

# AN ILLUSTRATED GUIDE TO THE GENERA OF ORB-WEAVING SPIDERS IN AUSTRALIA

VALERIE TODD DAVIES

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An illustrated key to 47 genera of orb-weaving spiders from 8 families is presented. Further notes on some of the genera are given. The females of *Miagrammopsidis*, *Nanometa*, *Heurodes* and the ♂ palps of *Nanometa*, *Herennia*, *Ordgarius* and *Pasilobus* are illustrated for the first time. *Dicrostichus* Simon, 1895, is newly synonymised with *Ordgarius* Keyserling, 1886, resulting in new combinations: *D. magnificus* = *O. magnificus* (Rainbow, 1897) n. comb.; *D. furcatus* = *O. furcatus* (O.P. Cambridge, 1877) n. comb.; *D. caliginosus* (Rainbow, 1894) = *O. furcatus* (O.P. Cambridge, 1877) n. syn. Other new combinations: *Uloborus variabilis* = *Philoponella variabilis* (Keyserling, 1887) n. comb.; *Meta argentiopunctata* = *Mesida argentiopunctata* (Rainbow, 1916) n. comb.

□Key, spiders, orb-weaving, Australia.

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Eight families of spiders that construct orb-webs or modifications of these for the capture of their prey, are recognised; all are represented in Australia. Spiders of the Uloboridae (5 genera) and Deinopidae (2 genera) possess an ancestral spinning organ, the cribellum, which produces thick sticky silk. The uloborid web may be reduced to a segment of an orb or even a single line (Miagrammopinae). In deinopids the basic orb-web structure (Coddington, 1986b) is more difficult to recognise as the catching-net with its thick cribellate silk tends to obscure the basic non-sticky threads on which the spider rests while holding its net. The Tetragnathidae (including the metines) are represented by 10 genera; the Araneidae (including nephilines) by 24 genera. In the latter the orb-web has been completely reduced in two sub-families, Celaeninae and Mastophorinae. Four families of minute-tiny spiders, Theridiosomatidae, Mysmenidae, Symphytognathidae and Anapidae also construct orb-webs.

There are four basic steps in the construction of an orb-web. First, the Y-shaped construction of the first three radii, which form the foundation of the web. Secondly, the formation of a framework for the rest of the radii and their construction. Thirdly, the spinning of a non-sticky scaffolding (or auxiliary) spiral from the centre of the web outwards and fourthly the spinning of a sticky spiral from the outside towards the centre; while doing this the spider usually removes the non-sticky spiral (Main, 1976; Levi, 1978; Coddington, 1986c).

Research into the silk glands, that are concerned with the production of the capture threads, has shown that in the uloborids the silk from the cribellum is combed (by the calamistrum) on to core fibres produced by pseudoflagelliform glands opening on the posterior spinnerets and fine paracribellar threads from glands on the median spinnerets (Peters, 1984). It is presumed that the sticky deinopid silk has a similar origin. It is of interest to note in all other cribellate spiders so far studied (Kovoor, 1977) the cribellar silk is combed on to fibres produced from ampullate glands on the anterior spinnerets. In the araneoid families the sticky capture silk is produced by aggregate glands opening on the posterior spinnerets. The core fibres on to which the sticky silk is laid are produced by flagelliform glands also opening on the posterior spinnerets. These glands are believed to be homologous with the pseudoflagelliform glands of uloborids. The aggregate glands are believed to be a synapomorphy of araneoids (Coddington, 1986c).

Recent behavioural studies by Eberhard (1982), Lubin (1986), Shear (1986) and others favour the conventional view that the orb-web has arisen twice, once in the cribellate orb-weavers and once in the araneoids. Brignoli (1979) and Levi (1980) both questioned this view and raised the issue of monophyly of the orb-web, earlier suggested by Wiehle (1931). Recently Coddington (1986c) produced some good evidence to suggest that the orb-web has

evolved only once and that the uloborids (and/or the deinopids) are the sister group of the superfamily Araneoidea. This latter group would include not only the orb-web families described here but also the Theridiidae, Nesticiidae, Linyphiidae, Cyatholipidae and Mimetidae (Coddington, *loc. cit.*). When the homologies of anatomical structures such as the sclerites of the male palp and the spinning glands and spigots are fully understood, the origin of the orb-web may be resolved.

*Acroaspis olorina* Karsch, 1878, an araneid from Western Australia is not illustrated as no fresh material has been identified. The holotype female (originally pinned) is in the Museum für Naturkunde der Humboldt Universität, Berlin. It is a small spider with 3 posterior abdominal tubercles and a large epigynum which may have had a scape. The names of two Tasmanian genera, *Aerea* Urquhart, 1891, and *Collina* Urquhart, 1891, are *nomina dubia* as the figures, cited by Urquhart, were never published and the types are lost.

Because of the visibility and beauty of their webs the orb-web spinners, with the exception of the minute ones, have been more widely collected and are thus better known than most Australian spiders — an estimated eighty percent of which are yet to be described (Davies, 1985). It is hoped that this publication will encourage revision of the genera and descriptions of new species.

It is regretted that the key is not entirely satisfactory. There are exceptions (exc.) noted in some couplets and others do not work in the absence of one sex. In such cases examination of the drawings should indicate the direction to be taken and allow an identification to be made. Notes on some of the genera are given below the relevant part of the key.

The lengths of spiders in the size-classes used are as follows: 'large' more than 8.0, 'medium' more than 4.0, 'small' more than 2.0, 'tiny' more than 1.0, 'minute' 0.5-1.0mm.

The following abbreviations are used: ALE, anterior lateral eyes; AME, anterior median eyes; PLE, posterior lateral eyes; PME, posterior median eyes; MOQ, median ocular quadrangle; ALS, anterior lateral spinnerets; PMS, posterior median spinnerets; PLS, posterior lateral spinnerets.

A key to all the Australian families of spiders and a glossary of the terms used may be found in Davies (1986).

## ILLUSTRATIONS

A dorsal view of the female is usually drawn. The male is illustrated if it is much smaller than the female or has a special shape or other diagnostic features. Ventral and dorsal views are given for most epigyna and sometimes a view from behind (posterior) or from the side is drawn. The left palp of the male is illustrated, usually twice to show sclerites and paracymbium. With the exception of the two symphytognathid genera, each spider occupies a separate page of illustrations. When an undetermined species is illustrated, the name of the locality is given in brackets. The scale line beside each female indicates the body length in millimetres, unless labelled otherwise. Colour photographs of many of the spiders that are illustrated here may be found in Mascord (1980).

## ACKNOWLEDGEMENTS

As well as the papers cited, numerous papers on araneoids, particularly those by H.W. Levi have been consulted and have been of great help to me in preparing this paper. References to them may be found in the works listed.

The paper owes much to Sybil Monteith's beautiful illustrations and I am grateful to her and to the Council of the Australian Biological Resources Study for its financial support of this talented artist. I thank Professor H.W. Levi (Museum of Comparative Zoology, Harvard) for the loan of ♂ *Herennia* sp. and ♂ *Pasilobus* sp. from Papua New Guinea; and Dr M.R. Gray (Australian Museum, Sydney) for the loan of ♀♀ *Paraplectanoides crassipes*, ♀♂ *Ordgarius monstrosus*, ♀ *Cyrtarachne* sp. and ♀ *Pasilobus* sp. I am indebted to Jonathan Coddington for checking names of the deinopid species illustrated and to Norman Platnick for discussions during his stay in Queensland in 1987. Thanks also to the Director, the Board of Trustees and the Staff of the Queensland Museum for the generous treatment given to their 'honorarys'.

I am grateful to Professors Levi and Platnick and Dr Coddington who read and commented on the manuscript.



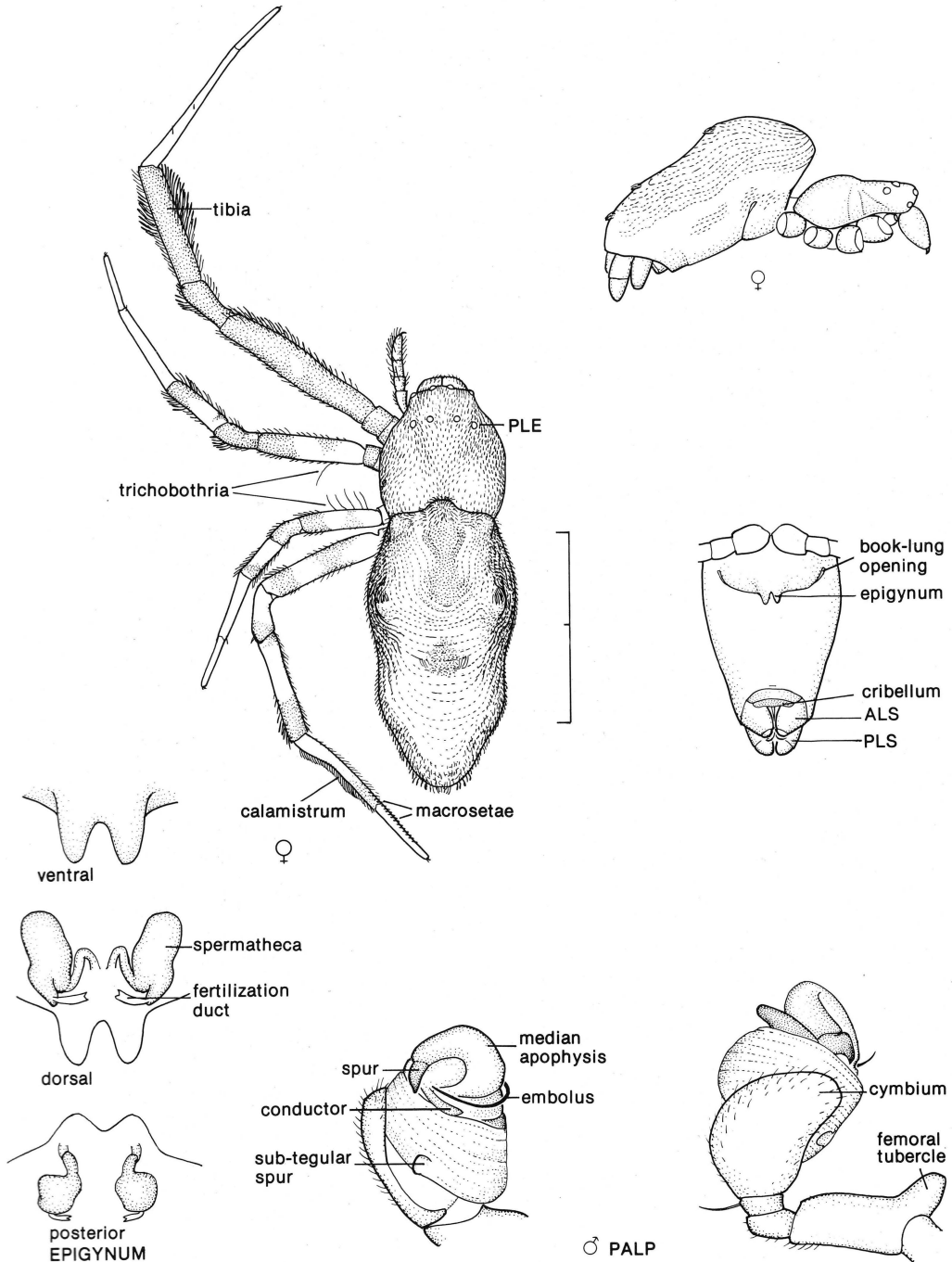
GENERA	PLATE NUMBERS
<i>Anapistula</i> .....	45B
<i>Anepsion</i> .....	23
<i>Arachnura</i> .....	41
' <i>Araneus</i> ' .....	27
<i>Argiope</i> .....	33
<i>Arkys</i> .....	9
<i>Baalzebub</i> .....	43
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<i>Celaenia</i> .....	35
' <i>Chasmocephalon</i> ' .....	47
<i>Cyclosa</i> .....	26
<i>Cyrtarachne</i> .....	38
<i>Cyrtophora</i> .....	42
<i>Deinopis</i> .....	6
<i>Deliochus</i> .....	11
<i>Dolichognatha</i> .....	12
<i>Dolophones</i> .....	28
<i>Eriophora</i> .....	24
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<i>Leucauge</i> .....	14
<i>Menneus</i> .....	7
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<i>Metinae</i> sp .....	16
<i>Miagrammopes</i> .....	4
<i>Miagrammopsidis</i> .....	5
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<i>Nanometa</i> .....	17
<i>Neoscona</i> .....	21
<i>Nephila</i> .....	19
<i>Nephilengys</i> .....	20
<i>Ordgarius</i> .....	36, 37
<i>Paraplectanoides</i> .....	30
<i>Pasilobus</i> .....	40
<i>Philoponella</i> .....	2
<i>Phonognatha</i> .....	10
<i>Poecilopachys</i> .....	39
<i>Polys</i> .....	34
<i>Risdonius</i> .....	46
<i>Symphytognatha</i> .....	45A
<i>Tetragnatha</i> .....	8
<i>Tylorida</i> .....	13
<i>Uloborus</i> .....	1
<i>Zosis</i> .....	3

## KEY TO GENERA

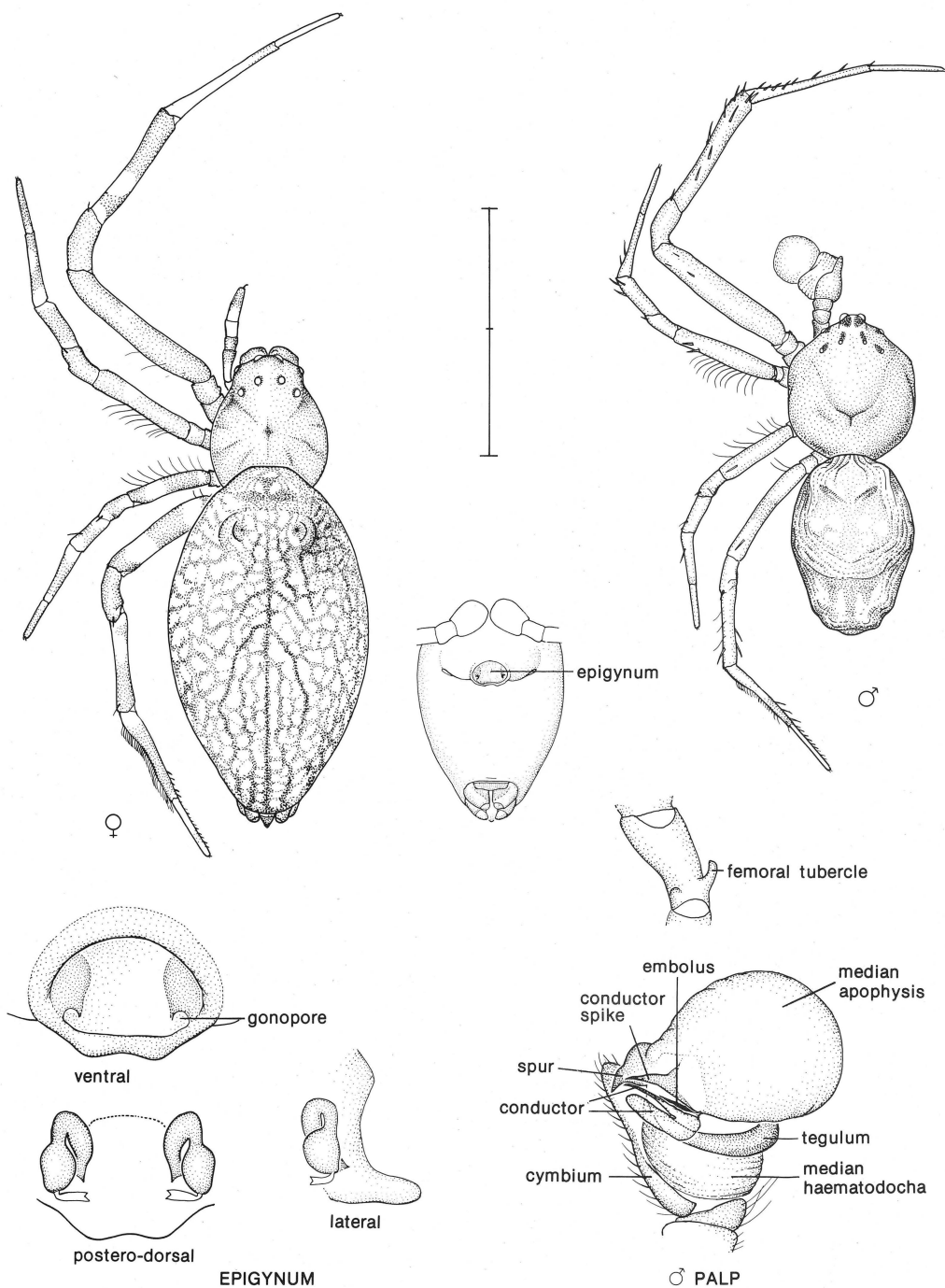
- 1 Tarsi shorter than metatarsi. ♀ palp with tarsal claw. Small-very large spiders ..... 2
- Tarsi longer than metatarsi (exc. Theridiosomatidae). ♀ palp without claw, or without tarsus and other segments. Minute-tiny spiders ..... 42
- 2 Cribellum and calamistrum. Tarsi IV with ventral row of macrosetae. ♂ palp without paracymbium ..... 3
- Colulus, ♂ paracymbium ..... 9
- 3 Femora II and III with trichobothria. Eyes in 2 rows ..... ULOBORIDAE 4
- Femora without trichobothria. Eyes in 3 rows. ♂ tarsi I with dorsal notch. Net-casting spiders ..... DEINOPIDAE 8
- 4 8 eyes, PLE not on tubercles. Femoral tubercle on ♂ palp. Sternum undivided ..... Uloborinae 5
- 4 eyes, lacking anterior row. PLE on lateral tubercles. No femoral tubercle on ♂ palp. Sternum divided. Web reduced to single-line web ..... Miagrammopinae 7
- 5 Brush of hair on tibia I. Epigynum with paired posterior lobes (Pl. 1) ..... *Uloborus*
- Without brush of hair on tibia I. Epigynum otherwise ..... 6
- 6 Posterior row of eyes strongly recurved. Epigynum with ventral atrium. Conductor on ♂ palp (Pl. 2) ..... *Philoponella*
- Posterior row of eyes slightly recurved. Epigynum otherwise. No conductor; long tegular spur on ♂ palp (Pl. 3) ..... *Zosis*
- 7 Cephalothorax almost  $\times 1\frac{1}{2}$  long as wide (Pl. 4) ..... *Miagrammopes*
- Cephalothorax as long as wide (Pl. 5) ..... *Miagrammopsidis*  
(northern Australia)

In uloborids the venom glands are lacking. Diagnoses and descriptions of genera are given by Opell (1979). Coddington (1986c) discusses the presence of spinning glands and web-building behaviour that is unique to the family. Lubin (1986) shows modifications of the uloborid orb-webs, both elaborations and reductions and mentions the use of sticky cribellate silk along non-sticky radii, frame threads and barrier webs (*cf.* araneids). She attempts to show 'how the structure of a web may be influenced by the spider's ecological relationships. . . ' suggesting 'that similar ecological pressures could have selected for an orb-type structure in different groups of spiders.'

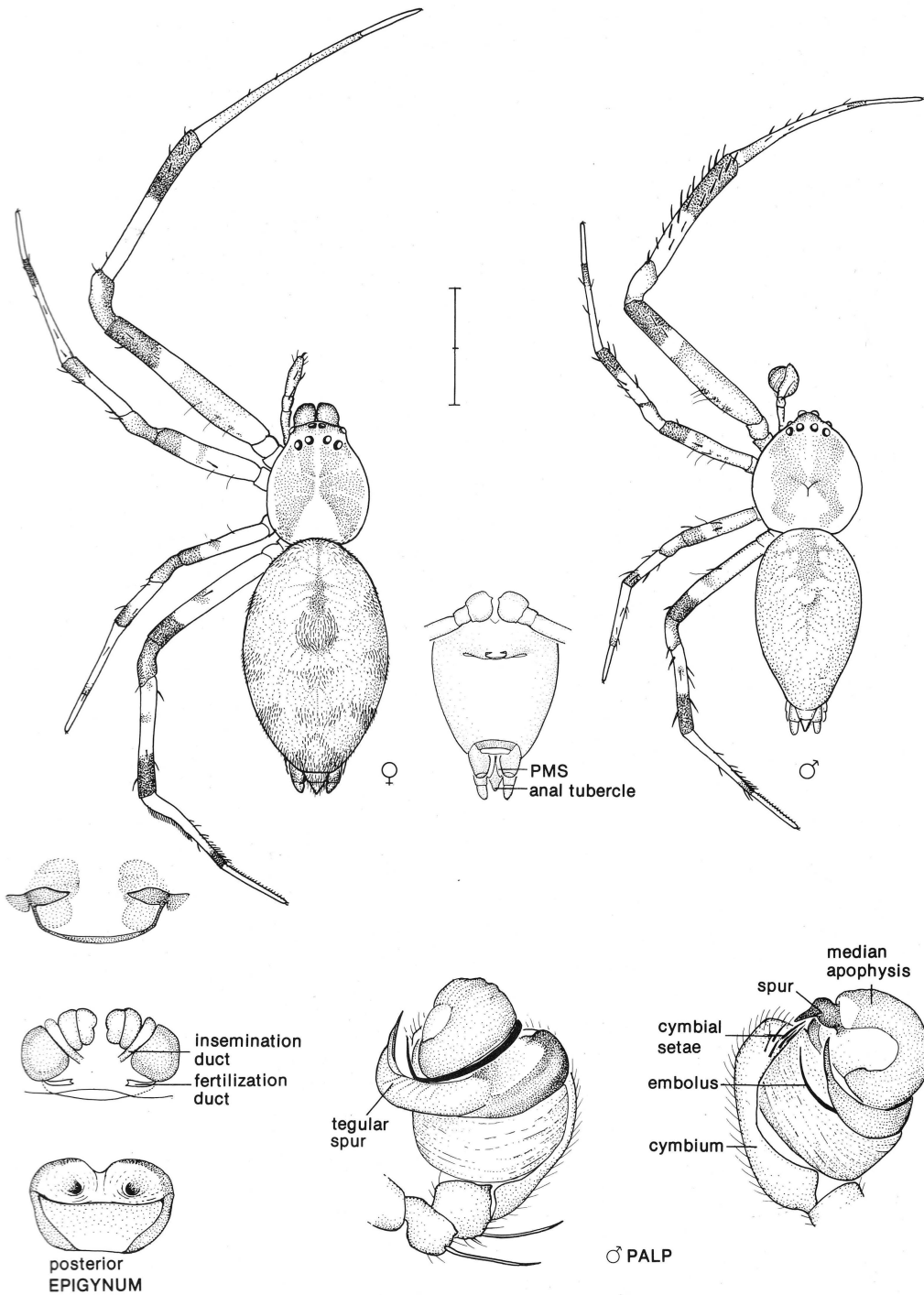
In miagrammopines the tibia of the ♂ palp is extended into a blunt projection dorsally. Eggs are laid in a long string (Mascord, 1980, pl. 15: 4). *Miagrammopes* builds webs consisting of one or more sticky threads, attached to a non-sticky resting thread (Lubin, 1986).

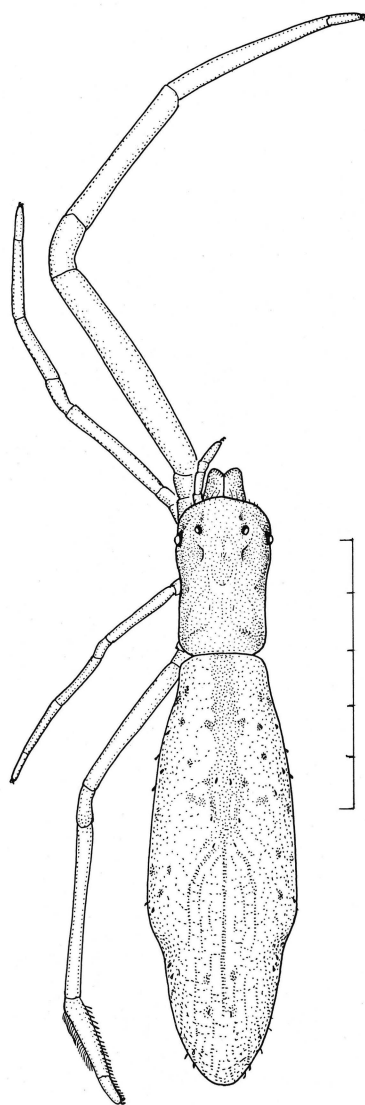


1. *ULOBORUS* SP (Davies Ck, north Queensland)

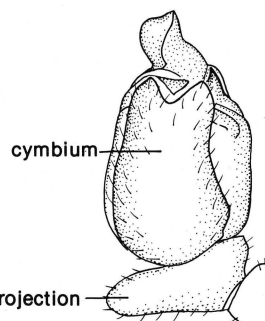
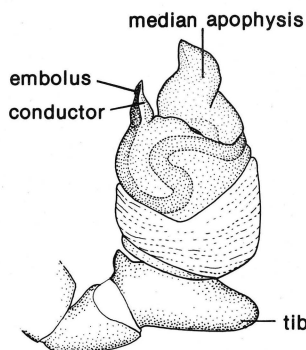
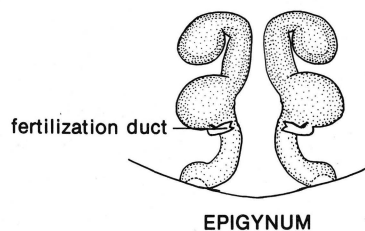
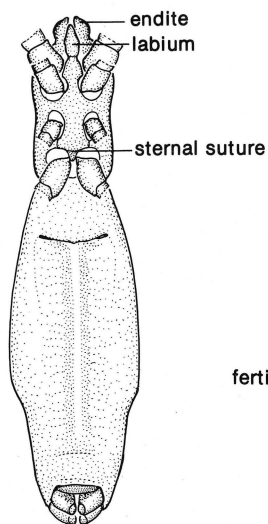


2. *PHILOPONELLA VARIABILIS* (KEYSERLING, 1887) N. COMB.

