, Hayfield (36°56'S, 145°45'E), 16.xi.1921, ex *Acacia* (NMV); 1 ♀, Melbourne, French (SAM); 1 ♂, Mordialloc, 1.i.1931, A. L. Brown (NMV); 1 ♂, Cheltenham, C. Oke (NMV); 2 ♂, Hazelwood, 29.xii.1948, A. L. Brown (NMV); 1 ♂, Saint Kilda, C. Oke (NMV); 1 ♂, Yinnar, xii.1948, A. L. Brown (NMV); 1 ♂, 3km SE Taggerty, Little River, 6.i.1972, Neboiss (NMV); 1 ♂, Mitta Mitta River, Neboiss & Malcolm (NMV); 1 ♂, Mitcham, xi.1950, A. L. Brown (NMV); 1 ♂, Thompson Reserve, 12.xii.1973, La Trobe R. Survey (NMV); 1 ♂, Rainbow Creek, 4 km NNW of Cowarr, 4.xii.1976, A. A. Calder (NMV); 1 ♂, N. Mallee, Dixon (NMV); 1 ♀, Moe, 5.i.1949, C. G.

L. Gooding (NMV); 2 ♂, Studley Park, 12.vii.1916, bred from *Pomaderris*, Dixon (NMV); 1 ♂, Sea Lake, xi.1912, G. C. Goodie (NMV); 1 ♂, Gippsland Lake Park, (NMV); 1 ♀, Richmond, 26.xii.1904 (NMV); 1 ♂, Victoria (MAM); 4 ♂, 4 ♀, same as above but (NMV); 4 ♂, Victoria, ex *Acacia*, xi.1919 (NMV); 2 ♂, same data as above but xi.1905 (NMV); 3 ♂, same data as above but xi.1912 (NMV); 1 ♂, same data as above but xi.1916 (NMV); 2 ♂, Vic, 6.xi.1909, ex *Pomaderris,* (NMV); 1 ♂, same locality as above but x.1907, ex *Acacia mollissima* (NMV). **SA:** 1 ♂, Kurlge Blackwood, 850 ft. MV light, 5.xi.1960, N. B. Tindale (SAM); 1 ♀, 20 km S of Wirraminna HS, at light, 2.xi.1975, J. A. Herridge (SAM); 1 ♂, Burrawing, 10.i.1933 (AM). **Locality unknown:** 1 ♂, 1 ♀, Jemey Moryma, 19.x.1896 (NMV); 1 ♂, 11.xi.1975, light trap, V. P. R. I. (VAIC); 1 ♂, no data, no abdomen (WINC). 1 ♂, Australia, H. E. Cox Collection 1916 (HMO); 1 ♂, no data (UQIC).

Description

Male. Body length, 11.81–20.45 mm; *width*, 2.13–3.10 mm.

Colour (Fig. 2.39). Body reddish brown with head, thorax, antennae segments, scutellum, and basal 1/5 to 1/3 of elytra often darker. Head with dense golden pubescence. Pronotal disc with a broad longitudinal stripe of very dense golden pubescence on each side and two longitudinal stripes of relatively sparse pubescence in middle; side with a narrow longitudinal stripe of very dense golden pubescence near ventral side. Elytron with dense short golden pubescence, particularly on apical ½.

Head. Postclypeus semicircular, slightly convex, with fairly dense coarse punctures; frontoclypeal suture deep and narrow in middle; distance between lower lobes of eyes 2.0–2.33 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 0.80–0.84 × as long as distance between eyes on ventral side; genal length 0.26–0.31 × as long as head width immediately below eyes; Antennae shorter than body; segments 5-10 subcylindrical and slightly produced on one side at apex.

Thorax and abdomen. Pronotum 1.42–1.57 × as long as width, rounded at side; posterior margin 1.24–1.53 × as wide as anterior margin; pronotal disc finely punctate with two very feebly raised nodules in middle area; posterior ¼ of disc weakly, transversely rugose. Scutellum semicircular, glabrous. Elytra 3.70–3.87 × as long as prothorax and 3.81–4.15 × as long as shoulder width; each elytron with 3 longitudinal carinae; basal 1/3 of elytra with dense coarse punctures and 2/3 of elytra with fine punctures; apex sharply pointed. Apex of terminal sternite truncate or truncate with a small notch.

Male terminalia. Apex of ventral median lobe slightly pointed and apex of dorsal lobe rounded; ventral lobe slightly longer than dorsal lobe; internal sac with dense simple and long spines except short unspined basal and terminal areas (Fig. 2.77a). Eighth sternite obliquely truncate at side, widely emarginate at apex, with long setae arising terminally; ventral surface with fairly dense cloud-like processes (Fig. 2.77b). Eighth tergite rounded at sides with a small notch at apex; surface with fairly dense, simple and short spines in middle area (Fig. 2.77c). Paramere long and thin, 2.5–2.6 × as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.77d).

Female. Body length, 18.60–23.87 mm; *width*, 3.8–4.49 mm.

Abdomen more robust, antennae and legs shorter; distance between lower lobes of eyes less than 2 × as long as distance between upper lobes of eyes; elytra 4.33–4.95 × as long as prothorax and 3.80–4.06 x as long as shoulder width.

Ovipositor and spermatheca. Ovipositor very short; styli arising terminally with short hairs (Fig. 2.77e). Spermatheca slightly curved; spermathecal gland arising near base (Fig. 2.77f).

Distribution

Western, southern and eastern Victoria, eastern New South Wales, southern and southeastern South Australia, and northeastern and southeastern Queensland (Fig. 2.104).

Variation

The longitudinal stripes on middle pronotal disc may vary from very distinct to vague.

Biology

Hosts are peach, plum and apricot, *Amygdalus persica*, *Armeniaca vulgaris*, *Acacia dealbata* and *A. mollissima*, *Pomaderris* spp. and *Loranthus* sp. and visiting *Eucalyptus*. Larvae at the first bore towards and then into the heartwood, but later tunnel right round beneath the bark, causing the latter to wilt and die, and finally break off. Adults were collected from December to February. Adults are attracted to light.

Comments

This species resembles *U. loranthi* but differs in having body more slender, pronotal disc with transverse ruga only in the area near posterior margin, and the apex of elytra sharply pointed.

Uracanthus loranthi **Lea, 1916**

(Figs 2.40, 2.78, 2.105)

Uracanthus loranthi Lea, 1916: 380. –McKeown, 1947: 65; Duffy, 1963: 117.

Material examined

Holotype. ♂. **VIC:** Melbourne, 15.v.1916, Coll. no. T-8880; bearing a red holotype label; left antenna damaged; right antenna and left mid tibia and tarsus missing (NMV).

Paratypes. 2 ♀. **VIC:** 1 ♀, Victoria, Coll. no. 9084, 3 segments of left antenna and 2 segment of right antenna, and right elytron missing (SAM); 1 ♀, locality unknown, i.1908, Coll. no. J. 5693 (SAM).

Other material examined. 33 ♂, 27 ♀. **QLD:** 1 ♀, Toowoomb, OLD, 10.xi.1974, Macqueen (ANIC); 1 ♂, Vallis, v.1984 (ANIC); 1 ♂, W of Shore, Tinaroo, 7.xi.1966, at light, E. Britton (ANIC); 1 ♂, 26 km N of Mazeppa, National Park, 24.iii.1993, G. Monteith (QM); 1 ♂, Booloumba Creek, Conondale Ra., 29-30.x.1998, G. B. Monteith (QM); 1 ♂, Nocundra Waterhole, Wilson River, 20.x.1968, J. A. L. Watson (ANIC); 1 ♀, Lake Broadwater via Dalby, 26-28.i.1985, G. Monteith & G. Thompson (QM); 1 ♀, Mt. Mistake Plateau via Goomburra, 21-22.xi.1987, G. B. Monteith (QM); 1 ♂, 350 m, Mt. Hayward (20°20'S, 148°45'E), 19-20.xi.1992, Monteith, Thompson & Janetzki (QM); 1 ♀, Brisbane, R. Illidge (UQIC). **NT:** 1 ♂, 39 km E of Alice Springs, 26.xi.1978, Upton & Barret (ANIC). **NSW:** 1 ♂, 65 NW Nyngan, 21.x.1949, E. F. Riek (ANIC); 1 ♀, Jenolan Caves, 18.i.1985, Georae Hangay (ANIC); 1 ♂, Burrapine (30°42'S, 152°38'E), 10.i.1933 (AM). **ACT:** 1 ♀, Black Mtn, Canberra, ACT, 11.i.1972, K. R. Pullen (ANIC); 2 ♀, same as above but 25.i.1968, M. S. Upton (ANIC); 1 ♂, same as above but 16.i.1952 (no abdomen), L. J. Chimick (ANIC). **VIC:** 1 ♂, 2 ♀, Melton, i.1973, bred from *Loranthus* sp.,

F. E. Wilson (NMV); 1 ♂ , Bumley, 28.i.1975, at light trap, V. P. R. I. (VAIC); 1 ♂, same as above but xii.1975 (VAIC); 1 ♂, same as above but 24.i.1974 (VAIC); 1 ♂, South Morang (37°39'S, 145°05'E) (NMV); 1 ♀, Melbourne, French (SAM); 1 ♂, 1 ♀, Kew (37°48'S, 145°02'E), ex. *Loranthus,* 11.i.1920 (NMV); 1 ♀, Kiata, Victoria, x.1928, F. E. Wilson (NMV); 4 ♀, Red Hill, 10.ii.1970, Dr. Holmes (ANIC); 1 ♂, Moorooduc (38°14'S, 145°06'E), x.1914, J. E. D. (NMV); 1 ♀, Mordialloc, 19.xi.1930, A. L. Brown (NMV); 1 ♂, same data as above but 1.ii.1931 (NMV); 1 ♂, Parwan, ex. *Loranthus*, xi.1911 (NMV); 1 ♂, same locality as above but ex mistletoe on *Casuarina* sp., 5.ix.1915 (NMV); 1 ♂, Birchip, J. C. Goudie (NMV); 1 ♀, Studley Park (NMV); 1 ♂, 1 ♀, Victoria (NMV). **SA:** 2 ♂, 850 ft. Kurge, Blackwood, 17.xii.1968, at MV light, N. E. Tindale (SAM); 1 ♀, 20 km, S. Wirraminna, 2.xi.1975, at light, J. A. Herridge (SAM). **WA:** 1 ♀, Mcdermid Rock (32°01'S, 120°44'E), 27.xi-x.1978, T. F. Houston et al. (WAM). **Locality unknown:** 2 ♂, 4 ♀, no locality data, ex. *Loranthus*, i.1905 (NMV); 1 ♂, no locality data, 24.x.1920, bred out mistletoe, D. Millian (NMV); 1 ♂, no locality data, ex *Acacia,* i.1910 (NMV); 1 ♂, 1 ♀, no data (NMV); 1 ♂, no data (AM); 3 ♂, no locality data, ex mistletoe, xii.1908 (NMV).

Description

Male. Body length, 12.58–15.70 mm; *width*, 2.13–2.87 mm.

Colour (Fig. 2.40). Body reddish brown with head, thorax, antennae, scutellum, and basal elytra often darker. Head with fairly dense golden pubescence. Pronotum with a wide longitudinal stripe of dense golden pubescence on each side of disc, a median wide longitudinal stripe of sparse pubescence (may be divided into two by a narrow median glabrous line), and a narrow longitudinal stripe of dense golden pubescence on each side near sternum. Elytral disc covered with fairly dense short golden pubescence particularly on apical ½.

Head. Postclypeus semicircular, flattened, with fine punctures; frontoclypeal suture deep and narrow in middle; distance between lower lobes of eyes 1.92–2.0 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 0.68–0.70 × as long as distance between eyes on ventral side; genal length 0.27–0.30 × as long as head width immediately below eyes; Antennae slightly shorter than body; segments 5-10 subcylindrical and slightly produced on one side at apex.

Thorax and abdomen. Pronotum 1.22–1.46 × as long as width, strong rounded at side; posterior margin 1.05 – 1.06 × as wide as anterior margin; pronotal disc feebly binodulose in middle area and finely punctate; disc and side strongly rugose transversely. Scutellum semicircular, glabrous. Elytra 3.72 – 4.36 × as long as prothorax and 3.67 – 4.35 × as long as shoulder width; each elytron with 3 feeble longitudinal carinae; basal half of elytra with dense coarse punctures and apical half with fine punctures; apex truncate or slightly emarginate with a small process at margin and suture, respectively. Apex of terminal sternite truncate.

Male terminalia. Apex of ventral median lobe rounded to slightly pointed and and apex of dorsal lobe rounded; dorsal lobe almost as long as ventral lobe; internal sac with dense simple and long spines except short unspined basal and terminal areas (Fig. 2.78a). Eighth sternite obliquely truncate at sides, truncate and slightly emarginate at apex, with long and fairly long setae arising terminally; ventral surface with sparse cloud-like processes (Fig. 2.78b). Eighth tergite shallowly emarginate at apex, with dense setae arising from apical ½; surface with fairly dense multi-branched spines near base and fairly dense simple spines in mid area (Fig. 2.78c). Paramere 2.0–2.12 × as long as wide, cylindrical in shape; apex rounded with long and short setae (Fig. 2.78d).

Female. Body length, 12.86–17.41 mm; *width*, 2.48–3.12 mm.

Abdomen more robust, antennae and legs shorter; the median longitudinal glabrous line on pronotal disc more obvious and broader; elytra 3.44–4.72 × as long as prothorax and 3.68–4.21 × as long as shoulder width.

Ovipositor and spermatheca. Ovipositor short; styli arising terminally with short hairs (Fig. 2.78e). Spermatheca short and robust, slightly curved; spermathecal gland short, arising from basal 1/3 (Fig. 2.78f).

Distribution

Eastern, southeastern and southern Queensland, eastern New South Wales, Southern and central Victoria, southeastern South Australia, southern Western Australia, northern & central Australian Capital Territory, and southern Northern Territory (Fig. 2. 105).

Variation

Body colour varies from reddish brown to yellowish brown. The elytral apex may be clearly bispinose.

Biology

Known hosts are *Loranthus* sp., *Acacia* sp. and mistletoe on *Casuarina* sp. Adults were collected between September and April by light trap and beating from *Loranthus* sp.

Comments

This species closely resembles *U. acutus* but differs in having elytral apex truncate or bispinose and the male eighth tergite truncate and slightly emarginate.

Uracanthus cupressianus Rondonuwu and Austin, 1988

(Figs 2.41, 2.79, 2.106)

Uracanthus cupressianus Rondunuwu and Austin, 1988: 110.

Material examined

Holotype. ♂. **SA:** Glenelg, reared ex *Cupressus sempervirens,* 5.x.1986, S. Rondunuwu, bearing a circular type label (SAM).

Paratypes. 15 ♂, 10 ♀. **SA:** 12 ♂, 9 ♀, North of Glenelg, reared ex *Cupressus sempervirens*, 5.x.1986, S. Rondunuwu (WINC); 3 ♂, 1 ♀, same as above but (SAM).

Other material examined. 4 ♂, 5 ♀. **SA:** 1 ♂, 1 ♀, Adelaide, adult 1960 (larvae iii.1959), reared ex *Cupressus macrocarpa*, F. D. Morgan Coll. (WINC); 1 ♂, 1 ♀, same locality as above but R. Brown (SAM); 1 ♀, same locality as above but ex limb of cypress pine, 17.x.1984 (WINC); 1 ♀, Wood Ville West, xi.1963, reared ex *Cupressus arizonica,* B. Rankine Coll. (WINC); 1 ♀, near Torreng Bridge 26.x.1973, H. Mincham (SAM); 1 ♂, Warradale, 16.xi.1973,MV light, B. P. Mcquillan(SAM); 1 ?, Plympton Park, 8.xi.1961, boring in *Cupressus* sp.,(no abdomen) (SAM). **Locality unknown:** 1 ♂ (WINC).

Description

Male. Body length, 12.76–18.06 mm; *width,* 2.11–3.20 mm.

Colour (Fig. 2.41). Body light reddish brown with head, thorax, antennae, scutellum, femora, and basal elytra often darker. Head with dense, long, golden pubescence. Pronotal disc with 2 broad longitudinal stripes of dense, long, golden pubescence, a narrow, longitudinal, glabrous median line between stripes, and 4 vague sparsely haired or glabrous spots near the median line; pronotum with a narrow longitudinal stripe of dense, long, golden pubescence on each side near sternum; ventral surface of prothorax with sparse golden pubescence. Elytra covered with dense, short, golden pubescence but pubescence near prothorax much longer.

Head. Postclypeus subtriangular and flattened, with sparse punctures; frontoclypeal suture deep and narrow in middle; distance between lower lobes of eyes 1.72–1.82 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 0.76–0.94 × as long as distance between eyes on ventral side; genal length 0.26–0.32 × as long as head width immediately below eyes. Antennae shorter than body; segments 5-10 subcylindrical.

Thorax and abdomen. Pronotum 1.26–1.54 × as long as width, rounded at side; posterior margin 1.14–1.32 × as wide as anterior margin; pronotal disc finely punctate; disc and sides strongly rugose transversely. Scutellum semicircular, glabrous. Elytra 4.28–5.47 × as long as prothorax and 4.13–4.44 × as long as shoulder width; each elytron with 3 longitudinal carinae; elytra with coarse punctures on basal 1/3 and fine punctures on the rest 2/3; elytral apex rounded or slightly pointed. Apex of terminal sternite slightly emarginate.

Male terminalia. Apex of ventral median lobe pointed and apex of dorsal lobe shallowly emarginate; dorsal lobe slightly longer than ventral lobe; Spined region of internal sac divided into two sections; first section longer than basal unspined region, with sparse multi-branched spines at base and very dense long simple spines on the remaining part; second section about 3 × shorter than first section, with sparsely simple spines; a short unspined gap between sections (Fig. 2.79a). Eighth sternite, rounded at sides, widely emarginate at apex, long and fairly long setae arising terminally; ventral surface with sparse cloud-like processes (Fig. 2.79b). Eighth tergite long and narrow, emarginate at apex, with fairly dense simple spines in middle area (Fig. 2.79c). Paramere 3.0–3.1 × as long as wide, cylindrical in shape, apex rounded with sparse long and short setae (Fig. 2.79d).

Female. Body length, 15.29–19.67 mm; *width*, 2.68–3.87 mm.

Abdomen more robust, antennae and legs shorter; the median glabrous longitudinal line at pronotal disc broader; elytra 4.51–5.13 × as long as prothorax and 3.92–4.12 × as long as shoulder width.

Ovipositor and spermatheca. Ovipositor relatively long in the genus; styli arising terminally with short hairs (Fig. 2.79e). Spermatheca heavily curved; spermathecal gland arising near base (Fig. 2.79f).

Distribution

Southeastern South Australia (Fig. 2.106).

Variation

Body colour may vary from yellowish brown to reddish brown. The glabrous median longitudinal on pronotal disc may vary from narrow to wide.

Biology

Known hosts are *Cupressus sempervirens*, *C. macrocarpa,* and *C. arizonica.* Adults were collected from December to February.

Comments

This species resembles *U. acutus* but differs in having pronotal disc with denser pubescence and more transverse ragae on disc, and apex of elytra not strongly pointed.

Uracanthus minatus Pascoe, 1866

(Figs 2.42, 2.80, 2.106)

Uracanthus minatus Pascoe, 1866: 93. –Aurivillius, 1912: 147; McKeown, 1947: 65.

Material examined

Holotype. ♀. **WA:** no data, bearing a circular type label, and Pascoe's hand writing (BMNH).

Other material examined. 1 ♂, 3 ♀. **WA:** 1 ♀, Lake Grace (33°05'S, 118°24'E), 17.xi.1928, K. & E. Carnaby (ANIC); 1 ♀, Thomas River (33°51'S, 123°05'E), 1.xi.1983, K. & E. Carnaby (ANIC); 1 ♂, Marloo Stn., Wurarga, 1931-1941, A. Goerling (ANIC); 1 ♀, 18 km E by S of Kalbarri (27°44'S, 114°21'E), Kalbarri National Park, 19.x.1984, D. C. Y. Rentz (ANIC).

Description

Male. Body length, 16.36 mm; *width*, 2.58 mm.

Colour (Fig. 2.42). Antennae, legs, metasternite, and abdomen blackish brown; remaining body yellowish brown with head, prothorax and basal 1/3 elytra darker. Head with dense, long, yellowish pubescence. Pronotal disc with 2 broad longitudinal stripes of dense, long, long yellowish pubescence, a narrow, longitudinal, glabrous median line between stripes; side with a narrow longitudinal stripe of very dense golden pubescence near ventral side; Elytron with very dense short yellowish pubescence.

Head. Postclypeus triangular, convex, with fairly dense punctures; frontoclypeal suture deep and wide in middle; distance between lower lobes of eyes 1.94 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 0.95 × as long as distance between eyes on ventral side; genal length 0.45 × as long as head width immediately below eyes. Antennae longer than body; segments 5-10 subcylindrical and slightly produced on one side at apex.

Thorax and abdomen. Pronotum 1.38 × as long as width, rounded at side with a very small process on each side; posterior margin 1.33 × as wide as anterior margin; pronotal disc and side strongly rugose transversely. Scutellum semicircular, with dense pubescence. Elytra 4.31 × as long as prothorax and 4.43 × as long as shoulder width; basal 1/3 of elytra with dense coarse punctures and the rest with fine punctures; apex rounded.

Male terminalia. Apex of ventral median lobe pointed and apex of dorsal lobe rounded; ventral lobe shorter than dorsal lobe; spined region of internal sac divided into two sections: first section with dense long simple spines and sparse multi-branched spines; second section about as long as first section, with sparse simple spines; no distinct unspined gap between sections (Fig. 2.80a). Eighth sternite obliquely truncate at sides; widely emarginate at apex, with long and fairly long setae arising terminally; ventral surface with short simple spines and fairly dense cloud-like processes (Fig. 2.80b). Eighth tergite truncate or slightly rounded at apex, with fairly dense simple spines and multi-branched spines on surface (Fig. 2.80c). Paramere short, cylindrical in shape, apex rounded with long and short setae (Fig. 2.80d).

Female. Body length, 12.73–17.46 mm; *width*, 2.26–3.52 mm.

Body more robust, antennae shorter than body; distance between lower lobes of eyes less than 2 × as long as distance between upper lobes of eyes; elytra 3.70–3.75 ×as long as prothorax and 3.96–4.16 ×as long as shoulder width.

Ovipositor and spermatheca. Ovipositor long; styli short, arising terminally with short hairs (Fig. 2.80e). Spermatheca heavily curved; spermathecal gland arising near base (Fig. 2.80f).

Distribution

Southwestern Western Australia (Fig. 2.106).

Biology

Hosts unknown. Adults were collected in October and November.

Comment

This species resembles *U. corrugicollis* but differs in having antennae, legs and abdomen black; the elytral apex rounded without any spine.

Uracanthus longicornis Lea, 1916

(Figs 2.43, 2.81, 2.106)

Uracanthus longicornis Lea, 1916: 381. –McKeown, 1947: 65.

Uracanthus daviumbus Gressitt, 1951: 24. –Gressitt, 1959: 147, 148. **syn. nov.**

Material examined

Uracanthus longicornis. Holotype. ♂. **QLD:** Coll. no. I. 5704; bearing a name label on which 'TYPE' was written in red (SAM). *Paratypes.* 3 ♂, **QLD:** 2 ♂, Coll. no. 18539 (SAM); 1 ♂, Endeavour River (SAM).

Uracanthus daviumbus. Holotype. ♂. **New Guinea:** Lake Daviumbu, Fly River, Papua New Guinea, 19–30.viii.1936, Archbold Expedition; bearing a red Holotype label (AMNH). *Allotype.* ♀. **New Guinea:** same locality as above; bearing a red allotype label (AMNH).

Other material examined. 72 ♂, 8 ♀. **QLD**: 9 ♂, Cooktown, 2.viii.1978, J. C. Le Souef (ANIC); 1 ♂, same locality as above but (NMV); 2 ♂, Cairns, vi.1969, at MV light, R. Hardicb (ANIC); 1 ♂, same locality as above but 28.vii.1941 (ANIC); 1 ♂, same locality as above but v.1956, G. B. (ANIC); 1 ♂, same locality as above but viii.1949, J. G. Brooks (AM); 1 ♂, same locality as above but 1.iv.1935 (QM); 1 ♂, Keating Gap (15° 30'S, 145°15'E), 3 km SW by S of Cooktown, 16.v.1977, Common & Edward (ANIC); 7 ♂, Dividing Range, 15 km W. of Catain Billy Creek (15°18'S, 144° 51'E), Cape York Pen., 5-9.vii.1975, J. F. R. Kerr (ANIC); 1 ♂, Battle Camp Range, 26.VI.1993, at light, P. Zborowski & I. Naumann (ANIC); 7 ♂, 7 km N of Hope Vale Mission (15°14'S, 145°07'E), Station Creek, 10.v.1981, A. Calder (ANIC); 1 ♂, same locality as above but

4.x.1980, Tom Weir (ANIC); 2 ♂, 14 km WN of Hope vale Mission (15°16'S, 144°59'E), 8-10.x.1980, Tom Weir (ANIC); 2 ♂, same locality as above but 7-10.v.1981, A. Calder (ANIC); 1 ♂, same locality as above but 9.vii.1976, G. B. and S. R. Monteith (QM); 1 ♂, 4 Km of WS Cooktown, 12.v.1980, I. F. B. Common & E. D. Edwards (ANIC); 1 ♂, 1 Km W. of Cooktown (15°28'S, 145°15'E), 12-13.v.1981, A. Calder (ANIC); 4 ♂, 15 km WNW of Bald Hill (13°43'S, 143°19'E), Mcllwralth Range, 27.vii.1989, weather station site, at night, Tom Weir (ANIC); 1 ♂, Batavia Downs (12°40'S, 142°40'E), 22.vii.1992, at light, P. Zborowski & E. S. Nielsen (ANIC); 4 ♂, Monton (12°27'S, 142°38'E), 27.vi.1992, at light, P. Zborowski & E. S. Nielsen (ANIC); 1 ♂, Morton, Wenlock R., Cape York Pen., 14.ix.1974, G. B. Monteith (QM); 4 ♂, Turn off to Captain Billy Landing (11°41'S, 142°42'E), 20.viii.1992, at light, J. Cardale & P. Zboroski (ANIC); 1 ♂, Heartland (11°45'S, 142°35'E), 26.vii.1992, P. Zborowski & E. S. Nielsen (ANIC); 2 ♂, Archer River (13°33'S, 143°03'E), 28.vii.1992, at light, P. Zborowski and E.S. Nielsen (ANIC); 1 ♂, 1 km WN of Rounded Hill (15°17'S, 145°13'E), 8-10.x.1980, Tom Weir (ANIC); 1 ♂, NE of Mt. Webb (15°03'S, 145°09'E), 1-3.x.1980, Tom Weir (ANIC); 3 ♂, 2 km S of Horseshae lookout (23°46'S, 149°06'E), Black Down Tab, 23-24.iv.1981, A. Clader (ANIC); 1 ♂, Mt. Cook National Park (15°29'S, 145°16'E), 11-12.x.1980, T. Weir (ANIC); 1 ♂, Edae Hill, x.1956, G.B. (ANIC); 1 ♂, 8 km WN of Mt. Molloy, 21-22.v.1980, I. D. Naumann & T.C. Cardale (ANIC); 1 ♂, Torrus Station, C. T. McNamara (AM); 1 ♂, Brisbane, 25.x.1964, L. Grossett (UQIC); 1 ♂, Iron Range, Cape York Penn., 30.vi.-4.vii.1977, G. B. Monteith (QM); 1 ♂, Edmonton, 5-12.ix.1971, R. E. Mascord (ANIC); 1 ♂, 3 km WS of Black Mt. Annan R., 27.vi.1980, T. Weir (ANIC); 1 ♂, 2 ♀, Hann R., 2.vi.1970, J. C. Le Souef (ANIC). 1 ♀, Monto Q, 17.vi.1978, J. C. Le Souef (ANIC). **Locality unknown:** 1 ♀, N of Queensland (SAM); 1 ♂, 4 ♀, Queensland (NMV).

Description

Male. Body length, 13.49–21.76 mm; *width,* 2.41–4.18 mm.

Colour (Fig. 2.43). Head and thorax dark reddish to blackish brown; antennae, legs, and basal elytra reddish brown; remaining parts reddish to yellowish brown. Head and pronotal disc with dense white pubescence; pronotum with a wide longitudinal stripe of very dense white pubescence on each side near ventral side; sterna and pleura with fairly dense white pubescence. Elytra with dense white pubescence on disc and a stripe of very dense white pubescence on margins, gradually diminishing towards apex. Legs and abdomen with dense white pubescence. Pubescence on head, thorax and elytral margins longer than that on the remaining parts.

Head. Postclypeus semicircular, flattened and depressed toward to anteclypeus, with fairly dense coarse punctuate; frontoclypeal suture deep and narrow in middle; distance between lower lobes of eyes 2.09–2.27 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.37–1.57 × as long as distance between eyes on ventral side; genal length 0.18–0.21 × as long as head width immediately below eyes. Antennae longer than body; segments 4-10 flattened and strongly produced on one side at apex.

Thorax and abdomen. Pronotum 1.02–1.38 × as long as width, rounded at side; posterior margin 1.11–1.34 × as wide as anterior margin; pronotal disc and side strongly rugose transversely. Scutellum semicircular, with dense pubescence. Elytra 3.60–4.40 × as long as prothorax and 3.56–3.90 × as long as shoulder width; each elytron with 3 feeble longitudinal carinae; basal 1/3 of elytra coarsely punctate and the rest finely punctate diminishing toward apex; apex narrowly emarginate with a sharp spine at suture. Apex of terminal sternite truncate.

Male terminalia. Apex of ventral median lobe slightly pointed and apex of dorsal lobe rounded; ventral lobe distinctly longer than dorsal lobe; spined region of internal sac almost occupying the whole internal sac, only leaving a very short basal unspined region; spined region divided into 3 sections: first section with fairly dense short and simple spines and some multi-branch spines; second section longer than first section, with dense long and simple spines on each side; third section with fairly dense simple spines and multi-branched spines (Fig. 2.81a). Eighth sternite rounded or slightly obliquely truncate at sides, strongly emarginate at apex, with long setae arising terminally; ventral surface with fairly dense cloud-like processes (Fig. 2.81b). Eighth tergite rounded to truncate and shallowly emarginate at apex; surface with sparse multi-branched spines near based and dense short simple spines basal-mid area (Fig. 2.81c). Paramere robust, 2.0–2.1 × as long as wide, tapering toward to apex; apex rounded with long and short setae (Fig. 2.81d).

Female. Body length, 19.78–24.78 mm; *width*, 3.65–4.63 mm.

Abdomen more robust, antennae and legs shorter; distance between lower lobes of eyes 1.69–2.22 × as long as distance between upper lobes of eyes; elytra 3.87–4.72 × as long as prothorax and 3.79–3.92 × as long as shoulder width.

Ovipositor and spermatheca. Ovipositor short; styli arising terminally with short hairs (Fig. 2.81e). Spermatheca robust, heavily curved; spermathecal gland arising near base (Fig. 2.81f).

Distribution

Northern and southeastern Queensland (Fig. 2.106) and southern New Guinea.

Variation

The glabrous longitudinal mark on pronotal disc may vary from very narrow to narrow. Body colour may vary from reddish brown to yellowish brown. The elytral apex varies from rounded to narrowly emarginate. The apical spine of the elytron varies from sharp to none.

Biology

Hosts are unknown. Adults were collected by light trap during mid April to July and August to mid October.

Comments

This species resembles *U. cupressianus* and *U. acutus* but differs from those species in having distance between eyes on ventral side closer, stronger transverse ruga on pronotal disc, antennae more robust and longer and apex of elytra rounded with acutely spine at suture.

Uracanthus albatus Lea, 1916

(Figs 2.44, 2.82, 2.107)

Uracanthus albatus Lea, 1916: 378. –Lea, 1917b: 619; McKeown, 1947: 63; Duffy, 1963: 116.

Material examined

Holotype. ♂. **VIC:** Dimboola, Coll. no. I. 5492, bearing a name label on which 'TYPE' was written in red; 6 segments of left antenna missing (SAM).

Paratypes. 2 ♂, 3 ♀. **SA:** 2 ♀, Pirachilna, Flinder Range (SAM). **VIC:** 1 ♂, Birchip, 18.v.1937 (no abdomen) (SAM); 1 ♂, Leigh Creek, Creewood (SAM); 1 ♀, 5.xi.1908, C. French Collection (NMV).

Other material examined. 70 ♂, 20 ♀. **QLD:** 1 ♂, 160 m. Brigalow Res. Stn. Site (22°48'S, 149°45'E), 27-28.x.2000, at MV light, vine scrub, Coll. no. 9804, QM party (QM); 1 ♀, 560m Amphitheare Camp, Expedition Range National Park (25°12'S,148°59'E), 17.xii.1997, Monteith, Cook, & Thompson (QM); 1 ♂, S Cunnamulla (28°04'S,145°41'E), 15.x.1968, at light, J. A. Watson (ANIC). **NSW:** 1 ♂, 20 m Coolabah (31°01'S, 146°41'E), 11.xii.1963, R. Lossin (AM); 3 ♂, Round Hill (31°45'S, 149°40'E), Fauna Reserve, 27.x.1977, MV lamp, G. Daniels (AM); 1 ♂, Clements (29°49'S, 149°07'E), xii.1928, K. K. S (AM); 2 ♂, 65 NW Nyngan (31°32'S, 147°10'E), 21.x.1949, E. F. Riek (ANIC); 1 ♂, Nyngan-Bourke, 22.x.1949, S. J. Paramonov (ANIC); 1 ♂, Bourke (30°04'S, 145°57'E), 24.x.1949, S. J. Paramonov (ANIC); 3 ♀, 4 miles, Sand hills (35°12'S, 149°33'E), Pt. Parie, 23.xi.1958, T. Greaves (ANIC). **VIC:** 2 ♂, Kiata (36°21'S, 141°47'E), F. E. Wilson, F. E. Wilson Collection (NMV); 1 ♂, 2 ♀, same as above but ex *Acacia*, iv.1916 (NMV); 1 ♂, Myrniong (37°37'S, 144°20'E), 528A (AM); 1 ♂, Mallee District (36°21'S, 141°47'E), bred out of *Grevillea huegelii*, 26.xi.1915 (NMV); 1 ♂, same as above but xi.1915 (no abdomen), T. S. Dixon (NMV); 1 ♀, same locality but (WADA); 1 ♂, Victoria (AM); 1 ♀, Victoria (NMV); 1 ♀, Gypsum (35°16'S, 142°23'E), C. Oke (NMV); 1 ♂, Victoria, no abdomen (NMV); 1 ♀, Birchip (35°58'S, 142°54'E) (no abdomen) (NMV). **SA:** 1 ♀, just west of Lake Eyre (28°22'S, 137°22'E), 17.viii.1985, T. D. Schwaner (SAM); 1 ♀, Port Lincoln (34°43'S, 135°51'E), xi.(no year), S. H. Curnow Collection (SAM); 1 ♂, same as above but 29.ii.1936 (SAM); 3 ♂, 1 ♀, Myrtle Spring (30°43'S, 137°09'E), Pine Dam, 13.ix.1964, N. B. Tindale (SAM); 1 ♀, Iron Knob (32°43'S, 137°09'E), S. H. Curnow Collection (SAM); 1 ♂, Baroota (32°55'S, 137°58'E), xi, S. H. Curnow Collection (SAM); 1 ♂, 8 km NE Mt. Woodroofe (26°17'10"S, 131°48'20"E), Musgrave Range, at light, 14.x.1994, Pitjantjatjara Land Survey (SAM); 1 ♂, 20 m S. Cradock (32°04'S, 138°29'E), 20.x.1972, H. E. Evans & T. Houston (SAM); 3 ♂, Middleback stn. (32°57'S, 137°24'E), 26.x.1983, at light, T. Woodell (SAM); 1 ♂, Great Victoria Desert (27°52'S, 130°22'E), 100 km N of Cook, leg. CRA team (SAM); 1 ♂, 51 km N Morgan (34°02'S, 139°40'E), on Canegrass stn. Rd, 1.xi.1995, at light, G. F. Gross (SAM); 2 ♂, Frome River (29°04'S, 137°54'E), Crossing of Bridsville Track nr Marree, 25.x.1966, G. F. Cross (SAM); 1 ♂, 30 km SW Mabel Creek. HS Sand plain (29°09'40"S, 134°06'30"), at ligh, 25.x.1984, CRA

Suvey (SAM); 3 ♂, Simpson Desert (26°07'S, 138°37'E), vii-viii.1972, C. R. Harris (SAM); 1 ♂, same locality but Poeppel Corner and Birdsville, 6.ix.1986, at night on sand, J. A. Forrest (SAM); 1 ♂, N of Roxby Downs (30°33'S, 136°54'E), Woodland, 25.x.1976, around light in camp in *Acacia sowdenii* , L. D. Williums (SAM); 2 ♂, Dalhousie Springs (26°27'S, 135°31'E), 6.x.1987, at light, J. A. Forrest (SAM); 2 ♂, Gum Creek (33°35'S, 138°40'E), 6m. N of Mulligan Springs, 24.ix.1967, to light (SAM); 1 ♂, Farina(30°04'S, 138°16'E), Creek bed , 27.x.1970, G. Gross & E. Matthews (SAM); 1 ♂, Yorke Peninsula (34°21'S, 137°37'E), Marion Bay, 8.xi.1976, at light, I. Kowanko (SAM); 1 ♂, Minnie Downs (27°49'S, 134°40'E), NE Corner of SA, L. Reese (SAM); 1 ♂, Memmema (31°39'S, 138°22'E), 1948 (SAM); 1 ♂, Parachina (31°07'S, 138°23'E), Flinders Range, H. Hule (AM); 2 ♂, Flinders Rang National Park, Dingleys Dell Camp, Oraparinna Creek (32°21'17"S, 138 °42'16"E), 9.x.1997, at light, S. & A. Skevington, C. Lambkin & S. Winterton (UQIC); 1 ♂, Algebuckina (27°54'S, 135°48'E), 50 km SE of Oodmadatta, 8.ix.1988, G. B. Monteith (QM); 2 ♂, Poochera (32°43'S, 134°50'E), Mallee Woodland, x–xi.1984, R. W. Taylor & R. J. Bartell (ANIC); 2 ♂, 11 km E by SE of Poochera (32°46'S, 134°56'E), SA, 25 – 26.ix.1981, at MV light, A. A. Calder (ANIC);1 ♂, Birkenshaw Well (28°57'S, 136°07'E), nr William Creek, x.1992, I. Gee (ANIC); 1 ♂, Lake George (27°20'S, 140°10'E), SA, 13.x.1972, Roffey & Mitchell (ANIC); 2 ♀, Leigh Creek (30°32'S, 138°28'E), SA, 29.ix.1965, G. C. Gregory (ANIC); 1 ♀, Angorichina Creek Below Hostel (31°07'S, 138°33'E), 22.x.1978, E. B. Britton (ANIC); 1 ♂, 2 ♀, William Creek (28°54'S, 136°21'E), 6.ix.1990, attracted to light, I. Bunic (ANIC). **WA:** 1 ♀, 130 m NE Carnegie (26°35'S, 120°13'E), 3.xi.1971 (WAM); 1 ♂, 2 mile west of Warburton (26°13'S, 126°39'E), 23.vii.1962, W. H. Buther (WAM); 1 ♂, Merredin (31°29'S, 118°17'E), 25.ix.1938, A. & T. Winere (QM); 1 ♂, 24-25 km End of Beyondie HS (24°47'S, 120°02'E), 17-20.iix.1964, T. F. Houston & B. Hanich, Coll no. 537-18 (WAM); 2 ♂, 2 km W by SW Muggan RH, 156 km SW of Warburton (27°00'S, 129°19'E), 13-14.ix.1982, T. F. Houston & B. Hanich (WAM); 1 ♂, Giles (29°24'S, 125°20'E), iix.1965, D. G. Matthews (WAM); 1 ♂, same as above but 1960, B. Gilmour (ANIC); 1 ♂, Cullculli (27°05'S, 118°14'E) station, iix.1972, J. Cark (ANIC); 1 ♂, Cooper Hills (27°22'S, 126°22'E), 5.viii.1967, W. D. L. Ride (WAM); 1 ♂, Koondra (23°34'S, 120°05'E), Goyder Lagoon, WA, 30.iix.1975, J. Blyth (NMV); 1 ♂, NE of Streich Mound (30°27'S, 123°41'E), Great Victoria Desert, Officer Basin, 24 -28, ix.1991, R. P. McMillan (WAM). **Locality unknown:** 1 ♂, John Davidson (WINC).

Description

Male. Body length, 13.37–24.56 mm; *width*, 2.38–5.23 mm.

Colour (Fig. 2.44). Body reddish brown with head, thorax and basal 1/5 of elytra often darker. Head, pronotal disc and basal 1/10 of elytra with very dense white and long pubescence; a longitudinal line, more or less glabrous, starting from frontoclypeal suture and ending near posterior margin of pronotal disc; pronotal disc with a small glabrous spot on each side of median longitudinal line; each side of pronotum with a wide longitudinal stripe of dense white pubescence near ventral side; sterna and pleura with dense yellowish white pubescence. Each elytron covered with dense short white pubescence, and 3 narrow stripes of denser pubescence on disc excluding 1 at suture and 1 at margin. Legs covered with fairy dense pubescence; mid and hind femora with very dense, brush-like brownish hairs on ventral side. Abdomen with fairly dense yellowish pubescence; each of visible sternites 1-3 with a medial tuft of very dense brownish hairs.

Head. Postclypeus subtriangular and flattened, with dense coarse punctures but mostly hidden in dense pubescence; frontoclypeal suture deep and narrow in middle; distance between lower lobes of eyes 1.82–2.00 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 0.86–0.94 × as long as distance between eyes on ventral side; genal length 0.24–0.37 × as long as head width immediately below eyes. Antennae slightly longer than body; segments 4-10 flattened and produced on one side at apex.

Thorax and abdomen. Pronotum 1.14–1.25 × as long as width, with a small conical process at each side; posterior margin 1.25–1.43 × as wide as anterior margin; pronotal disc weakly binodulose in middle area; disc and side strongly rugose transversely throughout. Scutellum semicircular, with dense pubescence. Elytra 4.07–4.56 × as long as prothorax and 3.34–4.07 × as long as shoulder width; each elytron with 3 longitudinal carinae on disc; apex distinctly bispinose, with sutural spine usually longer. Apex of terminal sternite more or less truncate.

Male terminalia. Apices of ventral and dorsal median lobes rounded; ventral lobe slightly shorter than or as long as dorsal lobe; spined region of internal sac divided into two sections: first section with mixture of dense simple spines and multi-branched spines along side areas; second section with sparse short simple spines (Fig. 2.82a). Eighth sternite strongly obliquely truncate at sides, widely and deeply emarginate at apex, with long setae arising terminally; ventral surface with dense cloud-like processes (Fig. 2.82b). Eighth tergite truncate or slightly emarginate at apex, with some short simple spines and multi-branched spines on mid area (Fig. 2.82c). Paramere 1.46–1.48 × as long as wide, cylindrical in shape; apex rounded with long and short setae (Fig. 2.82d).

Female. Body length, 17.21–26.55 mm; *width,* 4.27–5.43 mm.

Antennae and legs shorter; abdomen more robust; femora without brownish brush-like hairs and visible sternites without medial tufts of very dense brownish hairs.

Ovipositor and spermatheca. Ovipositor short; styli arising terminally with short hairs (Fig. 2.82e). Spermatheca slightly curved; spermathecal gland arising at base (Fig. 2.82f).

Distribution

Widely distributed in southern and southeastern Queensland, northeastern New South Wales, Victoria, northern, eastern and southeastern South Australia, and southern Western Australia (Fig. 2.107).

Variation

Body colour varies from reddish brown to yellowish brown. Specimens from Victoria differ from other specimens in having sparser pubescence.

Biology

Known hosts are *Grevillea huegelii* and *Acacia* sp. and *A. sowdenii*. Adults were collected from July to December and February to March, by MV light trap.

Comments

This species resembles *U. ventralis* but differs in having apex of elytra distinctly biospinose; head, pronotal disc and basal 1/10 of elytra with pubescence distinctly denser, whiter and longer than that on remaining parts, and each elytron with only 3 longitudinal stripes of dense pubescence on disc.

***Uracanthus ventralis* Lea, 1917**

(Figs 2.45, 2.83, 2.107)

Uracanthus ventralis Lea, 1917a: 741. –McKeown, 1947:67.

Uracanthus multilineatus McKeown, 1948: 54. **syn. nov.**

Material examined

U. ventralis. Holotype. ♂. **WA:** Mullewa, J. F. May, bearing a name label on which 'TYPE' was written in red; 1 segment of right antenna missing (SAM).

U. multilineatus. Holotype. ♂. **WA:** Lake Violet, Coll. no. 27-1497, Reg. no. 33556, antennae damaged (WAM).

Other material examined. 14 ♂, 5 ♀. **QLD:** 1 ♂, 24 ml. NE of Kihee H.S (27°23'S, 142°37'E), QLD, 14.i.1965, at MV light, L. J. Chinnick (ANIC). **NT:** 1 ♂, Stuart H'way, NT, 26 km. S of Tennant Creek (19°33'S, 134°14'E), 29.xi.1972, D. H. Colless (ANIC); 1 ♂, 30 km NW by W of Alice Springs (23°32'S, 133°38'E), 7.x.1978, Upton & Barrett (ANIC). **SA:** 1 ♂, Musgrave Ranges, 12.ii.1966, at light, P. Aitken & N. B. Tindale (SAM); 1 ♀, Mulgathing HS (30°14'S, 133°59'E), 8.xi.1977, on brushes forming a hedge around the SH, F. & J. Austin (SAM). **WA:** 1 ♂, Sandstone, det by Lea, H. J. Carter Collection (NMV); 1 ♂, same as above but (WAM); 2 ♂, 37 km SW of Youanmi (28°45'S, 118°31'E), 13-14.iii.1982, at light, Coll. no. 437-8, T. F. Houston & B. Hanich (WAM); 1 ♂, 12 km NE of Warriedar (29°04'S, 117°18'E), 18.iii.1982, at light, Coll. no. 442-1, T. F. Houston & B. Hanich (WAM); 1 ♂, Wiluna (26°35'S, 120°13'E), ii.1961, A. Douglas leg., G. F. Mus (WAM); 1 ♀, Ellavalla stn., Carnarvon, WA, ii.1955, A. Snell (NMV); 1♂, 3 ♀, Marloo Stn.(28°22'S, 122°37'E), Wurarga, WA, 1931-1941, A. Goerling (ANIC); 2 ♂, Deeba Rockhole (28°19'S, 116°10'E), 34 km NE by N of Laverton, WA, 12.xi.1977, T. A. Weir (ANIC); 1 ♂, Binnu (28°02'S, 114°40'E), 8.ii.1965, M. de. Graaf (WAM).

Description

Male. Body length, 13.53–20.79 mm; *width,* 2.72–4.27 mm.

Colour (Fig. 2.45). Body reddish brown with head, thorax and basal 1/5-1/3 of elytra often darker. Head and thorax with dense white pubescence; pronotal disc with a glabrous median longitudinal line and a glabous spot on each side of the median line. Elytra covered with whitish pubescence; each elytron with 4 longitudinal stripes of very dense white pubescence on disc excluding 1 at margin and 1 at suture. Legs covered with fairy dense pubescence; mid and hind femora with very dense, brush-like brownish hairs on ventral side. Abdomen with fairly dense yellowish pubescence; each of visible sternites 1-3 with a medial tuft of very dense brownish hairs.

Head. Postclypeus semicircular and flattened, with dense large coarse punctures; distance between lower lobes of eyes 1.62–1.82 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.0–1.15 × as long as distance between eyes on ventral side; genal length 0.23–0.25 × as long as head width immediately below eyes. Antennae slightly longer than body; segments 4-10 flattened and produced on one side at apex.

Thorax and abdomen. Pronotum 1.14–1.43 × as long as width, with a small conical process at each side; posterior margin 1.08–1.30 × as wide as anterior margin; pronotal disc binodulose in middle area; disc and side strongly rugose transversely. Scutellum semicircular, with dense pubescence. Elytra 3.45–4.15 × as long as prothorax and 3.29–3.57 x as long as shoulder width; apex rounded or truncate, with an acute spine at suture. Apex of terminal sternite emarginate.

Male terminalia. Apex of ventral median lobe narrowly rounded and apex of dorsal lobe rounded; ventral lobe slightly shorter than or as long as dorsal lobe; spined region of internal sac divided into two sections: first section located near base with a mixture of dense simple spines and fairly dense multi-branched spines; second section with sparse short simple spines; a long unspined gap between the two sections (Fig. 2.83a). Eighth sternite obliquely truncate at side, shallowly emarginate at apex, with sparse long setae arising terminally; ventral surface with cloud-like processes (Fig. 2.83b). Eighth tergite truncate or shallowly emarginate at apex; dorsal surface with fairly dense short simple spines and multi-branched spines (Fig. 2.83c). Paramere 1.96 – 1.98 × as long as wide, cylindrical in shape, apex rounded (Fig. 2.83d).

Female. Body length, 12.81–19.72 mm; *width,* 2.38–4.04 mm.

Antennae distinctly shorter than body; femora without brownish brush-like hairs and visible sternites without medial tufts of very dense brownish hairs.

Ovipositor and spermatheca. Ovipositor relatively long; styli arising terminally with short hairs (Fig. 2.83e). Spermatheca slightly curved; spermathecal gland arising at base (Fig. 2.83f).

Distribution

Southwestern Queenland, central Northern Territory, northern and sourthern South Australia, and central and southwestern Western Australia (Fig. 2.107).

Variation

No obvious variation was observed.

Biology

Hosts are unknown. Adults were collected by light in November and January to March.

Comments

This species resembles *U. albatus* but differs in having elytral apex unispinose and each elytron with 4 longitudinal stripes of dense pubescence on disc.

Uracanthus strigosus Pascoe, 1875

(Figs 2.46, 2.84, 2.108)

Uracanthus strigosus Pascoe, 1875: 62. –French, 1911: 67, pl. cxi, Fig. 2.6; Aurivilius, 1912: 147; Lea, 1916: 384; McKeown, 1947: 66; Duffy, 1963:117; Monné, 2005: 660.

Material examined

Holotype. ♀. **NSW:** Rope's Creek, Pascoe Coll. 93-60, bearing circular type label, and Pascoe's handwriting of the species names (BMNH).

Other material examined. 59 ♂, 41 ♀. **QLD:** 1 ♂, Toowoomba, 1.x.1928, W. B. Branard (QDPI); 1 ♂, 5 ♀, Yuleba SF Site 1 (26°58'S, 149°44'E), 270 m, Cypress/ Box, 8-10.iii.2002, MV light, Moteith & Wright (QM); 1 ♀, 330 m, Barakula (26°26'S, 150°31'E), 17-18.xii.2001, MV light, Moteith & Wright (QM); 1 ♂, Lake Broadwater (27°21'S, 151°07'E) via Dalby, Gravel Ridge, 12.ii.1985, to light, M. Benie (QM); 1 ♂, same locality but 23.ii.1986, MV light, G. B. Moteith & G. Thompson (QM); 1 ♀, Mt. Moffat National Park (25°01'S, 147°57'E), Top Moffat Camp, 13-15.xii.1987, Monteith, Thompson & Yeates (QM); 1 ♂, 1 ♀, 520 m, Wonga Hills site 3 (26°04'S, 150°49'E), 11.xii.2001, MV light, vine scrub, Monteith, Cook & Wright (QM); 1 ♂, Blackdown Table and Staney Ck. Via Dinge, 17-19.xii.1985, at light, S. Hamlet (QM); 1 ♂, 24 km N. Tinaroo Dam (17°09'S, 145°33'E), 10-11.xii.1999, at MV light, A. E. Wart (QM); 1 ♂, Bulimba (16°52'S, 143°29'E), 1.vii.1923 (UQIC); 1 ♂, Miles (26°39'S, 150°11'E), 12.i.1939, N. Geary (AM); 1 ♀, Condamine (26°55'S, 150°08'E), 6.ii.1939, N. Geary (AM); 1 ♀, Roma (26°34'S, 148°47'E), 28.iii.1957, E. F. Riek (ANIC); 1 ♂, Tambourine (27°52'S, 153°07'E) (UQIC). **NSW:** 1 ♂, Rope's Creek (QM); 1 ♂, same locality but 29.ix.1913, in wattle nut, W. du B. (SAM); 1 ♀, same locality but (MAM); 1 ♀, Sydney, H. W. Cox (WADA); 2 ♀, same as above but (NMV); 1 ♂, Grose Vale, 27.ix.1985, J. A. Humphreys (ASCU); 1 ♂, Mangrove Mt., 6.xi.1960, Mosse and Robinson (ASCU); 1 ♀, Clarence, Blue Mt, 12.ii.1979, N.W. Rodd (AM); 1 ♀, Bombala (AM); 1 ♂, Mogriguy (32°03'S, 148°39'E), 9.ii.1981, R. H. Mulder Collection (AM); 1 ♂, Mt. Kaputar (30°16'S, 150°10'E), Bullawa Creek, 28.xi.1984, George Hangay (MAM); 1 ♀, NSW (WADA); 1 ♂, 20 miles SW of Singleton, NSW, 12.xi.1968, no abdomen, I. F. B. Common (ANIC); 1 ♀, Yarras, 27.xi.1964 (ANIC). **VIC:** 1 ♀, Bright (36°43'S, 146°57'E), Coll. no. I. 5485 (SAM); 3 ♂, 1 ♀, Melton (37°40'S, 144°34'E), 28.iii.1920, on *Casuarina*, F. E. Wilson, F. E. Wilson Collection (NMV); 1 ♂, 1 ♀, same locality but (VAIC); 1 ♀, same locality but (AM); 1 ♂, Kiata (36°21'S, 141°47'E), i.1928, bred from *Melaleuca uncinata,* F. E. Wilson Collection (NMV); 1 ♀, Walpeup (35°08'S, 142°20'E), 25.x.1984, light trap (VAIC); 1 ♂, Birchip (35°58'S, 142°54'E), x.1902, det. Lea (NMV)1 ♂, Victoria (AM); 1 ♀, 7.vi.1937, Coll. no. I 5485 (SAM); 1 ♂, Victoria, 15.v.1916, D. Bcatly (NMV); 1 ♀, You Yangs (37°56'S, 144°26'E), C. Oke (NMV); 1 ♂, Grampians (37°08'S, 142°21'E), 1400ft., Wannon Dividing, Vic., 8.ii.1956, no abdomen, I. F. B. Common (ANIC); 1 ♂, 17 NW Orbost (37°42'S, 148°27'E),Vic, 8.xii.1955, no abdomen, E. F. Riek (ANIC); 1 ♀, Wyperfeld (35°33'S, 142°07'E), Vic, i.1974, GWA (ANIC); 1 ♂, 4 ♀, N Mallee, Dixon, 1917 (NMV); 1 ♀, 5 miles W of Jeparit (36°08'S, 141°59'E), VIC, 4.ii.1956, I. F. B. Common (ANIC); 1 ♂, Big Desert, Broken

Bucket Crown Land Res. 7.iii.1975, UV light, P. B. McQuillan (SAM); 1 ♀, Vic, 4.vi.1908 (ANIC). **SA:** 3 ♂, Glenmanyie Bore (30°50'S, 140°34'E), E of Lake Frome, 28.ix.1975, at light, sand ridges with black oak *Acacia*, P. Aitken & T. F. Houston (SAM); 2 ♂, 15 km W Sturt Vale Stn. (35°29'S, 138°59'E), 17.xi.1975, at light, G. F. Gross (SAM); 1 ♂, 185 km S Radium Hill, 3.x.1926, on powerline track, at light, P. Aitken (SAM); 1 ♂, 10 km NW Emu Junc. (28°38'S, 132°12'E), Great Victoria Desert., 10.x.1976, at light, J. A. Herridge & G. F. Gross (SAM); 1 ♀, 'Kurlge' Blackwood, 860ft, 1.x.1956, at MV light, N. B. Tindale (SAM); 1 ♂, nr Morgan, xi.1954, F. J. Mitchell (SAM); 1 ♀, Wirrabara, xi.(no year) (SAM); 1 ♀, no data, SA, no abdomen (SAM). **WA:** 1 ♂, 4 km W of Hyden, 29.i.1993, E. D. Edward & E. S. Nielsen (ANIC); 1 ♀, no data, det by Lea, no abdomen (ANIC); 1 ♂, Wialki, 6.x.1983, R. P. McMillan (WAM); 5 ♂, 7.5 km SE of Banjiwarn HS (27°42'S, 121°37'E), 24.iii. 1979, T. F. Houston et. al. (WAM); 1 ♂, Binnu, 2.ii.1965, M. de. Graaf (WAM); 1 ♂, Condingup, E of Esperance, 27.i.1977, A. M. & M. J. Douglas (WAM); 1 ♂, 10 km W by SW of Point Malcolm (33°48'S, 123°48'E), 15-18.i.1982, B. Hanich & T. F. Houston (WAM); 1 ♂, Fitzgerald River Nation Park (33°47'S, 119°45'E), 5.i.1986, MV lamp, no abdomen, G. & A. Daniels (UQIC). **Locality unknown:** 3 ♀, Coll. no. 3455, Relton Bequest (QM); 2 ♂, ex *Casuarina*, 1.ii.1911 (NMV); 1 ♀, same as above but ix.1911 (AM); 1 ♂, Colo Vale, 21.v.1900 (AM); 2 ♀, same as above but xi.1912 (NMV); 1 ♂, same as above but (NMV); 1 ♂, same as above but (NMV); 1 ♂, same as above but xii.1908 (NMV); 1 ♂, same as above but xi.1908 (NMV); 1 ♂, same as above but i.1907 (NMV); 1 ♂, same as above but ii.1914 (NMV); 1 ♂, same as above but iii.1918 (NMV); 1 ♂, no data (NMV).

Description

Male. Body length, 15.26–22.93 mm; width, 2.98–4.5 mm.

Colour (Fig. 2.46). Body reddish brown with head, prothorax and basal 1/3 of elytra often darker. Head with fairly dense yellowish pubescence. Pronotal disc with 4 longitudinal stripes of yellowish pubescence: 2 wider and denser ones on sides and 2 narrower and sparser ones between the former; each side of pronotum with a longitudinal stripe of dense pubescence near ventral side; ventral surface of prothorax with fairly dense white pubescence. Each elytron with 4 longitudinal stripes of dense yellowish white pubescence; the two closer to suture appearing to merge into one from basal 1/3 or middle to apex. Mid and hind femora with very dense, brush-like brownish hairs on ventral side. Abdomen with fairly dense yellowish pubescence; each of visible sternites 1-3 with a medial tuft of very dense brownish hairs.

Head. Postclypeus semicircular to subtriangular and flattened, with fine punctures; frontoclypeal suture deep and narrow in middle; distance between lower lobes of eyes 2.06–2.21 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 0.77–0.85 × as long as distance between eyes on ventral side; genal length 0.31–0.41 × as long as head width immediately below eyes. Antennae slightly shorter than body; segments 4–10 slightly produced on one side at apex.

Thorax and abdomen. Pronotum 1.12–1.30 × as long as width, with a strongly raised conical process at each side; posterior margin 1.17–1.44 × as wide as anterior margin; pronotal disc weakly binodulose in middle area; disc and side strongly rugose transversely. Scutellum semicircular, with dense pubescence. Elytra 3.87–4.61 × as long as prothorax and 3.64–4.05 × as long as shoulder width, with coarse punctures in basal 1/3, gradually diminishing toward apex; apex bispinose with marginal spine much longer. Apex of terminal sternite slightly emarginate.

Male terminalia. Apex of ventral median lobe emarginate and apex of dorsal lobe narrowly rounded or slightly pointed; ventral lobe longer than dorsal lobe; spined region of internal sac divided into two sections: first section longer than unspined gap between first and second sections, with fairly dense short simple spines; second section about as long as first section, with sparse short simple spines (Fig. 2.84a). Eighth sternite obliquely truncate or more or less rounded at side, clearly emarginate at apex, with sparse long setae arising terminally; ventral surface with cloud-like processes (Fig. 2.84b). Eighth tergite shallowly emarginate at apex; dorsal surface with fairly dense short simple spines and multi-branched spines in basal area (Fig. 2.84c). Paramere 1.96–1.98 × as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.84d).

Female. Body length, 19.82–22.19 mm; *width,* 3.56–4.63 mm.

Antennae distinctly shorter than body; femora without brownish brush-like hairs and visible sternites without medial tufts of very dense brownish hairs.

Ovipositor and spermatheca. Ovipositor relatively long; styli arising terminally with short and long hairs (Fig. 2.84e). Spermatheca curved, particularly near apex; spermathecal gland short and arising at basal 1/3 (Fig. 2.84f)

Distribution

Northeastern and southeastern Queensland, eastern New South Wales, southern and central Victoria, northern South Australia, and southwestern Western Australia (Fig. 2.108). This species was accidentally introduced to Ecuador (Monné 2005).

Variation

Body colour may vary from reddish brown to blackish. Pubescence colour may vary from whitish to greyish. Specimens from Queensland are darker than those from New South Wales. The apical spines of elytra may vary from long to short.

Biology

Known hosts are *Acacia* spp, *Helichrysum ferrugineum*, *Melaleuca uncinata* and *Casuarina* sp. Adults were collected from October to April, and attracted to light.

Comments

This species resembles *U. albatus* but differs in having pronotal disc with 4 longitudinal stripes of pubescence on disc; pubescent stripes close to elytral suture tended to merge from middle towards apex.

Uracanthus parallelus Lea, 1916

(Figs 2.47, 2.85, 2.109)

Uracanthus parallelus Lea, 1916: 377. –McKeown, 1947: 65.

Material examined

Holotype. ♂. **QLD:** Cooktown, Coll. no. T-8879, bearing a red holotype label; left antenna missing (NMV).

Other material examined. 2 ♂**. QLD:** 1 ♂, Carnarvon Range, 14.xii.1938, N. Geary (AM); 1 ♂, Boomer Range (23°12'S, 149°44'E), 240 m Pyton Scrub site 5, 28-29.ix.1999, Vine scrub, Monteith, Cook, Burwell & Evan (QM); 1 ?, N Qld, no abdomen (SAM).

Description

Male. *Body length*, 14.22–17.94 mm; *width*, 2.08–3.28 mm.

Colour (Fig. 2.47). Body reddish brown with head thorax, femora and basal elytra often darker. Head, thorax, abdomen and elytra with dense, long, pale yellow pubescence;

pronotum with a large more or less glabrous spot in the middle; elytral shoulder with a small longitudinal glabrous mark.

Head. Postclypeus subtriangular, slightly convex, with fairly dense coarse punctures; distance between lower lobes of eyes 1.66–1.80 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.00–1.09 ×as long as distance between eyes on ventral side; genal length 0.40–0.48 × as long as head width immediately below eyes. Antennae slightly shorter than body; segments 5-10 subcylindrical and slightly produced on one side at apex.

Thorax and abdomen. Pronotum 1.18–1.20 × as long as width, rounded or sligthyl produced at side; posterior margin 1.08–1.25 × as wide as anterior margin; pronotal disc without obvious nodules in middle area; disc and side smooth with transverse rugae near anterior and posterior margins. Scutellum semicircular, with dense pubescence. Elytra 4.74–4.83 ×as long as prothorax and 4.50–5.04 × as long as shoulder width; longitudinal carinae on disc not obvious; basal 1/3 of elytra with coarse punctures and the remaining 2/3 with fine punctures gradually diminishing toward apex; apex emarginate and bispinose but spines small. Apex of terminal sternite emarginate.

Male terminalia. Apex of ventral median lobe pointed and apex of dorsal lobe truncate; ventral lobe shorter than dorsal lobe; spined region of internal sac divided into two sections: first section longer than second section, with dense long simple spines in basal half and fairly dense muti-branched spines on sides in apical half; second section about as long as unspined gap between two sections, with sparse simple spines (Fig. 2.85a). Eighth sternite rounded or slightly obliquely truncate at sides, shallowly emarginate at apex, with long and fairly long setae arising terminally; ventral surface with fairly dense cloud-like processes (Fig. 2.85b). Eighth tergite more or less rounded at apex with a small pointed process in middle of apex; dorsal surface with very sparse multi-branched spines near base and sparse short simple spines in middle area (Fig. 2.85c). Paramere 1.38–1.4 ×

as long as wide, subcylindrical in shape, apex rounded with sparse long and short setae (Fig. 2.85d).

Female. Unknown.

Distribution

Eastern Queensland (Fig. 2.109).

Variation

No significant variation was observed.

Biology

Hosts are unknown. One specimen was found on vine scrub. Adults were collected from September to December.

Comments

This species resembles *U. froggatti* but differs in having pubescence on elytral disc more or less evenly distributed; elytra apex bispinose.

Uracanthus froggatti Blackburn, 1894

(Figs 2.48, 2.86, 2.109)

Uracanthus froggatti Blackburn, 1894: 106. –Froggatt, 1894: 116; Aurivillius, 1912: 147; Lea, 1916: 385; McKeown, 1947: 64; Duffy, 1963: 116.

