

SPIDERS OF THE ORB-WEAVER GENUS *PARAWIXIA* IN AMERICA (ARANEAE: ARANEIDAE)

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ABSTRACT. *Parawixia* are Neotropical, nocturnal orb weavers related to *Acanthepeira*, *Eriophora*, *Wagneriana*, and *Wixia*. The relationship is based mainly on synapomorphic character states of male and female genitalia.

Of the 26 species of *Parawixia* found in collections, 10 are new, four are known only from males, six from females. There are 24 new synonyms of species and subspecies names. Most *Parawixia* species are found in the Amazon area primarily, and in Central America and eastern Brazil. Many species probably build webs in the canopy. The social nianduti spider (*Parawixia bistrata*), which made such an impression on Darwin, belongs to *Parawixia*.

INTRODUCTION

Among the interesting spiders found in South America by Charles Darwin, as reported in 1839 in *The Voyage of the Beagle*, was a social orb-weaver species. "... I found near St. Fé Bajada [present day Paraná] many large black spiders, with ruby-coloured marks on their backs, having gregarious habits. The webs were placed vertically, as is invariably the case with the genus *Epeira*: they were separated from each other by a space of about two feet, but were all attached to certain common lines, which were of great length, and extended to all parts of the community. In this manner the tops of some large bushes were encompassed by the united nets. Azara [F. de Azara, 1809, *Voyage dans l'Amérique méridionale*] has described a gregarious spider in Paraguay, which Walckenaer thinks must be a *Theridion*, but probably it is an *Epeira*, and perhaps even the same species with mine. I cannot, however, recollect seeing a cen-

tral nest as large as a hat, in which, during autumn, when the spiders die, Azara says the eggs are deposited. As all the spiders which I saw were of the same size, they must have been nearly of the same age. This gregarious habit, in so typical a genus as *Epeira*, among insects, which are so bloodthirsty and solitary that even the two sexes attack each other, is a very singular fact."

It is a reflection on the current status of spider studies that this spider, though named *bistrata* in 1836 by the Swiss traveler Rengger, and frequently mentioned (Buskirk, 1981), has never been illustrated before. In 1932 Mello-Leitão placed *bistrata* in *Eriophora* and was followed by the catalogers Roewer and Bonnet. Mello-Leitão did not provide illustrations and on receiving some specimens 15 years later did not recognize them and gave them a new name. Only recently Shear (1970) considered that Darwin's spider may have been a *Cyrtophora*, an orb-weaver genus with some social species. Several investigators (Fowler and Diehl, 1978; Fowler and Gobbi, 1988a,b) studied the behavior but were uncertain as to whether there are one or two species that are social. Badcock (1932) realized that a species described and illustrated previously by Tullgren from Bolivia was a social spider also found in Paraguay as reported by Carter (1928), the collector of Badcock's specimens.

This paper is part of the ongoing study of Neotropical orb weavers (Berman and Levi, 1971; Harrod, Levi, and Leiben-sperger, 1991; Levi, 1968, 1971, 1985, 1986, 1988, 1989, 1991a,b). The primary purpose of my revisions is to help determine

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species within a given genus, in this case *Parawixia*. Such determinations are needed because spider species are often of economic importance or biological interest (e.g., *Parawixia bistrata*). A secondary function is to provide information aiding in the understanding of evolutionary relationships within the genus. Sequestering this information may be easy in small families but is much more difficult in large and diverse families. Studies on the evolution of small families less diverse than the orb weavers have been published based on an understanding of a few species in the genus (Coddington, 1986).

Before a genus has been revised, it may only be known by its most common species or by the type species to which the generic name is attached. However, the type species is often the most aberrant member of the genus, and has been placed in its own genus specifically because of unusual characters that may not occur in more "average" congeners. Also, in large diverse families, the study of all species is necessary to determine generic-level characters.

To take examples, when I first worked on *Eriophora* in 1970, I assumed that *Parawixia* belonged to the same genus perhaps as a species group of *Eriophora*. Careful study of *Parawixia* showed this assumption to be erroneous because several characters were found to be apomorphies for *Parawixia* only (see below). In another study, I characterized the genus *Wixia* as lacking a long scape (Levi, unpublished key). I have since found that this absence is only true for Nearctic species; many Neotropical species (which otherwise share apomorphies with Nearctic *Wixia* and can fairly be considered congeneric) do have a long scape (Levi, in prep.). These characters were not elucidated until revisions of the genera in question had been done.

Evolutionary analyses of generic relationships cannot be made until the relevant genera themselves have been revised and the limits of the individual genera defined. Any premature analysis would have to be revised with each successive generic re-

vision. I am currently completing work on a sub-group of the family Araneidae, characterized by the presence of a palpal parame-dian apophysis and including the genera *Parawixia*, *Eriophora*, *Acanthepeira*, *Wagneriana*, *Alpaida*, *Wixia*, *Acacesia*, and *Cyclosa*. When the final members of this group, *Wixia* and *Acacesia* (both manuscripts in preparation), are revised, comparison and evolutionary analysis of this group will be possible.

METHODS AND MATERIALS

The methods used are the same ones as those used in previous papers on Neotropical orb weavers. Relative eye sizes were measured by comparing their diameter in profile with that of the anterior median eyes. The distance separating the eyes of the anterior row was measured relative to the diameter of the anterior median eyes in profile; and that the posterior row to the diameter of the posterior median eyes. A forthcoming paper on the genus *Wixia* will describe these methods in some detail.

The specimens used came from the following collections.

AMNH	American Museum of Natural History, New York, New York, United States; N. Platnick, L. Sorkin
BMNH	British Museum (Natural History), London, Great Britain; P. Hillyard, F. Wanless
CAS	California Academy of Sciences, San Francisco, California, United States; W. J. Pulawski, D. Ubick
CS	C. Sandoval, São Paulo, Brazil
CUC	Cornell University Collection, kept in the AMNH; N. Platnick
CV	C. Valderrama A., Bogotá, Colombia
FSCA	Florida State Collection of Arthropods, Gainesville, Florida, United States; G. B. Edwards
HEC	Hope Entomology Collections, Oxford University, Ox-

	ford, Great Britain; D. Spencer-Smith, I. Lansbury	MZSP	Museu de Zoologia da Universidade de São Paulo, Brazil; P. Vanzolini, L. Neme, J. L. M. Leme
IBNP	Inventario Biológico Nacional, San Lorenzo, Paraguay; J. A. Kochalka	MZUF	Museo Zoologico de "La Specola," Università, Florence, Italy; S. Mascherini
IMPR	I. M. P. Rinaldi, Botucatu, São Paulo, Brazil	MHMW	Naturhistorisches Museum, Vienna, Austria; J. Gruber
INPA	Instituto Nacional de Pesquisas da Amazonia, Manaus, Amazonas, Brazil; J. A. Raphael	NRMS	Naturhistoriska Riksmuseet, Stockholm, Sweden; T. Kronstedt
IRSNB	Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium; L. Baert	PAN	Polska Akademia Nauk, Warszawa, Poland; A. Riedel, W. Starega, J. Proczynski, A. Slojewska, E. Kierych
MACN	Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina; E. A. Maury	RLCB	R. L. C. Baptista, São Paulo, Brazil
MCN	Museu de Ciências Naturais, Porto Alegre, Rio Grande do Sul, Brazil; E. H. Buckup	SMF	Forschungsinstitut Senckenberg, Frankfurt am Main, Germany; M. Grasshoff
MCZ	Museum of Comparative Zoology, Cambridge, Massachusetts, United States	USNM	National Museum of Natural History, Smithsonian Institution, Washington, D. C., United States; J. Coddington
MECN	Museo Ecuatoriano de Ciencias Naturales, Quito, Ecuador; L. Avilés	ZMK	Zoologisk Museum, København, Denmark; H. Enghoff
MEG	M. E. Galiano, Buenos Aires, Argentina		
MHNM	Museo de Historia Natural de Montevideo, Uruguay; R. M. Capocasale		
MHNMC	Museo de Historia Natural, Medellín, Colombia; M. A. Serna D.		
MLP	Museo de Universidad Nacional, La Plata, Argentina; R. F. Arrozpide		
MNHC	Museu de História Natural, Curitiba, Paraná, Brazil; S. de F. Caron		
MNRJ	Museu Nacional, Rio de Janeiro, Brazil; A. Timotheo da Costa		
MUSM	Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru; D. Silva D.		
MZCR	Museo Zoologico de Universidad de Costa Rica, San José, Costa Rica; C. E. Valerio		

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TABLE 1. DIFFERENTIAL CHARACTERS OF *PARAWIXIA* (PARW), *ERIOPHORA* (ERIO), *ACANTHEPEIRA* (ACAN), *WAGNERIANA* (WAGN), *ALPAIDA* (ALPA). (DATA FROM LEVI, 1971, 1976, 1988, 1991B).

	PARW	ERIO	ACAN	WAGN	ALPA
Pattern					
carap. glabrous	—	—	—	—	[+*]
paired spots on carap.	+*	—	+	—	—
marks betw. ME and LE	+*	—*	+	—	—
black eye rings	—	—	—	—	[+*]
sides of thoracic reg. black	—	—	—	[+*]	—
pattern on sternum	[+*]	—	—	—	—
abd. color pattern	—	—	—	—	[+*]
abd. v. with black rect.	—	[+]	—	—	—
abd. v. black with white spots	+	—	—	—	—
Female Morphology					
LE on sides of tuber.	+	—	+	—	—
PME on slight swelling	—*	—	—	—	—
carap. swollen behind eyes	+	+	+	+	+
abd. with tubers.	4–15	0–3	12+	9–15	—*
ant. median abd. tuber.	—*	—	[+]	—	—
abd. subspherical	+*	+	+	—	—
abd. longer than wide	—*	—	—	+	+
abd. with tail	—	—	—	[+*]	—
3 median post. tubers.	+	—*	+	+	—*
abd. glabrous	—	—	—	—	[+]
Epigynum					
scape	+	+	+	—	—
lobe	—	—	—	+	+
knob at tip	—*	—	—	[+]	—*
notch on face	—	—	—	—	[+*]
post. med. plate round	—	—	[+]	—*	—
post. med. plate oval	—	—	—	+*	+*
post. med. triangular	—	[+]	—	—	—
Male Morphology					
ceph. reg. wide	—	—	[+]	—	—
hook on coxa I	+	+	[—]	+	+*
macrosetae on coxae III, IV	+*	+*	+*	+*	+*
trochanter IV macrosetae	+*	+*	—	—*	—*
tibia II modified	—	—	—	—	—*
Palpus					
patella macrosetae	1**	[2**]	1	1	1*
Y narrow	—	[+]	—	—	—
Y covers PM	—	—	[+]	—	—
PM free	—	+	+	—	—
PM stalk and cap	—	—	—	—	[+*]
PM L- or U-shaped	—	—	—	[+]	—
PM disk with finger	+	+	—	—	—
PM disk with fold	—	—	[+]	—	—
M with base teeth	+	+	—	+	—
base of M with concavity	+	+	—	—	—
long “stipes”	—	[+]	—	—	—
E cone, bullet-shaped	[+*]	—	—	—	—
E knife-shaped	—	—	—	—	[+*]
E razor clam-shaped	—	—	[+]	—	—
A absent	—	—	[+]	—	—
A fused with embolus	—	—	—	+	+
A–R with hinge	+	+	—	—	—

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Parawixia F. P.-Cambridge

Parawixia F. P.-Cambridge, 1904: 487. Type species by original designation *Epeira desticta* O. P.-Cambridge, 1889.

Diagnosis. *Parawixia* can be distinguished by the epigynum which, unlike that of *Wagneriana*, has a scape as long as or longer than the width of the base and, unlike that of *Eriophora*, has the scape originating from the posterior margin of the base (Figs. 9, 19, 74). The distal end of the paramedian apophysis in *Parawixia* males is in the shape of a disk with a finger along the distal margin and extending beyond it (Figs. 7, 26, 39). In *Wagneriana* the paramedian apophysis is L-shaped; in *Wixia* and *Acacesia* the paramedian apophysis is a straight prong. In *Acanthepeira* and *Eriophora* the paramedian apophysis is a separate sclerite. Unlike that of *Eriophora*, the palpal patella of *Parawixia* males has only one macroseta.

Coloration, lateral eyes, and abdomen shape are distinctive. There are dark marks between median and lateral eyes (Figs. 2, 4, 12), paired dark spots on the carapace (Figs. 24, 62), and a pattern of paired light patches on the sternum (Fig. 6). In some

species, these marks are missing. The lateral eyes are on the sides below tubercles (Figs. 2–5). The spherical to trapezoidal abdomen has 2 to 6 pairs of lateral tubercles and usually 2 to 3 tubercles in a median line posteriorly (Figs. 12, 17).

In collections from Mexico and Guatemala, where the ranges of the two genera overlap, females of *Parawixia* can be separated from those of Nearctic *Acanthepeira* (Levi, 1976; fig. 12) that also have paired spots on the carapace, but have an abdominal median anterior tubercle lacking in *Parawixia* (Figs. 12, 17, 49).

The shape of the embolus of the male palpus and its attachment (soft, lightly sclerotized tissue with a small hematodocha) may be an autapomorphy. The round to trapezoidal shape of the tubercle-bearing abdomen is an autapomorphy of *Parawixia* species, as are the paired light marks on the sternum (Fig. 6, Table 1).

Description. Carapace orange to brown with one or more pairs of spots and characteristic dark marks between median and lateral eyes and behind the lateral eyes (Figs. 12, 17, 37). There are few hairs on the carapace. *Parawixia bistriata*, however, has a hairy carapace and lacks the paired spots. Chelicerae of all are darker distally than proximally. The endite and labium may be dark. The sternum is dark with pairs of lighter patches (Fig. 6) except in *P. baracoa*, *P. undulata*, and *P. bistriata*. The coxae are orange to brown with dusky patches and the legs have indistinct dark rings. The dorsum of the abdomen is variable in individuals of each species but the venter has a species-characteristic pattern. It is black with a distinctive median

* There are exceptions.

** *P. bistriata* and *E. nephiloides* (Levi, 1971) have a large macroseta and a smaller one on the male palpal patella.

Bracketed characters are autapomorphies for the genus.

Abbreviations: abd., abdomen; ant. anterior; betw., between; carap., carapace; ceph., cephalic; med., median; post., posterior; rect., rectangle; reg., region; tuber(s), tubercle(s); v., venter; A, terminal apophysis; E, embolus; LE, lateral eyes; M, median apophysis; ME, median eyes; PM, paramedian apophysis; PME, posterior median eyes; R, radix; Y, cymbium; ACAN, *Acanthepeira*; ALPA, *Alpaida*; ERIO, *Eriophora*; PARW, *Parawixia*; WAGN, *Wagneriana*.

white patch (Fig. 31), pairs of white marks (Figs. 18, 44, 140, 147), or other distinctive markings always different from those of related species.

The anterior median eyes are the largest, the lateral eyes the smallest. The posterior median eyes may be on a slight swelling in *Parawixia*, but are not in *Wagneriana*, *Acanthepeira*, or *Eriophora*. In *Wixia* (in prep.) and *Acacesia* (in prep.) the posterior median eyes are on a swelling with the eyes directed toward the sides.

Parawixia have a subspherical to trap-ezoidal abdomen with four to 15 tubercles, three or four pairs on the sides toward the anterior and middle, one pair posterior on the sides, and two to three single tubercles in a posterior median line (Figs. 12, 17). All individuals of a species have the abdomen about the same shape. Adult *Parawixia bistriata* females lack these tubercles, but immatures and males frequently have three lateral pairs and a faint posterior median tubercle (Fig. 157). Only rarely (in immature and some adult female *P. audax*) does *Parawixia* have a median anterior tubercle as in *Acanthepeira*.

Male coloration is as in females. In males the cephalic region is narrow (Figs. 3, 4) as in males of *Eriophora* and *Wagneriana*. It is not narrow in males of *Acanthepeira*. The abdomen is the same shape as in the female but smaller (Fig. 62). The palpal patella has only one macroseta, except in *P. bistriata*, which has a second smaller, white macroseta. The endite has a tooth facing a tubercle on the proximal end of the palpal femur (Figs. 4, 6). There is always a hook on the distal margin of the first coxa (Fig. 6) fitting into a groove on the second femur. The fourth and sometimes third coxae and trochanters of *Parawixia* males (except in *P. audax*, *P. undulata*, and *P. bistriata*) have one or more macrosetae (Fig. 6), as in males of *Wagneriana*, *Eriophora*, *Acanthepeira*, and *Wixia*. The second tibia is armed with macrosetae and thicker than the first tibia. As in related genera, the palpus has a para-

median apophysis. The base of the median apophysis, just above the radix, is usually modified to resemble a depressed oval with teeth or keels along its margin (Figs. 7, 26, 142, 149, 156), a synapomorphy shared with *Eriophora* and important for separating species of *Parawixia*. In *Wagneriana* and *Wixia* the base is sclerotized, sometimes with a tooth; in other genera it usually is not modified or sclerotized. The embolus is cone- or bullet-shaped (Fig. 7) in all but *P. kochi*. In *Eriophora* it is of various shapes. The terminal apophysis of the *Parawixia* palpus is partly fused to the embolus, as in *Wagneriana* and *Eriophora*. (*Acanthepeira* lacks a terminal apophysis.) This fusion is probably a plesiomorphy.

Variation. The dorsal abdominal pattern and coloration differ among individuals of the same species. The number of macrosetae on the third and fourth trochanters of males is variable and commonly differs on left and right sides of the same specimen.

Relationships. *Parawixia* is closest to *Eriophora* (Levi, 1971) and *Acanthepeira* (Levi, 1976). The long scape of the epigynum is a synapomorphy with *Acanthepeira* and *Eriophora* species (in *Acanthepeira* the scape is relatively short). But in all *Eriophora* species the scape originates from the anterior margin, and folds back to point posteriorly. The shape of the paramedian apophysis of the male palpus (which is attached to the conductor) and of the abdomen are autapomorphies for the genus *Parawixia*. The tubercles of the lateral eyes and the pairs of dark spots on the carapace are synapomorphies with species of *Acanthepeira*. The dark streaks between median and lateral eyes may also be found in *Eriophora edax*. The usually black underside of the abdomen may have a median white patch or distinctive pairs of light or white patches (Figs. 13, 18, 31, 79) that are also found in species of *Wixia*. The tubercles on the abdomen are homologous with those of *Wagneriana* and

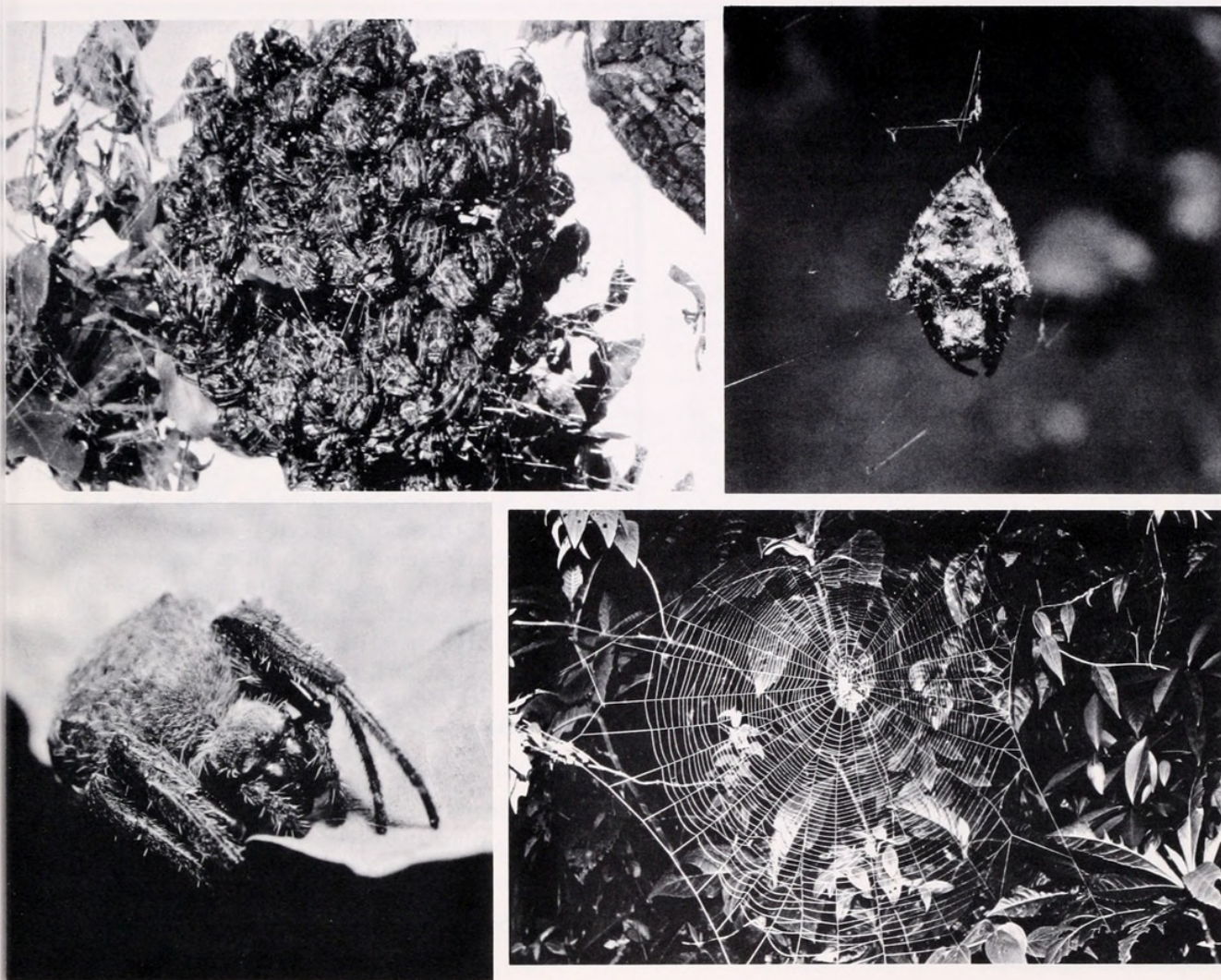


Plate 1. Upper left, *Parawixia bistriata*, sixth instar (photo C. P. Sandoval). Others, *P. audax*. Upper right, female hanging in web. Lower left, female. Lower right, web, orb about 50 cm horizontal diameter.