3. *ZOSIS GENICULATUS* (OLIVIER, 1789)



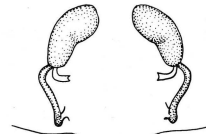
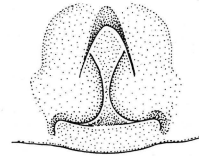
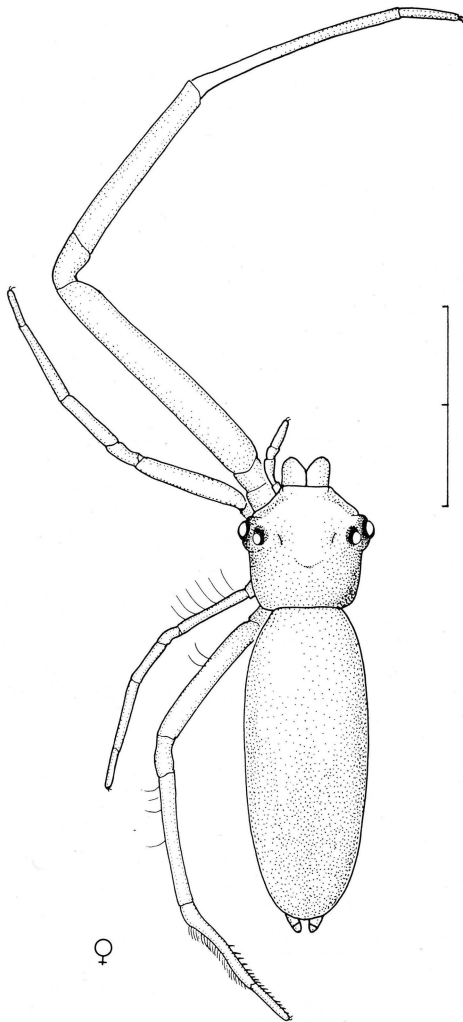
♀ Cooloola, southeast Queensland



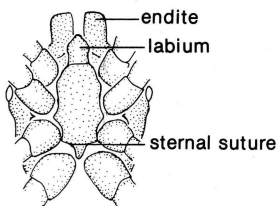
♂ PALP Braemar State Forest, southeast Queensland

#### 4. MIAGRAMMOPES SPP



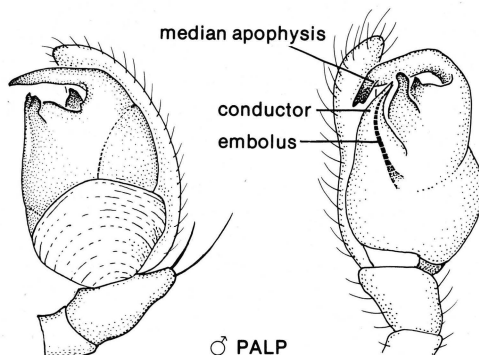


EPIGYNUM



endite  
labium

sternal suture



median apophysis

conductor

embolus

♂ PALP

**5. MIAGRAMMOPSIDIS FLAVUS WUNDERLICH, 1976.**

- 8 PME greatly enlarged. Proximal prolateral bump on ♀ femur I (Pl. 6) ..... *Deinopis*  
 - PME slightly larger than other eyes. Without bump on ♀ femur I (Pl. 7) ..... *Menneus*  
 9 Without transverse furrows on epigastric plate. ♂ palpal tibia long, shaped like an inverted cone.  
 Femoral trichobothria often present. ♂ not much smaller than ♀ .. TETRAGNATHIDAE 10  
 - Transverse furrows on epigastric plate. ♂ palpal tibia short. Without femoral trichobothria. ♂  
 often much smaller than ♀ ..... ARANEIDAE 19  
 10 ♂ paracymbium separate and movable; spherical tegulum with coiled embolus and conductor at  
 anterior end. Chelicerae porrect. Haplogyne (secondarily) (Pl. 8) ..... Tetragnathinae *Tetragnatha*  
 - ♂ paracymbium broadly joined to cymbium; oval tegulum with embolus coiled with or lying free  
 on conductor, occupying most of 'ventral' surface of tegulum. Chelicerae geniculate. Entelegyne  
 ..... metines 11  
 11 Long prolateral spines on tibiae and metatarsi I and II. Oval patch of sensory hairs on prolateral  
 surface of ♂ tarsus I. Without orb-web (Pl. 9) ..... Arkyinae *Arkys*  
 - Without long prolateral spines on tibiae and metatarsi I and II. Without sensory organ on ♂  
 tarsus I. Orb-web ..... 12  
 12 Paracymbium a long sclerotized flange on cymbium. Leaf-curling spiders .... Phonognathinae 13  
 - Paracymbium otherwise. Not known to be leaf curlers ..... 14

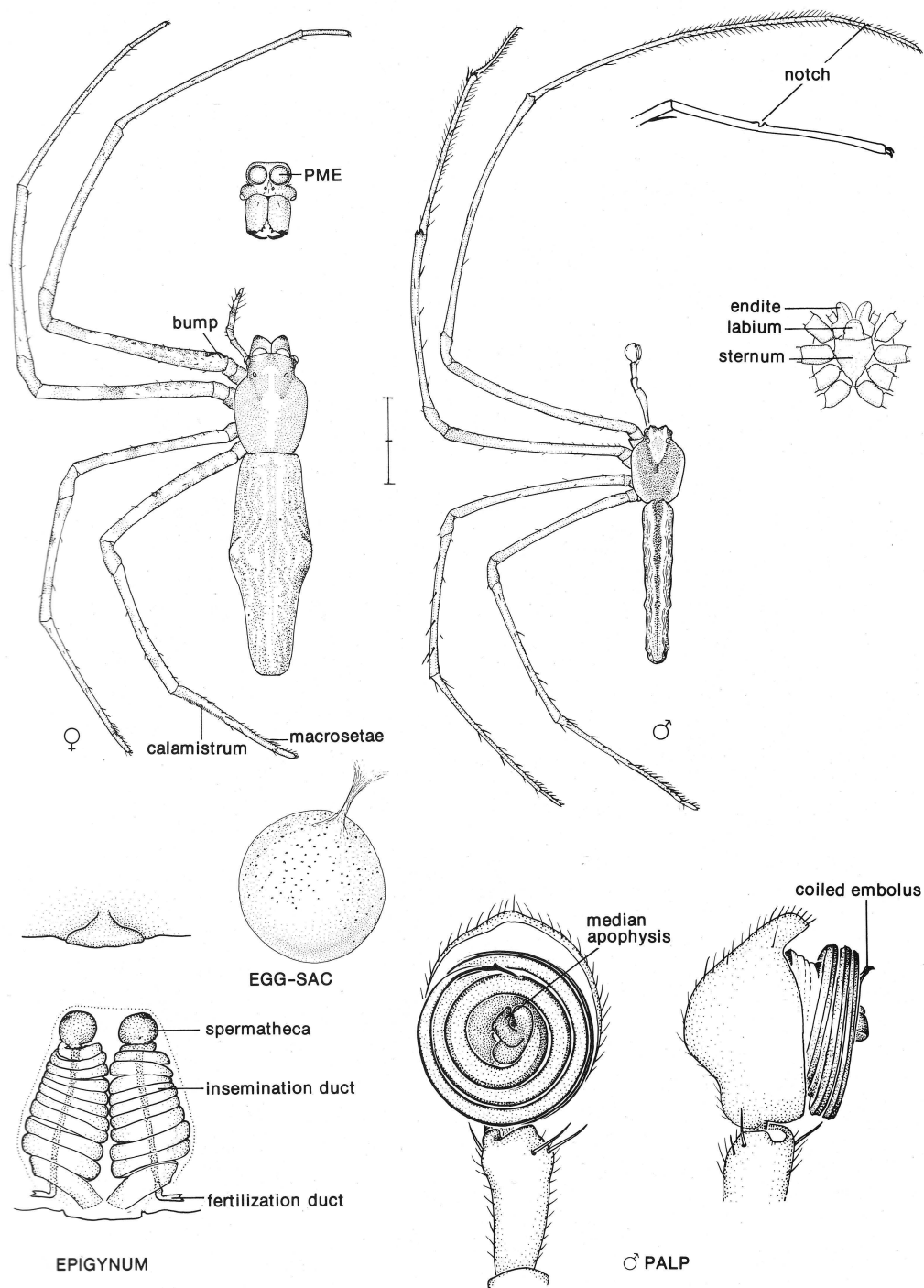
Coddington (1986b) has shown that deinopids display the same behaviour as orb-weavers in the making of their webs. The sticky cribellate net that is used for prey catching is at all times connected to the substrate by the guy lines. At rest, the Australian *Deinopis* spp. take up an X position with two legs in each branch, a similar stance to *Argiope*. The egg-sacs are suspended near the web.

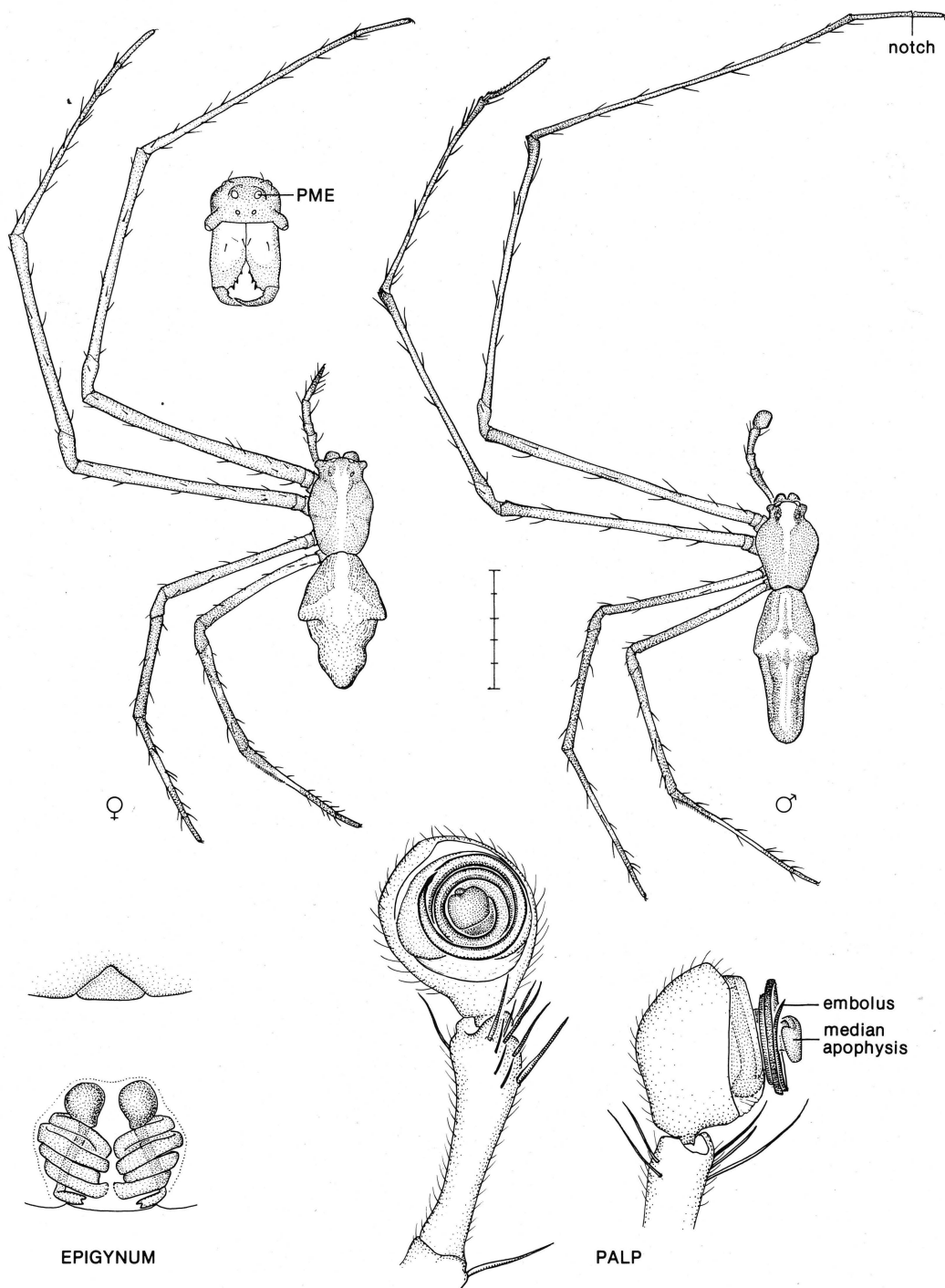
*Menneus* spp. (= *Avella*, Coddington, pers. comm.) are found in moist places, e.g., wet sclerophyll and rainforest. The egg-sacs are placed in the litter (Mascord, 1980: 40).

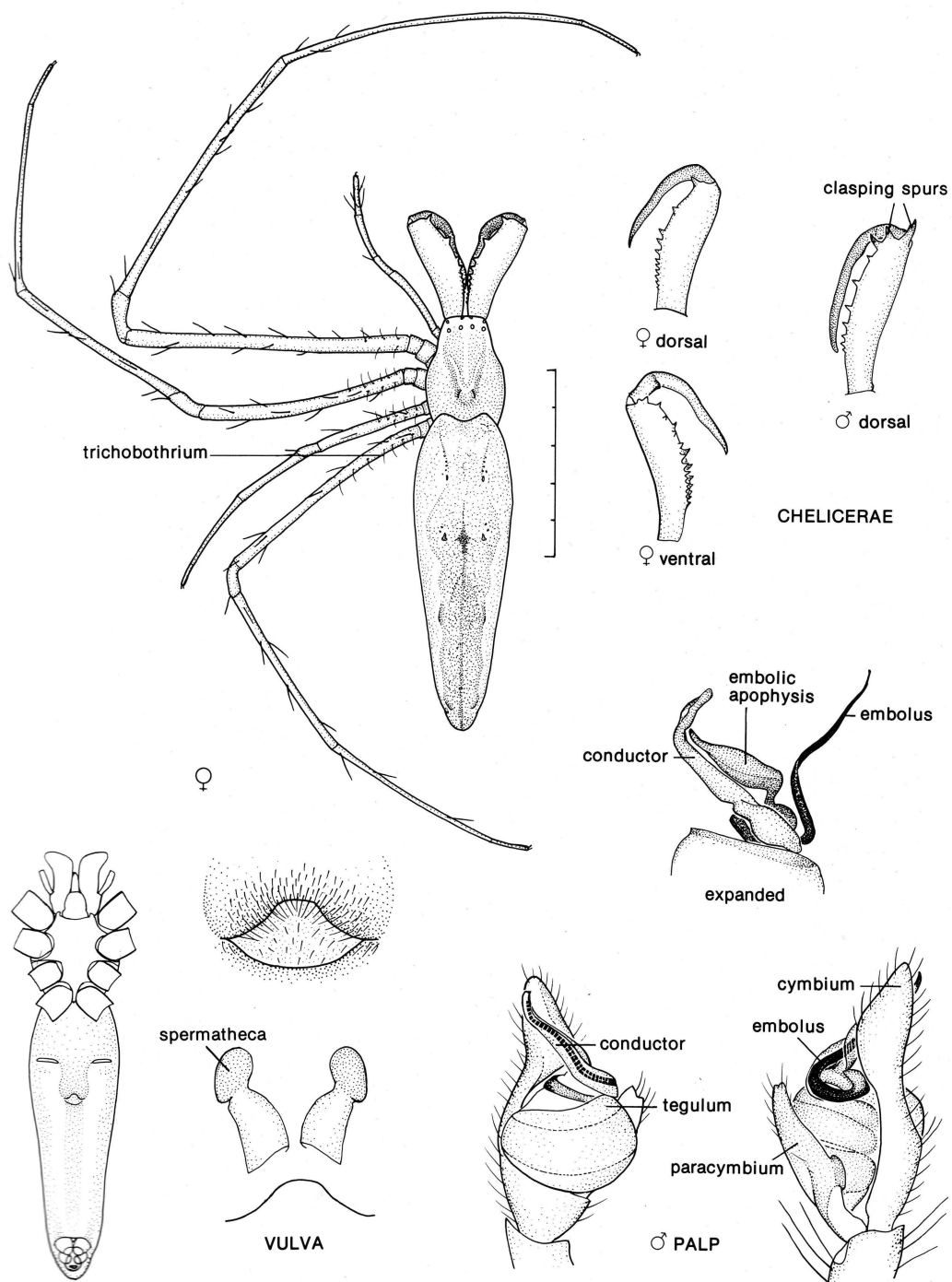
*Tetragnatha* has a very long cylindrical abdomen and straight, unbranched femoral trichobothria in a dorsal position. Males have clasping spur(s) on the chelicerae, distally. In the ♂ palp there is a third sclerite, an embolic apophysis, coiled with the embolus and conductor (Levi, 1986: 94; Locket, Milledge and Merrett, 1974: fig. 36,D). At rest, femora I and II are stretched out in front and III and IV stretched out behind, in line with body.

In his catalogue, Brignoli (1983) separated the metines from the Tetragnathidae as a distinct family, Metidae. Levi (1986) retains the metines as a sub-family of the Tetragnathidae but there is some doubt that this is a monophyletic lineage (Coddington, 1986c).

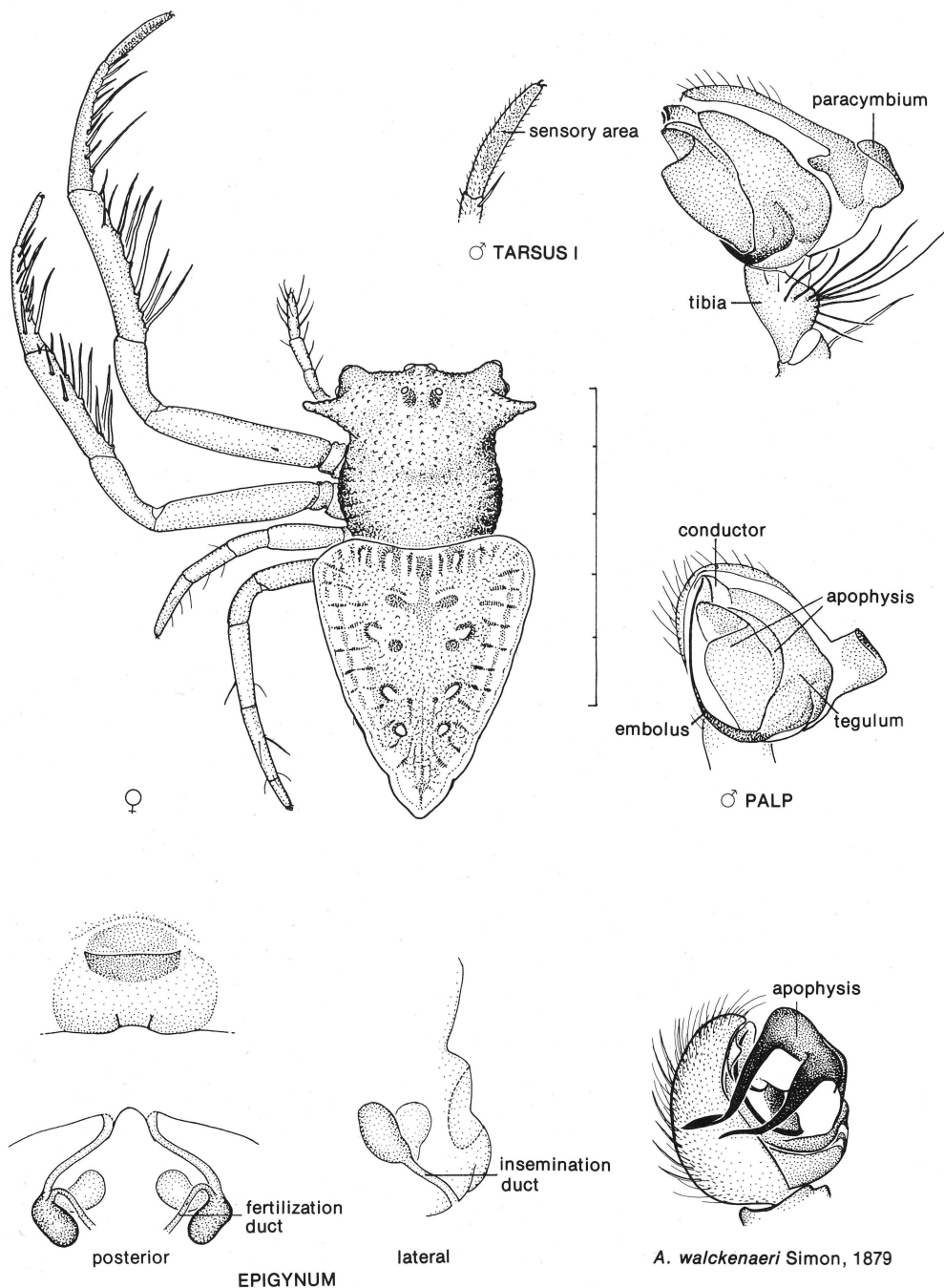
The placement of *Arkys* has always been controversial. It was transferred by Heimer (1984) to the Mimetidae as part of the superfamily Araneoidea. Forster and Platnick (1984) boldly included the Mimetidae in the superfamily Palpimanoidea based on the presence of promarginal peg teeth and an elevated cheliceral gland. As *Arkys* has neither of these characters it is illustrated here, tentatively placed with the metines. Heimer *et al.* (1982) give details of the ♂ sensory organ. The apophysis varies greatly between species (see *A. walckenaeri*). Main (1982) discusses prey-catching of *A. nitidiceps* both off and on its reduced non-viscid web. Stowe (1986) records that its prey-wrapping behaviour is araneid.

6. *DEINOPIS SUBRUFa* L.KOCH, 1878

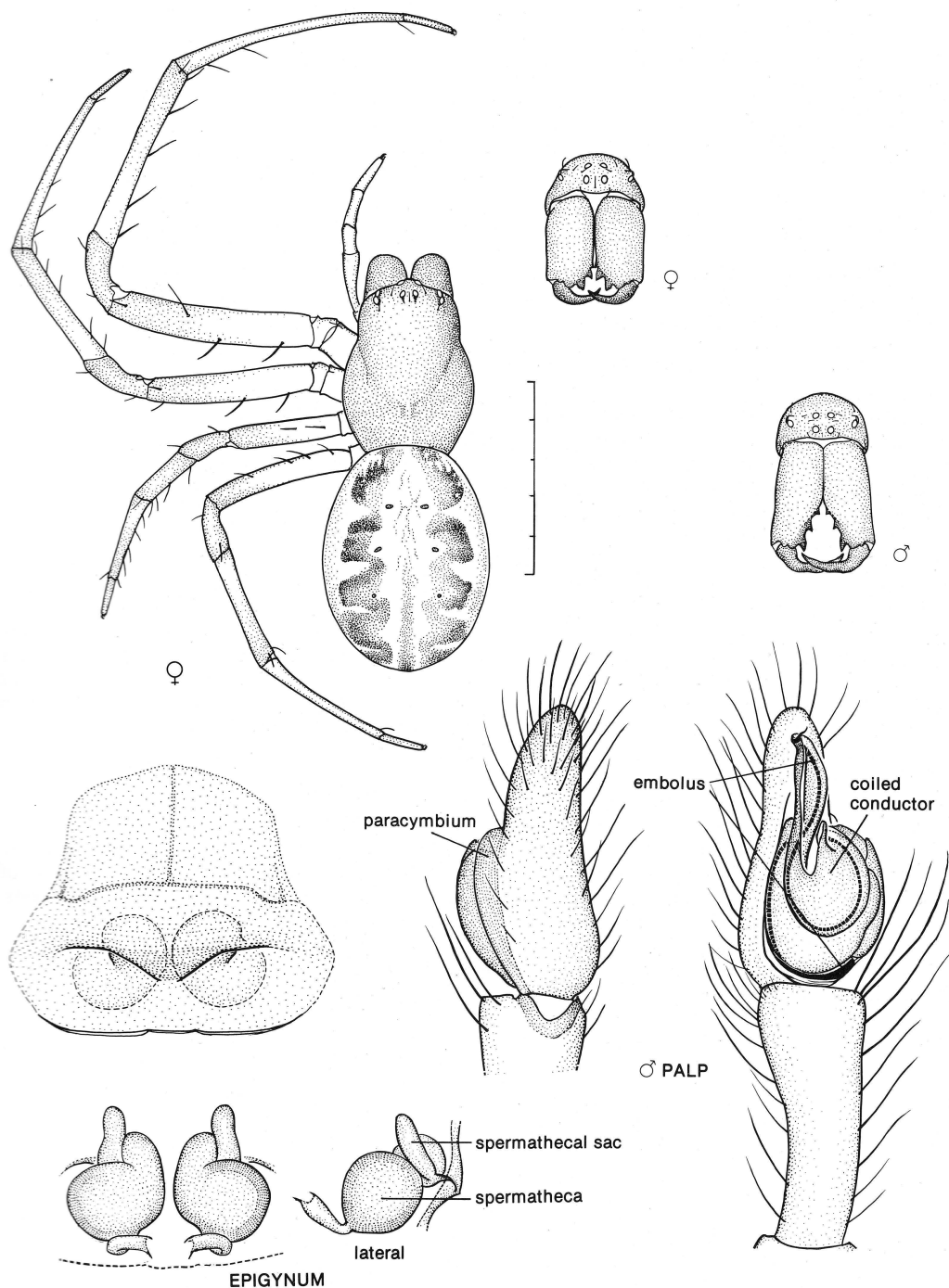
7. *MENNEUS ANGULATUS* L.KOCH, 1878



8. *TETRAGNATHA NITENS* (SAVIGNY & AUDOUIN, 1825)

