

A REVIEW OF THE
SPIDER SUPERFAMILIES
HYPOCHILOIDEA AND
AUSTROCHILOIDEA
(ARANEAE, ARANEOMORPHAE)

RAYMOND R. FORSTER, NORMAN I. PLATNICK,
AND MICHAEL R. GRAY

BULLETIN
OF THE
AMERICAN MUSEUM OF NATURAL HISTORY
VOLUME 185 : ARTICLE 1 NEW YORK : 1987

A REVIEW OF THE
SPIDER SUPERFAMILIES
HYPOCHILOIDEA AND
AUSTROCHILOIDEA
(ARANEAE, ARANEOMORPHAE)

RAYMOND R. FORSTER

*Research Associate, Department of Entomology
American Museum of Natural History
Director, Otago Museum, Dunedin, New Zealand*

NORMAN I. PLATNICK

*Curator, Department of Entomology
American Museum of Natural History
Adjunct Professor, Department of Biology
City College, City University of New York*

MICHAEL R. GRAY

*Scientific Officer, Division of Invertebrate Zoology
Australian Museum, Sydney*

BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY

Volume 185, article 1, pages 1-116, figures 1-400

Issued March 16, 1987

Price: \$10.00 a copy

CONTENTS

Abstract	3
Introduction	3
Acknowledgments	4
Systematics	5
Hypochiloidea Marx	5
Hypochilidae Marx	5
<i>Hypochilus</i> Marx	6
<i>Ectatosticta</i> Simon	22
Austrochiloidea Zapfe	25
Austrochilidae Zapfe	25
Austrochilinae Zapfe	28
<i>Austrochilus</i> Gertsch and Zapfe	33
<i>Thaيدا</i> Karsch	44
Hickmaniinae Lehtinen, new rank	48
<i>Hickmania</i> Gertsch	48
Gradungulidae Forster	50
<i>Gradungula</i> Forster	59
<i>Spelungula</i> Forster, new genus	63
<i>Tarlina</i> Gray, new genus	66
<i>Kaiya</i> Gray, new genus	75
<i>Progradungula</i> Forster and Gray	84
<i>Pianoa</i> Forster, new genus	86
<i>Macrogradungula</i> Gray, new genus	90
Comparative Morphology	92
Cladistics	111
Literature Cited	114

ABSTRACT

The "hypochiloids," the most primitive known araneomorph spiders, are reclassified on the basis of a cladistic analysis of the results of a comparative morphological survey. Platnick's previous hypothesis—that the family Hypochilidae, containing two genera (*Hypochilus*, from the United States, and *Ectatosticta*, from China), represents the sister group of all other araneomorphs—is corroborated, and four new species of *Hypochilus* (*H. pococki*, *H. coylei*, *H. sheari*, and *H. kastoni*) are described. However, Platnick's and all other previous arrangements of the remaining "hypochiloid" genera are rejected in favor of a hypothesis that these austral taxa form a monophyletic group, the superfamily Austrochiloidea, containing two families, the Austrochilidae and Gradungulidae. The family Hickmaniidae Lehtinen, containing only the Tasmanian species *Hickmania troglodytes* (Higgins and Petterd), is relegated to subfamilial status within the Austrochilidae. In its sister group, the Austrochilinae, Lehtinen's synonymy

of *Austrochilus manni* Gertsch and Zapfe with *Thaïda peculiaris* Karsch is rejected on both the specific and generic levels; four new species of *Austrochilus* (*A. melon*, *A. schlingeri*, *A. franckei*, and *A. newtoni*) and one new species of *Thaïda* (*T. chepu*) are described from Chile and adjacent Argentina. Five new genera of Gradungulidae are described: *Spelungula*, containing *S. cavernicola*, new species, from New Zealand; *Tarlina*, containing five new species (*T. noorundi*, type species, *T. milledgei*, *T. smithersi*, *T. daviesae*, and *T. simipes*) and *T. woodwardi* (Forster), transferred from *Gradungula*, all from eastern Australia; *Kaiya*, containing three new species (*K. terama*, type species, *K. bemboka*, and *K. parnabyi*) and *K. brindabella* (Moran), transferred from *Gradungula*, all from eastern Australia; *Pianoa*, containing *P. isolata*, new species, from New Zealand; and *Macrogradungula*, containing *M. moonya*, new species, from Queensland, Australia.

INTRODUCTION

The animals treated in this paper have long been recognized as the most primitive of the araneomorph, or true, spiders; almost a century ago, Marx (1889, p. 166) remarked that *Hypochilus thorelli* Marx is "so anomalous that it appears like the representative of a prototype." Since Marx's time, some six genera, containing 11 species, have been recognized from the United States (*Hypochilus* Marx), China (*Ectatosticta* Simon), Chile and Argentina (*Thaïda* Karsch), Tasmania (*Hickmania* Gertsch), and New Zealand and Australia (*Gradungula* Forster and *Progradungula* Forster and Gray). The wide variety of opinions published concerning the relationships of these genera, both among themselves and to other spiders, was reviewed by Platnick (1977), who also provided the first cladistic analysis of the problem.

Over the ensuing decade, it has become increasingly clear that both the northern and southern hemisphere faunas of these taxa are much more diverse than previously suspected, and considerable effort has therefore been put into collecting new material in North and South America, Australia, and New Zealand. As a result, the number of genera we recognize below has doubled, and the number of

species has increased to 32. In addition, our investigations of the morphology of these taxa have added information allowing us to test, and partially reject, Platnick's (1977) cladogram. Because so many of the taxa involved are new, we first present our systematic results, and then summarize and analyze the morphological variation encountered.

Our division of labor has been largely geographical; the first author is primarily responsible for the sections on the Hickmaniinae, the New Zealand Gradungulidae, and comparative morphology; the second author for the sections on the Hypochilidae, Austrochilinae, and cladistics; and the third author for the sections on Australian Gradungulidae. To avoid inconveniencing our colleagues with triply-authored specific names, each new taxon is ascribed below to that person who is to be regarded, for nomenclatorial purposes, as its author. As a result of our long-distance collaboration, the format of the species descriptions varies slightly among sections, but all abbreviations of morphological terms follow those used by Platnick and Shadab (1975), and all measurements are in millimeters.

ACKNOWLEDGMENTS

This study would not have been possible without the cooperation and assistance of many of our colleagues. Dr. Richard L. Hoffman of Radford University, a long-time student of *Hypochilus*, recognized as new the species described below as *H. pococki* over a decade ago, and had compiled much information about its distribution; he very generously donated not only his data but also his extensive collection of *Hypochilus* specimens. A similarly generous donation of *Hypochilus* material was made by Dr. Frederick A. Coyle of Western Carolina University, who also assisted greatly with our collecting efforts in western North Carolina and who arranged (through Mr. William de Buys) for access to habitats there owned by the Nature Conservancy. Dr. Coyle, Dr. William A. Shear of Hampden-Sydney College, Dr. Jonathan A. Coddington of the National Museum of Natural History, and Dr. Robert J. Raven of the Queensland Museum provided most helpful comments on the typescript. Mr. Walter Sedgwick of San Francisco responded valiantly, and successfully, to a request that he journey to northern California to collect the first males of the new species *H. kastoni*. Dr. Daxiang Song of the Institute of Zoology, Academia Sinica, Beijing, China, donated the new Chinese specimens of *Ectatosticta* that enabled our redescription of this poorly known genus. As always, Dr. Willis J. Gertsch of the American Museum of Natural History encouraged our study with gifts of material and counsel. Platnick's fieldwork in Chile and Argentina was expedited by Dr. Luis E. Peña G. of Santiago, Dr. Tomás Cekalovic K. of the Universidad de Concepción, Dr. Raúl Calderón G. of the Academia Superior de Ciencias Pedagógicas, Valparaíso, and Drs. Emilio A. Maury, María Elena Galiano, and Cristina L. Scioscia, and Mr. Pablo A. Goloboff, of the Museo Argentino de Ciencias Naturales; funding for that fieldwork was provided by the Eppley Foundation for Research and the National Science Foundation (grant no. BSR-8312611). Special thanks are due to Dr. Oscar F. Francke, formerly of Texas Tech University, and Dr. Randall T. Schuh of the American Museum, for their invaluable assistance during trips to South America

in 1985 and 1986, respectively. Platnick's research was supported by the National Science Foundation (grant no. BSR-8406225), Foster's by the Scientific Distribution Committee of the Golden Kiwi Lottery Fund. Scanning electron microscope facilities were made available by the University of Otago Medical School and the Biological and Chemical Research Institute, Sydney. Ms. Greta E. J. Gray inked the line drawings done at the Australian Museum. At the American Museum, assistance with illustrations, micrographs, and collections was obtained from Dr. Mohammad U. Shadab, Mr. Louis Sorkin, Ms. Lauren Duffy, and Ms. Ronnie Tuft.

We are deeply indebted to the following collectors, curators, and institutions for lending material:

AMNH, American Museum of Natural History, New York
 AMS, Australian Museum, Sydney
 ANIC, Australian National Insect Collection, Canberra, Mr. R. J. Moran
 BDO, Dr. B. D. Opell, Virginia Polytechnic Institute
 CAS, California Academy of Sciences, Dr. W. Pulawski
 CDU, Mr. D. Ubick, California Academy of Sciences
 CEG, Dr. C. E. Griswold, American Museum of Natural History
 CMC, Canterbury Museum, Christchurch, Dr. R. A. Savill
 JAB, Dr. J. A. Beatty, Southern Illinois University
 JEC, Dr. J. E. Carico, Lynchburg College
 MACN, Museo Argentino de Ciencias Naturales, Dr. E. A. Maury
 MCZ, Museum of Comparative Zoology, Harvard University, Dr. H. W. Levi
 MNHN, Muséum National d'Histoire Naturelle, Paris, Dr. J. Heurtaut
 NMW, National Museum, Wellington, Drs. R. G. Ordish and R. L. Palma
 OMD, Otago Museum, Dunedin
 QMB, Queensland Museum, Brisbane, Drs. V. E. Davies and R. J. Raven
 SER, Dr. S. E. Riechert, University of Tennessee
 UCB, University of California at Berkeley, Dr. E. I. Schlinger
 UCOL, University of Colorado, Mr. E. L. Licht
 UCON, Universidad de Concepción, Dr. T. Cekalovic K.
 UQE, Department of Entomology, University of Queensland, Brisbane, Ms. M. A. Schneider

USNM, National Museum of Natural History,
Washington, Dr. J. A. Coddington
WAS, Dr. W. A. Shear, Hampden-Sydney College

WCS, Mr. W. C. Sedgwick, San Francisco
ZMB, Zoologisches Museum, East Berlin, Dr. M.
Moritz

SYSTEMATICS

HYPOCHILOIDEA MARX

The superfamily Hypochiloidea, as here construed, contains only the family Hypochilidae, with two genera (*Hypochilus* and *Ectatosticta*). As argued by Platnick (1977) and below, these two genera represent the sister group of all other araneomorph spiders.

HYPOCHILIDAE MARX

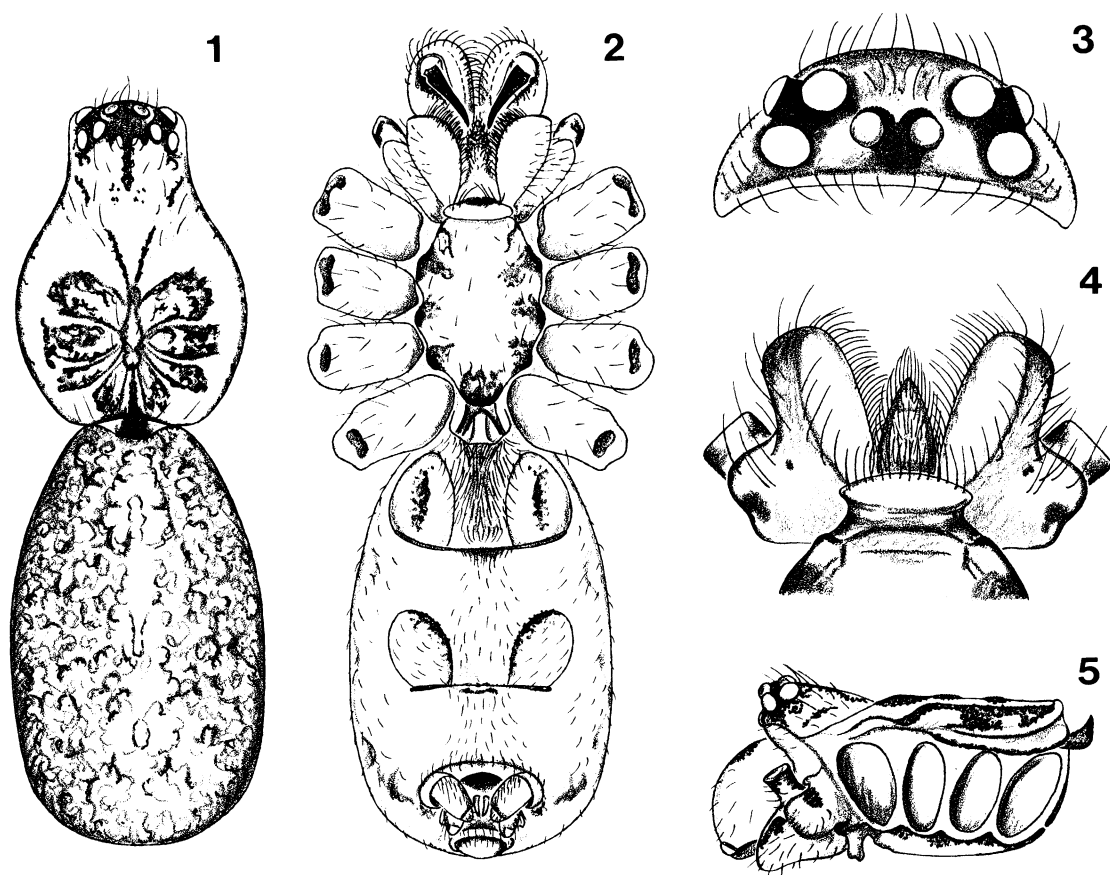
Hypochilidae Marx, 1888, p. 161 (type genus *Hypochilus* Marx).

Ectatostictidae Lehtinen, 1967, p. 298 (type genus *Ectatosticta* Simon). First synonymized by Platnick, 1977, p. 20.

DIAGNOSIS: Hypochilids can easily be distinguished from austrochilids and gradungulids (as well as all other araneomorphs) by having the serrula composed of several rows of teeth (figs. 21–24).

DESCRIPTION: Large (total length 7–15) araneomorph, cribellate spiders (figs. 1, 2, 6, 7). Carapace longer than wide, low, greatly depressed along midline and grooves radiating to coxae, oval but distinctly narrowed opposite palpi, widest between coxae II and III, posterior margin invaginated and reflexed medially, elevated laterally (figs. 5, 10); clypeus short, vertical, not produced between chelicerae (figs. 3, 8); thoracic groove long, wide, deep posteriorly, occupying middle one-third of carapace length; margins with long, semirecumbent, dark setae, few longer bristles occurring behind ocular area. Eight eyes in two rows, ALE, PME, and PLE forming triads in *Hypochilus*; from above, both eye rows recurved; from front, anterior row procurved, posterior row almost straight; all eyes ringed with black pigment; AME circular, dark, others oval, light; AME smaller than other, usually subequal eyes; AME usually closer to ALE than to each other, PME almost touching PLE in *Hypochilus*, well separated in *Ectatosticta*; MOQ much wider in back

than in front and than long. Chelicerae vertical, diaxial, not divergent, without lateral condyles, with row of strong promarginal teeth and row of smaller retromarginal teeth (figs. 11, 12); cheliceral gland opening through field of pores just proximal of first promarginal tooth (figs. 15, 16); posterolateral surface without stridulatory file; median surface with deep, glabrous depression (figs. 13, 14; Platnick, 1977, fig. 8). Endites parallel, globose medially, with truncate distal margins bearing dense scopula anteromedially and serrula composed of several rows of teeth (figs. 21–24) anterolaterally. Labium much wider than long, widest distally, where reflexed ventrally in *Hypochilus* (fig. 4), almost as long as wide, widest proximally, where triangular lateral flanges are present in *Ectatosticta* (fig. 9). Sternum much longer than wide, incised opposite coxae, without sclerotized extensions, with (*Ectatosticta*) or without (*Hypochilus*) externally distinct sigilla, reaching half length of coxae IV in both sexes; coxae IV separated by up to two-thirds their width. Leg formula 1243 or 1423, legs long, narrow, with (*Ectatosticta*) or without (*Hypochilus*) true spines; trochanters not notched; metatarsi without preening combs; calamistrum composed of two rows of bristles occupying proximal one-quarter of metatarsi IV; tarsi not scopulate, flexible (pseudosegmented in male *Ectatosticta*), with three dentate claws, superiors equal; tarsal organ exposed, shallowly excavated disc bearing several receptor nodes grouped near center (figs. 17, 18); trichobothria in double row on tibiae, single subdistal (*Hypochilus*) or double row (*Ectatosticta*) on metatarsi, absent on tarsi, bothria without transverse ridges, with entire distal margin (figs. 19, 20). Abdomen coated with long, erect, dark setae, both pairs of spiracles leading to booklungs, posteriors situated about halfway between epigastric furrow and spinnerets, connected by distinct furrow ex-



Figs. 1-5. *Hypochilus thorelli* Marx, female. 1. Carapace and abdomen, dorsal view. 2. Cephalothorax and abdomen, ventral view. 3. Carapace, anterior view. 4. Labium and endites, ventral view. 5. Cephalothorax, lateral view. Modified from Gertsch (1958).

ternally; cribellum wide, short, undivided (figs. 25, 31), bearing ribbed spigots (figs. 26, 32); anterior lateral spinnerets thick, three-segmented, two distal segments very short, last bearing numerous short spigots (figs. 27, 33, 34), posterior medians short, narrow, one-segmented, bearing several short spigots (figs. 28, 35), posterior laterals smaller than anterior laterals, two-segmented, second segment almost as long as first, bearing oblique spigots (figs. 29, 30, 36). Palpal segments with some thickened bristles, tarsus of females bearing long, dentate claw, of males with spine-bearing paracymbium and complex bulb attached subdistally. Female genitalia unipartite, with two pairs of receptacula.

INCLUDED GENERA: *Hypochilus* and *Ectatosticta*.

DISTRIBUTION: United States (*Hypochilus*) and China (*Ectatosticta*).

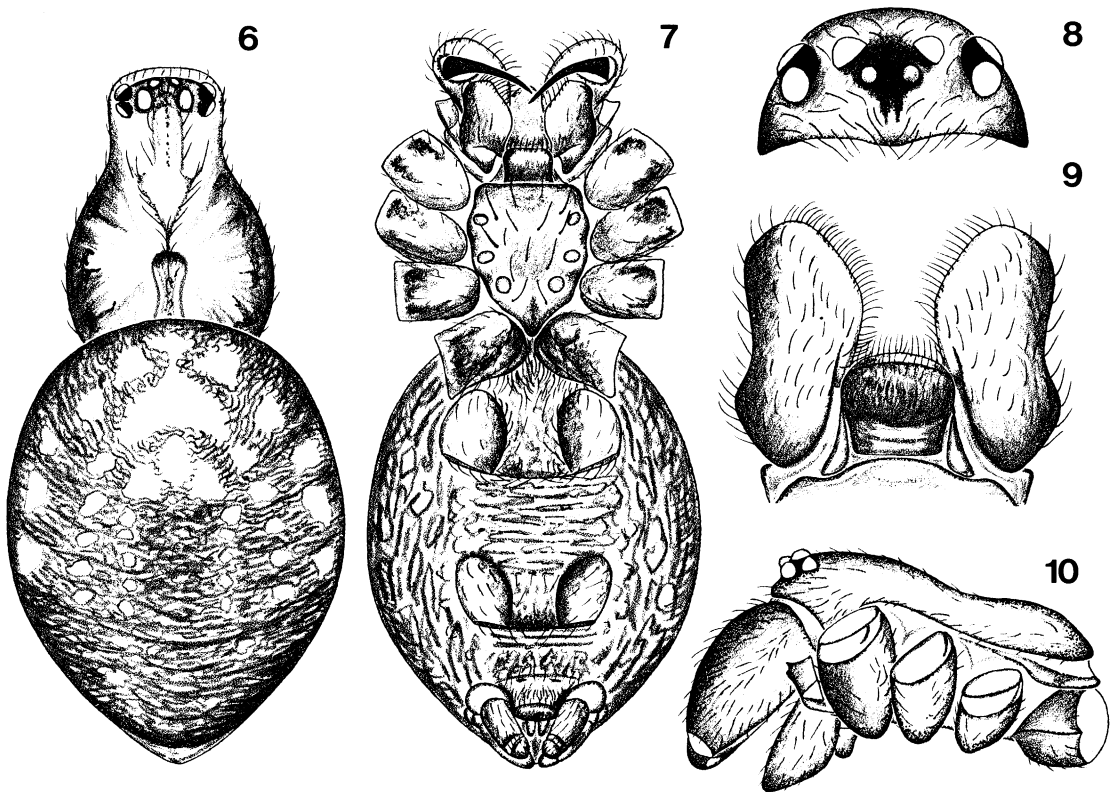
HYPOCHILUS MARX

Hypochilus Marx, 1888, p. 161 (type species by monotypy *Hypochilus thorelli* Marx).

DIAGNOSIS: *Hypochilus* can be distinguished from *Ectatosticta* by the strongly rebordered, ventrally reflexed distal tip of the labium, which is much wider than long and lacks posterolateral flanges (fig. 4).

MALE PALP: Tibia basally enlarged. Tarsus with spine-bearing paracymbium. Bulb subdistal, with small subtegulum, globose tegulum bearing prolateral raised ledge, and spiral embolus supported by wide conductor.

EPIGYNUM: Adult females with epigynal



Figs. 6–10. *Ectatosticta davidi* (Simon), female. 6. Carapace and abdomen, dorsal view. 7. Cephalothorax and abdomen, ventral view. 8. Carapace, anterior view. 9. Labium and endites, ventral view. 10. Cephalothorax, lateral view. Modified from Gertsch (1958).

area covered with long, strong, brown setae; bursa copulatrix bearing two pairs of receptacula.

DISTRIBUTION: Known only from the United States: California, Colorado and New Mexico, and the Appalachian Mountains (fig. 37).

Hypochilus thorelli Marx

Figures 1–5, 38–42

Hypochilus thorelli Marx, 1888, p. 161, figs. 1–13 (male and female syntypes from Lookout Mountain, Hamilton County, Tennessee, should be in USNM, lost).

Hypochilus thorelli: Simon, 1892, p. 201. Gertsch, 1958, p. 7, fig. 14 (in part; not figs. 13, 16, 18). Hoffman, 1963, p. 5 (in part; not figs. 6, 7).

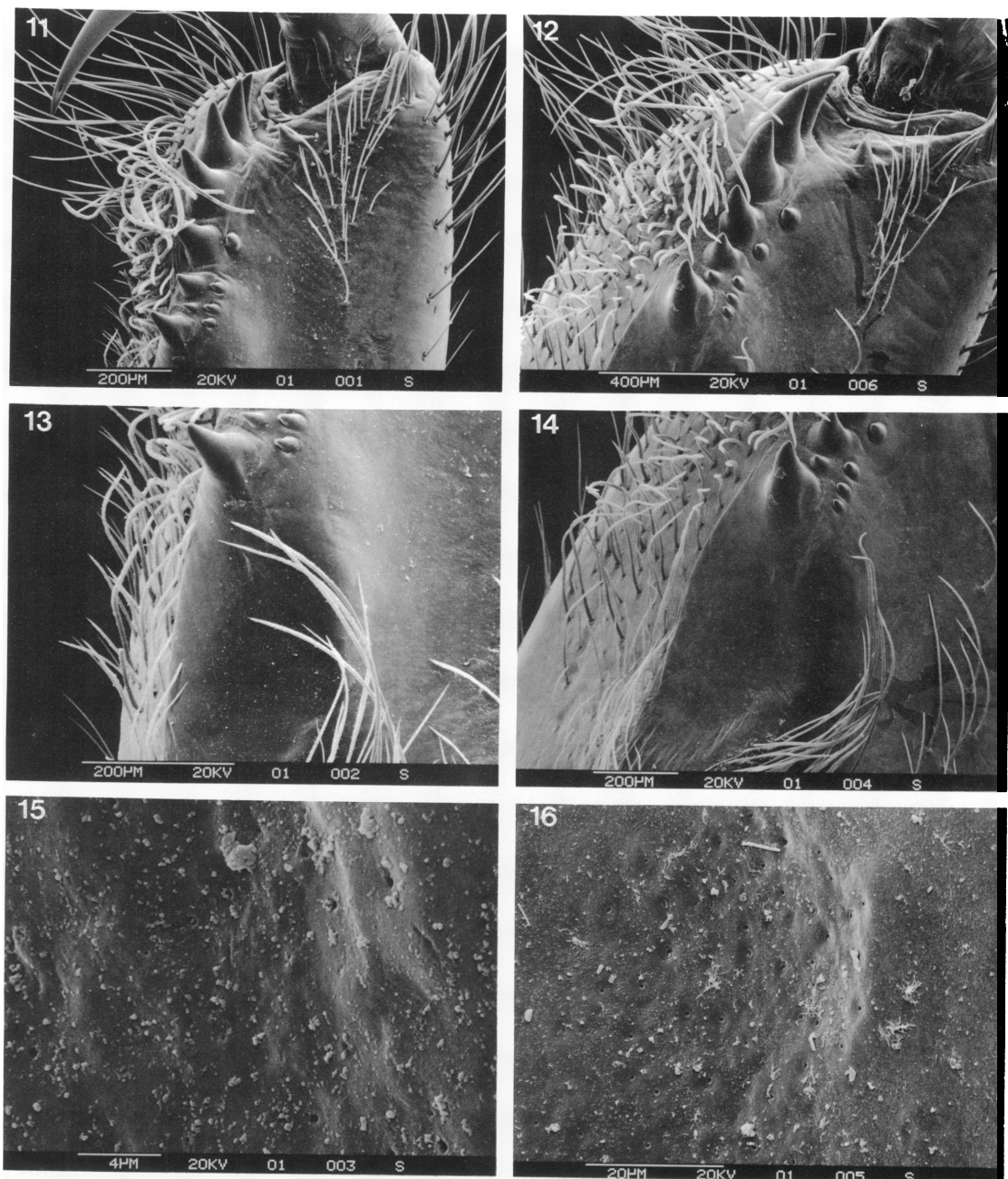
DIAGNOSIS: Males can be recognized by the short, prolaterally bent tip of the palpal con-

ductor (fig. 39), females by the short, rounded, subequal receptacula (fig. 42).

MALE: Described by Gertsch (1958).

FEMALE: Described by Gertsch (1958).

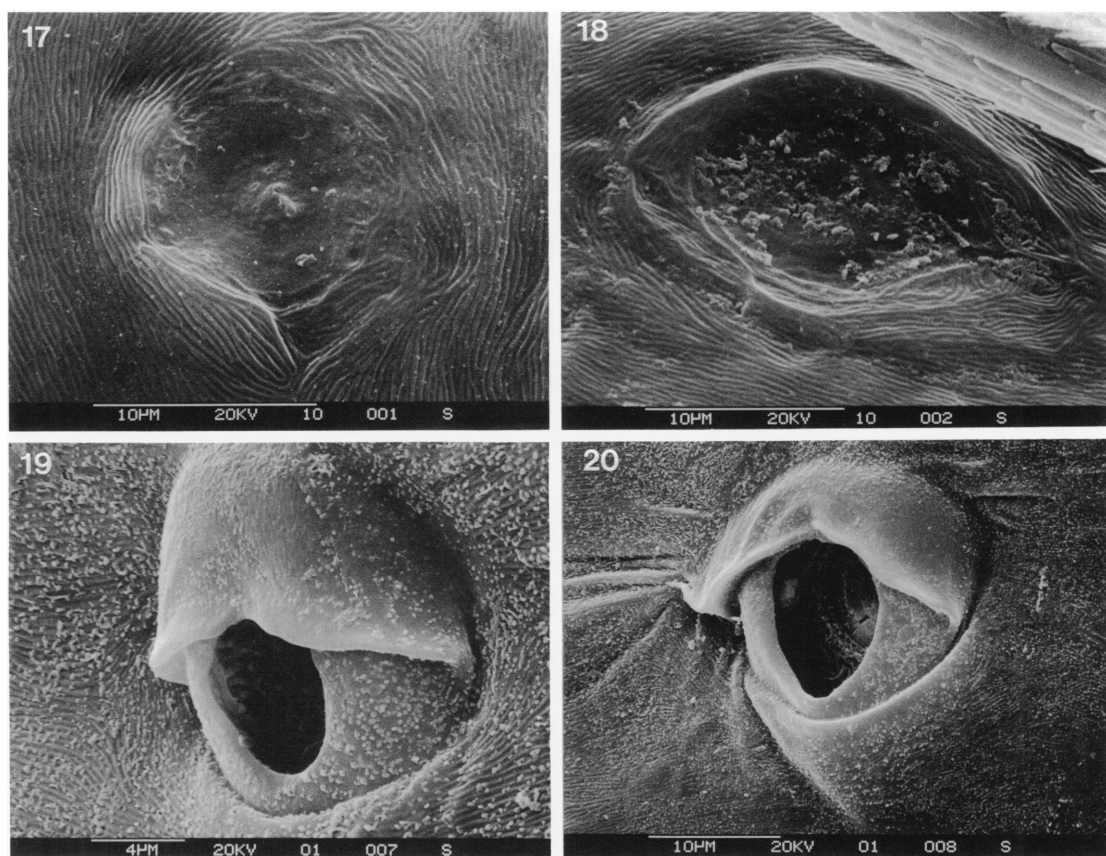
MATERIAL EXAMINED: UNITED STATES:
Alabama: *Cherokee Co.*: Mary's Gulf, Aug. 11–Sept. 14, 1940–1949 (A. F. Archer, AMNH), 4♂, 4♀. *De Kalb Co.*: Buck's Pocket State Park, June 19, 1984, forest shrub layer, cliffs (J. Coddington, USNM), 1♀, June 18–19, 1985 (B. D. Opell, BDO), 1♀; De Soto Falls area, De Soto State Park, June 28, 1966 (J. A. Beatty, JAB), 7♀, Sept. 5, 1966 (F. A. Coyle, AMNH), 3♂, 3♀, Sept. 14, 1970, on rock outcrops above river near falls (J. A. Beatty, Trudeau, JAB), 4♂, 7♀, De Soto State Park, Aug. 10, 1948 (A. F. Archer, AMNH), 1♂, 1♀. *Madison Co.*: Hurricane Cave, 4 mi E New Market, Sept. 13, 1968 (S. B. Peck, AMNH), 1♀. *Marshall Co.*: 0.8 mi N Grant



Figs. 11–16. *Ectatosticta davidi* (Simon), chelicera, oblique ventral view. 11, 13, 15. Male. 12, 14, 16. Female. 11, 12. Promarginal and retromarginal teeth. 13, 14. Most proximal teeth and glabrous depression. 15, 16. Cheliceral gland pores at distal end of glabrous depression.

on Co. road 63, July 26, 1966 (F. A. Coyle, AMNH), 1♀. **Georgia:** *Dade Co.*: Boxcan Cave, Nov. 12, 1967 (T. Iles, AMNH), 1♀; Cloudland Canyon State Park, July 11, 1967

(C. R. McGhee, AMNH), 1♀. **Kentucky:** *Bell Co.*: Chain Rock area, Pine Mountain State Park, June 30, 1967 (C. R. McGhee, AMNH), 1♀; Pine Mountain, Aug. 12, 1919, elev. 2200



Figs. 17–20. 17. *Hypochilus pococki*, new species. 18–20. *Ectatosticta davidi* (Simon). 17, 18. Tarsal organ from leg IV of female. 19. Base of first tibial trichobothrium on male leg I. 20. Base of distal tibial trichobothrium on male leg I.

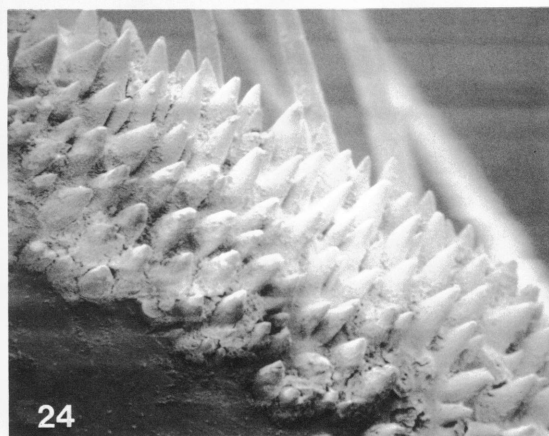
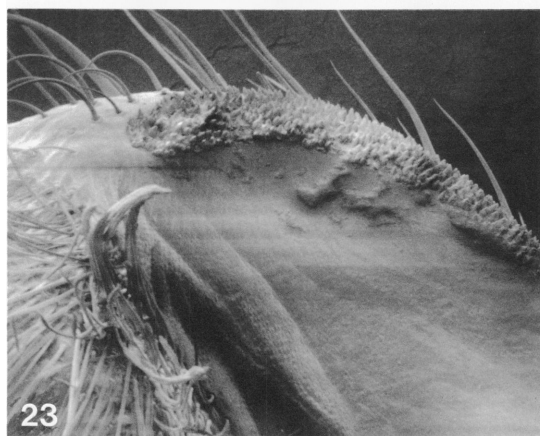
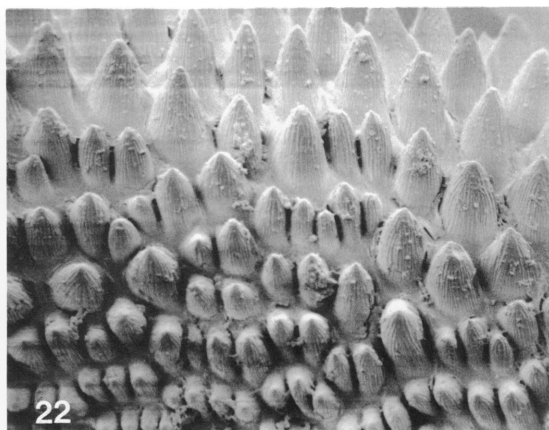
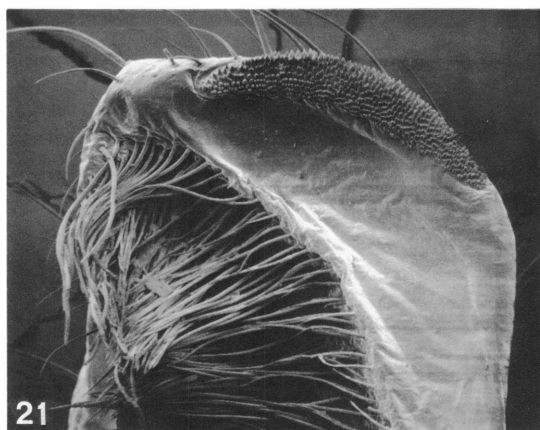
ft (W. D. Funkhouser, AMNH), 1♂. *Whitley Co.*: Cumberland Falls State Park, July 15, 1966 (S. Kelsay, MCZ), 2♀, July 21, 1966 (F. A. Coyle, AMNH), 1♀, Sept. 8, 1967 (Neff, R. L. Hoffman, AMNH), 1♂, 1♀. **Tennessee:** *Fentress Co.*: Jamestown, Oct. 20, 1970 (P. C. and V. F. Holt, JEC), 1♀. *Grundy Co.*: Beersheba (MCZ), 1♀; gorge of Savage Creek, near Palmer, July 13, 1971 (P. C. Holt, AMNH), 3♀, Aug. 27, 1971 (P. C. Holt, AMNH), 3♂. *Hamilton Co.*: Signal Mountain, Aug. 30, 1969, elev. 1700 ft (R. L. Hoffman, AMNH), 1♂. *Morgan Co.*: Catoosa Wildlife Refuge, Sept. 14, 1978 (A. Cady, SER), 1♀. *Pickett Co.*: Hazard Cave area, Pickett State Park, June 25, 1967 (C. R. McGhee, AMNH), 1♀. *Van Buren Co.*: 1.5 mi E Spencer, Aug. 11, 1951 (AMNH), 1♂,

3♀. *White Co.*: Sparta, July 15, 1933 (W. J. Gertsch, AMNH), 1♀. **Virginia:** *Lee Co.*: Sky-light Cave, Cumberland Gap National Park, Sept. 5, 1970 (W. A. Shear, AMNH), 3♂; Sky-light trail, Cumberland Gap National Park, July 4, 1967 (C. R. McGhee, AMNH), 1♀.

DISTRIBUTION: Cumberland Plateau, from extreme western Virginia and southeastern Kentucky south through Tennessee (west of the Smokies) into extreme northwestern Georgia and northern Alabama.

Hypochilus pococki Platnick, new species
Figures 17, 25–30, 43–47, 332–334, 349–352,
364–366, 370, 372, 373, 377, 385

Hypochilus thorelli (misidentification): Gertsch, 1958, p. 7, figs. 13, 16, 17 (in part; not fig. 14).



Figs. 21–24. Serrula of female, anterior view. 21, 22. *Hypochilus* sp. 23, 24. *Ectatosticta davidi* (Simon). From Platnick (1977).

Hoffman, 1963, p. 5, figs. 6, 7 (in part; not more western records).

TYPES: Male holotype and female paratype from lampshade webs under rock overhangs at an elevation of 1350 ft 0.3 miles northwest of Hot Springs, Madison County, North Carolina (August 15, 1985; N. I. Platnick, F. A. Coyle, L. Sorkin, D. Song), deposited in AMNH.

ETYMOLOGY: The specific name is a patronym in honor of Reginald Pocock, in keeping with the tradition of dedicating species names in this genus to eminent arachnologists.

DIAGNOSIS: Males can be recognized by the flaplike tip of the palpal conductor (fig. 44), females by the narrowed lateral pair of receptacula (fig. 47).

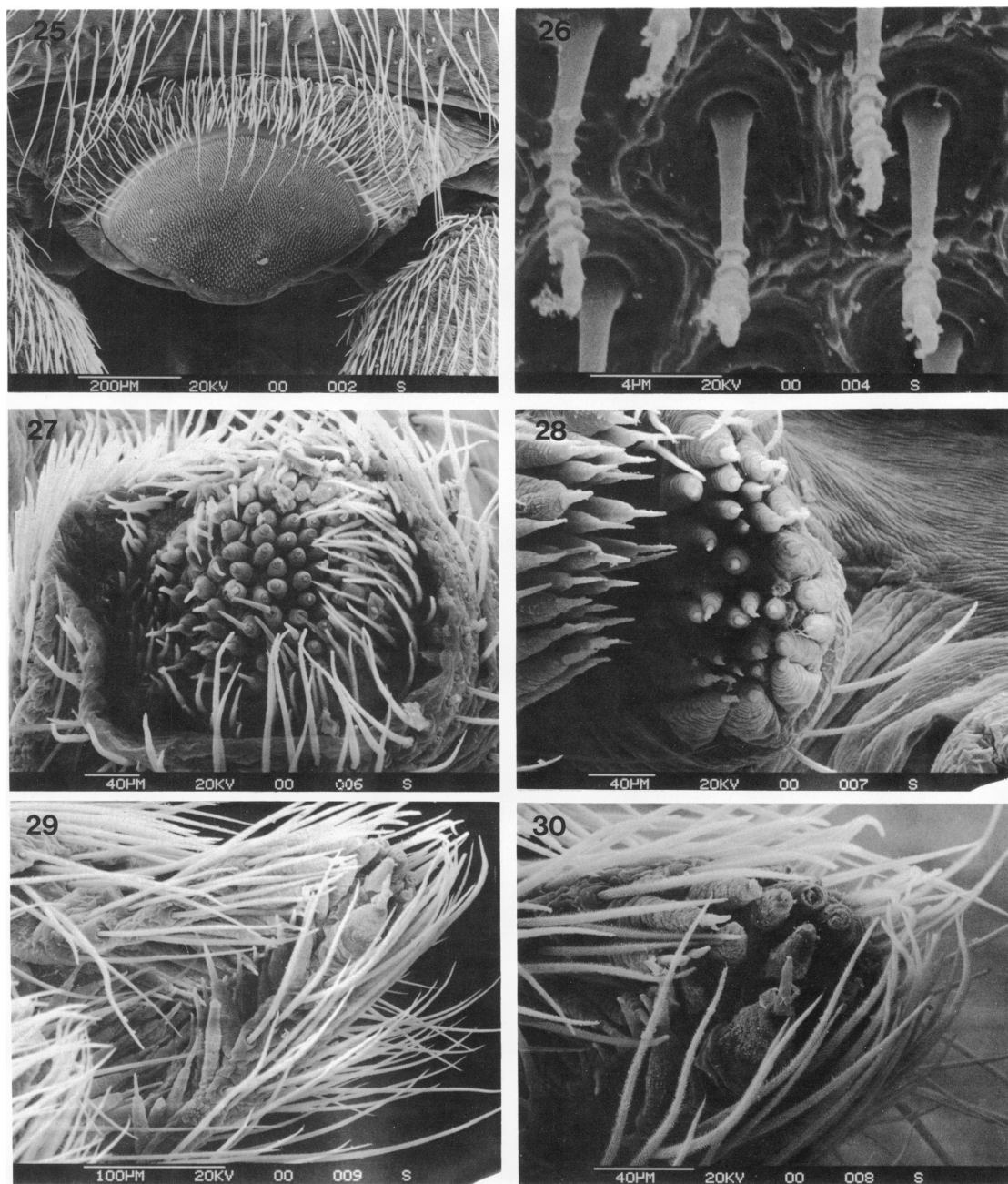
MALE: Total length 10.08. Carapace 4.32 long, 3.06 wide, pale yellow, surface (except for broad submarginal longitudinal bands) mottled with purplish brown; clypeus at middle about AME diameter in height. Eye sizes and interdistances: AME 0.23, ALE 0.22, PME 0.21, PLE 0.24; AME-AME 0.21, AME-ALE 0.10, PME-PME 0.52, PME-PLE 0.03, ALE-PLE 0.02; MOQ length 0.38, front width 0.57, back width 0.94. Chelicerae pale yellow with proximal anteromedian purplish brown spots; endites pale yellow with darker patches along labium, trochanter, and serrula; labium pale yellow, darkened laterally; sternum yellow with dark patches opposite coxae I–III and between coxae IV. Legs pale yellow, all segments except tarsi with at least distal banding. Femur I more than five times as long as carapace. Dorsum of abdomen with

circular purplish brown mottling, venter pale yellow. Palpal tibia only slightly incrassate, conductor with flaplike tip (figs. 43–46).

FEMALE: As in male, except as noted. Total length 12.79. Carapace 5.04 long, 3.71 wide. Eye sizes and interdistances: AME 0.17, ALE 0.27, PME 0.20, PLE 0.28; AME-AME 0.22, AME-ALE 0.15, PME-PME 0.62, PME-PLE 0.03, ALE-PLE 0.09; MOQ length 0.56, front width 0.68, back width 1.02. Femur I only about three times as long as carapace. Palp pale yellow, femur with three, patella with one distal, tibia with two, and tarsus with one dark ring. Lateral pair of receptacula much narrower than median pair (fig. 47).

MATERIAL EXAMINED: UNITED STATES:
Georgia: *Lumpkin Co.:* Desoto Falls Recreation Area, rt. 19, July 30, 1966, elev. 2150 ft (F. A. Coyle, AMNH), 1♂, 3♀. *Rabun Co.:* Tallulah, Aug. 1887 (N. Banks, MCZ), 1♂, 1♀; Worwoman Dell, July 16, 1961 (J. A. MacMahon, MCZ), 2♀. *White Co.:* Tray Mountain, Sept. 15, 1935, elev. 3000 ft (J. M. Valentine, AMNH), 1♂. **North Carolina:** *Avery Co.:* Grandfather Mountain, Oct. 4, 1960 (W. J. Gertsch, W. Ivie, AMNH), 5♂, 3♀; E slope, Grandfather Mountain, just above rt. 221, Sept. 5, 1971, elev. 4000 ft (R. L. Hoffman, Knight, AMNH), 1♂, Sept. 27, 1979, elev. 5000 ft (B. D. Opell, R. L. Hoffman, AMNH), 6♂; Linville, Sept. 8, 1930 (N. Banks, MCZ), 1♀. *Burke Co.:* Linville Caverns, Sept. 3, 1975, elev. 2600 ft (F. A. Coyle, AMNH), 1♂, 1♀. *Graham Co.:* Highway 129, 1.1 mi N junction with highway 19, Oct. 13, 1977 (J. Connors, CAS), 1♀. *Haywood Co.:* above Crabtree to Betsey's Gap, Oct. 3, 1960, elev. 3956 ft (W. J. Gertsch, W. Ivie, AMNH), 40♂, 49♀. *Jackson Co.:* Brushy Fork of Greene Creek, July 27, 1971 (F. A. Coyle, AMNH), 2♀; Cherokee Indian Reservation, 10 mi W Maggie, Oct. 3, 1960 (W. J. Gertsch, W. Ivie, AMNH), 3♀; Wolf Creek, Cullowhee Mountain, Nov. 28, 1969, with egg sac under rock shelf (F. A. Coyle, AMNH), 1♀. *Macon Co.:* Dry Falls, 3 mi NW Highlands on US rt. 64, Oct. 10, 1964, rocks along Cullasaja River gorge (J. A. Beatty, JAB), 1♀, Aug. 13, 1975, elev. 3350 ft (F. A. Coyle, AMNH), 2♂; Horse Cove Clearcut, 3.6 mi E Highlands, June 22, 1976, elev. 3000 ft, stream bank (F. A. Coyle, AMNH), 1♀; Whiteside Mountain, near Highlands, Aug. 31, 1932, elev. 4900 ft (A.

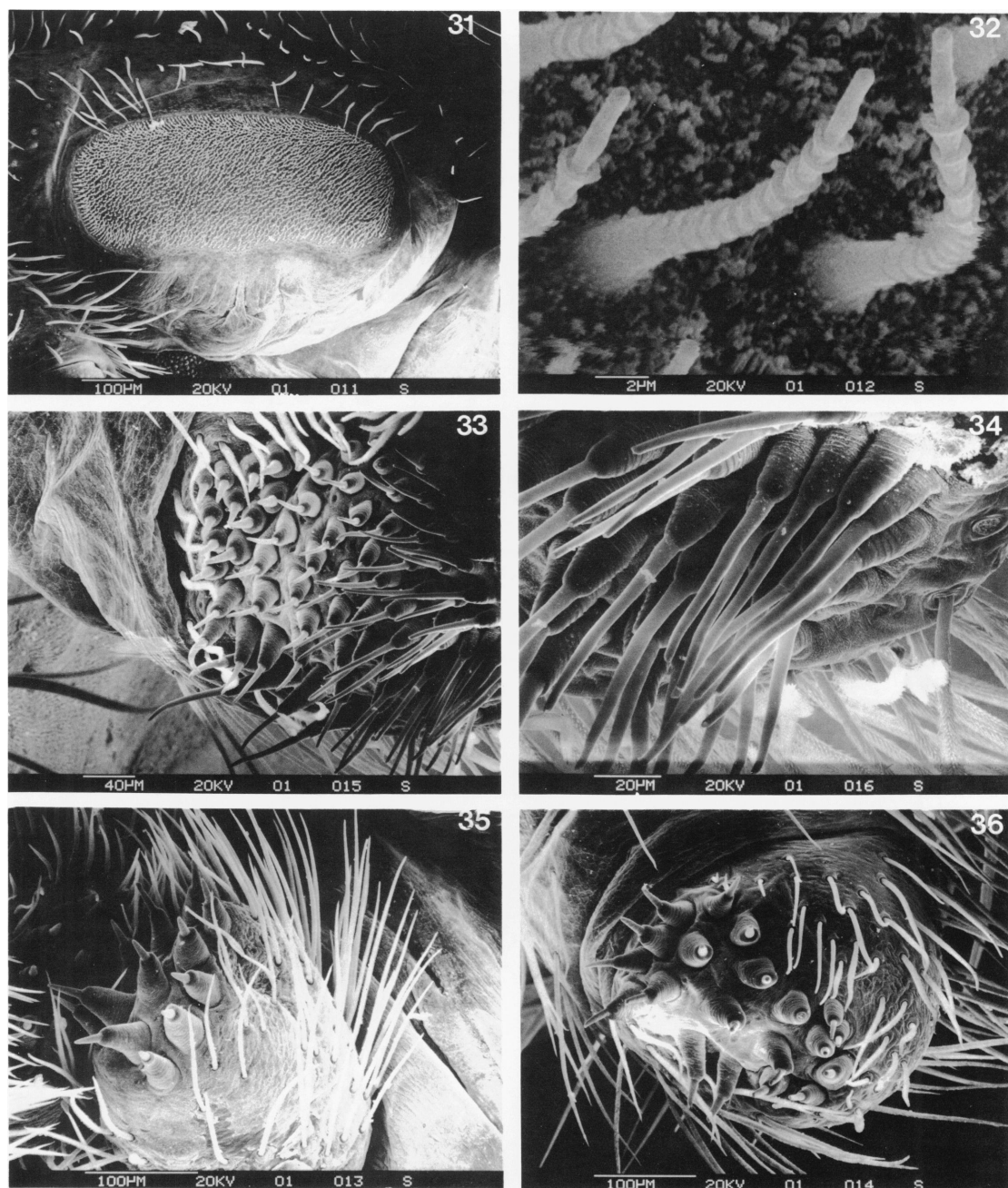
Petrunkévitch, USNM), 1♀. *Madison Co.:* French Broad Cave, 1 mi NW Hot Springs, July 17, 1977 (P. Hertl, AMNH), 1♀, Aug. 15, 1985, elev. 1300 ft (N. I. Platnick, F. A. Coyle, L. Sorkin, D. Song, AMNH), 5♂, 2♀; 0.3 mi NW Hot Springs, Aug. 15, 1985, elev. 1350 ft (N. I. Platnick, F. A. Coyle, L. Sorkin, D. Song, AMNH), 4♂, 10♀ (including types). *McDowell Co.:* entrance, Wind Cave, July 28, 1985, cliff face (P. Kirchner, C. Holler, Jr., AMNH), 1♂. *Mitchell Co.:* 1 mi N Spruce Pine, Oct. 4, 1960 (W. J. Gertsch, W. Ivie, AMNH), 1♂. *Swain Co.:* 5 mi E Bryson City, Oct. 2, 1960 (W. J. Gertsch, W. Ivie, AMNH), 1♂, 12♀; Deep Creek, 4 mi N Bryson City, July 8, 1933 (W. J. Gertsch, AMNH), 1♀, Oct. 1, 1960 (W. J. Gertsch, W. Ivie, AMNH, MCZ), 33♂, 29♀; Nantahala, Aug. 27, 1930 (W. S. Creighton, MCZ), 1♀, summer 1952 (L. H. Gillies, AMNH), 1♂, 2♀; 1.1 mi SW Nantahala on rt. 19, July 20, 1957 (S. and D. Mulaik, AMNH), 1♀; Smokemont, Great Smoky Mountains National Park, Oct. 3, 1960 (W. J. Gertsch, W. Ivie, AMNH), 6♂, 32♀. *Transylvania Co.:* Toxaway, Aug. 18, 1961 (J. E. Carico, JEC), 1♂; Toxaway River Gorge, July 22, 1961 (J. E. Carico, JEC), 1♀; ridge between Whitewater and Thompson River Gorges, Aug. 22, 1975, elev. 2800 ft, under ledge (D. Pittillo, AMNH), 1♂, 1♀. **South Carolina:** *Greenville Co.:* 2 mi S Caesars Head, Aug. 14, 1985, elev. 2800–3000 ft (N. I. Platnick, F. A. Coyle, L. Sorkin, D. Song, AMNH), 2♂, 4♀. **Tennessee:** *Anderson Co.:* Oak Ridge, Sept. 1953 (R. P. Gechler, USNM), 1♀. *Blount Co.:* Great Smoky Mountains National Park, Oct. 30, 1982, under stone bridge on wall (Yoder-Williams, SER), 1♀; The Sinks, Little River Gorge, Great Smoky Mountains National Park, Aug. 6, 1975, elev. 1700 ft (F. A. Coyle, AMNH), 1♂, Sept. 30, 1983, rock outcrops (F. A. Coyle, AMNH), 5♂, 5♀; 3.9 mi W The Sinks on Little River Gorge Road, Aug. 6, 1975, elev. 1600 ft (F. A. Coyle, AMNH), 1♂; road from Townsend to Cades Cove, Aug. 29, 1971, in same web (D. W. Ogle, AMNH), 1♂, 1♀. *Carter Co.:* Roan Mountain Station, Sept. 9, 1967, elev. 2700 ft (R. L. Hoffman, Neff, AMNH), 1♂; S Roan Mountain Station, Sept. 8, 1979, roadside overhang (B. D. Opell, R. L. Hoffman, AMNH), 1♀. *Cocke Co.:* Carson's Springs, near Newport, Aug. 24, 1958 (R. Sellers,



Figs. 25–30. *Hypochilus pococki*, new species, female spinnerets, ventral view. 25. Cribellum. 26. Spigots of cribellum. 27. Anterior lateral spinneret. 28. Posterior median spinnerets. 29, 30. Posterior lateral spinneret.

AMNH), 1♂, 2♀, fall 1958–1959 (R. Sellers, AMNH), 2♂, 8♀. *Greene Co.*: Paint Creek Recreation Area, 4 mi NE Wolf Creek, Aug. 1, 1962 (R. L. Hoffman, AMNH), 1♀. *John-*

son Co.: Backbone Rock Recreation Area, 4 mi S Damascus, Sept. 9, 1967 (R. L. Hoffman, Neff, AMNH), 1♂, 1♀. *Knox Co.*: Knoxville, July 15 (W. B. Cartwright, AMNH), 1♀.



Figs. 31–36. *Ectatosticta davidi* (Simon), female spinnerets, ventral view. 31. Cribellum. 32. Spigots of cribellum. 33, 34. Anterior lateral spinneret. 35. Posterior median spinneret. 36. Posterior lateral spinneret.

Morgan Co.: Burghardt land, Sept. 3, 1978, cliff face (S. E. Riechert, SER), 1♂. *Sevier Co.*: Alum Cave trail, Mt. Le Conte, Great Smoky Mountains National Park, Aug. 24, 1940,

elev. 4000 ft (W. H. Ball, USNM), 5♀; Buck-eye Nature Trail, Great Smoky Mountains National Park, Aug. 8, 1981, elev. 1000 m, cliffs in humid forest (H. and L. Levi, MCZ),

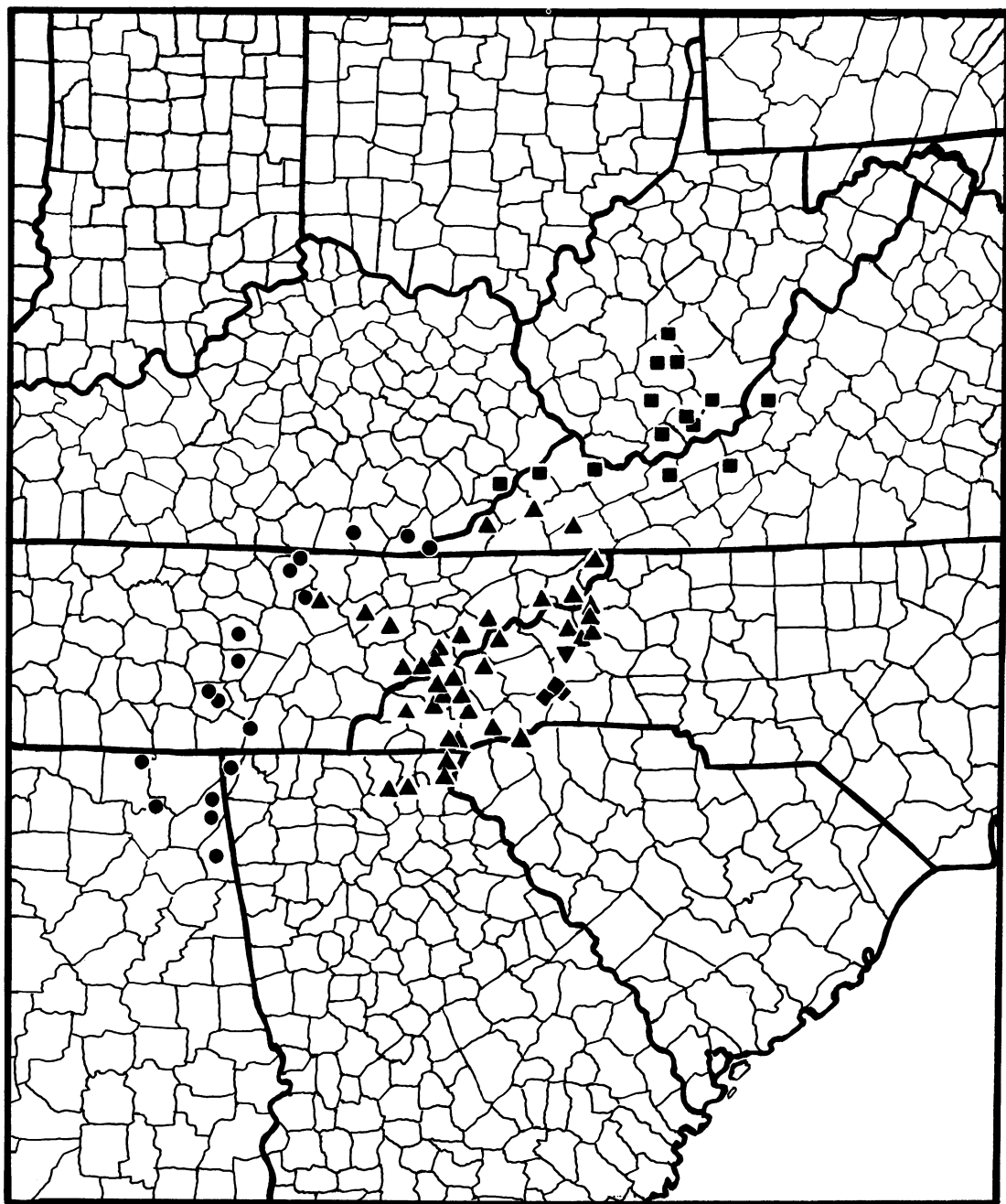
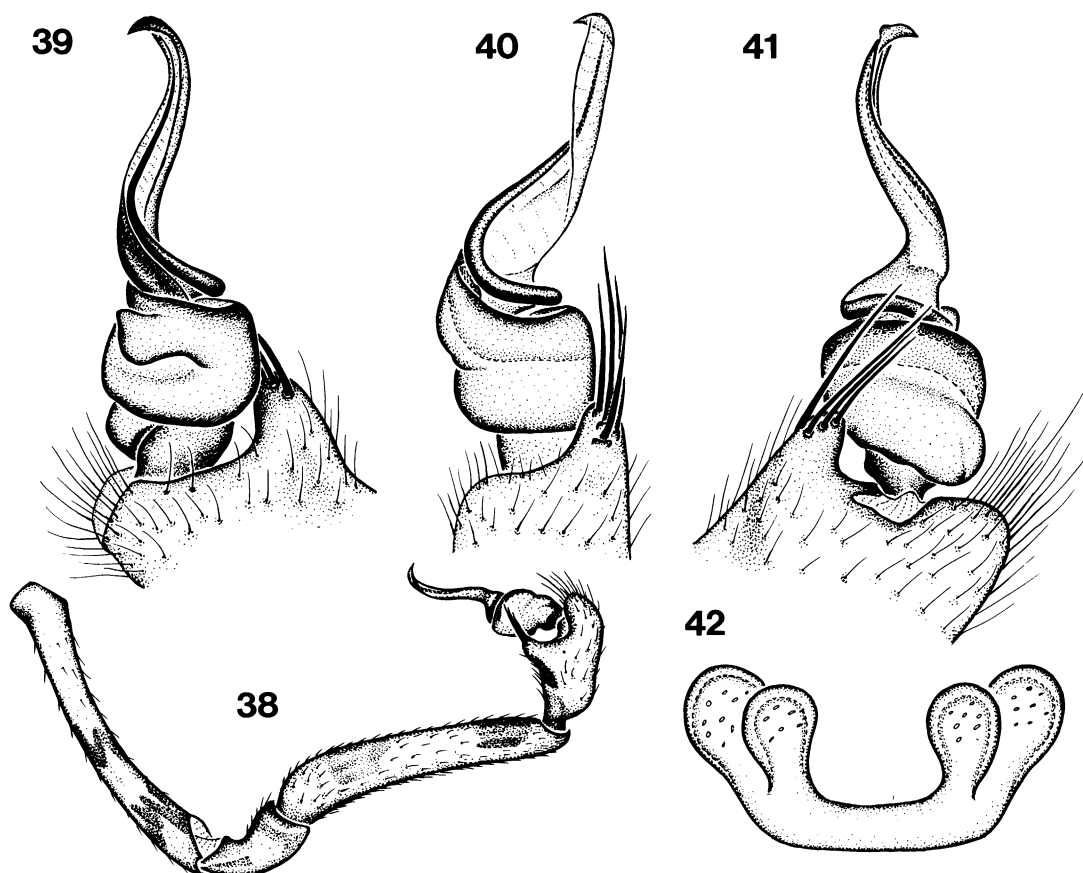


Fig. 37. Southeastern United States, showing distribution of *Hypochilus thorelli* Marx (circles), *H. pococki*, new species (triangles), *H. coylei*, new species (diamonds), *H. sheari*, new species (inverted triangle), and *H. gertschi* Hoffman (squares).

2♂, 4♀; Great Smoky Mountains National Park, Aug. 8, 1981 (J. Coddington, MCZ), 1♂, 1♀; Greenbrier Cove, 7–8 mi NE Gatlin-

burg, Oct. 2, 1960 (W. J. Gertsch, W. Ivie, AMNH), 7♂, 26♀; Great Smoky Mountains National Park, Nov. 5, 1984, mature hem-



Figs. 38–42. *Hypochilus thorelli* Marx. 38. Palp, retrolateral view. 39–41. Palpal bulb, prolateral, ventral, and retrolateral views. 42. Receptacula, dorsal view.

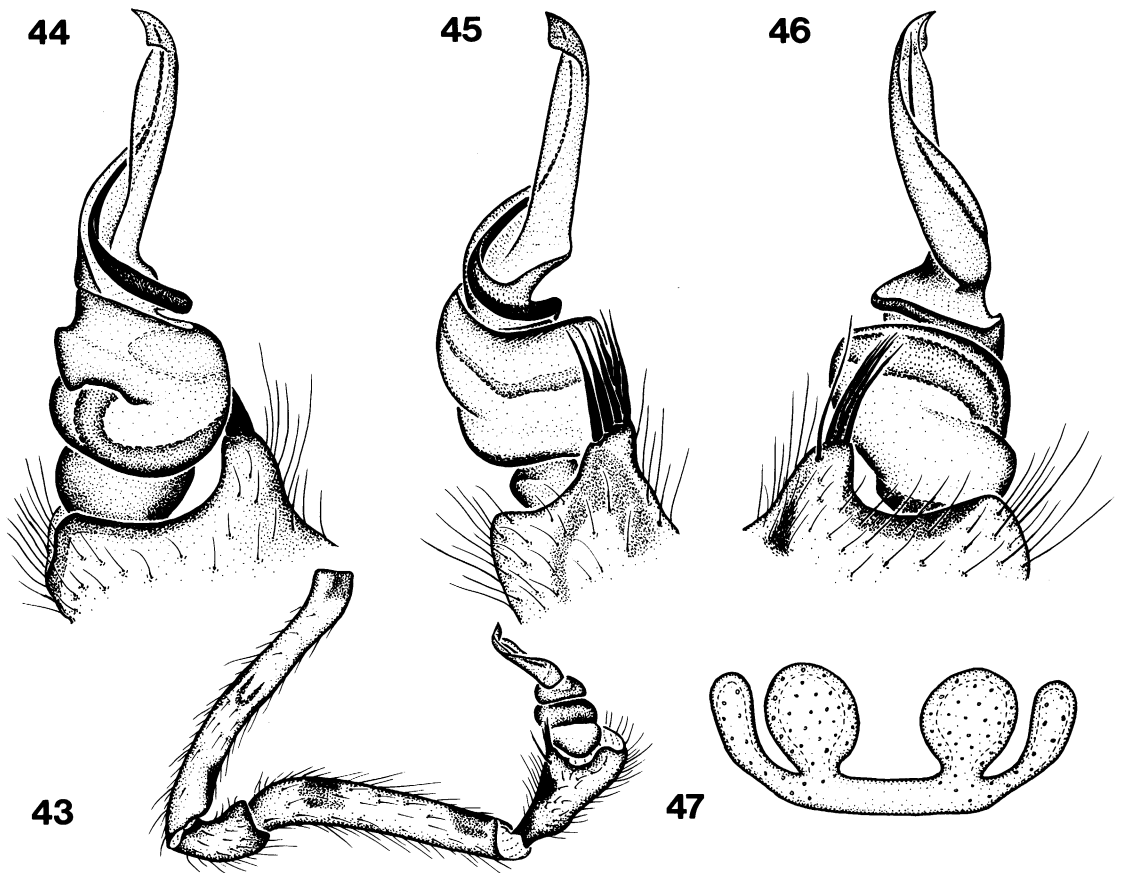
lock-hardwood forest (Fox, SER), 1♀; Laurel Falls, Great Smoky Mountains National Park, June 25, 1938 (W. H. Ball, USNM), 2♀; Little Pigeon River, July 10, 1933 (W. J. Gertsch, AMNH), 2♀; Little River at rt. 73, July 9, 1957 (S. and D. Mulaik, AMNH), 5♀; sides of Mt. Le Conte, Sept. 6, 1928 (W. M. Barrows, AMNH), 2♂, 1♀; N summit, Newfound Gap, Oct. 14, 1965, elev. 4500 ft (J. and W. Ivie, AMNH), 3♂, 5♀; 5 mi below Newfound Gap, Sept. 2, 1930 (N. Banks, MCZ), 1♂; Orchard Drive, Great Smoky Mountains National Park, Oct. 4, 1984, shale cliffs (L. Bishop, SER), 1♀; Ramsey Trail, Great Smoky Mountains National Park, Sept. 4, 1938 (A. C. Cole, AMNH), 2♂, 3♀; Roaring Fork Road, Great Smoky Mountains National Park, Oct. 4, 1984, limestone and sandstone bluffs (Fox, SER), 1♂. *Unicoi Co.*: 3.7 mi S, 3.5–4.0 mi E Unicoi, Aug. 22, 1967, elev. 3700–4000 ft

(R. G. Zweifel, AMNH), 1♂, 2♀. **Virginia:** *Lee Co.*: Cave Spring Recreation Area, 2 mi N Dryden, Sept. 2–3, 1972 (R. L. Hoffman, AMNH), 5♂. *Washington Co.*: N fork, Holston River, S side of river at Holston, Aug. 20, 1978, sandstone cliff (D. W. Ogle, AMNH), 1♂. *Wise Co.*: gorge of Guest River, SE Coeburn, Aug. 20, 1984 (D. W. Ogle, AMNH), 2♂.