Acanthepeira, therefore synapomorphic. However, in *Wagneriana*, the abdomen is rectangular, longer than wide and often with a tail above the spinnerets. Macrosetae on the third and fourth coxae and trochanters of males (not always present), presence of a paramedian apophysis, and lack of distal hematodocha are synapomorphies of these various genera: *Parawixia*, *Acanthepeira*, *Wagneriana*, *Wixia*, *Eriophora*, *Alpaida*, *Verrucosa*, and others (Table 1).

Natural History. The best known species is *P. audax*, which makes a loose large web and sits in the hub, cephalic region down, or in a rolled-leaf retreat, one to

two meters above the ground. Most species probably live in the canopy and are rarely collected. *Parawixia bistriata* is social and makes webs fairly high up, commonly on telephone poles. All individuals in a colony are of the same age and size and during daytime they cluster together in a shared retreat (Plate 1; see below).

Note. When working on *Eriophora* in 1970 I thought that *Parawixia* might be a synonym of *Eriophora* (Levi, 1971), but this is not the case (see above). The two genera are related. No additional species of *Eriophora* have been found (only one doubtful male from Peru).

Distribution. *Parawixia* is found



Map 1. Approximate number of *Parawixia* species known from different areas.

throughout the Neotropics, most species being found in the Amazon area (Map 1). It is not certain whether any of the numerous *Epeira* species described from Australia belong to *Parawixia*.

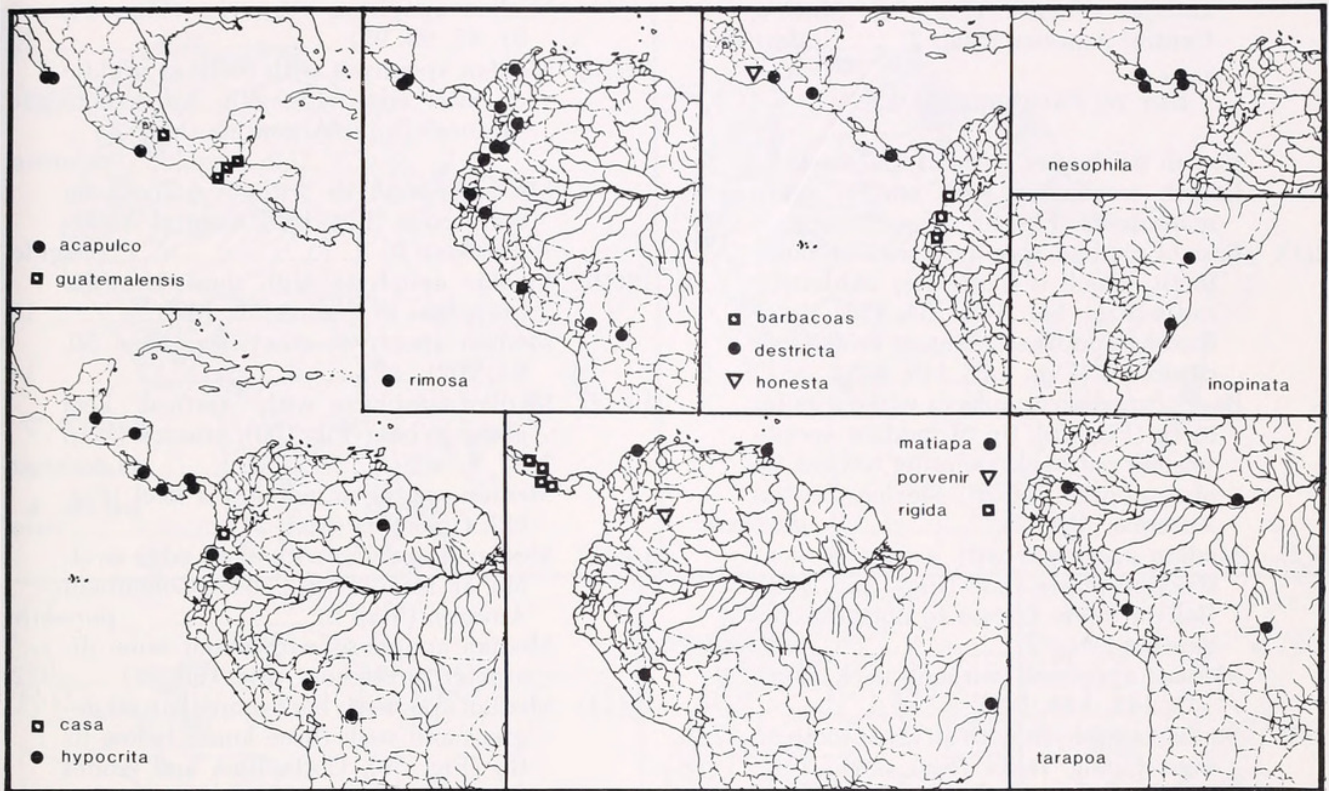
Misplaced Species

- Parawixia darlingtoni* Bryant, 1945: 382, figs. 14, 16, 21, is a *Wixia*.
P. mastophoroides Mello-Leitão, 1942: 402, figs. 23, 24, imm., is a *Wixia*.
P. tullgreni di Caporiacco, 1955: 348, fig. 31, ♂, is *Alpaida tullgreni* new combination. This species was overlooked in my revision of *Alpaida* (1988).
P. zigzag Mello-Leitão, 1951: 331, figs. 3, 4, ♂, belongs to a new unnamed genus.

KEY TO PARAWIXIA FEMALES

1. Scape of epigynum long, reaching at least to midpoint between genital groove and spinnerets (Figs. 50, 79) 2
- Scape not reaching midpoint between genital groove and spinnerets (Figs. 13, 18, 25) 9
2(1). Scape with swelling near tip, tapered most near tip (Figs. 74, 81, 110) 3
- Scape without swelling, evenly tapered (Figs. 46, 123, 136) 5
3(2). Posterior median plate of epigynum narrow (Figs. 75, 76, 111) 4
- Posterior median plate wide; lateral plates

- short (Figs. 82, 83); southern Brazil (Map 3) *monticola*
4(3). Length of lateral plates about twice their diameter (Fig. 76); Amazon to Misiones Prov., Argentina (Map 3) *velutina*
- Length of lateral plates about one and one-half times their diameter (Fig. 111); Amazon area of Peru, Brazil (Map 3) *ouro*
5(2). Abdomen of adult spherical, without tubercles (Fig. 153); Bolivia, Mato Grosso to northern Argentina (Map 3) *bistriata*
- Abdomen with tubercles 6
6(5). Scape flat and wide (Figs. 46, 48); Mexico, Guatemala, Greater Antilles (Map 3) *tredecimnotata*
- Scape not noticeably flat (Figs. 123, 136, 150); South America 7
7(6). Scape slender, both sides concave and coming to a fine point (Figs. 123-125); base with paired dark spots (Fig. 123); abdomen narrow, longer than wide (Fig. 126); widespread in South America (Map 3) *kochi*
- Scape thicker, base without dark spots (Figs. 136, 143); abdomen subspherical with tubercles (Figs. 139, 146) 8
8(7). Scape thin (Figs. 136, 138); posterior median plate convex, dark brown (Fig. 137); widespread in South America (Map 3) *audax*
- Scape swollen (Figs. 143, 145); posterior median plate flat, usually white (Fig. 144); southern Brazil to Buenos Aires Prov., Argentina (Map 3) *undulata*
9(1). Scape of epigynum swollen at distal end above tip (Figs. 88, 97, 104); taper greatest near tip 10
- Scape without swelling above tip (Figs. 9, 14, 117) 15
10(9). Swelling indistinct; scape long (Figs. 81, 84); southern Brazil (Map 3) *monticola*
- Swelling distinct; scape shorter (Figs. 74, 88) 11
11(10). Posterior median plate much wider than lateral plates (Fig. 105); Amazon (Map 2) *tarapoa*
- Posterior median plate equal in width to or narrower than lateral plates (Figs. 76, 89, 98, 111) 12
12(11). Posterior median plate vase-shaped as in Figure 98; Ecuador, Peru to Bahia State, Brazil (Map 3) *divisoria*
- Posterior median plate narrower than lateral plates (Figs. 76, 89, 111) 13
13(12). Median plate with sides almost parallel (Fig. 89); Central America (Map 3) *hoxaea*
- Median plate constricted in middle (Figs. 76, 111); 14



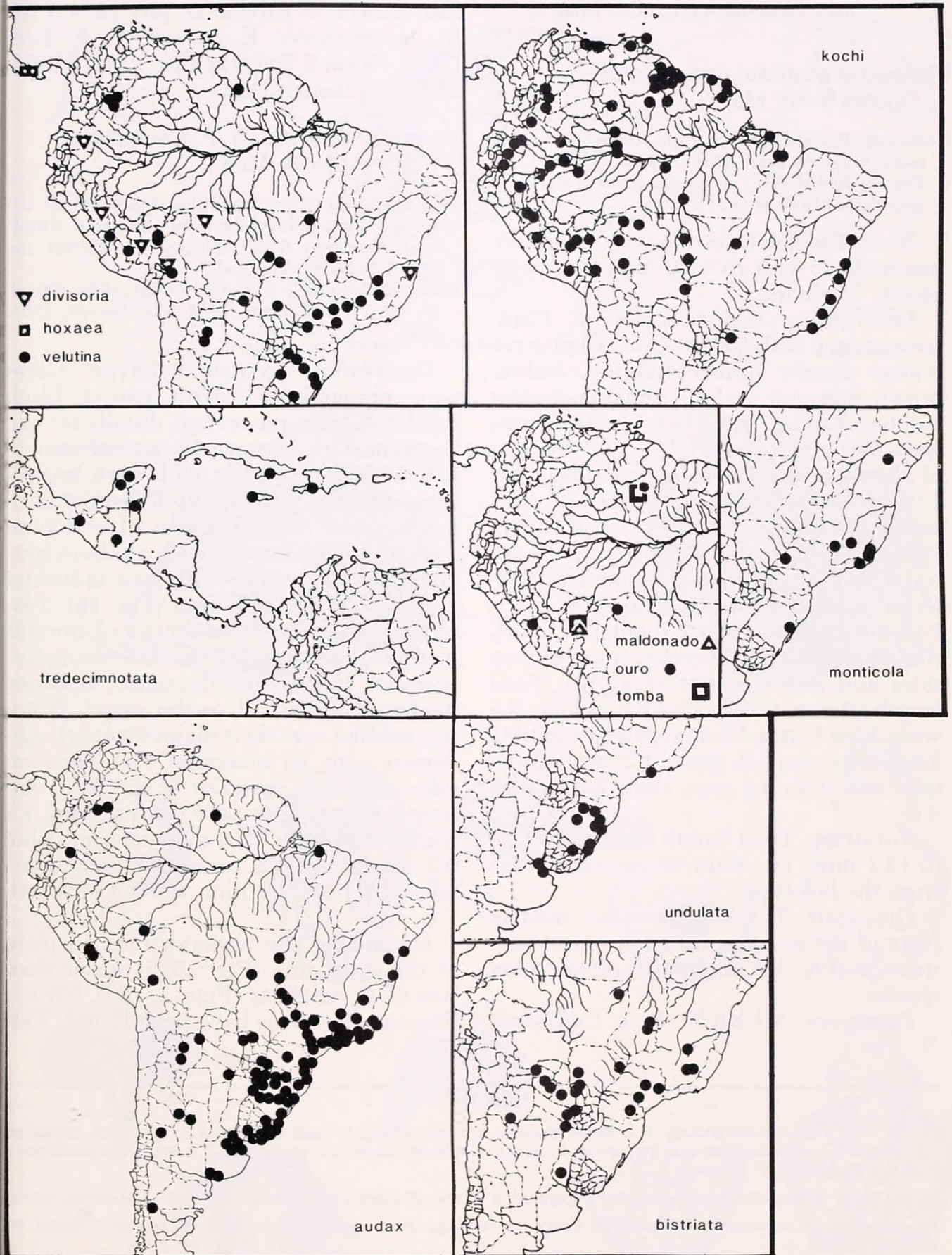
Map 2. Distribution of *Parawixia* species.

- 14(13). Swelling of scape almost as wide as base of epigynum (Fig. 110); Amazon of Peru, Brazil (Map 3) *ouro*
- Swelling half as wide as epigynum base or narrower (Fig. 74); widespread in South America (Map 3) *velutina*
- 15(9). Posterior median plate of epigynum with ventral constriction (top of Fig. 10); Mexico (Map 2) *acapulco*
- Posterior plate without ventral constriction (Figs. 15, 22) 16
- 16(15). Length of scape (from origin with base) about one and one-half times width of base (Fig. 117); Central America (Map 2) *rigida*
- Scape barely longer than width of base or shorter (Figs. 14, 56, 63) 17
- 17(16). Width of posterior median plate equal to or greater than width of a lateral plate (Figs. 15, 28, 33, 41) 20
- Lateral plates each wider than median plate (Figs. 57, 64, 70) 18
- 18(17). Lateral plates evenly curved in median (Fig. 64); Central America (Map 2) *nesophila*
- Lateral plates otherwise (Figs. 57, 70) 19
- 19(18). Median plate bottle-shaped (Fig. 70); southern Brazil (Map 2) *inopinata*
- Median plate square with paired depressions on anterior margin (Fig. 57); Central America to Bolivia, Brazil (Map 2) *hypocrita*
- 20(17). Base of epigynum longer than wide in posterior view (Fig. 41); Mexico, Guatemala (Map 2) *guatemalensis*
- Base of epigynum as long as wide or wider than long in posterior view (Figs. 15, 21, 33) 21
- 21(20). Visible width of each lateral plate less than half width of posterior median plate (Figs. 33–35); Costa Rica and Andes (Map 2) *rimosa*
- Visible width of each lateral plate equal to or greater than half width of posterior median plate (Figs. 15, 22, 28) 22
- 22(21). Base of epigynum tapering evenly into scape (Fig. 27); lateral plates without dorsal lobe (Fig. 28); abdomen with ventral white median patch on black (Fig. 31); Colombia (Map 2) *barbacoas*
- Base of epigynum set off from scape (Figs. 14, 19); lateral plates with dorsal lobe (Figs. 15, 21, 22); abdomen with two pairs of ventral white spots (Figs. 18, 25); Mexico, Central America 23
- 23(22). Posterior median plate as wide as long (Fig. 15); abdomen with anterior tubercles double (Fig. 17); Mexico (Map 2) *honesta*
- Posterior median plate longer than wide (Figs. 21, 22); abdomen with single

anterior tubercle (Fig. 24); Mexico, Central America (Map 2) *destricta*

KEY TO *PARAWIXIA* MALES

- | | | | | | |
|---------|---|----|--|--|----------------------|
| 1. | Fourth trochanter without macroseta | 2 | | | |
| - | Fourth trochanter with one or more macrosetae (Fig. 6) | 5 | | | |
| 2(1). | Base of median apophysis with an outer tooth, which is sometimes hidden by radix (Figs. 141, 142, 155, 156), tip of median apophysis pointing away from cymbium (Figs. 141, 149, 155) | 3 | | | |
| - | Base of median apophysis without outer tooth (Fig. 26); tip of median apophysis curved back, pointing toward tip of cymbium (Fig. 26); Mexico, Central America (Map 2) | | | | <i>destricta</i> |
| 3(2). | Median apophysis with a neck or constriction above base (Figs. 155, 156); Bolivia, Mato Grosso to northern Argentina (Map 3) | | | | <i>bistriata</i> |
| - | Median apophysis without neck (Figs. 141, 142, 148, 149) | 4 | | | |
| 4(3). | Median apophysis with an inner tooth on base facing radix (Figs. 141, 142); widespread in South America (Map 3) | | | | <i>audax</i> |
| - | Median apophysis with an inner lobe on base facing radix (Figs. 148, 149); southern Brazil to Buenos Aires Prov., Argentina (Map 3) | | | | <i>undulata</i> |
| 5(1). | Embolus club-shaped, with a neck (Figs. 129-135); widespread in South America (Map 3) | | | | <i>kochi</i> |
| - | Embolus pointed at tip, without neck (Figs. 51, 61, 73) | 6 | | | |
| 6(5). | Median apophysis with a distal, fine point and a knob two-thirds along its length (Fig. 61); Central America to Bolivia, Brazil (Map 2) | | | | <i>hypocrita</i> |
| - | Median apophysis otherwise | 7 | | | |
| 7(6). | Median apophysis distally forked into two branches with pointed tips (Figs. 68, 73) | 8 | | | |
| - | Median apophysis otherwise (Figs. 80, 122) | 10 | | | |
| 8(7). | Southern Brazil (Figs. 73, Map 2) <i>inopinata</i> | | | | |
| - | Mexico, Central America (Figs. 45, 68, Map 2) | 9 | | | |
| 9(8). | More proximal branch of median apophysis pointed (Fig. 68); underside of abdomen with median white patch | | | | <i>nesophila</i> |
| - | More proximal branch of median apophysis blunt (Fig. 45); underside of abdomen with four white spots | | | | <i>guatemalensis</i> |
| 10(7). | Median apophysis with two small distal lobes separated by a notch (Figs. 80, 122) | 11 | | | |
| - | Median apophysis otherwise (Figs. 39, 51, 87, 93, 95) | 12 | | | |
| 11(10). | Median apophysis with tooth at middle of outer edge (Fig. 80); Amazon to Misiones Prov., Argentina (Map 3) | | | | <i>velutina</i> |
| - | Median apophysis without a tooth on outer edge (Fig. 122); Central America (Map 2) | | | | <i>rigida</i> |
| 12(10). | Median apophysis with short, truncate branch as in Figures 52, 109 | 13 | | | |
| - | Median apophysis otherwise (Figs. 50, 54, 102) | 14 | | | |
| 13(12). | Median apophysis with "vertical" keel above its base (Fig. 109); Amazon (Map 2) | | | | <i>tarapoa</i> |
| - | Median apophysis without a keel (Fig. 52); Colombia (Map 2) | | | | <i>casa</i> |
| 14(12). | Median apophysis with outer edge swollen at middle (Fig. 54); Colombian Amazon (Map 2) | | | | <i>porvenir</i> |
| - | Median apophysis with about same diameter throughout (Figs. 39, 87) | 15 | | | |
| 15(14). | Median apophysis bent more than 90 degrees and with three knobs below its tip (Fig. 39); Costa Rica and Andes (Map 2) | | | | <i>rimosa</i> |
| - | Median apophysis, if bent more than 90 degrees, with only one or two knobs (Figs. 102, 115) | 16 | | | |
| 16(15). | Visible part of conductor almost as wide as long, subcircular (Fig. 102); median apophysis with 90 degree bend (Fig. 102); Ecuador, Peru (Map 3) | | | | <i>divisoria</i> |
| - | Visible part of conductor longer than wide or mostly hidden (Figs. 51, 115); curvature of median apophysis less than 90 degrees | 17 | | | |
| 17(16). | Median apophysis with "vertical" keel one third its length from base (Figs. 51, 87) or near base (Figs. 93, 95) | 18 | | | |
| - | Median apophysis without a keel near its base (Fig. 115); Peruvian Amazon (Map 3) | | | | <i>maldonado</i> |
| 18(17). | Median apophysis with three distal knobs (Fig. 51); conductor large, longer than wide (Fig. 51); Mexico, Guatemala, Greater Antilles (Map 3) <i>tredecimnotata</i> | | | | |
| - | Median apophysis with only one or two distal knobs (Figs. 87, 93, 95); conductor smaller (Figs. 87, 93, 95) | 19 | | | |
| 19(18). | Embolus equal to or larger in area than small terminal apophysis (Fig. 87); southern Brazil (Map 3) | | | | <i>monticola</i> |
| - | Embolus smaller in area than large terminal apophysis (Figs. 93, 95) | 20 | | | |
| 20(19). | Tip of median apophysis extends beyond most distal part of tegulum (Fig. 95); Peruvian Amazon (Map 3) | | | | <i>tomba</i> |
| - | Median apophysis shorter, not extending beyond tegulum edge (Fig. 93); Trin- | | | | |



Map 3. Distribution of *Parawixia* species.

idad, Colombia, Peru, Brazil (Map 2)
..... matiapa

Parawixia acapulco new species
 Figures 9–13; Map 2

Holotype. Female holotype from Revolcadero, Acapulco, Guerrero State, Mexico, July 1959 (N. L. H. Krauss), in AMNH. The specific name is a noun in apposition after the type locality.

Note. The holotype is in poor condition, just molted, with its epigynum not completely hardened.

Description. Female holotype. Carapace orange with brown spots. Chelicerae orange distally brown. Labium, endites brown. Sternum dusky with pairs of clear patches. Coxae, legs orange with brown spots and rings and white setae. Dorsum of abdomen whitish, brown on sides (Fig. 12); venter black with a pair of white spots anterior to spinnerets (Fig. 13). Eyes small. Posterior median eyes 0.8 diameter of anterior medians, laterals 0.7 diameter. Anterior median eyes 1.6 diameters apart. Posterior median eyes 2 diameters apart. Abdomen with 13 tubercles: four pairs on sides and five posterior (Fig. 12). Total length 12 mm. Carapace 4.2 mm long, 3.8 wide. First femur 4.8 mm, patella and tibia 5.8, metatarsus 3.5, tarsus 1.3. Second patella and tibia 5.4 mm, third 3.0, fourth 4.6.