9. *ARKYS CORNUTUS* L.KOCH, 1871





10. PHONOGNATHA GRAEFFEI (KEYSERLING, 1865)

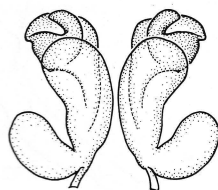
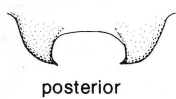
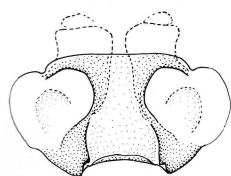
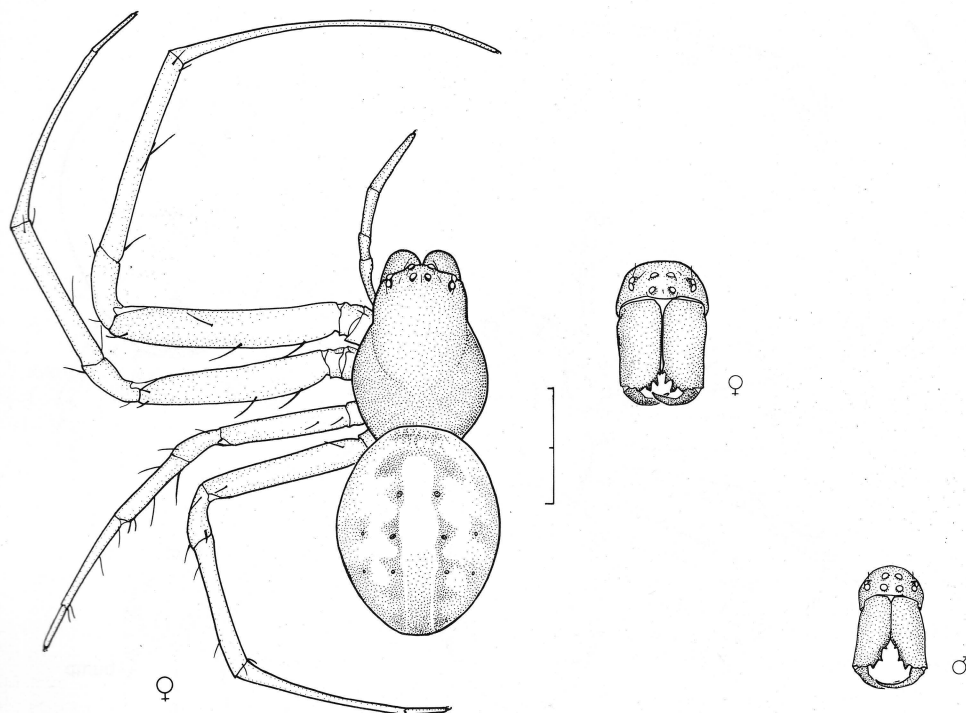
- 13 Paracymbium smooth-edged, on proximal half of cymbium. Epigynum regular shape postero-laterally (Pl. 10) ..... *Phonognatha*  
 – Paracymbium, with small proximal lobe, extending along length of cymbium. Epigynum horn-shaped posteriorly (Pl. 11) ..... *Deliochus*
- 14 PME reduced. ♂ palpal trochanter short; paracymbium branching postero-laterally (Pl. 12) .  
 ..... *Dolichognathinae Dolichognatha*  
 – PME normal. ♂ palpal trochanter long; paracymbium branching laterally or hook-like ....15
- 15 Femoral trichobothria. ♂ embolus enclosed by or coiled with conductor; cymbium reduced; paracymbium hook-like with or without small lateral branch. Thin-walled spermathecal sacs as well as spermathecae in ♀ ..... *Leucauginae* 16  
 – Without femoral trichobothria. ♂ embolus lying free on conductor; cymbium not reduced; paracymbium with several branches ..... *Metinae* 18
- 16 Two rows of long curved trichobothria on femur IV only ..... 17  
 – Single row of straight trichobothria on all legs. Very long leg I (Pl. 13) ..... *Tylorida*
- 17 Paracymbium unbranched. Paired bumps on abdomen. ♂ chelicerae without clasping spurs (Pl. 14) ..... *Leucauge*  
 – Paracymbium with small lateral branch. Bumps on abdomen unpaired if present. Trichobothria obviously branched. ♂ chelicerae with clasping spurs (Pl. 15) ..... *Mesida*
- 18 Endites much longer than wide. Epigynum sclerotized (Pl. 16) ..... *Metinae* sp  
 – Endites as long as wide. Epigynum lightly sclerotized. Small rainforest spiders (Pl. 17) .....  
 ..... *Nanometa*

Because of the long carapace, phonognathines have usually been regarded as nephilines; sometimes they leave the auxiliary non-sticky spiral in the web (Vollrath, pers. comm.). However the position of the ♂ palpal sclerites, the long palpal tibia and the similar size of the ♂ and ♀ indicate they are more likely metines. The spiral threads from an upper segment of the orb-web of *Phonognatha graeffei* are missing; the space is occupied by the curled leaf in which the spider rests. Details of web construction are not known.

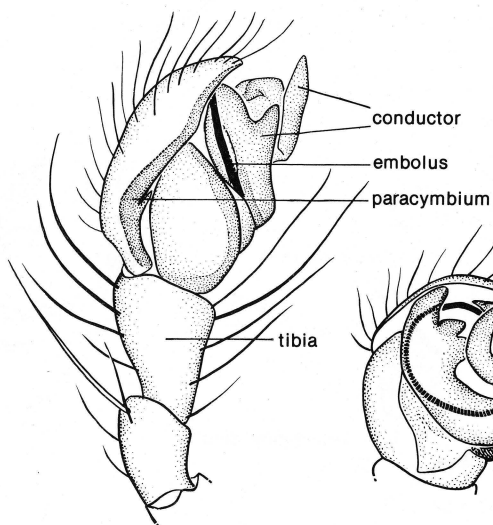
*Dolichognatha* is usually regarded as a tetragnathine (Levi, 1981) because both *Tetragnatha* and *Dolichognatha* have lost the tapetum in the secondary eyes and show a similar looping arrangement of the rhabdoms (Homann, 1971). It is placed with the metines because the paracymbium is joined to the cymbium. The Australian Metinae, represented by an undescribed genus and *Nanometa*, are found in moist situations, mainly in rainforest.

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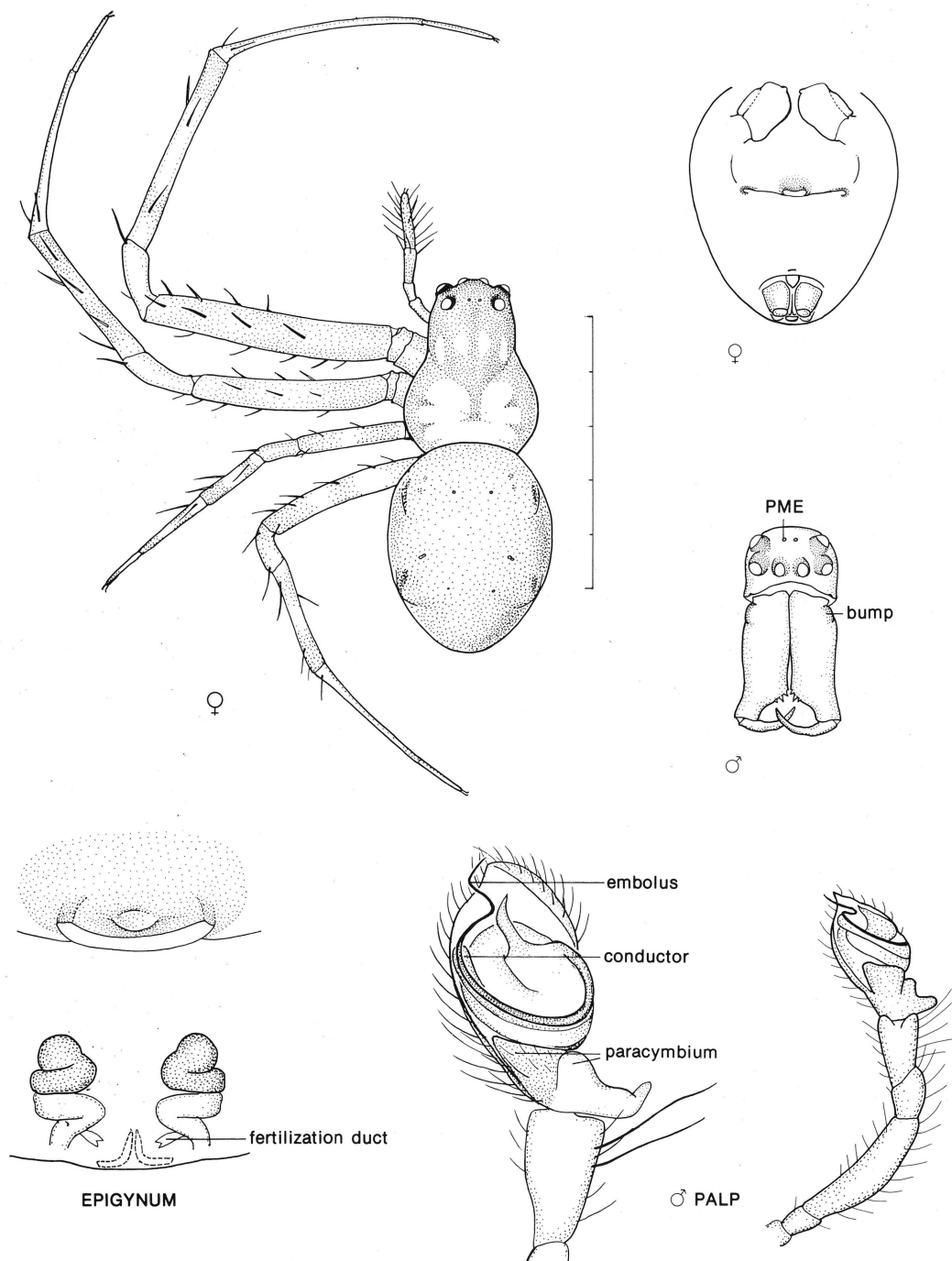


EPIGYNUM

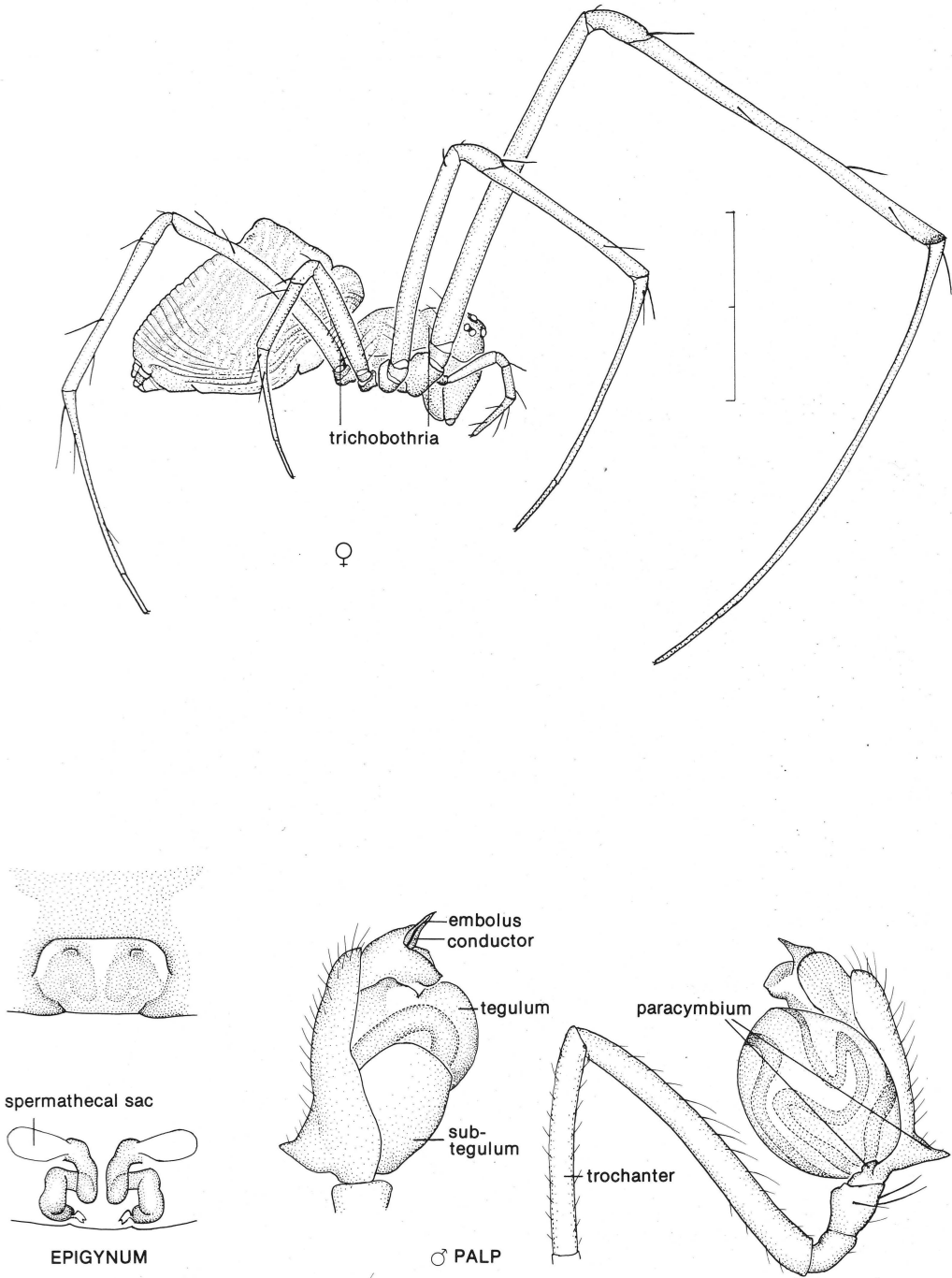


♂ PALP

# 11. DELIOCHUS SP (Bulburin State Forest, mid-east Queensland)

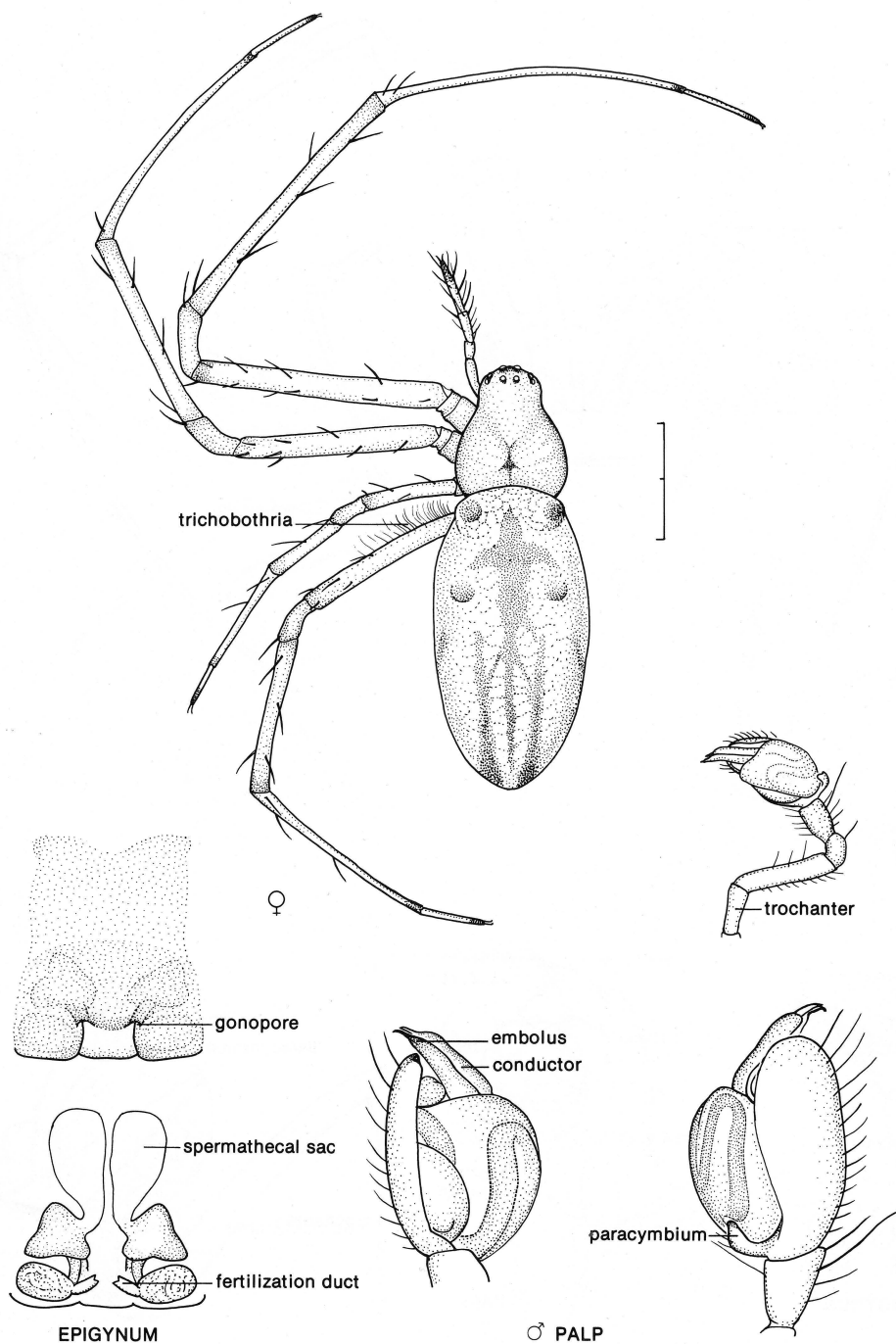


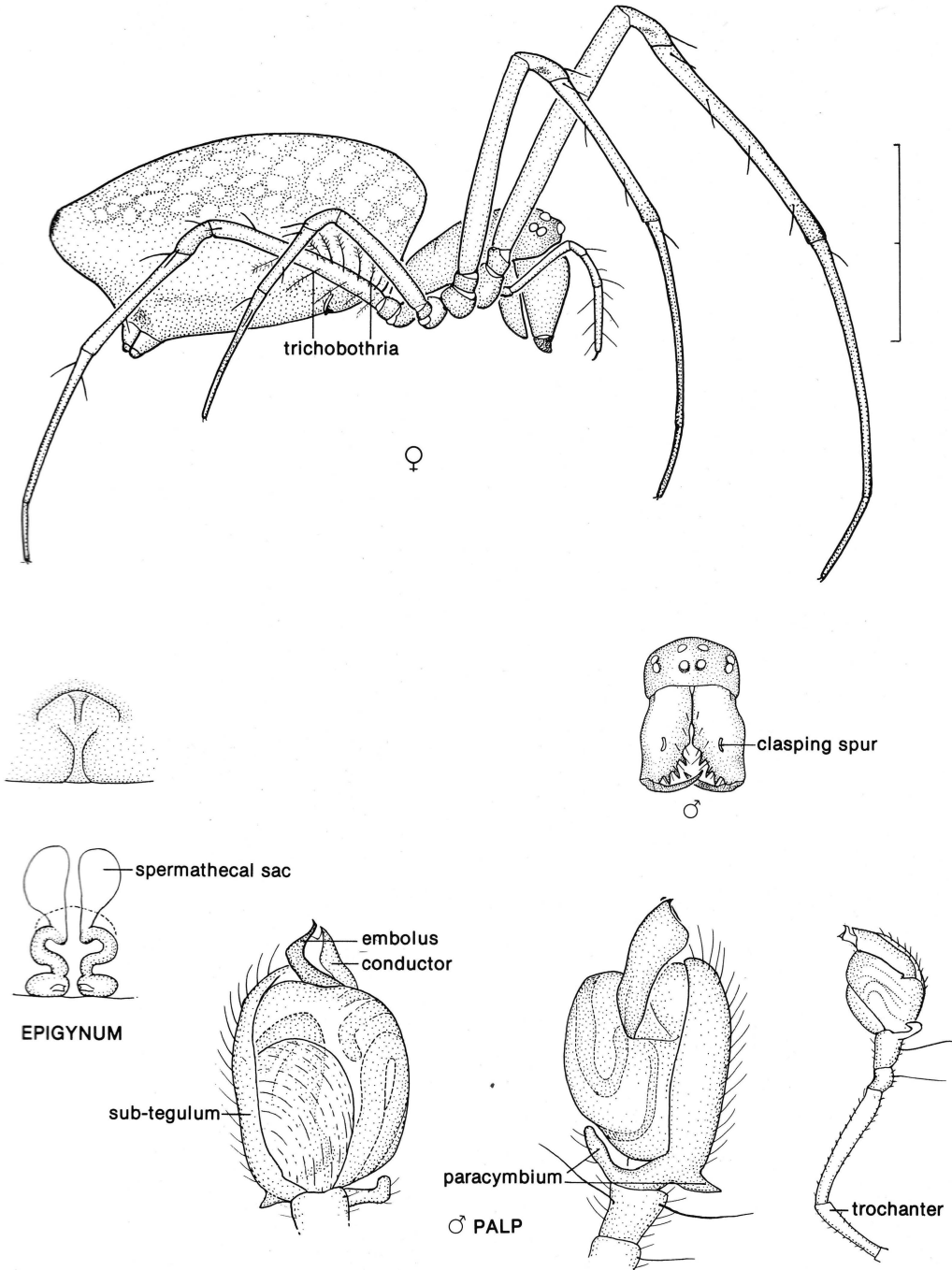
12. DOLICHOGNATHA SP (Iron Range, Cape York Peninsula, Queensland)



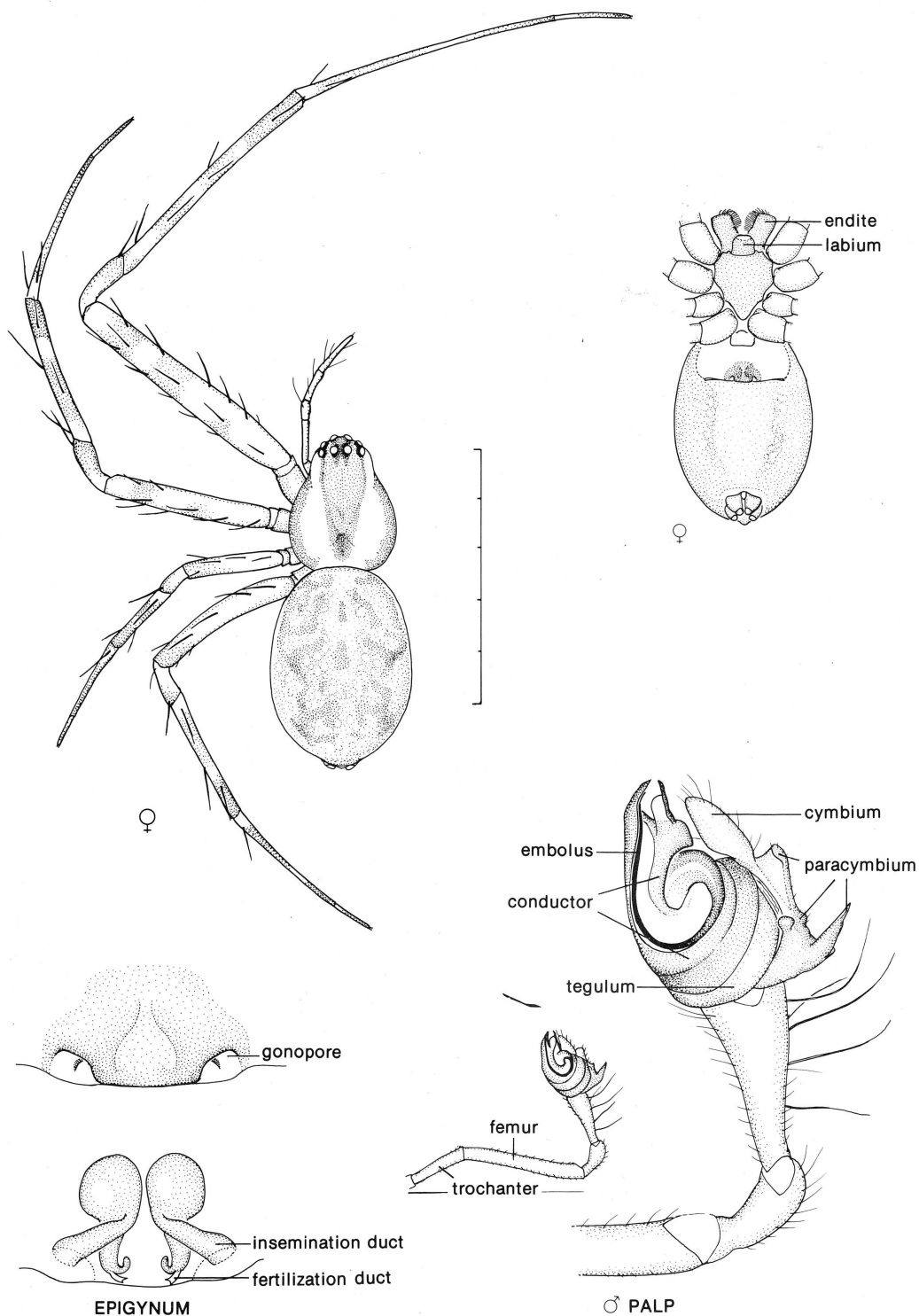
13. TYLORIDA STRIATA (THORELL, 1877)



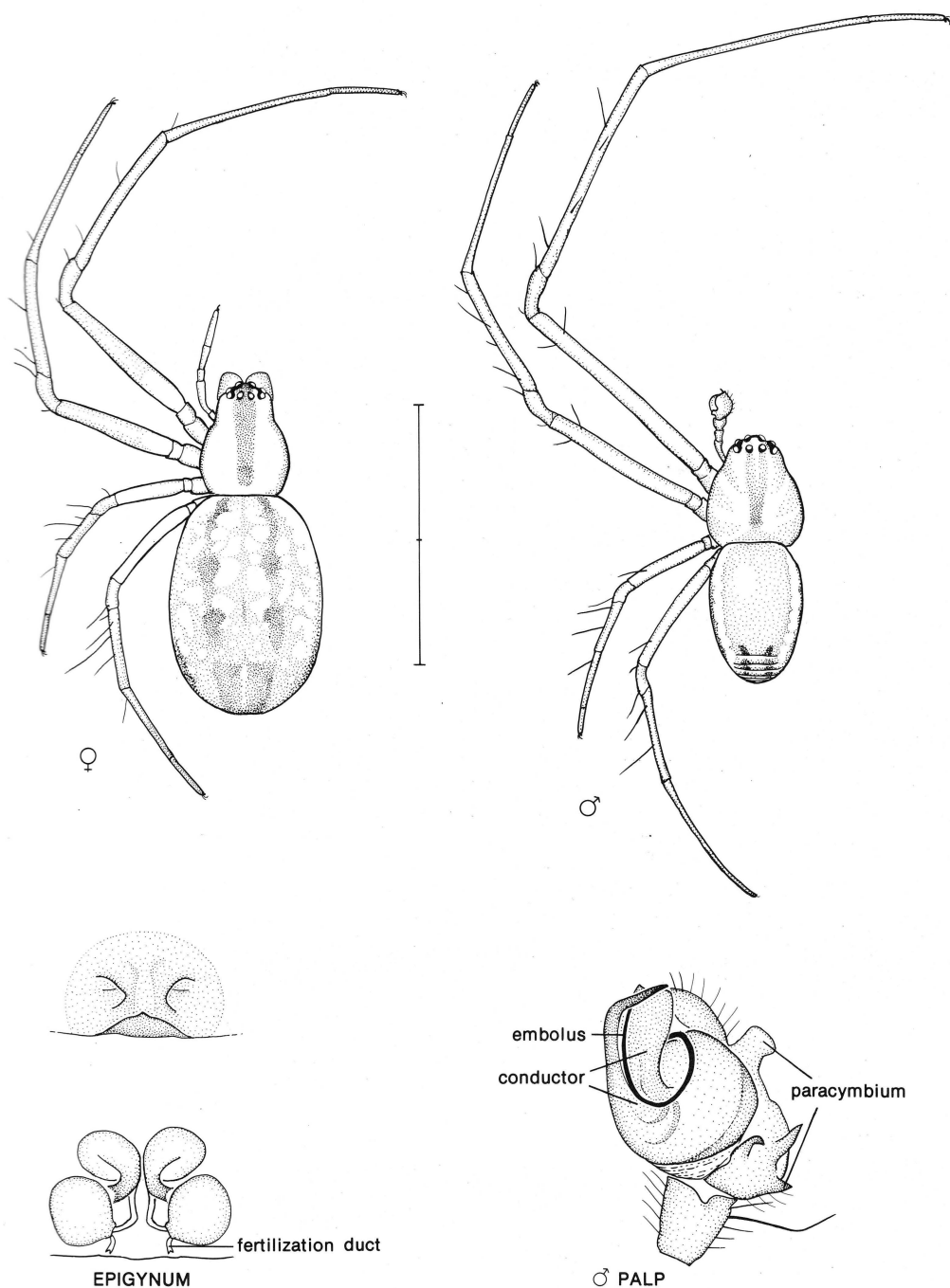
14. *LEUCAUGE GRANULATA* (WALCKENAER, 1842)



15. *MESIDA ARGENTIOPUNCTATA* (RAINBOW, 1916) N.COMB.



