PELEGRINA FRANGANILLO AND OTHER JUMPING SPIDERS FORMERLY PLACED IN THE GENUS *METAPHIDIPPUS* (ARANEAE: SALTICIDAE)

WAYNE P. MADDISON[1]

CONTENTS

[1] Department of Ecology and Evolutionary Biology, University of Arizona, Tucson, Arizona 85721.

ABSTRACT. The genus *Pelegrina* Franganillo contains 38 species of dendryphantine jumping spiders from North and Central America that were formerly placed in the genus *Metaphidippus* F. O. Pickard-Cambridge. The close relatives of the Dendryphantinae may include the Euophryinae and several smaller groups, for they share an embolus that is coiled counterclockwise (left palp) and separated from the tegulum by a fully expandable hematodocha. The subfamily Dendryphantinae itself is delimited by the derived conditions of a carina on the underside of the male chelicera, the coil of the embolus folded back so as to be hidden behind the base of the embolus, and S-shaped epigynal openings.

Within the subfamily, generic relationships are poorly understood, but it is clear that the genus *Metaphidippus* is polyphyletic. The genus should include at most a few species closely related to the neotropical genera *Messua* G. & E. Peckham, *Bagheera* G. & E. Peckham, and *Gastromicans* Mello-Leitão. *Gastromicans* is removed from synonymy with *Beata* G. & E. Peckham. The following new combinations are established for species in this group: *Bagheera prosper* (G. & E. Peckham), *Messua centralis* (G. & E. Peckham), *Messua dentiger* (F. P.-Cambridge), *Messua donalda* (Kraus), *Messua lata* (Chickering), *Messua laxa* (Chickering), *Messua limbata* (Banks), *Messua moma* (F. P.-Cambridge), *Messua octonotata* (F. P.-Cambridge), *Messua pura* (Bryant), *Messua tridentata* (F. P.-Cambridge), *Gastromicans albopilosa* (G. & E. Peckham), *Gastromicans hondurensis* (G. & E. Peckham), *Gastromicans levispina* (F. P.-Cambridge), *Gastromicans noxiosa* (Simon), and *Gastromicans vigens* (G. & E. Peckham). The combination *Messua desidiosa* G. & E. Peckham is revived. The proper placement of various groups currently assigned to *Metaphidippus* is discussed, and the *harfordii* group is transferred to the genus *Phanias* F. P.-Cambridge, which appears to be relatively distantly related to most other dendryphantines. The following new combinations are established: *Phanias albeolus* (Chamberlin & Ivie), *Phanias concoloratus* (Chamberlin & Gertsch), *Phanias dominatus* (Chamberlin & Ivie), *Phanias furcifer* (Gertsch), *Phanias furcillatus* (F. P.-Cambridge), *Phanias harfordii* (G. & E. Peckham), *Phanias monticola* (Banks), *Phanias neomexicanus* (Banks), and *Phanias watonus* (Chamberlin & Ivie). Also removed from *Metaphidippus* are the *mylothrus* and *castaneus* groups, for which the new genera Terralonus and *Ghelna* are described, thus yielding the new combinations *Terralonus californicus* (G. & E. Peckham), *Terralonus mylothrus* (Chamberlin), *Terralonus unicus* (Chamberlin & Gertsch), *Terralonus shaferi* (Gertsch & Riechert), *Terralonus versicolor* (G. & E. Peckham), *Terralonus vittatus* (Banks), *Terralonus fraternus* (Banks), *Ghelna castanea* (Hentz), *Ghelna barrowsi* (Kaston), *Ghelna sexmaculata* (Banks), and *Ghelna canadensis* (Banks). The new combination *Sassacus paiutus* (Gertsch) is established. The *vitis* group is retained in *Metaphidippus*. The limits of the genera *Dendryphantes* C. L. Koch and *Beata* G. & E. Peckham are also reconsidered. The combination *Dendryphantes nigromaculatus* Keyserling is revived and the following combinations established: *Beata hispida* (G. & E. Peckham), *Beata inconcinna* (G. & E. Peckham), *Beata maccunii* (G. & E. Peckham), and *Beata rustica* (G. & E. Peckham). *Dryphias* (G. & E. Peckham) is synonymized with *Beata*.

The largest group removed from *Metaphidippus* is placed in the genus *Pelegrina* Franganillo, 1930, whose species are, with some exceptions, distinguished from other dendryphantines by the presence of two terminal rami retrolateral to the embolus opening, an embolic hematodocha that bulges distally, wrinkles on the anterior margin of the male cheliceral fang, a distinct band of pale scales on the side of the face, and male courtship with the first legs held low and forward. The following species are moved into *Pelegrina*: *P. aeneola* (Curtis), *P. arizonensis* (G. & E. Peckham), *P. bicuspidata* (F. P.-Cambridge), *P. clemata* (Levi & Levi), *P. exigua* (Banks), *P. flaviceps* (Kaston), *P. flavipedes* (G. & E. Peckham), *P. furcata* (F. P.-Cambridge), *P. galathea* (Walckenaer), *P. helenae* (Banks), *P. insignis* (Banks), *P. montana* (Emerton), *P. ochracea* (F. P.-Cambridge), *P. pallidata* (F. P.-Cambridge), *P. peckhamorum* (Kaston), *P. pervaga* (G. & E. Peckham), *P. proterva* (Walckenaer), *P. proxima* (G. & E. Peckham), *P. tillandsiae* (Kaston), *P. variegata* (F. P.-Cambridge), and *P. verecunda* (Chamberlin & Gertsch). *Pelegrina proxima* is shown to be a senior synonym of *Pelegrina geniculata* Franganillo, the latter being the types species of *Pelegrina*. A neotype is designated for *Attus galathea* Walckenaer. Seventeen species are described as new: *P. balia*, *P. bunites*, *P. chaimona*, *P. chalceola*, *P. clavator*, *P. dithalea*, *P. edrilana*, *P.*

huachuca, *P. kastoni*, *P. morelos*, *P. neoleonis*, *P. orestes*, *P. sabinema*, *P. sandaracina*, *P. tristis*, *P. volcana*, and *P. yucatecana*. *Euophrys leucophaea* C. L. Koch, *Icius crassiventer* Keyserling, and *Metaphidippus digitatus* F. P.-Cambridge are newly synonymized with *P. galathea*; *Dendryphantes uteanus* Chamberlin & Gertsch with *P. aeneola*; and *Dendryphantes mimus* Chamberlin with *P. furcata*. *Euophrys concolor* Banks is removed from synonymy with *P. proterva* and considered a senior synonym of *Sittacus cursor* Barrows, yielding the new combination *Sitticus concolor*. Identification keys are presented for all *Pelegrina* males and for females from restricted geographical regions. All species are described and illustrated. Male/female associations were achieved for all species north of Mexico. Courtship behavior is described for 22 species of *Pelegrina*, karyotypes for 10 species, and habitat information for most species.

The genus *Pelegrina* may be closely related to the *Metaphidippus mannii* group, *Nagaina* and/or *Eris*. *Nagaina incunda* G. & E. Peckham is described and illustrated; *Dendryphantes vegetus* G. & E. Peckham, *Metaphidippus flavolineatus* F. P.-Cambridge, and *Metaphidippus expallidatus* F. P.-Cambridge are synonymized with *N. incunda*. The species of the *mannii* group (temporarily retained in *Metaphidippus*) that occur in the United States are also described and illustrated; two new combinations, *Metaphidippus chera* (Chamberlin) and *Metaphidippus carmenensis* (Chamberlin), are established; one species, *Metaphidippus emmiltus*, is described as new; *Dendryphantes versicolor* G. & E. Peckham is synonymized with *Metaphidippus mannii* (G. & E. Peckham), and *Metaphidippus franciscanus* Schenkel with *Metaphidippus diplacis* (Chamberlin).

INTRODUCTION

For about 50 years after the Peckham's (1909) revision of the jumping spider species north of México, taxonomic work on North American representatives of this large family consisted mostly of scattered species descriptions by Chamberlin, Gertsch, Ivie, and others. Some generic revisions consolidating and clarifying the previous work began appearing in the 1950s (Gertsch and Ivie, 1955; Barnes, 1955, 1958), but most genera remained untouched, including the three largest genera, *Habronattus*,* *Phidippus*, and *Metaphidippus*, which together include about half of the nearly 300 species of salticids occurring north of México (according to the count of Richman and Cutler, 1978). In the last three decades, increased interest in the family has resulted in revisions of *Habronattus* (Griswold, 1987), *Phidippus* (Edwards, in preparation), and other genera (Prószyński, 1968, 1971a, 1973a, 1980; Cutler, 1981a, 1987; Richman, 1981, 1989). However, except for works by Kaston (1973) on some eastern species and by Cutler and Jennings (1985) on the *arizonensis* group, *Metaphidippus* has remained unrevised, perhaps because its poorly defined limits have made the scope of any revision potentially troublesome. When I first began to revise *Metaphidippus*, I knew that I would have to restrict the revision to only some of the disparate groups placed there. The largest group placed in *Metaphidippus*, including the species most commonly collected in northern and eastern North America, was chosen for revision and is here moved to the genus *Pelegrina* Franganillo.

The jumping spiders placed in *Pelegrina* are medium-sized dendryphantines distributed throughout North America, with some species extending as far south as Panamá. The 38 species include the well-known *P. galathea*, *P. proterva*, *P. flavipedes*, *and P. aeneola*. Males of *Pelegrina* are generally brown with white stripes (Fig. 1), and most can be distinguished from other dendryphantines by the wide embolus with two rami retrolateral to the opening (Fig. 3). The spotted females (Fig. 2) have large thickened flaps over the epigynal openings (Fig. 4). Although the eastern species were well studied by Kaston (1973), most of the species occur in the western United States, México, and Central America, and they received their last comprehensive treatments by G. & E. Peckham (1909) and F. O. Pickard-Cambridge (1901). Many of the western species have been inadequately described and illustrated, often from only one sex, making identification almost impossible by anyone other than an araneol-

* Authors of scientific names are given in the index.

ogist familiar with the group. Many species in the southwest were undescribed, and for most species there is little published information on natural history. The present revision has as its main goal to make the species known, by describing and illustrating them, their courtship displays, and their habitats. Although much progress has been made in distinguishing species and matching males to females, many problems of geographical variation and uncertain male–female matching remain for future work, especially among Mexican *Pelegrina*.

In addition to the *Pelegrina* species, *Nagaina incunda* and the U.S. species of the *Metaphidippus mannii* group are described because they could very well be confused with species of *Pelegrina* and because their taxonomy is in need of revision.

This work addresses the phylogeny of *Pelegrina* and the subfamily Dendryphantinae, but it has no pretensions of being a comprehensive or modern phylogenetic treatment. My phylogenetic goals are to propose some characters that might provide an outline of dendryphantine relationships, focusing on the question of the monophyly of *Pelegrina* and a few other groups formerly placed in *Metaphidippus*. I hope that this and the basic exploratory, species-level taxonomic work will provide the groundwork for future phylogenetic treatments.

ACKNOWLEDGMENTS

This paper formed part of a Ph.D. thesis for the Department of Organismic and Evolutionary Biology, Harvard University. The work described in it has roots many years deep, and during these years I received the help of many friends and colleagues. As always, David Maddison has been foremost among my collaborators in formulating ideas, on collecting expeditions, on behavioral observations, and in many other activities. My thesis advisor, Herbert W. Levi, provided a well-organized laboratory in which to work, a model of dedication to arachnology, and a helpful encouragement that allowed me to grow on my own. My other friends and colleagues at Harvard and in our spider laboratory—Leticia Avilés, Anna Weitzman, Mark Moffett, Jonathan Coddington, Mark Stowe, Jackie Palmer, Cecile Villars, John Hunter, Caty Sibble, Ardis Johnston, Laura Leibensperger, Dee Woessner, and Ann Blum—made a very supportive community in which to work. Leticia Avilés and Christopher Maddison gave me much aid and inspiration during the most difficult stages of the project.

H. W. Levi, L. Avilés, D. Maddison, G. B. Edwards, P. F. Stevens, and E. O. Wilson read and commented on this paper. Two anonymous reviewers gave useful suggestions. For discussion of jumping spider issues, I thank B. Cutler, G. B. Edwards, D. B. Richman, J. Prószyński, F. Wanless, and P. Wijesinghe. B. Cutler, G. B. Edwards, A. Moldenke, and D. B. Richman have sent live specimens to me for courtship observations. Brent Opell helped with trypsin clearing. H. D. Cameron gave me helpful advice on the formation of names, though he is not to be held responsible for any ill formed, especially since I did not always follow his no doubt proper advice. Curators at various institutions lent me specimens; a list can be seen under Materials and Methods. I thank these curators for their help. I would especially like to thank Luis F. de Armas of the Instituto de Ecologia y Sistemática, Havana, Cuba, for sending the Franganillo collection of salticids.

This work was supported in part by a NSERC (Canada) Postgraduate Fellowship. For allowing me to participate in a major collecting trip to México, I thank S. B. Peck and R. S. Anderson. The trip was funded by NSERC and had assistance from the Universidad Nacional Autonoma de México and Harvard University. The Department of Organismic and Evolutionary Biology of Harvard supported trips to California, Arizona, and Spain. Publication costs of this study were covered in part by the Wetmore Colles fund.

MATERIALS AND METHODS

Collections Examined. The taxonomic revision is based on specimens in the following collections. The abbreviation for the collection is followed by the name of the collection and the curator and others responsible for aiding in loaning the material, to whom many thanks are due:

AMNH	American Museum of Natural History, New York (N. Platnick, L. Sorkin)
BMNH	The Natural History Museum, London (P. Hillyard)
CAS	California Academy of Sciences, San Francisco (W. Pulawski, D. Ubick)
DU	Darrel Ubick personal collection
IESC	Instituto de Ecologia y Sistemática, Havana (Luis F. de Armas)
MCZ	Museum of Comparative Zoology, Cambridge (H. Levi)
MSUW	Midwestern State University, Wichita Falls, Texas (N. Horner)
TXAM	Texas A&M University, College Station, Texas (A. Dean)
UCB	University of California, Berkeley (E. Schlinger, C. Griswold)
UWBM	Burke Museum, University of Washington, Seattle (R. Crawford)
WPM	W. Maddison personal collection
ZMB	Zoologishes Museum Berlin (M. Moritz, S. Fischer)

Note that Canadian specimens are, in general, underrepresented in this revision because two major collections of Canadian spiders, the Canadian National Collection at the Biosystematics Research Centre, Ottawa, and the Royal Ontario Museum collection, were not examined due to time limitations.