DISTRIBUTION: Blue Ridge Mountains, from western Virginia and eastern Tennessee through western North Carolina into north-eastern Georgia and northwestern South Carolina.

Hypochilus coylei Platnick, new species
Figures 48–52

TYPES: Male holotype and female paratype from lampshade webs under rock overhangs



Figs. 43–47. *Hypochilus pococki*, new species. 43. Palp, retrolateral view. 44–46. Palpal bulb, prolateral, ventral, and retrolateral views. 47. Receptacula, dorsal view.

at an elevation of 1600–1800 ft on cliffs below Bat Cave, Rutherford County, North Carolina (August 14, 1985; N. I. Platnick, F. A. Coyle, L. Sorkin, D. Song), deposited in AMNH.

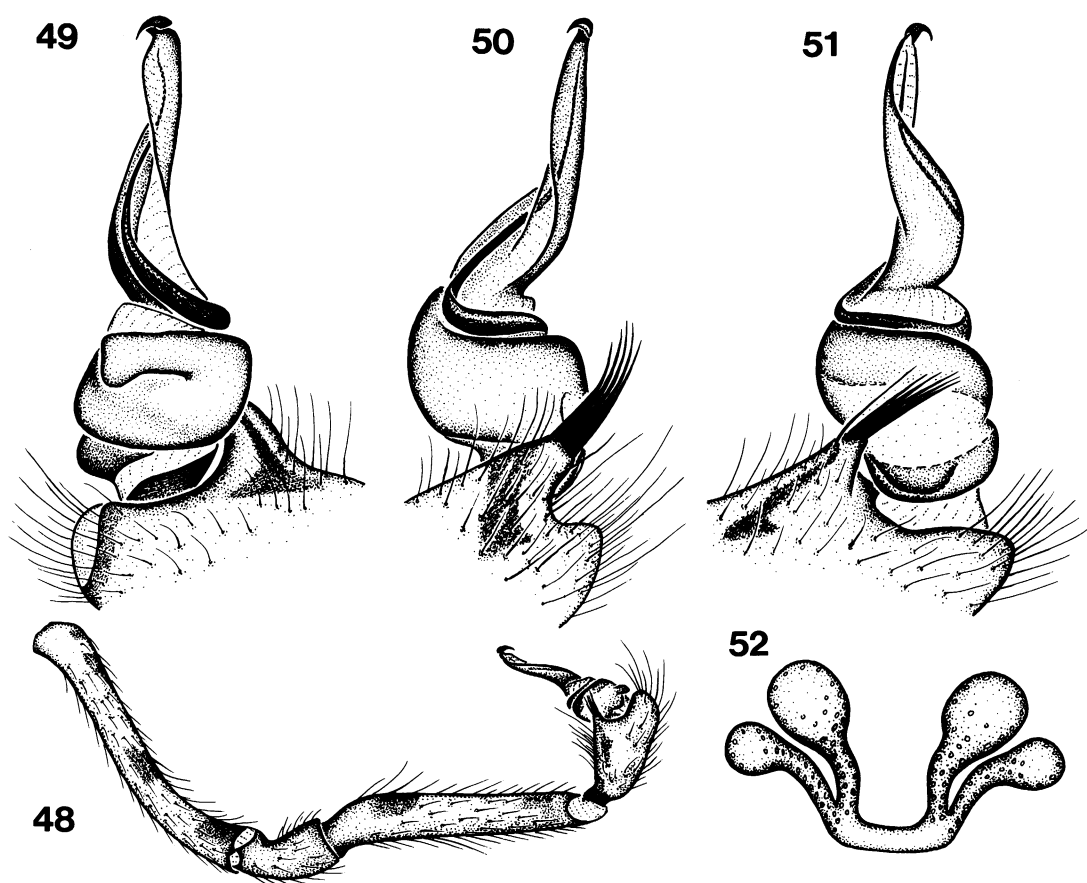
ETYMOLOGY: The specific name is a patronym in honor of Dr. Frederick A. Coyle of Western Carolina University, in keeping with the tradition of dedicating species names in this genus to eminent arachnologists, and in recognition of his help in collecting and studying *Hypochilus*.

DIAGNOSIS: Males can be recognized by the recurved tip of the palpal conductor (fig. 49), females by the elongate, narrow-stemmed receptacula (fig. 52).

MALE: As in *H. pococki*, except as noted. Total length 8.71. Carapace 3.41 long, 2.97 wide, with only slightly darkened lateral mar-

gins. Eye sizes and interdistances: AME 0.17, ALE 0.21, PME 0.21, PLE 0.20; AME-AME 0.21, AME-ALE 0.12, PME-PME 0.53, PME-PLE 0.03, ALE-PLE 0.03; MOQ length 0.48, front width 0.55, back width 0.95. Sternal dark patches confluent. Femur I more than six times as long as carapace. Conductor with recurved tip (figs. 48–51).

FEMALE: As in male, except as noted. Total length 11.94. Carapace 3.95 long, 2.81 wide. Eye sizes and interdistances: AME 0.17, ALE 0.23, PME 0.21, PLE 0.22; AME-AME 0.18, AME-ALE 0.12, PME-PME 0.51, PME-PLE 0.06, ALE-PLE 0.09; MOQ length 0.45, front width 0.52, back width 0.93. Femur I only about three times as long as carapace. Palpal coloration as in *H. pococki* except tarsal ring incomplete. Receptacula on long, narrow stems (fig. 52).



Figs. 48–52. *Hypochilus coylei*, new species. 48. Palp, retrolateral view. 49–51. Palpal bulb, prolateral, ventral, and retrolateral views. 52. Receptacula, dorsal view.

MATERIAL EXAMINED: UNITED STATES: **North Carolina:** *Henderson Co.:* Hickory Creek, 1 mi SE Gerton, Aug. 14, 1985, elev. 2575 ft (N. I. Platnick, F. A. Coyle, L. Sorkin, D. Song, AMNH), 1♂, 3♀. *Rutherford Co.:* cliffs below Bat Cave, 1 mi SE Bat Cave City, Aug. 14, 1985, elev. 1600–1800 ft (N. I. Platnick, F. A. Coyle, L. Sorkin, D. Song, AMNH), 8♂, 6♀ (including types); Breakdown Cave, Rumbling Bald Mountain, Lake Lure, July 2, 1977 (P. Hertl, AMNH), 1♂.

DISTRIBUTION: Known only from Henderson and Rutherford counties in southwestern North Carolina.

Hypochilus sheari Platnick, new species
Figures 53–57

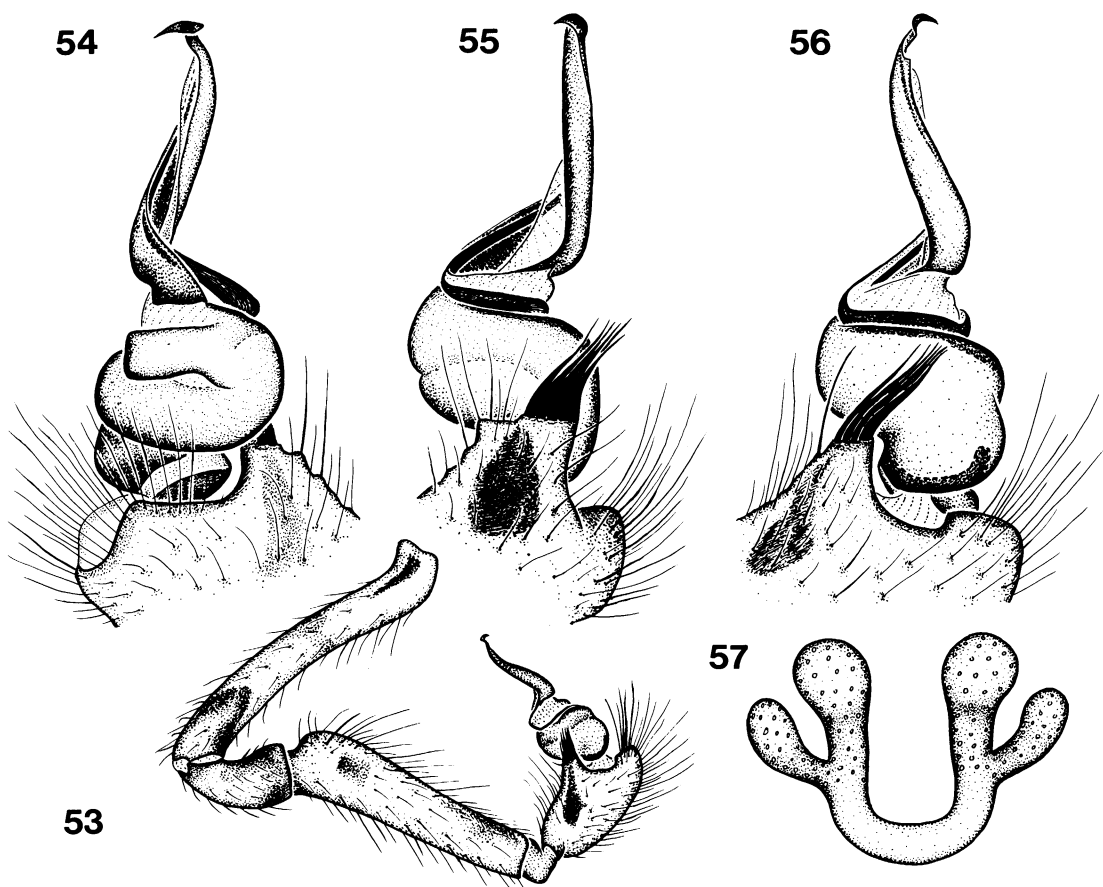
TYPES: Male holotype and female paratype from lampshade webs on rock faces at an

elevation of 3200 ft at Crabtree Falls, on Blue Ridge Parkway, McDowell County, North Carolina (August 15, 1985; N. I. Platnick, F. A. Coyle, L. Sorkin, D. Song), deposited in AMNH.

ETYMOLOGY: The specific name is a patronym in honor of Dr. William A. Shear of Hampden-Sydney College, who first collected the species, in keeping with the tradition of dedicating species names in this genus to eminent arachnologists.

DIAGNOSIS: Males can be recognized by the beaklike tip of the palpal conductor (fig. 54), females by the short lateral receptacula inserting on the median receptacula (fig. 57).

MALE: As in *H. pococki*, except as noted. Total length 7.34. Carapace 3.40 long, 2.52 wide. Eye sizes and interdistances: AME 0.18, ALE 0.22, PME 0.20, PLE 0.23; AME-AME



Figs. 53–57. *Hypochilus sheari*, new species. 53. Palp, retrolateral view. 54–56. Palpal bulb, prolateral, ventral, and retrolateral views. 57. Receptacula, dorsal view.

0.15, AME-ALE 0.12, PME-PME 0.45, PME-PL 0.04, ALE-PL 0.07; MOQ length 0.47, front width 0.51, back width 0.85. Chelicerae with additional anterolateral dark longitudinal line. Metatarsi with only weak distal band. Conductor with beaklike tip (figs. 53–56).

FEMALE: As in male, except as noted. Total length 10.41. Carapace 3.53 long, 2.73 wide. Eye sizes and interdistances: AME 0.18, ALE 0.22, PME 0.21, PL 0.25; AME-AME 0.16, AME-ALE 0.12, PME-PME 0.48, PME-PL 0.05, ALE-PL 0.09; MOQ length 0.48, front width 0.51, back width 0.90. Endites distinctly bicolored, white medially, pale brown laterally. Distal metatarsal band strong. Femur I only about three times as long as carapace. Palpal coloration as in *H. pococki*. Lat-

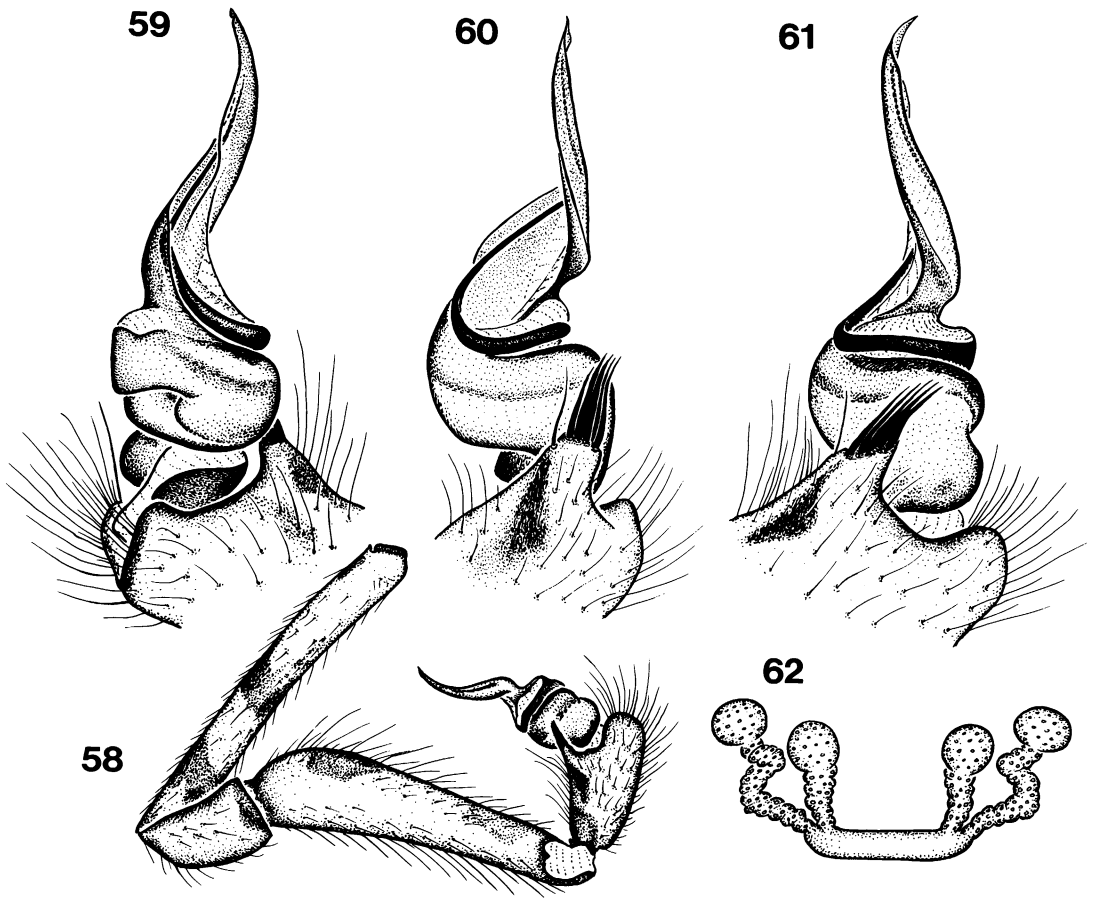
eral receptacula short, originating on median pair (fig. 57).

MATERIAL EXAMINED: UNITED STATES: **North Carolina:** McDowell Co.: Crabtree Falls, Blue Ridge Parkway, July 14, 1969 (W. A. Shear, MCZ), 1♂, Aug. 15, 1985, elev. 3200 ft (N. I. Platnick, F. A. Coyle, L. Sorkin, D. Song, AMNH), 2♂, 3♀ (including types).

DISTRIBUTION: Known only from the type locality in McDowell County, North Carolina.

Hypochilus gertschi Hoffman
Figures 58–62

Hypochilus gertschi Hoffman, 1963, p. 2, figs. 1–5 (male holotype from Grandview State Park, Raleigh County, West Virginia, in AMNH, examined).



Figs. 58–62. *Hypochilus gertschi* Hoffman. 58. Palp, retrolateral view. 59–61. Palpal bulb, prolateral, ventral, and retrolateral views. 62. Receptacula, dorsal view.

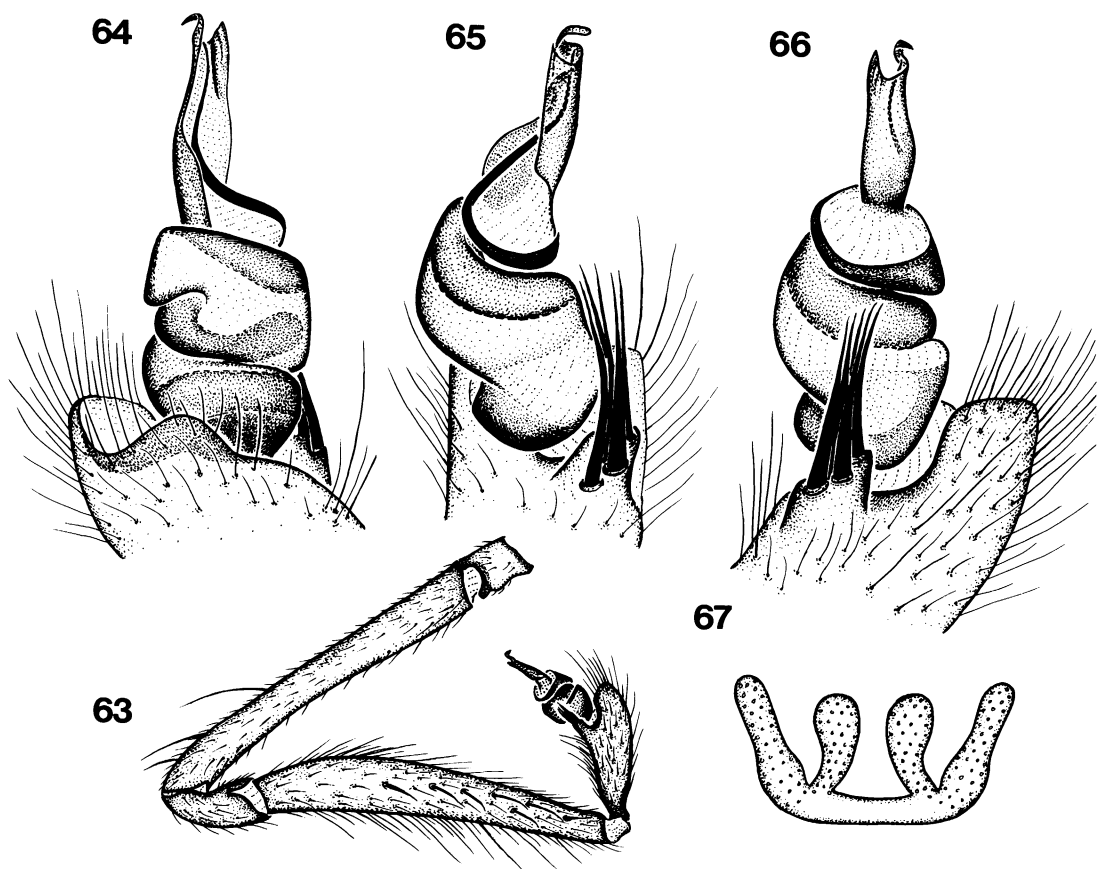
DIAGNOSIS: Males can be recognized by the simple tip of the palpal conductor (fig. 59), females by the long, convoluted receptacula (fig. 62).

MALE: Described by Hoffman (1963).

FEMALE: Described by Hoffman (1963).

MATERIAL EXAMINED: UNITED STATES: **Kentucky:** *Letcher Co.*: near Whitesburg, Aug. 28, 1932, elev. 2400 ft (A. Petrunkevitch, USNM), 1♂. **Virginia:** *Alleghany Co.*: mouth of Blue Spring Cave at Clifdale, 7.5 mi S Covington, Sept. 8, 1958 (R. L. Hoffman, AMNH), 2♀. *Bland Co.*: mouth of Hamilton's Cave, 4 mi E Mechanicsburg, Sept. 10, 1956 (R. L. Hoffman, AMNH), 3♀. *Buchanan Co.*: Bear Wallow Mountain, rt. 613, 0.5 mi W junction with rt. 616, Aug. 19, 1977 (D. W. Ogle, AMNH), 4♂, 1♀; rt. 83 just W Stacy,

across Slate Creek, Aug. 20, 1977 (D. W. Ogle, AMNH), 2♂. *Dickenson Co.*: Breaks Interstate Park, May 25, 1967, in deep rock clefts at Notches Area (W. A. Shear, WAS), 1♀, Sept. 7, 1967 (Neff, R. L. Hoffman, AMNH), 3♂. *Montgomery Co.*: Blacksburg, May 15–Aug. 27, 1960 (J. E. Carico, JEC), 6♀; Craig Creek, Blacksburg, Aug. 22, 1962 (J. E. Carico, JEC), 1♀; Poverty Creek Mines, Blacksburg, Sept. 30–Oct. 7, 1962 (J. E. Carico, JEC), 4♀. **West Virginia:** *Fayette Co.*: Babcock State Park, June 17, 1967 (W. A. Shear, WAS), 2♀; rt. 21, 2 mi N Beckwith, Sept. 2, 1965, under rock ledges (Brownell, R. L. Hoffman, AMNH), 1♂, 2♀; 1 mi W Glen Ferris, Sept. 2, 1965, elev. 700 ft (R. G. Zweifel, AMNH), 1♂, 5♀; Hawk's Nest State Park, Aug. 5, 1967 (A. Moreton, MCZ), 1♂, 1♀. *Greenbrier Co.*:



Figs. 63–67. *Hypochilus bonneti* Gertsch. 63. Palp, retrolateral view. 64–66. Palpal bulb, prolateral, ventral, and retrolateral views. 67. Receptacula, dorsal view.

mouth of Mulligan's Creek, near rt. 63, 5 mi E Alderson, June 24, 1967, webs under large boulders (W. A. Shear, WAS), 1♀. *Mercer Co.*: Brush Creek Falls, Camp Creek, Oct. 3, 1965 (W. A. Shear, MCZ, JAB), 1♂, 3♀; Jackson's Park, Unity Road, Athens, May 18, 1967 (W. A. Shear, WAS), 1♀; Old Pump House, Athens, July 23, 1967 (W. A. Shear, WAS), 1♂. *Nicholas Co.*: rt. 39, 1 mi W Swiss, Sept. 2, 1965, rock ledges (Brownell, R. L. Hoffman, AMNH), 2♀. *Raleigh Co.*: Grandview State Park, 7 mi NE Beckley, Sept. 14–22, 1962 (R. L. Hoffman, AMNH), 1♂, 4♀ (including types), Nov. 23, 1962 (J. E. Carico, JEC), 4♂, 4♀, May 21, 1966, along natural tunnels walk (W. A. Shear, WAS), 2♀, Sept. 23, 1967, tunnels area (W. A. Shear, WAS), 2♂, Sept. 2, 1968 (W. A. Shear, MCZ), 1♂, 5♀, Aug. 16, 1970 (N. I. Platnick, AMNH), 1♂. *Summers*

Co.: Bellepoint, Sept. 23, 1962, on rock faces (J. E. Carico, JEC), 1♀; Forest Hill, 10 mi SE Hinton, Sept. 23, 1962 (J. E. Carico, JEC), 2♀.

DISTRIBUTION: Southern West Virginia and adjacent Virginia and Kentucky.

Hypochilus bonneti Gertsch
Figures 63–67

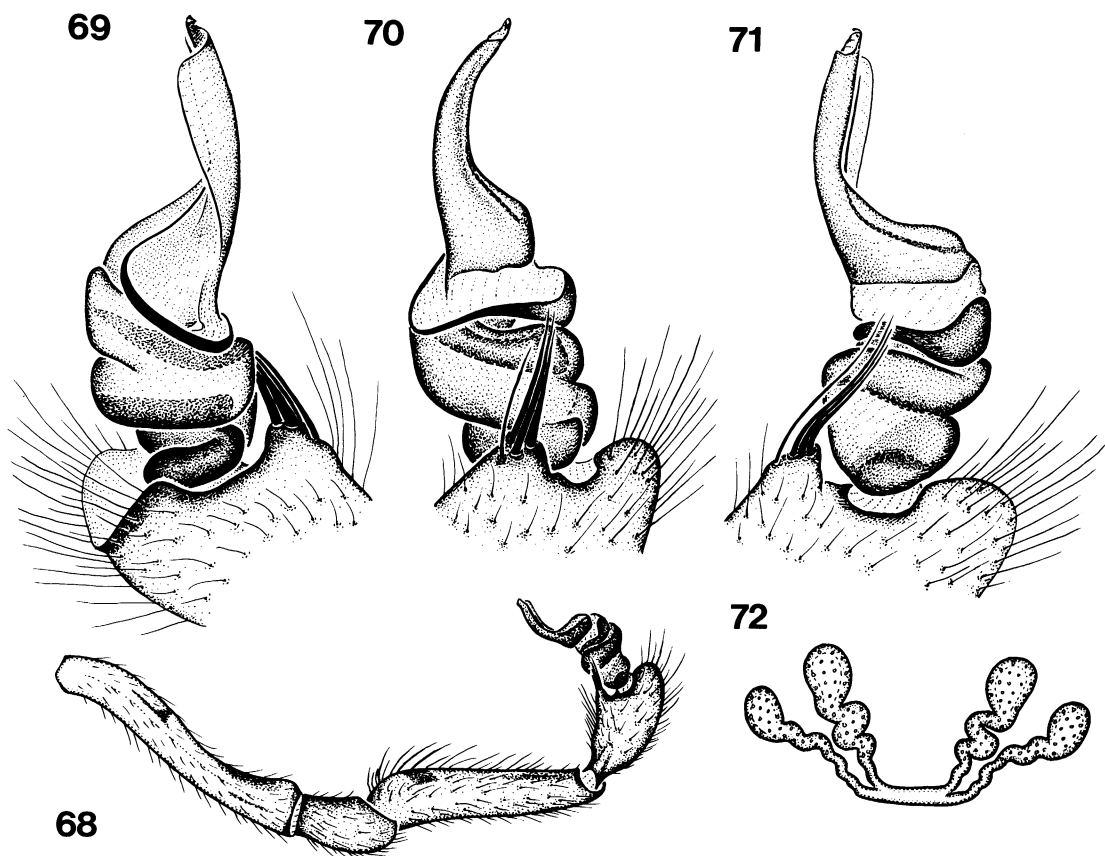
Hypochilus bonneti Gertsch, 1964, p. 6, figs. 3–8 (female holotype from Fly Cave, Fremont County, Colorado, in AMNH, examined).

DIAGNOSIS: Males can be recognized by the bifid tip of the palpal conductor (fig. 64), females by the narrow receptacula (fig. 67).

MALE: Described by Gertsch (1964).

FEMALE: Described by Gertsch (1964).

MATERIAL EXAMINED: UNITED STATES:



Figs. 68–72. *Hypochilus petrunkevitchi* Gertsch. 68. Palp, retrolateral view. 69–71. Palpal bulb, prolateral, ventral, and retrolateral views. 72. Receptacula, dorsal view.

Colorado: *El Paso Co.:* Manitou Grand Caverns, Apr. 17, 1986, elev. 7000 ft, on walls of limestone cave (E. Licht, UCOL), 1♂. *Fremont Co.:* Fly Cave, Oil Creek, 13 mi N Canon City, Feb. 26, 1961, elev. 5800 ft (R. W. Ayre, AMNH), 1♀ (type), Apr. 28, 1961 (T. P. Maslin, C. J. McCoy, Jr., B. Vogel, AMNH), 1♂, Aug. 28, 1961 (W. J. Gertsch, W. Ivie, AMNH), 2♀. *Gunnison Co.:* East Portal, Black Canyon National Monument, June 28, 1962, elev. 6547 ft (C. J. McCoy, Jr., P. Miller, AMNH), 6♀, July 26, 1962 (B. Vogel, W. J. Gertsch, R. Graham, AMNH), 3♂, 9♀.

DISTRIBUTION: Known only from three localities in Colorado, but a population in Terro Cave, Santa Fe Co., New Mexico (from which, unfortunately, only juveniles are available) may belong to this species.

Hypochilus petrunkevitchi Gertsch
Figures 68–72

Hypochilus petrunkevitchi Gertsch, 1958, p. 11, figs. 5, 7, 15, 17, 21 (male holotype from Cedar Grove, Fresno County, California, in AMNH, examined).

DIAGNOSIS: Males can be recognized by the relatively blunt-tipped palpal conductor (fig. 69), females by the coiled receptacula (fig. 72).

MALE: Described by Gertsch (1958).

FEMALE: Described by Gertsch (1958).

MATERIAL EXAMINED: UNITED STATES: **California:** *Fresno Co.:* Sheep Creek, Cedar Grove, Kings Canyon, July 16, 1952, elev. 4633–5200 ft (W. J. Gertsch, AMNH), 1♀, Aug. 8, 1953 (W. J. and J. W. Gertsch, AMNH), 3♂, 11♀ (including types). *Mariposa*

Co.: base of Yosemite Falls, Yosemite National Park, Sept. 22, 1961 (W. J. Gertsch, W. Ivie, AMNH), 1♀. *San Bernardino Co.*: Mountain Home, matured Aug. 13, 1959 (W. J. Gertsch, V. Roth, R. X. Schick, AMNH), 1♂; San Bernardino Mountains (Akin, USNM), 1♂, 1♀. *Tulare Co.*: near Ash Mountain Entrance, Sequoia National Park, July 5, 1956, elev. 3700 ft (W. J. Gertsch, V. Roth, AMNH), 2♀, July 9, 1958 (W. J. Gertsch, V. Roth, AMNH), 1♀, Aug. 5, 1959 (W. J. Gertsch, AMNH), 1♀; Belnap Springs, near Camp Nelson, Sequoia National Park, July 11, 1958 (W. J. Gertsch, V. Roth, AMNH), 1♂, 8♀, matured Aug. 8, 1958 (V. Roth, AMNH), 1♂; 0.9 mi S Giant Forest Village, Sequoia National Park, Aug. 17, 1984, elev. 1800 m (T. S. Briggs, V. F. Lee, D. Ubick, CAS), 1♂; Halstead Meadow, Sequoia National Park, Aug. 23, 1979, elev. 7000 ft, in webs on underhangs of massive granite boulders (D. Ubick, CDU), 1♂, 2♀; McIntire Creek, near Camp Nelson, July 11, 1958 (W. J. Gertsch, V. Roth, AMNH), 1♀; Soda Creek, W Camp Nelson, July 11, 1958 (W. J. Gertsch, V. Roth, AMNH), 11♀.

DISTRIBUTION: Central California.

***Hypochilus kastoni* Platnick, new species**

Figures 73–77

Hypochilus petrunkevitchi (misidentification): Gertsch, 1958, p. 11 (in part; northern records only).

TYPES: Male holotype and female paratype from Ney Springs Creek, 5 miles west of Mount Shasta, Siskiyou County, California (September 14, 1985; W. C. Sedgwick), deposited in AMNH.

ETYMOLOGY: The specific name is a patronym in honor of the late Dr. B. J. Kaston, in keeping with the tradition of dedicating species names in this genus to eminent arachnologists.

DIAGNOSIS: Males can be recognized by the abruptly narrowed tip of the palpal conductor (fig. 74), females by the tubular but uncoiled receptacula (fig. 77).

MALE: As in *H. pococki*, except as noted. Total length 7.45. Carapace 2.81 long, 2.23 wide, with lateral mottling reduced to longitudinal rows of small maculations. Eye sizes and interdistances: AME 0.11, ALE 0.14,

PME 0.14, PLE 0.17; AME-AME 0.11, AME-ALE 0.14, PME-PME 0.38, PME-PLE 0.03, ALE-PLE 0.04; MOQ length 0.34, front width 0.33, back width 0.66. Palpal conductor with abruptly narrowed tip (figs. 73–76).

FEMALE: As in male, except as noted. Total length 7.92. Carapace 3.13 long, 2.27 wide, surface pale yellow except darkened along thoracic groove and with scattered maculations longitudinally on each side. Eye sizes and interdistances: AME 0.16, ALE 0.20, PME 0.16, PLE 0.18; AME-AME 0.10, AME-ALE 0.16, PME-PME 0.40, PME-PLE 0.05, ALE-PLE 0.08; MOQ length 0.33, front width 0.32, back width 0.72. Endites distinctly bicolored, yellow laterally, white medially; dark patches on sternum almost obsolete. Legs spotted rather than truly banded. Femur I less than three times as long as carapace. Dorsum of abdomen only weakly mottled. Palpal coloration as in *H. pococki* except tarsus unmarked. Receptacula tubular, uncoiled (fig. 77).

OTHER MATERIAL EXAMINED: Two males and one female taken with the types (AMNH), one female taken at the type locality on September 2, 1959, by W. J. Gertsch and V. Roth (AMNH), and two females taken 5 miles southwest of Orleans, Humboldt Co. (near Del Norte Co. line), California, on August 22, 1959, by W. J. Gertsch and V. Roth (AMNH).

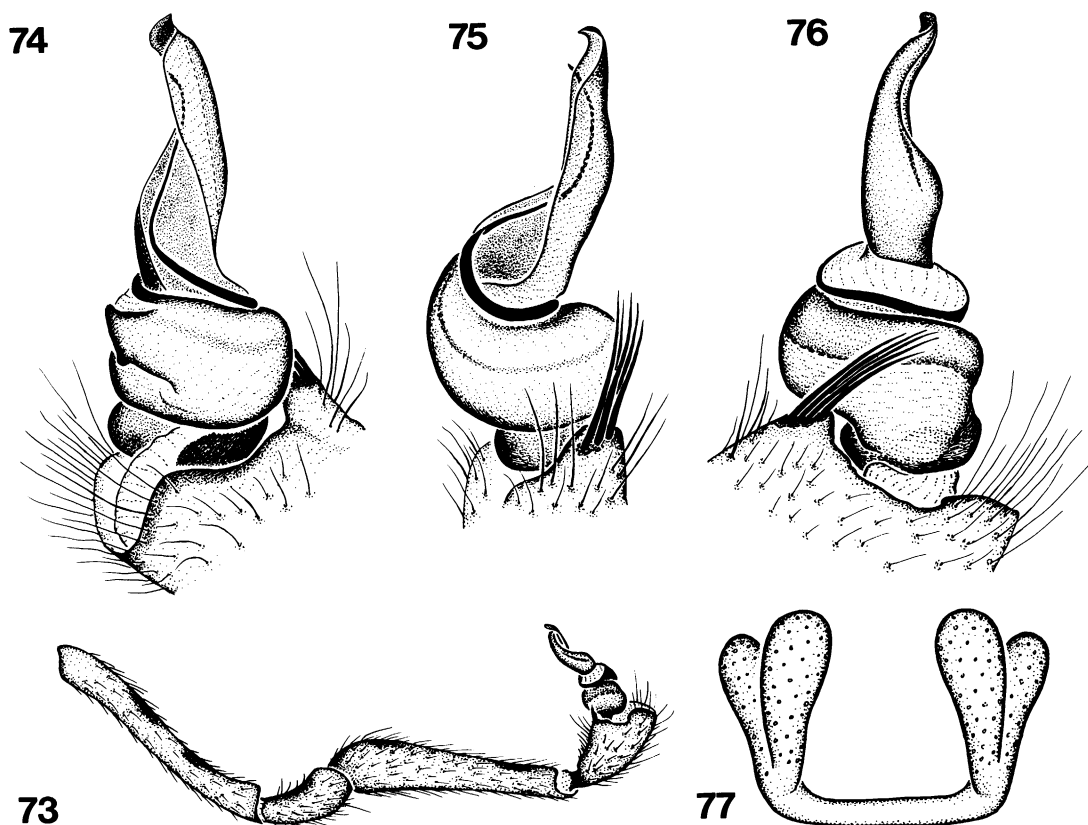
DISTRIBUTION: Northern California.

ECTATOSTICTA SIMON

Ectatosticta Simon, 1892, p. 204 (type species by original designation *Hypochilus davidi* Simon).

DIAGNOSIS: *Ectatosticta* can be distinguished from *Hypochilus* by the distally unreflexed labium, which is almost as long as wide and bears a pair of triangular posterolateral flanges (fig. 9), and by the presence of numerous leg spines.

MALE PALP: Tibia enormously elongated, as long as femur, not basally enlarged. Tarsus with spine-bearing paracymbium preceded by double row of thickened bristles. Bulb subdistal, with small subtegulum bearing rounded dorsal extension, short tegulum produced ventrally into sharp point, and proximally broad embolus supported distally by broad conductor.



Figs. 73–77. *Hypochilus kastoni*, new species. 73. Palp, retrolateral view. 74–76. Palpal bulb, pro-lateral, ventral, and retrolateral views. 77. Receptacula, dorsal view.

EPIGYNUM: Adult females with epigynal area unmodified; bursa copulatrix bearing two pairs of small receptacula.

DISTRIBUTION: Known only from China.

Ectatosticta davidi (Simon)

Figures 6–16, 18–20, 23, 24,
31–36, 78–82

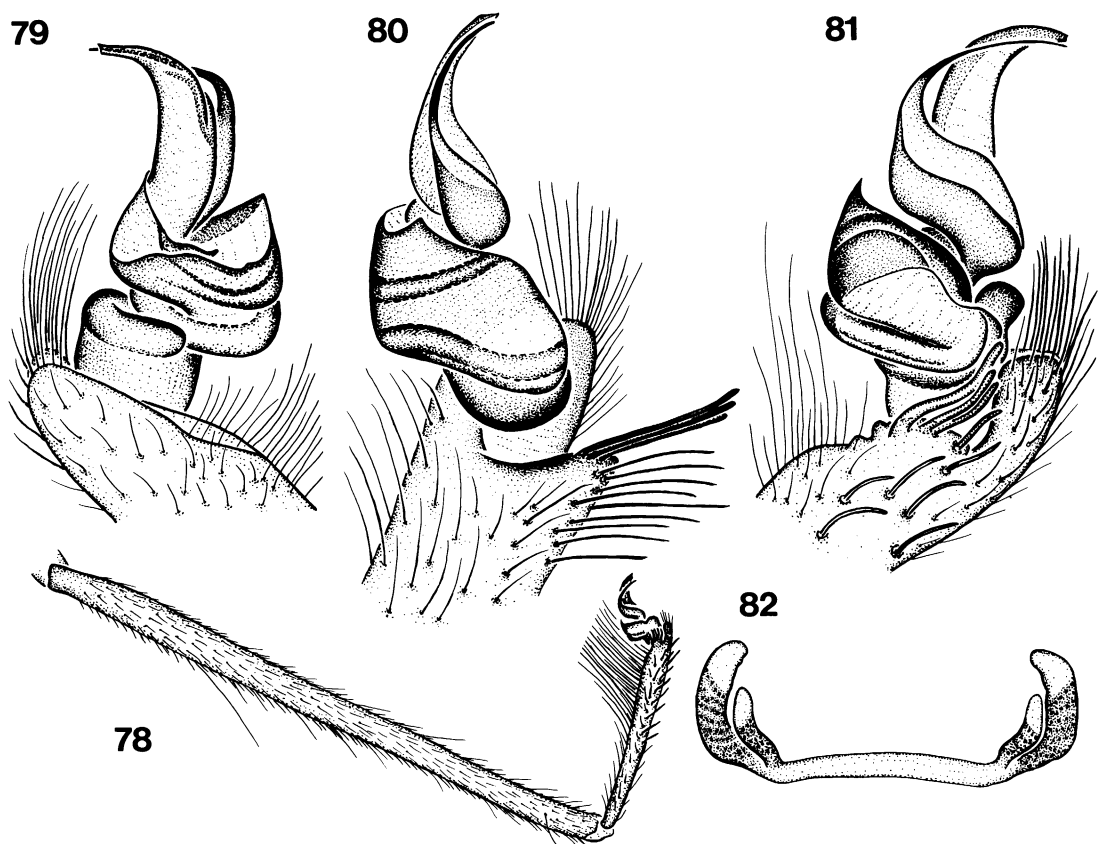
Hypochilus davidi Simon, 1888, p. ccviii (male and female syntypes supposedly from “Montagnes au nord de Péking,” China, in MNHN, examined).

Ectatosticta davidi: Simon, 1892, p. 204, figs. 143–146, 148, 149. Gertsch, 1958, p. 13, figs. 10, 19, 22–31. Lehtinen, 1967, p. 298, fig. 15.

DIAGNOSIS: With the characters of the genus.

MALE: Total length 7.42. Carapace 3.61 long, 2.92 wide, yellow, with margins of pars cephalica, broad marginal bands, and tho-

racic groove mottled with purplish brown; clypeus at middle about twice AME diameter in height. Eye sizes and interdistances: AME 0.11, ALE 0.17, PME 0.17, PLE 0.15; AME-AME 0.18, AME-ALE 0.22, PME-PME 0.30, PME-PLE 0.09, ALE-PLE 0.06; MOQ length 0.29, front width 0.40, back width 0.64. Chelicerae yellow, unmarked; endites light brown, darkened distally; labium light brown except white distally; sternum light brown, with narrow dark margins. Legs light brown, darkened distally; femora, patellae, and tibiae ringed with dark pigment. Femur I more than twice as long as carapace. Leg spination (only surfaces bearing spines listed): femora: I d4-0-1, p1-3-1, r0-2-2; II d4-1-1, p0-1-2, r3-3-1; III d3-2-1, p2-2-1, r1-2-1; IV d2-2-1, p0-1-2, r0-2-2; tibiae: I d1-0-1, p1-2-2, v3-2-4, r2-2-2; II d1-0-1, p2-1-2, v4-4-3, r2-1-2; III d1-0-1, p1-2-1, v2-2-2, r-1-1-1; IV d1-0-1,



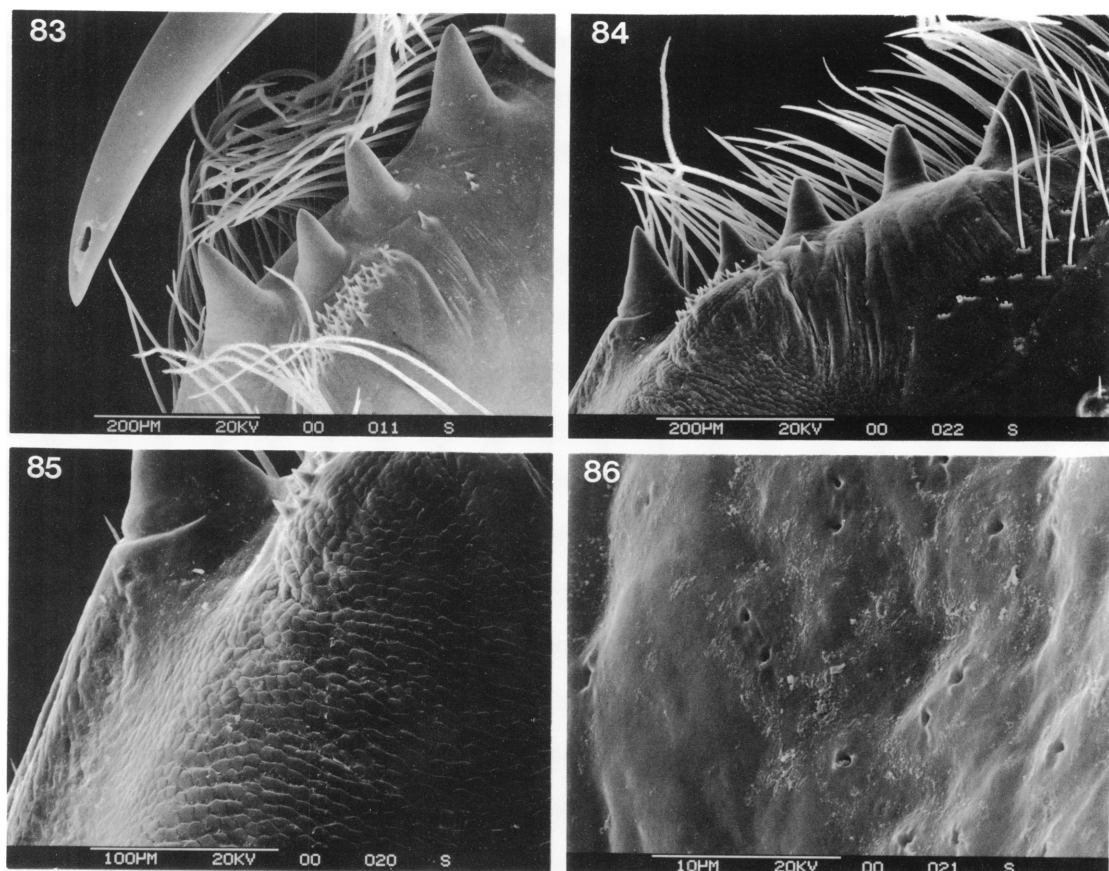
Figs. 78-82. *Ectatosticta davidi* (Simon). 78. Palp, retrolateral view. 79-81. Palpal bulb, prolateral, ventral, and retrolateral views. 82. Receptacula, dorsal view.

p1-2-1, v2-2-1p, r1-2-2; metatarsi: I d1-0-0, p1-0-1, v2-2-3, r1-0-1; II d1-0-0, p1-1-2, v3-3-3, r1-1-1; III d1-0-1, p1-1-0, v2-4-4, r1-0-1; IV p0-1-1, v2-4-4, r1-0-1. Dorsum of abdomen with scattered pale white patches anteriorly, almost completely mottled posteriorly; venter mottled except on lung patches. Palp as in figures 78-81.

FEMALE: As in male, except as noted. Total length 12.95. Carapace 5.35 long, 3.61 wide. Eye sizes and interdistances: AME 0.15, ALE 0.21, PME 0.21, PLE 0.22; AME-AME 0.18, AME-ALE 0.33, PME-PME 0.44, PME-PLE 0.20, ALE-PLE 0.06; MOQ length 0.40, front width 0.48, back width 0.86. Chelicerae light brown; endites distinctly bicolored, brown laterally, white medially; sternum uniformly brown. Femur I less than twice as long as carapace. Leg spination: femora: I d3-0-1, p1-2-2, r0-3-1; II d3-1-1, p0-3-2, r2-2-2; III d3-1-1, p0-2-2, r1-3-1; IV d3-2-0, p0-2-1; tibiae:

I d0-0-1, p1-2-1, v4-4-4, r1-2-2; II p0-2-2, v4-4-2, r0-2-2; III p1-1-1, v3-2-2, r0-1-1; IV p1-1-1, v3-1p-1p, r1-2-1; metatarsi: I p1-1-0, v4-4-4, r1-1-1; II p1-1-1, v4-4-2; III d1-0-0, p1-1-1, v2-3-4, r1-1-1; IV d0-0-1, p1-1-1, v4-3-3, r1-1-1. Palp light brown, unmarked, with tarsus darkened, all segments spined. Receptacula as in figure 82.

MATERIAL EXAMINED: (1) The two syntypes (MNHN), collected by A. David; according to the original description, these are from mountains north of Beijing, but they are currently labeled only "Sina." Simon (1892) later listed the species as being from "China merid." (southern China), which hardly describes Beijing. (2) One female (AMNH) from "Inkiaphou," Shaanxi Province, China, donated to Dr. W. J. Gertsch by authorities at MNHN; according to Schenkel (1963, p. 8), A. David collected at this locality in 1873. As repeated attempts to collect the species in



Figs. 83–86. Chelicerae of austrochilines. 83. *Thaida peculiaris* Karsch, female. 84–86. *Austrochilus manni* Gertsch and Zapfe, male. 83, 84. Promarginal teeth and retromarginal denticles. 85. Field of cheliceral gland pores, just proximal of first promarginal tooth. 86. Cheliceral gland pores.

the mountains north of Beijing have been unsuccessful (Dr. D. Song, personal commun.), it seems likely that the syntypes are actually from Inkiaphou. (3) One male and one female taken in Huangyuan County, Qinghai Province, China, on Sept. 10, 1983, by Li Zhong Shan, deposited in AMNH courtesy of Dr. D. Song.

DISTRIBUTION: Known only from central China.

AUSTROCHILOIDEA ZAPFE

The superfamily Austrochiloidea, as here construed, contains two families, the Austrochilidae and Gradungulidae. Both of these family-group names were established in 1955, and we have not been able to determine which one appeared earlier in that year; as first re-

visers, we choose the former. As argued below, these two families represent the sister group of all araneomorph spiders other than the Hypochiloidea.

AUSTROCHILIDAE ZAPFE

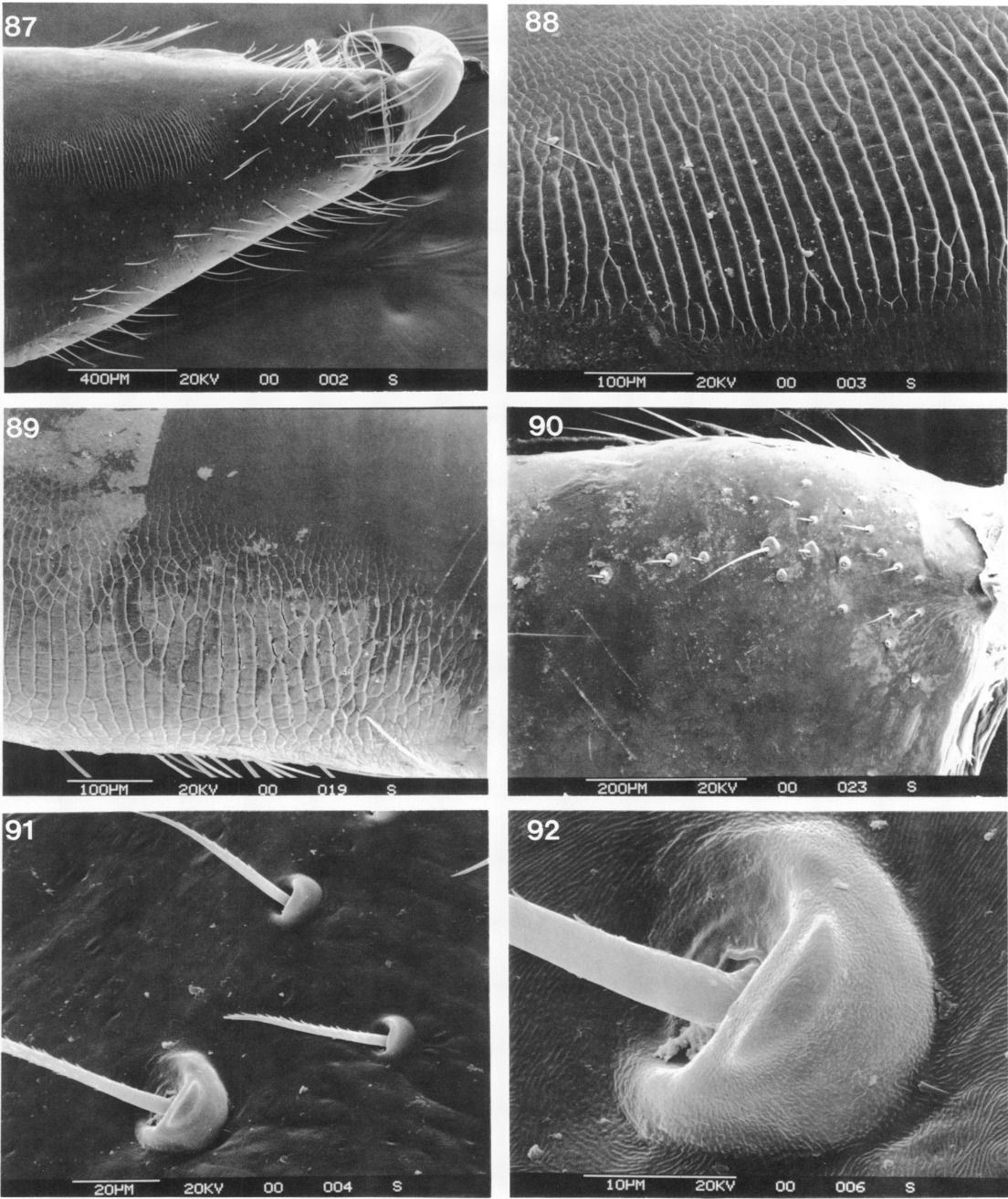
Austrochilinae Zapfe, 1955, p. 51 (type genus *Austrochilus* Gertsch and Zapfe).

Thaididae Lehtinen, 1967, p. 299 (type genus *Thaida* Karsch).

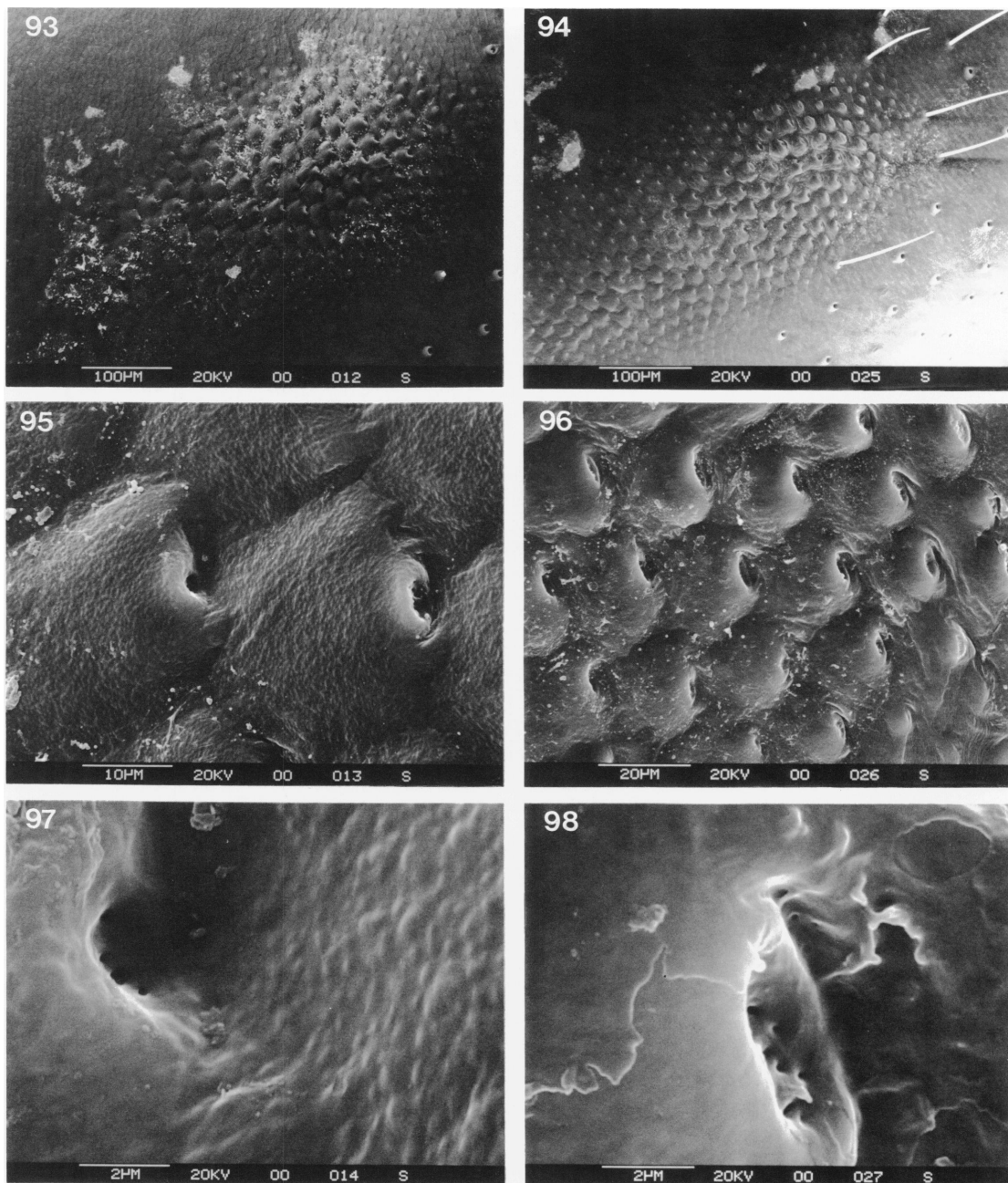
Hickmaniidae Lehtinen, 1967, p. 299 (type genus *Hickmania* Gertsch). NEW SYNONYMY.

Austrochilidae: Marples, 1968, p. 30.

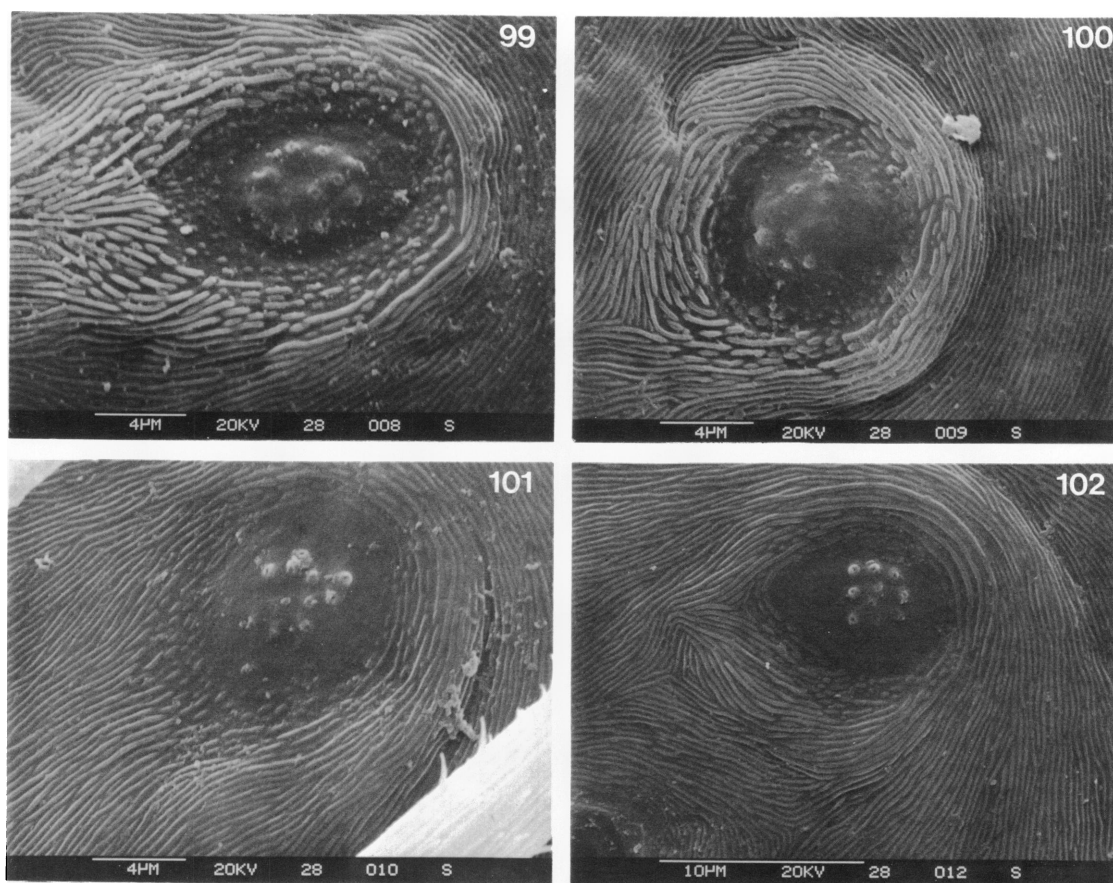
DIAGNOSIS: Austrochilids are united by the structure of the female genitalia, which are bipartite and have separate openings into the anterior and posterior receptacula; the posterior receptaculum consists of a wide pocket



Figs. 87-92. Stridulatory system of male austrochilines. 87, 88, 91, 92. *Thaida peculiaris* Karsch. 89, 90. *Austrochilus manni* Gertsch and Zapfe. 87-89. File on posterolateral surface of chelicera. 90-92. Pick on enlarged setal base situated proximally on palpal femur.



Figs. 93-98. Modified stridulatory system of female austrochilines. 93, 95, 97. *Thajda peculiaris* Karsch. 94, 96, 98. *Austrochilus manni* Gertsch and Zapfe. 93, 94. Posterolateral surface of chelicerae, showing rows of separate nodules. 95, 96. Nodules, showing distal pore fields. 97, 98. Pores of one nodule.



Figs. 99–102. Tarsal organ of austrochilines. 99, 100. *Thaidia peculiaris* Karsch, male. 101, 102. *Austrochilus melon*, new species, male. 99, 101. Organ from leg I. 100, 102. Organ from leg IV.

of wrinkled, translucent cuticle (as in figs. 158–160). Members of the family can be distinguished from hypochilids by having a uniseriate calamistrum and a serrula composed of a single row of teeth, and from gradungulids by having equally long superior claws on tarsi I and II.

DESCRIPTION: See Austrochilinae and Hickmaniinae, below.

INCLUDED GENERA: *Austrochilus*, *Thaidia*, and *Hickmania*.

DISTRIBUTION: Chile and adjacent Argentina (*Austrochilus* and *Thaidia*) and Tasmania (*Hickmania*).

SYNONYMY: See the section on cladistics, below, for our reasons for placing *Hickmania* in its own subfamily within the Austrochilidae.

NOMENCLATURE: Lehtinen (1985) proposed that the International Commission on Zoological Nomenclature use its plenary powers to award the name Thaididae Lehtinen nomenclatural precedence over the earlier name Austrochilidae Zapfe. Our reasons for disagreeing are detailed elsewhere (Platnick and Forster, in press).