Variation. Total length of females 12.0 to 13.1 mm. The illustrations were made from the holotype.

Diagnosis. The long posterior median plate of the epigynum has a ventral constriction (Fig. 10) unlike that of any other species.

Paratypes. MEXICO *Baja California*

Sur: 3.2 km SE Ribera, 26 July 1974, ♀ (R. M. Haradon, W. E. Savary, V. F. Lee, CAS); 19 km S Todos Santos, 12 July 1968, 2♀ (S. Williams, CAS).

Parawixia honesta (O. P.-Cambridge)
 Figures 14–18; Map 2

Epeira honesta O. P.-Cambridge, 1899: 300, pl. 37, fig. 6, ♀. Female holotype from Omilteme, [Omiltemi, Guerrero State], Mexico, in BMNH no. 1905.4.28.2834, examined.

Parawixia honesta:—F. P.-Cambridge, 1904: 490, pl. 46, fig. 17, ♀. Roewer, 1942: 871. Bonnet, 1958: 3340.

Description. Female holotype. Carapace orange-brown with paired black patches. Chelicerae orange, distally brown. Sternum dark brown with paired orange patches. Coxae yellow with dark brown; legs orange to yellow with indistinct dark patches and rings. Dorsum of abdomen dark and light brown, with a folium outline (Fig. 17); venter with four indistinct white spots in dusky area (Fig. 18). Posterior median eyes 0.8 diameter of anterior medians, anterior laterals 0.8 diameter, posterior laterals 0.9 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Abdomen with 13 tubercles: four pairs on sides, and five posterior (Fig. 17). Total length 17 mm. Carapace 6.0 mm long, 4.9 wide. First femur 7.7 mm, patella and tibia 9.2, metatarsus 6.2, tarsus 1.9. Second patella and tibia 7.9 mm, third 4.7, fourth 7.1.

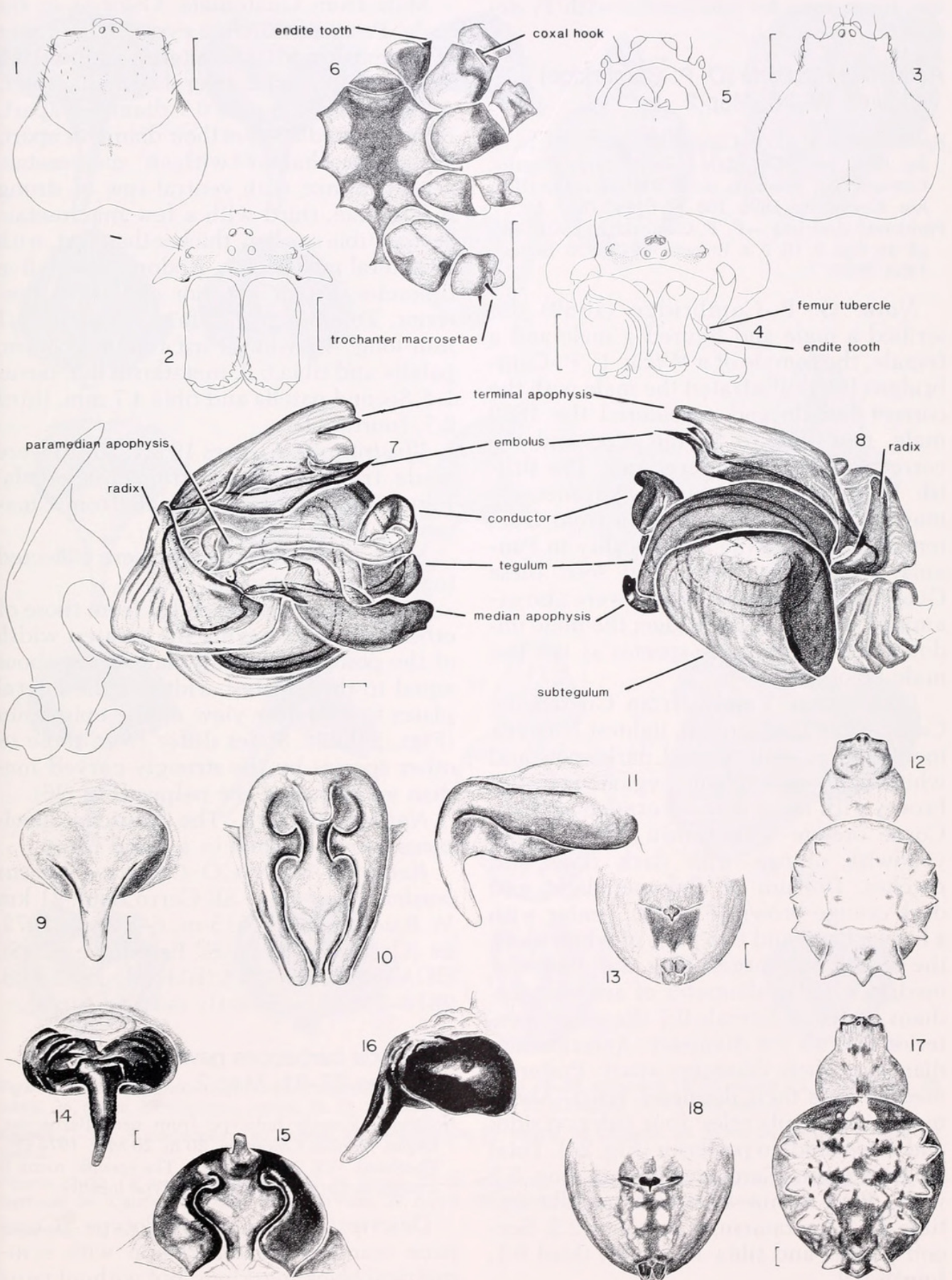
Diagnosis. The posterior median plate of the epigynum (Fig. 15) is wider than that of *P. destricta* (Figs. 21, 22). No additional specimens have been found. This

Figures 1–8. *Parawixia* morphology. 1, 2, female carapace and chelicerae. 3–8, male. 3, carapace. 4, eye region, chelicerae, right palpus. 5, eye region, chelicerae from below. 6, sternum, left endite, coxae, and trochanters. 7, 8, left palpus pulled apart. 1–5, 7, 8, *P. audax*. 6, *P. rimosa*.

Figures 9–13. *P. acapulco* n. sp., female. 9–11, epigynum. 9, ventral. 10, posterior. 11, lateral. 12, dorsal. 13, abdomen, ventral.

Figures 14–18. *P. honesta* (O. P.-Cambridge), female. 14–16, epigynum. 14, ventral. 15, posterior. 16, lateral. 17, dorsal. 18, abdomen, ventral.

Scale lines 1.0 mm, genitalia 0.1 mm.



specimen may be conspecific with *P. destricta*.

***Parawixia destricta* (O. P.-Cambridge)**
Figures 19–26; Map 2

Epeira destricta O. P.-Cambridge, 1889: 39, pl. 4, fig. 13, ♂, not 14, ♀. Male holotype from Bugaba, Chiriquí Prov., Panama, not in BMNH, not in HEC, lost. Keyserling, 1892: 105, pl. 5, fig. 78, ♀, ♂.

Parawixia destricta:—F. P.-Cambridge, 1904: 488, pl. 46, figs. 9, 10, ♀, ♂. Roewer, 1942: 870. Bonnet, 1958: 3339.

Note. O. P.-Cambridge (1889) described a male and figured a male and a female, the female of a *Wixia*. F. P.-Cambridge (1904) illustrated the male with the correct female and considered the 1889 male, now lost, to be the type and the correct female a “deuterotype.” The British Museum has specimens erroneously marked as types, which come from Guatemala, not from the type locality in Panama. Keyserling (1892) had seen these Guatemala specimens, which were also examined by F. P.-Cambridge; the male undoubtedly is the same species as the lost male holotype.

Description. Female from Guatemala. Carapace orange-brown, lightest between median eyes, with paired dark spots and white setae on cephalic region. Sternum brown with three pairs of orange patches. Coxae orange with brown patches; legs yellowish orange with dark rings and patches. Dorsum of abdomen light and dark orange-brown (Fig. 24); venter with a brown band and two pairs of white spots, the second pair largest (Fig. 25). Posterior median eyes 0.7 diameter of anterior medians, anterior laterals 0.7 diameter, posterior laterals 0.6 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Abdomen with 11 tubercles: four pairs on sides and three median posterior (Fig. 24). Total length 18 mm. Carapace 9.6 mm long, 5.5 wide. First femur 10.6 mm, patella and tibia 11.7, metatarsus 7.6, tarsus 2.5. Second patella and tibia 10.2 mm, third 6.1, fourth 9.2.

Male from Guatemala. Color as in female. Posterior median eyes 0.6 diameter of anterior medians, anterior laterals 0.5 diameter, posterior laterals 0.6 diameter. Anterior median eyes 0.7 diameter apart. Posterior median eyes their diameter apart. Fourth trochanter without macrosetae. Second femur with ventral row of strong macrosetae, third with a few macrosetae. Second tibia swollen, thicker than first, with prolateral macrosetae. Abdomen with five tubercles: a pair anterior and three posterior. Total length 7.5 mm. Carapace 4.1 mm long, 3.4 wide. First femur 4.8 mm, patella and tibia 6.0, metatarsus 3.5, tarsus 1.4. Second patella and tibia 4.7 mm, third 2.7, fourth 4.0.

Illustrations. Figures 19, 21, 23–26 were made from specimens from Guatemala; Figures 20, 22, from a female from Chiapas.

Note. Males and females were collected together in Guatemala.

Diagnosis. Females differ from those of other species by having the greatest width of the posterior median plate being about equal to the greatest width of the lateral plates in posterior view of the epigynum (Figs. 21, 22). Males differ from those of other species by the strongly curved median apophysis of the palpus (Fig. 26).

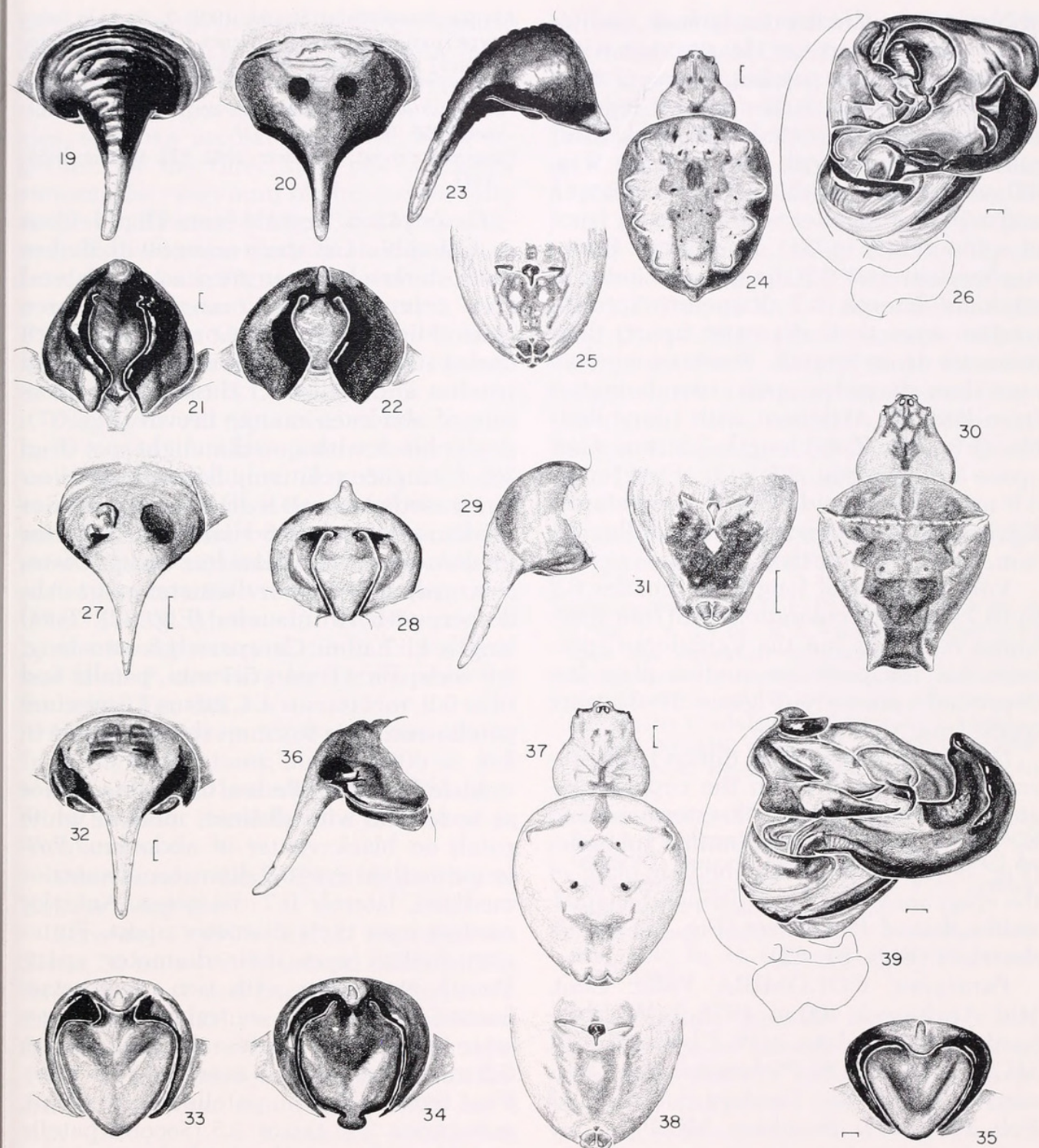
Natural History. The Mexican specimens were collected in a cloud forest.

Records. MEXICO *Oaxaca-Chiapas border*: along ridge SE Cerro Baul, 21 km W Rizo de Oro, 1,615 m, 6–8 Sept. 1972, 2♀ (C. Mullinex, D. E. Breedlove, CAS). GUATEMALA ♀, 2♂ (BMNH, 1905.4.28. 2819–28822 incorrectly marked types).

***Parawixia barbacoas* new species**
Figures 27–31; Map 2

Holotype. Female holotype from near Barbacoas, Depto. Nariño, Colombia, 20 m, 20 Mar. 1974 (W. Eberhard, WE 741), in MCZ. The specific name is a noun in apposition after the type locality.

Description. Female holotype. Carapace orange, cephalic region with symmetrical black markings, but without pairs



Figures 19–26. *Parawixia destricta* (O. P.-Cambridge). 19–25, female. 19–23, epigynum. 19, 20, ventral. 21, 22, posterior. 23, lateral. 24, dorsal. 25, abdomen, ventral. 19, 21, 23, (Guatemala). 20, 22, (Chiapas). 26, left male palpus.

Figures 27–31. *P. barbacoas* n. sp., female. 27–29, epigynum. 27, ventral. 28, posterior. 29, lateral. 30, dorsal. 31, abdomen, ventral.

Figures 32–39. *P. rimosa* (Keyserling). 32–38, female. 32–36, epigynum. 32, ventral. 33–35, posterior. 36, lateral. 32, 33, 36, (syntype). 34, (Cauca, Colombia). 35, (Costa Rica). 37, dorsal. 38, abdomen, ventral. 39, male palpus.

Scale lines 1.0 mm, genitalia 0.1 mm.

of black spots. Chelicerae, labium, endites dusky orange. Sternum clear orange without the usual light patches. Coxae orange, without dusky or darker marks; legs orange, ringed and spotted with black. Dorsum of abdomen with black folium (Fig. 30); venter black with a central white spot and a pair of smaller white spots in front of spinnerets (Fig. 31). Eyes large. Posterior median eyes 0.9 diameter of anterior medians, laterals 0.7 diameter. Anterior median eyes their diameter apart, their diameter from laterals. Posterior median eyes their diameter apart, two diameters from laterals. Abdomen with four tubercles (Fig. 30). Total length 7.5 mm. Carapace 3.5 mm long, 2.5 wide. First femur 3.9 mm, patella and tibia 4.7, metatarsus 2.9, tarsus 1.1. Second patella and tibia 4.1 mm, third 2.5, fourth 3.8.

Variation. Total length of females 6.2 to 10.7 mm. The coloration of all four specimens is similar but the Ecuadoran specimen has the posterior median plate less depressed anteriorly. Figures 27–31 were made from the holotype.

Diagnosis. This species differs from others by having marks on the cephalic region, lacking marks on the sternum, and by having only four abdominal tubercles (Fig. 30). The posterior median plate of the epigynum (Fig. 28) is diamond-shaped, unlike that of *P. honesta* (Fig. 15) and *P. stricta* (Figs. 21, 22).

Paratypes. COLOMBIA *Valle:* Cent. Hld. Anchicayá, 400 m, 1978, ♀ (W. Eberhard, MCZ); no date, ♀ (W. Eberhard E77, MCZ). ECUADOR *Pichincha:* Río Corazón, 6.5 km E Río Tandapi, 1,750 m, 18 Feb. 1979, ♀ (L. Burnham, MCZ).

Parawixia rimosa (Keyserling)
Figures 32–39; Map 2

Epeira rimosa Keyserling, 1892: 110, pl. 6, fig. 82, ♀. Three female syntypes and two immatures from Bogotá, Colombia, in BMNH no. 1890.7.1.4674–8, examined.

Parawixia hamata F. P.-Cambridge, 1904: 489, pl. 46, fig. 13, ♂. Parts of male holotype from Costa Rica, in BMNH, examined. Roewer, 1942: 871. Bonnet, 1958: 3340. NEW SYNONYMY.

Aranea dstrictoides Strand, 1908: 2. Female holotype from "Popayan oder Cauca" [Popayan, Depto. Cauca], Colombia, in SMF, examined. NEW SYNONYMY.

Parawixia dstrictoides:—Roewer, 1942: 870. Bonnet, 1958: 3340.

Parawixia rimosa:—Roewer, 1942: 871. Bonnet, 1958: 3341.

Description. Female from Depto. Cauca, Colombia. Carapace orange with darker spots, darker between median and lateral eyes. Sternum dusky orange with three pairs of lighter patches. Coxae orange with darker streaks; legs dark orange with dusky patches and indistinct dusky rings. Dorsum of abdomen orange brown (Fig. 37); venter black with a median light spot (Fig. 38). Carapace relatively flat and low. Posterior median eyes 0.9 diameter of anterior medians, laterals 0.8 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Abdomen with 10 tubercles (Fig. 37). Total length 11.7 mm. Carapace 4.8 mm long, 3.6 wide. First femur 5.7 mm, patella and tibia 6.9, metatarsus 4.1, tarsus 1.3. Second patella and tibia 6.3 mm, third 3.6, fourth 5.6.

Male from San Pedro, Colombia. Color as in female with distinct, median white patch on black venter of abdomen. Posterior median eyes 0.7 diameter of anterior medians, laterals 0.7 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Fourth trochanter with two macrosetae. Second femur with a ventral row of macrosetae. Abdomen as in female. Total length 8.2 mm. Carapace 4.3 mm long, 3.5 wide. First femur 5.1 mm, patella and tibia 6.3, metatarsus 3.9, tarsus 1.5. Second patella and tibia 4.9 mm, third 2.9, fourth 4.5.

Note. Males and females have not been collected together but both sexes have been collected in San Pedro, Colombia, and their distribution is similar.

Variation. The proportions of the epigynum of the syntype illustrated are similar to those of the female from Cauca. In no two individuals is the posterior median plate exactly alike (Figs. 33–35), and the

terminal apophysis of males differs slightly among individuals. Some individuals have only four tubercles on the abdomen: two widely separated median anterior tubercles, and two median posterior, close together. Of the three syntypes of *Epeira rimosa*, the epigynum of the one recently molted is illustrated (Figs. 32, 33, 36). Figures 36 to 38 were made from a specimen from Costa Rica; Figure 34 was made from a specimen from Cauca, Colombia, and Figure 39, from Magdalena Dept., Colombia. Total length of females 9.7 to 14 mm, of males 6.2 to 9.5.

Diagnosis. All specimens of this species have a median white patch on the black venter of the abdomen (Fig. 38). Females can be separated from those of *P. destriata* and *P. barbacoas* by the wide posterior median plate and relatively narrow lateral plates in posterior view of the epigynum (Figs. 33–35). Males can be distinguished by the strongly curved median apophysis and from *P. destriata* by the shape of the embolus (Fig. 39).

Natural History. Most specimens come from high elevations, above 1,000 m, but a few are from low elevations. The pair from Ecuador came from a rain forest in Tinalandia.

Distribution. Costa Rica, Colombia to Bolivia (Map 2).

Records. COSTA RICA *Heredia*: La Selva, 50 m, ♀ (W. Eberhard 2756, MCZ). *San José*: nr. Túnel Zurqui, 1,400 m, ♀ (W. Eberhard, MCZ). *Puntarenas*: Monteverde, Campbell's woods, 1,500 m, 5 Apr. 1979, ♂ (J. Coddington, MCZ). COLOMBIA *Magdalena*: San Pedro, 1,160 m, 3 Apr. 1975, ♂ (J. A. Kochalka, MCZ); San Pedro, 500–1,000 m, 1 Aug. 1985, ♀ (H.-G. Müller, SMF); Serra Nueva Granada, 1,300 m, 12 Apr. 1975, ♀ (J. A. Kochalka, MCZ); Pueblo Bello, 1,100 m, 10–17 June 1968, ♂ (B. Malkin, AMNH). *Antioquia*: Ituango, 1,450 m, 26 May 1989, ♀ (M. A. Serna, MNHMC). *Cauca*: between Pienamó and Mondomo, ♀ (W. Eberhard 567, MCZ). *Huila*: 19 km E Station Leticia, 2,300 m, Mar. 1976, ♀ (W. Eberhard, MCZ).