Routine Examination and Illustrations. Specimens were examined in a glass dish with a bottom layer of half black, half white silicone rubber (bathtub caulking). The silicone rubber is superior to paraffin for most purposes, for it can hold even minuten pins firmly and later heal, and it offers the advantage over sand of allowing appendages to be pinned open. Palpi were mounted on Vaseline in an alcohol-filled depression slide with a coverslip and drawn at 100× and 200× under an Olympus BH-2 compound microscope using incident fiber-optics illumination and a camera lucida. Not only did the use of a compound microscope allow higher resolution, but also the axial light path prevented the drawing difficulties caused by the side-to-side shifting of the image that occurs when focusing on a stereo dissecting microscope. For the external (ventral) view, epigyna were examined using the same technique, without clearing. Epigyna were dissected off of the specimen to allow for the small working distance of the compound microscope. The Vaseline on which they were mounted was made opaque by mixing with chalk dust, in order to simulate the cream-colored muscles and glands that would underly the epigynum on an intact specimen. After examination of the specimen, Vaseline was removed by a xylene rinse. The oblique drawings of the male carapace and chelicerae were made mostly under the compound microscope, at 40×. Most drawings of the female abdomen were made under a Zeiss stereo dissecting microscope with a camera lucida. The drawings of the male face and female abdomen show the appearance in alcohol. Most drawings were done on coquille board with ink, a Conté drawing pencil, and white paint. Small labels with my initials (WPM) and the year drawn (e.g., 84) were placed in vials of specimens illustrated. Photographs of living specimens were made with a standard 55-mm lens reversed on extension tubes to yield approximately 2.5× magnification on Kodak Technical Pan or Kodachrome film, using illumination by flash. Measurements of carapace length, carapace width, and body length (Galiano, 1963; Wanless, 1978) were made from the

dorsal view using an eyepiece reticle on a Leitz stereo dissecting microscope. Generally only about five specimens of each sex were measured, because little reliance on these measurements was made in this study. They are intended to give only a general idea as to the size and proportions of the species. The results are presented as follows: minimum (median) maximum. Thus, if five measurements for carapace length for the females of one species are 2.0, 2.1, 2.2, 2.3, and 2.3, these would be reported as follows: 2.0(2.2)2.3, n = 5.

Descriptions. A species description was originally written from a sample of five males and five females or more (if available). During subsequent identifications, the description was periodically checked to ensure that it covered the range of variation within the species. Two characters described that were less thoroughly sampled are the exact region of contact of the forehead band with the anterior median eyes, which was examined in only four to eight males, and the details of the internal epigynal ducts of the female, which in many species was examined in only one to three females.

Clearing. Clearing was used for detailed examination of the integument, especially to observe external and internal structures of the genitalia and mouthparts. The various body parts were cleared by placing them in warm trypsin solution for 1–2 days to digest internal tissues. When the trypsin-clearing procedure is successful, it reveals palp morphology to a level of detail not previously published (Figs. 3, 16–27). Trypsin was used instead of potassium or sodium hydroxide because it damages the cuticle very little and has shown no tendency to expand the palp except perhaps when hematodochae are tightly coiled as in *Ashtabula* and *Bagheera*. If the tissues of the specimen are well fixed and firm, then digestion will be very slow. Hence, for best results the specimen should be fresh-killed (not fixed) or "fixed" in a poor fixative with a low concentration of alcohol. Fresh-killed, dilute ethanol-triton fixed, 80% ethanol fixed, and Kahle's fixed specimens were all used. Specimens not fresh-killed were first rinsed in water for several hours before digestion. The body parts were separated to allow penetration of the trypsin. The trypsin solution was made from about 1 ml purified trypsin (Fisher #T-360) in 10 ml water, filtering after mixing. The trypsin was warmed under a light bulb during digestion. After digestion, the parts, especially dark, heavily sclerotized palps or epigyna, were bleached. They were first rinsed in water and then 80% ethanol, then moved to a solution of 1 part ethanol : 1 part 10% Aerosol for a day, and then for bleaching moved into a solution of 1 part 30% hydrogen peroxide : 1 part ethanol : 2 parts 10% Aerosol. Aerosol (Fisher) was added to the bleaching solution to inhibit the formation and buildup of bubbles, which otherwise can fill the body part and make it unusable. After about 1 day of bleaching, the body part was moved to 80% ethanol and then transferred to 95–100% ethanol. The body part was then mounted temporarily in clove oil or permanently in Euparal. For most specimens, the transferral to Euparal was accomplished by placing the body parts in Euparal thinned with either ethanol or Euparal Essence and letting the ethanol or essence evaporate off, thus gradually taking the specimen through a series of stronger Euparal solutions. This was most easily done directly on the microscope slide, which was then let to dry partially in a dust-free area. Drying thickened the Euparal, allowing final positioning of the parts before adding the coverslip. After the coverslip is added, the body parts, especially the palpus, may move. Thus, the palp was placed near the edge of the coverslip to allow repositioning using a microneedle slipped under the coverslip.

Expansion of Palps. Palps were best expanded permanently by boiling the specimen alive and then fixing it in dilute Kahle's fluid to harden it in an expanded position followed by gradual dehydraton to 80% alcohol. This technique is much

like that described by Sadana (1971). Palps so prepared are resistant to contraction and can be critical-point-dried successfully (Figs. 7, 9). A few palpi that were already preserved in alcohol were expanded in a few minutes by placing them in a hot mixture of 15% hydrogen peroxide, 40% water, and 45% ethanol.

Chromosomes. Chromosomes were examined using the Feulgen technique as described by Maddison (1982). The results are given under the description of each species examined.

Courtship. Courtship observations were obtained for *Pelegrina* species and numerous other dendryphantines. Specimens were examined within a few days after collecting. A male and a female were placed on a cotton beating sheet, usually not in full sunlight, and manipulated until the male faced the female and began display. Behavior of the male was observed by eye, and notes and still photographs were taken. Female behavior was not recorded. For most species, no filming or videotaping was done. As salticid behavior can be fast, it is difficult to take notes accurately, and there are likely errors in observation, especially of subtle differences in timing and positions. Still, consistency of observations and videotape confirmation of my own previously taken notes for *Pelegrina dithalea*, *Metaphidippus mannii*, *Metaphidippus chera*, and *Phanias watonus* all indicate that the descriptions should be generally accurate. There are a number of observations, such as the alternate palp waving in the *Pelegrina flavipedes* group and the triangular crouch pose of *Pelegrina aeneola*, that have been repeated a number of times and in which I have strong confidence. In the descriptions of the displays, the sample sizes for the observations are indicated by listing the number of observations for each feature of the display. For instance, in the description of the courtship of *P. galathea*, the following sentence occurs: "First legs flicker (n = 12, 6♂) on each series (n = 4, 2♂) up and down (n = 4, 2♂) and alternately back and forth at tips (n = 1), vigorously (ca. 5 c/s) (n = 1) but at low amplitude (n = 5, 3♂)." The parenthetical comments indicate the number of observations (n) and the number of males in which the feature was noted. The number of observations was counted as follows: a male was observed doing a bout of courtship display; any features of position or motion were considered to have thus been observed once during this bout. If the male stopped displaying because the female left or rejected him, and if he began again later (perhaps after I had moved them back together), then the next display was counted as a separate observation. While the more obvious features of the display may have been observed many times (for instance, that the legs were flickered was observed 12 times in six males in the preceding example), some of the more subtle details of the display were not noticed in most displays and, thus, would have been observed only a few times (for instance, that the legs flickered "alternately back and forth at tips" was observed only once). Where there is variation, the description lists each of the alternatives with an indication of sample sizes. For instance, if the legs were usually flickered at low amplitude, but occasionally at high amplitude or not at all, the description might read like this: "On each series legs flickered (n = 9, 1♂) noticeably (n = 1) or with fairly low amplitude (n = 7, 3♂) or perhaps not at all (n = 3, 1♂)." Sample sizes are in general small. It was felt that it is presently more important to obtain a broad survey, including many species, than a deep analysis of a few species. Explanations of terms used to describe courtship are given in the section Explanation of Morphological and Behavioral Terms and in the description of behavioral characters (item 7) supporting the monophyly of *Pelegrina*.

Phylogenetic Analysis. Though this work is primarily concerned with the genus *Pelegrina*, an attempt was made to outline the broader structure of the family and the relationships of dendryphantines,

partly for their own sake and partly to set the context for the genus *Pelegrina*. The general discussion of phylogeny within the family is presented separately (Maddison, 1988, unpublished manuscript). My phylogenetic proposals are presented in a narrative discussion of groups and characters; no numerical phylogenetic analysis was done. Table 2 shows the distribution of some of the more important characters, but it will be noted that some of these do not perfectly support the groups proposed. Problems with some of the characters are noted in the phylogenetic discussion. Furthermore, the presumption of ancestral state for a given character is usually not accompanied by rigorous outgroup analysis (e.g., Maddison et al., 1984). We are still making only preliminary sketches of the phylogenetic structure of this large and poorly known family, and it would not be productive to delay phylogenetic hypotheses until they can be rigorously defended. The suggestions made should have at least a glimmer of truth and will, I hope, stimulate future work.

Species Distinctions. Populations were considered distinct species if several consistent and discrete morphological differences could be found among them, but when there were few differences, apparent intergradation, or little material, the decision as to whether one or more species are present was sometimes difficult. In several cases, only a single species was recognized despite geographical variation, because the geographical variation was too confusing at present (*furcata-mimus*), or because the differences were slight and possibly not consistent (*aeneola/uteanus*, northern and Floridian *tillandsiae*, northern and southern *carmenensis, mannii/versicolor*). In other cases, allopatric populations that are similar but that differ consistently in a number of features were recognized as distinct (*sabinema/pervaga, bicuspidata/volcana, neoleonis/tristis, proxima/galathea/dithalea, chera/tricolor/diplacis*), though in each of these cases the decision was difficult. *Pelegrina flavipedes, flaviceps,* and *exigua* were maintained distinct despite apparent hybridization because they differ in numerous features. The two sympatric forms of *exigua* were left under one specific name until they can be better studied.

Male/Female Matching. Care had to be taken in proposing which males and females belonged together in the same species, as in other spiders (Levi, 1985). The problem was especially bad in *Pelegrina* species from the southwestern United States, México, and Central America, where collecting has been limited. Despite the strong sexual dimorphism, similarity in body form and markings could often be used as evidence. Other criteria used were expected correlations in genitalia (e.g., wide, robust embolus with strong epigynal flaps), co-collecting in same geographical region, locality, or microhabitat, and similarity of the male and female each to those of another well-matched species. Comments regarding evidence used to match males and females are given in those species descriptions where it seems needed. Among the less certain matchings are those for *Pelegrina sandaracina, pallidata, chaimona, huachuca,* and *morelos.*

EXPLANATION OF MORPHOLOGICAL AND BEHAVIORAL TERMS

Markings in General. Color patterns are generated by integument coloring and by covering of setae, though pale setae usually overlie pale integument and dark overlie dark. The terms *hair* and *scale* are used to refer to a thin, more or less cylindrical seta and a broad, flattened seta, respectively (cf. Hill, 1979).

Markings of the Carapace. Male dendryphantines are commonly dark brown with bands of white to yellow scales, usually including a major longitudinal band on either side of the carapace and abdomen. The following names are used to refer to the bands of pale scales on the carapace (Fig. 1):

side bands: Longitudinal bands on either

side of carapace, beginning beside the anterior lateral eyes (ALEs) and proceeding just beneath the small eyes and posterior eyes and beyond, onto the thorax.

cheek band: Oblique band on the side of the face, starting beneath the ALEs and proceeding down and posteriorly to the carapace margin, in *Pelegrina* and the *mannii* group.

forehead band: A V-shaped marking on the dorsal cephalic area just behind the anterior median eyes (AMEs).

marginal band: On the lower margin of the sides of the carapace, often extended from the cheek band in *Pelegrina*. Females of most species show none of these bands distinctly; the carapace is instead often covered more or less uniformly with pale scales including a dense white covering on the clypeus.

Setae Surrounding Anterior Median Eyes. These are of various colors, from white to black. In the descriptions of *Pelegrina* males, the colors of setae around the circumference of the *left* anterior median eye (AME) are indicated using a notation derived from hours on a clock's face. Usually, the colors on only the dorsal part of the AMEs are described, for those ventrally are more variable. Thus, "white forehead band contacts the AME dorsally 10:30–12:30" means that as one looks from the front at the left AME there are white setae from 10:30 o'clock to 12:30 o'clock that are continuous with the forehead band, and dark setae on either side of this.

Markings of the Legs. The legs are yellow to dark brown, but there are often annulate markings (Fig. 1), especially in males, so that each leg has pale portions covered with white scales alternating with darker portions lacking white.

Markings of the Abdomen. The abdomen is usually brown above in males, ringed by white *side bands* (Fig. 1). The dorsum of the abdomen often shows traces of the *paired pale spots* seen in females (Fig. 2). These pale spots are central and paired: the first pair just anterior to the muscle attachment of the second dorsoventral muscle (number 86viii + ix of Whitehead and Rempel, 1959), the second pair anterior to the attachments of the third dorsoventral muscle, and the third, fourth, fifth, and sixth pairs of spots behind this. The fifth and sixth pairs are very small. Often the fourth through sixth pairs are each connected medially and thus form small chevrons. Between these pale spots may be spots of dark brown, sometimes very dark (e.g., Fig. 353).

Male Palpus (Figs. 3, 6–9). The descriptions generally assume that the left palp is being viewed from the ventral. The adjectives basal and apical when unqualified refer to the appearance in a contracted palp (i.e., basal = toward the tibia and apical = toward the tip of the cymbium). In contrast, "anatomically basal" and "apical" refer to the cymbium–embolus axis of connections of the palp's bulb (ie., anatomically basal = toward the basal hematodocha and anatomically distal = toward the tip of the embolus).

In the subfamily Dendryphantinae, the shoe-shaped *cymbium* holds a bulb consisting of (from anatomically basal to apical) a fully expandable basal hematadocha, a small subtegulum, a much reduced median hematodocha, the large tegulum, a fully expandable distal (embolic) hematodocha, and the embolus. The *basal hematodocha* expands so as to give a clockwise rotation to the subtegulum and tegulum in ventral view of the left palp, as in other salticids. This has been observed by artificial expansion on many dendryphantines and during copulation of *Dendryphantes nigromaculatus.* The *subtegulum* is small and contains little more than the basal portion of the sperm duct reservoir (Figs. 3, 8).