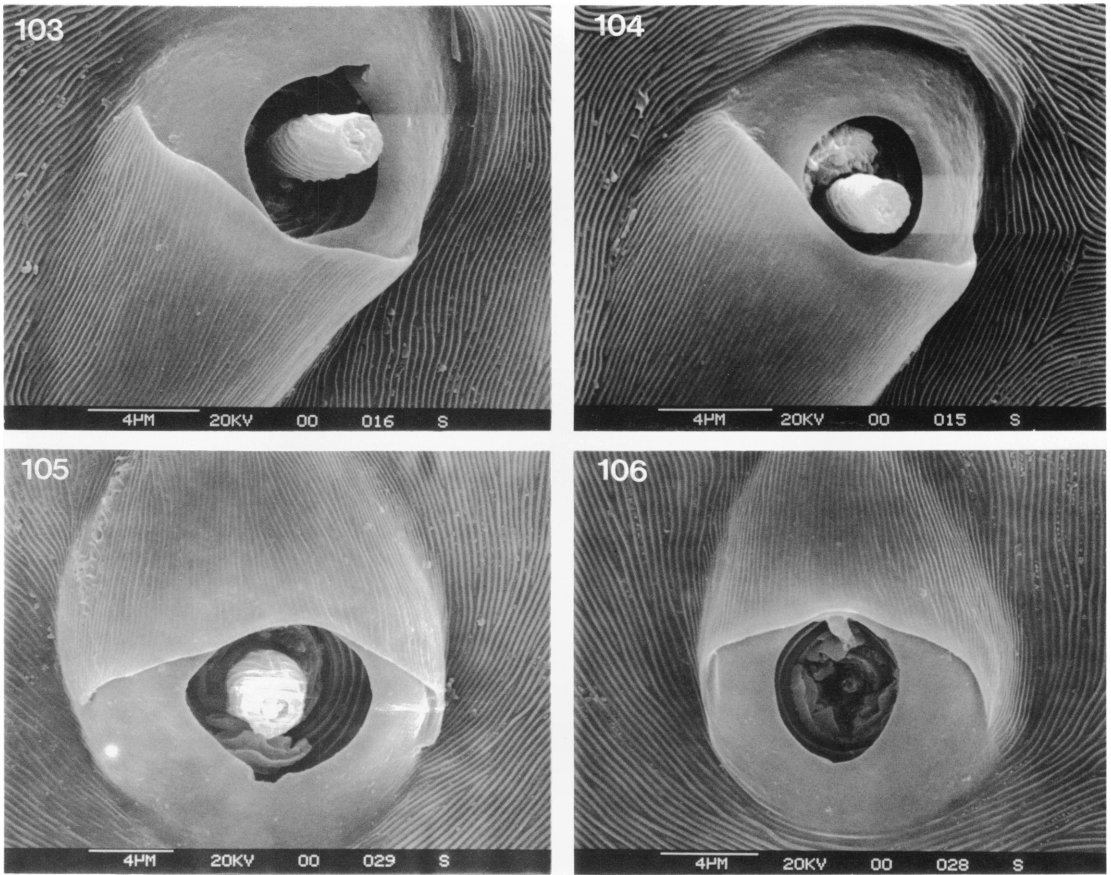
AUSTROCHILINAE ZAPFE

Austrochilinae Zapfe, 1955, p. 51 (type genus *Austrochilus* Gertsch and Zapfe).

Thaididae Lehtinen, 1967, p. 299 (type genus *Thaidia* Karsch).

Austrochilidae: Marples, 1968, p. 30.

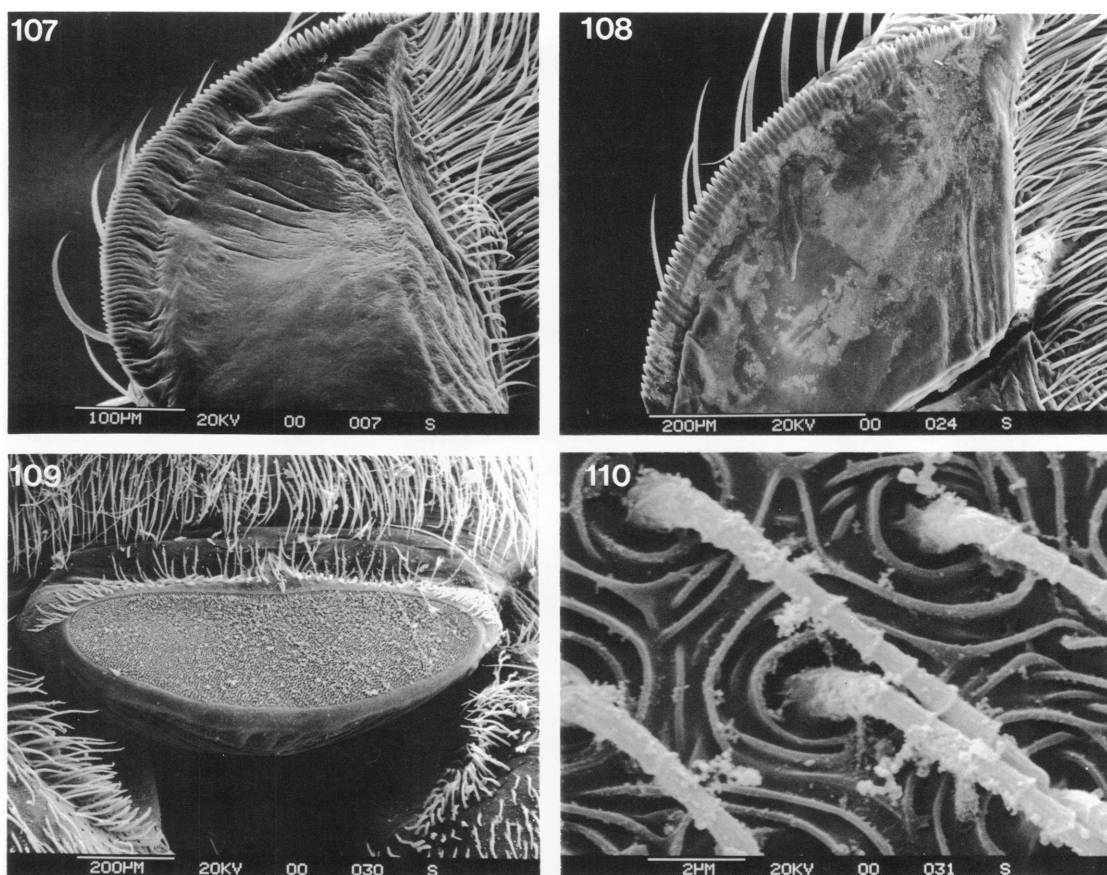
DIAGNOSIS: Austrochilines can be distinguished from hickmaniines by having posterior tracheae.



Figs. 103–106. Trichobothrial base of austrochilines. 103, 104. *Thaida peculiaris* Karsch, female. 105, 106. *Austrochilus manni* Gertsch and Zapfe, female. 103, 105. Typical bothrium, showing unnotched distal margin. 104, 106. First tibial bothrium, showing unnotched distal margin.

DESCRIPTION: Large (total length 8–16) araneomorph, cribellate spiders. Carapace longer than wide, low, oval but distinctly narrowed opposite palpi, widest between coxae II and III, posterior margin invaginated and reflexed medially; clypeus vertical, produced between chelicerae; thoracic groove long, y-shaped, deep posteriorly, situated back about three-fourths of carapace length; surface coated with short, semirecumbent, dark setae, few longer bristles occurring only behind ocular area. Eight eyes in two rows; from above, anterior row at least slightly recurved, posterior row straight or very slightly procurved; from front, anterior row straight, posterior row procurved; all eyes circular, ringed with black pigment; AME dark, others light; AME smaller than other, usually sub-

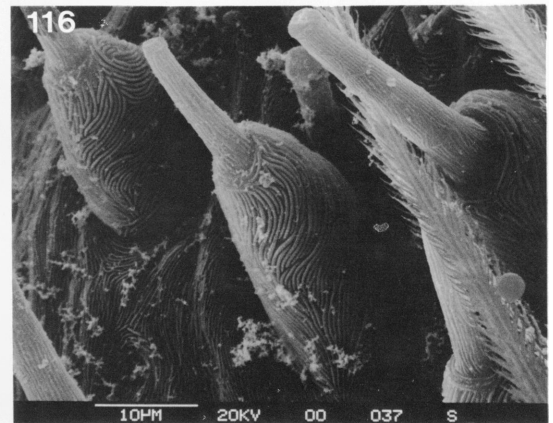
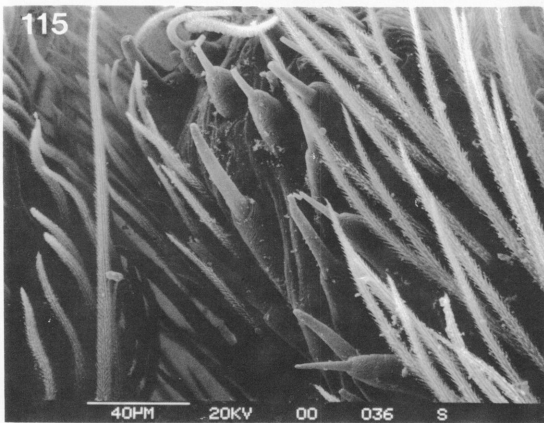
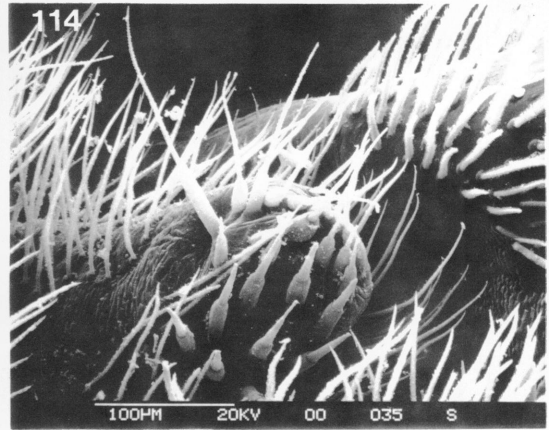
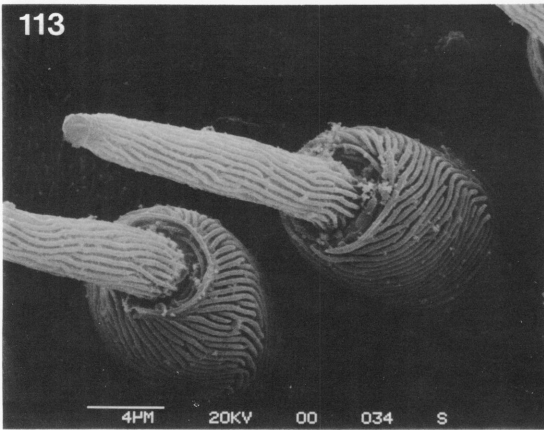
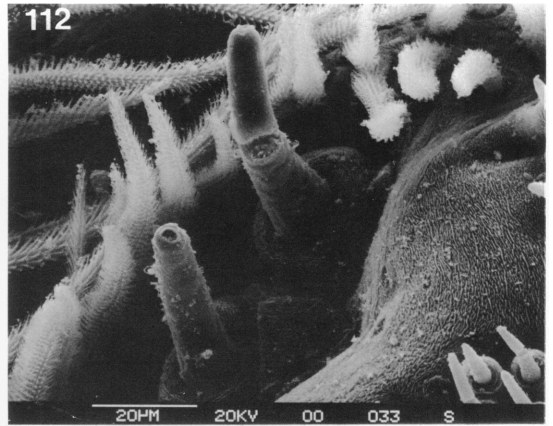
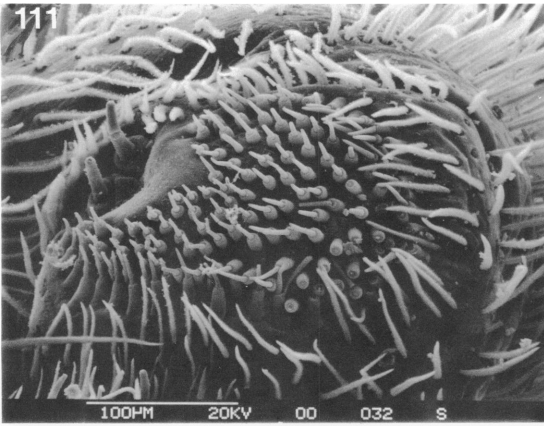
equal eyes; AME closer to each other than to ALE, posteriors subequally spaced; MOQ usually wider in back than long, longer than wide in front. Chelicerae vertical, diaxial, not divergent, without lateral condyles, with five strong promarginal teeth, most distal largest, second most proximal smallest, retromargin with clump of tiny denticles closely packed opposite two most proximal promarginal teeth, followed distally by two or three slightly larger denticles (figs. 83, 84); cheliceral gland opening through field of pores just proximal of first promarginal tooth (figs. 85, 86); posterolateral surface in males with stridulatory file of evenly spaced ridges (figs. 87–89), ridges longest distally; posterolateral surface in females with ridges represented by rows of separate nodules (figs. 93, 94), each



Figs. 107–110. Serrula and cribellum of austrochilines. 107, 109, 110. *Thaïda peculiaris* Karsch. 108. *Austrochilus manni* Gertsch and Zapfe. 107, 108. Serrula of male, posterior view. 109. Cribellum of female, ventral view. 110. Spigots of cribellum.

nodules bearing distal field of several pores (figs. 95–98) possibly serving to dispense pheromones. Endites parallel, with truncate distal margins bearing dense scopula anteromedially and serrula composed of long single row of teeth (figs. 107, 108) anterolaterally. Labium wider than long, widest at about half of length, with distal margin slightly incised at middle. Sternum much longer than wide, incised between coxae, without sigilla or sclerotized extensions, reaching half length of coxae IV in females, full length of coxae IV in males; coxae IV separated by one-fourth their width. Leg formula 1243 or 1423, legs long, narrow, strongly spined; trochanters slightly notched; metatarsi without preening combs; calamistrum composed of single row of bristles occupying middle one-third of me-

tatarsi IV; tarsi lightly scopulate, with three dentate claws, superiors equal; tarsal organ exposed, shallowly excavated disc bearing about 10 receptor nodes grouped near center (figs. 99–102); trichobothria in double row on tibiae, absent on tarsi, single subdistally on metatarsi, bothria without transverse ridges, with notched distal margin (figs. 103, 105) except on most proximal tibial bothrium, where margin entire (figs. 104, 106). Abdomen coated with long, erect, dark setae, anterior spiracles leading to booklungs, posteriors situated near spinnerets, connected by distinct furrow externally, leading to tracheae; cribellum wide, short, undivided (fig. 109), bearing ribbed spigots (fig. 110); anterior lateral spinnerets thick, three-segmented, bearing two long and numerous short spigots



Figs. 111–116. Spinnerets and spigots of *Thaidia peculiaris* Karsch, female. 111–113. Spigots of anterior lateral spinneret. 114. Spigots of posterior median spinneret. 115, 116. Spigots of posterior lateral spinneret.

(figs. 111–113), posterior medians short, narrow, one-segmented, bearing long marginal (“paracribellar”) and shorter median spigots (fig. 114), posterior laterals smaller than an-

terior laterals, two-segmented, bearing oblique spigots (figs. 115, 116). Palpal segments bearing spines, femur in both sexes with single proximal enlarged setal base prob-



Figs. 117, 118. 117. *Thaidia peculiaris* Karsch, female with egg sac. 118. *T. chepu*, new species, web.

ably functioning (at least in males) as stridulatory pick (figs. 90–92), tarsus of females bearing long, dentate claw, of males with complex bulb attached basally. Female genitalia bipartite, with separate openings into anterior and posterior receptacula.

INCLUDED GENERA: *Austrochilus* and *Thaïda*.

DISTRIBUTION: Chile and adjacent Argentina.

NATURAL HISTORY: Austrochilines build extremely conspicuous and horizontally oriented aerial webs that are among the most commonly encountered silk structures in the moist forests of Chile (figs. 117–122). During the day, the spiders remain in retreats at the end of a funnel-shaped portion of the web; the retreats are usually placed far back in rocks or tree roots and are often entirely inaccessible to collectors (short of using dynamite or chain saws!). At night, however, the spiders hang under their webs and are more easily collected. When disturbed, the animals often assume a defensive pose, with all the legs drawn tightly up around the body. The retreats of adult females often contain several egg cases (as well as an occasional adult male). Web and spider size are highly correlated; judging from the amounts of silk accumulated in retreats, it seems likely that individuals tend to stay in one place, possibly over a period of several years.

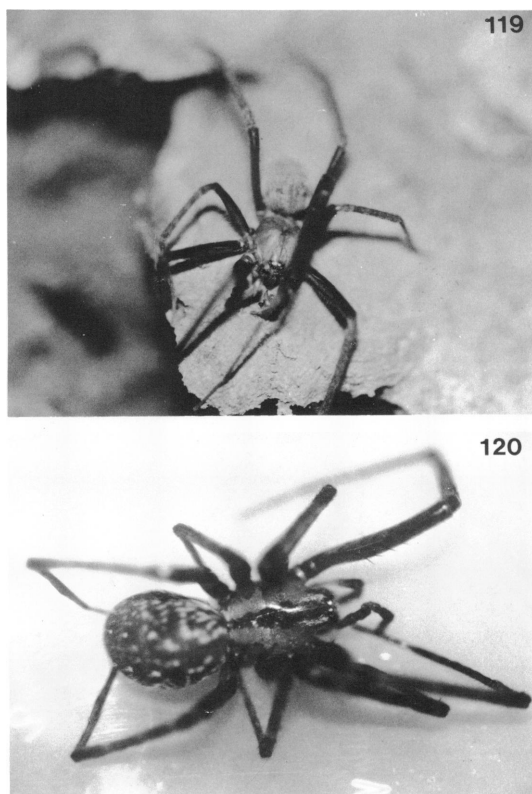
AUSTROCHILUS GERTSCH AND ZAPFE

Austrochilus Gertsch and Zapfe, in Zapfe, 1955, p. 47 (type species by original designation *Austrochilus manni* Gertsch and Zapfe).

NOTE: Lehtinen (1967) synonymized *Austrochilus* with *Thaïda*, and its type species, *A. manni*, with that of *Thaïda*, *T. peculiaris*; these synonymies are rejected here.

DIAGNOSIS: Members of this genus can be separated from those of *Thaïda* by having relatively smaller anterior median eyes, such that the clypeal height at the midline is five or six times, rather than two or three times, the diameter of an anterior median eye, as well as by the genitalic features detailed below.

MALE PALP: Bulb attached to small, oval alveolus by short basal hematodocha; subtegulum and tegulum apparently fused, sep-



Figs. 119, 120. *Austrochilus franckei*, new species. 119. Male. 120. Female.

aration between them possibly represented by area of weakened sclerotization around small, sharp apophysis on retrolateral side, bearing additional short apophysis distally, connected proximally to long, massive, conductor separated by large distal hematodocha from long, spear-shaped terminal apophysis and massive embolus bearing longitudinal ridges distally.

EPIGYNUM: Small anterior knob situated on anterior face, some species with distinct sclerotization just behind anterior knob; transverse plate present between openings into anterior and posterior receptacula, plate invaginated anteriorly at middle, appressed against anterior face, oriented horizontally; posterior portion of internal genitalia represented by long, flattened pouch; anterior portion divided into medial and anterior lobes, medial lobe bearing elongate, distally widened extension, anterior lobe enclosing well-developed poreplate.



Figs. 121, 122. *Austrochilus franckei*, new species, web.

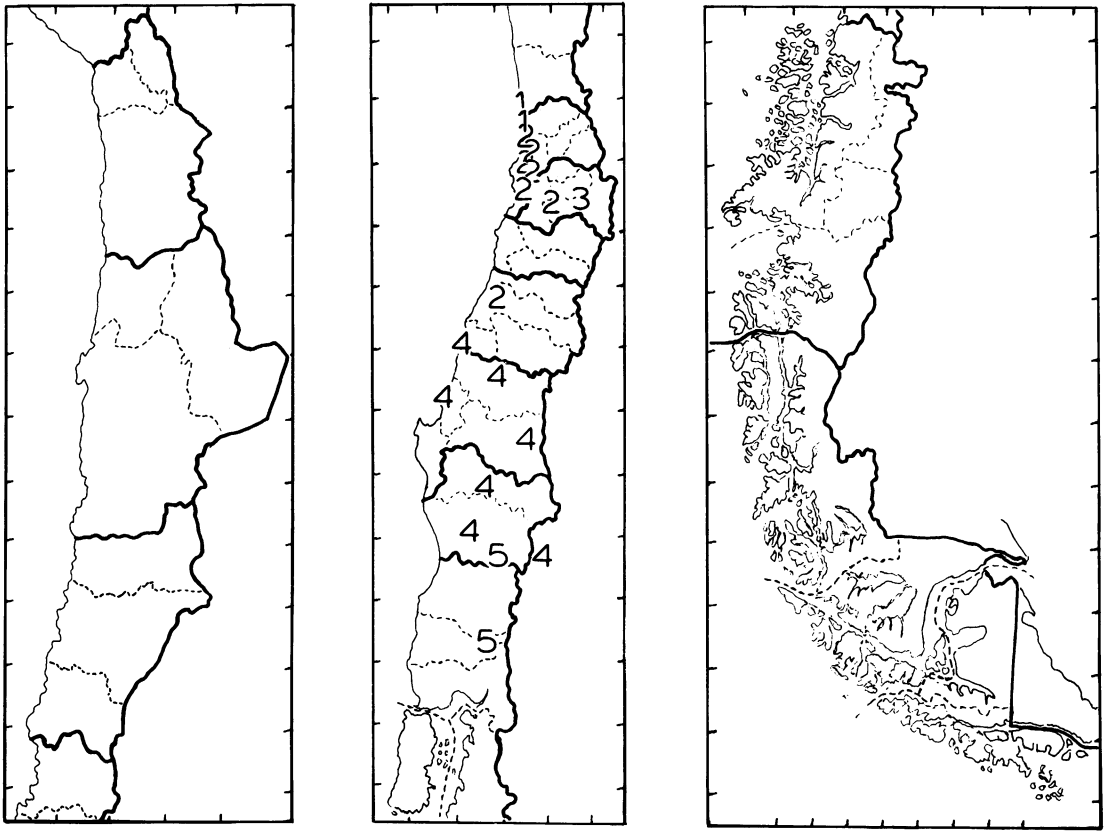


Fig. 123. Chile and adjacent Argentina, showing records of *Austrochilus manni* (1), *A. melon* (2), *A. schlingeri* (3), *A. franckei* (4), and *A. newtoni* (5).

DISTRIBUTION: North-central to south-central Chile (Coquimbo to Osorno) and adjacent Argentina (fig. 123).

INTERRELATIONSHIPS: On the basis of genitalic features discussed in the diagnoses below, *A. manni* and *A. melon* (species 1 and 2, fig. 123), as well as *A. franckei* and *A. newtoni* (species 4 and 5, fig. 123), appear to be pairs of sister species, and *A. schlingeri* (species 3, fig. 123) seems more closely related to the first of these pairs than to the second.

Austrochilus manni Gertsch and Zapfe

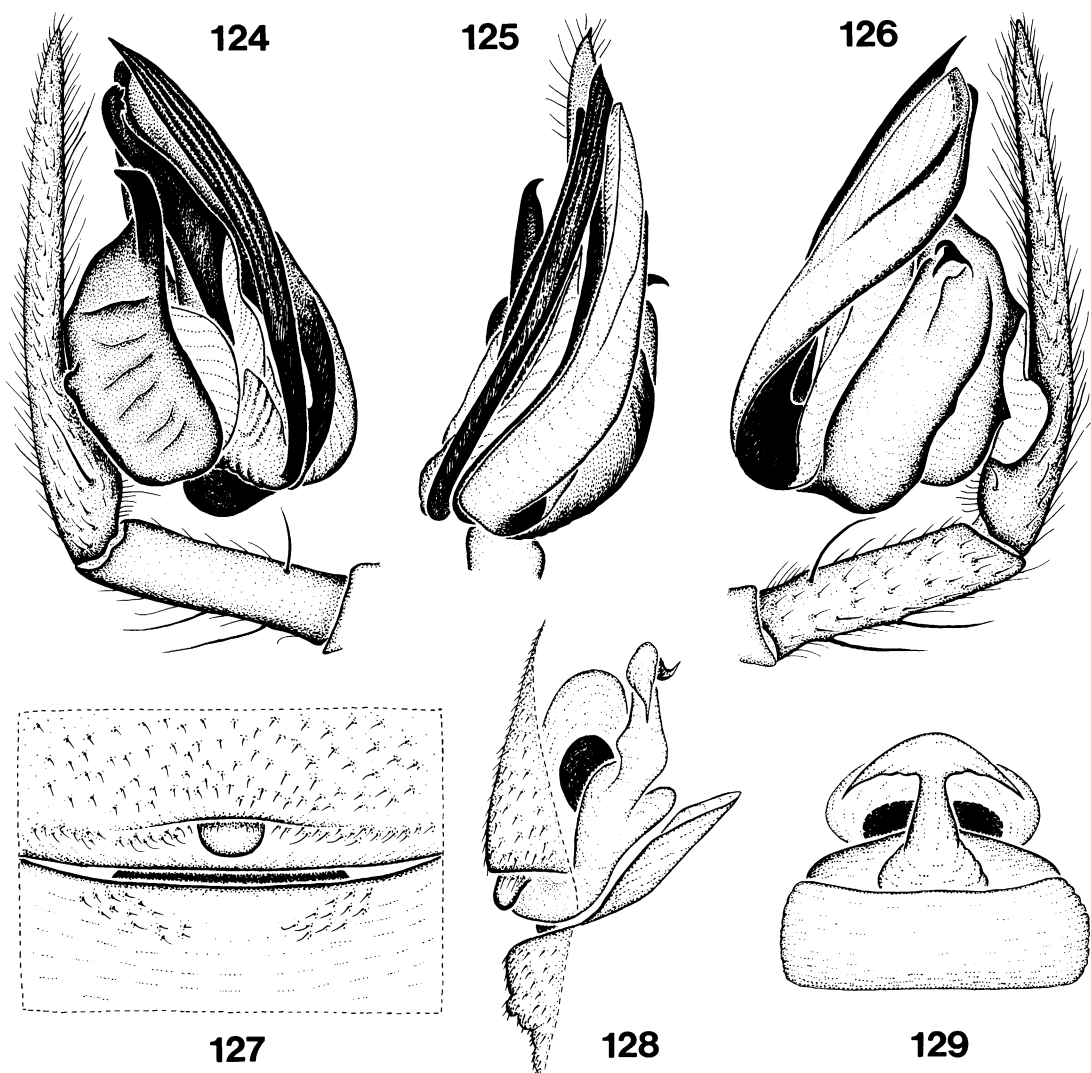
Figures 84–86, 89, 90, 94, 96, 98,
105, 106, 108, 124–129

Austrochilus manni Gertsch and Zapfe, in Zapfe, 1955, p. 47 (male holotype from Jorgen, Los Vilos, Choapa, Region de Coquimbo [IV], Chile,

in AMNH, examined); Gertsch, 1958, p. 20, fig. 41 (male only).

DIAGNOSIS: This species seems closest to *A. melon*, which it resembles in having a trapezoidal sclerotization medially on the plate between the anterior and posterior epigynal openings, but can be distinguished by having that sclerotization wider than in females of *A. melon* (fig. 127) and by having a much smaller sclerotized strip retrolaterally on the male palpal conductor (fig. 126).

MALE: Total length 10.65. Carapace 5.80 long, 4.20 wide, dull yellow, sides with wide, dentate, dusky brown, longitudinal bands, midline with narrow, dusky brown, longitudinal band reaching from PME almost to rear of pars thoracica, median band enclosing five dark longitudinal streaks extending back from PME to about half of pars cephalica length,



Figs. 124–129. *Austrochilus manni* Gertsch and Zapfe. 124–126. Palp, prolateral, ventral, and retrolateral views. 127–129. Epigynum, posteroventral, lateral, and dorsal views.

posterior portion of pars cephalica with median, v-shaped, dark maculation; clypeus at middle about six times AME diameter in height. Eye sizes and interdistances: AME 0.11, ALE 0.23, PME 0.21, PLE 0.22; AME-AME 0.11, AME-ALE 0.21, PME-PME 0.21, PME-PLE 0.21, ALE-PLE 0.04; MOQ length 0.56, front width 0.33, back width 0.63. Chelicerae brown; endites dark brown except anteromedian surfaces white anteriorly, yellow posteriorly; labium dark brown except for white anterior margin; sternum dusky brown

with indistinct pattern of darker markings. Legs yellow, femora with four darkened rings, apical ring smaller than others, patellae darkened, tibiae with three darkened rings, apical ring as large as others, anterior metatarsi and tarsi uniformly reddish brown, posteriors unmarked. Spination (only surfaces bearing spines listed): femora: I d1-1-1, p0-2-2, r2-3-1; II d1-1-1, p1-2-2, r2-3-1; III d1-2-1, p1-2-2, r2-2-1; IV d1-1-1, p1-2-2, r1-3-2; tibiae: I p1-2-0, v2-3-0, r1-2-0; II d1-1-0, p1-2-1, v2-4-2, r1-2-1; III d1-1-1, p1-1-1, v2-4-2, r1-

1-1; IV d1-1-1, p1-2-1, v2-4-2, r1-2-1; metatarsi: I p1-2-1, v1r-2-2, r1-1-1; II p2-2-1, v3-2-2, r2-1-2; III p2-2-1, v2-3-2, r2-1-2; IV p1-2-1, v2-2-2, r2-1-2. Leg formula 1423 (leg measurements from Gertsch, 1958):

	I	II	III	IV	Palp
Femur	9.65	7.60	6.35	8.50	2.52
Patella	2.17	2.00	1.65	1.70	0.72
Tibia	10.50	7.35	5.60	7.75	1.52
Metatarsus	11.70	8.90	6.70	8.70	—
Tarsus	5.20	3.65	2.80	3.75	3.25
Total	39.22	29.50	23.10	30.40	8.01

Abdomen dusky purplish brown, dorsum with light spots in paramedian, longitudinal rows, venter with light spots in longitudinal rows between booklung and tracheal light patches. Palpal femur spination d1-1-2, p0-0-1, r0-1-1; patella with single distodorsal spine, tibial spination d0-1-1, p0-1-0, v2-0-0; tarsus with translucent, sclerotized tip, bearing complex bulb (figs. 124–126).

FEMALE: As in male, except as noted. Total length 9.04. Carapace 4.03 long, 3.17 wide; clypeal height about five times AME diameter. Eye sizes and interdistances: AME 0.12, ALE 0.21, PME 0.20, PLE 0.22; AME-AME 0.06, AME-ALE 0.16, PME-PME 0.18, PME-PLE 0.19, ALE-PLE 0.03; MOQ length 0.51, front width 0.30, back width 0.59. Posterior metatarsi and tarsi with vaguely indicated dark bands. Spination: femora: I p1-2-2, r2-2-2; II d1-1-0; III d1-1-1; IV r1-2-1; tibiae: I p1-2-1, v2-5-2, r1-1-1; II d1-0-0; III, IV v2-2-2; metatarsi: I p1-1-1, v1p-4-2; II p1-2-1, r1-1-2. Leg formula 1243:

	I	II	III	IV	Palp
Femur	6.30	5.32	4.41	5.48	1.94
Patella	1.58	1.30	1.08	1.14	0.47
Tibia	7.02	5.18	3.60	5.05	1.15
Metatarsus	6.20	4.59	3.56	5.03	—
Tarsus	3.03	2.24	1.72	2.16	2.04
Total	24.13	18.63	14.37	17.86	5.60

Palpal spination: femur r0-0-1; patella p0-1-0, r0-1-0; tibia d1-1-0, p1-1-0, v1r-0-0; tarsus d1-1-0, p1-1-1, v1p-2-3, r1-2-0. Epigynum with wide, trapezoidal sclerotization on plate between anterior and posterior openings (figs. 127–129).

MATERIAL EXAMINED: CHILE: **Region de Coquimbo (IV):** *Choapa*: Jorgen, Los Vilos,

Nov. 9, 1951 (AMNH), 1♂ (holotype). **Region de Valparaíso (V):** *Petorca*: Quebrada Huaquén, Pichicuy, Jan. 7, 1984 (E. A. Maury, P. Goloboff, MACN, AMNH), 3♀.

DISTRIBUTION: Northern Chile (Coquimbo and Aconcagua).

***Austrochilus melon* Platnick, new species**
Figures 101, 102, 130–135

TYPE: Male holotype taken under dead cactus in chaparral at an elevation of 520 m at Cuesta El Melón, Quillota, Region de Valparaíso (V), Chile (January 10, 1985; N. I. Platnick and O. F. Francke), deposited in AMNH.

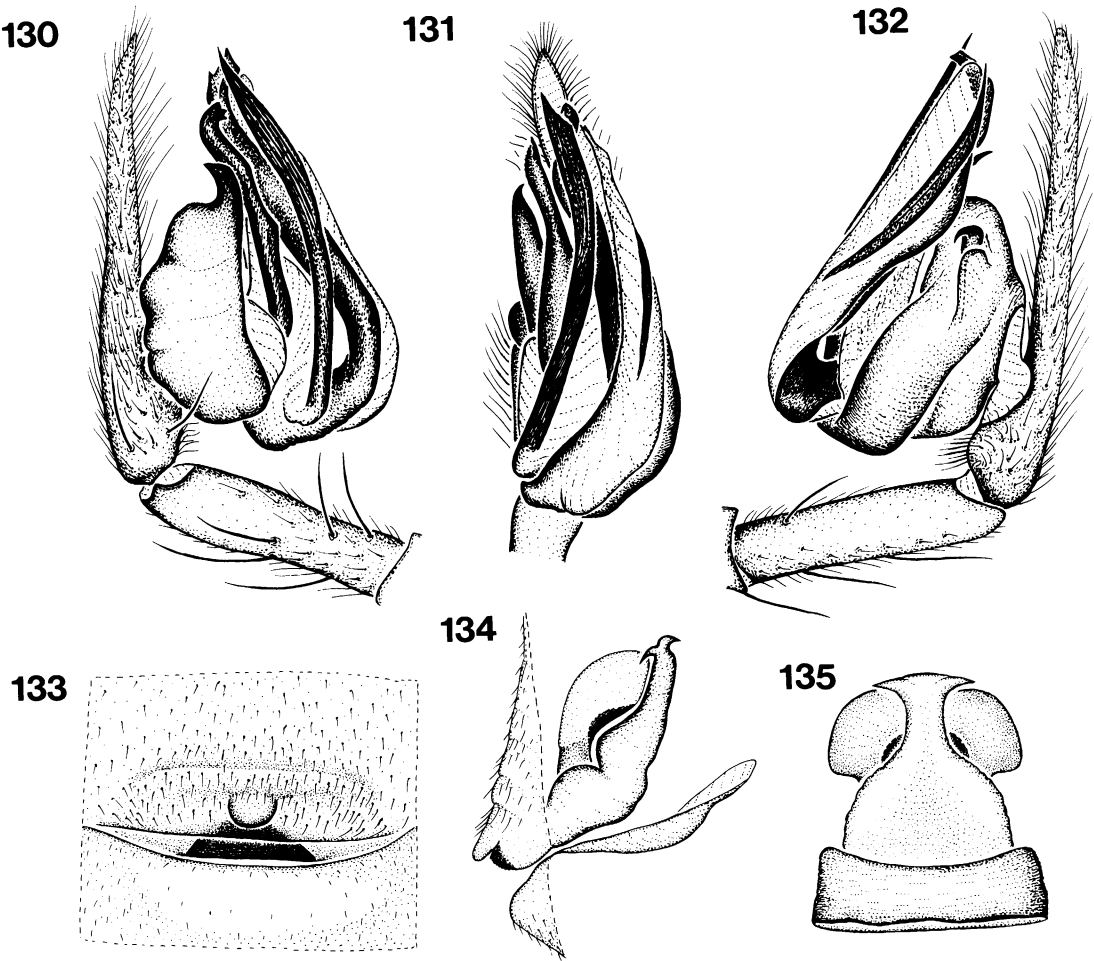
ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

DIAGNOSIS: Males can be distinguished from those of *A. manni* by the different shape of the tip of the palpal conductor and the wider sclerotized strip situated retrolaterally on the conductor (fig. 132), females by the much narrower median sclerotization on the plate between the anterior and posterior epigynal openings (fig. 133).

MALE: As in *A. manni*, except as noted. Total length 8.05. Carapace 4.75 long, 3.48 wide, longitudinal band extending back from PME enclosing only three dark longitudinal streaks. Eye sizes and interdistances: AME 0.12, ALE 0.22, PME 0.20, PLE 0.22; AME-AME 0.09, AME-ALE 0.18, PME-PME 0.20, PME-PLE 0.21, ALE-PLE 0.02; MOQ length 0.47, front width 0.33, back width 0.60. Femoral and tibial banding less distinct on anterior legs than on posteriors. Spination: femora: I p1-2-2, r2-2-2; II r2-2-2; III d1-1-1; IV r2-3-2; tibiae: I p2-2-1, v2-4-2, r1-2-1; II r1-1-1; III v2-3-2; metatarsi: I p1-1-1, v1r-4-2, r1-1-2; II p1-1-1, v2-2-2, r1-1-1; IV p2-1-1, v1r-3-2. Leg formula 1243:

	I	II	III	IV	Palp
Femur	7.41	6.04	5.04	6.24	2.66
Patella	1.66	1.45	1.35	1.31	0.58
Tibia	7.92	6.04	4.31	5.94	1.51
Metatarsus	8.28	6.76	4.81	6.44	—
Tarsus	3.46	2.59	1.90	2.65	2.74
Total	28.73	22.88	17.41	22.58	7.49

Palpal spination: femur d0-1-2; patella r0-1-0; tibia d1-1-0, p1-1-0; palpal bulb as in figures 130–132.



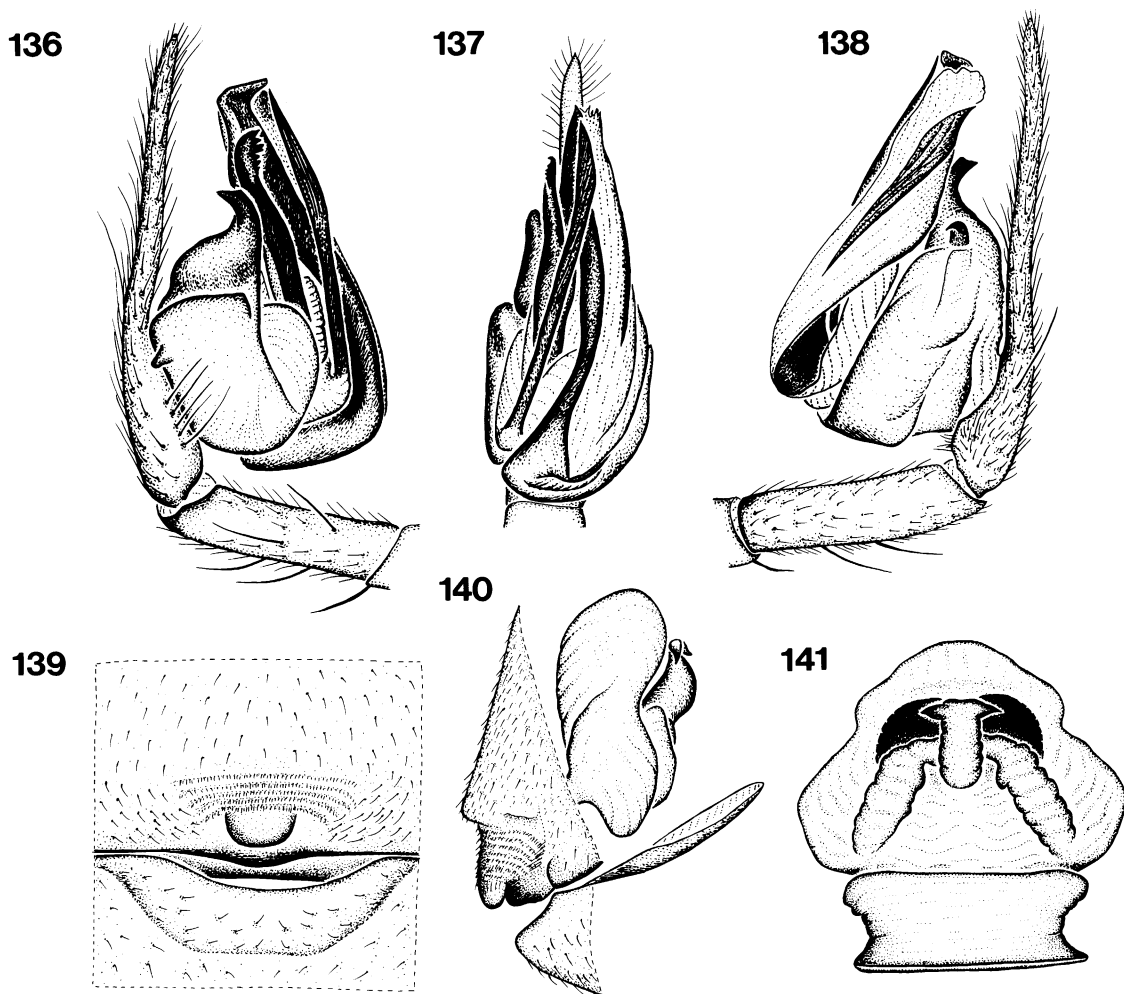
Figs. 130–135. *Austrochilus melon*, new species. 130–132. Palp, prolateral, ventral, and retrolateral views. 133–135. Epigynum, posteroventral, lateral, and dorsal views.

FEMALE: As in male, except as noted. Total length 13.46. Carapace 6.26 long, 4.14 wide, dusky band along midline reaching entire length, much darker than lateral bands. Eye sizes and interdistances: AME 0.15, ALE 0.24, PME 0.23, PLE 0.24; AME-AME 0.09, AME-ALE 0.24, PME-PME 0.30, PME-PLE 0.28, ALE-PLE 0.06; MOQ length 0.65, front width 0.39, back width 0.76. Spination as in male of *A. manni* except: femora: I d0-1-1, p1-4-1; III d1-1-1; IV r2-2-2; tibiae: I p1-2-1, v2-4-2, r2-2-1; II d1-0-0, r1-1-1; III v2-3-2; IV v4-2-2; metatarsi: I p1-1-2, v3-2-2; II p1-2-1, r1-1-2; III p1-2-1; IV p1-1-2, v1r-3-2, r2-1-1. Leg formula 1423:

	I	II	III	IV	Palp
Femur	8.86	7.70	6.12	8.01	2.75
Patella	2.17	1.84	1.66	1.80	0.80
Tibia	9.72	7.20	5.26	7.23	1.63
Metatarsus	8.01	6.92	5.40	6.83	—
Tarsus	3.78	2.66	2.42	2.74	2.95
Total	32.54	26.32	20.86	26.61	8.13

Palpal spination as in male of *A. manni* except: femur d0-1-2; patella r0-1-0; tarsus d1-1-1, p1-1-0, v2-0-4, r1-1-1, with long, dentate claw. Epigynum with narrow trapezoidal sclerotization on plate between anterior and posterior openings (figs. 133–135).

OTHER MATERIAL EXAMINED: CHILE: Re-



Figs. 136–141. *Austrochilus schlingeri*, new species. 136–138. Palp, prolateral, ventral, and retrolateral views. 139–141. Epigynum, posteroventral, lateral, and dorsal views.

gion de Valparaíso (V): *Petorca*: Quebrada El Tigre, Aug. 12, 1966 (E. I. Schlinger, M. E. Irwin, UCB), 1♀; Talanquén, Oct. 1982 (L. E. Peña G., AMNH), 1♂. *Quillota*: Cuesta Pucalán, Aug. 1, 1966 (E. I. Schlinger, M. E. Irwin, UCB), 1♀; E side, Cuesta Pucalán, Sept. 19, 1966 (E. I. Schlinger, CEG), 2♂, 2♀; Palmas de Ocoa, Parque Nacional La Campana, Jan. 12, 1985, elev. 475 m, riparian forest (N. I. Platnick, O. F. Francke, AMNH), 1♂, 1♀, Feb. 5, 1986, elev. 450 m, dry, rocky streamside (N. I. Platnick, R. T. Schuh, AMNH), 1♀; Río Marga Marga, Los Perales,

Oct. 13, 1966, elev. 330 m (E. I. Schlinger, M. E. Irwin, UCB), 1♂, 4♀. **Valparaíso**: 10 km S Casablanca, Jan. 1984 (E. A. Maury, P. Goloboff, MACN), 1♀. **Region Metropolitana: Santiago**: Quebrada de La Plata, near Maipú, Sept. 28, 1966 (E. I. Schlinger, UCB), 2♀, Jan. 15, 1985, elev. 580 m, streamside rocks (N. I. Platnick, O. F. Francke, AMNH), 3♀. **Region del Maule (VII): Talca**: Tonlema, Dec. 14–21, 1984 (L. Irarrazaval, AMNH), 1♀.

DISTRIBUTION: North-central Chile (Valparaíso to Talca).

Austrochilus schlingeri Platnick,
new species

Figures 136–141

TYPES: Male holotype and female paratype taken from streamside rocks at an elevation of 850 m 1 km east of El Canelo, Cordillera, Region Metropolitana de Santiago, Chile (January 16, 1985; N. I. Platnick and O. F. Francke), deposited in AMNH.

ETYMOLOGY: The specific name is a patronym in honor of Dr. E. I. Schlinger, who first collected the species.

DIAGNOSIS: This species seems closest to *A. manni* and *A. melon*, with which it shares the presence of a sclerotized strip retrolaterally on the male palpal conductor; males can be distinguished from those of *A. manni* and *A. melon* by the shape of the tip of the palpal conductor (fig. 136), females by the much wider anterior receptacular elements (fig. 141).

MALE: As in *A. manni*, except as noted. Total length 9.50. Carapace 5.18 long, 4.00 wide, with dark median streaks extending back from each posterior eye to about half length of pars cephalica; clypeal height about five times AME diameter. Eye sizes and interdistances: AME 0.14, ALE 0.26, PME 0.22, PLE 0.21; AME-AME 0.05, AME-ALE 0.18, PME-PME 0.24, PME-PLE 0.25, ALE-PLE 0.02; MOQ length 0.45, front width 0.33, back width 0.68. Banding indistinct on femur I. Spination: femora: I p2-2-1, r2-3-2; II, III r-2-2-2; IV d1-2-1; tibiae: I d0-1-0, vlr-4-2, r1-2-1; II d1-1-1; III p2-2-1; metatarsi: I v3-2-2; II p1-2-1, r1-1-1; III v3-2-2; IV p2-1-1.

	I	II	III	IV	Palp
Femur	8.98	7.38	5.89	7.65	2.74
Patella	1.72	1.71	1.44	1.53	0.78
Tibia	9.08	7.19	5.31	7.12	1.58
Metatarsus	10.88	7.98	6.26	8.18	—
Tarsus	4.47	3.06	2.39	3.20	3.36
Total	35.13	27.32	21.29	27.68	8.46

Palpal femur spination d0-1-1; conductor with blunt, ventrally directed tip (figs. 136–138).

FEMALE: As in male, except as noted. Total length 15.34. Carapace 7.42 long, 5.18 wide, streaks extending back from PLE only half as long as those extending back from PME. Eye sizes and interdistances: AME 0.16, ALE

0.27, PME 0.26, PLE 0.27; AME-AME 0.11, AME-ALE 0.27, PME-PME 0.29, PME-PLE 0.29, ALE-PLE 0.09; MOQ length 0.73, front width 0.43, back width 0.81. Banding indistinct except on posterior femora and tibiae. Spination as in male of *A. manni* except: femora: I p1-2-2, r2-3-2; II r2-2-1; III d1-1-1; IV r2-3-2; tibiae: I d1-1-0, p2-3-1, vlp-4-2, r1-2-1; III p1-2-1, r1-0-1; IV r2-2-1; metatarsi: I p1-1-1, v2-2-2; II p1-2-1, r1-1-2; III v3-2-2; IV p1-1-1. Leg formula 1243:

	I	II	III	IV	Palp
Femur	10.52	8.92	7.41	9.09	3.04
Patella	2.44	2.43	1.70	1.80	0.90
Tibia	11.30	8.42	4.84	8.01	1.87
Metatarsus	9.91	8.06	4.90	8.02	—
Tarsus	4.25	3.15	2.44	3.10	3.53
Total	38.42	30.98	21.29	30.02	9.34

Palpal spination as in male of *A. manni* except: femur d0-1-2; tarsus d1-1-0, p1-1-2, v2-2-3, r1-1-1. Poreplate and anterior sac of anterior receptaculum very wide (figs. 139–141).

OTHER MATERIAL EXAMINED: Four females taken with the types (AMNH), and one female taken at an elevation of 950 m at El Canelo, Cordillera, Region Metropolitana de Santiago, Chile, on September 8, 1966, by E. I. Schlinger and M. E. Irwin (UCB).

DISTRIBUTION: Known only from the vicinity of El Canelo, Santiago, Chile.

Austrochilus franckei Platnick,
new species

Figures 119–122, 142–147, 329, 337–340,
353, 360, 361, 369, 375, 379

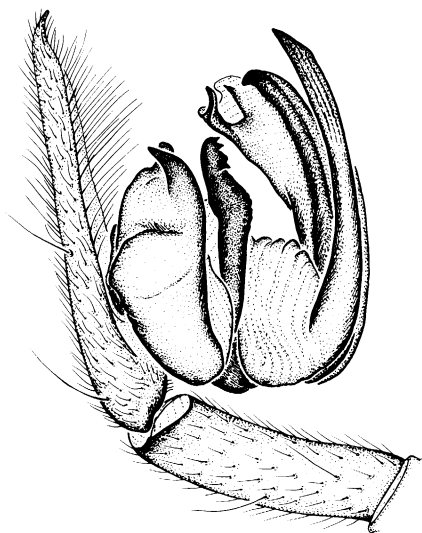
Thaidea peculiaris (misidentification): Lehtinen, 1967, fig. 17.

TYPES: Male holotype and female paratype taken in a moist forest at an elevation of 75 m at Hualpén, Concepción, Region del Bío-Bío (VIII), Chile (January 22, 1985; N. I. Platnick and O. F. Francke), deposited in AMNH.

ETYMOLOGY: The specific name is a patronym in honor of Dr. Oscar F. Francke, in recognition of his skill, persistence, and success as an austrochilid collector.

DIAGNOSIS: This species seems closest to *A. newtoni*, with which it shares the presence of a distinct sclerotization on the area just

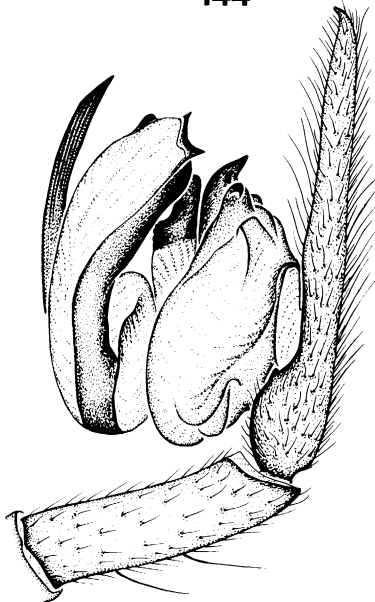
142



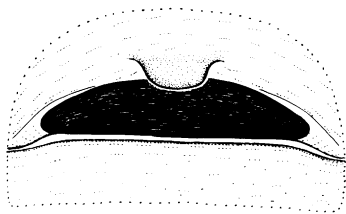
143



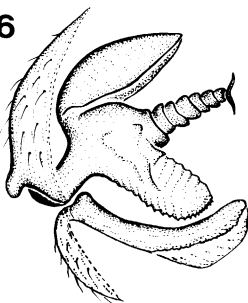
144



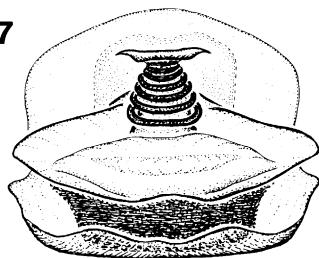
145



146



147



Figs. 142–147. *Austrochilus franckei*, new species. 142–144. Palp, prolateral, ventral, and retrolateral views. 145–147. Epigynum, posteroventral, lateral, and dorsal views.

behind the epigynal knob of females; males of *A. franckei* can be distinguished by the serrate tip of the terminal apophysis (fig. 142), females by having the sclerotization behind the epigynal knob very wide (fig. 145).

MALE: As in *A. manni*, except as noted. Total length 9.58. Carapace 5.19 long, 3.96 wide, with dark longitudinal streaks extending back from each posterior eye about half length of pars cephalica. Eye sizes and interdistances: AME 0.12, ALE 0.23, PME 0.22, PLE 0.24; AME-AME 0.09, AME-ALE 0.23, PME-PME 0.24, PME-PLE 0.25, ALE-PLE 0.05; MOQ length 0.64, front width 0.33, back width 0.68. Leg banding indistinct, noticeable only on posterior femora and tibiae. Spination: femora: I d0-0-1, r2-2-1; III d1-1-1, p1-2-1; IV p1-2-1, r2-2-1; tibiae: I p2-

2-1, v2-5-2, r2-2-1; III p0-1-1, v1p-4-2; IV v2-3-2; metatarsi: I p1-1-1, v2-2-2; II p1-2-1, r1-1-2; III p1-2-1, v3-2-2, r1-1-2; IV p2-1-1, r1-1-2. Leg formula 1243:

	I	II	III	IV	Palp
Femur	9.64	7.64	6.04	7.88	2.81
Patella	1.88	1.86	1.44	1.80	0.95
Tibia	10.59	7.99	3.27	7.42	1.53
Metatarsus	10.31	8.24	6.03	7.68	—
Tarsus	3.74	2.74	2.01	2.66	3.10
Total	36.16	28.47	18.79	27.44	8.39

Palpal spination: femur d0-1-2, r0-0-1; tibia v1p-0-0; conductor bifid distally (figs. 142–144).

FEMALE: As in male, except as noted. Total length 10.36. Carapace 4.18 long, 2.89 wide,

with posterior streaks on each side of pars cephalica fused posteriorly; clypeal height about five times AME diameter. Eye sizes and interdistances: AME 0.11, ALE 0.18, PME 0.20, PLE 0.20; AME-AME 0.08, AME-ALE 0.18, PME-PME 0.20, PME-PLE 0.19, ALE-PLE 0.04; MOQ length 0.51, front width 0.30, back width 0.60. Banding indistinct on leg I, distinct on other legs. Spination as in male of *A. manni* except: femora: I d0-0-1, r2-2-1; II p1-2-1, r2-2-1; III d1-1-1, p1-1-2; IV p1-2-1, r1-2-1; tibiae: I p1-2-1, v1p-4-2, r1-2-2; II d0-0-0, p0-2-1, r1-1-1; III v2-2-2, r1-0-1; IV p0-2-1, v2-1p-2, r0-2-1; metatarsi: I p0-1-1, v1r-4-2; II p2-1-1, r1-1-2; III p1-2-1, v1r-4-2, r1-1-2; IV p1-1-1, r1-1-2.

	I	II	III	IV	Palp
Femur	6.34	5.04	4.09	4.82	1.69
Patella	1.58	1.33	1.07	1.12	0.58
Tibia	6.71	5.04	3.38	4.64	1.08
Metatarsus	5.84	4.56	3.28	4.67	—
Tarsus	2.37	1.93	1.66	2.03	1.94
Total	22.84	17.90	13.48	17.28	5.29

Palpal spination as in male of *A. manni* except: femur d0-1-2; tibia v1p-0-0; tarsus d1-1-0, p1-1-2, v3-3-2, r1-1-0. Epigynum with wide, almost oval sclerotization just behind anterior knob (figs. 145–147).

OTHER MATERIAL EXAMINED: CHILE: **Region del Maule (VII):** *Cauquenes*: Tregualemu, Mar. 14, 1967 (T. Cekalovic K., Moyano, UCON), 1♀. *Talca*: Alto Vilches, Jan. 18, 1985, montane forest, elev. 1160 m (N. I. Platnick, O. F. Francke, AMNH), 1♂, 1♀. **Region del Bio-Bio (VIII):** *Ñuble*: 50 km E San Carlos, Dec. 26, 1950 (E. S. Ross, A. E. Michelbacher, CAS), 1♀. *Concepción*: Bosque Ramuntcho, Dec. 12–13, 1961 (A. F. Archer, AMNH, UCON), 1♂, 3♀. *Hualpén*, Nov. 17, 1981, elev. 60 m, native forest (N. I. Platnick, R. T. Schuh, AMNH, OMD), 3♀, Jan. 22, 1985, elev. 75 m, moist forest (N. I. Platnick, O. F. Francke, AMNH), 1♀. *Bío-Bío*: Avarigo, Apr. 2, 1985 (W. C. Sedgwick, WCS), 8♀. **Region de la Araucanía (IX):** *Malleco*: 17 km W Angol, Dec. 8, 1984–Feb. 16, 1985, elev. 800 m, flight intercept trap in mixed *Nothofagus* forest (S. and J. Peck, AMNH), 1♂; 15 km W Victoria, Jan. 26, 1985, elev. 365 m, wet forest (N. I. Platnick, O. F. Francke, AMNH), 1♂, 1♀. *Cautín*: Parque Na-

cional Cerro Ñielol, Temuco, Jan. 27, 1985, elev. 230 m, wet forest (N. I. Platnick, O. F. Francke, AMNH), 2♀, Dec. 15, 1985 (E. A. Maury, MACN), 1♂. ARGENTINA: *Neuquén*: Lago Moquehué, Jan. 10, 1985 (E. A. Maury, Toth, MACN), 1♀.

DISTRIBUTION: Central Chile (Talca to Cautín) and adjacent Argentina (Neuquén).

Austrochilus newtoni Platnick,
new species

Figures 148–153

TYPE: Male holotype taken in a window trap in a *Nothofagus* forest at an elevation of 720 m on the Antillanca road, Parque Nacional Puyehue, Osorno, Region de los Lagos (X), Chile (December 18–24, 1982; A. Newton and M. Thayer), deposited in AMNH.

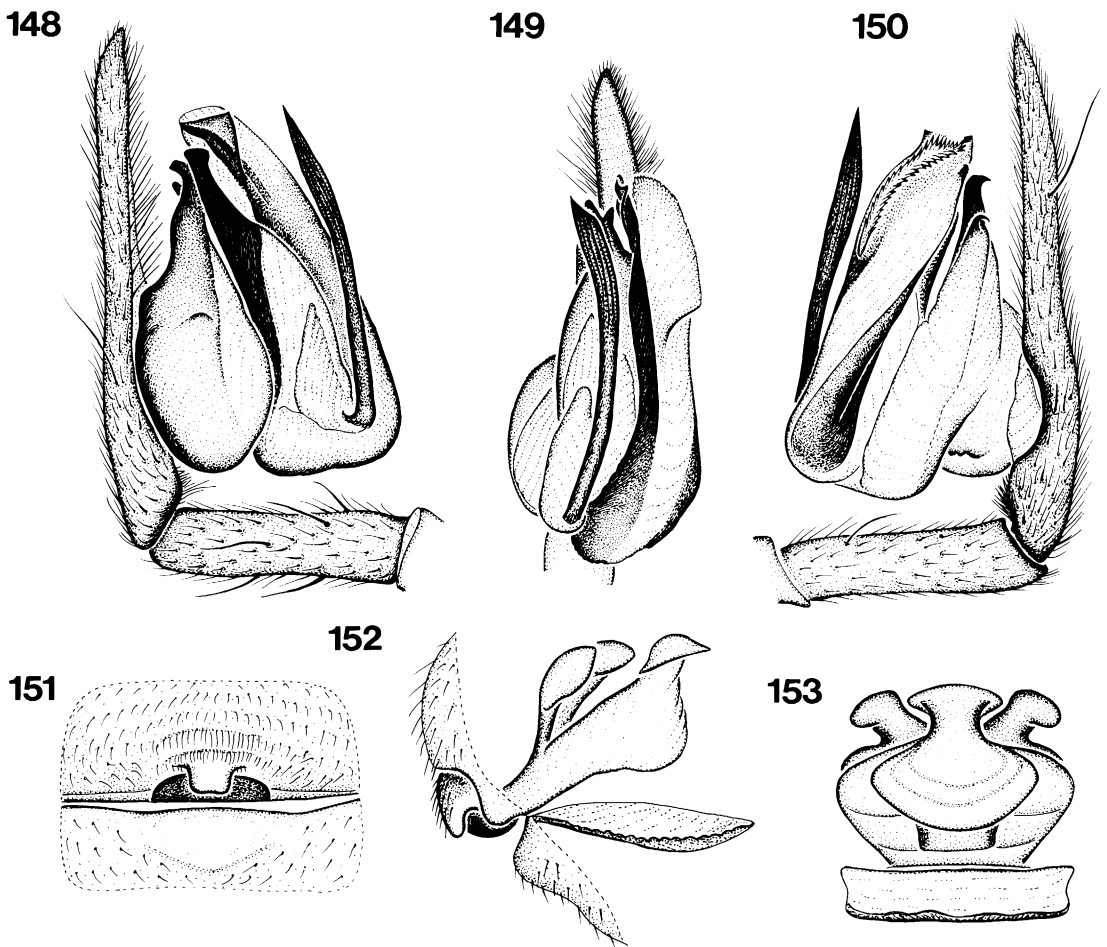
ETYMOLOGY: The specific name is a patronym in honor of Dr. A. F. Newton, collector of the holotype.

DIAGNOSIS: This species seems closest to *A. franckei* but can be distinguished by the different shape of the terminal apophysis of the male palp (fig. 148) and by the narrow sclerotization behind the epigynal knob of females (fig. 151).

MALE: As in *A. manni*, except as noted. Total length 9.58. Carapace 4.59 long, 3.15 wide, uniformly brownish orange. Eye sizes and interdistances: AME 0.12, ALE 0.22, PME 0.19, PLE 0.21; AME-AME 0.07, AME-ALE 0.18, PME-PME 0.20, PME-PLE 0.22, ALE-PLE 0.03; MOQ length 0.52, front width 0.31, back width 0.58. Legs with only scarcely detectable traces of banding. Spination: femora: I p2-3-2; III p0-2-2, r2-3-1; IV d1-2-1, r1-2-2; tibiae: I d1-1-1, p1-3-2, v2-10-2, r2-4-2; II d1-1-1, p1-3-1, v2-7-2, r1-3-1; III d1-2-1, p1-2-1, v2-6-2, r1-2-1; IV p1-3-1, v2-7-2, r1-3-1; metatarsi: I p2-2-1, v4-4-2, r2-2-1; II p1-2-1, v2-5-2, r1-1-2; III v2-7-2; IV p2-2-1, v2-6-2. Leg formula 1243:

	I	II	III	IV	Palp
Femur	8.00	7.93	6.56	7.92	2.38
Patella	1.52	1.51	1.17	1.22	0.79
Tibia	9.72	8.10	6.12	7.63	1.46
Metatarsus	11.88	8.06	6.71	8.72	—
Tarsus	5.33	4.14	2.60	3.82	3.04
Total	36.45	29.74	23.16	29.31	7.67

Palpal spination: femur d0-1-2; terminal



Figs. 148–153. *Austrochilus newtoni*, new species. 148–150. Palp, prolateral, ventral, and retrolateral views. 151–153. Epigynum, posteroventral, lateral, and dorsal views.

apophysis with club-shaped tip (figs. 148–150).

FEMALE: As in male, except as noted. Total length 8.50. Carapace 4.90 long, 3.73 wide, unmarked except for vague traces of dark streaks extending back from posterior eyes. Eye sizes and interdistances: AME 0.14, ALE 0.24, PME 0.17, PLE 0.25; AME-AME 0.07, AME-ALE 0.23, PME-PME 0.20, PME-PLE 0.25, ALE-PLE 0.03; MOQ length 0.50, front width 0.35, back width 0.54. Posterior femora and tibiae lightly banded. Spination as in male of *A. manni* except: femora: I p2-2-2, r2-3-2; II d1-2-1, p1-3-2; IV d1-2-1, r2-3-1; tibiae: I d1-1-1, p2-3-1, v2-6-2, r2-2-2; II d1-1-1, p1-2-2, v2-5-2; III p1-2-1, r2-1-1; IV

v2-5-2; metatarsi: I v2-4-2; II p2-1-1, v2-3-2, r1-2-1; III v2-5-2, r1-2-2; IV v2-4-2, r2-1-1.

	I	II	III	IV	Palp
Femur	8.72	7.19	5.98	7.20	2.52
Patella	1.62	1.57	1.41	1.58	0.66
Tibia	9.35	7.20	5.34	6.27	1.49
Metatarsus	8.92	6.85	5.68	6.30	—
Tarsus	4.10	3.42	2.65	3.15	2.16
Total	32.71	26.23	21.06	24.50	6.83

Palpal spination as in male of *A. manni* except: femur d0-1-1, p0-1-1; patella r0-1-0; tibia p0-1-1, v2-0-1p, r0-1-0; tarsus d1-1-1, p1-1-1, v4-2-2, r1-1-0. Epigynum with nar-

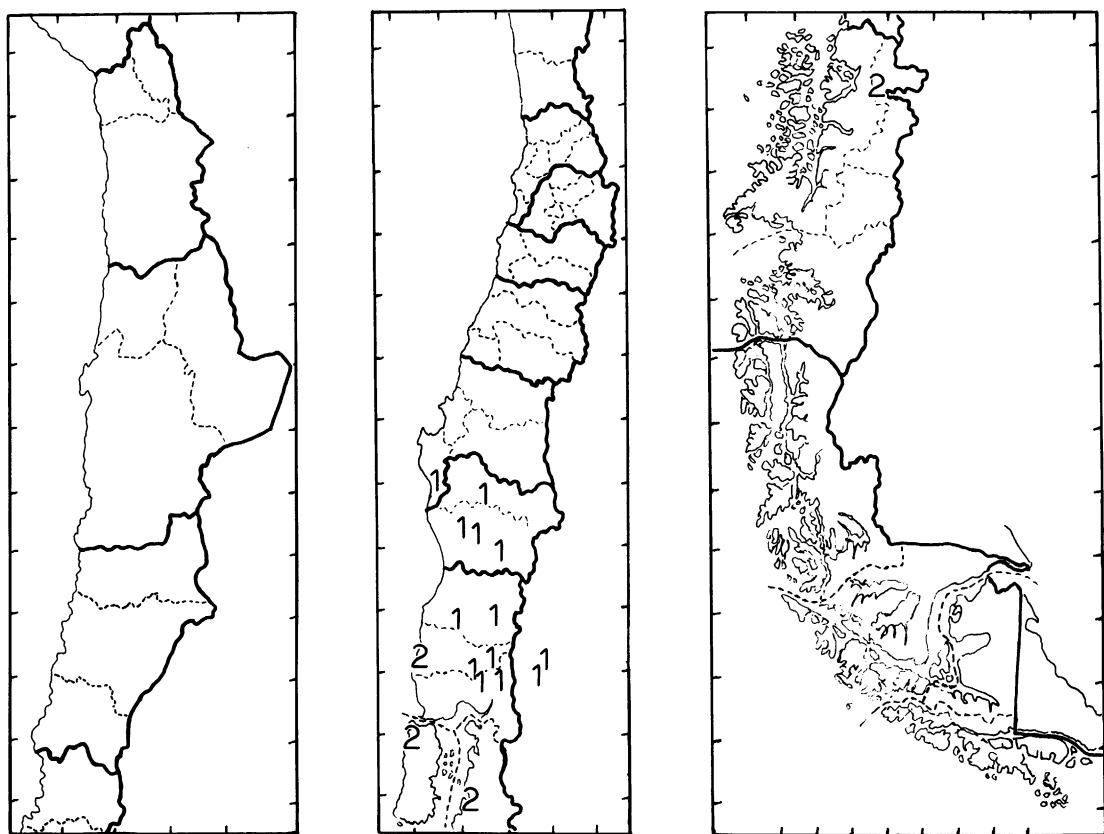


Fig. 154. Chile and adjacent Argentina, showing records of *Thaida peculiaris* (1) and *T. chepu* (2).

row sclerotization just behind anterior knob (figs. 151–153).