Material examined

Paratype. 2 ♂. **NSW:** 1 ♂, Coll. no. I. 5489, no abdomen (SAM); 1 ♂, Coll. no. 5170, bearing a blue paratype label; left antenna missing (NMV).

Other material examined. 3 ♂, 2 ♀. **QLD:** 1 ♂, Toowoomba, R. Illidge (UQIC). **NSW:** 1 ♀, Coogee, 8.x.1925, F. A. McNell (AM); 1 ♀, Sydney (ASCU); 1 ♂, no locality, 20.iv.1893, bred from *Lasiopetalum ferrugineum,* Froggatt (ANIC); 1 ♂, Thomas River, 23 km NW by W of Mt. Arid, 4-7.xi.1977, at light, J. F. Lawrence (ANIC).

Description

Male. Body length, 15.48–18.99 mm; *width*, 2.23–3.26 mm.

Colour (Fig. 2.48). Body dark reddish brown with head, thorax and basal elytra darker. Head with fairly dense white pubescence; thorax and basal elytra with dense white pubescence; pronotal disc with 3 vague and not well-defined, longitudinal, glabrous lines. Elytra with fairly dense white pubescence of uneven distribution, giving an appearance of irregular pubescent patterns; elytra apex with very dense white pubescences.

Head. Postclypeus triangular, convex, with shiny and smooth surface; frontoclypeal suture deep and wide in middle; distance between lower lobes of eyes 1.63–1.71 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.0–1.2 × as long as distance between eyes on ventral side; genal length 0.56–0.57 × as long as head width immediately below eyes. Antennae slightly shorter than body; segments 4-10 thin and subcylindrical, and slightly produced on one side at apex.

Thorax and abdomen. Pronotum 1.26–1.34 × as long as width, rounded at side; posterior margin 1.15–1.30 × as wide as anterior margin; pronotal disc weakly binodulose in middle area; disc and side rugose transversely. Scutellum semicircular, with dense pubescence. Elytra 4.60–4.97 ×as long as prothorax and 4.20–4.77 × as long as shoulder width; longitudinal carinae on disc not obvious; disc with fine punctures; apex more or less truncate. Apex of terminal sternite rounded with a small notch.

Male terminalia. Apex of ventral and dorsal median lobes narrowly rounded or slightly pointed; ventral lobe shorter than dorsal lobe; basal unspined region of internal sac with wave-like patterns throughout, about as long as spined region; spined region with fairly dense long simple spines and sparse multi-branched (Fig. 2.86a). Eighth sternite obliquely truncate at side, widely emarginate at apex, with long and fairly long setae arising terminally, ventral surface with sparse cloud-like processes (Fig. 2.86b). Eighth tergite semicircular in shape and rounded at apex, with fairly dense basally-forked spines on dorsal surface (Fig. 2.86c). Paramere short, as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.86d).

Female. Body length, 14.46–15.82 mm; *width*, 2.17–2.40 mm

Body more robust; antennae and legs shorter. Elytra 5.30–5.27 × as long as prothorax and 4.64–5.15 × as long as shoulder width.

Ovipositor and spermatheca. Ovipositor very short; styli arising terminally with short and long hairs (Fig. 2.86e). Spermatheca curved; spermathecal gland long and arising near base (Fig. 2.86f).

Distribution

Southeastern Queensland and eastern New South Wales (Fig. 2.109).

Variation

Ragae on pronotal disc may vary from very distinct to vague.

Biology

The known host is *Lasiopetalum ferrugineum*. Adults emerge in April. Larvae feed in the stems of the host, completely hollowing them for a considerable length, and usually cutting the branch off before pupating, and forming a cell at the end of the gallery. Adults were collected November by light trap.

Comments

This species resembles *U. parallelus* but differs in having pubescence on elytral disc unevenly distributed and elytral apex truncate.

Uracanthus tropicus Lea, 1916

(Figs 2.49, 2.87, 2.109)

Uracanthus tropicus Lea, 1916: 376. –McKeown, 1947: 67.

Material examined

Holotype. 1 ♀. Northern Queensland, Coll no. I. 5697, bearing a name label on which 'TYPE' was written in red (SAM).

Other material examined. 4 ♂, 7 ♀. **QLD:** 2 ♂, 2 ♀, 15 km W of Irvinebank (17°25'S, 145°04'E), 27-28.xi.1981, J. Balderson (ANIC); 1 ♀, 24 km E by N of Ravenshoe (17° 35' S,145° 43' E), 14.xi.1981, J. Balderson (ANIC); 1 ♀, Mossman Gorge National Park (16°28'S, 45°20'E), nr Mossman, 23.xi.1981, J. Balderson (ANIC); 1 ♀, SW of Mount Garnet (18°05'S, 144°40'E), 4.x.1989, Forty Mile Scrub, L. Ring (UQIC); 1 ♀, Brisbane, 14.x.1956, Rirhpateacts (UQIC); 1 ♀, Mt. Abbott (20°06'S, 147°45'E), summit area, 8-10.xii.1996, 750-1000 m, G. Monteith, D. & I. Cook (QM); 1 ♂, Flinder River, 59 km SW of Normantan, QLD, 1.xii.1981, J. Bladerson (ANIC); 1 ♂, 6 km SE of Chillagoe, QLD, 26.xi.1981, J. Bladerson (ANIC).

Description

Male. Body length, 13.99–15.58 mm; *width,* 2.21–2.58 mm.

Colour (Fig. 2.49). Head, thorax, antennae, and basal 1/3 elytra reddish brown to blackish brown, and remaining elytra yellowish brown. Body covered with fairly dense pale yellow pubescence. Each elytron usually with a wide submarginal longitudinal glabrous mark starting from shoulder extending to basal 1/3–apical 1/3 of elytra.

Head. Postclypeus triangular, convex, smooth, shiny and glabrous; frontoclypeal suture deep and narrow in middle; distance between lower lobes of eyes 1.58–1.76 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.44–1.50 × as long as distance between eyes on ventral side; genal length 0.26–0.34 × as long as head width immediately below eyes. Antennae as long as or slightly longer than body; segments 4-10 thin, subcylindrical in shape, and slightly produced on one side at apex.

Thorax and abdomen. Pronotum 1.25–1.48 × as long as width, rounded at sides; posterior margin 1.10–1.21 × as wide as anterior margin; pronotal disc without obvious nodulse in middle area; disc and side smooth with feeble transverse rugae near posterior margin. Scutellum semicircular, with dense pubescence. Elytra 3.70–3.89 × as long as prothorax and 4.19–4.53 × as long as shoulder width; basal 1/3 of elytra with fine puncture, diminishing toward apex; apex truncate or slightly marginate with a small tooth at suture and margin, respectively. Apex of terminal sternite rounded or widely truncate.

Male terminalia. Apex of ventral median lobe and apex of dorsal lobe slightly pointed or widely rounded; ventral lobe shorter than dorsal lobe; spined region of internal sac about 3 × as long as terminal unspined area, with dense long simple spines (Fig. 2.87a). Eighth sternite rounded or obliquely truncate at sides, shallowly emarginate at apex, with some setae arising terminally; ventral surface with simple spines (Fig. 2.87b). Eighth tergite rounded or very weakly emarginate at apex; dorsal surface with fairly dense basally-forked spines on basal-mid area (Fig. 2.87c). Paramere 2.8–2.9 × as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.87d).

Female. Body length, 11.11–17.50 mm; width, 2.0–2.90 mm

Body more robust; antennae shorter than body; elytra 4.23–4.53 × as long as prothorax and 4.06–4.39 ×as long as shoulder width.

Ovipositor and spermatheca. Ovipositor relatively long; styli arising terminally with short hairs (Fig. 2.87e). Spermatheca heavily curved, particularly near base; spermathecal gland arising at base (Fig. 2.87f).

Distribution

Northern and eastern Queensland (Fig. 2.109).

Variation

The submarginal longitudinal glabrous mark varies from very clear to almost completely absent.

Biology

Hosts are unknown. Adults were collected during October to December.

Comments

This species resembles *U. parallelus* but differs in having each elytron with a wide submarginal longitudinal glabrous mark starting from shoulder extending to basal 1/3–apical 1/3 of elytra; elytral apex more or less truncate. The label of the holotype states that the specimen is a male but it is in fact a female.

***Uracanthus parvus* Lea, 1916**

(Figs 2.50, 2.88, 2.110)

Uracanthus parvus Lea, 1916: 375. –McKeown, 1947: 65.

Uracanthus dentiapicalis McKeown, 1948:54. **syn. nov.**

Material examined

Uracanthus parvus. Holotype. ♂. **WA:** no locality, Coll. no. I. 5703, W. du Boulay (SAM).

Uracanthus dentiapicalis. Holotype. ♂. **WA:** Wandagee Station (23°50'S, 114°30'E) , Coll. no. 41-740 (WAM).

Other material examined: 31 ♂, 6 ♀. **NT:** 1 ♂, 26 km WSW of Mulga Park (26°00'S, 131°25'E) HS, 18.i.1982, D. C. F. & B. G. F. Rentz, & R. Honeycutt (ANIC); 1 ♂, Rimbija (11°01'S, 136°45'E), Wessel Island, 21.i-3.ii.1977, Farrow & Dowse (ANIC); 1 ♂, same data as above but no abdomen (ANIC); 1 ♂, Finke Gorge National Park, 4 km N Finke Ellery Ck, JCL, 26.iii.1993, J. A. Forrest & D. Hirst (SAM); 1 ♀, Yuendumu, Central Australia (QM). **NSW:** 5 ♂, 11 km N of Mossgiel (33°16'S, 144°34'E), Willandra Bridge, dry swamp, 21.xii.1970, at light, Britton, Misko & Pullen (ANIC). **SA:** 1 ♂, Mt. Davies (26°12'S, 129°15'E), 11.xi.1963, at light, P. Aitken & N. B. Tindale (SAM); 1 ♂, Minnie Downs, N.E. Corner of SA, L. Reese (SAM); 1 ♂, Everard Park (27°00'S, 132°42'E), 30.x.1970, at light, E. Matthews (SAM); 1 ♂, same data as above but 2.xi.1970 (SAM); 2 ♂, 48.9 km SE Mt. Lindsay (27°18'50"S, 130°15'54"E), Sand plain PIL camp, 22-25.x.1996, pitfall, Pitjantjatjara Lands (SAM); 1 ♂, 6 mile W of Iron Knob (32°43'S 137°49'E), 16.iii.1968, I. F. B. Common & M. S. Upton (ANIC); 1 ♀, 40 km W Vokes Hill

Junct, (28°32'S, 130°16'E), 14-15.iv.1994, Malaise trap, J. A. Forrest (SAM); 1 ♂, Margaret Rv. 9.5 km SE Coward Spring. 2.xii.1974, at light, J. A. Herridge (SAM); 1 ♂, Frome River crossing of Bridsville Track nr Marree, 25.x.1966, G. F. Gross (ANIC). **WA:** 2 ♂, Milly Milly (26°04'S, 116°41'E), 27.v.1922 (WAM); 1 ♀, 3.75 km NE of Comet Vale Siding (29°57'S, 121°07'E), 7-15.iii.1979, T. F. Houston et. al. (WAM); 1 ♂, 29 km SE by E of Coolgardie (31°07'S, 121°24'E), 5.v.1983, E. S. Nielson & E. D. Edwards (ANIC); 1 ♂, Carson Escarpment (14°49'S, 126°49'E), 9-15.viii.1975, no abdomen, I. F. B. Common & M. S. Upton (ANIC); 1 ♂, Yanchep NP (31°32'S, 115°41'E), 28.iii.1990, Horak Wooks, Walsh & Yeates (ANIC); 1 ♂, 10 km W by SW of point Malcolm (33°48'S, 123°46'E),15-18.i.1982, at light, B. Hanich & T. F. Houston (WAM); 1 ♂, 1 ♀, Bernier Island, 18.v.1963, R. D. Hughes (ANIC); 1 ♂, Drysdale River (15°02'S, 126°55'E), 3-8.viii.1975, I. F. B. Common & M. S. Upton (ANIC); 1 ♂, Kalgoorlie, iii.1845, Mathews (WADA); 1 ♂, 16km W of Lyons River HS (24°38'S, 115°20'E), 13-15.v.1981, B. Hanich & T. F. Houston (WAM); 1 ♂, 11 km N of Geraldton, at Drummond Cove, 2-11.v.1973, UV light, N. McFarland (ANIC); 1 ♂, 9 km NW of Mt Ragged, Junana Rock (33°23'S, 123°24'E),, 26.x.1977, J. F. Lawrence (ANIC); 1 ♀, 1.7-2.7 Km NW of Toolinna Rockhole (32°45'S, 124°59'E), 24-28.ii.1984, on *Colluvium* swale-stunted grass, T. F. Houston (ANIC); 1 ♂, 1 ♀, Wittenoom (22°14'S, 118°20'E) (WAM).

Description

Male. Body length, 11.9–20.4 mm; *width*, 1.71–2.93 mm.

Colour (Fig. 2.50). Head, thorax, antennae, and basal elytra blackish brown; the remaining part reddish brown. Body covered with sparse to fairly dense white or yellowish pubescence; elytra with denser and longer whitish pubescence on base along suture and from basal 1/10 to 1/3 near margin. Antennal segments 4 to 10 with dense fringe of yellowish pubescence on one side.

Head. Postclypeus semicircular, convex, smooth and shiny; frontoclypeal suture deep and narrow in middle; distance between lower lobes of eyes 1.37–1.75 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.5–1.67 × as long as distance between eyes on ventral side; genal length 0.35–0.38 × as long as head width immediately below eyes. Antennae slightly longer than body; segments 4-10 slightly flattened and strongly produced on one side at apex.

Thorax and abdomen. Pronotum 1.25–1.41 × as long as width, rounded at side; posterior margin 1.23–1.44 × as wide as anterior margin; pronotal disc very weakly binodulose in middle area; disc and side strongly rugose transversely. Scutellum semicircular, with sparse pubescence. Elytra 4.94–5.30 × as long as prothorax and 4.2–4.65 × as long as shoulder width; basal 1/3 of elytra coarsely punctate and then 2/3 of elytra finely punctate, gradually diminishing toward to apex; apex bispinose. Apex of terminal sternite truncate or slightly emarginate.

Male terminalia. Apex of ventral median lobe rounded and apex of dorsal lobe narrowly rounded or slightly point; dorsal lobe shorter than ventral lobe. Spined region of internal sac divided into two sections: first section longer than unspined gap and second section combined, with fairly dense multi-branched spines on basal 2/3 and some scale-like spines on apical 1/3; second section with sparse short simple spines (Fig. 2.88a). Eighth sternite rounded or slightly obliquely truncate at side, almost truncate at apex, with fairly long setae arising terminally; ventral surface with cloud-like processes (Fig. 2.88b). Eighth tergite truncate and shallowly emarginate at apex; surface with fairly dense basally-forked spines and simple spines (Fig. 2.88c). Paramere robust, 2.0–2.09 × as long as wide, apex obliquely truncate with fairly dense long and short setae (Fig. 2.88d).

Female. Body length, 11.21–18.33 mm; *width*, 1.87–2.80 mm.

Body more robust; pubescence on elytra more or less evenly distributed; antennae shorter than body, without fringe.

Ovipositor and spermatheca. Ovipositor relatively long; styli long, arising terminally with short and long hairs (Fig. 2.88e). Spermatheca curved, particularly near apex; spermathecal gland relatively long, arising at base (Fig. 2.88f).

Distribution

Southern, southwestern and northeastern Western Australia, southern and northern Northern Territory, northern and southern South Australia, and southwestern New South Wales (Fig. 2.110).

Variation

Body colour varies from blackish brown to reddish brown. The apical spines of the elytra may vary from highly developed to small processes.

Biology

Hosts are unknown. Adults were collected from October to March, and in May and August by UV light and pitfall.

Comments

This species closely resembles *U. pertenuis* but differs in having body more slender, male elytra with denser and longer whitish pubescence along suture and margin while female elytra with pubescence more or less evenly distributed, and elytral apex with two small spines of similar size or length.

***Uracanthus pertenuis* Lea, 1916**

(Figs 2.51, 2.89, 2.111)

Uracanthus pertenuis Lea, 1916: 374. –McKeown, 1947: 66; Duffy, 1963:117.

Material examined

Holotype. ♂. **VIC:** no locality, Coll. no. I. 5488; bearing a name label on which 'TYPE' was written in red; abdomen damaged (SAM).

Paratypes. 1 ♂, 1 ♀. **TAS:** 1 ♀, Hobart, Coll. no. I. 4504, A. M. Lea (SAM). **SA:** 1 ♂, Goolwa, Old collection (SAM).

Other material examined: 37 ♂, 23 ♀. **QLD:** 1 ♂, 1 ♀, Brisbane (27°28'S, 153°01'E), 4.xi.1960, K. Roarao (UQIC); 1 ♀, same locality as above but 15.iv.1949, W. Wetherall (UQIC); 1 ♀, 16 km N of Boonah (27°60'S, 152°01'E), 27.ix.1986, C. Burwell (UQIC); 1 ♂, Carnarvon National park, Mount Moffatt section; Range Headquarters (25°00'122″S, 147°56'59″E), 1.xii.1987, MV light, J. Skevington, C. Lambkin & S. Evans (UQIC); 1 ♂, Cunnamulla (28°04'S, 145°41'E), 22.xi.1938, N. Grary (AM); 1 ♂, Rockhampton (23°22'S, 150°32'E) (MAM); 1 ♀, Watalgan Range (24°40'S, 128°53'E), N of Bundaberg, 7.x.1972, H. Frauca (ANIC). **NSW:** 1 ♂, 5 mi S Mendooran (31°47'S, 149°17'E), Goonoo State Forest, 25.iv.1971, D. K. McAlpine (AM); 1 ♂, Killara (33°45'S, 151°09'E), 20.xii.1924, Allowrie (MAM); 2 ♂, Ropes Creek (29°55'S, 146°16'E) (MAM); 1 ♀, Sydney, 24.i.1904 (ASCU); 1 ♀, 15 km NE Ulan, 4.xii.1982, L. O'Donnell (ANIC). **ACT:** 1 ♂, Canberra (35°18'S, 149°08'E), at MV light, N. B. Tindale (SAM); 1 ♂, same locality as above but 28.i.1988, B. J. Lepschi (ANIC); 1 ♂, Black Mountain (35°18'S 149°08'E), 29-31.xii.1985, K. R. Pullen (ANIC); 1 ♂, same locality as above but 31.xii.1951, L. Obinaick (ANIC); 1 ♂, same locality as above but ii.1986, light trap, Z.

Liepa (ANIC); 1 ♂, same locality as above but 18.i.1956, light trap, P. B. Carne (ANIC); 1 ♂, same locality as above but 28.i.1988, L. Obinaick (ANIC); 1 ♀, Guabgahlin, 21.xii.1962, S. Baker (SAM). **VIC:** 3 ♂, 3 ♀, Baxter (38°11'S, 145°09'E), C. Oke (NMV); 2 ♂, 1 ♀, Langwarrin (38°09'S 145°10'E), J. E. Dixon (NMV); 1 ♂, same data as above but (AM); 1 ♂, same locality as above but i.1914, C. French Collection (NMV); 1 ♂, 1 ♀, same locality as above but 4.ii.1922 , ex *Acacia oxycedrus* (NMV); 3 ♂, same locality as above but 5.ii.1922 (NMV); 3 ♂, same locality as above but 12.ii.1922 (NMV); 2 ♀, same data as above but (VAIC); 1 ♂, Mallee (36°10'S, 146°54'E) (VAIC); 1 ♂, Clayton (37°55'S, 145°07'E) (NMV); 1 ♀, Victoria (NMV). **SA:** 1 ♂, Adelaide (34°55'S, 138°36'E), C. Watts (SAM); 1 ♀, Wirrabara (33°01'S, 138°16'E), xi (no year), S. H. Curnow Collection (SAM); 1 ♀, Gordon (32°07'S, 138°16'E), 5.v.1924, Hanson (MAM). **TAS:** 1 ♀, Tasmania, A. Simon (SAM). **WA:** 1 ♀, Beverley (32°06'S, 116°55'E), E. F. du Boulay (SAM); 1 ♂, Marloo Stn, Wurarga, 1931-1941, A. Goerling (ANIC); 1 ♀, Eucla (31°40'S, 128°53'E), 30.iv.1995 (SAM); 1 ♂, Duke of Orleans (33°55'S, 122°35'E), Bay Caravan Park, Ablution block, 21.i.1995, A. F. Longbotton (WAM). **Locality unknown:** 1 ♀, no locality, S. R. E. Brock Collection donate (ANIC); 1 ♀, no data (QM); 1 ♂, G. 355 (QDPI); 1 ♂, no data (QDPI); 1 ♂, 1 ♀, no data (NMV).

Description

Male. Body length, 12.62–21.6 mm; *width,* 1.8–3.45 mm.

Colour (Fig. 2.51). Body reddish brown with head, thorax and basal elytra darker. Frons with sparse white pubescence, clypeus glabrous or with very sparse white pubescence. Antennal segments 3 to 10 with yellowish fringe. Pronotal disc with 2 broad longitudinal stripes of fairly dense white pubescence; prothorax with a longitudinal stripe of very dense white pubescence on each side near ventral side. Each elytron with 2 longitudinal stripes of dense white pubescence: 1 along suture starting from base, widest at base, and becoming narrower toward apex, and 1 along margin, starting from or behind shoulder, widest at base tapering toward apex; the rest of elytra with sparse white pubescence.

Head. Postclypeus subtriangular, convex, smooth and shiny; frontoclypeal suture deep and wide in middle; distance between lower lobes of eyes 1.67–1.9 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.23–1.31 × as long as distance between eyes on ventral side; genal length 0.35–0.39 × as long as head width immediately below eyes. Antennae as long as or slightly longer than body; segments 5-10 produced on one side at apex.

Thorax and abdomen. Pronotum 1.25–1.47 × as long as width, rounded at side; posterior margin 1.15–1.35 × as wide as anterior margin; pronotal disc weakly binodulose in middle area; disc and side strongly rugose transversely. Scutellum semicircular, with sparse pubescence. Elytra 4.25–4.78 × as long as prothorax and 4.50–4.87 × as long as shoulder width; elytra finely punctate; elytral apex strongly bispinose with spine at margin distinctly longer than that at suture. Apex of terminal sternite truncate or slightly emarginate.

Male terminalia. Apices of both ventral and dorsal median lobes rounded; dorsal lobe slightly longer than ventral lobe; spined region of internal sac divided into 2 sections: first section about as long as unspined gap between first and second sections, with fairly dense multi-branched spines and scale like spines; second section shorter than first section, with sparse short simple spines (Fig. 2.89a). Eighth sternite obliquely truncate at sides, shallowly emarginate at apex, with fairly long setae arising terminally; ventral surface with cloud-like processes (Fig. 2.89b). Eighth tergite shallowly emarginate at apex; surface with fairly dense basally-forked spines and simple spines (Fig. 2.89c). Paramere robust, 2.0–2.09 × as long as wide; apex obliquely truncate with fairly dense long and short setae (Fig. 2.89d).

Female. Body length, 15.57–22.69 mm; *width*, 2.34–3.50 mm.

Body more robust and broader; pubescent parterns on elytra similar to those in males; antennae shorter than body, without the fringe;

Ovipositor and spermatheca. Ovipositor relatively long; styli arising terminally with short and long hairs (Fig. 2.89e). Spermatheca heavily curved; spermathecal gland short, arising near base (Fig. 2.89f).

Distribution

Northeastern, southern and southeastern Queensland, northern, northeastern and southeastern New South Wales, eastern and southern Victoria, southern Tasmania, southeastern South Australia, and southwestern and southeastern Western Australia (Fig. 2.111).

Variation

The sutural spine at the elytra apex varies from a small process to long but never longer than marginal spine. Body colour varies from blackish brown to reddish brown.

Biology

Known hosts are *Acacia armata,* and *Loranthus* sp. and *A. oxycedrus*. Adults were collected by light trap between September and April.

Comments

This species closely resembles *U. parvus* but differs in having body more robust and longer; elytra of both sexes with denser and longer whitish pubescence along suture and margin, and the elytral apex with the marginal spine always distinctly longer than sutural spines.

***Uracanthus bivittatus* Newman, 1838**

(Figs 2.52, 2.90, 2.112)

Uracanthus bivitta Newman, 1838: 172. –Best, 1882: 35; Aurivillius, 1912: 147; 1917: 16; McKeown, 1947: 63; Duffy, 1963: 116.

Uracanthus bivittata. –French, 1911: 67.

Uracanthus bivittatus. –Lea, 1916: 385.

Uracanthus marginellus Hope, 1841a: 54.-Hope, 1841b: 65; 1844: 198; Aurivillius, 1912: 147; Lea, 1916: 384; McKeown, 947: 65. **syn. nov.**

Uracanthus inermis Lea (not Aurivillius), 1917: 738. **syn. nov.**

Uracanthus leai McKeown, 1938: 214 (nom. nov. for *U. inermis* Lea). –McKeown, 1947: 64.

Material examined

U. bivitta. Holotype. ♀. **New Holland (Australia):** no locality, Ent. Club 44-12; bearing a red circular type label; 4 segments of left antenna and 3 segments of right antenna missing (BMNH).

U. marginellus. *Holotype*. ♂. No locality, Type Coll. no.1769 in Hope Coll.; bearing a type label; right antenna missing (HMO).

U. inermis. *Holotype*. ♂. **QLD:** Cairns, type no 12587; bearing a name label with Lea's handwriting; 3 segments of left antenna missing (SAM). *Allotype*. ♀. **QLD:** same locality as above; bearing an allotype label (SAM).

Other material examined: 115 ♂, 102 ♀. **QLD:** 2 ♀, Mt. Lofty Ranges, S. H. Curnow (SAM); 1 ♀, same as above but (AM); 1 ♂, same as above but (QM); 1 ♂, Bowen, A. Simson (SAM); 1 ♀, 3 km N of Lake Bowarrady, Fraser Island, 12.x.1978, G. B. Monteith (QM); 1 ♀, Inglewood Ranges (NMV); 1 ♂, same locality as above but 4.xi.1925 (UQIC); 1 ♂, Charteville-Bollon Rd, 70 km SE Charteville (26°52'S, 146°35'E), 28.x.1991, MV lamp, G. Daniels (UQIC); 1 ♂, Brisbane, 30.xii.1970, *Acacia* ridge, E. C. Dahms (QM); 1 ♀, same locality as above but 8.xii.1914, H. Hacker (QM); 1 ♂, same locality as above but Illidge (UQIC); 1 ♀, 3 km S of Stanthorpe, 21.xi.1980, MV lamp, M. A. Schneider & G. Daniels (UQIC); 1 ♂, Stanthorpe, 29.x.1926 (NMV); 1 ♀, same locality as above but 19.x.1926 (QDPI); 1 ♂, same locality but E. Sutton (QM); 1 ♀, Colton Vale, E. F. du Boulay Collection (WAM); 1 ♂, Fletcher, 3.xii.1938, E. Sutton (QM); 2 ♂, 2km NbyNW Jowalbina (15°45'S, 144°15'E), 17.i.1994, at light, P. Zborowski & E. D. Edwards (ANIC); 1 ♂, Cooktown (QM); 1 ♂,1 ♀, 560 m Amphitheare Camp, Expedition Range National Park (25°12'S, 148°59'E), 17.xii.1997, MV light, Monteith, Cook & Thompson (QM); 1 ♀, Blackdown Tableland, Stoney Creek via Dingo, NE QLD, 17-19. xii.1985, at light, S. Hamlet (SAM); 1 ♀, Glen Aplin, 1.i.1965, P. Kerridge (UQIC). **NSW:** 1 ♂, 1 ♀, Darkey Creek near Mt. Papong, 1.i.1979, on *Eucalyptus* bloom (ANIC); 1 ♀, Glen Apline, 27.x.1929 (ANIC); 1 ♀, same as above but 27.x.1941, S. R. E. Brock Collection (ANIC); 1 ♀, same as above but 1.i.1965 (NMV); 1 ♀, Shoalhaven, 1895, G. W. F. (ANIC); 2 ♀, Galson, Dumbrell (SAM); 1 ♀, Cumberland Park, 9.i.1958, G. Dolazel (AM); 1 ♂, Pt. Denison (MAM); 1 ♂, Nelson Bay, 12.xi.1960, I. F. B. Common & M. S. Upton (ANIC); 1 ♀, 50 miles S of Singleton, NSW, 5.i.1956, I. F. B. Common (ANIC); 1 ♀, Mt. Kaptar, 3000 ft, 30.xi.1968, at light, C. W. Frazier (ANIC); 1 ♂, same data as above but 18.xi.1968 (ANIC); 1 ♂, same locality as above but Bullewa Creek, 29.xi.1984, George & Hangay (ANIC); 1 ♀, Lane Cove, 16.x.1943, N. W. Rodd (AM); 1 ♀, Roseville, 28.i.1961, C. E. Chadwick (ASCU); 1 ♂, Black Hill, Athelstone, 22.x.1966, on scrub *Cryptandra tomentosa,* N. McFarland (SAM); 1 ♂, Hornsby, xi.1911, C. Gibbons (AM); 1 ♂, Helensburgh, vii.1996, H. E. Osburne (ASCU); 1 ♂, Frenchs Forest (33°44'S, 151°12'E), 11.xii.1937, N. C. Lioyel (ASCU); 1 ♂, Springwood, 30.x.1961, A. E. Searle (ASCU); 1 ♂, Ropes Creek (MAM); 1 ♂, 1 ♀, 14 km W of Braidwood, emerged 2.xi.1992, ex thick stems of *Cytisus scoparius*, P. Hodge Coll. (ANIC); 1 ♀, Allomwrie, 22.x.1923, Killarn (AM); 2 ♂, 3 ♀, NSW (AM); 2 ♂, 2 ♀, same data as above but (SAM); 1 ♀, same data as above (NMV); 1 ? (no abdomen) (AM); 1 ? (no abdomen) (WADA); 1 ♂, National Park, x.1920 (NMV); 1 ♀, 1 ♂, Sydney, 1.xi.1902, W. B. G. Warerley (ASCU); 1 ♀, 1 ♂ , Sydney (MAM); 1 ♀, 1 ♂, same locality as above but (HMO); 2 ♂, same locality as above but (SAM); 1 ♂, same locality as above but Deane (UQIC); 1 ♂, 1 ♀, same locality as above but H. J. Carter (NMV); 1 ♀, same locality as above but xi.1911, C. Gibbons (AM); 1 ♀, same locality as above but 1924, W. W. Froggatt (ANIC); 1 ♀, Cessnock, NSW (WAM); 1 ♀, Newell H' Way, 9 km N by NE Coonabarabran, 9.xii.1980, at light, E. Britton (ANIC); 1 ♂, 23 km N by NE Coonabarabran (30°05'S, 149°24'E), 488 m, 7.xii.1974, at light, I. F. B. Common & E. D. Edwards (ANIC); 1 ♂, Merimbula (36°54'S, 149°56'E), 23.ix.1999, E. C. Zimmerman (ANIC); 1 ♂, 3ml NW. of Evans Head, 13.xii.1955, M. J. D. White (ANIC); 1 ♂, Kurina, xi.1973, A. Werl (ANIC); 2 ♂, 1 ♀, Wahroonga, H. J. Carter (ANIC); 2 ♂, same locality as above but x.1952, R. D. (ANIC) 1 ♀, Thredbo River, Mt. Kosciusko, 3000ft, 15.xii.1931, L. Graham (ANIC); 1 ♀, La Perouse (33°58'S, 151°14'E), 8.xi.1978, E. E. Taylor (FCNI); 1 ♂, Narrabeen (33°42'S, 151°17'E), 24.x.1956, H. Booth (FCNI). **ACT:** 3 ♂, 2 ♀, Black Mountain (35°17'S, 149°07'E), at light, xi.1965- ii.1966 (ANIC); 1 ♂, same locality as above but 16.xii.1952, L. J. Chinnick (ANIC); 1 ♂, same locality as above but 19.i.1956, light trap, I. F. B. Common (ANIC); 1 ♂, same data as above but 24.xii.1964 (ANIC) 1 ♂, same data as above but 12.xi.1964 (ANIC); 1 ♂, same data as above but 27.x.1964(ANIC). **VIC:** 1 ♂, Donvale, x.1952, C. J. R. J (VAIC); 1 ♂, N of Melbourne, no abdomen (NMV); 1 ♀, Melbourne (NMV); 1 ♂, same locality as above but (VAIC); 2 ♂, 1 ♀, Ringwood, C. Oke

(NMV); 1 ♂, Femtree Gully, xi.1936, C. Oke (NMV); 1 ♂, Boronia, xii.1955, Fleet (NMV); 1 ♂, Cheltenham, x.1930, J. C. Goudie (NMV); 1 ♀, N. Mallee, Dixon (NMV); 1 ♀, Somerville, 12.iii.1902 (NMV); 1 ♂, Wellington, Carey River, 15.ii.1977, A. A. Calder (NMV); 1 ♀, no locality (NMV); 1 ♂, no locality, Coll. no. 3455, Relton Bequest (QM); 1 ♂, Melboume, H.W. Davey (VAIC); 1 ♀, no locality, Vic (NMV); 1 ♂, 1 ♀, Little Desert, 13 miles S of Kiata, Vic, 7.xi.1966, I. F. B. Common & M. S. Upton (ANIC); 1 ? (no abdomen), same as above but 6.xi.1966 (ANIC); 1 ♀, same locality as above but 14.xi.1945, F. E. Wilson (NMV); 1 ♂, same as above but 23.x.1946 (NMV); 1 ♂, Kiata, 26.x.1961, J. C. Le Souef (NMV); 1 ♀, same locality as above but x.1939, R. Oldneld (NMV); 1 ♂, 1 ♀, Lake Hattah, J. E. Dixon (NMV); 1 ♂, 90 miles Desert, N of Yanac, 6.xi.1958, F. E. Wilson (NMV); 1 ♂, Grampians, xi.1950 (ANIC); 1 ♀, Melboune, 1901 (NMV); 2 ♂, 4 ♀, Victoria (NMV); 1? (no abdomen), same locality as above (NMV). **SA:** 1 ♂, Murray River, H. S. Cope (SAM); 1 ♀, Port Lincoln, Blackbum (SAM); 1 ♀, Cape Donnington Lincoln, 19.i.1982, at light, E.G. Matthews (SAM); 1 ♀, Karoonda to Peebinga, SA, G. E. H. Wright (SAM); 1 ♀, Adelaide, R. F. Kemp (AM); 1 ♂, 1 ♀, same locality as above but Wilson (HMO); 2 ♂, 1 ♀, no locality, SA (NMV); 1 ♂, 1 ♀, no locality (♀ in AM, ♂ in SAM); 1 ♂, no locality, A. P. Burgess (AM); 1 ♂, same as above but (SAM); 1 ? (no abdomen), no locality (QM); 1 ♂, 'Kurlge' Blackwood, SA, 850ft, xi.1965, N. B. Tindale (SAM); 1? (no abdomen), Yorktown (SAM). **WA:** 1 ♂, Geraldton, J. Clark (AM); 1 ♀, nr Howathara Hill, 25 km E by NE of Geraldton, 28.x.1992, E. D. Edwards & E. S. Nielsen (ANIC); 1 ♂, Kellerberrin, 2.xii.1926, K. & E. Camaby (ANIC); 1 ♀, Murchison, WA, x.1935, H. Brown (ANIC); 1 ♂, Denmark, larva in *Pultanea* stem: 14.i.1975; emerged 18.iv.1975, R. P. McMillan (WAM); 1 ♂, Cottesloe, cut from stem of *Jacksonia*, R. P. McMillan (WAM); 1 ♀, Yallingup, 22.xii.1979, ex *Eucalyptus,* R. M. Bohart (ANIC); 1 ♀, near Howatharra Hill, 25 km E by NE of Geraldton, 28.x.1992, E. D. Edwards & E. S. Nielsen (ANIC); 1 ♀, Bruce Rock, i.1951, A. Douglas Collection (WAM); 1 ♂, Aquinas (32°01'S, 115°51'E), 30.v.1967, Marchison (WAM); 1 ♂, Star swamp, North Beach (Perth), 3.xi.1983, on flower of *Xanthorrhoea*, R. P. McMillan (WAM); 1 ♀, Lake Esperance, E. Sutton Collection (QM); 1 ♀, 2 km N of Mundaring, 19.xii.1962, J. Dell (WAM); 1 ♂, Drummond Cove (28°40'S, 114°36'E), Geraldton, 24.ix.1972, light trap, N. M. Cfriand (WADA); 1 ♀, Swan River (32°03'S, 115°44'E), L. J. Newman (WADA); 1 ♂, same locality as above but xi (no year), Little (WADA); 1 ♂, same locality as above but 1869, de Boulay (HMO); 1 ♂, Kings Park (31°57'S, 115°49'E), 23.ix.1963 (WADA); 1 ♀, Cottesloe (31°59'S, 115°45'E), larva 20.xi.1975, adult 4.iii.1976, as larva in stem *Jacksonia sternbergiana*, R. P. McMillan (WAM); 3 ♀, same locality and host as above but v.1987 (WAM); 1 ♀, same locality as above but larva 16.viii.1975, adult 6.ix.1975, cut from stem of *Jacksonia sternbergiana*, R. P. McMillan (WAM); 1 ♀, Eneabba (29°49'S, 115°16'E), 26.x.1993, R. P. McMillan (WAM); 1 ♂, 1 ♀, Jurien Bay (30°17'S, 115°02'E), 30.i.1976, A. M & M. J. Douglas (WAM); 3 ♂, Talbot Road Res. (31°52'S, 116°02'E), 17.iv.1967, in *Jacksonia sternbergiana*, R. P. McMillan (WAM); 1 ♂, South Perth (31°58'S, 115°51'E), 19.x.1971, S. J. Curay (WADA); 1 ♀, Maylands (31°55'S, 115°53'E), 5.xi.1973, Exlucernce tree, P. S. Lawrence (WADA); 1 ♂, Coorow (29°52'S, 116°01'E), 15.x.1990, UV light, A. Szito (WADA); 1 ♂, Jandakot (32°07'S, 115°50'E), S Perth, 22.xi.1977, dead on ground, A. Page (WAM); 1 ♀, Bayswater (31°55'S, 115°55'E), 19.i.1966, B. G. Muir (WAM); 1 ♂, Salter Point (Perth) (32°01'S, 115°52'E), 28.x.1983, L. E. Koch (WAM); 1 ♀, Perth (NMV); 2 ♂, Thomas River, 63 mi E of Esperance (33°51′S, 121°53′E), 20.xi.1969, UV light, E. B. Briton (ANIC); 1 ♀, Mt Yorkrakine (32°22'S, 117°35'E), 27.x.1957, I. M. (ANIC); 1 ♂, 9km W of Hopetoun (33°57'S, 120°07'E), 23.x.1971, UV light, D. &N. McFarland (ANIC); 1 ♀, South Perth, 5.x.1905, H. M. Giles (NMV); 1 ♀, Glen Forrest (33°14'S, 115°55'E), WA, xi.1950, A. B. (ANIC); 1 ♀, 11 km N Geraldton (28°46'S, 114°36'E) WA, 25.x.1972, UV light (ANIC); 1 ♂, no data (HMO); 2 ♀, Pt D'Entrecasteaux (34°50'S, 115°57'E), 6.xi.1926, K. R. Norris (ANIC); 1 ♂, 11 miles E of Pingrup, 21-27.xi.1958, Greave & Dowse (ANIC). **TAS**: 1 ♂, Kingston, TAS, 2.i.1947, J. R. Cunningham (AM); 1 ♀, same data as above but 23.ii.1946 (AM); 1 ? (no abdomen), Freycinet Nation Park, 28.ii.1963, I. F. B. & M. S. Upton (ANIC); **Locality unknown:** 2 ♂, K 36096 (AM); 1 ♂, 1 ♀, K10942 (AM); 1 ♂, K22588 (AM); 1 ♂, 3455, Relton Bequest (QM); 1 ♂, C. French Collection (NMV); 1 ♂, same data as above but (QDPI); 1 ♀, F. E. Wilson Coll. (NMV); 1 ♀, L. C. Haines Collection (AM); 1 ♂, no data (ANIC); 2 ♂, 6 ♀, no data (NMV); 1 ♀, no data but (SAM).

Description

Male. Body length, 17.17–32.12 mm; *width,* 2.68–5.59 mm.

Colour (Fig. 2.52). Body reddish brown with head, thorax and basal elytra darker. Frons and vertex with mixture of fairly dense white and yellowish pubescence. Pronotum with 2 longitudinal stripes of very dense yellowish pubescence at each side: 1 on disc and 1 near ventral side; each side with 2 spots of very dense yellowish pubescence between above longitudinal stripes: anterior one larger than posterior one; rest of pronotum with fairly sparse to very sparse pubescence. Each elytron with two longitudinal stripes of very dense yellowish pubescence: 1 wide on disc and 1 narrow at margin; the area between the two stripes glabrous or sparsely pubescent.

Head. Postclypeus triangular, convex, with fairly dense fine punctures; frontoclypeal suture deep and wide in middle; distance between lower lobes of eyes 2.12 – 2.37 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.14 – 1.23 × as long as distance between eyes on ventral side; genal length 0.20 – 0.38 × as long as head width immediately below eyes. Antennae slightly shorter than body; segments 4-10 thin and slightly produced on one side at apex.

Thorax and abdomen. Pronotum 1.17–1.44 × as long as width, rounded at side; posterior margin 1.02–1.33 × as wide as anterior margin; pronotal disc weakly binodulose in middle area; disc and side strongly rugose transversely. Scutellum semicircular, with sparse to faily dense pubescence. Elytra 4.20–4.89 × as long as prothorax and 4.03–4.51 × as long as shoulder width; apex emarginate or weakly bispinose. Apex of terminal sternite emarginate.

Male terminalia. Apices of both ventral and dorsal median lobes slightly pointed; dorsal lobe about as long as or slightly longer than ventral lobe; spined region of internal sac occupying most of internal sac; basal unspined region very short with 1-2 lines of large spines near base, sometimes forming an arch in shape; spined region divided into two sections; first section much longer than second section, with sparse scale-like spines, dense long simple spines; second section with sparse simple spines and multi-branched spines near the end of this section; a short unspined gap between sections (Fig. 2.90a). Eighth sternite obliquely truncate at side, narrowly emarginate at apex, with fairly long setae arising terminally; ventral surface with cloud-like processes (Fig. 2.90b). Eighth tergite rounded to truncate or slightly emarginate at apex, with dense simple spines or basally-forked spines on ventral surface (Fig. 2.90c). Paramere 2.53–3.0 × as long as wide, subcylindrical in shape; apex rounded with fairly dense long and short setae (Fig. 2.90d).

Female. Body length, 18.14–29.59 mm; width, 2.92–5.23 mm.

Body more robust, antennae distinctly shorter than body.

Ovipositor and spermatheca. Ovipositor relatively long; styli long, arising terminally with short hairs (Fig. 2.90e). Spermatheca short, slightly curved; spermathecal gland arising near base (Fig. 2.90f).

Distribution

Southeastern Queensland, eastern New South Wales, Australian Capital Territory, southern and western Victoria, southeastern South Australia, eastern Tasmania, and southwestern Western Australia (Fig. 2.112).

Variation

Body colour may be darker or paler. The elytral apex varies from widely emarginate to narrowly emarginate or even more or less truncate; apical spines may be well developed or reduced to the minimum. The transverse rugae on the pronotal disc may vary from very strong to weak. Specimens from Western Australia are more hairy, for example, pronotal disc between two longitudinal stripes can have fairly dense pubescence, and the area between the two longitudinal stripes of very dense pubescence on the elytron can be densely pubescent.

Biology

Known hosts are *Ulex* sp.; *Acacia longifolia*, *Pultenaea stipularis*, *Helichrysum ferrugineum*, *Cytisus scoparius, Jacksonia* sp., *J. sternbergiana, Pultanea* sp., and *Eucalyptus* sp. Adults were found feeding on *Leptospermum scoparium* in November and visiting *Eucalyptus* and *Xanthorrhoea* flowers.

Comments

This species is similar to *U. discicollis* but differs in having the pronotal disc strongly rugose transversely; the elytral apex widely emarginate to narrowly emarginate or even more or less truncate; each side of the pronotum with 2 spots of very dense yellowish pubescence.

Uracanthus discicollis **Lea, 1916**

(Figs 2.53, 2.91, 2.113)

Uracanthus discicollis Lea, 1916: 373. –McKeown, 1947: 63.

Material examined

Holotype. ♂. **SA:** Mount Lofty Rgs (34°07'S, 139°02'E), Coll. no. I.5696 (SAM).

Cotypes. 7 ♂, 1 ♀. **SA:** 2 ♂, Kangaroo Island, J. G. O. Tepper (SAM); 1 ♂, 1 ♀, Karoonda to Peebinga, G. E. H. Wright (SAM); 1 ♂, Mount Lofty Rgs, Coll. no. 12586, S. H. Curnow (SAM); 1 ♂, Marree (29°38'S, 138°03'E) (SAM); 1 ♂, no locality, SA (SAM). **WA:** 1 ♂, Albany, Helms (SAM).

Other material examined: 125 ♂, 52 ♀. **NSW:** 1 ♂, 1 ♀, 40 mile S of Narrabri (30°19'S, 149°46'E), 19-20.x.1973, Pilliga scrub, G. B. Monteith (UQIC); 1 ♂, 1 ♀, W. Wyalong (33°54'S, 147°14'E), 24.xi.1963, J. C. Le Souef (ANIC); 1 ♂, 23 km W by SW of Ranklin Spring (33°43'S, 146°03'E), Gap Dam SF., 3.xii.1992, at light, McEvery Moulds & McAlpine (AM); 1 ♂, Jibbon beach (34°04'S, 151°10'E), Port Macquarie, x.1928, F. H. Rodda (AM); 1 ♂, West Pymble (33°45'S, 151°07'E), nr Sydney, 27.x.1983, at UV light, D. J. Scambler (AM); 2 ♂, 23 km N by NE of Coonabarabran (30°09'S,149°24'E), 7.xii.1974, I. F. B. Common & E. D. Edwards (ANIC); 1 ♂, 9 km W of Coonabarabran, 2.xii.1974, I. F. B. Common & E. D. Edwards (ANIC); 1 ♂, 1 ♀, Sydney, 9.xi.1930, K. K. Spence (AM); 1 ♀, NSW (AM); 1 ♀, same data as above but (NMV); 3 ♂, Mt. Kaputar (30°16'S,150°10'E), NSW, 300 ft., 30.x.1967, at light, C. W. Frazier (ANIC); 1 ♂, same data as above but 18.xi.1968 (ANIC);1 ♂, 2 ♀, Mulla (31°49'S, 147°19'E), xi.1930, H. J. Carter (ANIC). **ACT:** 1 ♀, Black Mt. (35°16'S, 149°06'E), 28.xi.1977, E. C. Zimmerman Collection (ANIC). **VIC:** 3 ♂, 1 ♀, 30 km NW of Rainbow, Big Desert National Park (35°43'S, 141°46'E), Milmed Rock Track, 1.xii.1992, at light, McAlpine, McEvery & Moulds (AM); 1 ♀, 14 km S. of Murrayville (35°15'S, 141°11'E), Big Desert Wildermess, 31.x.1982, J. & D. Gardner (SAM); 1 ♂, 44 km E by SE of Murrayville (35°38'S, 141°98'E), 2.xi.1985, The Springs, Big Desert, 2.xi.1985 (NMV); 1 ♀, Wyperfeld National Park (35°37'S, 142°01'E), Ranger's House, light trap, 17.xi.1973, Misko & Anderson (ANIC); 1 ♂, Glenaladale (37°45'S, 147°19'E), 1.xii.1978, J. C. Le Souef (ANIC); 1 ♂, 13 mile S. of Kiata, Little Desert (36°33'S, 141°38'E), 7.xi.1966, I. F. B. Common & M.S.

Upton (ANIC); 1 ♂, Little Desert (36°33'S, 141°38'E), 13.xi.1942, A. D. Bishop (NMV); 1 ♂, same locality as above but 12.xi.1945, F. E. Wilson (NMV); 1 ♀, Inglewood (36°34'S, 143°52'E), 24.xi.1952, J. C. Le Souef (ANIC); 1 ♂, 1 ♀, same locality as above but 21.xi.1945, I. Smith (NMV); 1 ♂, Kiata (36°21'S, 141°47'E), 12.xi.1945, A. B. (ANIC); 1 ♂, same data as above but (NMV); 3 ♀, same data as above but 7.xi.1945, A. B. (ANIC); 3 ♂, same locality as above but 5.xi.1949, J. C. Le Souef (ANIC); 1 ♂, same data as above but 26.x.1967, J. C. Le Souef (ANIC); 1 ♂, Birchip (35°58'S, 142°54'E), xii.1900 (NMV); 1 ♂, Bacchus Marsh (37°40'S, 144°26'E), xi.1908, C. Oke (NMV); 4 ♂, Gypsum (35°16'S, 142°23'E), xi.1924, C. Oke (NMV); 1 ♀, Sea Lake (35°29'S, 142°51'E), ix.1917, Goudie (NMV). **SA:** 5 ♂, 3 ♀, Calpatanna Waterhole Conservative Park, Wedina Well, Eyre Peninsular, 30.xi.1986, at light, J. A. Forrest (SAM); 4 ♂, 4 ♀, Yumbarra National Park (31°39'S, 133°22'E), 11.xi.1975, J. A. Herridge (SAM); 4 ♂, 2 ♀, Cold & Wet station (35°44'S, 139°45'E), 19.xi.1962, at light, P. Aitken, G. Pretty & N. B. Tindale (SAM); 4 ♂, 1 ♀, Ngarkat Conservative Park (35°50'S, 140°37'E), 18.xi.1991, Box Flat at light, J. A. Forrest (SAM); 1 ♀, 5 km Scorpion Spring Conservative Park (35°27'S, 140°53'E), S. W. Namam's Well, 16.xii.1983, at light, Museum Party (SAM); 1 ♀, same data as above but 17.xii.1983 (SAM); 1 ♂, 1 ♀, Athelstone (34°52'S, 138°42'E), 24.x.1967, UV light 7 pm-2 am, J. Szent & lvany (SAM); 1 ♀, same data as above but 5.xi.1967 (SAM); 1 ♂, same data as above but 19.xi.1967 (SAM); 1 ♂, Blackwood (35°01'S, 138°36'E), 850 ft, 17.xi.1961, N. B. Tindale (SAM); 1 ♀, 2 km W of Blewitt Spring (35°10'S, 138°35'E), 9.xi.1976, 18 °C, UV light, P. B. McMillan (SAM); 1 ♂, Rupara (33°26'S, 138°57'E), 2.xi.1922, J. D. Wilson (SAM); 1 ♂, 1 ♀, 2mi W Darke Peak (33°28'S, 136°12'E), 8.xii.1968, N. McFarland & N. B. Tindale (SAM); 1 ♂, Ferries-McDonald Conservative Park (35°13'S, 139°08'E), 19.x.1988, A. Stolarski (SAM); 1 ♂, Karkoo (34°01'S, 135°43'E) nr Pt. Linncoln, C. Kimber (SAM); 1 ♂, Coonalpyn (35°41'S, 139°51'E) (SAM); 1 ♀, 1.5 km NNW Horne Lookout, E. Bascombe Wells Conservative Park (33°39'S, 135°31'E), Kappawanta Basin Eyre Pen, at light, 2-3.xii.1986, J. A. Forrest (SAM); 1 ♂, 22 mile W by SW of Mundulla (36°21'S, 140°41'E), SA, 8.xi.1966, I. F. B. Common & M. S. Upton (ANIC); 1 ♂, Kuitpo Forrest (35°13'S, 138°42'E), 30.vii.1979, on *Melaleuca* flower, F. D. M (WINC); 2 ♀, Yeelanna (SAM); 1 ♀, Waite Institute, 16.xi.1955, light trap (WINC); 1

♂, no locality label, SA, A. H. C. Zietz (SAM); 1 ♂, SA, A. H. Elston, A. H. Elston Collection(AM); 1 ♂, SA (AM);1 ♂, SA (MAM). **WA:** 1 ♂, 20 km N of Leeman (29°45'S, 114°58'E), Gum Tree Bay, 6.x.1993, R. P. McMillan (WAM); 1 ♂, same data as above but 7.x.1993 (WAM); 2 ♂, 1 ♀, 1 km S of Leeman (29°58'S, 114°59'E), 30.x.1992, E. D. Edwards & E. S. Nielsen (ANIC); 1 ♂, 6 mile West of Hopetoun (33°51'S, 120°07'E), 25.xi.1968, N. McFarland (SAM); 2 ♂, Salmon Gums (32°58'S, 121°38'E), Coll. no. 42-389 (WAM); 1 ♂, Scaddan (32°27'S, 121°44'E), 25.i.1977, A. & M. J. Douglas (WAM); 1 ♂, Watheroo National Park (30°12'S, 115°50'E), 3- 5.x.1980, T. F. Houston (WAM);1 ♀, Eneabba (29°49'S, 115°16'E), 25.x.1993, R. P. McMillan (WAM); 1 ♂, Western Flora Caravan Park, 22 km NNW Eneabba (29°37'39"S, 115°13'26"E), 4.xi.1999, T. F. Houston (WAM); 1 ♂, Robb Road Bushland, 26 km N of Eneabba (29°35'3"S, 115°17'55"E), 18.xi.2000, T. F. Houston (WAM); 1 ♀, 25 km N of Eneabba (29°36'S, 115°15'E), 24-25.x.1984, A. A. Clader Coll.(ANIC); 1 ♂, 2 ♀, Coonadgee (31°22'S, 115°50'E), WA, (WAM); 1 ♂, Claremont (31°58'S, 115°46'E), WA, 16.x.1978, R. P. McMillan (WAM); 1 ♂, 5 mi W Denmark (34°58'S, 117°21'E), iii.1965, W. H. Butter (WAM); 1 ♂, Perth (31°57'S, 115°51'E) (WAM); 1 ♂, 1 ♀, Wembley (31°56'S, 115°48'E), 6.xi. 1953 (WAM); 1 ♂, Jurien Bay (30°17'S, 115°02'E), WA, 30.i. 1976, A. M & M. J. Douglas (WAM); 1 ♂, Mt Toolbrunup (34°23'S, 118°02'E), Stirling Ranges, WA, 7.xii.1970, MV lamp, G. A. Holloway (AM); 1 ♂, Moingup Spring (34°24'S, 118°26'E), Stirling Ranges, 7.xii.1970, MV lamp, G. A. Holloway (AM); 1 ♂, Sheoaks Hill (33°36'S, 123°39'E), W Israelite Bay, WA, 8.i.1993, E. D. Edwards & E. S. Nielsen (AM); 1 ♂, Geraldton (28°46'S, 114°36'E), WA, J. Clark (AM); 1♀, same data as above but (WADA); 1 ♂, same locality as above but 12.xi.1981, K. &. E. Carnaby (ANIC); 1 ♀, 50 km NW Yuna (33°38'S, 123°40'E), 6.ix.1981, G. A. Holloway (AM); 3 ♂, 15 mi NW of Mt Arid (33°49'S, 123°02'E), 13.xi.1969, M. S. Upton (ANIC); 3 ♂, Boxwood Hill (34°21'S, 118°44'E), WA, 6-7.xi.1980, K. & E. Carnaby (ANIC); 4 ♂, 23 km NW by W of Mt. Arid (33°51'S, 123°00'E), Thomas River, WA, 4-7.xi.1977, at light, J. F. Lawrence (ANIC); 1 ♂, 1 ♀, 101 km. E of Esperance (33°51'S, 121°53'E), Thomas River, WA, 20.xi.1962, at light, beach dumes, Britton, Taylor & Upton (ANIC); 1 ♂, same locality as above but E. of Esperance (33°51'S, 121°53'E), WA, 20.xi.1962, UV light, E. B. Britton (ANIC); 1 ♂, same data as above but 19.xi.1969 (ANIC); 2 ♂, 11 mi. S by W of Cocklebiddy (32°12'S, 126°03'E), 2.xi.1969, Key & Upton (ANIC); 2 ♂, 2mi S by SW of Mt Ragged (33°27'S, 123°28'E), WA, 13.xi.1969, M. S. Upton (ANIC); 1 ♂, Swan River (32°03'S, 155°44'E), WA, J. Clark (WADA); 1♀, same locality as above but 30.xi.(no year) (WADA); 1 ♂, Yanchep (31°33'S, 115°41'E), 25.x.1969, at light trap, S. J. Curry (WADA); 1 ♂, same data as above but 26.x.1969 (WADA); 1 ♂, 23 mi W of Fraser Range (32°03'S, 122°47'E), 7.xi.1969, M. S. Upton (ANIC); 1 ♂, Carnarvon (24°53'S, 113°39'E), Blow Holes Rd., 3.ix.1978, K. & E. Carnaby (ANIC); 1 ♂, 12 km S by E Kalbarri National Park (27°49'S, 114°11'E), 19.x.1984, at MV light, A. A. Calder Collection (ANIC); 1 ♀, 34 Km NE by N of Laverton (28°22'S, 122°37'E), Deeba Rock Hole, 12.xi.1977, T. A. Weir (ANIC); 2 ♂, 2 ♀, 11 mi. E. of Pingrup (33°36'S, 118°36'E), WA, 21-27.xi.1958, at light, Greaves & Dowse (ANIC); 1 ♂, Junana Rock, 9 km NW of Mt Ragged (33°23'S, 123°24'E), 26.x.1977, J. F. Lawrence (ANIC); 1 ♀, Dongara, 5.xi.1958, at light, Greaves & Dowse (ANIC); 1 ♂, Bremer Bay (34°24'S, 119°26'E), 15.xi.1941, K. K. Norris (ANIC); 3 ♂, Woodridge (31°20'S, 115°35'E), 20-30.x.1996, intercept trap, H. Demarz (WADA); 3 ♂, same data as above but x.1997 (WADA); 1 ♂, Perth, 1913, H. M. Giles (HMO); 1 ♂, Tachalarup, 25.x.1938, at light trap, D. Hardy (WADA); **Locality unknown:** 1 ♂, K 58326 (AM); 1 ♀, Australia old Collection (ANIC). 1 ♂, no data (VAIC).

Description

Male. Body length, 13.58–25.34 mm; *width,* 2.52–4.93 mm.

Colour (Fig. 2.53). Body reddish brown to brown with head, prothorax and basal elytra darker. Head with sparse to fairly dense white or pale yellow pubescence. Pronotal disc with 2 longitudinal stripes of very dense white pubescence; each side of pronotum with a longitudinal stripe of very dense white pubescence near ventral side; the remaining pronotum glabrous or very sparsely pubescent; prosternum with fairly dense white pubescence. Each elytron with 2 longitudinal stripes of very dense whitish pubescence: 1

wide on disc near suture and 1 narrow near margin; the remaining elytra glabrous or very sparsely pubescent.

Head. Postclypeus triangular or subtriangular, shiny and convex, with fairly dense fine punctures; frontoclypeal suture deep and wide in middle; distance between lower lobes of eyes 1.76–2.12 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.05–1.13 × as long as distance between eyes on ventral side; genal length 0.36–0.51 × as long as head width immediately below eyes. Antennae slightly longer than body; segments 5-10 thin, subcylindrical in shape, and slightly produced on one side at apex.

Thorax and abdomen. Pronotum 1.10–1.26 × as long as width, with a conical process at each side; posterior margin 1.05–1.34 × as wide as anterior margin; pronotal disc very weakly binodulose or not nodulose in middle area; disc and side smooth and shiny, with very feeble transverse rugae near posterior margin. Scutellum semicircular, with fairly dense pubescence. Elytra 3.34–4.28 × as long as prothorax and 3.6–4.01 × as long as shoulder width; basal 1/3 of elytra coarsely punctate and the remaining 2/3 finely punctuate toward apex; elytral apex rounded at margin and spinose or processed at suture. Apex of terminal sternite distinctly emarginate.

Male terminalia. Apex of ventral median lobe strongly pointed and apex of dorsal lobe rounded or broadly projected; ventral lobe shorter than dorsal lobe; spined region of internal sac not clearly divided, with dense long simple spines (Fig. 2.91a). Eighth sternite obliquely truncate or even rounded at sides, very shallowly emarginate at apex, with sparse long and short setae arising terminally; ventral surface with sparse cloud-like processes (Fig. 2.91b). Eighth tergite slightly point at apex, with fairly dense basally-forked spines and simple spines on ventral surface (Fig. 2.91c). Paramere long, 2.0–2.09 × as long as wide, gradually tapering toward apex; apex with sparse to dense long and short setae (Fig. 2.91d).

Female. Body length, 13.71–24.55 mm; *width*, 2.54–4.83 mm.

Body more robust, antennae shorter than body; elytra 3.81–4.42 × as long as prothorax and 3.59–3.85 × as long as shoulder width.

Ovipositor and spermatheca. Ovipositor relatively long; styli long, arising almost terminally with short hairs (Fig. 2.91e). Spermatheca slightly curved; spermathecal gland arising near base (Fig. 2.91f).

Distribution

Northeastern New South Wales, Australian Capital Territory, southern and central Victoria, southeastern South Australia, and southern and southwestern Western Australia (Fig. 2.113).

Variation

The apical spine of the elytron varies from sharp to none. Body colour varies from blackish brown to reddish brown or brown.

Biology

Hosts are unknown. Adults visit flowers of *Melaleuca* sp. Adults were collected by light trap between October and January.

Comments

This species resembles *U. bivittatus* but differs in having the pronotal disc mostly smooth and shiny; the elytral apex rounded or with a sharp spine or process at suture; each side of the pronotum without 2 spots of very dense yellowish pubescence.

Uracanthus corrugicollis **Lea, 1917**

(Figs 2.54, 2.92, 2.114)

Uracanthus corrugicollis Lea, 1917a: 742. –McKeown, 1947: 63.

Material examined

Holotype. ♂. **WA:** Mullewa (28°26'S, 115°35'E), Miss J. F. May; bearing a name label on which 'TYPE' was written in red; 8 segments of left antenna and 8 segment of right antenna damaged (SAM).

Description

Male. Body length, 25.26 mm; *width,* 5.41 mm.

Colour (Fig. 2.54). Body reddish brown with head, thorax, and basal and apical elytra darker. Head, pronotum and elytra covered with fairly dense, more or less evenly distributed, whitish pubescence; pubescence on elytra generally shorter.

Head. Postclypeus subtriangular and flattened, with fairly dense coarse punctures; frontoclypeal suture deep and wide in middle; distance between lower lobes of eyes 1.8 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.25 × as long as distance between eyes on ventral side; genal length 0.19 × as long as head width immediately below eyes. Antennae largely damaged.

Thorax and abdomen. Pronotum 0.94 × as long as width, rounded with a small process at each side; posterior margin 1.22 × as wide as anterior margin; pronotal disc without distinct nodules in middle area; disc and side strongly rugose transversely. Scutellum semicircular, with sparse pubescence. Elytra 5.26 × as long as prothorax and 3.44 × as long as shoulder width; basal 1/3 with coarsely punctures; apex more or less rounded at margin and with a small spine at suture. Apex of terminal sternite rounded or slightly truncate.

Male terminalia. Apex of ventral median lobe emarginate and apex of dorsal lobe with rounded; ventral lobe distinctly longer than dorsal lobe; spined region of internal sac divided into two sections; first section with sparse short simple spines on sides near base; second section with fairly dense long simple spines; unspined gap between first and second section above as long as second section (Fig. 2.92a). Eighth sternite rounded at side, shallowly emarginate at apex, with long and fairly long setae arising terminally; ventral surface with sparse cloud-like processes (Fig. 2.92b). Eighth tergite rounded at apex, with fairly dense simple spines and multi- branched spine on surface (Fig. 2.92c). Paramere long, 2.5 × as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.92d).

Female. Unknown.

Distribution

Southwestern Western Australia (Fig. 2.114).

Comments

This species differ from others species of *Uracanthus* in having very short genal length; pubescence on elytra uniform without any line or stripe of denser pubescence. No other specimen matches the type.

Uracanthus lateroalbus Lea 1916

(Figs 2.55, 2.93, 2.114)

U. lateroalbus Lea, 1916: 378. –McKeown, 1947: 65.

U. fuscostriatus McKeown, 1948: 55. **syn. nov.**

Material examined

U. lateroalbus: Holotype. ♂. **WA:** Swan River (32°03'S, 115°44'E), Coll. no. I. 5695, bearing a name label on which 'TYPE' was written in red; 8 segments of left antenna and 1 segment of right antenna missing (SAM).

U. fuscostriatus: *Holotype*. ♂. **WA:** Maylands (31°55'S, 155°28'E), Coll. no. 32-242; bearing a red holotype label; 4 segments of left antenna missing (WAM).

Other material examined. 4 ♂, 2 ♀.**WA:** 1 ♀, Swan River, J. Clark (SAM); 1 ♂, Jandakot (south of Perth), 12.ii.1950, F. H. Uther Baker (WADA); 1 ♂, Dumbleyung (33°15'S, 117°14'E), 26.xii.1962 (WAM); 1 ♂, Sorrento (31°49'S, 115°44'E), 6.xii.1972, P. G. & A. J. Kendrick (WAM); 1 ♂, 1 ♀, no locality, WA (WADA).