From the subtegulum, the *sperm duct* loops up, down, and around the *tegulum* (Fig. 3) in a clockwise direction to the embolus. The distal retrolateral portion of the tegulum, where the sperm duct enters the tegulum from the subtegulum, is generally

extended distally and contains a loop of the sperm duct pressed against its wall. This portion I call the *shoulder* of the tegulum (Fig. 3). Just proximal to the embolus and shoulder is a fold extending across the surface of the tegulum, the *tegular ledge* (Figs. 3, 6, 7), which serves as a pocket to hold the proximal part of the embolic base. Wanless (1984) suggested that the tegular ledge (his M3) is absent from salticids other than spartaeines, in which he described it. However, the fold that I am here calling the tegular ledge may be homologous with his M3, for it appears as an extension of the embolic hematodocha cutting across the face of the tegulum and occurs in many groups of salticids. The tegulum is filled with *tegular glands*, which empty into the sperm duct via a series of pores in the sperm duct (see Osterloh, 1922; Bhatnagar and Rempel, 1962). As in other spiders, these pores are aligned into a band (Schult, 1980), which, when narrow, appears as if it were a seam along the length of the sperm duct. Along the narrower part of the sperm duct toward the embolus, the glands are connected to the sperm duct via long ducts (Fig. 3; also known from other spiders; Osterloh, 1922: figs. 20, 26). These pores, ducts, and glands have been largely ignored in systematics but appear to be a potential source of good systematic characters (for instance, in some salticids the pores are arranged in a broad ribbon, whereas in others the band is very narrow, and in *Sitticus* the pores are arranged into prominent craters).

The *embolic hematodocha* arises on the back side of the tegulum (Fig. 8), prolateral to the subtegulum. Its wrinkles sweep apically up toward the embolus. The exact arrangement of the folds of the hematodocha is probably of systematic value but is very difficult to untangle, for especially near the base of the embolus the folds are twisted and confusing even in a well-cleared palpus. During expansion, the embolic hematodocha expands fully to move the embolus counterclockwise (i.e., prolaterally) and back (i.e., toward the cymbium), as indicated by artificial expansions (Figs. 7, 9). The counterclockwise movement of the embolus itself probably explains why the counterclockwise-coiled embolus can still engage the epigynal opening despite the clockwise movement of the tegulum (in salticids with the embolus fixed to the tegulum, the embolus has a clockwise curve, which thus coincides with the clockwise thrust of the tegulum). The *embolus* of dendryphantines usually consists of a basal portion, which is transversely directed, and an apical portion, which is usually thin and erect and has the opening of the sperm duct at its tip (Figs. 40–47; also Figs. 64b, d). The *embolic base* consists of a more or less sclerotized portion of the embolic hematodocha that is exposed to the ventral surface and that rests betwee the tegular ledge and the embolus (Figs. 3, 6, 7). Its wrinkles suggest that it should be considered part of the hematodocha. As noted, the embolus is coiled counterclockwise, a feature much more readily apparent in the euophryines and other subfamilies than it is in the dendryphantines. In dendryphantines, the spiral is hidden and best seen in expansions or dissections (e.g., Fig. 35). The dendryphantine embolus arises prolaterally and moves across toward the retrolateral side (the transverse basal portion of the embolus) and then folds back toward the prolateral and abruptly rises as the erect apical portion (Figs. 20–23). In many genera, the erect apical portion is fused against the transverse portion so that there is no open, freely coiling spiral. A suture on the back side of the embolus (the *embolic suture*), between the transverse portion and the erect portion, is often present and indicates where the folded-back spiral has not completely fused (Figs. 3, 8, 20–23, 31–35). In cleared palpi, a slight bend in the sperm duct can be seen at this point. The coiling of the embolus and the embolic suture suggesting it are clearly visible in *Dendryphantes, Eris, Pelegrina, Phidippus, Tutelina, Phanias*, and many other genera. In *Metaphidippus chera*, the coiling is eas-

ily seen (Fig. 35); in *Pelegrina proterva*, the only trace is the small suture (Fig. 34); in *Pelegrina flavipedes*, the suture is sometimes visible and sometimes not. No trace of the suture or past coiling can be found in *Terralonus* cf. *unicus* and *Poultonella alboimmaculata*, but *Terralonus mylothrus* and *Tutelina elegans*, which are, respectively, their close relatives, show them well. The loss of a trace of coiling may have evolved several times in the dendryphantines. In some genera such as *Zygoballus*, *Hentzia* and *Mabellina*, the coil is not so compact and, instead, is more open (e.g., Figs. 24–27, 37, 38, 50, 51, 58–63, 64c, f). Figure 64 summarizes some of the coiling patterns seen in dendryphantines. The erect portion of the embolus is sometimes a simple spike with the opening terminal, but in many dendryphantines there are prolongations that will be referred to as *rami*, and often small denticles occur on the surface of the embolus. In *Pelegrina*, in particular, there are two rami retrolateral to the opening of the sperm duct, the prolateral ramus very near the opening and the retrolateral ramus some distance away (Fig. 3).

Epigynum. In most dendryphantines, the openings are well separated and S-shaped (Figs. 65–70), with entry toward the lateral in the anterior half and toward the medial in the posterior half (Fig. 5). The lateral rim of the opening is often thickened to yield a more or less convex teardrop-shaped area, which will be called the *epigynal flap* (Fig. 4). The inner margins of the left and right flaps may be *parallel* to each other (e.g., Figs. 262, 274, 322) or be *divergent* from anterior to posterior (e.g., Figs. 346, 352, 398) or be *convergent* (e.g., Figs. 280, 297, 332, 363). In some *Pelegrina*, the flaps converge to such an extent that their posterior halves are rotated 90° and become transverse (e.g., *P. kastoni*, Fig. 317). Even more extreme rotations are seen in *P. arizonensis* (180°, Fig. 424) and *P. helenae* (270°, Fig. 430). The surface of the epigynum between and behind the openings varies in topography among the species of *Pelegrina* (Figs. 236–255). In some, the entire surface behind the openings is raised into a mound (e.g., *P. clemata*, Fig. 246); in others, it is much more concave (e.g., *P. furcata*, Figs. 249, 250). At the posterior margin of the epigynum is the *notch*, or guide (Figs. 4, 5), into which fits the male tibial apophysis, although in some dendryphantine groups (*Poultonella*, *Hentzia*) the guide has moved anteriorly as in pellenines (*Pellenes*, *Habronattus*) and *Bianor*.

The different parts of the copulatory ducts of *Pelegrina* species are named as follows (Fig. 5). From the anterior half of the openings, the ducts proceed first laterally and posteriorly (the *first curve*), then medially (the *second curve*), and then posteriorly (the *third curve*), and then twist a number of times and proceed dorsally to the fertilization ducts. The inner surface of the duct is relatively smooth in the first and second curves, smooth or rough in the third curve depending on the species, and rough with projections in the twisted area posteriorly. The *flower-shaped openings* of the accessory glands occur on the second curve, usually near the junction with the first curve (Fig. 5). The pathway from the copulatory opening through the copulatory ducts toward the fetilization ducts is almost straight, lacking the separate spermathecal reservoir seen in, for instance, some euophryines.

Courtship. Some introduction to the format of descriptions of courtship has already been given under the Materials and Methods section. Males, especially early in display, often walk not straight toward the female but instead *sidle* so that they approach obliquely or not at all. The sidling may be first to the left and then to the right, and so on, to form a zigzag dance (Jackson, 1978). The male usually walks sporadically, taking a series of steps then pausing, another series of steps then pausing, and so on. Because the male's pose and motions of the first legs, palp, and abdomen often differ depending on whether he is walking or paused, a dis-

tinction is made between the walking phase, which is called the *series* (of steps), and the *pauses*. While the male is walking, the first legs are generally raised, spread, and/or extended forward. The first legs may be *waved* or *flickered* up and down or forward and backward, one or repeatedly. The distinction between a wave and a flicker is not precise; in general, "wave" is used when the motion is of low speed or frequency, "flicker" for high-frequency repeated motions. The abdomen may be *twitched* (Jackson, 1978) down then up, which in many species produces a sound that may function in courtship (Maddison and Stratton, 1988). Explanations of "crouch" and "raisedspread" stages of courtship are given in the discussion of monophyly (item 7) in the description of the genus *Pelegrina*.

THE SUBFAMILY DENDRYPHANTINAE

Pelegrina and *Metaphidippus* are dendryphantines, which are salticids. Maddison (1988) reviewed the phylogeny of the family Salticidae. The majority of salticid species are considered to form a monophyletic group, called the Salticine division (Maddison, 1988), which are distinguished from the remaining groups (Lyssomaninae, Spartaeinae, and the *Cocalodes* group) by eye structure (Wanless, 1984; Eakin and Brandenburger, 1971; Blest, 1983; Blest and Sigmund, 1984), absence of a tarsal claw on the female palp, medial displacement of the gnathocoxal glands (Figs. 14, 15), asymmetrical tarsal claws, a mound of slit sense organs with an associated seta on the medial edge of the chelicera (Figs. 12, 13), and a small intercheliceral sclerite (Figs. 12, 13), each of which may be considered derived within the family. Within the Salticine division, there are some prominent subfamilies that have the embolus fixed immovably to the tegulum, including the Heliophaninae (delimited by an apparent stridulatory apparatus and a bump on the tegulum just clockwise [left palp] of the embolus; Maddison, 1987), the Plexippinae (including *Plexippus*, *Hyllus*, *Evarcha*, *Thyene*, *Telamonia*, *Harmochirus*, and part of *Bianor*, delimited by a modified serrula on the male endite and a bump on the tegulum just counterclockwise [left palp] of the embolus), and many other familiar groups such as *Pellenes*, *Salticus*, *Sitticus*, *Phiale*, *Myrmarachne*, *Amycus*, and their respective relatives. However, the Euophryinae, Dendryphantinae, and several smaller groups are united by an embolus that is free to move, being separated from the tegulum by a fully expandable hematodocha (Figs. 29–31). In these groups, the embolus is also coiled counterclockwise (left palp). The subfamily Dendryphantinae itself is delimited by the derived conditions of a carina on the underside of the male chelicera, by the coil of the embolus folded back so as to be hidden behind the base of the embolus, and by S-shaped epigynal openings.

The Dendryphantinae is a subfamily of several hundred species, most of these in the New World. Males are usually striped, with longitudinal bands of pale scales on either side of the carapace and abdomen, while females usually have paired spots on the abdomen. The chelicerae of males are often enlarged or elongate as is the first pair of legs. The posterior eyes are smaller than in most euophryines.

Table 1 lists the generic names (including those now considered synonyms) that I refer at least tentatively to the subfamily. Some of these genera are included for the first time. Some genera are included with hesitation, either because they are obscure and their type species were not examined (e.g., *Anamosa*, *Homalattus*) or because they exhibited none of the supposed dendryphantine synapomorphies listed later but have the general body form and markings much like those of other dendryphantines (e.g., *Mabellina*). Other genera are excluded with hesitation—for instance, those genera related to *Ballus* (*Colaxes*, *Marengo*, *Padilla*, *Pachyballus*, and perhaps *Admestina*) and to *Synageles* (*Consingis*, *Descanso*, *Peckhamia*, and

Table 1. Generic names of jumping spiders tentatively referred to the subfamily Dendryphantinae. Synonymies are not indicated.

Admirala G. & E. Peckham, 1901	*Nagaina* G. & E. Peckham, 1896
Agassa Simon, 1901	*Osericta* Simon, 1901
Amerotritte Mello-Leitão, 1944	*Paradamoetas* G. & E. Peckham, 1885
Anamosa G. & E. Peckham, 1895	*Parahentzia* Bryant
Anicius Chamberlin, 1925	*Paraphidippus* F. P.-Cambridge, 1901
Anoka G. & E. Peckham, 1893	*Parnaenus* G. & E. Peckham, 1896
Ashtabula G. & E. Peckham, 1894	*Partona* Simon, 1902
Avitus G. & E. Peckham, 1896	*Pelegrina* Franganillo, 1930
Bagheera G. & E. Peckham, 1896	*Phanias* F. P.-Cambridge, 1901
Beata G. & E. Peckham, 1895	*Phidippus* C. L. Koch, 1846
Bellota G. & E. Peckham, 1892	*Poultonella* G. & E. Peckham, 1909
Bryantella Chickering, 1946	*Ramboia* Mello-Leitão, 1944
Cerionesta Simon, 1901 (n. nov. for *Cydonia* G & E Peckham, 1893, preoccupied)	*Rhene* Thorell, 1869 (n. nov for *Rhanis* C. L. Koch, 1848, preocc.)
Chirothecia Taczanowski, 1878	*Rhetenor* Simon, 1902
Dendryphantes C. L. Koch, 1837	*Rudra* G. & E. Peckham, 1885
Donaldius Chickering, 1946	*Sassacus* G. & E. Peckham, 1895
Dryphias Simon, 1901	*Sebastira* Simon, 1901
Eris C. L. Koch, 1846	*Selimus* G. & E. Peckham, 1901
Gastromicans Mello-Leitão, 1917	*Semora* G. & E. Peckham, 1892
Ghelna new genus	*Tacuna* G. & E. Peckham, 1901
Hentzia Marx, 1883	*Terralonus* new genus
Homalattoides F. P.-Cambridge, 1901	*Thammaca* Simon, 1902
Homalattus White, 1841	*Tulpius* G. & E. Peckham, 1896
Lurio Simon, 1901	*Tutelina* Simon, 1901
Mabellina Chickering, 1946	*Uluella* Chickering, 1946
Maeviobeata di Caporiacco, 1947	*Wala* Keyserling, 1884
Megatimus Thorell, 1891	*Zeuxippus* Thorell, 1891
Messua G. & E. Peckham, 1896	*Zygoballus* G. & E. Peckham, 1885
Metaphidippus F. P.-Cambridge, 1901	

perhaps *Cheliferoides* and *Leptorchestes*) may very well be derived dendryphantines (see Maddison, 1988).

Simon (1901, 1903) placed many of these dendryphantine genera in his group Dendryphanteae or Rheneae, though a number of them were scattered among other groups: *Beata* in the Simaetheae, *Bellota* in the Synageleae, *Nagaina* in the Bellieneae, *Rudra* in the Rudreae, *Tutelina* in the Chrysilleae, and *Zygoballus* in the Zygoballeae. G. & E. Peckham (1901b) included in their *Phidippus* group of genera *Phidippus, Paraenus, Dendryphantes, Selimus,* and *Admirala,* here considered dendryphantines, but as well many other genera now considered to belong to the Euophryinae and other subfamilies. Prószyński (1976: 15, 148–150) listed the genera *Cheliferoides, Dendryphantes, Eris, Metaphidippus, Paradamoetas, Phidippus, Rhetenor, Sassacus, Thiodina,* and *Wala,* in the subfamily Dendryphantinae; all except *Cheliferoides* and *Thiodina* are here considered dendryphantines.

Specifying distinct apomorphies to justify my concept of the subfamily is difficult, for no characters both universal throughout and unique to the group are known; homoplasy must therefore be invoked if the subfamily is to be accepted as proposed. Three characters derived within the family are proposed as synapomorphies of the subfamily:

1. Carina on underside of the male chelicerae (Table 2, character 1). On the ventrolateral edge of the basal segment of the chelicera there is a fold or carina (Fig. 10). This carina occurs in almost

TABLE 2. CHARACTERS USED IN RECONSTRUCTING DENDRYPHANTINE PHYLOGENY.