Nariño: Barbacoas, 20 Mar. 1974, ♀ (W. Eberhard 730, MCZ); La Planada, 1,800 m, 7 km S Choconés, July 1986, 2♀ (W. Eberhard, MCZ). ECUADOR *Pichincha*: Tinalandia, 16 km E Santo Domingo, 680 m, 4 May–25 July 1985, ♀, ♂ (S., J. Peck, AMNH). *Bolívar*: Balzapampa, May to June 1938, ♀ (W. C. Macintyre, MCZ). PERU *Amazonas*: Alto Río Comaina, Puesto de Vigilancia 22, "Falso Paquisha," 850–1,150 m, 21 Oct.–3 Nov. 1987, ♀ (D. Silva D., MUSM). *Junín*: Amable María, ♀ (K. Jelski, PAN). BOLIVIA *La Paz*: Río Zongo, 1,900–2,200 m, 24 Oct.–3 Nov. 1984, ♀ (L. Peña, AMNH). *Cochabamba*: Yungas Chaparé, 1,900–2,800 m, 10–12 Dec. 1984, ♀ (L. Peña, AMNH).

Parawixia guatemalensis (O. P.-Cambridge) Figures 40–45; Map 2

Epeira guatemalensis O. P.-Cambridge, 1889: 40, pl. 7, fig. 7, ♀, not fig. 8, ♂. Female lectotype (with most legs separated) designated by F. P.-Cambridge from "Livingston, Chicoyito [?], Polochic Valley near Tamahú [Rio Polochic, Alta Verapaz], Cubilguitz [Gubilguitz, Depto. Alta Verapaz, 15°38'N, 90°22'W], Guatemala," in BMNH no. 1905.4.28.2826–30. Keyserling, 1892: 112, pl. 6, fig. 83, ♀, not ♂.

Epeira merens O. P.-Cambridge, 1898: 246, pl. 31, fig. 2, ♀. Five female syntypes from Atoyac [18°54'N, 96°46'W], Veracruz State, Mexico, in BMNH no. 1905.4.28.2826–2830, examined. First synonymized by F. P.-Cambridge, 1904.

Parawixia guatemalensis:—F.P.-Cambridge, 1904: 489, pl. 46, fig. 14, ♀. Roewer, 1942: 870. Bonnet, 1958: 3340.

Description. Female lectotype. Carapace orange to brown. Sternum orange with three pairs of light patches. Coxae yellowish with brown patches; legs yellowish with brown patches and rings. Dorsum of abdomen with blackish brown median longitudinal band and white cardiac mark (Fig. 43); venter with black band containing two pairs of white spots (Fig. 44). Posterior median eyes 0.7 diameter of anterior medians, laterals 0.8 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Abdomen with nine tubercles (10 according to F. P.-Cambridge): two pairs on sides and

five posterior (Fig. 43). Total length 12 mm. Carapace 5.2 mm long, 4.1 wide. First femur 5.0 mm, patella and tibia 6.6, metatarsus 4.1, tarsus 1.5. Second patella and tibia 6.0 mm, third 3.6, fourth 5.5.

Male. Color as in female but with dark patches on carapace and abdomen darker without cardiac mark. Posterior median eyes 0.7 diameter of anterior medians, anterior laterals 0.7 diameter, posterior laterals 0.6 diameter. Anterior median eyes 0.6 diameter apart. Posterior median eyes 0.8 diameter apart. Fourth trochanter with three macrosetae. A pair of macrosetae, side by side on proximal end of femur. Second tibia thicker than first, swollen with prolateral macrosetae. Abdomen as in female. Total length 9.3 mm. Carapace 5.2 mm long, 4.3 mm wide. First femur 7.5 mm, patella and tibia 8.5 mm, metatarsus 5.8 mm, tarsus 3.3 mm. Second patella and tibia 6.3 mm, third 3.8 mm, fourth 5.7 mm.

Note. Males and females were matched because of similar size and both having four white spots on the underside of the abdomen.

Variation. The females other than the type have three pairs of lateral abdominal tubercles and five posterior. Total length of females 11.3 to 15.0 mm. The female lectotype and the only male have been illustrated.

Diagnosis. The long, vase-shaped posterior median plate of the epigynum (Fig. 41) and the relatively short scape are diagnostic (Figs. 40, 42). The male differs from that of *P. nesophila* by having four white spots on the underside of the abdomen and details of the palpal sclerites.

Natural History. The male was collected in a cloud forest.

Records. MEXICO *Oaxaca-Chiapas:* ridge SE Cerro Baul, 21 km W Rizo de Oro, 1,615 m, 6–8 Sept. 1972, ♂ (C. Mullin, D. E. Breedlove, CAS). GUATEMALA *Suchitepequez:* Finca Santa Adelaida, 13 km N Santa Bárbara, 14, 15 July 1959, ♀ (C. P. Vaurie, AMNH).

Parawixia tredecimnotata F. P.-Cambridge Figures 46–51; Map 3

Parawixia tredecimnotata F. P.-Cambridge, 1904: 490, pl. 46, fig. 16, ♀. Female holotype from Guatemala, in BMNH no. 1905.4.28.2833, examined. Roewer, 1942: 871. Bonnet, 1958: 3341.

Parawixia cambridgei Bryant, 1940: 342, figs. 104–106, ♀, ♂. Female holotype from coast below Pico Turquino, Santiago de Cuba Prov., Cuba, in MCZ, examined. Brignoli, 1983: 278. NEW SYNONYMY.

Description. Female holotype of *P. tredecimnotata*. Carapace brown with darker brown spots. Sternum brown with pairs of light patches. Coxae lighter than sternum; legs brown with darker patches. Dorsum of abdomen brown, darker on sides (Fig. 49); venter with two dark brown patches side by side (Fig. 50). Eyes subequal. Anterior median eyes slightly less than their diameter apart. Posterior median eyes their diameter apart. Abdomen subspherical, with 13 tubercles (Fig. 49). Total length 12.7 mm. Carapace 5.8 mm long, 4.7 wide. First femur 6.8 mm, patella and tibia 8.4, metatarsus 5.1, tarsus 1.8. Second patella and tibia 7.5 mm, third 4.7, fourth 7.2.

Male from Yucatan, Mexico. Color lighter, more orange than female and with a pair of light patches on venter in front of spinnerets. Posterior median eyes 0.7 diameter of anterior medians, laterals 0.6 diameter. Anterior median eyes 0.8 diameter apart. Posterior median eyes 1.1 diameters apart. Second, third and fourth femora each with a row of ventral macrosetae. Third trochanter with one short macroseta. Abdomen with 13 tubercles. Total length 9.4 mm. Carapace 5.4 mm long, 4.4 wide. First femur 6.7 mm, patella and tibia 8.0, metatarsus 4.9, tarsus 1.7. Second patella and tibia 5.9 mm, third 4.1, fourth 5.8.

Note. The female and the male were collected together in Cuba.

Variation. Total length of females 11.5 to 16.0 mm, of males 8.1 to 9.4. The male paratype of *P. cambridgei* has macrosetae on the third and fourth trochanters. The



Figures 40–45. *Parawixia guatemalensis* (O. P.-Cambridge), female. 40–42, epigynum. 40, ventral. 41, posterior. 42, lateral. 43, dorsal. 44, abdomen, ventral. 45, left palpus.

Figures 46–51. *P. tredecimnotata* F. P.-Cambridge. 46–50, female. 46–48, epigynum. 46, ventral. 47, posterior. 48, lateral. 49, dorsal. 50, abdomen, ventral. 51, male palpus.

Figures 52, 53. *P. casa n. sp.*, male. 52, palpus. 53, dorsal.

Figures 54, 55. *P. porvenir n. sp.*, male. 54, palpus. 55, dorsal.

Scale lines 1.0 mm, genitalia 0.1 mm.

female holotype and a male from Yucatan have been illustrated.

Diagnosis. Females have a pair of more or less distinct bulges on the cephalic region (Fig. 49). The female can be separated from other Central American *Parawixia* species by the relatively long, flat scape of the epigynum (Figs. 46, 48). In some individuals the scape has been broken off. The male can be separated by the shape of the relatively small terminal apophysis, the large conductor, and the shape of the median apophysis (Fig. 51). This is the only *Parawixia* species known from the Greater Antilles.

Natural History. Specimens were found in a short tropical rain forest in Campeche, Mexico, and on a building in Jamaica.

Distribution. Southern Mexico, Guatemala, and Greater Antilles (Map 3).

Records. MEXICO *Chiapas*: Tampico, 15 July 1909, ♀ (F. A. Schwarz, USNM). *Campeche*: Chicanna Ruins, ca. 8 km W Xpujil, 18°32'N, 89°31'W, 12–14 July 1983, ♀ (W. Maddison, MCZ). *Yucatan*: Chichen Itza, 16 July 1952, ♂ (J., D. Pallister, AMNH). BELIZE Corosal, 28 June 1975, 2♀ (W. C. Sedgwick, MCZ). JAMAICA *Westmoreland*: Negril, 23–30 Mar. 1981, ♂ (H., L. Levi, MCZ). HAITI Damiens, 1931, ♀ (H. L. Dozier, AMNH).

Parawixia casa new species

Figures 52, 53; Map 2

Holotype. Male holotype from Cali, Colombia, on house, 1973, 1974 (W. Eberhard), in MCZ. The specific name is a noun in apposition after the Spanish word for house.

Description. Male holotype. Carapace orange, with paired spots, sides of thoracic region dusky, dark dusky between median and lateral eyes. Sternum dusky orange with three pairs of clear orange patches. Coxae dusky orange; legs orange to mostly gray and black. A white transverse line on dorsum of abdomen (Fig. 53) between anterior tubercles and a folium in middle; venter dusky with two pairs of tiny white spots in center. Posterior median eyes 0.7

diameter of anterior medians, laterals 0.6 diameter. Anterior median eyes 0.9 diameter apart. Posterior median eyes their diameter apart. Fourth trochanter with two short macrosetae. Third femur only with a distinct row of ventral macrosetae. Abdomen with five tubercles: one pair anterior and three posterior in a row (Fig. 53). Total length 8.0 mm. Carapace 4.2 mm long, 3.4 wide. First legs missing. Second patella and tibia 4.5 mm, third 2.7, fourth 4.0.

Note. The male was first thought to be that of *P. barbacoas*, for which only the female is known, but they differ in coloration of the carapace, of the sternum, and of the venter of the abdomen.

Diagnosis. The peculiar shape of the median apophysis of the palpus (Fig. 52) distinguishes the male from males of other species.

Parawixia porvenir new species

Figures 54, 55; Map 2

Holotype. Male holotype from Finca Chenevo, ca. 20 km N Río Muco, 20 km S El Porvenir, 170 m, Depto. Meta, Colombia, no date (W. Eberhard), in MCZ. The specific name is a noun in apposition after the type locality.

Description. Male holotype. Carapace yellowish with a dusky patch on each side extending posteriorly from below lateral eyes to anterior of thoracic region, and lacking paired dark spots (Fig. 55). Chelicerae yellowish with a dusky streak. Endites, labium dusky yellowish. Sternum dusky with three pairs of clear yellowish patches. Coxae yellowish; legs yellow with dusky marks and rings. Dorsum of abdomen spotted, with folium outlined with black. Venter dusky with three pairs of small white spots. Posterior median eyes 0.8 diameter of anterior medians, laterals 0.7 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Fourth trochanter with two short macrosetae on one side, one on the other. Second, third, and fourth femora each with ventral row of macrosetae. Abdomen with five tubercles: one pair an-

terior and three posterior median. Total length 5.5 mm. Carapace 2.7 mm long, 2.1 wide. First femur 3.1 mm, patella and tibia 3.5, metatarsus 2.1, tarsus 0.3. Second patella and tibia 2.7 mm, third 1.5, fourth 2.7.

Diagnosis. The first tarsus only, on both sides, is minute. This may be a character of the species or a malformation of the male. The C-shaped embolus, which appears to have a cap, and the distal lobe of the median apophysis make the palpus distinct from that of other species (Fig. 54).

***Parawixia hypocrita* (O. P.-Cambridge)**
Figures 56–62; Map 2

Epeira hypocrita O. P.-Cambridge, 1889: 38, pl. 5, fig. 8, ♂. Male holotype from Bugaba, Chiriquí Prov., Panama, in BMNH, examined. The male was on a pin in alcohol, which was removed. Keyserling, 1892: 109, pl. 5, fig. 81, ♂.

Parawixia hypocrita:—F. P.-Cambridge, 1904: 489, pl. 46, fig. 12, ♂. Roewer, 1942: 871. Bonnet, 1958: 3340.

Description. Female from Barro Colorado Island, Panama. Carapace orange-brown with darker spots. Sternum, coxae, legs orange-brown. Dorsum of abdomen black-brown and white (Fig. 59); venter black with a white spot in center (Fig. 60). Posterior median eyes 0.8 diameter of anterior medians, laterals 0.7 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Abdomen with about 10 tubercles (Fig. 59). Total length 11.7 mm. Carapace 5.0 mm long, 4.0 wide. First femur 6.2 mm, patella and tibia 7.7, metatarsus 4.6, tarsus 1.5. Second patella and tibia 6.8 mm, third 4.0, fourth 6.2.

Male holotype. Color as in female, except for abdominal pattern of the holotype (Fig. 62). Posterior median eyes 0.6 diameter of anterior medians, anterior laterals 0.6 diameter, posterior laterals 0.5 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Fourth trochanter with two short macrosetae. Total length 6.4 mm. Carapace 3.6 mm long, 2.7 wide. First fe-

mur 5.2 mm, patella and tibia 6.1, metatarsus 3.4, tarsus 1.1. Second patella and tibia 5.3 mm, third 2.5, fourth 3.7.

Note. The species is common in Panama, and males and females were collected together.

Variation. Total length of females from 10.2 to 15.0 mm, of males 6.2 to 7.2. Specimens from Napo, Ecuador, lack the median ventral white spot. The male holotype and a female from Barro Colorado Island, Panama, were illustrated.

Diagnosis. The abdomen of the females is trapezoidal (Figs. 59, 62). Females can be separated from similar species by the small, square, posterior median plate of the epigynum (Fig. 57). The palpus of the male differs from that of any other species in having a pointed median apophysis bearing a small knob on its margin (Fig. 61).

Distribution. Guatemala to Roraima Terr., Brazil, and Beni Prov., Bolivia (Map 2).

Records. GUATEMALA Livingston, May, ♀ (USNM). NICARAGUA Musawas, 10–31 Oct. 1955, ♀ (B. Malkin, AMNH). COSTA RICA *Heredia*: La Selva, Dec. 1980, imm. (W. Eberhard 2175, MCZ); Feb. 1986, ♀ (W. Eberhard 3229, MCZ). PANAMA *Panamá*: Barro Colorado Island, 16 July 1954, numerous ♀♀, ♂♂ from several collections (AMNH, MCZ); Experimental Gardens, Chilibre, Fort Sherman, (all A. M. Chickering, MCZ); Gamboa (W. Eberhard, MCZ). COLORADO *Nariño*: La Planada, 1,800 m, 7 km S Choconés, Aug. 1986, ♀ (W. Eberhard, MCZ). ECUADOR *Napo*: Cuyabeno, Puce Field Sta., 1–7 Aug. 1988, ♀ (W. Maddison, MCZ); Cuyabeno, Laguna Grande, 25–29 June 1988, ♀ (W. Maddison, MCZ); Dureno, S. Río Aguarico, 25–30 Sept. 1977, ♀ (L. Peña, AMNH). PERU *Madre de Dios*: Zona Reservada Pakitza, 20 Sept. 1987, ♀ (I. Bohorquez M., MUSM). BRAZIL *Roraima*: Ilha do Maracá, 21 July 1987, 2♀ (A. A. Lise, MCN). BOLIVIA *Beni*: Estac. Biol. Beni, 9 Sept. 1987, ♀ (J. Coddington, S. Larcher, USNM).

Parawixia nesophila Chamberlin and Ivie
Figures 63–68; Map 2

Parawixia nesophila Chamberlin and Ivie, 1936: 52, pl. 16, figs. 141–143, ♀. Female holotype from Barro Colorado Island, Lago Gatún, Panama, in AMNH, examined. Roewer, 1942: 871. Bonnet, 1958: 3340.

Description. Female holotype. Carapace orange with symmetrical dark marks, darkest between median and lateral eyes, lightest between median eyes (Fig. 66). Sternum dusky with paired orange patches on sides. Coxae orange with dusky patches; legs orange with brown spots and rings. Dorsum of abdomen orange-brown with brown streaks and spots, and folium outlined with dark brown (Fig. 66). Venter black with a white patch in middle (Fig. 67). Posterior median eyes 0.8 diameter of anterior medians, laterals 0.8 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Abdomen with 12 tubercles; the anterior lateral tubercle is double and the tubercle above the spinnerets is missing (Fig. 66). Total length 12.0 mm. Carapace 6.1 mm long, 4.8 wide. First femur 6.8 mm, patella and tibia 8.5, metatarsus 5.3, tarsus 1.5. Second patella and tibia 7.7 mm, third 4.4, fourth 7.0.

Male from Barro Colorado Island. Color as in female, but carapace without dark marks. Posterior median eyes 0.7 diameter of anterior medians, anterior laterals 0.7 diameter, posterior laterals 0.6 diameter. Anterior median eyes 0.7 diameter apart. Posterior median eyes their diameter apart. Fourth trochanter with two short macrosetae. Abdomen with 12 tubercles: the second, third, and fourth pairs small. Total length 8.0 mm. Carapace 4.7 mm long, 3.9 wide. First femur 6.0 mm, patella and tibia 7.0, metatarsus 4.2, tarsus 1.4. Second patella and tibia 5.4 mm, third 3.1, fourth 4.8.

Note. The male was collected at the type locality.

Variation. Total length of females 9.0 to 14.4 mm, of males 8.0 to 8.8. All illustrations were made from Barro Colorado Island specimens.

Diagnosis. The 13 abdominal tubercles, with anterior laterals double (Fig. 66), and the narrow median posterior plate of the epigynum, bordered on each side by convex margins of the lateral plates (Fig. 64), distinguish this species from the Brazilian *P. inopinata* (Fig. 70). The male differs from *P. guatemalensis* (Fig. 45) and *P. inopinata* (Fig. 73) by the shape of the terminal apophysis and median apophysis of the palpus (Fig. 68), and from *P. guatemalensis* by having a median white patch on the underside of the abdomen.

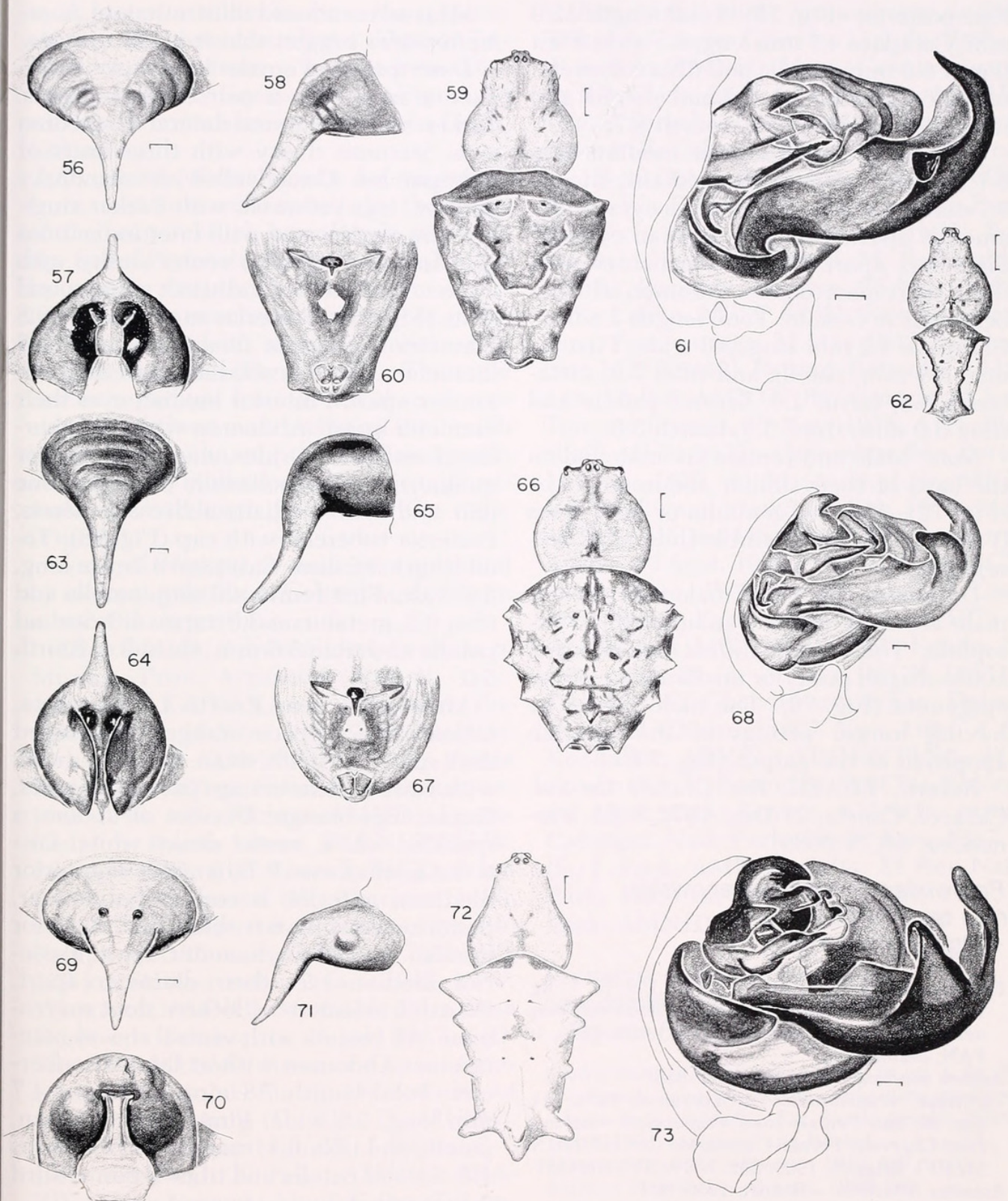
Natural History. *Parawixia nesophila* is apparently found in forested areas. A male was found in Costa Rica in leaf litter.