Description

Male. *Body length*, 26.63–28.93 mm; *width*, 5.25–5.73 mm.

Colour (Fig. 2.55). Body reddish brown with head, thorax, legs and basal elytra darker. Head with fairly dense pale yellow and white pubescence. Pronotum with mixture of fairly dense whitish and yellowish pubescence; each side with a longitudinal stripe of very dense white pubescence near ventral side. Elytra covered with dense yellowish pubescence on disc; pubescence near suture and margin (basal elytra in particular) almost white; each elytron with a narrow glabrous longitudinal stripe starting from shoulder and extending to about basal 1/3 of elytra.

Head. Postclypeus triangular, convex, coarsely punctuate; frontoclypeal suture deep and wide in middle; distance between lower lobes of eyes 2.08–2.3 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.0–1.04 × as long as distance between eyes on ventral side; genal length 0.32–0.39 ×as long as head width immediately below eyes. Antennae slightly shorter than body; segments 4–10 flattened and produced on one side at apex.

Thorax and abdomen. Pronotum 1.15–1.30 × as long as width, sides rounded with a small rounded process at each side; posterior margin 1.09–1.18 × as wide as anterior margin; pronotal disc weakly binodulose in middle area; disc and sides strongly rugose transversely, particularly near anterior and posterior margins. Scutellum semicircular, with dense pubescence. Elytra 4.15–5.04 × as long as prothorax and 3.60–3.90 ×as long as shoulder width; elytron finely puncture; apex slightly emarginated with a small process at margin and a small spine at suture. Apex of terminal sternite truncate with a small notch.

Male terminalia. Apex of ventral median lobe pointed and apex of dorsal lobe rounded; dorsal lobe about as long as ventral lobe; spined region of internal sac almost occupying the entire internal sac, divided into two sections: first section about as long as second section, with very dense long simple spines; second section with fairly dense multi-branched spines at base near first section and sparse simple spines on the remaining part (Fig. 2.93a). Eighth sternite rounded or slightly obliquely truncate at sides; emarginate at apex, with long and fairly long setae arising terminally; ventral surface with short simple spines (in mid area) and fairly dense cloud-like processes (Fig. 2.93b). Eighth tergite truncate at apex, with fairly dense simple spines and multi-branched spines on surface (Fig. 2.93c). Paramere 2.3–2.38 × as long as wide, cylindrical in shape; apex rounded with long and short setae (Fig. 2.93d).

Female. Body length, 21.39–28.67 mm; *width,* 4.96–5.51 mm.

Antennae and legs distinctly shorter, body broader. Elytra 3.10–3.64 × as long as shoulder width and 4.31–4.91 × as long as prothorax.

Ovipositor and spermatheca. Ovipositor short; styli arising terminally with short hairs (Fig. 2.93e). Spermatheca C-shaped; spermathecal gland arising at base (Fig. 2.93f).

Distribution

Southwestern Western Australia (Fig. 2.114).

Variation

Colour varies from reddish brown to blackish; the apical spine of the elytron at suture may vary from very small and relatively long.

Biology

Hosts are unknown. Adults were collected in February and December.

Comments

This species resembles *U. discicollis* but differs in having pubescence on pronotal disc more or less evenly distributed; the pronotal disc strongly rugose transversely, and glabrous areas on elytra only occurring laterally between shoulder and basal 1/3 of elytra.

Uracanthus bistriolatus, sp. nov.

(Figs 2.56, 2.94, 2.114)

Material examined

Holotype. ♂. **QLD:** Carnarvon Range (25°17'S, 148°44'E), 16.i.1940, N. Geary; bearing a red holotype lable (AM).

Paratypes. 7 ♂, 1 ♀. **QLD:** 2 ♂, same data as holotype (AM); 1 ♂, same data as above but 11.i.1940 (AM); 3 ♂, 1 ♀, 560m Amphitheare Camp, Expedition Range National

Park (25°12'S, 148°59'E), 17.xii.1997, MV light in open forest, Monteith, Cook and Thompson (QM); 1 ♂, same data as above but Evens, Burwell and Ewart (QM).

Description

Male. Body length, 24.82–29.29 mm; *width,* 4.49–5.36 mm.

Colour (Fig. 2.56). Body dark reddish brown with head, thorax, and basal elytra darker. Head with fairly dense white pubescence. Antennal segments 3-11 with very short white fringe on one side. Pronotal disc with fairly dense white pubescence divided by a very narrow glabrous median line; each side of pronotum with a longitudinal stripe of very dense white pubescence near ventral side, and a wide glabrous longitudinal stripe between pubescent area on disc and pubescent stripe near ventral side. Elytra covered with more or less evenly distributed dense short white pubescence, with pubescence denser and longer on base and margins; each elytron with a narrow glabrous longitudinal stripe ranging from shoulder to basal 1/4 of elytra.

Head. Postclypeus triangular, convex, finely punctate; frontoclypeal suture deep and wide in middle; distance between lower lobes of eyes 2.06 – 2.46 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 0.78 – 0.94 × as long as distance between eyes on ventral side; genal length 0.28 – 0.36 × as long as head width immediately below eyes. Antennae longer than body; segments 4-10 flattened and produced on one side at apex.

Thorax and abdomen. Pronotum 1.09–1.25 × as long as width, with a small rounded process at each side; posterior margin 1.08–1.35 × as wide as anterior margin; pronotal disc weakly binodulose in middle area; disc and side strongly rugose transversely. Scutellum semicircular, with dense pubescence. Elytra 4.6–4.94 × as long as prothorax and 3.67–3.95

× as long as shoulder width; elytron disc with fine punctures; apex bispinose. Apex of terminal sternite truncate or slightly emarginate.

Male terminalia. Apex of ventral median lobe with a small notch and apex of dorsal lobe with rounded; dorsal lobe as long as or slightly longer than ventral lobe; spined region occupying almost all internal sac, divided into two sections: first section about as long as second section, with dense long simple spines; second section with sparse short simple spines (Fig. 2.94a). Eighth sternite rounded at side, shallowly emarginate at apex, with long and fairly long setae arising terminally; ventral surface with simple spines and cloud-like processes (Fig. 2.94b). Eighth tergite truncate, shallowly emarginate at apex, with fairly dense basally-forked spines on surface of basal ½ of tergite (Fig. 2.94c). Paramere long, 2.22–2.27 × as long as wide, cylindrical in shape, apex rounded with long and short setae (Fig. 2.94d).

Female. Body length, 29.81 mm; *width,* 5.47 mm.

Antennae as long as or slightly shorter than body; antennal segments without white fringe; elytra 3.89 × as long as shoulder width and 4.71 × as long as prothorax.

Ovipositor and spermatheca. Ovipositor long; styli short, arising terminally with short and long hairs (Fig. 2.94e). Spermatheca curved; spermathecal gland arising at base (Fig. 2.94f).

Distribution

This species is found only from southeastern Queensland (Fig. 2.114).

Variation

Body colour varies from dark reddish to blackish brown; the apical spine at suture may be reduced to a small process.

Biology

Hosts are unknown. Adults were collected at light in December and February.

Comments

This new species resembles *U. lateroalbus* but differs in having the pronotum with a glabrous stripe on each side; the glabrous stripe on the lateral elytron shorter; elytral usually bispinose, and male antennae usually longer than body, with short white fringe on one side.

Uracanthus suturalis Lea, 1916

(Figs 2.57, 2.114)

Uracanthus suturalis Lea, 1916: 380. –McKeown, 1947: 66.

Material examined

Holotype. ♂. **SA:** Murat Bay (32°07'S, 133°37'E), E. A. King, Coll. no. I. 5692, bearing a type label and a species name label on which 'TYPE' was written in red (SAM).

Other material examined. **WA:** 1 ♂, 9 km NW of Mt. Ragged (33°27'S, 123°28'E), Junana Rock, 26.x.1977, no abdomen, J. F. Lawrence (ANIC).

Description

Male. Body length 19.14–21.60 mm; *width,* 3.83–4.34 mm.

Colour (Fig. 2.57). Body blackish brown, with head, thorax and basal elytra almost back. Head with fairly dense white pubescence. Pronotal disc covered with dense white pubescence, with 5 glabrous areas: 4 more or less round spots (2 on each side) and 1 longitudinal stripe (on middle line) starting from posterior margin and extending to posterior 1/3; each side of pronotum with a wide longitudinal stripe of very dense white pubescence near ventral side, and a wide longitudinal glabrous area between pubescent disc and pubescent stripe near ventral side. each elytron with 6-7 very narrow longitudinal lines of white pubescence interspaced with glabrous longitudinal lines on disc, and a wide longitudinal stripe of dense white pubescence on margin.

Head. Postclypeus semicircular or subtriangular, slightly convex, with densely fine punctures; frontoclypeal suture deep and narrow in middle; distance between lower lobes of eyes 1.60–1.87 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.45–1.53 × as long as distance between eyes on ventral side; genal length 0.31–0.33 × as long as head width immediately below eyes; ventral side of head with transverse wrinkles. Antennae slightly longer than body; segments 4-10 flattened and strongly produced on one side at apex.

Thorax and abdomen. Pronotum 1.02–1.06 × as long as width, conical process at side; posterior margin 1.25–1.32 × as wide as anterior margin; pronotal disc with 4 weakly raised and glabrous nodules; pronotal disc smooth with transverse rugae near posterior margin; side strongly rugose transversely. Scutellum semicircular, with dense pubescence.

Elytra 4.45–4.88 × as long as prothorax and 3.63–3.67 × as long as shoulder width; elytron finely punctate toward apex; apex with an acute spine at suture.

Male terminalia. Unknown. The unique type specimen was not dissected.

Female. Unknown

Distribution

Southern South Australia, and southern Western Australia (Fig. 2.114).

Variation

No significant variation was observed.

Biology

Hosts are unknown. Adults were collected in October.

Comments

This species resembles *U. ater* but differs in having elytral apex with an acute spine at suture and elytra with clearly defined longitudinal lines of white pubescence.

Uracanthus ater **Lea, 1917**

(Fig. 2.58)

Uracanthus ater Lea, 1917a: 742. –Lea, 1917b: 619; McKeown, 1947: 63.

Material examined

Holotype. ♂, Central Australia, type no. 18528, abdomen and 6 segments of right antenna missing, H. Hacker; bearing a type label, and a name label on which 'TYPE' was written in red (SAM).

Description

Male. Body length, 21.50 mm; *width,* 4.39 mm.

Colour (Fig. 2.105). Body blackish brown except middle area of elytra reddish brown. Head, pronotum and elytra with more or less evenly distributed white pubescence.

Head. Postclypeus semicircular and flattened, with sparse coarse punctures; frontoclypeal suture deep and narrow in middle; distance between lower lobes of eyes 1.53 × as long as distance between upper lobes of eyes; distance between upper lobes of eyes 1.08 × as long as distance between eyes on ventral side; genal length 0.24 × as long as head width immediately below eyes. Antennae about as long as body; segments 4-10 flattened and produced on one side at apex.

Thorax and abdomen. Pronotum 1.22 × as long as width, with a small conical process at each side; posterior margin 1.46 × as wide as anterior margin; pronotal disc binodulose in middle area; disc and side strongly rugose transversely. Scutellum semicircular, with dense pubescence. Elytra 4.03 × as long as prothorax and 3.60 × as long as shoulder width; elytra coarsely and shallowly punctate from base to apex; apex slightly emarginate, with a small spine at suture.

Male terminalia. Unknown.

Female. Unknown.

Distribution

Central Australia.

Comments

This species resembles *U. suturalis* but differs in having elytral apex slightly emarginate with a very small spine at suture; pubescence on elytra more or less evenly distributed.

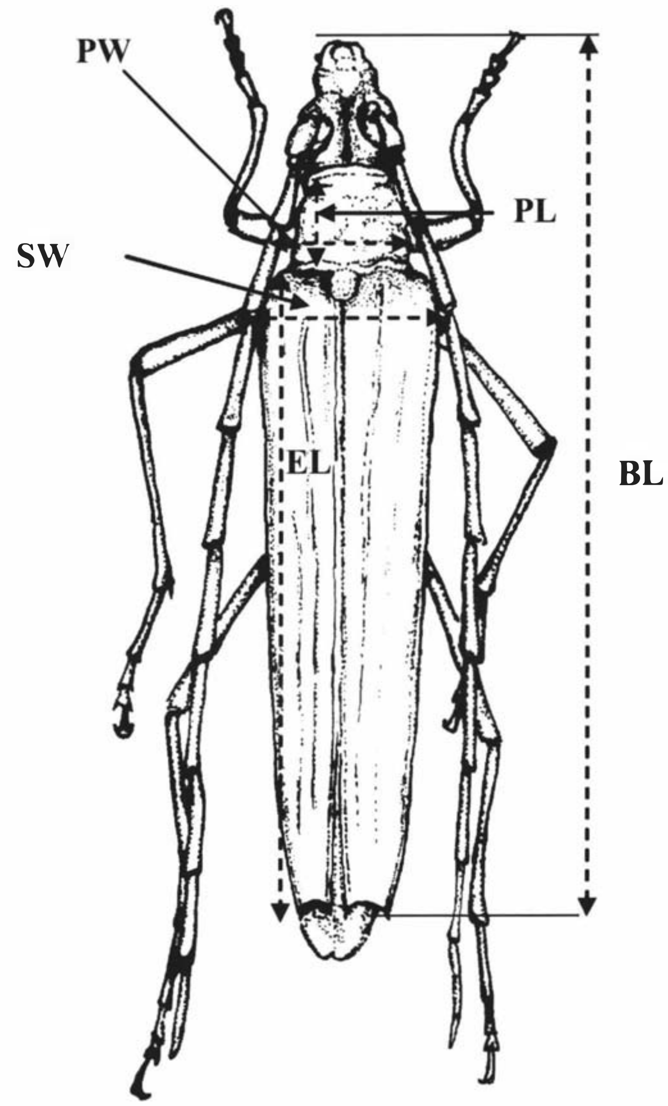
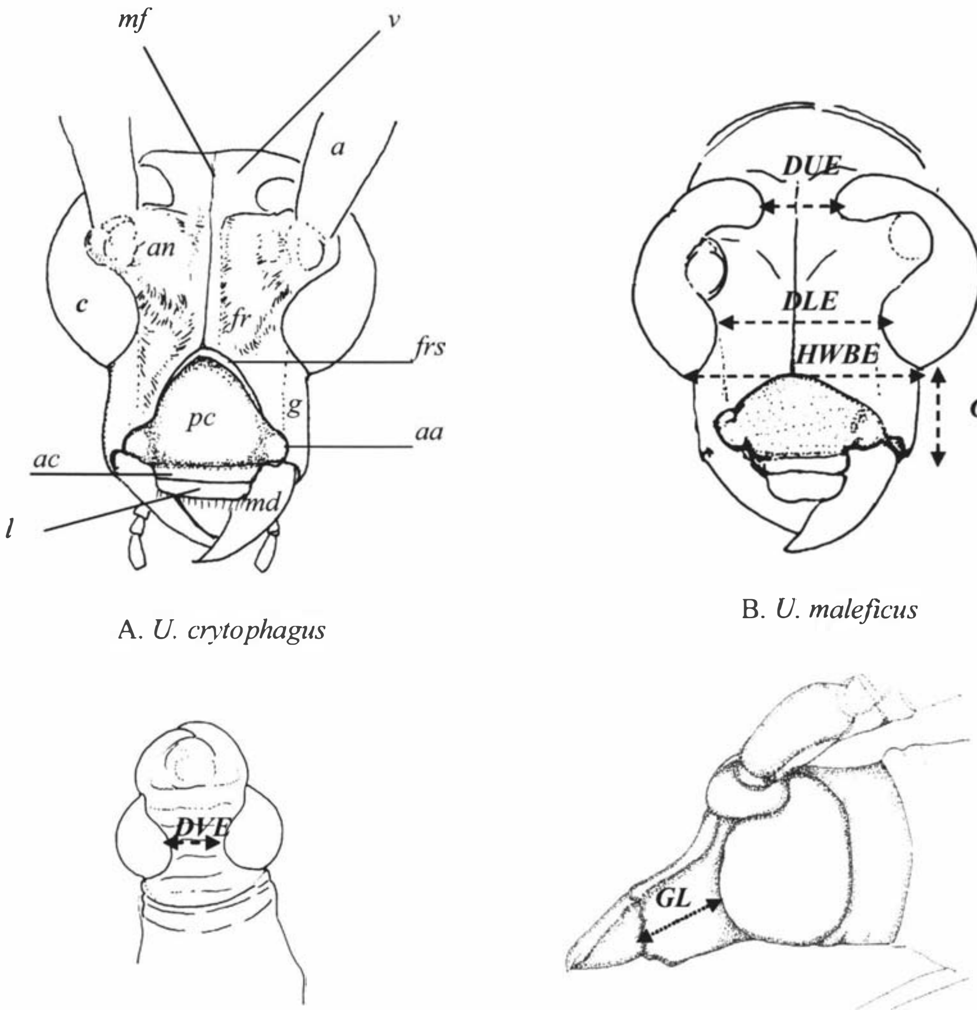


FIGURE 2.1 ***Uracanthus gigas*****, dorsal view: BL, body length from tip of mandibles to apex of elytra; SW, shoulder width; PL, pronotal length; PW, pronotal width; EL, length of elytron along suture.**



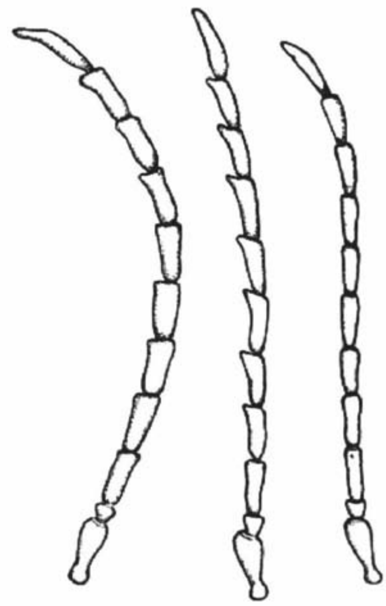
A. *U. crytophagus*

B. *U. maleficus*

C. ventral view of *U. crytophagus*

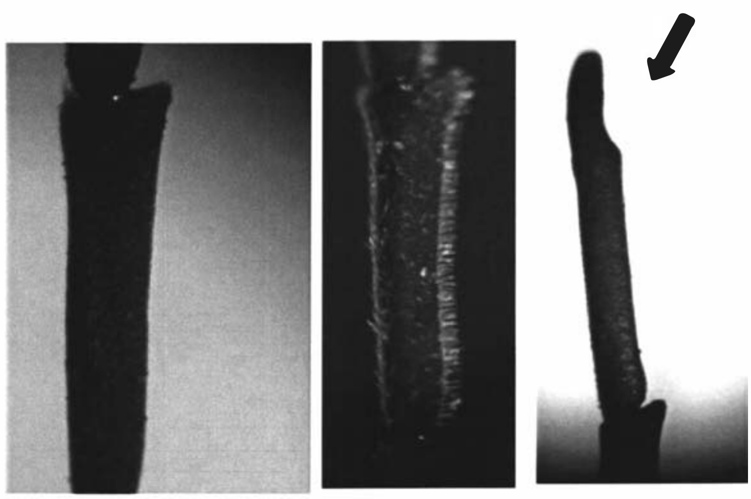
D. lateral view of *U. gigas*

FIGURE 2.2 Head of *Uracanthus.* A: *c* , compound eye; *a*, antennae; *an*, antennal socket; *pc*, postcypleus; *ac*, anteclypeus; *fr*, frons; *frs*, frontoclypeal suture; *aa*, tentorial pit or anterior articulation; *g*, gena; *l*, labrum; *md*, mandible; *mf*, median frontal groove; *v*, vertex. B: *DUE*, distance between upper lobes of eyes; *DLE*, distance between lower lobes of eyes; *HWBE*, head width immediately below eyes; *GL*, genal length. C: *DVE*, distance between lobes of eyes on ventral side. D: *GL*, genal length.



a b c

FIGURE 2.3 **Antennae of** ***Uracanthus*****:** **a,** ***U. dubius*****; b,** ***U. fuscus*****; c,** ***U. cupressianus*****.**



a b c

FIGURE 2.4 **Antennal segments of** ***Uracanthus*****:** **a,** ***U. gigas*****, produced at apex; b,** ***U. pertenuis*** **male, fringed; c,** ***U. gigas*****, antennal segment 11 of male.**

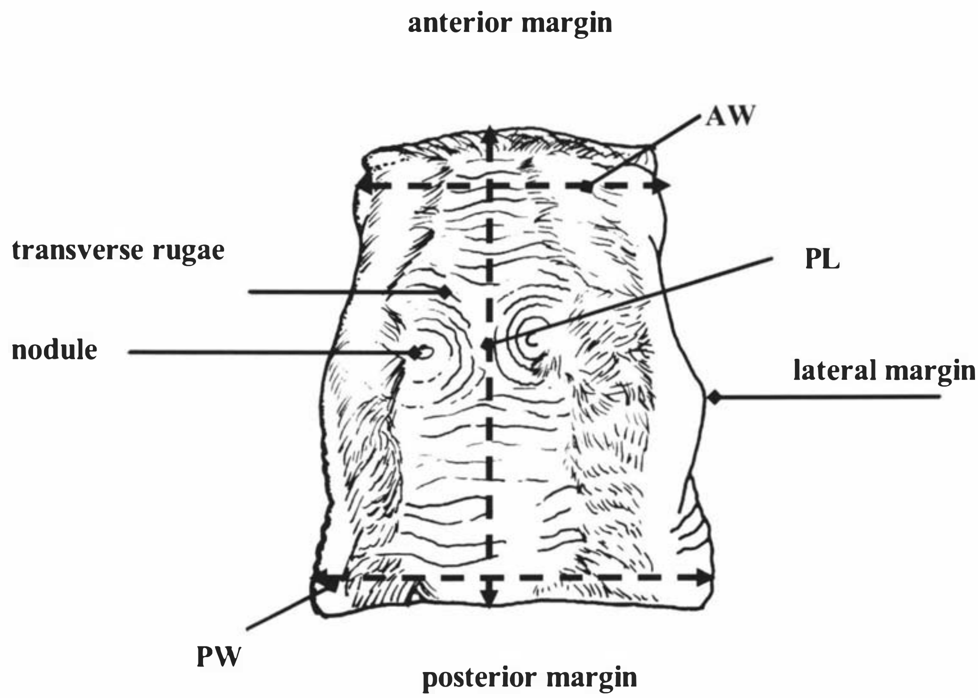


FIGURE 2.5 Pronotum of *U fuscocinereus*, dorsal view: PL, pronotal length; AW, pronotal width at anterior margin; PW, pronotal width at posterior margin.

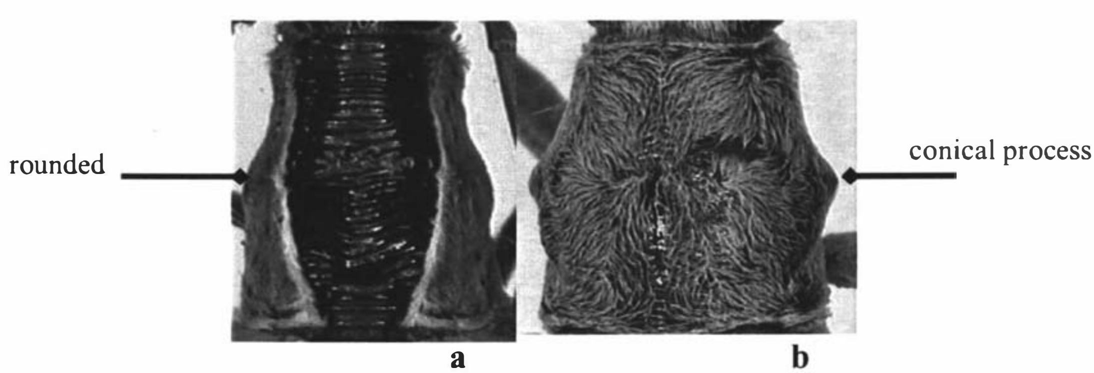


FIGURE 2.6 Pronotum of *U. insignis* (a) and *U. albatus* (b), dorsal view.

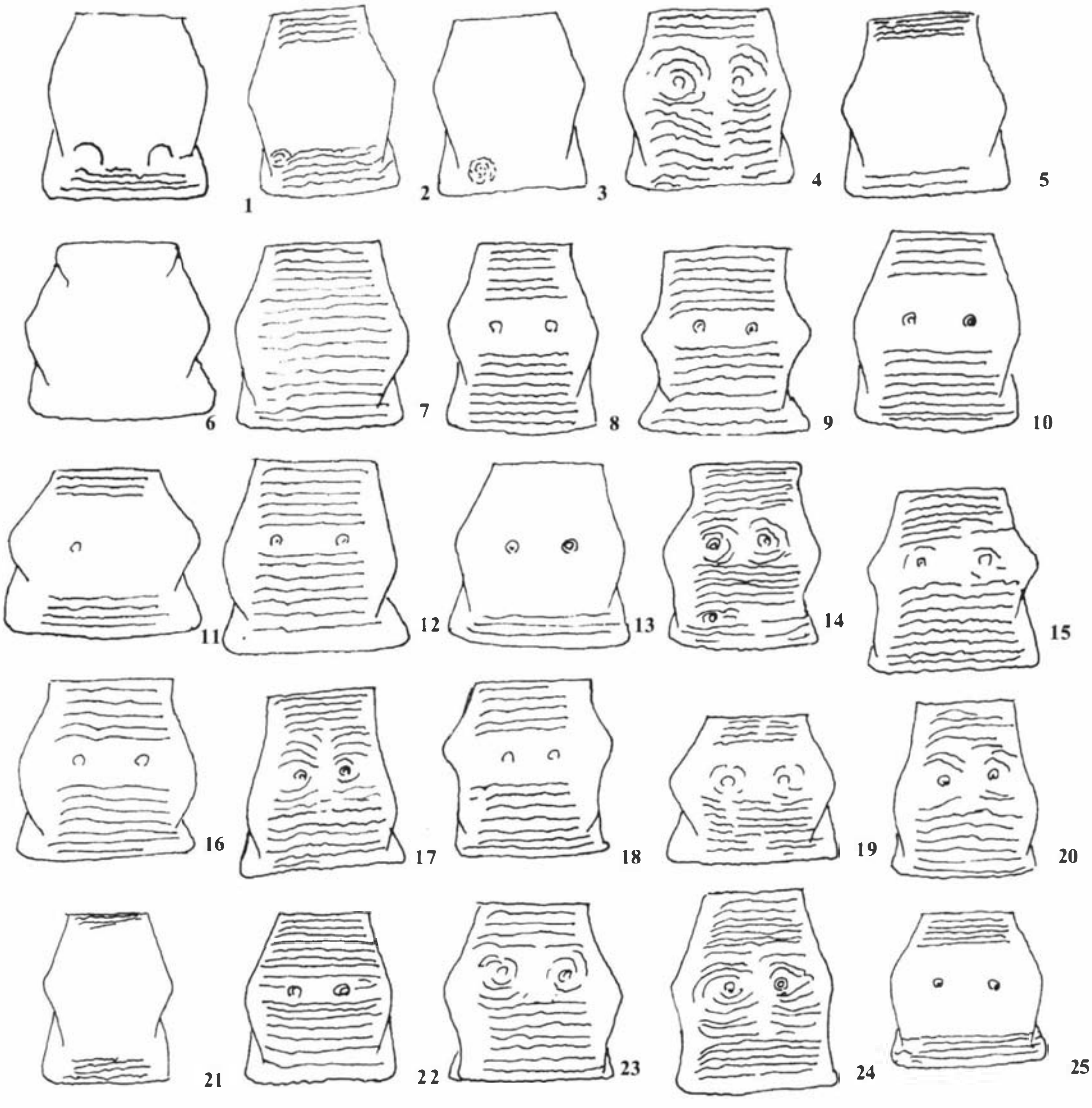
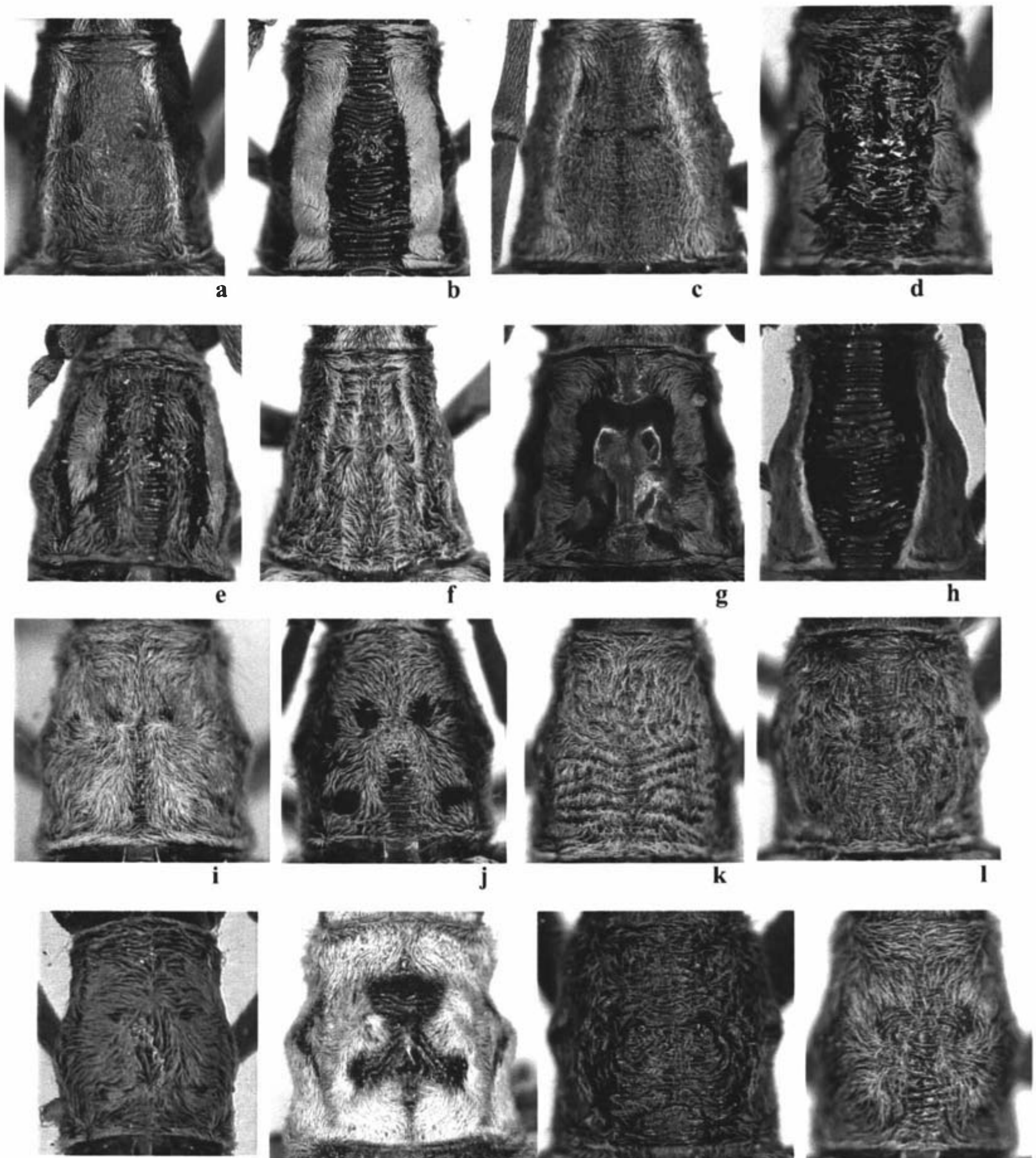


FIGURE 2.7 Surface of pronotal disc of *Uracanthus*: 1, *U. tropicus*; 2, *U. parallelus*; 3, *U. froggatti*; 4, *U. loranthi*; 5, *U. cupressianus*; 6, *U. maleficus*; 7, *U. longicornis;* 8, *U. glabrilineatus*; 9, *U. albatus*; 10, *U. pallens*; 11, *U. corrugicollis*; 12, *U. pertenuis*; 13, *U. suturalis*; 14, *U. fuscocinereus*; 15, *U. dubius*; 16, *U. ventralis*; 17, *U. regalis*; 18, *U. albatus*; 19, *U. lateroalbus*; 20, *U. cryptophagus*; 21, *U. discicollis* ; 22, *U. insignis*; 23, *U. bivittatus*; 24, *U. parvus*; 25, *U. fuscus*.



a b c d e f g h i j k l m n o p

FIGURE 2.8 Pronotal pubescence pattern of *Uracanthus*, dorsal view: a, *U. pallens;* b, *U. quadristriolatus;* c, *U. bicoloratus;* d, *U. bivittatus;* e, *U. strigosus;* f, *U. cryptophagus;* g, *U. maleficus;* h, *U. insignis;* i, *U. albatus;* j, *U. suturalis;* k, *U. longicornis;* l, *U. lateroalbus;* m, *U. parallelus;* n, *U. pseudogigas;* o, *U. ater;* p, *U. ventralis.*

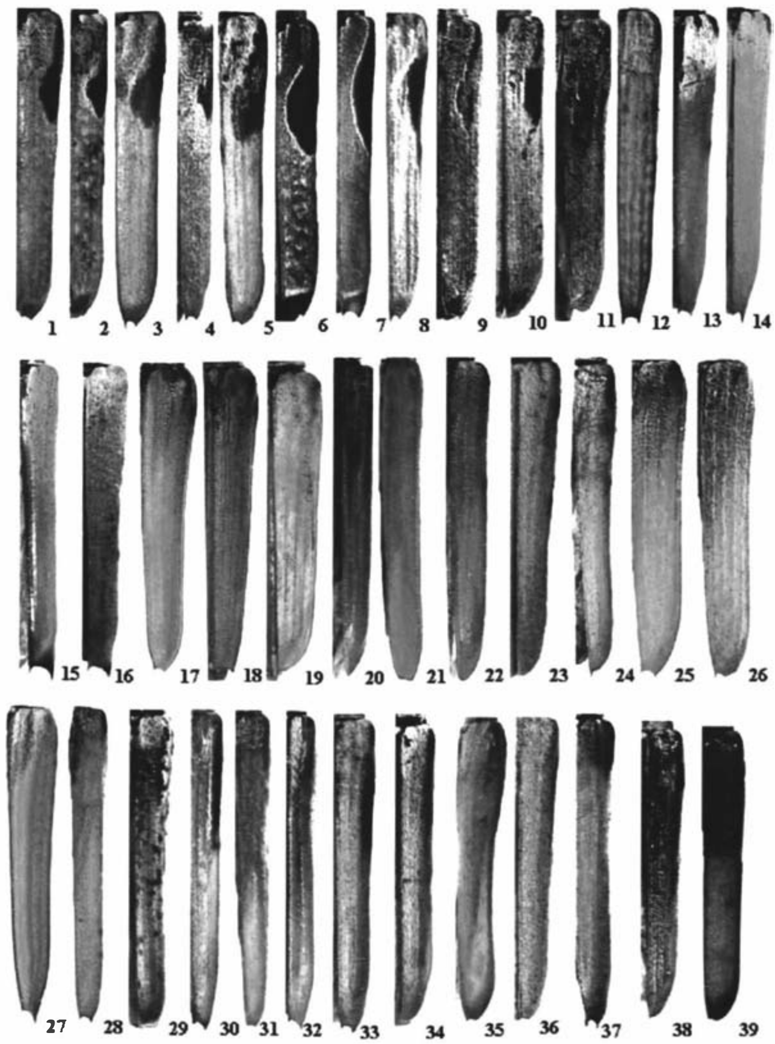


FIGURE 2.9 Right of elytra of *Uracanthus*, dorsal view: 1, *U. bicoloratus;* 2, *U. maculatus;* 3, *U. perthensis;* 4, *U. griseus;* 5, *U. glabrilineatus;* 6, *U. triangularis;* 7, *U. pallens;* 8, *U. regalis;* 9, *U. dubius;* 10, *U. simulans;* 11, *U. fuscus;* 12, *U. cryptophagus;* 13, *U. fuscocinereus;* 14, *U. quadristriolatus;* 15, *U. insignis;* 16, *U. punctulatus;* 17, *U. maleficus;* 18, *U. gigas;* 19, *U. pseudogigas;* 20; *U. acutus;* 21, *U. loranthi;* 22, *U. cupressianus;* 23, *U. minatus;* 24, *U. longicornis;* 25, *U. albatus;* 26, *U. ventralis;* 27,*U. strigosus;* 28, *U. parallelus;* 29, *U. tropicus;* 30, *U. froggatti;* 31, *U. parvus;* 32, *U. pertenuis;* 33, *U. bivittatus;* 34, *U. discicollis;* 35, *U. corrugicollis;* 36, *U. lateroalbus;* 37, *U. bistriolatus;* 38, *U. suturalis;* 39, *U. ater.*

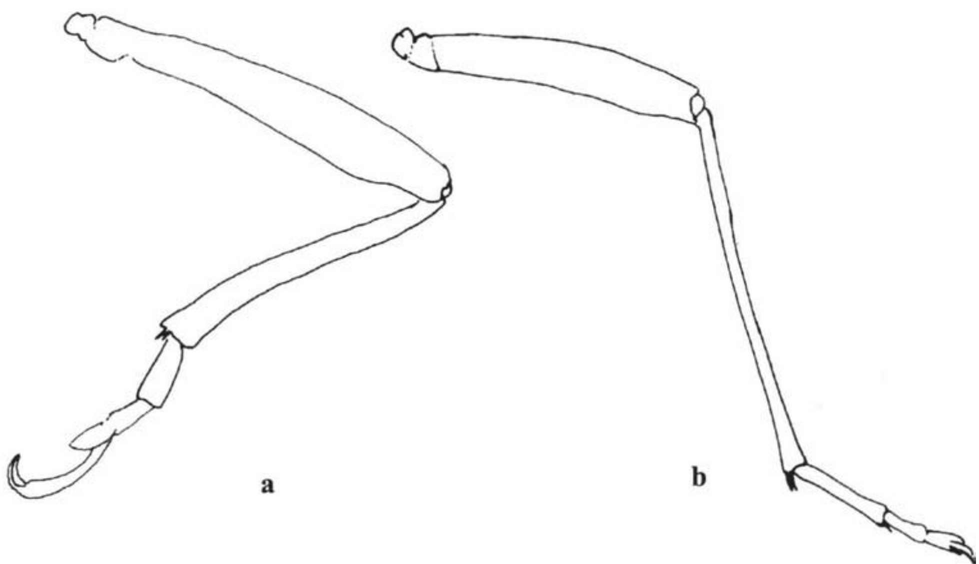


FIGURE 2.10 Legs of *Uracanthus:* a, *U. cryptophagus;* b, *U. gigas*

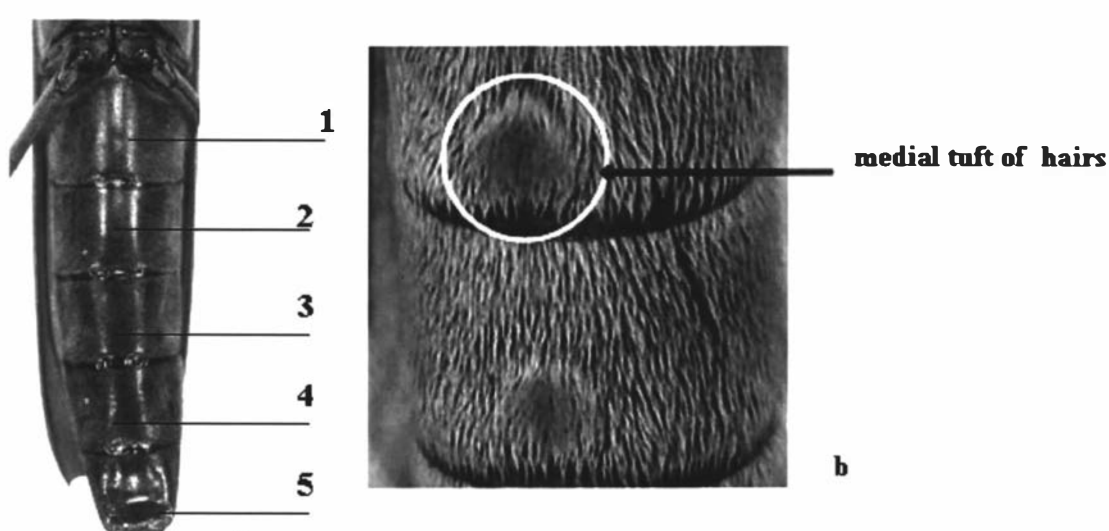


FIGURE 2.11 Visible sternites of male: a, *U. gigas;* b, *U. albatus.*

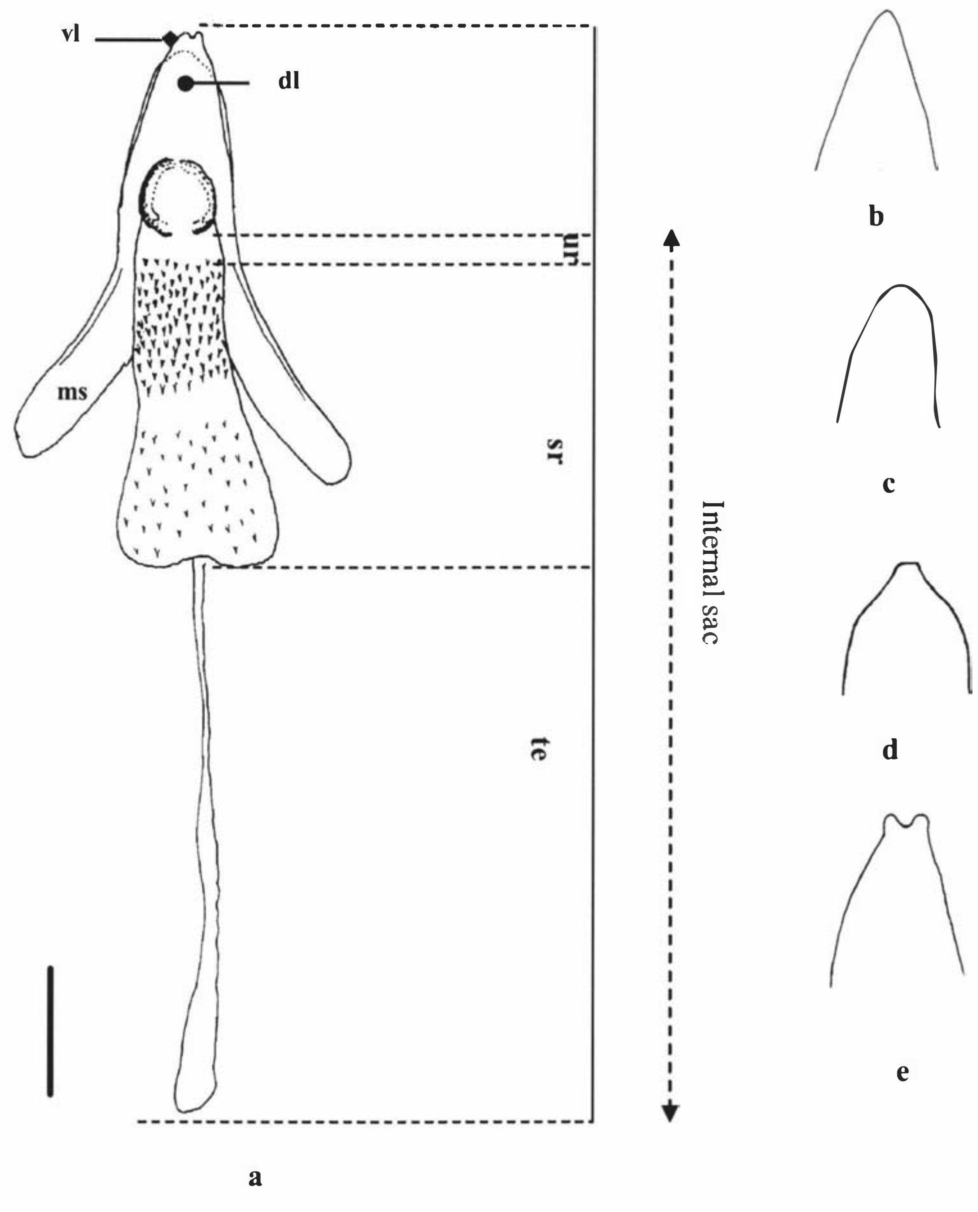


FIGURE 2.12 Aedeagus of *Uracanthus*, ventral view: a, complete structure: *vl*, ventral lobe; *dl*,dorsal lobe; *ms*, median strut; *sr*, spined region; *ur*, unspined region; *te*, terminal region; b, ventral lobe pointed; c, ventral lobe rounded; d, ventral lobe truncate; e, ventral lobe emarginate. Scale bars = 0.5 mm.

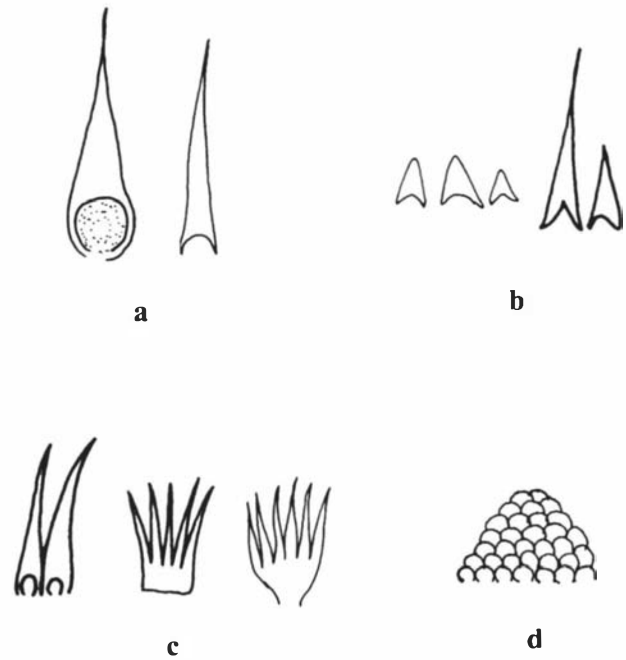


FIGURE 2.13 Forms of spines or processes on internal sac of aedeagus: a, simple spines; b, basally-forked spines; c, multi-branched spines; d, scale-like processes.

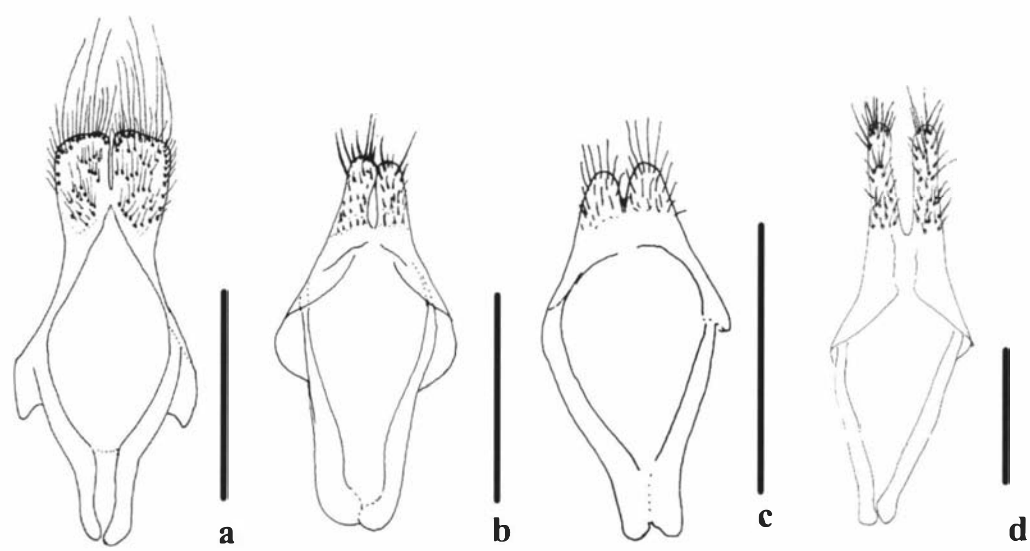


FIGURE 2.14 Tegmens of *Uracanthus*, dorsal view: a, *U. pertenuis*; b, *U. pallens*; c, *U. froggatti;* d, *U. gigas*. Scale bars = 0.5 mm.

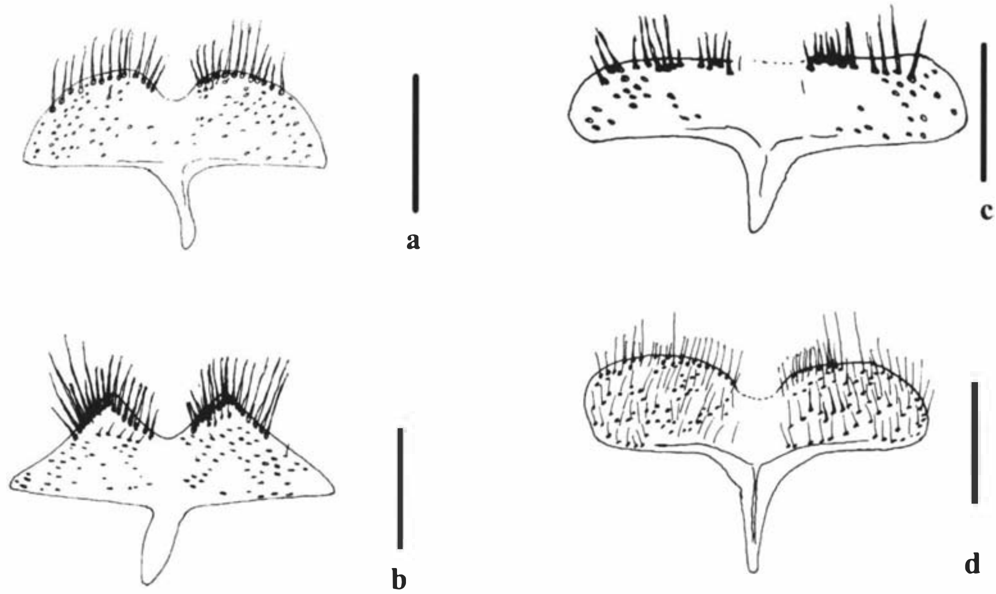


FIGURE 2.15 Male eighth sternites, ventral view: a, *U. fuscocinereus*; b, *U. maleficus*; c, *U. parvus;* d, *U. pseudogigas* sp. nov. Scale bars = 0.5 mm.

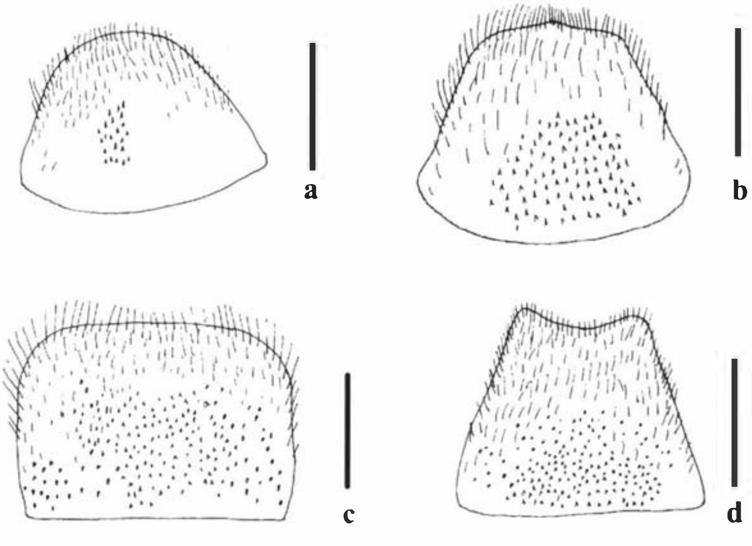


FIGURE 2.16 Male eighth tergites: a, *U pallens*; b, *U parallelus*; c, *U. insignis*; d, *U strigosus.* Scale bars = 0.5 mm.

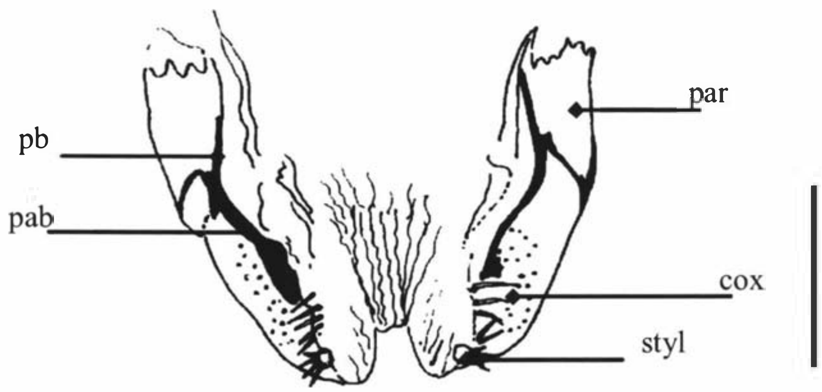


FIGURE 2.17 Ovipositor of *U. cryptophagus*: *cox*, coxite; *db*, dorsal baculus; *pab*, paraproct baculus; *par*, paraproct; *pb*, proctiger baculus; *styl*, stylus. Scale bars = 0.5 mm.

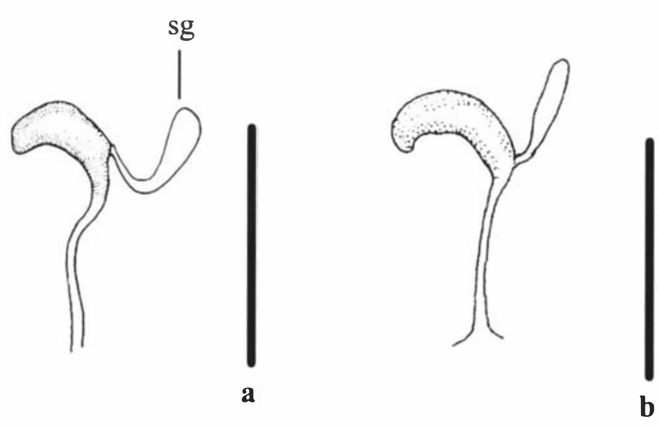
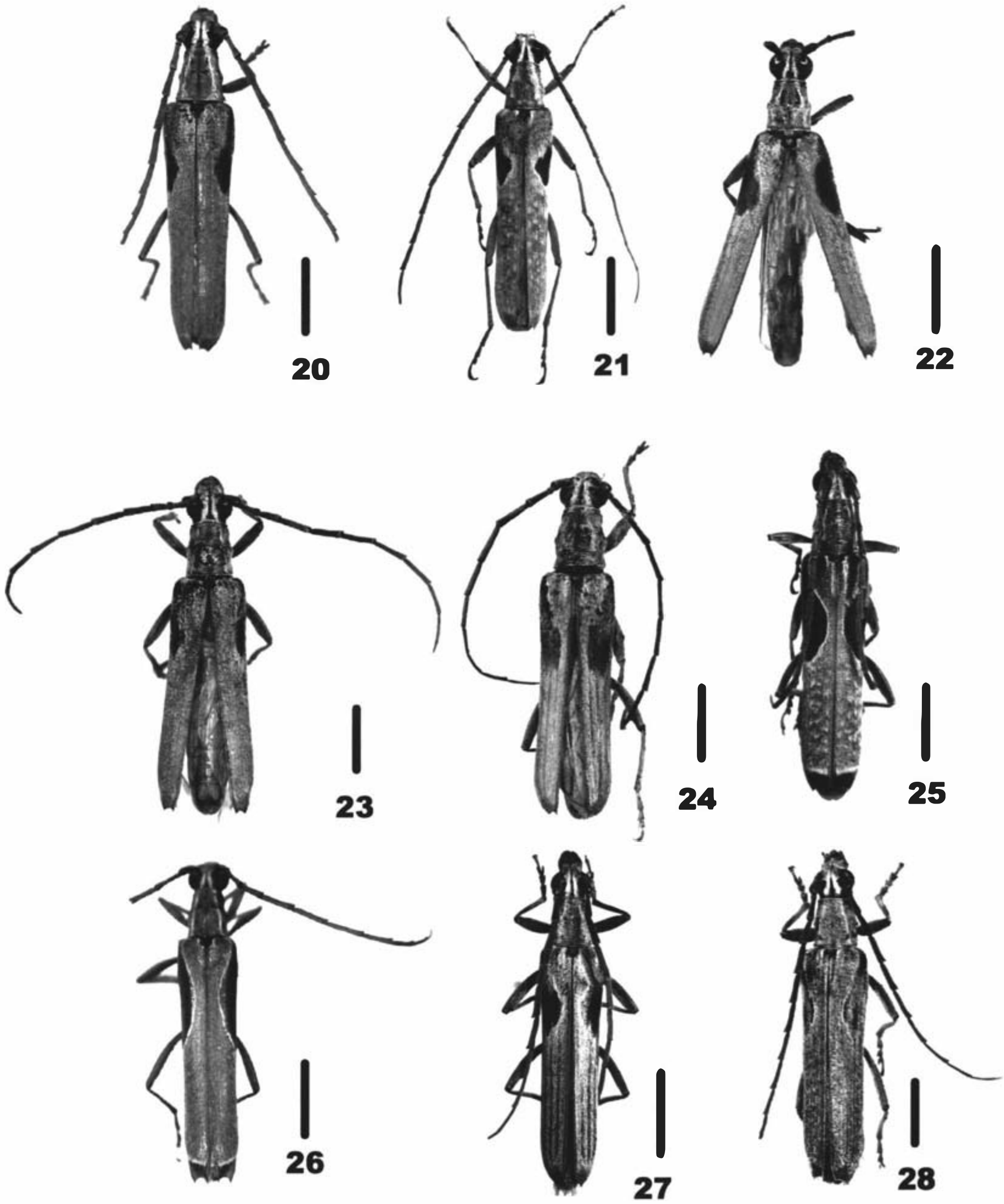
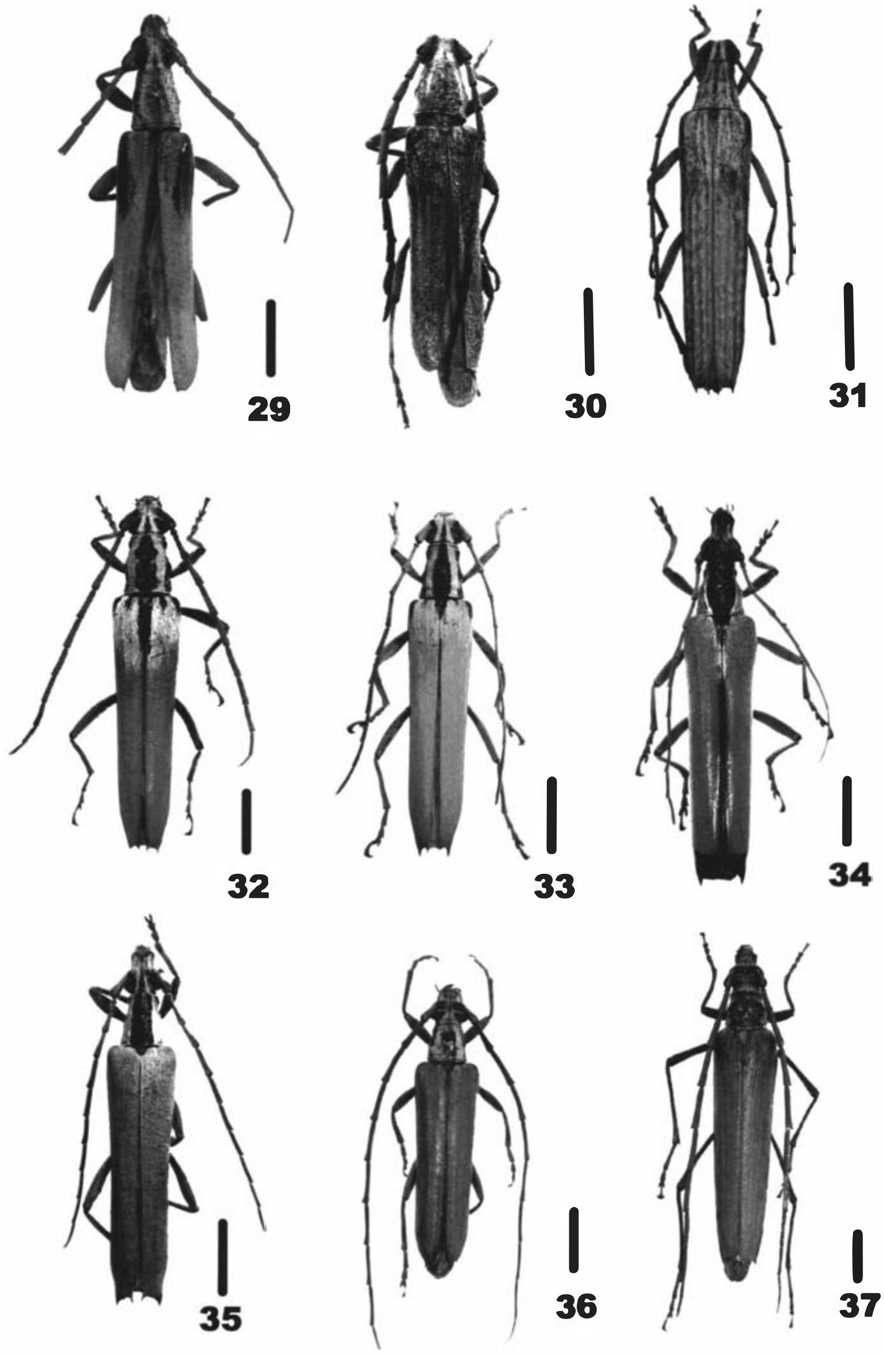


FIGURE 2.18 Spermatheca: *sg,* spermathecal gland; a, *U. bistriolatus*; b, *U. fuscocinereus*. Scale bars = 0.5 mm.

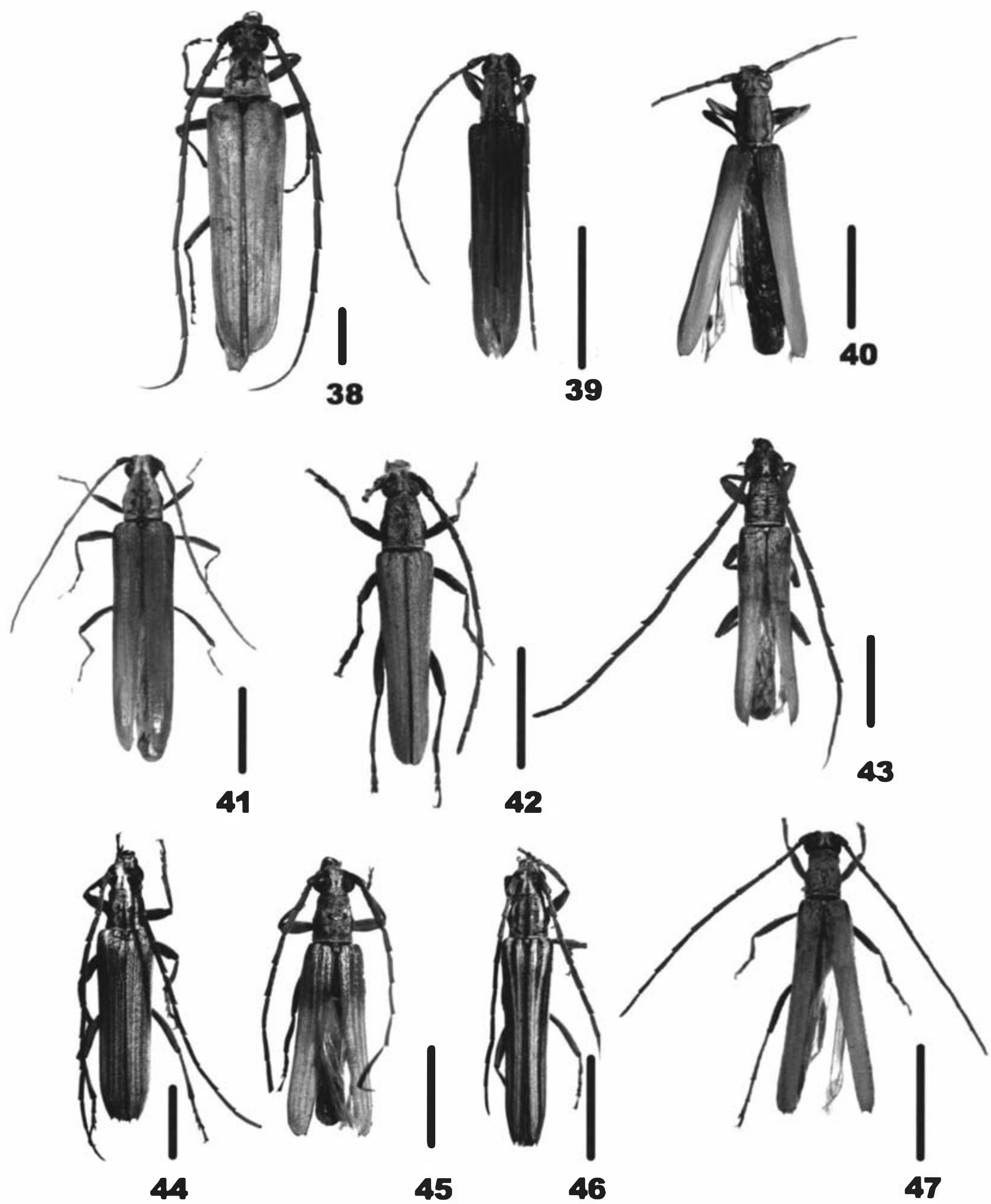
FIGURE 2.19 Known distribution of *Uracanthus*.