	1. Carina	2. Spiral	3. Epig. Op.	4. Tib. Ap.	5. Teg. ledge	6. Fusules	7. Hem Bulge	8. F. Wrinkles	9 Courtship	10. T. Ridge
Pelegrina proterva (Walckenaer)	present	hidden	sinuate	tapered	40°	?	present	present	crouch	present
P. galathea (Walckenaer)	present	hidden	sinuate	tapered	40°	absent	present	present	crouch	present
P. peckhamorum (Kaston)	present	hidden	sinuate	tapered	50°	absent	present	present	crouch	present
P. flavipedes (Pkm.)	present	hidden	sinuate	tapered	40°	?	present	present	crouch	weak
P. clemata (Levi & Levi)	present	hidden	sinuate	tapered	40°	absent	present	present	crouch	present
P. montana (Emerton)	present	hidden	sinuate	tapered	50°	absent	present	present	crouch	present
P. insignis (Banks)	present	hidden	sinuate	tapered	40°	?	present	present	crouch	present
P. aeneola (Curtis)	present	hidden	sinuate	tapered	40°	?	present	present	crouch	present
P. furcata (F. Cambridge)	present	?	sinuate	tapered	40°	absent	present	present	rs	present
P. arizonensis (Pkm.)	present	?	sinuate	tapered	70°	absent	present	present	rs	present
P. tillandsiae (Kaston)	?	hidden	sinuate	?	50°	?	present	?	?	present
P. bunites new species	present	hidden	sinuate	tapered	50°	?	present	present	crouch	weak, present
P. orestes new species	present	hidden	sinuate	tapered	40°	?	present	absent	crouch	absent
Metaphidippus mannii (Pkm.)	present	hidden	sinuate	tapered	50°	?	absent	absent	crouch	present
M. chera (Chamberlin)	present	hidden	sinuate	tapered	40°	absent	absent	absent	crouch	absent
Anicius spp.	present	hidden	not	tapered	80°, 90°	absent	absent	absent	rf	absent
Ashtabula dentata F. Cambridge	present	?	not	er. blade	50°	?	?	absent	?	?
Bagheera prosper (Pkm.)	absent	?	not	er. blade	90°	absent	?	absent	rf	absent
Beata hispida (Pkm.)	present	hidden	sinuate	tapered	30°	absent	absent	absent	rs	present
"Beata" octopunctata (Pkm.)	absent	?	not	tapered	70°	absent	absent	present	?	absent
"Beata" wickhami (Pkm.)	absent	?	not	tapered	40°	present	?	absent	rf	absent
Bellota wheeleri Pkm.	present	hidden	sinuate	tapered	50°	absent	absent	absent	ls	weak
Dendryphantes rudis (Sundevall)	present	hidden	sinuate	tapered	40°	absent	absent	absent	?	absent
D. nigromaculatus (Keyserling)	present	hidden	sinuate	?	40°	?	absent	absent	rf	?
"D." zygoballoides Chamberlin	present	hidden	sinuate	tapered	70	absent	absent	absent	?	absent
Eris militaris (Hentz)	present	hidden	not	tapered	40°	absent	absent	present	crouch	weak
E. floridana (Banks)	?	hidden	sinuate	?	40°	?	absent	?	?	?
E. aurantia (Lucas)	present	hidden	sinuate	tapered	50°	absent	absent	absent	ls, rf	weak
Gastromicans levispina (F. Cambridge)	present	?	not	er. blade	90°	absent	?	absent	?	absent
Ghelna sexmaculata (Banks)	present	?	?	?	60°	absent	?	?	?	?
Ghelna barrowsi Kaston	present	?	?	tapered	?	absent	?	?	?	?
"Eris" nidicolens (Walckenaer)	absent	open	not	tapered	80°	present	absent	absent	?	absent
Hentzia palmarum (Hentz)	absent	hidden	not	tapered	50°	present	?	absent	ls	?
Messua limbata (Banks)	absent	?	not	?	90°	absent	?	absent	rs, rf	absent
"Metaphidippus" vitis (Cockerell)	present	open	not	tapered	?	absent	?	absent	rf	weak

TABLE 2. CONTINUED.

	1. Carina	2. Spiral	3. Epig. Op.	4. Tib. Ap.	5. Teg. ledge	6. Fusules	7. Hem. Bulge	8. F. Wrinkles	9. Courtship	10. T. Ridge
"*M.*" cf. *pluripuncatus* Mello-Leitão	present	open	sinuate	tapered	?	?	?	absent	?	absent
Paradamoetas sp.	absent	open	not	?	?	absent	?	absent	rs	?
"*Paraphidippus*" *validus* Chickering	absent	?	not	er. blade	?	absent	?	?	?	?
Parnaenus recurvus Chickering	present	?	not	?	50°	absent	?	absent	?	absent
Phanias harfordii (Pkm.)	absent	hidden	sinuate	tapered	90°	present	absent	present	rf	absent
P. watonus (Chamberlin & Ivie)	absent	?	?	tapered	90°	present	absent	present	rf	absent
P. albeolus (Chamberlin & Ivie)	absent	hidden	sinuate	?	90°	present	absent	present	rf	?
P. neomexicanus (Banks)	present	?	sinuate	tapered	80°	present	absent	?	crouch	absent
P. monticola (Banks)	present	?	sinuate	tapered	60°	present	absent	?	?	absent
Phanias sp.	present	?	sinuate	?	90°	present	?	present	rf	?
Phidippus audax (Hentz)	present	hidden	sinuate	?	50°	absent	absent	absent	rs	?
P. purpuratus Keyserling	present	hidden	sinuate	tapered	40°	absent	absent	absent	rs	absent
P. whitmani Pkm.	?	hidden	sinuate	tapered	40°	absent	absent	absent	?	absent
P. clarus Keyserling	present	hidden	?	?	50°	absent	?	absent	?	?
Poultonella alboimmaculata (Pkm.)	absent	?	?	er. blade	?	absent	absent	absent	?	absent
"*Pseudicius*" *siticulosus* Pkm.	present	hidden	sinuate	tapered	50°	absent	absent	absent	rf	absent
Rhene cf. *flavigera* (C. L. Koch)	absent	hidden	sinuate	tapered	70°	present	absent	absent	?	?
Sassacus papenhoei Pkm.	present	hidden	sinuate	tapered	40°	absent	absent	absent	rf	absent
Selimus sp.	present	open	not	tapered	?	absent	?	present	?	absent
Terralonus myolothrus (Chn.)	present	hidden	sinuate	tapered	40°	absent	absent	absent	?	absent
Tutelina elegans (Hentz)	absent	hidden	?	tapered	40°	absent	absent	absent	crouch	absent
Tulpius hilarus Pkm.	present	hidden	?	tapered	50°	absent	absent	absent	ls	present
Zygoballus rufipes Pkm.	present	hidden	not	?	?	absent	?	absent	rs	?
Z. sexpunctatus (Hentz)	present	?	not	tapered	70°	absent	absent	absent	rs	absent
Zygoballus incertus Chickering	absent	open	not	?	80°	absent	absent	absent	rs	?

[a] Characters: 1, ventrolateral carina on male chelicera; 2, spiral of embolus hidden or open; 3, shape of epigynal openings; 4, tibial apophysis an erect blade or tapered; 5, angle of tegular ledge from the transverse; 6, epiandrous gland fusules; 7, embolic hematodocha bulges to shoulder of embolus; 8, wrinkles on male fang; 9, courtship display pose (ls = lowspread, rf = raisedforward, rs = raisedspread, crouch = crouch display); 10, ridge under tibial apophysis. Authors' abbreviations Pkm. = G. & E. Peckham.

Quotation marks around generic names indicate that I believe the current generic placement of the species is incorrect, but I will not here attempt to move the species. "*Eris*" *nidicolens* is almost certainly not an *Eris* but, rather, may be more closely related to *Phanias*. *Zygoballus incertus* should probably be placed in *Ramboia* (Bauab-Vianna and Soares, 1982). "*Pseudicius*" *siticulosus* is clearly not a *Pseudicius* (subfamily Heliophaninae; see Maddison, 1987), but whether it can fall into an existing dendryphantine genus is unclear; Edwards (1980) has moved *Icius annectans* (probably = "*P.*" *siticulosus*) to *Metaphidippus*. "*Paraphidippus*" *validus* belongs in the genus *Lurio*. As noted in the text, "*Beata*" *wickhami* and "*Beata*" *octopunctata* do not belong in *Beata*, the former with genitalia closely resembling *Hentzia* and the latter of uncertain affinity. "*D.*" *zygoballoides* is not a *Dendryphantes* but its proper placement is unclear.

all genera considered dendryphantines. It is absent in some groups in which the chelicerae are much elongate (*Messua, Hentzia, Rudra, Paradamoetas*), though this may be related to the elongation, as *Hentzia mitrata* (with short chelicerae) does have the carina. More troublesome are those dendryphantine groups (some *Phanias, Tutelina, "Eris" nidicolens, "Beata" octopunctata*) in which the chelicerae are not elongate and yet the carina is lacking. In at least one of these, *Phanias*, there are some species with the carina, and its absence in others is presumably a secondary loss. The carina is lacking in all other salticids I have seen, except for *Simaetha paetula* (see Prószyński, 1984: 132) and *Simaetha tenuior*, in which a similar carina is present. These species have a *Sitticus*-like palpus, with a round tegulum and immovable embolus, and appear to be distantly related to dendryphantines.

2. Coil of embolus compressed, so that the embolus folds back sharply on itself and superficially appears not to be coiled (Figs. 20–25, 31–35, 37–39, 64b–d, g; Table 2, character 2). Typically, the embolus arises prolaterally and moves across toward the retrolateral side (the transverse basal portion of the embolus) and then folds back toward the prolateral and abruptly rises as the erect apical portion. A suture on the back side of the embolus, between the transverse portion and the erect portion, is often present and indicates where the folded-back spiral has not completely fused. The coils of the embolus are not folded but rather open and exposed (Fig. 19), in the other groups, such as the euophryines, that have a counterclockwise-coiled embolus. Two main problems with the use of this character are posed by various dendryphantines: in some, the embolus appears not even coiled, and in others the embolus appears coiled but the coils are exposed (Fig. 64 summarizes some of the variation seen among the dendryphantines). Despite the first problem, coiling is considered primitive for the subfamily (see earlier discussion under the section Explanation of Morphological and Behavioral Terms). More troublesome is the second problem: the occurrence of dendryphantine groups such as *Paradamoetas*, the South American *"Sassacus," Mabellina, Dendryphantes tropicus*, and *Bryantella* in which the coils of the embolus are exposed (Figs. 26, 27, 58–63, 64e, f). However, three lines of evidence suggest that the exposure of the coils is not homologous to that of the euophryines and, instead, is secondarily derived from the hidden condition. First, the exposed spiral of Dendryphantines is always of a different form from that of the euophryines, being placed more retrolaterally and not so small and tightly coiled. Second, other characters suggest that these troublesome dendryphantines do indeed belong with other dendryphantines, such as the lack of a concave retrolateral loop on the sperm duct in the tegulum, which may be apomorphic as noted later with respect to *Phanias*, the more basally placed tegular ledge, which may be apomorphic or plesiomorphic, and the occurrence of the cheliceral carina in at least some species (e.g., *Metaphidippus vitis*). Third, there is an apparent morphocline between the hidden spiral of *Eris aurantia* (Fig. 64b), through the more marginally open spiral of *Eris militaris* and a species near *Zygoballus incertus* (Figs. 64d, 53, 57), to the more open spiral of *Zygoballus incertus* and *Paradamoetas* (Figs. 64e, 58), to the open and well-coiled spiral of *Mabellina* and *Dendryphantes tropicus* (Figs. 62, 63, 64f). The transition would require merely a retrolateral shift of the erect portion of the embolus and a loss of sclerotization of the basal (laterally directed) portion of the embolus to leave the erect part of the embolus free, at which point it could coil as in

Dendryphantes tropicus and *Mabellina prescotti* (Figs. 62, 63).

3. Epigynal openings S-shaped, with entry toward the lateral in the anterior half and toward the medial in the posterior half (Figs. 5, 65, 67–70; Table 2, character 3). To my knowledge, this sinuate opening is unique among salticids. Though most dendryphantines have this character, it has similar problems to the preceding one and is correlated with it. A number of dendryphantines (e.g., *Eris militaris, Tutelina elegans, Phidippus clarus, Hentzia, Paradamoetas, Anicius, Zygoballus, Messua, Bagheera*) have C-shaped or simple cavernous openings. In some of these, however, ridges descending into the opening are presumably remnants of the teardrop-shaped flaps associated with the sinuate openings (*Eris militaris*, Fig. 66; *Tutelina elegans*). For some of these, there are related species that have the sinuate openings (*Eris floridana, Tutelina hartii, Phidippus* spp., *Anicius* sp., *Zygoballus tibialis*), but there remain other genera with no remnant of the flaps or obvious close relatives with sinuate openings. In general, the species lacking a compact embolic spiral also lack the sinuate openings, perhaps because a retrolateral shift of the erect portion of the embolus is correlated with an expansion of the epigynal openings and weakening of the teardrop-shaped flaps. Such a correlated change seems to mark each of *Eris militaris, Pelegrina kastoni, Dendryphantes nigromaculatus*, and *Phidippus octopunctatus* from its close relatives.

RELATIONSHIPS WITHIN THE DENDRYPHANTINAE

The limits and interrelationships of genera within the subfamily Dendryphantinae (see Table 1 for a list) are at present poorly understood. The following discussion will make an attempt to resolve only a small part of the confusion, for I will focus on those phylogenetic questions that are most important to resolve the generic placement of the *galathea* group of species, which is the subject of the species revision that makes up the bulk of this paper. The *galathea* group has resided in the genus *Metaphidippus*, but, as explained next, this genus is polyphyletic. Here I will begin (but not complete) the task of dismantling *Metaphidippus*. The *galathea* group will be moved to the genus *Pelegrina*, the *harfordii* group to *Phanias*, the *mylothrus* group to *Terralonus*, the *castaneus* group to *Ghelna*, some other species to *Messua*, but some species groups (*mannii* group, *vitis* group, various neotropical species) will remain temporarily in *Metaphidippus* for want of a better alternative. Table 3 lists the proposed reclassification of *Metaphidippus* and some other dendryphantine species.