OTHER MATERIAL EXAMINED: CHILE: Region de la Araucanía (IX): Cautín: Estero Chaulco, near Molco, Feb. 22, 1983 (N. Cekalovic, AMNH), 1♀. **Region de los Lagos (X):** Osorno: Derumbes Forest Trail, Aguas Calientes, Parque Nacional Puyehue, Dec. 20, 1984–Feb. 8, 1985, flight intercept trap, elev. 500 m (S. and J. Peck, AMNH), 1♂.

DISTRIBUTION. South-central Chile (Cautín to Osorno).

THAIDA KARSCH

Thaida Karsch, 1880, p. 389 (type species by original designation *Thaida peculiaris* Karsch).

DIAGNOSIS: Members of this genus can be separated from those of *Austrochilus* by having relatively larger anterior median eyes, such that the clypeal height at the midline is two

or three times, rather than five or six times, the diameter of an anterior median eye, as well as by the genitalic features detailed below.

MALE PALP: As in *Austrochilus*, except embolus short, much weaker.

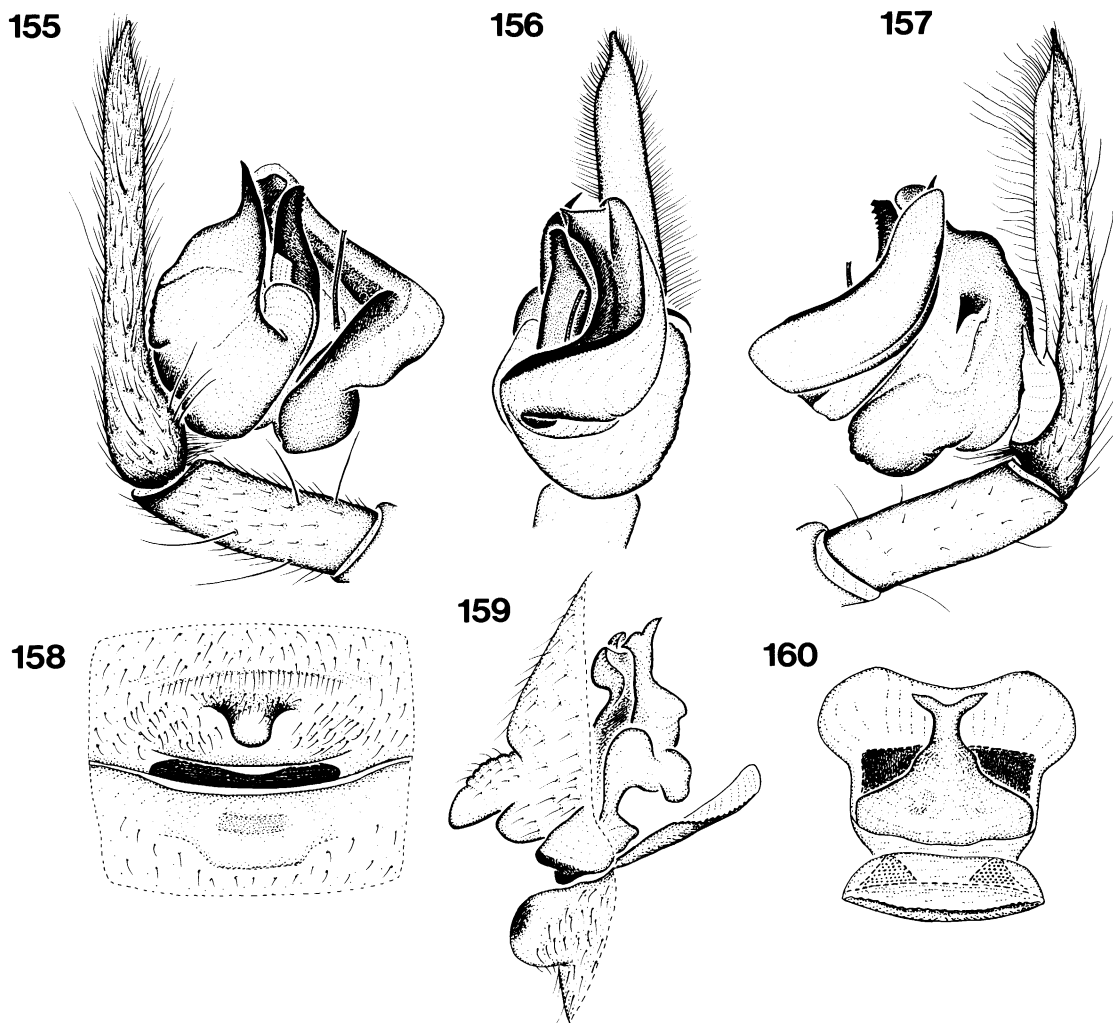
EPIGYNUM: As in *Austrochilus*, except transverse plate between openings into anterior and posterior receptacula oriented vertically rather than horizontally.

DISTRIBUTION: South-central to southern Chile (Arauco to Aisén) and adjacent Argentina (fig. 154).

Thaida peculiaris Karsch

Figures 83, 87, 88, 91, 92, 93, 95, 97, 99, 100, 103, 104, 107, 109–117, 155–160

Thaida peculiaris Karsch, 1880, p. 389, figs. 14, 14a (male syntype from Chile, no specific locality, in ZMB, examined).



Figs. 155–160. *Thaida peculiaris* Karsch. 155–157. Palp, prolateral, ventral, and retrolateral views. 158–160. Epigynum, posteroventral, lateral, and dorsal views.

Austrochilus manni (misidentification): Schiapelli and Gerschman, 1963, p. 107.

NOTE: Although Roth (1967) and Lehtinen (1967) recorded the types as lost, both the male and the cephalothorax of a second specimen that were mentioned by Karsch (1880) are still in ZMB. These specimens establish the type locality (unspecified in the original description) as “Chile, leg. Franck.”

DIAGNOSIS: Females can be distinguished from those of *T. chepu* by the absence of lateral projections on the plate between the openings into the anterior and posterior re-

ceptacula (fig. 158); males of *T. chepu* are unknown.

MALE: Total length 9.72. Carapace 5.04 long, 3.51 wide, light brown with anterior portion of pars cephalica darkest; clypeus at middle about twice AME diameter in height. Eye sizes and interdistances: AME 0.19, ALE 0.23, PME 0.25, PLE 0.25; AME-AME 0.07, AME-ALE 0.15, PME-PME 0.25, PME-PLE 0.20, ALE-PLE 0.02; MOQ length 0.63, front width 0.45, back width 0.74. Chelicerae brown; endites brown except anteromedian surfaces white; labium brown; sternum brown laterally, light brown medially. Legs light

brown, posterior tibiae with vague indications of darker banding. Spination (only surfaces bearing spines listed): femora: I d0-0-1, p1-2-2, r2-2-2; II d1-1-1, p2-2-2, r2-2-2; III d1-1-1, p1-2-2, r2-2-2; IV d1-2-1, p2-2-1, r2-2-2; tibiae: I d1-1-1, p2-2-2, v2-4-4, r1-2-2; II d0-1-1, p1-2-1, v2-2-2, r1-2-1; III d1-1-1, p1-1-1, v2-2-2, r1-2-1; IV d1-1-1, p1-2-1, v2-3-2, r1-2-2; metatarsi: I p1-2-1, v2-3-2, r1-1-2; II p1-1-2, v2-3-1r, r1-2-2; III p1-2-2; v1r-4-1r, r1-1-2; IV p1-2-2, v2-2-1r, r1-1-2. Leg formula 1243:

	I	II	III	IV	Palp
Femur	7.84	6.34	3.05	6.04	2.31
Patella	1.72	1.68	1.21	1.26	0.76
Tibia	8.46	5.99	3.86	3.69	1.19
Metatarsus	8.36	6.88	4.90	6.16	—
Tarsus	3.36	2.53	1.93	2.56	2.48
Total	29.74	23.42	14.95	19.71	6.74

Abdomen mottled brownish gray except pulmonary areas pale yellow. Palpal femur with distal spines (d0-0-3, p0-0-1, r0-0-1), patella with distodorsal bristle, tibia with two dorsal and two prolateral spines, tarsus with translucent, sclerotized tip, bearing complex bulb (figs. 155–157).

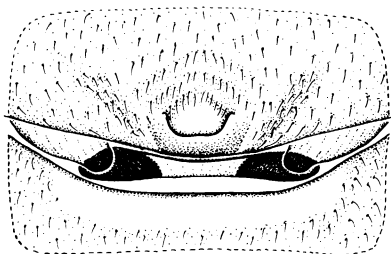
FEMALE: As in male, except as noted. Total length 11.48. Carapace 5.76 long, 3.92 wide, with sides distinctly darker than median half; clypeal height at middle about three times AME diameter. Eye sizes and interdistances: AME 0.20, ALE 0.23, PME 0.25, PLE 0.25; AME-AME 0.08, AME-ALE 0.22, PME-PME 0.28, PME-PLE 0.24, ALE-PLE 0.04; MOQ length 0.72, front width 0.48, back width 0.78. Femora also with vague indications of darker banding. Spination: femora: II p1-2-2, r2-2-1; III, IV p1-2-1; tibiae: I d1-1-0, p2-2-1, v4-6-4, r1-2-1; II v2-4-2; III v2-3-2, r1-1-1; IV v2-2-2; metatarsi: I p1-2-2, v4-4-2; II p1-2-2, v3-2-1r; III v3-2-1r, r2-1-2; IV v2-3-1r.

	I	II	III	IV	Palp
Femur	7.46	6.44	5.27	6.19	2.38
Patella	1.80	1.66	1.30	1.57	0.85
Tibia	8.15	6.26	3.92	5.33	1.45
Metatarsus	6.66	5.55	4.18	5.22	—
Tarsus	2.84	2.30	0.86	1.94	2.30
Total	26.91	22.21	15.53	20.25	6.98

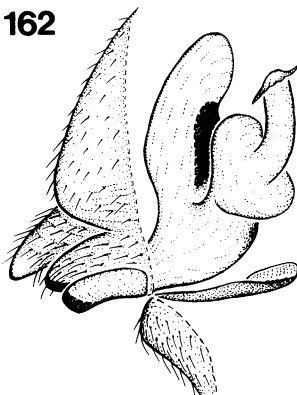
Palpal tibia with additional ventral spine; tarsus with long, dentate claw, spination d1-1-0, p1-1-1, v2-2-2, r1-1-1. Epigynum with area between anterior and posterior openings occupied by sclerotized plate broadly invaginated at middle but without lateral projections (figs. 158–160).

MATERIAL EXAMINED: CHILE: no specific locality (Franck, ZMB), 1♂ (syntype). **Region del Bío-Bío (VIII): Arauco:** Monumento Naturale Contulmo, Jan. 23, 1985, elev. 425 m, montane forest (N. I. Platnick, O. F. Francke, AMNH), 1♀. **Region de la Araucanía (IX): Malleco:** Princesa, 20 km W Curacautín, Dec. 12, 1984–Feb. 16, 1985, elev. 1000 m, flight intercept trap in *Nothofagus* forest (S. and J. Peck, AMNH), 1♂; Tolhuaca, Mar. 15–23, 1986 (L. E. Peña G., AMNH), 1♀; 15 km W Victoria, Jan. 26, 1985, elev. 365 m, wet forest (N. I. Platnick, O. F. Francke, AMNH), 1♀. **Cautín:** Bellavista, N shore, Lago Villarrica, Dec. 15–30, 1982, elev. 310 m, window trap, Valdivian rainforest (A. Newton, M. Thayer, AMNH), 1♂, Jan. 28, 1985, elev. 305 m, native forest (N. I. Platnick, O. F. Francke, AMNH), 1♀, Jan. 30, 1986, elev. 260 m, undisturbed forest (N. I. Platnick, R. T. Schuh, AMNH), 2♀; Flor de Lago, 15 km NE Villarrica, Dec. 14, 1984–Feb. 10, 1985, elev. 300 m, flight intercept traps in *Nothofagus* forest (S. and J. Peck, AMNH), 2♂; 31 km NW Nueva Imperial, Jan. 27, 1985, elev. 730 m, dry forest (N. I. Platnick, O. F. Francke, AMNH), 1♀; Parque Nacional Cerro Nielol, Temuco, Jan. 27, 1985, elev. 230 m, wet forest (N. I. Platnick, O. F. Francke, AMNH), 1♀; Pucón, Parque Nacional Villarrica, Dec. 15, 1984–Feb. 10, 1985, elev. 900 m, flight intercept trap in *Nothofagus* grove on volcanic ash (S. and J. Peck, AMNH), 1♂. **Region de los Lagos (X): Valdivia:** Cudico, Nov. 11, 1966, elev. 40 m, *Nothofagus* forest (E. I. Schlinger, M. E. Irwin, UCB), 1♀; Lago Ranco (W. C. Sedgwick, WCS), 1♀; Llifén, Lago Ranco, Mar. 12, 1985 (W. C. Sedgwick, WCS), 2♀. **Osorno:** Aguas Calientes, Parque Nacional Puyehue, Jan. 31, 1985, elev. 425 m, Valdivian rainforest (N. I. Platnick, O. F. Francke, AMNH), 6♀, Jan. 27, 1986, elev. 450 m, wet forest (N. I. Platnick, R. T. Schuh, AMNH), 2♀; Antillanca road, Parque Nacional Puyehue, Jan. 31,

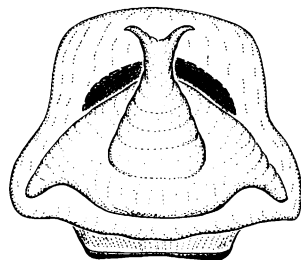
161



162



163



Figs. 161–163. *Thaida chepu*, new species, epigynum, posteroventral, lateral, and dorsal views.

1985, elev. 715 m, mixed forest (N. I. Platnick, O. F. Francke, AMNH), 1♀, Jan. 28, 1986, elev. 600–700 m (N. I. Platnick, R. T. Schuh, AMNH), 3♀; “El Refugio,” 8 km W La Picada, Volcán Osorno, Feb. 6, 1967, elev. 350 m (E. I. Schlinger, UCB), 1♀; Termas de Puyehue, Nov. 24, 1981, elev. 180 m, forest (N. I. Platnick, R. T. Schuh, AMNH), 3♀; 7.7 km NE Termas de Puyehue, Dec. 19–25, 1982, elev. 200 m, window trap, Valdivian rainforest (A. Newton, M. Thayer, AMNH), 1♂; Volcán Osorno, Feb. 12, 1985, elev. 610 m, mature forest (N. I. Platnick, O. F. Francke, AMNH), 3♀. *Llanquihue*: 2–3 km NW Ensenada, Mar. 18, 1965 (H. W. Levi, MCZ), 1♀; Petrohué, Mar. 3, 1974 (R. Calderón G., UCON), 2♀; Peulla, Mar. 13, 1985 (W. C. Sedgwick, WCS), 3♀; Salto Petrohué, Parque Nacional Vicente Perez Rosales, Dec. 23, 1984–Feb. 4, 1985, elev. 150 m, flight intercept trap in mixed moist forest (S. and J. Peck, AMNH), 3♂. ARGENTINA: Neuquén: Puerto Blest, Laguna Los Cántaros, Parque Nacional Nahuel Huapí, Jan. 30, 1985 (Ramirez, MACN), 2♀; Pucará, Nov. 1961 (M. E. Galiano, MACN), 1♀; Quetrihué, Parque Nacional Nahuel Huapí, Jan. 23, 1985 (Ramirez, MACN), 1♀.

DISTRIBUTION: South-central Chile (Arauco to Llanquihue) and adjacent Argentina (Neuquén).

***Thaida chepu* Platnick, new species**

Figures 161–163

TYPE: Female holotype taken in a wet forest at an elevation of 15 m at Chepu, Isla de

Chiloé, Chiloé, Region de Los Lagos (X), Chile (February 2, 1985; N. I. Platnick and O. F. Francke), deposited in AMNH.

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

DIAGNOSIS: Females can be distinguished from those of *T. peculiaris* by the presence of lateral projections on the plate between the openings into the anterior and posterior receptacula (fig. 161).

MALE: Unknown.

FEMALE: As in male of *T. peculiaris*, except as noted. Total length 9.40. Carapace 4.47 long, 3.32 wide, light brown with pair of longitudinal, paramedian, light stripes; clypeal height at middle about three times AME diameter. Eye sizes and interdistances: AME 0.16, ALE 0.21, PME 0.27, PLE 0.25; AME-AME 0.10, AME-ALE 0.19, PME-PME 0.27, PME-PL 0.22, ALE-PL 0.04; MOQ length 0.69, front width 0.43, back width 0.81. Anterior femora vaguely, posteriors distinctly, banded with dark rings. Spination: femora: I d1-0-1, r1-2-1; II d0-1-1, p1-2-1, r2-2-1; IV p0-2-1, r1-2-1; tibiae: I d0-0-0, v4-4-2, r2-2-2; II d1-1-1; III d1-0-1, v1p-2-2, r0-1-1; IV v1p-3-2; metatarsi: I v1r-4-2; II v1-1-2; III v3-2-1r; IV p1-1-2, v2-3-1r.

	I	II	III	IV	Palp
Femur	6.97	5.62	4.89	5.32	2.03
Patella	1.66	1.44	1.07	1.35	0.73
Tibia	7.70	5.76	3.60	4.94	1.16
Metatarsus	6.76	5.33	4.17	5.26	—
Tarsus	2.66	2.43	1.88	2.43	2.80
Total	25.75	20.58	15.61	19.30	6.72

Palpal femur without prolateral spine; tarsal spination d1-1-1, p1-1-0, v2-1p-0, r1-1-0. Epigynum with area between anterior and posterior openings occupied by sclerotized plate broadly invaginated at middle, with ventrally directed projections at sides, projections produced over invagination in near-ventral view (figs. 161–163).

OTHER MATERIAL EXAMINED: CHILE: **Region de los Lagos (X): Osorno:** hills S Mui-colpué, Jan. 30, 1985, elev. 120 m, disturbed forest (N. I. Platnick, O. F. Francke, AMNH), 3♀, Jan. 26, 1986, elev. 75 m, wet disturbed forest (N. I. Platnick, R. T. Schuh, AMNH), 1♀. **Chiloé:** Chepu, Isla de Chiloé, Nov. 29, 1981, elev. 17 m (N. I. Platnick, R. T. Schuh, AMNH), 2♀. **Palena:** Chaiten, Jan. 16, 1986, elev. 10 m, along roadside at night (N. I. Platnick, P. A. Goloboff, R. T. Schuh, AMNH, MACN), 2♀. **Region de Aisén (XI): Aisén:** Parque Nacional Queulat, near Puerto Cisnes, Feb. 6, 1985, elev. 500 m, wet forest (N. I. Platnick, O. F. Francke, AMNH), 1♀.

DISTRIBUTION: Southern Chile (Osorno to Aisén).

HICKMANIINAE LEHTINEN, NEW RANK

Hickmaniidae Lehtinen, 1967, p. 299 (type genus *Hickmania* Gertsch).

DIAGNOSIS: Hickmaniines differ from austrochilines in having normal posterior booklungs, as well as in the genitalic details discussed below.

DESCRIPTION: See generic description, below.

INCLUDED GENERA: *Hickmania*.

DISTRIBUTION: Tasmania.

HICKMANIA GERTSCH

Hickmania Gertsch, 1958, p. 16 [type species by original designation *Ectatosticta troglodytes* (Higgins and Petterd)].

DIAGNOSIS: *Hickmania* can be separated from both *Thaida* and *Austrochilus* by the distinctive female genitalia, the form of the male palpal bulb (in which the sperm duct passes through a prominent embolic rod, and a median apophysis is lacking), and by having normal posterior booklungs that are not modified as in those genera.

DESCRIPTION: Large (total length 16–20) austrochilids with long, slender legs. Carapace longer than wide, narrowing at leg I, widest between coxae II and III. Anterior margin of clypeus extended at middle. Eight eyes in two more or less straight rows. AME smallest, others subequal. MOQ wider behind than long, longer than wide in front. Fovea a longitudinal groove. Chelicerae with small stridulatory ridge area on outer surface, five strong promarginal teeth, and numerous small denticles situated basally on retromargin. Cheliceral gland opening through numerous pores on flattened area behind fang tip. Labium as wide at base as long. Endites rectangular, as long as wide, with serrula composed of single row of teeth. Sternum scutiform, longer than wide, bluntly pointed behind. Leg formula 1243; legs slender, strongly spined, even on tarsi. Superior claws long, slender, with single row of teeth; inferior claw with single tooth. Trichobothria in double row on tibiae; single subdistal trichobothrium on each metatarsus. Distal margin of bothria notched, except on first tibial trichobothrium. Tarsal organ a simple pit. Metatarsus II of males sinuous. Respiratory system with two pairs of typical booklungs. Female genitalia with two pairs of twisted receptacular tubes on anterior face of bursa and short, wide, wrinkled, translucent projection from posterior face. Male bulb with slender embolic rod, from which sperm duct opens distally; median apophysis absent.

DISTRIBUTION: Widespread in Tasmania.

NATURAL HISTORY: Only a single species (*H. troglodytes*), restricted to Tasmania, is known. The original specimens described by Higgins and Petterd came from caves in the Mole Creek district but Hickman (1967) reported that the spiders are not restricted to caves and are also found in dark and cool cavities. They have been found in hollow logs and tree stumps, in mine shafts, and even in household wells. A large horizontal web is constructed, one of which was recorded by Hickman as being 122 cm long and 61 cm wide. The spider moves on the underside of the web. The eggsac, which is similar to that of the New Zealand cave gradungulid *Spe-lungula*, is pyriform, about 40 mm long and 26 mm wide. It is constructed of white silk and suspended by a narrow stalk that is usu-

ally longer than the eggsac itself. Hickman noted that although the eggsac is pure white when constructed in caves and other sites where there is little debris, in other situations (such as hollow logs) the spiders tend to attach debris to the outer surface of the sac. No observations appear to have been recorded on the method used by the spiderlings to emerge from the eggsac, or on the life cycle of the animals.

Hickmania troglodytes

(Higgins and Petterd)

Figures 327, 341–346, 355,
362, 371, 376, 380

Theridion troglodytes Higgins and Petterd, 1883, p. 191 (male and female syntypes from Mole Creek Caves, Chudleigh district, Tasmania, should be in Tasmanian Museum, Hobart, not examined).

Ectatosticta australis Simon, 1902, p. 240 (juvenile female holotype from Tasmania, no specific locality, should be in MNHN, not examined). First synonymized by Rainbow, 1904, p. 327.

Ectatosticta troglodytes: Rainbow, 1904, p. 327. Hickman, 1928, p. 169.

Hickmania troglodytes: Gertsch, 1958, p. 16. Lehtinen, 1967, p. 238.

DIAGNOSIS: The species is characterized by the form of the male and female genitalia.

FEMALE: Total length 21.25. Carapace 9.75 long, 5.88 wide. Abdomen 11.38 long, 7.50 wide. Carapace reddish brown, without patterning; abdomen uniform pale brown except booklung covers paler. Eye sizes and interdistances: AME 0.28, ALE 0.43, PME 0.38, PLE 0.40; AME-AME 0.25, AME-ALE 0.38, PME-PME 0.42, PME-PLE 0.40, ALE-PLE 0.10; MOQ length 0.93, front width 0.75, back width 1.10. Leg spination: femora: I d2-1-1-1, p1-1-1-1-1-1 distal, v0, r1-1-1-1-1 distal; II d2 distal, p1-2-1-1-1-1-1, v0, r1-1-1-1-1-1-1; III d1 basal, 2 distal, p1-1-1-1-1-1, v1 median, r1-1-1 distal; IV d1-1-2, p1-1-1-1-1-1, v1-1-1 median, r1-1 distal; patellae: I–III none; IV d1 distal; tibiae: I d0, p1-1-1-1-1-1, v2-2-1-2-1-1-1-1-2, r1-1-1-1-1-1; II d0, p2-2-2-2, v2-2-2-2-2-2, r1-1-1-1-1; III d0, p1-2-2-1-2, v2-1-2-2-2, r1-1-1; IV d0, p1-1-1-1-1-1, v3-2-1-2-2-2, r1-1-1-1-1; metatarsi: I d0, p1-1 basal, v1-1-1-1-2, r1-1-1-1-1; II d2 basal, p1-1-0-0-1, v1-1-1-1-2, r1-1-1-1-1; III d1-1-0, p1-1-1, v2-1-2-1-2, r1-1-1-1;

IV d0, p1 basal, v2-2-1-1-2, r1-1-0; tarsi: I none; II v1-1-1; III v1-1-1; IV v1-1-2-2-2-2.

	I	II	III	IV	Palp
Femur	25.00	20.63	15.12	18.95	5.75
Patella	4.10	3.75	2.75	3.37	1.75
Tibia	26.26	18.95	14.12	16.00	4.10
Metatarsus	20.52	16.25	12.50	12.88	—
Tarsus	7.98	6.37	5.38	4.50	5.27
Total	83.86	65.95	49.87	55.70	16.87

Palpal spination: femur d0-1-1-2, p1-1-0, v0, r1-1-0; patella d1 distal; tibia d1-1-0, p1-1-0, v2-2-0, r1-1-0; tarsus d1 basal, p2-2-1-1, v2-2-2-2, r1-2-2-1; claw with 10 teeth. Internal genitalia as in figures 341, 342.

MALE: Similar in appearance to female but with metatarsus II twisted. Total length 16.58. Carapace 8.25 long, 6.13 wide. Abdomen 9.00 long, 6.00 wide. Eye sizes and interdistances: AME 0.25, ALE 0.35, PME 0.35, PLE 0.35; AME-AME 0.19, AME-ALE 0.32, PME-PME 0.38, PME-PLE 0.35, ALE-PLE 0.03; MOQ length 0.89, front width 0.67, back width 0.92. Leg spination: femora: I d3 basal, 1 subdistal, p1-1-1-1-1-1, v0, r1-1 distal; II d3 basal, 1 distal, p1-1-1-1, v0, r1-1-1-1-1; III d3-1-1-1-1-1, p1-1-1-1-1, v0, r1-1-1-1; IV d3 basal, 2 distal, p0-1-1-1-1, v0, r1-1-1-1-1; patellae none; tibiae: I d0, p1-1, v2-1-1, r1-1-1-1-1; II d0, p1-1-1-1, v2-1-1-1-2, r1-1-1-1-1; III d0-1-0, p1-1-1-1, v1-2-2, r1-1-1-1; IV d0, p1-1-1-1, v2 basal, 1 distal, r0-1-1-1; metatarsi: I d0, p1-1-0, v2-1-2-2-2, r1-1-0; II d2 basal, p1-1-1, v2-1-2-1-2, r1-1-1; III d1-1-1, p1-1-1-2, v1-1-1-0, r1-1-1-1; IV d2 basal, p1 distal, v2-1-1-2, r0; tarsi: I none; II v1 at two-thirds; III v1-1-1-1-2 on distal half; IV p1-1-1-1, v1-1-2, r1-1-1-1-1 on distal half.

	I	II	III	IV	Palp
Femur	25.63	21.25	17.50	19.12	6.25
Patella	3.76	3.76	3.12	3.25	1.52
Tibia	25.26	21.12	14.37	16.21	5.00
Metatarsus	20.12	17.75	14.37	19.00	—
Tarsus	7.88	7.62	5.64	7.00	3.12
Total	82.65	71.50	55.00	64.58	15.89

Palpal spination: femur d1-2-2 distal; tibia d1-0, p0-1, v3 basal; palpal bulb as in figures 343–346.

MATERIAL EXAMINED: TASMANIA: cave at Franklin River, Jan. 2, 1962 (A. Scott,

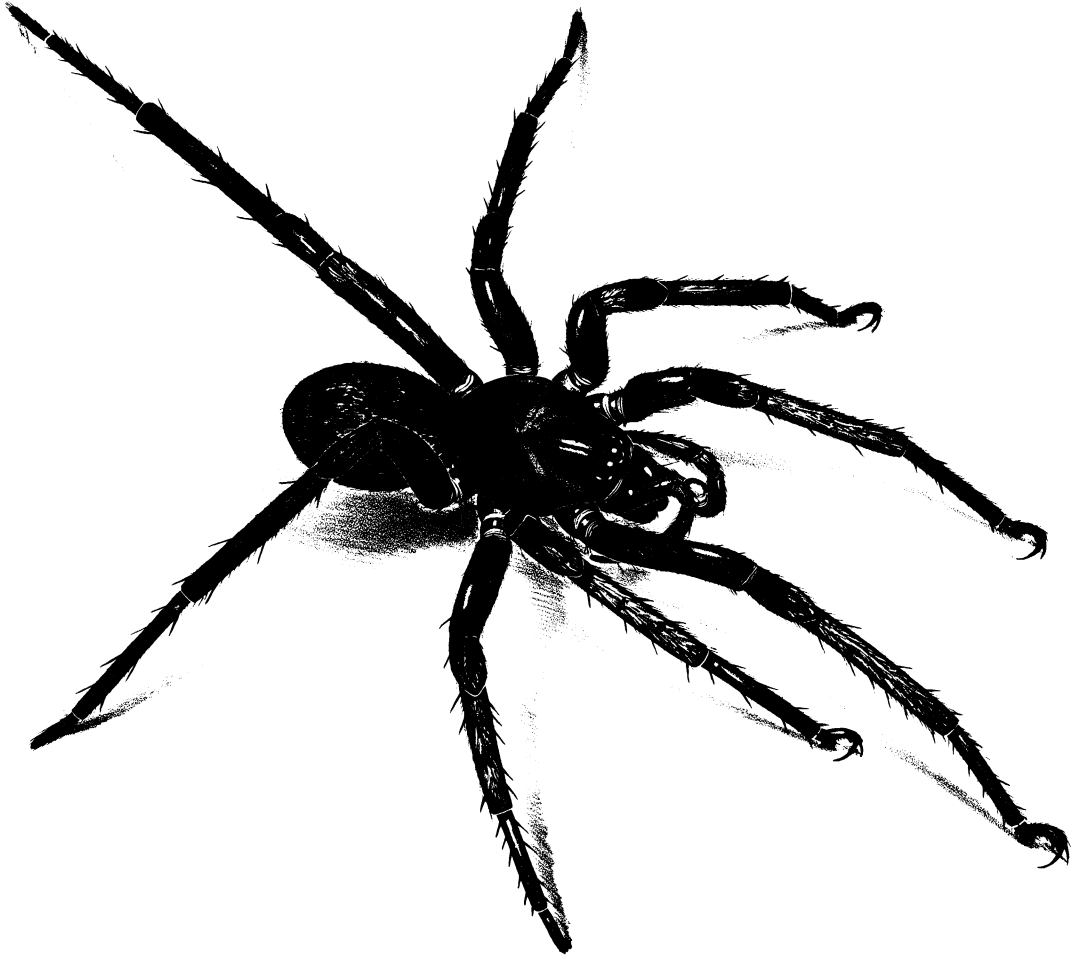


Fig. 164. *Kaiya terama*, new species, male from Blue Mountains, New South Wales.

OMD); Maanoopa II Cave, Mole Creek, Feb. 10, 1962 (G. Bain, OMD); Redpa Caves, Redpa, Dec. 29, 1965 (A. Goede, OMD), ♂♂, ♀♀ (on which descriptions above are based); Vanishing Cave, Flowery Gallery, Sept. 4, 1966 (A. Goede, OMD).

NOTE: Gertsch (1958) provided a detailed description of the species; the specimens described above are slightly larger than the material examined by Gertsch.

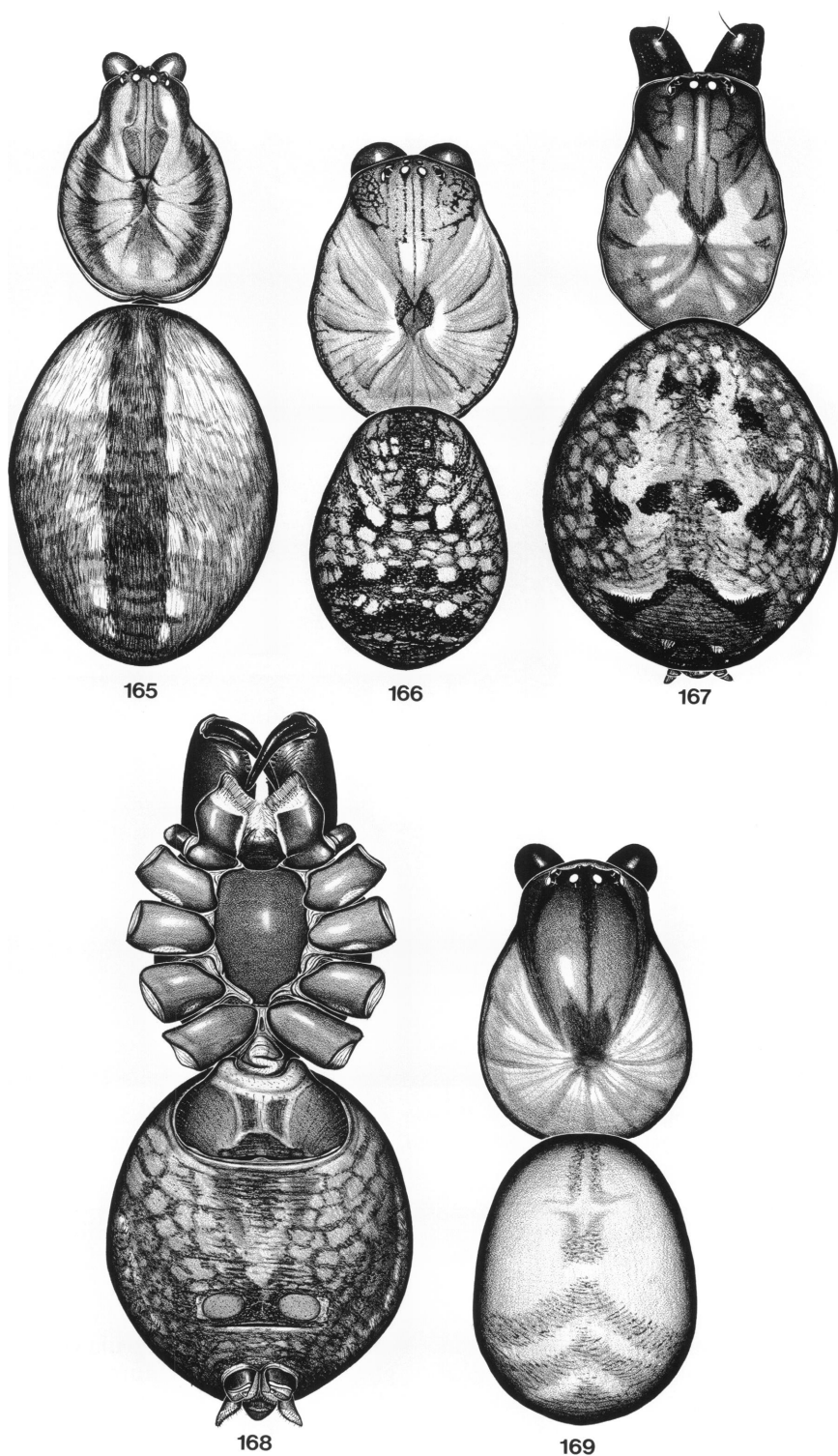
GRADUNGULIDAE FORSTER

Gradungulidae Forster, 1955, p. 277 (type genus *Gradungula* Forster).

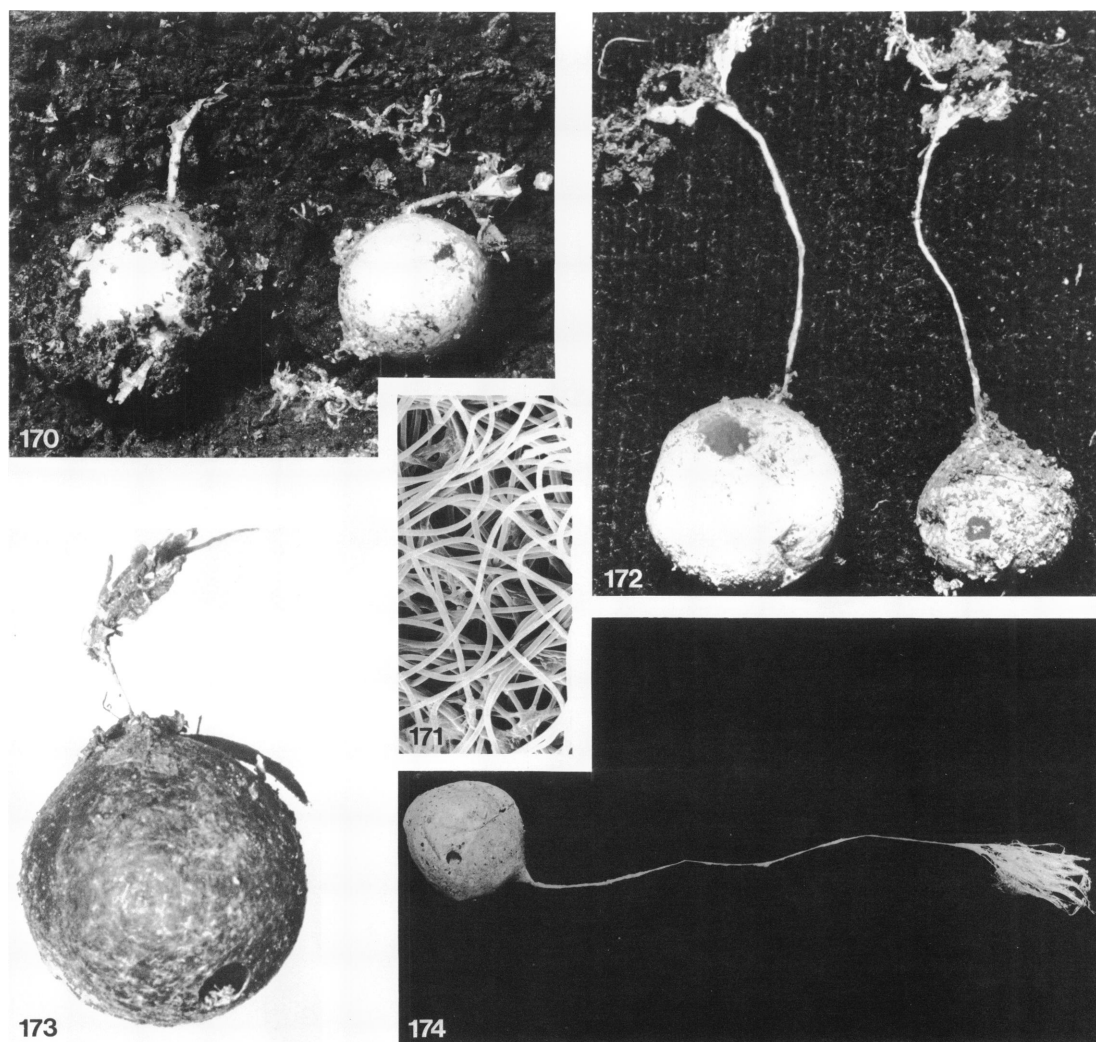
DIAGNOSIS: Gradungulids can be distinguished from hypochilids and austrochilids

by the strikingly dissimilar superior claws of the first two pairs of legs, occurring in association with a swollen tarsus and numerous stout spines on the ventral surface of that segment.

DESCRIPTION: Medium to large (total length 7–20) araneomorph spiders; generally ecribellate but with two known cribellate genera. Carapace longer than wide; thoracic margins evenly curved, but head region distinctly narrowed, with lateral margins subparallel. Clypeus sloping down, central portion produced forward, projecting as ledge over chelicerae; often clothed with finely ciliate hairs. Thoracic region clothed with similar recumbent hairs, other erect hairs extending back from eyes. Fovea oval, shallow. Eight eyes in



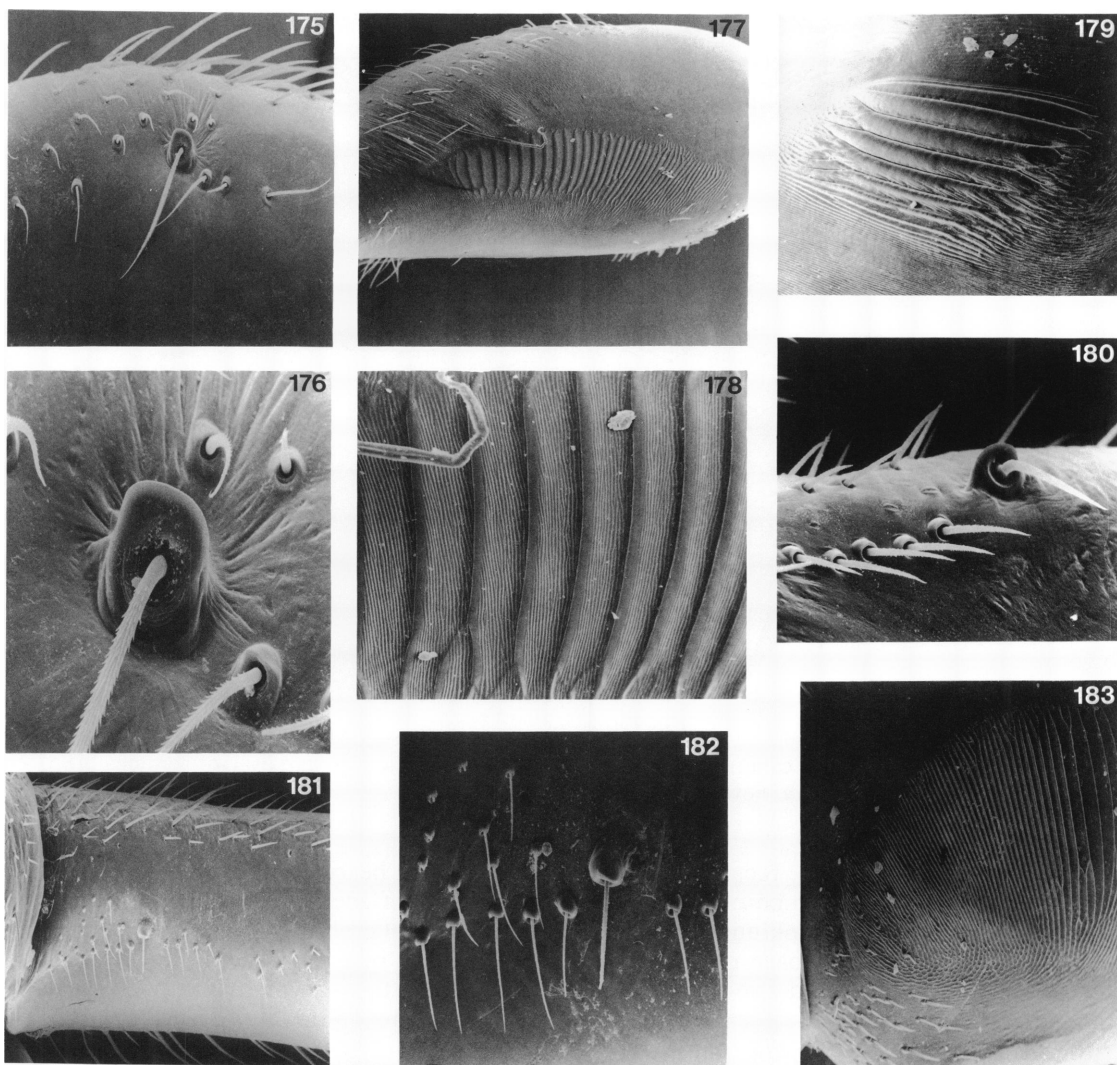
Figs. 165–169. Body of female gradungulids. **165.** *Gradungula sorenseni* Forster. **166.** *Kaiya terama*, new species (drawn at angle, with caput foreshortened). **167, 168.** *Tarlina noorundi*, new species. **169.** *Progradungula carraiensis* Forster and Gray.



Figs. 170–174. Gradungulid eggsacs. 170. *Pianoa isolata*, new species. 171. Same, scanning electron micrograph of surface of eggsac. 172. *Kaiya terama*, new species. 173. *Gradungula sorenseni* Forster. 174. *Spelungula cavernicola*, new species.

two more or less straight rows. Eyes circular, AME always smallest; lateral eyes contiguous, widely separated from medians. MOQ wider behind than in front, longer than wide in front. Chelicerae vertical, diaxial, without lateral condyles; only promargin with typical teeth, retromargin with group of denticles or sometimes few small teeth near base of furrow. Cheliceral gland opening through numerous pores on ventral surface of paturon behind tip of fang at rest. Stridulatory ridges on posterolateral surface of chelicerae in both sexes. Chelicerae usually with long, stout

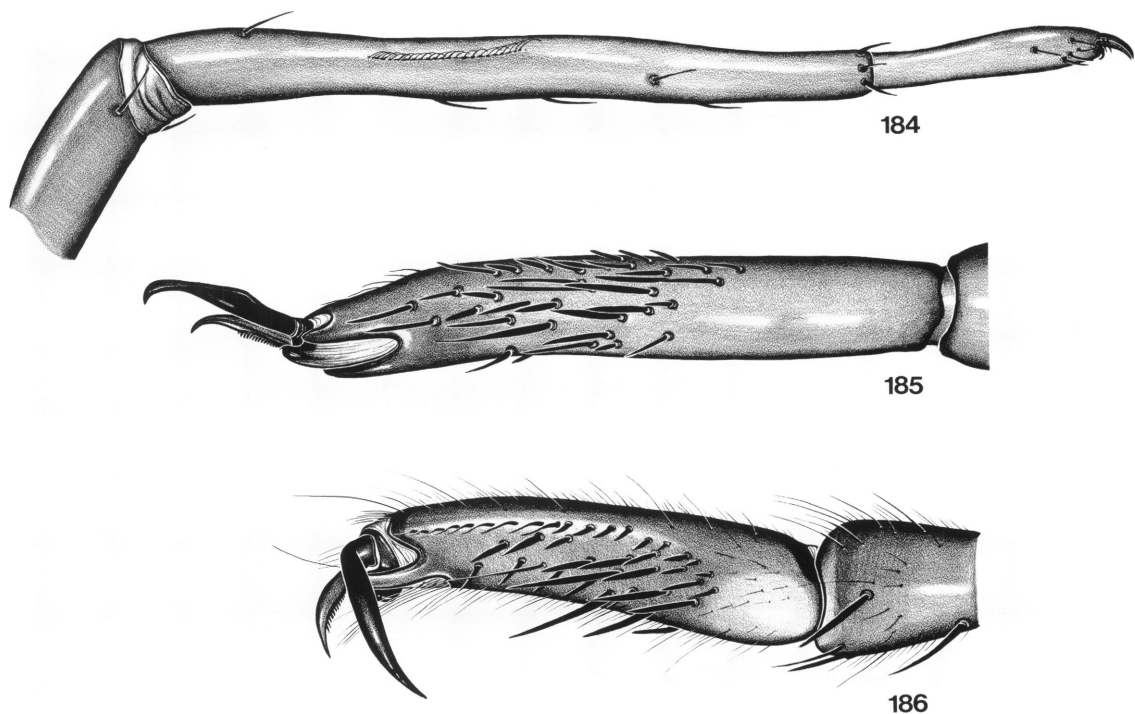
bristle on proximal anterior surface in addition to numerous smaller hairs scattered over surface. Endites longer than wide, subparallel, with thick bunch of sieve hairs on inner distal surface; serrula composed of single row of teeth. Labium as long as wide or slightly longer than wide, notched at base, indented on anterior margin. Sternum longer than wide, scutiform; lateral margins indented at bases of coxae; posterior margin more or less pointed, extending between coxae IV, separating them by approximately one-fourth its width; sigilla absent. Leg formula



Figs. 175–183. Male cheliceral stridulatory ridges, and femoral picks, of gradungulids. 175–178. *Tarlina* sp. from Barrington Tops, New South Wales. 179–182. *Gradungula sorenseni* Forster. 183. *Pianoa isolata*, new species. 175, 176, 180–182. Modified bristles on inner surface of femur. 177–179, 183. Cheliceral stridulatory ridges.

1423 or 4123; legs strongly spined. Tarsi of legs I and II stout, with numerous stout spines on ventral surface, excavated ventrally in males of some species. Superior claws of first two pairs of legs strongly dissimilar, with proclaw much stronger than retroclaw; both claws pectinate in single row. Inferior claw reduced to small curved spine pressed against distinct baseplate. Claws and tarsi of legs III and IV not modified; superior claws relatively long, slender, pectinate in single row; inferior claw

with single tooth or none. Trichobothria in double row on tibiae; single, subdistal trichobothrium on metatarsi; bothria without transverse ridges but anterior margin strongly crenulate (except for most proximal tibial trichobothrium). Tarsal organ exposed, of varying form, ranging from probable plesiomorphic pit organ to structures with prominent basal mounds surmounted by numerous receptor nodes (and in some genera with strong erect sensory spine). Abdomen closely



Figs. 184–186. 184. *Progradungula carraiensis* Forster and Gray, distal portion of leg IV of female, showing the position of the calamistrum. 185, 186. Prolateral view of tarsus I of females. 185. *P. carraiensis*. 186. *Kaiya terama*, new species.

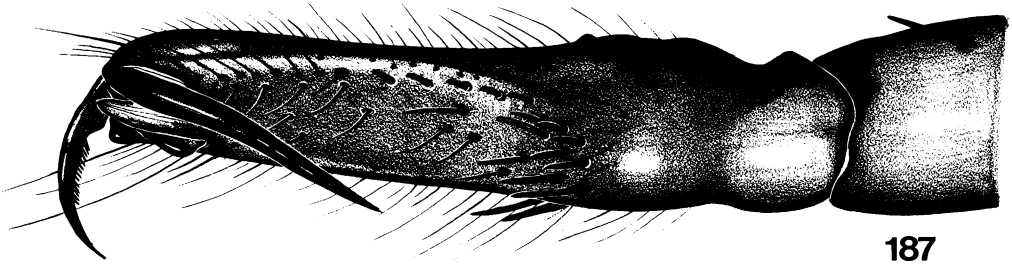
clothed with short, ciliate, recumbent hairs and fewer erect hairs. Two pairs of spiracles associated with typical booklungs; posterior spiracles separated from base of spinnerets by between one-fourth and one-third of distance between spinnerets and epigastric furrow. Cribellum, when present, with narrow transverse field of spigots, not divided. Ecribellate species sometimes with small conical colulus. Calamistrum in single row near median surface of fourth metatarsi. Six spinnerets; anteriors and posteriors with two segments, medians with single segment. Epiandrous glands numerous, forming large field above epigastric furrow in males. Palpal segments strongly spined; femora in both sexes with bristles arising from small mounds on inner surface, acting as picks for cheliceral stridulatory ridges. Female palpal claw slender, with single row of teeth. Female internal genitalia diverse but always multireceptaculate, often associated with membranous median sac lacking secretory glands. Male palpal bulb characteristically with prominent em-

bolic branch bearing secondary processes, and with distinct median apophysis; conductor absent; tip of embolic branch resting on ventral surface of apex of cymbium, which is usually slightly excavated; bulb attached subbasally or near midventral surface of cymbium.

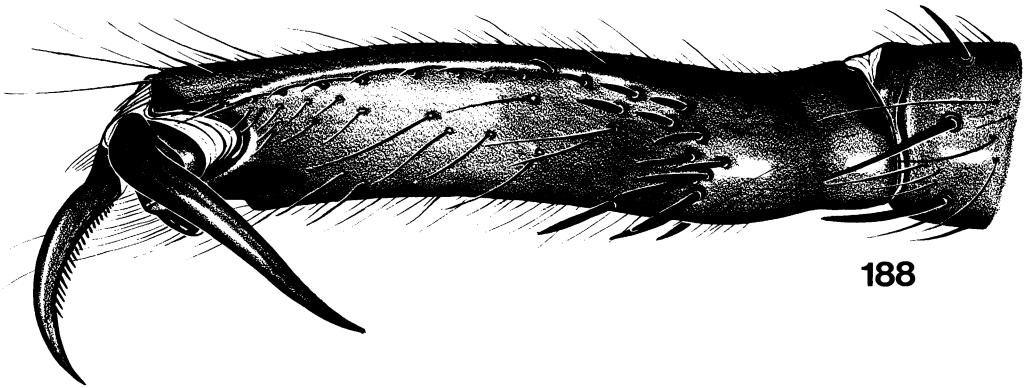
INCLUDED GENERA: *Gradungula*, *Spelungula*, *Tarlina*, *Kaiya*, *Progradungula*, *Pi-anoa*, and *Macrogradungula*.

DISTRIBUTION: New Zealand and Australia.

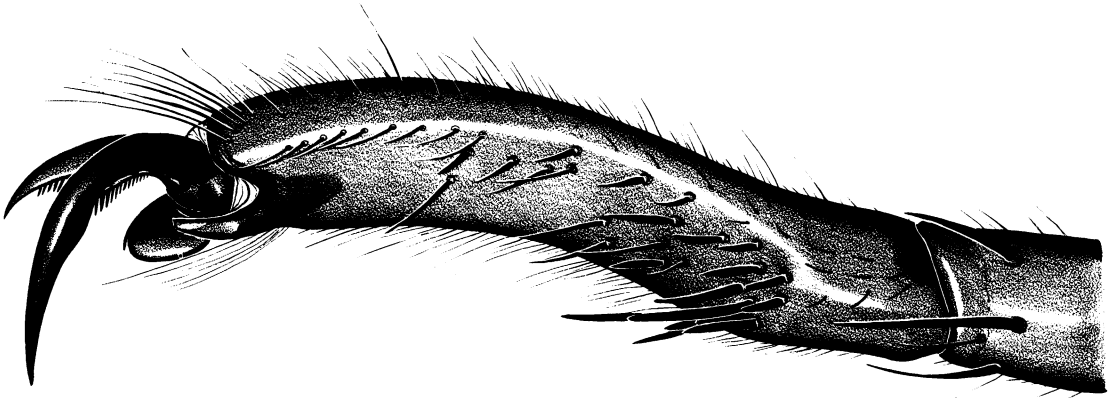
NOTES: When first established by Forster (1955), the family was unique among the "hypochiloids" (at that time all placed in the family Hypochilidae) in that although both species then known retained most of the primitive characters which separate these spiders from the rest of the araneomorphs, both were ecribellate. Field observations on the New Zealand species (*Gradungula sorensoni* Forster) had also shown that, unlike all the other known "hypochiloids," this species is cursorial and does not construct a snare to



187



188

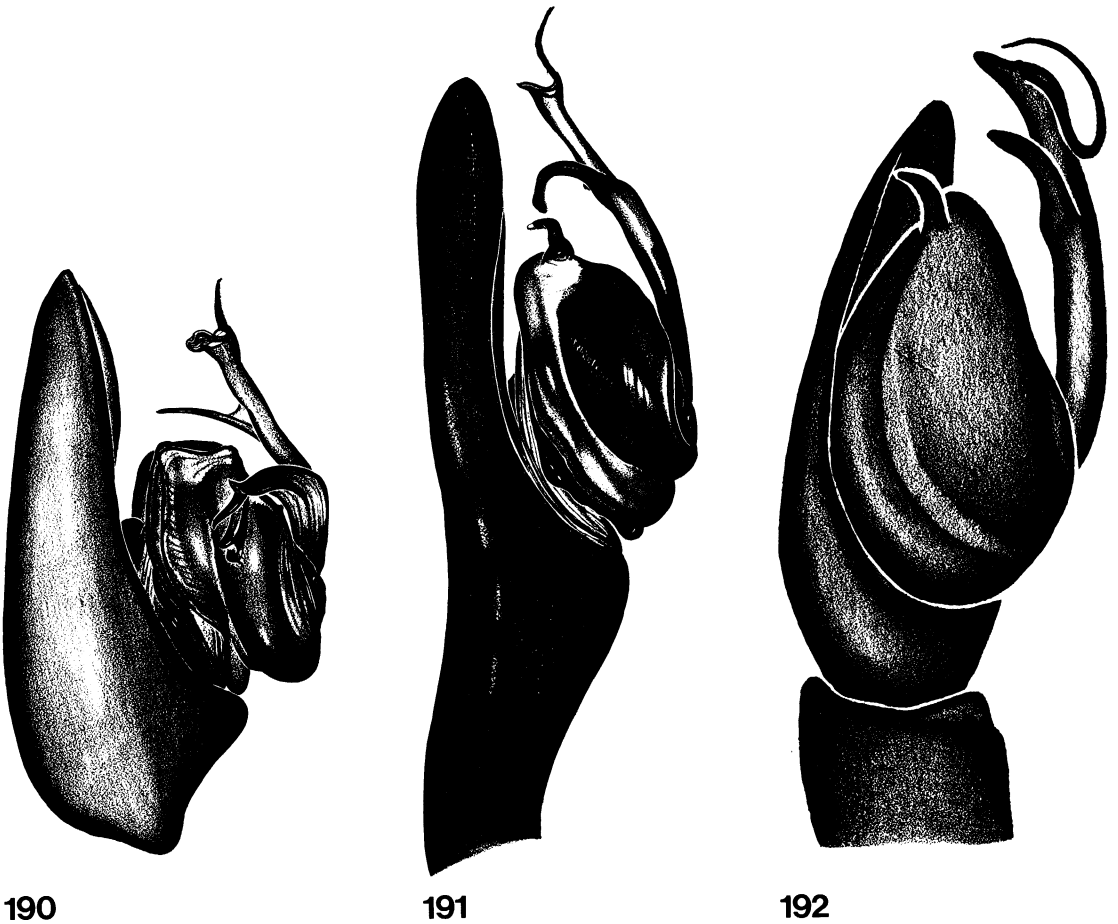


189

Figs. 187–189. Prolateral view of tarsus I of gradungulid males. 187. *Kaiya terama*, new species. 188. *K. bemboka*, new species. 189. *Tarlina noorundi*, new species.

capture prey. It was presumed (and later confirmed) that the Australian species (*G. woodwardi*) also described at that time shared this behavior. However, the subsequent discovery of a cribellate species in the Carrai Caves

of New South Wales (*Progradungula carraiensis* Forster and Gray) which did construct a snare (of very different form from those constructed by other “hypochiloids”) showed that this cursorial behavior was prob-



190

191

192

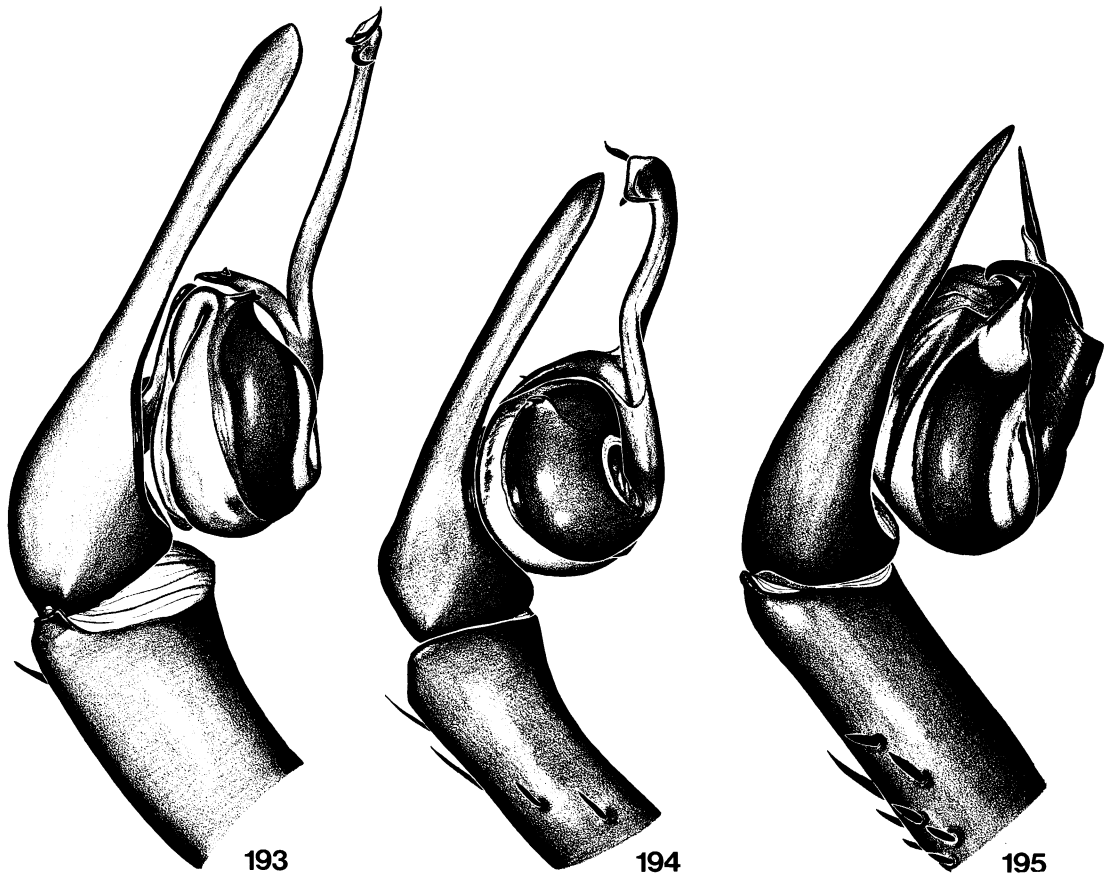
Figs. 190–192. Male palp of gradungulids. 190. *Gradungula sorenseni* Forster. 191. *Spelungula cavernicola*, new species. 192. *Pianoa isolata*, new species.

ably an apomorphic development within the family.

WEB: Snare construction occurs only in the two cribellate genera. The web structure of *P. carraiensis* was described in detail in earlier papers (Forster and Gray, 1979; Gray, 1983). The webs are constructed among rocks or under wall overhangs of the cave in which this species is found. The larger part of the web forms an upper retreat network, from which two semivertical lateral support threads run down to substrate attachments 20–130 cm below. The lower parts of these support threads are held almost parallel to each other by short cross or bridge threads; between them is a narrow ladderlike platform consisting of an irregular zigzag of cribellate silk. The spi-

der takes up its hunting position head-down on the lower side of this semivertical springy catching ladder. One juvenile web was observed to have two catching ladders which were suspended between two sets of lateral threads running to ground and side wall attachments, respectively.