FIGURES 2.20 – 2.28 *Uracanthus* **species: 20,** ***U. bicoloratus*****; 21,** ***U. maculatus*****; 22,** ***U. perthensis*****; 23,** ***U. griseus*****; 24,** ***U. glabrilineatus*****; 25,** ***U. triangularis*****; 26,** ***U. pallens*****; 27,** ***U. regalis*****; 28,** ***U. dubius*****. Scale bar = 5 mm.**



FIGURES 2.29 – 2.37 ***Uracanthus*** **species: 29,** ***U. simulans*****; 30,** ***U. fuscus*****; 31,** ***U. cryptophagus*****; 32,** ***U. fuscocinereus*****; 33,** ***U. quadristriolatus*****; 34,** ***U. insignis*****; 35,** ***U. punctulatus*****; 36,** ***U. maleficus*****; 37,** ***U. gigas*****. Scale bar = 5 mm.**



FIGURES 2.38 – 2.47 ***Uracanthus*** **species: 38,** ***U. pseudogigas*****; 39,** ***U. acutus*****; 40,** ***U. loranthi*****; 41,** ***U. cupressianus*****; 42,** ***U. minatus*****; 43,** ***U. longicornis*****; 44,** ***U. albatus*****; 45,** ***U. ventralis*****; 46,** ***U. strigosus*****; 47,** ***U. parallelus*****. Scale bar = 5 mm.**

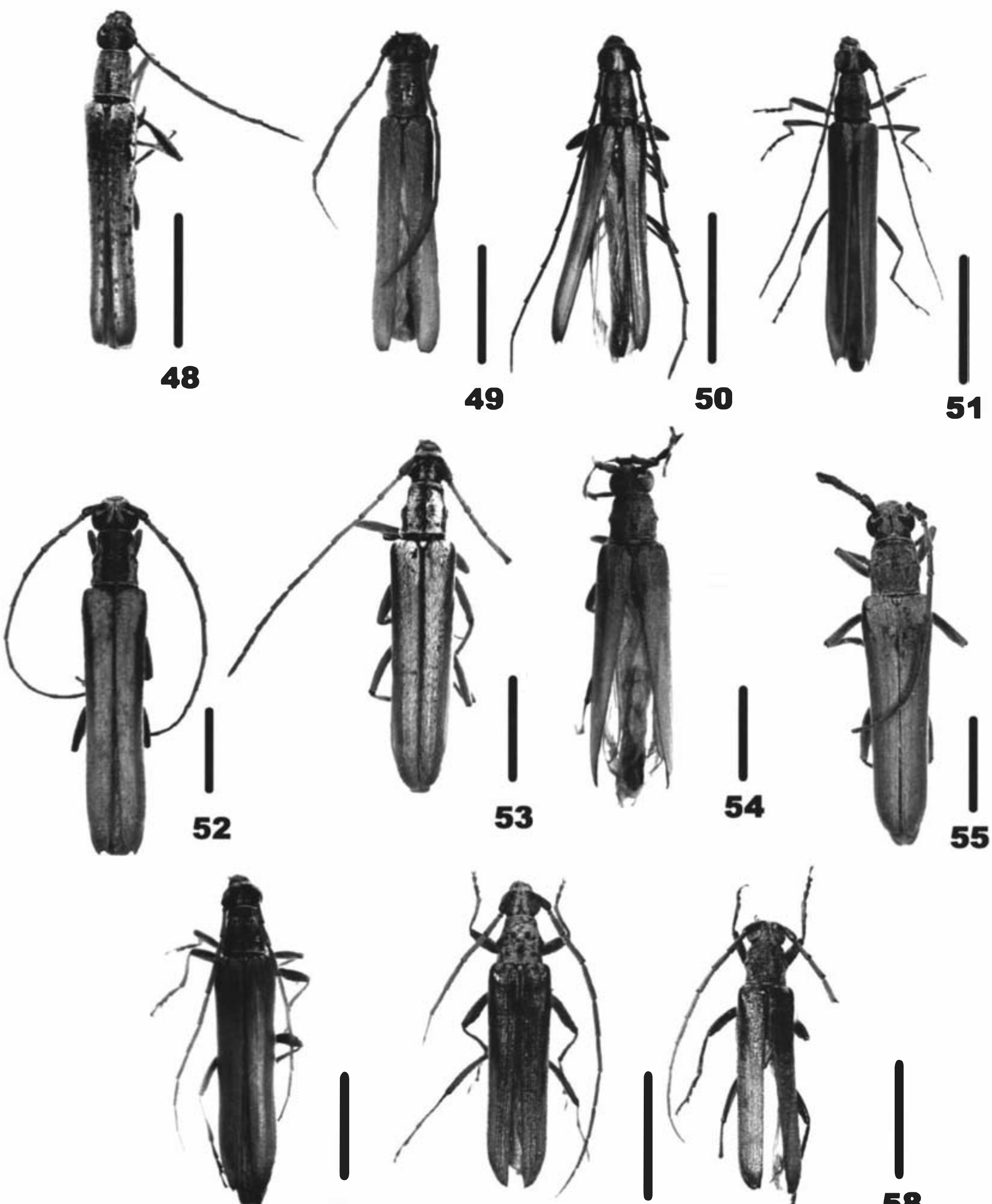


FIGURE 2.48 – 2.58 *Uracanthus* species: 48, *U. froggatti*; 49, *U. tropicus*; 50, *U. parvus*; 51, *U. pertenuis*; 52, *U. bivittatus*; 53, *U. discicollis*; 54, *U. corrugicollis*; 55, *U. lateroalbus*; 56, *U. bistriolatus*; 57, *U. suturalis*; 58, *U. ater*. Scale bar = 5 mm.

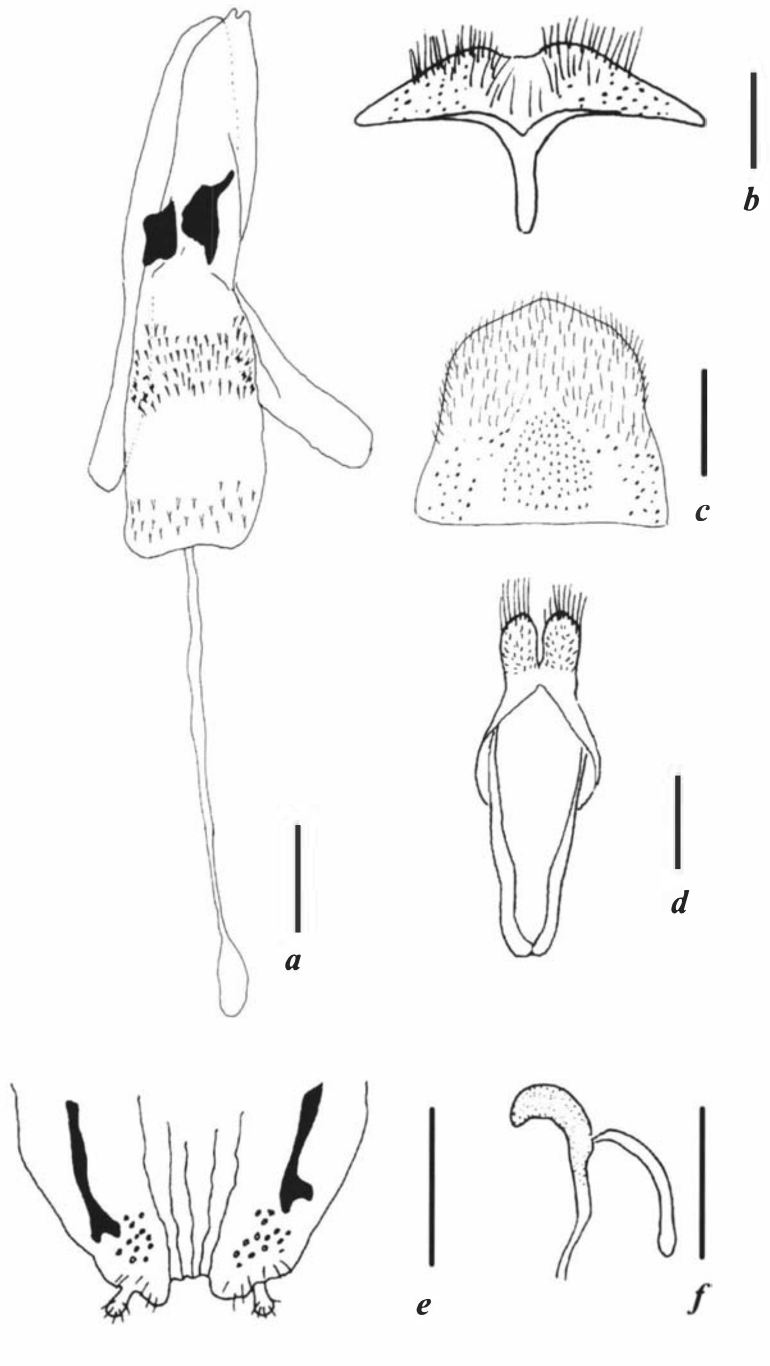


FIGURE 2.59 Terminalia of *U. bicoloratus*. Male: *a*. median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

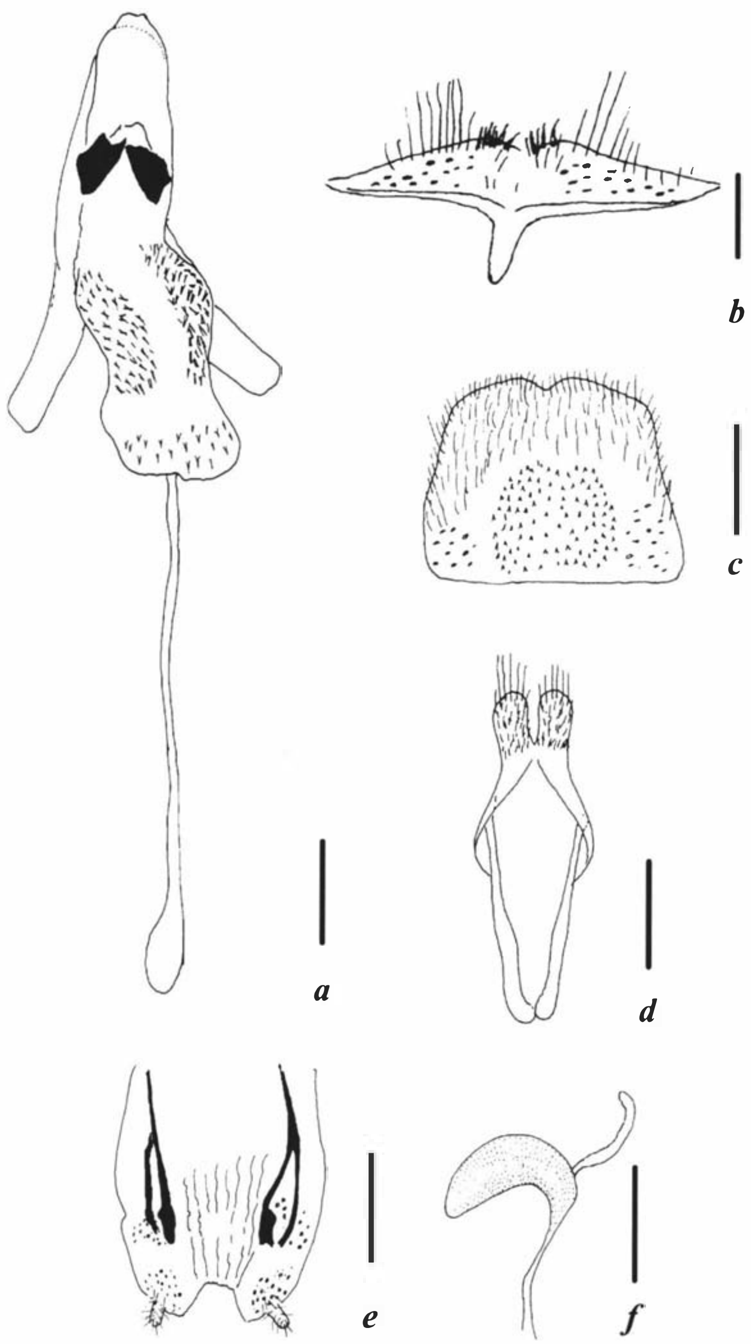


FIGURE 2.60 Terminalia of *U. maculatus*. Male: *a.* median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

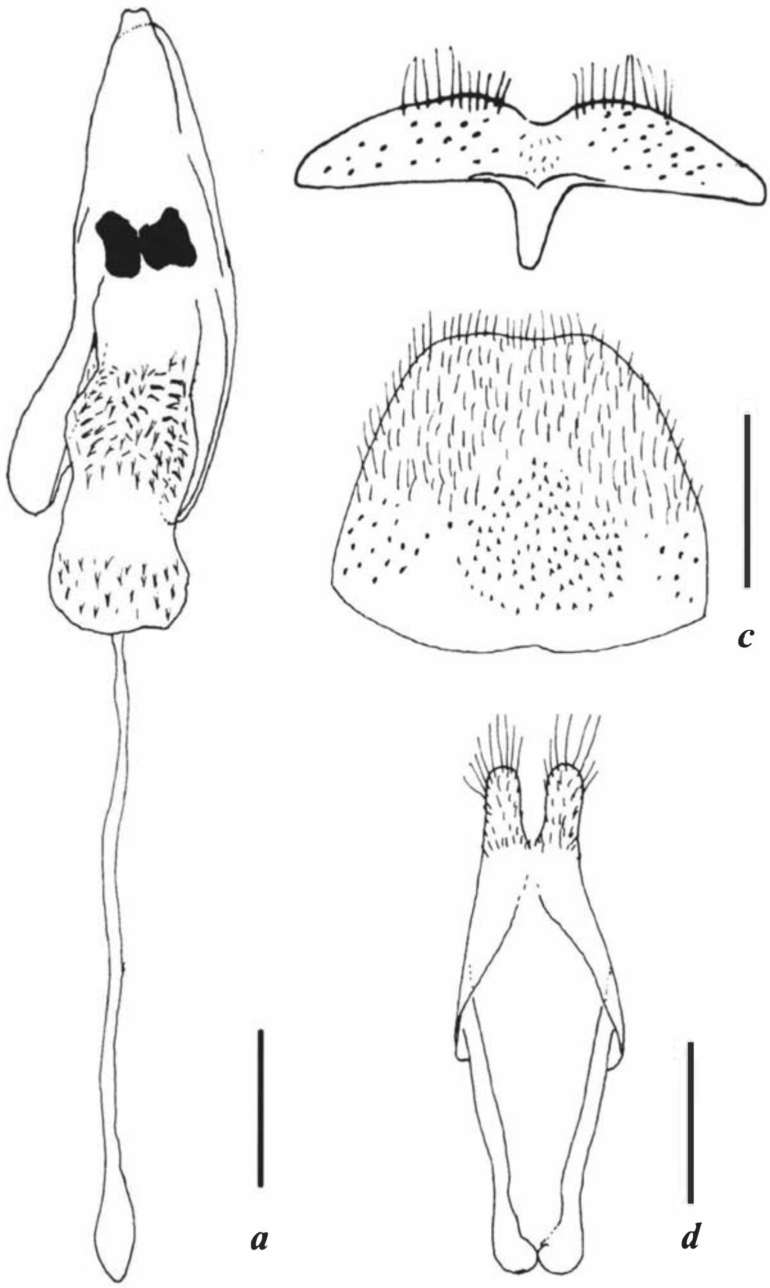


FIGURE 2.61 Male terminalia of *U. perthensis:* *a.* median lobe and internal sac, ventral view; *b,* eighth sternite; *c,* eighth tergite; *d,* tegmen. Scale bars = 0.5 mm.

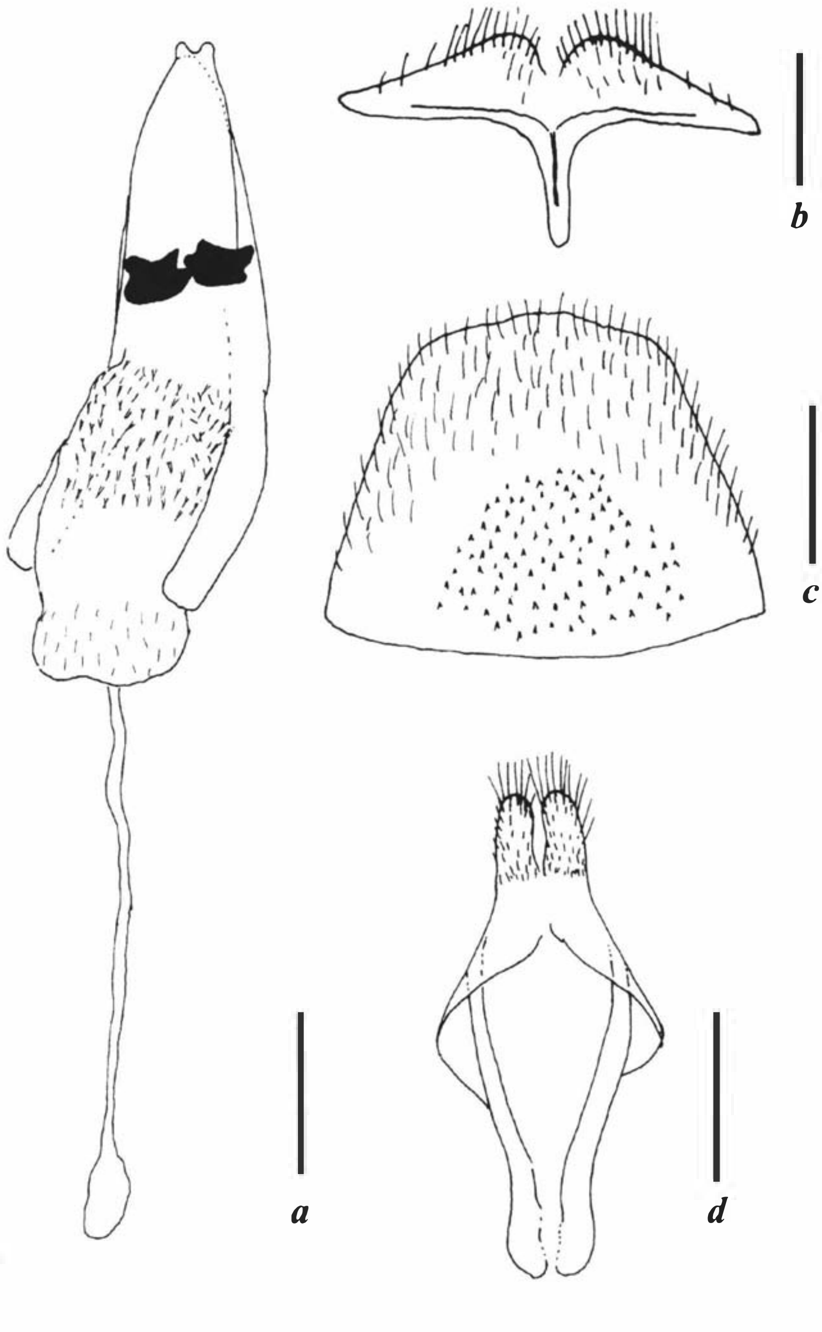


FIGURE 2.62 Male terminalia of *U. griseus: a.* median lobe and internal sac; *b,* eighth sternite; *c,* eighth tergite; *d*, tegmen. Scale bars = 0.5 mm.

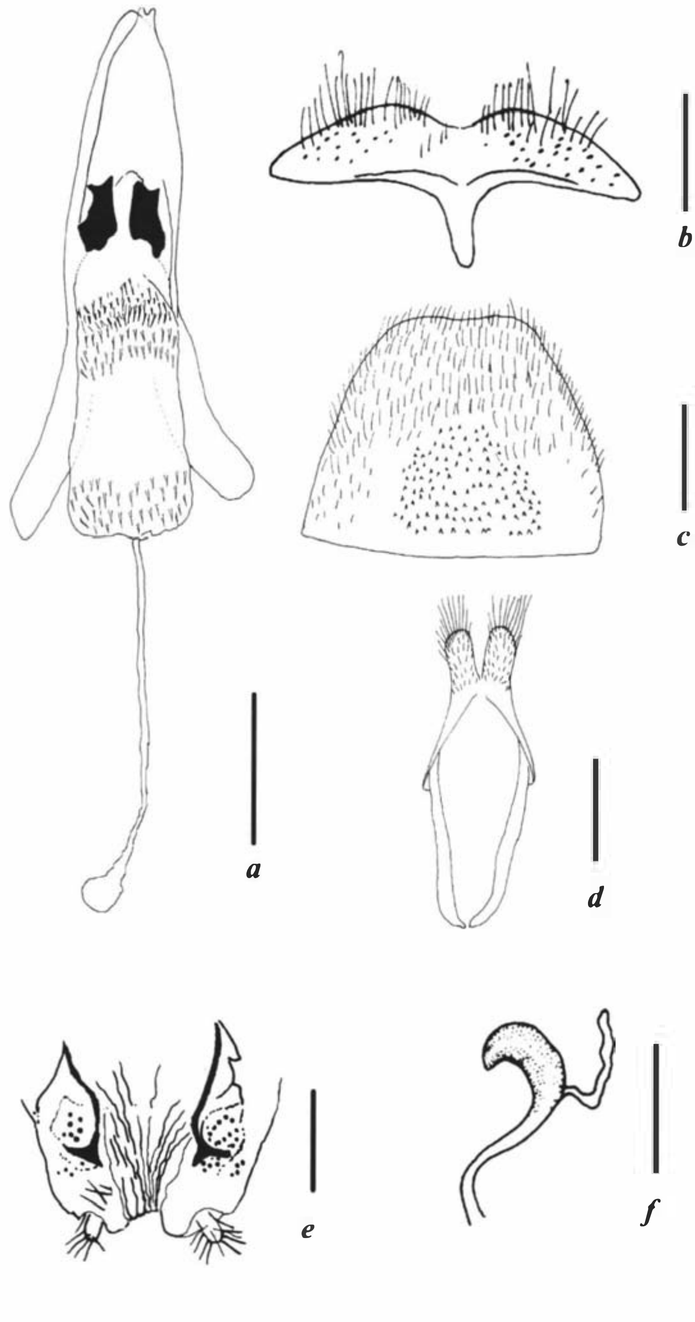


FIGURE 2.63 Terminalia of *U. triangularis*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

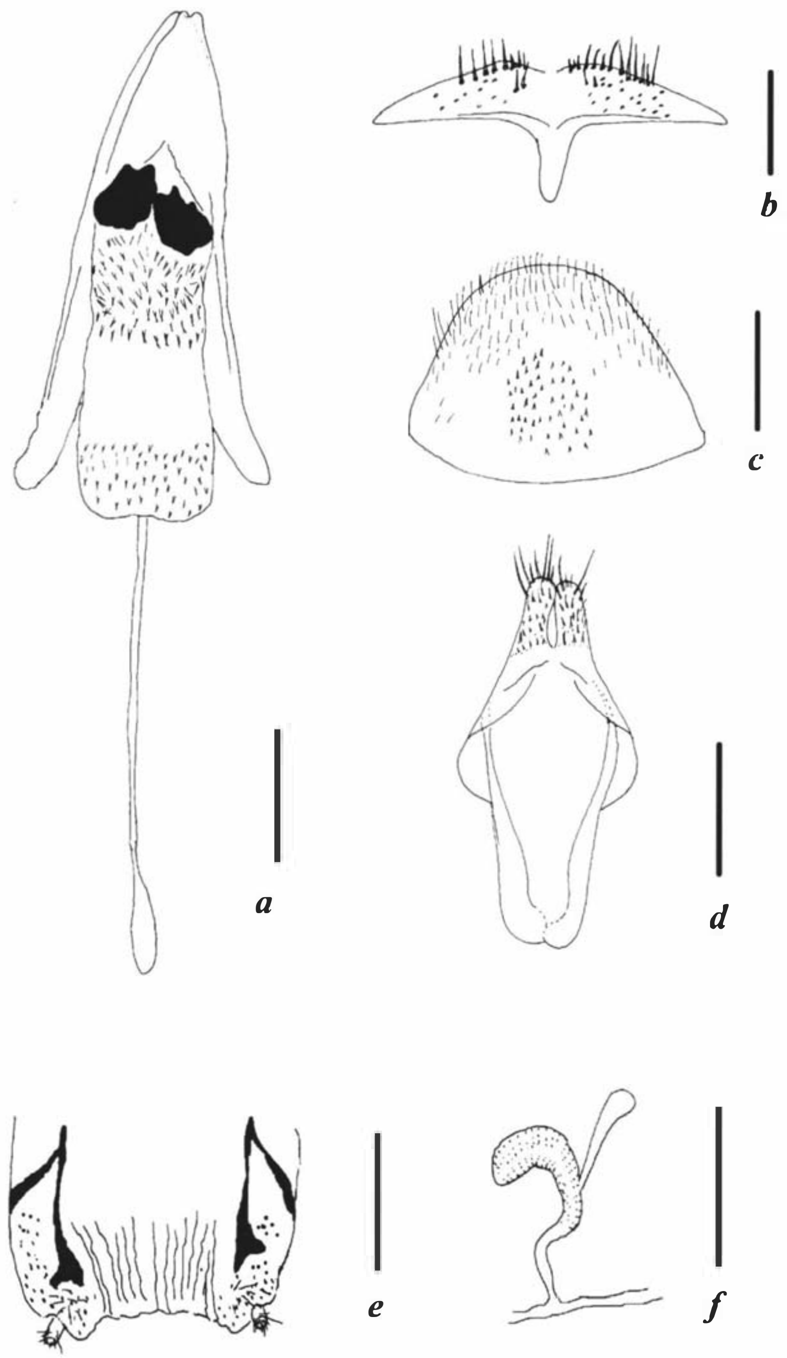


FIGURE 2.64 Terminalia of *U. pallens*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

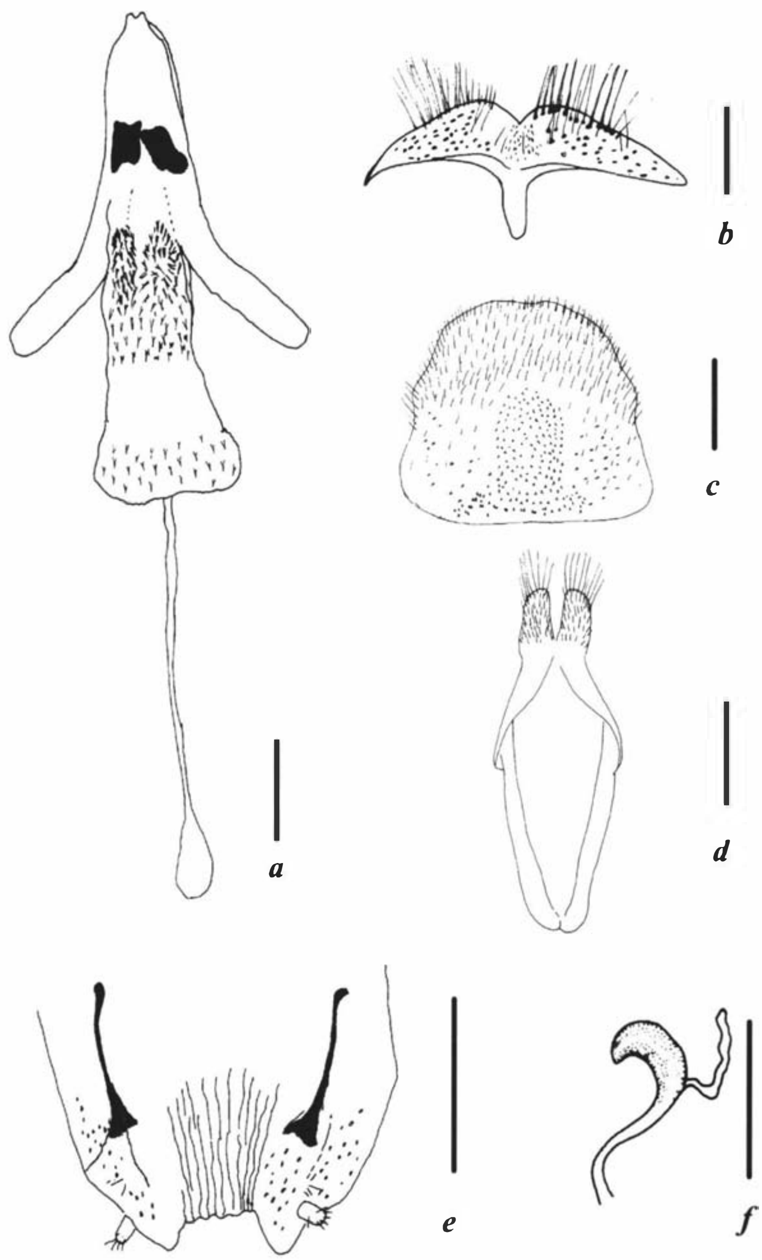


FIGURE 2.65 Terminalia of *U. regalis*. Male: *a*. median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

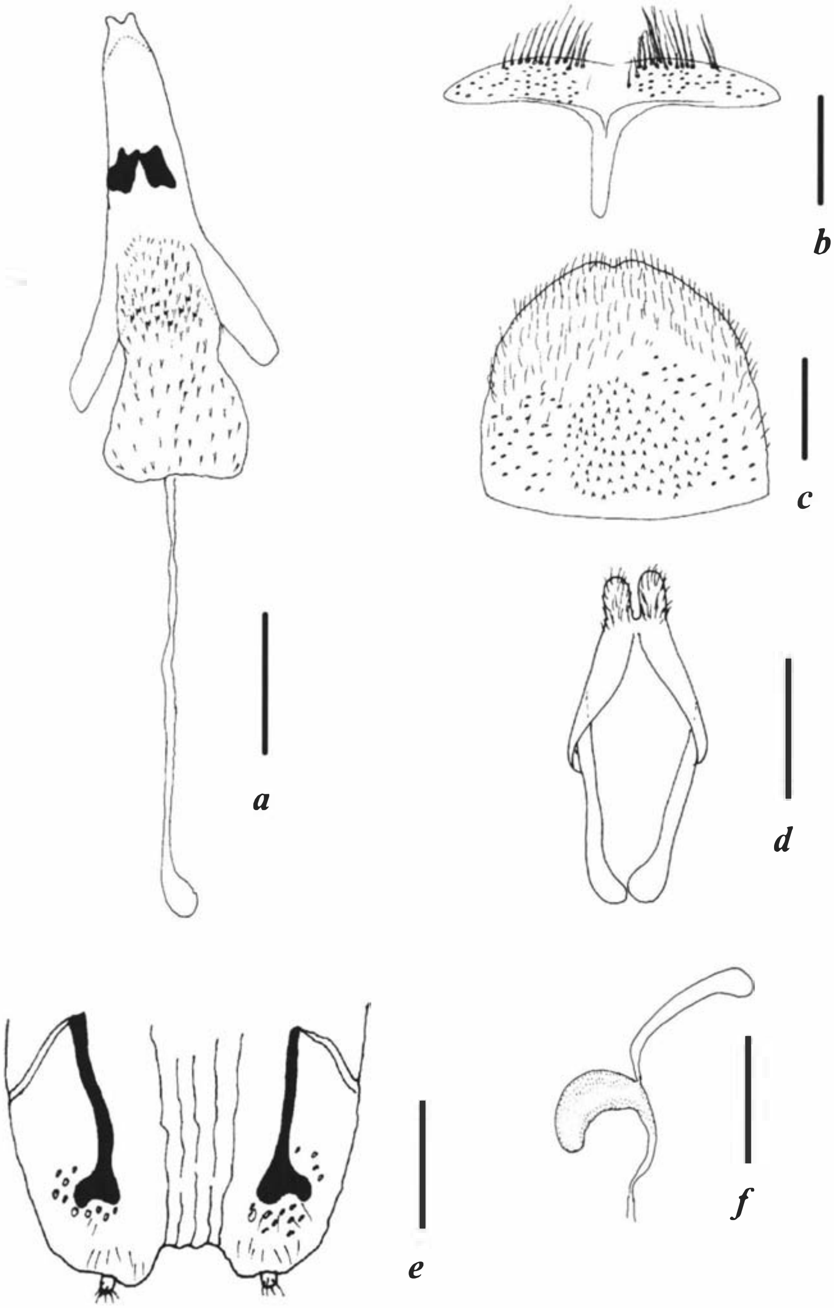


FIGURE 2.66 Terminalia of *U. dubius*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

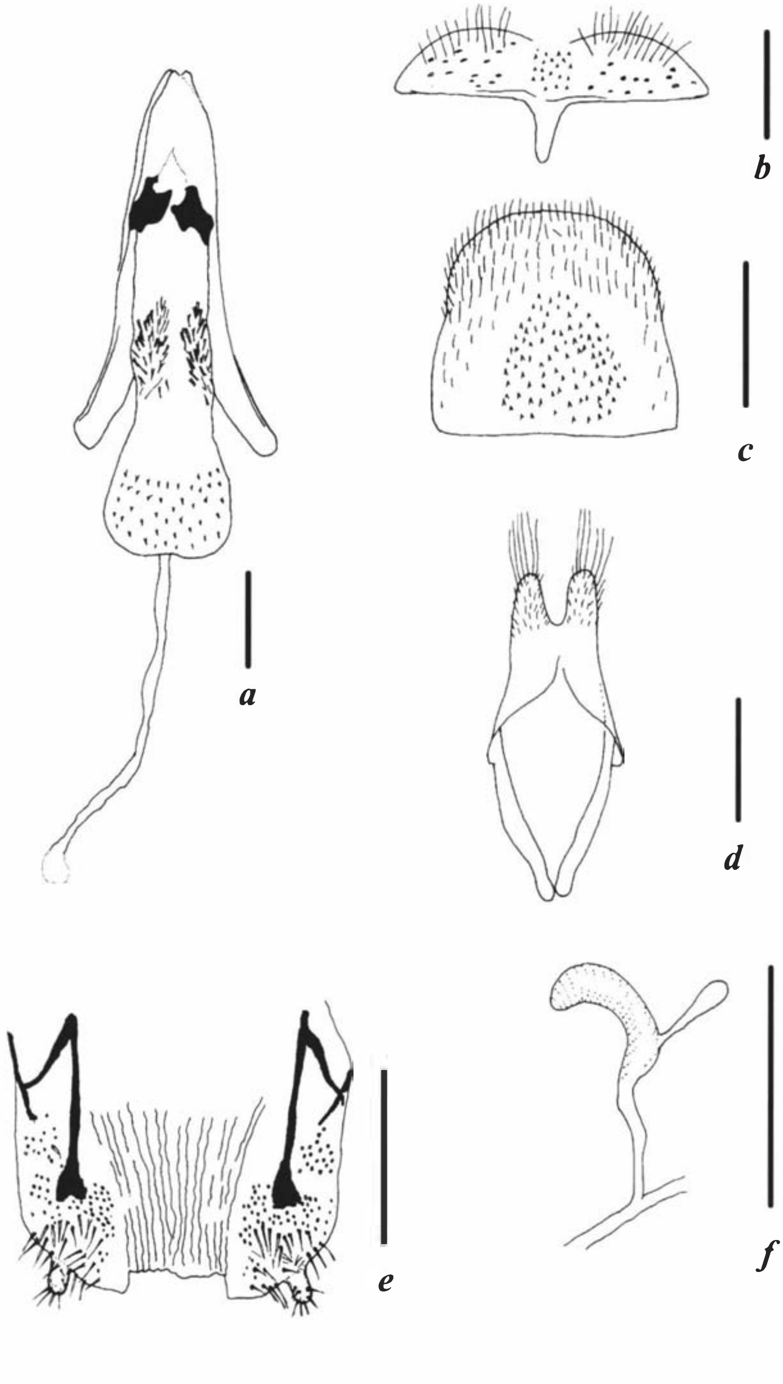


FIGURE 2.67 Terminalia of *U. simulans*. Male: *a*. median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

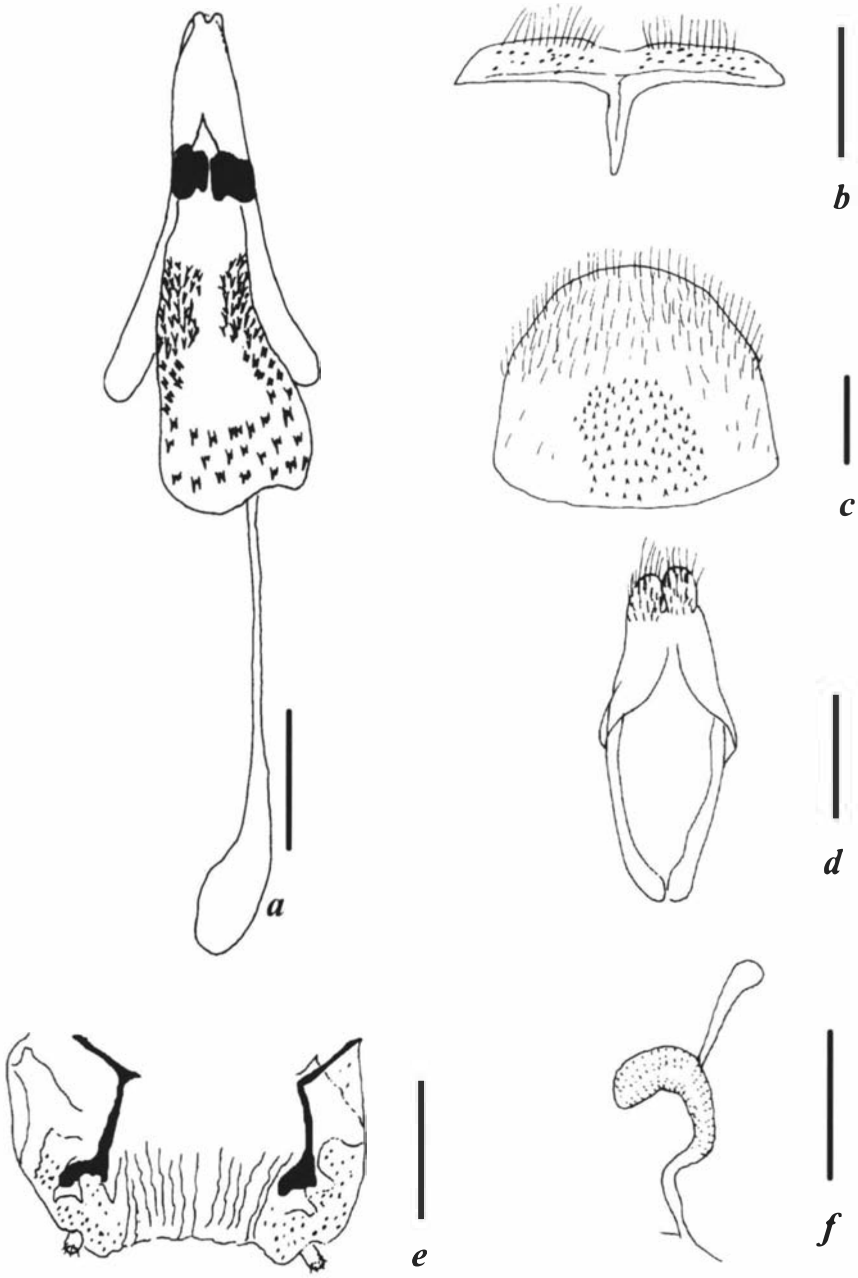


FIGURE 2.68 Terminalia of *U. fuscus*. Male: *a*, median lobe and internal sac, ventral view; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

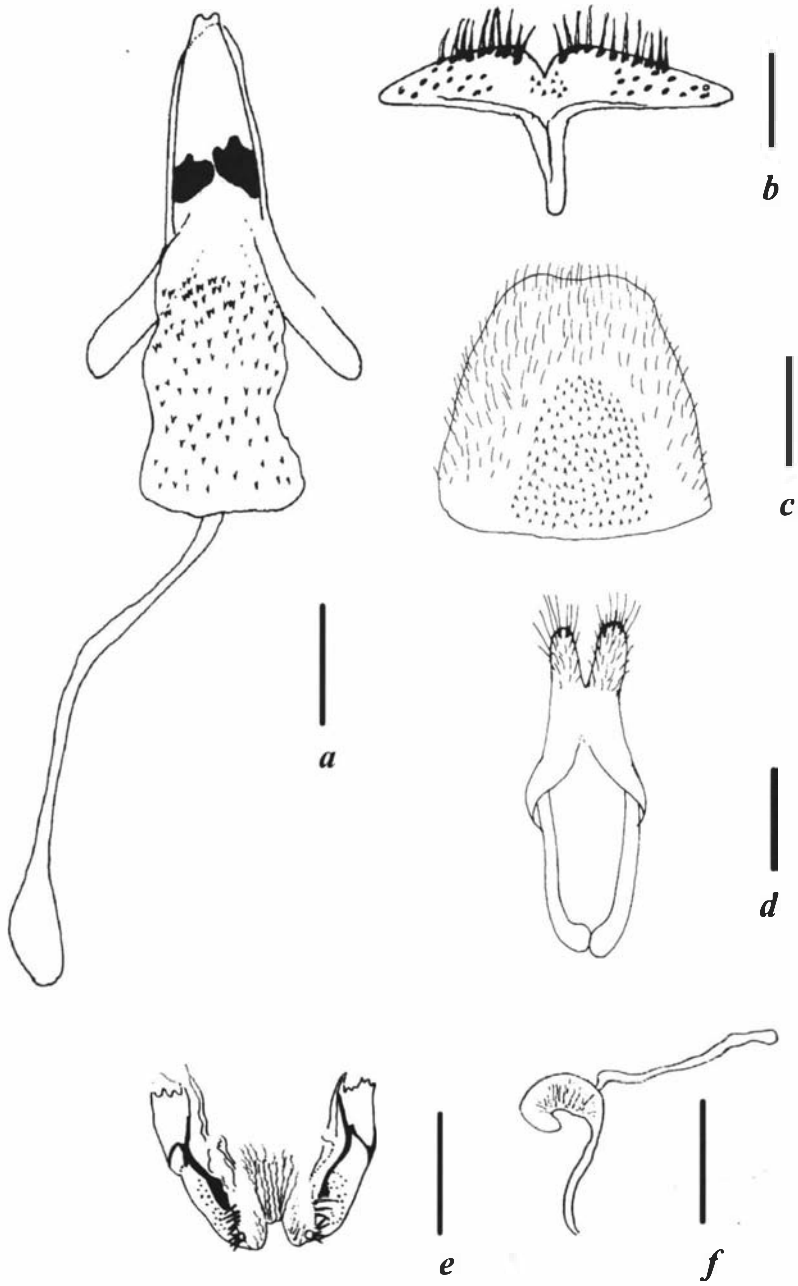


FIGURE 2.69 Terminalia of *U. cryptophagus*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

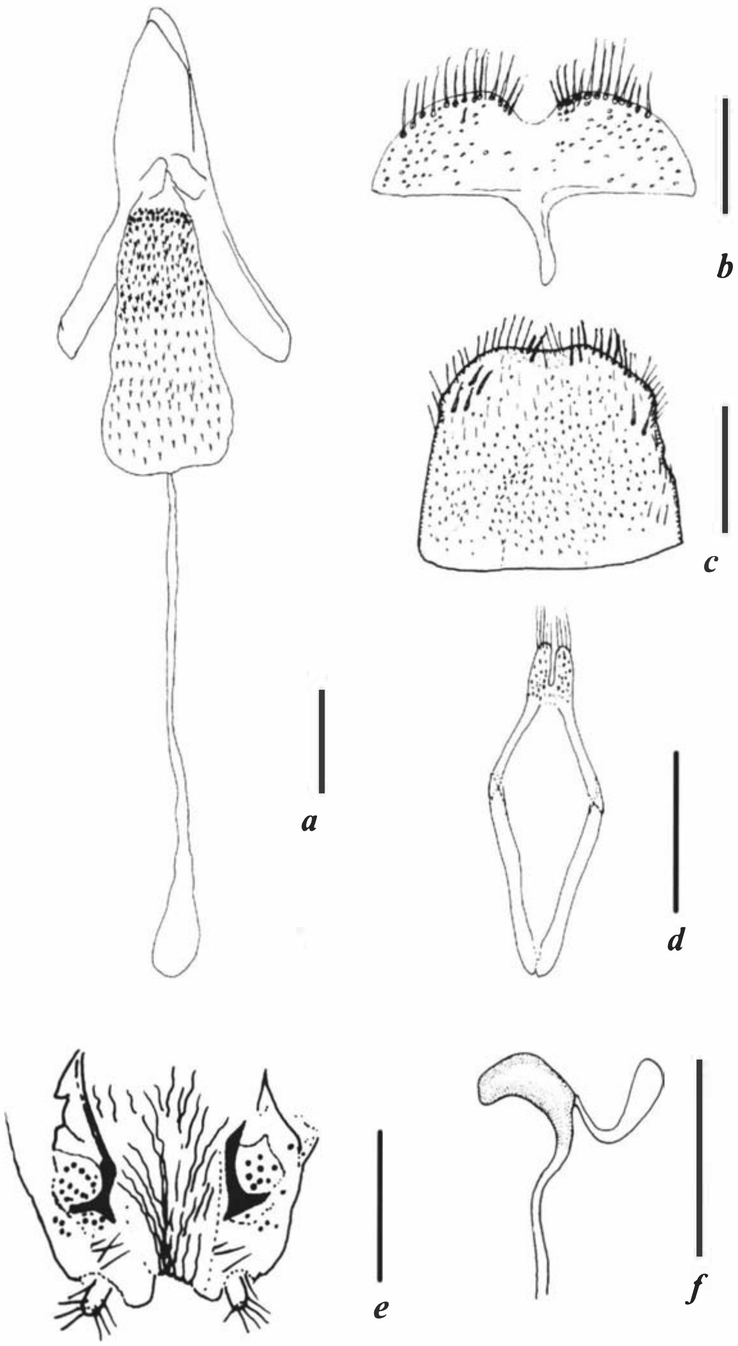


FIGURE 2.70 Terminalia of *U. fuscocinereus*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

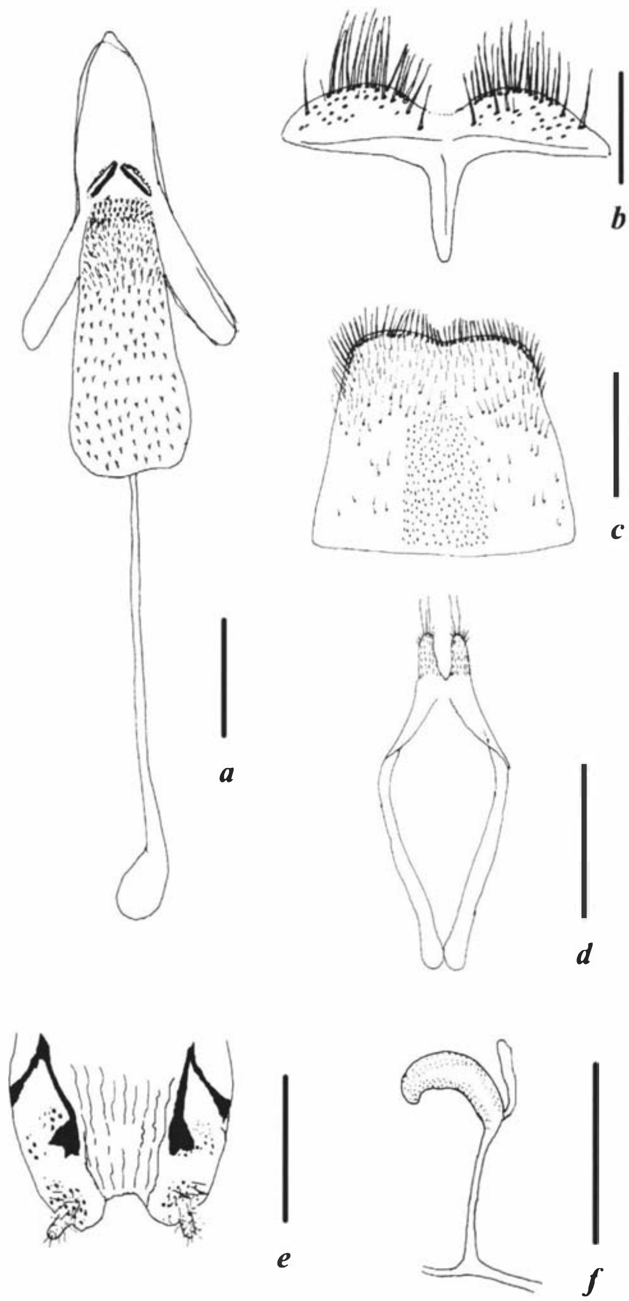


FIGURE 2.71 Male terminalia of *U. quadristriolatus*. Male: *a*, median lobe and internal sac, ventral view; *b*, eighth sternite; c, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

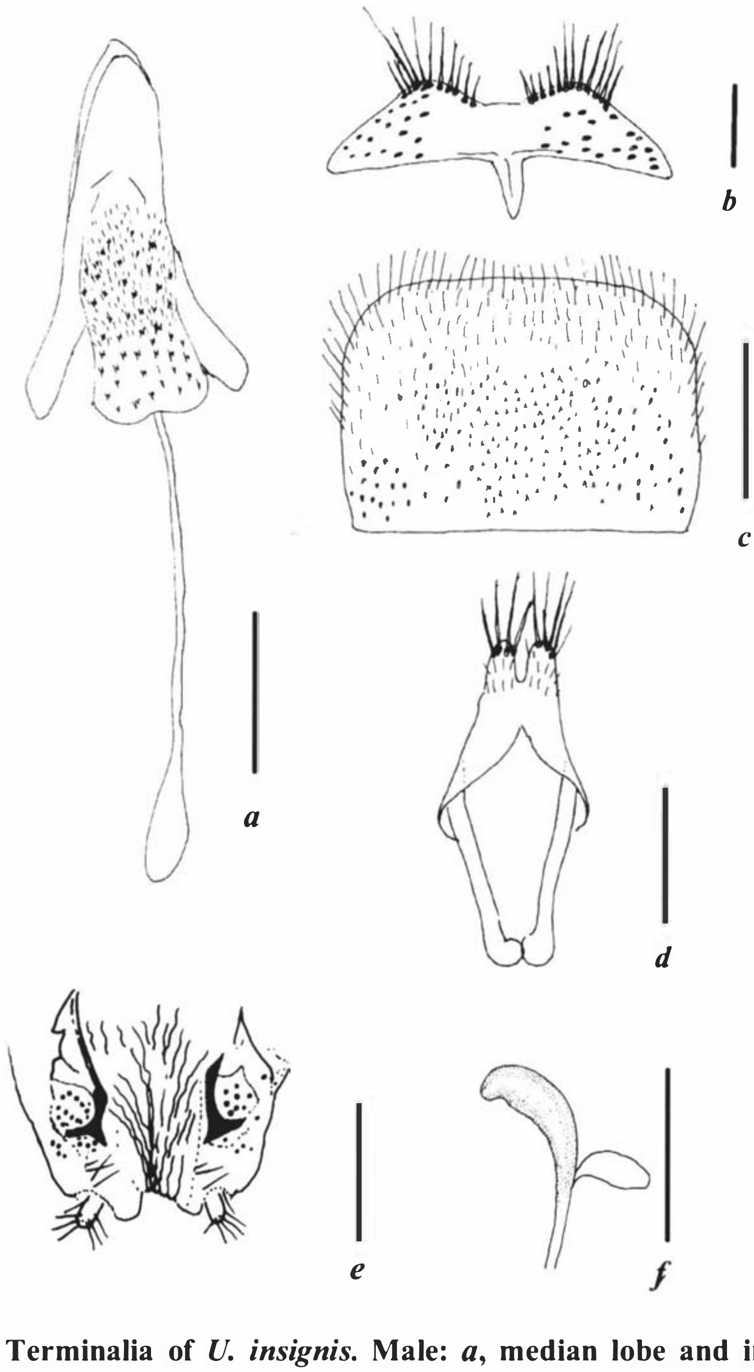


FIGURE 2.72 Terminalia of *U. insignis*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

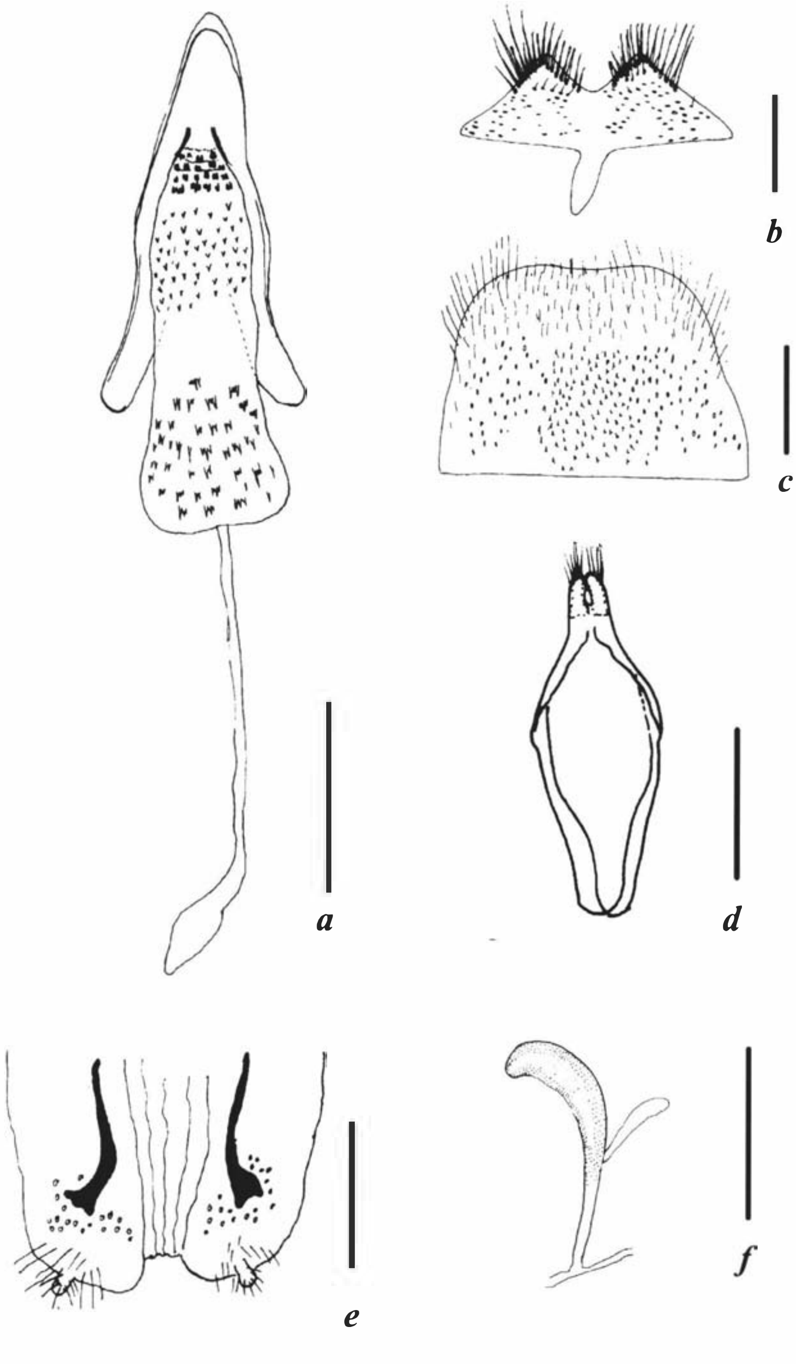


FIGURE 2.73 Terminalia of *U. punctulatus*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatherca. Scale bars = 0.5 mm.

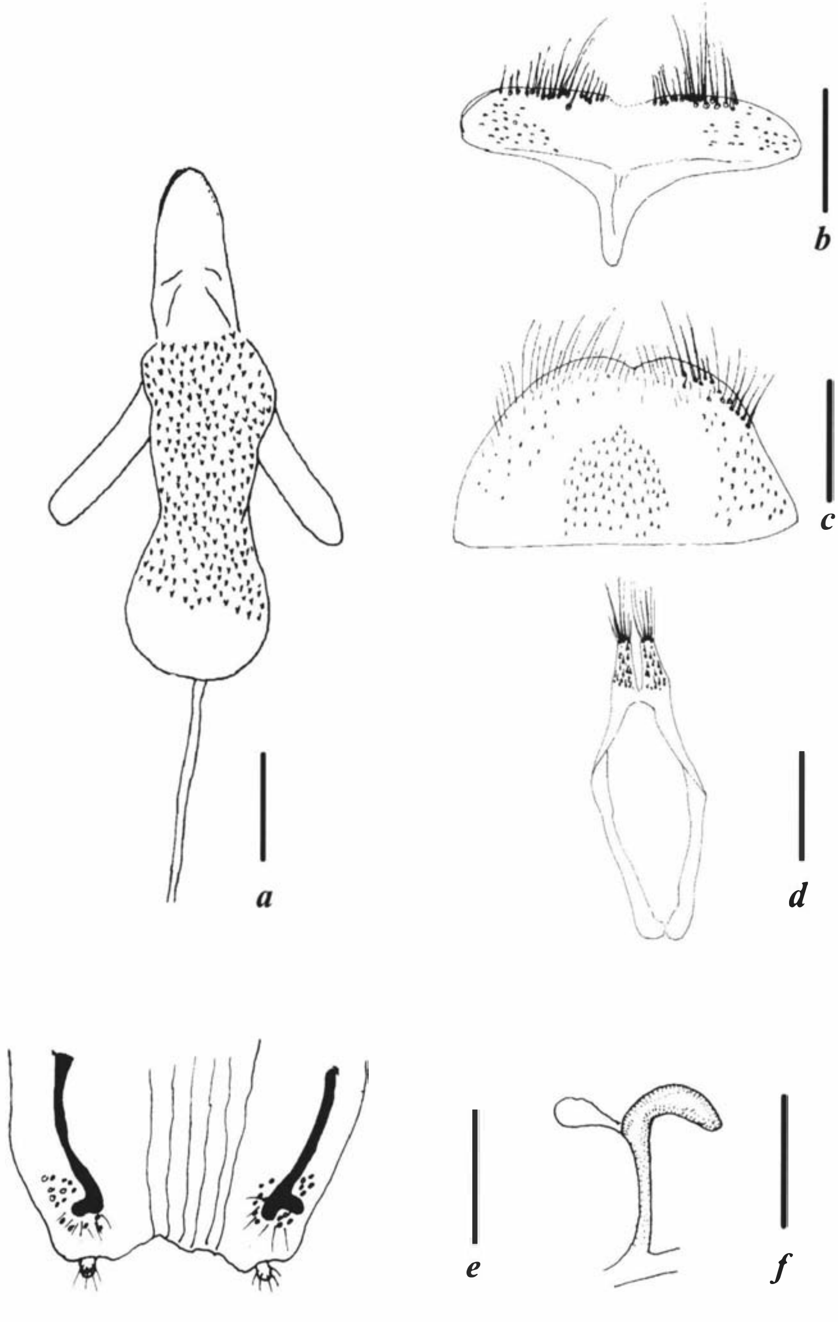


FIGURE 2.74 Terminalia of *U. maleficus*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

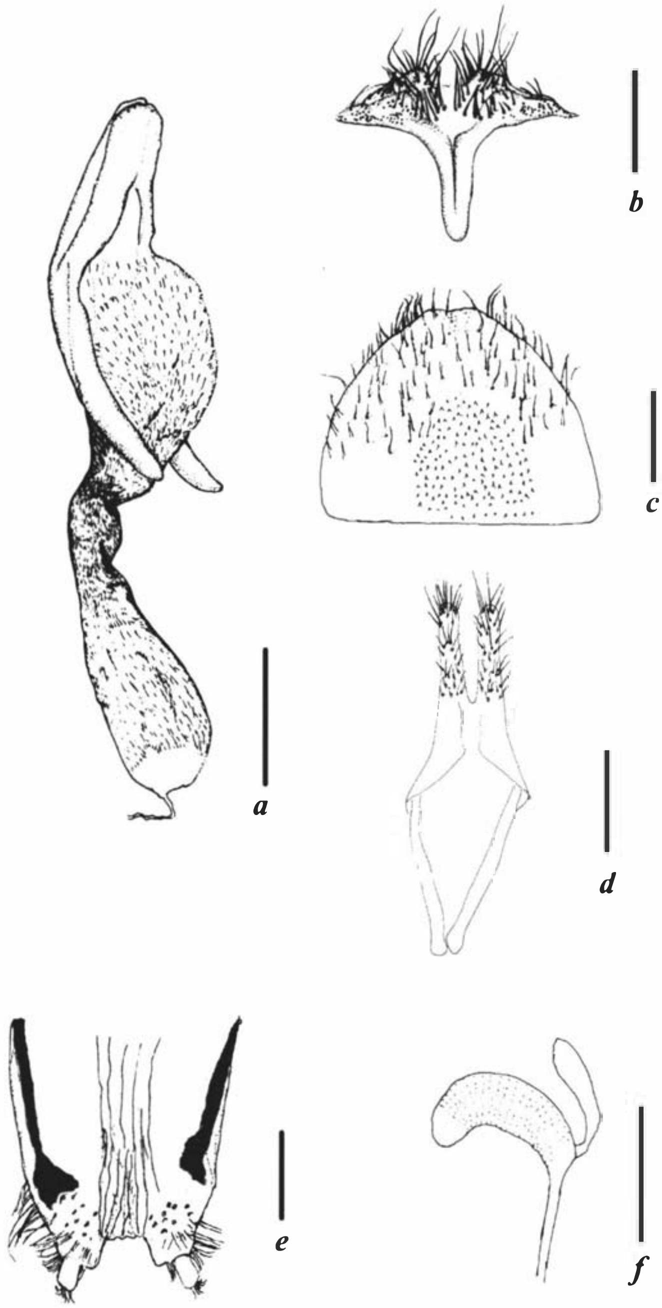


FIGURE 2.75 Terminalia of *U. gigas*. Male: *a,* median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

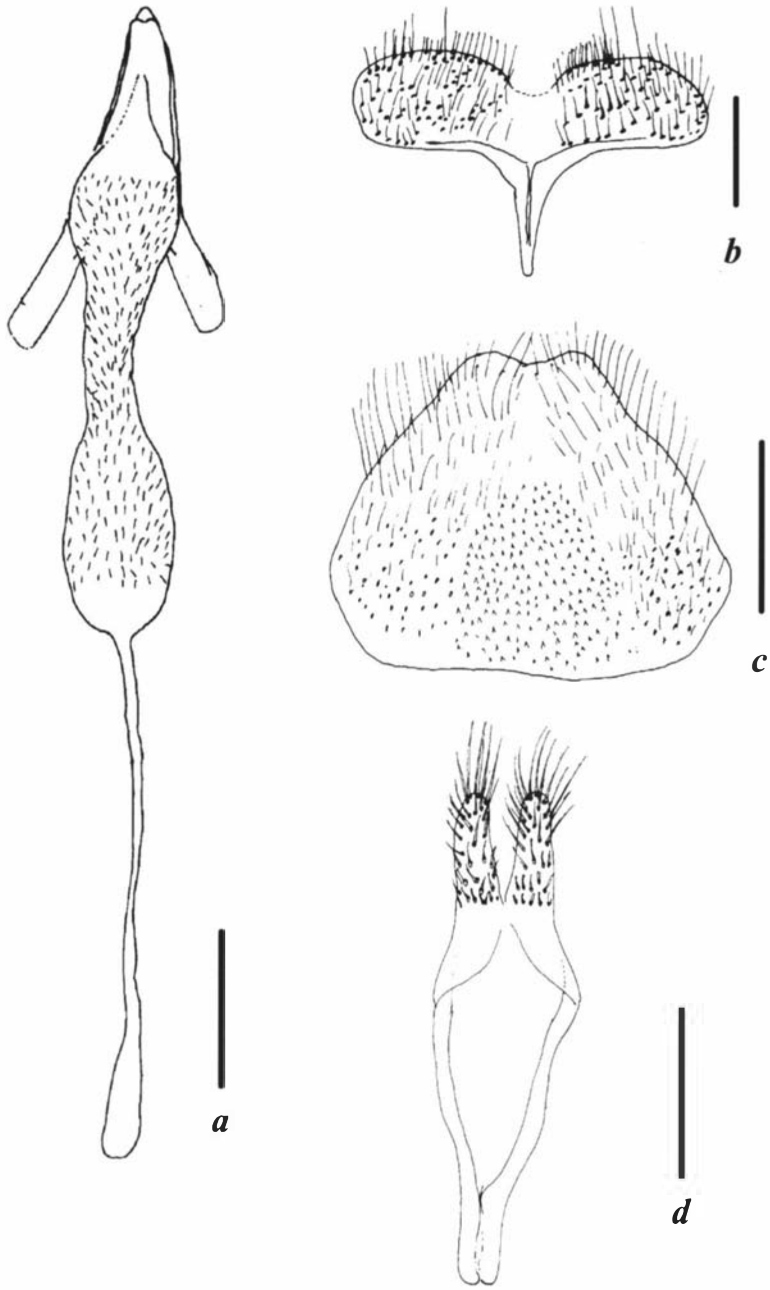


FIGURE 2.76 Male terminalia of *U. pseudogigas: a,* median lobe and internal sac, ventral view; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen. Scale bars = 0.5 mm.