Metaphidippus was described in 1901 by F. O. Pickard-Cambridge, who gave no clear justification for its limits. Many of the North American species that had been placed in *Dendryphantes* were subsequently transferred to *Metaphidippus*, in part because of Bryant's (1941) conclusion that these species did not belong with the Old World *Dendryphantes*. In fact, her cited evidence was mistaken: the European specimens she compared were actually "*Eris*" *nidicolens* misidentified as *D. hastatus* (Maddison, 1988). Regardless, the more or less wholesale transfer of North American species from *Dendryphantes* resulted in a *Metaphidippus* that has been desperately polyphyletic, being nothing more than a catch-all genus of unremarkable North and Central American dendryphantines spanning much of the diversity of the subfamily. Because the type species of *Metaphidippus* (*M. mandibulatus* F. O. Pickard-Cambridge) is not closely related to most species placed in the genus, including the *galathea* group, many species of *Metaphidippus* should be placed elsewhere. The relationships of the true *Metaphidippus* will first be considered, after which the limits of *Dendryphantes* and

TABLE 3. SUMMARY OF PLACEMENTS OF VARIOUS NEW WORLD DENDRYPHANTINE SPECIES APART FROM *PELEGRINA* SPECIES, DISCUSSED IN TEXT. ? INDICATES PLACEMENT CONSIDERED POSSIBLE BUT UNCONFIRMED. AUTHORS OF NAMES ARE GIVEN IN INDEX.

Bagheera
- *Bagheera kiplingi*
- *B. prosper*
- *?Metaphidippus nigropictus*
- *?M. bicavatus*

Beata
- *Beata hispida*
- *B. inconcinna*
- *B. longipes*
- *B. maccunii*
- *B. magna*
- *B. rustica*

Dendryphantes (partial)
- *Dendryphantes nigromaculatus*
- *D. chuldensis*
- *D. fusconotatus*
- *D. hastatus*
- *D. rudis*

Gastromicans
- *Gastromicans albopilosa*
- *G. hondurensis*
- *G. levispina*
- *G. noxiosa*
- *G. vigens*
- *?Hasarius lisei*

Messua
- *Messua desidiosa*
- *M. centralis*
- *M. dentiger*
- *M. donalda*
- *M. lata*
- *M. laxa*
- *M. limbata*
- *M. moma*
- *M. octonotata*
- *M. pura*
- *M. tridentata*
- *?Metaphidippus cupreus*
- *?Metaphidippus ovatus*
- *?Metaphidippus iridescens*
- *?Metaphidippus inflatus*
- *?Metaphidippus quadrinotatus*
- *?Dendryphantes felix*

Phanias
- *Phanias albeolus*
- *P. concoloratus*
- *P. dominatus*
- *P. flavostriatus*
- *P. furcifer*
- *P. furcillatus*
- *P. harfordii*
- *P. monticola*
- *P. neomexicanus*
- *P. watonus*
- *?P. salvadorensis*

Terralonus
- *Terralonus californicus*
- *T. mylothrus*
- *T. unicus*
- *T. shaferi*
- *T. versicolor*
- *T. vittatus*
- *T. fraternus*

Ghelna
- *Ghelna castanea*
- *G. barrowsi*
- *G. canadensis*
- *G. sexmaculata*

Metaphidippus mannii group
- *Metaphidippus mannii*
- *M. carmenensis*
- *M. chera*
- *M. diplacis*
- *M. emmiltus*
- *M. tricolor*

Metaphidippus vitis group
- *Metaphidippus vitis*
- *M. texanus*
- *M. mathetes*
- *Dendryphantes melanomerus*

Beata will be discussed. Then, the correct placement of various groups placed in *Metaphidippus* will be considered.

The *Bagheera* Group of Genera

It is within the *Bagheera* group, common in the Neotropics, that the true *Metaphidippus* appear to fall. Members of this group, which includes such common species known as "*Eris*" *limbata*, "*Metaphidippus*" *prosper*, "*Beata*" *albopilosa*, have a distinctive embolus, which appears, at first glance, to be coiled or curved clockwise in the left palpus, opposite the coun-

terclockwise coiling I have said characterizes the dendryphantines and related subfamilies (Figs. 99–101). This clockwise coiling is apparently superimposed upon the normal coiling by a twisting of the embolus. The main axis of the embolus has twisted counterclockwise (as viewed from tip of embolus in left palpus), thus winding the hematodocha and sperm duct around it (Figs. 64h, 99–101). The tip of the embolus, though, seems to have been left behind by the twisting, so that the apical part of the embolus takes on a clockwise curling. In some species, this clockwise coiling is visible in the uncleared palpus (Figs. 81, 84, 87, 93), but in others it is not (Fig. 91), and the palpus is little modified from the typical compressed counterclockwise spiral of dendryphantines. The most extreme clockwise coiling is seen in *"Metaphidippus" prosper* (Fig. 99) and *"Beata" albopilosa* (see Fig. 101).

Species in the group can be sorted provisionally into three subgroups, which may or may not be monophyletic, for each of which there exists an available generic name that has been mostly ignored in the literature: *Bagheera* G. & E. Peckham, *Messua* G. & E. Peckham, and *Gastromicans* Mello-Leitão. A fourth genus sharing a twisted embolus is *Ashtabula* G. & E. Peckham, though whether or not it belongs with the group is unclear. The twisting of the embolus in *Ashtabula* (Fig. 102) is hidden beneath the tegulum and is more extreme, though similar to, that in *Bagheera*, *Messua*, and *Gastromicans*. However, there are several features that cast doubt on the placement of *Ashtabula* with these genera. *Ashtabula* has an extra concave loop on the sperm duct in the palpus, possibly placing it near the base of the subfamily as noted later in connection with *Phanias*. The body in *Ashtabula* is not nearly so large and robust as in the *Bagheera* group, instead resembling that of *Hentzia* or *Anicius*. More work is needed before the place of *Ashtabula* can be settled. Species of *Ghelna* and the *arizonensis* group of *Pelegrina* (discussed later) both have a twisted embolus, but in each it takes a very different form from the twisting in the *Bagheera* group of genera. *Sebastira*, *Thammaca*, *Lurio*, and *Parnaenus* may also belong with the *Bagheera* group of genera, though their emboli do not so obviously possess the twisting. A brief account of *Bagheera*, *Messua*, *Gastromicans* and *Metaphidippus* is here given.

Bagheera *(Figs. 80–85). Bagheera* males have elongate, horizontal, *parallel* chelicerae (Fig. 80); the retromarginal teeth are near the base of the chelicera; in all but one species there is distally, near the fang, what appears to be a large retromarginal tooth but actually is not (it does not have the terminal canal through the cuticle that seems to characterize all true teeth), and most species have tubercles bearing setae on the inner margin of the basal cheliceral segment. Included in *Bagheera* are the type species, *B. kiplingi* G. & E. Peckham, 1901 (type species by monotypy; holotype examined; Figs. 80–83), and *Bagheera prosper* (G. & E. Peckham) (NEW COMBINATION; Figs. 84, 85, 99) and at least two undescribed species. *Metaphidippus nigropictus* F. P.-Cambridge and *M. bicavatus* F. P.-Cambridge may also belong in *Bagheera*.

Messua *(Figs. 86–92).* Males of this genus have elongate *divergent* chelicerae (Fig. 86) with a long and sickle-shaped retromarginal tooth near the fang; the promarginal teeth are near the base, well separated from the retromarginal tooth; on the anterior distal margin of the basal segment of chelicera near the fang is a flange. Included in *Messua* are the type species *M. desidiosa* G. & E. Peckham, 1896 (type species by monotypy; holotype and collections of males and females from San Jose, Costa Rica examined; Figs. 86–89), *Messua centralis* (G. & E. Peckham) (lectotype here designated, a male from Chiriqui), *Messua dentiger* (F. P.-Cambridge) (see Fig. 91), *Messua donalda* (Kraus), *Messua lata* (Chickering), *Messua laxa* (Chickering), *Messua limbata* (Banks) (Figs. 90, 100, 117), *Messua moma* (F. P.-Cam-

bridge), *Messua octonotata* (F. P.-Cambridge), *Messua pura* (Bryant), and *Messua tridentata* (F. P.-Cambridge). All these except *M. desidiosa* are NEW COMBINATIONS. *Metaphidippus cupreus* F. P.-Cambridge, *M. ovatus* F. P.-Cambridge, *M. iridescens* F. P.-Cambridge, *M. inflatus* F. P.-Cambridge, and *M. quadrinotatus* F. P.-Cambridge may also belong in *Messua*. *Dendryphantes felix* G. & E. Peckham might be considered either a *Bagheera* or *Messua* depending on any future lectotype designation: the body (G. & E. Peckham, 1901b: fig. 6a) in the type vial and its attached palpus are of a *Bagheera* species, probably *B. prosper*, while the separate palpus in a microvial (G. & E. Peckham, 1901b: fig. 6) is of a *Messua* species.

Gastromicans *(Figs. 93–95).* This genus is distinguished from *Bagheera* and *Messua* in having short and vertical but very robust male chelicerae. Included are *Gastromicans albopilosa* (G. & E. Peckham), *Gastromicans hondurensis* (G. & E. Peckham), *Gastromicans levispina* (F. P.-Cambridge) (Figs. 93–95, 101), *Gastromicans noxiosa* (Simon), and *Gastromicans vigens* (G. & E. Peckham). All these are NEW COMBINATIONS. *Hasarius lisei* Bauab-Vianna & Soares probably also belongs in *Gastromicans*. Galiano (1980) synonymized *Gastromicans* Mello-Leitão with *Beata* G. & E. Peckham because its type species *Gastromicans squamulata* Mello-Leitão (type species by monotypy) is synonymous with "*Beata*" *albopilosa*. But insofar as *Beata albopilosa* does not belong in the genus *Beata*, *Gastromicans* is available as a generic name for *albopilosa* and its relatives.

Metaphidippus *(Figs. 96–98).* Though the placement of the true *Metaphidippus* with these genera of the *Bagheera* group is to some extent problematical, such a placement is the best supported at present. Before discussing the uniting characters, it would be valuable to give the following brief description of the type species of *Metaphidippus*, *M. mandibulatus* F. P.-Cambridge (type species by original designation), whose single known male (Costa Rica, BMNH, examined), is strikingly unlike most other jumping spiders that have been placed in *Metaphidippus*. *Palpus* (Figs. 97, 98): Embolus reminiscent of that of *Eris* species but with the longitudinally directed apical portion not fully erect, instead reclined to the prolateral (Fig. 98). The embolic base bears a flange covering the basal part of the embolus. *Chelicerae:* Long and cylindrical, horizontal and diverging (Fig. 96), with two promarginal teeth near the base and one retromarginal tooth near the fang. The fang is forked near its base (Fig. 96). *Markings* (Fig. 96): Carapace brown, lacking side bands except one patch of white scales on either side of fovea. Wide white band along margin. At least some metallic green-blue scales on cephalic area. Abdomen with thin white side bands broken basally; just anterior to each of the main dorsoventral muscle attachments is a small white patch of scales; in the posterior half of the dorsum are two pairs of small lateral white bars. The dorsum has some metallic green-blue scales. *Measurements:* Body length 5.4 mm; carapace length 2.4 mm, carapace width/length 1.93/2.37.

Two features that can be proposed as synapomorphies for the group of *Bagheera*, *Messua*, *Gastromicans*, and *Metaphidippus* are the following:

1. The tibial apophysis is erect and at its base parallel-sided, shaped like a knife blade (Figs. 71–74; Table 2, character 4). Almost all other dendryphantines have an apophysis tapering throughout its length (Figs. 75–79), including *Phanias* and other genera that appear to be near the base of the subfamily (see later), and usually the apophysis points at least somewhat ventrally. The only other dendryphantines known to me with a similar knife-shaped apophysis are *Ashtabula* and *Poultonella*. *Poultonella* does not belong with these genera; rather, its peculiar chelicerae

assure a relationship with *Tutelina*. A few species of *Messua*, including *M. lata*, have a more tapering apophysis.

2. The tegular ledge runs longitudinally (Figs. 87, 90–93, 98; Table 2, character 5), instead of obliquely at 0–60° from the transverse as seen in other dendryphantines and other salticids with a tegular ledge (Figs. 40–46, 50, 52, 53). While this is unusual among dendryphantines, it is not unique: it also occurs in *Phanias*, *Anicius*, and *Zygoballus incertus*.

Additional features that suggest a relationship between *Metaphidippus* and *Messua* in particular are the long, tubular divergent chelicerae with a near-terminal retromarginal tooth and a distal anterior flange beside the fang base. Other dendryphantines have long divergent chelicerae, but in all that I have seen except some South American "*Sassacus*," the tooth arrangement is different than in *Metaphidippus* and *Messua*, with the retromarginal tooth remaining near the base or the promarginal teeth near the apex. This different tooth placement may indicate that the elongation occurred in different portions of the chelicerae in these other dendryphantines, and thus the elongation is not homologous. As well, the general body form and occurrence of greenish reflective scales are also suggestive of a close relationship between *Metaphidippus* and *Messua*, though these characters are loosely defined and not necessarily unique. The only feature that would exclude *M. mandibulatus* from *Messua* is the apparent lack of the reverse twisted embolus in *M. mandibulatus*. However, one undescribed species from Costa Rica represented by a single male specimen appears very closely related to *M. mandibulatus* in having similar body form and markings and in having a slightly forked fang, and yet it has a slightly twisted embolus (Fig. 92). If these two species form a monophyletic group, then the lack of twisting in *mandibulatus* may be a secondary loss, which is not unreasonable given that other species such as *Messua octonotata* have little trace of a twisted embolus, and the embolus of *M. mandibulatus* shows unusual folds and does recline to the prolateral as in *Messua*. Perhaps more detailed study of its peculiar embolus, when more specimens become available, will allow a more definitive answer to the question of twisting in *M. mandibulatus*. If the genus *Metaphidippus* is only an offshoot of *Messua*, then *Metaphidippus* would fall as a synonym of the older name *Messua*. However, I am reluctant to effect such a synonymy at present given the number of *Metaphidippus* species that would be left homeless, and so *Metaphidippus* will be left standing for the moment. Regardless, the best-supported conclusion at present is that the name "*Metaphidippus*" properly applies to a small group of neotropical dendryphantines related to *Messua*, *Bagheera*, and *Gastromicans*.

Two Genera That Have Exchanged Species with *Metaphidippus*: *Dendryphantes* and *Beata*

Because most species that have been placed in *Metaphidippus* do not belong to the *Bagheera* group of genera, they cannot follow *M. mandibulatus* and, thus, need to be placed elsewhere. The first place we might look for a possible home for *Metaphidippus* species are two genera, *Dendryphantes* and *Beata*, which have in the past exchanged many species with *Metaphidippus*. Many "*Metaphidippus*" were formerly placed in *Dendryphantes* and several *Beata* were formerly placed in *Metaphidippus*. To discuss the proper placement of species now in *Metaphidippus* more clearly, it would be valuable to reconsider the limits of these two genera.