Records. COSTA RICA Hacienda de Limón[?, unknown locality], ♀ (USNM). *Puntarenas*: Rincón de Osa, 15 Aug. 1966, ♂ (S. Peck, AMNH). PANAMA *Colon*: Paraíso, Feb. 1911, ♀ (E. A. Schwarz, USNM). *Panamá*: Barro Colorado Island, Lago Gatún, Aug. 1928, 2♀ (A. M. Chickering, AMNH); July 1936, ♀; Aug. 1939, 2♀; July 1950, ♀; July 1954, ♀; Aug. 1954, ♂, imm. (all A. M. Chickering, MCZ); ♀ (Y. Lubin, MCZ).

Parawixia inopinata Camargo
Figures 69–73; Map 2

Parawixia inopinata Camargo, 1950: 223, pl. 2, figs. 7–9, pl. 13, figs. 2, 3, ♂. Male holotype from Boracéia, Mun. Salesópolis, Est. São Paulo, Brazil, in MZSP no. 1347, examined. Brignoli, 1983: 278.

Description. Female from Rio Grande do Sul, Brazil. Carapace orange with a pair of darker spots on cephalic region and a thin dusky line on each side of thoracic region (Fig. 72). Sternum dusky orange. Coxae orange with dusky distal patch; legs orange with black rings on first two femora and at ends of tibiae and tarsi. Dorsum of abdomen yellowish with black patches (Fig. 72); venter black behind epigynum, white in front of spinnerets. Posterior median eyes 0.7 diameter of anterior medians, laterals 0.6 diameter. Anterior median eyes 0.8 diameter apart. Posterior median eyes their diameter apart. Abdomen narrow with three pairs of lateral tubercles,



Figures 56–62. *Parawixia hypocrita* (O. P.-Cambridge). 56–60, female. 56–58, epigynum. 56, ventral. 57, posterior. 58, lateral. 59, dorsal. 60, abdomen, ventral. 61, 62, male. 61, left palpus. 62, dorsal.

Figures 63–68. *P. nesophila* Chamberlin and Ivie. 63–67, female. 63–65, epigynum. 63, ventral. 64, posterior. 65, lateral. 66, dorsal. 67, abdomen, ventral. 68, male palpus.

Figures 69–73. *P. inopinata* Camargo. 69–72, female. 69–71, epigynum. 69, ventral. 70, posterior. 71, lateral. 72, dorsal. 73, male palpus.

Scale lines 1.0 mm, genitalia 0.1 mm.

four posterior (Fig. 72). Total length 12.0 mm. Carapace 4.7 mm long, 3.5 wide. First femur 6.9 mm, patella and tibia 8.0, metatarsus 6.0, tarsus 1.9. Second patella and tibia 4.7 mm, third 3.9, fourth 6.7.

Male holotype. Posterior median eyes 0.7 diameter of anterior medians, laterals 0.7 diameter. Anterior median eyes 1.3 diameters apart. Posterior median eyes 1.5 diameters apart. Fourth trochanter with three short macrosetae. Abdomen with tubercles as in female. Total length 7.8 mm. Carapace 4.2 mm long, 3.3 wide. First femur 5.8 mm, patella and tibia 7.3, metatarsus 5.5, tarsus 1.6. Second patella and tibia 5.0 mm, third 3.0, fourth 5.0.

Note. Male and female are matched on the basis of their similar abdomen shape (Fig. 72). Also the genitalia of both sexes (Figs. 69–71, 73) resemble those of *P. nesophila*.

Diagnosis. Both the male and the female are close to the Panamanian *P. nesophila*. The female differs by having a bottle-shaped posterior median plate of the epigynum (Fig. 70). The male differs by having longer prongs of the median apophysis of the palpus (Fig. 73).

Record. BRAZIL *Rio Grande do Sul*: Caracol, Canela, 27 Dec. 1972, ♀ (M. Fernandez, MCN 0689).

Parawixia velutina (Taczanowski),
new combination

Figures 74–80; Map 3

Epeira velutina Taczanowski, 1878: 159, pl. 1, fig. 10, ♀. Female lectotype here designated from wasp nest from Amable María, Depto. Junín, Peru, in PAN, examined.

Aranea velutina:—Roewer, 1942: 855.

"*Araneus*" *eriphoroides* di Caporiacco, 1954: 111, figs. 29, 29a. Female from *Trypoxylon* wasp nest from Charvein, French Guiana, lost (not in MNHN, MZUF). Brignoli, 1983: 262. NEW SYNONYMY.

Araneus velutinus:—Bonnet, 1955: 627.

Note. The type collection from a wasp nest contains the female lectotype and one female and one immature paralectotype of *E. velutina*, three female paralectotypes, that are probably *P. ouro*, and a male and an immature paralectotype, that are *Wagneriana jelskii*.

Measurements and illustrations of *A. eriphoroides* suggest that it is this species.

Description. Female lectotype. Carapace orange with a pair of dusky spots, darker on clypeus and lateral to median eyes. Sternum dusky with three pairs of light patches. Coxae yellowish with dusky patches; legs yellowish with darker rings. Dorsum of abdomen with faint indications of a folium (Fig. 78); venter dusky with three to four pairs of indistinct white round spots (Fig. 79). Posterior median eyes 0.8 diameter of anterior medians, laterals 0.7 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Abdomen with 15 tubercles: four pairs on sides, one small anterior median, and six posterior. Of these, one pair and four medians above spinnerets. Posterior tubercles with cap (Fig. 78). Total length 9.6 mm. Carapace 4.7 mm long, 3.6 wide. First femur 4.5 mm, patella and tibia 6.2, metatarsus 3.6, tarsus 1.3. Second patella and tibia 5.6 mm, third 3.1, fourth 5.0.

Male from near Puerto Lleras, Meta, Colombia. Carapace orange with paired dark spots and white setae. Sternum dusky with pairs of clear orange patches on sides. Coxae, legs orange. Dorsum of abdomen speckled white, venter dusky white. Posterior median eyes 0.7 diameter of anterior medians, anterior laterals 0.7 diameter, posterior laterals 0.6 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Fourth trochanter with three stout macrosetae. All femora with ventral row of macrosetae. Abdomen with at least 11 tubercles. Total length 7.8 mm. Carapace 4.7 mm long, 3.8 wide. First femur 5.2 mm, patella and tibia 6.4, metatarsus 3.7, tarsus 1.3. Second patella and tibia 5.4 mm, third 3.1, fourth 4.3.

Note. Males and females were collected together in Mato Grosso, and both were collected at a second locality in Mato Grosso although not together.

Variation. Total length of females 11 to 13.6 mm, of males 6.2 to 9.2. The anterior median tubercle of the abdomen and the

most posterior tubercle above the spinnerets may be present or absent. Figures 74–79 were made from a female from Diamantina, Minas Gerais, Brazil; Figure 80 was made from a male from Meta Dept., Colombia.

Diagnosis. Females can be separated from most *Parawixia* species by the shape of the scape, which has a knob above its tip. From *P. monticola* they are separated by another feature of the epigynum: the lateral plates overhang the median plate, forming a slit with almost parallel edges in posterior view (Figs. 75, 76). The male can be separated from males of most species by the three macrosetae on the fourth trochanter, by having the median apophysis distally bilobed, and having proximally a small tooth just above the radix (Fig. 80).

Natural History. A male was collected by sweeping shrubs in Colombia, and from a forest in Argentina.

Distribution. Amazon area, Guianas to Misiones Prov., Argentina (Map 3).

Records. GUYANA nr. Yupukarri, Rupununi Riv., 10 Nov. 1937, ♀ (W. G. Hassler, AMNH). COLOMBIA *Meta*: Monte Redondo, 1,500 m, 45 km W Villavicencio, June 1949, ♂ (L. Richter, AMNH); Lomalandina, nr. Puerto Lleras, 3°16'N, 73°23'W, 26 Sept. 1985, ♂ (B. Carroll, MCZ); 6 km SW Puerto Lopez, ♀ (W. Eberhard 1480, MCZ). PERU *Apurímac*: Ninabamba, Río Pampas, [2,135 m, ca. 13°28'N, 73°49'W], 129 km SE Ayacucho, 2 Oct. 1947, ♀ (W. Weyrauch, AMNH). *Madre de Dios*: Zona Reservada Tambopata, 25 July 1987, ♀ (D. Silva D., MUSM); Reserva Cuzco Amazonico, 15 km NE Puerto Maldonado, 14 July 1989, ♀, imm. (D. Silva D., MUSM). BOLIVIA *La Paz*: Miguilla, 1,800 m, 2–3 Dec. 1984, ♀ (L. E. Peña, AMNH). BRAZIL *Goiás*: Fazenda Mongolinho, Corumbá, 8 June 1942, ♂ (K. Lenko, MZSP 6663). *Mato Grosso*: Chapada dos Guimarães, 18 Nov. 1983, 2♂ (M. Hoffman, MCN 11982, 11984); Barra dos Bugres, Nov. 1983, ♀ (A. Cerrutti, MNRJ); no date, ♂ (A. Cerrutti, MNRJ); Barra do Tapirapé, Jan. 1963, 2♂ (B. Malkin, AMNH); 17 Jan.–2 Feb., ♀ (B.

Malkin, MZSP 3403). *Mato Grosso do Sul*: 50 km S Campo Grande, 17 July 1988, ♂ (P. Salinas, AMNH). *Minas Gerais*: Carmo do Rio Claro, 3♂ (J. C. Carvalho, MNRJ); Minas Serinha Diamantina, Jan.–Mar. 1943, ♀ (E. Cohn, AMNH); Morro da Graça, 18–20 Oct. 1964, ♀ (Exped. Zool. MZSP 4180). *São Paulo*: 6 km N Paraguaçu Paulista, Feb. 1965, ♂ (G. Eiten, AMNH); Botucatu, 12 Feb. 1987, ♀ (I. M. P. Rinaldi, IMPR); Fazenda Itaquere, 25 Nov. 1963, ♂ (K. Lenko, MZSP 6962); Fazenda Graciosa, Piraçununga, 31 May 1947, ♂ (Schubart, MZSP 6442). *Paraná*: Rôlandia, 1948, ♂ (A. Maller, AMNH). *Rio Grande do Sul*: Tenente Portela, 29 Nov. 1978, ♂ (H. Bischoff, MCN 8436); Garruchos, São Borja, 11 Dec. 1975, ♀, 2♂ (A. A. Lise, MCN 10978); Itapua, Viamão, 5 Feb. 1975, ♀ (A. A. Lise, MCN 2446); Ponta Grossa, Porto Alegre, 13 Sept. 1975, ♀ (A. A. Lise, MCN 3013); Bage, 28 Oct. 1981, ♀ (A. A. Lise, MCN 9966); Farroupilha, 29 Sept. 1978, ♀ (H. Bischoff, MCN 8320); Passo Fundo, 12 Oct. 1985, 2♀ (A. A. Lise, MCN 14341). PARAGUAY *Chaco*: Parque Nac. Defensores del Chaco, 18–27 Nov. 1984, ♂ (J. Kochalka, IBNP). ARGENTINA *Misiones*: ♀ (R. V. Partridge, MACN); Eldorado, 1964, ♂ (A. Kovacs, AMNH). *Jujuy*: Calilegua Natl. Park, 18–28 Dec. 1987, ♀ (S., J. Peck, AMNH). *Salta*: El Rey Natl. Park, 1,000 m, 5–15 Dec. 1987, ♀ (S., J. Peck, AMNH).

Parawixia monticola (Keyserling),
new combination
Figures 81–87; Map 3

Epeira monticola Keyserling, 1892: 94, pl. 4, fig. 70, ♀. Female holotype and four early instar paratypes from Serra Vermelha, Est. Rio de Janeiro, Brazil, in BMNH, examined and labeled.

Aranea monticola:—Roewer, 1942: 847.

Araneus monticola:—Bonnet, 1955: 546.

Description. Female holotype. Carapace orange-brown with dark patches and light and dark setae (Fig. 85). Sternum dark brown with pairs of light patches on sides. Legs with darker rings. Dorsum of abdomen with patches of different shades of brown (Fig. 85); venter dusky to black

(Fig. 86). Posterior median eyes 0.8 diameter of anterior medians, anterior laterals 0.8 diameter, posterior 0.7 diameter. Anterior median eyes slightly less than their diameter apart. Posterior median eyes their diameter apart. Abdomen with three pairs of lateral tubercles and five posterior (Fig. 85). Total length 12 mm. Carapace 5.2 mm long, 3.7 wide. First femur 5.7 mm, patella and tibia 7.1, metatarsus 4.5, tarsus 1.5. Second patella and tibia 6.4 mm, third 3.9, fourth 6.1.

Male from Minas Gerais, Brazil. Color as in female. Posterior median eyes 0.7 diameter of anterior medians, laterals 0.7 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Fourth trochanter with two macrosetae on right, three on left. Abdomen as in female. Total length 7.8 mm. Carapace 4.2 mm long, 3.6 wide. First femur 5.1 mm, patella and tibia 6.4, metatarsus 3.2, tarsus 1.2. Second patella and tibia 5.1 mm, third 3.0, fourth 4.7.

Note. The males were not collected with females but with two males of *P. velutina*. Their similarity to females in appearance and being collected within the same range suggested the match.

Variation. Total length of females 9.6 to 13.6 mm. The female from Bahia had the posterior median plate narrower than the one illustrated (Figs. 82, 83). Females from Itabapoana and Porto Cabral had the epigynum with a larger base relative to the length of the scape. Both females belonging to the MNRJ had their scapes broken off. Figures 81, 82, 85, 86 were made from the holotype; Figures 83, 84, from a specimen from Sumaré, Rio de Janeiro, in AMNH.

Diagnosis. In posterior view (Figs. 82, 83), the epigynum of *P. monticola* has a round posterior median plate, constricted dorsally, while that of *P. velutina* is very narrow over most of its length (Figs. 75, 76). But there is considerable variation in the shape of the posterior median plate and the shape of its base.

Natural History. A female was collected

in Espírito Santo in an orb on a shrub in woods, another in Itabapoana hanging on a thread from a leaf of a shrub in woods at night.

Records. BRAZIL *Bahia*: Rio Jacuípe, ♀ (MNRJ). *Espírito Santo*: Apiacá, 26 July 1987, ♀ (R. L. C. Baptista, RLCB). *Minas Gerais*: Lagôa Santa, ♀ (Reinhardt, ZMK); Carmo do Rio Claro, 2♂ (J. C. Carvalho, MNRJ). *Rio de Janeiro*: Sumaré, Rio de Janeiro, Jan., Feb. 1946, 2♀ (H. Sick, AMNH); Rio de Janeiro, 26 May 1979, ♀ (C. J. Becker, MCN 8579), 14 Sept. 1987, ♀ (R. Sanches, RLCB); Botanical Garden, Rio de Janeiro, Nov. 1983, ♀ (R. Domingues, RLCB); Bom Jesus do Itabapoana, 14 June 1987, ♀ (R.L.C. Baptista, RLCB). *São Paulo*: Porto Cabral, 1941, ♀ (L. Travassos Filho, MZSP 9579). *Rio Grande do Sul*: Porto Alegre, ♀ (MNRJ).

Parawixia hoxaea (O. P.-Cambridge) Figures 88–92; Map 3

Epeira hoxaea O. P.-Cambridge, 1889: 35, pl. 5, fig. 6, ♀. Two female syntypes and one abdomen from Tolé, Chiriquí Prov., Panama, in BMNH no. 1905.4.28.2831–2832, examined. Keyserling, 1892: 87, pl. 4, fig. 65, ♀.

Parawixia hoxaea:—F. P.-Cambridge, 1904: 490, pl. 46, fig. 15, ♀. Roewer, 1942: 871. Bonnet, 1955: 3340.

Note. There are two female syntypes and one abdomen. The abdomen may be of a different species but it may be the epigynum of this abdomen that was illustrated by O. P.-Cambridge. Here I follow Keyserling (1892) and F. P.-Cambridge (1904), who illustrated the epigynum of a complete specimen (but with cephalothorax and abdomen separated). The third specimen, with the abdomen attached to the carapace, has the scape of the epigynum broken. All had been on pins in alcohol and are in poor condition. The pins were carefully removed.

Description. Female syntype. Carapace dull orange with brown marks. Chelicerae, dark orange. Labium brown, endites orange to brown. Sternum orange-brown with three pairs of light patches. Coxae

orange with brown; legs orange with indistinct brown rings and spots. Dorsum of abdomen brown and white (Fig. 91); venter with indistinct white pigment spots (Fig. 92). Posterior median eyes 0.8 diameter of anterior medians, anterior laterals 0.8 diameter, posterior laterals 1 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Abdomen with 11 tubercles: three pairs on sides, one pair posterior and three median posterior (Fig. 91). Total length 9 mm. Carapace 3.4 mm long, 2.7 wide. First femur 4.8 mm, patella and tibia 5.4, metatarsus 3.4, tarsus 1.1. Second patella and tibia 4.4 mm, third 2.2, fourth 4.0.

Illustrations. A syntype was illustrated.

Diagnosis. All specimens are smaller and have a shorter scape (Figs. 88, 90) than *P. velutina* (Figs. 74, 77).

Record. PANAMA Chiriquí: El Volcán, 28 Feb. 1936, ♀ (W. J. Gertsch, AMNH).

Parawixia matiapa new species

Figures 93, 94; Map 2

Holotype. Male holotype from Hacienda Matiapa, Camacã, Bahia State, Brazil, 14 Oct. 1978 (J. S. Santos), in MCN no. 11099a. The specific name is a noun in apposition after the type locality.

Description. Male holotype. Carapace orange. Chelicerae, endites orange. Labium brown. Sternum orange, dusky only in center. Legs orange with indistinct darker patches. Abdomen dorsum darkest in median area; venter dusky with a pair of white spots behind genital groove. Posterior median eyes 0.7 diameter of anterior medians, laterals 0.5 diameter. Anterior median eyes slightly less than their diameter apart. Posterior median eyes slightly more than their diameter apart. Fourth trochanter with two short macrosetae on right, three on left. Second, third, and fourth femora with a ventral row of macrosetae. Abdomen with one pair of tubercles anterior, four tubercles posterior, and three pairs of bulges on sides; no caps on tubercles (Fig. 94). Total length 7.5 mm. Carapace 4.1 mm long, 3.2 wide. First femur 5.6 mm, patella and tibia 6.6, metatarsus 3.5, tarsus

0.5. Second patella and tibia 4.7 mm, third 2.8, fourth 4.2.

Variation. Total length of males 5.5 to 7.8 mm. The male from Colombia has macrosetae on the fourth trochanters as in the holotype; the other males have only two macrosetae. Figure 93 of the palpus was made from the male from Utcuyacu, Peru; Figure 94, from the holotype.

Diagnosis. This male differs from those of *P. monticola* and *P. divisoria* by the sculpturing of the base of the median apophysis and the position of the conductor in the palpus (Fig. 93).

Distribution. Trinidad, northern Colombia, to Junín Dept., Peru, and Bahia States, Brazil (Map 2).

Paratypes. TRINIDAD Piarco, 3–6 Jan. 1955, ♂ (A. M. Nadler, AMNH). COLOMBIA Magdalena: Pueblo Bello, 1,100 m, Sierra Nevada de Santa Marta, 10, 11 June 1968, ♂ (B. Malkin, AMNH). PERU Junín: Utcuyacu, Mar. 1948, ♂ (F. Woytkowsky, AMNH).

Parawixia tomba new species

Figures 95, 96; Map 3

Holotype. Male holotype from Explorer's Inn, Tambopata Reserve, Depto. Madre de Dios, Peru, 30 Mar. 1988 (J. Palmer, D. Smith), in MUSM. The specific name is an arbitrary combination of letters.

Description. Male holotype. Carapace orange-yellow with black spots. Chelicerae, endites orange-yellow. Sternum dusky in center. Legs yellowish with black spots. Abdomen whitish, dusky on sides; venter with black spots underlain by white. Posterior median eyes 0.6 diameter of anterior medians, anterior laterals 0.5 diameter, posterior laterals 0.4 diameter. Anterior median eyes slightly less than their diameter apart. Posterior median eyes their diameter apart. Fourth trochanter with five macrosetae on right, three on left. Second, third, and fourth femora each with ventral row of macrosetae. Abdomen with one pair of tubercles anterior and four distinct tubercles posterior (Fig. 96). Total length 9.6 mm. Carapace 4.5 mm long, 3.4 wide. First femur 6.3 mm, patella and tibia 7.2, meta-

tarsus 4.2, tarsus 1.4. Second patella and tibia 5.4 mm, third 3.1, fourth 4.6.

Illustration. The holotype was illustrated.

Diagnosis. This male differs from those of *P. monticola* and *P. divisoria* by the sculpturing of the base of the median apophysis and the position of the conductor in the palpus (Fig. 95).

Paratype. BRAZIL *Roraima*: Estação Ecologica de Maracá, Ilha de Maracá, Rio Uraricuera, 17 July 1987, ♂ (A. A. Lise, MCN 19281).