The prey-catching behavior was described by Gray (1983). The spider stretches out its long front legs so that they are poised just above the substrate. The second legs often rest upon the lower ends of the lateral support threads and may sense ground vibrations transmitted by those threads. The third and fourth legs hold the spider on the catching ladder; the third legs also stretch the web outward, forming a sizeable space between the

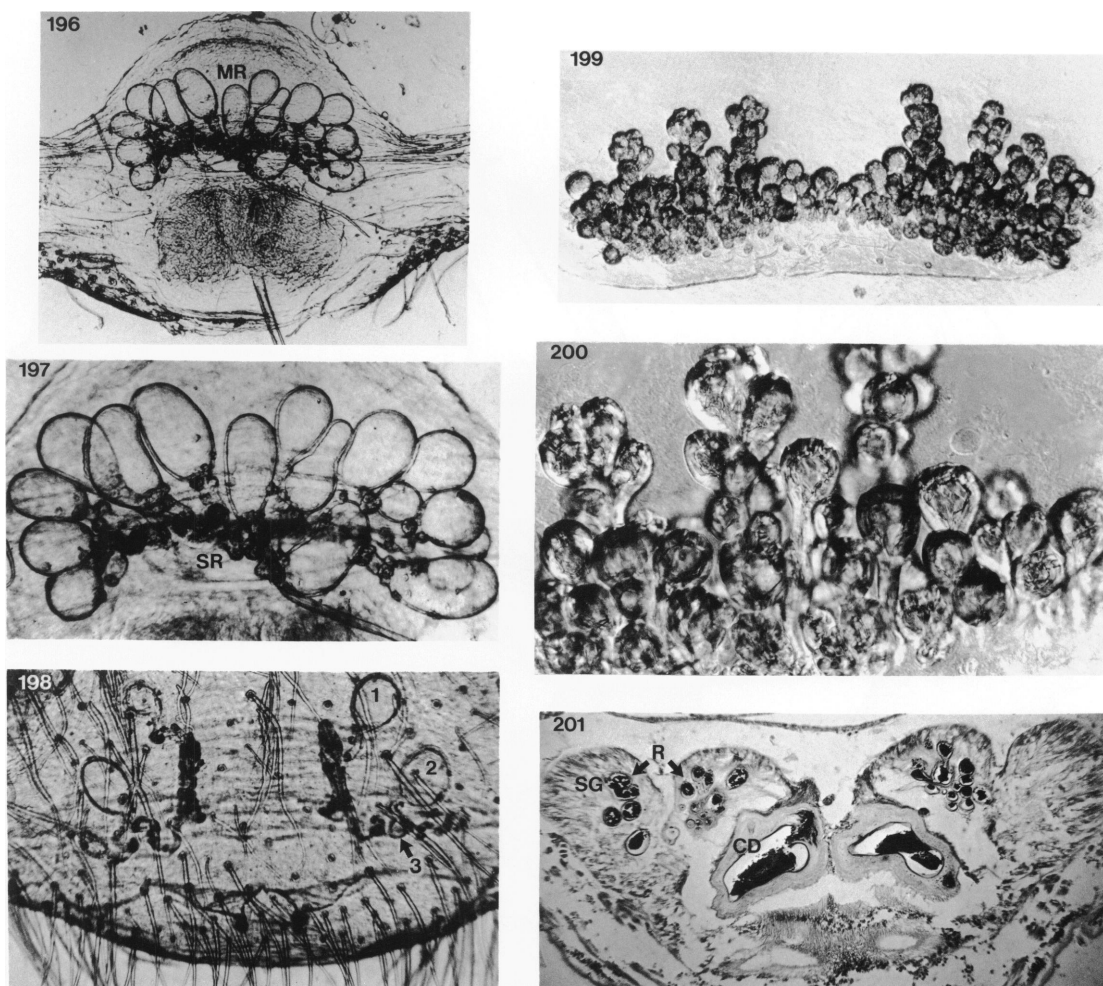


Figs. 193–195. Male palp of gradungulids. 193. *Kaiya bemboka*, new species. 194. *K. terama*, new species. 195. *Tarlina* sp.

lower part of the ladder and the spider's ventral surface. A prey animal moving across the substrate within range of the spider's front legs is scooped up into this space by a sudden lunging action of these legs, which clasp the prey and thrust it on the cribellate silk ladder. This silk immediately ensnathes the prey, which remains held in the tight embrace of the spider's front legs while being bitten. Once the prey is immobile, the spider relaxes its grip, moves to a head-up position above the prey, and begins prey wrapping. The only prey observed being captured by the spiders were tineid moths (length 6–10), which are common members of the guanophilic cave floor fauna and rarely fly. Such prey, wandering on the substrate, must be detected by air current movements or by ground vibrations transmitted to the lateral lines via their attach-

ments. Although prey capture results in the destruction of the cribellate part of the catching ladder, the lateral support threads usually do not break (though they often become entangled with each other). Relatively little energy and silk seem to be needed to renew the structure of the catching ladder. Such renewal activity may interrupt or even precede feeding activity, as some spiders were observed feeding on prey remains while sitting in hunting position on undamaged catching ladders. Spiders were also observed feeding in the upper retreat network, but stored prey was not detected in any of the webs examined.

These observations help clarify the original functional significance of the modified gradungulid tarsi and claws of legs I and II, which have apparently evolved as an adjunct to a specialized form of web-based prey capture.

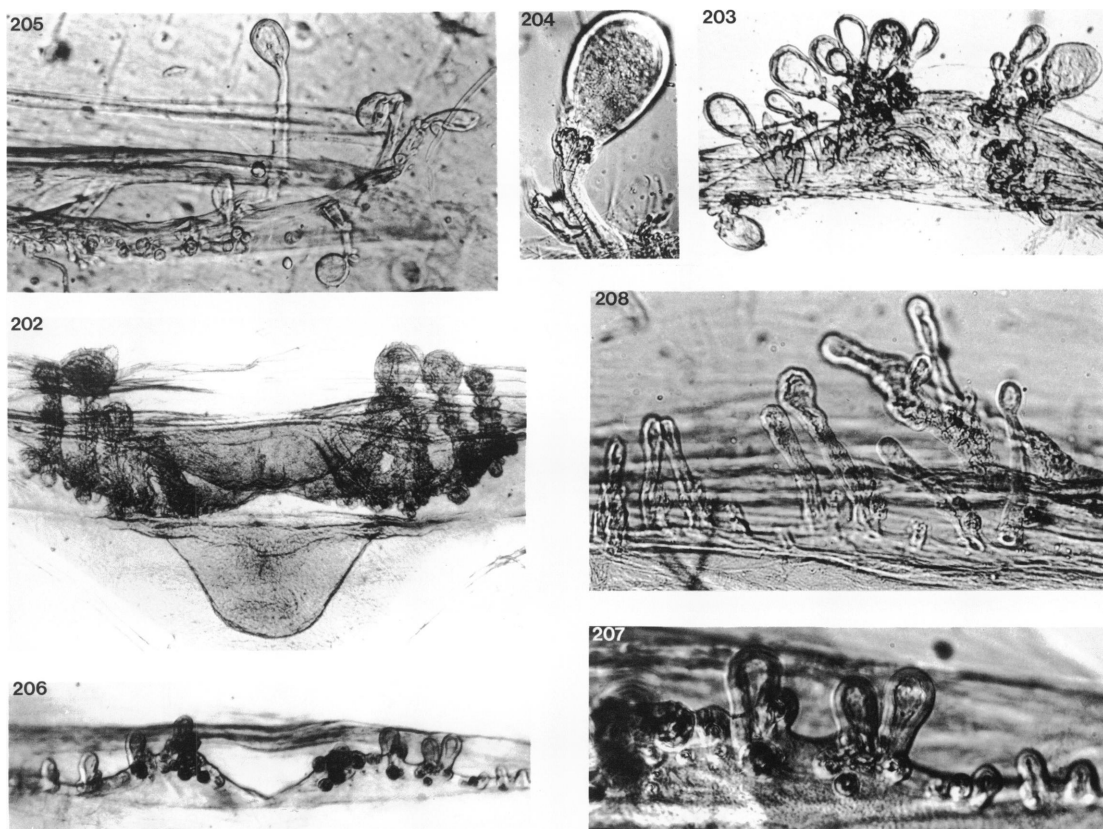


Figs. 196–201. Female genitalia of gradungulids. **196, 197.** *Pianoa isolata*, new species; MR, median receptaculum. **198.** *Progradungula carraiensis* Forster and Gray. **199, 200.** *Gradungula sorenseni* Forster. **201.** *Kaiya terama*, new species, transverse section, showing the presence of paired ducts leading from the two aggregations of receptacula; SG, secretory gland; R, receptacula; CD, communicating duct.

The catching tactics employed by *P. carraiensis* involve a combination of the ambushing tactics of a vagrant “lie-in-wait” hunter and the immobilizing/wrapping effects of a cribellate snare. The tarsal modifications seemingly have been successfully incorporated into the prey-catching behavior of the vagrant cribellate gradungulids, which use only ambushing/foraging tactics to capture their prey.

The structure of the cribellate silk of *P. carraiensis* (Gray, 1983) consists of a mass of fine cribellate threads supported by two lateral threads and a single axial thread. The

cribellate and lateral support threads are twisted in an irregular spiral around the axial thread, which probably consists of a composite double line. This structure is responsible for the elasticity of the catching ladder. During prey capture, the small zigzag of cribellate silk stretches to provide a relatively large surface area for prey entanglement, much as in the web of *Dinopis*. The cribellate silk of *Hypochilus*, whose web (Shear, 1969) is quite different from that of *P. carraiensis*, differs mainly in having two quite separate axial support threads (Comstock, 1912). The prey-subduing behavior of *P. carraiensis* also



Figs. 202–208. Female genitalia of gradungulids. **202.** *Spelungula cavernicola*, new species, adult. **203, 204.** *Macrogradungula moonya*, new species, adult, with detail of distal receptaculum, showing smooth sac and lobes on duct bearing the pores of the secretory gland. **205.** *S. cavernicola*, subadult. **206, 207.** *Pianoa* sp. from Teal Valley, subadult. **208.** *M. moonya*, subadult.

differs from that of *Hypochilus*. The latter subdues its prey only by biting, whereas *P. carraiensis* both bites and wraps its prey. The escape behavior of both species is very similar; low-level disturbance causes the spider to retreat to the upper web or exit on to the adjacent substrate, but greater threat levels result in the spider dropping from the web and adopting an inert pose with tightly flexed legs, a common reaction of many web builders (including the austrochilines). This behavior pattern is in many ways paralleled by the ecribellate vagrant species.

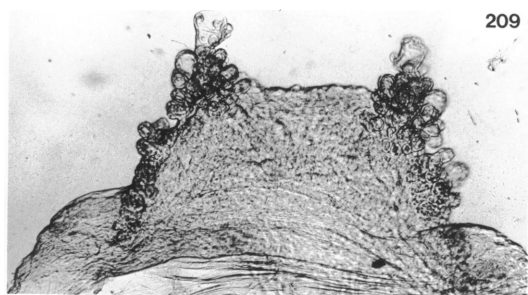
The snare of the large *Macrogradungula* described from North Queensland is very similar in form. The webs have been found on rock faces and tree trunks in tropical forest. As with *Progradungula*, the actual catching platform is small, particularly in relation

to the size of the spider, and the cribellate threads are even fewer. The threads leading from the catching platform of an adult female extended approximately 210 cm up the side of a tree trunk to the retreat.

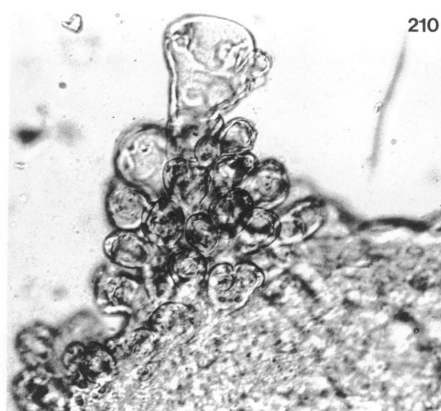
GRADUNGULA FORSTER

Gradungula Forster, 1955, p. 277 (type species by original designation *Gradungula sorenseni* Forster).

DIAGNOSIS: *Gradungula* can be separated from all other gradungulid genera by the distinctive tarsal organ, which bears only one or two relatively large receptor mounds in addition to a large erect median sensory spine, and by the presence of numerous small pore-bearing receptacula spread across the full width of the internal female genitalia (the re-



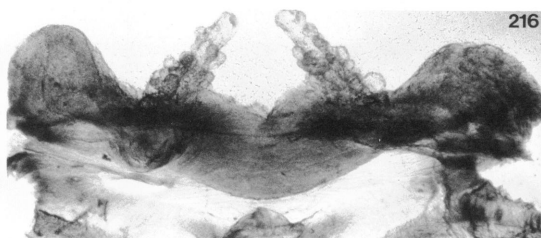
209



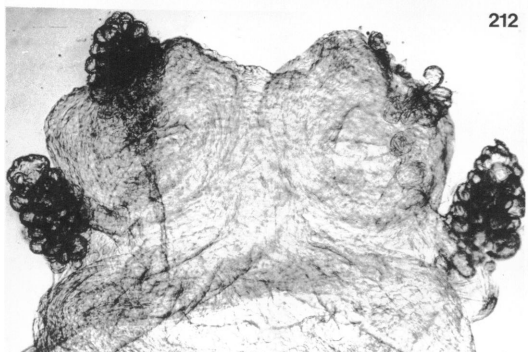
210



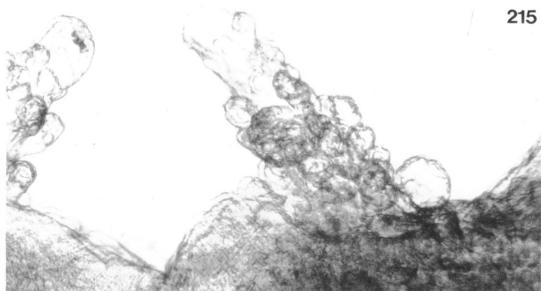
211



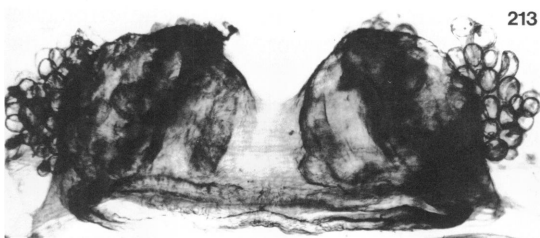
216



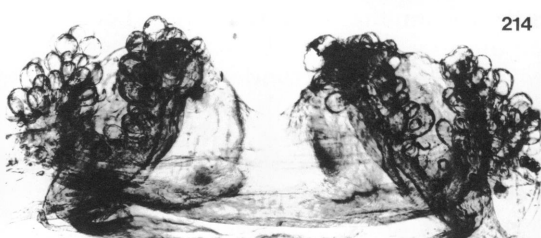
212



215



213



214

Figs. 209–216. Female genitalia of gradungulids. 209, 210. *Tarlina woodwardi* (Forster). 211, 212. *Kaiya terama*, new species, specimens from Gordon and Mount Wilson. 213, 214. *K. brindabella* (Moran). 215, 216. *T. noorundi*, new species.

ceptacula are also evenly spread in *Pianoa* but in that genus the receptacula are fewer, larger, and are not pierced by pores).

DESCRIPTION: The original generic description is full and need not be repeated here. New diagnostic characters discovered sub-

sequent to the original generic description are found in the tarsal organ, bothrial structure, and internal female genitalia; these are described below in the comments on the only species known in the genus.

DISTRIBUTION: Found only in the South Is-

land of New Zealand and Stewart Island; in the South Island the distribution is restricted primarily to the western side of the Main Divide from Nelson-Marlborough in the north to Fiordland and western Southland in the south.

MISPLACED SPECIES: The species earlier described from Australia as *Gradungula woodwardi* by Forster (1955) and *Gradungula brindabella* by Moran (1985) are transferred below to the new genera *Tarlina* and *Kaiya*, respectively.

Gradungula sorenseni Forster

Figures 165, 173, 179–182, 190, 199, 200, 217–221, 326, 363, 367, 368, 387–391

Gradungula sorenseni Forster, 1955, p. 278, figs. 1a–h, 2a–c (female holotype from Franz Joseph, Westland, South Island, New Zealand, in CMC, examined).

Gradungula soerenseni: Brignoli, 1983, p. 143 (lapsus).

NOTES: The original description was detailed and is not repeated here, but we add the following notes on structures which were not examined earlier. The distribution of trichobothria is typical for the family, with a double row on each tibia and a single subdistal trichobothrium on each metatarsus. The anterior margin of all bothria except for the first tibial trichobothrium is strongly crenulate. The tarsal organ is prominent and situated on the subdistal dorsal surface of each tarsus (figs. 387–391). A strong median spine rises from the center of a well-developed basal mound. There are a number of shallow pits irregularly spaced along the surface of the spine which indicate the receptor points served by the five nerve bundles which pass into the spine from the basal mound. In addition to the median receptor spine, there are either one or two low, rounded mounds, each of which is innervated by a single nerve bundle. The nerve bundles each consist of three nerve fibers. The female genitalia consist of a large number of small receptacula which extend over the full width of the genitalic region. The individual receptacula are each enclosed in secretory tissue, from which secretory fluid passes into the lumen of the receptacula through numerous pores (figs. 199,

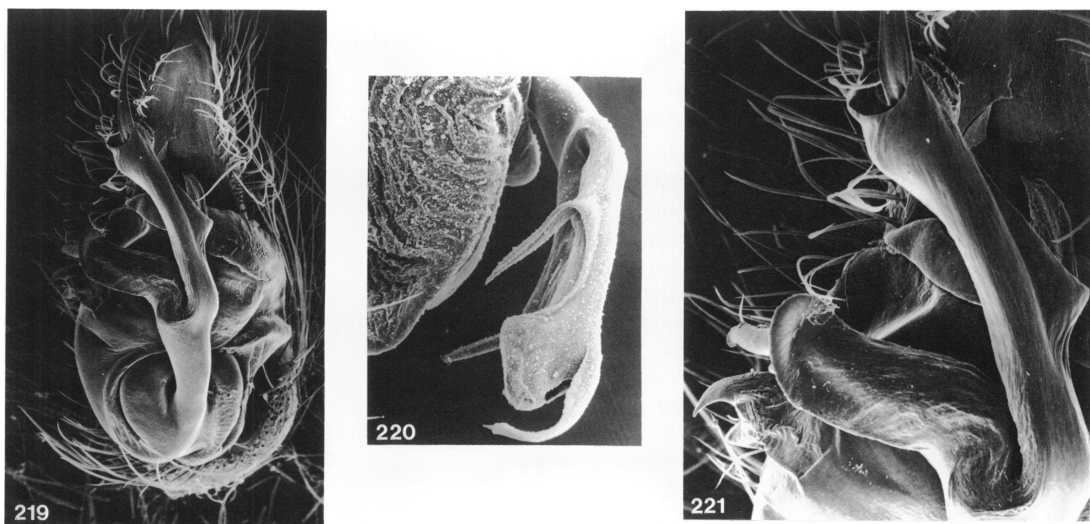


Figs. 217, 218. *Gradungula sorenseni* Forster. 217. Adult female. 218. Immature, probably fourth instar.

200). A rudimentary bilateral organization is indicated by the aggregation of some of the receptacula in association with three or four invaginated lobes on each side. In addition to the small receptacula there is a wide, membranous, dorsally situated sac that does not appear to be associated with secretory tissue. The form of the male palpal bulb is shown in figures 190 and 219–221. The sperm duct passes through a stout embolic rod bearing a broad, flaplike parembolic process near the midpoint and three spiniform terminal processes, and opens at the base of the terminal spines.

MATERIAL EXAMINED: Numerous specimens, mainly immature, have been examined from many localities throughout the range of the genus.

DISTRIBUTION: The numerous records of this species, albeit mainly based on imma-



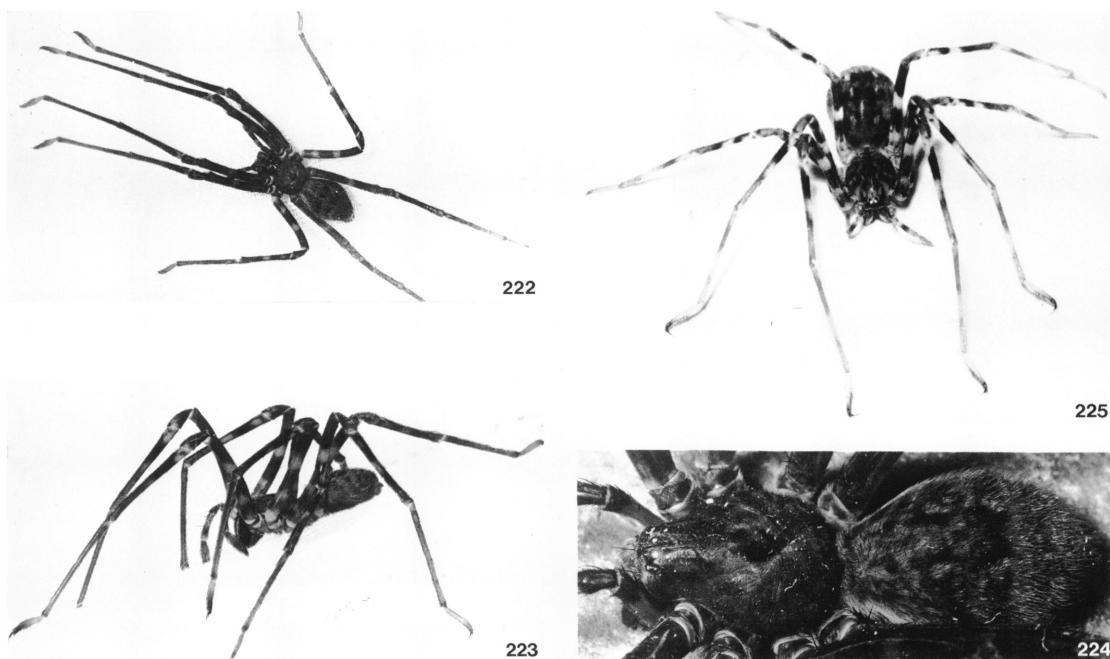
Figs. 219–221. *Gradungula sorenseni* Forster, male palp. 219. Ventral view. 220. Lateral view of tip of embolic rod, showing processes and opening of sperm duct below the distal process. 221. Distal portion of embolic rod, with median apophysis on left.

tures, suggest that it is evenly distributed along the west coast of the South Island from western Southland to Nelson, and on the southern side of Stewart Island. The range probably extends over most of Stewart Island; only the northern region has been extensively collected. The spiders nevertheless appear to be absent from the offshore islands adjacent to Stewart Island and from Snares Island (these smaller islands have now been fairly thoroughly examined).

NATURAL HISTORY: Although generally more commonly found at lower altitudes, from sea level to 300 m, the spiders also occur near the upper limits of the forests to which they appear to be restricted. They are only rarely found as adults; because many of the immatures examined were collected from Berlese samples, there has been little opportunity to raise series of adult specimens from the full distributional range. Because of this lack of adult specimens, it is uncertain whether only a single species is involved; that only minor differences have been detected between adults from the northern and southern limits of the known distributional range suggests that this is so. The presence of a single widespread species would be of interest, because very few of the forest-inhabiting spiders of New Zealand enjoy such a wide dis-

tribution. Most species have much more restricted ranges and fit closely to a speciation pattern apparently resulting from drastic land changes through the Tertiary and Pleistocene that have permitted extensive allopatric speciation. The distributional range of *G. sorenseni* covers four of these areas, each of which would normally be populated by different but related species.

The spiders are nocturnal; mature spiders are generally found resting beneath fallen logs during the day but forage on the forest floor and tree trunks during the night. Immatures are more often found in leaf litter or moss and thus are most often collected in Berlese samples. These appear to be the normal habitats for the immature stages. The eggsacs, however, are usually laid in cavities within decaying logs; the female will often be found in association with the eggsac immediately after its construction, but when the full complement of eggsacs is laid they are then deserted. From two to three eggsacs are generally laid consecutively, each suspended from the upper surface of a cavity within the log. Eggsacs have nonetheless been found in moss on steep banks and occasionally in deep mats of moss on the forest floor. Each eggsac is spherical, with a smooth black outer skin (fig. 173). The spiderlings, as in all gradungulids, emerge



Figs. 222–225. *Spelungula cavernicola*, new species. 222, 223. Subadult male. 224. Adult female. 225. Immature, third or fourth instar.

from the eggsac through a circular hole that appears after the spiderlings molt within the sac; the silk may actually be dissolved by the action of a fluid which accumulates at the bottom of the sac; the position of the hole appears to vary according to the angle at which the sac is suspended when the spiderlings hatch.

In captivity, the spiders will feed on a wide range of invertebrates, including other spiders. An adult female and five immatures have been recorded among the prey of the psammophile pompilid wasp *Priocnemis* (*Trichocurgus*) *nitidiventris*, which hunts in beech forest skirting the Haast beach in Westland (A. C. Harris, personal commun.).

SPELUNGULA FORSTER, NEW GENUS

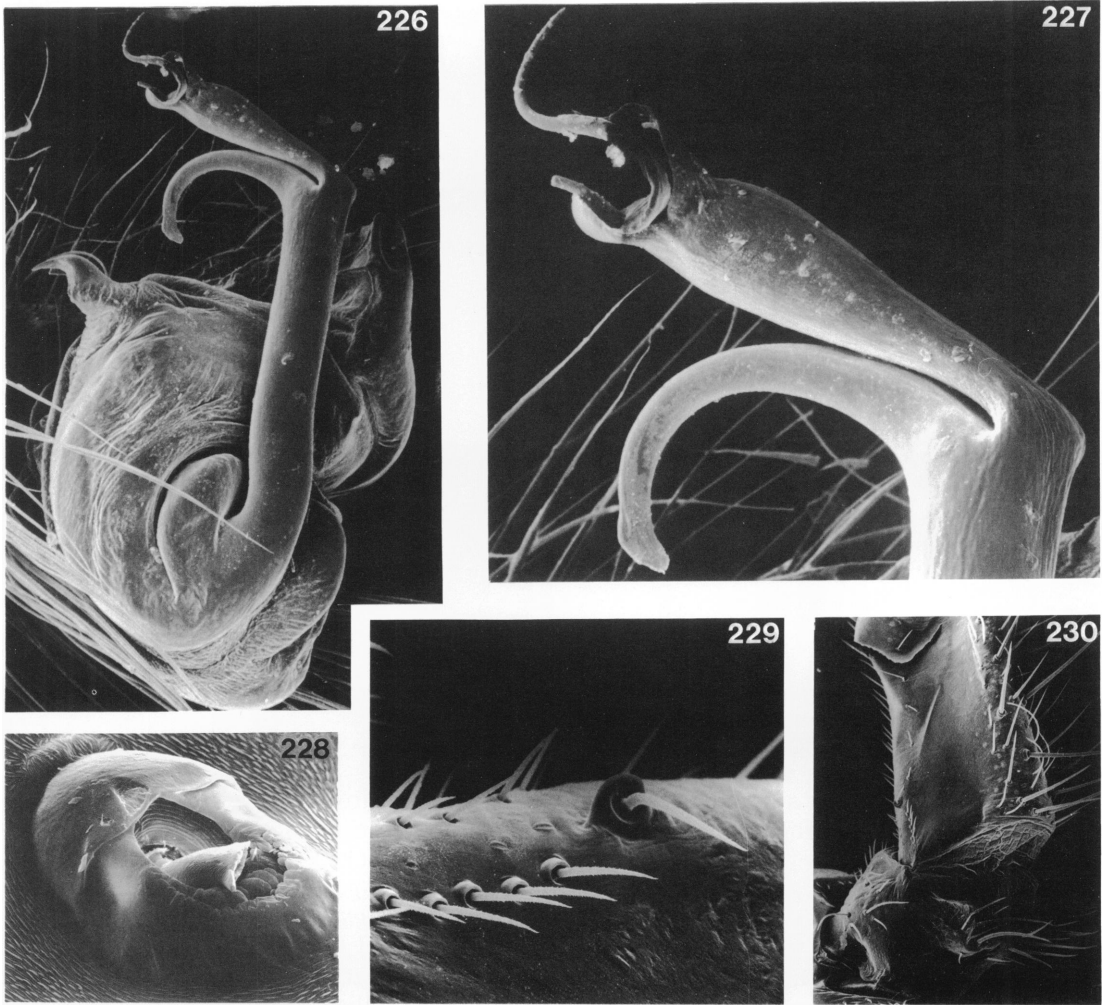
TYPE SPECIES: *Spelungula cavernicola*, new species.

ETYMOLOGY: The generic name is based on the Latin spelunca (cave) and is feminine in gender.

DIAGNOSIS: These large (total length 20 mm), ecribellate, cave-dwelling spiders can

be separated from both ecribellate Australian genera by the form of the female genitalia and the tarsal organ, and from the other two New Zealand genera by their larger size (also, from *Gradungula* by the different form of tarsal organ and from *Pianoa* by the different abdominal patterning and the form of the female genitalia).

DESCRIPTION: Large (total length 20), ecribellate gradungulids. Carapace longer than wide, closely clothed with recumbent, finely ciliated hairs and fewer erect bristles; caput rounded but not high; fovea a broad oval pit. Abdomen with dense covering of recumbent hairs and numerous erect black bristles, brown and faintly patterned but not with chevrons as in *Pianoa*; pigmentation reduced in some cave populations. Female genitalia with numerous small receptacula grouped bilaterally around four lobes on each side (fig. 202); large median membranous receptaculum extends over full width of genitalia. Male palp distinctive, with parembolic process a curved rod; terminal embolic process a single curved spine; sperm duct opening from near base of embolic process; median apophysis spini-



Figs. 226–230. *Spelungula cavernicola*, new species. 226, 227. Male palp. 228. Third tibial bothrium from leg 1. 229, 230. Inner surface of male palpal femur, showing setal picks.

form (figs. 191, 226, 227). Legs heavily spined; trichobothria in double row on tibiae, single trichobothrium on subdistal dorsal surface of each metatarsus. Tarsal organ a simple cup (fig. 381).

DISTRIBUTION: Found only in caves in the Nelson district of the South Island of New Zealand.

***Spelungula cavernicola* Forster,**
new species

Figures 174, 191, 202, 205,
222–230, 381

TYPES: Male holotype collected while feeding on a cave weta in Wonder Sump Cave,

Oparara River area, northwestern Nelson, South Island, New Zealand (February 7, 1983; P. Wood), deposited in NMW, and female paratype from Ida Cave, Oparara, north of Karamea, Nelson, South Island, New Zealand (June 26, 1973; J. McBurney, J. I. Townsend), deposited in OMD.

ETYMOLOGY: The specific name refers to the fact that the species is restricted to caves.

DIAGNOSIS: The species is characterized by the structure of the male and female genitalia.

MALE (holotype): Total length 19.92. Carapace 9.85 long, 8.51 wide. Abdomen 10.00 long, 7.34 wide. Carapace shape, hair distribution, and abdominal pattern as in figures

222–225. Eye sizes and interdistances: AME 0.25, ALE 0.45, PME 0.41, PLE 0.38; AME-AME 0.13, AME-ALE 0.42, PME-PME 0.42, PME-PLE 0.45, ALE-PLE 0.13; MOQ length 0.84, front width 0.64, back width 1.26. Chelicerae with four promarginal teeth and group of denticles on proximal retromargin; anterior face with numerous hairs and strong proximal bristle. Sternum scutiform, longer than wide in ratio of 3:2. Endites almost twice as long as wide, subparallel, with thick brush of hairs on distal inner margin and single row of serrula teeth on outer margin. Labium longer than wide in ratio of 9:8; outer margins slightly convergent.

	I	II	III	IV	Palp
Femur	17.62	17.04	14.28	15.95	7.61
Patella	4.51	4.50	4.32	4.51	2.17
Tibia	16.85	15.31	12.61	14.01	6.18
Metatarsus	20.17	19.29	14.35	19.46	—
Tarsus	<u>5.01</u>	<u>5.00</u>	<u>4.03</u>	<u>4.35</u>	<u>3.84</u>
Total	64.16	61.14	49.59	58.28	19.80

Leg spination: femora: I d1-1-1-0-0-0-1, v1-1-0, p2-2-2-1-1-1-1, r1-2-1-1-1; II d2-2-1-2-2-1-2, v2-2-0, p1-2-1-1-2-1-1, r1-1-2-1-1; III d1-1-1-1, v0, p1-1-1-2-1-1, r1-1-1-1-1; IV d0, v1 basal, p1-1-2-2-1-1, r1-1-1-1-1; patellae: I p1, r1; II p2-1-1, r1; III p1, r1; IV p1, r1; tibiae: I d0, v2-2-2-0, p1-1-1, r1 subdistal; II d0, v2-2-2-0, p2-1-1-1, r1 basal, 1 distal; III d2-2-2-2-2, v2-2-2-2, p2-1-1-1, r1 basal, 1 distal; IV d1-1-1-1, v2-2-2-2, p1-1-1-0, r1-1-1-0; metatarsi: I d0, v2-2-2-2, p0, r1 basal; II d0, v2-2-2-2, p0, r1-1-1-2; III d0-0-1-0, v0-1-1-1, p2-1-2-2, r2-1-2-1-2; IV d1-1-0-0, v1-1-1-2, p2-1-2-1-2, r1-1-1-2-2. Palpal spination: femur d1-1-2 on distal half, p1-1, r1-1; patella d1-1, p1-1, r1-1; tibia d1-1-2, p1-2-1, r2-1-0; cymbium p1 basal. Trichobothria in double row on each tibia; prolateral row of five or six with progressively longer trichemes matching those of retrolateral row (which, however, continues to near distal margin of segment with another 10–11). Metatarsi with single subdistal trichobothrium. Distal margin of first tibial bothrium entire but remainder strongly crenulate (fig. 228). Proclaw of legs I, II without teeth; retroclaws with 18–20 teeth; inferior claw small, associated with sclerotized basal plate. Superior claws of legs III, IV normal, with

20 teeth; inferior claw with single tooth. Palpal femur with row of eight bristles, each arising from distinct tubercle, along basal prolateral surface; bristles act as picks for cheliceral stridulatory ridges (figs. 229, 230). Palpal bulb as in figures 191, 226, 227; terminal embolic process evenly curved, par-embolic process rodlike; median apophysis spiniform.

FEMALE: Total length 20.54. Carapace 9.84 long, 6.70 wide. Abdomen 11.85 long, 5.74 wide. General characteristics as in male. Eye sizes and interdistances: AME 0.12, ALE 0.36, PME 0.28, PLE 0.33; AME-AME 0.12, AME-ALE 0.36, PME-PME 0.30, PME-PLE 0.31, ALE-PLE 0.09; MOQ length 0.72, front width 0.51, back width 0.84. Chelicerae with well-defined stridulatory ridge field associated with typical bristles on inner surface of palpal femora.

	I	II	III	IV	Palp
Femur	14.22	12.64	9.48	12.32	4.90
Patella	4.42	4.11	3.63	3.64	1.90
Tibia	12.64	11.85	9.80	12.11	3.48
Metatarsus	15.01	12.96	10.74	14.22	—
Tarsus	<u>4.74</u>	<u>4.58</u>	<u>3.48</u>	<u>5.58</u>	<u>4.74</u>
Total	51.03	46.14	37.13	47.87	15.02

Leg spination: femora: I d3-2-1-2-2-2, v1 median, p2-1-1-1, r1-1-1-1-1; II d2-2-1-1-2-2-1-1, v0, p1-1-1, r1 median; III d4-3-3-1-2-1-1-1, v2-2-0, p1 median, r1 median; IV d3-2-2-1-2-1, v2-2-0, p1-1-1-1, r0; patellae: I r1; II, III p1, r1; IV d1 median; tibiae: I, II d0, v2-2-2-0, p1-1-1, r1-1-1; III d1 basal, v2-2-2, p1-1-1, r1-1-1; IV d1-1-1, v2-2-2-2, p1-1-1, r1-1-1; metatarsi: I d0, v2-2-2-2, p0, r0; II d0, v2-2-2-2, p1 subbasal, r1 subdistal; III, IV d1 basal, v2-2-2-2, p1-1-1-2, r1-1-1-2. Palpal spination: femur d1-1-1, v0, p1 distal, r1 distal; patella d1, p1-1, r1-1; tibia d1-1, v1 basal, 1 distal, p1-2-2-1, r1-0; tarsus d1-1-0, p2-2-2-1, r2-2-1. Genitalia as in figure 202; although distal receptaculum on each of invaginated regions appears to lack perforations, smaller receptacula are enclosed in secretory tissue discharging through numerous small perforations in receptacular wall.

OTHER MATERIAL EXAMINED: NEW ZEALAND: **South Island:** Honeycomb Hill Cave, Oparara, Sept. 29, 1983 (I. R. Miller); Ida Cave, Oparara, N Karamea, Mar. 10, 1971

(J. I. Townsend), June 26, 1973 (J. I. Townsend); Motupipi Cave, Takaka, May 21, 1961, with empty eggsacs (C. Coates, P. R. Kettle, J. I. Townsend), Jan. 1958 (F. Walton), July 23, 1984 (I. Miller); Neil's New Passage, Honeycomb Cave, Oparara, Sept. 29, 1983 (P. R. Millener); Upper Oparara River, Karamea, Nov. 18, 1957, elev. 1800 ft. (E. S. Gourlay); Y Cave, above bluff in bush, Heaphy River, Nov. 29, 1959 (O. R. Wilkes). Except for a mature male from Y Cave, all these specimens are immature.

DISTRIBUTION: Surprisingly, these large and conspicuous spiders have only come to notice in comparatively recent times, apparently because they are restricted to a few caves in the northwest corner of the South Island. The enthusiastic investigation of cave systems throughout New Zealand in recent years has not brought to light populations in any caves elsewhere in New Zealand. Apart from the large size and slender legs (which seem to be characteristic of the "hypochiloids" as a whole), the spiders show no strong troglomorphic morphological characteristics, although the populations in the Motupipi Caves of Nelson are much paler than those inhabiting the western coast cave complexes. The spiders from both these areas are similar in morphology, but because mature specimens have not been available from the Motupipi Caves it has not been possible to compare the genitalia to see whether there are two species involved or (as assumed here) merely a depigmented population.

NATURAL HISTORY: The spiders construct no snare and hunt on the cave walls and roof. The only positive indication of their prey is based on two records of spiders observed devouring the large cave wetas (orthopterans) that are commonly present in large numbers. A preliminary survey of the population in the Oparara cave system (I. R. Miller, personal commun.) suggests that the spiders are restricted to the twilight zone (as are the wetas), and are only rarely found in the deeper parts of the caves. The eggsacs, which are large and pear-shaped (fig. 174), have been found suspended from the walls and roofs of caves. Unlike the eggsacs recorded from epigean gradungulids, the outer layer of silk is soft and white. The spiderlings escape from the sac through a small circular hole, in typical gradungulid fashion.

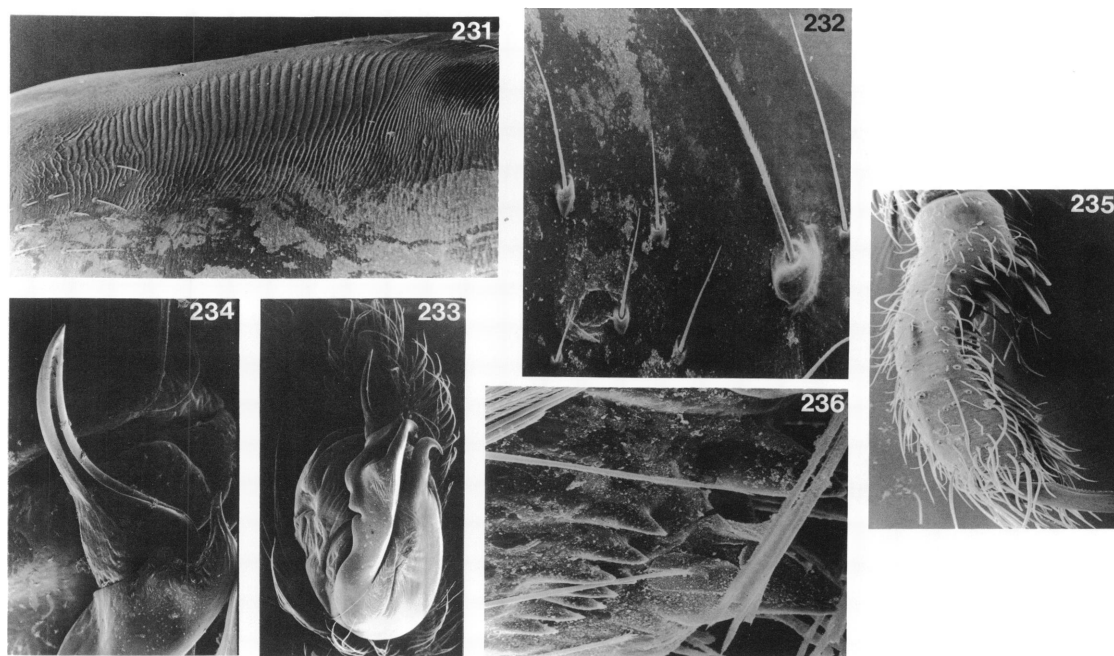
TARLINA GRAY, NEW GENUS

TYPE SPECIES: *Tarlina noorundi* Gray, new species.

ETYMOLOGY: The generic name is taken from an aboriginal word meaning "tongue" and refers to the shape of the distal part of the parembolic process; it is considered feminine in gender.

DIAGNOSIS: These ecribellate, strongly pigmented gradungulids can be recognized by the following combination of characters: chelicerae with stridulatory ridges; male palp with a strong, distally spoon-shaped parembolic process, a spiniform, grooved subterminal embolic process, and the distal portion of the embolus membranous and sometimes bilobed; female genitalia typically with only one pair of multireceptaculate lobes (in contrast to two or more pairs in all other ecribellate genera); and a tarsal organ with a prominent median sensory spine.

DESCRIPTION: Medium to large ecribellate gradungulids. Carapace with dark middorsal band, usually extending back to posterior margin. Abdomen with numerous white hairs dorsally, sometimes clumped in discrete groups. Eye group occupying less than two-thirds of caput width. Chelicerae with five to seven teeth on promargin and group of denticles basally on retromargin; stridulatory ridges present, reduced in females. Fovea a longitudinal pit. Labium strongly indented anteriorly. Sternum scutiform, narrowly truncate posteriorly. Male palpal femur with bristles as stridulatory picks, one greatly enlarged. Cymbium narrow, triangular. Tegulum large, ovoid, more than half as long as cymbium, inserted subbasally to centrally; median apophysis simple, hooked; parembolic process spoon-shaped distally, rounded or shallowly bifurcate apically; subterminal embolic process grooved, distally spiniform; distal portion of embolus with one or two membranous lobes. Female epigastric region weakly swollen; male epigastric region with numerous spigots. Female internal genitalia with only two lobes, each associated with numerous small receptacula; lobes apparently associated directly with extensive membranous structure probably homologous with separate membranous sac typical of other genera. Legs strongly spined; most species with male tarsi I and II ventrally excavated.



Figs. 231–236. *Tarlina noorundi*, new species, male from Coffs Harbour. 231. Cheliceral stridulatory organ. 232. Stridulatory picks on palpal femur. 233. Palpal bulb, ventral view. 234. Distal embolic process of palp. 235. Tarsus of leg I. 236. Retromarginal cheliceral teeth.

Tarsal organ a low circular plate or raised mound with strong erect sensory spine and numerous small receptor nodes grouped on posterior surface of base mound behind spine.

DISTRIBUTION: Mideastern to northeastern Australia.

RELATIONSHIPS: Morphological subgroups are discernible within *Tarlina*, although they are not formally recognized here. The large size and characteristic, strongly sclerotized palpal structure of *T. milledgei* and *T. noorundi* establish the close relationship of those species. The remaining species are smaller and have less strongly sclerotized palpal bulbs. The northern Queensland species, *T. daviesae* and *T. simipes* form another pair of closely related species, linked by the distinctive development of the parembolic process and the distal portion of the embolus.

***Tarlina noorundi* Gray, new species**

Figures 167, 168, 189, 215, 216,
231–236, 241–243, 264–266, 397

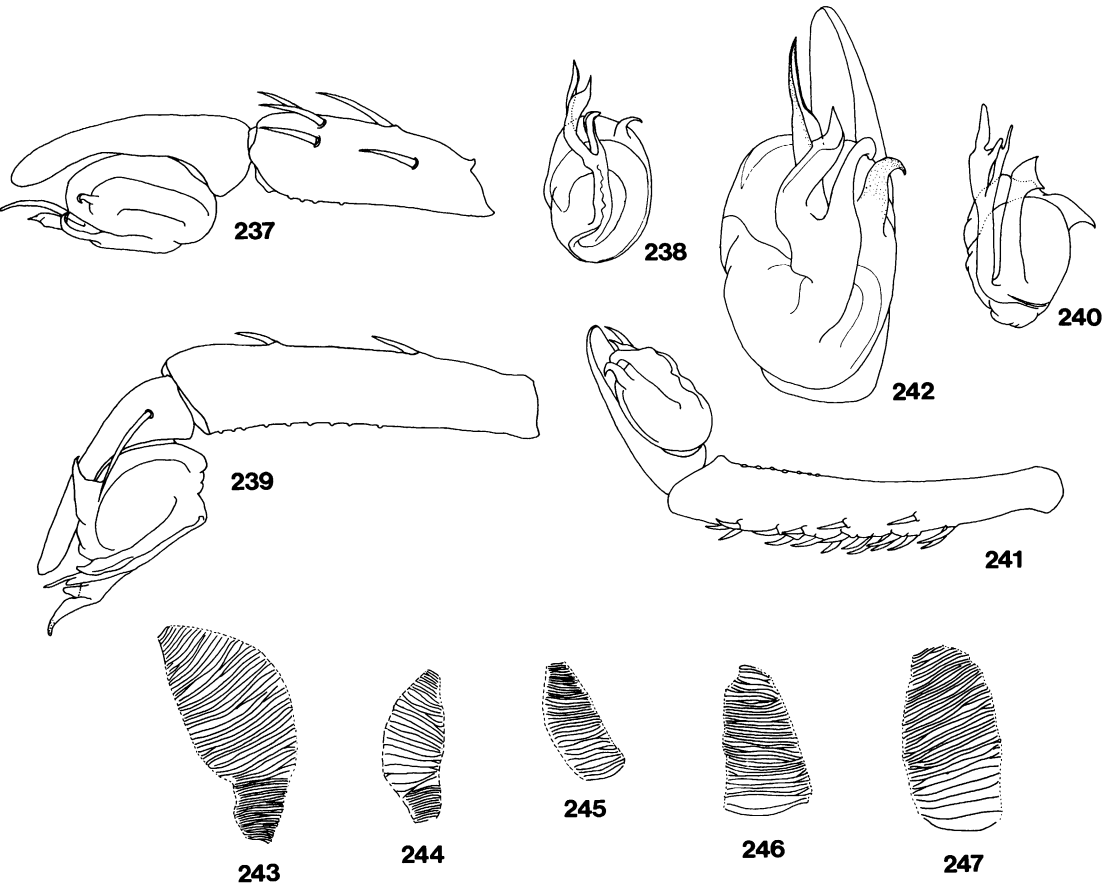
TYPES: Male holotype (KS 13911) found wandering on doline floor in a closed forest

at the entrance of Carrai Bat Cave, near the Natural Arch, Carrai State Forest, New South Wales, Australia (July 3, 1971; M. Gray), deposited in AMS. Paratypes: allotype female (KS 13912) from log in closed forest at the type locality (July 19, 1971; M. Gray), second female (KS 13913) from the type locality (August 1971; M. Gray), and male (KS 13910) from the type locality (April 26, 1974; M. Gray), all deposited in AMS.

ETYMOLOGY: The specific name is an aboriginal word meaning “darkness,” referring to the dark coloration of these spiders.

DIAGNOSIS: This species can be separated from *T. milledgei* by the rather short, slightly curved, spiniform part of the subterminal embolic process and from the other species by its larger size and differences in the male and female genitalia.

MALE: Total length 9.60. Carapace 5.72 long, 4.26 wide. Abdomen 3.80 long, 3.24 wide. Chelicerae and caput dark brown to black; caput with narrow middorsal brown line and black arcuate marking in front of fovea, flanked by two large light brown patches (figs. 167, 168); dark striae, separated

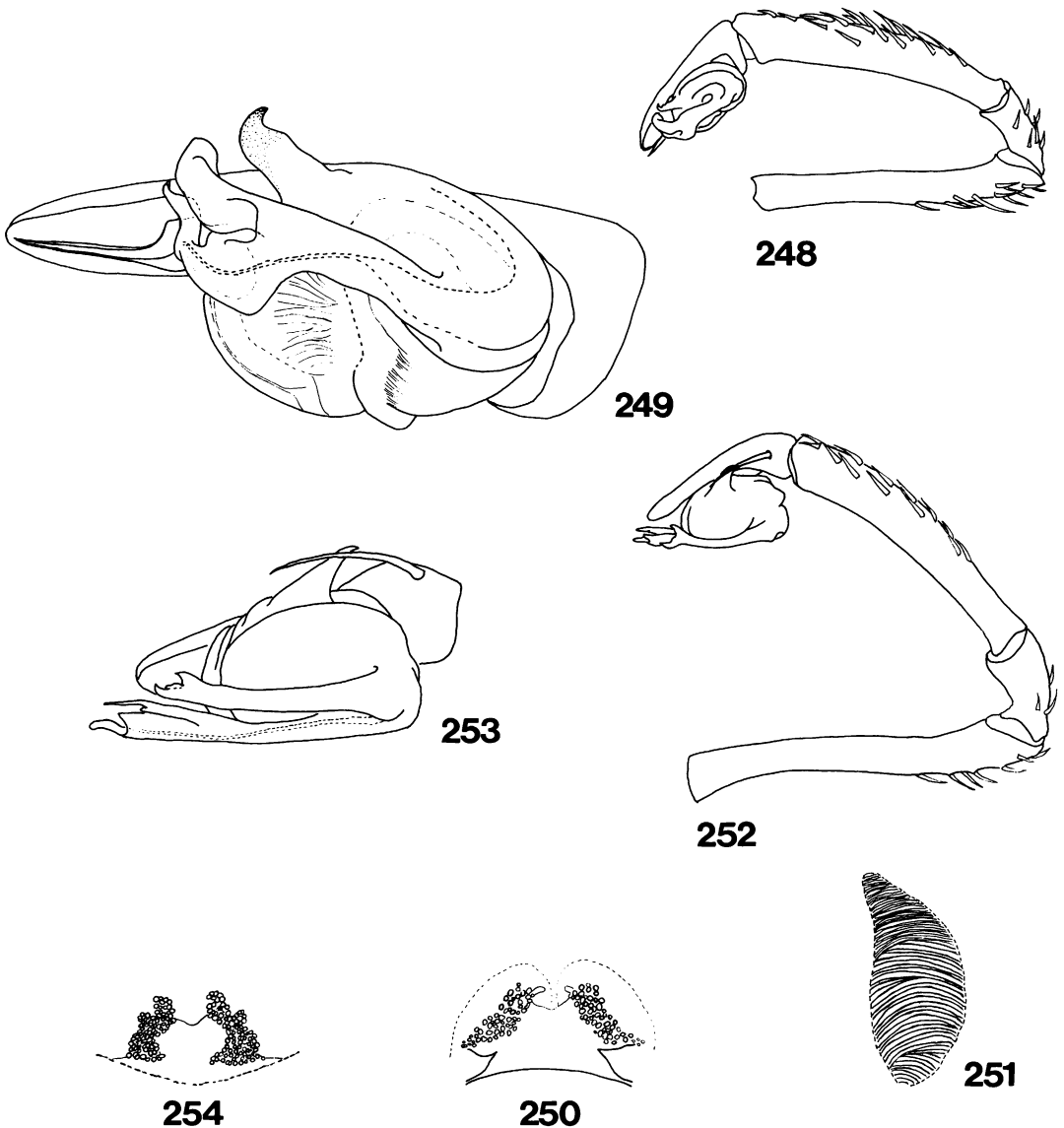


Figs. 237–247. Structures of male *Kaiya* and *Tarlina*. 237, 238, 244. *T. woodwardi* (Forster). 239, 240, 245. *T. daviesae*, new species. 241–243. *T. noorundi*, new species. 246. *K. terama*, new species. 247. *K. bemboka*, new species. 237, 239, 241. Palp, retrolateral view. 238, 240, 242. Palp, ventral view. 243–247. Stridulatory ridges on outer surface of chelicerae.

by light brown patches, connect this band to brownish grey lateral areas; abdomen mottled grey, darkest anteriorly and laterally, browner dorsally, bearing numerous white patches of hairs grouped with dark grey patches to form series of five disjunct chevrons dorsally. Carapace with caput gently arched, only slightly higher than thoracic region; irregular group of bristles extends back from lateral eyes; three rows of hairs extend back from median eyes to fovea. Eye group 1.54 wide; from above, anterior row weakly recurved, posterior row very slightly recurved; from front, anterior row straight, posterior row procurved. Eye sizes and interdistances: AME 0.13, ALE 0.29, PME 0.21, PLE 0.23; AME-AME 0.12, AME-ALE 0.22,

PME-PME 0.21, PME-PLE 0.32, ALE-PLE 0.04; MOQ length 0.45, front width 0.39, back width 0.61. Cheliceral stridulatory ridges as in figure 243; six or seven promarginal teeth, basal retromargin with row of eight small denticles. Labium 0.88 long, 0.92 wide. Endites weakly grooved near base, lateral margins concave, scopula well developed; serrula single row of 35–40 teeth. Sternum 2.96 long, 2.28 wide.

	I	II	III	IV	Palp
Femur	7.13	6.72	5.82	6.97	5.37
Patella	2.46	2.38	2.17	2.13	1.68
Tibia	6.81	5.99	4.84	6.81	4.76
Metatarsus	6.40	5.23	5.00	7.30	—
Tarsus	2.59	2.40	1.48	2.05	2.54
Total	25.39	22.72	19.31	25.26	14.35



Figs. 248–254. Structures of *Tarlina*. 248–251. *T. milledgei*, new species. 252–254. *T. simipes*, new species. 248, 252. Male palp, retrolateral view. 249, 253. Male palp, retroventral view. 250, 254. Female internal genitalia. 251. Stridulatory ridges of male chelicera.

Leg formula 1423. Spination: I: femur d2-1-2-1-2-1-2, v1-0-0-0-1-0, p1-1-1-1-1-2, r1-0-1-0-0-0; patella p1, r1; tibia d0-1-0-1-1-1-0, v2-2-2-2, p1-1-2-1-1-1-1-0, r2-1-1-2-1-2-1-0; metatarsus d1-1-1-1-1-0, v2-2-1-2-1, p1-1-1-2, r2-2-2-1-2; tarsus v21; II: femur d2-1-2-1-2-1-2, v1-1-0-0-1-0, p1-1-1-1-1-1-0, r1-1-0-0-0; patella p1, r1; tibia d1-0-1-1-1-0, v2-2-2-2, p1-1-1-1-1-0, r2-1-2-1-1-1-1-0;

metatarsus d1-1-2-2-0, v2-2-2-1, p2-1-1-1-2, r2-2-0-1-2; tarsus v19; III: femur d3-2-2-2-2, v1-2-2-0, p1-1-1-1-1-0, r1 basal; patella d1-1, p1, r1; tibia d0-1-1-1-0, v2-2-2-2, p2-1-0-1-0, r1-1-1-0; metatarsus d2-2-2-0, v2-2-2-1, p2-1-1-2, r1-1-1-2; tarsus r1; IV: femur d2-1-2-1-2-2, v1-2-2-0, p1-1-1-1-0, r1 basal; patella d1-1, p1, r1; tibia d0-0-1-1-0, v2-2-2-2, p1-1-1-1, r1-1-1-1-0; metatarsus

d0-1-0-1-0-2-0, v2-2-1-2-1, p2-1-1-2, r1-1-1-1-1-2; tarsus r1. Tibial trichobothria: pro-lateral, 6-7 proximal, 1 distal; retrolateral 9-10. Tarsal organ as in figure 397. Prolateral claws of legs I, II with 19, 15 teeth, respectively; retroclaws with 20, 17; paired claws of legs III, IV with 11-13 teeth; inferior claws smooth. Palpal segments long; tibia thickest near middle, with short but strong spines grouped dorsally, trichobothria in two rows (seven, eight); spination: femur d23, r3 (all in distal half), patella d1-1-1-0, p1-1-0-0, r1-1-0-0; tibia d24 (in middle two-thirds), p3 (reduced to bristles), r1; tarsus 0. Tegulum of palpal bulb large, retroventral region swollen (figs. 241, 242); median apophysis robust, distally hooked; embolic branch thickened, rodlike; parembolic process distally spoon-shaped, curved between median apophysis and tegulum; subterminal embolic process broad basally, deeply grooved, groove continuing as narrowing channel in short, slightly curved spiniform distal part; distal portion of embolus membranous, tapering, with sperm duct opening subapically upon low mound closely associated with basal groove of subterminal embolic process. Colulus small, coniform.

FEMALE: General characteristics as in male. Total length 13.04. Carapace 7.52 long, 5.52 wide. Abdomen 7.20 long, 5.92 wide.

	I	II	III	IV	Palp
Femur	6.24	5.92	5.28	6.32	3.05
Patella	2.88	2.96	2.56	2.48	1.20
Tibia	5.60	5.20	4.48	6.00	2.60
Metatarsus	4.64	4.40	4.48	6.08	—
Tarsus	2.16	2.16	1.60	1.92	2.91
Total	21.52	20.64	18.40	22.80	9.76

Leg formula 4123. Spination: I: femur d2-2-1-2-1-2, v0-0-0-1, p1-0-1-1-2, r1 basal; pa-tella 0; tibia v2-2-2-2-2, p2-1-2-1-1, r2-2-1-1-1; metatarsus v1-1-1-1, p1-1-0-1, r1-1-1-1; tarsus v30; II: femur d2-2-1-2-1-2-2, v1-1-0-1-0, p1-1-1-1-1-1, r1-0-1-0-0; patella p1; tibia v2-2-2-2, p1-1-1-1, r2-2-1-1; metatar-sus v2-1-1-1, p1-1-1-1, r1-1-0-1; tarsus v33; III: femur d3-2-2-2-2, v1-2-2-0, p1-1-1-1-1-1, r1; patella p1, r1; tibia d1-1-1, v2-2-2-2, p1-1-1-1, r1-1-1; metatarsus d2-2-2, v2-2-2-1, p2-1-1-2, r2-1-2; tarsus r1; IV: femur d2-

2-2-2-2, v2-2-2-0, p1-1-1-1-1, r1 basal; pa-tella p1, r1; tibia d0-1-1-1, v2-2-2-2, p1-1-1, r1-1-1; metatarsus d2-2-2, v2-2-2-1, p2-1-1-2, r2-1-1-2; tarsus r1. Superior claws of legs I-IV with 16, 15, 8, 9 teeth; inferior claw of legs III, IV with single tooth. Internal geni-talia with one pair of multireceptaculate lobes clearly extending beyond membranous cop-ulatory bursa (figs. 215, 216).

OTHER MATERIAL EXAMINED: AUSTRA-LIA: New South Wales: Gibraltar Range Na-tional Park, Mar. 1971 (D. Clyne, AMS KS 13893, 13894), 2♂; Narrow Neck Saddle, Chandler River, near Hillgrove, Aug. 26, 1969 (G. Hunt, AMS KS 13898), 1♂; Point Look-out area, New England National Park, Aug. 27, 1969, under log in closed forest (G. Hunt, AMS KS 13897), 1♀.

DISTRIBUTION: The Carrai Plateau, New England Plateau, Gibraltar Range, and ad-jacent coastal regions of northern New South Wales.

Tarlina milledgei Gray, new species
Figures 248-251, 400

TYPES: Male holotype (KS 15879) from a pitfall trap in closed forest (site 108-2) in Kerewong State Forest, near Lorne, New South Wales, Australia (July 15, 1979; D. Milledge), deposited in AMS. Paratypes: al-lotype female (KS 5429), same data, and one female and six males (KS 5471), same data, all deposited in AMS.

ETYMOLOGY: The specific name is a pat-ronym in honor of the collector of the type series.

DIAGNOSIS: This species can be separated from *T. noorundi* by the long, straight, spi-niform distal part of the subterminal embolic process, which reaches the tip of the cym-bium, and from the other species by its larger body size and differences in the male and female genitalia.

MALE: Total length 11.63. Carapace 6.15 long, 4.60 wide. Abdomen 4.99 long, 4.15 wide. Eye group 1.60 wide. Eye sizes and in-terdistances: AME 0.15, ALE 0.31, PME 0.22, PLE 0.27; AME-AME 0.10, AME-ALE 0.32, PME-PME 0.26, PME-PLE 0.35, ALE-PLE 0.10; MOQ length 0.56, front width 0.37, back width 0.71. Cheliceral stridulatory area as in figure 251; promargin with five or six

teeth, retromargin with seven or eight basal denticles. Labium 0.82 long, 0.90 wide. Sternum 3.22 long, 2.22 wide.

	I	II	III	IV	Palp
Femur	7.04	6.80	5.95	7.14	4.76
Patella	2.52	2.52	2.14	2.28	1.70
Tibia	6.73	6.09	4.79	6.49	4.59
Metatarsus	6.29	5.54	5.24	7.41	—
Tarsus	2.41	2.35	1.63	1.90	2.62
Total	24.99	23.30	19.75	25.22	13.67

Leg formula 4123. Spination: I: femur d2-1-2-2-1-3-2, v1-0-0-1-0, p1-0-1-1-1-1-1, r1-1-0-0-0; patella p1, r1; tibia d1-0-1-2-1-0, v2-2-2-2, p1-1-1-1-1-1-1, r1-1-1-1-1-1-1-0; metatarsus d0-1-2-1-1-1-1-2-0, v2-2-1-2-1, p2-1-1-1-1-2, r1-1-1-1-1-1-1-2; tarsus v19; II: femur d2-1-2-2-1-3-2, v1-1-0-1-0, p1-1-1-1-1-1, r1-0-1-0-0-0; patella p1, r1; tibia d1-1-0-1-1-1, v2-2-2-2, p1-1-1-1-1-0, r1-1-1-1-1-0; metatarsus d1-2-1-2-1-2-0, v2-2-1-1-1, p2-1-0-1-1, r1-2-2-1-1-1-1-2; tarsus v19; III: femur d3-2-2-1-2-1-2, v1-2-0-2-0, p1-1-1-1-1, r1-0-0-0-0; patella p1, r1; tibia d1-1-1-1, v2-1-2-2, p1-1-1-1-0, r1-1-1-0; metatarsus d1-2-2-0, v2-2-2-1, p2-1-1-2, r2-1-1-2; tarsus r1; IV: femur d2-2-2-2-2, v1-2-0-0-2-0, p2-1-1-1-1, r1-0-0-0-0; patella p1, r1; tibia d0-1-1-1-0, v2-1-0-2-2, p2-1-1-1-0, r1-1-1-1-0; metatarsus d1-1-2-2-2, v2-2-2-1, p2-1-1-1-2, r2-1-1-1-2; tarsus r1. Tibial trichobothria: prolateral, 1 distal, 6-7 proximal; retrolateral 8-10. Tarsal organ subdistal to central, sensory spine shorter than adjacent hairs (fig. 400). Teeth on paired claws of legs I-IV: proclaws 16-17, 17, 10-11, 11-12; retroclaws 19, 18, 10-11, 11-12; inferior claws bare. Palpal tibia long, strongly spined; tibial trichobothria: 7 dorsal, 8 retrolateral; spination: femur d19, r1 (all in distal half); patella d1-1-1, p1-1-1, r1-1-1; tibia d26 (some short, thick), p4 (bristlelike), r1. Palpal bulb as in figures 248-249; median apophysis basally cylindrical hook; parembolic process thick, spoon-shaped, apical area bent up toward cymbium; subterminal embolic process broad, deeply grooved proximally, with strong retrolateral flange; distal part tapering rapidly into long, straight, grooved spine reaching almost to cymbial tip; distal embolus tapered, membranous; sperm duct opening on

lobe intimately connected with proximal part of subterminal embolic process.

FEMALE: General characteristics as in male. Total length 12.42. Carapace 5.72 long, 4.08 wide. Abdomen 6.62 long, 5.74 wide. Eye group 1.58 wide.

	I	II	III	IV	Palp
Femur	4.62	4.51	4.00	4.92	2.22
Patella	1.93	1.97	1.84	1.89	0.91
Tibia	4.26	3.97	3.12	4.31	1.80
Metatarsus	3.51	3.31	3.30	4.53	—
Tarsus	1.71	1.72	1.22	1.56	2.00
Total	16.03	15.48	13.48	17.21	6.93

Leg formula 4123. Spination: I: femur d2-1-2-1-2-1, v0-0-0-0-1, p1-0-0-1-1-1, r1-0-0-0-0; patella 0; tibia v2-2-2-2, p1-2-1-1, r2-0-0-0; metatarsus v2-2-2-2, p1-0-0-0; tarsus v24; II: femur d2-1-1-2-2-2, v1-1-0-1-0, p1-0-0-1-1-1, r1-0-0-0-0; patella 0; tibia v2-2-2-2, p1-1-1-1, r2-0-0-0; metatarsus v2-2-2-3, p1-0-0-0; tarsus v22; III: femur d2-2-2-2-2, v1-1-2-0, p1-1-1-1-1, r1-0-0-0-0; patella p1, r1; tibia d1-1-1, v2-2-2-2, p1-1-1-0, r1-1-1-0; metatarsus d2-1-2-0, v3-2-2-3, p1-1-1-1, r0-1-1-1; tarsus r1; IV: femur d2-2-2-2-3, v0-2-2-0, p1-0-1-1-1-1, r1-0-0-0-0; patella p1, r1; tibia d0-1-1-0-1, v2-2-2-2, p1-1-1, r1-1-1; metatarsus d2-2-2-0, v3-2-2-3, p1-1-1-1, r1-1-1-1; tarsus r1. Teeth on paired claws: legs I, II, prolateral 16, retrolateral 14; legs III, IV, 6-8; inferior claws bare. Internal genitalia as in figure 250.