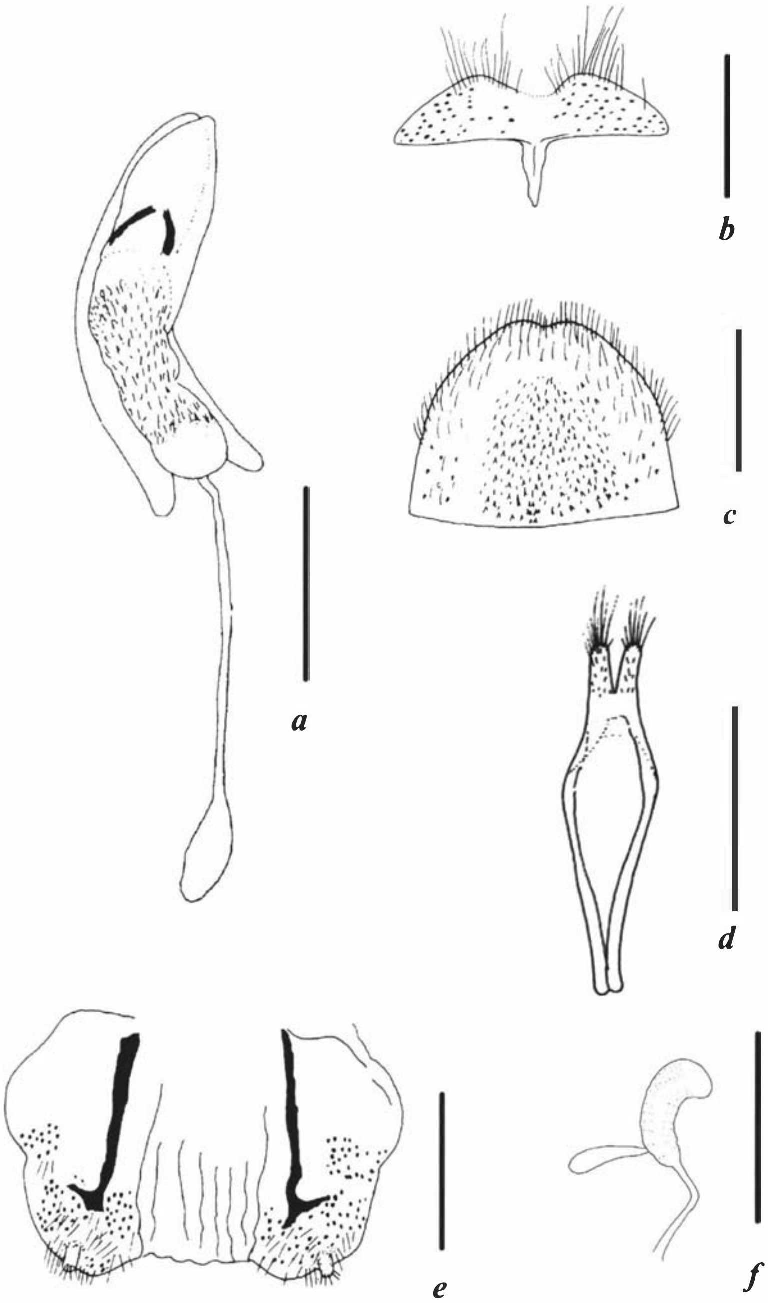


FIGURE 2.77 Terminalia of *U. acutus*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

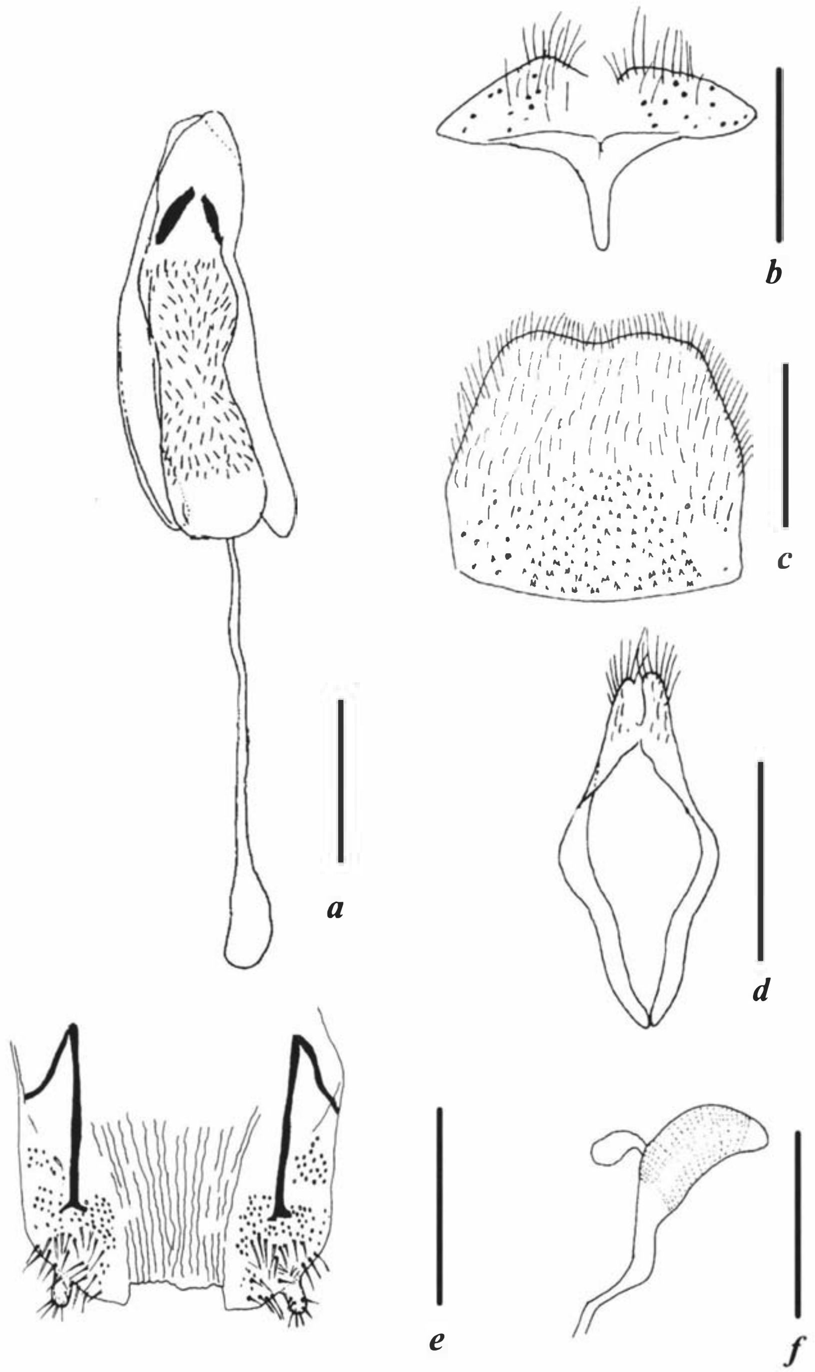


FIGURE 2.78 Terminalia of *U. loranthi*. Male: *a*, median lobe and internal sac, ventral view; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatherca. Scale bars = 0.5 mm.

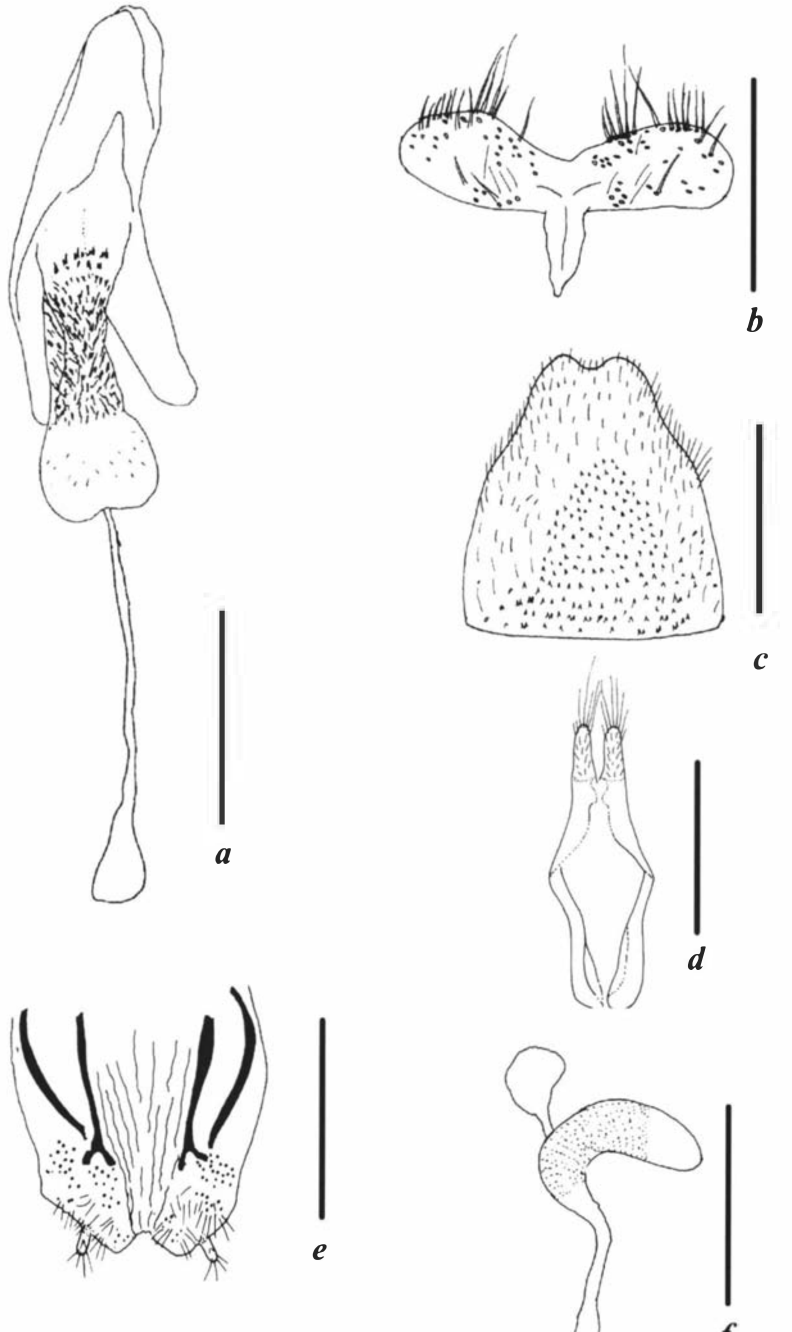


FIGURE 2.79 Terminalia of *U. cupressianus*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

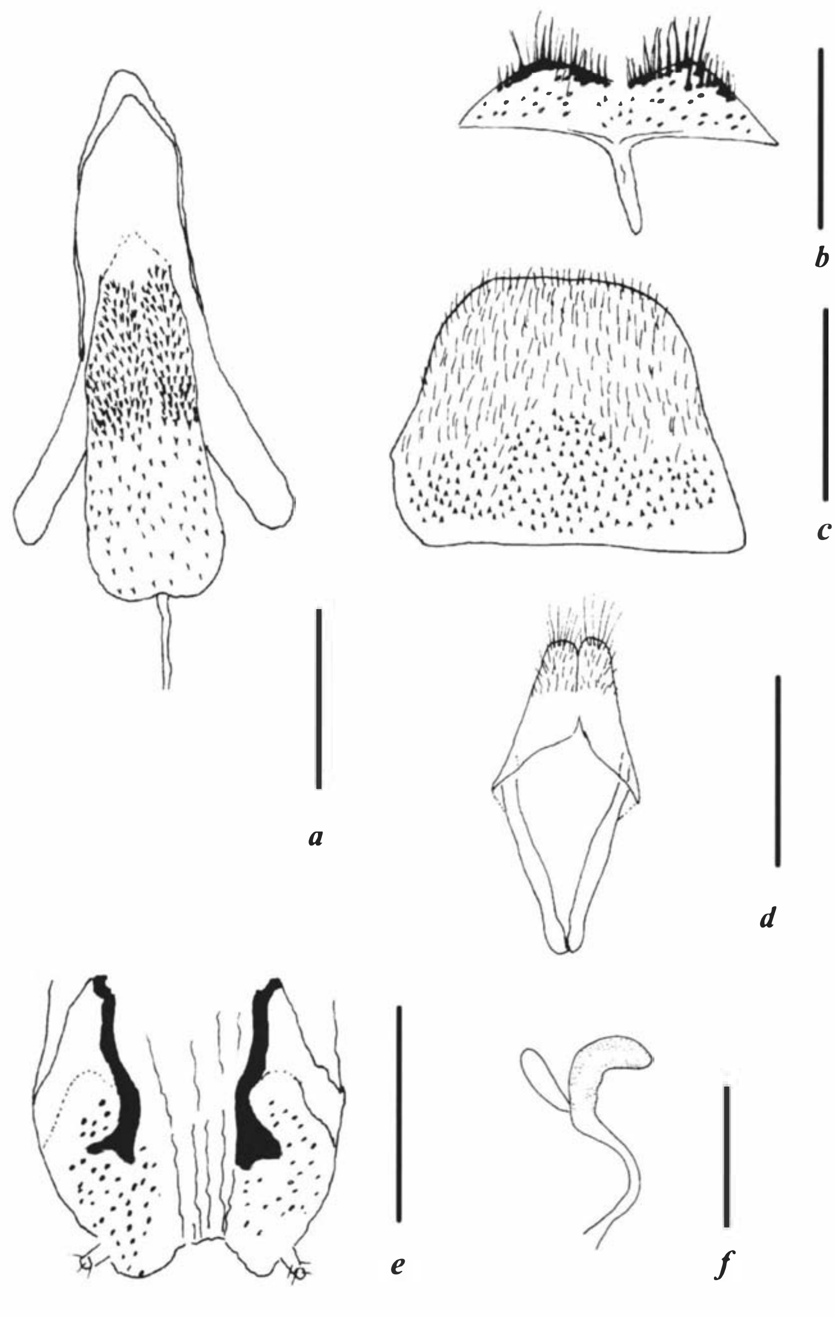


FIGURE 2.80 Terminalia of *U. minatus*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

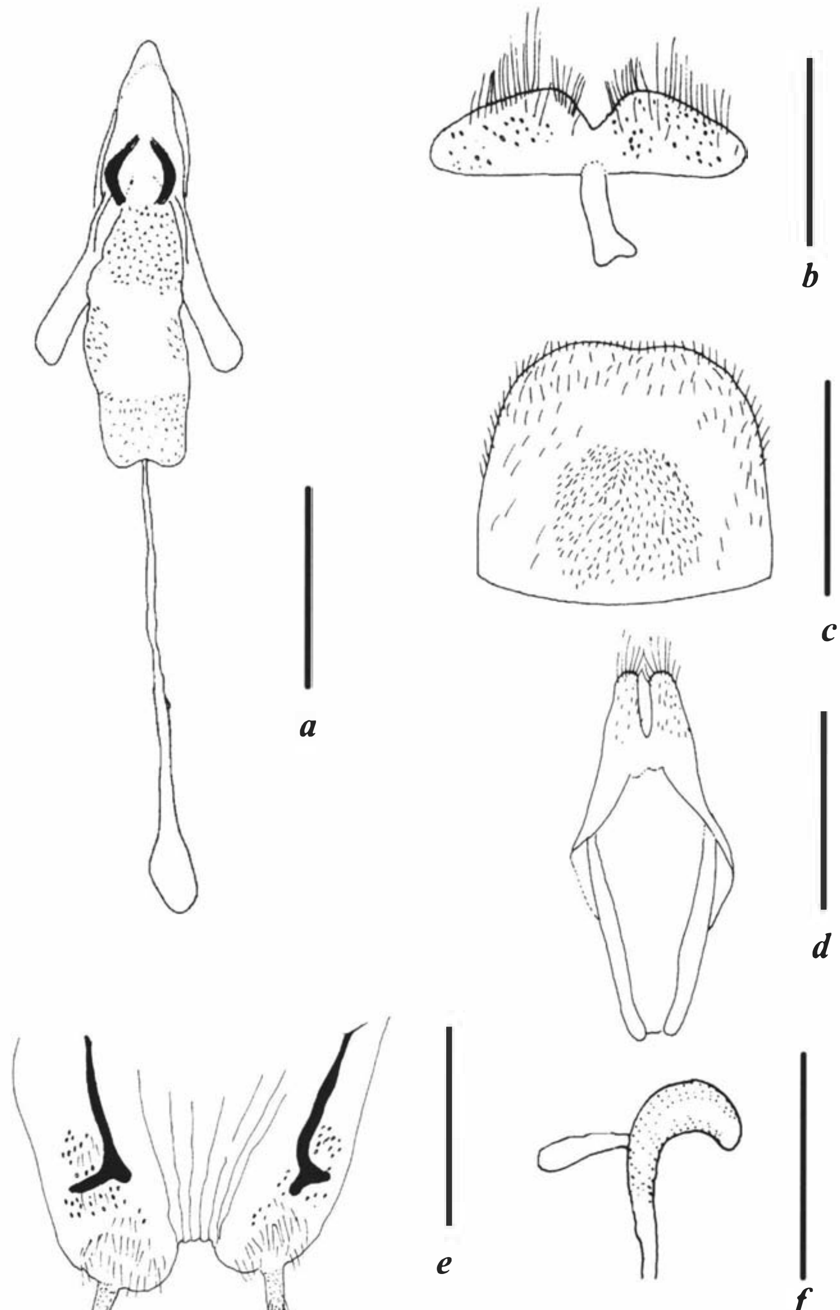


FIGURE 2.81 Terminalia of *U. longicornis*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

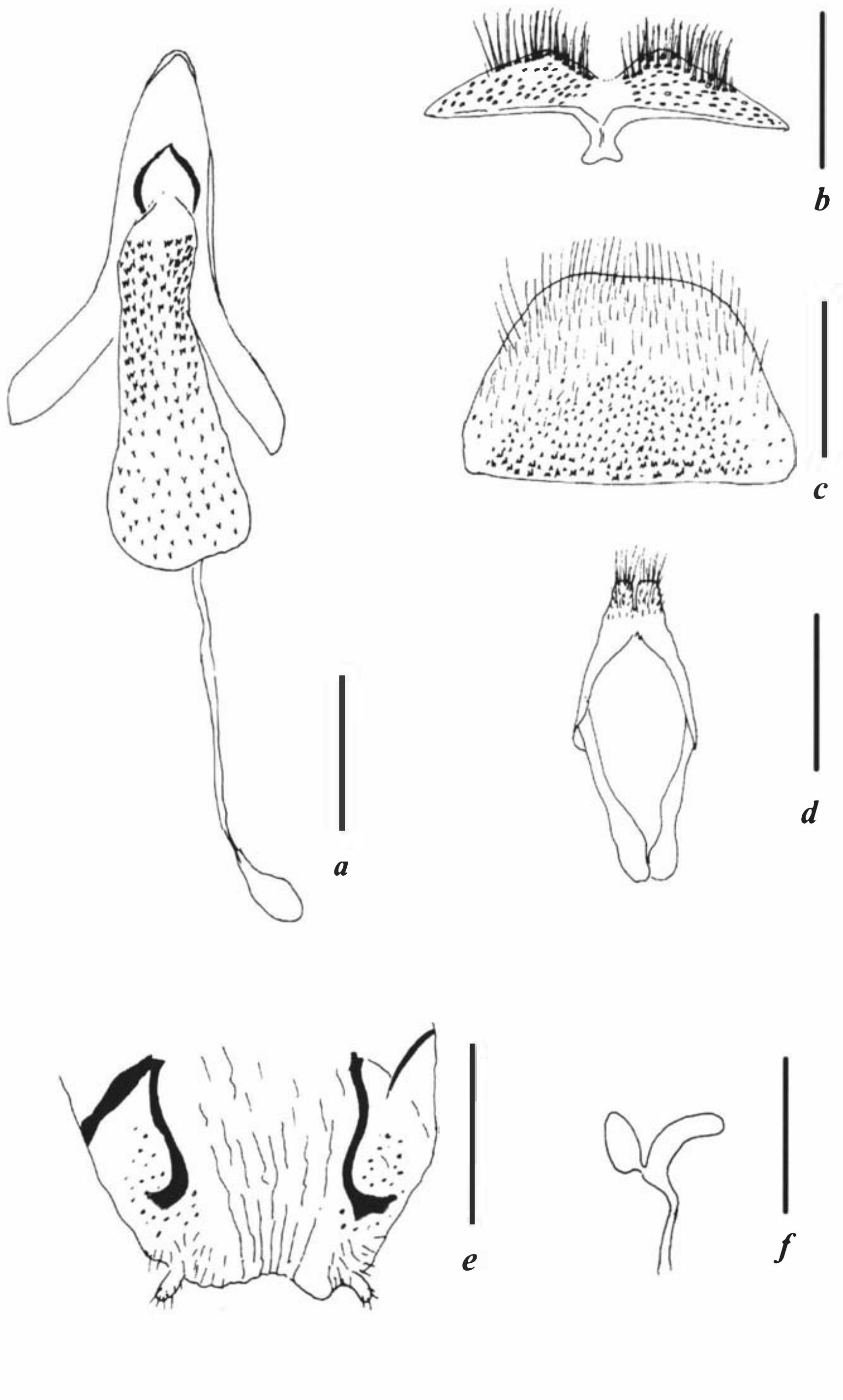


FIGURE 2.82 Terminalia of *U. albatus*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

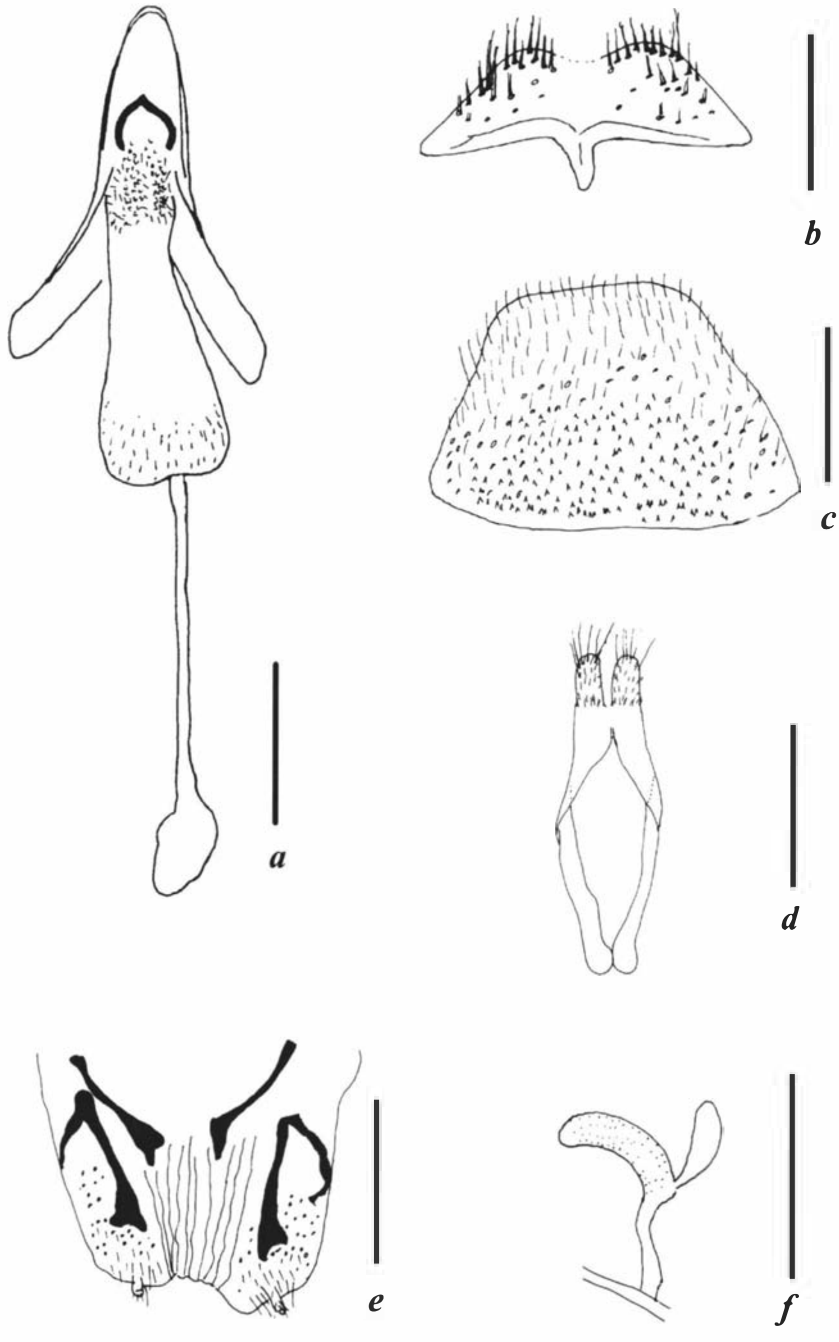


FIGURE 2.83 Terminalia of *U. ventralis*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

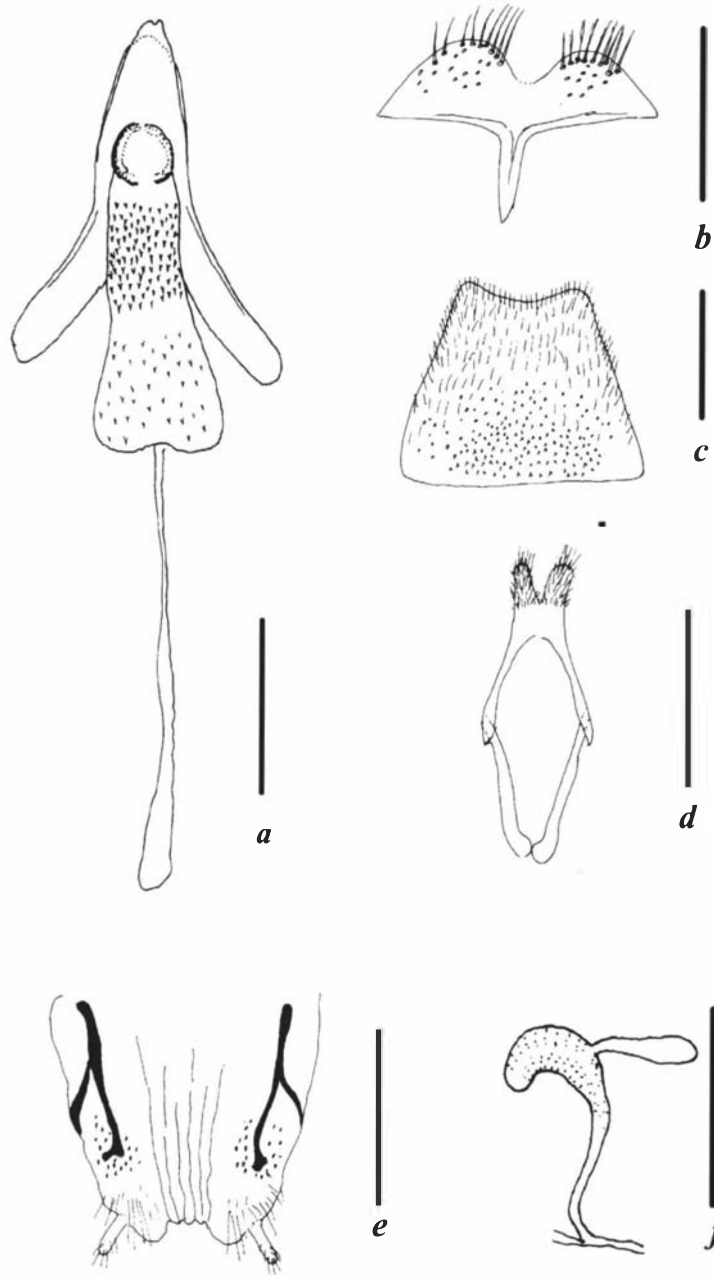


FIGURE 2.84 Terminalia of *U. strigosus*. Male: *a,* median lobe and internal sac, ventral view; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

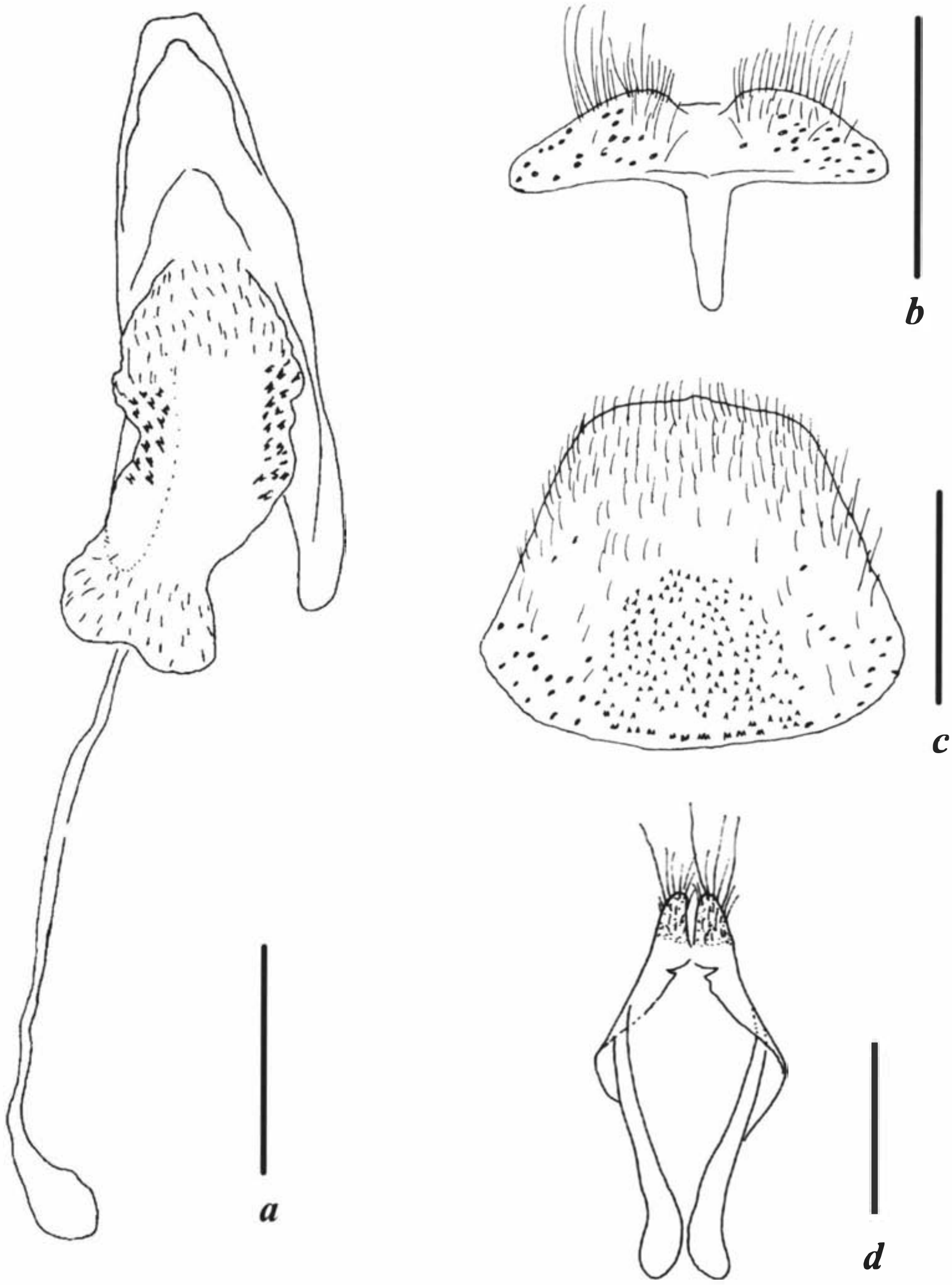


FIGURE 2.85 Male terminalia of *U. parallelus*: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen. Scale bars = 0.5 mm.

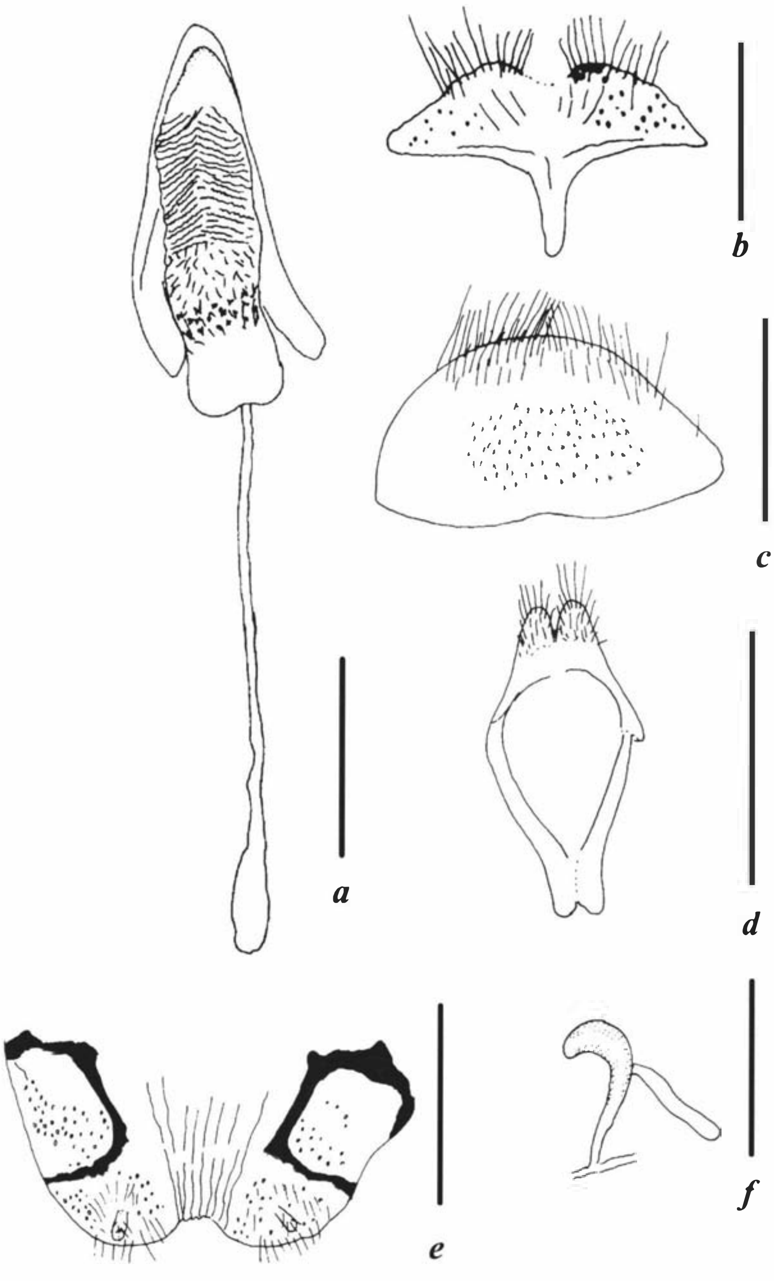


FIGURE 2.86 Terminalia of *U. froggatti*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

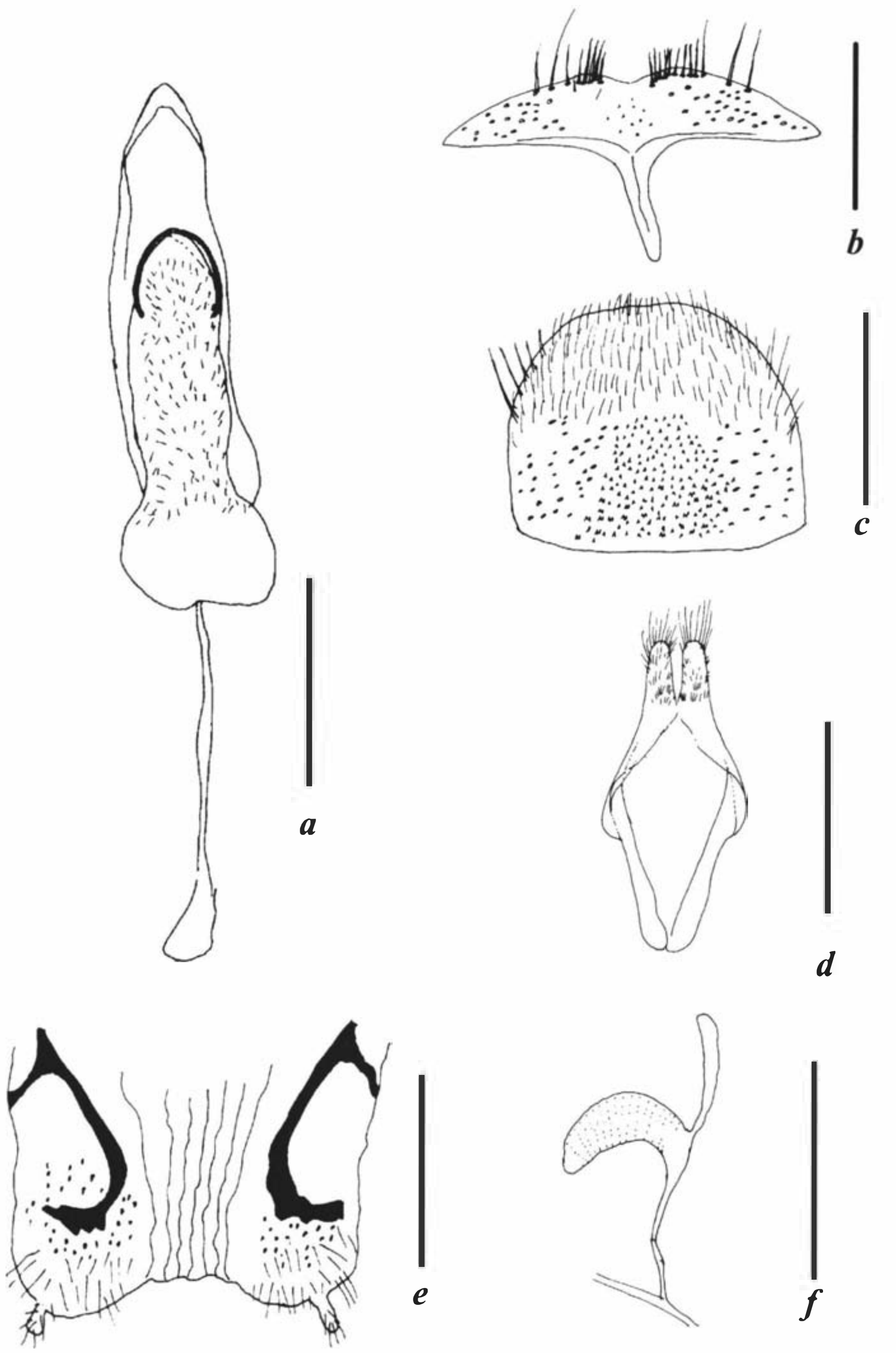


FIGURE 2.87 Terminalia of *U. tropicus*. Male: *a*, median lobe and internal sac, ventral view; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

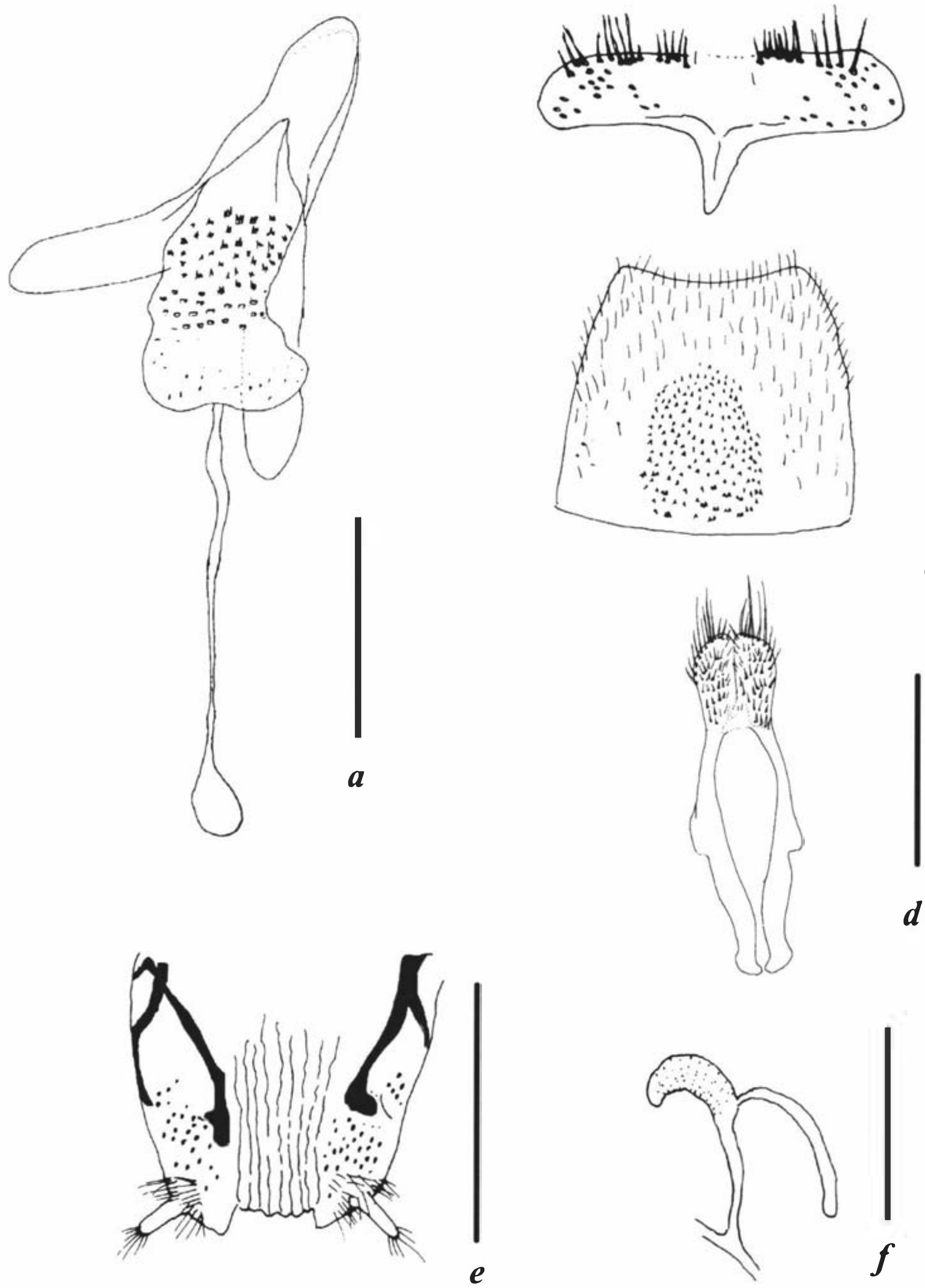


FIGURE 2.88 Terminalia of *U. parvus*. Male: *a*, median lobe and internal sac, ventral view; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

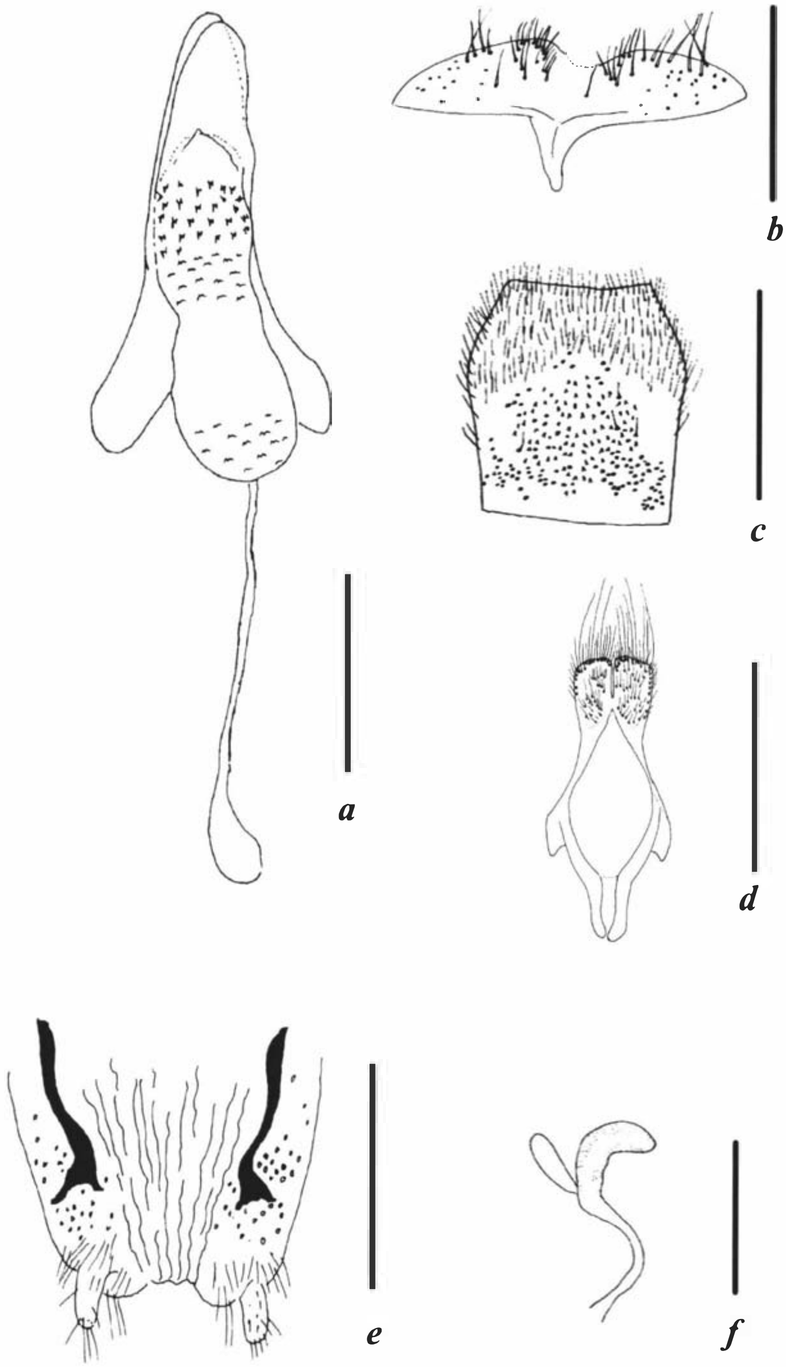


FIGURE 2.89 Terminalia of *U. pertenuis*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

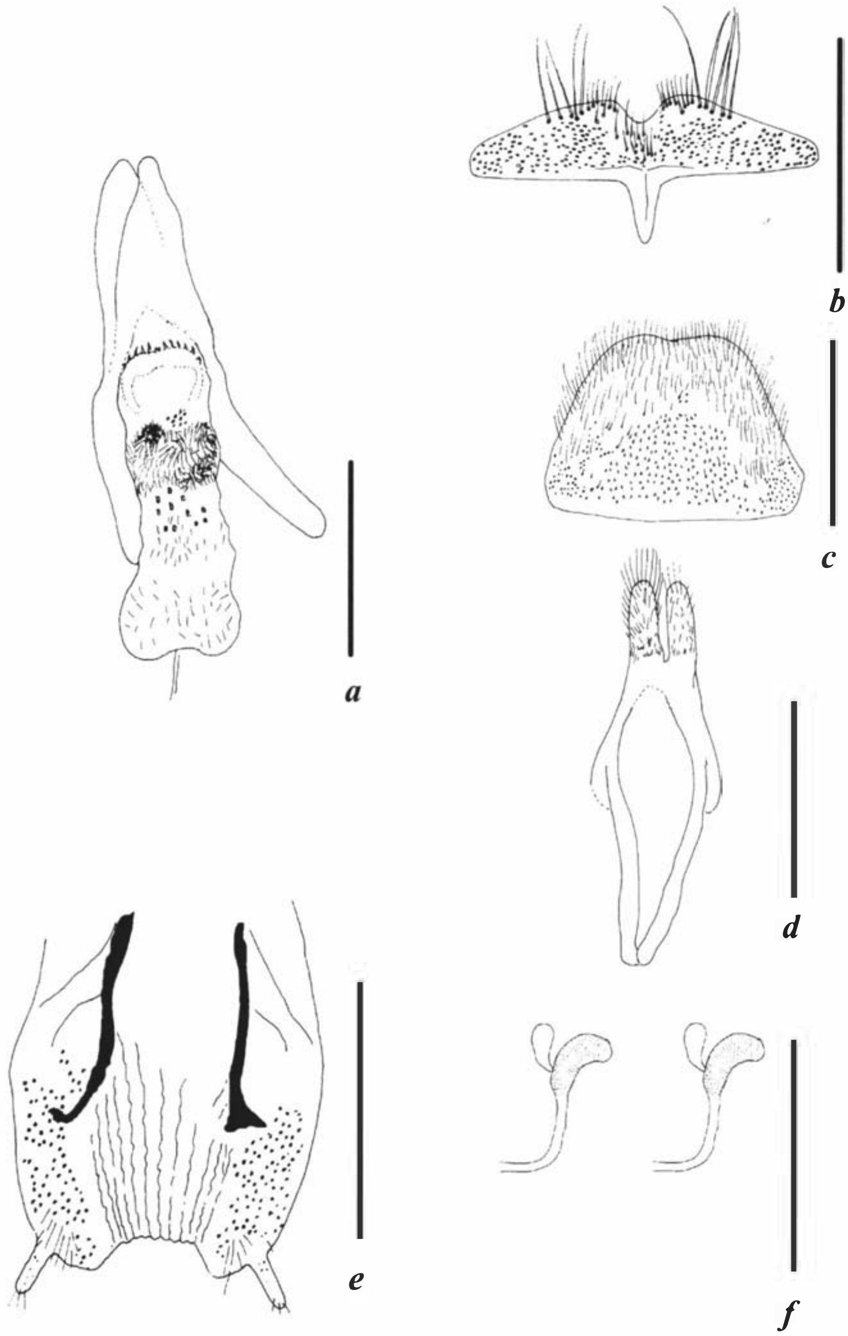


FIGURE 2.90 Terminalia of *U. bivittatus*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

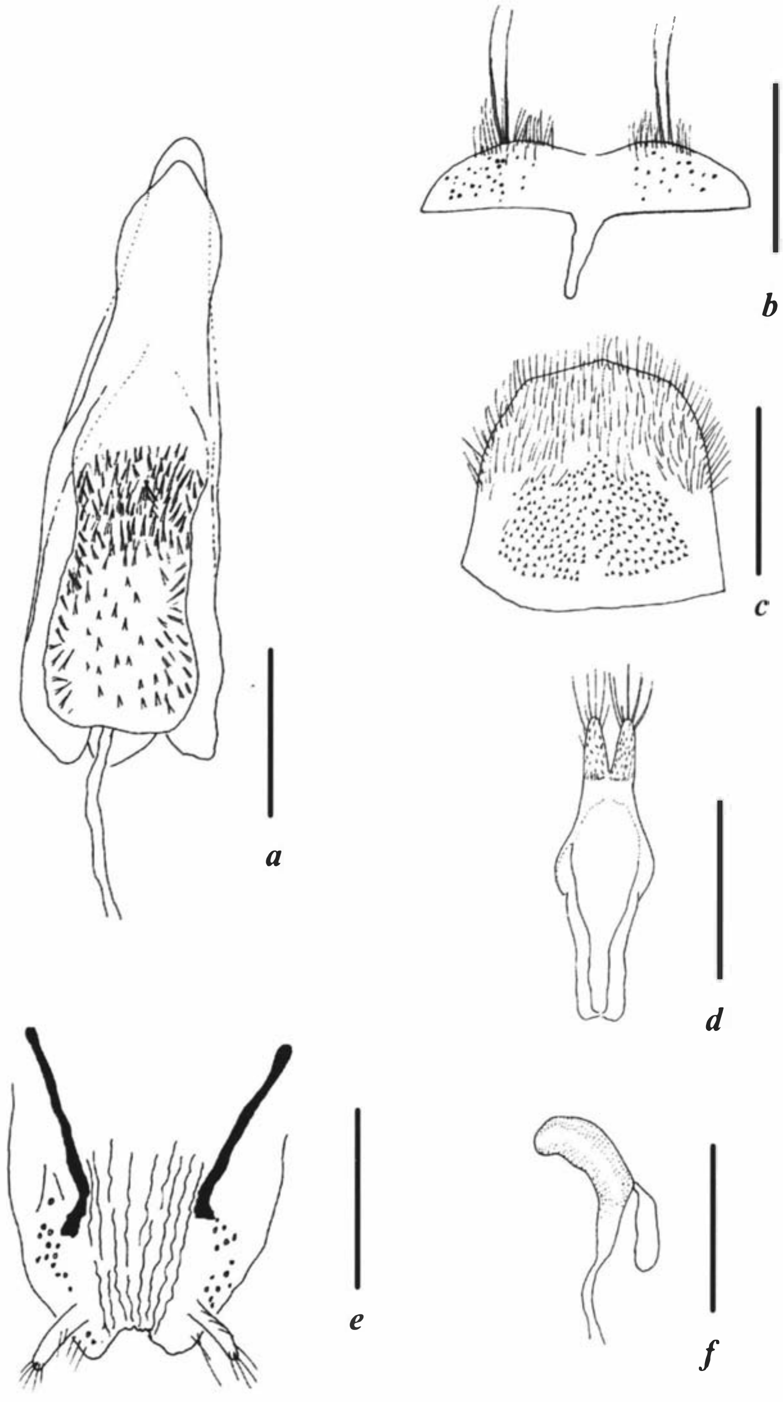


FIGURE 2.91 Terminalia of *U. discicollis*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.

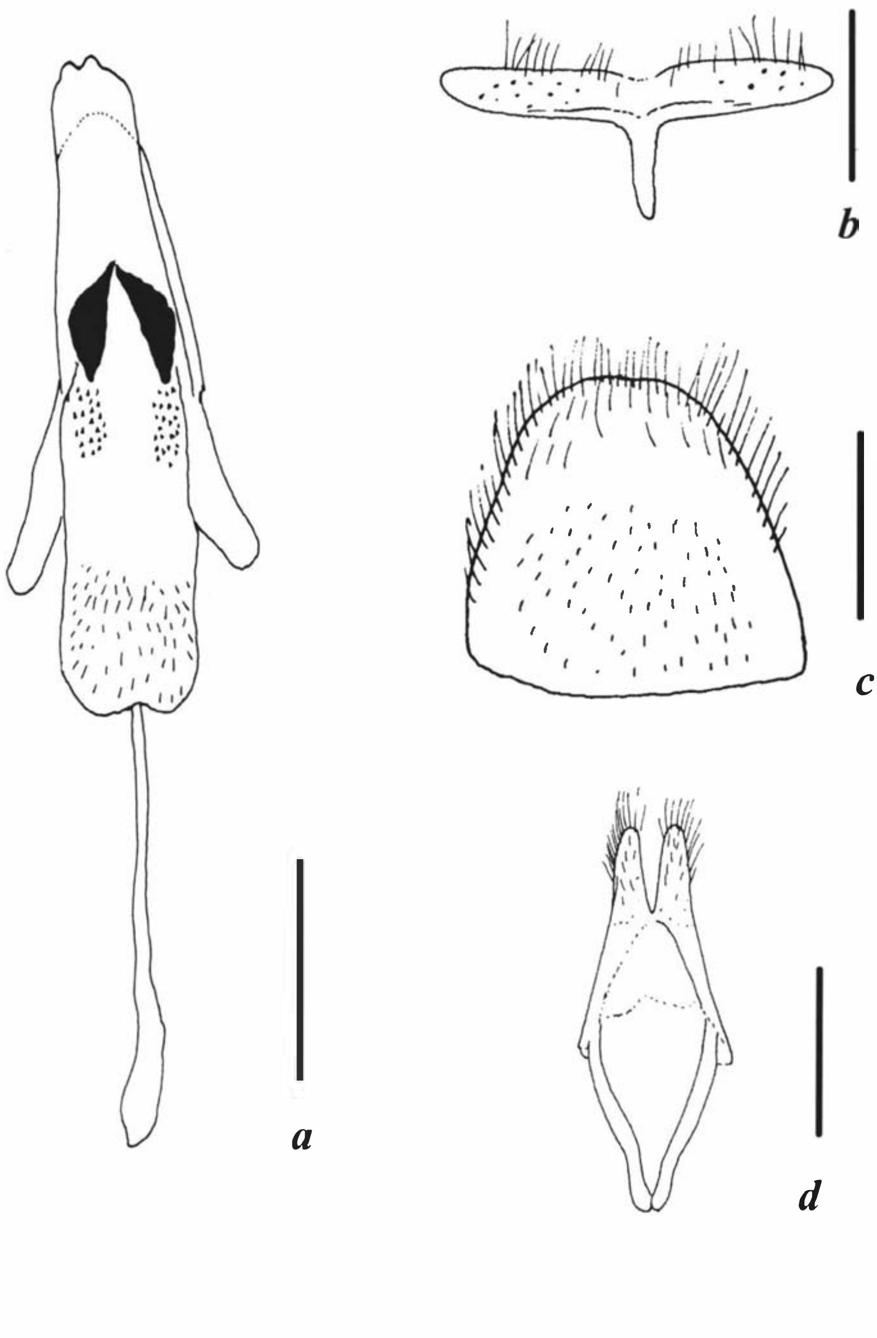


FIGURE 2.92 Male terminalia of *U. corrugicollis*. *a*, Median lobe and internal sac, ventral view; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen. Scale bars = 0.5 mm.

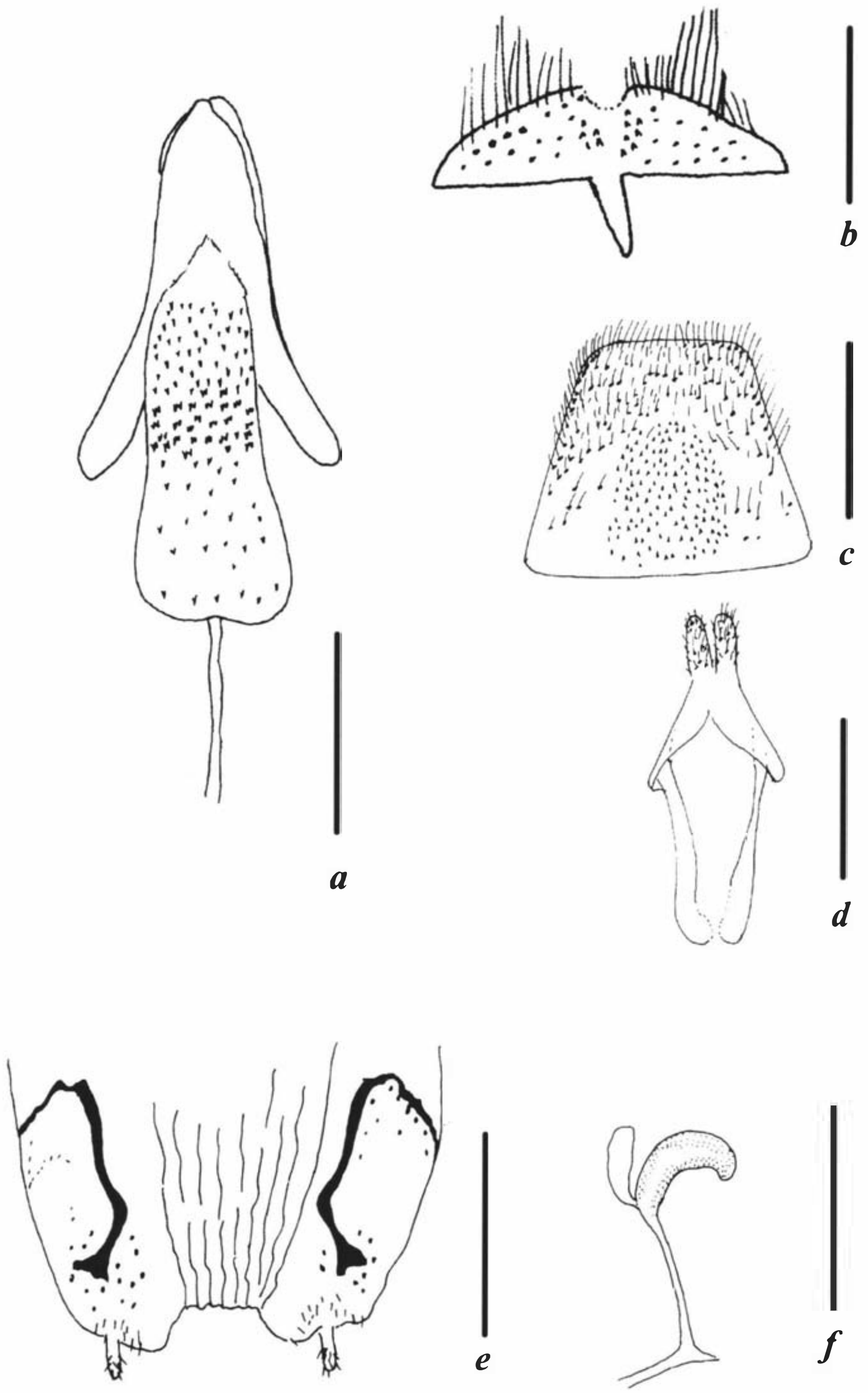


FIGURE 2.93 Terminalia of *U. lateroalbus*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatherca. Scale bars = 0.5 mm.