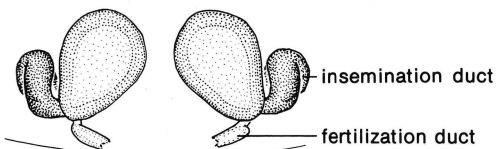
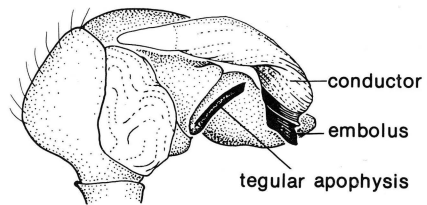
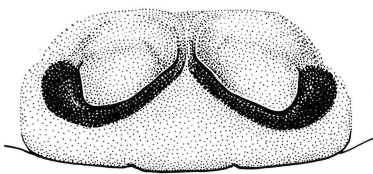
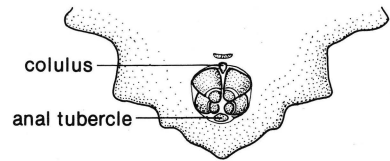
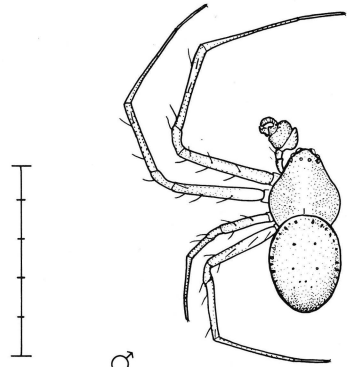
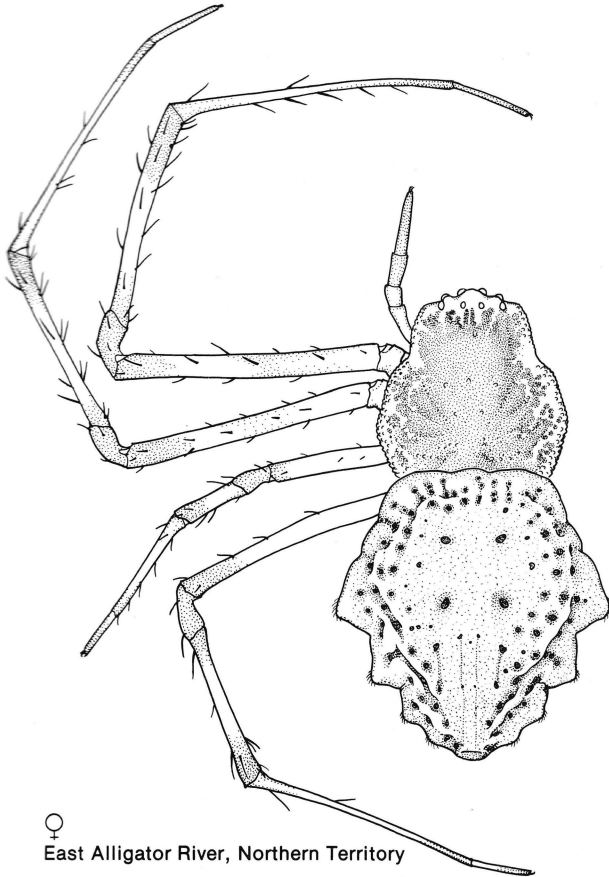
16. *METINAE* SP (Lamington National Park, southeast Queensland)



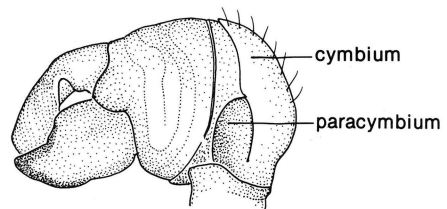
17. *NANOMETA* SP (Mt Glorious, southeast Queensland)

- 19 ♂ palpal tibia not saucer-shaped. Paracymbium flat. ♂ small, ♀ large-very large ..... Nephilinae 20  
 - ♂ palpal tibia saucer-shaped. Paracymbium hook-shaped (exc. *Paraplectanoides*). ♂ small or not much smaller than ♀ ..... 22
- 20 Spiders with dark cephalothorax and smooth oval or cylindrical abdomen ..... 21  
 - Pale spiders with laterally crenellate flattish abdomen. Orb-webs modified to form a ladder-web with solid silk hub-cup (Pl. 18) ..... *Herennia*  
 (northern Australia)
- 21 Brushes of hair (very reduced in *N. maculata*) on tibiae and metatarsi of ♀. Sticky spiral of golden silk; barrier web(s) sometimes associated with orb. ♀ leg I at least  $\times 5$  length of cephalothorax (Pl. 19) ..... *Nephila*  
 - Without brushes of hair on legs of ♀. Sticky spiral of normal silk; long tubular retreat from hub of web. ♀ leg I about  $\times 4$  length of cephalothorax (Pl. 20) ..... *Nephilengys*  
 (northern Australia)

The nephilines show unique behaviour in the detailed construction of the radii of the web (Eberhard, 1982). Coddington (1986c) further showed that nephilines have behavioural apomorphies that suggest they represent a monophyletic lineage and that they lack the behavioural synapomorphies that link the other non-cribellate orb-weavers. There are no established anatomical apomorphies for the group. The non-removal of the auxiliary spiral during web building is also found in *Phonognatha* (Vollrath *pers. comm.*) considered here to be a metine. Most *Nephila* spp., the golden orb-web spiders, attach their egg-sacs to foliage near the web; however, *N. maculata* lays eggs in an egg sac on the ground and covers this with litter (Robinson, 1980). After hatching the young climb up into vegetation before dispersing.



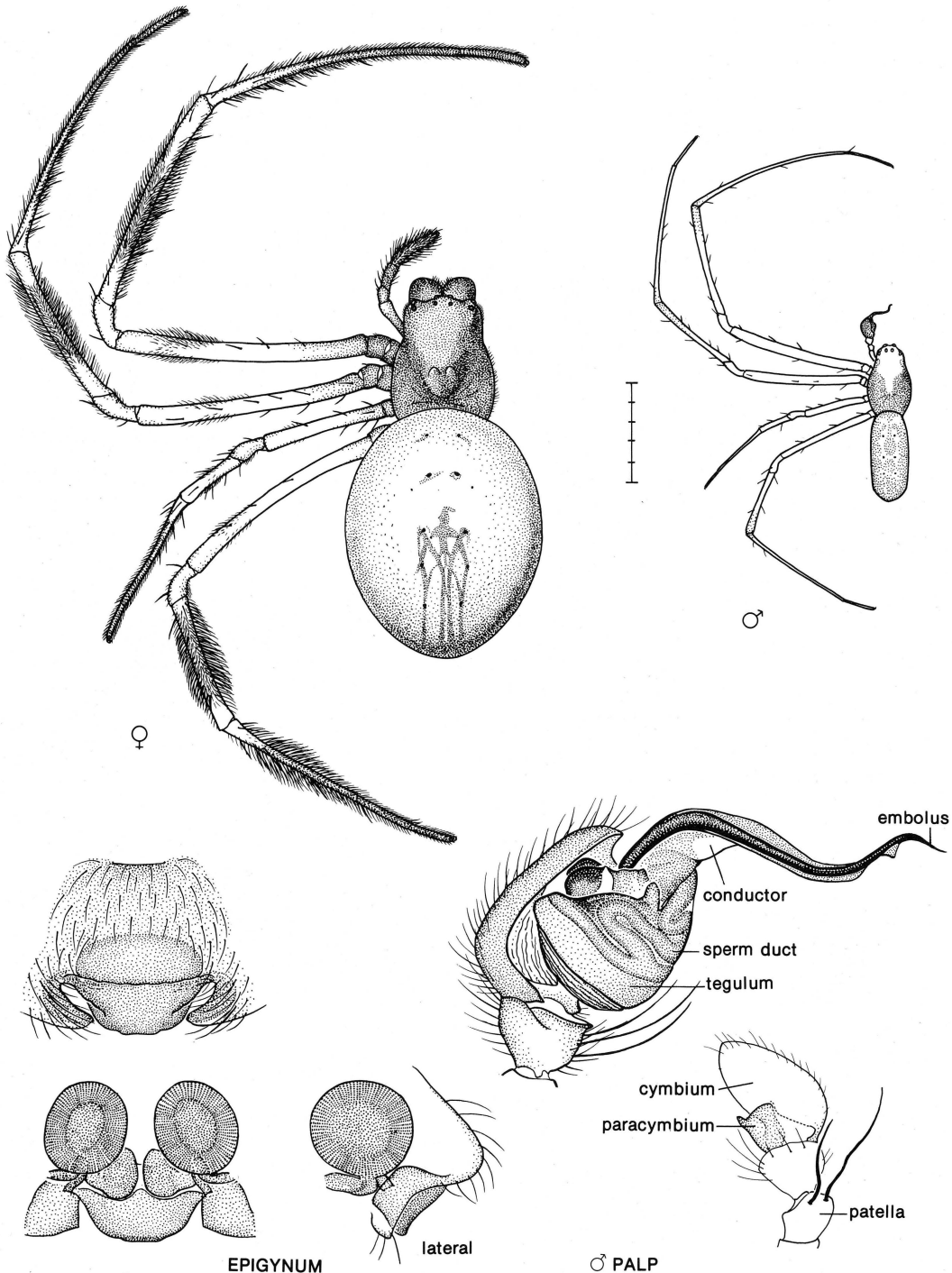
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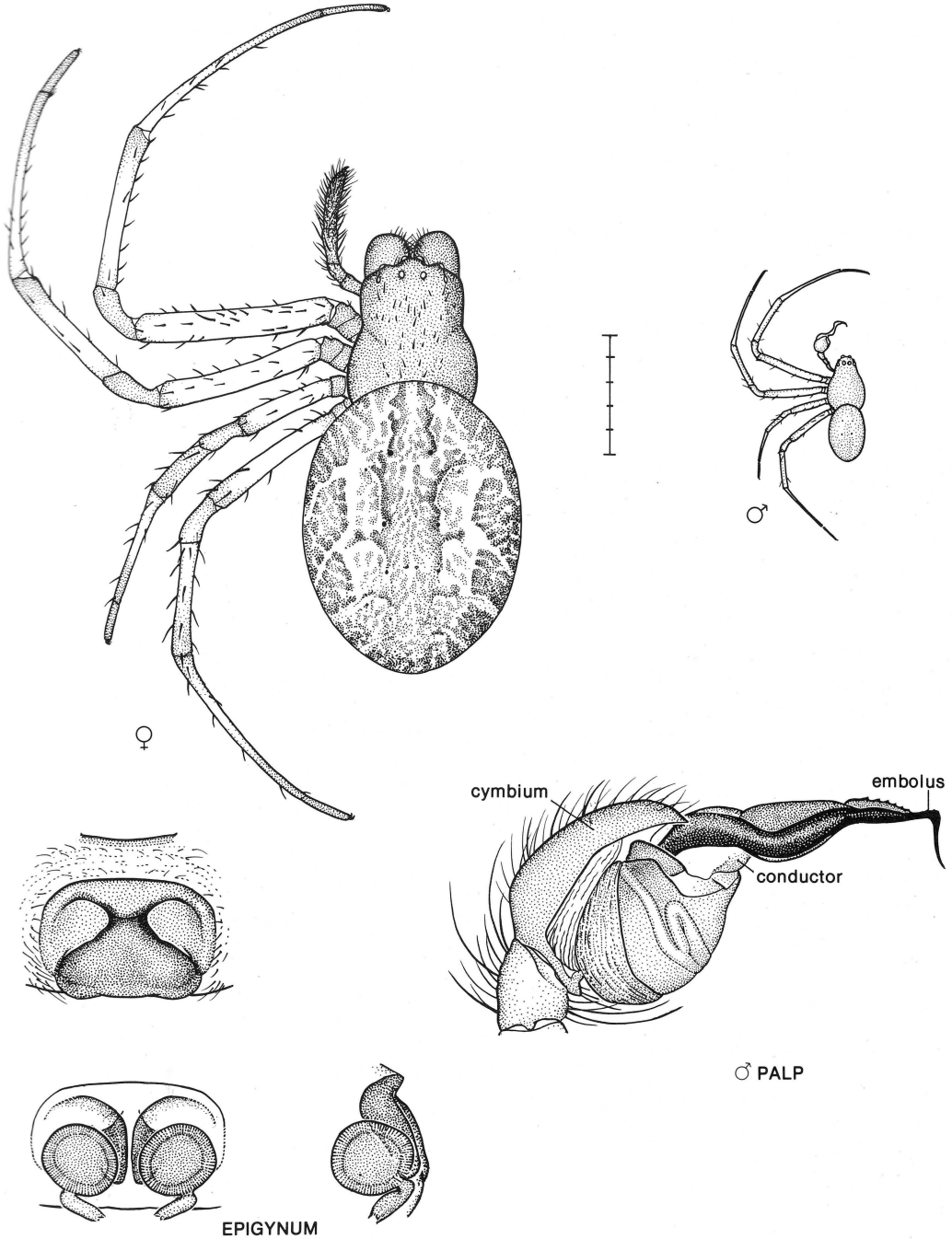
♂ PALP

18. HERENNIA SPP





19. *NEPHILA PLUMIPES* (LATREILLE, 1804)



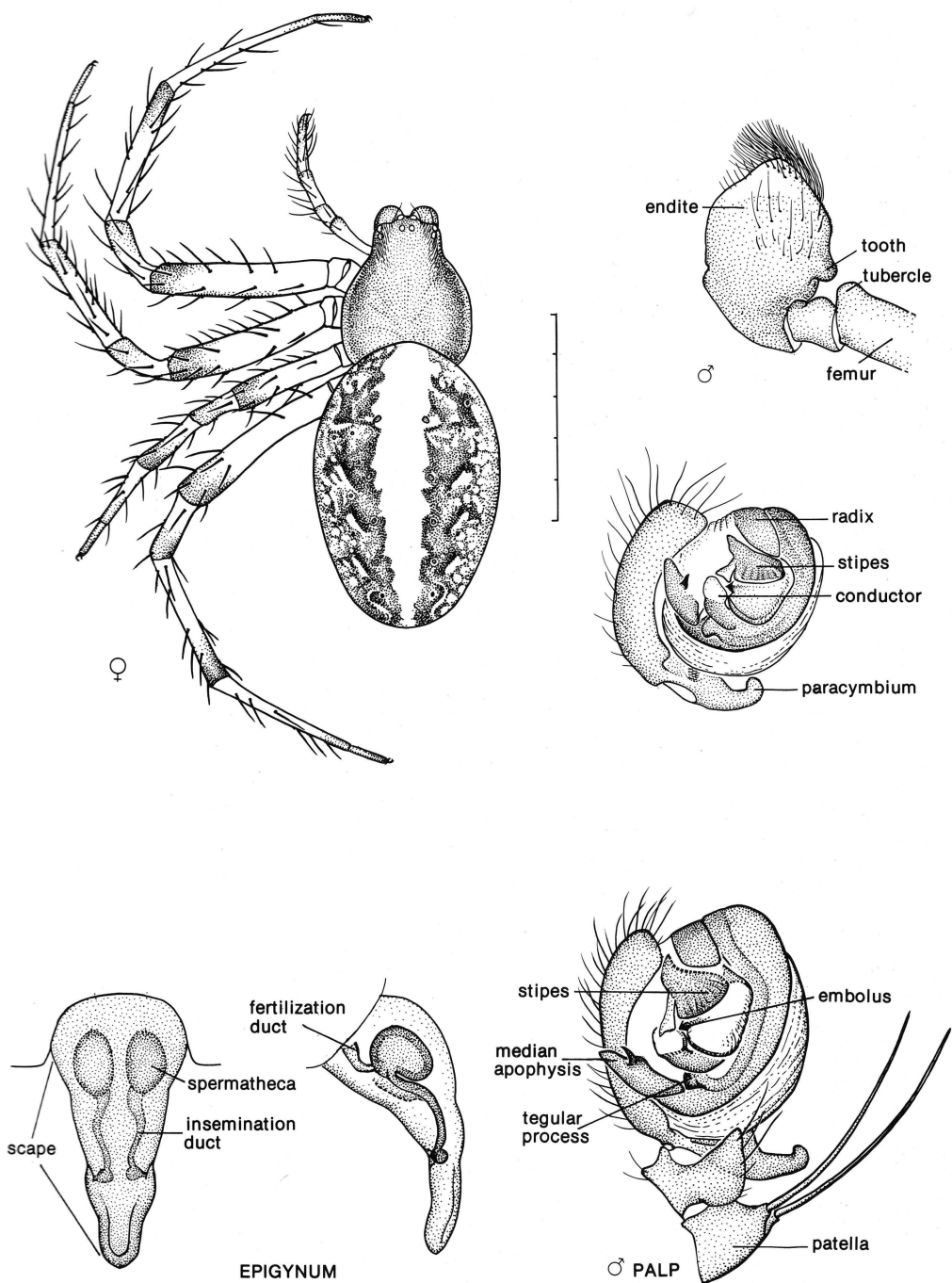
20. NEPHILENGYS MALABARENSIS (WALCKENAER, 1841)

- 22 ♂ endite with tooth meeting tubercle on palpal femur. ♂ palp with terminal apophysis (exc. *Neoscona*). ♀ with long or short scape. ♂ only slightly smaller than ♀ ..... Araneinae 23
- ♂ endite without tooth. ♂ palp rarely with terminal apophysis. ♀ without scape. ♂ much smaller than ♀ ..... 31
- 23 ♂ coxa I with postero-ventral spur (Pl. 24) ..... 24
- ♂ coxa I without spur ..... 30
- 24 ♀ scape tongue-shaped, directed backwards. Sclerites of ♂ palp in narrow area between cymbium and tegulum; no terminal apophysis. ♂ palpal patella with 2 spines (Pl. 21) ..... *Neoscona*
- ♀ scape directed forwards and then backwards. Sclerites of ♂ palp not so confined. ♂ palpal patella with 1 spine ..... 25
- 25 Carapace with high cephalic area ..... 26
- Carapace with normal cephalic area ..... 27
- 26 Hairy cephalic area. PME more than  $\times 2$  diameter apart. Abdomen with multiple humeral bumps and lateral bumps (Pl. 22) ..... *Carepalxis*
- Smooth cephalic area. PME less than  $\times$  ♀ diameter apart. Abdomen smooth. ♂ coxa IV with thorn-like ventral spines. Small spiders (Pl. 23) ..... *Anepsion*
- 27 Very hairy cephalic area ..... 28
- Smooth or lightly haired cephalic area ..... 29
- 28 PME smaller than AME. Abdomen not extended dorsally. Large-very large spiders (Pl. 24) ..... *Eriophora*
- PME larger than AME. Abdomen extended dorsally into turret-shape (Pl. 25) ..... *Heurodes*
- 29 PME less than  $\times$  ♀ diameter apart. ♀ rounded cephalic area separated by deep V-shaped groove from thoracic area of carapace. Obliquely horizontal orb-web, usually decorated (Pl. 26) .... *Cyclosa*
- PME  $\times 1$  diameter or more apart. No marked groove between cephalic and thoracic carapace. Vertical orb-web (Pl. 27) ..... '*Araneus*'

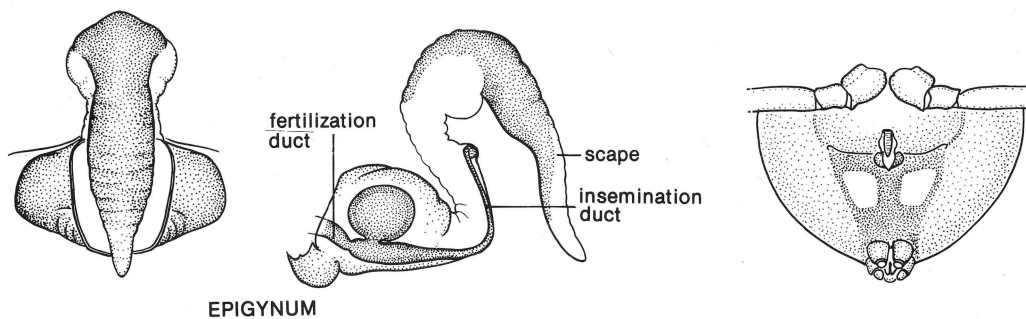
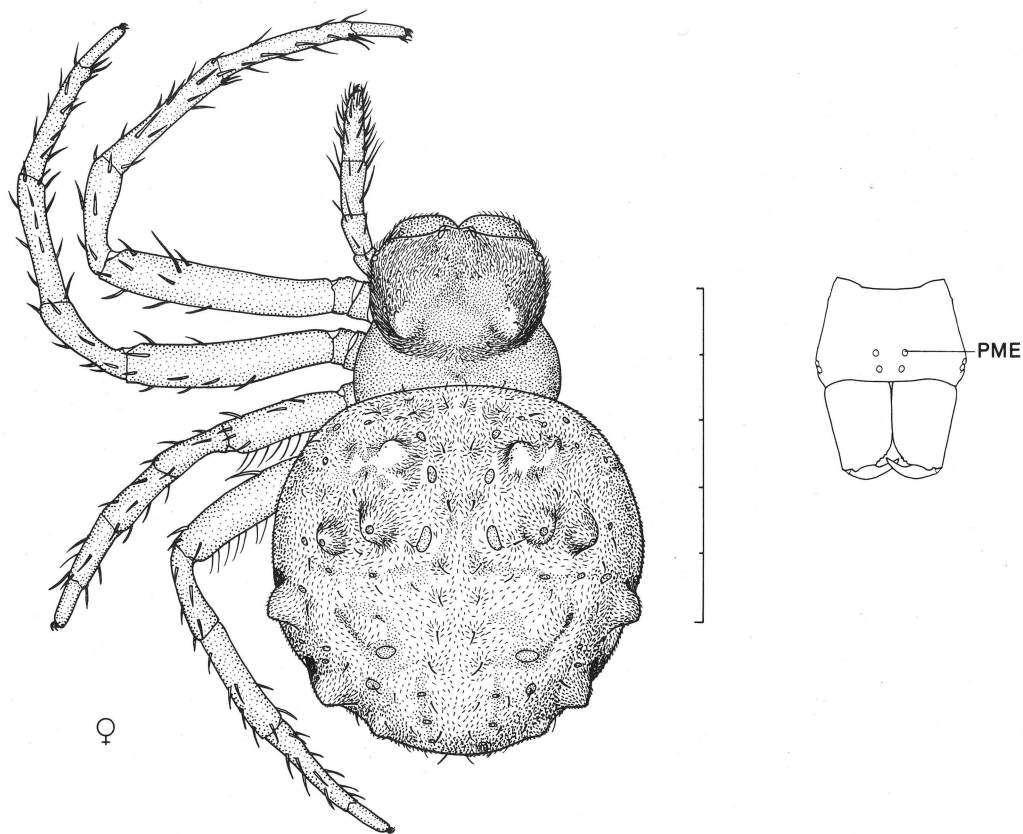
Although many unmatched males have been examined none was certainly identified as *Carepalxis*.