Dendryphantes *(Figs. 65, 103–108, 120).* The genus *Dendryphantes*, described last century, has over the years accumulated many species, mostly on the basis of their being unremarkable dendryphantines. Many species were since moved to genera such as *Metaphidippus*, while others re-

maining in the genus will probably eventually be placed elsewhere (see the comments of Edwards, 1977). Among the New World species, there is only one species for which there is presently good evidence for a placement in *Dendryphantes*: *D. nigromaculatus* (Keyserling), most recently placed in *Eris* (Kaston, 1973). Several Old World species placed in *Dendryphantes*, including *D. fusconotatus* and *D. chuldensis*, appear very closely related to *D. nigromaculatus* (see figures of Prószyński, 1971b, 1982). Like the Old World *D. hastatus* (the type species) and *D. rudis*, *D. nigromaculatus* has a slightly elongate body dully marked. Perhaps the best character that strictly delimits *Dendryphantes* is the presence of a fold of embolic hematodocha that lies across the basal part of the embolic base, covering the wrinkles there (Figs. 103–108). If this character is used to delimit the genus, then it would be a small genus of mostly Palearctic species. The placement of *nigromaculatus* in *Dendryphantes* is further supported by its sharing with *D. rudis*, *D. fusconotatus*, and *D. chuldensis* a much elongated prong coming off of the base of the embolus and curving toward the cymbium (Figs. 106, 108). The embolus therefore appears to have two rami, much as in *Pelegrina flavipedes*, though not homologous according to reasoning given below. Species of the other two major groups of Old World dendryphantines, the "*Eris*" *nidicolens* group (Fig. 61) and the genus *Rhene* (Fig. 52), lack the fold across the embolic base seen in *Dendryphantes*. Though *Rhene* species often have a prong arising from the base of the embolus, in *Rhene* it is not curled toward the cymbium and, instead, is erect as in *Beata* and the *mannii* group. *Rhene* has been considered a close relative and possibly a synonym of *Dendryphantes* (Prószyński, 1973b), but a number of other features of *Rhene* such as the presence of epiandrous fusules and the concave retromarginal loop of the sperm duct of the palpus also cast some doubt on this placement.

The option of returning a number of groups from *Metaphidippus* to *Dendryphantes* has little merit at present. Moving these back to *Dendryphantes* would be useful only if they are likely to stay there, that is, if they are closely related to the type species of *Dendryphantes*. Otherwise, we would merely be worsening *Dendryphantes'* status as a catch-all genus and adding to it the confusion of changing the generic placement of many common species. As noted, only *D. nigromaculatus* among New World species is a strong candidate to stay in *Dendryphantes*.

Beata *(Figs. 77, 109–112)*. The limits of the genus *Beata* have been greatly overestimated (Simon, 1903; Chickering, 1946). Because the type species of *Beata* is fissident (it has a bifid retromarginal cheliceral tooth), it has not only been removed from the dendryphantines (Simon, 1903) but has also been burdened with diverse dendryphantines that happen to have a similarly bifid tooth (Simon, 1903; Chickering, 1946). Note that the tooth is better considered a single bifid tooth rather than two fused teeth because the inner boundary of the cuticle does not extend to the tip of the second cusp. The second cusp shows all gradations of development in the dendryphantines, with most lacking it, some showing a slightly swollen margin (e.g., *Pelegrina proterva*, Fig. 10), and others having a well-developed cusp. It is therefore best to place far less emphasis on this character. *Beata magna* G. & E. Peckham (Fig. 109), the type species of *Beata* (by monotypy), bears few resemblances to most of the other fissident dendryphantines, instead having many more resemblances with the other robust-bodied dendryphantines previously placed in *Dryphias*, *Homalattoides*, and *Anamosa*. The following characters, which appear derived within the subfamily, delimit this group containing *Beata magna*:

1. Tibial apophysis narrow and bent toward the ventral, almost paralleling a ridge on the tibia below it (Fig. 77).

This tibial ridge is similar to that in *Pelegrina* (Fig. 78), but it is longer and sharper in *Beata*.

2. First leg tibia dark and enlarged at least slightly compared to patella, even in females.
3. Carapace distinctively wide and high, higher than in *Sassacus*, *Agassa*, and *Rhene*, wider than in *Sassacus* and *Agassa*. Unlike *Zygoballus*, but like *Sassacus* and *Agassa*, the carapace is wide well past the posterior eyes before it abruptly drops and narrows.
4. Carapace scales erect (in at least some but perhaps not all species).
5. Retromargin of base of embolus with prong rising parallel to apical erect portion of embolus (Fig. 110). Such a prong is also seen in *Rhene* (Fig. 52) and the *Metaphidippus mannii* group (Fig. 499).

The following species are placed in *Beata* and NEW COMBINATIONS therefore established: *Beata hispida* (G. & E. Peckham) (Figs. 77, 110–112), *Beata inconcinna* (G. & E. Peckham), *Beata maccunii* (G. & E. Peckham), and *Beata rustica* (G. & E. Peckham). Also included is *Beata longipes* F. P.-Cambridge, which may be the male of *B. magna*. *Dryphias* (type species *maccuni* by original designation) is a NEW SYNONYM of *Beata*. The genus *Beata* as here delimited excludes *B. digitata* (= *Pelegrina galathea*) and *B. variegata* (= *Pelegrina variegata*), *B. albopilosa* (= *Gastromicans albopilosa*), *B. flavolineata* (= *Nagaina incunda*), *B. cephalica* F. P.-Cambridge, *B. jubata* (C. L. Koch), *B. munda* Chickering, *B. pernix* (G. & E. Peckham), *B. venusta* Chickering, *B. wickhami* (G. & E. Peckham), and *B. zeteki* Chickering. No new placements are suggested for the last-mentioned seven species. Other species placed in the genus but probably not belonging there are *B. cinereonitida* Simon, *B. germaini* Simon, *B. lineata* (Vinson), and *B. striata* Petrunkevitch.

The Proper Placements of *Metaphidippus* Species

Now that the relationships of the true *Metaphidippus* and the limits of *Dendryphantes* and *Beata* have been reconsidered, we are in position to discuss how the various groups within *Metaphidippus* might be dispersed. Some of these conclusions are summarized in Table 3.

Four groups are here removed from *Metaphidippus*, as discussed in subsequent sections. The *galathea* group is transferred to the genus *Pelegrina* (and its species revised), the *harfordii* group to the genus *Phanias*, the *mylothrus* group to the new genus *Terralonus*, and the *castaneus* group to the new genus *Ghelna*.

Two species groups occurring in the United States are retained temporarily in *Metaphidippus* pending further study: the *mannii* group and the *vitis* group. The *mannii* group is discussed later in connection with the revision of its U.S. species. The status of the *vitis* group (Figs. 27, 59), including *Metaphidippus vitis* (Cockerell), *M. texanus* (Banks), *M. mathetes* (Chamberlin), and *Dendryphantes melanomerus* Chamberlin, is not clear. These species have a characteristic hooked embolus (Figs. 27, 59) and are small, somewhat elongate, and brown to black and shiny. *Metaphidippus vitis* was placed in *Sassacus* by Hill (1979) on the basis of scale morphology and courtship, but scale morphology is known in only few dendryphantines, and a similar courtship is also seen in many other dendryphantines (raisedforward, Table 2, character 9). Furthermore, the genitalia of *M. vitis* are very different from those of the true *Sassacus* and, instead, are similar to those of the neotropical species placed in *Sassacus* such as *S. arcuatus*, which may better be placed in the genus *Ramboia* (see Bauab-Vianna and Soares, 1982). The *vitis* group, here retained in *Metaphidippus*, may eventually find its place in a primarily neotropical genus.

Some species placed in *Metaphidippus*

belong in *Bagheera* or *Messua*, as already noted. *Metaphidippus paiutus* Gertsch is a *Sassacus* (*Sassacus paiutus* (Gertsch), NEW COMBINATION), possibly a synonym of *S. papenhoei*. Other species of *Metaphidippus* require further study before their placement can be settled. Among the neotropical species listed under *Metaphidippus* by Bonnet (1957), *M. longipalpus* F. P.-Cambridge, *M. nitidus* (G. & E. Peckham), and perhaps *M. taylori* (G. & E. Peckham) seem to belong to *Parnaenus*, *M. pallens* F. P.-Cambridge in *Eris*, *M. perfectus* (G. & E. Peckham) (Fig. 60) in *Selimus*, and *M. tropicus* (G. & E. Peckham) (Fig. 62) in *Bryantella*. For the remaining neotropical species (see Prószyński, 1990), I have no placement to suggest.

Phanias F. P.-Cambridge, 1901

Type species, *Phanias flavostriatus* F. P.-Cambridge, 1901, by monotypy.

The unusual, elongate dendryphantines of the *harfordii* group (Figs. 20, 36, 47, 70) include several species in the western United States but many more in the highlands of México. A generic name is available for this group, *Phanias* F. P.-Cambridge, 1901, based on *Phanias flavostriatus*, described from two females from Omilteme, México (BMNH, examined), and previously considered to belong in the Marpissinae. The species of the *Metaphidippus harfordii* group are therefore transferred to *Phanias*. The members of the genus *Phanias* share these characters, which may be apomorphies within the subfamily:

1. Tegular ledge expanded so as to cover the tegular shoulder (Fig. 47). The tegular ledge of other dendryphantines and other salticids is not so expanded.
2. Embolic hematodocha reduced and sclerotized prolaterally and basally. In at least some species, much of the expansion occurs from out of the tegular ledge instead of from the prolateral dorsal surface (back side) of the tegulum (Fig. 36), but this feature may be primitive as it is also found in *Synageles* and *Admestina* (Figs. 29, 30).
3. Courtship with first legs raised, forward, and parallel (Fig. 118) and waved asymmetrically so that the leading leg on sidles is waved exclusively or more strongly (seen by me otherwise only in *Anicius*).
4. Small blunt teeth on the embolus (Fig. 20). Many other dendryphantines (e.g., *Pelegrina montana*, Fig. 204) have teeth on the embolus, but their teeth are sharp. The blunt teeth are lacking, however, in some species of *Phanias* (e.g., *P. watonus*).
5. Longitudinal bands of white scales, instead of passing below and beside the posterior eyes as in other dendryphantines, pass around and directly posteriorly from the posterior eyes. The distribution of this character is not well known.

The following NEW COMBINATIONS are established: *Phanias albeolus* (Chamberlin & Ivie) (Figs. 20, 70), *Phanias concoloratus* (Chamberlin & Gertsch), *Phanias dominatus* (Chamberlin & Ivie), *Phanias furcifer* (Gertsch), *Phanias furcillatus* (F. P.-Cambridge), *Phanias harfordii* (G. & E. Peckham) (Fig. 47), *Phanias monticola* (Banks), *Phanias neomexicanus* (Banks), and *Phanias watonus* (Chamberlin & Ivie). *Phanias marginalis* Banks (type specimen examined) is a *Menemerus*, not a *Phanias*, while *Phanias salvadorensis* Kraus may be either a *Phanias* or an *Anicius*. Also included in *Phanias* are at least 15 undescribed species from México and the southwestern United States. *Phanias* may be placed near the base of the subfamily, for it has two features that are arguably ancestral for the subfamily, namely, the presence of epiandrous gland fusules (Machado, 1951; Table 2, character 6; see also Maddison, 1988), which it shares with *Hentzia*, "*Beata*" *wickhami*, "*Eris*" *nidicolens*, *Rhene*, and groups apparently related to dendryphantines (euophryines, synagelines, ballines, *Mopsus*, *Itata*, *Phle-*

gra, though not *Neon*), and a concave sperm duct loop along the retromargin of the tegulum (Fig. 20), which it shares with some *Hentzia*, "*Eris*" *nidicolens* (Fig. 61), *Rhene* (Fig. 52), some *Tutelina*, *Anicius*, euophryines (Fig. 19), and *Admestina*.

Terralonus new genus

Type species, *Dendryphantes mylothrus* Chamberlin, 1925, here designated. Name treated as masculine.

Description and Diagnosis (Figs. 22, 44, 68). These western North American species are unusual among dendryphantines in being ground-dwelling, usually on ground more or less barren of vegetation, often under rocks. The body shape and markings are distinctive and uniform throughout the group. They are somewhat elongate and have relatively low-contrast mottled markings of coarse brown or gray pubescence. The embolus is long and its base is more longitudinally directed than is usual in dendryphantines (Fig. 22), except for *T. californicus*, which has a more typical embolus (Fig. 44).

Included Species. The following species are moved to *Terralonus*: *Maevia californicus* G. & E. Peckham, *Dendryphantes mylothrus* Chamberlin, *Dendryphantes unicus* Chamberlin & Gertsch, *Metaphidippus shaferi* Gertsch & Riechert, *Icius versicolor* G. & E. Peckham, *Menemerus vittatus* Banks, and *Menemerus fraternus* Banks (type specimens of last-mentioned three species examined). This establishes the NEW COMBINATIONS: *Terralonus californicus* (G. & E. Peckham), *Terralonus mylothrus* (Chamberlin), *Terralonus unicus* (Chamberlin & Gertsch), *Terralonus shaferi* (Gertsch & Riechert), *Terralonus versicolor* (G. & E. Peckham), *Terralonus vittatus* (Banks), and *Terralonus fraternus* (Banks).

Discussion. By appearance, these are not typical dendryphantines—two of the species were described in the genus *Menemerus* and have remained there to this day. Their relatives are unclear, but almost certainly they do not belong in the genus *Metaphidippus*, because they lack the characters of the *Bagheera* group of genera. I have chosen to describe a new genus for the group to remove it from its uneasy placement in *Metaphidippus*. I do this with some hesitation, given the overabundance of obscure genera in salticids, but the *mylothrus* group apparently does not reach the Neotropics where it might have found an available generic name, and so it is unlikely to be synonymized soon. Describing a genus allows easier discussion of this distinctive group. The three species associated with the group for the first time (*fraternus*, *vittatus*, and *versicolor*) can therefore be moved directly into *Terralonus* without being temporarily sentenced to *Metaphidippus*.

Ghelna new genus

Type species, *Attus castaneus* Hentz, 1846, here designated. Name treated as feminine.

Description and Diagnosis. These eastern North American species, like the species of *Terralonus*, are ground-dwelling, though in more mesic habitats. They share a dark granulate carapace with fine golden scales, posterior lateral spines on the first tibia displaced anteriorly, reduced spines on the first femora, first coxae nearly touching, and the female palpus slightly swollen. The embolus, at least in the first two species mentioned and perhaps in all, is twisted so as to wind the embolic hematodocha around the embolus much as in the *Bagheera* group of genera, though the twisting takes a very different form.

Included species. The species *Attus castaneus* Hentz, *Metaphidippus barrowsi* Kaston, *Icius sexmaculatus* Banks, and *Icius canadensis* Banks are here moved to *Ghelna* to establish the following NEW COMBINATIONS: *Ghelna castanea* (Hentz), *Ghelna barrowsi* Kaston, *Ghelna sexmaculata* (Banks), and *Ghelna canadensis* (Banks).