Parawixia divisoria new species

Figures 97–103; Map 3

Holotype. Female holotype and male paratype from Divisoria, Huánuco [La Divisoria, Dpto. Ucayali, 09°05'S, 75°46'W], 1,700 m, Peru, 23 Sept. to 3 Oct. 1946 (W. Woytkowski), in AMNH. The specific name is a noun in apposition after the type locality.

Description. Female holotype. Carapace orange with paired dark patches and dark area between median and lateral eyes. Sternum brown with pairs of light orange patches. Coxae orange with brown; legs orange with indistinct brown rings. Dorsum of abdomen gray with brown patches (Fig. 100); venter black with a pair of white spots (Fig. 101). Posterior median eyes 0.9 diameter of anterior medians, anterior laterals 0.8 diameter, posterior laterals 0.8 diameter. Anterior median eyes slightly more than their diameter apart. Posterior median eyes slightly more than their diameter apart. Abdomen with 10 tubercles, none posterior above spinnerets (Fig. 100). Total length 9.5 mm. Carapace 4.2 mm

long, 3.3 wide. First femur 4.9 mm, patella and tibia 6.0, metatarsus 3.3, tarsus 1.2. Second patella and tibia 5.1 mm, third 3.0, fourth 4.8.

Male paratype from Divisoria, Peru. Coloration as in female. Posterior median eyes 0.7 diameter of anterior medians, laterals 0.6 diameter. Anterior median eyes 0.7 diameter apart. Posterior median eyes their diameter apart. Third trochanter with one macroseta on one side, fourth with three short macrosetae, two thick, one thin. Second and third femora each with a ventral row of macrosetae. Abdomen with 5 tubercles: two anterior, three posterior (Fig. 103). Total length 7.0 mm. Carapace 3.5 mm long, 3.1 wide. First femur 5.2 mm, patella and tibia 6.0, metatarsus 3.1, tarsus 1.2. Second patella and tibia 4.2 mm, third 2.5, fourth 3.9.

Variation. Total length of females 7.0 to 8.8 mm. The male paratype has only two macrosetae on the fourth trochanter, none on the third. The female holotype and the male paratype collected with it were illustrated.

Diagnosis. Females differ from those of *P. tarapoa* by having a longer scape and a narrower posterior median plate in the epigynum (Fig. 98). The male differs from those of similar species by the nearly round conductor and shorter median apophysis (Fig. 102).

Natural History. A male was found in a rain forest in Rondônia.

Paratypes. ECUADOR *Napo*: Dureno, 200 m, Río Aguarico, 00°04'S, 76°34'W, 23–30 Sept. 1977, ♀ (L. Peña, AMNH).

Figures 74–80. *Parawixia velutina* (Taczanowski). 74–79, female. 74–77, epigynum. 74, ventral. 75, 76, posterior. 77, lateral. 78, dorsal. 79, abdomen, ventral. 80, male left palpus.

Figures 81–87. *P. monticola* (Keyserling). 81–86, female. 81–84, epigynum. 81, ventral. 82, 83, posterior. 84, lateral. 85, dorsal. 86, abdomen, ventral. 87, male palpus.

Figures 88–92. *P. hoxaea* (O. P.-Cambridge), female. 88–90, epigynum. 88, ventral. 89, posterior. 90, lateral. 91, dorsal. 92, abdomen, ventral.

Figures 93, 94. *P. matiapa* n. sp., male. 93, palpus. 94, dorsal.

Figures 95, 96. *P. tomba* n. sp., male. 95, palpus. 96, dorsal.

Scale lines 1.0 mm, genitalia 0.1 mm.



PERU *Cuzco*: Sayllapampa, 3,800 m, 13°25'S, 71°40'W, 23 Sept. 1987, ♂ (D. Silva D., MUSM). BRAZIL *Bahia*: Fazenda N. Senhora das Neves, Itamaraju, 9 Oct. 1978, ♀ (J. S. Santos, MCN 11021). *Rondônia*: Fazenda Rancho Grande, NE Cacauplandia, 6–15 Dec. 1990, ♀ (G. B. Edwards, FSCA). BOLIVIA *La Paz*: Guanay, N La Paz, Tres Esteros, 19–25 Aug. 1989, ♀, ♂ (L. Peña, AMNH).

***Parawixia tarapoa* new species**

Figures 104–109; Map 2

Holotype. Female holotype from Tarapoa, Cuyabeno, 0°07'S, 76°20'W, Napa Prov., Ecuador, 23 June to 1 July 1988 (W. Maddison), in MCZ. The specific name is a noun in apposition after the type locality.

Description. Female from Manaus, Brazil. Carapace orange with paired darker spots. Sternum dusky yellow. Coxae yellowish with dusky marks; legs light orange with dusky rings, which are darker on proximal articles. Dorsum of abdomen with dark brown median band bordered by white (Fig. 107); venter black with a pair of small white spots, spots almost touching (Fig. 108). Tubercles of lateral eyes small and indistinct. Posterior median eyes 0.8 diameter of anterior medians, laterals 0.7 diameter. Anterior median eyes their diameter apart. Posterior median eyes slightly more than their diameter apart. Abdomen narrow, with five tubercles, and two pairs of swellings on sides (Fig. 107). Total length 8.0 mm. Carapace 3.4 mm long, 2.6 wide. First femur 4.0 mm, patella and tibia 4.8, metatarsus 2.9, tarsus 1.1. Second patella and tibia 4.0 mm, third 2.5, fourth 4.0.

Male from Manaus. Color as in female, except for a transverse white line between anterior lateral tubercles on dorsum of abdomen. Posterior median eyes 0.7 diameter of anterior medians, laterals 0.6 diameter. Anterior median eyes their diameter apart. Posterior median eyes slightly more than their diameter apart. Fourth trochanter with two thick macrosetae. Ab-

domen with an anterior pair of lateral tubercles, three posterior tubercles in a median row, and two pairs of slight humps on each side. Total length 6.4 mm. Carapace 3.5 mm long, 2.9 wide. First femur 4.5 mm, patella and tibia 5.2, metatarsus 2.7, tarsus 1.0. Second patella and tibia 3.6 mm, third 2.1, fourth 3.4.

Note. The male and the female were collected together in Manaus.

Variation. The holotype is darker than the specimen described and figured (Fig. 107) and 9.3 mm in total length. All illustrations were made from specimens from Manaus.

Diagnosis. The large, wide median plate of the epigynum (Fig. 105) separates females of *P. tarapoa* from those of *P. divisoria*, which has a narrower median plate (Fig. 98). The male is separated by the wider base of the median apophysis and the slightly different shape of the embolus of the palpus (Fig. 109).

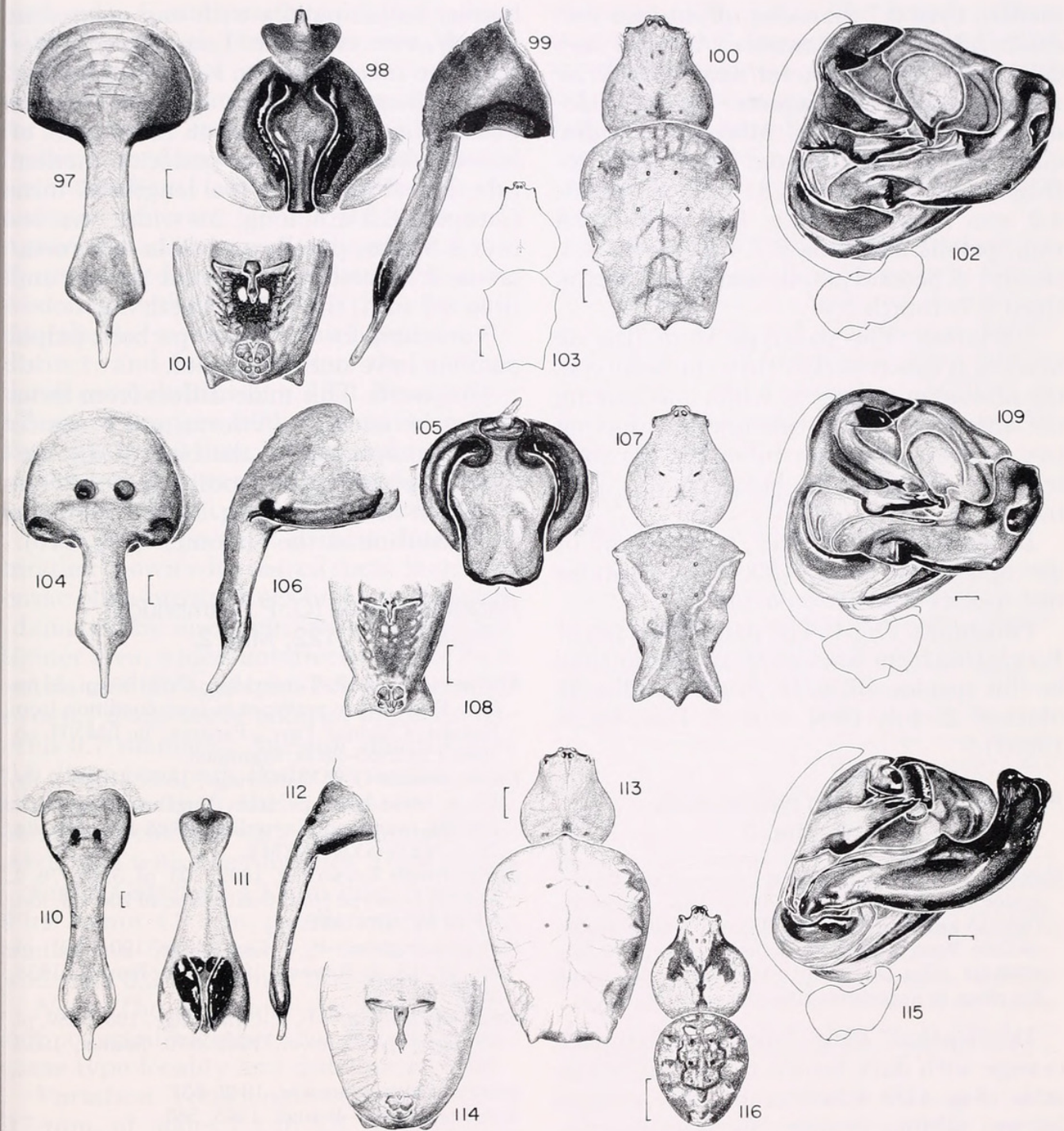
Paratypes. PERU *Pasco*: Villa America, nr. Quebrada Castillo, 298 m, 28 Oct. 1986, ♂ (D. Silva D., MUSM). *Cuzco*: Sayllapampa, 3,800 m [13°25'S, 71°40'W], 23 Sept. 1987, ♂ (D. Silva D., MUSM). BRAZIL *Amazonas*: Manaus, 3 Sept. 1986, ♀, ♂ (M. B. Barcia, MCN 19658). *Mato Grosso*: NE Cáceres, 20 July 1988, ♀ (P. Salinas, AMNH).

***Parawixia ouro* new species**

Figures 110–114; Map 3

Holotype. Female holotype from Ouro Preto do Oeste, Rondônia State, Brazil, Oct. 1982 (W. Roth), in MZSP ex RLCB. The specific name, the Portuguese word for gold, is a noun in apposition after the type locality.

Description. Female holotype. Carapace orange-yellow. Chelicerae orange. Labium, endites brown. Sternum dusky with pairs of light patches. Coxae orange-yellow; legs orange-yellow with indistinct dusky rings. Dorsum of abdomen mostly whitish, sides brown (Fig. 113); venter with a white rectangular patch between genital groove and spinnerets (Fig. 114). Posterior



Figures 97–103. *Parawixia divisoria* n. sp. 97–101, female. 97–99, epigynum. 97, ventral. 98, posterior. 99, lateral. 100, dorsal. 101, abdomen, ventral. 102, 103, male. 102, left palpus. 103, dorsal.

Figures 104–109. *P. tarapoa* n. sp. 104–108, female. 104–106, epigynum. 104, ventral. 105, posterior. 106, lateral. 107, dorsal. 108, abdomen, ventral. 109, male palpus.

Figures 110–114. *P. ouro* n. sp., female. 110–112, epigynum. 110, ventral. 111, posterior. 112, lateral. 113, dorsal. 114, abdomen, ventral.

Figures 115–116. *P. maldonado* n. sp., male. 115, palpus. 116, dorsal.

Scale lines 1.0 mm, genitalia 0.1 mm.

median eyes 0.7 diameter of anterior medians, laterals 0.7 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Abdomen with four pairs of tubercles on sides, one anterior median, and three posterior (Fig. 113). Total length 11 mm. Carapace 4.2 mm long, 3.1 wide. First femur 5.4 mm, patella and tibia 6.7, metatarsus 4.3, tarsus 1.4. Second patella and tibia 5.8 mm, third 2.7, fourth 5.0.

Variation. The paratype from Ilha de Maracá is much darker than the holotype, the abdomen as long as wide, and lacking the anterior median tubercle, but having two posterior median tubercles. Its total length is 10 mm. The holotype was illustrated.

Diagnosis. The shorter, wider scape of the epigynum (Figs. 110, 112) separates this species from *P. velutina*.

Paratypes. PERU The paralectotypes of *P. velutina* from Amable María, Junín, may be this species. BRAZIL *Roraima*: Ilha de Maracá, 25 July 1987, ♀ (A. A. Lise, MCN 19657).

Parawixia maldonado new species Figures 115, 116; Map 3

Holotype. Male holotype from Reserva Cuzco Amazonico, 12°33'S, 69°03'W, 200 m, Río Madre de Dios, 15 km NE Puerto Maldonado, Depto. Madre de Dios, Peru, 29 June 1989, male paratype 13 July 1989 (D. Silva D.), in MUSM. The specific name is a noun in apposition after the type locality.

Description. Male holotype. Carapace orange with dark brown marks and white setae (Fig. 116). Chelicerae dusky, endites brown, labium orange. Sternum orange, slightly darker in midline. Legs orange with wide dark brown rings and patches. Abdomen black with two pairs of white spots anteriorly and white marks behind tubercles, and a faint darker black outline of a folium (Fig. 116). Sides and venter black. Posterior median eyes 0.7 diameter of anterior medians, laterals 0.7 diameter. Anterior median eyes 0.6 diameter apart. Posterior median eyes their diameter apart. Endite with tooth, palpal femur with tu-

bercle. Palpal patella with one macroseta on left, two on right. Fourth trochanter with two macrosetae on right. Second and third femora each with a ventral row of macrosetae. Abdomen with three pairs of lateral tubercles and two posterior, median tubercles (Fig. 116). Total length 6.7 mm. Carapace 3.5 mm long, 2.9 wide. First femur 3.9 mm, patella and tibia 4.6, metatarsus 2.7, tarsus 1.1. Second patella and tibia 3.7 mm, third 2.0, fourth 3.2.

Variation. In the paratype both palpal patellae have one macroseta.

Diagnosis. This male differs from those of *P. monticola*, *P. divisoria*, and *P. tomba* by the sculpturing of the base of the median apophysis and the position of the conductor in the palpus (Fig. 115), and by the ovoid outline of the abdomen (Fig. 116).

Parawixia rigida (O. P.-Cambridge) Figures 117–122; Map 2

Epeira rigida O. P.-Cambridge, 1889: 36, pl. 5, fig. 5, ♀. Two female syntypes in poor condition from Bugaba, Chiriquí Prov., Panama, in BMNH no. 1905.4.28.2835–2836, examined.

Epeira armata O. P.-Cambridge, 1889: 41, pl. 4, fig. 17, ♂. Male holotype from Bugaba, Panama, in BMNH, examined. Keyserling, 1892: 107, pl. 5, fig. 79, ♂. NEW SYNONYMY.

Epeira rivalis Keyserling, 1892: 103, pl. 5, fig. 76, ♀. Female holotype from Guatemala, in BMNH, lost. NEW SYNONYMY.

Parawixia rigida:—F. P.-Cambridge, 1904: 491, pl. 46, fig. 18, ♀. Roewer, 1942: 871. Bonnet, 1958: 3341.

Parawixia armata:—F. P.-Cambridge, 1904: 489, pl. 46, fig. 11, ♂. Roewer, 1942: 870. Bonnet, 1958: 3339.

Aranea rivalis:—Roewer, 1942: 851.

Araneus rivalis:—Bonnet, 1955: 586.

Note. The syntypes of *E. rigida* and the holotype of *E. armata* were on pins in alcohol and are in poor condition with the legs separate. The pins were carefully removed. The female type of *E. rivalis* is lost, but illustration and description match only this species.

Description. Female from Costa Rica. Carapace light orange with black marks on thoracic region. Labium, endites black. Sternum black with an orange patch on

each side. Coxae orange and black; legs light orange with black spots, streaks and rings. Dorsum of abdomen brown and white with a folium outline (Fig. 120); venter with white spots on brown (Fig. 121). Posterior median eyes 0.7 diameter of anterior medians, anterior laterals 0.7 diameter, posterior laterals 0.6 diameter. Anterior median eyes 0.9 diameter apart. Posterior median eyes 0.8 diameter apart. Abdomen with 10 tubercles: three pairs of laterals, the second and third pairs barely distinct, and four posterior; the median dorsal one indistinct (Fig. 120). Total length 17 mm. Carapace 5.9 mm long, 4.9 wide. First femur 6.9 mm, patella and tibia 8.0, metatarsus 5.0, tarsus 1.8. Second patella and tibia 7.5 mm, third 4.4, fourth 7.2.

Male holotype of *E. armata*. Carapace mottled brown with paired spots. Sternum, coxae olive-brown. Legs brown. Abdomen (damaged by insect pin) with trapezoidal, lighter area, widest anteriorly; venter dark with a median light spot. Posterior median eyes 0.7 diameter of anterior medians; laterals 0.7 diameter. Anterior median eyes 0.6 diameter apart. Posterior median eyes slightly less than their diameter apart. Fourth trochanter with three macrosetae. Abdomen with five tubercles. Total length 7.4 mm. Carapace 4.1 mm long, 3.4 wide. First femur 4.9 mm, patella and tibia 6.2, metatarsus 5.9, tarsus 1.2. Second patella and tibia 3.2 mm, third 3.1, fourth 4.2.

Note. The male and the female were not collected together, but they have the same type locality and distribution.

Variation. Total length of females 12 to 17 mm, of males 7.4 to 8.8. The females have nine or 10 tubercles on the abdomen: the last tubercle, the posterior median, may be missing. The fourth trochanter of the male from Sirena has two macrosetae on one side, three on the other. Figures 117–121 were made from a female from La Selva, Costa Rica; Fig. 122, from the holotype of *E. armata*.

Diagnosis. *Parawixia rigida* differs from other Central American species by having a median white spot on the venter of the

abdomen (Fig. 121). The female differs from those of *P. hypocrita* and *P. nesophila*, which also have a white spot, by having the scape of the epigynum long (Figs. 117, 119, 121) and laterally flattened (Fig. 119). The male differs by the shape of the large curved median apophysis with a distal notch (Fig. 122).

Records. COSTA RICA Hacienda de Limón [?, not located], ♀ (Burgdorf, Schild, USNM). *Heredia:* La Selva, nr. Puerto Viejo, 22 Mar. 1979, ♀ (J. Coddington, MCZ), Feb. 1981, ♀ (W. Eberhard 2204, MCZ). *Puntarenas:* Osa Peninsula, ♂ (MZCR); Sirena, Osa Peninsula, Feb. 1984, ♂ (W. Eberhard, MCZ).

Parawixia kochi (Taczanowski) Figures 123–135; Map 3

Epeira opuntiae:—C. L. Koch, 1845: 102, pl. 383, fig. 909, ♀. Specimens probably from Brazil, lost. Misidentification, not *Epeira opuntiae* Walckenaer, 1841 = *Cyrtophora citricola* (Forskål).

Epeira kochii Taczanowski, 1873: 134. New name for *E. opuntiae* C. L. Koch, not Walckenaer.

Epeira minas Keyserling, 1892: 95, pl. 5, fig. 71, ♀, ♂. Three female, two male syntypes from Rio Minas, Est. Espírito Santo [?, unknown locality], Brazil, in BMNH, examined. NEW SYNONYMY.

Aranea kochii:—Roewer, 1942: 845.

Aranea minas:—Roewer, 1942: 847.

Molinaranea setosa Mello-Leitão, 1948: 169, fig. 11, ♂. Male holotype from Guest [? house] near Moraballi River, Essequibo River, 24 km above Bartica, Guyana (W. Hingston) [locality from label], in BMNH, examined. NEW SYNONYMY.

Parawixia kochi albozonata di Caporiacco, 1948: 655. Female holotype, without abdomen from Conwarook near Potaro River, Guyana, in MZUF, examined; 1954: 99. Brignoli, 1983: 278. NEW SYNONYMY.

Parawixia kochi maculilatera di Caporiacco, 1948: 655. Female holotype from Two Mouths near Essequibo River, Guyana, in MZUF, examined. Brignoli, 1983: 278. NEW SYNONYMY.

Parawixia kochi nigrohumeralis di Caporiacco, 1948: 655. Female holotype from Guyana, in MZUF, examined. Brignoli, 1983: 279. NEW SYNONYMY.

Araneus kochi:—Bonnet, 1955: 525.

Araneus minas:—Bonnet, 1955: 544.

Araneus setosus:—Brignoli, 1983: 263.

Note. C. L. Koch's illustration shows a *Parawixia* with a relatively narrow body and Koch considered the 5-mm-long, curved scape characteristic of this species:

“zwei Linien langen, geschweift gebogenen nadelförmigen Legestachel.” Most other *Parawixia* species with a long scape have a more spherical abdomen. *Parawixia kochi albozonata* is presumably the same species as the other two “subspecies” described by di Caporiacco even though the abdomen is missing. *Parawixia kochi maculilatera* has the characteristic abdomen shape and epigynum of *P. kochi*. *Molinarana setosa* has the characteristic embolus with a round tip and neck of males of *P. kochi*.