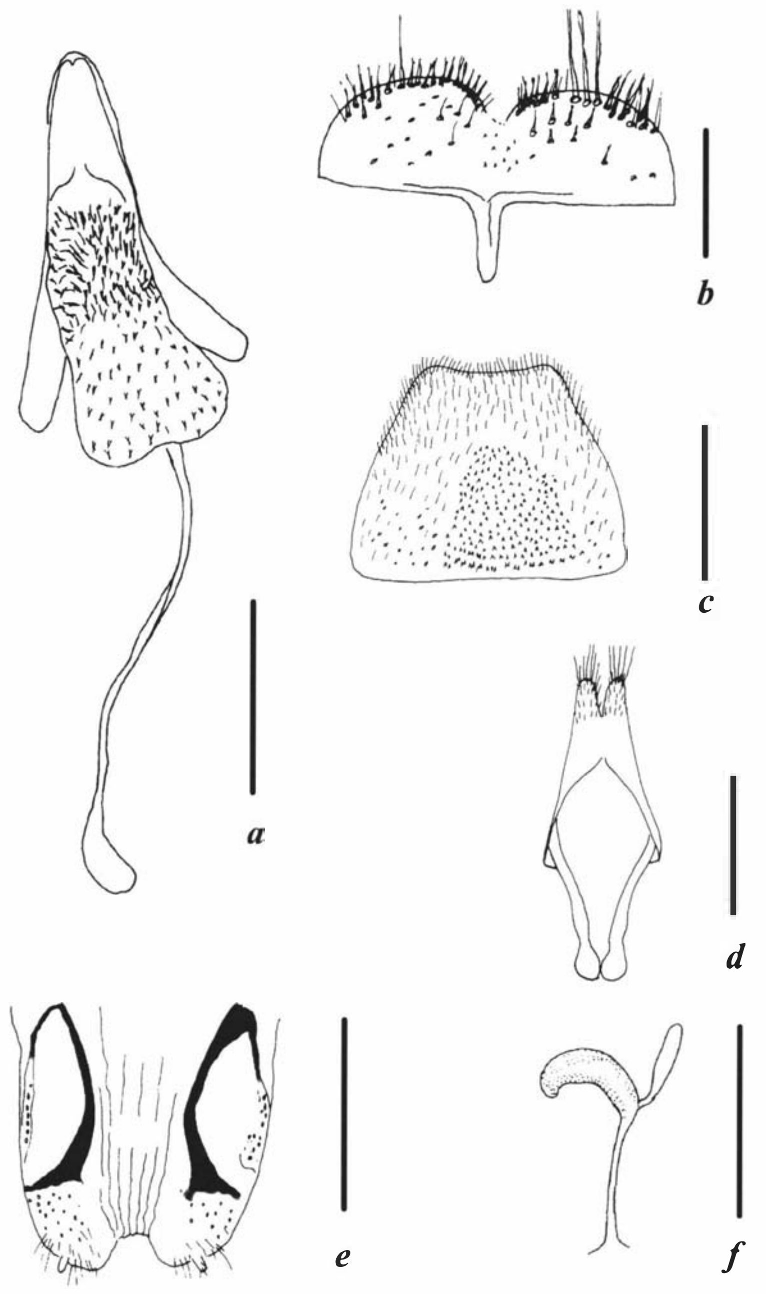
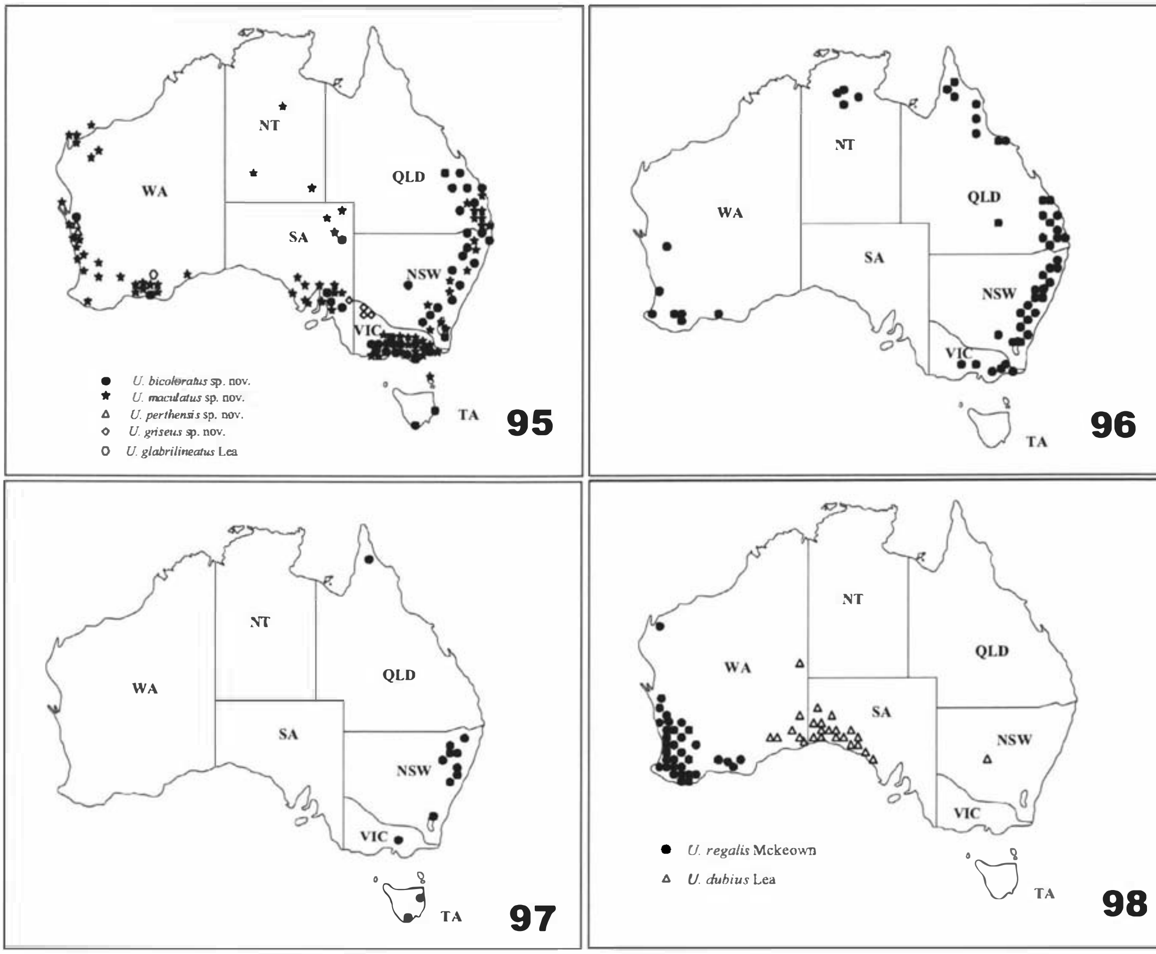
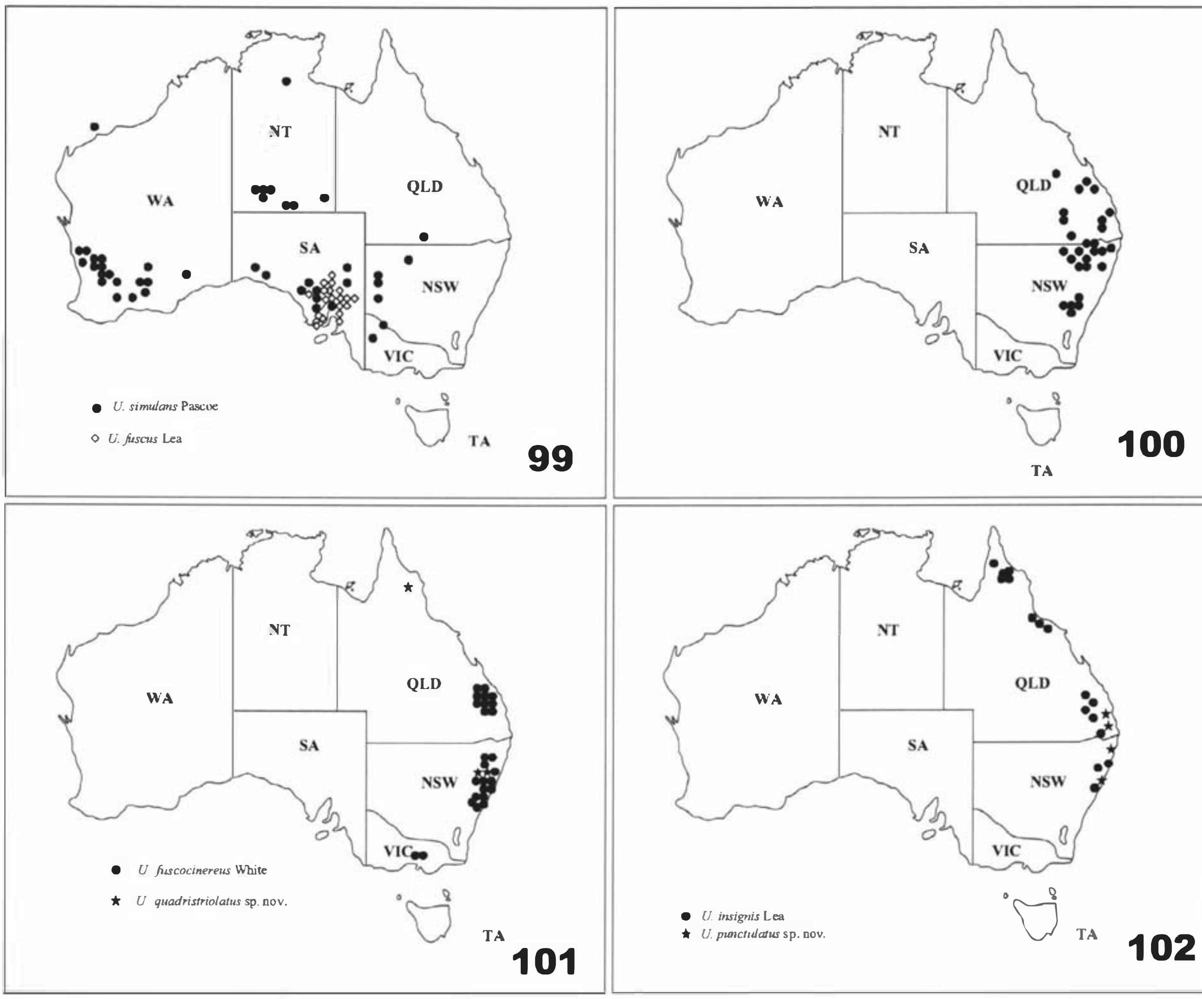


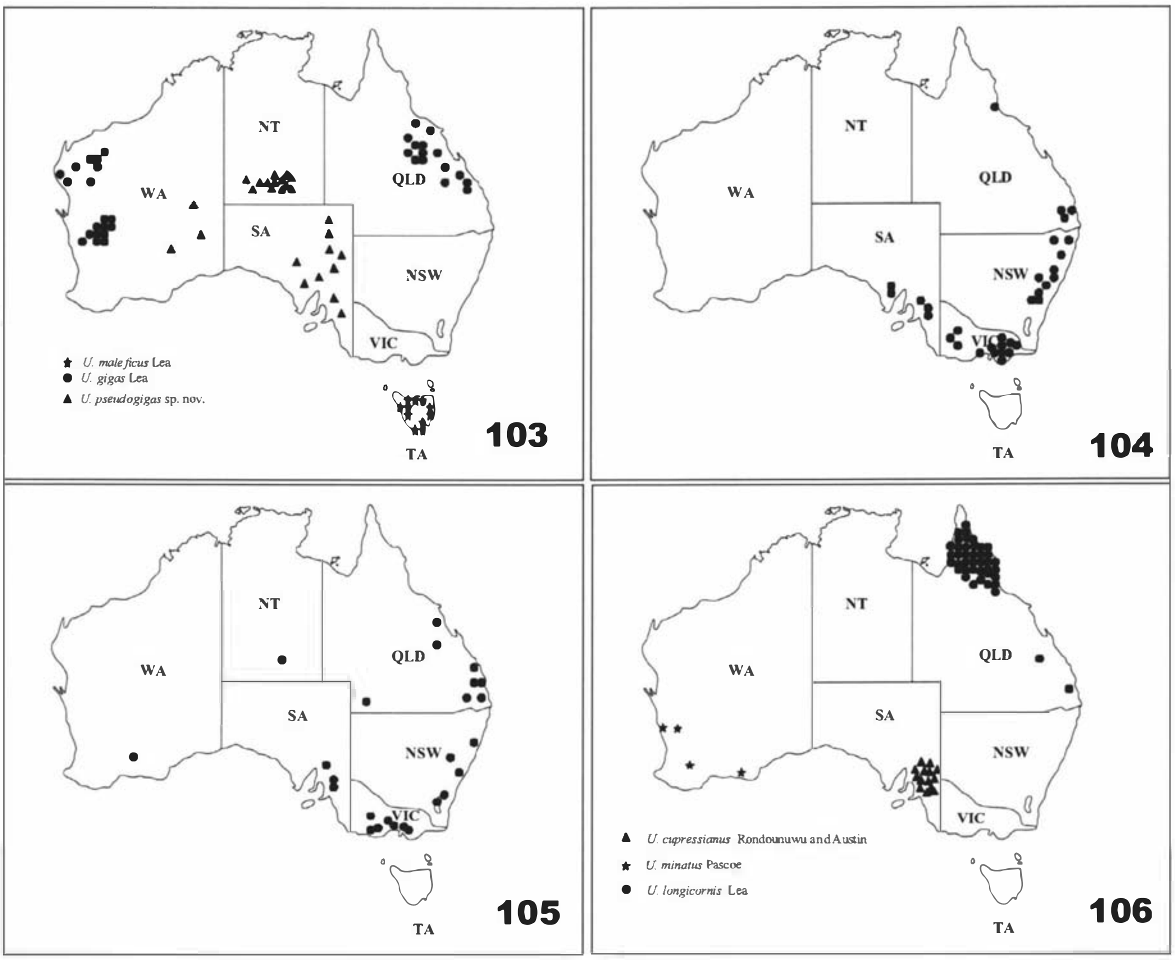
FIGURE 2.94 Terminalia of *U. bistriolatus*. Male: *a*, median lobe and internal sac; *b*, eighth sternite; *c*, eighth tergite; *d*, tegmen; female: *e*, ovipositor; *f*, spermatheca. Scale bars = 0.5 mm.



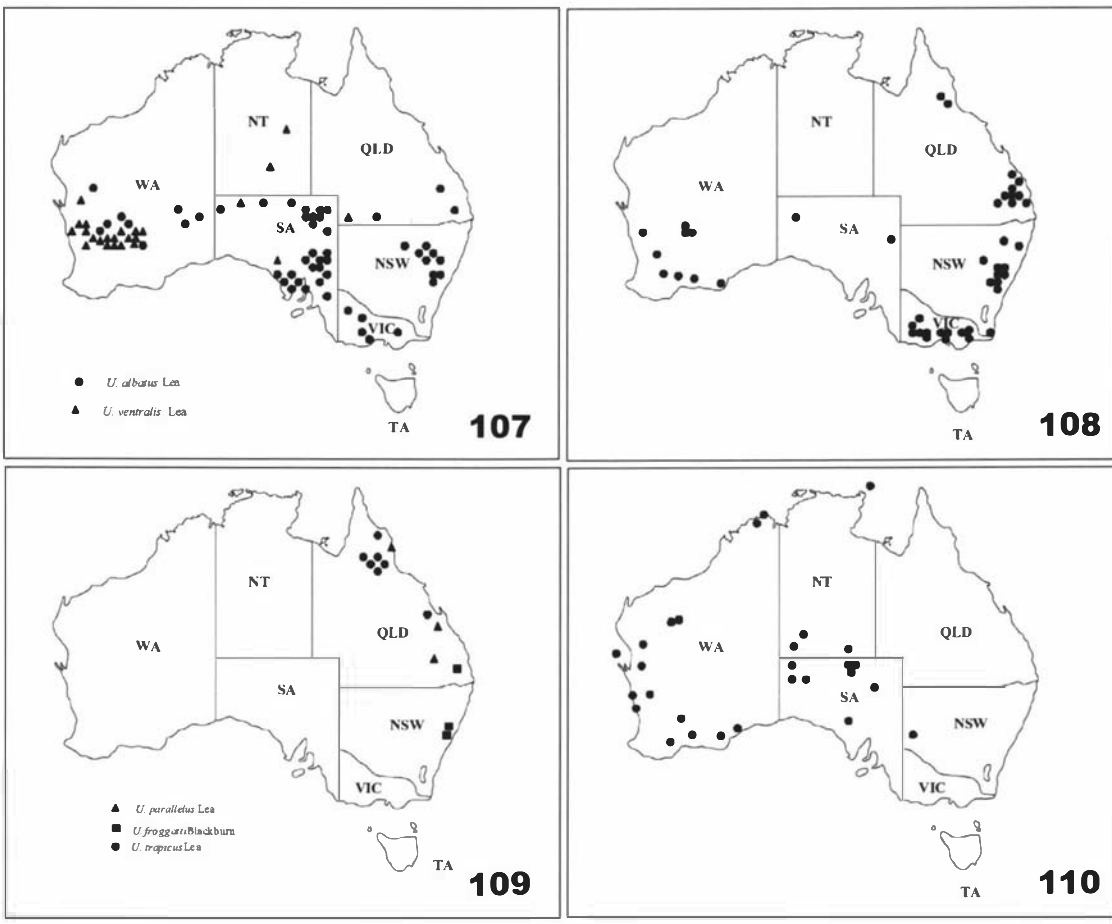
FIGURES 2.95 – 2.98 Known distribution of *Uracanthus* species: 95, *U. bicoloratus*, *U. maculatus*, *U. perthensis*, *U. griseus*, and *U. glabrilineatus*; 96, *U. triangularis*; 97, *U. pallens*; 98, *U. regalis* and *U. dubius*.



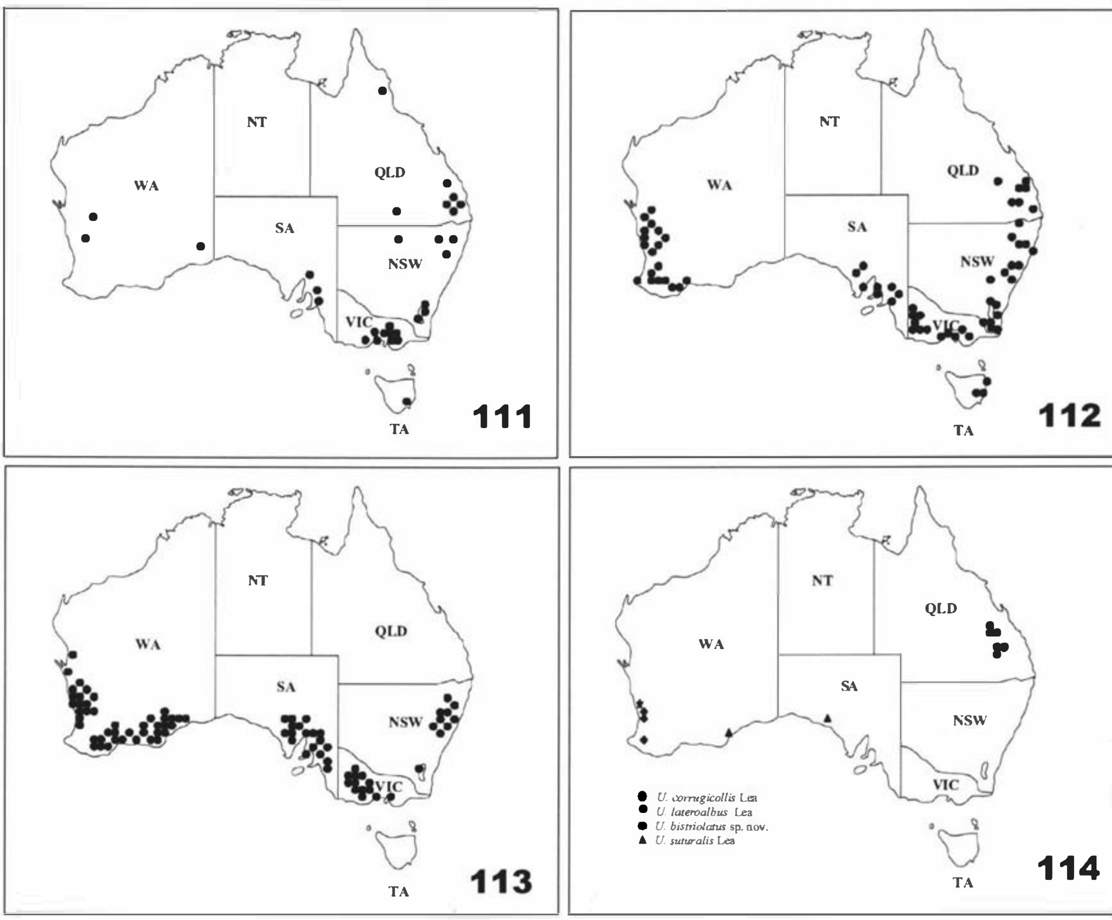
FIGURES 2.99 – 2.102 Known distribution of *Uracanthus* species: 99, *U. simulans* and *U. fuscus*; 100, *U. cryptophagus*; 101, *U. fuscocinereus* and *U. quadristriolatus*; 102, *U. insignis* and *U. punctulatus*.



FIGURES 2.103 – 2.106 Known distribution of *Uracanthus* species: 103, *U. maleficus*, U. *gigas* and *U. pseudogigas*; 104, *U. acutus*; 105, *U. loranthi*; 106, *U. cupressianus*, *U. minatus,* and *U. longicornis*.



FIGURES 2.107 – 2.110 Known distribution of *Uracanthus* species: 107, *U. albatus* and *U. ventralis*; 108, *U. strigosus*; 109, *U. parallelus*, *U. froggatti*, and *U. tropicus*; 110, *U. parvus*.



FIGURES 2.111 – 2.114 Known distribution of *Uracanthus* species: 111, *U. pertenuis*; 112, *U. bivittatus*; 113, *U. discicollis;* 114, *U. corrugicollis*, *U. lateroalbus*, *U. bistriolatus*, and *U. suturalis*.

CHAPTER 3

PHYLOGENY AND DISTRIBUTION OF THE AUSTRALIAN LONGICORN BEETLE GENUS *URACANTHUS* HOPE 1833

3.1 Introduction

The phylogenetic relationships and distributional patterns of *Uracanthus* species have not been investigated prior to this study. A phylogenetic treatment of the genus helps confirm its monophyly and infer species grouping, information of which can enhance our understanding of its taxonomic system, pest status and ecological roles. Equally important is the understanding of this genus distribution patterns on the Australian continent and Tasmania. This can provide information for applied entomologists in the development of pest control measures and selection of tree species for plantation in different parts of Australia.

The aims of this chapter are (1) to test the monophyly of the genus and to infer species groups using morphologic characters and cladistic methods, and (2) to define the areas of endemism using available current distribution data and discuss faunal composition and resemblance.

3.2 Phylogeny of *Uracanthus*

3.2.1 Introduction

The thorough taxonomic revision of the genus *Uracanthus* in the previous chapter allows me to undertake a phylogenetic analysis of these beetles. Henning (1966) developed a method for reconstruction of the branching of lineages, i.e. phylogenetic or cladistic analysis. His method for recovering the evolutionary history of taxa relied on apomorphies (derived character states). Synapomorphies (shared derived character states) are used to define monophyletic groups of organisms (an ancestral species and all of its descendants) (Kitching et al. 1998). In this section, I carried out a cladistic analysis of all *Uracanthus* species recognised in Chapter 2.

3.2.2 Materials and Methods

3.2.2.1 Ingroup taxa

In the analysis, 39 *Uracanthus* species recognised in the previous chapter were treated as ingroup taxa.

3.2.2.2 Outgroup taxa

An outgroup is a taxon that is outside the group under study and is used to determine which of two or more homologous character states that are found in the ingroup may be apomorphic and where to root the phylogenetic trees (Wiley 1981). In cladistic studies, a character state occurring in the outgroup(s) is assumed to be the plesiomorphic state if found in both in- and outgroups and a character state that is found only in the ingroup or a portion of it is assumed to be apomorphic (Watrous & Wheeler 1981; Wiley 1981).

Wiley et al. (1991) suggested that the most important outgroup is the sister group of the ingroup. However, Nixon and Carpenter (1993) argued that outgroups did not have to be the sister-groups of the ingroup or to be ancestral relative to the ingroup, and the outgroup /ingroup relationship should not be constrained in the analysis to establish monophyly of, and phylogenetic relationships within the taxa under study. Further assuming polarity *a priori* is not essential, and simultaneous (unconstrainted) analysis of both the ingroup and outgroup allows to search for informative character distributions of the observed similarities. Polarity then can be established *a posterior* using the outgroup as a root for the ingroup giving direction to the character transformations along a tree.

Having examined all Australian genera within the tribe Uracanthini, I found that *Scoleobrotus* was the genus that is most similar to *Uracanthus* morphologically. Therefore, four species of *Scoleobrotus*: *S. westwoodi*, *S. bimaculatus*, *S. uniformis,* and *U. variegatus* were designated as outgroups for this study.

3.2.2.3 Characters and character coding

Originally, 74 characters were selected, measured and coded for each taxon. Nineteen characters were found to be uninformative and then excluded from the analysis. The remaining 55 characters were used for the analysis. The characters and character states used in this study are shown in Table 3.1. All characters were recorded using Nexus Data Editor (NDE) Version 0.5.0 (Page 2001). Most characters were binary except characters 16, 17, 40, 41 and 55, which were coded as 0, 1, or 2 (Table 3.2). All characters were treated as unordered (Fitch Optimisation) (Fitch 1971a, 1971b). Character states were scored as question marks (?) for missing data.

3.2.2.4 Cladistic methods

The parsimony criterion has been widely used as the basis of dendrogram-generating algorithms in cladistic analysis. It infers phylogenies by finding the cladograms with the least evolutionary change (Felsenstein 1983). The parsimony method is probably still the best technique for examining morphological characters (Maddison & Maddison 1992). Therefore, all analyses were conducted using the parsimony program PAUP*4.0b10

PC version (Swofford 2002) in this study. TreeView 1.6.6 was then used for tree manipulation (Page 1996).

An exhaustive searching could not be performed because of the large size of the data set. Therefore, heuristic methods searching for the most parsimonious trees were applied with the following settings: branch-swapping algorithm: tree-bisection-reconnection (TBR), steepest descent option not in effect initial 'MaxTrees' setting = 1000, and branches collapsed (creating polytomies) if maximum branch length is zero. Character states were optimized *a posteriori* using ACCTRAN criterion (de Pinna 1991). Majority rule consensus trees (Margush and McMorris 1981) were used to combine clades that were common in at least 50% of all trees. Bootstrapping (1000 replicates) was conducted using equivalent settings for the parsimony search to assess levels of support for individual clades (Felsenstein 1985).

Tree length (L), consistency index (CI), and retention index (RI) are three parameters used for measuring reliability of trees generated in the cladistic analysis (Kluge and Farris 1969, Farris 1989). The L is affected by the number of characters used in the data set and the weights for characters. The fewer the homoplasious steps on a tree, the shorter the length and the greater the descriptive power of the tree for a set of characters. The tree with minimum length is considered most parsimonious. The CI is measure of fit between a character set and a tree. When no homoplasy is required, the fit is perfect, and CI = 1. Therefore, the more homoplasy required by a tree, the greater the amount of change for the character set and the lower the CI, down to zero, i.e. the value of CI diminishes as the amount of homoplasy on the tree increases. In addition, the size of data set also affects CI, with the larger the data set, the smaller the CI. The RI is a measure of the fraction of potential synapomorphy retained as synapomorphy on the tree. RI of 1 for a character with the potential for synapomorphy indicates that it is completely consistent on the tree, whereas a value of zero indicates that the character has maximum possible homoplasy on the tree with none of its states acting as full synapomorphy.

All characters were equally weighted in the initial analysis. This was followed by a successive character weighting (Farris 1969) based on the maximum value of the rescaled consistency index. Farris (1969) suggested that the successive weighting may have the advantage of providing means of basing groups on more reliable characters without making prior decision on weighting. In practice, this option normally reduced the ambiguity of complex data sets and number of trees (Wang et al. 1999; Ceotto & Mejdalani 2004). The analysis was performed with the base weight set to 1000 (Farris 1989; Carpenter 1988, 1994) to find maximally consistent trees and the best fit of the characters over all equally parsimonious trees. This procedure was repeated until the weights and number of trees no longer changed.

Table 3.1 List of characters and character states used in the phylogenetic analysis of the *Uracanthus* (Character states are in square brackets).

Head

1. Position of median frontal groove: terminating just behind eyes [0]; terminating at posterior edge of vertex [1].
2. Relative length of distance between lower lobes of eyes (DLE) and distance between upper lobes of eyes (DUE): DLE $< 2 \times$ DUE [0]; DLE $> 2 \times$ DUE [1].
3. Relative length of genal length (GL) and distance between genae (DG): GL $< 0.5 \times$ DG [0]; GL $> 0.5 \times$ DG [1].
4. Relative length of distance between upper lobes of eye (DUE) and distance between eyes on ventral side (DVE): DUE $< 1 \times$ DVE [0]; DUE $> 1 \times$ DVE [1].
5. Postclypeus: convex [0]; flattened [1].

6. Postclypeus shape: triangular [0]; semicircular [1].

7. Punctures on clypeus: not punctate [0]; punctate [1].

Antennae

8. Number of antennal segments: 12 [0]; 11 [1].

9. Antennal segments serrate: yes [0]; no [1].

10. Apex of antennal segments 4-10: not produced at one side [0]; produced at one side [1].

11. Relative length of antennae and body: antennae longer than body [0]; antennae shorter than or as long as body [1].

Prothorax

12. The fringe on antennal segments in male: present [0]; absent [1].

13. Ratio of anterior margin width (AW) to posterior margin width (PW): AW > PW [0]; AW = PW [1].

14. Ratio of pronotal length (PL) to posterior margin width (PW): PL > PW [0]; PL < PW [1].

15. Disc binodulose: yes [0]; no [1].

16. Transverse rugae on disc: absent [0]; present only near anterior and/or posterior margins [1]; present throughout [2].

17. Longitudinal stripes of pubescence on disc: absent [0]; 2 [1]; more than 3 [2].

18. A large median longitudinal hairless or very sparsely haired area on disc (Fig. 3.1a): present [0]; absent [1].

19. A large median longitudinal hairless or very sparsely haired stripe at each side (Fig. 3.1b): present [0]; absent [1].

20. Pubescent pattern on disc: pubescence not arranged in longitudinal lines [0]; arranged in longitudinal lines [1].

21. Pubescence colour on disc: unicoloured [0]; more than one colour [1].

Mesothorax

22. Pubescence on scutellum (Fig. 3.2): sparse or none [0]; dense [1].

Elytra

23. Ratio of elytral length (EL) to prothoracic length (PL): EL > 5 × PL [0]; EL < 5 × PL [1].

24. Ratio of elytral length (EL) to shoulder width (SW): EL > 4 × SW [0]; EL < 4 × SW [1].

25. Punctures on basal half of disc: none or very sparse [0]; dense [1].

26. A glabrous or short-pubescent sub-basal subtriangular mark on each elytron: present [0]; absent [1].

27. The above mark margined with a line of dense pubescence: yes [0]; no [1].

28. Three or four hairless small marks at base: present [0]; absent [1].

29. Disc of each elytron with several longitudinal stripes of pubescence: yes [0]; no [1].

30. Disc of each elytron with a large longitudinal glabrous stripe near suture: yes [0]; no [1].

31. Apical area hairless or sparsely haired: yes [0]; no [1].

32. Apical hairless or sparsely haired area margined with a line of dense pubescence: yes [0]; no [1].

33. Elytral apex: bispinose (spines may be reduced to the minimum making the apex look truncate or emarginate) [0]; unispine at suture (spine may be reduced to the minimum) [1].

34. At least two raised longitudinal carinae present on disc: yes [0]; no [1].

35. Pubescent colour on disc: unicoloured [0]; more than one colour [1].

36. Pubescent pattern on disc: not arranged in longitudinal lines [0]; arranged in longitudinal lines [1].

Abdomen

37. Each of three basal sternites of males with a medial tuft of hairs: yes [0]; no [1].

38. Apex of male terminal sternite: truncate [0]; rounded or rounded with a notch [1].

Male terminalia

39. Apex of ventral median lobe: emarginate or notched [0]; rounded or pointed [1].

40. Apex of dorsal median lobe: rounded [0]; pointed [1]; truncate or shallowly emarginated [2].

41. Relative length of ventral and dorsal lobes: ventral lobe longer than dorsal lobe [0]; ventral lobe shorter dorsal lobe [1]; ventral lobe as long as dorsal lobe [2].

42. A pair of chitinous structures at base of internal sac: present [0]; absent [1].

43. Sclerotised arch with blunt spines in internal sac: present [0]; absent [1].

44. Multi-branched spines in first section of internal sac: present [0]; absent [1].

45. Simple spines in first section of internal sac: present [0]; absent [1].

46. Dense dark areas of long simple spines in first section of internal sac: present [0]; absent [1].

47. Scale-like spines in first section of internal sac: present [0]; absent [1].

48. Unspined gap between first and second sections of internal sac: present [0]; absent [1].

49. Multi-branched spines in second section of internal sac: present [0]; absent [1].

50. Simple spines in second section of internal sac: present [0]; absent [1].

51. Scale-like spines in second section of internal sac: present [0]; absent [1].

52. Spines in apical area of second section of internal sac: present [0]; absent [1].

53. The eighth sternite at sides: obliquely truncate [0]; rounded [1].

54. Microspines in mid area on ventral surface of eighth sternite: present [0]; absent [1].

55. Apex of eighth tergite: rounded or slightly pointed [0]; truncate [1]; emarginate [2].

a b

FIGURE 3.1 Prothorax of *U. quadristriolatus.* (a) dorsal view and *U. fuscocinereus* (b), lateral view.

a b

FIGURE 3.2 Scutellum of *U. pallens* (a) and *U. longicornis* (b), dorsal view.

Table 3.2 Data matrix for outgroups and *Uracanthus* species used in the cladistic analysis.

Taxa	Characters					
	1	1 1 1 1 1 1 1 1 1 2	2 2 2 2 2 2 2 2 2 3	3 3 3 3 3 3 3 3 3 4	4 4 4 4 4 4 4 4 4 5	5 5 5 5 5
	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5
U. bicoloratus	0 0 0 0 0 1 1 1 1 1	1 1 0 0 0 2 1 1 1 0	1 1 1 0 0 0 0 1 1 1	0 1 0 0 1 0 1 1 0 1	0 0 1 0 0 1 1 0 1 0	1 0 0 0 0
U. maculatus	0 0 0 0 0 1 1 1 1 1	1 1 0 0 0 1 1 1 1 0	1 1 1 1 0 0 0 1 1 1	0 0 0 0 1 0 1 1 0 0	0 0 1 0 0 0 1 0 1 0	1 0 0 0 2
U. perthensis	0 0 0 1 0 1 1 1 1 1	1 1 0 0 0 1 1 1 1 0	0 1 1 1 0 0 0 1 1 1	0 1 0 0 0 1 1 1 0 0	0 0 1 1 0 1 1 0 1 0	1 0 0 0 2
U. griseus	1 0 0 1 0 1 1 1 1 1	0 1 0 0 0 1 1 1 1 0	0 1 1 0 0 0 0 1 1 1	0 1 0 0 1 0 1 1 0 1	0 0 1 1 0 1 1 1 1 0	1 0 0 1 0
U. glabrilineatus	0 0 0 1 0 1 1 1 1 1	1 1 0 0 0 1 0 1 1 1	0 0 1 1 0 0 1 1 0 1	1 1 0 0 0 1 1 1 ? ?	? ? ? ? ? ? ? ? ? ?	? ? ? ? ?
U. triangularis	0 0 0 0 0 1 1 1 1 1	1 1 0 0 0 2 1 1 1 0	1 1 0 0 0 0 0 1 1 1	0 0 0 0 1 0 1 1 0 0	0 0 1 1 0 1 1 0 1 0	1 0 0 1 2
U. pallens	1 0 0 1 0 0 1 1 1 1	1 1 0 0 0 1 1 1 1 0	1 0 1 0 0 0 0 1 1 1	0 0 0 0 1 0 1 1 0 1	2 0 1 1 0 1 1 0 1 0	1 0 0 1 0
U. regalis	1 0 1 1 0 0 1 1 1 1	1 1 0 0 0 2 1 1 1 0	1 1 1 0 0 0 0 1 0 1	0 1 0 0 0 1 1 1 0 1	0 0 1 1 0 0 1 0 1 0	1 0 0 0 0
U. dubius	0 0 0 1 0 0 1 1 1 1	1 1 0 0 0 2 1 1 1 0	0 1 1 1 0 0 1 1 0 1	0 1 0 0 0 1 1 1 0 0	0 0 1 1 0 0 1 0 1 0	1 0 0 1 2
U. simulans	0 0 0 1 1 1 1 1 1 1	1 1 0 0 0 2 1 1 1 0	0 1 1 1 0 0 1 1 1 1	1 1 1 0 0 0 1 1 0 0	2 0 1 1 0 0 1 0 1 0	1 0 0 1 0
U. fuscus	0 0 0 1 0 1 1 1 1 1	1 1 0 0 0 1 1 1 1 0	0 1 1 1 0 0 1 1 1 1	1 1 1 0 0 0 1 1 0 0	2 0 1 0 0 0 1 1 1 0	1 1 0 1 0
U. cryptophagus	0 0 0 1 0 1 1 1 1 1	1 1 0 0 0 2 2 1 1 0	0 1 1 0 0 0 1 1 0 1	1 1 0 0 0 1 1 1 0 0	0 0 1 0 0 0 0 1 1 0	1 0 0 0 2
U. fuscocinereus	0 0 0 1 0 0 1 1 1 0	1 1 0 0 0 2 1 0 0 0	0 1 1 0 0 1 1 0 1 1	1 1 0 0 1 0 1 1 1 0	1 1 1 0 0 0 0 1 1 0	1 0 0 0 2
U. quadristriolatus	0 0 1 1 0 0 1 1 1 0	1 1 0 0 0 2 1 0 0 0	0 1 1 1 0 1 1 0 1 1	1 1 0 0 0 0 1 1 1 0	0 1 1 0 0 0 0 1 1 0	1 0 0 1 2
U. insignis	0 1 1 0 0 0 0 1 1 1	1 1 0 0 0 2 1 0 0 0	1 1 1 1 0 1 1 1 1 1	0 1 0 0 1 0 1 0 1 1	1 1 1 0 0 0 1 1 0 1	1 0 0 1 1
U. punctulatus	0 0 1 0 1 0 0 1 1 1	1 1 0 0 0 2 1 0 0 0	0 0 1 1 0 1 1 1 1 1	1 1 0 0 0 0 1 0 1 0	1 1 1 0 0 0 0 0 0 1	1 0 0 1 1
U. maleficus	0 0 0 0 1 1 1 1 1 1	0 1 0 0 1 0 1 0 0 0	0 1 0 1 0 1 1 1 1 1	1 1 0 1 0 0 1 1 1 0	0 1 1 1 0 1 1 1 1 0	1 1 0 1 2
U. gigas	1 0 0 0 1 1 1 1 1 0	0 1 0 1 1 0 0 1 1 1	0 1 0 0 0 1 1 1 1 1	1 1 0 0 0 0 1 1 0 1	0 1 1 1 0 1 1 1 1 0	1 1 0 1 0
U. pseudogigas	0 0 0 0 1 1 1 1 1 1	0 1 0 1 0 0 0 1 1 1	0 0 0 1 0 1 1 1 1 1	1 1 1 0 0 0 1 1 0 1	1 1 1 1 0 1 1 1 1 0	1 1 1 1 2
U. acutus	0 0 0 1 0 1 1 1 1 0	1 1 0 0 0 1 2 1 0 0	0 0 1 0 1 1 1 1 1 1	1 1 1 0 0 0 1 1 1 0	0 1 1 1 0 1 1 1 1 0	1 1 0 1 2
U. loranthi	0 0 0 0 1 1 1 1 1 0	1 1 0 0 0 2 2 1 0 0	0 0 1 1 1 1 1 1 1 1	1 1 0 0 0 0 1 1 1 0	2 1 1 1 0 1 1 1 1 0	1 1 0 1 2
U. cupressianus	0 0 0 0 1 1 0 1 1 0	1 1 0 0 0 2 1 1 0 0	0 0 1 0 1 1 1 1 1 1	1 1 1 0 0 0 1 1 1 2	1 1 1 0 0 1 1 0 1 0	1 1 1 1 2
U. minatus	0 0 0 0 1 0 1 1 1 0	0 1 0 0 0 2 1 1 0 1	0 1 1 1 1 1 1 1 1 1	1 1 1 0 0 0 1 1 1 0	1 1 1 0 0 1 1 1 1 0	1 0 0 0 1
U. longicornis	0 1 0 1 1 1 1 1 1 1	0 1 0 0 1 2 0 1 1 1	0 1 1 1 0 1 1 1 1 1	1 1 1 0 0 0 1 1 1 0	0 1 1 0 0 1 1 0 0 0	1 0 0 1 2
U. albatus	0 0 0 1 1 1 1 1 1 1	0 1 0 0 0 2 0 1 1 0	0 1 1 1 1 1 1 1 0 1	1 1 0 0 0 1 0 1 1 0	1 1 1 0 0 1 1 0 1 0	1 0 0 1 2
U. ventralis	0 1 0 1 1 1 1 1 1 1	0 1 0 0 0 2 0 1 1 0	0 1 1 1 1 1 1 1 0 1	1 1 1 0 0 1 0 1 1 0	1 1 1 0 0 1 1 0 1 0	1 0 0 1 2
U. strigosus	0 0 0 1 1 1 1 1 1 0	1 1 0 0 0 2 2 1 1 1	0 1 1 0 1 1 1 1 0 1	1 1 0 0 0 1 0 1 0 0	0 1 1 1 0 1 1 0 1 0	1 0 0 1 2
U. parallelus	0 0 0 0 0 1 1 1 1 0	1 1 1 0 1 1 0 1 1 0	0 1 1 0 0 1 1 1 1 1	1 1 0 0 0 0 1 1 1 2	1 1 1 0 0 1 1 0 1 0	1 0 0 1 0
U. froggatti	0 0 0 1 0 0 0 1 1 0	1 1 1 0 1 1 0 1 1 0	0 1 1 0 0 1 1 1 1 1	1 1 0 0 0 0 1 1 1 0	1 1 1 0 0 1 1 1 1 0	1 1 0 1 0
U. tropicus	0 1 0 1 0 0 0 1 1 0	0 1 1 0 0 1 0 1 1 0	0 1 1 0 0 1 1 1 1 1	1 1 0 0 0 0 1 1 1 0	1 1 1 1 0 1 1 1 1 0	1 1 0 1 0
U. parvus	0 0 0 1 0 1 0 1 1 1	0 0 0 0 0 2 0 1 1 0	0 0 1 0 0 1 1 1 1 1	1 1 0 0 0 0 1 1 1 0	0 1 1 0 1 1 0 0 1 0	0 0 0 1 2
U. pertenuis	1 0 0 1 0 1 0 1 1 1	0 0 0 0 0 2 1 0 0 1	0 0 1 0 0 1 1 1 0 0	1 1 0 0 0 1 1 1 1 0	1 1 1 0 1 1 0 0 1 0	0 0 0 1 2
U. bivittatus	0 1 0 1 0 0 1 1 1 0	1 1 0 0 0 2 1 0 0 1	1 0 1 0 0 1 1 1 0 0	1 1 0 0 1 1 1 1 1 0	1 1 0 1 0 0 1 0 1 0	1 0 0 1 2
U. discicollis	1 1 0 1 0 0 0 1 1 0	0 1 0 0 1 1 1 0 0 1	0 0 1 0 0 1 1 1 0 0	1 1 1 1 0 1 1 1 1 0	1 1 1 1 0 1 1 1 1 0	1 1 0 1 0
U. corrugicollis	0 0 0 1 1 1 1 1 1 ?	? 1 0 1 0 2 0 1 1 0	0 0 0 1 0 1 1 1 1 1	1 1 1 1 0 0 1 1 0 0	0 0 1 1 0 1 1 0 1 0	1 0 1 1 0
U. lateroalbus	1 0 0 1 0 0 1 1 1 1	1 1 0 0 0 2 0 1 1 0	1 1 1 1 0 1 1 1 1 1	1 1 1 0 1 0 1 1 1 0	2 1 1 1 0 1 1 1 1 0	1 0 0 0 1
U. bistriolatus	1 1 0 1 0 0 1 1 1 1	0 0 0 0 0 2 0 1 1 0	0 1 1 1 0 1 1 1 1 1	1 1 0 0 0 0 1 1 0 0	1 1 1 1 0 1 1 0 1 0	1 0 0 1 2
U. suturalis	0 0 0 1 0 1 1 1 1 1	1 1 0 0 0 1 0 1 1 0	0 1 1 1 0 1 1 1 0 1	1 1 1 0 0 1 1 ? ? ?	? ? ? ? ? ? ? ? ? ?	? ? ? ? ?
U. ater	0 0 0 0 1 1 0 1 1 1	0 1 0 1 0 2 0 1 1 0	0 1 1 1 0 1 1 1 1 1	1 1 0 0 0 0 1 ? ? ?	? ? ? ? ? ? ? ? ? ?	? ? ? ? ?
S. bimaculatus	0 1 0 0 1 1 0 0 0 1	0 1 0 1 0 2 0 1 1 0	0 1 1 1 1 1 1 1 1 1	1 1 0 1 0 0 1 0 1 ?	1 0 1 0 0 0 1 1 1 1	1 0 0 0 2
S. uniformis	0 0 0 0 1 1 0 0 0 1	1 1 0 1 0 2 0 1 1 0	0 1 0 1 1 1 1 1 1 1	1 1 0 1 0 0 1 0 1 1	1 0 1 0 0 0 1 1 1 1	1 0 0 1 2
S. westwoodi	1 0 1 1 1 1 0 0 0 1	0 1 0 0 0 2 0 1 1 0	0 1 1 1 1 1 1 1 1 1	1 1 0 1 0 0 1 0 1 0	2 0 1 0 0 0 1 1 1 1	1 0 0 0 2
S. variegatus	0 0 0 0 1 1 0 0 0 1	0 1 0 0 0 2 0 1 1 0	0 1 1 1 1 1 1 1 1 1	1 1 0 1 0 0 1 0 1 0	2 0 0 0 0 0 1 1 1 1	1 0 0 1 1

3.2.3 Results and Discussion

3.2.3.1 Trees obtained

The initial analysis with all characters of equal weight produced 100 equally parsimonious trees (L = 265, CI = 0.2264, RI = 0.1291). The 50% majority rule consensus tree from these trees is shown in Fig. 3.3. It is indicated that the trees generated in the initial analysis were quite variable in topology and the polytomies at higher level were largely unsolved.

Following the successive character weighting procedure, 15 equally parsimonious trees were obtained (L = 340, CI = 0.5316, RI = 0.4391). Examination of these 15 trees shows that they only differed in the arrangement of a few species in terminal clades. The 50 % majority rule consensus tree from the 15 trees is shown in Fig. 3.4. Comparison of Figs 3.3 and 3.4 indicates that they are similar in topology but the polychotomy is largely resolved in Fig. 3.4. The bootstrap analysis indicates that most branches in Fig. 3.4 are significantly supported. The following discussions were thus based on Fig. 3.4.

3.2.3.2 Character analysis

The minimum number of steps required to explain the evolution of character state are given in the PAUP output and diagnostics of the distribution of each character in terms of its L (steps), CI and RI on the tree (Fig. 3.4) is shown in Table 3.3. It is indicated that characters 8, 9, 12, 13, 26, 27, 28, 32, 37, 38, 45, 50 and 51 have maximum CI and RI and minimum L, suggesting that they function as good synapomorphies supporting monophyletic species groups without reversal and convergence. The characters in between may function as synapomorphies but have some degree of reversal or convergence and need one or more additional steps to become full synapomorphies.

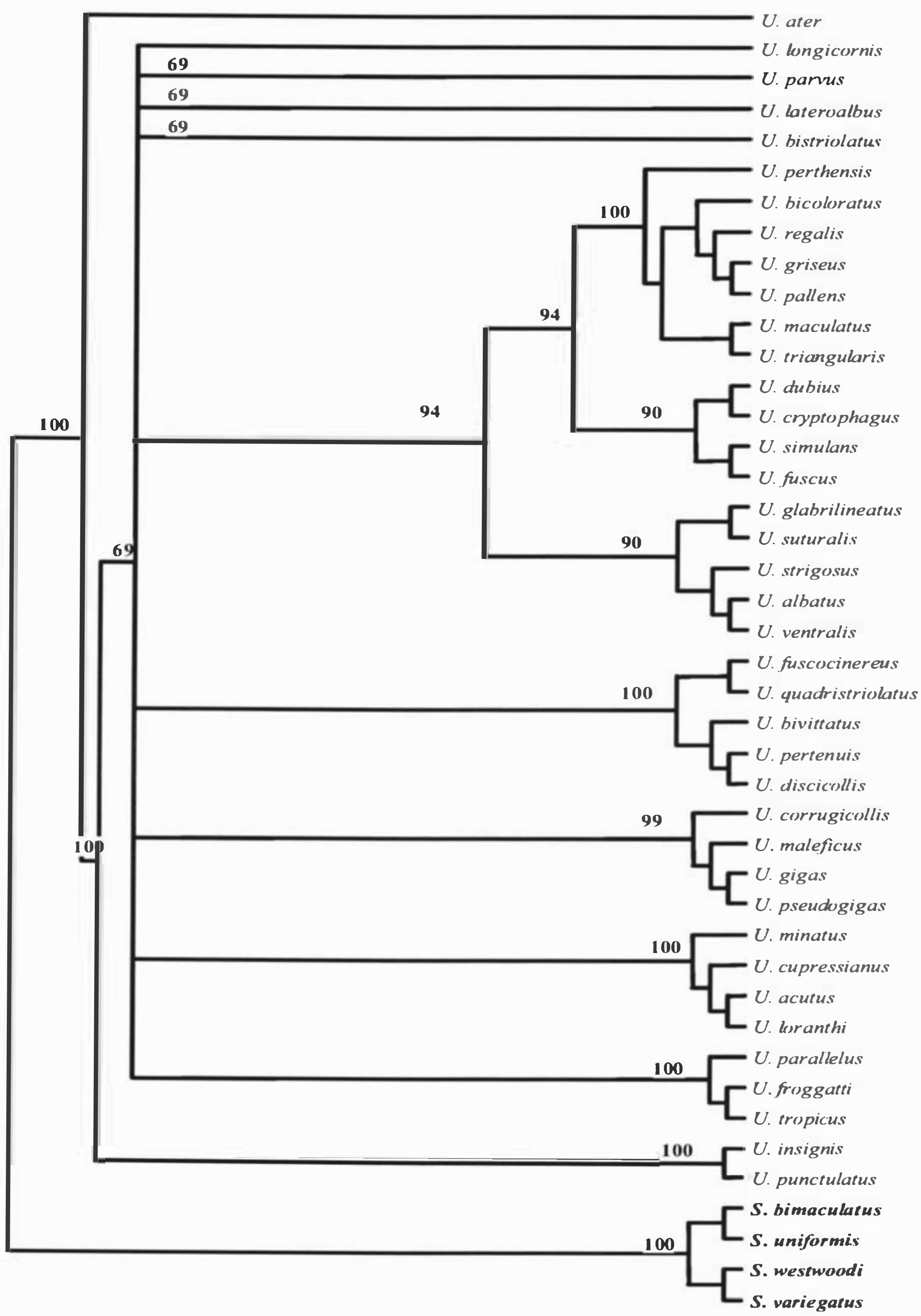


FIGURE 3.3 Fifty percent majority rule consensus tree of 100 equally parsimonious trees (equal weighting applied) (L = 265, CI = 0.2264, RI = 0.1291). Majority-rule consensus values are shown above the branches (from 1000 replications). Outgroups are in bold.

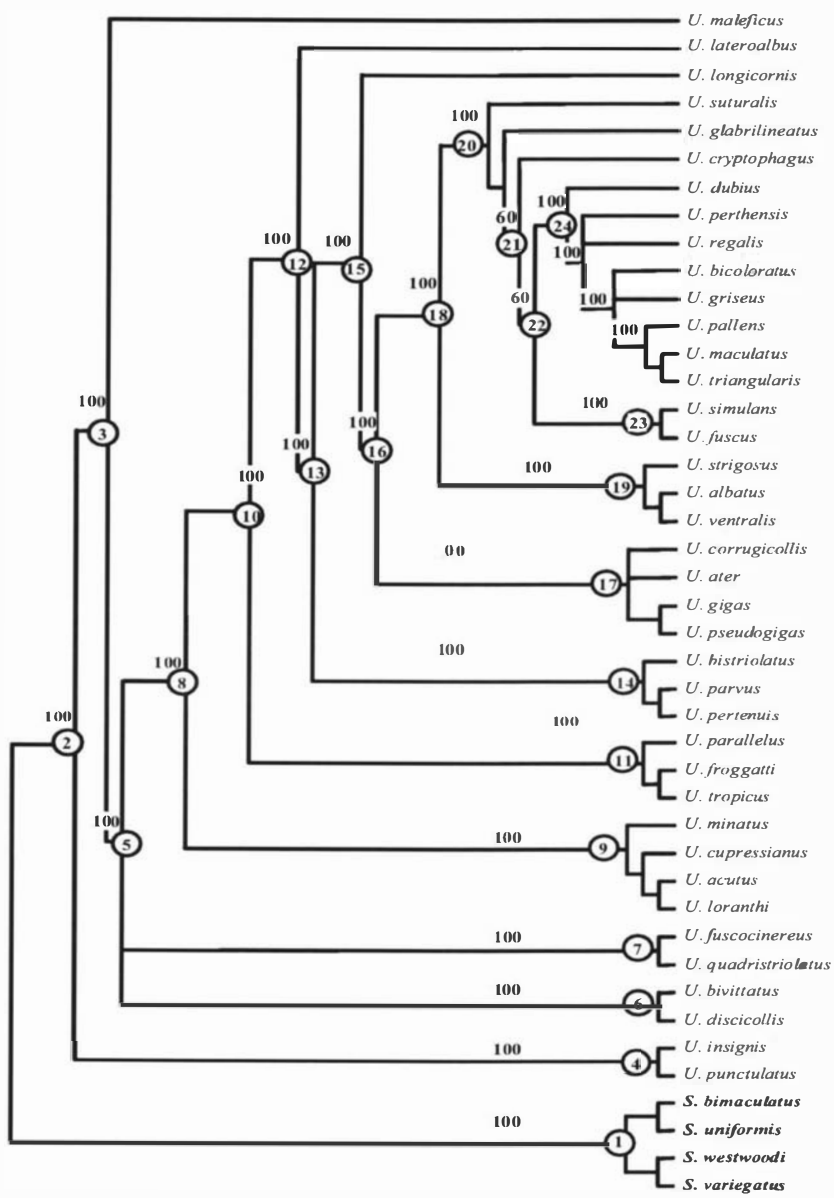


FIGURE 3.4 Fifty percent majority rule consensus tree of the 15 equally parsimonious trees (successive weighting applied) (L = 340, CI = 0.5316, RI = 0.4391). Majority-rule consensus values are shown above the branches (from 1000 replications). Clade numbers are encircled and outgroups are in bold.

Table 3.3. Diagnostics of the contribution of different characters to the tree (Fig. 3.4).

Character	L (steps)	CI	RI
1	9	0.111	0.000
2	7	0.143	0.143
3	4	0.250	0.250
4	9	0.111	0.467
5	7	0.143	0.647
6	9	0.111	0.385
7	6	0.167	0.583
8*	1	1.000	1.000
9*	1	1.000	1.000
10	4	0.250	0.750
11	10	0.100	0.483
12*	1	1.000	1.000
13*	1	1.000	1.000
14	2	0.500	0.800
15	6	0.167	0.000
16	11	0.182	0.308
17	7	0.286	0.762
18	3	0.333	0.714
19	3	0.333	0.818
20	7	0.143	0.250
21	5	0.200	0.429
22	8	0.125	0.364
23	4	0.250	0.400
24	11	0.091	0.412
25	3	0.333	0.800
26*	1	1.000	1.000
27*	1	1.000	1.000
28*	1	1.000	1.000
29	6	0.167	0.500
30	2	0.500	0.500
31	2	0.500	0.875
32*	1	1.000	1.000
33	10	0.100	0.182
34	4	0.250	0.500
35	5	0.200	0.500
36	5	0.200	0.636
37*	1	1.000	1.000
38*	1	1.000	1.000
39	3	0.333	0.867
40	7	0.286	0.375
41	12	0.167	0.524
42	3	0.333	0.867
43	2	0.500	0.000
44	12	0.083	0.389
45*	1	1.000	1.000
46	7	0.143	0.571
47	4	0.250	0.250
48	9	0.111	0.111
49	2	0.500	0.500
50*	1	1.000	1.000
51*	1	1.000	1.000
52	6	0.167	0.444
53	3	0.333	0.000
54	9	0.111	0.111
55	11	0.182	0.400

Characters with * are good synapomorphies without reversal

3.2.3.3 Monophyly of *Uracanthus*

My analysis shows that the monophyly of the genus *Uracanthus* (clade 2 in Fig. 3.4) is supported by at least five potential synapomorphies (character number given in parentheses): antennae with 11 segments (character 8), antennal segments not clearly serrate (character 9), antennae shorter or as long as body (character 11), the pronotal disc with at least two longitudinal stripes of pubescence (character 17), and the internal sac of aedeagus without a pair of chitinous structure at base (character 42).

The apomorphic states of characters 8 and 9 are good synapomorphies supporting the monophyly of *Uracanthus* without reversal or convergence (Table 3.3). The monophyly of this genus was confirmed before (Fig. 3.2) and after (Fig. 3.4) successive weighting was applied.

However, character 11 was reversed in 14 species: *U. griseus*, *U. maleficus*, *U. gigas*, *U. pseudogigas*, *U. minatus*, *U. longicornis*, *U. albatus*, *U. ventralis*, *U. tropicus*, *U. parvus*, *U. pertenuis*, *U. discicollis*, *U. bistriolatus*, *U. ater* and convergent in one species of outgroups, *S. uniformis*. This character needs nine additional steps to become a definite synapomorphy. Character 17 was reversed in 10 species: *U. glabrilineatus*, *U. gigas*, *U. pseudogigas*, *U. longicornis*, *U. albatus*, *U. ventralis*, *U. parallelus*, *U. froggatti, U. tropicus*, *U. parvus*, and outgroups, and required six additional steps to function as a full synapomorphy. Character 42 was reversed in 14 species: *U. cryptophagus, U. dubius, U. glabrilineatus, U. suturalis, U. fuscus, U. simulans, U. perthensis, U. maculatus*, *U. triangularis*, *U. regalis, U. griseus, U. pallens* and *U. bicoloratus, U. corrugicollis*, and outgroups. This character needs two additional steps to function as a full synapomorphy.

3.2.3.4 Monophylies of divisions of species groups of *Uracanthus*

In the following sections, the monophylies of main species groups and synapomorphies supporting them are described and discussed (character number given in parentheses).

3.2.3.4.1 *The insignis-species* group (clade 4 in Fig. 3.4)

This group consists of only two species, *U. punctulatus.* and *U. insignis*, and is supported by three potential synapomorphies: genal length > 5 × as long as distance between genae (character 3), internal sac of aedeagus with multi-branched spines in the second section (character 49) and apex of male eighth tergite truncate (character 55). The separation of this species group from the remaining *Uracanthus* species was consistent before and after the successive weighting procedure was applied (Figs 3.3. and 3.4).

However, the support of this species group by these three characters is relatively weak. The apomorphic states of these characters need one to 10 additional steps to achieve full synapomorphy status. Both reversal and convergence occurred.

3.2.3.4.2 The *triangularis-species* group (clade 3 in Fig. 3.4)

This is the largest species group in the genus, including all remaining 37 species. This group is support by four potential synapomorphies: clypeus punctate (character 7), apex of male terminal sternite rounded or rounded with a notch (character 38), internal sac of aedeagus without dense dark areas of long simple spines in the first section (character 46), and internal sac with simple spines in the second section (character 50).

Characters 38 and 50 support the monophyly of this group without reversal and convergence (Table 3.3). However, character 7 was reversed in 14 species: *U. insignis*, *U.*

punctulatus, *U. cupressianus*, *U. froggatti*, *U. tropicus*, *U. parallelus*, *U. parvus*, *U. pertenuis*, *U. discicollis*, *U. ater* and outgroups. Character 46 is reversed in 15 species: *U. bivittatus* *U. insignis*, *U. punctulatus*, *U. quadristriolatus*, *U. fuscocinereus*, *U. cryptophagus*, *U. dubius*, *U. regalis*, *U. fuscus, U. simulans,* and *U. maculatus*, and outgroups.

In this large species group, *U. maleficus* was separated from all other species at the base of this clade. The following discussion thus concentrates on species within clade 5 (Fig. 3.4).

3.2.3.4.2.1 The *bivittatus*-species group (clade 6 in Fig 3.4)

This species group has only two species. The sister species relationship between *U. bivittatus* and *U. discicollis* is supported by seven potential synapomorphies: distance between lower lobes of eyes > 2 × as long as distance between upper lobes of eyes (character 2), pubescence pattern on pronotal disc arranged in longitudinal lines (character 20), scutellum glabrous or with very sparse pubescence (character 22), elytral disc with several longitudinal stripes of pubescence (character 29), elytral disc with a large longitudinal glabrous stripe near suture (character 30), pubescence pattern on elytral disc arranged in longitudinal lines (character 36) and internal sac of aedeagus without multi-branched spines in the first section (character 44).

The apomorphic states of all these seven characters have reversal or convergence to some degree and need 1 to 12 additional steps to achieve full synapomorphies (Table 3.3).

3.2.3.4.2.2. The *fuscocinereus*-species group (clade 7 in Fig. 3.4)

This species group includes two species: *U. fuscocinereus* and *U. quadristriolatus.* The monophyly of this group is supported by two potential synapomorphies: base of each elytron with three or four hairless small marks (character 28) and internal sac of aedeagus with scale-like spines in the first section (character 47).

As Table 3.3 shows, character 28 supports the monophyly of this group as a good synapomorphy without reversal or convergence. However, character 47 is convergent in three species: *U. punctulatus*, *U. parvus*, and *U. pertenuis*.

3.2.3.4.2.3 The *dubius-species* group (clade 8 in Fig. 3.4)

This is the largest subgroup in the *triangularis*-species group and consists of 32 species. The monophyly of this group is supported by only one synapomorphy: prothorax with a large median hairless stripe on disc (character 18). However, this character is reversed in eight species: *U. maleficus*, *U. fuscocinereus*, *U. quadristriolatus*, *U. insignis*, *U. punctulatus*, *U. bivittatus*, *U. discicollis*, and *U. pertenuis* and needs two additional steps to become a full synapomorphy (Table 3.3). Therefore, this group could be a paraphyletic group. More characters need examining for further analysis to confirm whether this group is indeed monophyletic.

In the *dubius*-species group, the monophylies of three clades are not well supported: clade 9 (*U. minatus, U. cupressianus, U. acutus,* and *U. loranthi*), clade 17 (*U. corrugicollis, U. ater, U. gigas,* and *U. pseudogigas*), and clade 23 (*U. simulans* and *U. fuscus*). The potential synapomorphies supporting clade 9 (characters 25 and 33), clade 17 (characters 4, 14, 53 and 55) and clade 23 (characters 29, 33, 36 and 41) have very low CI and RI and long steps to reach full synapomorphic status (Table 3.3). However, the monophylies of four clades are well or fully supported and discussed below.

1) Clade 11 (Fig. 3.4)

This species group consists of three species: *U. parallelus*, *U. froggatti*, and *U. tropicus,* It is supported by four potential synapomorphies: anterior margin of prothorax as wide as posterior margin (character 13), pronotal disc not binodulose (character 15), pronotal disc with transverse rugae (character 16), and apex of male eighth tergite rounded or slightly pointed (character 55).

Of these four characters, the apomorphic state of character 13 is a good synapomorphy without reversal or convergence (Table 3.3). Character 15 is convergent in *U. maleficus*, *U. gigas*, *U. longicornis,* and *U. discicollis,* and needs five additional steps to be a definite synapomorphy. Character 16 is convergent in 8 species: *U. griseus, U. perthensis, U. maculatus, U. glabrilineatus, U. fuscus, U. acutus, U. discicollis* and *U. suturalis* and needs ten additional steps to resolved this problem. Character 55 is convergent in 8 species: *U. discicollis, U. corrugicollis*, *U. gigas*, *U. fuscus, U. simulans, U. pallens, U. regalis, U. griseus,* and *U. bicoloratus.* This character requires ten additional steps to become a full synapomorphy.

2) Clade 14 (Fig. 3.4)

This species group includes three species: *U. bistriolatus*, *U. parvus* and *U. pertenuis.* The monophyly of this species group is supported by one good synapomorphy: male antennal segments 3-10 with fringe (character 12).

3) Clade 19 (Fig. 3.4)

Three species of *U. strigosus*, *U. albatus* and *U. ventralis* are included in this group. Its monophyly is supported by two potential synapomorphies: basal half of elytral disc with dense punctures (character 25) and each visible sternite of males with a medial tuft of hairs (character 32). As Table 3.3 shows, character 32 is a definite synapomorphy without reversal or convergence. However, character 25 is convergent in 4 species: *U. acutus*, *U. minatus*, *U. loranthi*, *U. cupressianus* and outgroups and needs two more steps to become a definite synapomorphy.

4) Clade 24 (Fig. 3.4)

This group consists of eight species: *U. dubius, U. perthensis, U. maculatus*, *U. triangularis, U. regalis, U. griseus, U. pallens,* and *U. bicoloratus.* The monophyly of this clade is supported by a single synapomorphy: apical area of elytron glabrous or very sparsely pubescent (character 31). This character is convergent in *U. insignis* and needs one more step to be able to fully support the monophyly of this group.

3.3 Biogeographic Distribution of *Uracanthus*

3.3.1 Introduction

The distributional subdivisions of the Australian fauna have been discussed by various authors (e.g. Calder 1986; Heatwole 1987; Matthews 1992; Cracraft 1991; Cranston & Naumann 1991; Wang et al. 1995, 1996). Wang et al. (1996) were the first to discuss subregional divisions of Australasian cerambycids. Here I described the general geographic distribution patterns of the genus *Uracanthus*, defined its areas of endemism and discussed its faunal composition and resemblance between subregions, and distribution patterns in relation to phylogeny.

3.3.2 Materials and Methods

3.3.2.1 Distribution data

The data used in this section were from all specimens and their collection records examined in Chapter 2. Information from literature was also employed where this was considered reliable. The distributional data were then plotted on the map based on the latitude and longitude of the distributional localities (Australian Atlas online (http://www.ga.gov.au/map/names/).

3.3.2.2 Biogeographic subregions in the Australian Region

Having considered various subdivision schemes proposed for vertebrates and invertebrates by previous workers, Heatwole (1987) produced a general subregion scheme for the fauna of Australian mainland and Tasmania. The subdivision scheme proposed for the cerambycine tribe Phoracanthini by Wang et al. (1996) was very similar to that proposed by Heatwole (1987) but the western and eastern coastal subregions were much larger in the former scheme than the latter, and Tasmania and south eastern Australian mainland fell into a single subregion in Wang et al. (1996) rather than two separate subregions in Heatwhole (1987).

For the discussion of the biogeographic distribution of *Uracanthus*, I used the scheme proposed for a cerambycid group (Wang et al. 1996) as the model, where six subregions are recognised: Western (WES), Kosciuskan (KOS), Torresian (TOR), Timorian (TIM), Eyrean (EYR), and New Guinean (NGU). Because the species of *Uracanthus* only occur in Australia, the following five subregions are relevant to this study (Fig. 3.5):

The Western - This subregion is located in south western area, having a Mediterranean climate and the western highlands with a subtropical dry climate.

The Kosciuskan - This is the largest subregion in size and covers Victoria, New South Wales, southern South Australia, Tasmania, and south eastern Queensland, having Mediterranean and subtropical dry climates as well as moist subtropical to temperate climates.

The Torresian – This subregion includes the moist, tropical northern Queensland.

The Timorian - This subregion occupies the Kimberley area of north eastern Western Australia and northern Northern Territory, with moist to moderately moist tropical climates.

The Eyrean - This subregion covers central Australia with a subtropical dry climate.