Discussion. As with *Terralonus*, the relatives of *Ghelna* are unclear but, likewise,

are not near the genus *Metaphidippus*. The justification for a new generic name is similar to that for *Terralonus*.

THE GENUS *PELEGRINA* FRANGANILLO, 1930

Pelegrina Franganillo, 1930: 44. Type species by original designation and monotypy *Pelegrina geniculata* Franganillo (= *P. proxima*).

Notes on Synonymy. The problem of the generic name to be given to the *galathea* group was not an easy one to solve. In my thesis (Maddison, 1988), I concluded that a new generic name was needed for the group, because (1) it clearly does not belong with *Metaphidippus* and (2) the group is arguably monophyletic and of respectable size for a genus, and (3) it appeared that there was no genus whose type species fell within the group. However, subsequent investigation has indicated that an obscure Franganillo name, *Pelegrina*, should be applied to the *galathea* group. Although the revival of obscure names is often undesirable, in *Pelegrina*'s case there is little harm because no other published name is available for the group. In 1930, Franganillo described *Pelegrina* and based it on *Pelegrina geniculata* Franganillo, which he placed in the section Unidentati, subfamily Heliophaninae. As discussed under the description of *P. proxima*, *P. geniculata* is here considered a junior synonym of *Dendryphantes proximus* G. & E. Peckham; thus, the name *Pelegrina* is applicable to the *galathea* group.

Description and Diagnosis. Small to medium-sized dendryphantines distributed throughout North and Central America. *Males* (Fig. 1) typically brown with longitudinal bands of white scales on either side of the carapace and abdomen. The inverted white V-shaped marking on the forehead that contacts the AMEs distinguishes *Pelegrina* from most other dendryphantines, though it is not present in all *Pelegrina*. Legs often with annulate markings. The relatively wide embolus with the tip expanded retrolateral to its opening and bearing two rami (Figs. 3, 190–216, 220–224) is generally a good diagnostic feature for the genus, but it is absent in a number of species. Tibial apophysis stout; just ventral to apophysis is usually a ridge (Fig. 78), developed into a second apophysis in some species (*furcata* group) or a wide flange in other species (*arizonensis* group). *Females* gray, yellow, or brown with mottled markings of four prominent pairs of pale spots on the abdominal dorsum (see, e.g., Figs. 2, 263, 269, 358, 382). Epigynal openings relatively long. Among small dendryphantines, the species of *Pelegrina* have perhaps the best-developed epigynal flaps (Figs. 236–255), which are the teardrop-shaped lateral rims of the openings. The flaps are usually convex and overlap the medial rim of opening. All species of *Pelegrina* examined have the same chromosome complement, $2n♂ = 26 + XXO$, as is prevalent throughout the family.

Monophyly. Thirty-eight species are included in *Pelegrina*. Most of these species can be easily recognized as belonging to the genus by an experienced identifier on the basis of body form, size, and markings, but to articulate precisely characters that could serve as evidence for monophyly is more difficult. The following characters support the monophyly of the genus, though none provides a simple, strict delimitation. Some of the characters delimit a group slightly smaller than the genus, others a group slightly larger. Thus, each character provides only indirect and partial evidence for monophyly.

1. Embolus with two terminal rami retrolateral to opening (Figs. 3, 190–216, 220–224). The sperm duct opening lies on the prolateral side of the embolus, often below the tip. Retrolateral to the opening are two rami, one just distal to the opening; the other often elongate (see especially *P. tristis*, Fig. 197) and forming the retrolateral tip of the embolus. While other dendryphantines such as *Tulpius*, *Phanias*, and *Tutelina*

have accessory rami emerging from the embolus, none have such rami in the position or form seen in *Pelegrina*. This is perhaps the clearest character delimiting the genus, but some *Pelegrina* appear to lack it (*verecunda*, *tillandsiae*, *bunites*, *orestes*, *arizonensis*, *helenae*; Figs. 217–219, 225–227), while others have the rami but in a much modified form (*flavipedes* and related species; Figs. 201–203). These problems are discussed later.

2. Hematodocha of embolus bulges as far distally as the base of the erect portion of the embolus (Fig. 3; Table 2, character 7). This feature is present throughout *Pelegrina*, including *P. orestes* and *P. bunites*. In other dendryphantines examined, including the *mannii* group and *Eris*, the hematodocha joins the retrolateral edge of the embolic base more basally so that the hematodocha fails to bulge as far distally (Figs. 22, 23).
3. Epigynal flaps well developed, long, and wide and not descending into the opening posteriorly. This character is difficult to assess, for there are other dendryphantines with well-developed flaps, though in these the flaps do not exactly match those of *Pelegrina*, being either much shorter (*Phidippus*, Fig. 67; *Bellota*), narrower (*Beata*; Figs. 109, 112), or less convex (e.g., "*Pseudicius*" *siticulosus*). The flaps of most *Pelegrina* differ from those of the *mannii* group and *Eris*, which have weak flaps that descend into the opening at posterior end (Figs. 66, 256, 257); the flaps in the two most problematical *Pelegrina* species, *P. bunites* and *P. orestes*, are somewhat like those of the *mannii* group.
4. Wrinkles present on anterior margin of male cheliceral fang (Fig. 11; Table 2, character 8). Running parallel to the serrate edge of the fang (Hill, 1977b), just anterior to it, is a line of transverse wrinkles, which appears like an irregular secondary serrate edge. In *Pelegrina*, except *P. orestes*, it reaches distally to the fang opening. This contrasts with *Dendryphantes*, the *mannii* group, and most other dendryphantines, which lack such wrinkles. The only other salticids seen with such a "secondary serrula" are (a) *Phanias* (four species examined), in which the wrinkles are restricted to a depression that does not reach the opening; (b) *Selimus* sp. and "*Beata*" *octopunctata*, in which the wrinkles are long and regular; and (c) *Eris militaris*, in which the wrinkles do not quite reach the opening. Except for *E. militaris*, the wrinkles are of different form, suggesting they are not homologous.
5. Distinct cheek bands on the male face (Figs. 1, 258, 264, and so on). Though other dendryphantines may have pale scales on the side of the face under the ALEs, in most these pale scales do not form a distinct band separated from the side bands by a dark area. Such a separation of the cheek and side bands is also seen in some species of the *mannii* group (Figs. 493, 514, 534). It is lacking in other dendryphantines except one species from Venezuela examined, possibly an *Admirala* sp., though the character has not been surveyed intensively. Some species of *Pelegrina* (*P. variegata*, Fig. 447), however, do not have a distinct cheek band.
6. An inverted V-shaped mark of pale scales on the forehead, contacting the AMEs (Figs. 1, 258, 264, and so on). Most *Pelegrina* males show this forehead band, though some lack it (e.g., *P. aeneola*). While the character has not been surveyed thoroughly, it is lacking in other dendryphantines except for a few species (e.g., *Tutelina hartii*).
7. Male courtship with prolonged "crouch" display. In the courtship of *Pelegrina*, *Eris militaris*, the *Metaphidippus mannii* group, and *Nagaina incunda*, there is a *crouch* display, in which the first legs are held low and forward, usually horizontal and below

the level of the body (Figs. 125–128, 134, 140, 162 for *Pelegrina*; Figs. 124, 178, 184 for *Eris* and *mannii* group; Peckham and Peckham, 1889; Richman, 1982: fig. 3; Table 2, character 9). The more distal segments may be raised (e.g., *Pelegrina kastoni*, Fig. 140), but at least the femur is low. The male proceeds toward the female in this pose, waving the first legs at low amplitude if at all. The body is held horizontal, in many species close to the substrate (hence the name "crouch"). This pose contrasts with that seen in most other dendryphantines (Table 2; Peckham and Peckham, 1889, 1890; Crane, 1949a; Richman, 1982; Jackson, 1978; Hill, 1977a; and my own unpublished observations on about 50 species in which the first legs are generally raised and spread (the *raisedspread* display, Figs. 113–115, 121; e.g., *Phidippus, Paradamoetas, Zygoballus*) or raised and held forward (the *raisedforward* display, Figs. 118–120; e.g., *Phanias, Sassacus papenhoei, Dendryphantes nigromaculatus*), or held horizontal and spread very wide (the *lowspread* display, Figs. 116, 117; e.g., *Messua limbata, Tulpius*). The distinctions among these poses are, of course, vague. It should be noted that *Pelegrina* does have a raisedspread display, generally performed with the carapace held high and the abdomen low, but this is performed usually when the male is far from the female. A *Pelegrina* male thus often begins with a raisedspread display and then proceeds to a crouch display as he approaches the female. Insofar as other dendryphantines often reach with the legs parallel, forward, and low just before mounting and copulation (stage II courtship, Crane, 1949b), as in the crouch display, it may be claimed that the crouch display is merely stage II courtship and, thus, not restricted to *Pelegrina* and relatives. Indeed, the crouch display may represent a prolonged stage II. If so, however, it is still distinctive from the brief stage II seen in other salticids, in being much more prolonged, performed farther from the female, and having a more rigid appearance. The crouch display has been observed in all *Pelegrina* and *mannii* group species examined, with the following exceptions: in *P. furcata* a strikingly different display (the semaphore display) is seen, whereas in *Pelegrina arizonensis, P. chalceola,* and *Metaphidippus diplacis* only a raisedspread display was seen. The lack of observed crouch display in these latter species calls attention to the difficulty of using the character. When seen, the crouch display is distinctive and can be considered present. However, when not seen, it may still be characteristic of the species but not observed because the male simply failed to perform it, remaining longer than usual in the raisedspread display. Nevertheless, the crouch display was scored as absent in these *Pelegrina* species because the males were observed for a reasonable sample of displays. Another problem with the character is the occurrence of a similar first leg pose in *Tutelina* and *Hentzia* (Figs. 122, 123). However, the exact leg poses and motions in these other genera differ in a number of respects from those of *Pelegrina*.

8. Ridge under tibial apophysis (Figs. 78, 389, 421, 427; Table 2, character 10). Under the tibial apophysis is a ridge that in extreme cases can make the apophysis appear bifid (e.g., *Pelegrina bicuspidata*). The ridge is present throughout *Pelegrina* (except *flavipedes* and similar species) but is also present in some species of the *mannii* group (*mannii, diplacis*), *Beata* (Fig. 77), and in *Tulpius hilarus*. It is poorly developed in *Eris militaris* (Fig. 79), *Bellota wheeleri,* and *Metaphidippus vitis*. It is lacking in other dendryphantines including *Dendryphantes* (Figs. 75, 76).

The preceding characters give reasonable support to the monophyly of the genus *Pelegrina*, though none provides a strict delimitation. Even if the genus as constituted here is not monophyletic, the characters provide good evidence that it is at least mostly monophyletic, to the extent that monophyly could probably be achieved by including or excluding only a few troublesome species. The following discussion regards the *Pelegrina* species that fail to show some of the characters supposedly delimiting the genus and why I have chosen to include these species in the genus. Whether or not species in the *mannii* group might be included in *Pelegrina* is discussed in the introduction to the revision of the species of the *mannii* group.

Pelegrina arizonensis and *P. helenae*. These species lack the two rami on the embolus. Instead, the embolus is blade-shaped, shifted retrolaterally, and concave on the exposed (ventral) surface (Figs. 217, 218, 422, 428). However, there are a number of other characters that would otherwise place the two species within *Pelegrina*. These species have distinct cheek and forehead bands, a ridge just ventral to the tibial apophysis, and the male fang with wrinkles as in other *Pelegrina*. The peculiar embolus might be derived from that of a typical *Pelegrina* embolus by twisting about its longitudinal axis so as to reverse pro- and retrolateral edges and to present the embolus's concave surface, normally facing inward to the cymbium, outward toward the front. This is indicated by the presence of a ridge cutting across the face of the embolus joining the prolateral surface of the base with the retrolateral edge of the embolus, the position of the opening on the retrolateral side, the concave exposed face of the embolus, and a pronounced furrow on the embolis hematodocha as if folded inward. Cutler and Jennings (1985) noted that "internal epigynal structure of his [Prószyński, 1982:1] *D*[*endryphantes*]. *czekanowskii* bears a close resemblance to the internal epigynal structures seen in the *M. arizonensis* group." Perhaps the similarity they noticed was the looping of the duct just inside the opening. The epigynum of *D. czekanowskii* is much like that of *D. nigromaculatus* and *D. fusconotatus*. This looping in both *Dendryphantes* and the *arizonensis* group is related to the rotation of the epigynal flaps medially at the posterior end. In *Dendryphantes*, the rotation reaches 90°; in the *arizonensis* group, it is much more extreme, 180–270°. This rotation must not be considered a critical character; similar rotations are seen in the *Pelegrina pervaga* group (*P. kastoni*), in *Phidippus octopunctatus*, and in *Agassa* (as compared to *Sassacus*). Indeed, in other respects the epigyna of the *arizonensis* group and *Dendryphantes* are rather different, with the flaps being on the surface in the former (as in other *Pelegrina*, Fig. 251), whereas they descend beneath the opening as a simple ridge in the latter (Fig. 65).

Pelegrina flavipedes, *P. flaviceps*, and *P. exigua*. The biramous embolus of this group (Figs. 201–203) might be interpreted either as arising from an embolus like that of *Pelegrina sabinema* (Fig. 198) by more deeply splitting the two terminal rami of the embolus or as arising from an embolus like that of *Dendryphantes rudis* and *D. nigromaculatus* (Figs. 106, 108) by prolongation of the retrolateral projection on the shoulder of the embolus. The *flavipedes* group lacks a ridge under the tibial apophysis, which otherwise seems characteristic of *Pelegrina*, thus supporting the interpretation that the *flavipedes* group does not belong with *Pelegrina*. However, there is more compelling evidence that the *flavipedes* group is derived from within *Pelegrina*. Like the *pervaga* group, the *flavipedes* group members are conifer dwellers with yellow chelicerae. Like *Pelegrina*, they have wrinkles anterior to the fang serrula and an embolic hematodocha bulging distally, cheek bands on the male face, and a crouch display in male courtship (Fig. 127). Like *Pelegrina* and a few other dendryphantines, the embolic base is well

sclerotized, with few wrinkles over most of its exposed surface. Finally, if the *flavipedes* group were derived from those *Dendryphantes* with long retrolateral prolongations on the embolus shoulder (*rudis, nigromaculatus*), the group should have the synapomorphy for *Dendryphantes,* the fold across the embolic base. The *flavipedes* group lacks this fold.

Pelegrina furcata. This species has two terminal rami on the embolus, robust epigynal flaps, and cheek bands, but its courtship display is unlike that of any others in the genus. The first legs are held wide and high, unlike *Pelegrina, Eris militaris,* and the *mannii* group, but like most other dendryphantines, and waved in a distinctive semaphore-like fashion (Fig. 121).