Description. Female syntype of *E. minas*. Carapace brown, clypeus darkest. Sternum maculated light and dark brown. Legs brown, indistinctly ringed. Dorsum of abdomen shades of brown with folium outlined with dark (Fig. 126); venter brown with indistinct light patches and some paired white pigment patches (Fig. 127). Posterior median eyes 0.8 diameter of anterior medians, laterals 0.7 diameter. Anterior median eyes slightly less than their diameter apart. Posterior median eyes their diameter apart. Abdomen longer than wide, with three pairs of lateral tubercles and five posterior (Fig. 126). Total length 16 mm. Carapace 6.6 mm long, 5.4 wide. First femur 7.8 mm, patella and tibia 9.5, metatarsus 6.2, tarsus 2.1. Second patella and tibia 9.2 mm, third 5.5, fourth 8.7.

Male syntype of *E. minas*. Carapace orange, less distinctly marked than carapace of female. Fourth trochanter with one short macroseta. Abdomen oval, humps indistinct. Total length 10.5 mm. Carapace 6.2 mm long, 4.8 wide. First femur 6.9 mm, patella and tibia 8.4, metatarsus 5.2, tarsus 1.7. Second patella and tibia 6.7 mm, third 4.2, fourth 6.7.

Variation. Some individuals have a spherical abdomen, but usually the abdomen is longer than wide (Fig. 126). There always are an anterior pair of tubercles and five posterior, with two smaller pairs on the sides. One female from Peru had the anterior lateral tubercles double. There are many individual differences but there is no consistent geographical variation. However, there are consistent geographical differences in the shape of the terminal apophysis, embolus, and base of the median apophysis (Figs. 128–135). Nevertheless, in all palpi the tip of the embolus is round and has a neck, and in all palpi the base of the median apophysis has a similar tooth pointing at the radix (Figs. 128–135). Total length of females 12.8 to 18.8 mm, of males 8.3 to 10.8. Figures 123 to 128 were prepared from a female from the Meta Dept., Colombia; Figure 129 was prepared from a male from Guyana; Figure 130, from the male syntype of *Epeira minas*.

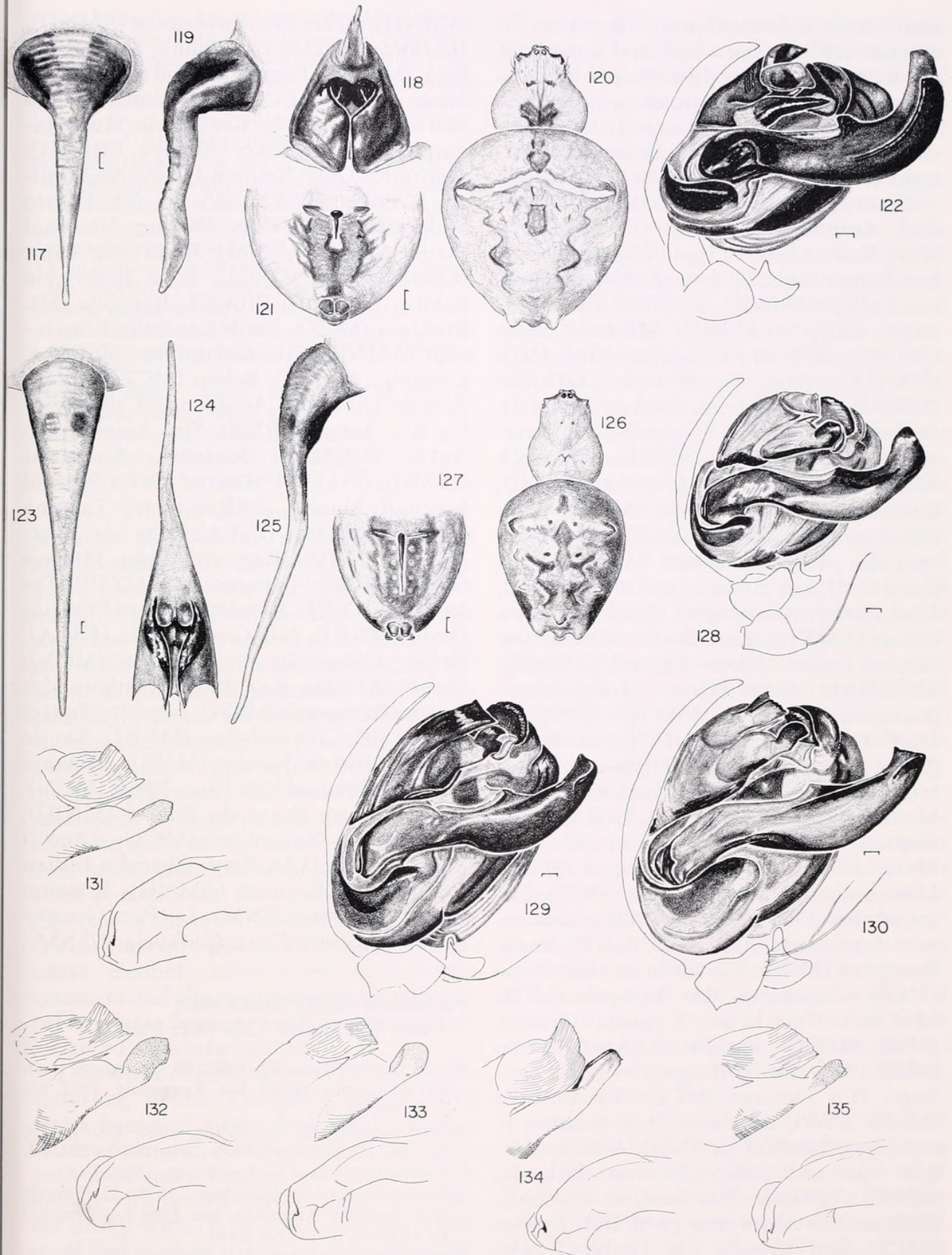
Diagnosis. The female can be recognized by the long, slender scape of the epigynum with concave sides (Figs. 123–125), and usually by the slightly elongate abdomen (Fig. 126). The base of the epigynum has two characteristic dark spots (Fig. 123). This is the only *Parawixia* species in which the male palpus has a round embolus tip above a neck (Figs. 128–135). The fourth trochanter of the male almost always has one macroseta; only one Peruvian male lacked the seta.

Natural History. The species has been collected in its web at night in rain forest, in secondary forest, savanna, and swamp forest, and also on a burned out tree. Specimens collected by H. Höfer near Manaus

Figures 117–122. *Parawixia rigida* (O. P.-Cambridge). 117–121, female. 117–119, epigynum. 117, ventral. 118, posterior. 119, lateral. 120, dorsal. 121, abdomen, ventral. 122, male left palpus.

Figures 123–135. *P. kochi* (Taczanowski). 123–127, female. 123–125, epigynum. 123, ventral. 124, posterior. 125, lateral. 126, dorsal. 127, abdomen, ventral. 128–130, male palpus. 128, (Meta, Colombia). 129, (Guyana). 130, (Espírito Santo, Brazil). 131–135, tip of embolus, terminal apophysis, and base of median apophysis. 131, (Trinidad). 132, (Caripito, Venezuela). 133, (Puerto Lopez, Meta, Colombia). 134, (Cuzco Amazonica, Madre de Dios, Peru). 135, (Barra dos Bugres, Mato Grosso, Brazil).

Scale lines 1.0 mm, genitalia 0.1 mm.



came from a vertical web, 80 cm in diameter, with an open hub and a mesh of 0.7 to 2 cm. If disturbed the spider flees upward and tries to escape on the tree trunk to the side of the web.

Distribution. Trinidad, Venezuela, Amazon area to Paraná State, Brazil (Map 3).

Records. LESSER ANTILLES *Trinidad*: Arima, St. George's Co. (AMNH); Navy Base (AMNH); Port of Spain (MCZ); Los Banguizales, Cedros (AMNH); Maracas Valley (AMNH). VENEZUELA *Monagas*: Caripito (AMNH). *Miranda*: Santa Cruzita, 450 m, Guatopo Nat. Park (USNM). *Arauca*: Rancho Grande (USNM). *Carabobo*: San Esteban (AMNH). *Bolívar*: Maripa, Río Caura (MCZ). *Amazonas*: Cerro Duida (AMNH). GUYANA *Mazaruni-Potaro*: Kaieteur Fall (CUC); Kartabo (CUC); Kamakusa (AMNH); Tumatumari Riv., Potaro (CUC); nr. Mazaruni Riv., Pakaraima Mts. (AMNH). *Rupununi*: Upper Essequibo Riv. (AMNH). *East Berbice-Corentyne*: Canje, Ikuruwa Rivers (AMNH). *East Berbice-Demerara*: "Opora region" [Ororo Marali], (AMNH). SURINAM *Marowijne*: "Langaman" [Langamankondre, 5°42'N, 54°00'W] (AMNH). FRENCH GUIANA nr. Placer Tresor, Roura Mts. (MCZ); Sautero, Matoury (MCZ); nr. Cayenne (MCZ); Saül, Mont Bœuf Mort (AMNH). COLOMBIA *Boyacá*: Río Upia, 850–950 m (AMNH). *Meta*: 15 km SW Puerto Lopez (MCZ); Lomalinda, nr. Puerto Lleras (MCZ). *Caquetá*: Río Orteguaza (AMNH). *Amazonas*: Araracuara (CV). ECUADOR *Napo*: Pompeya (MCZ); Río Coca nr. Río Napo (MCZ); Cuyabeno, Río Tarapuy (MCZ, MECN); Cuyabeno, Laguna Grande (MCZ, MECN). *Pastaza*: 4.1 km SE Puyo (MCZ). *Morona-Santiago*: Los Tayos Santiago, Río Santiago (MCZ); Tayos caves (MCZ). PERU northern Peru: Reanrer [? unknown locality] (AMNH). *Loreto*: Parque Nacional Pacaya-Samiria, Pithecia, 05°06'S, 74°50'W, Río Samirio (MUSM); Estiron, Río Ampiyacu (AMNH); Iquitos (MCZ). *San Martín*: Río Tanbo [Tambo Río Negro, Pósic, 05°59'S, 77°12'W]

(AMNH); 32 km SE Moyobamba (AMNH). *Huánuco*: Dantos-La Molina, SW Puerto Inca, (MUSM); Panguana, 260 m (MUSM); Tingo María (AMNH); 100 km E Tingo María (CAS). *Junín*: Río Tarma, Huacapistana (CUC). *Cuzco*: Atalaya (MUSM). *Madre de Dios*: Reserva Cuzco Amazonico, 12°33'S, 69°03'W, 15 km NE Puerto Maldonado (MUSM); Parque Nacional Manu (MUSM, USNM); Reservada Tambopata (MCZ, MUSM); Zona Reservada Pakitza (MUSM). BRAZIL *Roraima*: Mt. Roraima (MCZ). *Pará*: Canindé, Rio Gurupi (AMNH); Rio Gurupiuna, 50 km E Canindé (AMNH); Belém (MCZ); Jacara-Acanga (AMNH). *Amazonas*: Cururuzinko, Rio Autas (NRMS); Sta. Amelia, Rio Autas (NRMS); Benjamin Constant (MNRJ); 60 km N Manaus (INPA); Canal Janauari, Manaus (INPA); Igapo Tarumã Minim, Manaus (INPA); Ilha da Marchantia (INPA); Reserva Ducke, Manaus (INPA, MCN); Tapurucuara (MZSP); Tobatinga (MNRJ). *Rondônia*: Ouro Preto do Oeste (MNRJ); NE Cacaullandia (FSCA). *Bahia*: Conceição do Almeida (MCN); Ilhéus (RLCB); Faz. Nossa Senhora das Neves, Itamarajú (MCN). *Espírito Santo*: Apicá (RLCB); Colatina (MNRJ). *Rio de Janeiro*: Rio de Janeiro (MNRJ). *Paraná*: Reserva Estadual Vila Rica, Fênix (MCN). *Mato Grosso*: Barra do Bugres (MNRJ); 260 km N Xavantina (MCZ); Utiariti (MZSP). BOLIVIA *Beni*: Chacobo Indian Village, Río Benicito (AMNH); Estacion Biologico Beni (USNM). *La Paz*: Guanay (AMNH). *Santa Cruz*: Cachuela (USNM).

Parawixia audax (Blackwall)

Plate 1; Figures 136–142; Map 3

Epeira audax Blackwall, 1863: 29. Specimens from Rio de Janeiro, Brazil, lost. Keyserling, 1892: 85, pl. 4, fig. 64, ♀.

Epeira meridionalis Keyserling, 1865: 810, pl. 19, figs. 19, 20, ♀. Female from Uruguay, in BMNH. First synonymized by Keyserling, 1892: 85.

Epeira amaurophila Holmberg, 1876: 17. Female from northern Argentina, lost. First synonymized by Houssay, 1917 (not seen).

Epeira duodecimtuberculata Bertkau, 1880: 91, pl. 2, fig. 33, ♀. Females from Tijuca, Rio de Janeiro,

Cap Irmao, Cap Gavia, and Copacobana, Brazil, lost. First synonymized by Keyserling, 1892: 85.
Epeira coronigera Taczanowski, 1878: 157, pl. 1, fig. 9, imm. One immature female, two immature males, and three smaller immature syntypes from Amable María, Depto. Junín, Peru, from wasp nest, in PAN, examined. NEW SYNONYMY.

Parawixia eumeniphila Strand, 1915: 115. Male holotype from Joinville, Jaragua, Itapocú, Est. Santa Catarina, Brazil, in SMF, examined. Roewer, 1942: 870. Bonnet, 1958: 3340. NEW SYNONYMY.

Araneus ribeiroi Mello-Leitão, 1917: 89, figs. 11, 12. Female from Belo Horizonte, Minas Gerais, Brazil, lost. DOUBTFUL NEW SYNONYMY.

Araneus rugosa Badcock, 1932: 24. Immature holotype from Corcovado, Rio de Janeiro, Brazil, in BMNH, examined. Bonnet, 1955: 588. NEW SYNONYMY.

Verrucosa audax:—Mello-Leitão, 1933: 42. Roewer, 1942: 880. Bonnet, 1959: 4790.

Aranea coronigera:—Roewer, 1942: 840.

Aranea rugosa:—Roewer, 1942: 851.

Araneus coroniger:—Bonnet, 1955: 470.

Note. I follow Keyserling in the interpretation of *P. audax*, as the species was not illustrated by Blackwall and Blackwall's specimens are lost. The immature specimens of *Epeira coronigera* have the abdomen circular, almost as wide as long, and with a distinct anterior median tubercle as may be characteristic of this species. Mello-Leitão's *A. ribeiroi* was perhaps an immature female of *P. audax*, having a soft projection in place of the future scape of the epigynum. Badcock's immature specimens of *P. eumeniphila* have a pair of white spots on the venter of the abdomen as do some immature *P. audax* and adult *P. undulata*; they may belong to either this or the other species. Mello-Leitão (1942) correctly placed *E. audax* in *Parawixia*. Bonnet (1956: 1783) erroneously synonymized the name *Epeira duodecimtuberculata* Bertkau with *Eriophora socialis* [= *Parawixia bistriata*].

Description. Female from Pinhal, Santa Catarina, Brazil. Carapace orange with white hair and a few dark hairs; clypeus brown. Sternum, coxae orange; legs orange with dark spots. Dorsum of abdomen yellowish with brown marks (Fig. 139); venter dusky with three pairs of small white spots and a white streak on each side (Fig. 140). Cephalic area of carapace with a pair

of swellings. Posterior median eyes 0.9 diameter of anterior medians, anterior laterals 0.9 diameter, posterior laterals 0.8 diameter. Anterior median eyes slightly more than their diameter apart. Posterior median eyes their diameter apart. Abdomen with 13 tubercles: one anterior median, four pairs on sides and four posterior (Fig. 139). Total length 12.0 mm. Carapace 5.6 mm long, 4.5 wide. First femur 5.4 mm, patella and tibia 7.2, metatarsus 4.5, tarsus 1.7. Second patella and tibia 6.0 mm, third 3.5, fourth 5.4.

Male from Pinhal, Santa Catarina, Brazil. Color as in female. Posterior median eyes 0.8 diameter of anterior medians, laterals 0.5 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Lateral eyes 0.6 diameter apart. Fourth trochanter without macroseta. Second and third femora with ventral row of strong macrosetae, first and fourth with two rows. Abdomen with 13 tubercles as in female. Total length 8.4 mm. Carapace 4.1 mm long, 3.7 wide. First femur 4.1 mm, patella and tibia 5.6, metatarsus 3.3, tarsus 1.3. Second patella and tibia 4.5 mm, third 2.5, fourth 3.7.

Variation. The anterior, median tubercle of the abdomen is frequently missing. Some females have the anterior lateral tubercles double. The photograph of a female from S of Jujuy, Argentina, shows her to be mostly green and white with some brown spots and brown patellae matching the lichens of the substrate. Immatures may have a pair of white patches on the venter of the abdomen. Total length of females 10.0 to 20.8 mm; of males 7.7 to 9.6. Figures 136–139 were made from specimens from Canela, Rio Grande do Sul, Brazil; Figures 140–142, from Pinhal, Santa Catarina, Brazil.

Diagnosis. Females differ from those of *P. bistriata* by having distinct tubercles on the abdomen (Fig. 139), from those of *P. undulata* by having the posterior median plate of the epigynum swollen, sclerotized, and dark in color (Fig. 137), and from those of both by the pattern on the venter

of the abdomen (Fig. 140). Males differ from most species of *Parawixia* by lacking macrosetae on the fourth trochanter, from *P. bistrata* by having tubercles on the abdomen, and from both *P. bistrata* and *P. undulata* by the shape of the base of the median apophysis and the shape of the terminal apophysis of the palpus (Figs. 141, 142).

Natural History. This is perhaps the most common araneid orb weaver in southern Brazil. I made the following notes on 22 March 1985 at Cataratas do Iguaçu, Brazil. This *Parawixia* is very common and makes an enormous web, with a bridge about 2 m long, the web 50 to 90 cm in horizontal diameter, with very loose, wide mesh (Plate 1). The bottom of the orb is about 1 to 2 m above the ground. The spider hangs in the middle, cephalic region down (Plate 1), or hides in a silk retreat within a curled leaf near a radius or a frame line. The spider walks to the retreat when disturbed and if touched there, drops slowly on a thick silk rope. If handled the female tries to throw silk on the hand. I watched individuals feed on grasshoppers 3.5 cm long, longer than the spider. The viscous silk is very sticky. No two specimens have the same dorsal coloration of the abdomen or similar humps; the reddish and green coloration of some individuals is washed out in alcohol. The spider is probably mostly nocturnal and builds at night.

Distribution. Amazon area to Chubut Province, Argentina (Map 3).

Records. GUYANA *Rupununi*: Rupununi River betw. Dadanawa and Isherton, ♀ (AMNH). COLOMBIA *Meta*: 15 km SW Puerto Lopez, ♂ (MCZ); 20 km S El Porvenir, ♂ (MCZ). ECUADOR *Napo*: Cuyabeno, ♀, ♂ (MCZ). PERU *Junín*?: Mejorada, Río Mantaro, ♀ (AMNH). BOLIVIA *La Paz*: Coroico, imm. (MCZ). BRAZIL *Pará*: Belém (MCZ, MEG). *Acre*: Rio Branco (MZSP). *Bahia*: Ilhéus (RLCB); Mucuri (MCN); Rio Una, 74 km SW Salvador (MCN); Salvador (ZMK). *Goiás*: Jataí (MZSP); 40 km from Porto Landia nr. Mineiros (MCZ). *Mato Grosso*: Chavantina (MZSP); Rosário Oeste (AMNH); 260 km

N Xavantina (MCZ). *Mato Grosso do Sul*: Três Lagoas (MZSP). *Minas Gerais*: Belo Horizonte (AMNH); Caxambú (MCZ); Lagoa Santa (ZMK); Lavras (MCZ); Pouso Alegre (MZSP); Santa Barbara, Reserva Flores (RLCB); Serra do Cipó (RLCB); Reserva Ecológica do Panga, Uberlândia (MCN). *Espírito Santo*: Apiaio (RLCB); Colatina (MNRJ); Guarapará (MZSP); Santa Teresa (MZSP); Vitória (MNRJ). *Rio de Janeiro*: Açude de Solidão (MCZ); Angra dos Reis (MZSP); Bom Jesus do Itabapoane (RLCB); Campos Itatiaia (MZSP); Ilha Santana Macaé (RLCB); Itaipava (RLCB); Parque Nacional Itatiaia (RLCB); Magé (RLCB); Parati (RLCB); Rio de Janeiro (AMNH, MCZ, MNRJ); São João da Barra (RLCB); Teresópolis (AMNH, RLCB); Pico da Tijuca (MCZ); Barra da Tijuca (MCZ, RLCB). *São Paulo*: Alto do Leno; Barueri; Boracéia (all MZSP); Botucatu (IMPR, MZSP); Caraguatatuba; Carvalho Arayo; Castello; Cocaia; Eldorado; Guarulhos (all MZSP); Ilha Comprida (AMNH); Ilha Vitória; Itapetininga; Itaquera Nova Europa (all MZSP); Itu (MCN); Jaboticabal (MCN); Juquiá (MZSP); Maua (AMNH); Mogi dos Cruces (MZSP); Monte Alegre (MZSP); Praia do Santos (MNRJ, MZSP); Rio Claro (MCZ); São Paulo (AMNH, MZSP, NHMW); São Roque (AMNH, MZSP); Serra da Cantareira (MZSP); Salesópolis (AMNH); Ubatuba (RLCB). *Paraná*: Cavinna (AMNH); Engelheiro Lange (MZSP); Ponte Rio Coutinho, Guarapuava (MZSP); Curitiba (MNRJ, MZSP); Salta do Iguaçu (MCZ); Parque Estad. Marumbi, Morretes (RLCB); Rio Branco (MCN); Rôlandia (AMNH); Serra Negra (MNRJ). *Santa Catarina*: Alto da Serra, estrada São Bento Corupá (MZSP); Blumenau (MZSP, NHMW); Mono dos Cionventos Aranguá (MCN); Pinhal (AMNH). *Rio Grande do Sul*: Barra do Ribeiro; Bom Jesus; Cambara do Sul; Campo Bom; Canela; Canoas; Capão da Canoa; Catuipe; Caxias do Sul; Charqueadas; Dois Irmãos; Encantado; Estaio; Garruchus São Borja; Garibaldi; Guaíba; General Câmara; Irai; Gravataí; Montenegro; Morro do Côco Viamão; Morro São Pedro; Niterói; Nonai; Novo Ham-



Figures 136–142. *Parawixia audax* (Blackwall). 136–140, female. 136–138, epigynum. 136, ventral. 137, posterior. 138, lateral. 139, dorsal. 140, abdomen, ventral. 141, male left palpus. 142, tip of embolus, terminal apophysis, and base of median apophysis.