♂ chelicerae of *Eriophora* spp have an anterior concavity accommodating the large palpal bulbs. This concavity is also found in *Heurodes* and *Cyclosa*. Some *Cyclosa* spp have short, rounded abdomens.

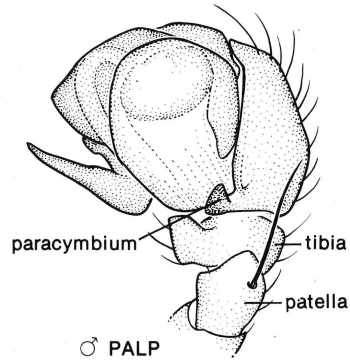
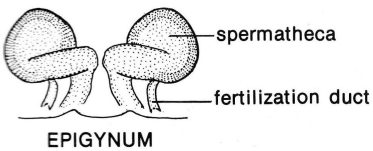
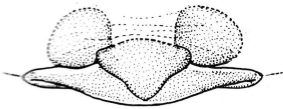
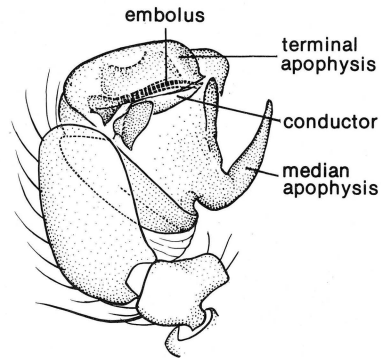
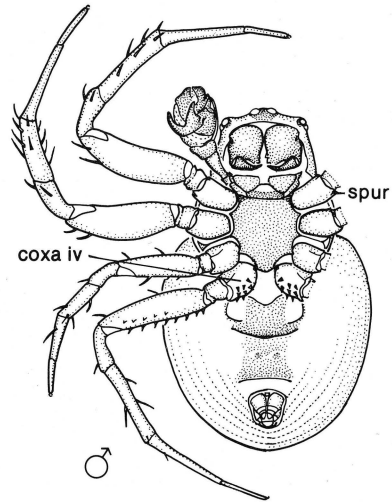
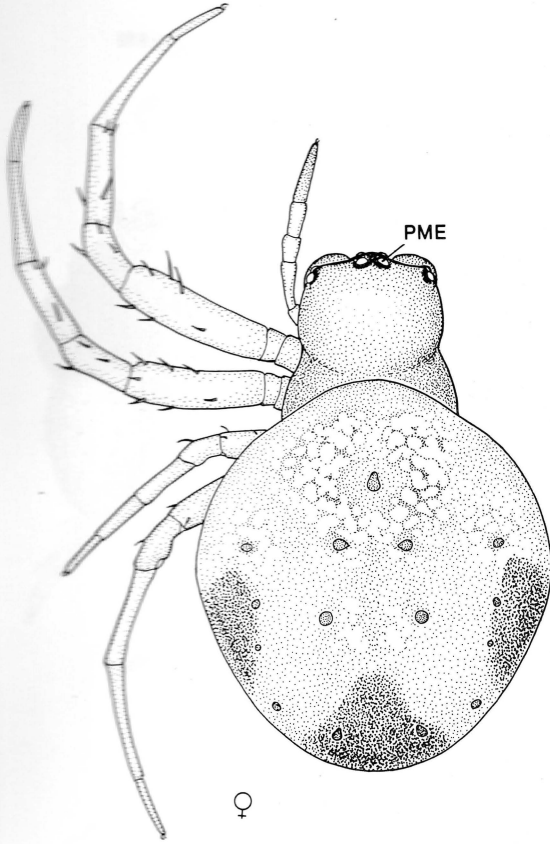
Many Australian araneines belong in a group at present placed in '*Araneus*'. The ♂♂ have a tooth on the endite meeting a tubercle on the palpal femur; a spur on coxa I, that fits into a groove on the proximal end of its femur II during mating and a terminal apophysis on the palpal bulb. The ♀♀ have a scape folded back on itself. Two further ♂ characters, a paramedian apophysis and a single spine on the palpal patella distinguish them from *Araneus* (Levi, 1983, unpublished key).



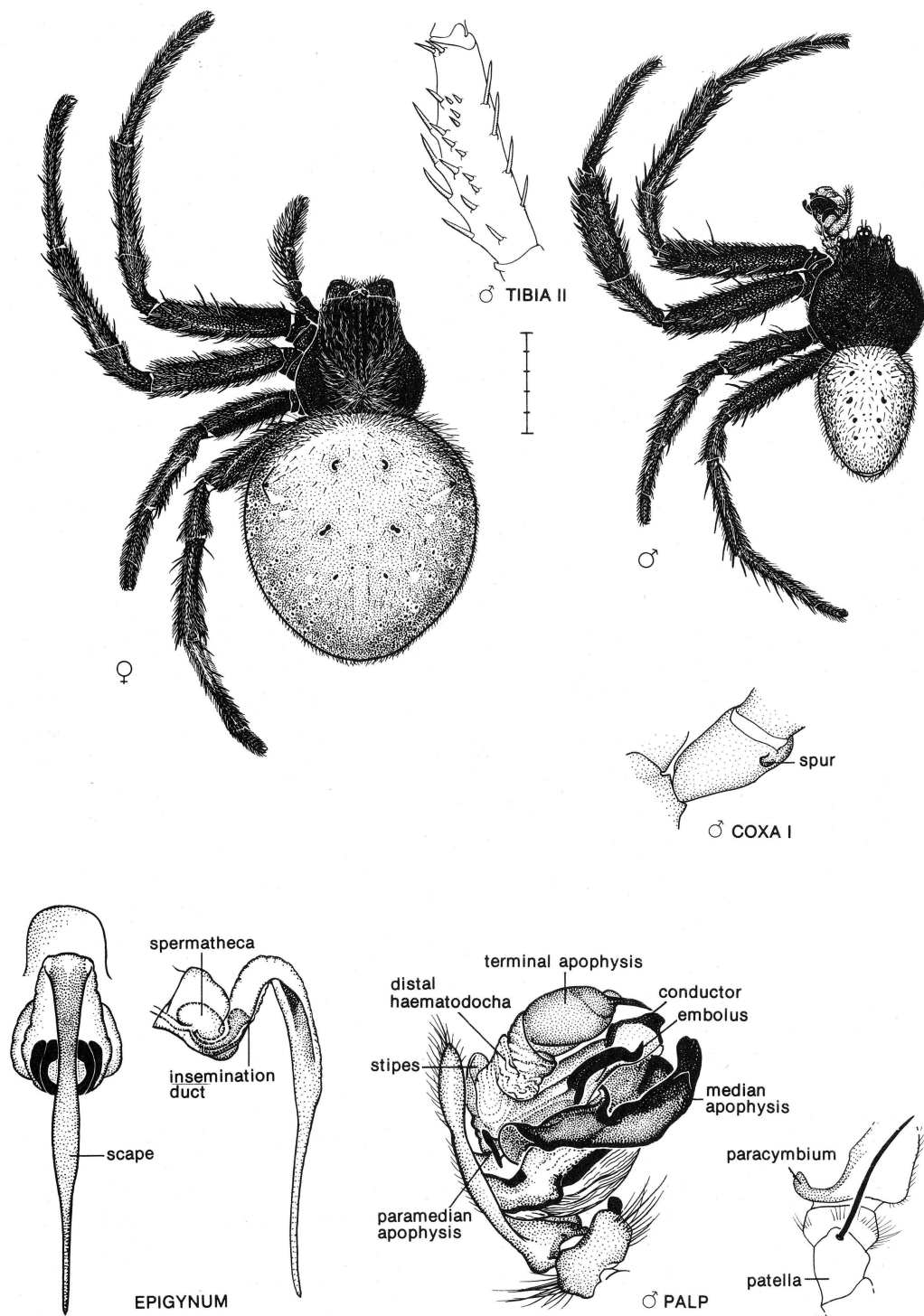
21. *NEOSCONA THEISI* (WALCKENAER, 1841)

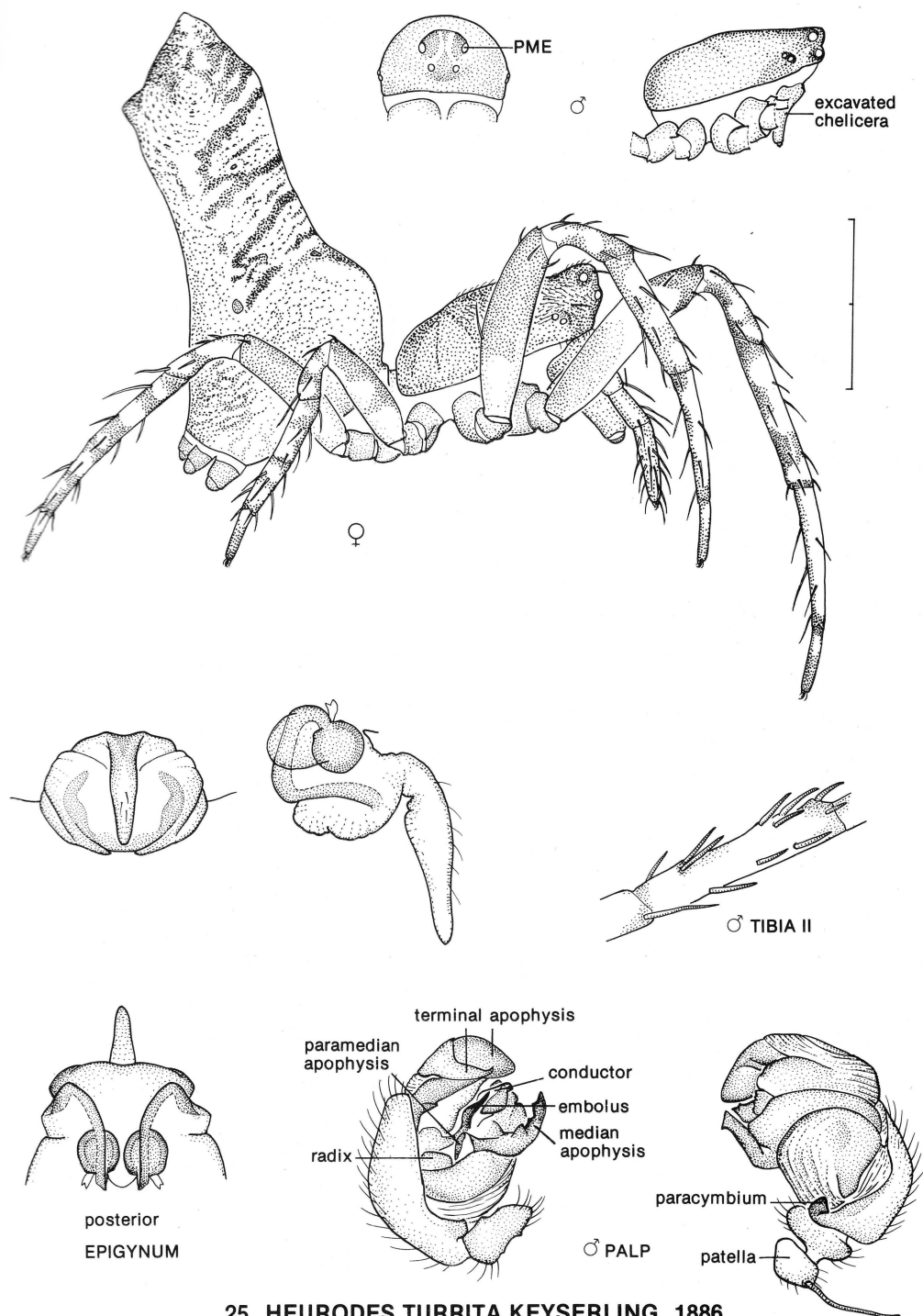


22. CAREPALXIS TUBERCULATA KEYSERLING, 1886



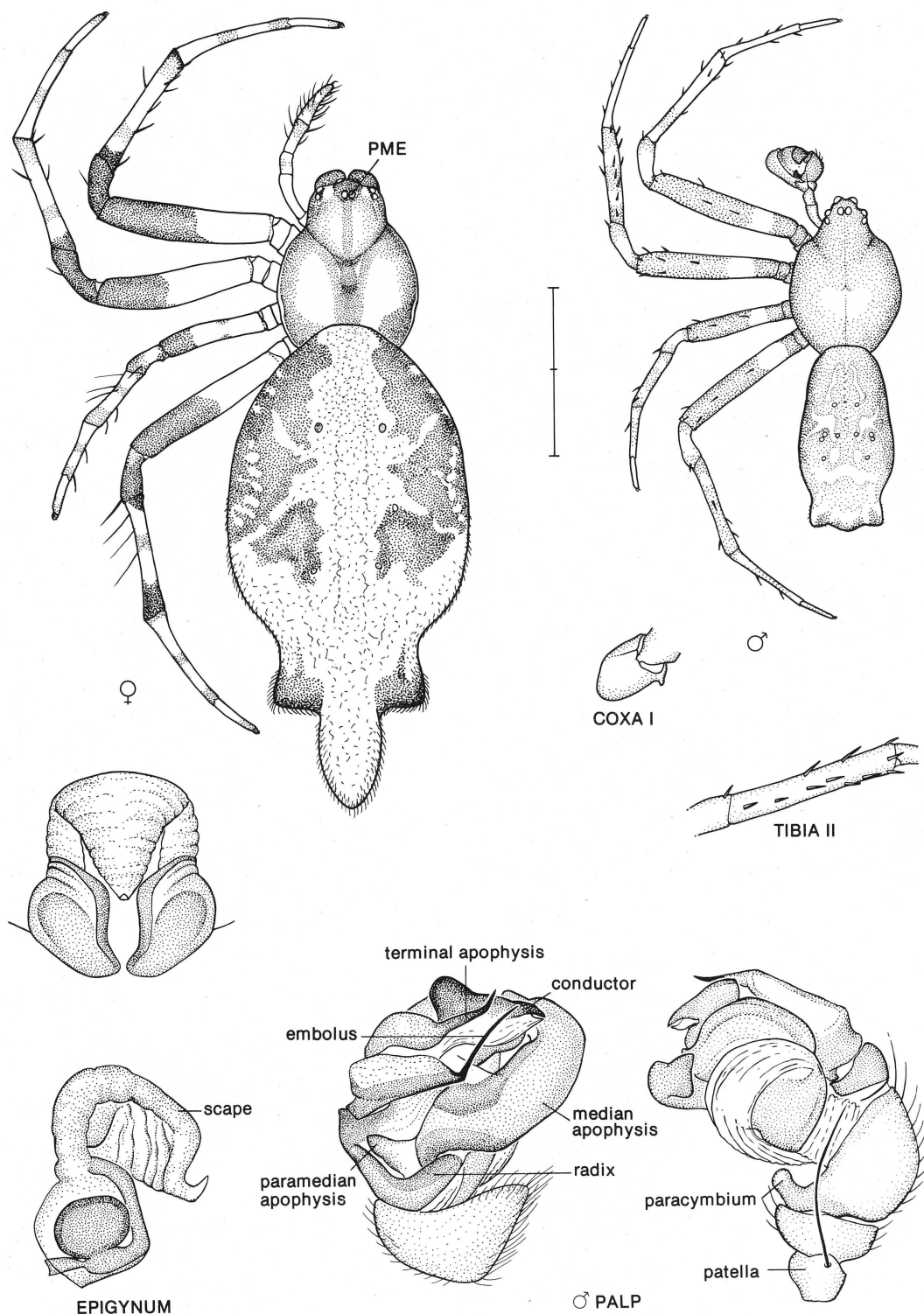
23. ANEPSION PELTOIDES (THORELL, 1878)

24. *ERIOPHORA TRANSMARINA* (KEYSERLING, 1865)

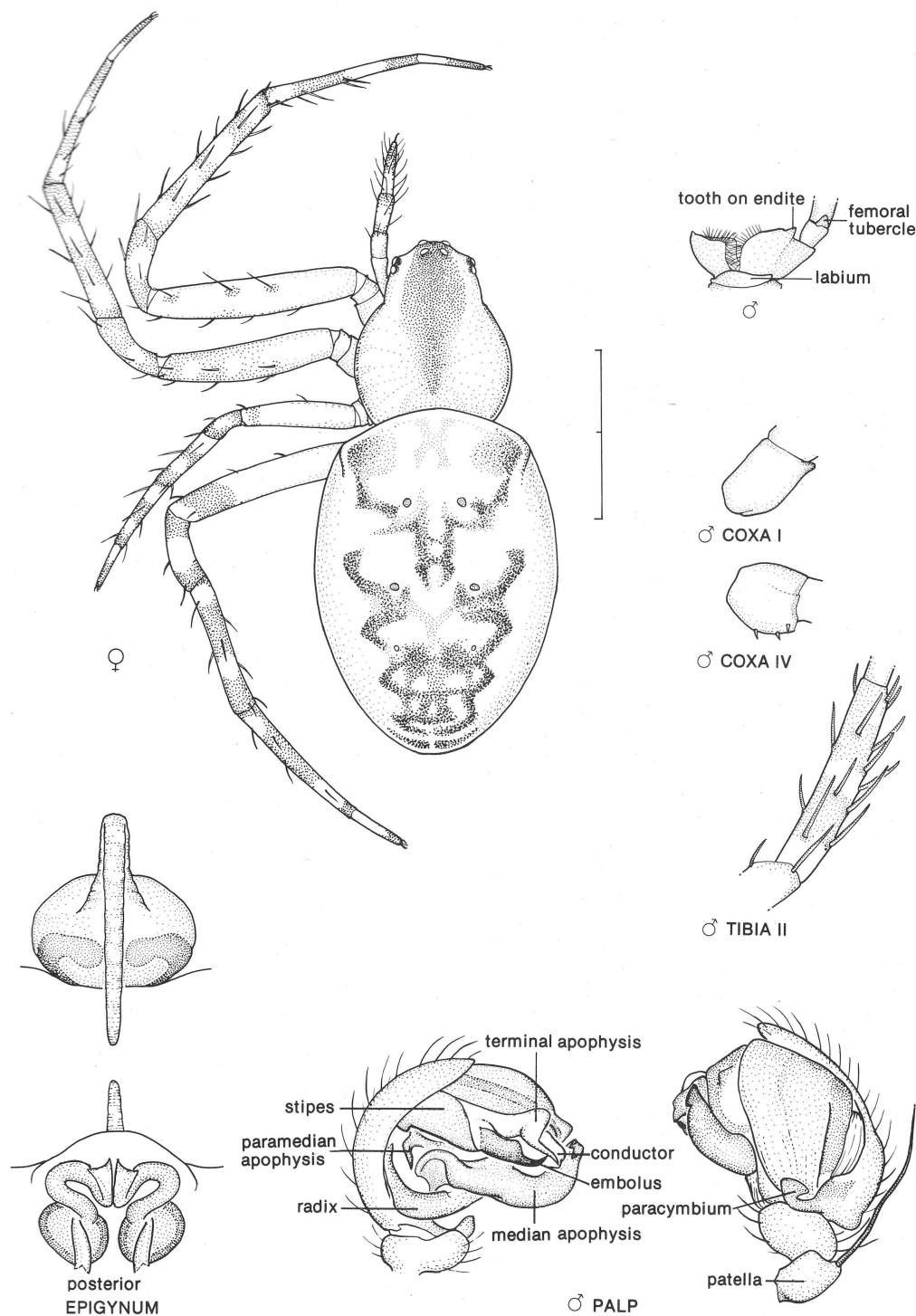


25. HEURODES TURRITA KEYSERLING, 1886



26. *CYCLOSA TRILOBATA* (URQUHART, 1884)

INSULANA?



27. 'ARANEUS' EBURNUS (KEYSERLING, 1886)

- 30 MOQ wider behind than in front. Abdomen wider than long. ♂ palpal patella with many spines (Pl. 28) ..... *Dolophones*  
 – MOQ wider in front than behind. Abdomen longer than wide. ♂ palpal patella with 2 spines (Pl. 29) ..... *Larinia*
- 31 High smooth cephalic area. Abdomen with dorsal sclerotized discs ..... 32  
 – Flat cephalic area, or if high not smooth ..... 33
- 32 Chelicera with flange on fang; ♀ abdomen without pointed projections (Pl. 30) ..... incertae sedis *Paraplectanoides*  
 – Chelicera normal. ♀ abdomen with 2 pairs of thick pointed lateral projections and usually 2 posterior projections. Sclerotized ring round spinnerets (exc. *Gasteracantha minax*) (Pl. 31) ..... *Gasteracanthinae Gasteracantha*
- 33 Posterior eye row procurved ..... *Argiopinae* 34  
 – Posterior eye row straight or recurved ..... 35
- 34 PME about same distance from each other as from PLE (Pl. 32) ..... *Gea*  
 – PME much closer to each other than to PME (Pl. 33) ..... *Argiope*

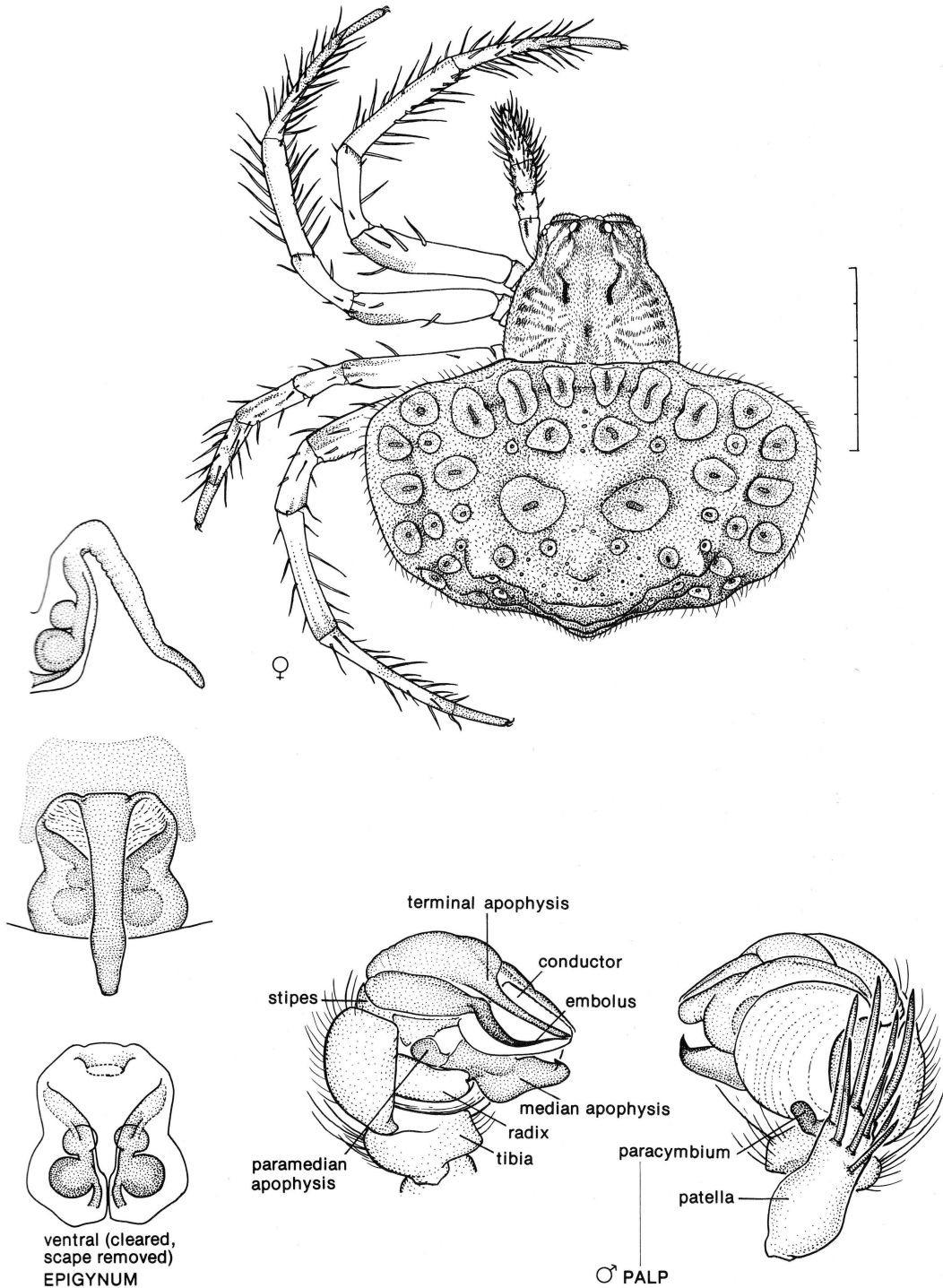
Dorsal protuberances are found on the abdomens of some *Dolophones* spp.

*Larinia* is usually found in long grass; ♀♀ *L. phthysica* have a scape.