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: The eastern Comboyne Plateau area of mid-northern New South Wales.

Tarlina woodwardi (Forster),
new combination

Figures 209, 210, 237, 238, 244, 399

Gradungula woodwardi Forster, 1955, p. 282, figs. 2d-g (juvenile female holotype from Mount Hobwee, Lamington Plateau, Queensland, Australia, in OMD, not examined). Davies, 1969, p. 95, figs. 1-14.

DIAGNOSIS: This species can be separated from the others in the genus by the short male palpal tibia (which is as long as the cymbium) as well as other differences in the male and female genitalia. Descriptions of male and

female topotypes were provided by Davies (1969); some additional information is given below.

MALE: Total length 8.20. Carapace 4.69 long. Cheliceral stridulatory area as in figure 244. Sternum narrowly truncate posteriorly. Leg spination: I: femur d1-1-2-2-2, v0-0-0-1-0, p1-1-1-1-1, r1 basal; patella p1, r1; tibia v2-2-2-2, p2-3-2-2-1-2-0, r2-2-2-1-1-2-2-1-0; metatarsus v2-2-1-2-1, p2-2-2-2-2-1-2, r2-1-2-2-2-2-2; tarsus v21; II: femur d1-2-2-2-2-2, v1 basal, p1-1-1-1-1, r1 basal; patella p1, r1; tibia v2-2-2-2, p2-2-1-2-1-2-1-0, r2-3-1-3-2-2-0; metatarsus v2-2-2-2-1, p2-2-2-2-2-1-2, r2-1-2-2-2-1-2; tarsus v22; III: femur d3-1-2-2-2, v2-1-2-0-0, p1-1-1-1-1, r1 basal; patella p1, r1; tibia d1-1-1-0, v2-2-2-2, p1-1-2-0, r1-1-1-2-0; metatarsus d1-2-2-0, v2-2-2-1, p2-1-2-1-2, r2-1-2-1-1; tarsus r1; IV: femur p0-1-1-1-1, r1 basal; patella p1, r1; tibia d0-1-1-1, v2-1-2-2, p1-1-2-0, r1-1-1-1-1-1; metatarsus d2-1-1-2-0, v2-2-1-2-2, p1-2-1-2-1, r2-2-1-1-2; tarsus r2. Tibial trichobothria: prolateral, 4–5 proximal, 1 distal; retrolateral, 6–8. Tarsal organ as in figure 399. Palpal tibia short, as long as cymbium; segment lengths: femur 1.97, patella 0.78, tibia 1.50, tarsus 1.50; spination: femur prodorsal 0-0-0-1-1-3, patella prodorsal 1-1-1, tibia prodorsal 1-3-3. Parembolic process narrow, distally curved, apically spoon-shaped; subterminal embolic process slender, grooved, running dorsally across basal part of membranous embolus at opening of ejaculatory duct; distal portion of embolus tapered, lobelike.

FEMALE: Internal genitalia as in figures 209, 210.

MATERIAL EXAMINED: AUSTRALIA: **Queensland:** Cunningham's Gap (G. Ingram, QMB); Lamington, July 22, 1973 (R. Raven, QMB), ♂♂; Lamington Plateau, July 29, 1965 (A. B. Main, UQE), 1♂, 1♀; Mount Glorious, June 7, 1974, under log (V. E. Davies, J.C.; QMB), 1♀.

DISTRIBUTION: Mount Glorious and the McPherson Range area of southern Queensland.

***Tarlina smithersi* Gray, new species**

Figures 255–257, 395, 396

TYPES: Male holotype (KS 15878) from pit-fall trap in closed forest at "Tuglo," 48 km

north of Singleton, New South Wales, Australia (January 1977; M. Gray and C. Horseman), deposited in AMS. Paratypes: two males (KS 13909), same data, deposited in AMS.

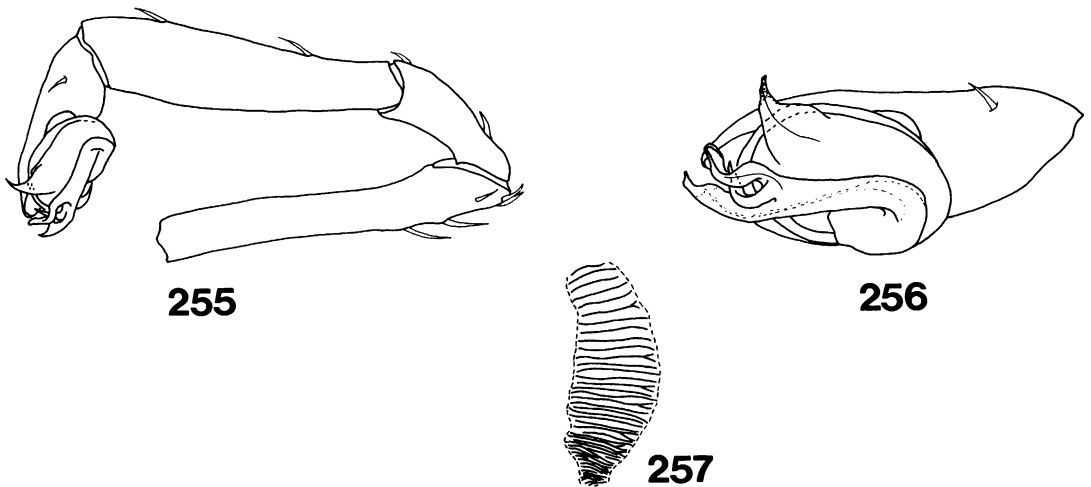
ETYMOLOGY: The specific name is a patronym in honor of Dr. C. N. Smithers, formerly principal curator of the Australian Museum.

DIAGNOSIS: This species can be distinguished from all others in the genus by the absence of a ventral excavation on tarsi I and II of males, from *T. noorundi* and *T. milledgei* by its smaller size, from these species and *T. woodwardi* by the basally broad and membranous median apophysis, and from *T. daviesae* and *T. simipes* by differences in the male and female genitalia.

MALE: Total length 6.85. Carapace 3.57 long, 2.85 wide. Abdomen 3.57 long, 2.57 wide. Color preservation poor; carapace brown with dark grey patterning on caput, foveal and lateral thoracic areas, and thoracic margins; legs banded; abdominal pattern inadequately preserved. Eye group 0.70 wide. Eye sizes and interdistances: AME 0.10, ALE 0.24, PME 0.16, PLE 0.21; AME-AME 0.09, AME-ALE 0.14, PME-PME 0.16, PME-PLE 0.20, ALE-PLE 0.04; MOQ length 0.36, front width 0.28, back width 0.36. Cheliceral stridulatory area as in figure 257; promargin with six teeth, retromargin with 8–9 denticles proximally. Labium 0.53 long, 0.56 wide. Sternum 1.86 long, 1.52 wide.

	I	II	III	IV	Palp
Femur	4.15	3.85	3.82	4.40	2.80
Patella	1.52	1.35	1.35	1.44	1.40
Tibia	3.99	3.40	2.66	3.94	2.37
Metatarsus	3.49	2.95	2.80	4.02	—
Tarsus	1.25	1.15	1.04	1.31	1.36
Total	14.40	12.70	11.67	15.11	7.93

Leg formula 4123. Spination: I: femur d2-2-2-1-2, v2 bristles, p1-1-1-1-1, r1-0-0-0-0; patella p1; tibia d1-0-1-1, v2-2-2-2, p1-1-1-1, r1-1-1-1; metatarsus d1-1-2-2, v2-2-2-3, p1-1-1-1, r2-1-1-1; tarsus v24; II: femur d1-2-1-2-2-1-2, v2 bristles, p1-1-1-1-1, r1-0-0-0-0; patella p1; tibia d1-1-1-0, v2-2-2-2, p1-1-1-1, r1-1-1-1; metatarsus d1-1-1-1-2, v3-2-2-3, p1-1-1-1, r1-1-1-1; tarsus v25; III: femur d2-1-2-2-1-2, v1-2-0, p1-1-1-1, r1-0-0-0-0; patella p1, r1; tibia d1-1-1, v2-2-2-2, p1-1-



Figs. 255–257. *Tarlina smithersi*, new species, male. 255, 256. Palp, retrolateral and retroventral views. 257. Stridulatory ridges of chelicera.

1-0, r1-1-1-0; metatarsus d2-2-2-0, v2-2-2-3, p2-1-1-1, r1-1-1; tarsus 0; IV: femur d2-1-2-1-3-1, v1-0-2, p1-0-0-0, r1 bristle; patella p1, r1; tibia d1-1-1, v2-2-2-2, p1-1-1, r1-1-1-1; metatarsus d2-2-2-0, v2-2-2-3, p1-1-1-1, r1-1-1-1; tarsus 0. Tibial trichobothria: prolateral, 6 proximal, 1 distal; retrolateral 6–7. Tarsal organ subcentral to central, sensory spine moderately long (figs. 395, 396). Inferior claws of legs I, II vestigial; claw teeth (legs I–IV): proclaws 10, 9, 8–10, 8–9; retroclaws 18, 15, 10, 9; inferior claws bare. Tarsi of legs I and II not ventrally excavated. Palpal tibia thickened distally; tibial trichobothria 6 dorsal, 6 retrodorsal; spination: femur d6 (distal); patella d1-1, p1; tibia d1-1, p1-2-2; tarsus r1 plus short bristles dorsally and prolaterally. Bulb as in figures 255, 256; median apophysis broad, membranous basally, tapering, sclerotized apically; parembolic process strongly bent, rodlike lamina, spoon-shaped distally; short, curved, grooved subterminal embolic process weakly sclerotized, apically pointed; membranous distal embolus ending in apically pointed lobe; sperm duct opening at base of this lobe, adjacent to subterminal embolic process.

FEMALE: Unknown.

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Known only from the type locality in New South Wales.

***Tarlina daviesae* Gray, new species**

Figures 239, 240, 245, 398

TYPE: Male holotype (S 1397) taken under rocks at an elevation of about 1000 m on Mount Finnegan, northern Queensland, Australia (November 9, 1974; V. E. Davies and L. Roberts), deposited in QMB.

ETYMOLOGY: The specific name is a patronym in honor of Dr. V. T. Davies, formerly Curator of Arachnida at the Queensland Museum.

DIAGNOSIS: This species can be separated from *T. noorundi* and *T. milledgei* by its smaller size, from all species except *T. simipes* by the presence of an elongate, anteriorly directed parembolic process, and from *T. simipes* by having fewer (about seven) spines on the male palpal tibia.

MALE: Total length 7.26. Carapace 4.10 long, 3.16 wide. Abdomen 3.36 long, 2.50 wide. Carapace brown, caput and lateral thoracic region with darker grey patterning; thoracic margin dark grey; dark grey pigment patch in front of fovea continues posteriorly as lighter longitudinal stripe; chelicerae and palpi dark brown; legs banded with brown and grey; abdomen mottled grey with four pairs of dark grey chevron markings. Eye group 1.24 wide. From above, both eye rows recurved; from front, anterior row straight,

posterior recurved. Eye sizes and interdistances: AME 0.12, ALE 0.23, PME 0.22, PLE 0.19; AME-AME 0.07, AME-ALE 0.25, PME-PME 0.14, PME-PLE 0.24, ALE-PLE 0.03; MOQ length 0.34, front width 0.31, back width 0.55. Chelicerae with six promarginal teeth and basal retrolateral row of four denticles; stridulatory ridges as in figure 245. Labium 0.61 long, 0.67 wide. Sternum 2.17 long, 1.76 wide.

	I	II	III	IV	Palp
Femur	4.92	4.59	4.18	5.17	2.96
Patella	1.74	1.74	1.58	1.74	0.98
Tibia	4.77	4.26	3.24	4.90	2.16
Metatarsus	3.90	3.61	3.76	5.08	—
Tarsus	1.64	1.74	1.19	1.68	1.37
Total	16.97	15.94	13.95	18.57	7.47

Leg formula 4123. Spination: I: femur d2-1-2-3-1-2-2, v1-0-0-0-0-1-0, p0-1-0-1-1-1-1-1, r1-1-1-0-0-0; patella p1, r1; tibia d2-0-1-1-1, v2-1-2-2-2-2-2-2, p1-1-2-2-2-1-0, r2-1-2-2-2-2-2-2-0; metatarsus d1 basal, v2-1-2-2-1-0-2-0-1, p1-2-1-2, r1-2-2-2-1-2; tarsus v17; II: femur d2-2-2-2-2, v1-1-0-0-0, p1-1-1-1-1-1-1, r1-1-0-0-0; patella p1, r1; tibia v2-2-2-2, p1-1-1-1, r2-3-3-1-2-0; metatarsus d1 basal, v2-2-2-1, p2-1-1-1-2, r3-2-1-2-2; tarsus v19; III: femur d2-1-2-2-2, v1-1-0-2-0, p1-0-1-1-1-1-1, r1 basal; patella d1-1, p1, r1; tibia d0-1-1-1-0, v2-1-2-2, p2-1-1-0, r1-1-1-0; metatarsus d1-0-1-1-0, v2-2-2-1, p1-1-1-2, r0-1-2; tarsus 0; IV: femur d2-1-1-2-2, v1-2-0-1-0, p1-1-1-0-1, r1 basal; patella p1, r1; tibia d0-1-0-1-0, v2-2-2-2, p1-1-1-0, r1-0-1-1-0; metatarsus d1-0-1-1-0, v2-2-2-1, p1-1-1-2, r0-1-1-0-2; tarsus 0. Tibial trichobothria: prolateral, 5–6 proximal, 1 distal; retrolateral 8–9. Tarsal organ as in figure 398. Proclaws of legs I–IV with 15, 14, 8, 8 teeth, retroclaws with 20, 20, 8, 9; inferior claws bare. Palpal tibia thickened distally; two rows, each of six trichobothria, on dorsal and retrolateral surfaces of tibia; spination: femur d1-3-3 on distal half; patella d3-3-1; tibia d1-1, p0-2; cymbium with two strong basolateral bristles. Bulb as in figures 239, 240; median apophysis wide, membranous basally, tapering to weak hook apically; parembolic process large, originating at base of embolic branch, extending forward parallel with embolic rod, expanded apically to form shallow

bifurcate spoon; distal portion of embolic rod divided into spiniform, anterodorsally directed subterminal embolic process and membranous, apically bilobed distal embolus; sperm duct opening on distal embolus between those lobes. Colulus small, indistinct, coniform.

FEMALE: Unknown.

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Known only from the type locality in northern Queensland.

Tarlina simipes Gray, new species

Figures 252–254

TYPES: Male holotype from an elevation of 1000–1200 m on Mt. Fisher, 7 km southwest of Millaa Millaa on Whiteing Road, Queensland, Australia (May 5, 1983; G. B. Monteith and D. K. Yeates), deposited in QMB. Paratypes: female from type locality (April 27–29, 1982; G. Monteith, D. Yeates, and D. Cook) and three females from an elevation of 900–1000 m on North Bell Peak, 20 km south of Cairns, Queensland, Australia (September 15–16, 1981; G. Monteith and D. Cook), all deposited in QMB.

ETYMOLOGY: The specific name is a Latin contraction referring to the flat, nonexcavated ventral surface of the male tarsus I.

DIAGNOSIS: This species can be separated from the similar form *T. daviesae* by the numerous (about 18) male palpal tibial spines and the absence of a ventral excavation on tarsus I of males, and from the other species by the latter character (except in *T. smithersi*) and by the structure of the male and female genitalia.

MALE: Total length 7.02. Carapace 3.42 long, 2.73 wide. Abdomen 3.60 long, 3.18 wide. Pale longitudinal lateral thoracic patches on carapace well developed.

	I	II	III	IV	Palp
Femur	4.63	4.28	3.83	4.73	2.76
Patella	1.45	1.51	1.26	1.34	0.84
Tibia	4.22	3.80	3.11	4.19	2.31
Metatarsus	3.87	3.43	3.31	4.69	—
Tarsus	1.45	1.54	1.05	1.42	1.37
Total	15.62	14.56	12.56	16.37	7.28

Leg formula 4123. Spination: I: femur d4-3-3-3-1, v1-0-1-0-2-0, p0-0-0-0-1; patella p1, r1; tibia v2-2-1-1-2, p2-1-1-1, r1-0-1-0-

1-0; metatarsus d1-1-1-1, v2-1-1-2-1-1-2-3, p1-0-1-0-1-0-1, r0-0-1-0-1-0-1; tarsus v17; II: femur d4-3-3-1-3-3, v2-1-0-1-2-0; patella r1, d1; tibia v2-2-1-2, p1-1-1-1-1, r1-0-1-0-1; metatarsus d0-0-1-0, v2-2-2-3, p1-1-1-1, r1-1-1-0-1; tarsus v13; III: femur d4-3-2-2-3, v0-1-0-2-2-0, p1-0-0-0-0, r1-0-1-0-0; patella p1, r1; tibia d0-1-0-1-1, v2-2-2-2, p1-2-0-1-0, r1-0-1-1-0; metatarsus d1-0-1-0, v2-2-2-3, p1-1-1-1, r1-0-1-0-1; tarsus 0; IV: femur d3-3-2-3-3, v0-2-0-2-2-0, p1-0-0-0-0-0; patella p1, r1; tibia d0-1-0-1-0-1, v2-2-2-2, p1-1-0-1, r1-0-1-0-1; metatarsus d1-0-0-1-0, v2-2-2-3, p1-1-1-1, r1-1-1-0-1; tarsus 0. Tarsi I straight, not ventrally excavated; tarsi II excavated. Tarsal organ similar to that of *T. daviesae* but sensory spine shorter. Tarsal claw teeth (legs I-IV): proclaws 12, 13, 12-13, 14; retroclaws 21, 22, 13, 14; inferior claws bare. Palpal tibia with five dorsal and six retrodorsal trichobothria; spination: femur d0-0-0-0-3-5-4; patella d4; tibia d17, p1; cymbium with large retrolateral bristle proximally; bristle engages or lies adjacent to hooked apex of median apophysis. Basal part of median apophysis a wide lamina, tapering apically; parembolic process deeply bifurcate apically, elongate, parallel to remainder of embolic branch; subterminal embolic process slender, spiniform distally; distal portion of embolus with two distinct terminal lobes (figs. 252, 253).

FEMALE: Total length 8.29. Carapace 3.99 long, 3.00 wide. Abdomen 4.28 long, 3.08 wide.

	I	II	III	IV	Palp
Femur	3.32	3.28	2.82	3.74	1.74
Patella	1.48	1.44	1.31	1.42	0.73
Tibia	3.22	2.84	2.44	3.40	1.30
Metatarsus	2.24	2.16	2.46	3.44	—
Tarsus	1.28	1.26	1.01	1.24	1.55
Total	11.54	10.98	10.04	13.24	5.32

Leg formula 4123. Spination: I: femur d1-1-2-3-1-2, r1-0-0; patella 0; tibia v2-2-2-2, p0-1-1-0; metatarsus v2-2-2-2; tarsus v19; II: femur d2-2-2-2-1-2, p1-0-0; patella 0; tibia v2-1-2-2, p0-1-1-0; metatarsus v2-2-2-2; tarsus v14; III: femur d3-2-3-1-3, v0-2-1, p1-0-0, r1-0-0; patella p1; tibia d1-1-1, v2-2-2-2, p1-0-0-1, r1-1-1; metatarsus d1-1-1-0, v2-2-1-3, p2-1-1-1, r1-1-1; tarsus 0; IV: femur d3-



Figs. 258, 259. *Kaiya terama*, new species. 258. Adult male. 259. Second instar spiderling.

3-3-3, v1-1-2-0, p1-0-0, r1-0-0; patella p1; tibia d1-1-1, v2-2-2-2, p1-1-1, r1-1-1; metatarsus d1-0-0, v2-2-2-3, p1-1-1-1, r1-1-1; tarsus 0. Genitalia with pair of shallowly subdivided multireceptaculate lobes (fig. 254).

OTHER MATERIAL EXAMINED: None.
DISTRIBUTION: Cairns to Ravenshoe area of northern Queensland.

KAIYA GRAY, NEW GENUS

TYPE SPECIES: *Kaiya terama* Gray, new species.

ETYMOLOGY: The generic name is an aboriginal word meaning "a spear with several barbs" and refers to the shape of the embolus; it is considered feminine in gender.

DIAGNOSIS: These ecribellate and heavily pigmented gradungulids can be separated from all other genera by the grouping of the female receptacula around four well-separated lobes (except in *K. parnabyi*) and from the closely related Australian genus *Tarlina* in

particular by the elongate, rodlike embolic branch of the male palpal bulb.

DESCRIPTION: Medium to large ecribellate gradungulids. Carapace grey-brown with dark grey patterning anteriorly and laterally; abdomen mottled grey-brown with dark grey pigment forming disjunct chevron pattern dorsally; white hairs few, scattered. Eye group occupying less than two-thirds of caput width. Chelicerae with five or six promarginal teeth and basal retromarginal denticles; stridulatory ridges present in both sexes but reduced in female. Fovea longitudinal, pitlike. Labium strongly indented anteriorly. Sternum scutiform, usually bluntly pointed posteriorly but occasionally truncate. Prolateral surface of male palpal femur with setal picks, one greatly enlarged. Cymbium elongate; tegulum rounded, inserted subbasally; median apophysis simple or apically bifurcate, hooked; embolic process elongate, rodlike; parembolic process curved dorsally, apex pointed, with flaplike tooth on anterior surface; distal margin of embolic rod containing opening of sperm duct, surmounted by thin, hooked terminal processes; in some species, parembolic process or embolic rod with several small teeth. Median portion of upper margin of female epigastric region with prominent "epigynal" mound; internal genitalia with receptacula typically grouped around four separated lobes (only two in *K. parnabyi*) directly associated with membranous sac. Tarsal organ ranging from pit organ with slightly raised floor to forms with distinct median mound or spine. Legs strongly spined. Tarsi of legs I, II of male excavated ventrally (figs. 187, 188).

DISTRIBUTION: Southeastern Australia.

NOTES ON *KAIYA* AND *TARLINA*: Representatives of these ecribellate Australian genera are found in both closed and moist open forest habitats from northern Queensland to Victoria (interestingly, gradungulids are at present unknown from Tasmania). They are found in or under logs, litter, and rocks. The spiders forage at night, using a combination of slow searching activity and ambushing to capture prey. The spherical egg sacs, suspended by single stalks, are often seen in log cavities. The sacs are pinkish brown in color but are usually more or less disguised by the addition of soil particles and other detritus.

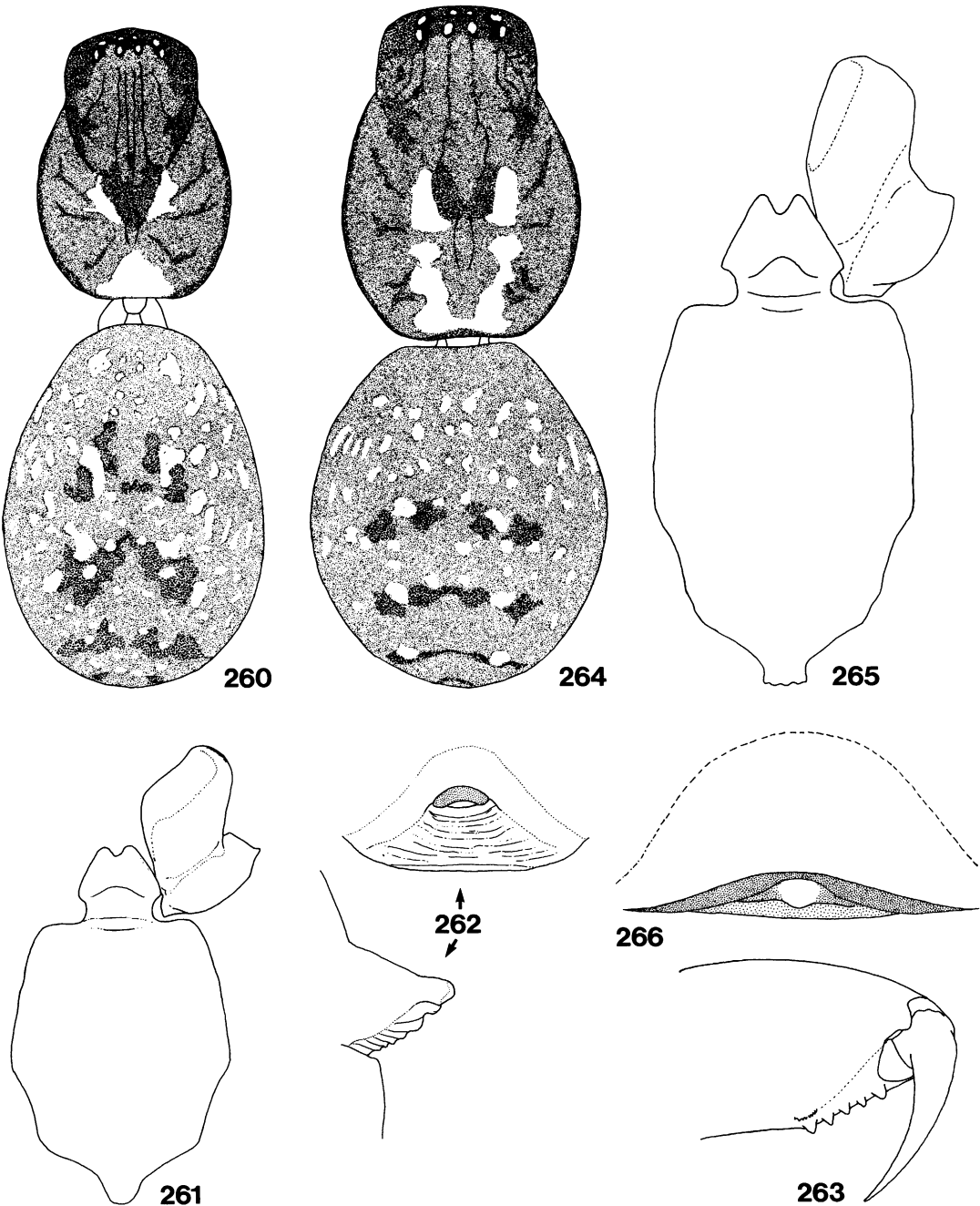
Kaiya and *Tarlina* are sister genera which have southern and northern distributions, respectively. They are separated at the Cassilis Gap, a topographic discontinuity in the Eastern Highlands in which the Hunter/Goulburn River valleys lie. *Kaiya* is of particular interest because of its tarsal organ variation, noted above. This variation has a distributional trend, with *K. parnabyi* in the south having the most plesiomorphic form of the organ and the most northern species, *K. terama*, having the most apomorphic form. Of interest is that *K. parnabyi* also has the most plesiomorphic female genitalic structure, with only two large lobes being present (instead of the four-lobed structure typical of other *Kaiya* species).

A similar distributional trend among *Kaiya* species is apparent in male palpal length (as estimated by embolus length), which becomes progressively shorter from south to north; palpal structures are also short in the more northern genus *Tarlina*. Distributional tarsal organ variation is also apparent in *Tarlina* species: the length of the tarsal organ spine increases from south to north. Such character patterns could be indicative of a speciation process which has proceeded from south to north on each side of the Cassilis Gap, with the most northern species in each genus showing the most derived characteristics.

***Kaiya terama* Gray, new species**

Figures 164, 166, 172, 186, 187, 194,
201, 211, 212, 246, 258-263, 273-280,
282, 283, 335, 336, 347, 348, 354, 384

TYPES: Male holotype (KS 13903) from rotting log in tall open forest at Jenolan, New South Wales, Australia (September 20, 1969; M. Gray), deposited in AMS. Paratypes (all from New South Wales, Australia): allotype female taken under wood detritus in open forest on Mount Emperor, Boyd Plateau (June 6, 1970; G. Hunt), male (KS 12648) from Gordon (July-August, 1983; C. Horseman), female (KS 13916) from Kuringai Creek, St. Ives (August 26, 1969; G. Hunt), 4 males (KS 13926) from Mount Wilson (September 22, 1969; M. Gray), female (KS 13925) from Cathedral of Ferns, Mount Wilson (January 21, 1975; M. Gray), and male (KS 13939) from



Figs. 260–266. Structures of *Kaiya* and *Tarlina*. 260–263. *K. terama*, new species. 264–266. *T. noorundi*, new species. 260, 264. Body of female, dorsal view. 261, 265. Sternum, labium, and endite. 262, 266. Epigastric area, ventral view. 263. Chelicera.

Mount Curracodgie, via Kandos (October 4, 1969; G. Hunt), all deposited in AMS.
ETYMOLOGY: The specific name is an ab-

original word referring to mountains or high-land country, habitats in which these spiders are commonly found.

DIAGNOSIS: This species can be separated from the others by the presence of a strong sensory spine associated with the tarsal organ, and by the presence of three terminal processes on the male palp.

MALE: Total length 9.66. Carapace 5.58 long, 4.08 wide. Abdomen 3.68 long, 3.12 wide. Chelicerae and caput dark grey-brown; caput with dark grey patterning and arcuate marking in front of fovea, flanked by two light brown patches; thoracic region brown with dark grey stria markings, margins dark grey; legs banded with brown and grey; abdomen mottled brown-grey dorsally with dull white and dark grey patches forming pattern of four or five irregular chevrons, white patches set with few short grey hairs (figs. 166, 258). Carapace with prominent caput, weakly arched, only slightly higher than thorax; irregular row of hairs present behind lateral eyes; three rows of weak hairs extend from median eyes to fovea. Eye group 1.46 wide. From above, both eye rows recurved; from front, both rows procurved but anterior row only weakly so. Eye sizes and interdistances: AME 0.12, ALE 0.24, PME 0.21, PLE 0.22; AME-AME 0.10, AME-ALE 0.26, PME-PME 0.22, PME-PLE 0.31, ALE-PLE 0.04; MOQ length 0.46, front width 0.35, back width 0.62. Chelicerae with anterior basal bristle; stridulatory region as in figures 246, 276; promargin with five or six teeth, retromargin with irregular proximal row of 9–11 denticles. Labium 0.90 long, 0.94 wide. Endites weakly grooved subbasally, serrula with single row of 40 teeth. Sternum 2.98 long, 2.34 wide, bluntly pointed posteriorly.

	I	II	III	IV	Palp
Femur	6.00	5.52	5.04	6.16	3.84
Patella	2.32	2.24	1.76	2.00	1.12
Tibia	5.76	4.88	4.08	5.76	2.32
Metatarsus	5.44	4.80	4.32	6.16	—
Tarsus	2.16	2.00	1.44	1.92	2.40
Total	21.68	19.44	16.64	22.00	9.68

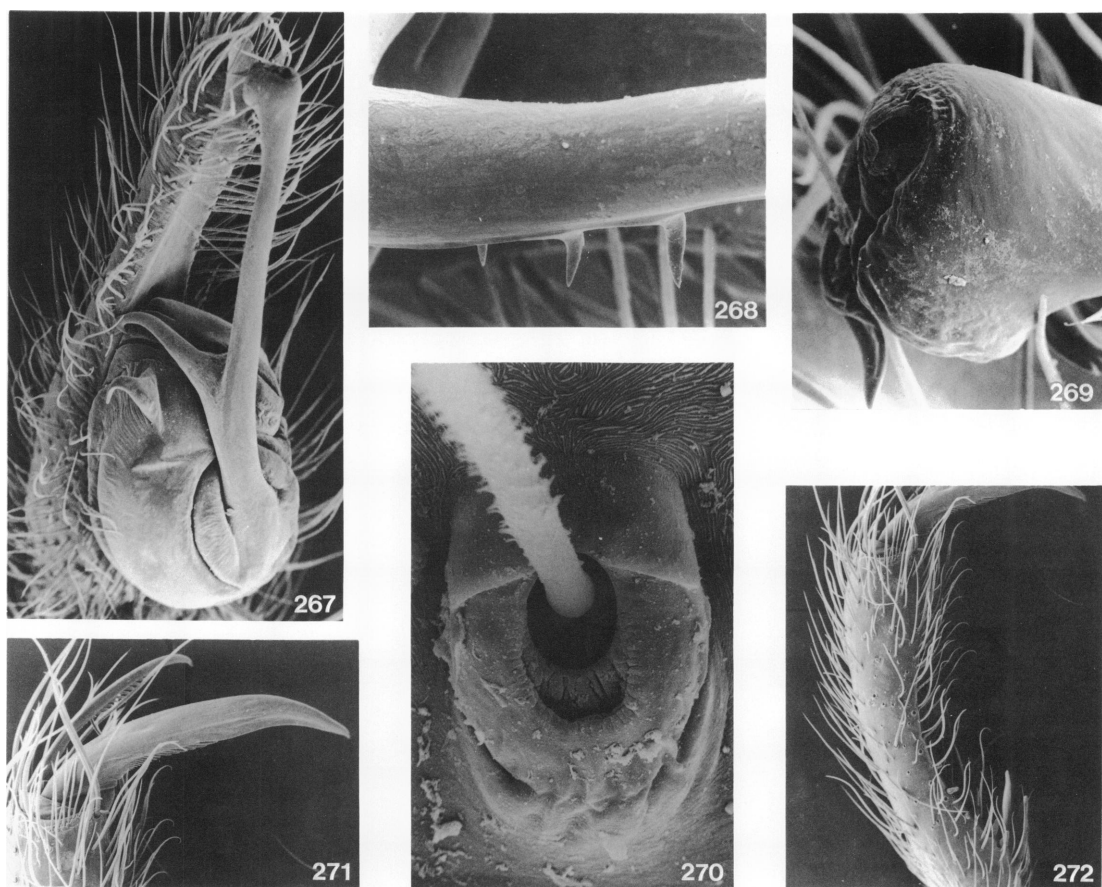
Leg formula 4123. Spination: I: femur d2-2-2-2-2, v1 basal, p1-1-1-1-1, r1-1-1-0-0; patella p1-1, r1; tibia d2-0-1-0-1, v2-1-2-2-2, p2-1-1-2-1-2-1, r1-1-1-1-1-1-1; metatarsus d0-1-1-2-0, v2-2-2-3, p2-1-2-1-2-1, r2-1-1-1-1-1; tarsus v20; II: femur d2-2-2-2-2-2, v1-1-0-1-0, p1-1-1-1-1, r1-1-0-0-0; patella p1-

1, r1; tibia d0-2-0-1-0-2, v2-2-2-2, p2-1-2-1-1-2, r1-2-2-1-1; metatarsus d0-1-1-1-0, v2-2-2-3, p2-1-2-1-1-1, r2-1-1-1-1; tarsus v15; III: femur d2-1-2-2-2-1-2, v1-2-2-0, p1-1-1-1-1, r1-1-0-0-0; patella d1-1, p1-1, r1; tibia d1-1-1-2, v2-2-2-2, p2-1-2, r1-1-1-0-1; metatarsus d2-2-2-0, v2-2-2-3, p2-1-1-1, r2-1-1-1; tarsus r1; IV: femur d2-2-1-2-2-2, v2-2-0-2-0, p1-1-1-1-1; patella d1-1-1, p1-1, r1; tibia d1-1-0-1-0-2, v2-2-2-2, p1-1-1, r1-1-1-1-1-1-1; metatarsus d1-1-2-2, v2-2-2-3, p2-1-1-1, r1-1-1-1; tarsus 0. Tibial trichobothria of legs I–IV: prolateral 7, 6, 5, 6 proximal, 1 distal; retrolateral 9, 9, 8, 9. Proclaws of legs I, II with 20–21 teeth; retroclaws with 23; superior claws of legs III, IV with 12–14 and 15–18 teeth, respectively; inferior claws of legs I, II bare, of legs III, IV with single tooth. Tarsal organ as in figures 278–280; sensory spine prominent, contrasting strongly with other three species in genus but much shorter and stouter than in *Tarlina*. Palpal spination: femur d0-0-0-1-1-4; patella d3-1-1-1; tibia d2-3-3-3-3, p0-1-1, r1-1-0. Palpal bulb as in figures 273, 274, 347, 348; median apophysis strong, hooked; embolic rod of moderate length, with three slender, spiniform terminal processes; parembolic process large, curved, apically spiniform with subapical flaplike tooth. Colulus small, conical.

FEEMALE: General characteristics as in male. Total length 12.37. Carapace 5.57 long, 4.00 wide. Abdomen 6.80 long, 4.64 wide.

	I	II	III	IV	Palp
Femur	4.56	4.16	3.28	4.80	2.20
Patella	2.16	2.00	1.92	1.92	0.98
Tibia	3.92	3.60	2.96	4.32	1.72
Metatarsus	3.28	3.12	3.28	4.32	—
Tarsus	1.84	1.68	1.36	1.60	2.08
Total	15.76	14.56	12.80	16.96	6.98

Leg formula 4123. Spination: I: femur d2-2-2-1-2, v1 distal, p0-0-0-1-1, r1 basal; patella p1; tibia v2-2-2-2, p2-2-1-1, r1 basal; metatarsus v2-1-1-1, p1-1-1-1, r1-0-0-1; tarsus v26; II: femur d2-2-1-1-2, v0-1-0-1-0, p1-1-1-1-0, r0; patella p1; tibia v1-1-2-2, p1-1-1-1, r1 basal; metatarsus v2-1-1-1, p1-2-1-1, r1 distal; tarsus v26; III: femur d3-2-2-2-2, v1-1-2-0, p1-1-1-1-1, r1 distal; patella p1-1, r1; tibia d1-1-2, v2-2-2, p1-1-2, r1-1-1; metatarsus d2-2-2-0, v2-2-2-1, p2-1-1-2, r2-1-1-



Figs. 267–272. *Kaiya brindabella* (Moran). 267–269. Male palp, retrolateral view, denticles on embolic rod, and distal portion of embolic rod. 270. Third tibial trichobothrium from leg I. 271. Claws of leg I. 272. Tarsus of leg I.

2; tarsus r1; IV: femur d2-1-2-2-2, v0-2-0-2-0, p1-1-1-0-1, r1 basal; patella p1, r1; tibia d1-1-1, v2-2-2-2, p1-2-1, r1-1-1; metatarsus d1-1-1-2, v2-2-2-1, p2-1-1-2, r2-1-1-2; tarsus r1. Superior claws of legs I, II with 14 teeth, of legs III, IV with 7 and 8, respectively; inferior claw of legs I, II bare, of legs III, IV with single tooth. Internal genitalia as in figures 201, 335, 336.

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Mideastern coastal and highland regions of New South Wales.

Kaiya brindabella (Moran),
new combination

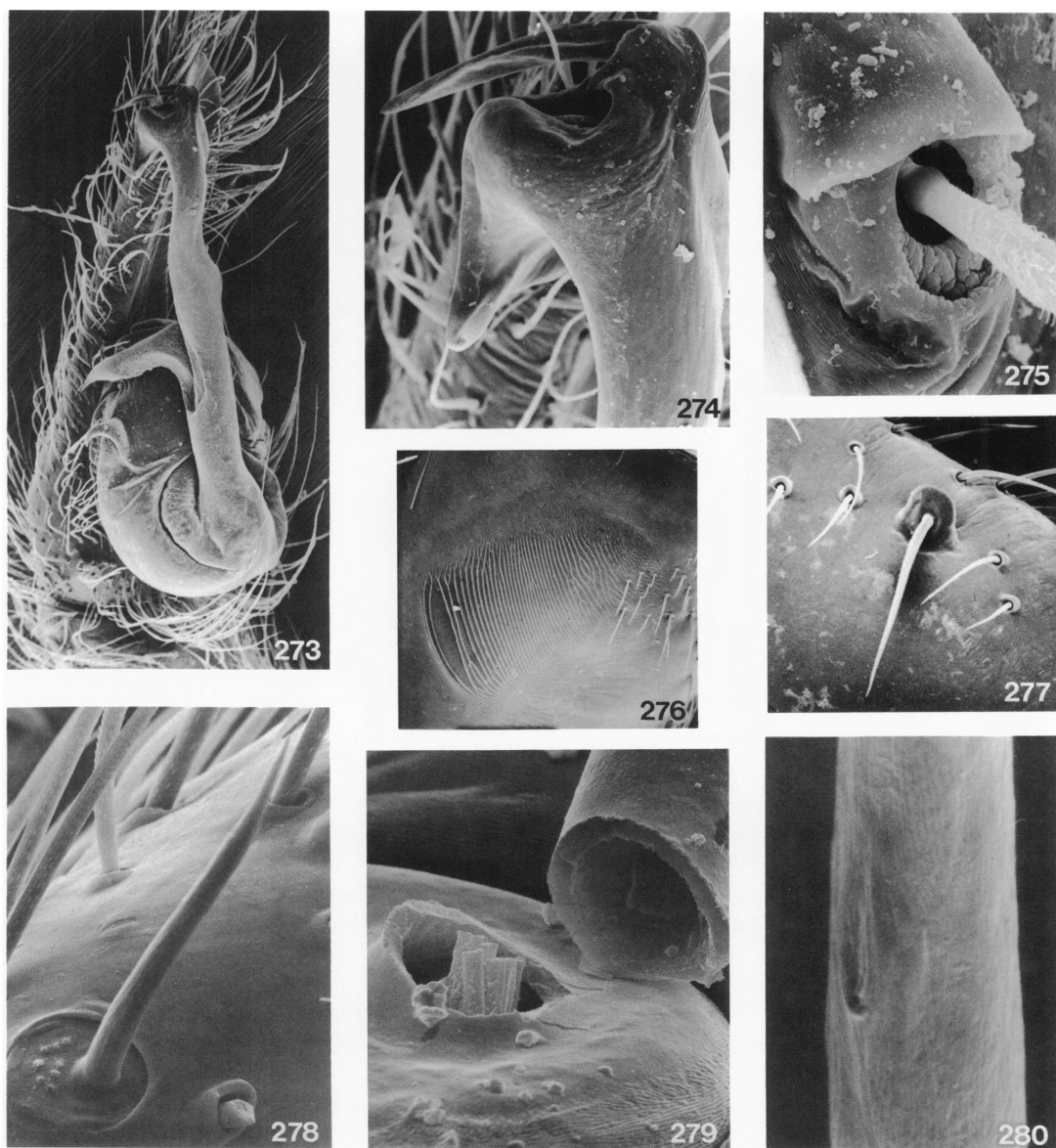
Figures 213, 214, 267–272, 392, 393

Gradungula brindabella Moran, 1985, p. 304, figs. 1–7 (holotype male from Brindabella Ranges,

Capital Territory, Australia, in ANIC, not examined; paratype male and female in AMS, examined).

DIAGNOSIS: This species can be separated from all others by the form of the tarsal organ (figs. 392, 393), which is characterized by a broad median lobe bearing numerous receptor nodes; in addition, the male bulb is distinguished by the presence of teeth on the embolic shaft (fig. 268), the female genitalia are distinctive (figs. 213, 214) (being close to those of *K. terama* but with the median membranous sac more deeply indented on the middistal surface), and the anterior margins of the bothria are only weakly crenulate.

DESCRIPTION: The original description is full and the structures listed above clearly separate the species from all others.



Figs. 273–280. *Kaiya terama*, new species. 273, 274. Male palp, ventral view and distal portion of embolic rod, showing processes and opening of sperm duct. 275. Third tibial trichobothrium from leg I. 276. Cheliceral stridulatory ridges of male. 277. Setal picks from prolateral surface of male palpal femur. 278–280. Tarsal organ. 278. Note the depressed base plate and the grouping of small receptor nodules on the proximal surface. 279. Base, with median spine broken to show five or six sclerotic sheaths enclosing the nerve bundles entering the spine. 280. Portion of median spine, showing one of the receptor nodes.

DISTRIBUTION: Known only from the type locality in the Australian Capital Territory.

Kaiya bemboka Gray, new species
 Figures 188, 193, 247, 284–286, 394

TYPES: Male holotype (KS 13900) from log in tall, open forest at Mount Brown, 17 km

west of Bemboka, New South Wales, Australia (March 28, 1970; M. Gray), and paratype (allotype) female (KS 13899) from same locality (September 20, 1971; H. Posamentier), both deposited in AMS.

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

DIAGNOSIS: This species can be separated from both *K. terama* and *K. brindabella* by the simple pit tarsal organ, the floor of which is only slightly raised, and from all the species by the distally bifurcate median apophysis and the basal teeth on the parembolic process.

MALE: Total length 10.88. Carapace 6.13 long, 4.60 wide. Abdomen 5.66 long, 4.51 wide. Coloration similar to that of *K. terama*. Eye group 1.49 wide. Eye sizes and inter-distances: AME 0.14, ALE 0.30, PME 0.26, PLE 0.31; AME-AME 0.10, AME-ALE 0.22, PME-PME 0.19, PME-PLE 0.26, ALE-PLE 0.04; MOQ length 0.60, front width 0.36, back width 0.64. Cheliceral promargin with five or six teeth, retromargin with six or seven basal denticles; stridulatory ridges as in figure 247. Labium 0.89 long, 0.86 wide. Sternum scutiform, 3.02 long, 2.38 wide.

	I	II	III	IV	Palp
Femur	6.56	6.08	5.60	6.56	4.32
Patella	2.56	2.40	2.16	2.24	1.52
Tibia	6.08	5.52	4.40	6.08	2.88
Metatarsus	5.60	5.12	4.96	6.88	—
Tarsus	2.24	2.16	1.60	2.00	3.04
Total	23.04	21.28	18.72	23.76	11.76

Leg formula 4123. Spination: I: femur d2-2-2-2-2, v1-0-0-1-0, p1-0-0-1-1-1, r1-0-1-0-0-0; patella p1, r1; tibia d1-0-1-1, v2-2-2-2, p2-1-1-1-1, r1-1-1-1; metatarsus d0-1-0-1-1, v2-2-2-3, p1-1-1-1, r2-1-1-1; tarsus v17; II: femur d2-2-2-2-1-2, v1-1-0-1-0, p1-1-1-1-1, r1-1-0-0-0; patella p1, r1; tibia d1-0-1-1-1, v2-2-2-2, p1-1-1-1, r1-1-1-1; metatarsus d1-1-2-2, v2-2-2-2, p1-1-1-1, r0-1-0-1-1; tarsus v20; III: femur d2-2-2-2-2, v1-2-2-0, p1-1-1-1-1, r1 basal; patella d1, p1-1, r1; tibia d1-1-2, v2-2-2-2, p1-1-1, r3; metatarsus d2-2-2-0, v2-2-2-2, p2-1-1-1, r0-1-1-1; tarsus r1; IV: femur d2-2-2-2-2, v2-2-0-2-0, p2-1-1-0-1, r1 basal; patella p1, r1; tibia d1-1-2, v2-1-1-2, p1-1-1, r1-1-1; metatarsus d1-1-2-2, v2-2-2-3, p1-1-1-1-1, r0-1-1-0-1; tarsus 0. Tibial trichobothria of legs I-IV: prolateral 6, 6, 7, 6 proximal, 1 distal; retrolateral 9, 10, 8, 8. Proclaws of legs I, II with 19-20 teeth; retroclaws with 18-19; superior claws of legs III, IV with 12-14 teeth; inferior claws bare. Tarsal organ as in figure 394; basic form of typical pit organ but with central area raised, apparently as precursor of prominent

lobe found in *K. brindabella*. Palpal spination: femur d1-1-4 on distal half; patella d1; tibia p0-2-2. Embolic rod long, slender (figs. 193, 284-286); parembolic process hooked apically, anterior margin with hooked tooth near middle, prolateral surface with five broad teeth; two terminal embolic processes, both curved, spiniform, directed anteriorly.

FEMALE: General characteristics as in male. Total length 16.00. Carapace 6.16 long, 4.64 wide. Abdomen 9.84 long, 8.48 wide. Eye group 1.72 wide.

	I	II	III	IV	Palp
Femur	5.36	5.26	4.48	5.92	2.52
Patella	2.40	2.56	2.08	2.24	1.05
Tibia	5.04	4.47	3.76	5.28	1.88
Metatarsus	4.08	3.92	4.00	5.28	—
Tarsus	1.92	1.91	1.52	1.84	2.63
Total	18.80	18.12	15.84	20.56	8.08

Leg formula 4123. Spination: I: femur d2-2-2-2-0-2, v0-0-0-1-0, p1-0-1-1-1-1, r1 basal; patella 0; tibia v2-2-2-2, p2-1-1-1, r1-1-1-1; metatarsus v3-2-2-3, r0-1-0-0; tarsus v35; II: femur d2-2-2-2-2, v0-1-0-0-0, p1-0-1-1-1-1, r1 basal; patella 0; tibia p2-1-1-1-1, r1-1-1-1; metatarsus d2-2-2-2, v2-2-2-3, p0-1-0-0, r0-1-1-0; tarsus v31; III: femur d2-1-2-2-1-2, v2-0-2-0, p1-0-1-1-1-1, r1 basal; patella p1, r1; tibia d1-1-2, v2-2-2-2, p2-1-2, r1-0-1-1; metatarsus d0-1-1-1, v3-2-2-3, p1-1-1-1, r0-1-1-1; tarsus v1; IV: femur d2-2-2-1-2, v1-2-2-0, p1-1-1-1-1, r1 basal; patella p1-1, r1; tibia d1-0-1-1, v2-1-2-2, p1-1-1, r2-1-1; metatarsus d1-1-2-2-0, v3-1-2-2-3, p1-1-1-1, r0-1-1-1; tarsus v1. Claws of leg I, prolateral with 12, retrolateral with 15 teeth; leg II, both superior claws with 14; III, IV both with 9; inferior claw of legs I, II bare, of legs III, IV with one tooth. Genitalia with paired receptaculate lobes well separated.

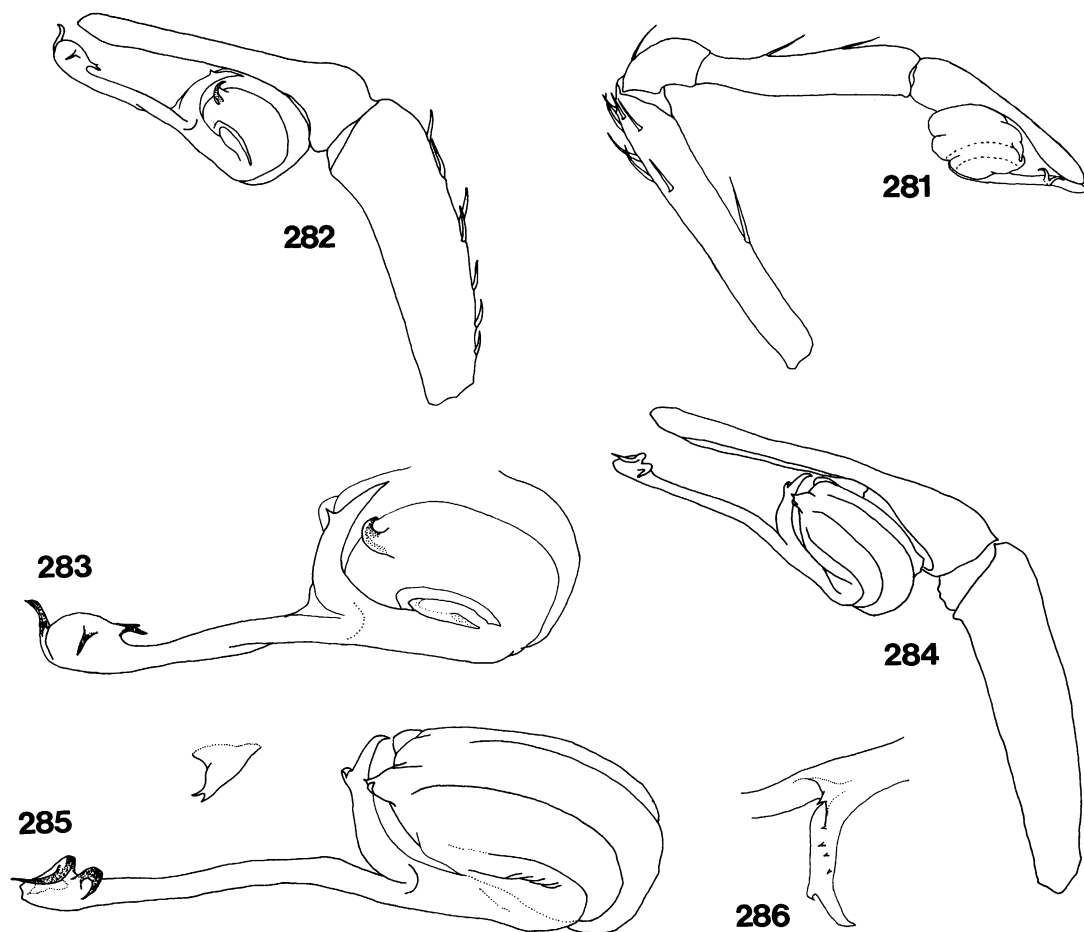
OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Known only from the type locality in New South Wales.

Kaiya parnabyi Gray, new species
Figures 287-293

Types: Male holotype (KS 10773) and female paratype (KS 15997) taken in an old mine tunnel at Westburn Quarry, Warburton, Victoria, Australia (January 29, 1978; H. Parnaby), deposited in AMS.

ETYMOLOGY: The specific name is a pat-



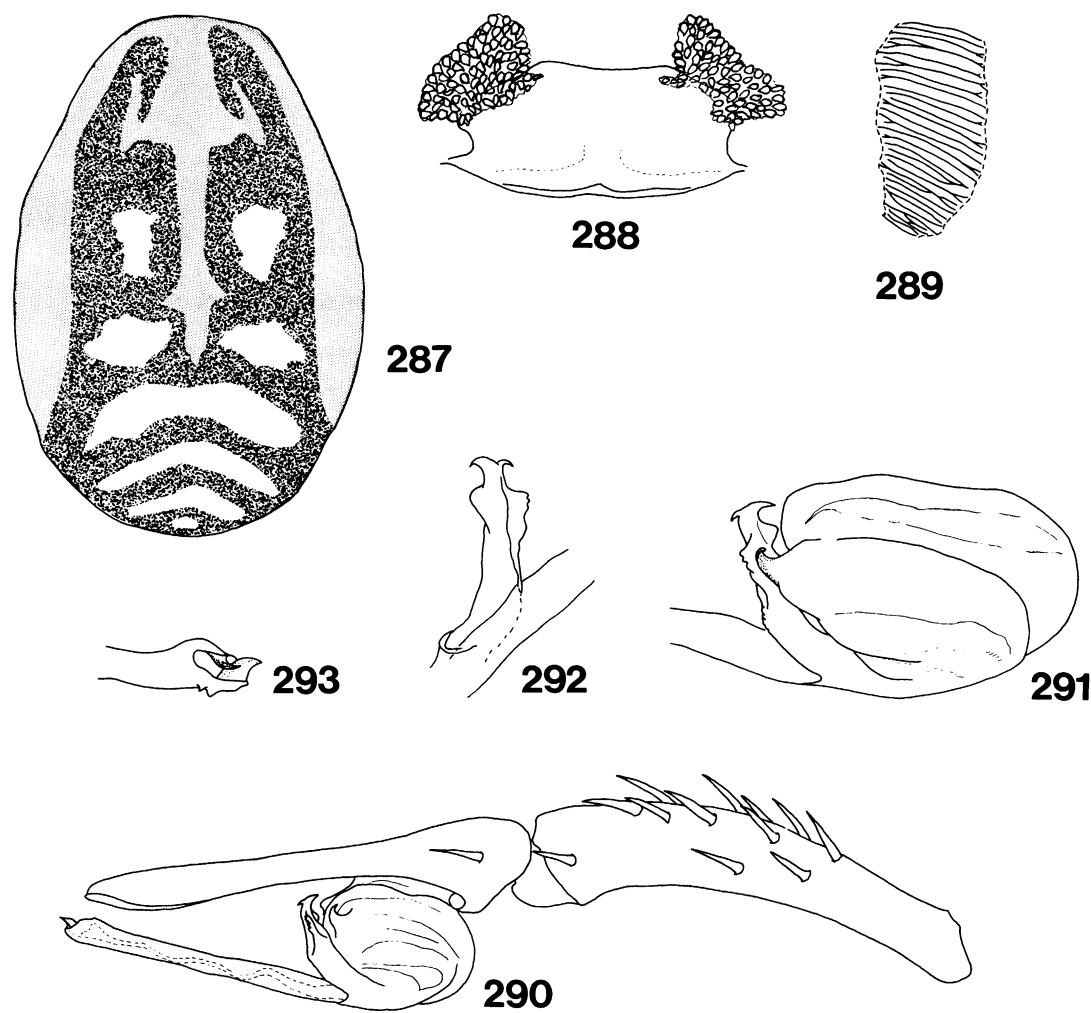
Figs. 281–286. Male palp of gradungulids. 281. *Progradungula carraiensis* Forster and Gray, retro-lateral view. 282, 283. *Kaiya terama*, new species, retrolateral view. 284–286. *K. bemboka*, new species, retrolateral view, ventral view of median apophysis, and prolateral view of embolic process.

ronym in honor of the collector of the type specimens.

DIAGNOSIS: This species can be recognized by the distinctive abdominal pattern, by the parembolic process with lateral flanges and the short terminal embolic processes of males, and by the pair of large receptaculate lobes in the female genitalia.

MALE: Total length 10.70. Carapace 5.45 long, 3.62 wide. Abdomen 5.04 long, 3.50 wide. Carapace and legs light amber; chelicerae and palpi reddish-brown; abdomen dark mottled grey dorsally, with distinctive pale grey to off-white patterning: middorsal stripe,

anteriorly flanked by two or three pairs of paler patches, followed by three or four large chevrons posteriorly (fig. 287). Eye group 1.33 wide. Anterior median eyes small, about one-third size of anterior laterals; eye sizes and interdistances: AME 0.09, ALE 0.25, PME 0.21, PLE 0.22; AME-AME 0.08, AME-ALE 0.23, PME-PME 0.23, PME-PLE 0.30, ALE-PLE 0.08; MOQ length 0.43, front width 0.28, back width 0.56. Cheliceral stridulatory area as in figure 289; promargin with five teeth, retromargin with eight or nine denticles proximally. Labium 0.90 long, 0.87 wide. Sternum 2.54 long, 2.05 wide.



Figs. 287–293. *Kaiya parnabyi*, new species. 287. Abdomen of female, dorsal view. 288. Internal female genitalia. 289. Stridulatory ridges of male chelicera. 290–293. Male palp, two retrolateral views, anteroprolateral view of parembolic process, and prolateral view of distal portion of embolus.

	I	II	III	IV	Palp	
Femur	6.70	6.05	5.34	6.30	4.76	femur d3-1-2-2-3-3, v1-1-0-0-0-0, r1-1-1-0-0-0; patella p1; tibia d0-0-0-1-0-0, v2-0-1-2-2-2-2, p1-1-1-1-1-1-1, r1-1-1-1-1-1; metatarsus v2-2-2-1-2-3, p1-1-1-1-1, r1-1-1-1-2-1; tarsus v18; III: femur d3-2-3-3-2, v1-2-1-0-0-0, r1-0-0-0-0; patella p1; tibia d0-1-0-1-1, v2-2-2-2, p1-1-1, r1-0-1-1; metatarsus d1-1-1-1, v2-2-2-3, p1-1-1-1, r1-1-1; tarsus v3; IV: femur d3-2-1-3-2-3, v2-1-1-1-0-0-0, p1-0-0-0-0; patella p1, r1; tibia d0-1-0-1-1, v2-0-1-1-2, p1-0-0-1, r1-0-1-1; metatarsus d1-0-1-1-0, v2-2-2-2-3, p1-0-1-1-1, r0-1-0-1-0-1; tarsus v1. Tibial trichobothria of legs I–IV:
Patella	2.19	2.11	1.95	1.92	1.39	
Tibia	6.93	6.21	4.91	6.30	3.18	
Metatarsus	5.89	5.23	5.12	6.65	—	
Tarsus	2.21	2.21	1.83	2.24	3.15	
Total	23.92	21.81	19.15	23.41	12.48	

Leg formula 1423. Spination: I: femur d3-1-2-3-2-3, p0-0-0-1-0, r1-1-0-0-0; patella p1, r1; tibia v2-1-2-1-2-2-2, p1-1-1-2-1-2, r1-1-1-1-1-1-1-1; metatarsus v2-1-2-2-2-3, p1-0-1-1-1-0-1, r1-1-1-1-1-1; tarsus v17; II:

prolateral, 1 distal plus 7, 7, 7, 7 proximally; retrolateral, 10, 9, 8, 9. Tarsal organ ovoid pit with numerous receptor areas scattered within margin. Superior claw teeth: legs I, II prolateral 18–19, retrolateral 17–19, legs III, IV 8–9; inferior: legs I, II bare, legs III, IV one. Palpal tibia strongly spined, distally curved; two rows, each of eight trichobothria, dorsally and retrodorsally on tibia. Palpal spination: femur d0-0-0-9; patella d6; tibia d10, p5, r3; tarsus p1 (small), r1. Palpal bulb as in figures 290–293; median apophysis with broad base surmounted apically by short, narrow, spoon-shaped hook; embolic rod elongate, slender; parembolic process hooked apically, with subapical tooth and retrolateral and posteroprolateral flanges; distal portion of embolus with two short, spiniform terminal processes.

FEMALE: General characteristics as in male. Total length 15.93. Carapace 8.63 long, 5.80 wide. Abdomen 7.25 long, 4.85 wide. Cheliceral promargin with six teeth.

	I	II	III	IV	Palp
Femur	8.25	8.12	6.85	8.38	4.00
Patella	3.13	3.06	2.73	2.75	1.70
Tibia	8.50	7.63	6.00	8.25	2.88
Metatarsus	6.88	6.33	6.50	8.56	—
Tarsus	<u>3.16</u>	<u>3.13</u>	<u>2.25</u>	<u>2.85</u>	<u>4.05</u>
Total	29.92	28.27	24.33	30.79	12.63

Leg formula 4123. Spination: I: femur d3-2-4-3-4, v1-1-0-0-1-0, r2-1-1-0-0-0; patella p1, r1; tibia d0-0-0-0-1-0-0, v2-2-2-2-2, p2-2-2-1-3, r1-1-1-1-2-1-1; metatarsus v2-2-2-2-3, p2-2-2-2-0, r2-2-1-0-0; tarsus v19; II: femur d4-2-3-3-3-3, v0-0-0-2-1-0, r2-1-1-0-0-0; patella p2, r1; tibia d0-0-0-0-1-0, v2-2-2-2-2, p1-1-2-1-1-3, r2-1-1-2-1-1-2-1; metatarsus v2-2-2-2-3, p1-1-1-1-1-0, r2-2-1-1-1-0; tarsus v18; III: femur d4-2-2-3-3-1, v2-2-1-0-2-1-0, r1-1-1-0-0-0; patella p2, r1; tibia d1-0-1-2, v2-2-2-2, p2-1-0-1-0, r1-1-1; metatarsus d1-1-1-1-0, v2-2-2-2-3, p2-2-1-1, r1-2-1-0-1; tarsus v1; IV: femur d3-3-2-3-2-3, v2-2-2-0-1-0-0, p2-1-2-0-0-0; patella p1, r1; tibia d0-0-1-1, v2-0-1-0-2-2, p1-1-1-1, r2-1-1-1-1-1; metatarsus d1-0-1-0-0, v2-2-2-2-3, p1-1-1-1-1, r1-1-1-1; tarsus v1. Superior claw teeth of legs I–IV: prolateral, 22, 22, 8, 6; retrolateral 17, 16, 8–9, 6; inferior claws 0, 0, 1, 1. Internal genitalia with wide, scler-

otized copulatory bursa bearing large multi-receptaculate lobe on each side (fig. 288).

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Known only from the type locality in Victoria.

PROGRADUNGULA FORSTER AND GRAY

Progradungula Forster and Gray, 1979, p. 1053 (type species by original designation *Progradungula carraiensis* Forster and Gray).

DIAGNOSIS: These cribellate gradungulids can be separated from members of the only other known cribellate genus, *Macrogradungula*, by their smaller size, the smaller number of receptacula in the female genitalia, and the arrangement of those receptacula in a truly bilateral form.

DESCRIPTION: Medium to large cribellate gradungulids, lightly pigmented, with more or less distinct abdominal chevrons. Chelicerae without stridulatory ridges. Eye group occupying more than two-thirds of caput width. Fovea broad, subcircular, pitlike. Sternum elongate, pointed posteriorly. Cribellum entire, narrow (figs. 302, 303). Calamistrum subcentral to proximal, uniseriate, occupying one-fifth of metatarsus IV length (fig. 184). Tarsal organ pitlike, with several receptor nodes on floor. Embolic rod of male palp without terminal processes; parembolic process bifurcate (fig. 281). Female genitalia consisting of two widely separated groups of spherical receptacula with long convoluted ducts extending to bursal cavity (fig. 198); secretory glands associated with ducts rather than receptacula.