Figures 143–149. *P. undulata* (Keyserling). 143–147, female. 143–145, epigynum. 143, ventral. 144, posterior. 145, lateral. 146, dorsal. 147, abdomen, ventral. 148, male palpus. 149, tip of embolus, terminal apophysis, and base of median apophysis.

Figures 150–157. *P. bistrata* (Rengger). 150–154, female. 150–152, epigynum. 150, ventral. 151, posterior. 152, lateral. 153, dorsal. 154, abdomen, ventral. 155, male palpus. 156, tip of embolus, terminal apophysis, and base of median apophysis. 157, immature, dorsal.

Scale lines 1.0 mm, genitalia 0.1 mm.

burgo; Osório; Palmares do Sul; Passo Fundo (all MCN); Porto Alegre (MCN, MCZ); Pelotas (AMNH, MCN, MCZ); Portão; Rio Grande; Rio Pardo; Saint Hilaire; Santa Cruz do Sul; Santa Maria; São Francisco de Paula; São Jeronimo (all MCN); São Leopoldo (MCN, MZSP); São Vincente do Sul; Santa Maria; Santa Vitória do Palmar; Est. Ecol. do Taim; Tenente Portela; Tôrres; Triunfo; Vacaria; Viamão (all MCN); Vila Oliva (MCN, MNRJ). URUGUAY *Canelones*: Las Piedras (MHNH); Pando (MHNH). *Lavaleja*: Fuente del Puma (FSCA). *Maldonado*: Sierra de las Animas (MHNH). *Montevideo*: Carrasco (MHNH); Cerro (MHNH); Montevideo (MHNH); Sayago (CAS). *Rocha*: Chuy (MHNH); Palmares de Castillos (MHNH). *Treinta y Tres*: Arrozal[?] (MHNH). PARAGUAY *Amambay*: Bella Vista (IBNP); nr. Pedro Juan Caballero (MCZ). *Concepción*: Fonciere (MHNH). *Alto Paraná*: Itabo Reserve (IRSNB); Mision Nueva Tribu Cerro León (IRSNB); km 12 de Stroessner, Centro Forestal de Alto Paraná (IBNP); Tatiyupi Reserve (IRSNB). *Paraguarí*: Cerro Acahaí, 500–570 m (IBNP). *Itapúa*: 20 km NNE Puerto Capitán Meza (MCZ). ARGENTINA *Misiones*: Colonia Acaraguá, Rt. 8, km 26 (MACN); Iguazú (CAS, MEG); Eldorado (AMNH); Gral. Manuel Belgrano (MEG); Posadas (MEG); Rt. 12, Gruta India, Dpto. Libertador San Martín, (MEG). *Jujuy*: Yuto (MEG). *Salta*: 5 km S Jujuy (MCZ); Oran (MEG). *Chaco*: Resistencia (MACN). *La Rioja*: Iliar, 7 km S Olta (MACN). *Córdoba*: Calamuchita (MACN); Palamuelita (MACN). *Buenos Aires*: Azul (AMNH); Buenos Aires (ZMK); Delta del Paraná (MEG); La Plata (MZSP); Moreno (MACN); Pte. Samborombón (MACN); Sierra de la Ventana (MEG); Tigre (MACN); Villa Ballester (AMNH); Zelaya (MACN); Zubiaurre (ZMK). *Mendoza*: 8 km SSW Estación Cacheuta, 1,500 m (MCZ); Mendoza (MACN, NHMW). *Río Negro*: El Bolson (AMNH). *Chubut*: El Rlesempeiro [?] (MACN).

Parawixia undulata (Keyserling),
new combination

Figures 143–149; Map 3

Mahadeva undulata Keyserling 1892: 67, pl. 3, fig. 52, ♀. Four female syntypes from Rio Grande do Sul, Brazil, in BMNH, examined.

Aranea undulata:—Roewer, 1942: 855.

Verrucosa undulata:—Bonnet, 1959: 4791.

Description. Female from Vacaria, Rio Grande do Sul. Carapace orange-brown, with a pair of dark spots and a few light colored setae. Sternum dark orange without marks. Coxae dark orange; legs orange, distal articles ringed with black. Dorsum of abdomen black, brown, and white (Fig. 146); venter black with two white patches (Fig. 147). Posterior median eyes 0.7 diameter of anterior medians, laterals 0.6 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Laterals separated by their radius. Abdomen with 9 tubercles: Three pairs on sides and three posterior median (Fig. 146). Total length 16.0 mm. Carapace 6.8 mm long, 5.7 wide. First femur 5.6 mm, patella and tibia 7.8, metatarsus 4.7, tarsus 1.7. Second patella and tibia 7.0 mm, third 4.2, fourth 6.4.

Male from Vacaria, Rio Grande do Sul. Lighter in color than female, with faint indications of folium on abdomen. Posterior median eyes 0.5 diameter of anterior medians, laterals 0.5 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Laterals separated by their radius. Fourth coxa and trochanter without macroseta. Second and third femur with ventral row of macrosetae, scattered ventral macrosetae on first and fourth femora. Abdomen as in female. Total length 11.5 mm. Carapace 6.4 mm long, 5.2 wide. First femur 5.8 mm, patella and tibia 8.0, metatarsus 4.5, tarsus 1.7. Second patella and tibia 6.5 mm, third 3.7, fourth 5.5.

Variation. Total length of females 11.2 to 18.0 mm, of males 7.7 to 11.5. The illustrations were made from specimens from Vacaria, Rio Grande do Sul, Brazil.

Diagnosis. Females differ from those of *P. bistriata* by having tubercles on the abdomen (Fig. 146), from those of *P. audax* by having the posterior median plate of the epigynum not sclerotized, flat, and usually white (Fig. 144). The venter of the abdomen, unlike that of *P. bistriata* and of adult *P. audax*, has a pair of white patches on black (Fig. 147). Males differ from those of *P. bistriata* by having tubercles on the abdomen and from males of *P. bistriata* and *P. audax* by the shape of the terminal apophysis and the proximal end of the median apophysis (Figs. 148, 149).

Natural History. One female from São Paulo State came from a shrub in a field along the road; the web was 40 cm in diameter.

Distribution. From São Paulo State, Brazil, to Buenos Aires Province, Argentina (Map 3).

Records. BRAZIL *São Paulo*: Ubatuba, 7 June 1985, ♀ (R. L. C. Baptista, RLCB). *Rio Grande do Sul*: São Francisco de Paula, ♀ (P. P. Buck, MNRJ), 18 Jan. 1981, ♀ (T. de Lema, MCN 9497); Canela, 10 Feb. 1966, 3♀, 11 May 1974, 2♀ (A. A. Lise, MCN 709, 2099); Esc. Ecologico do Taim, Vitória, 3 Dec. 1986, ♀ (M. Rosenau, MCN 16538); Est. Ecol. do Esmeralda, Esmeralda, 12 Dec. 1978, 2♀ (C. J. Becker, MCN 8461); Gramado, 20 Mar. 1976, 2♀ (P. C. Braun, MCN 3822); Itaimbézinho, Cambará do Sul, 18 May 1985, ♀ (A. A. Lise, MCN 13300); Pelotas, 12 Apr. 1964, 4♀ (C. Biezanko, MCZ), 26 Sept. 1975, ♀ (A. A. Lise, MCN 3463); Porto Alegre, 6 July 1973, ♀ (M. Moraes, MCN 1476); Rio Grande, 8 Dec. 1976, 2♀, ♂ (H. Bischoff, MCN 4864), 4 Nov. 1986, ♀ (C. Biezanko, MCZ); Santana Guiaba, 21 Jan. 1977, 2♀ (A. A. Lise, MCN 4998); Vacaria, 14 Jan. 1974, 14♀, 7♂, 23 May 1982, 4♀ (A. A. Lise, MCN 309, 10151). URUGUAY *Cerro Largo*: nr. Melo, 1926, ♀ (Sanborn, AMNH). ARGENTINA *Buenos Aires*: Boulogne, ♂ (Prosen, MLP); Tigre, 2♀ (Viana, MACN).

Parawixia bistriata (Rengger),
new combination;
Nianduti Spider

Plate 1; Figures 150–157; Map 3

Epeira bistriata Rengger, 1836: 131. Specimens from Paraguay, lost.

Epeira socialis Rengger, 1836: 131. Specimens from Paraguay, lost.

Epeira bicolor:—C. L. Koch, 1839: 57, fig. 374, ♀.

Epeira socialis:—Holmberg, 1874: 95.

Epeira burmeisteri Holmberg, 1874: 95. Specimens from Barrancas de Obligado, Argentina, lost. NEW SYNONYMY.

Araneus nordenskiöldii Tullgren, 1905: 29, figs. 9a–h, ♀, ♂. Eighteen female and eight male syntypes from Tatarenda [600 m, Tarija, 21°50'S, 63°37'W, NE of Aguairenda], Bolivia, in NRMS, examined. Badcock, 1932: 22. Bonnet, 1955: 552. NEW SYNONYMY.

Araneus horizontinus Mello-Leitão, 1917: 87, fig. 9, ♀. Specimens lost. First synonymized by Mello-Leitão, 1932: 124.

? *Araneus paraopeba* Mello-Leitão, 1917: 92, fig. 10, ♀. Specimens lost. NEW SYNONYMY.

Eriophora bistriata:—Mello-Leitão, 1932: 124. Roewer, 1942: 866. Sandoval, 1987. Fowler and Diehl, 1978. Fowler and Gobbi, 1988a,b.

Araneus sermoniferus Mello-Leitão, 1932: 124. New name for *Araneus socialis*:—Burmeister, [?] 1872: 492 [not seen] allegedly not Rengger. Bonnet, 1955: 598 (*A. sermonifer*). NEW SYNONYMY.

Aranea bicolorata Roewer, 1942: 837. New name for *Epeira bicolor* preoccupied by *Aranea bicolor* Walckenaer (a European salticid *Carrhotus bicolor*). NEW SYNONYMY.

Aranea nordenskiöldii:—Roewer, 1942: 849.

Aranea sermonifera:—Roewer, 1942: 852.

Eriophora burmeisteri:—Roewer, 1942: 866. Bonnet, 1956: 784.

Eriophora aeronavis Mello-Leitão, 1947: 241, fig. 8, ♀. Female holotype from Ponta Grossa, Paraná, Brazil, in MNHC, examined. Brignoli, 1983: 268. NEW SYNONYMY.

Eriophora socialis:—Bonnet, 1956: 1785.

Note. Rengger gave the name “*Epeira bistriata* oder [or] *socialis*” to this species. *Epeira bistriata* has never been illustrated before. According to Rengger its main characters are that it is a “social *Epeira* with a hazelnut-shaped abdomen having red spots.” Only one species fits this description, the one illustrated here. Rengger’s specimens are not in NHMB or in the Naturmuseum Aarau, Switzerland (R. Maurer, C. Stocker, personal communication).

C. L. Koch's *Epeira bicolor* (Fabricius) is a large spider from Brazil. Critical features are a spherical abdomen with transverse marks, no distinct marks on the underside of the abdomen and a 5-mm-long scape ("2 Linien langen, über dieselbe rückwärts gebogenen Legstachel"). This fits *Parawixia bistrata*. But this is probably a misidentification of *Aranea bicolor* Fabricius (1798: 230), which has a worthless, unrecognizable description of a spider from "America." *Aranea bicolor* Fabricius (1798) is also a junior homonym of *Aranea bicolor* Olivier (1789: 230). Olivier's *Aranea bicolor* is a worthless description without a holotype for a spider from Guadeloupe, Lesser Antilles (see also Petrunkevitch, 1911).

Holmberg (1874) writes that the scape of *E. burmeisteri* reaches the center of the spinnerets. This is characteristic for this species, but not known for any others. Mello-Leitão (1932) thought Burmeister's and Holmberg's descriptions fit a different social species, common in Argentina. This could not be verified.

The spider is known in Spanish as the "ñandutí" spider, derived from the word for "spider-web" in the Guaraní language (Fowler and Diehl, 1978; Kochalka, 1989, personal communication), in Portuguese as *aranha do cerrado* (C. Sandoval, 1990, personal communication).

Description. Female from Depto. Central, Paraguay. Carapace with dark orange cephalic region, sides of carapace red-brown; cephalic region with long white hairs. Sternum dark orange. Coxae dusky dark orange; legs orange-brown. Dorsum of abdomen dark gray with indistinct folium (Fig. 153); venter dark gray with indistinct paired lighter patches (Fig. 154). Posterior median eyes 0.7 diameter of anterior medians, laterals 0.6 diameter. Anterior median eyes 1.3 diameters apart. Posterior median eyes their diameter apart. Lateral eyes their diameter apart. Abdomen spherical, without tubercles (Fig. 153). Total length 22 mm. Carapace 9.4 mm long, 8.1 wide. First femur 8.8 mm, patella

and tibia 11.1, metatarsus 7.1, tarsus 2.7. Second patella and tibia 10.5 mm, third 6.5, fourth 9.6.

Male from Formosa, Argentina. Darker than female in coloration. Posterior median eyes 0.7 diameter of anterior medians, laterals 0.6 diameter. Anterior median eyes their diameter apart. Posterior median eyes their diameter apart. Laterals their diameter apart. Palpal patella with one dark macroseta and one light-colored smaller seta. Fourth trochanter without macroseta. Abdomen oval. Total length 13 mm. Carapace 7.7 mm long, 6.7 wide. First femur 7.5 mm, patella and tibia 9.4, metatarsus 5.9, tarsus 1.8. Second patella and tibia 7.6 mm, third 5.0, fourth 7.1.

Variation. Total length of females 16.7 to 27 mm, of males 11.7 to 18.5. In adult females preserved in alcohol the abdomen is variable in color. In immature specimens the abdomen has a diagnostic pattern and three to four pairs of lateral tubercles, and two posterior, median tubercles (Fig. 157). The tubercles may be visible on the abdomen of males. Early instars are almost all black; later instars have light stripes, a longitudinal row of dark red dots on the tubercles on each side, and a faint red spot in the cardiac area. Adults are mostly dark gray with a little red anterior lateral on the abdomen dorsum (Kochalka, 1989, personal communication; and color photographs by C. P. Sandoval, Plate 1). Figures 150, 151 were prepared from the holotype of *E. aeronavis*, Figure 152 was made from a female from Tucumán, Argentina, 153–155 were made from syntypes of *A. nordenskiöldi*, and 157 was prepared from an immature from Barra da Tapirapé, Mato Grosso, Brazil.

Diagnosis. Females differ from those of *P. audax* and *P. undulata* by having a spherical abdomen sometimes with only three faint pairs of lateral tubercles, indistinctly marked on the venter (Figs. 153, 154). The scape of the epigynum is less sclerotized than in *P. audax* and *P. undulata* and the posterior median plate may be white (Fig. 151). Males differ from those

of the similar two species by having a proximal constriction of the median apophysis, and by the shapes of the base of the median apophysis and the distal end of the terminal apophysis (Figs. 155, 156).

Natural History. The species has communal webs 2 to 5 m above the ground, just beyond reach, often on telephone poles in urban and suburban areas, in open woodland and orchard, in the lower Pantanal, and in isolated trees in dry areas, but never in a forest having a closed canopy. Individuals cluster during daytime in a common shaded retreat "as big as a hat," constructed with relatively little silk (Plate 1). At dusk the spiders move out on thick silk lines that stretch as far as 30 m and build orbs. Within an hour all orbs are completed, and may cover a 100 m² area. The orbs are taken down at dawn. Marked spiders do not return to the same spot as that of the previous night, but build in the vicinity. Large prey ensnared are overpowered and fed on by many spiders, the number in proportion to prey size. Reproductive casts of ants are a common prey item, but are not the only food. All spiders in a colony are of the same age and molt during the same week. Spiders transferred to another colony are not attacked and neighboring colonies may fuse. Males and females mature in late January in southern Brazil. The number of males is approximately equal to that of females. Following the final molt, females disperse and deposit egg-sacs with a mean of 551 eggs, less than half the number laid by related araneids of equal size. Spiderlings emerge in May. In the laboratory there are eight postembryonic instars. (J. Kochalka, C. Sandoval, personal communications; Fowler and Diehl, 1978; Fowler and Gobbi, 1988a,b). Rengger gives colony size as between 30 to 40 individuals; Azara in 1808 estimated less than 100 individuals (Fowler and Diehl, 1978; Kochalka, 1989, personal communication). In 1965, when visiting Rio de Janeiro, I saw what I believed to be webs of this species, high up on telegraph poles outside the entrance of the Parque da Ci-

dade, too high up to collect. I could not find any webs on a return visit to the same spot in 1987. Carter (1928) claims that the spiders' bite is venomous. They can kill beetles larger than 2.5 cm in a few minutes and there are records of birds trapped in their webs (C. Sandoval, personal communication).

Venom. The Hospital Vital Brazil of the Instituto Butantan has recorded only three accidents, all of persons living in the area surrounding the city of São Paulo: In 1964, a 7-year-old girl was bitten on the hand with only slight pain. In 1966, an 18-year-old man was bitten on the foot; no treatment was necessary. In 1970, a baby of eight months was bitten on the buttock with moderate local pain, edema and mild erythema. In all cases punctures of fangs were visible. The first and last victims were treated with antihistamines and analgesics. Vellard, in his book on spider venoms (1936: 262), did not cite any accidents with the species, but expressed the belief that they do occur and are not serious. In recent years, V. P. D. von Eickstedt has received, from the São Paulo State Central Electrical Co. from Andradina and from Pirassununga, requests for help in removing the spiders because workers were afraid to work on poles with webs (Vera P. D. von Eickstedt, 1990, personal correspondence).

Distribution. From Mato Grosso, Minas Gerais States, Brazil, to Bolivia and Buenos Aires Prov., Argentina (Map 3).

Records. BRAZIL *Distrito Federal*: Brasília, 27 Mar. 1964, 2♀ (C., E., E. S. Ross, CAS); Sobradinho, 3 Apr. 1971, 3♀, 2♂ (A. Carlos, C. Sandoval, CS). *Minas Gerais*: Diamantina, Minha Serinha, Jan.–Mar. 1945, 6♀ (E. Cohn, AMNH); Serra do Cipó, 1977, ♀, ♂ (V. R. D. von Eickstedt, MCZ); Mariana, ♀ (P. Fonseca, MZSP 7615); Lagoa Santa, imm. ♀ (ZMK), 12 Jan. 1965, 21 imm. (J. Morgante, MZSP 3893). *Mato Grosso*: Barra do Tapirapé, 23 Dec. 1962, 43 imm., 12 Jan. 1963, 20 imm. (B. Malkin, AMNH); Tapirapé, 23 Nov. 1960, 91 imm. (AMNH). *Mato Grosso do Sul*: Miranda, 17 Jan. 1985, 33 imm. (B. A. M. Soares,

MZSP 157); Três Lagoas, 26–27 Mar. 1964, ♀ (P. Vanzolini, MZSP 3179). *São Paulo: Rincão*, 1942, 5♀ (B. A. M. Soares, MZSP 7616); Itirapina, imm., 29 Nov. 1984, imm. (C. Sandoval, CS); Piraju, 12 June 1985, ♀ (C. Sandoval, CS); Campinas, 15 Mar. 1990, 2♀, 3♂ (J. Vascocellos-Neto). **PARAGUAY** *Boquerón*: Laguna Negra, Transchaco km 470, 17 May 1984, ♀; *Filadelfia*, 16 May 1984, ♀. *Nueva Asunción*: Transchaco km 709, 25 May 1984, ♀; 1984 (all L. Baert, J. P. Maelfait, IRSNB). *Concepción*: Concepción, 7 Mar. 1989, 3♀, 3♂ (J. A. Kochalka, MCZ); San Lorenzo, 24 July 1976, ♀, ♂ (H. Fowler, MCZ), 9 Jan. 1982, 4♀, 2♂ (J. A. Kochalka, IBNP). *Central*: Villeta, Feb., Mar. 1983, ♀ (L. Fogarty, MCZ); Asunción, Jan. 1892, 6 imm. (Dr. Bohls, BMNH). **ARGENTINA** *Formosa*: Formosa, Mar. 1918, 2♂ (P. Jorgensen, MCZ), ♀ (MACN). *Chaco*: Resistencia, July 1934, 9♀ (J. B. Daguerre, MACN). *Salta*: Rosario de la Frontera, Los Baños, 8 May 1979, 9♀, 3♂ (Mision Scient. Danesa, ZMK). *Tucumán*: Tucumán, 1987, 45♀, 88♂, 4 imm. (J. A. Kochalka, MCZ). *Entre Ríos*: Rosario, 2♀ (W. Sörensen, ZMK).

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