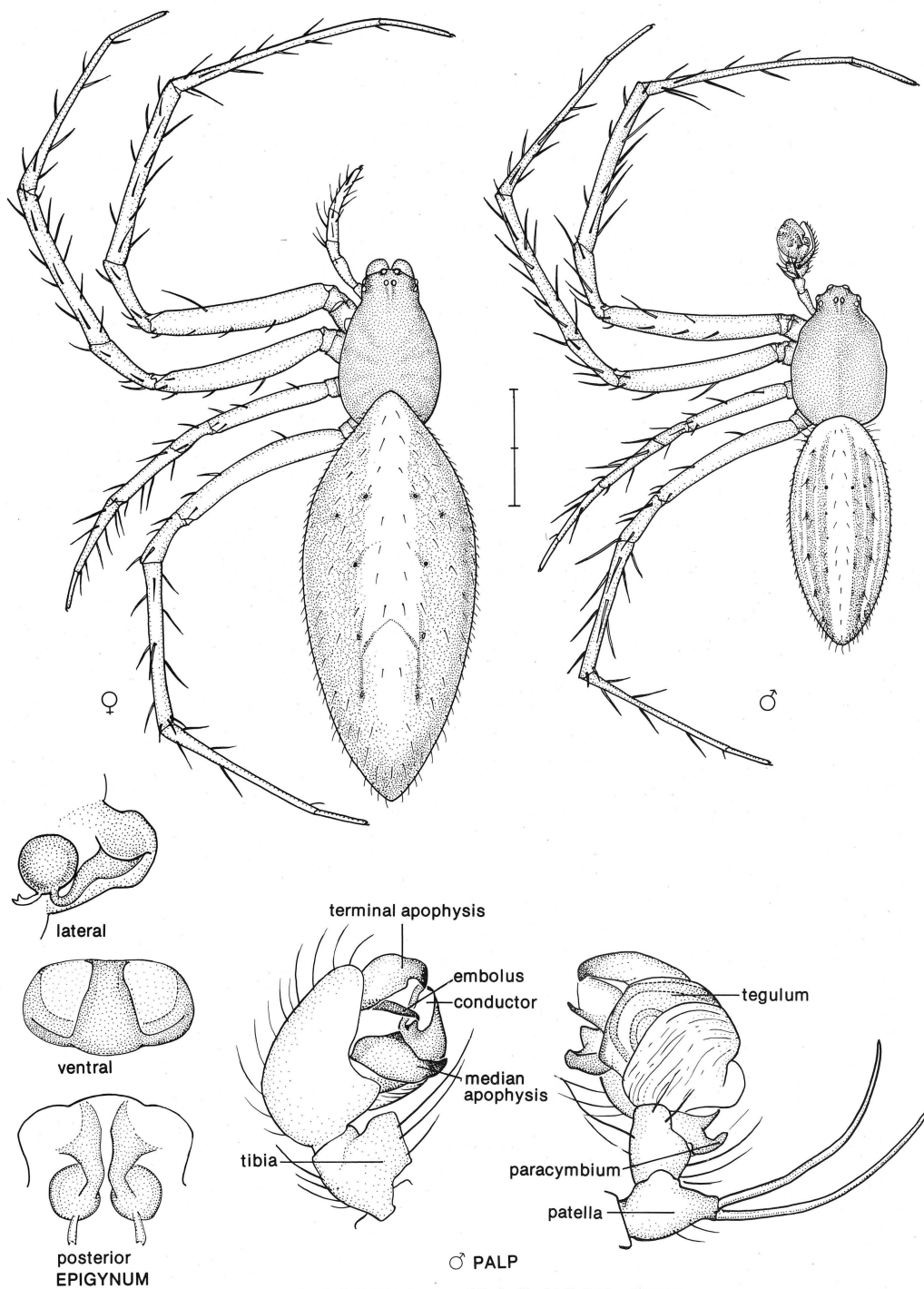
*Paraplectanoides* is a very peculiar, long-lived (♀s to 6 years or more) spider. The flange on the fang overlies the comb (? preening) of spines on the promargin of the chelicera. Hickman (1975) described the web and nest of the spider. It spins a few intersecting horizontal threads attached to adjacent twigs near the ground; there is no spiral. A nest is built completely enclosing the radial threads and hub; a small entrance is left in the wall. There are no sticky threads and the spider rests under the hub. Prey enters and is captured when running on the inside of the mesh nest, not on the 'orb-web'. I consider it an araneine because it has transverse furrows on the epigastric plates, a paramedian apophysis and radix in ♂ palp.

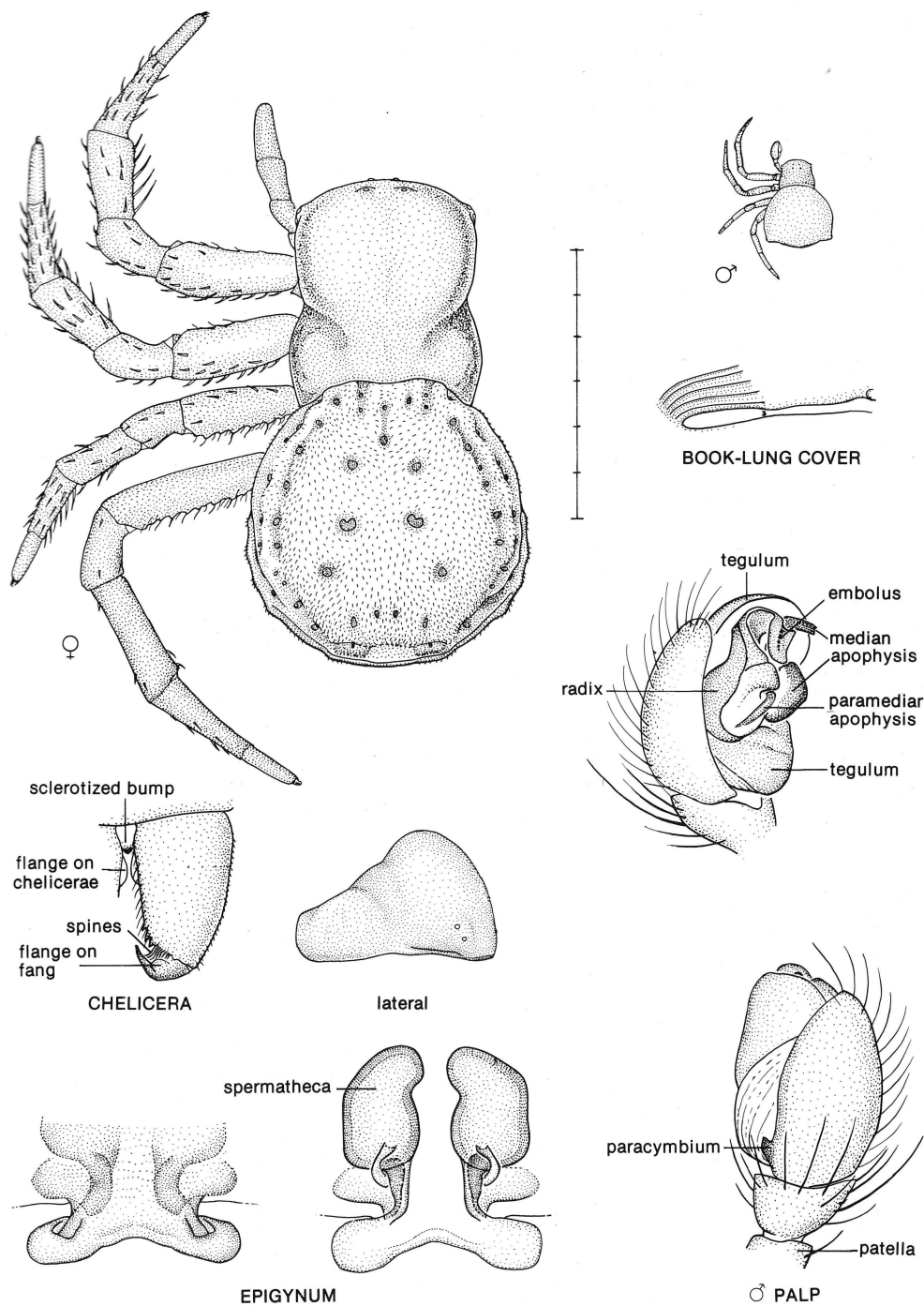
♀ *Gasteracantha minax* is atypical of the genus in that the ring around the spinnerets is only slightly more sclerotized than the rest of the venter and the sclerotized knob between the epigynum and spinnerets is absent. See *G. brevispina* for these features.

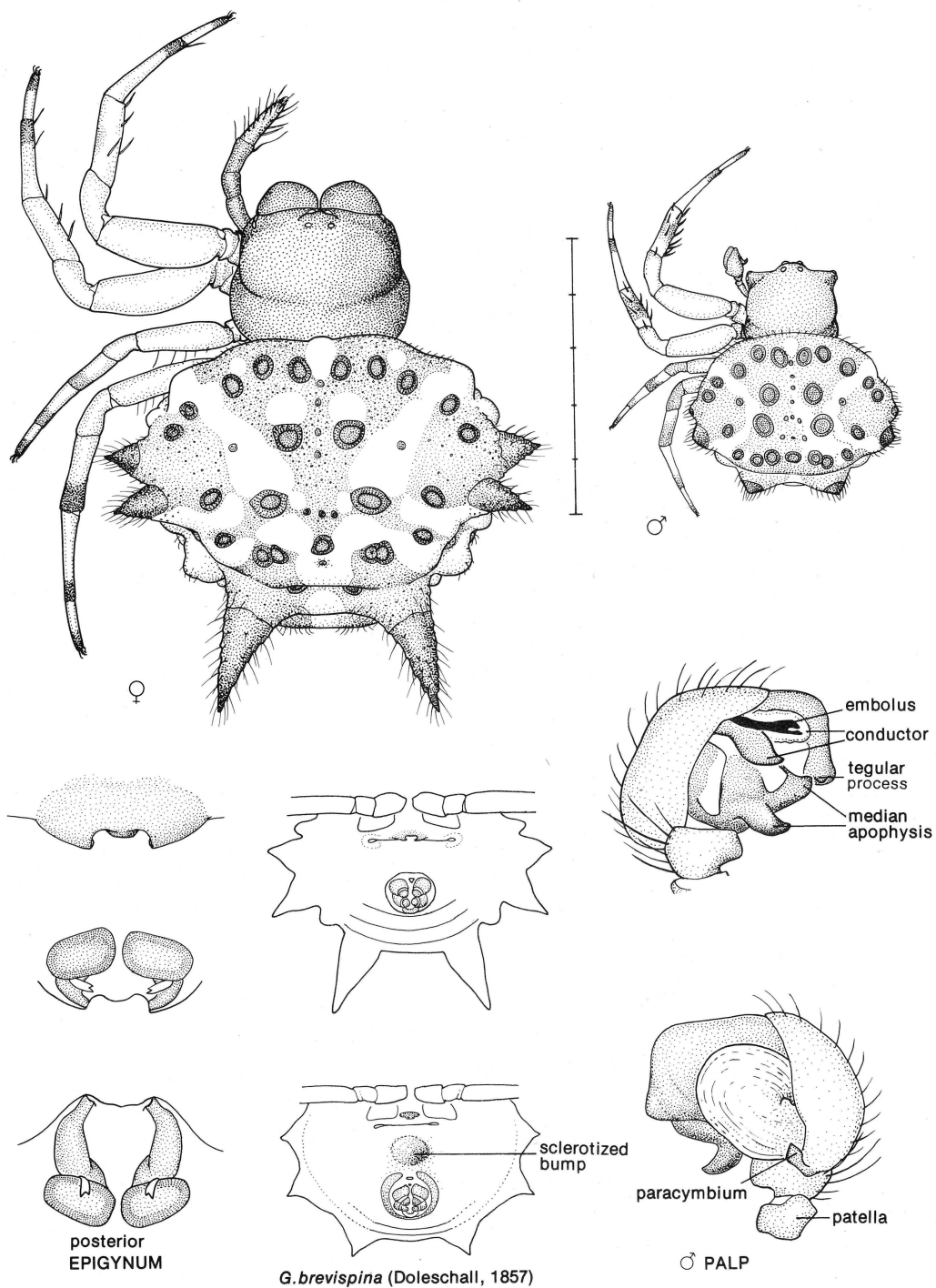
Some *Argiope* spp build crossing zig-zag stabilimenta in their webs hence the name St Andrew's Cross spider for *A. aetherea* and *A. keyserlingii*. The spiders rest in the web in an X position (Mascord, 1980, pl. 24: figs 1, 3, 4, 5).

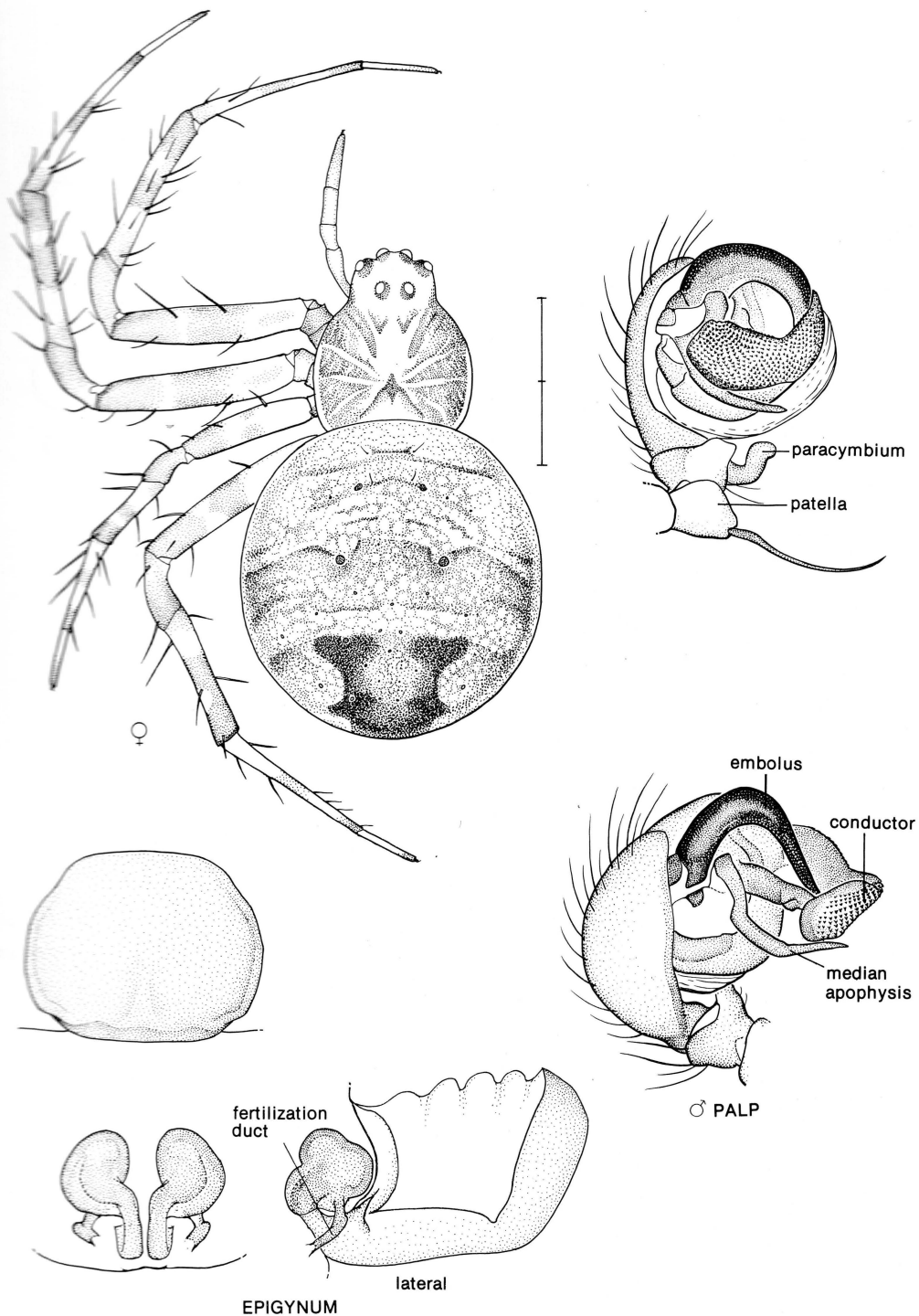


28. DOLOPHONES TUBERCULATA (KEYSERLING, 1886)

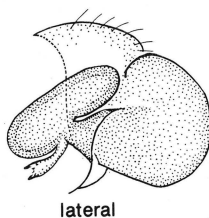
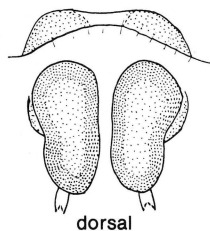
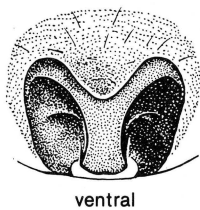
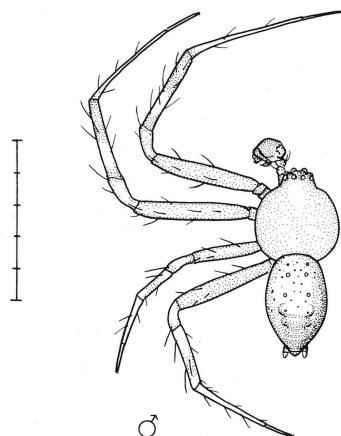
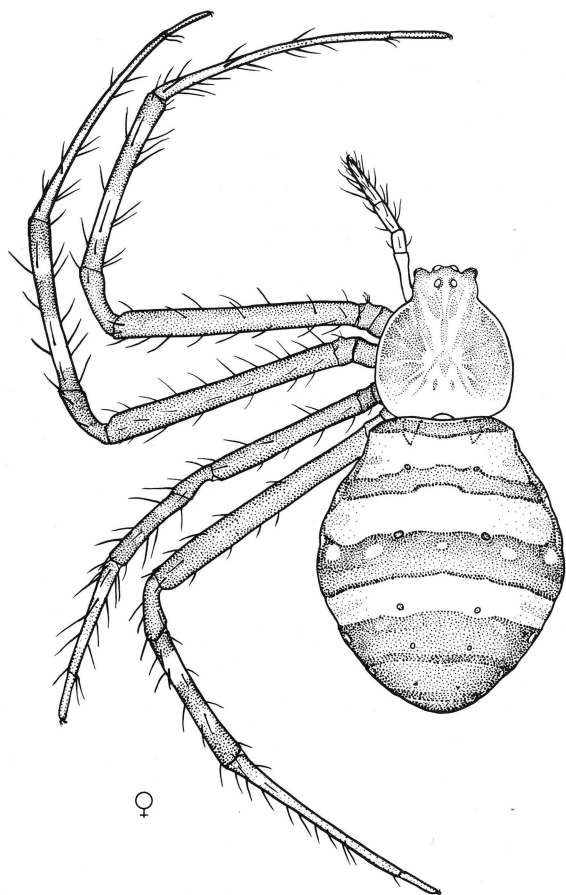
29. *LARINIA TABIDA* (L. KOCH, 1872)

30. *PARAPLECTANOIDES CRASSIPES* KEYSERLING, 1886

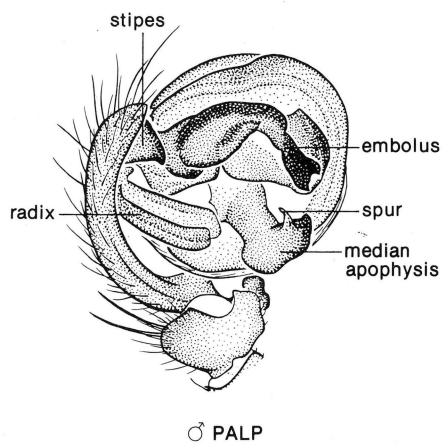
31. *GASTERACANTHA MINAX* THORELL, 1859

32. *GEA THERIDIoides* (L.KOCH, 1872)

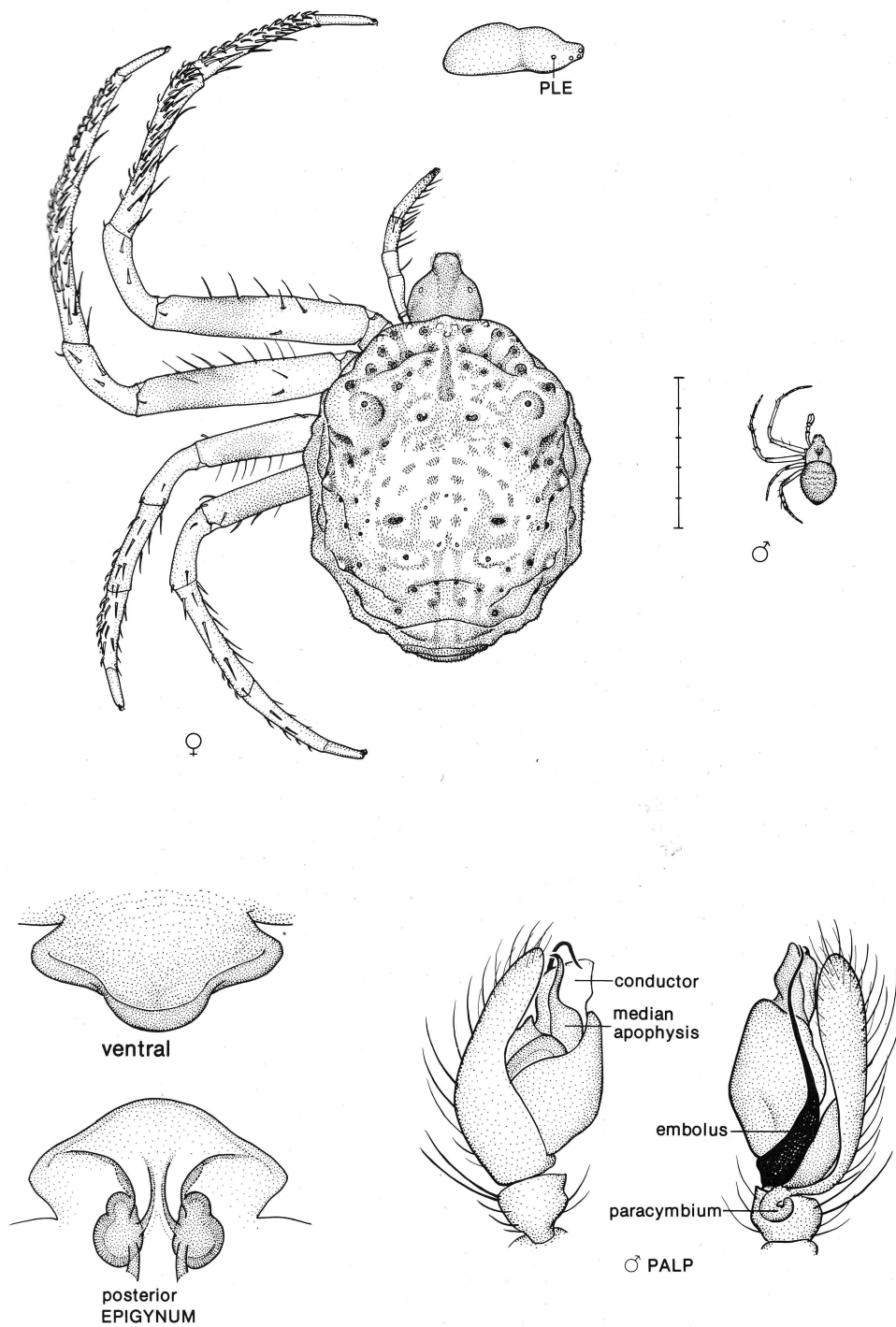




EPIGYNUM



## 33. ARGIOPE KEYSERLINGII KARSCH, 1878



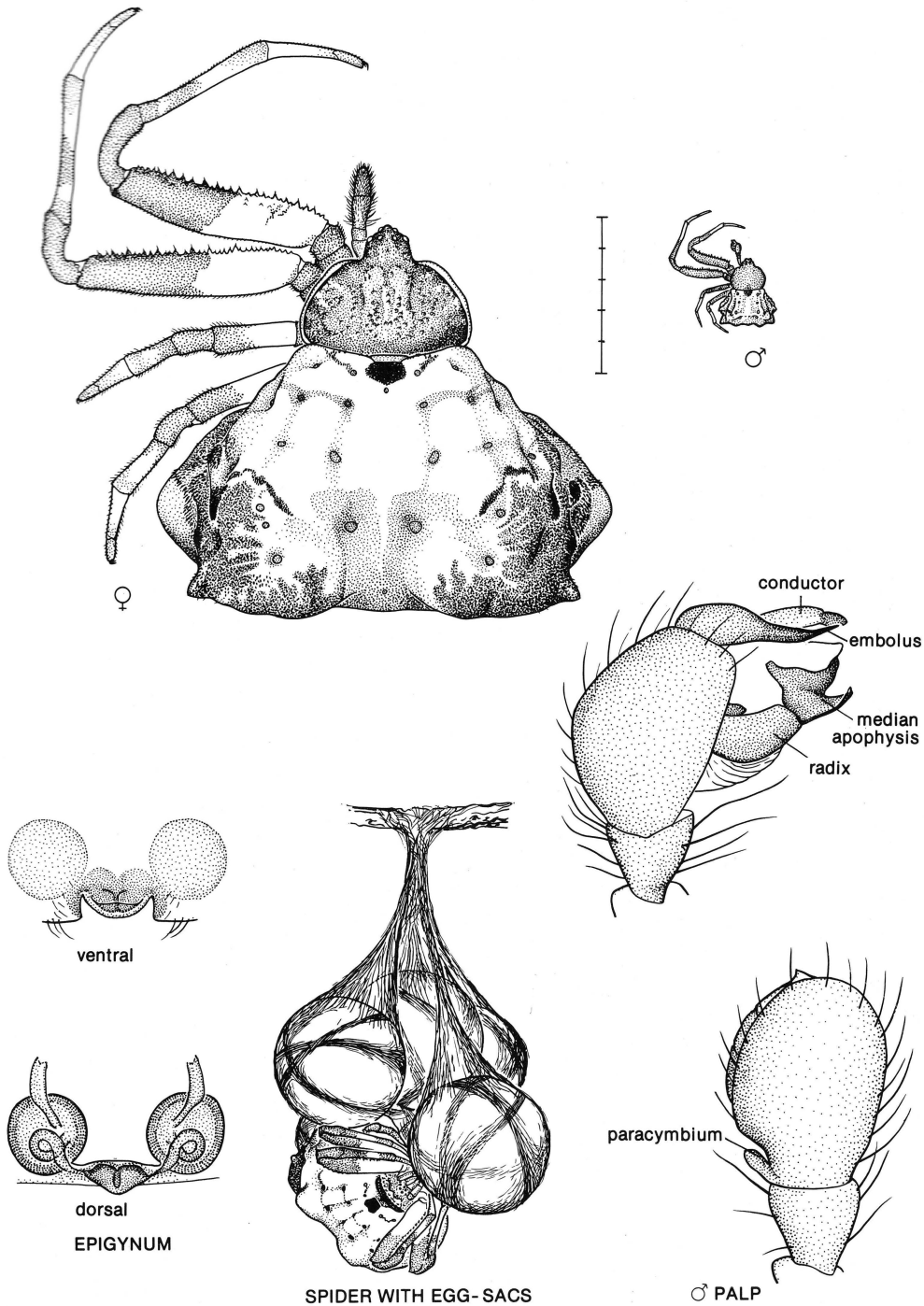
34. *POLTYS ILLEPIDUS* C.L.KOCH, 1843

- 35 Lateral eyes widely separated. Carapace narrowed anteriorly. ♂ median apophysis pointed (Pl. 34) ..... Poltyinae *Poltya*  
 - Lateral eyes adjacent. Carapace pointed or truncated. Median apophysis bifid ..... Mastophorinae 36
- 36 Carapace pointed anteriorly. Posterior eye row slightly recurved. Without web (Pl. 35) ..... *Celaenia*  
 - Carapace truncated anteriorly ..... 37
- 37 Carapace with branched protuberances dorsally. Bolas spider (Pls. 36, 37) ..... *Ordgarius*  
 (= *Dicrostichus* nov. syn.) ..... 38  
 - Carapace smooth ..... 38
- 38 Abdomen wider than long ..... Cyrtarachninae 39  
 - Abdomen longer than wide ..... 41