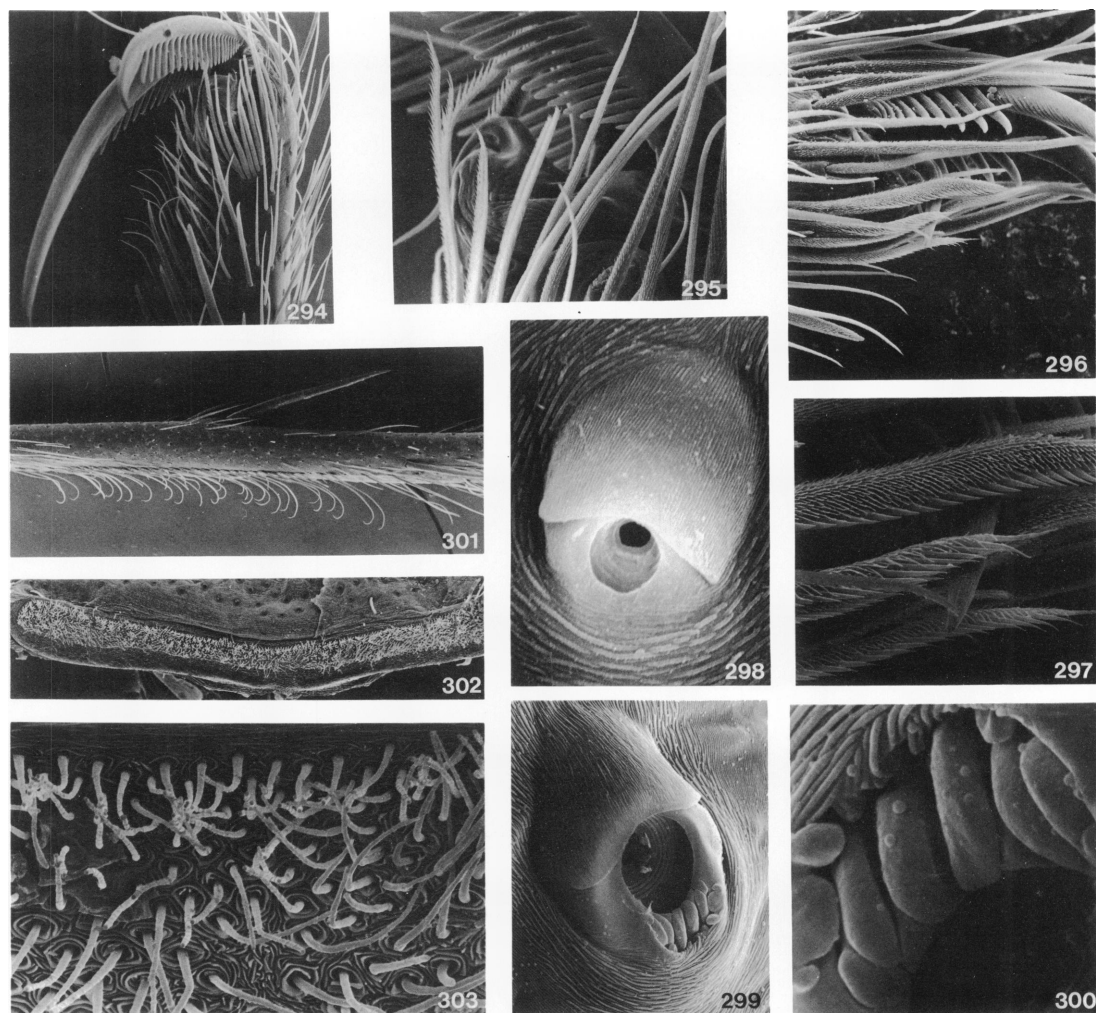
DISTRIBUTION: Northeastern New South Wales, Australia.

Progradungula carraiensis Forster and Gray

Figures 169, 184, 185, 198,
281, 294–303, 330

Progradungula carraiensis Forster and Gray, 1979, p. 1053, figs. 1, 2, 5, 7–9, 12, 13, 17–19, 21, 22, 26, 27, 33–37, 39, 49–53, 61–65 (female holotype, KS 1583, from Carrai Bat Cave, Carrai State Forest, New South Wales, Australia, in AMS, examined). Gray, 1983, p. 51, figs. 1–15.

DIAGNOSIS: This species can be recognized by having the characters of the genus as well



Figs. 294–303. *Progradungula carraiensis* Forster and Gray. 294. Claws, leg I of female. 295. Same, showing the inferior claw. 296. Claws, leg IV of female. 297. Serrate bristles below claws, leg I of female. 298. First tibial trichobothrium from leg I of female. 299. Fourth tibial trichobothrium from leg I of female. 300. Distal margin of fourth bothrium. 301. Middle section of metatarsus IV of female, showing calamistrum. 302, 303. Cribellum of female.

as a carapace length of 5–6 mm, a weakly pigmented abdomen bearing three pairs of indistinct pale chevrons (fig. 169), a male palpal bulb with two slender spiniform parembolic processes near the middle of the embolic rod (fig. 281), and the female genitalia having three receptacula on each side of the genitalic region (fig. 198).

NOTES: Specimens of this cribellate species have been collected only from the type locality, a small cave surrounded by closed for-

est vegetation in northern New South Wales, but local cavers have reported sightings from other caves in the region. Apart from some reduction of pigmentation, there is little morphological or behavioral evidence that *P. carraiensis* is wholly cavernicolous. Its characteristic webs could be placed in sheltered microhabitats in the moist surface forest (such as cavities in rotting logs and stumps or eroded limestone rock outcrops). A very similar type of web is made in surface closed forest



Figs. 304–307. *Pianoa isolata*, new species. **304.** Female with eggsac in hollow log. **305.** Adult female. **306.** Female in comatose position after disturbance; note the presence of a dragline thread extending from the spinnerets to the tarsi. **307.** Female after molt; the spider positions itself on the substrate and is not suspended.

habitats by the other cribellate gradungulid, *Macrogradungula moonyia*.

Discussions of the web and behavior of *P. carraiensis* were presented in the family discussion above. A single subspherical egg sac found in Carrai Bat Cave probably belongs to this species. Its outer silk layer is not of the close, paperlike texture typical of most gradungulid egg sacs, but instead is soft, white, and flocculent. The sac was found lying on the cave floor but the presence of a definite stalk suggests that it would normally be suspended from a wall or roof. A few soil particles adorning the outside of the sac may have been deliberately placed or may just have resulted from contact with the soil floor. The soft outer silk structure noted here resembles that described for the egg sac of the New Zea-

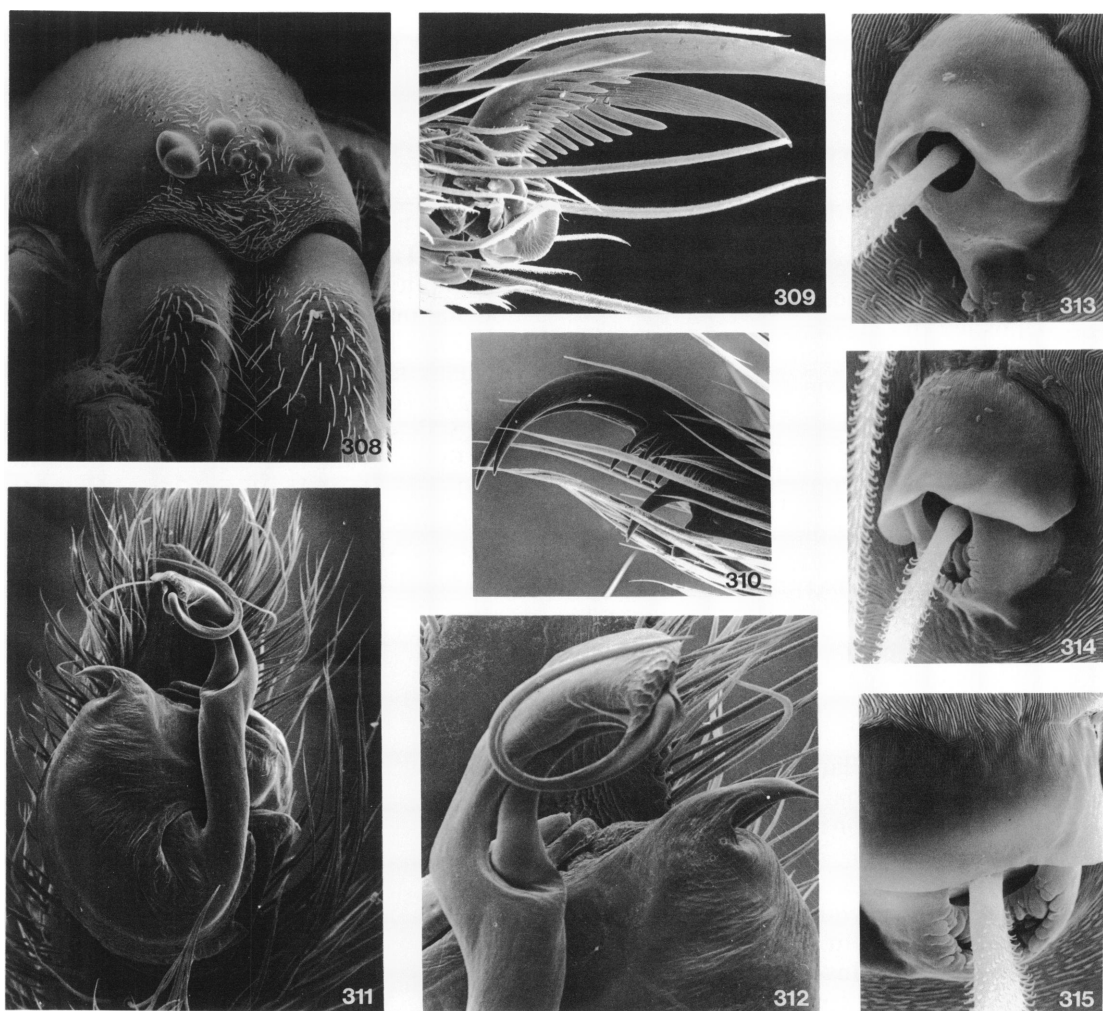
land species *Spelungula cavernicola*, also a cave dweller.

PIANOA FORSTER, NEW GENUS

TYPE SPECIES: *Pianoa isolata* Forster, new species.

ETYMOLOGY: The generic name is modified from that of the only locality from which the genus is known, and is considered feminine in gender.

DIAGNOSIS: These medium-size, ecribellate gradungulids seem most closely related to the cribellate genus *Progradungula*, and are similar in abdominal patterning to the two cribellate genera *Progradungula* and *Macrogradungula*, with which they share a similar receptacular form. The receptacula are more numerous in *Pianoa*, are uniform, and are



Figs. 308–315. *Pianoa isolata*, new species. 308. Anterior view of caput and chelicerae, showing the typical austrochiloid median extension of the clypeus and the arrangement of the eyes. 309. Claws of leg I. 310. Claws of leg IV. 311, 312. Ventral views of male palpal bulb. 313–315. First, second, and third tibial trichobothria from female palp.

evenly spread across the genital region, in contrast to those genera. The pit tarsal organ also separates the genus from all other ecirbellate genera except *Kaiya*.

DESCRIPTION: Medium-size, ecirbellate gradungulids. Abdomen with paired pale patches down abdominal dorsum delineating chevron pattern. Total length 12–14. Carapace distinctly longer than wide; caput rounded but only slightly higher than thoracic region. Clypeus wide, projecting forward between chelicerae. Fovea broad, sub-oval depression. Leg formula 4123; legs

strongly spined, with double row of trichobothria on tibiae and single subdistal trichobothrium on metatarsi. Tarsal organ of simple pit form. Parembolic process of male palpal bulb strongly spinous, directed along embolic rod; distal (terminal) process spiniform, curved. Female genitalia with row of large pyriform receptacula across genitalic region; secretory glands discharging through ducts connecting receptacula with bursal cavity.

DISTRIBUTION: Known only from the South Island of New Zealand.

***Pianoa isolata* Forster, new species**
Figures 170, 171, 183, 192, 196, 197,
304–315, 328, 358, 359, 374, 382

TYPES: Female holotype from rotten log on *Nothofagus* forest floor at Piano Flat, Waiaka Valley, Otago, South Island, New Zealand (February 18, 1983; R. R. and L. M. Forster), and paratype male from same locality (collected immature September 1979, matured after two molts on June 27, 1980; R. R. Forster), deposited in OMD.

ETYMOLOGY: The specific name refers to the restricted distribution of the species.

DIAGNOSIS: The species is characterized by the form of the male and female genitalia.

FEMALE: Total length 14.08. Carapace 7.27 long, 5.50 wide. Abdomen 6.84 long, 6.00 wide. Eye sizes and interdistances: AME 0.08, ALE 0.30, PME 0.30, PLE 0.30; AME-AME 0.13, AME-ALE 0.42, PME-PME 0.30, PME-PLP 0.38, ALE-PLP 0.08; MOQ length 0.50, front width 0.30, back width 0.88. Carapace closely clothed with recumbent hairs except on surface at sides of eyes. Coloration pattern as in figures 304–307. Chelicerae with numerous hairs and one large bristle on anterior surface, six promarginal teeth, and numerous denticles proximally on retromargin. Labium as wide at base as long. Maxillae longer than wide in ratio of 6:5. Sternum scutiform, slightly longer than wide. Abdomen closely clothed with recumbent ciliate hairs and fewer erect bristles. Colulus small, setose, lobate. Spiracles leading to posterior booklungs at one-third of distance between spinnerets and epigastric furrow. Internal genitalia as in figures 196, 197; 16 spherical to pyriform, smooth receptacula spread across genital region; each receptaculum linked with bursal cavity by short duct bearing small lobes that serve as receptor loci for the secretory glands; membranous sac lies over receptacula.

	I	II	III	IV	Palp
Femur	6.34	5.51	5.01	6.67	3.17
Patella	3.34	3.34	3.17	3.01	1.34
Tibia	5.84	5.01	3.51	5.34	1.74
Metatarsus	5.51	5.51	5.34	6.67	—
Tarsus	2.67	2.67	2.17	2.17	3.01
Total	23.70	22.04	19.20	23.86	9.26

Leg spination: femora: I d3-3-3-3-3-3, p1-1-1-1-1, r1-1-0-0; II d2-3-3-3-3-2-3, v1-1-0-0,

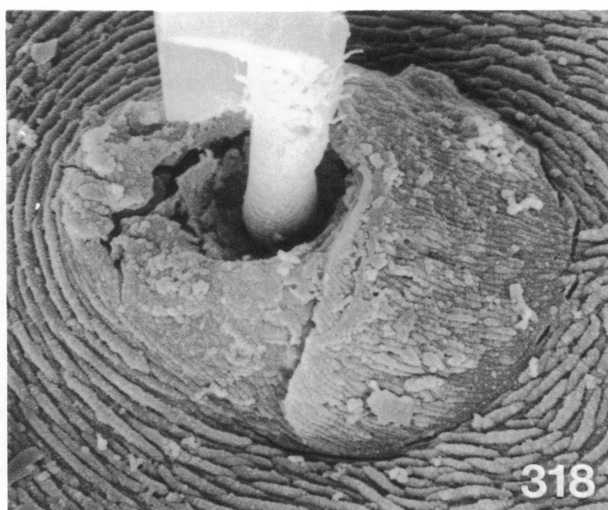
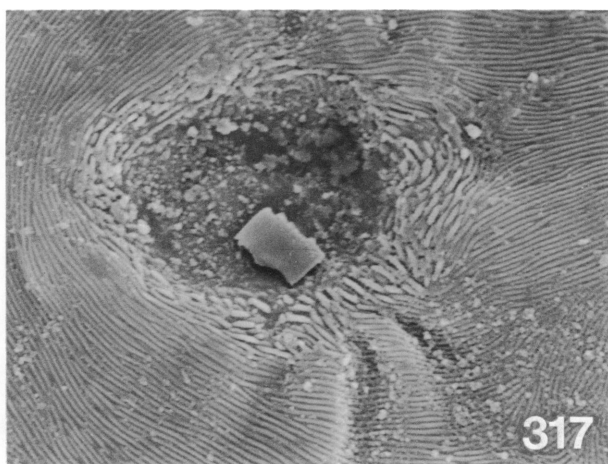
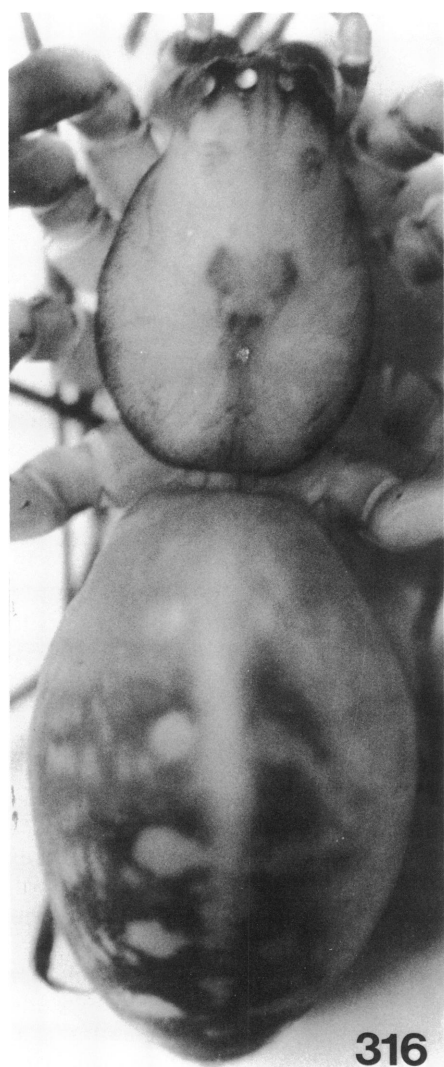
p1-1-1-2-1-2, r1-1-0-0; III d4-2-3-3-3-3-3, v1-1-1, r1-1-1-1; IV d4-4-1-3-1-3-3-2, v2-2-2, p1-1-1-1-1-1; tibiae: I v2-2-2-2, p1-1-1-1-1; II v2-2-2-2, p1-1-1, r1-0-0; III d1-1-2-1, v2-2-2-2, p1-1-1; IV d1-1-1, v2-2-2-2, p1-1-1; metatarsi: I v2-2-2-2, p1-1-1-1; II p1-1-1-1, r0-0-0-2; III d2-2-2-2, v2-2-2-2, p1-1-1-1, r1-1-1-1; IV d2-2-1-2, v2-2-2-2, p1-1-1, r1-1-1-1. Tarsal organ as in figure 218. Trichobothria in double row on each tibia, single subdistal one on each metatarsus; except on first tibial bothria, distal margins strongly crenulate (figs. 313–315).

MALE: Total length 12.65. Carapace 6.84 long, 5.55 wide. Abdomen 6.17 long, 4.34 wide. Eye sizes and interdistances: AME 0.13, ALE 0.34, PME 0.25, PLE 0.25; AME-AME 0.34, AME-ALE 0.34, PME-PME 0.30, PME-PLP 0.34, ALE-PLP 0.06; MOQ length 0.59, front width 0.50, back width 0.76.

	I	II	III	IV	Palp
Femur	5.92	5.92	4.64	6.42	3.72
Patella	2.97	2.97	2.51	2.98	1.43
Tibia	5.57	5.47	4.34	6.05	2.88
Metatarsus	6.34	5.84	5.00	7.43	—
Tarsus	2.14	1.92	2.59	2.59	1.92
Total	22.94	22.12	19.08	25.47	9.95

Leg spination: dorsal spination of femora and tibiae consists of three distinct rows; femoral spines all strong but tibiae have three bands of smaller spines with four large spines spaced along median row and three along lateral rows; remaining spines: femora: I v1 basal, p1 distal, r1-1-0; II v1-1-2, r1-1-0; III v2-1-1, p1 basal, r1-1-0; IV v3-1-2-0, p1 basal, r1 basal; patellae III, IV d1, p1, r1; tibiae I–IV v2-2-2-2; metatarsi: I v3-3-3-3, p1-1-1, r1-1-1; II d1 median, group of 12 distal, v2-2-2-2, p1-1-1-1, r1-1-1-1; III d1-1-3-1, v2-2-2, p1-1-1-1, r1-1-1-1. Palp as in figures 311, 312; parembolic process strongly spinous, extending parallel to embolic rod, reaching to near opening of sperm duct at base of slender, curved, spiniform terminal embolic process; median apophysis broadly based hook.

OTHER MATERIAL EXAMINED: All known specimens have been collected from a single isolated patch of *Nothofagus* forest at Piano Flat, Waiaka Valley, Otago, South Island, New Zealand. Specimens examined were collected on the following dates: adult males:



Figs. 316–318. *Macrogradungula moonya*, new species. 316. Body of adult female, dorsal view (preserved specimen). 317. Tarsal organ. 318. Trichobothrium (the crenulated anterior margin is obscured by detritus).

Mar. 1983; Sept. 1979 (matured Aug. 25, 1980, after three molts); females: Apr. 8, 1972 (A. C. Harris); Sept. 1979; Sept. 1979 (matured Dec. 23, 1980, after three molts); Oct. 12, 1979; Mar. 12, 1981; Mar. 1983. In addition to this adult material a number of immature specimens which died before reaching maturity were also examined.

DISTRIBUTION: Waiaka Valley, Otago, South Island, New Zealand. The species is apparently restricted to a single locality. A single damaged subadult female specimen has

been examined bearing the label "Teal Valley, Nelson"; it appears to belong to *P. isolata* or a closely related species. The only substantial character difference from *P. isolata* detected is the presence of many more receptor nodes on the floor of the tarsal organ (fig. 383). Although *Gradungula sorenseni* has been recorded on numerous occasions from forests in the Nelson district, widespread collecting in that area has failed to provide any further specimens of *Pianoa* and the record is suspect.

NATURAL HISTORY: The spiders are relatively common in the one small isolated patch of forest where they have been found. They are usually found beneath or inside fallen logs which have reached a certain level of decay. The eggsacs, which are usually laid in cavities inside the logs, are pale cream or white (in contrast to the black eggsacs of *Gradungula* which are also found in the same locality). The eggsacs are laid in late spring or early summer (October–December) and the spiders emerge from a small round hole at the base of the sac in three or four weeks. The young spiderlings are pale white and lack markings; they do not become pigmented until another two molts. Although we have not been successful in rearing spiderlings all the way through to maturity, they do readily capture and eat *Drosophila* and seem to have little difficulty in passing through the first two ecdyses. Spiders taken later in the summer, when they are two or three molts from maturity, have been successfully reared on a diet of houseflies. It appears that the life cycle is annual and that the adult female at least may live for a year or more.

MACROGRADUNGULA GRAY, NEW GENUS

TYPE SPECIES: *Macrogradungula moonyia* Gray, new species.

ETYMOLOGY: The generic name refers to the large size and is feminine in gender.

DIAGNOSIS: These large (total length about 20) cribellate gradungulids can be recognized by the female genitalia with numerous receptacula situated in clumps across the genital region and the presence of retromarginal cheliceral teeth.

DESCRIPTION: Large cribellate gradungulids. Carapace weakly pigmented; abdomen with interrupted chevron pattern. Chelicerae with four promarginal teeth and proximal retromarginal row of small teeth; stridulatory ridges absent. Eye group occupying more than two-thirds of caput width. Fovea broad, sub-circular, pitlike. Sternum scutiform, elongate, pointed behind. Cribellum narrow, not divided. Calamistrum uniseriate, occupying middle eighth of metatarsus IV. Tarsal organ of pit form, with many small receptor nodes on floor. Female internal genitalia with nu-

merous receptacula grouped across genital region (figs. 203, 204).

DISTRIBUTION: Northeastern Queensland, Australia.

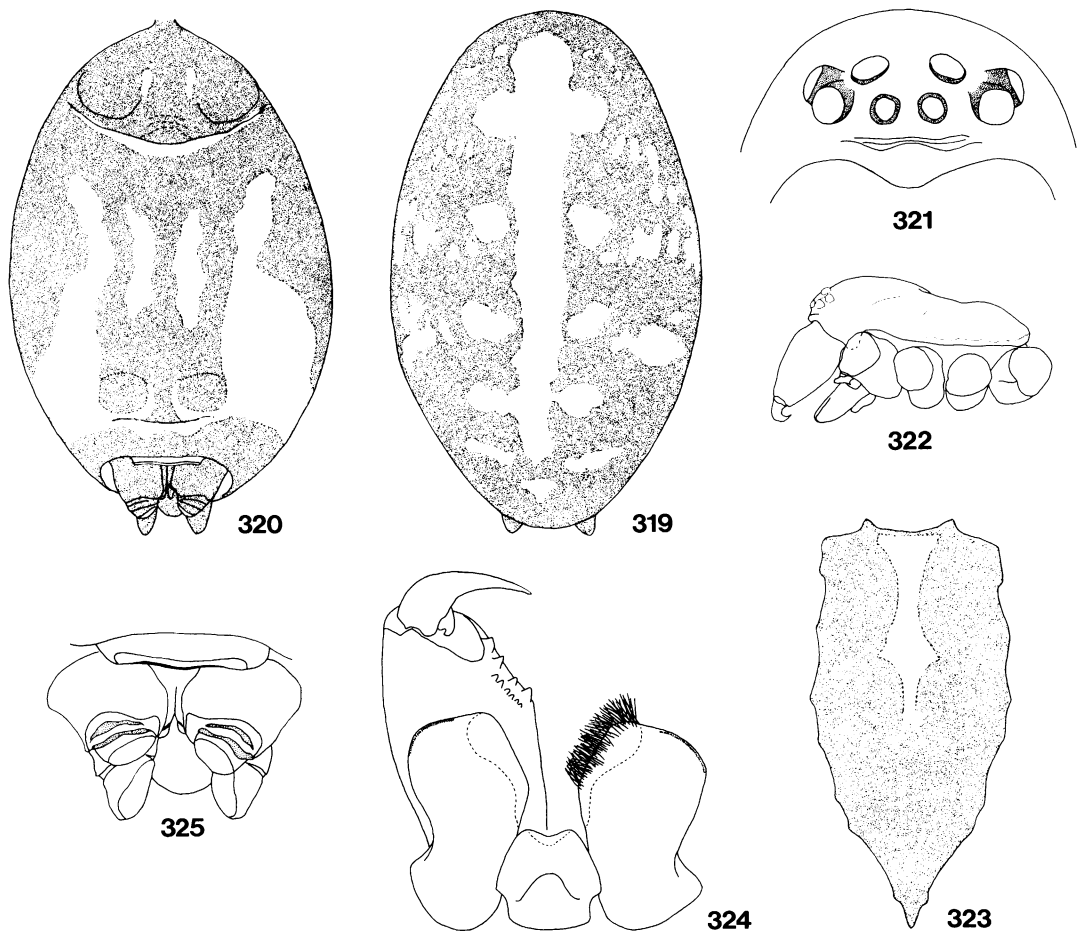
***Macrogradungula moonyia* Gray, new species** Figures 203, 204, 208, 316–325

TYPES: Female holotype (S 1402) from Lower Boulder Creek, Walter Hill Range via Tully, Queensland, Australia (November 17, 1984; J. Gallon and V. E. Davies), deposited in QMB. Paratypes: penultimate female (S 1395) and juvenile male (S 1396) taken on a single horizontal strand 20 cm above ground in closed forest at an elevation of 900 m at Upper Boulder Creek, Walter Hill Range via Tully, Queensland, Australia (October 26, 1983; G. B. Monteith and D. Yeates), deposited in QMB.

ETYMOLOGY: The specific name is an aboriginal word meaning “camp,” and refers to the serendipitous discovery of the first specimen of this remarkable spider, walking on the outside of a tent at a rainforest campsite.

DIAGNOSIS: With the characters of the genus.

FEMALE: Total length 19.27. Carapace 9.59 long, 6.29 wide. Abdomen 9.68 long, 7.38 wide. Carapace light brown with weak grey patterning anteriorly on caput and lateral thoracic areas; anterior foveal region with pair of grey markings; chelicerae brown; sternum light brown with anterior longitudinal pale stripe; legs banded light reddish brown and grey; abdomen brown with pale cream markings: dorsal surface with large middorsal stripe flanked by five pairs of broken chevrons (fig. 319), ventral surface with two pairs of longitudinal stripes. Carapace weakly arched, caput prominent (fig. 322). Fovea large, ovoid. Eye group 2.24 wide. From above, both eye rows recurved; from front, anterior row straight, posterior row procurved. Eye sizes and interdistances: AME 0.37, ALE 0.49, PME 0.48, PLE 0.48; AME-AME 0.29, AME-ALE 0.45, PME-PME 0.50, PME-PLE 0.44, ALE-PLE 0.15; MOQ length 1.14, front width 0.95, back width 1.39. Cheliceral groove with four large promarginal teeth; four to six small retromarginal teeth on proximal two-thirds of groove. Labium 1.49 long, 1.35 wide. En-



Figs. 319–325. *Macrogradungula moonya*, new species. 319. Abdomen of juvenile male, dorsal view, showing pattern. 320. Same, ventral view. 321. Eyes and clypeus, anterior view. 322. Prosoma, lateral view. 323. Sternum of female. 324. Labium, endites, and chelicerae of female. 325. Spinnerets and cribellum of female.

dites weakly grooved subbasally, serrula well developed. Sternum 5.33 long, 2.71 wide.

	I	II	III	IV	Palp
Femur	27.04	19.44	19.52	21.44	4.28
Patella	3.76	3.74	3.12	3.44	1.10
Tibia	23.68	18.24	17.76	20.08	3.07
Metatarsus	30.40	21.76	20.56	21.92	—
Tarsus	4.64	3.20	3.04	4.00	3.65
Total	89.52	66.38	64.00	70.88	12.10

Leg formula 1423. Legs very long, slender; spination: I: femur d0-1-0-0-0-0-1, v1-1-1-1-0-0, p1-1-1-1-1-1-0, r1-1-1-1-0-0; patella r1; tibia d1-0-0-0-0-1-0, v0-0-0-1-0,

p0-1-1-1-0-0, r0-1-1-1-0; metatarsus v0-1-0-1-0-1, p1-0-0-0-0-1, r1-0-0-0-0-1; tarsus v22; II: femur d1-1-0-1-0-1, v0-2-2-0-0, p1-1-1-1-1-0, r1-0-1-1-0-0; patella r1; tibia d1-0-0-0-1-0, v0-1-1-1-0, p1-1-1-1-1-0, r1-0-1-1-1-0; metatarsus v2-1-2-2-1-2, p1-1-1-1-1, r1-1-1-0-1; tarsus v18; III: femur d1-1-0-0-0-1, v1-2-2-0-0, p1-1-1-1-1-1-0, r1-1-1-0-0; patella p1; tibia d0-1-0-0-0-1-0, v2-2-1-1-1, p1-1-1-1-1-0, r1-1-1-1-0; metatarsus v2-1-2-2-1-1-1, p2-1-1-1-1-2, r1-1-1-1-2; tarsus v2; IV: femur d1-0-0-0-0-1, v0-2-1-0-0-0, p1-0-1-1-1-1-0, r1-0-1-1-1-0; patella 0; tibia d1-0-0-1-0, v0-1-0-1-1, p0-1-1-1-1-0, r0-1-1-0-

0; metatarsus v2-1-1-2-1-1-1, p1-1-1-1-1-2, r1-0-1-1-1-2; tarsus v4. Tarsi I, II with ventral spines grouped on proximal half. Tibial trichobothria of legs I-IV: prolateral (distal, proximal), (2, 6), (2, 6), (1, 6), (1, 6); retrolateral (all distal), 9, 7, 6, 7. Tarsal organ subdistal, structure as in figure 317. Distal tarsi with three or four toothed sustentacular hairs. Tarsal claw teeth of legs I-IV: proclaw 17, 13, 9, 11; retroclaw 24, 17, 11, 12; inferior claw 1, 1, 1, 0-1. Palpal spination: femur d0-0-1, p0-0-1, r0-0-1; patella d0-1, p1, r1; tibia d2-0-0, p0-1-1-0; tarsus d1-1, v0-0-1, p0-0-

2, r2-2-1; tibial trichobothria: prolateral, 1 distal, 6 proximal; retrolateral, 7; tarsal claw with 12 teeth. Spinnerets short, conical. Cribellum about half as wide as spinnerets, posterior margin strongly sclerotized. Calamistrum short. Epigastric area weakly swollen. Internal genitalia as in figures 203, 204.

MALE: Unknown.

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Known only from the Tully region of northeastern Queensland.

NOTE: Comments on the web were provided in the family discussion above.

COMPARATIVE MORPHOLOGY

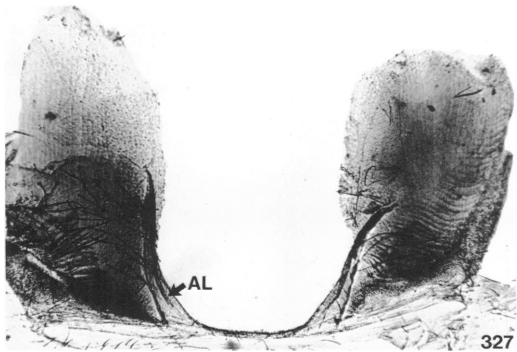
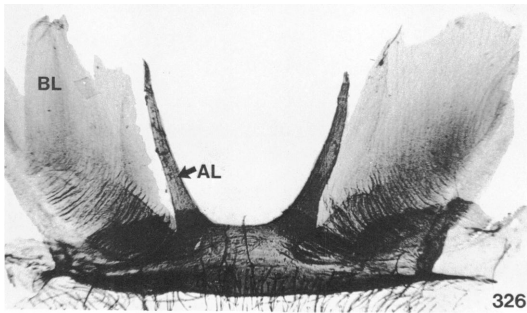
RESPIRATORY SYSTEM

Traditionally, the respiratory systems of all the "hypochoiloid" spiders were assumed to resemble those of amblypygids, liphistiids, and (all then known) mygalomorphs in con-

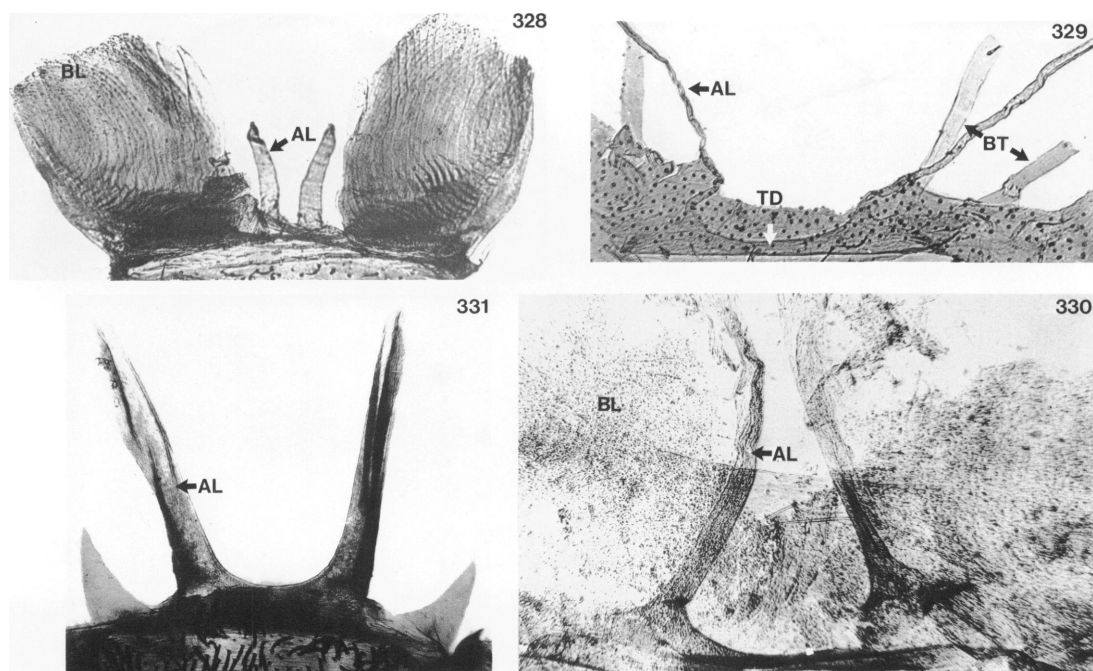
sisting of two pairs of booklungs, and the retention of this plesiomorphic feature was used to separate the "hypochoiloids" from all other araneomorphs, at up to the subordinal level. Zapfe (1955) demonstrated, however, that in *Austrochilus* the posterior spiracles open into a type of tracheal system (fig. 329).

Marples (1968) examined these structures and concluded that they represent true tracheae, although he commented that the "tracheal processes" seem to have the same microstructure as booklung lamellae. He further commented that "it is perhaps surprising that the tracheal arrangements of *Austrochilus* do not suggest modifications of lungs, as do the anterior tracheae of some of the apneumone spiders." Although these two comments may appear contradictory, the point Marples was making was that only a few tracheal tubes are present in *Austrochilus*, in contrast to the tuft of tracheae occurring in a number of other apneumone spiders. Marples did not consider the possibility that the booklungs may in some instances have undergone a reduction sequence before tracheal development began, and that the resultant tracheal configuration would bear little relationship to the number and arrangement of lamellae customarily found in booklungs. Despite the tracheate appearance of the structures found in *Austrochilus* and *Thaidea*, the organs are perhaps more appropriately described as modified booklungs than as tracheae.

The posterior booklungs of *Filistata* (fig. 331), it might be noted, carry this reduction



Figs. 326, 327. Posterior booklungs; BL, booklung; AL, apodemal lobe. 326. *Gradungula sorenseni* Forster. 327. *Hickmania troglodytes* (Higgins and Petterd).



Figs. 328–331. Posterior booklungs; BL, booklung; BT, reduced booklung lamellae–incipient tracheae; AL, apodemal lobe; TD, transverse duct. **328.** *Pianoa isolata*, new species. **329.** *Austrochilus franckei*, new species; note the slender apodemal lobe and the reduction of each booklung to two ducts. **330.** *Progradungula carraiensis* Forster and Gray; the apodemal lobes appear to retain a muscle attachment. **331.** *Filistata hibernalis* Hentz, Filistatidae; the booklungs are reduced to a single triangular flap and the spiracles merged into a single median slit.

sequence even further, in that the paired spiracles have merged and the booklung organization, though still recognizable as such, includes only a vestige of the original atrium, along with the apodemal lobes. The potential for intrafamilial changes in respiratory organization stemming directly from modifications of the posterior booklungs is well demonstrated in the Filistatidae, as in some other genera of that family the original paired spiracles are retained but the booklungs are reduced to a short duct (Forster, in prep.).

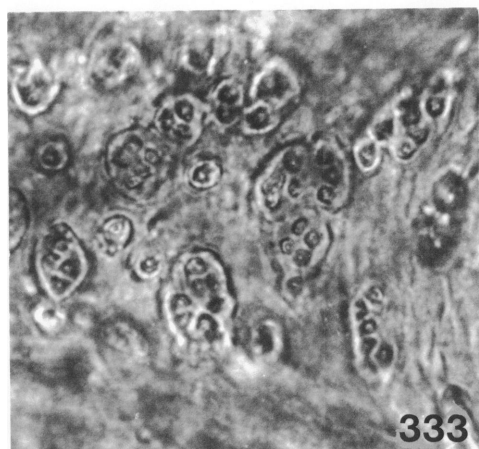
Forster and Gray (1979) reported that the atria of the posterior booklungs of “hypochiloids” are linked by a hollow transverse duct, from which a pair of forwardly directed (usually triangular) lobes extend. These lobes are also found in some other araneomorph spiders, such as the Cyatholipidae (Forster, 1980) and some Orsolobidae and Segestriidae (Forster and Platnick, 1985), and are apparently homologous with the muscle apo-

demes (that are independent of the booklungs) of liphistiids. Mygalomorphs, it should be noted, differ from both liphistiids and primitive araneomorphs in lacking the transverse duct, and (so far as known) they show no associated apodemal modifications. In some liphistiids, the muscle apodemes have apparently been modified to form peculiar eversible sacs. Amblypygids also have muscle apodemes associated with the posterior booklungs; although linked to the atria by a strip of cuticle, their apodemes do not actually communicate with the atria, and hence seem to function only in muscle attachment, not in respiration.

Marples recorded three tracheal tubes associated with each of the posterior spiracles of *Austrochilus*, but closer examination shows that the inner pair are in fact the apodemes, which are somewhat more slender and elongate than in the other “hypochiloid” genera. The middle pair of tubes (those immediately



332



333



334

Figs. 332–334. *Hypochilus pococki*, new species, female genitalia. 332. Genitalia cleared to show the extent of the secretory gland, SG. 333. Surface of receptaculum, showing the irregular groups of secretory pores. 334. Section showing paired receptacula and secretory gland tissue; the dark patch on the left is the sperm mass, displaced from the lumen of the receptaculum.

lateral to the apodemal lobes) could well be homologous with one of the booklung lamellae, but the outer pair are more likely to represent the marginal extensions of the original atrial pouch, which in most spiders, including the other “hypochiloids,” tends to be arcuate. In the non-austrochiline genera under consideration here, the posterior booklungs are typical (figs. 326–328, 330), with numerous lamellae and atria linked by a hollow transverse duct bearing a pair of anteriorly projecting, triangular extensions.

FEMALE GENITALIA

The sole genitalic element common to all female spiders, aside from the ovary and associated structures, appears to be the secretory gland system. A number of hypotheses have been propounded suggesting various physiological functions for this secretion (usually related to a possible role as an energy source for sperm, or as a triggering agent for sperm activation or, alternatively, transformation back to a resting stage). Regardless of



336



335

Figs. 335, 336. *Kaiya terama*, new species, female genitalia; note the bilateral grouping of the receptacula, in contrast to the even distribution in *Pianoa* and *Gradungula* (figs. 196, 199).

the validity of such hypotheses, the secretions clearly also play an essential part in the purely mechanical aspects of sperm storage and distribution.

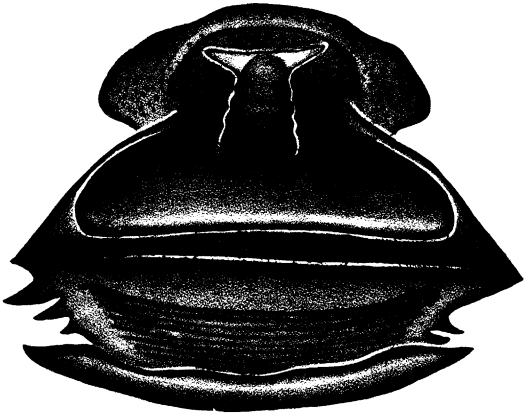
It has long been known that the form, number, and arrangement of the receptacula in some haplogyne spiders preclude any possibility of the sperm being deposited directly into the individual receptacula in the manner commonly found in entelegyne spiders. In a number of these haplogynes where a cytological examination of the genitalia has been carried out immediately after insemination (Forster, in prep.), the sperm are definitely deposited in the bursal cavity and not directly into the receptacula. At this stage, the receptacula are filled with secretions but devoid of sperm. An hour or more after insemination, however, the sperm are evenly dispersed throughout the receptacula, even in species (such as *mecysmaucheniids* and *huttoniids*) with numerous receptacula linked to the bursal cavity only by long and slender ducts.

During oviposition, the sperm must pass back down these ducts from the receptacula to fertilize the eggs. Perhaps the sperm are activated at this time, so that they have a high degree of motility and directional responses assisting in this passage to the bursal cavity, but the mechanism might simply involve the transport of the total contents of the receptacula en masse. In haplogyne spiders, the receptacula are generally rigid, scler-

otized sacs with no associated musculature; furthermore, they are usually imbedded in a thick mass of secretory tissue. Hence, the simplest explanation for such a forced mass movement of the stored fluid and sperm back down the ducts to the bursa could lie in active secretion from the glands at the time of fertilization. In the entelegyne families, where direct insertion of the sperm into the receptacula is the usual method of insemination, secretory glands are also associated with the female genitalia and presumably could function in the same way during fertilization. The direct insemination of entelegynes circumvents any disadvantages involved in the initial charging of the receptacula and is presumed to represent an advantageous apomorphy (which, however, has probably been acquired a number of times in phylogeny).

The relevance of this hypothesis lies in the emphasis placed on the secretory gland system of the female genitalia, rather than on the more conspicuous receptacula, in understanding the plesiomorphic organization of female spider genitalia.

The diversity of known receptaculate structures on one hand, and the numerous instances of homoplasies (often stepped) present in undoubtedly disparate families on the other, militates strongly against acceptance of a receptaculate organization as the plesiomorphic state for spiders. The simplest



337

Figs. 337. *Austrochilus franckei*, new species, dorsal view of female internal genitalia; the dorsal flap has been bent back to show the median lobe.

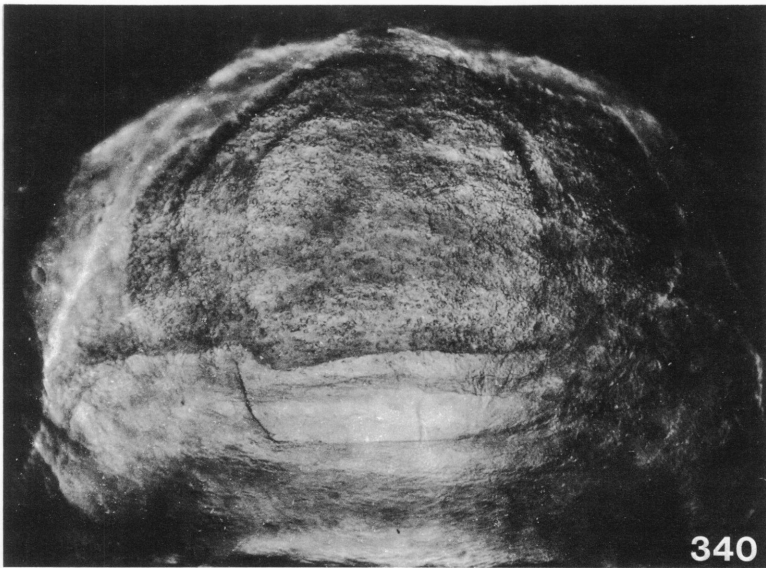
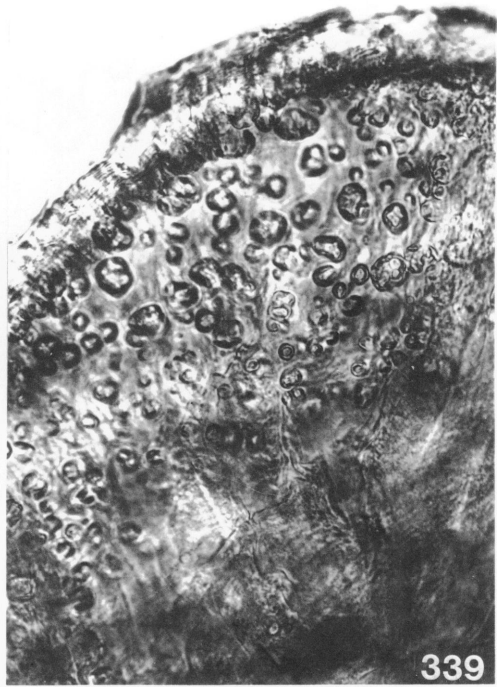
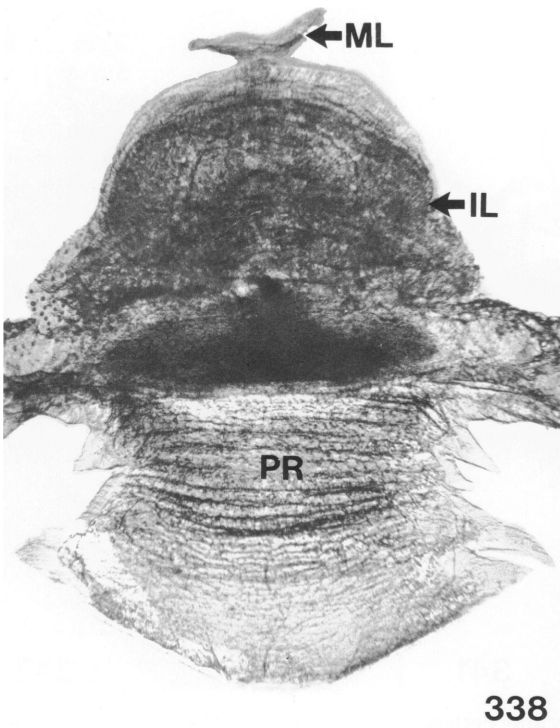
configuration that might be suggested based on a secretory system alone would be the location of a secretory gland in association with the anterior face of the bursal cavity. The suggestion that such an organ would be situated on the anterior face reflects the fact that it is this face which is part of the third abdominal segment (the primitive locus for all arachnid genitalic structures). Such a simple organ would discharge a secretion, through pores in the bursal wall, into the bursal cavity. The original function of the secretion presumably would be to provide a substrate to fix the sperm package in place. In such a system, desirable properties for the secretion would include miscibility with the sperm package and a sufficiently high viscosity to retain the sperm-charged mass in situ until eggs pass down the oviduct.

This simple type of organization is, in fact, known in at least three families of present-day spiders (Diguettidae, Pholcidae, and Orsolobidae), but only in the Diguettidae could this genitalic form be considered a plesiomorphic retention, because in both the Pholcidae and Orsolobidae (*Subantarctia*) the secretory gland system is associated with the posterior face of the bursal wall. Traces of a receptaculate organization associated with the anterior face of the bursal wall in both those families also suggests that their secretory gland system is a secondary development. If the

primitive female genitalia did consist of a secretory gland discharging from the anterior face of the bursa directly into the bursal cavity and the receptacula subsequently developed by invagination of the bursal wall (particularly that region bearing the secretory pores), plausible transformation series can be developed that can account (in general terms) for all the forms of receptaculate organization known in spiders.

The hypothesis that the secretory system is the fundamental plesiomorphic element in female spider genitalic morphology gains support from outgroup comparison with the Amblypygi, where the female genitalic organization is simple, consisting of invaginated sacs on the anterior wall of the bursal cavity and an extensive secretory system discharging through pores on the bursal surface adjacent to the sacs.

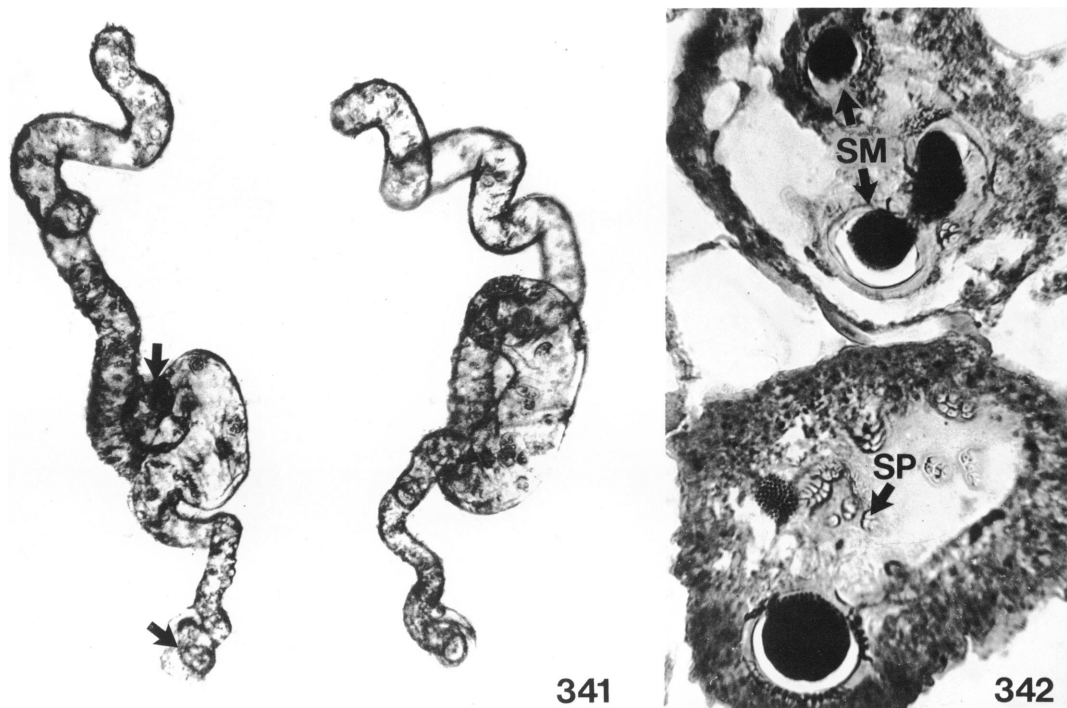
Among the "hypochiloids," the widest range of female genitalic forms is found within the Gradungulidae. This diversity allows some conclusions to be drawn on transformation sequences that might develop within a family, and therefore throws some light on probable homologies with the other taxa under consideration. There are two sequences apparent within the gradungulids. The most generalized, and presumably plesiomorphic, stages within each series are represented by the two New Zealand genera *Gradungula* and *Pianoa* (figs. 196, 197, 199, 200). The genitalia of *Gradungula* consist of a large number of small receptacula spread across the full width of the genital region. This organ could have been derived from the postulated primitive configuration if the original poreplate region associated with the secretory gland underwent multiple invaginations. Each receptaculum is imbedded in secretory tissue discharging into its lumen through a number of pores. The ducts leading from the receptaculum are short and open directly into the bursa. The bursal wall is irregularly invaginated, carrying the receptacula along with it to form three or four bunches on each side. Lying above these receptacula is a broad, membranous sac extending over the full width of the receptaculate region. This dorsal sac—the median receptaculum—is present in all gradungulids, although it is merged with the secretory receptacula in the Australian genera



Figs. 338–340. *Austrochilus franckei*, new species, internal female genitalia. 338. Dorsal view; ML, median lobe; IL, inner (dorsal) lobe; PR, posterior receptaculum. 339. Ventral lobe, showing groups of secretory pores. 340. Dorsal lobe.

Tarlina and *Kaiya* (figs. 172, 175–178, 250, 254, 288, 335, 336), and does not have an associated secretory system.

The sequence which follows from the *Gradungula* organization exhibits bilateral grouping of the receptacula and a reduction

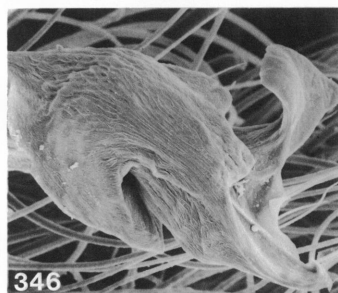
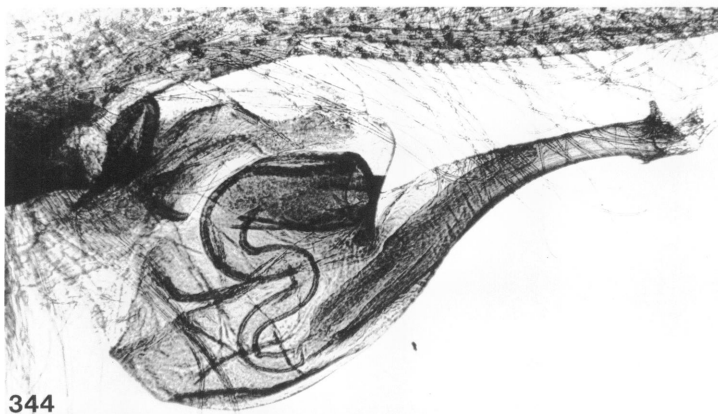
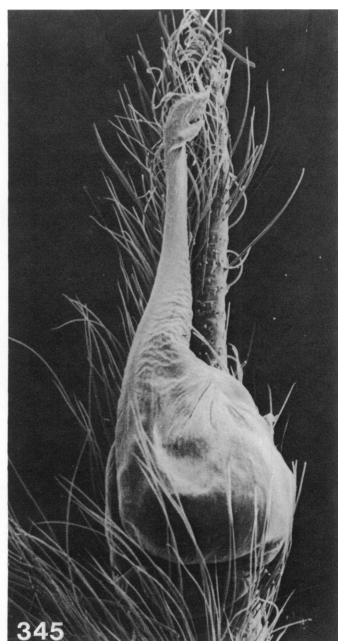
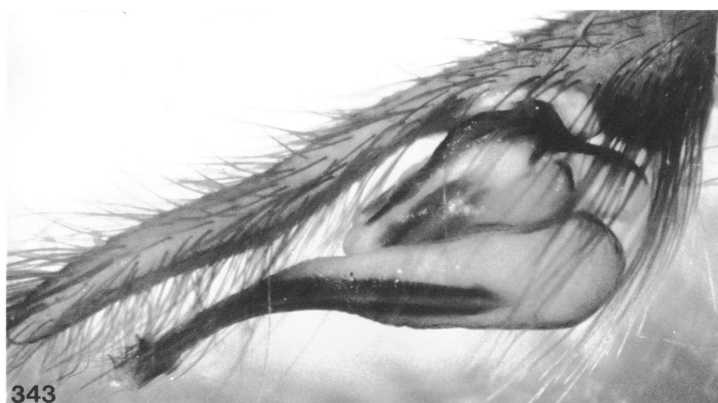


Figs. 341, 342. *Hickmania troglodytes* (Higgins and Petterd), female genitalia. 341. Paired anterior receptacula; the arrows indicate the openings of each pair of receptacula into the bursa. 342. Section through the two receptacula on one side; SM, sperm mass; SP, secretory pores.

in their number. In the Australian genera *Tarlina* and *Kaiya* the secretory receptacula are fully bilaterally grouped and illustrate a tendency for the discrete bunches of receptacula to open into distinctive secondary ducts which lead down to the bursal cavity. This development contrasts strongly with the simple indentations of the bursal wall found in *Gradungula* (figs. 199, 200).

A similar sequence of genitalic forms is also found within the Liphistiidae, with the difference that in *Liphistius* the individual receptacula remain imbedded in a heavily sclerotized poreplate. Apart from this feature, the organization in some species of *Liphistius* is the same as in *Gradungula*. As in the gradungulids, the various species of *Liphistius* show a tendency for bilateral aggregation of the invaginated areas; this tendency is carried even further in *Heptathela*, where the heavily sclerotized plate is reduced and the receptacula are almost free. The genitalic organization of *Heptathela* is similar to that of the gradungulid genus *Tarlina*.

The genitalia of *Pianoa* appear to share a common origin (a direct derivation from a plesiomorphic poreplate) with those of *Gradungula* but have the distal receptacula enlarged and not pierced with pores (figs. 196, 197). The ducts are longer than in *Gradungula* and bear the secretory pores, which are restricted to small tubercles irregularly spaced along the duct. The secretory fluid must discharge into the ducts leading to the receptacula rather than into the receptacula themselves (in contrast to *Gradungula* and the related Australian genera *Tarlina* and *Kaiya*). The receptacula are evenly spaced across the full width of the genitalic region and show no tendency toward bilateral grouping. In the cribellate genus *Progradungula*, however, where the same type of receptacula are present, the number is reduced to six, occurring in two widely separated triads (fig. 198). This sequence is actually repeated within the Atypidae, where the genitalia of *Atypus piceus* Sulzer are very similar to those of *Pianoa* but the reduction sequence in other *Atypus*

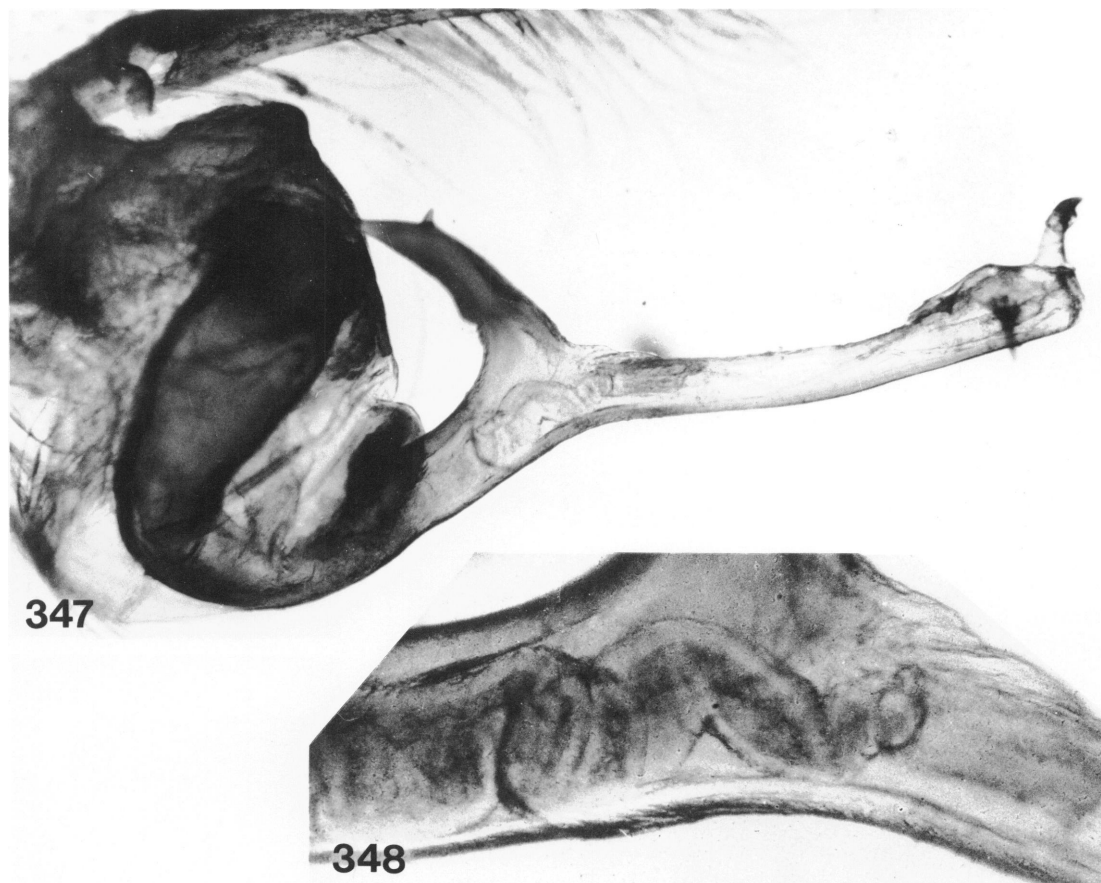


Figs. 343–346. *Hickmania troglodytes* (Higgins and Petterd), male palp. 343. Retrolateral view, showing the divisions of the bulb and the absence of a median apophysis. 344. Cleared bulb, showing the slender spermathèque lacking secretory pores. 345. Ventral view. 346. Distal embolic processes.

species leads to two distinct pairs of receptacula.

The four receptacula in the hypochilid genitalia are also bilaterally grouped in two pairs but differ from both the gradungulid and atypid organization in that all of the receptacula open into the bursa from a single opening. This arrangement parallels that found in some species of *Heptathela*. In the Austrochilidae the genitalia differ greatly between the two South American genera *Thaïda* and *Austrochilus* and the Tasmanian genus *Hickmania*, but the presence of an extension from the posterior face of the bursa seems to represent a significant synapomorphy linking the three genera and clearly separating them from the other two “hypochiloid” families.

The anterior genitalia of *Thaïda* and *Austrochilus* are bipartite (figs. 337–340). The two structures consist of a ventral and dorsal flap; the ventral flap is hollow and enveloped in a thick layer of secretory tissue discharging into the lumen through numerous closely spaced pores. The dorsal flap, which does not appear to have any associated secretory tissue, bears a digitiform lobe on its lower surface near the base; the lobe is sandwiched between the two flaps. Although the homology of the ventral secretory sac and dorsal structure with the two components of the gradungulid genitalic form is apparent, the paths of development are strikingly different. Although the genitalic organization of the two South American genera is unique among the “hypochiloids,” an



Figs. 347, 348. *Kaiya terama*, new species, male palp; cleared bulb, showing the simple spermophore lacking secretory pores, and the coiled duct at the level of the parembolic process.

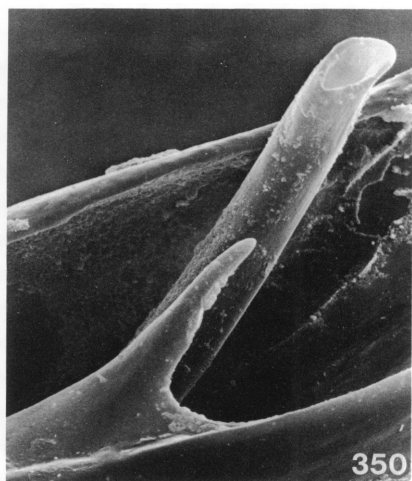
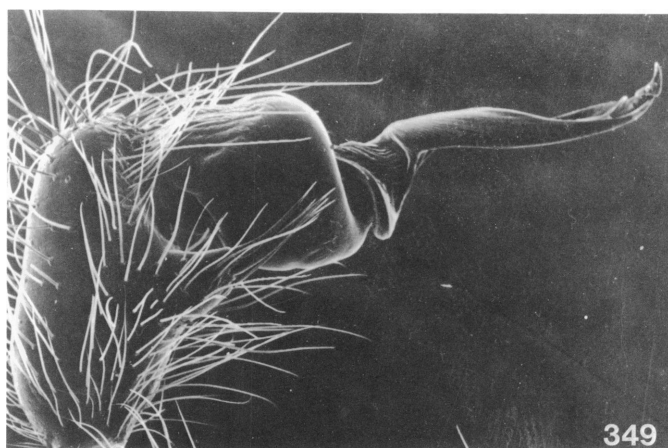
almost identical configuration has been recorded in the Archaeidae (Forster and Platnick, 1984).