3.3.2.3 Distribution patterns and biogeographic subdivisions of *Uracanthus*

In this study, distribution patterns and biogeographic subdivisions of *Uracanthus* fauna were described and discussed in association with the previously proposed subregions (Wang et al. 1996) (Fig. 3.5) and phylogenetic relationships among species (Fig. 3.4).

3.3.3 Results and Discussion

3.3.3.1 Distribution pattern

The combined distribution pattern of *Uracanthus* is shown in the previous chapter (Fig. 2.19). This genus is distributed widely in Australian mainland and Tasmania, covering all five zoogeographic subregions. In comparison to biogeographic subdivisions proposed for the Phoracanthini (Fig. 3.5), the distribution pattern of *Uracanthus* species has both similarity and dissimilarity to that of the Phoracanthini. In *Uracanthus* the Timorian is much smaller and separated from all other subregions, and the Torresian is restricted to the coast of north eastern Queensland but not clearly separated from the Kosciuskan at the base of the Gulf of Carpentaria. In the southern half of Australia, there appears to be no border between the Western and the Kosciuskan but there are two large areas in central-southern NSW and central South Australia, where no *Uracanthus* species is distributed. There is also no clear separation between the Eyrean and the Western/Kosciuskan.

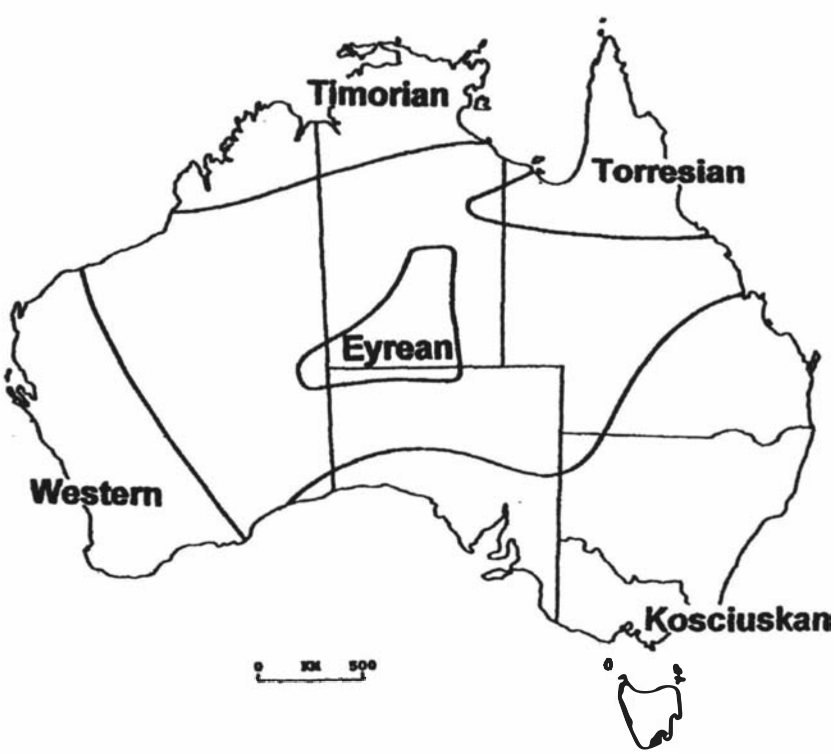


FIGURE 3.5 Zoogeographic subregions of Australia (after Wang et al. 1996)

Having examined distribution patterns of individual *Uracanthus* species (Figs 2.95-2.114), I found that the zoogeographic subregions in Australia proposed by Wang et al. (1996) could still be applied to *Uracanthus*. For example, the Timorian and Torresian are two subregions for *Uracanthus*. A vast majority of *Uracanthus* species in southern Australia are clearly distributed in separate Kosciuskan and Western subregions except only three species (*U. dubius, U. albatus* and *U. pseudogigas*) occurring in the arid Nullarbor Plain area that borders these two subregions. The Eyrean also appears to a clear subregion for *Uracanthus* with only two widely distributed species (*U. albatus* and *U. parvus*) occurring in the Great Victoria Desert and Simpson Desert that isolate the Eyrean and the Kosciuskan.

3.3.3.2 *Uracanthus* faunal composition and endemism at subregion level

The faunal composition and endemism of *Uracanthus* are summarised in Table 3.4. The fauna are richest with highest endemism in the Kosciuskan and Western of the southern Australia. There are 11 species found in the tropical Torresian but no species is endemic to this subregion. The central arid Eyrean has ten species with only one being endemic. The most poorly represented subregion is the Timorian which has only three species without any endemic species. It is suggested that *Uracanthus* is mainly a wet-adapted genus distributed along the coastal areas and that most of its species found in the arid Eyrean are usually widely-distributed and also occur in the coastal areas. This distribution pattern is remarkably similar to that of the Australian cerambycid genus *Phoracantha* (Wang et al. 1996 & 1999).

The number of species in common between subregions is shown in Table 3.5. The Kosciuskan and Western have many species in common: about 44% of the species found in the Kosciuskan and 70% of the species in the Western are shared between these two subregions. Ninety percent and 80% of the species in the Eyrean are also distributed in the Kosciuskan and Western, respectively, and 10% and 20% of the Eyrean species are shared with the Torresian and Timorian, respectively. About 90% and 36% of the species in the

Torresian are in common with the Kosciuskan and Western subergions, respectively. All species in the Timorian are shared by the Kosciuskan and Western subregions, and one Timorian species also occurs in the Torresian and two in the Eyrean. These patterns suggest that the Kosciuskan and Western are very similar in *Uracanthus* faunal composition and closely related; the Eyrean has probably acted as a faunal exchange transit area between the Kosciuskan and Western, and there has been little physical barrier between the Kosciuskan and Torresian.

Table 3.4. Faunal composition and endemism of *Uracanthus*

Subregion	No. of spp.	% of Total spp.	No. of endemic spp.	% endemism
Kosciuskan	32	82.0	10	31.2
Western	20	51.3	6	30.0
Torresian	11	28.2	0	0
Eyrean	10	25.6	1	11
Timorian	3	7.7	0	0

*Column 1 is the total number of species recorded in one subregion including species occurring in more than one subregion; column 2 is the ratio of the number of species recorded in the subregion divided by the total (39) species in *Uracanthus*; column 3 includes species restricted to each subregion; column 4 is the ratio of the number of the endemic species in each subregion divided by the number of total species recorded in it.

Table 3.5 The number of *Uracanthus* species shared by different subregions

	Western	Kosciuskan	Torresian	Timorian
Kosciuskan	14			
Torresian	4	10		
Timorian	3	3	1	
Eyrean	8	9	1	2

As Figs 2.95-114 show, no *Uracanthus* species can occur in all five subregions but the most widely distributed species (about 10% of total *Uracanthus* species) cover four subregions: *U. strigosus* in the Kosciuskan, Western, Eyrean and Torresian; *U. triangularis* in the Kosciuskan, Western, Timorian and Torresian, and *U. simulans* and *U. parvus* in the Kosciuskan, Western, Timorian and Eyrean. Seven species (about 18%) are found in three subregions: *U. maculatus, U. albatus, U. pseudogigas, U. ventralis*, and *U. loranthi* in the Kosciuskan, Western and Eyrean, and *U. pertenuis* and *U. gigas* in the Kosciuskan, Western and Torresian. Eleven species (about 28%) are shared by two subregions and 17 species (about 44%) are endemic to only one of the four subregions except the Timorian. In general, the species with wider distribution are better adapted to both diverse environments and wide host-ranges. For example, the most widely distributed species, *U. simulans, U. triangularis* and *U. strigosus*, can feed on plants from a number of genera. In their study of the Australian cerambycid genus *Phoracantha*, Wang et al. (1999) suggested that the species with a wide natural distribution are more likely to become pests in Australia and overseas. Whether this is the case with *Uracanthus* remains unknown and worth exploring.

3.3.3.3 Distribution patterns in relation to phylogeny of *Uracanthus*

When the area of endemism of each species is attached to the proposed phylogenetic tree (Fig. 3.4), a clear picture of the distribution patterns of species groups is yielded (Fig. 3.6). The monophyletic *insignis*-species group (clade 4) that is separated from the rest of *Uracanthus* species (clade 3) are distributed in the Kosciuskan with *U. insignis* also occurring in the Torresian, and the species, *U. maleficus*, that is split from the clade 5 near the base of the tree, is endemic to the Kosciuskan.

There are three 'equally aged' species groups within clade 5 (Fig. 3.6) where massive speciation and radiation must have occurred in *Uracanthus* and the ancestral species have broadened their distribution range and reached the Western, Eyrean and Timorian. The monophyletic *bivittatus*-species group (clade 6) and *fuscocinereus*-species group (clade 7) are dominant in the Kosciuskan or Kosciuskan/Western with only one species shared by the Torresian. The *dubius*-species group (clade 8) appears to be paraphyletic (see **Section 3.2.3.4.2.3**) but it can still give us some light on the relationship between phylogeny and geographic distribution of many *Uracanthus* species.

As Fig. 3.6 shows, the species groups split from the lower parts of clade 8, such as monophyletic clades 11 and 14, paraphyletic clade 9 and *U. lateroalbus*, are dominantly distributed in the Kosciuskan and Western of southern Australia, with two species shared by the Eyrean and four by the Torresian. Four species are endemic to the Kosciuskan or Western, none to Torresian, Eyrean or Timorian. *Uracanthus* species started to show up in the Timorian at clade 14. Higher on the tree more speciation and species radiation must have occurred in all five subregions. The hypothesis that *Uracanthus* species show up in the Timorian late in the history and the fact that no *Uracanthus* species is endemic to it may suggest that this subregion is less likely a main centre of speciation and species radiation.

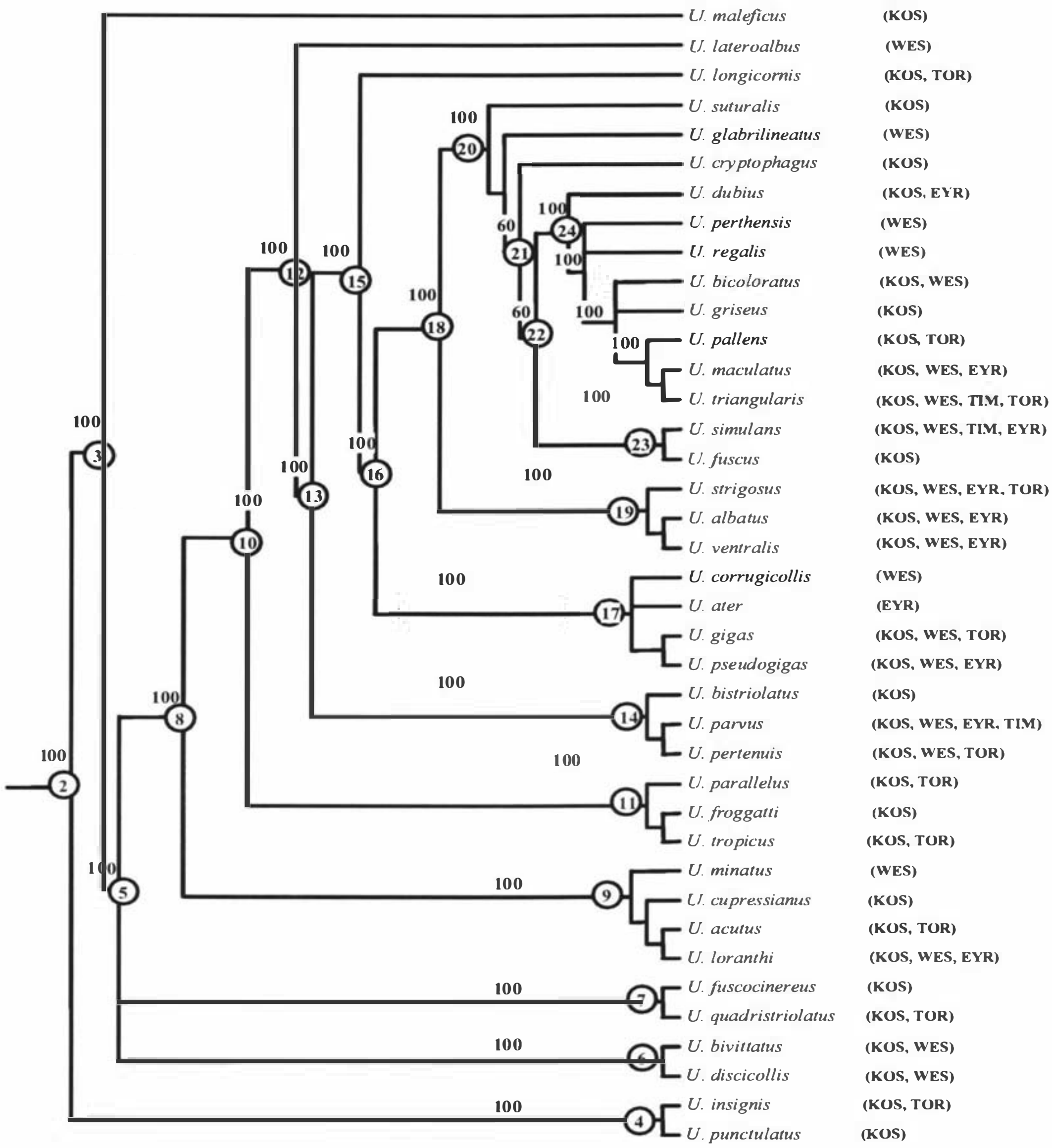


FIGURE 3.6 Taxon cladogram of Uracanthus (from Fig. 3.4) with areas of endemism attached. KOS, the Kosciuskan; WES, the Western; TOR, the Torresian; TIM, the Timorian, and EYR, the Eyrean.

The above results and discussion suggest that the speciation and species radiation of *Uracanthus* may have occurred first in the Kosciuskan, then in the Western, and finally in the Eyrean, Torrasian, and Timorian. Like *Uracanthus* the cerambycine tribe Phoracanthini also appears to have originated in southern Australia (Wang et al. 1996).

3.4 Conclusion

The phylogeny and biogeographic distribution of the Australian longicorn beetle genus *Uracanthus* have been studied in terms of genus monophyly and species group subdivisions, current geographic distribution patterns, areas of endemism definitions, faunal composition and similarities between subregions, and biogeographic distribution patterns in relation to phylogeny.

Here the monophylies of the genus *Uracanthus* and seven terminal species groups are confirmed. However, the large species group (clade 8) still needs additional steps to become a monophyletic group and is currently considered a paraphyletic group. More characters may be needed to solve this problem and more new species from this species group are likely to be found.

The *Uracanthus* fauna can be divided into five subregions: Kosciuskan, Western and Eyrean in southern and central Australia, and Torresian and Timorian in northern Australia. The fauna are richest with highest endemism in the Kosciuskan and Western. These two subregions are very similar in faunal composition and closely related; the Eyrean has probably acted as a faunal exchange transit area between the Kosciuskan and Western; there has been little physical barrier between the Kosciuskan and Torresian, and the Timorian and Torresian subregions have no endemic species. It is also suggested that the speciation and species radiation of *Uracanthus* may have occurred first in the Kosciuskan, then in the Western, and finally in the Eyrean, Torresian, and Timorian.

CHAPTER 4

MOLECULAR PHYLOGENY OF THE AUSTRALIAN LONGICORN BEETLE GENUS *URACANTHUS* HOPE 1883

4.1 Introduction

The phylogenetic analysis based on morphological characters presented in the previous chapter (Chapter 3) yields a valuable insight into the relationships among species of the Australian *Uracanthus*. However, in that analysis, relationships of some species and species groups were not well resolved probably due to insufficient information that morphological data could offer. A reasonable number of species available for molecular analysis allowed me to perform a molecular phylogenetic treatment to help further resolve the phylogeny of this genus.

This chapter presents the first phylogenetic analysis of the genus *Uracanthus* based on molecular data. In this study, a phylogenetic analysis using DNA sequences of the mitochondrial Cytochrome Oxidase I (COI) gene region was made to reconstruct the phylogeny of the *Uracanthus* species available for molecular studies. This study also includes a test of the hypothesis that molecular and morphological data sets can be combined to produce a more robust phylogeny.

The aims of this study were (1) to test the species level relationships in *Uracanthus* using DNA sequence data, and (2) to critically compare phylogenies derived from molecular, morphological and combined data sets.

4.2 Material and Methods

4.2.1 Taxa

This study included 21 *Uracanthus* species and one outgroup species, *Scoleobrotus westwoodi,* available for DNA extraction (Table 4.1). *S. westwoodi* was also used as one of the outgroup species in the phylogenetic analysis based on morphological characters in Chapter 3.

4.2.2 DNA extraction

Genomic DNA was extracted using a Qiagen DNAeasy Tissue Kit® (QIAGEN Inc, USA) following the manufacturer's instructions for animal extraction. Since many dried specimens in this study were up to 10 years old, they typically contained small amount of DNA. Therefore, the lysis step was included which involved only overnight digestion of tissue with proteinase K and at least 3 hours digestion of RNA with RNAse. Final elution lasted for two hours rather than 1 min and was eluted in only 50 µl final volume instead of 100 µl in order to increase DNA concentration. One hundred µl of elution buffer were used for DNA extraction from specimens preserved in alcohol.

4.2.3 Measuring DNA concentration

The concentration of DNA samples was determined by electrophoresing DNA samples on 1 % agarose gel alongside a series of Lambda (λ) DNA (Invitrogen® , USA) concentration standards of 10 ng/µl, 25 ng/µl and 50 ng/µl. The concentration of the fragment of interest was estimated by comparing the intensity of the ethidium bromide fluorescence to that of the known DNA concentration standards. Two µl of DNA sample was mixed with 3 µl of loading dye and then loaded on 1 % agarose gel. The gel was run at

100 volts for 30 minutes. Thereafter, the DNA bands were visualised under ultraviolet light and photographed.

4.2.4 PCR amplification and sequencing

4.2.4.1 Primers used

In an initial study, the target segment of COI gene was amplified using primer C-J-1718 to TL-N-3014 (primer pair PB1 reproduced from Simon et al. 1994). A sequence of approximately 1,290 bp corresponding to positions 1718 to 3014 of *Drosophila yakuba* (Clary & Wolstenholme 1985) was the target. However, this sequence was typically too long to be amplified in one round of amplification, especially for dried specimens. Therefore, amplification of the target gene was achieved by three overlapping fragments. The first fragment (PB2) was amplified using the forward primer C-J-1718 (Simon et al., 1994) together with the reverse primer C-N-2191 in Simon et al. (1994), which amplifies a central portion of the COI gene. The second overlapping COI fragment was amplified using the forward primer C-J-2183 (Simon et al. 1994) together with the reverse primer C-N-2609 (Damgaard et al., 2000). These primers amplify a small fragment of central COI gene. The third overlapping fragment was amplified using the forward primer C-J-2456 (Damgaard et al. 2001) and the reverse primer TL2-N-3014 (Simon et al. 1994). This amplified 3' fragments of the COI gene along with a 5' portion of the t-RNA-Leu gene. The primers are listed in Table 4.2. Primers were synthesized by Sigma®, Australia.

Table 4.1 *Uracanthus* specimens from which DNA was extracted.

	Taxa	Locality	Pres*	Year
	In group			
1	*U. acutus*	Canungra, QLD	D	2001
2	*U. loranthi*	Mt Hayward, QLD	D	1992
3	*U. longicornis*	Norman River, QLD	D	1993
4	*U. discicollis*	Gum Tree Bay, N Leeman, WA	D	1994
5	*U. bivittatus*	Tinnanbar, QLD	OH	2002
6	*U. pertenuis*	Carnarvon National park, Mt Moffat, QLD	D	1997
7	*U. dubius*	Yumbarra , SA	D	1995
8	*U. simulans*	Musgrave Ra, SA	D	1994
9	*U. triangularis*	N Mareeba, QLD	OH	2002
10	*U. bicoloratus*	Mimosa Rocks National Park, NSW	D	1998
11	*U. griseus*	73 km SW of Wemen, WA	D	1988
12	*U. regalis*	E Sheoaks Hill, W Israelite Bay, WA	D	1993
13	*U. cryptophagus*	Brisbane, QLD	OH	2003
14	*U. strigosus*	Brisbane, QLD	OH	2004
15	*U. albatus*	Flinders Range National Park, SA	D	1997
16	*U. insignis*	Paluma District, QLD	D	1995
17	*U. maleficus*	Bathurst Harbor, TAS	D	1991
18	*U. bistriolatus*	Expedition Ra NP, QLD	D	1997
19	*U. pseudogigas*	Arcoona, SA	D	1996
20	*U. gigas*	Gullewa, WA	D	Unknown
21	*U. punctulatus*	No data	D	Unknown
	Outgroup			
22	*S. westwoodi*	E Wirrula, SA	D	1995

*Pres = preservation method: D, dried; OH, 100%ethanol

Table 4.2 Sequences of six primers used for amplification of COI.

Primer number	name	Sequence (5' to 3')	Location
1	C1-J-1718(F)	GGA GGA TTT GGA AAT TGA TTA GTT CC	1718
2	C-N-2191(R)	CCC GGT AAA ATT AAA ATA TAA ACT TC	2191
3	C1-J-2183 (F)	CAA CAT TTA TTT TGA TTT TTT GG	2183
4	C1-N- 2609(R)	CCA ATA CTG CTC CTA TTG ATA	2609
5	C1-J-2456 (F)	TTA GCA AAT TCT TC A ATT GA	2456
6	TL2-N-3014(R)	TCC AAT GCA CTA ATC TGC CAT ATT A	3014

F = forward primer, R = Reverse primer

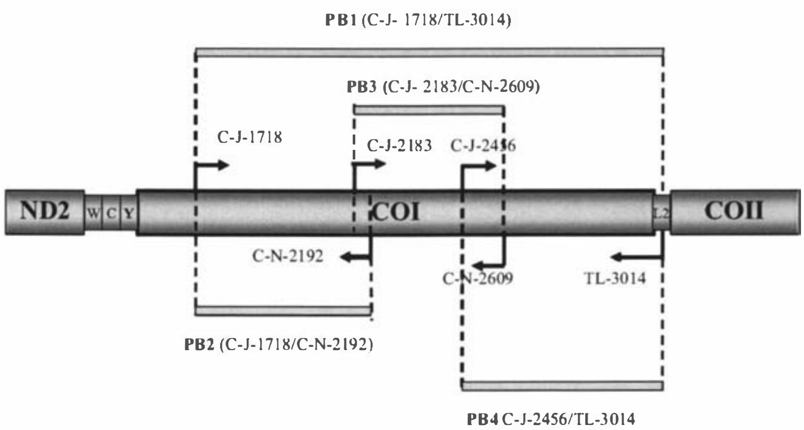


FIGURE 4.1 Locations on mitochondrial of PCR primers designed to PCR-amplify the COI gene region. The arrowheads represent the 3' end of each primer.

4.2.4.2 PCR amplification

PCR reactions were set up on ice using a cocktail which contained all common reagents used in the PCR in a ratio of n + 1 PCR reactions (where n = the number of PCR reactions to be amplified). Components were added in order and kept on ice at all times. Amplifications were performed in an Eppendrof® Gradient thermal cycler (Eppendrof®, Germany). Following the amplification, the reactions were stored at 4°C and the products viewed using 1% agarose gel electrophoresis. To avoid contamination of PCR reactions, separate areas of the laboratory and separate pipettors were used for DNA extraction.

PCR conditions were optimised by adjusting the concentration of template DNA, titrating $MgCl_2$ and primer concentrations. A range of annealing temperatures (gradient PCR from 40 °C to 59 °C) were used to determine the optimal reaction condition. The annealing temperatures depend on the particular combination of primer and taxa. In addition, Q-solution (Qiagen ®, USA) was used to enhance PCR amplification, especially, at lower annealing temperatures.

A standard PCR mix of ingredients Table 4.3 was made. In these proportions for each sample, the initial amount of DNA template used for alcohol-preserved and dried specimens was 5 µl and 8 µl, respectively. In some cases, however, this amount was later increased, and then the proportions of mixed ingredients remained the same except for the dH_2O, which was variable in volume to make up 25 µl of the mix in total. The mix was made up in a 1.5 ml Eppendorf tube, excluding only the DNA template.

The PCR negative control contained the identical amount of PCR mixture with 5 µl dH_2O instead of DNA template. A PCR positive control was also included, containing the PCR mixture plus DNA that had been successfully put through the PCR reaction on a previous occasion. The tubes were then put in the PCR machine which was programmed as follows: initial denaturation 94°C for 1.30 min 1 cycle which ensured that the DNA was separated into single strands, followed by 35 cycles of denaturation 94°C for 10s, annealing 52 ° C for 10s and extension 72 ° C for 45s followed by 1 cycle of final extension 72°C for 5min. For dried specimens, amplifications were performed by using various annealing temperatures.

Table 4.3 Ingredients of the PCR mixture, concentration and volume in the 25 μl of PCR tube

Ingredient	1x reaction(μl)
dH_2O	16.8
10xbuffer (++Mg)	2.5
3mM dNTP (Roche® Germany)	1.5
10 μM Primer 1	1
10 μM Primer 2	1
Taq Polymerase (Roche® Germany)	0.2
DNA template	5

When the PCR was complete, the samples were run on a gel to check for DNA amplification. Five μl of PCR product and 3 μl of loading dye were loaded onto 1 % agarose gel in 1x TAE buffer with a 1 kb DNA marker (Invitrogen®, USA) at 100 volts for 30 min to ensure that a single DNA band was produced of the expected size.

4.2.4.3 Purification of PCR product

If amplification was successful, the remaining 20 µl from each PCR reaction was purified by using HIGH Pure PCR production kits (Roche® Molecular Biochemicals, Germany). The PCR purification protocol was used according to the manufacturer's instructions. Product concentrations were estimated by UV visualization of ethidiumbromide stained 1% agarose gel loaded with 1 µl of PCR purification product to check the quality by comparing with a series of standard DNA (lambda 25 and 10 ng/µl Invitrogen®, USA). This was then photographed and if the checked gel was successful, the remaining product was sent to the Massey University's Allan Wilson Centre's genome service.

4.2.4.4 Sequence alignment

Electrophenograms were viewed and edited using BioEdit (Hall 1999). The sequence alignments were performed using the CLUSTAL X algorithm (Thompson et al. 1997), with multiple alignment parameters of fixed gap penalty equal to 15, gap extension equal to 6.66 followed by slight modifications by eyes and the data were converted to nexus formats. Appendix 1 provides an overview of the length of the sequence alignment used in the analyses.

4.2.5 Phylogenetic analysis

The 22 species used for molecular analysis were also used for the morphological analysis performed during this study so that accurate comparisons could be made between molecular and morphological data sets.

Cladistic analyses through outgroup comparison (Nixon & Carpenter 1993) were conducted on all data sets using the PAUP*4.0b10 PC version (Swofford 2002).

Subsequently, TreeView 1.6.6 was used for tree manipulation (Page 1996). Maximum parsimony analysis was performed for all analyses with all characters unweighted in the initial analysis. All parsimony analyses were performed using heuristic search and the tree-bisection-reconnection (TBR) branch-swapping algorithm. To reduce the number of cladograms and obtain the better resolution, a successive weighting scheme according to a rescaled consistency index was applied to all data sets. Bootstrap values were calculated (Felsenstein 1985) with 1,000 replicates (standard random addition) and were used to assess the sample variation and degree support of each node in the cladograms.

In the combined analyses, all molecular and morphological characters were coded together for the 22 species. Missing molecular characters were coded as (?). Gap positions in molecular data were treated as a fifth base, and ambiguous base calls were as N and treated as missing data. The combined data matrix is shown in Appendix 1.

To determine whether or not significant incongruence existed between the sequence data set and the morphological data set, the Incongruence Length Difference (ILD) test (Farris et al. 1995) was conducted by using the 'Partition Homogeneity Test' in PAUP*4.0b10 (Swofford 2002). The test was implemented under parsimony with ten random addition sequences of taxa and 100 replicates to generate the null distribution in each test ($P<0.05$ indicates significant incongruence between data partitions).

4.3 Results and Discussion

Since the majority of taxa (65.7%) used in this study were represented by dried pinned specimens, DNA was in most cases considerably degraded. Therefore, I could not amplify usable sequences for 16S, ITS and the long region of the COI gene. However, good amplifications using three primer pairs for short fragments of COI were obtained for most species. Although the total number of analysed sequences was lower than expected, the phylogenetic signal from these data resolved topologies in the phylogenetic analysis.

4.3.1 DNA extractions

Fig. 4.2 shows that genomic DNA extracted from specimens preserved in 100% alcohol (lanes 2, 5) was of a high quality, as there was only one band on the electrophoresis gel while the DNA extraction from dried specimens in lanes 4, 6, 7 contained a wide range of short DNA fragments (smear band in lane) probably due to DNA degradation. Reineke et al. (1998) indicated that the success or failure of insect DNA extraction depended on several factors such as the protocol used, the source of DNA and the range of inhibiting substance compounds present in the biological material. The latter are especially common in old specimens.

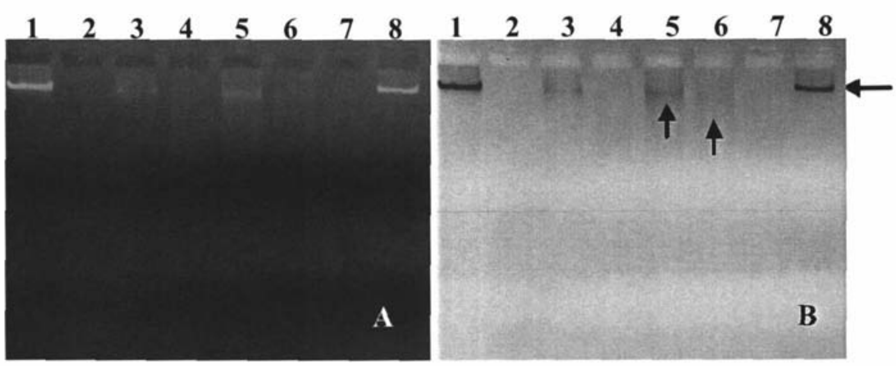


FIGURE 4.2 Electrophoresis patterns of DNAs extracted from the *Uracanthus* species run on 1 % agarose gel electrophoresis in 1xTAE buffer at 100 volt: lane 2, *U. strigosus*; lane 3, *U. cryptophagus*; lane 4, *U. discicollis*; lane 5, *U. bivittatus*; lane 6, *U. acutus*; lane 7, *U. dubius* comparing with λ standard DNA (Invitrogen®) 10 ng/μl (lane 1), and 25 ng/μl (lane 8). (A) Picture based on positive, (B) Invert picture to negative.

4.3.2 PCR amplification and sequence variation

In this study, an almost complete sequence was obtained from the COI gene region with three primer base pairs. Gel electrophoresis of PCR products from all taxa (22) included in the present study with three primer pairs always yielded a single band with approximate length of 473 bp in PB1 (C-J-1718 / 2191), 426 bp in PB2 (C-J- 2183/C-N-1609) and 558 bp in PB3 (C-J-2456/TL-3014).

DNA from one species, *U. triangularis* preserved in alcohol, was successfully amplified and sequenced for the large region between part of the 3' of Cytochrome Oxidase I (COI) and the Leucine tRNA (tRNA^{Leu}) using a primer pair C1-J-1718 to TL2-N-3014. Gel electrophoresis for this primer pair produced a strong and clear band for the preserved specimen (Fig. 4.3). DNA purification was also successful. However, all dried specimens failed to be amplified by this primer pair.

Amplification and sequencing of three primer base pairs are shown in Fig. 4.4. The result shows that not all 22 taxa investigated could be amplified for the same region of the COI gene. The first region of the sequence was amplified for 21 taxa (95%) using primers C-J-1718 and C-N- 2191, the second region amplified for 20 taxa (91 %) using primers C-J- 2183 and C-N-1609; and the third section amplified for 19 taxa (87 %) using primers C-J-2456 to TL-3014.

4.3.3 Alignment

Twenty-two sequences were aligned using the programme Clustal X version 1.81 (Thompson et al. 1997).

4.3.4 Phylogenetic analysis

There are many phylogenetic tree-building algorithms from which to choose depending on the investigation and research goal. In this study, I chose the commonly used maximum parsimony method with unweighted and successive weighted options for all data sets. The discussions of all results were based on parsimony analysis with successive weighting. Maximum parsimony with unweighted and successive weighted analyses were performed for all substitutions. COI and morphology data were analysed separately and then in combination. Maximum likelihood analyses were considered in this study. However, since a high percentage of the COI data was ambiguously aligned in some regions, the data set is not appropriate for likelihood analyses (Lutzoni et al. 2000).

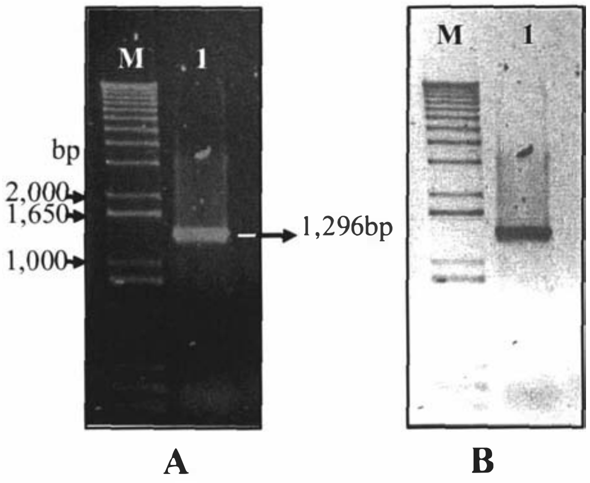


FIGURE 4.3 Electrophoresis patterns of PCR product on 1 % agarose gel electrophoresis in 1xTAE buffer at 100 volt showing the PCR amplification of the COI region of primer C-J 1718/ TL-N-3014.(A) positive picture;(B) negative picture. In each lane: Lane M, 1kb DNA marker 1 kb+ ladder (Invitrogen®) and lane 1, PCR product of *U. triangularis*. (A) Picture based on positive, (B) Invert picture to negative.

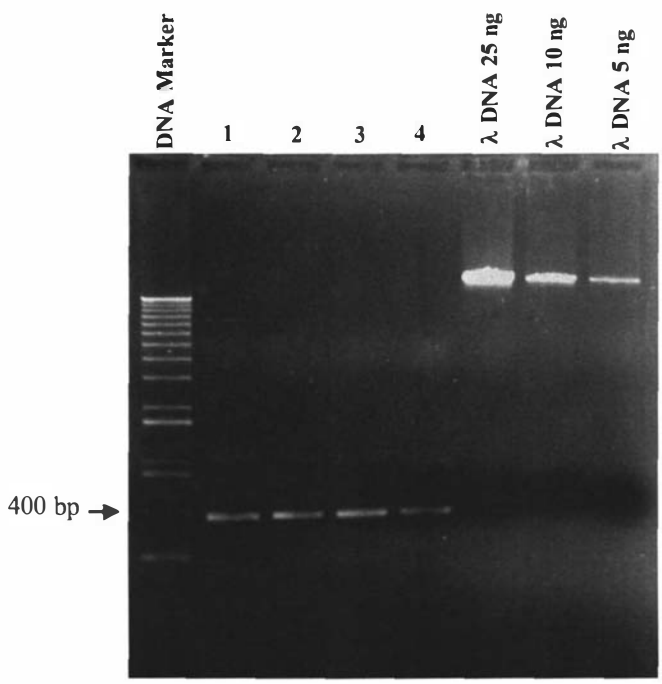


FIGURE 4.4 Electrophoresis patterns of PCR product on 1 % agarose gel electrophoresis in 1xTAE buffer at 100 volt showing the PCR amplification of the COI region of primer C-J 1718/ TL-N-3014: lane 1, *U. acutus*; lane 2, *U. longicornis*; lane 3, *U. bivittatus*; lane 5, *U. bicoloratus*, comparing with DNA marker 1 kb ladder, and a series of λ standard DNA (5 ng/μl, 10 ng/μl, and 25 ng/μl).

4.3.4.1 Analysis of morphological data (smaller data set, taxa =22)

To allow comparison and combined analyses, I included only 22 taxa that were also represented by DNA sequences in this study. The new data set consisted of 55 characters: 7 variables, 2 constant and 46 informative characters. An unweighted parsimony analysis yielded 67,718 equally parsimonious trees (L = 231, CI = 0.2267, RI = 0.2898), the majority rule consensus of which is shown in Fig. 4.5. The result of this analysis shows that the tree was weakly supported and most species were not resolved. When successive weighting was applied, a single most parsimonious tree (L = 31,958, CI = 0.5112, RI = 0.7455) (Fig. 4.6) was obtained. This tree had high bootstrap support for all clades (100%), with no major effect on the position of the basal species. Three major clades could be recognised in this analysis: *U. insignis* and *U. punctulatus* formed clade I; clade II was represented by five species: *U. gigas*, *U. pseudogigas*, *U. acutus*, *U. loranthi* and *U. maleficus*. Within this group, *U. maleficus* is sister to *U. gigas + pseudogigas*, and *U. maleficus + gigas + pseudogigas* is a sister group to *U. acutus + loranthi*. Clade III includes the remaining species and can be separated into two subgroups. *U. longicornis + bistriolatus* form a sister group (a), and the remaining twelve species are clustered to another group (b).

When compared to the tree with all 39 *Uracanthus* species, the result here (Fig.4.6) was very similar to that obtained from the larger data set (Fig.3.4). For example, *U. insignis* and *U. punctulatus* are identified as the most basal species of all members, and the relationships between some closely related taxa remain constant such as *U. bivittatus + discicollis*, *U. gigas + pseudogigas* and *U. acutus + loranthi*.

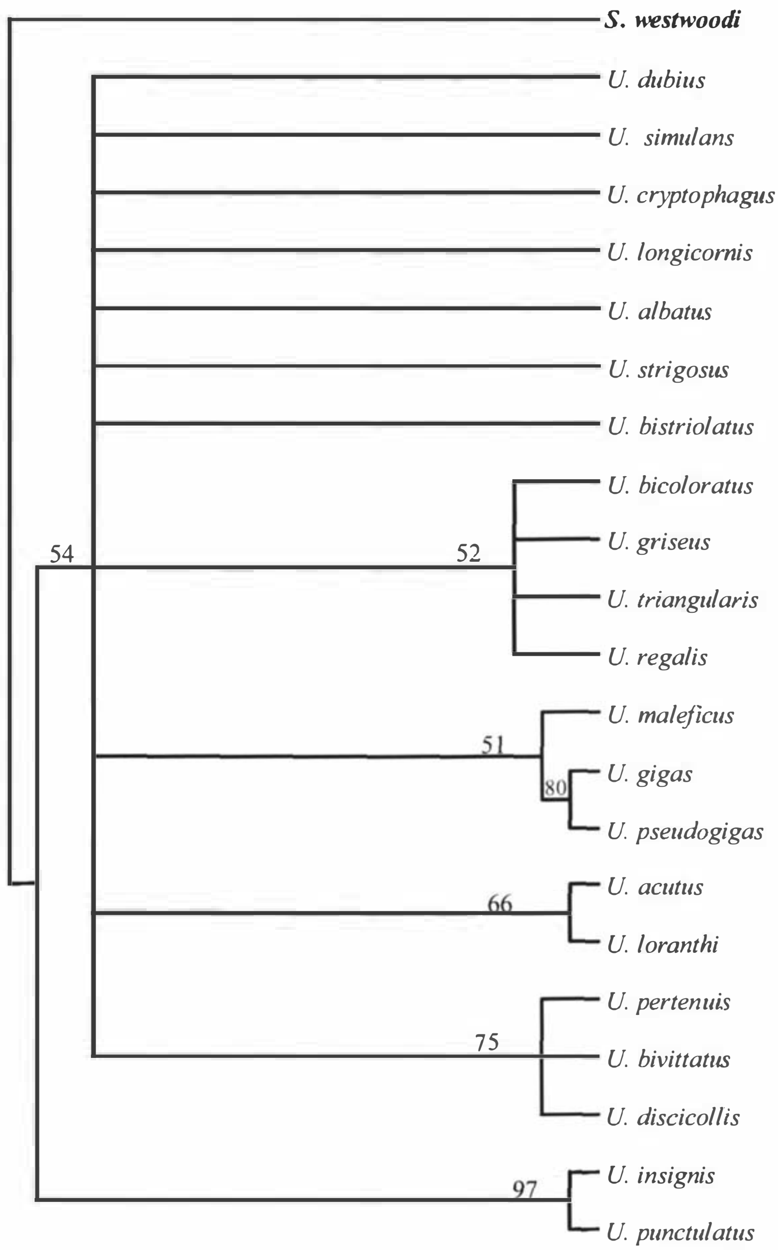


FIGURE 4.5 Phylogenetic relationships of *Uracanthus* species using morphological data set. Fifty majority-rule consensus of 673,966 equally parsimonious trees (unweighting applied) (L = 231, CI = 0.2267, RI = 0.2898). Values above branches refer to bootstrap value from 1000 replicates. Outgroup is bold.

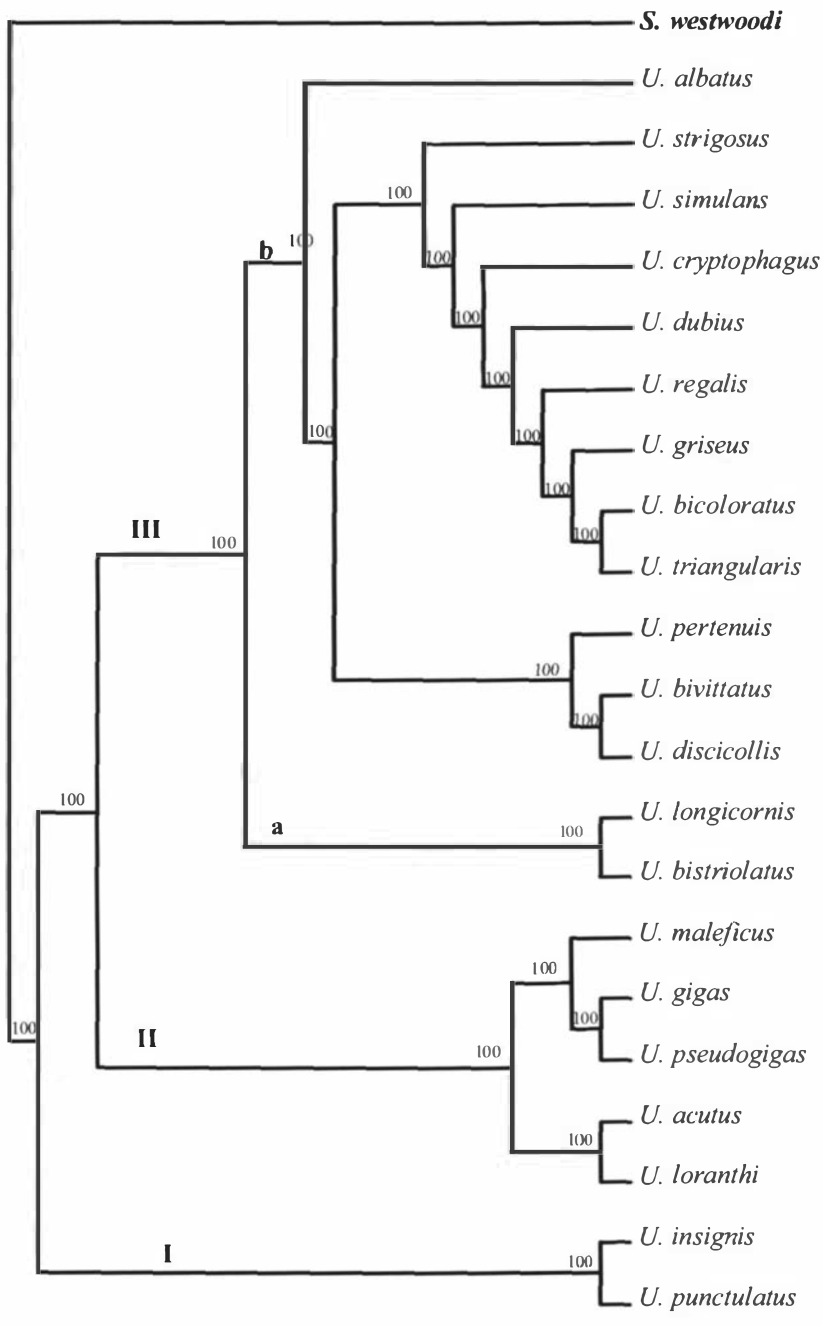


FIGURE 4.6 Phylogenetic relationships of *Uracanthus* species using morphological data set (successive weighting applied) (L = 31,958, CI = 0.5112, RI = 0.7455). Values above branches refer to bootstrap value from 1000 replicates. Outgroup is bold.

4.3.4.2 Analysis of COI mtDNA sequence data

When gaps were added to improve alignment, a total of 1,318 nucleotide sites were used in the analysis. Of these, 614 nucleotide sites (46.5 %) were constant, 306 characters phylogenetically uninformative (23.21%), and 398 characters informative (30.19%).

An unweighted parsimony analysis of the COI mtDNA data set gave 100 equally parsimonious trees (L = 2,642, CI = 0.4337, RI = 0.4337), the majority rule consensus of which is shown in Fig. 4.7 with most branches bootstrap values weakly supported. A successive weighting procedure reduced this number to five most parsimonious trees (L = 564,195, CI = 0.6489, RI = 0.6867), with the majority rule consensus showing that bootstrap supports all clades (Fig. 4.8). The following discussions were thus based on Fig. 4.8. Three monophyletic clades were recognised: *U. strigosus* and *U. albatus* form clade I. The second clade comprises *U. bistriolatus*, a sister taxon to *U. longicornis* + *pertenuis*. The third clade consists of two minor subgroups, where a number of monophyletic groups were supported.

In comparison of Figs 4.6 and 4.8, the major difference between the morphology and COI parsimony trees involves the placement of the basal taxa. In particular, *U. strigosus* and *U. albatus* were placed as the most basal species in the CO I sequence data while these species were placed as more derived species in the morphological parsimony tree.

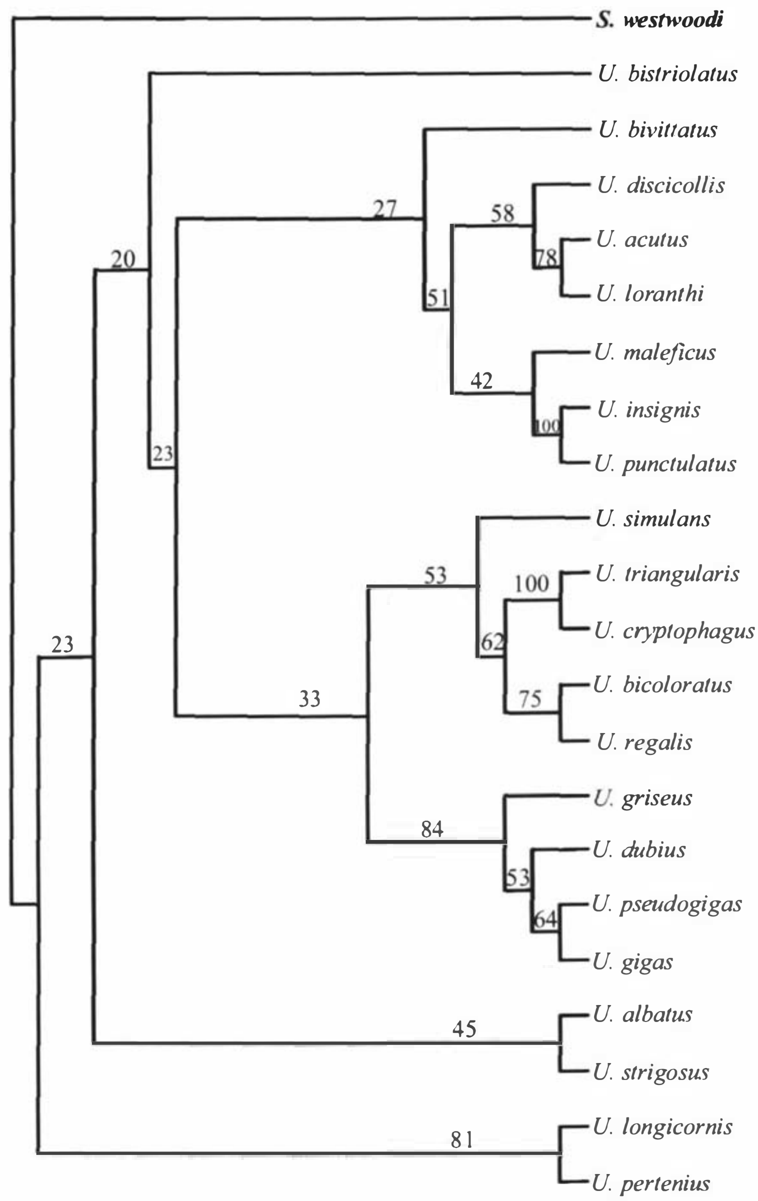


FIGURE 4.7 Phylogenetic relationships of *Uracanthus* species using COI sequences dataset. Fifty majority-rule consensus of 100 equally parsimonious trees (equal weighting applied) (L = 2,642, CI = 0.4337, RI= 0.4337). Values above branches refer to bootstrap value from 1000 replicates. Outgroup is bold.

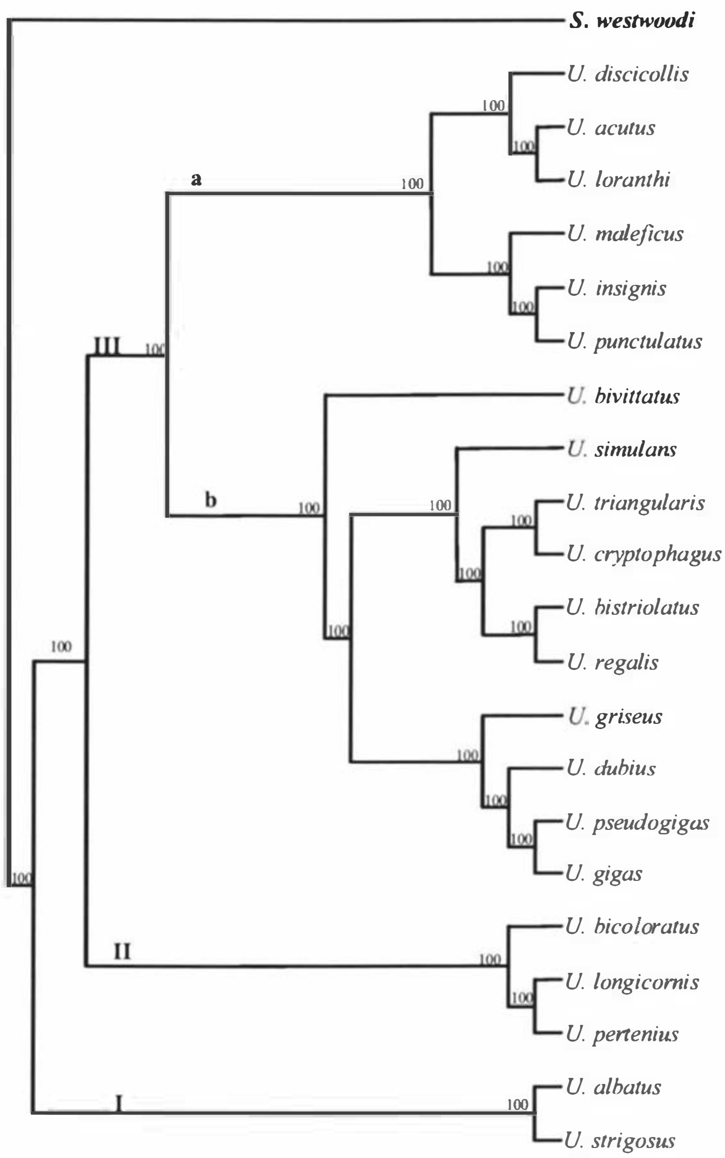


FIGURE. 4.8. Phylogenetic relationship of *Uracanthus* species using COI sequences dataset. Fifty majority-rule consensus of the five most parsimonious trees (successive weighting applied) (L = 564,195, CI = 0.6489, RI = 0.6867). Values above branches refer to bootstrap value from 1,000 replicates. Outgroup is bold.

4.3.4.3 Analysis of combined sequence data

The result of the incongruence length difference (ILD) test indicated that the CO1 sequence and morphological data sets were significantly incongruent (P = 0.01) with one another. Therefore, to test this potential conflict, separate analyses were performed: first on each data set as described above, and then combined analyses were performed in consideration of the conflicting result of the ILD test (Baker et al., 1998; Yoder et.al., 2001; Dowton & Austin, 2002). The combined data consist of the aligned sequence of 1,318 bp of CO1 sequence data plus 55 morphological characters from 21 taxa and 1 outgroup. In total, 1,373 characters (Appendix 1) were included with 616 characters being constant (44.86 %), 313 variable characters (22.79 %) and 444 parsimony-informative (32.33 %). An unweighted parsimony analysis of combined data resulted in 100 equally parsimonious trees (L = 2,475, CI = 0.4172, RI = 0.2580) with the majority rule consensus showing that most clades have low bootstrap values support (Fig 4.9). The successive weighting procedure reduced the number of trees to a single most parsimonious tree (L = 585,532, CI = 0.6166, RI = 0.3834)(Fig. 4.10). This tree has bootstrap support for all clades, showing that *U. longicornis* is the basal species to all other *Uracanthus* species, and two subgroups are formed:

A comparison of trees obtained from morphological, COI and combined data gives several interesting conclusions. First, the relationships of some closely related taxa remain constant, for example, the sister relationships of *U. gigas* + *pseudogigas*, *U. insignis* + *punctulatus*, and *U. acutus* + *loranthi*. Second, the placement of *U. insignis* and *U. punctulatus* varies from the most basal (in morphological analysis) to highly derived (in the combined and molecular analyses), whereas the placement of *U. albatus* and *U. strigosus* appears to be the most basal clade in the molecular analysis but is highly derived in the morphological analysis. In the combined analysis, *U. longicornis* is identified as the most basal species, whereas this species is placed as highly derived in the morphological analysis. The analyses of the morphological data gave strong support to both small and large morphological analyses, suggesting that *U. insignis* and *U. punctulatus* are the most basal clade in the genus *Uracanthus*. This is contradicted to the analyses of both COI and combined data. Considering the amount of available data was more limited in the molecular analysis than in the morphological analysis, the molecular analysis should be interpreted with caution. Therefore, I believe that *U. insignis* and *U. punctulatus* should be considered the most basal species, sister group to the remaining *Uracanthus* species.

The COI sequence and combined analyses also differed from morphological analysis in the taxon arrangement of the basal and derived species within the major clade. For example, *U. gigas* and *U. pseudogigas* appear to be more closely related to *U. maleficus* in the morphological analysis but this is not supported by molecular and combined data. Another difference is the placement of *U. bistriolatus*. In the morphological analysis, this species is one of the more basal, but in the COI and combined analyses, it is more derived.

4.4 Conclusion

Because of the poor preservation of DNA in the specimens studied, I was able to amplify and sequence a sufficiently long region of only three short fragments of the COI gene region from 22 species. Many molecular phylogenetic studies of insects have been conducted using fresh material or material preserved in alcohol. The present study suggests that when no fresh material is available, working with dried specimens may still yield good results, depending on the nature of the sequenced gene.

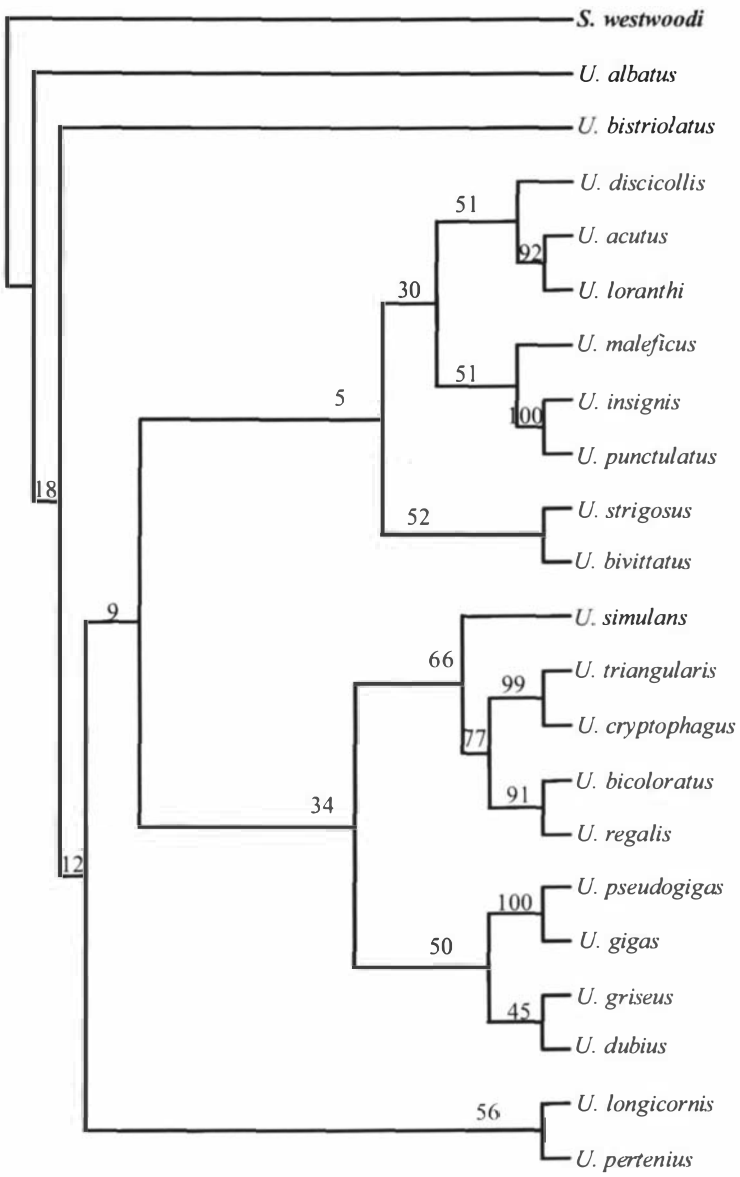


FIGURE 4.9 Phylogenetic relationship of *Uracanthus* species using a combined dataset. Fifty majority-rule consensus of 100equally parsimonious trees (equal weighting applied) (L = 3,013, CI = 0.4217, RI= 0.4310). Values above branches refer to bootstrap value from 1000 replicates. Outgroup is bold.

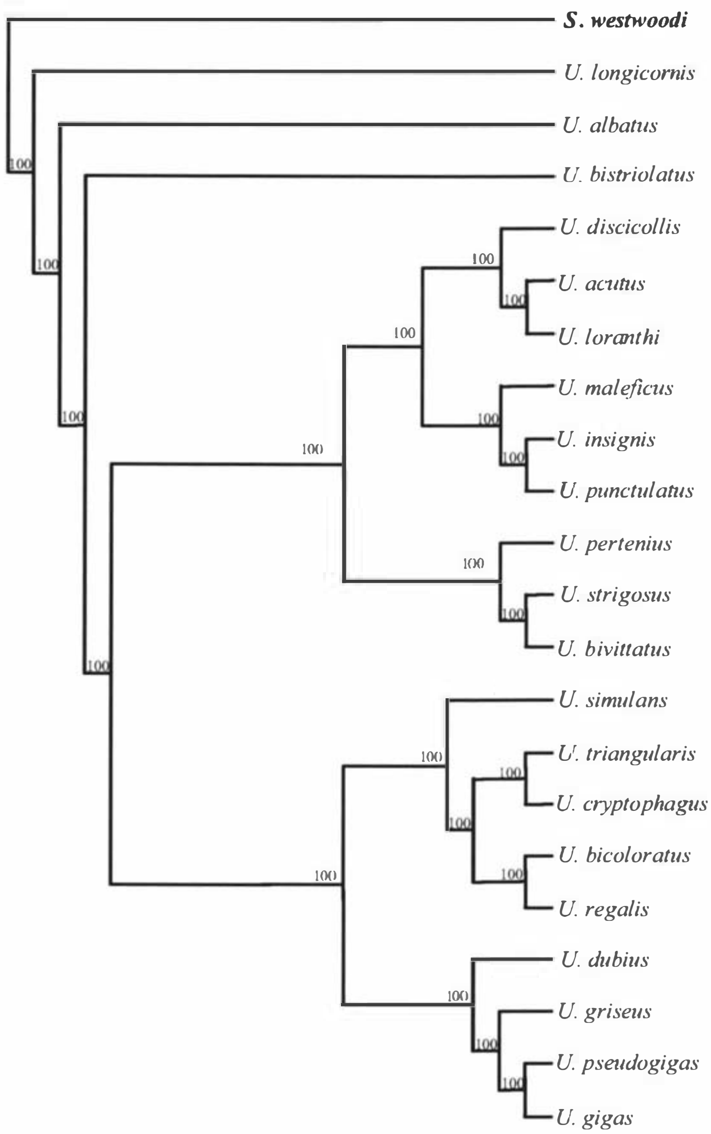


FIGURE 4.10 Phylogenetic relationship of *Uracanthus* species using a combined dataset. The single most parsimonious tree (successive weighting applied) (L = 735,643, CI = 0.5830, RI = 0.4170). Values above branches refer to bootstrap value from 1000 replicates. Outgroup is bold.

Three genes were initially obtained in this study. These included the mitochondrial protein-coding (COI), mitochondrial ribosomal (16S) and nuclear ribosomal spacer (ITS1) regions. However, it was only possible to successfully sequence the COI gene, while the ITS1 region did not show any amplification. The 16S was able to be sequenced but most sequences were ambiguous or too short to be informative. Therefore, the 16S was excluded from this study. Simon et al. (1994) suggested that the sequence of the ribosomal RNA gene among phylogenetically distant taxa was very difficult to align because of length variation. To avoid this problem, in this study I attempted to infer a molecular phylogenetic relationships of *Uracanthus* species based on the COI region gene.

In conclusion, the results are dependent upon both the taxa sampled and the resolving ability of the DNA sequences selected. Although the data analysed here provided some important insights into the species level relationships of *Uracanthus*, additional data would help in future studies to refine this phylogenetic hypothesis. These include additional taxa belonging to this genus and also a wider range of outgroup taxa. The present study was conducted using a small number of insect samples that represented at most a single replicate and thus it may not be representative of the entire range of genetic diversity of this genus. Therefore, there remains a need for additional taxa to fully resolve the relationship of the *Uracanthus* species. Finally, additional DNA nucleotide data may help to expand and improve our understanding of the phylogenetic relationships of these species. Other genes such as additional mitochondrial protein coding genes (Simon et al., 1994), nuclear ribosomal genes like 18S, or nuclear protein coding genes like elongation factor-1 (Caterino et al., 2000) also may be useful.

CHAPTER 5

GENERAL DISCUSSION AND CONCLUSION

5.1 Introduction

This thesis includes comprehensive treatments of taxonomy, phylogeny and biogeography of the Australian longicorn beetle genus *Uracanthus*. The main findings and problems of the study will be summarised and discussed in this chapter.

5.2 Taxonomy

The thesis undertakes the first thorough taxonomic revision of the genus *Uracanthus* since its establishment in 1833. Table 5.1 compares the taxonomic system presented by the current work with the previously recognized taxonomy of the genus. Prior to the present study, *Uracanthus* had 37 species and three variants recognised (McKeown 1947, 1948; Rondonuwu & Austin 1988). The revised genus now consists of 39 valid species, of which 31 are redescribed and eight described as new. Six new synonymies are also proposed. A key to all 39 species is provided. To ease the identification at the species level, photographs of adults are given for all species. This work forms the basis for species identification for longicorn pest management specialists, and conservation and biosecurity officers.

In this study, the male and female terminalia of the genus have been studied in detail for the first time. I have found that the characters of male genitalia are useful for taxonomy at the species level, particularly the shape of the median lobe and the forms and arrangement of the sclerotised processes or spines inside the internal sac. The male eighth sternite is also taxonomically useful, for example, the shape of the apical sternite and processes or spines on its ventral surface are conservative within the species. However, the general structure of the ovipositor appears to be similar for most species although it varies in several species. For these reasons, genitalia are described and illustrated for all species for the first time.

Table 5.1 Comparison between the present and previously recognized taxonomy of the genus *Uracanthus* (new species and new synonyms are shown in bold).