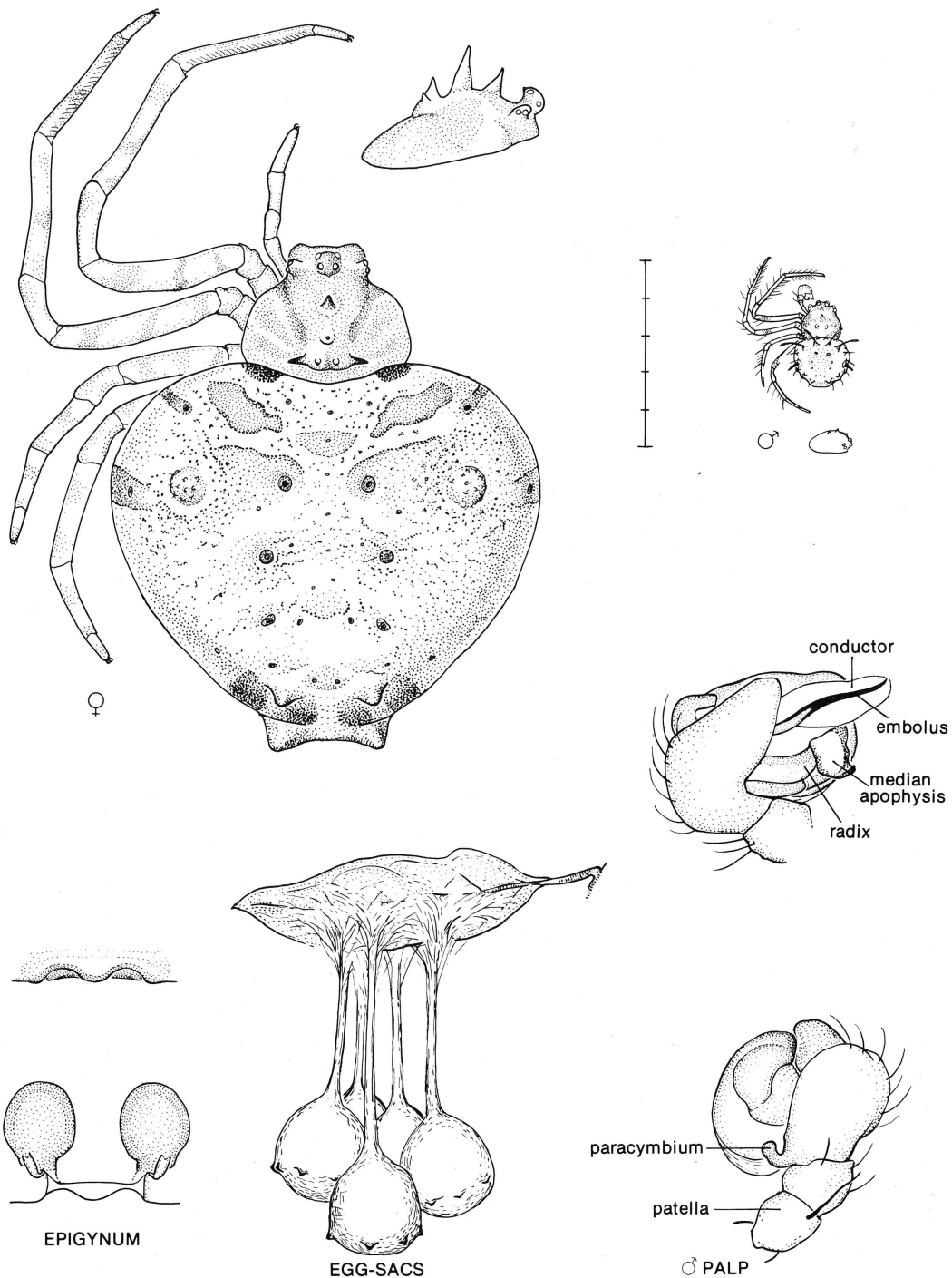
*Poltya* is the only araneid in which the lateral eyes are widely separated. The abdomens of some species have bizarre dorsal protuberances. *Poltya* spins a dense orb-web with a closely spaced spiral and captures large numbers of moths (Stowe, 1986).

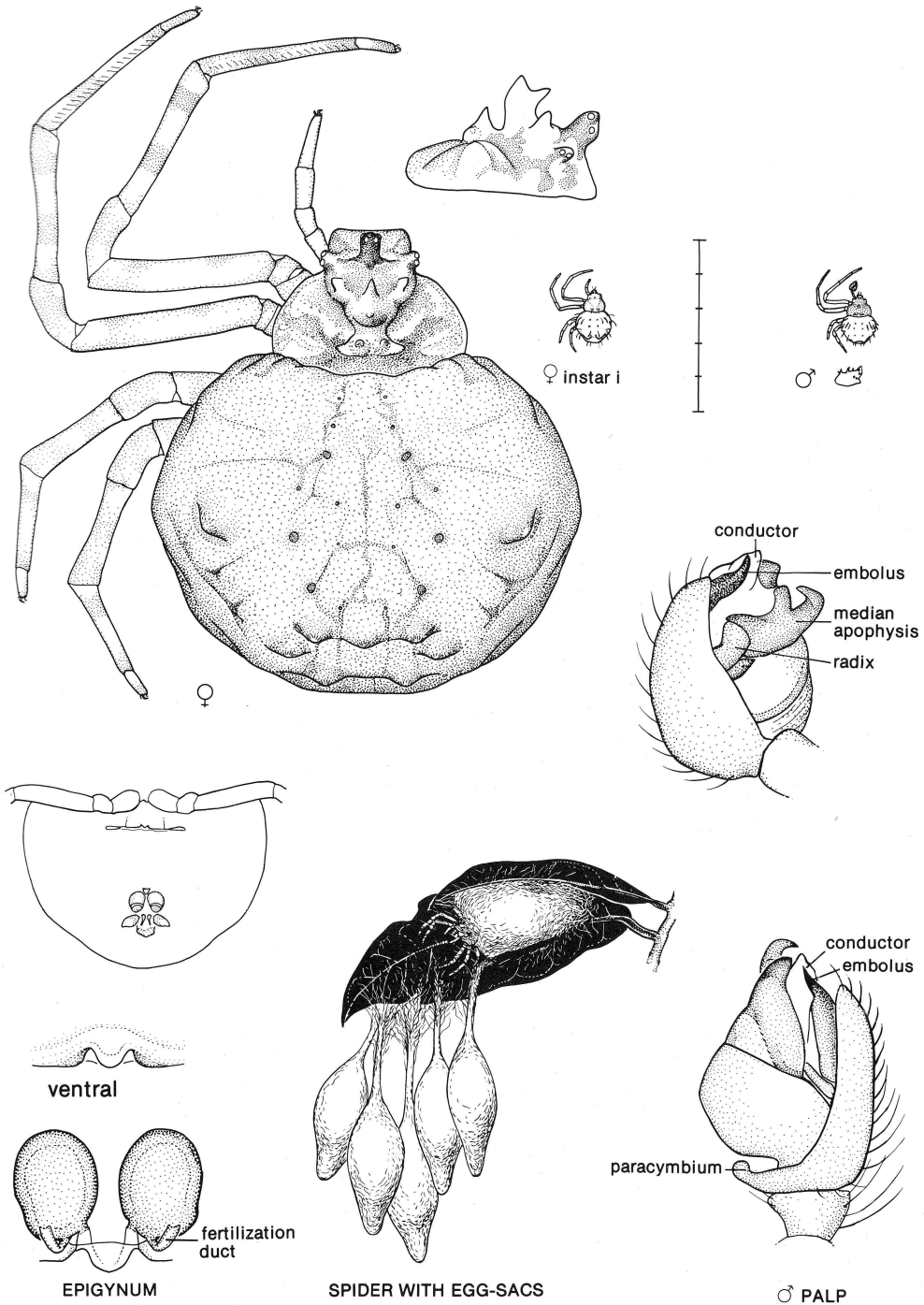
*Celaenia kinbergii* is known as the bird-dropping spider because of its colour and immobility when at rest (Mascord, 1980, pl. 33: 4). When active, it hangs upside-down from a line or the underside of a leaf with legs I and II spread (Stowe, 1986); ♂ moths are captured when they fly into the spider's outstretched legs. There is evidence to show that the moths are attracted by an odour which has the same effect as the sex pheromones produced by the ♀ moth. Hickman (1971) gives biological notes on three *Celaenia* spp.

From a study of the genital structures *Dicrostichus* Simon, 1895, is placed as a subjective junior synonym of *Ordgarius* Keyserling, 1886. Thus *Dicrostichus magnificus* = *Ordgarius magnificus* (Rainbow, 1897) n. comb.; *D. furcatus* = *O. furcatus* (O. P. Cambridge, 1877) n. comb.; *D. caliginosus* (Rainbow, 1894) = *O. furcatus* (O.P. Cambridge, 1877) n. syn. The mature ♂♂ are found in the egg-sacs. Moths are captured on the bolas when it is whirled by leg II as the moth approaches. Coleman (1976) gives details of prey capture and egg-laying in *Ordgarius monstrosus*. As in *Celaenia* there is evidence to show that the spider emits an odour similar to that of the ♀ moth (Stowe, 1986). *Cladomelea* sp. has been reported from Australia (Mascord, 1980, pl. 32: 4).



35. *CELAENIA KINBERGII* THORELL, 1868

36. *ORDGARIUS MONSTROSUS* KEYSERLING, 1886

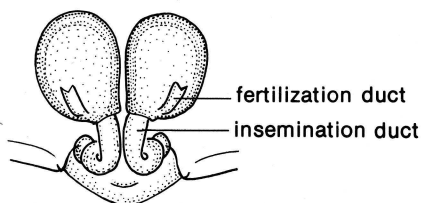
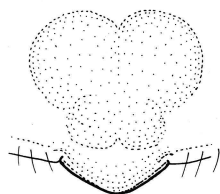
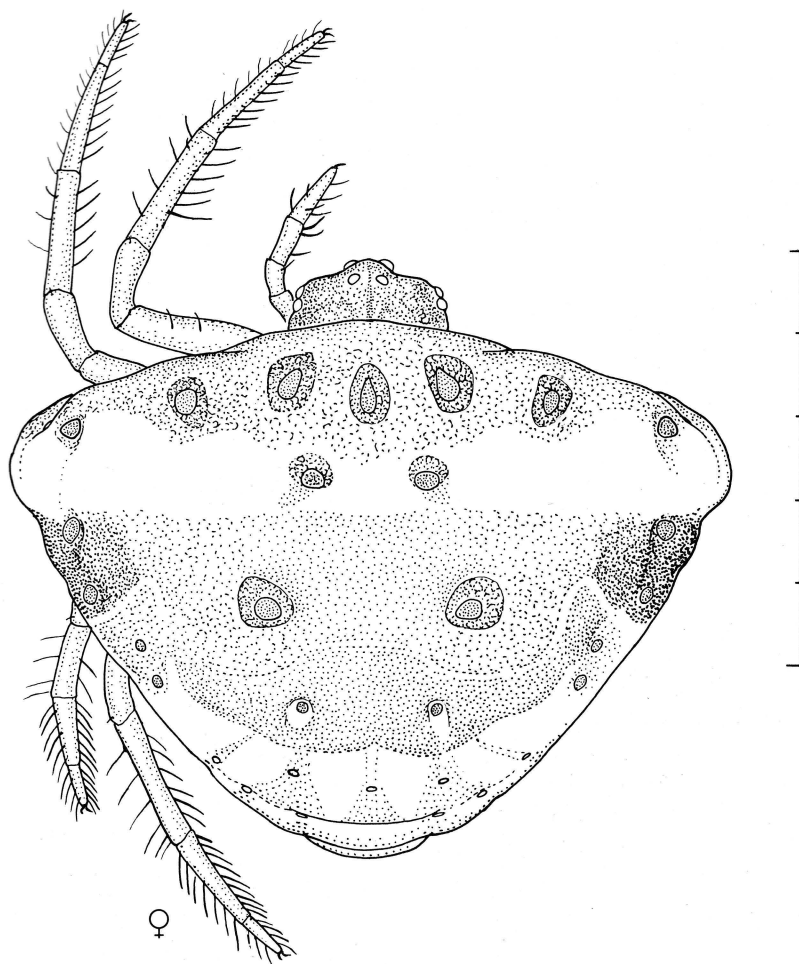


37. *ORDGARIUS MAGNIFICUS* (RAINBOW, 1897) *N.COMB.*

- 39 Abdomen smooth, without abdominal protuberances. Orb-web with spiral (Pl. 38) ..... *Cyrtarachne*  
 - Abdomen with protuberances. Webs with loose spiral threads ..... 40
- 40 Two large pointed abdominal protuberances dorsally. Complete orb-web (Pl. 39) ..... *Poecilopachys*  
 - Large antero-lateral abdominal protuberances. Triangular horizontal web, a partial orb (Pl. 40) .  
 ..... *Pasilobus*
- 41 Abdomen produced beyond spinnerets into long tail with peculiar bumps on end. Obliquely  
 horizontal orb-web. Scorpion-tailed spider (Pl. 41) ..... Arachnurinae *Arachnura*  
 - Abdomen normal. ♂ secondary conductor (from tegulum) encloses embolus. Tent-web spiders  
 (Pl. 42) ..... Cyrtophorinae *Cyrtophora*

♀ *Cyrtarachne* sp (? tricolor) has been found in Mareeba, north Queensland (Mascord, 1980, pl. 31: 5, 6); ♂ has not been collected. The webs of *Cyrtarachne*, *Poecilopachys* and *Pasilobus* have been called 'spanning-thread webs' (Clyne, 1973; Stowe, 1986). Clyne gives a good description of the web of *Poecilopachys*. The spanning threads of these webs are different from the viscid spiral threads of other araneids in that one end — the 'low-shear joint' (Robinson, 1982) breaks when prey contacts the thread. The stickiness is very effective in holding moths which are among the prey of these spiders. The scales of moths often allow them to escape from other orb-webs.

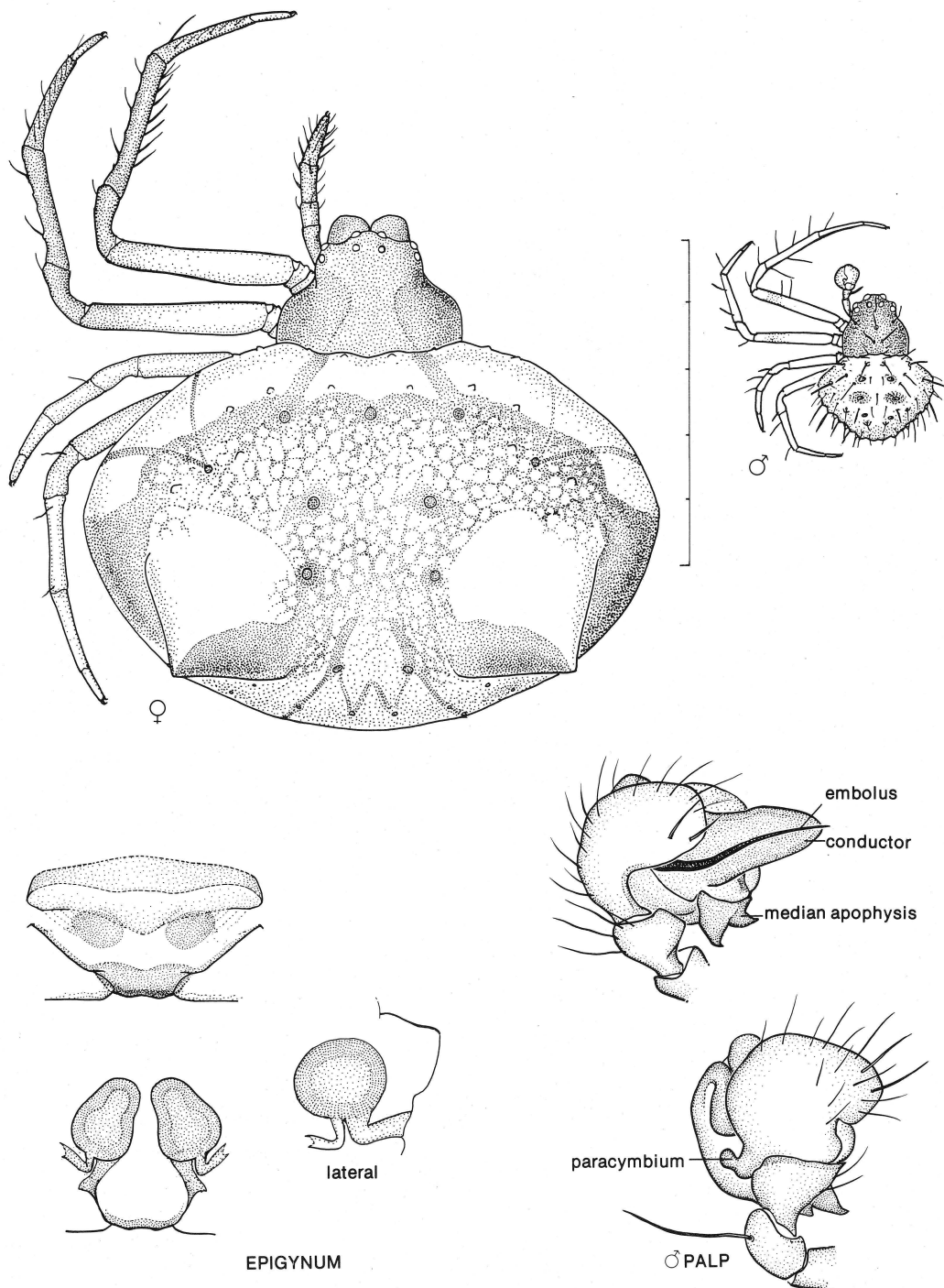
*Cyrtophora* webs lack a sticky spiral. The non-sticky spiral is not removed and the webs consist of a horizontal orb, either in the form of a dome, tent or bowl-shape, with supporting irregular barrier webs above and below. Webs of *C. moluccensis* may be solitary or colonial, in the latter case each is occupied and defended by the individual. There is evidence from studies on the predatory behaviour of *Cyrtophora* that these webs are derived from typical orb-webs and are not their precursors (Lubin, 1980).



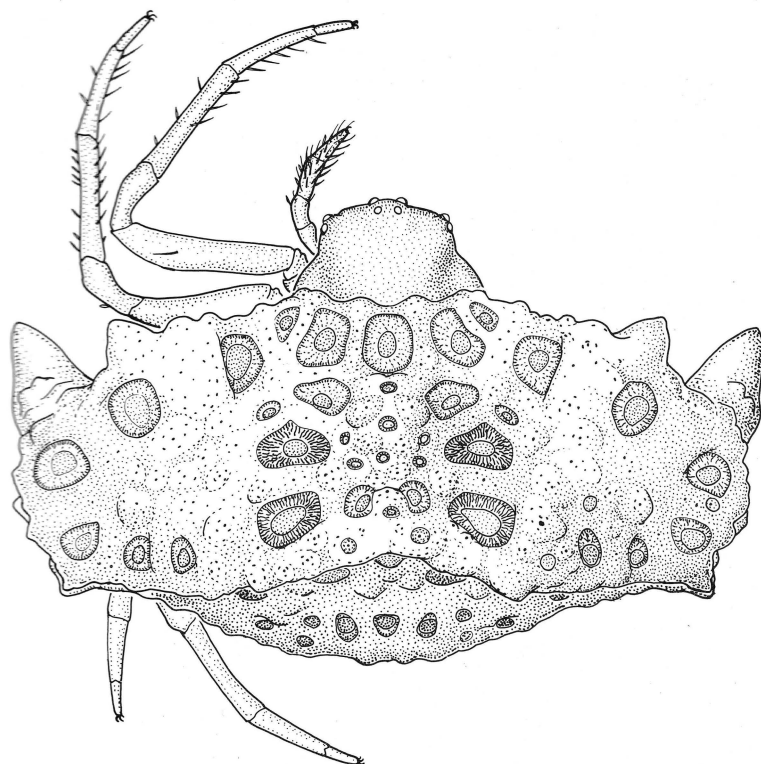
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38. CYRTARACHNE SP (Mareeba, north Queensland)

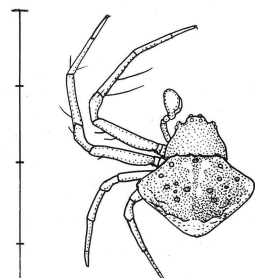




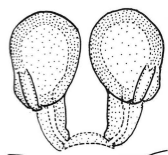
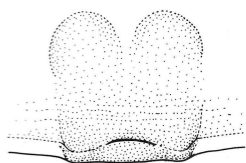
39. POECILOPACHYS AUSTRALASIA (GRIFFITH & PIDGEON, 1883)