The anterior receptaculate organization of the genitalia in *Hickmania* is also strikingly different (figs. 341, 342). It consists of two pairs of twisted tubes, each of which opens separately into the bursa, with each pair at different levels so that (as in the South American genera) there are two separate elements involved. Each receptaculum is enclosed in a separate layer of secretory tissue discharging into the lumen of the receptaculum through a number of small, irregularly spaced, pore-bearing tubercles. It is difficult to relate this genitalic form with the structures found in the South American genera, but, as in those genera, there is an extension from the posterior bursal wall of the bursa that although

not as pronounced does appear to be homologous.

MALE PALP

The articulation of the palpal bulb is distal in the Hypochilidae but median or subbasal in both the Gradungulidae and Austrochilidae. The spermophore in the Austrochilidae and Gradungulidae (figs. 344, 347) consists of a relatively slender sac, with a single bend, that lacks pores (suggesting the absence of a secretory gland within the bulb). In all genera examined histologically (Gradungulidae: *Gradungula*, *Pianoa*, *Kaiya*; Austrochilidae: *Hickmania*), the duct leading to the embolus is long and slender (and in *Kaiya* may be partially convoluted, fig. 348). The duct usually opens near the tip of the embolic process



Figs. 349, 350. *Hypochilus pococki*, new species, male palp. 349. Retrolateral view. 350. Distal portion of conductor, showing the tubular embolus.

but in *Spelungula* (fig. 227) continues as a short tube, as it does in *Hypochilus* (fig. 350).

Perhaps the most interesting aspect of the bulbal structure is the clear evidence supporting the hypothesis that the primitive form of the organ is not simple. The bulbs of gradungulids and austrochilines clearly show three separate divisions. Furthermore, these spiders also possess a hooked structure on the tegulum which in form and positioning appears homologous with the median apophysis commonly found in many entelegyne families. The absence of this structure in *Hickmania* and *Hypochilus*, where the divisions of the bulb are less clear, parallels the situation in most of the mygalomorph and haplogyne araneomorph spiders, where the bulb is secondarily simple and lacks accessory structures.

CARAPACE

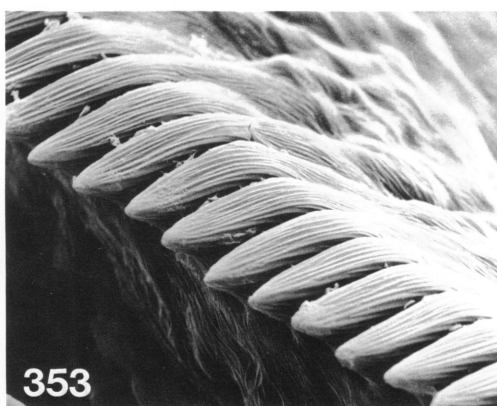
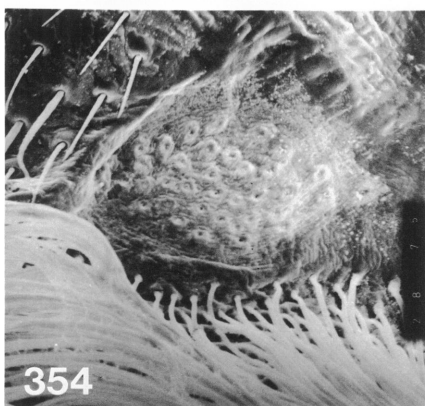
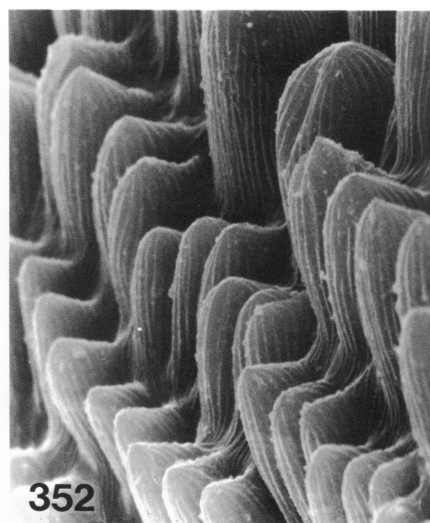
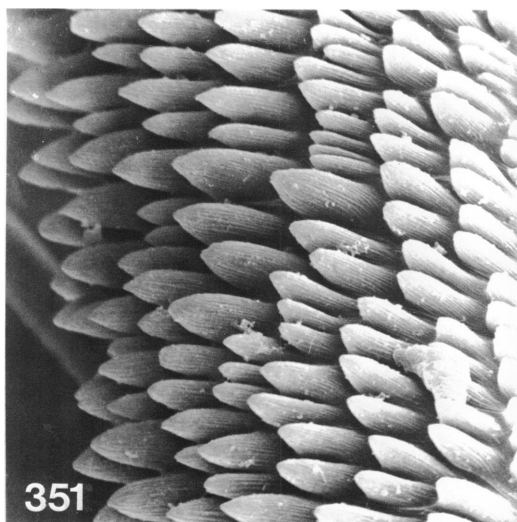
Although there are minor differences in outline, the general characteristics of the carapace are remarkably constant in these genera. The caput is never strongly raised and the fovea is usually represented by a shallow depression. The eight eyes are in two more or less straight rows occupying most of the caput width. The anterior median eyes are distinctly smaller than the others and are clearly separated from each other. The laterals are always contiguous or nearly so, and

are widely separated from the medians. This eye pattern is typical for araneomorph families in general and contrasts strongly with that found in the Filistatidae, where the eyes are closely grouped and hence bear a close resemblance to those of many orthognath families. Homann (1971) examined the eye structure of *Hypochilus* and placed them in his "primitive" category (along with all orthognaths and many haplogyne araneomorph families); as his study has not been extended to cover the full range of "hypochiloids" no firm conclusions can be drawn, but eye structure seems unlikely to contribute crucial data at this level of araneomorph classification.

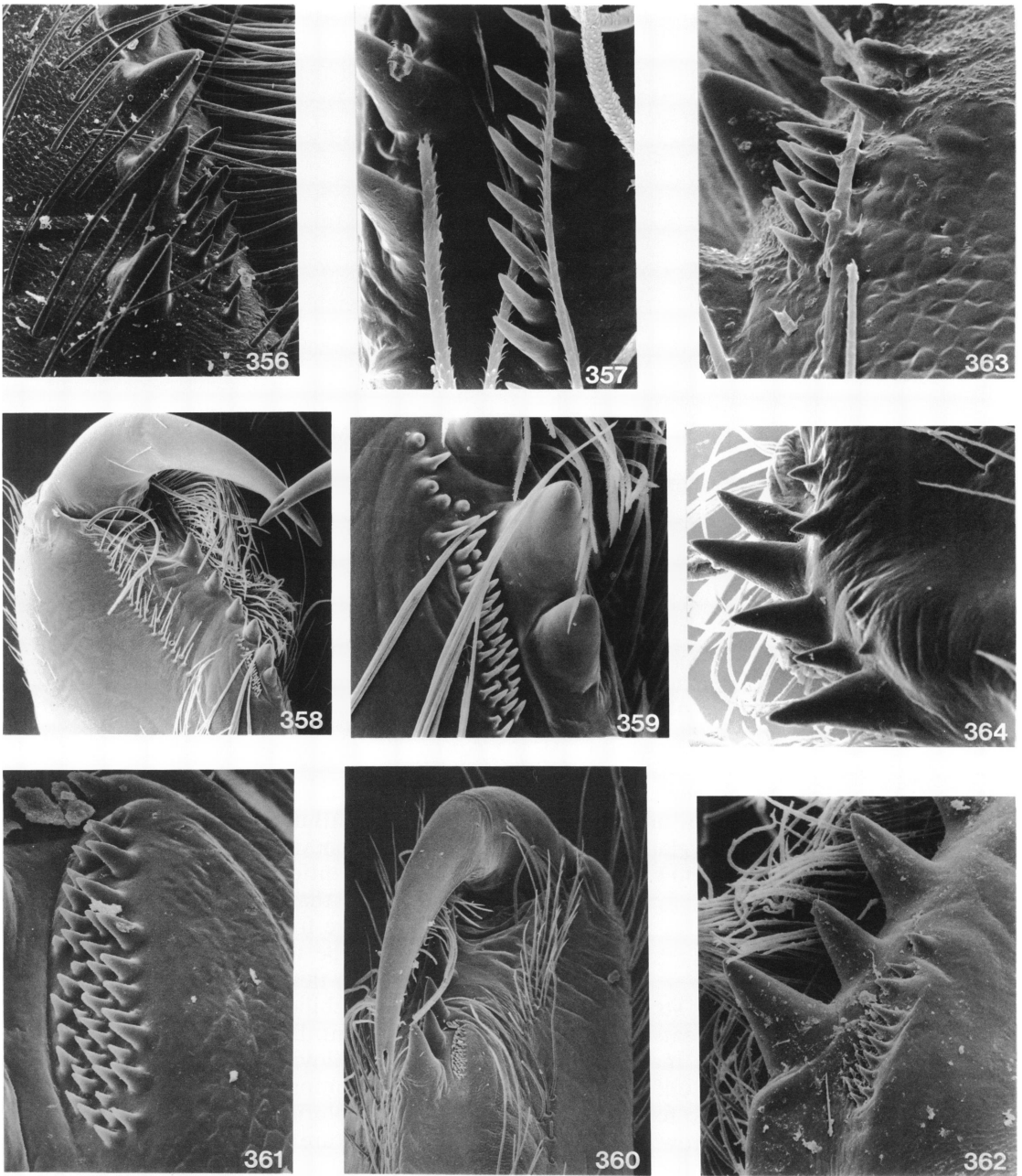
The clypeus is relatively wide and in the Austrochilidae and Gradungulidae (but not Hypochilidae) its margin is produced forward along the midline to form a triangular or subtriangular projection providing a short hood over the chelicerae. This distinctive modification is rarely, if ever, seen in other spiders, although a superficially similar (but more dorsally situated) extension is found in some Mecysmaucheniidae.

ENDITES

The endites are strongly developed, distinctly longer than wide, and lie more or less parallel to each other. The scopular hairs form a thick brush on the inner distal margin. The serrula is well developed in all genera but



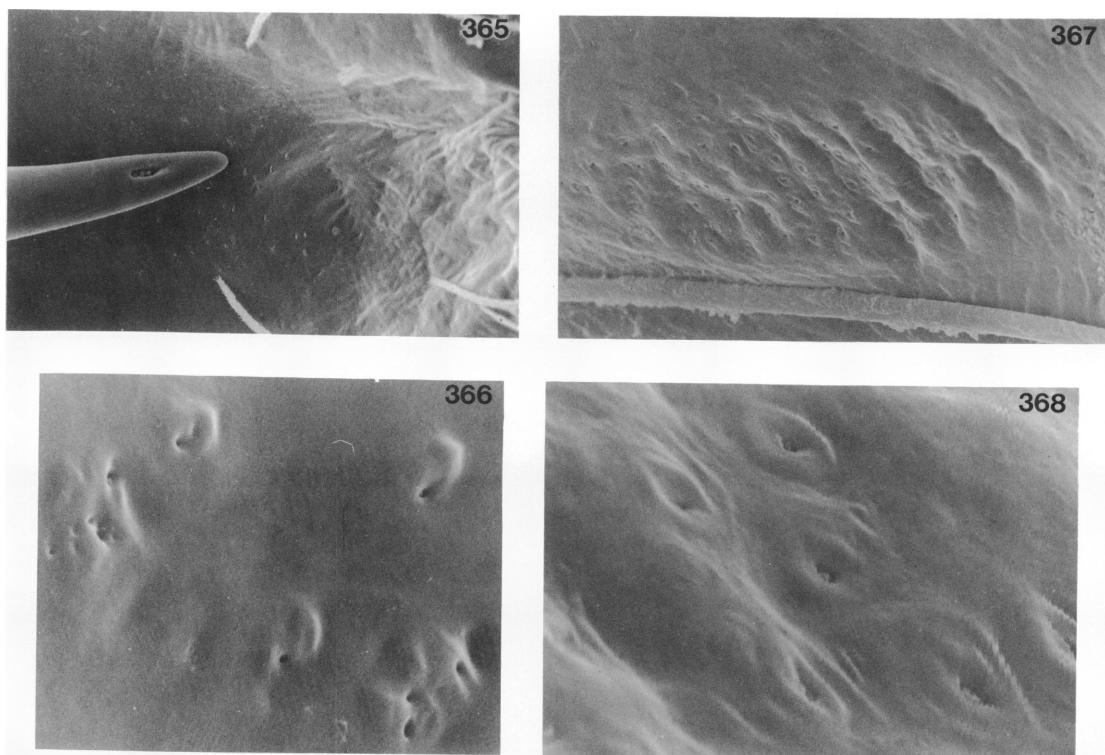
Figs. 351–355. Endite structure. 351, 352. *Hypochilus pococki*, new species, serrula. 353. *Austrochilus franckei*, new species, serrula. 354. *Kaiya terama*, new species, maxillary sieve plate. 355. *Hickmania troglodytes* (Higgins and Petterd), section through maxillary gland, showing the multicellular structure.



Figs. 356–364. Cheliceral teeth and retrolateral denticles. 356. *Ixamatus* sp., Nemesiidae. 357. *Mastertia* sp., Dipluridae. 358, 359. *Pianoa isolata*, new species. 360, 361. *Austrochilus franckei*, new species. 362. *Hickmania troglodytes* (Higgins and Petterd). 363. *Gradungula sorenseni* Forster. 364. *Hypochilus pococki*, new species.

consists of a single row of teeth in the Gradungulidae and Austrochilidae (fig. 353), in contrast to the presumed plesiomorphic mul-

titoothed form characteristic of the Hypochilidae (figs. 351, 352). The maxillary glands open from a circular sieve plate similar to



Figs. 365–368. Cheliceral glands. 365, 366. *Hypochilus pococki*, new species. 367, 368. *Gradungula sorenseni* Forster.

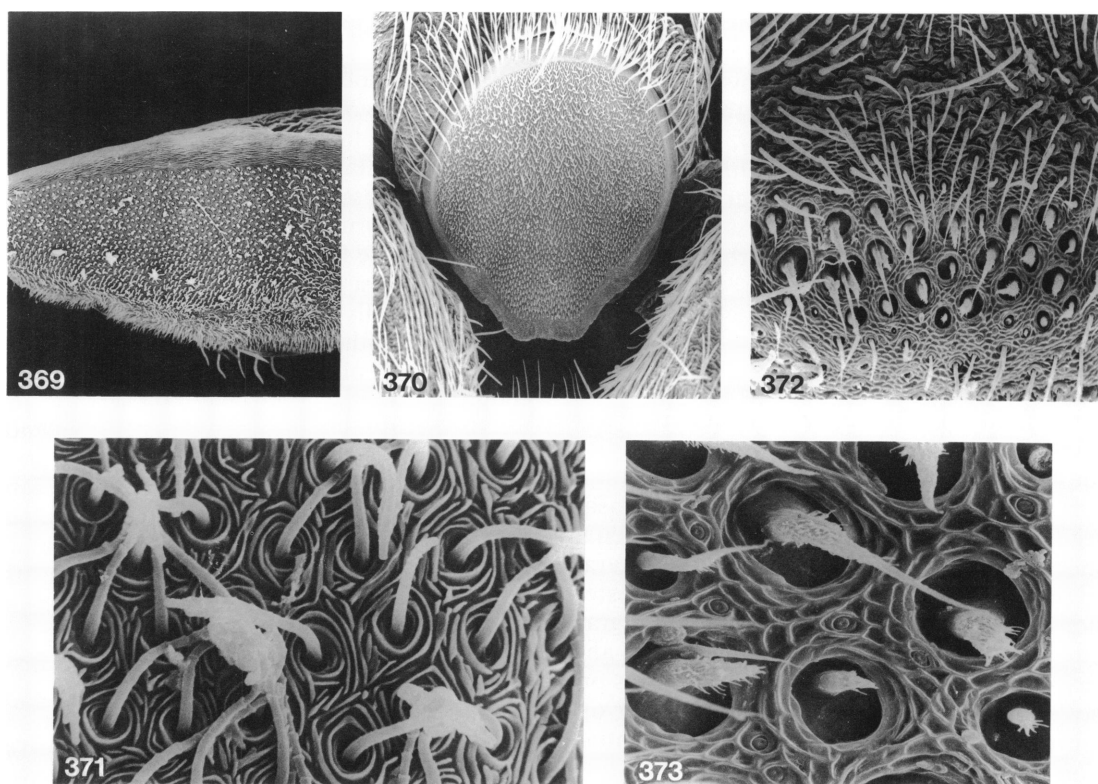
that found in other araneomorphs (fig. 354) rather than from the single row of pores characteristic of orthognaths. The glands are multicellular (fig. 355) in all genera examined by Marples (1968).

CHELICERAE

The cheliceral dentition is strikingly similar in all three families, repeats the general mygalomorph pattern, and may therefore represent the plesiomorphic configuration for spiders as a whole. The true teeth are generally restricted to a single row on the cheliceral promargin but in addition there is also a group of small denticles situated proximally on the retromargin. In the Hypochilidae, however, both genera depart slightly from this basic pattern and there are a few true teeth distally on the retromargin as well as a number of small teeth, rather than denticles, proximally on the retromargin (fig. 364). These proximal teeth are fewer and distinctly larger than the denticles present in the other

families but are nevertheless probably homologous. Within the gradungulids, there is also a tendency toward reduction in the number of denticles and their restriction to a row rather than group. In *Macrogradungula*, there are from four to six small teeth, too large to be termed denticles, along the proximal two-thirds of the retromargin. Unlike the hypochilids, however, the distal teeth are not present. Dentition similar to the typical “hypochiloid” pattern is also found in some mygalomorph families (e.g., Nemesiidae and Dipluridae, figs. 356, 357), where the denticles are usually present in a single row restricted to the proximal extremity of the furrow. In the Liphistiidae the teeth are restricted to the promargin and (if the “hypochiloid” dentition is to be considered primitive) have been lost from the retromargin.

The cheliceral gland pores are scattered over a flattened or slightly depressed region below the tip of the fang in much the same manner as in most spiders, including all mygalos-



Figs. 369–373. Abdominal structures. 369. *Austrochilus franckei*, new species, portion of cribellum. 370. *Hypochilus pococki*, new species, cribellum. 371. *Hickmania troglodytes* (Higgins and Petterd), spigots on cribellum. 372, 373. *H. pococki*, new species, structural detail of anal flap; note the modified setae and the small pores on the integument between the setae.

morphs and liphistiids. The poison gland in the two hypochilid genera is endocheliceral, as in *Liphistius* and mygalomorphs, but in both the Gradungulidae and Austrochilidae the gland is very large and extends back into the prosoma to pass over the brain to the level of the sucking stomach before bending down to run back to the level of the pharynx (Forster, 1955; Marples, 1968).

The lateral boss is not present in any of the families and stridulatory ridges are found only in the Austrochilidae and Gradungulidae. The ridges are situated on the outer face of the chelicerae and, as in the Mecysmaucheniidae, come into contact with bristles arising from small tubercles on the prolateral surface of the palpal femur. This region of the chelicerae is modified in female *Austrochilus* and *Thaida*, where the ridges are not strongly defined and the surface is pierced by a number of

pores, suggesting that in these genera a secondary function—perhaps pheromonal—has developed.

CRIBELLUM AND CALAMISTRUM

The cribellum is entire in all three families. The spigots are typical, being strobiliiform and arising from a shallow pit (fig. 371). The integument is always concentrically ridged, a feature surprisingly constant throughout the cribellate families. The only significant deviation recorded so far for any cribellate is in the Filistatidae, where the spigots are short and clubbed (Forster and Gray, 1979) and (in contrast to the “hypochiloids”) the spigot fields are also divided. The cribellar field is narrow in both the Gradungulidae and Austrochilidae (figs. 302, 369) but tends to be deeper in the Hypochilidae and almost circular in *Hypochilus* (fig. 370).

The bristles of the calamistrum are also structurally similar in each family but, whereas the hypochilids have two rows of bristles, there is only a single row in the other two families (both conditions occur, of course, in other araneomorphs). The calamistrum is situated near the base of the fourth metatarsi in the Hypochilidae but is closer to the middle of the segment in the Austrochilidae and cribellate Gradungulidae.

SPINNERETS

Six functional spinnerets are present in all three families. The anterior lateral pair are thick, three-segmented, and widely spaced in the cribellate species (but tend to become subcontiguous in ecribellate taxa). The basal segment is stout and the two distal segments short. Both the median and posterior lateral spinnerets are single-segmented. The posterior laterals are relatively long in some gradungulids but are more slender than the anterior laterals. The spigots are numerous on both pairs of lateral spinnerets but fewer on the median pair. There is some differentiation in the form of spigots but no investigations of the types of gland associated with the spigots, or of differences in their function, have yet been carried out.

ANAL TUBERCLE

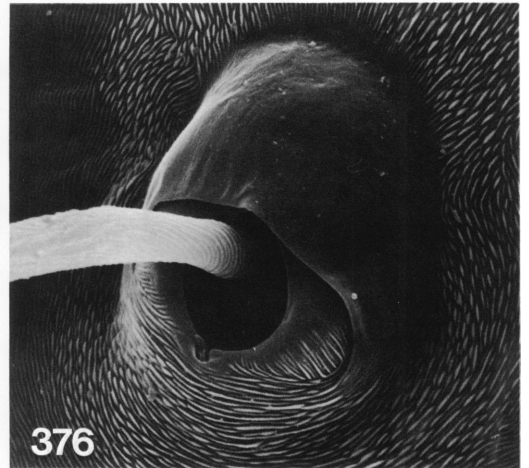
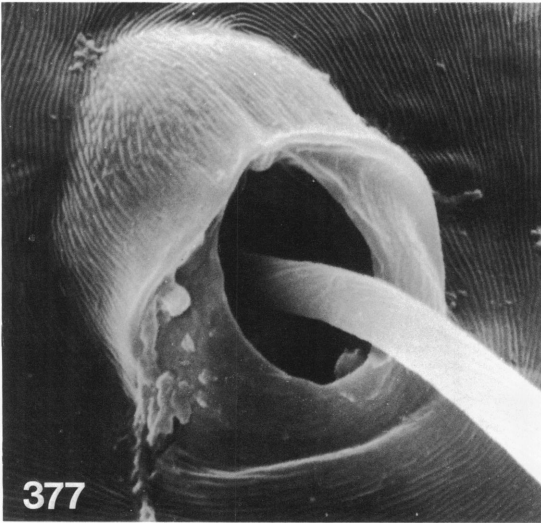
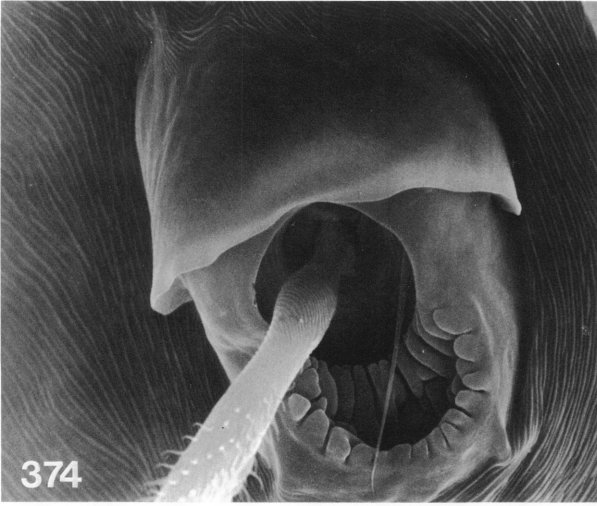
Marples (1968) examined the internal structure of the anal tubercle of representatives of each of the three families. He found a simple blood cavity, apparently serving no special function, in the Gradungulidae and Austrochilidae. In both *Hypochilus* and *Ectatosticta*, however, the anal tubercle contains a series of large, cylindrical or pear-shaped multicellular glands, which in *Hypochilus* open from 16 hollow setae arranged in two rows above the anus. Surface examination of the anal tubercle of *Hypochilus* shows a much larger number of specialized hairs, each rising from a shallow cup, which could be the hairs referred to by Marples (although we failed to find any openings through which a secretion could be discharged, figs. 372, 373). There are, however, a number of small pits scattered over the cuticle among the hairs, and these could be pores associated with the glands recorded by Marples.

LEGS

The basic spination of the legs appears to involve all segments from the tibiae to, and including, the tarsi. The first segment to lose spines is the tarsus. Tarsal spines are very strongly represented in the Gradungulidae, where they form part of the unusual modifications of the first two pairs of legs, but are completely absent from the Hypochilidae and only marginally present in *Hickmania*. The spination of other segments is maintained in all genera except *Hypochilus*, which lacks true spines.

Trichobothria are restricted to the tibia and metatarsus. In all families the trichobothria have in common a smooth posterior hood on the bothrium, but the anterior lip is modified in two of the families. In the Austrochilidae the distal margin is distinctly notched on its median surface (figs. 375, 376), whereas in the Gradungulidae this region is even more conspicuously modified and bears a transverse plate consisting of a number of irregularly raised plates (fig. 374). A modification somewhat similar to the notched margin of the austrochilid bothrium is found in the haplogyne family Leptonetidae (where a much narrower slit occurs along the midline) but the extraordinary development in the Gradungulidae appears to be unique. Interestingly, these modifications do not appear on the first (i.e., the most proximal) tibial trichobothrium. The general distribution of the trichobothria involves a double row on the tibiae and a single subdistal trichobothrium on each metatarsus. In *Ectatosticta*, however, there is a double row on the metatarsi as well.

All these spiders are three-clawed. The superior claws bear a single ventral row of teeth and the inferior claw has at most a single tooth. Only in the gradungulids is there any deviation from this pattern. In that family, the tarsal structure of the first two pairs of legs, including the claws, undergoes considerable modification after the second molt (figs. 185–189). In association with the swelling of the tarsal segments and the appearance of numerous strong spines on its ventral surface, the superior claws become dissimilar through the disproportionate development of the proclaw. The inferior claw is also modified by the appearance of a plate bearing a short,



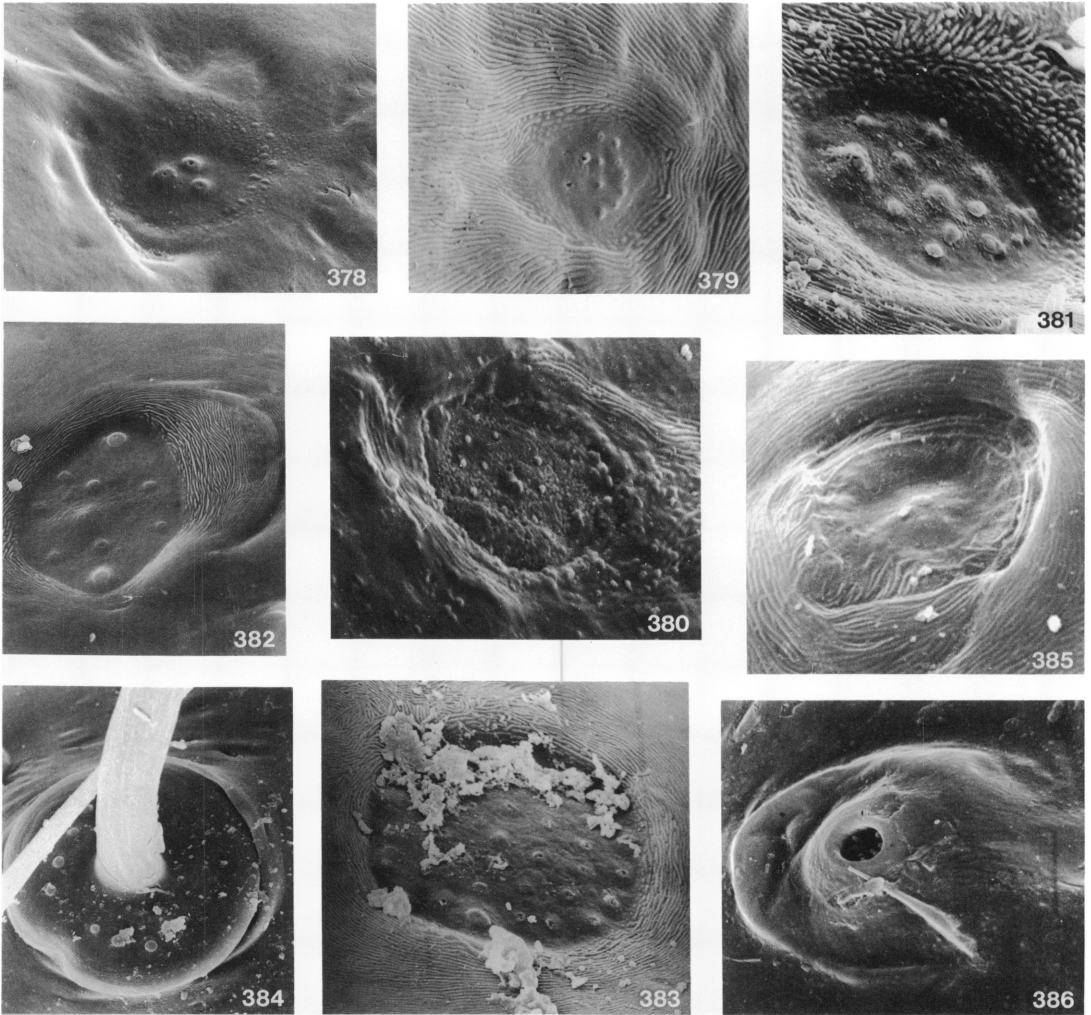
Figs. 374–377. Third tibial trichobothria. 374. *Pianoa isolata*, new species; note the crenulate distal margin. 375. *Austrochilus franckei*, new species; note the notched distal margin. 376. *Hickmania troglodytes* (Higgins and Petterd); note the notched distal margin. 377. *Hypochilus pococki*, new species; note the entire distal margin.

addressed, smooth claw. Similar modifications are found in at least three other disparate groups: the araneid genus *Celaenia* and the tetragnathid genus *Doryonychus* (see Forster and Gray, 1979), and the thomisid genus *Heterogriffus* (see Platnick, 1976).

TARSAL ORGAN

The pit tarsal organ is a shallow, saucer-shaped depression situated near the disto-

dorsal extremity of the tarsi of each leg and pedipalp. A number of low tubercles on the floor of the pit mark the receptor nodes where the nerve bundles terminate. The pit tarsal organ is found in all three families (figs. 379–383, 385), and outgroup comparison with the Amblypygi (fig. 378), which have similar tarsal organs, suggests that this form of tarsal organ is plesiomorphic for spiders as a whole. However, this hypothesis faces the difficulty that the liphistiids and some mygalomorphs



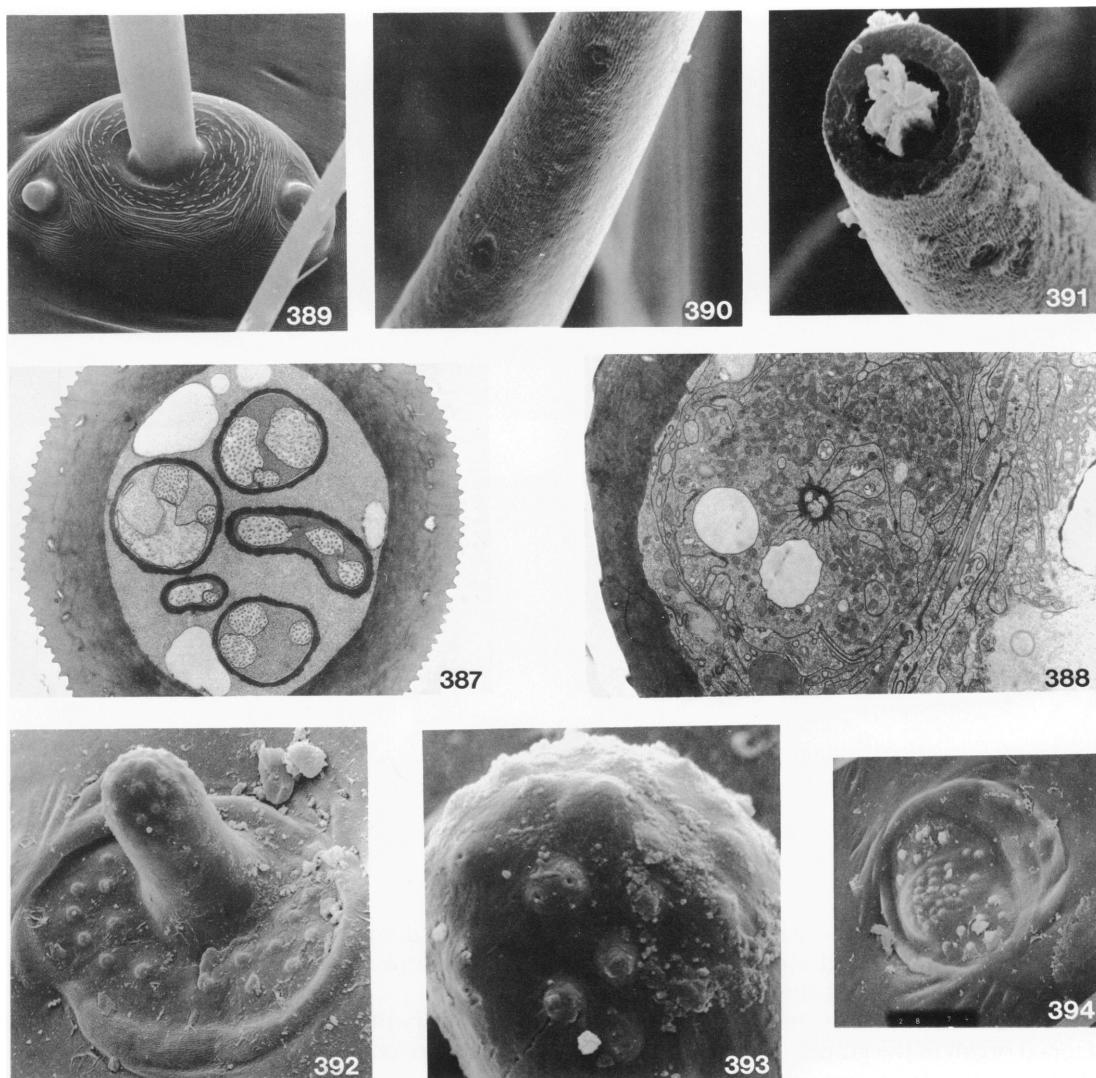
Figs. 378–386. Tarsal organs. 378. *Charon* sp.; Charontidae, order Amblypygi. 379. *Austrochilus franckei*, new species. 380. *Hickmania troglodytes* (Higgins and Petterd). 381. *Spelungula cavernicola*, new species. 382. *Pianoa isolata*, new species. 383. *Pianoa* sp. from Teal Valley, New Zealand. 384. *Kaiya terama*, new species. 385. *Hypochilus pococki*, new species. 386. *Filistata hibernalis* Hentz, Filistatidae.

possess an entirely different, smooth, lobulate organ instead. The wide range of exposed forms of tarsal organ now known for other haplogyne families provides no direct clues useful in developing a plausible transformation series linking the pit and lobulate forms.

Luckily, the diversity of structural forms now known within the Gradungulidae—an unequivocally monophyletic family—allows us to argue that the pit organ is indeed the plesiomorphic form for spiders. The series of forms found within the gradungulids pro-

vides not only a direct link with the liphistiid type of lobulate organ, but also with some of the other more strikingly spiniform forms which have been recorded recently (Forster and Platnick, 1984, 1985) in such families as the Mecysmaucheniidae and Orsolobidae.

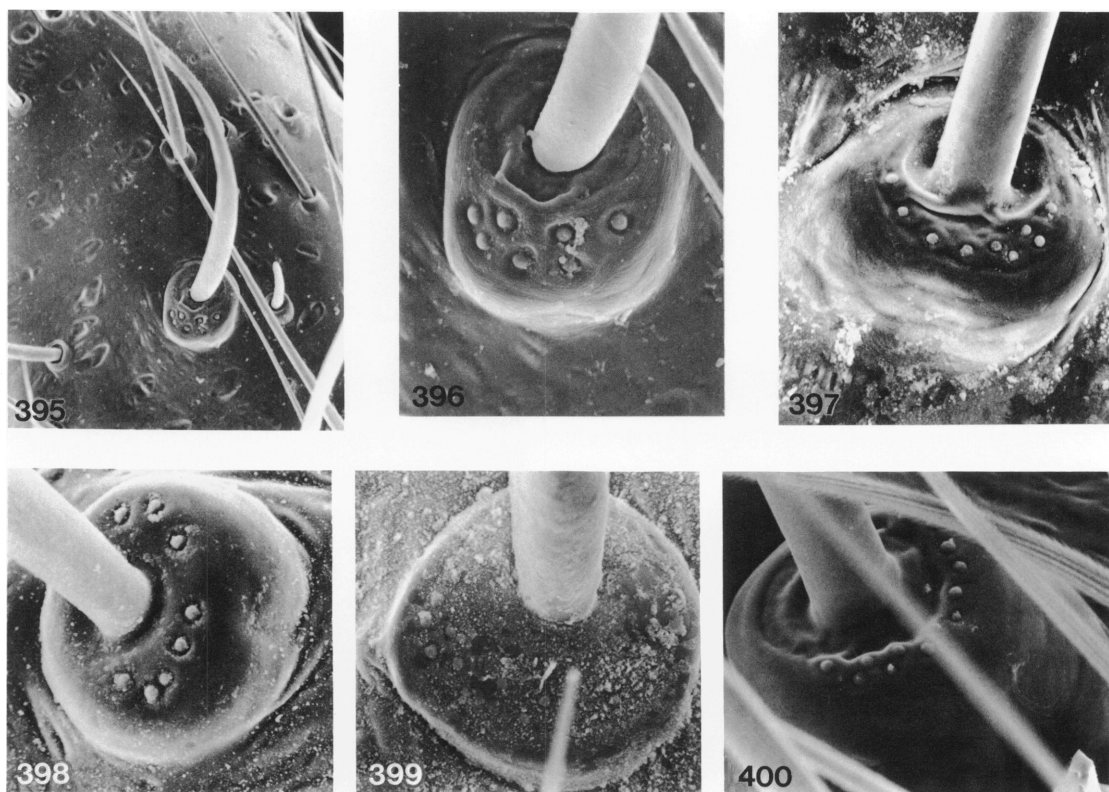
Four genera of the Gradungulidae do have typical pit organs but the tarsal organs of the remaining genera are considerably modified. The four species of the Australian genus *Kaiya* show an interesting sequence of developments leading first from the typical pit organ



Figs. 387–394. Tarsal organs. 387–391. *Gradungula sorenseni* Forster. 387. Section of median spine, showing five nerve bundles, each consisting of three neurons enclosed in a sclerotic sheath (transmission electron micrograph by R. Foelix). 388. Section of lateral receptor mound, showing single nerve bundle (transmission electron micrograph by R. Foelix). 389. Base of organ. 390. Portion of median spine, showing two receptor nodes. 391. Broken spine, showing five sclerotic sheaths. 392, 393. *Kaiya brindabella* (Moran); note the strongly raised median mound. 394. *K. bemboka*, new species; note the slightly raised region on the floor.

of *K. parnabyi* to a slightly modified organ in *K. bemboka* (fig. 394), where a portion of the floor is raised to form a low mound carrying some of the receptor nodes. This leads on to the strongly developed lobe found in *K. brindabella* (figs. 392, 393), a structure remarkably similar to the peculiar mound organ characteristic of the liphistiids and also

present in some mygalomorphs (such as the nemesiid genera *Ixamatus* and *Xamiatus* and the microstigmatid genera *Ministigmata* and *Microstigmata*; see Raven, 1980, and Raven and Platnick, 1981) where, however, the full width of the organ is usually raised. The fourth species in this genus (*K. terama*) has a much more slender spine rising from a basal, sau-



Figs. 395–400. Tarsal organs of *Tarlina*. 395, 396. *T. smithersi*, new species. 397. *T. noorundi*, new species. 398. *T. daviesae*, new species. 399. *T. woodwardi* (Forster). 400. *T. milledgei*, new species.

cer-shaped depression, with the receptor nodes irregularly spaced along the length of the spine (fig. 384). This development seems to represent the most strongly derived form of tarsal organ in the gradungulids, as the only other modifications present involve only the elevation of the depressed region of the original pit organ above the surface of the tarsus to form a mound from which the sensory spine rises. A remarkably similar development is found in two disparate families of haplogyne spiders, the Mecysmauchenidae and Orsolobidae, in which no pit tarsal organs or close derivatives are known.

Both genera of the Hypochilidae have fairly typical pit tarsal organs (figs. 18, 385) but the number of receptor nodes appears reduced to between four and six. In *Hypochilus*, the central portion of the floor is slightly raised and the receptor nodes are grouped inside this region, so that the organ appears very similar to that found in many dysderids, and not

strikingly different from the marginally ridged forms commonly found in many mygalomorphs.

The only other spider family which might be said to possess a pit tarsal organ is the Filistatidae (fig. 386) where, however, the pit (if it is in fact homologous) is greatly reduced in width, so that it appears as a small cup sunk in the distal surface of a low mound. Between 10 and 12 distinct receptor nodes rise from the floor of the cup to just below the lip.

INTERNAL ANATOMY

Marples (1968) reviewed, and in some instances corrected, the few references about the internal morphology published prior to the appearance of his paper, and added much new information covering all three families. His findings are summarized here.

Coxal Glands: The coxal glands open from

a single pore at the base of the first pair of coxae, as in other araneomorphs; the second opening at the base of the third pair of coxae characteristic of liphistiids and most mygalomorphs is lacking. Marples found that the coxal glands of *Hickmania* and *Austrochilus* are similar to those of *Gradungula* (Forster, 1955) but disagreed with Petrunkevitch (1933) and Millot (1933) regarding the form of the organ in *Hypochilus* and *Ectatosticta*. Marples pointed out that in the three genera he examined (now placed in the families Austrochilidae and Gradungulidae), the duct from the endsac is U-shaped. Marples found that the glands of both *Ectatosticta* and *Hypochilus* resembled each other and were quite distinct from those of the other genera. Their duct was not a simple U-shape but long and convoluted, and there were other striking differences which separate these two genera not only from the other two families but also from the other araneomorphs.

Nervous System: Marples confirmed that the number of ganglia united in the subesophageal nerve mass was 12 pairs, as in all spiders except for the liphistiids (which have 17 pairs).

Endosternite: Although the endosternites of the Gradungulidae and Austrochilidae were found to be of the normal araneomorph form, in that they have dorsolateral and ventrolateral processes, the muscles do not extend to the cuticle and so no sigilla are present. However, as might be expected by the presence of sigilla on the sternum and labium, the endosternite of *Ectatosticta* is similar to that of mygalomorphs in that the ventrolateral processes are attached to the sternum and the anteroventral rods are attached to the labium. In *Hypochilus*, the sternal sigilla are not present and the ventrolateral processes do not extend to the sternum; however, the anteroventral rods are present and, as in *Ectatosticta*, extend to the base of the labium, where distinct sigilla are visible on the posterolateral corners.

Abdominal Segmentation: In all "hypochiloids" examined the heart has four pairs

of ostia and it is generally agreed that the ostia are intersegmental. There are four pairs of dorsoventral and four pairs of infracardiac ligaments which may be associated with these ostia, but in *Ectatosticta* the second dorsoventral muscle is missing and in *Gradungula* both the second and third are missing. No further examination of other genera of the Gradungulidae has been made to see if this is characteristic for the family. In *Hickmania*, *Austrochilus*, and *Hypochilus* the normal four sets of muscles are present.

Alimentary Canal: Marples found that the muscles of the stomodaeum are normal (i.e., similar to those of other araneomorphs) in *Hickmania*, *Austrochilus*, and *Gradungula*, but that the positioning of the muscles in both *Hypochilus* and *Ectatosticta* was strikingly different and resembled the arrangement he found in the liphistiid genus *Heptathela*. The thoracenteron does differ considerably within araneomorphs, but Marples found little to comment on in the organization of *Hickmania*, *Austrochilus*, and *Gradungula*, all of which had a typical "classical" system where the main pair of diverticulae extend forward, giving off four lateral diverticulae extending to the bases of the four pairs of legs. In his examination of *Hypochilus*, however, Marples found that, as Millot (1933) had earlier described for *Ectatosticta*, the thoracenteron was extraordinarily complex, with the diverticulae penetrating to the ventral surface and sending branches into the base of the chelicerae and the rostrum. Millot (1933) pointed out that only in the liphistiids did the diverticulae extend into the chelicerae and noted that an extension into the rostrum was only known elsewhere in the Dinopidae. Marples also recorded that in all the "hypochiloids" he examined, the abdominal intestine was clearly defined throughout its length and (again in contrast to the normal araneomorph form) was M-shaped rather than straight. Both of these characteristics are also found in the orthognath spiders.

CLADISTICS

Platnick (1977) presented the first cladistic analysis of the primitive araneomorphs, and

used 12 characters to defend a cladogram (his fig. 7) in which *Hypochilus* and *Ectatosticta*

were shown as sister groups and constituted the sister group of all other araneomorphs, within which first *Hickmania*, then *Gradungula*, and finally *Thaïda* branched off independently. This cladogram was exactly reflected in a strictly subordinated classification (Platnick, 1977, p. 21).

Eight of the 12 characters used by Platnick concerned the fundamental dichotomy within the Araneomorphae, and can be reviewed quickly. Character 1 referred to the extension of the thoracentric midgut diverticulae into the cheliceral paturon, known only in *Liphistius*, *Hypochilus*, and *Ectatosticta* (Millot in Bristowe, 1933; Marples, 1968). Such extensions are lacking in the Amblypygi and therefore seem apomorphic; to argue otherwise requires three reversals (within the Liphistiidae, Mygalomorphae, and Araneomorphae other than Hypochilidae) rather than just parallel acquisitions in *Liphistius* and the Hypochilidae.

Character 2 referred to the presence in *Hypochilus* and *Ectatosticta*, but not the other genera, of distinct concavities on the median surface of the chelicerae. Subsequently, Raven (1985) described similar, though less pronounced, areas in some mygalomorphs that he termed the intercheliceral tumescence. The distribution of this feature does not indicate that it is plesiomorphic for mygalomorphs, but even if it were, and even if the concavities of hypochilids are homologous with it, only the polarity within araneomorphs would shift, and the character distribution would then argue for the monophyly of the microorder Neocribellatae Caporiacco (containing all araneomorphs other than the Hypochilidae) rather than the microorder Palaeocribellatae Caporiacco (containing only the Hypochilidae).

Character 3 concerned differences in serrula morphology between the Palaeocribellatae and Neocribellatae. In the latter group the serrula teeth are arranged in a single row, a pattern paralleled elsewhere only in the mygalomorph subfamily Masteriinae (Dipluridae). In the Hypochilidae, the serrula consists of a plate bearing several parallel rows of teeth. Both states were considered independent apomorphic acquisitions by Platnick (1977). It could be argued that the hypochilid

structure is homologous with that found in some mygalomorphs and, to a lesser extent, liphistiids, and is therefore plesiomorphic. Raven's (1985) studies do not indicate that the serrula can parsimoniously be regarded as plesiomorphically present in mygalomorphs. As in the last character, even if that were the case, the monophyly of at least the Neocribellatae would still be supported by the character.

Character 4 referred to the dorsal dilator muscles of the pharynx, which originate on an apodeme of the rostrum in the Hypochilidae, the liphistiid genus *Heptathela*, and the Amblypygi, but on the carapace in other araneomorphs (including the Austrochilidae and Gradungulidae) and mygalomorphs. In the absence of data on *Liphistius*, the polarity of this character is still unknown, and it merely supports the monophyly of either the Palaeocribellatae or Neocribellatae.

Characters 5 through 8 referred to relatively unequivocal synapomorphies of the Neocribellatae that were discussed in the previous section and by Platnick (1977): endocephalic venom glands, loss of ventral endosternite extensions and their associated sigilla, unconvoluted coxal glands with a single outlet, and loss of the fifth ventral abdominal endosternitic invagination. We conclude that, although the polarity of some features remains indeterminate or under possible dispute, available data argue decisively that the fundamental dichotomy within the Araneomorphae is between a group (Palaeocribellatae) including only the genera *Hypochilus* and *Ectatosticta* and a group (Neocribellatae) including all other araneomorphs.

Three other inclusive groups were delimited in Platnick's cladogram: the Bispermathecae (including all Neocribellatae except *Hickmania*), the Tracheospira (including all Bispermathecae except *Gradungula*, the only gradungulid genus then known), and the Araneoclada (including all Tracheospira except *Thaïda*, the only austrochiline genus then recognized). Each of these inclusive groups was based on far less evidence than the initial dichotomy—only one character in the case of the Bispermathecae and Tracheospira, and two in the case of the Araneoclada.

We have no evidence disputing the mono-

phyly of the Araneoclada (i.e., all araneomorphs other than the "hypochiloids") or the accuracy of the two characters used by Platnick (1977) to support that group: a straight (rather than M-shaped) intestine, and loss of all but two or three pairs of heart ostia. However, the single features that were used to support the Bispermathecae and Tracheospira, respectively, require further discussion.

Platnick (1977) followed an argument by Gertsch (presented in Platnick and Gertsch, 1976) that the presence of two pairs of spermathecae is plesiomorphic for spiders. The presence of such a female genitalic organization in some Liphistiidae, primitive Mygalomorphae (Atypidae, Antrodiaetidae, and Mecicobothriidae), and primitive Araneomorphae (Hypochilidae) made this a reasonable hypothesis. Over the last decade, however, much has been learned about the female genitalia of spiders. On the basis of character distributions alone, a strong case can be made that a multireceptaculate condition, as found in other Liphistiidae, Atypidae, Gradungulidae, and Mecysmaucheniidae, for example, is more plesiomorphic, and Forster's arguments for this view have been detailed elsewhere (Forster, 1980) and above.

If we accept the newer view, Platnick's separation of *Hickmania* from all other Neocribellatae is undefended, and the question is whether an alternative placement of that Tasmanian genus can be supported. We have found two characters that are, so far as known, uniquely shared by *Hickmania* and the two South American austrochiline genera, *Austrochilus* and *Thaida*. The first is the presence in all three genera of a wide, translucent, wrinkled extension of the posterior wall of the female bursa. The only group known to us in which an even vaguely similar structure occurs is the Archaeidae, a highly apomorphic member of the superfamily Palpimanoidea (Forster and Platnick, 1984). The second character shared by the three genera is the notch along the midline of the distal margin of all but the first tibial trichobothrial bases. As mentioned above, the only other similar condition of which we are aware is a much narrower slit in the same position on the bothria of many species of the haplogyne family Leptonetidae. That narrower notch

seems apomorphic to the leptonetids, for it has not been recorded in the Telemidae, which elsewhere have been argued to be their sister group (Platnick, 1986).

The Austrochilinae, represented in Platnick's cladogram only by *Thaida*, were placed by him as the sister group of the non-"hypochiloid" araneomorphs (the Araneoclada). This was based on only one feature—the transformation of the posterior booklungs into tracheae. The respiratory modifications of austrochilines were discussed in detail above; their tripartite nature lends credence to the view, required in order to accept the hickmaniine-austrochiline relationship just documented, that the "tracheae" of austrochilines represent an independent reduction from the original booklungs, and share no special homology with the tracheae of non-"hypochiloid" araneomorphs.

At this point, then, three lineages of Neocribellatae can be recognized: the Austrochilidae (Austrochilinae plus Hickmaniinae), the Gradungulidae, and the Araneoclada, and the question revolves around which two of these lineages are sister groups. We have found one feature that seems to be unique to the Austrochilidae and Gradungulidae: the anterior extension of the clypeus, along the midline, into a triangular hood that projects over the chelicerae. As mentioned above, the only similar structure known to us occurs in some members of the palpimanoid family Mecysmaucheniidae, where it is more dorsally situated and hence unlikely to be homologous.

It appears, therefore, that all of the austral "hypochiloids" form a monophyletic group (the superfamily Austrochiloidea), with the gradungulids of Australia and New Zealand representing the sister group of the austrochilids of Tasmania and southern South America, and that the Austrochiloidea represent the sister group of all araneomorphs other than the Hypochilidae (i.e., the Araneoclada). If this hypothesis is correct, we must acknowledge the possibility that the distinctively crenulate distal margins of all but the first tibial trichobothria of gradungulids are homologous to, and a further development of, the notched distal margins characteristic of hickmaniines and austrochilines. If so, the notched trichobothria would define

the larger group (Austrochiloidea) rather than just the Austrochilidae, and only one synapomorphy (the development of the posterior wall of the female bursa) would remain to define that family. The female genitalic character is so striking, however, that we would not hesitate to base a grouping on it alone, if necessary.

We present below a formal classification reflecting these hypotheses, and those of Raven (1985). The names provided by Platnick (1977) for higher taxa within the Neocribellatae no longer appear accurate; as they were

purposefully placed above the rank of superfamily, they can now be discarded without nomenclatural consequences. His name *Araneoclada*, however, does appear still to usefully describe a monophyletic group, and is here raised to the rank of gigapicoorder. In order to retain a strictly subordinated classification without creating a corresponding gigapicoordinal name that would necessarily be redundant with the superfamily Austrochiloidea, we use that name at both ranks (one free of, and one constrained by, nomenclatural regulations).

PROPOSED CLASSIFICATION

- Order Araneae Clerck, 1758
 - Suborder Mesothelae Pocock, 1892
 - Family Liphistiidae Thorell, 1869
 - Suborder Opisthothelae Pocock, 1892
 - Infraorder Mygalomorphae Pocock, 1892
 - Microorder Fornicephalae Raven, 1985
 - Gigapicoorder Atypoidina Raven, 1985
 - Family Atypidae Thorell, 1870
 - Family Antrodiaetidae Gertsch, 1940
 - Gigapicoorder Rastelloidina Raven, 1985
 - [other families; see Raven, 1985]
 - Microorder Tuberculotae Raven, 1985
 - Gigapicoorder Mecicobothrioidina Raven, 1985
 - Family Mecicobothriidae Holmberg, 1882
 - Family Microstigmatidae Roewer, 1942
 - Gigapicoorder Orthopalpae Raven, 1985
 - [other families; see Raven, 1985]
 - Infraorder Araneomorphae Smith, 1902
 - Microorder Palaeocribellatae Caporiacco, 1938
 - Family Hypochilidae Marx, 1888
 - Microorder Neocribellatae Caporiacco, 1938
 - Gigapicoorder [and superfamily] Austrochiloidea Zapfe, 1955
 - Family Austrochilidae Zapfe, 1955
 - Family Gradungulidae Forster, 1955
 - Gigapicoorder Araneoclada Platnick, 1977, new rank
 - [other families]

LITERATURE CITED

- Brignoli, Paolo M.
 - 1983. A catalogue of the Araneae described between 1940 and 1981. Manchester: Manchester Univ. Press, 755 pp.
- Bristowe, William S.
 - 1933. The liphistiid spiders. With an appendix on their internal anatomy by J. Millot. Proc. Zool. Soc. London, 1932, pp. 1015-1057, figs. 1-11, pls. 1-6.
- Comstock, John Henry
 - 1912. The spider book. New York: Doubleday, 721 pp., 770 figs.

- Davies, Valerie Todd
1969. The mature female and male *Gradungula woodwardi* Forster (Araneae: Hypochilomorphae: Gradungulidae). Jour. Australian Ent. Soc., vol. 8, pp. 95–97, figs. 1–14.
- Forster, Raymond R.
1955. A new family of spiders of the sub-order Hypochilomorphae. Pacific Sci., vol. 9, pp. 277–285, figs. 1, 2.
1980. Evolution of the tarsal organ, the respiratory system and the female genitalia in spiders. In J. Gruber (ed.), Verhandlungen der 8. Internationaler Arachnologen-Kongress. Vienna: Verlag H. Engermann, pp. 269–284, figs. 1–23.
- Forster, Raymond R., and Michael R. Gray
1979. *Progradungula*, a new cribellate genus of the spider family Gradungulidae (Araneae). Australian Jour. Zool., vol. 27, pp. 1051–1071, figs. 1–65.
- Forster, Raymond R., and Norman I. Platnick
1984. A review of the archaeid spiders and their relatives, with notes on the limits of the superfamily Palpimanoidea (Arachnida, Araneae). Bull. Amer. Mus. Nat. Hist., vol. 178, pp. 1–106, figs. 1–394.
1985. A review of the austral spider family Orsolobidae (Arachnida, Araneae), with notes on the superfamily Dysderoidea. Ibid., vol. 181, pp. 1–230, figs. 1–889.
- Gertsch, Willis J.
1958. The spider family Hypochilidae. Amer. Mus. Novitates, no. 1912, pp. 1–28, figs. 1–50.
1964. A review of the genus *Hypochilus* and a description of a new species from Colorado (Araneae, Hypochilidae). Ibid., no. 2203, pp. 1–14, figs. 1–11.
- Gray, Michael R.
1983. The male of *Progradungula carraiensis* Forster and Gray (Araneae, Gradungulidae) with observations on the web and prey capture. Proc. Linnean Soc. New South Wales, vol. 107, pp. 51–58, figs. 1–15.
- Hickman, Vernon V.
1928. Studies in Tasmanian spiders. Part II. Pap. Proc. Roy. Soc. Tasmania, 1927, pp. 158–175, figs. 1–8.
1967. Some common spiders of Tasmania. Hobart: Tasmanian Mus. Art Gallery, 112 pp., 182 figs., 18 pls.
- Higgins, Edmund T., and William F. Petterd
1883. Description of a new cave-inhabiting spider, together with notes on mam-
malian remains from a recently discovered cave in the Chudleigh district. Pap. Proc. Roy. Soc. Tasmania, pp. 191–192.
- Hoffman, Richard L.
1963. A second species of the spider genus *Hypochilus* from eastern North America. Amer. Mus. Novitates, no. 2148, pp. 1–8, figs. 1–8.
- Homann, Heinrich
1971. Die Augen der Araneae: Anatomie, Ontogenese und Bedeutung für die Systematik (Chelicerata, Arachnida). Zeits. Morphol. Tiere, vol. 69, pp. 201–272, figs. 1–35.
- Karsch, Ferdinand
1880. Arachnologische Blätter (Decas I). Zeits. Ges. Naturwiss., vol. 53, pp. 373–409, figs. 1–18.
- Lehtinen, Pekka T.
1967. Classification of the cribellate spiders and some allied families. Ann. Zool. Fennici, vol. 4, pp. 199–468, figs. 1–524, tables 1–52.
1985. Thaididae Jousseaume, 1888 (Mollusca, Gastropoda) and Thaididae Lehtinen, 1967 (Arachnida, Araneae): proposals to remove the homonymy. Bull. Zool. Nomenclature, vol. 42, pp. 389–390.
- Marples, B. J.
1968. The hypochilomorph spiders. Proc. Linn. Soc. London, vol. 179, pp. 11–31, figs. 1–7.
- Marx, George
1888. On a new and interesting spider. Ent. Amer., vol. 4, pp. 160–162, figs. 1–13.
1889. On a new and interesting spider from the United States. Proc. Washington Ent. Soc., vol. 1, pp. 166–167.
- Millot, Jacques
1933. Notes complémentaires sur l'anatomie des liphistiides et des hypochilides, a propos d'un travail récent de A. Petrunkevitch. Bull. Soc. Zool. France, vol. 58, pp. 217–235, figs. 1–9.
- Moran, Russell J.
1985. *Gradungula brindabella* (Araneae: Gradungulidae), a new species of hypochiloid spider from eastern Australia. Bull. Brit. Arachnol. Soc., vol. 6, pp. 304–308, figs. 1–7.
- Petrunkevitch, Alexander
1933. An inquiry into the natural classification of spiders, based on a study of their internal anatomy. Trans. Conn. Acad. Arts Sci., vol. 31, pp. 299–389, figs. 1–59, tables 1, 2.

- Platnick, Norman I.
 1976. Notes on the spider genus *Doliomalus* (Araneae, Gnaphosoidea). *Rev. Zool. Africaine*, vol. 90, pp. 975-983, figs. 1-11.
 1977. The hypochiloid spiders: a cladistic analysis, with notes on the Atypoidea (Arachnida, Araneae). *Amer. Mus. Novitates*, no. 2627, pp. 1-23, figs. 1-31.
 1986. On the tibial and patellar glands, relationships, and American genera of the spider family Leptonetidae (Arachnida, Araneae). *Ibid.*, no. 2855, pp. 1-16, figs. 1-62.
- Platnick, Norman I., and Raymond R. Forster
 In press. Comment on the proposal to remove the homonymy between Thaididae Lehtinen, 1967 (Arachnida, Araneae) and Thaididae Jousseume, 1888 (Mollusca, Gastropoda). *Bull. Zool. Nomenclature*.
- Platnick, Norman I., and Willis J. Gertsch
 1976. The suborders of spiders: a cladistic analysis. *Amer. Mus. Novitates*, no. 2607, pp. 1-15, figs. 1-18.
- Platnick, Norman I., and Mohammad U. Shadab
 1975. A revision of the spider genus *Gnaphosa* (Araneae, Gnaphosidae) in America. *Bull. Amer. Mus. Nat. Hist.*, vol. 155, pp. 1-66, figs. 1-150, maps 1-15.
- Rainbow, William J.
 1904. Studies in Australian Araneidae. No. 3. *Rec. Australian Mus.*, vol. 5, pp. 326-336, figs. 1-3.
- Raven, Robert J.
 1980. The Australian mygalomorph spider genus *Ixamatus* Simon (Dipluridae: Diplurinae) and its affinities. *Bull. Brit. Arachnol. Soc.*, vol. 5, pp. 43-49, figs. 1-14.
 1985. The spider infraorder Mygalomorphae: cladistics and systematics. *Bull. Amer. Mus. Nat. Hist.*, vol. 182, pp. 1-180, figs. 1-259, tables 1-9.
- Raven, Robert J., and Norman I. Platnick
 1981. A revision of the American spiders of the family Microstigmatidae (Araneae, Mygalomorphae). *Amer. Mus. Novitates*, no. 2707, pp. 1-20, figs. 1-54.
- Roth, Vincent D.
 1967. A review of the South American spiders of the family Agelenidae (Arachnida, Araneae). *Bull. Amer. Mus. Nat. Hist.*, vol. 134, pp. 297-346, pls. 50-53.
- Schenkel, Ehrenfried
 1963. Ostasiatische Spinnen aus dem Muséum d'Histoire Naturelle de Paris. *Mem. Mus. Natl. Hist. Nat.*, n. s., Zool., vol. 25, pp. 1-288, figs. 1-161.
- Schiapelli, Rita D., and Berta S. Gerschman de Pikelin
 1963. Los generos chilenos *Phrixotrichus* Simon, 1889 y *Paraphysa* Simon, 1892 (Theraphosidae, Araneae) en la Argentina: nuevas citas de algunas arañas comunes a ambos paises. *Rev. Soc. Ent. Argentina*, vol. 26, pp. 103-108, figs. 1-12.
- Shear, William A.
 1969. Observations on the predatory behavior of the spider *Hypochilus gertschi* Hoffman (Hypochilidae). *Psyche*, vol. 76, pp. 407-417, figs. 1-10.
- Simon, Eugène
 1888. [without title]. *Ann. Soc. Ent. France*, ser. 6, vol. 8, pp. ccviii-ccix.
 1892. Histoire naturelle des araignées. Paris, vol. 1, pt. 1, pp. 1-256, figs. 1-215.
 1902. Descriptions de quelques arachnides nouveaux del la section des Cribellatés. *Bull. Soc. Ent. France*, vol. 15, pp. 240-243.
- Zapfe C., Hildegard
 1955. Filogenia y función en *Austrochilus manni* Gertsch y Zapfe (Araneae-Hypochilidae). *Trab. Lab. Zool. Univ. Chile*, no. 2, pp. 1-53, figs. 1-60.

Recent issues of the *Bulletin* may be purchased from the Museum. Lists of back issues of the *Bulletin*, *Novitates*, and *Anthropological Papers* published during the last five years are available free of charge. Address orders to: American Museum of Natural History Library, Department D, Central Park West at 79th St., New York, New York 10024.