Taxonomy prior to present study	Present study
1. *U. acutus* Blackburn, 1889	1. *U. acutus* Blackburn, 1889
2. *U. albatus* Lea, 1916	2. *U. albatus* Lea, 1916
3. *U. ater* Lea, 1917	3. *U. ater* Lea, 1917
4. *U. bivittatus* Newman, 1838	4. *U. bivittatus* Newman, 1838
5. *U. corrugicollis* Lea, 1917	***U. marginellus*** **Hope, 1841 syn. nov.**
6. *U. cryptophagus* Olliff, 1892	***U. inermis*** **Aurivillius, 1917 syn. nov.**
7. *U. cupressianus* Rondonuwu & Austin, 1988	5. *U. corrugicollis* Lea, 1917
8. *U. dentiapicalis* McKeown, 1948	6. *U. cryptophagus* Olliff, 1892
9. *U. discicollis* Lea, 1916	7. *U. cupressianus* Rondonuwu & Austin, 1988
10. *U. dubius* Lea, 1916	8. *U. discicollis* Lea, 1916
11. *U. froggatti* Blackburn, 1895	9. *U. dubius* Lea, 1916
12. *U. fuscocinereus* White, 1855	10. *U. froggatti* Blackburn, 1895
13. *U. fuscostriatus* McKeown,1948	11. *U. fuscocinereus* White, 1855
14. *U. fuscus* Lea, 1916	12. *U. fuscus* Lea, 1916
15. *U. gigas* Lea, 1916	13. *U. gigas* Lea, 1916
16. *U. glabrilineatus* Lea, 1917	14. *U. glabrilineatus* Lea, 1917
17. *U. inermis* Aurivillius, 1917	15. *U. insignis* Lea, 1916
18. *U. insignis* Lea, 1916	16. *U. lateroalbus* Lea, 1916
19. *U. lateroalbus* Lea, 1916	***U. fuscostriatus*** **McKeown, 1948 syn. nov.**
20. *U. leai* McKeown, 1938	17. *U. longicornis* Lea, 1916

21. *U. longicornis* Lea, 1916
22. *U. loranthi* Lea, 1916
23. *U. maleficus* Lea, 1917
24. *U. marginellus* Hope, 1841
25. *U. minatus* Pascoe, 1866
26. *U. multilineatus* McKeown, 1948
27. *U. pallens* Hope, 1841
28. *U. parallelus* Lea, 1916
29. *U. parvus* Lea, 1916
30. *U. pertenuis* Lea, 1916
31. *U. simulans* Pascoe, 1866
32. *U. strigosus* Pascoe, 1875
33. *U. suturalis* Lea, 1916
34. *U. regalis* McKeown, 1948
35. *U. triangularis* Hope, 1833
    - *U. triangularis* Var A Lea, 1916
    - *U. triangularis* Var B Lea, 1916
    - *U. triangularis* Var C Lea, 1916
36. *U. tropicus* Lea, 1916
37. *U. ventralis* Lea, 1917

***U. daviumbus* Gresssitt, 1951 syn. nov.**

18. *U. loranthi* Lea, 1916
19. *U. maleficus* Lea, 1917
20. *U. minatus* Pascoe, 1866
21. *U. pallens* Hope, 1841
22. *U. parallelus* Lea, 1916
23. *U. pertenuis* Lea, 1916
24. *U. parvus* Lea, 1916
    - ***U. dentiapicalis* McKeown, 1948 syn. nov.**
25. *U. simulans* Pascoe, 1866
26. *U. strigosus* Pascoe, 1875
27. *U. suturalis* Lea, 1916
28. *U. regalis* McKeown, 1948
29. *U. triangularis* Hope, 1833
30. *U. tropicus* Lea, 1916
31. *U. ventralis* Lea, 1917
    - ***U. multilineatus* McKeown, 1948 syn. nov.**
32. ***U. bicoloraltus* sp. nov.**
33. ***U. maculatus* sp. nov.**
34. ***U. perthensis* sp. nov.**
35. ***U. griseus* sp. nov.**
36. ***U. quadristriolatus* sp. nov.**
37. ***U. punctulatus* sp. nov.**
38. ***U. pseudogigas* sp. nov.**
39. ***U. bistriolatus* sp. nov.**

The present taxonomic revision of the genus is based on the adult morphology. Although Duffy (1963) and Rondonuwu and Austin (1988) described the immature stages of several *Uracanthus* species, juveniles are still unknown for most species. Because the plant damage is caused by larvae in this group of beetles, species identification using larvae is important for quarantine inspection and host plant record confirmation. Therefore, future taxonomic work on the genus should focus on description and illustration of the immature stages. In addition, more new species will undoubtedly be found by future collectors.

5.3 General Biology

Little is known about the biology of many *Uracanthus* species. Before the current study the immature stages of only four species have been described in detail and their host plants correctly recorded (Duffy 1963; Rondonuwu & Austin 1988). However, biological records can still be summarized from fragmentary information on collecting labels attached to specimens and various publications (e.g. Allen et al. 1898a, 1898b; Best 1882; Dixon 1908; Froggatt 1893, 1894, 1898, 1902, 1907, 1919, 1923; Lea 1916, 1917a, 1917b; French 1900, 1911; Olliff 1892; Brimblecombe 1943; McKeown 1947; Tillyard 1926; Matthews 1997; Hawkeswood 2002). Some host plant records on collecting labels and in some publications should be treated with caution. For example, in some cases, plant names were written on the labels without further information such as whether these adults were collected on or emerged from the plants. Only the latter can be treated as reliable larval host plants because adults are free living and visit many plant species, which may not be their larval hosts.

My results show that the larvae of this genus are borers of at least 31 genera of trees and parasitic plants, including some economically important crops such as citrus, lychee (or litchi), peach, plum, and apricot. Adults can be found throughout the summer from September to March. Adults of many species are flower visitors and attracted to light. Much work is needed to understand the biology of this important genus.

5.3 Phylogenetic Relationships

Both morphological and molecular characters were used in my study to infer the species relationships within the genus. In Chapter 3, I performed cladistic analyses of the phylogeny of all 39 valid species using morphological characters. Due to the difficulties for DNA extraction, however, I analysed the phylogeny of only 21 species using molecular characters in Chapter 4. To make the molecular phylogeny comparable to the morphological one, I also carried out phylogenetic analyses of the 21 species using morphological and combined molecular and morphological characters. Maximum parsimony methods were used for all analyses with equal weighting and successive weighting applied. However, the preferred phylogenies were chosen and discussed from the 50% majority rule consensus trees with the successive weighting applied because this approach resulted in better resolution and support by bootstrap value.

In Chapter 3, the cladistic analysis of 39 species using 55 morphological characters shows that the monophyly of the genus is confirmed and the genus consists of seven species groups with *insignis*-species group (*U. insignis* + *U. punctulatus*) being placed as the basal taxa of the genus. Some species groups are verified as monophyletic but others are paraphyletic. For instance, the *triangularis* group (Clade 3) is a large monophyletic species group, which can be subdivided into three monophyletic species groups: *bivittatus* group (Clade 6), *fuscocinereus* group (Clade 7) and *dubius* group (Clade 8) (Fig. 3.4). Within the *dubius* group (Clade 8 in Fig. 3.4), the relationship between species remains unresolved. Some character states are distributed on the cladograms with many reversals. Reversals of character states on the cladograms might be due to missing taxa, irrespective of whether those have become extinct or have not been collected.

In Chapter 4, in order to better understand the phylogenetic relationship of the genus, I attempted to utilise molecular sequence data obtained from the mitochondrial gene. The mtDNA contains many characters that are useful in generating phylogenies (Simon et al. 1994; Swofford et al. 1996). The mtDNA sequences have been widely used in the systematic studies of the Coleoptera (Clark et al. 2001; Cognato & Vogler 2001; Shoda et al. 2003; Becerra 2004; Catherine et al. 2004; Caterino et al. 2005; Sota et al. 2005). A comparison of trees obtained from morphological, mtDNA, and combined morphological + mtDNA data gives several interesting conclusions. First, the relationships of some closely related taxa remain constant, for example, the sister relationships of *U. gigas* + *pseudogigas*, *U. insignis* + *punctulatus*, and *U. acutus* + *loranthi*. Second, the placement of *U. insignis* and *U. punctulatus* varies from the most basal (in morphological analysis) to highly derived (in the combined and molecular analyses), whereas *U. albatus* and *U. strigosus* appear to form the most basal clade in the molecular analysis but are highly derived in the morphological analysis. In the combined analysis, *U. longicornis* is identified as the most basal species, whereas this species is placed as highly derived in the morphological analysis. The analyses of the morphological data gave strong support to both small and large morphological data set analyses, suggesting that *U. insignis* and *U. punctulatus* form the most basal clade in the genus *Uracanthus*. This is contradicted by the analyses of both mtDNA and combined data. Considering the amount of data available for the molecular analysis was more limited than that for the morphological analysis, the results from molecular analysis should be interpreted with caution. Therefore, I believe that *U. insignis* and *U. punctulatus* should be considered the most basal species, being the sister group to the remaining *Uracanthus* species.

To better understand the phylogeny of the genus *Uracanthus*, more morphological characters should be considered and more species included for the molecular analysis in future studies.

5.4 Biogeographic Distribution

The general distribution patterns and areas of endemism of the Australian *Uracanthus* have been studied for the first time. My results show that the Australian fauna can be divided into five subregions: Kosciuskan, Western and Eyrean in southern and central Australia, and Torresian and Timorian in northern Australia.

It is indicated that *Uracanthus* is mainly a wet-adapted genus distributed along the coastal area and that most of its species found in the arid Eyrean are usually widely-distributed. The fauna are richest with highest endemism in the Kosciuskan and Western Subregions. These two subregions are very similar in faunal composition and closely related. The Eyrean Subregion has probably acted as a faunal exchange transit area between the Kosciuskan and Western Subregions. There has been little physical barrier between the Kosciuskan and Torresian Subregions. The Timorian and Torresian Subregion have no endemic species. It is thus suggested that the speciation and species radiation of *Uracanthus* may have occurred first in the Kosciuskan Subregion, then in the Western Subregion, and finally in the Eyrean, Torresian and Timorian Subregions.

Further biogeographic study of the genus will depend on the better understanding of its phylogeny, including more species and more characters (from adults, immature stages, DNA sequences and ecological data), and of the geological, geographic and climatic history of the Australian Region. Better approaches to biogeography to be developed in the future may also help in the study of these aspects of the genus.

5.6 Conclusion

The main findings in my PhD studies are summarized and discussed in this chapter. A comprehensive systematic treatment of the genus *Uracanthus* has been made in this study, including a general introduction to the beetles, a taxonomic revision, phylogenetic analyses using both morphological and molecular characters, and a distribution pattern appraisal. This work has provided a much firmer basis of knowledge of the genus than before. Such knowledge is essential for the correct identification of species, better management of pests and understanding of evolution of this increasingly important group of beetles. I hope that my work presented in this thesis is to be used as a foundation on which further research on *Uracanthus* can be built.

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APPENDIX 1 ALIGNMENT OF ALL COI SEQUENCE AND MORPHOLOGICAL DATA USED IN THIS STUDY (CHAPTER 4).

Molecular data are characters 1 – 1718; morphological data are character 1719-1373. Polymorphic characters are code as lette R=(AG); Y=(CT), M=(AC); K=GT; S=(CG); W=(AT)

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                           10        20        30        40        50        60        70        80        90       100
                   ....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|
U.bicoloratus      --------AATAATATAAGATTTTGGCT--ACTACCTCCTTCCTTGACTCTTCT--TTTAATAAGAAGAATTGTAGAAAATGGGGCTGGGACAGGGTGAA
U.griseus          -------------TTTTATATTTTAATT-TTACCCGGGATTATTGAATTAATATG-ATTGGAAGGAGGTATAGTAGAAAATGGAGCTGGTACAGGATGAA
U.triangularis     --------AATAATATAAGATTTTGGTT--ACTTCCCCCTTCCTTAACTCTTCT--TTTAATAAGAAGAATTGTAGAAAATGGGGCTGGTACAGGATGAA
U.dubius           ????????????????????????????????????????????????????????????????????????????????????????????????????
U.regalis          --------------------TTTTGACT--ACTCCCTCCTTCTTTAATTCTTCT--TTTAATAAGAAGAATTGTAGAAAATGGAGCTGGAACAGGATGAA
U.simulans         ----AATAAACAACATAAGATTTTGACT--ACTCCCTCCTTCCTTCCCTTTCCT--TTTAATAAGAAGAATTGTAGAAAATGGAGCTGGAACAGGATGAA
U.cryptophagus     ----------------AAGATTTTGATT--ACTCCCCCCTTCCTTAACCCTTCT--TTTAATAAGAAGAATTGTAGAAAATGGGGCTGGTACAGGATGAA
U.punctulatus      -----------------AGATTTTGATT--ATTACCTCCTTCACCAATTCTTCT--TCTGATAAGAAGAATCGTAGAAAATGGAGCTGGAACAGGATGAA
U.insignis         -----------------GATTTTCGATT--ATTACCTCCTTCACTAATTCTTCT--TCTGATAAGAAGAATCGTAGAAAATGGAGCTGGAACAGGATGAA
U.gigas            -------AAACAATATAAGATTTTGATT-ACTCCCCCCATCATTAATCTTACTT---CTAATAAGAAGAATTGTTGAAAATGGAGCAGGAACAGGATGAA
U.maleficus        -------------ATA-AGATTTTGATT-A-TTACCCCCTTCTCCTATTCTTCT--TCTCATGAGAAGAATTGTAAAAAATGGTGCAGGAACAGGATGAA
U.pseudogigas      ------------ATATAAGATTTTGATT-ACTCCCCCCATCATTAATCTTACTT---CTAATAAGAAGAATTGTTGAAAATGGAGCAGGAACAGGATGAA
U.acutus           -------------ATAGAGATTTTGATT-AGCTGCCCCCTTCCCTCACTCTTCTA-TCTTATAAGAAGAATTGTAGAAAATGGAGCAGGAACAGGATGAA
U.loranthi         --------AATAATATAAGATTTTGATT--ATTACCTCCTTCCCTCACCCTTCT--ACTTATAAGAAGAATTGTAGAAAATGGAGCAGGAACAGGATGAA
U.longicornis      ---------------TAAGATTTTGATT--GTTACCTCCTTCTCTTACTCTCCT--TTTAATAAAAAGAATTGTTGAAATGGAGCT--GATTTGGATGAA
U.albatus          ----------------AAGATTCTCACT--ACTCCCTCCCTCCTCATTTCTTCT--TTTGATGAGGAGAATTGTTGAAAATGGTGCTGGAACAGGATGAA
U.strigosus        --------------------TTTTGACT--TCTCCCCCCCTCACTCACCTTTCT--TTTAATAAGAAGAATTGTAGAAAATGGGGCTGGAACAGGATGAA
U.bivittatus       ------------------ATTTTGGACT--CCTACCTCCCTCTTTAACCCTTCT--TTTAATAAGAAGAATTGTAGAAAATGGAGCTGGAACAGGATGAA
U.discicollis      ----------------AAGATTTTGATT--ACTACCCCCCTCTTTAACCCTTCT--TCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAACAGGATGAA
U.pertenuis        ----------ATCATAAAGATTTTGGAT--ACCTTCCTATTC-CTGACTTTTCT--TTTATTAAGAAAAAAATTGAAAAATGAGGT--ACTGGGAATGAT
U.bistriolatus     -------------TATAAGATTTTGATT--ATTGCCCCCATCTTTACCCCTTCT--TTTAGTGAGAAGAATTGTAGAAAATGGGGTAGGAACAGGATGAA
S.westwoodi        -----------AATATAAGATTTTGATT--GCTTCCTCCCTCATTAACCTTTCT--TCTAATAAGAAGAATTGTTGAAAATGGGGCTGGAACCGGATGAA
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                          110       120       130       140       150       160       170       180       190       200
                   ....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|
U.bicoloratus      CTGTTTACCCACCATTATCAGCAAATGTGGCACATAGGGGTTCATCAGTTGATCTGGCGATTTTTAGCCTTCACCTGGCTGGAATCTCTTCTATTTTAGG
U.griseus          CTGTTTATCCTCCTCTTTCTTCTAGAATTGCTCATGGTGGAGCTTCTGTTGATTTAGCTATTTTTTCTCTTCATTTAGCTGGTATATCTTCAATTTTAGG
U.triangularis     CTGTTTACCCCCCCTTATCAGCAAATGTTGCACATAGAGGTTCATCTGTTGATCTAGCAATTTTTAGCCTTCACCTAGCTGGGATTTCCTCTATTTTAGG
U.dubius           ????????????????????????????????????????????????????????????????????????????????????????????????????
U.regalis          CTGTTTATCCACCATTATCAGCAAATGTTGCACATAGGGGTTCATCTGTTGATTTGGCAATTTTCAGCCTCCACCTGGCCGGAATCTCTTCTATTCTAGG
U.simulans         CAGTTTACCCCCCTTTATCAGCAAATGTAGCACACAGTGGTTCATCTGTCGATTTAGCAATTTTCAGACTTCATCTCGCTGGAATTTCATCTATTTTAGG
U.cryptophagus     CTGTCTACCCCCCCCTATCGGCAAATGTTGCACATAGAGGTTCATCTGTTGATCTAGCAATTTTTAGTCTTCACCTAGCTGGAATTTCCTCTATTTTAGG
U.punctulatus      CTGTTTACCCCCCTTTATCTTCAAATGTTGCACATAGAGGCTCATCTGTTGATTTAGCAATTTTCAGACTTCATCTTGCTGGAATTTCTTCTATTCTTGG
U.insignis         CTGTTTACCCCCCTTTATCTTCAAATGTTGCACATAGAGGCTCATCTGTTGATTTAGCAATTTTCAGACTTCATCTTGCTGGAATTTCTTCTATTCTTGG
U.gigas            CAGTTTACCCACCATTAGCAGCAAATGTAGCTCATAGAGGATCATCTGTTGATTTAGCAATTTTTAGACTACATCTAGCAGGAATTTCCTCAATTTTAGG
U.maleficus        CAGTTTACCCACCCCTATCAGCAAATGTAGCTCATAGAGGATCTTCTGTTGATTTAGCTATTTTTAGTCTTCATCTTGCAGGAATCTCCTCAATTTTAGG
U.pseudogigas      CAGTTTACCCACCATTAGCAGCAAATGTAGCTCATAAAGGATCATCTGTTGATTTAACATTTTTTAGACTACATCTAGCAGGAATTTCCTCAATTTTAGG
U.acutus           CAGTTTATCCTCCCTTATCTGCAAATGTTGCTCACAGAGGATCTTCTGTTGATCTAGCTATTTTTAGTCTCCATCTTGCAGGAATTTCTTCAATTCTAGG
U.loranthi         CAGTTTACCCTCCTTTATCTGCAAATGTCGCCCACAGAGGATCTTCTGTTGATCTCGCTATTTTTAGTCTTCATCTTGCAGGAATTTCTTCAATTCTAGG
U.longicornis      CAAATTACCCTCAATTATCCGCAAATATTGCCCATAGAGGCTCATCTGTTGATCTGGCAATTTTTAGGCTTCACTTAGCTGGTATTTCCTCAATTCCTCC
U.albatus          CCGTTTACCCGCCATTATCTGCAAATGTTGCTCATAGGGGCTCATCTGTTGACTTATCAATTTTTATACTCCACTTAGCCGGAATCTCTTCCATTCTTGG
U.strigosus        CCGTTTATCCACCATTATCAGCAAACGTCGCCCATAGAGGGTCCTCTGTTGATCTAGCAATTTTCAGACTCCACCTCGCAGGAATCTCCTCTATCCTAGG
U.bivittatus       CAGTTTATCCGCCTTTATCTGCAAATGTTGCTCATAGAGGTTCATCTGTTGACCTAGCAATTTTTAGACTTCATCTAGCTGGTATTTCATCTATTCTAGG
U.discicollis      CAGTATACCCCCCGCTATCTGCAAATGTAGCTCACAGAGGTTCATCAGTAGATCTAGCCATTTTTAGGCTACACCTTGCCGGTATCTCCTCCATTCTGGG
U.pertenuis        TGACTTACC----GATGTCAACCAATGTTGACCAGAGAACTTCATCAAAAATTGTTTTGATTTTGAGGTTCCACCGTTTCAGGAATC---AGGTTCAAGG
U.bistriolatus     CTGTTTATCCACCATTATCTGCTAATATTGCTCATAGAGGTTCATCAGTTGACTTAGCAATTTTTAGACTTCACTTAGCTGGAATTTCGTCTATTCTAGG
S.westwoodi        CAGTTTATCCTCCATTATCCGCAAATGTAGCACATAGAGGATCATCTGTCGATTTAGCTATTTTTAGGCTTCACTTAGCCGGAATCTCCTCCATTTTAGG
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                             210       220       230       240       250       260       270       280       290       300
                    ....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|
U.bicoloratus       AGCTGTCAATTTTATTACTACAGTAATCAATATACGGCCCACAGGTATATCACCAGATCAAATACCTTTATTTGTATGAGCAGTTGTAATTACAGCCATC
U.griseus           AGCAGTAAATTTTATTACTACAGTAATTAATATACGTTCTACAGGTATCTCTTATGATCGAATACCATTATTTGTTTGATCAGTTGTGATTACAGCTTTT
U.triangularis      AGCTGTCAATTTCATTACTACAGTAATTAATATACGGCCCACAGGTATATCACCAGACCAAATACCTTTATTTGTATGAGCAGTTGTAATTACAGCAATT
U.dubius            ????????????????????????????????????????????????????????????????????????????????????????????????????
U.regalis           AGCTGTTAATTTCATCACTACAGTAATTAATATGCGGCCCACAGGTATATCACCAGATCAAATACCTTTATTTGTATGAGCAGTTGTAATTACAGCTATT
U.simulans          AGCCGTTAATTTCATTACTACAGTAATCAACATACGACCTACAGGTATATCCCCAGACCAGATACCTTTGTTTGTATGGGCAGTAGTAATTACTGCCATC
U.cryptophagus      AGCTGTCAATTTTATTACTACAGTAATTAATATACGACCCACAGGCATATCACCAGACCAAATACCTTTATTTGTATGAGCAGTTGTAATTACAGCAATT
U.punctulatus       AGCCGTTAACTTTATTACTACAGTAATTAATATACGACCAACAGGTATATCCCCAGACCAAATACCATTATTTGTATGAGCTGTAGTAATTACAGCTGTT
U.insignis          AGCCGTTAACTTTATTACTACAGTAATTAATATACGACCAACAGGTATATCCCCAGACCAAATACCATTATTTGTATGAGCTGTAGTAATTACAGCTGTT
U.gigas             AGCTGTAAATTTTATTACTACCGTAATCAACATACATCCAACAGGTATATCCCCCGACCAATTACCATTGTTTGTGTGAGCAGTAGTAATTACTGCTATT
U.maleficus         AGCTGTAAACTTTATTACCACAGTTATTAATATACGACCTACAGGTATATCTCCTGACCAAATACCCTTATTTGTATGAGCAGTTGTTATTACCGCAATT
U.pseudogigas       AGCTGTAAATTTTATTACTACCGTAATCAACATACATCCAACAGGTATATCCCCCGACCAATTACCATTGTTTGTGTGAGCAGTAGTAATTACTGCTATT
U.acutus            AGCTGTAAATTTTATTACCACAGTAATTAATATACGACCCACAGGAATATCCCCTGATCAAATACCTTTATTTGTATGAGCAGTTGTAATTACTGCAATT
U.loranthi          AGCTGTAAACTTTATTACCACAGTAATTAATATACGACCTACAGGTATATCCCCCGATCAAATACCTTTATTTGTATGAGCAGTTGTAATTACTGCAATT
U.longicornis       CTGAGCAAACTTTATTACTACAGTAATTAATATACGACCCACAGGAATATCTCCAGATCAAATACCCTTATTTGTTTGAGCTGTCTAA-TCACAGCAGTT
U.albatus           TGCCGTTAATTTTATTACTACAGTAATTAATATACGGCCCACAGGAATATCCCCAGATCAAATACCTCTATTTGTTTGAGCGGTTGTAATTACAGCTGTC
U.strigosus         AGCCGTTAATTTTATCACAACAGTAATTAATATGCGACCCACGGGAATATCCCCAGATCAAATACCTTTATTTGTTTGAGCTGTTGTAATTACAGCTGTT
U.bivittatus        GGCAGTTAACTTTATCACTACAGTAATTAATATACGACCAACTGGAATATCACCAGATCAAATACCTCTATTTGTATGAGCCGTTGTTATTACAGCTATT
U.discicollis       AGCTGTTAACTTTATTACTACTGTAATCAATATACGACCTACCGGCATATCCCCAGACCAAATACCCCTATTTGTATGGGCTGTTGTTATTACAGCAGTC
U.pertenuis         AGCTGATAATTTTTCAACTAAAGTAATCAA-----GGCCCACAGGTATGTCTTCTGATTTAAAACCTTTATTTCTTTGAGCAGTTGAAATCACAGATATT
U.bistriolatus      TGCTGTTAATTTCATTACTACAATAATTAATATACGACCCACAGGAATATCCCCAGATCAAATACCATTATTTGTGTGAGCTGTAGTAATTACAGCTGTT
S.westwoodi         GGCTGTTAATTTCATTACTACAGTAATCAACATACGACCTACGGGAATGTCCCCAGATCAAATACCTTTATTTGCTTGATCCGTTGTAATTACAGCTATT

                             310       320       330       340       350       360       370       380       390       400
                    ....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|
U.bicoloratus       TTACTTCTACTTTCACTTCCAGTATTAGCAGGAGCAATTACTATATTATTAACAGATCGTAACCTAAATACATCCTTTTTTGATCCGGCAGGAGGTGGTG
U.griseus           CTTCTTTTATTATCATTACCAGTTCTTGCTGGAGCTATTACAATATTATTAACAGATCGAAATTTAAATACTTTTTTTTTGACCCAGCTGGAGGAGGAG
U.triangularis      TTACTCCTACTTTCACTTCCAGTATTAGCAGGGGCAATTACCATATTATTAACAGATCGTAATCTAAATACATCCTTTTTTGATCCAGCAGGAGGTGGAG
U.dubius            ????????????????????????????????????????????????????????????????????????????????????????????????????
U.regalis           TTACTCCTACTTTCACTTCCAGTATTAGCTGGAGCAATCACTATATTATTAACAGACCGTAACCTAAATACATCCTTTTTTGATCCAGCAGGAGGTGGAG
U.simulans          CTACTACTACTTTCACTTCCAGTACTAGCAGGAGCAATCACTATATTATTAACAGATCGTAATCTCAATACATCCTTTTTTGACCCAGCAGGAGGGGGAG
U.cryptophagus      TTACTACTACTTTCACTTCCAGTATTAGCAGGGGCAATTACTATATTATTAACAGATCGTAATTTAAATACATCCTTTTTTGACCCAGCAGGAGGTGGGG
U.punctulatus       TTACTTTTATTATCCCTTCCTGTACTAGCAGGAGCAATTACCATACTATTAACAGATCGAAATCTTAATACATCCTTTTTTGACCCAGCAAGAGGTGGTG
U.insignis          TTACTTTTATTATCCCTTCCTGTACTAGCAGGAGCAATTACCATACTATTAACAGATCGAAATCTTAATACATCCTTTTTTGACCCAGCAAGAGGTGGTG
U.gigas             TTATTATTACTTTCACTTCCAGTATTAGCCGGAGCAATCACAATATTATTAACAGATCGTAATTTAAATACATCCTTCTTTGATCCTGCTAGAGGCGGAG
U.maleficus         TTACTTCTTCTTTCACTTCCAGTATTGGCTGGAGCTATTACTATACTTCTAACAGACCGAAATTTAAATACATCCTTCTTTGATCCCGCAGGAGGTGGAG
U.pseudogigas       TTATTATTACTTTCACTTCCAGTATTAGCCGGAGCAATCACAATATTATTAACAGATCGTAATTTAAATACATCCTTCTTTGATCCTGCTAGAGGCGGAG
U.acutus            CTTCTTCTTCTGTCTCTTCCAGTGCTAGCTGGAGCTATCACAATGTTACTTACAGACCGAAACTTAAATACATCCTTCTTTGACCCCTCGGGAGGAGGAG
U.loranthi          CTACTTCTCTTATCTCTTCCTGTACTAGCTGGAGCTATCACAATATTATTAACAGACCGAAACTTAAATACATCCTTCTTTGATCCTTCAGGAGGAGGAG
U.longicornis       CTACTTTTACTTTCCTTATGACCCTTAGCAGGAGCAATTACTATGCTACTCACAGACCGAAATCTTAACACATCATTTTTTGAACCGGGAGTGGAGGTGA
U.albatus           TTGCTCTTGCTTTCACTTCCTGTACTAGCAGGGGCAATCACTATACTATTAACCGACCGAAATCTAAATACATCCTTTTTTGATCCAGCAGGGGGAGGAG
U.strigosus         CTACTTCTACTCTCTCTCCCAGTTTTAGCAGGAGCAATCACTATACTATTAACAGATCGAAATTTAAACACATCCTTCTTTGATCCAGCAGGAGGAGGTG
U.bivittatus        TTACTACTATTATCACTTCCAGTTCTTGCAGGAGCAATTACTATGTTATTAACAGATCGGAACCTAAATACATCTTTTTTTGATCCCGCAAGAGGGGGAG
U.discicollis       CTACTATTATTATCACTCCCAGTGTTAGCAGGAGCAATCACTATATTATTAACAGACCGAAATTTAAATACATCCTTTTTTGACCCTGCTGGAGGGGGAG
U.pertenuis         TTACCATTAATTTTACTTCCAGTCCTTGCAGAAGCAATTACTATATTATTAATCAATCAAAAT--TGGTTTTGCATTTTTTGATCCTGCCGGAGGAATAA
U.bistriolatus      TTATTATTGCTTTCACTTCCAGTATTAGCAGGGGCAATTACTATACTTTTAACARACCGAAATCTAAATACATCATTTTTTGATCCGGGAGGAGGTGGAG
S.westwoodi         TTACTTTTACTTTCACTACCAGTTTTAGCAGGGGCAATTACTATGCTATTAACAGACCGAAACTTAAATACATCTTTTTTTGACCCTGCCGGAGGGGGAG

                             410       420       430       440       450       460       470       480       490       500
                    ....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|
U.bicoloratus       ATCCTATTCTTTACCAGCACTTGTTTTGATTTTTTGGACATCCAGAAGTTTATATTT----------------------TCCCACATTATTAGRSMARGA
U.griseus           ACCCTATTTTATACCAACTTTTATTTTGATTTTTTGGTCACCCAGAAGTTTATATTTTAA----------------TTTGCTMATATTATTAGT-CAAGA
U.triangularis      ACCCTATTTTATACCAACACTTATTTTGATTTTTTGGACACCCGGAAGTTTATATTT-------------------------CACATTATTAGACAAG-A
U.dubius            ????????????????????????????????????????????????????????????????????????????????????????????????????
U.regalis           ACCCTATCCTCTACCAACACTTATTTTGATTTTTTGGACATCCAGAAGTTTATATTTAATTTTACCGG----------TTCTCACATTATTAGACAAG-A
U.simulans          ATCCTATTTTATACCAACACTTATTCTGATTTTTTGGACACCCAGAAGTTTAT---------------------------CCCATATTATTAGACAAG-A
U.cryptophagus      ACCCTATCCTATATCAACACTTATTTTGATTTTTTGGACACCCAGAAGTTTATATTTAATTTTA---------------TCCCACATTATTAGACAAG-A
U.punctulatus       ACCCCATTCTTTATCAACATTTATTTTGATTTTTTGGACATCCAGAAGTTTATATTTAATTTTAC-----------????????????????????????
U.insignis          ACCCCATTCTTTATCAACATTTATTTTGATTTTTTGGACATCCAGAAGTTTATATTTAATTTTAC------------------ATATTATTAGA-CAAGA
U.gigas             ATCCTATTTTATATCAACACTTATTTTGATTTTTTGGACATCCAGAAGTTTATATT-------------------------ACACATTATTAGT-CAAGA
U.maleficus         ATCCTATTTTATACCAGCATTTATTCTGGTTTTTTGGACACCCCGAAGTTTATATTTTAATTT-------------????????????????????????
U.pseudogigas       ATCCTATTTTATATAACCACTTATTTTGATTTTTTGGACATCCAGAAGTTTWTATTTTATT---------------????????????????????????
U.acutus            ACCCTATTCTTTATCAACATTTATTTTGATTTTTTGGACATCCTGAAGTTTATATTTTAA-------------------TCTCATATTATTAGA-CAAGA
U.loranthi          ATCCCATTCTTTATCAACATTTATTTTGATTTTTTGGACATCCCGAAGTTTATATTT-------------------????????????????????????
U.longicornis       -CCCCATTCTATATCAACACTTATTCTGATTTTTTGGGCACCCAGAAGTTTATATTTAATTTTACCG---------????????????????????????
U.albatus           ACCCCATCCTTTATCAACATCTATTTTGATTCTTCGGGCACCCGGAAGTTTATATTTAATTTTA-------------TTKCTSACATTATKAGS-CAAGA
U.strigosus         ATCCTATCCTGTATCAACACCTTTTCTGATTTTTTGGACACCCAGAAGTTTATATTTAATTTTACCGG----------ACWCTAATTCATTART-TAAKA
U.bivittatus        ACCCAATCCTATATCAACATCTATTTTGATTCTTTGGACACCCAGAAGTTTATATTTAATTTTTAC----------------CATATCATTATA-CAAGA
U.discicollis       ACCCTATCCTCTACCAACACCTATTTTGATTTTTTGGACATCCAGAAGTTTATATTTAATTTTA-------------SMCYRTGTATTAKMMAW-RRARA
U.pertenuis         ATCCTGTGCTTGATCAACATTTATTCTGATTCTTTGGCCACCCTAAAGTTTATATTTAATATTACTGGGAGAAAT?????????????????????????
U.bistriolatus      ATCCAATTCTTTATCAACATTTATTTTGATTTTTTGGACACCCTGAAGTTTATATTTTAATT--------------????????????????????????
S.westwoodi         ATCCTATCCTTTATCAACATTTGTTTTGATTTTTTGGACACCCAGAAGTTTATATTTTAA----------------------CATATTATTAGG-CAGGA
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                                    510       520       530       540       550       560       570       580       590       600
                           ....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|
U.bicoloratus              AAGAGGTAAAAM-MGWTARCATTTGGAACACTAGGAATAATTTATGCTATAATASCMATTGGRTTAYTAGGATTCGTTGTATGGGCTCATCACATATTTA
U.griseus                  ATCTGGAAAAMA--GKAAACTTTTGGATCATTAGGAATAATTTATGCAATATTMSCKWTWGGATTATTAGGATTTATTGTATGASCTCATCATATATTTA
U.triangularis             GAGAGGTAAAMMCAKWTARMAKTTGGAACACTAGGAATAATTTACGCTATAATAGCMWTTGGTTTACTAGGATTCGTTGTATGAGCTCATCATATATTTA
U.dubius                   ????????????????????????????????????????????????????????????????????????????????????????????????????
U.regalis                  AAGAGGTAAAMA-AKA-ARMATTTGGAACACTAGGAATAATTTATGCTATAATASCAWTTGGATTATTAGGATTCGTTGTATGGGCCCATCACATATTTA
U.simulans                 AAGAGGTAAAAA-AGA-AGCATTTGGAACACTAGGAATAATTTATGCTATAATAGCAATTGGATTATTAGGTTTCGTTGTATGAGCTCACCATATATTTA
U.cryptophagus             AAGAGGTAAAAMCAKWTAGCATTTGGAACACTAGGAATAATTTACGCTATAATAGCAATTGGTTTACTAGGATTCGTTGTATGAGCTCATCACATATTTA
U.punctulatus              ????????????????????????????????????????????????????????????????????????????????????????????????????
U.insignis                 AAGAGGTAAAAMCATKWARCATTTGGAACACTAGGAATAATCTACGCTATAATAGCAATTGGACTCCTAGGATTTGTTGTATGAGCTCATCATATATTTA
U.gigas                    AAGAGGTAAMMMC-AKAWGCATTTGGAACATTAGGAATAATTTATGCAATAATAGCTATCGGCTTATTAGGCTTTGTAGTTTGAGCACATCATATATTTA
U.maleficus                ????????????????????????????????????????????????????????????????????????????????????????????????????
U.pseudogigas              ????????????????????????????????????????????????????????????????????????????????????????????????????
U.acutus                   AAGAGGAAAAAMAKW--AGCRTTTGGAACMTTAGGWATAATTTAYGCTATAATASCWATTGGTYTATTRGGYTTTGTRGTRTGAGCWCACCAYATRTTTA
U.loranthi                 ????????????????????????????????????????????????????????????????????????????????????????????????????
U.longicornis              ????????????????????????????????????????????????????????????????????????????????????????????????????
U.albatus                  AAGAGGTAAAMM--WKWWSCCYTCSGAACACTRRGAATAAKCTATGCTATAAWASCGATTGGRCTCCTAGGATTTGTTGTTTGAGCTCATCATATATTTA
U.strigosus                KAGAAGKAMACC--ACAAAYATTWGGAACATTAGGAWTTTCTWAKSTTWT--TARATATTRGCMTTWTWGGATTTGTAGTATGAGCACATCATATGTTCA
U.bivittatus               AAGAGGTAAAAMM-GWTARMRTKKGGAACACTAGGAATAATTTATGCTATAATATCMWTTGGGTTACTAGGATTTGTAGTATGAGCTCATCATATATTTA
U.discicollis              GACRGYAATAWRGRW--WGCCTTTGGAACACTAGGTATAATTTATGCTATAATAGCAATTGGTYTTTTAGGATTTGTTGTATGAGCTCATCATATATTYA
U.pertenuis                ????????????????????????????????????????????????????????????????????????????????????????????????????
U.bistriolatus sp.nov      ????????????????????????????????????????????????????????????????????????????????????????????????????
S.westwoodi                AAGAGGTAAAMCMAKTAAGCATTTGGAACACTTGGAATAATTTATGCAATAATASCWWTCGGATTATTAGGATTTGTTGTTTGAGCTCACCATATATTTA

                                    610       620       630       640       650       660       670       680       690       700
                           ....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|
U.bicoloratus              CAGTAGGAATAGATGTTGATACCCGAGCATACTTTACTTCTGCTACAATAATTATTGCTGTTCCAACYGGAATTAAAGTATTTAGGTGACTTGCAACWTT
U.griseus                  CAGTAGGAATAGATGTAGATACACGAGCTTWTTTTACCTCAGCTACAATAATTATTGCAATTCCAACAGGAATTAAAATTTTTAGATGATTAGCTACTTT
U.triangularis             CAGTAGGAATAGATGTAGATACTCGAGCATATTTTACCTCTGCTACAATAATTATTGCTGTTCCAACTGGAATTAAAGTATTTAGATGACTTGCAACATT
U.dubius                   ????????????????????????????????????????????????????????????????????????????????????????????????????
U.regalis                  CAGTAGGAATAGATGTTGATACCCGAGCGTACTTTACTTCCGCTACAATAATTATTGCTGTTCCAACCGGAATTAAAGTATTTAGGTGGCTCGCAACATT
U.simulans                 CAGTAGGAATAGATGTTGATACTCGAGCATATTTTACTTCTGCTACAATAATCATTGCTGTTCCAACAGGAATTAAAGTATTCAGATGACTTGCAACTTT
U.cryptophagus             CAGTAGGAATAGATGTAGATACTCGAGCATATTTTACCTCTGCTACAATAATTATTGCTGTTCCAACTGGAATTAAAGTATTTAGATGACTTGCAACATT
U.punctulatus              ????????????????????????????????????????????????????????????????????????????????????????????????????
U.insignis                 CAGTAGGAATAGATGTTGATACCCGAGCATATTTTACTTCTGCTACCATAATTATTGCTGTCCCTACGGGAATTAAAGTATTTAGATGATTGGCAACTCT
U.gigas                    CAGTAGGGATAGATGTTGATACACGAGCTTATTTCACTTCTGCTACAATAATTATTGCTGTTCCTACAGGAATTAAAGTATTTAGATGATTAGCAACATT
U.maleficus                ????????????????????????????????????????????????????????????????????????????????????????????????????
U.pseudogigas              ????????????????????????????????????????????????????????????????????????????????????????????????????
U.acutus                   CAGTAGGMATAGATGTTGATACTCGGGCATACTTYACTTCCGCAACTATAATTATTGCTGTTCCAACYGGAATTAAAGTATTYAGTTGACTAGCAACTTT
U.loranthi                 ????????????????????????????????????????????????????????????????????????????????????????????????????
U.longicornis              ????????????????????????????????????????????????????????????????????????????????????????????????????
U.albatus                  CTGTAGGCATAGATGTAGATACCCGAGCATACTTTACTTCCGCTACTATAATTATTGCTGTTCCAACCGGAATTAAAGTCTTTAGATGACTCGCTACACT
U.strigosus                CTGTAGGAATGGATGTAGACACTCGGGCATACTTCACCTCCGCTACTATAATTATTGCTGTTCCTACTGGAATTAAAGTATTTAGGTGACTCGCAACACT
U.bivittatus               CAGTAGGAATAGATGTAGACACCCGGGCTTATTTTACATCAGCTACAATAATTATTGCAGTTCCTACTGGAATTAAAGTATTTAGATGACTAGCAACCTT
U.discicollis              CAGTAGGAATGGATGTTGATACYCGAGCATWTTTTACTTCWGCAACTATAATTATTGCCGTTCCTACCGGAATTAAAGTATTTAGWTGACTCGCAACCTT
U.pertenuis                ????????????????????????????????????????????????????????????????????????????????????????????????????
U.bistriolatus             ????????????????????????????????????????????????????????????????????????????????????????????????????
S.westwoodi                CTGTAGGAATAGACGTTGATACACGAGCATACTTTACTTCTGCAACCATAATTATTGCAGTTCCCACCGGAATTAAAGTATTTAGATGACTCGCAACTTT

                                    710       720       730       740       750       760       770       780       790       800
                           ....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|
U.bicoloratus              ACAYGGAGCTTATTTATYTMTTARCCCAGCTACTCTTTGATCCTTAGGATTTGTATTTCTATTTACGGTAGGAGGATTAACTGGGGTAGTAYTAGCCAAT
U.griseus                  ACATGGAACTAATATAWTTTATACTCCTGCTATATTATGAGCGCTAGGATTTGTATTTTTATTTACAGTAGGAGGATTAACTGGAGTAGTATTAGCTAAT
U.triangularis             ACATGGAGCTTATCTATTTCTTAATCCAGCTACTCTTTGATCTTTAGGATTTGTATTTCTATTTACAGKGGGAGGATTAACGGGAGTAGTATTAGCCAAT
U.dubius                   ????????????????????????????????????????????????????????????????????????????????????????????????????
U.regalis                  GCACGGAGCTTATCTATTTCTTAACCCAGCTACTCTTTGATCCTTAGGATTTGTATTTCTATTTACAGTAGGAGGACTAACTGGAGTAGTATTAGCCAAT
U.simulans                 ACACGGAGCTTATTTATTTATTAACCCAGCAACTCTCTGGGCCTTAGGATTTGTATTTCTATTCACCGTAGGGGGATTAACTGGAGTAGTACTAGCCAAC
U.cryptophagus             ACATGGAGCTTATCTATTTCTTAACCCAGCCACTCTTTGATCTTTAGGATTTGTATTTCTATTTACAGTAGGAGGATTAACGGGAGTAGTATTAGCCAAT
U.punctulatus              ????????????????????????????????????????????????????????????????????????????????????????????????????
U.insignis                 ACATGGAGCCTACTTATCCATTAGTCCTGCCACTCTTTGATCTCTAGGATTTGTATTCTTATTTACTGTGGGAGGATTAACCGGAGTTGTACTAGCCAAT
U.gigas                    ACATGGAACTCAATTATTTTTTTATCCAGCTACTTTATGATCATTAGGATTCGTCTTCCTATTTACTGTGGGTGGATTAACAGGAGTTGTACTAGCTAAT
U.maleficus                ????????????????????????????????????????????????????????????????????????????????????????????????????
U.pseudogigas              ????????????????????????????????????????????????????????????????????????????????????????????????????
U.acutus                   ACAYGGTRCCCAACTYTTTTTTAAYCCYGCYACCCTWTGATCTTTRGGATTTGTATTYTTRTTCACTGTTGGAGGRYTAACKGGAGTTGTYTTAGCTAAY
U.loranthi                 ????????????????????????????????????????????????????????????????????????????????????????????????????
U.longicornis              ????????????????????????????????????????????????????????????????????????????????????????????????????
U.albatus                  TCATGGAACCTACTTATTTTACAACCCAGCAACCYTATGAGCCCTAGGGTTTGTWTTTTTATTTACTGTAGGAGGACTGACTGGAGTAGTCCTAGCTAAC
U.strigosus                TCACGGAACTAATTTATTCTTTAACCCTGCCACCCTTTGATCTTTAGGATTTGTATTCCTTTTTACCGTTGGTGGACTCACCGGGGTTGTTCTASCTAAC
U.bivittatus               CCACGGAAYTTTTTTATTCTTTAACCCAGCAACTCTATGATCATTAGGATTTGTATTTTTATTTACTGTTGGAGGTTTAACTGGAGTTGTACTAGCTAAT
U.discicollis              GCATGGAACTCACCTATTTTTTAATCCAGCCACTCTTTGATCCTTAGGATTCGTATTTTTATTCACTGTGGGGGGACTAACTGGAGTTGTATTAGCTAAT
U.pertenuis                ????????????????????????????????????????????????????????????????????????????????????????????????????
U.bistriolatus             ????????????????????????????????????????????????????????????????????????????????????????????????????
S.westwoodi                GCACGGAGCTTACTTATTCTTTAACCCAGCCACTCTTTGATCTTTAGGATTTGTATTTCTTTTTACTGTGGGTGGATTAACTGGTGTGGTCTTAGCTAAC
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                      810       820       830       840       850       860       870       880       890       900
                 ....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|
U.bicoloratus    TCATCAATTGACATTGTACTACATGACACATACTACGTCGTAGCTCATTTCCATTATGTAYTATCAATAG--------------WTTAATWGGAGSARTA
U.griseus        TCTTCTCTTGATATTATTTTACATGACACATATTATGTAGTTGCACATTTCCATTATGTATTATCAATA----------------TCAATAGGGGCARTA
U.triangularis   TCATCAATTGATATTGTACTTCATGATACATACTACGTAGTAGCCCATTTTCATTATGTATTATCAATAGGAG--------------AATGGGGGCAGTG
U.dubius         ????????????????????????????????????????????????????????????????????????????------TCGTCAATAGGAGCAGTA
U.regalis        TCATCAATTGATATTGTATTACATGATACATATTACGTTGTAGCCCATTTTCATTATGTATTATCAATAGG-----------TTATCAATAGGAGCAGTA
U.simulans       TCATCAATTGATATTGTATTGCATGATACATACTATGTTGTAGCTCATTTTCATTACGTCCTATCAATAGGAG----------YKTCAMTAGGTGCAGTA
U.cryptophagus   TCATCAATTGACATTGTACTACATGATACATACTACGTAGTAGCCCATTTTCATTATGTACTATCAATAG-------------TATCAATGGGGGCAGTG
U.punctulatus    ????????????????????????????????????????????????????????????????????????????????????????????????????
U.insignis       TCATCAATTGATATCATTTTACATGACACATATTATGTAGTAGCTCACTTTCATTATGTTTTATCAATAGGAGC-------------AATAGGAGCTGTA
U.gigas          TCATCAATTGATATTATTTTACATGATACTTATTATGTTGTAGCCCATTTTCACTATGTTTTATCAATAGGAG---????????????????????????
U.maleficus      ????????????????????????????????????????????????????????????????????????????ATWGTTTTATCAATAGGAGCTGTA
U.pseudogigas    ????????????????????????????????????????????????????????????????????????????????????????????????????
U.acutus         TCATCAATTGATATYATTYTWCATGAYACTTAYTATGTTGTTGCACACTTCCATTAYGTTTTATCAATAGGA-------------TCAATAGGAGCCGTA
U.loranthi       ????????????????????????????????????????????????????????????????????????????????????????????????????
U.longicornis    ????????????????????????????????????????????????????????????????????????????-------------CTGTAGC-SAA
U.albatus        TCGTCAATCGACATTGTACTTCACGATACATACTATGTAGTAGCCCACTTCCACTATGTCCTATCAATAG------????????????????????????
U.strigosus      TCATCAATTGATATTGTACTACATGACACATATTACGTAGTAGCTCATTTTCATTATGTTTTATCAATAGGAG-----------CWTTTTAGCAGCSAAM
U.bivittatus     TCATCAATTGATATTGTATTACATGATACTTATTATGTAGTAGCACATTTCCATTACGTCTTATCAATAGGAGC----------------AGGAGCAGTA
U.discicollis    TCATCTATTGACATTATTTTACATGACACATATTATGTAGTTGCYCACTTCCATTATGTTCTATCAATAG------????????????????????????
U.pertenuis      ????????????????????????????????????????????????????????????????????????????????????????????????????
U.bistriolatus   ????????????????????????????????????????????????????????????????????????????????????????????????????
S.westwoodi      TCGTCAATTGATATTATTTTACACGATACATATTATGTAGTAGCACATTTCCATTATGTTTTATCAATAGGAG---????????????????????????

                      910       920       930       940       950       960       970       980       990      1000
                 ....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|
U.bicoloratus    TTTGYARTTAKAG-CA-TGRAATKGTK--MAATGATTCCCTTTATTTACAGGATTAACCY---YWWAMAAWAAACTCCTTAAAATCCAATTTATAGTAAT
U.griseus        TTTGCAATKATACCATTRRAAKRKGTT--CAATGATTCCCTTTATTTACAGGATTAACCY---TWWAMAASAAGCTTCTTAAAATTCAATTTATAGTAAT
U.triangularis   TTTGCAATTATAS-CC-TGGAATTGTC--CAATGATTTCCTTTATTTACAGGATTAACCT---TWAACAATAAACTCCTTAAAATCCAATTTATAGTAAT
U.dubius         TTTGCAATTATACCTT--GRARKKGTT--CAATGATTCCCTTTATTTACAGGATTAACCY---TAAACAAMAAGCTTCTTAAAATTCAATTTATAGTAAT
U.regalis        TTTGCAATTATAGCCT-KAGAAKTGTT--CAATGATTTCCTTTATTTACAGGATTAACCY---TWAACAATAAACTTCTTAAAATCCAATTTATAGTAAT
U.simulans       TWTGCRATTAWGCCCA-TGRRRWKGKT--CRATGGTTCCCTTTATTTACAGGATTAACCY---TWAAMAAKAARCTTCTTAAAATTCAATTTATAGTAAT
U.cryptophagus   TTTGCAATTATGS-CY-GGAAKGTGTC--CAATGATTTCCTTTATTTACAGGATTAACCT---TAAACAATAAACTCCTTAAAATCCAATTTATAGTTAT
U.punctulatus    ????????????????????????????????????????????????????????????????????????????????????????????????????
U.insignis       TTTGCCATTATAGCA---GGAATTGTA--CAGTGATTCCCTTTATTCACAGGATTAACCT---TAAATAATAAGTTACTAAAAATTCAGTTTTTAGTAAT
U.gigas          ????????????????????????????????????????????????????????????????????????????????????????????????????
U.maleficus      TTTGCCATTATACCA---TRARKKGTA--CAGTGATTCCCTTTATTCACAGGATTAACCY---TWAAWAATAAGTTACTAAAAATTCAGTTTTTAGTAAT
U.pseudogigas    ????????????????????????????????????????????????????????????????????????????????????????????????????
U.acutus         TTTGCTATTATACCAT-GRAATRTGTT--CAATGATTTCCCCTATTTACAGGACTAACTC---TWAATAACAAATTATTAAAAATTCAGTTTTTAGTAAT
U.loranthi       ????????????????????????????????????????????????????????????????????????????????????????????????????
U.longicornis    TTWATTATGGTAGWTC--CAATRARWWGGAAATGATCAC----WTTTTAAGGATWAACYCYTTTWWTAAAARAMCTTTTRAAWAWACAMTTTTTAGTMAT
U.albatus        ????????????????????????????????????????????????????????????????????????????????????????????????????
U.strigosus      TT--CTAWKRYGGMWRATTRSRGMRKWGGAAATGGTTTCCTTTATTCACAGGATTAACTT---TAARCRATAAACTTTTAAAAATSCAATTTTTAGTAAT
U.bivittatus     TTTGCAATTATAGCTT-RGAATRSGTT--CAATGATTTCCACTATTTACAGGATTAACAT---YWAATAATAAGCTCCTTAAAATTCAATTTTTAGTAAT
U.discicollis    ????????????????????????????????????????????????????????????????????????????????????????????????????
U.pertenuis      ????????????????????????????????????????????????????????????????????????????????????????????????????
U.bistriolatus   ????????????????????????????????????????????????????????????????????????????????????????????????????
S.westwoodi      ????????????????????????????????????????????????????????????????????????????????????????????????????

                     1010      1020      1030      1040      1050      1060      1070      1080      1090      1100
                 ....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|
U.bicoloratus    ATTTATTGGTGTTAATATAACCTTCTTCCCCCAACAYYTTTWAGGATTAAGAGGTATACCTCGACGATACTCAGATTACCCTGATGCCTTTACAATATGA
U.griseus        ATTCATTGGTGTTAATATAACATTTTTCCCTCAACWTTTTTTARGATTAAGAGGTATACCTCGACGATACTCAGATTACCCTGATGCCTTCACAATATGA
U.triangularis   ATTTATTGGTGTTAACATAACCTTTTTCCCCCAACATTTCTTAGGCTTAAGAGGTATACCTCGGCGATACTCAGATTATCCTGATGCCTTTACAATATGA
U.dubius         ATTCATTGGTGTTAATATAACATTTTTCCCTCAACATTYTTTARRAWWAAGAGGTATACCTCGACGATACTCAGATTACCCTGACGCCTTCACAATATGA
U.regalis        ATTTATTGGTGTTAATATAACCTTCTTCCCTCAACATTTCTTAGGACTAAGTGGTATACCTCGACGATACTCAGATTATCCTGATGCCTTCACAATATGA
U.simulans       ATTCATTGGTGTTAATATAACATTTTTCCCTCAACWTTTTTTAGGATTAAGAGGTATACCTCGACSATACTCAGATTACCCTGATGCATTTACAATATGA
U.cryptophagus   ATTTATTGGTGTTAATATAACCTTTTTCCCCCAACATTTCTTAGGCTTAAGAGGAATACCTCGACGATACTCAGATTATCCTGATGCCTTTACAATATGA
U.punctulatus    ????????????????????????????????????????????????????????????????????????????????????????????????????
U.insignis       ATTTATTGGAGTAAACTTAACTTTTTTTCCTCAACATTTTTTAGGATTAAGAGGAATACCACGACGGTATTCTGATTATCCAGATGCTTTTACTATATGA
U.gigas          ????????????????????????????????????????????????????????????????????????????????????????????????????
U.maleficus      ATTTATTGGAGTAAACTTAACTTTTTTTCCTCAACWTTTTTTAGGATTAAGAGGAATACCACGACGGTATTCTGATTATCCAGATGCTTTTACTATATGA
U.pseudogigas    ????????????????????????????????????????????????????????????????????????????????????????????????????
U.acutus         ATTTATTGGAGTAAATTTAACCTTTTTTCCACAACAYYYYTTARGATTAAGAGGTATACCACGACGATACTCTGATTATCCAGACGCATTTACTCTATGA
U.loranthi       ????????????????????????????????????????????????????????????????????????????????????????????????????
U.longicornis    ATTTATTGGTGTAAATATAACCTTTTTCCCTCMACWYYTYTTGGGACTTAGGGGGATACCTCSACRATACTCGGATTACCCTGATGCTTTTACAATATGA
U.albatus        ????????????????????????????????????????????????????????????????????????????????????????????????????
U.strigosus      ATTTATCGGAGTTAACATAACCTTTTTCCCCCAACATTTCTTAGGATTAAGAGGTATGCCTCGACGATACTCTGATTATCCTGACGCATTCACATTATGA
U. bivittatus    ATTTATTGGAGTAAATATAACATTCTTCCCTCAACACTTTTTAGGCTTAAGAGGTATACCTCGACGATACTCTGATTATCCAGACGCCTTTACAATATGA
U.discicollis    ????????????????????????????????????????????????????????????????????????????????????????????????????
U.pertenuis      ????????????????????????????????????????????????????????????????????????????????????????????????????
U.bistriolatus   ????????????????????????????????????????????????????????????????????????????????????????????????????
S.westwoodi      ????????????????????????????????????????????????????????????????????????????????????????????????????
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                      1110      1120      1130      1140      1150      1160      1170      1180      1190      1200
                  ....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|
U.bicoloratus     AATATTGTATCTTCAATTGGTTCCCTAATCTCTTTGGTTAGAATTATTTTCTTTCTGTWTATCTTATGAGAAAGATTATCTGTTCATCGAAAAAGATTAG
U.griseus         AATATTGTATCCTCAATTGGTTCTTTAATCTCTCTAGTTAGAATTATTTTCTTCTTATACATTTTATGAGAAAGATTATCTGTCCATCGAAAAATCCTCG
U.triangularis    AATATTGTATCTTCAATTGGTTCATTAATCTCTTTAGTTAGAATTATTTTCTTTCTATATATTTTATGAGAAAGATTATCTGTTCATCGAAAAAGGCTAG
U.dubius          AATATTGTATCCTCAATTGGTTCTTTAATCTCTCTAGTTAGAATTATTTTCTTCTTATACATTTTATGGGAAAGATTATCTGTTCATCGAAAAATCCTCG
U.regalis         AATATTGTATCTTCAATTGGTTCCCTAATCTCTTTAGTTAGAATCATTTACTTTCTATATATTTTATGAGAAAGATTATCTGTTCATCGAAAAAGATTAG
U.simulans        AATATTGTATCTTCAATTGGTTCTCTAATCTCTCTGGTCARAATTATTTTCTTCTTATATATTTTATGARAAAGATTGTCTGTTCACCGAAAAAGACTAG
U.cryptophagus    AATATTGTATCTTCAATTGGTTCATTAATCTCTTTAGTAAGAATCATTTTCTTTCTATATATTTTATGAGAAAGATTATCTGTTCATCGAAAAAGACTAG
U.punctulatus     ????????????????????????????????????????????????????????????????????????????????????????????????????
U.insignis        AATATTATTTCCTCAGTTGGATCCTTAATTTCTCTTGTAAGAATTCTTTACTTTATTTATATTCTATGGGAAAGTTTATCTGTTCATCGAAAAATTTTAG
U.gigas           ????????????????????????????????????????????????????????????????????????????????????????????????????
U.maleficus       AATATTATTTCCTCAGTTGGATCCTTAATTTCTCTTGTAAGAATTCTTTACTTTATTTATATTCTATGGGAAAGTTTATCTGTTCATCGAAAAATTTTAG
U.pseudogigas     ????????????????????????????????????????????????????????????????????????????????????????????????????
U.acutus          AATATTATTTCTTCAATTGGCTCCTTGATTTCCCTTGTTAGAATCATTTTCTTTATCTATATTTTATGAGAAAGATTGTCTGTTCATCGAAAAATTCTAG
U.loranthi        ????????????????????????????????????????????????????????????????????????????????????????????????????
U.longicornis     AATATTGYGTCATCAWTTGKATCCTTWATTTCACTASYCARAATTATTTTTTTCCTATMTATTTTGTGAGAAAGGTTATCTGTYCACCSAAAAASACTTG
U.albatus         ????????????????????????????????????????????????????????????????????????????????????????????????????
U.strigosus       AATATTGTATCTTCAATTGGGTCCTTAATCTCACTTGTTAGAATCATTTTCTTTCTATATATTTTATGAGAAAGATTATCAGTTCATCGAAAAAGGCTAG
U. bivittatus     AATATTGTTTCATCAATTGGATCCTTAATTTCTCTTGTCAGAATCATTTTCTTCTTATACATTTTATGAGAAAGATTATCAGTTCACCGAAAAAGACTTG
U.discicollis     ????????????????????????????????????????????????????????????????????????????????????????????????????
U.pertenuis       ????????????????????????????????????????????????????????????????????????????????????????????????????
U.bistriolatus    ????????????????????????????????????????????????????????????????????????????????????????????????????
S.westwoodi       ????????????????????????????????????????????????????????????????????????????????????????????????????

                      1210      1220      1230      1240      1250      1260      1270      1280      1290      1300
                  ....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|....|
U.bicoloratus     GAGGATTAAATATAATTACCTCAATTGAATGGCTTCAATATTTACCTCCAGCAGAACATAKATATTCTGAACTTCCTATTTTAGCTGCCAAATTCTAATA
U.griseus         GAGGATTAAATATAGTTACCTCAATTGAATGACTTCAATACCTACCACCAGCGGAACATAGATATTCTGAACTTCCTATTTTAGCTGCCAAATTCTAATA
U.triangularis    GTGGACTAAACATAATTACATCAATTGAATGACTTCAATATTTACCCCCAGCAGAACATAGATATTCTGAACTTCCTATTTTAGCTGCCAAATTCTAATA
U.dubius          GAGGATTAAATATAGTTACCTCAATTGAATGACTTCAATATCTACCACCAGCGGAACATAKWTATTCTGAACTTCCTATTTTASCTGCYWTATGSKGRKR
U.regalis         GAGGATTAAATATAATTACCTCAATTGAATGACTTCAATATTTACCTCCAGCAGAACATAGATATTCTGAACTTCCTATTTTAGCTGCCAAATTCTAATA
U.simulans        GAGGATTAAATATAATTACCTCAATTGAATGACTCCAATATTTACCACCAGCAGAACATAKATATTCTGAACTTCCAATTTTAGCTGCCAAATTCTAATA
U.cryptophagus    GTGGACTAAACATAATTACGTCAATTGAATGACTCCAATACTTACCCCCAGCAGAACATAGATATTCTGAACTTCCTATTTTAGCTGCCAAATTCTAATA
U.punctulatus     ????????????????????????????????????????????????????????????????????????????????????????????????????
U.insignis        GGGGACTAAATATAGTAACTTCTATTGAATGGTTACAACATCTTCCCCCAGCAGAACATAGATATTCTGAACTCCCTATTTTAGCTGCTAAATTCTAATA
U.gigas           ????????????????????????????????????????????????????????????????????????????????????????????????????
U.maleficus       GGGGACTAAATATAGTAACTTCTATTGAATGGTTACAACATCTTCCCCCAGCARAACATAGATATTCTGAACTCCCTATTTTAGCTGCTAAATTCTAATA
U.pseudogigas     ????????????????????????????????????????????????????????????????????????????????????????????????????
U.acutus          GAGGATTAAATATAATAACTTCTATTGAATGGCTCCAACACCTTCCCCCGGCAGAACATAGWTATTCTGAACTTCCTATTTTAGCTGCTATATTCTAATA
U.loranthi        ????????????????????????????????????????????????????????????????????????????????????????????????????
U.longicornis     GAGGATTAAACTTGKTTACCTCAATTGAATGMCTACAGTMTTTYCCCCCAGCAGAMCATTTATACTYTGAACTTCCTATTTTMSCTGCCAAATTCTAATA
U.albatus         ????????????????????????????????????????????????????????????????????????????????????????????????????
U.strigosus       GAGGACTAAATATAGTTACTTCAATTGAGTGGCTTCAACACTTACCCCCTGCGGAACWTWKWTATTCARAAATTCCCATTTTAGCTGCCAAATTCTAATA
U. bivittatus     GAGGATTAAATATAGTAACCTCAATTGAATGATTACAATACTTGCCCCCAGCAGAACATAGATATTCTGAACTTCCTATTTTAGCTGCCAAATTCTAATA
U.discicollis     ????????????????????????????????????????????????????????????????????????????????????????????????????
U.pertenuis       ????????????????????????????????????????????????????????????????????????????????????????????????????
U.bistriolatus    ????????????????????????????????????????????????????????????????????????????????????????????????????
S.westwoodi       ????????????????????????????????????????????????????????????????????????????????????????????????????

                      1310      1320      1330      1340      1350      1360      1370
                  ....|....|....|....|....|....|....|....|....|....|....|....|....|...
U.bicoloratus     TGGCAGATYAS-------0000011111110002111111000111000110100100110101000001100
U.griseus         TGGCARATTA--------1001011111010001111011000111000110100110111101001001100
U.triangularis    TGGCAGATTAGTGC----0000011111110002111100000111000110000110110101001200100
U.dubius          TGGMAGATT---------0001001111110002111011100101000110000110010101001211001
U.regalis         TGGCAGAT----------1011001111110002111111000101000110100110010101000001001
U.simulans        TGGCAGATT---------0001111111110002111011100111110110020110010101001011000
U.cryptophagus    TGGCAGATTA--------0001011111110002211011000101100110000100001101000211001
U.punctulatus     ??????????????????0010100111110002100001101111100101011100000011001111000
U.insignis        TGGCAGATTAKGGSC---0110000111110002100111101111000101111100011011001111100
U.gigas           ??????????????????1000111110010110011010001111100110101110111101101011010
U.maleficus       TGGC--------------0000111111010010100010101111101111001110111101101211000
U.pseudogigas     ??????????????????0000111111010100011000101111110110111110111101111211010
U.acutus          TGGCAGATTAG-------0001011110110001210001011111110111001110111101101211000
U.loranthi        ??????????????????0000111110110002210001111111100111021110111101101211000
U.longicornis     TGSCASATTAGTGYAT--0101111111010012011011101111110111001100110001001211010
U.albatus         ??????????????????0001111111010002011011111101100011011100110101001211001
U.strigosus       TGGCASACT---------0101001110110002100101001100100111011010010101001211111
U.bivittatus      TGGCAGATTAGTGCAT--0101001110110002100101001100100111011010010101001211111
U.discicollis     ??????????????????1101000110010011100001001100111111011110111101101011011
U.pertenuis       ??????????????????1001010111000002100001001100100111011101100100001211011
U.bistriolatus    ??????????????????1101001111000002011011101111100110011110110101001211000
S.westwoodi       ??????????????????1011110001010002011011111111101101020100011111000211000
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