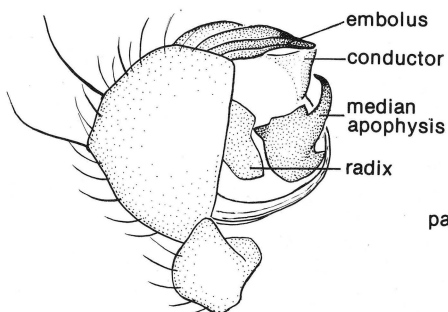
♀ Edmonton, north Queensland



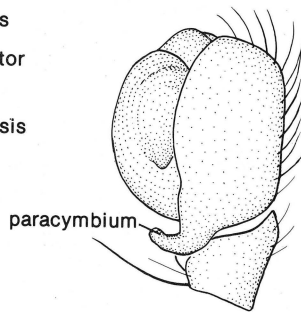
♂ Morobe Province,  
Papua New Guinea



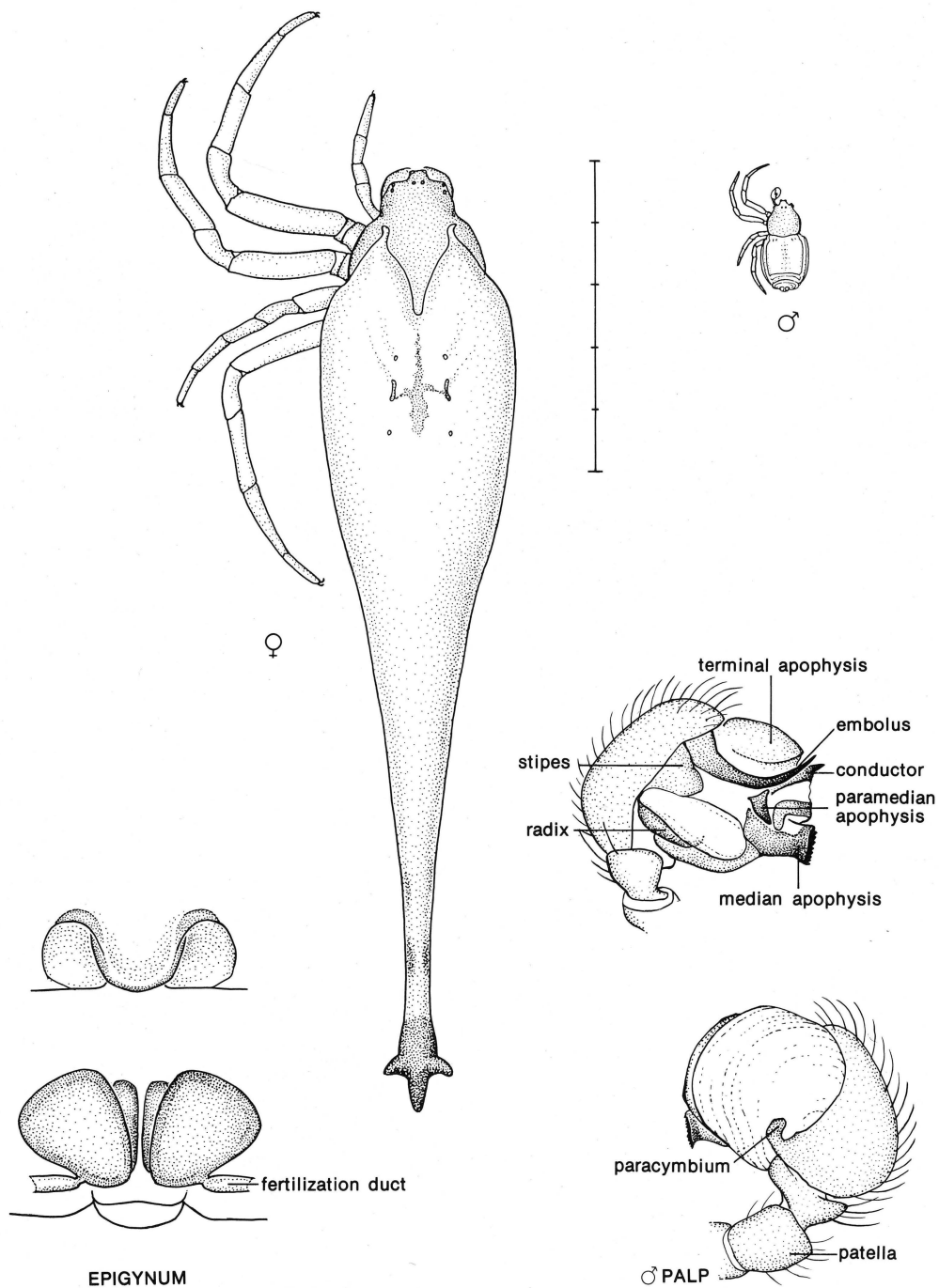
EPIGYNUM



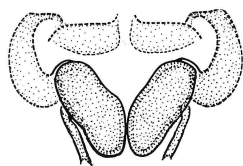
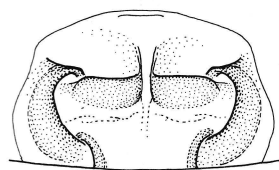
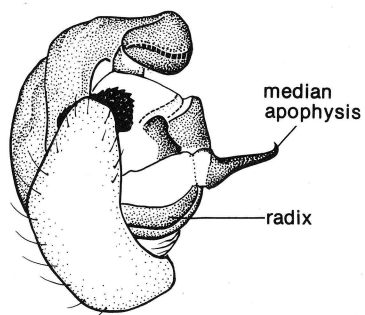
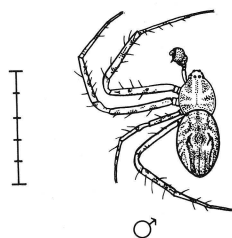
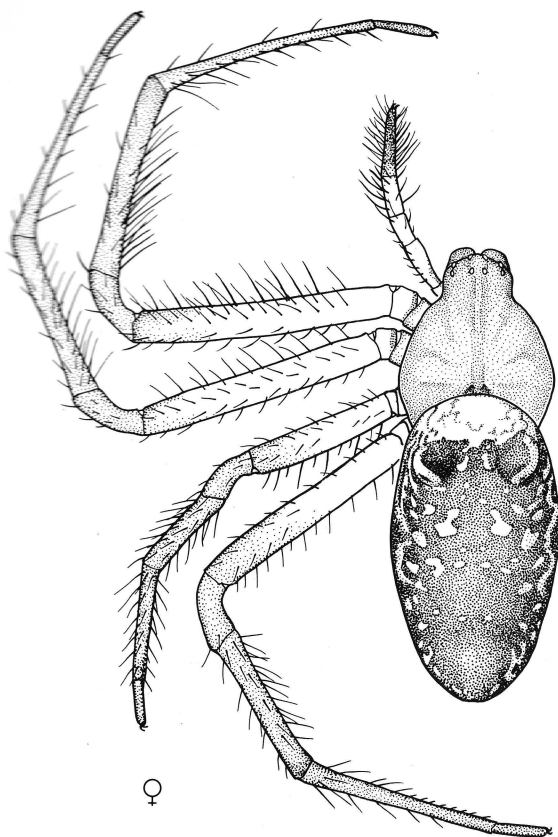
♂ PALP



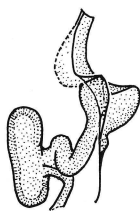
40. PASILOBUS SPP



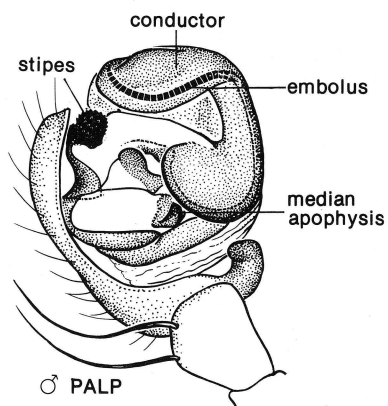
41. ARACHNURA HIGGINSII (L. KOCH, 1871)



EPIGYNUM



lateral



♂ PALP

**42. CYRTOPHORA MOLUCCENSIS (DOLESCHALL, 1857)**

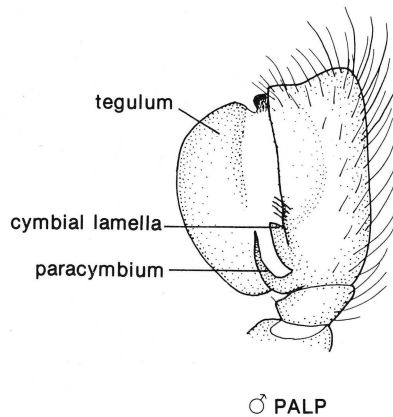
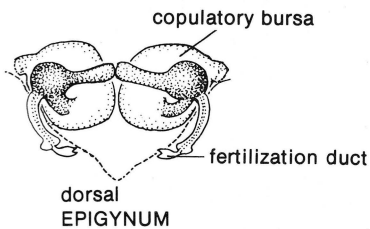
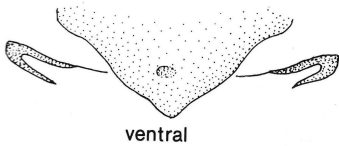
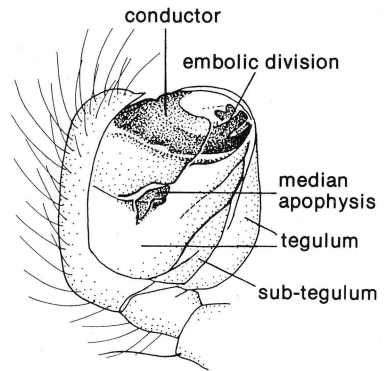
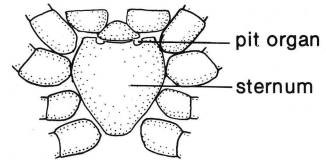
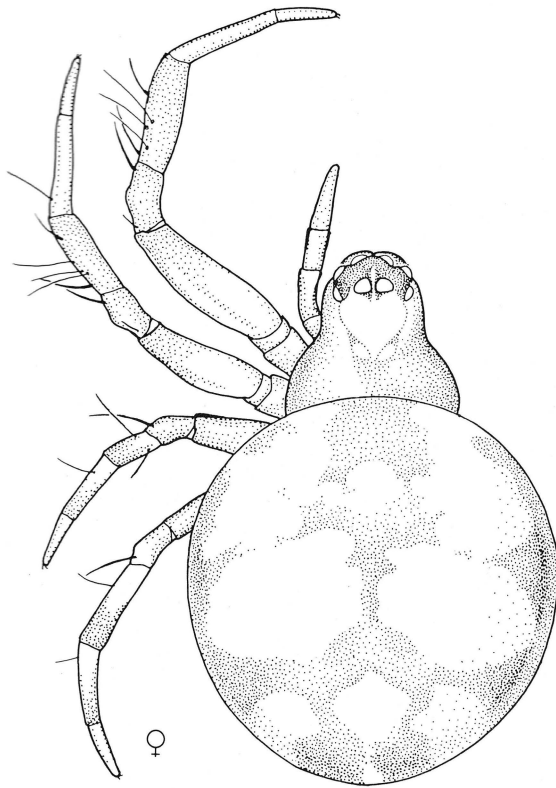
- 42 Tarsi shorter than metatarsi. Sternum with pair of anterior pit organs. Spring webs (Pl. 43)  
 ..... THERIDIOSOMATIDAE *Baalzebub*  
 - Tarsi longer than metatarsi. Sternum without pit organs ..... 43
- 43 ♀ palp entire. Eight eyes. Abdomen unsclerotized. Femoral spot on femur I. Metatarsal clasping  
 spur on ♂ leg I. Entelegyne (Pl. 44) ..... MYSMENIDAE *Mysmena*  
 - ♀ palp with segments missing. Four-eight eyes. Abdomen with or without sclerotized scute.  
 Without femoral spot or metatarsal spur. Haplogyne ..... 44
- 44 Chelicerae fused at base. All segments of ♀ palp missing except the endite (coxa). Abdomen  
 unsclerotized ..... SYMPHYTOGNATHIDAE 45  
 - Chelicerae free. Labral spur between chelicerae. ♀ abdomen usually unsclerotized, ♂ with scute  
 ..... ANAPIDAE 46
- 45 6 eyes (Pl. 45A) ..... *Symphytognatha*  
 - 4 eyes (Pl. 45B) ..... *Anapistula*
- 46 Anterior book-lungs and posterior spiracle (difficult to see). Very high clypeus  $\times 5$  ALE (Pl. 46)  
 ..... *Risdonius*  
 - Anterior book-lungs replaced by tracheae, no posterior spiracle. Clypeus  $\times 2$  ALE (Pl. 47)  
 ..... '*Chasmocephalon*'

So far as they are known, Australian theridiosomatids make small orb-webs with few radials and spirals. From the centre of the orb a horizontal thread runs to a point of attachment. The spider rests, back close to the web, on this; as the spider shortens this thread the web is pulled into a cone shape. When prey touches the web the thread is released and the web springs forwards and straightens with the spider in the centre. Coddington (1986a) has recently revised the genera of the Theridiosomatidae. He (1986c) has also found one synapomorphy that unites theridiosomatids exclusively with symphytognathids, anapids and mysmenids. During web construction they all add hub loops after the hub bite-out as part of the hub modification. Other araneids may fill this space but not in the same fashion which is reminiscent of non-sticky spiral construction.

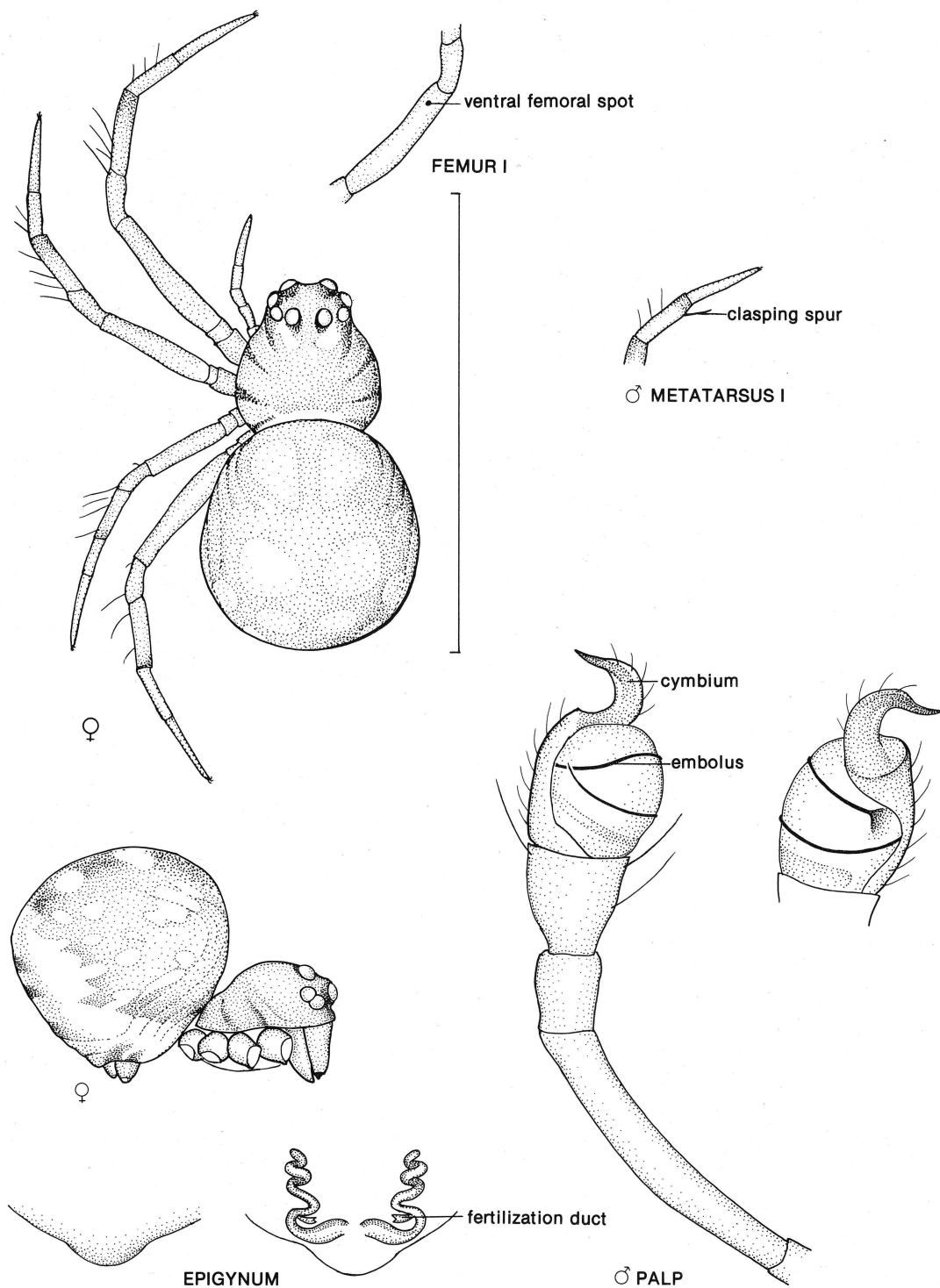
Mysmenids are found in leaf litter in both sclerophyll and rainforest areas. The web is probably like other *Mysmena* spp, a 3-dimensional orb-web with many out-of-place radii (Coddington, 1986c).

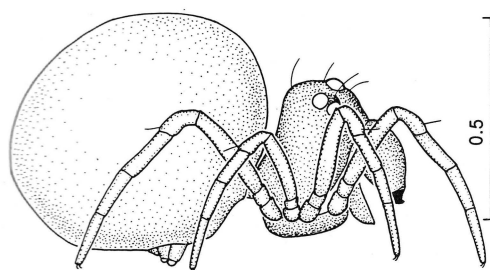
In symphytognathids the book-lungs are replaced with tracheae. In *Anapistula* a pair of posterior spiracles is present. The webs are small, closely woven, strictly 2-dimensional horizontal orbs (Coddington, 1986c).

The anapids spin horizontal orb-webs with the centre drawn up slightly, like a tent. This is supported by lines (radii) out of plane with the orb that are attached to the substrate above. Forster and Platnick, (pers. comm.) are revising the family; '*Chasmocephalon*' sp., illustrated here, will be placed in a new genus and several new Australian genera will be described.

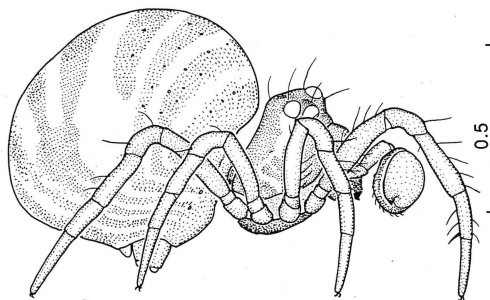


43. BAALZEBUB BRAUNI (WUNDERLICH, 1976)

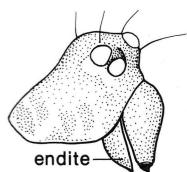
44. *MYSMENA* SP (nr Helenvale, north Queensland)



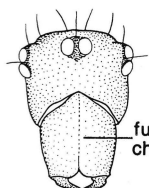
♀ nr Helenvale, north Queensland



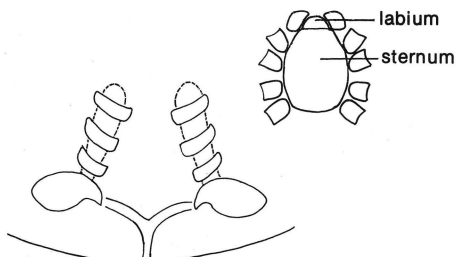
♂ Mt. Bellenden Ker, north Queensland



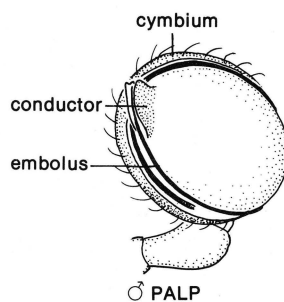
endite



fused  
chelicerae

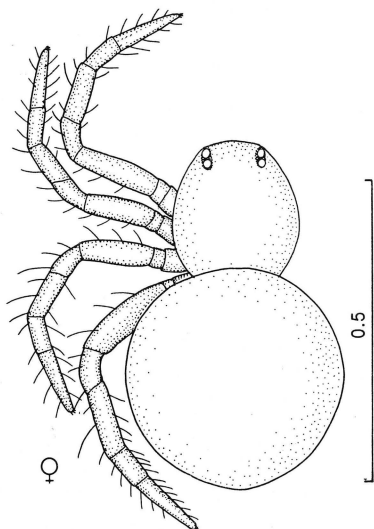


VULVA

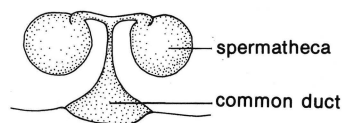


♂ PALP

#### 45A. SYMPHYTOGNATHA SPP



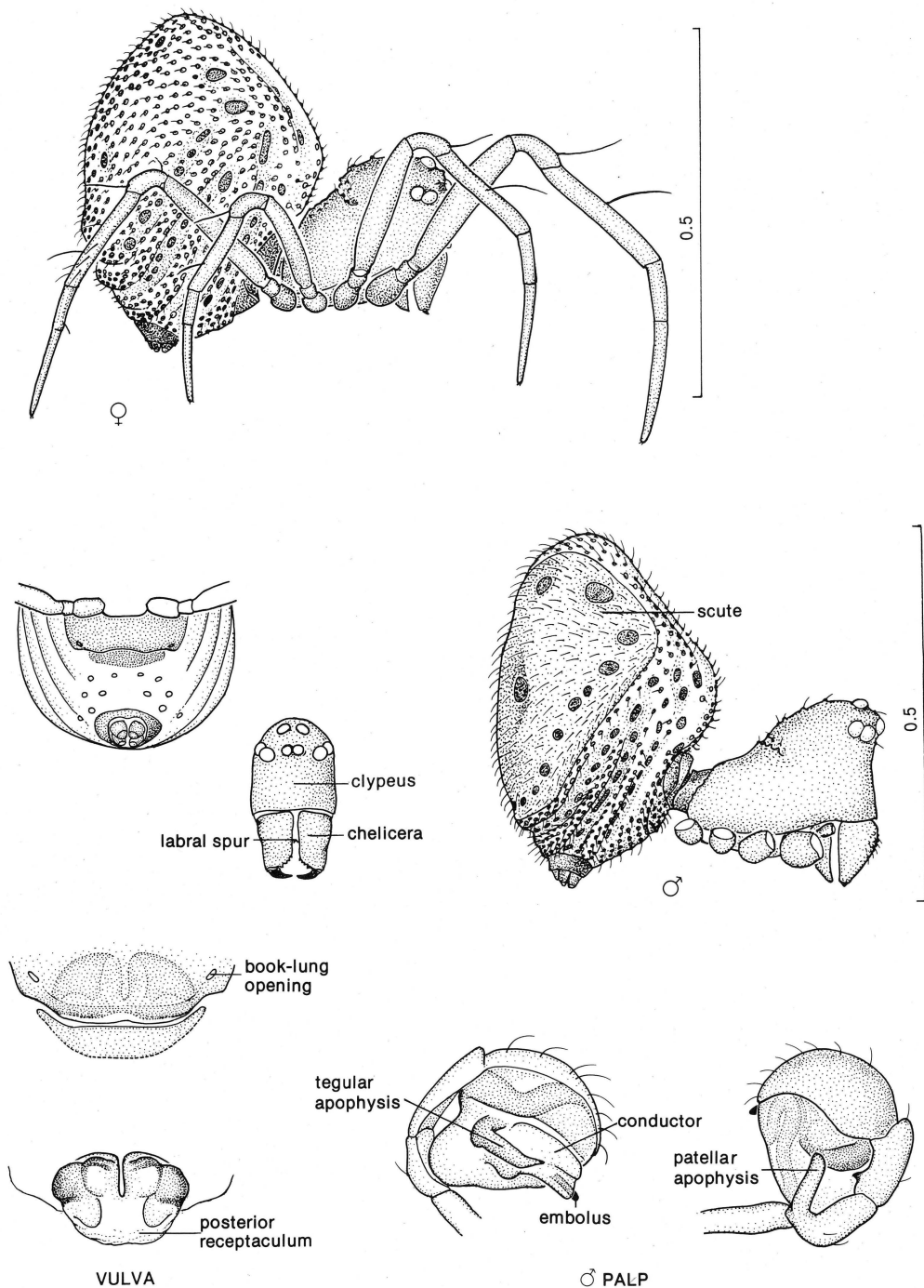
♀

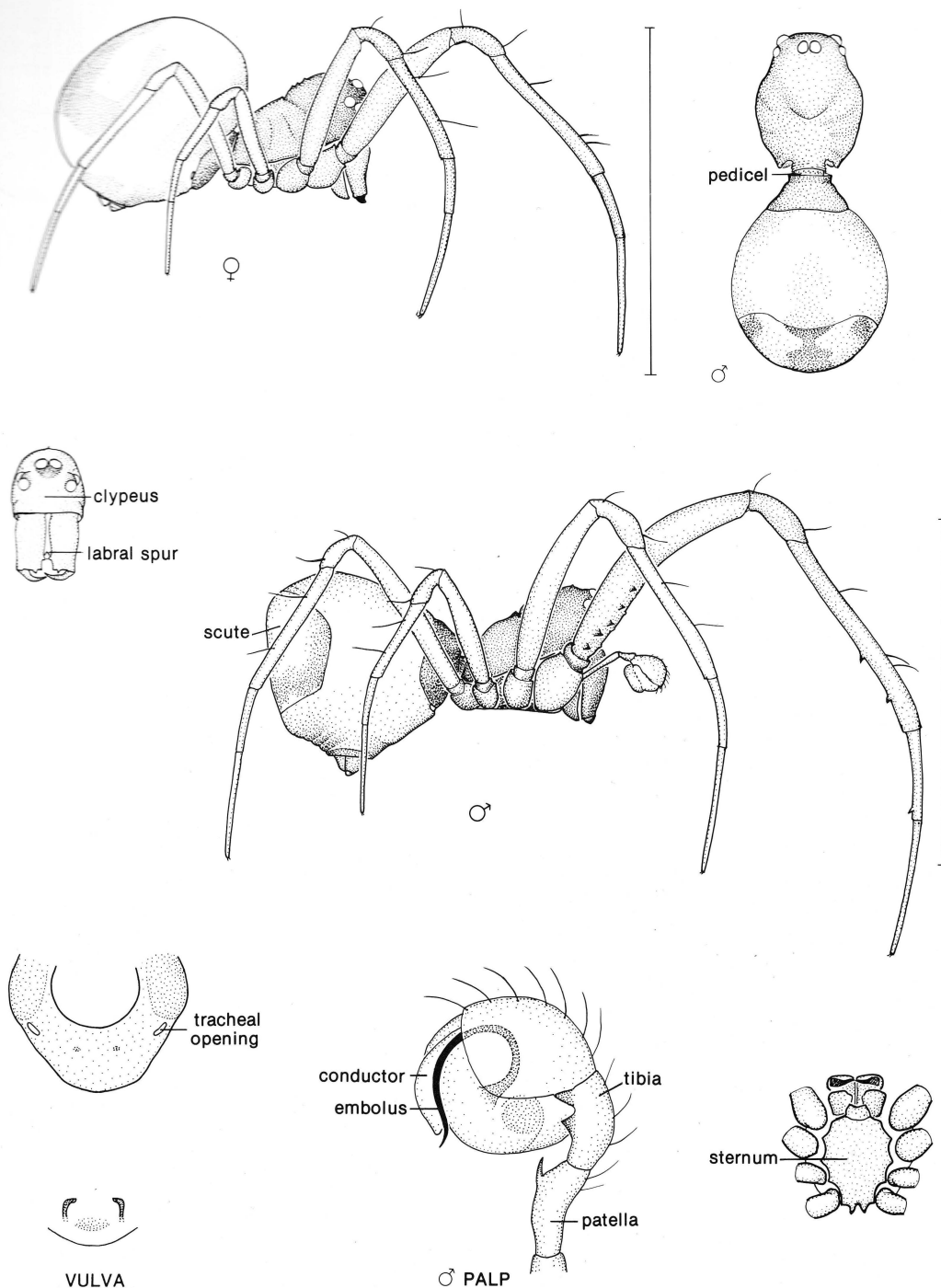


VULVA

#### 45B. ANAPISTULA AUSTRALIA FORSTER, 1959



46. *RISDONIUS PARVUS* HICKMAN, 1939



47. 'CHASMOCEPHALON' SP (Mt Bellenden Ker, north Queensland)

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