Pelegrina verecunda. Arizonan specimens lack the two distinct terminal rami on the embolus (Fig. 219), but Chihuahuan specimens identified as this species have the rami.

Pelegrina tillandsiae. This species lacks the two terminal rami on the embolus (Fig. 225) and is in many respects atypical. It is tentatively included in *Pelegrina* because its epigynum shows strong flaps that, as in *Pelegrina,* do not descend into the openings (Fig. 254).

Pelegrina orestes and *P. bunites.* These species present the greatest problems with inclusion in *Pelegrina,* and I might have treated them as belonging to the *mannii* group or elsewhere. They lack the two terminal rami on the embolus characteristic of *Pelegrina* (Figs. 226, 227), though at least in *P. orestes* the embolus is obliquely truncated distal to the opening and has one ramus well separated from the opening. On the other hand, the epigynal flaps of *bunites* are flatter and narrower than in other *Pelegrina,* more as in the *mannii* group (Figs. 225, 481). *Pelegrina bunites,* though, lacks the bulge above the tibial apophysis characteristic of the *mannii* group and has three characters that might argue for the placement of *bunites* in *Pelegrina*: the occurrence of wrinkles on the cheliceral fang, the bulging of the embolic hematodocha to the shoulder of the embolus, and the forehead band contacting the AMEs. On balance, then, a case can be made for tentatively describing *bunites* in *Pelegrina.* The situation with *orestes* is more difficult. *Pelegrina orestes* lacks the cheliceral fang wrinkles of *Pelegrina,* and one character, the presence of a ridge on the chelicera (Fig. 483), gives positive evidence to place *orestes* in the *mannii* group, though the ridge is especially weak and not present in all males. However, *orestes* lacks the bulge just dorsal to the tibial apophysis characteristic of the *mannii* group and does have the bulging embolic hematodocha characteristic of *Pelegrina.* Because of this, *orestes* will be described in *Pelegrina,* though it may eventually have to be moved.

Natural History. Species of *Pelegrina* are found in various habitats from the Arctic to the tropical lowlands of Central America. While most species in Mexico and Central America appear to occur in the highlands (cloud forest and oak-pine zones), there are some lowland tropical species (*P. sandaracina* and *P. yucatecana*). All species in the genus are primarily dwellers on foliage, being only occasionally found on the ground. Most other dendryphantines are also foliage dwellers, though some dendryphantines, in particular those with more elongate and dully marked gray or brown bodies, are ground or bark dwellers (*Terralonus, Ghelna,* some *Phanias* species). A number of species of *Pelegrina* appear to be most common on or restricted to particular sorts of plants: the *flavipedes* group to various confiers, the *pervaga* group and *P. balia* to junipers, *P. clemata* and *P. helenae* to sagebrush (*Artemisia tridentata*), and *P. tillandsiae* to spanish moss (*Tillandsia usneoides*). Other species do not appear so specialized to particular plants, yet in my collecting they do seem to prefer certain habitats: *P. proterva* occurs in forest understory, at least in the south of its range; *P. galathea,* in fields; *P. variegata,* in desert scrub; *P. montana,* in streamside vegetation; and *P.*

insignis, on low plants in fields and bogs. A number of southwestern species are most commonly collected from oaks. One generalist species is *P. aeneola*, which is found on trees and herbs of various sorts in the Pacific Northwest, though not usually in the arid regions. The silken retreats and egg sacs are constructed among the foliage on which the adults are collected.

PHYLOGENY WITHIN *PELEGRINA*

While insufficient evidence was found to indicate the basal divisions of *Pelegrina*, the delimitation of a number of smaller groups can be made (see cladogram given in Fig. 129). One clearly delineated group is the *flavipedes* group, whose three members (*flavipedes*, *flaviceps*, and *exigua*) share the following characters derived within the genus:

1. Embolus deeply bifid (Figs. 201–203). All other species of *Pelegrina* have the division between the terminal rami of the embolus not nearly so deep as in the *flavipedes* group. Other dendryphantines have either a simple embolus or one with accessory rami different from those in *Pelegrina* and the *flavipedes* group.
2. Chelicerae of male yellow with dark spot in medial concavity (Figs. 319, 324, 329, 334). The dark concavity is unique to this group.
3. Asymmetrical circling of palps in male courtship. During the crouch display, the palps are waved fairly slowly at high amplitude in circles such that as one is rising the other is falling (Fig. 127). Though other *Pelegrina* may wave their palps out of phase, in none examined is this asymmetrical waving made so obvious by the large slow waves. No other dendryphantines examined have such waving, except some *Phidippus*.

Another group similarly well defined is the *pervaga* group, consisting of *pervaga*, *sabinema*, and *kastoni*, which share the following:

1. Distinct markings on yellowish male palpus, consisting of prominent patches of white scales on the femur, tibia, and cymbium, interrupted by dark hairs on the patella. Other *Pelegrina* have no white scales on the tibia, or fewer on the tibia than on the patella.
2. Cheek band extended posteriorly parallel to the side band, separated from the side band by dense band of dark hairs (Figs. 304, 309, 314). This yields the appearance of white-black-white carapace side bands. Other *Pelegrina* have dark setae between side and cheek bands, but in none is the cheek band so horizontal and the dark hairs so dense. One species in the *mannii* group, *Metaphidippus emmiltus*, has a superficially similar pattern.

These two groups, the *flavipedes* and *pervaga* groups, may together form a monophyletic group, as delimited by the following:

1. Chelicerae yellow in males. Other *Pelegrina* have dark brown chelicerae except southern males of *P. tillandsiae*. Brown chelicerae are present in other similar dendryphantines such as *Eris*, *Nagaina*, *Beata*, and the *mannii* group except *Metaphidippus emmiltus*, which also has yellow chelicerae.
2. Conifer dwelling. All members of the *flavipedes* group, and *P. pervaga* and *P. kastoni*, are known to dwell more or less exclusively on conifers. The habitat of *P. sabinema* is unknown. This contrasts with the habitat of most other *Pelegrina*, which inhabit broadleaf trees, shrubs, and herbs. However, *P. proterva*, *P. aeneola*, and *P. furcata* are known to frequent conifers, whereas *P. balia* appears restricted to conifers. Also, the polarity of this character is unclear. Outside the genus, *Metaphidippus emmiltus* is a juniper dweller, whereas *Eris* species are often collected from conifers.

The *neoleonis* group, including *tristis*

from Arizona and *neoleonis* from México, is distinguished by the broad, dark rotated epigynal flaps. Though their appearance is much more like that of typical brown-legged *Pelegrina*, they share the following characters with the preceding two groups of yellow-legged species:

1. Retrolateral ramus of embolus much elongate and curled to the prolateral (Figs. 196–203). The only other *Pelegrina* with such a long ramus is the *furcata* group, though in that group all but one species have it curling to the retrolateral. The exception is *morelos*, which has a prolateral curl (Fig. 215), but because it seems very close to *furcata* the prolateral curl is probably convergent.
2. Embolus very broad. Such a broad embolus is not found in other *Pelegrina* except *peckhamorum*.
3. First curve of duct of epigynum broad. Though unusual, a duct as broad is found in *P. huachuca* and *P. morelos*.

The relationships of this proposed *flavipedes-pervaga-neoleonis* clade are not altogether clear, though the sickle-shaped retrolateral ramus of the embolus of *proterva*, *galathea*, *edrilana*, and *pallidata* may be viewed as a preliminary version of the very long ramus of this clade. Most of these species together with *dithalea*, *proxima*, and *peckhamorum* have an angle on the embolus just basal to the tip of the retrolateral ramus (Figs. 259, 265, 271, 277, 283, 289, 310) which may be a synapomorphy for a large clade (Fig. 129), but whether or not the angle is absent from all other *Pelegrina* is unclear (e.g., see Fig. 215).

Another clearly delineated group is the *arizonensis* group (Cutler and Jennings, 1985), including the two species *P. arizonensis* and *P. helenae*. The apomorphies supporting the group are as follows:

1. Epigynal flaps far rotated, at least 180° (Figs. 424, 430). No other dendryphantines known to me have a similar rotation; flap rotations in *Terralonus* and *Ghelna*, for example, are in the opposite direction.
2. Erect portion of embolus displaced to retrolateral side and tegulum rotated somewhat clockwise (Figs. 422, 428). The embolus displacement is seen in some other dendryphantines, but the tegulum rotation is perhaps unique.
3. Embolus twisted about longitudinal axis so as to reverse pro- and retrolateral edges and to present the back side forward.
4. Ridge under tibial apophysis uniquely developed into flange (Figs. 421, 427).
5. Markings of female abdomen somewhat lineate (Figs. 425, 431). Lineate markings are also seen in *P. tillandsiae* and the *Metaphidippus mannii* group.

The *furcata* group of Central America and southwestern North America includes the widespread and common *P. furcata* as well as a number of rare species (*huachuca*, *morelos*, *bicuspidata*, *volcana*, *ochracea*). Apomorphies supporting the group are as follows:

1. Ridge under tibial apophysis unusually strongly developed, so as to form a second apophysis (Fig. 389; even stronger in the other species in the group). This is found in all species, although it is lacking in some specimens of *furcata*.
2. Wrinkles on the retrolateral basal edge of the embolic base either transverse or ascending apically toward the retrolateral (Figs. 390–394, 404, 406, 411, 416). This contrasts with the wrinkles of other *Pelegrina* and similar dendryphantines, which have wrinkles descending basally toward the retrolateral. *Pelegrina insignis* may have wrinkles similar to those in the *furcata* group.
3. Epigynal flaps very convex, unlike other dendryphantines except *Pelegrina proxima* and *peckhamorum*.
4. Epigynum concave behind flaps, unlike the case in *Eris*, the *mannii* group, and *Nagaina*, though also seen in *Pelegrina proxima*, *peckhamorum*, and *balia*.

Pelegrina furcata itself has a very peculiar courtship display. Whether or not this feature is shared by other members of this group awaits their examination.

The montana group includes three species: *montana*, *insignis*, and *chaimona*. These species share the following:

1. Concavity on back of embolus restricted to distal half of erect portion. In other *Pelegrina* species, the concavity on the back of the embolus (Figs. 7, 34, 35) extends from the base of the erect portion to its tip. Some *Pelegrina*, however, have no clear concavity at all (e.g., *P. aeneola*, *P. chalceola*).
2. Small, sharp denticles on front surface of embolus (Figs. 204–206). Other dendryphantines have denticles on the embolus, but they are usually on the retrolateral surface or are of different form. This character has not been well surveyed, however.

Among the remaining species of *Pelegrina* are many that have a narrow embolus with small rami (*aeneola*, *clemata*, *chalceola*, *balia*, *variegata*, *verecunda*, *sandaracina*, and others). However, this may be the primitive condition for the genus. No clear subgroups were found among these species.

IDENTIFYING SPECIES OF *PELEGRINA* AND THE *METAPHIDIPPUS MANNII* GROUP

In general, the genitalia provide the best means of identifying species, but facility in recognizing the distinguishing features may require some experience. Males are much more easily identified than females, as the palpus and face markings provide more readily described and interpretable differences than the differences in epigyna. Take note especially of the width of the erect portion of the embolus and the size and orientation of the two terminal rami. Indeed, it is usually possible to identify males simply by referring to the two pages of Figures 190–235. A single key for all species is given for males.

Females, however, pose many more problems for identification. Though the abdominal markings and epigyna of females vary in a number of features, the differences can be subtle and difficult to describe. One might think of the abdominal markings as falling in two major categories: those in which the paired white spots dominate the dorsum (Figs. 263, 275, 293, 382, 441, 451) and those in which the dark patches between and beside the white spots dominate the dorsum (Figs. 281, 287, 347, 358, 364, 377, 387). Epigynal features to note are the topography of its surface and the size, convexity, color, and placement of the teardrop-shaped flaps covering the openings. Even once experienced with these characters, an identifier can still have difficulties with some specimens. The problems are lessened within a given geographical region. Because of this, separate female keys are given for five regions: the eastern United States and Canada, the Great Plains, Pacific Coast Untied States and western Canada, Arizona and México, and Central America. Parts of the southwestern United States are therefore without a key to females of *Pelegrina*, namely, Texas and the Rocky Mountain states. For Montana and Wyoming, the Pacific Coast key can be used (except possibly for prairie species). For Colorado, Utah, and New Mexico, most identifications can be accomplished using the Pacific Coast and Arizona keys, though the Great Plains key will be needed occasionally. For Texas, the Arizona and Great Plains keys will usually suffice, but the eastern United States key will be needed on occasion. In general, *mannii* group females are not included in the keys. *Metaphidippus mannii* is included in the Pacific Coast key, but five other species in the group that occur in southern California are not included; *mannii* and *chera* are in the Arizona key, but *carmenensis* is excluded.

The keys are written for adult specimens, but the keys for females will be of some aid to identifying immatures based on markings. A key for immature *Pele-*

grina from Minnesota has been given by Cutler (1981b).

Figures 258–538 provide the most comprehensive set of illustrations of the species, but important aid can be obtained from Figures 130–189, which show living specimens, Figures 190–235, which summarize the male emboli, and Figures 236–257, which show the surface topography of the epigyna.

Key to the Males of All Species of *Pelegrina* and Those *Metaphidippus mannii* Group Species Occurring in the United States*

1. Erect portion of embolus extremely narrow or tapers to point, lacking two terminal rami (Figs. 226–235); lateral margin of chelicera usually with ridge near base of fang (Figs. 483, 493, 503, 509, 514, 529); at least small patch of white or orange scales on chelicerae; western United States and southwestern Canada, south into Central America (*Metaphidippus mannii* group, in part, and some *Pelegrina*) 2
– Erect portion of embolus in most species wide at tip and with two terminal rami (Figs. 190–225); chelicera lacking ridge near base of fang (e.g., Figs. 258, 264); scales on chelicerae varied; widely distributed 10

2(1). Long patch of white scales on chelicerae, longer than ½ length of chelicerae (Figs. 478, 493, 514, 529) 3
– White or orange patch small (Figs. 483, 503, 509) 7

3(2). Embolus wide at base of erect portion (Figs. 226–231) 4
– Embolus very narrow (Figs. 516–523, 535) 6

4(3). Forehead white band lacking so that setae above AMEs are dark (Figs. 493, 503); retrolateral edge of base of embolus with prolongation (Figs. 494, 499, 505) 5
– White forehead band present and contacting AMEs above (Fig. 478); retrolateral edge of base of embolus lacking prolongation (Fig. 479); central Arizona south to Oaxaca ..... 37. *bunites* (part)

5(4). Carapace and abdomen shiny dark or coppery brown contrasting strongly with dense white cheek band and cheliceral patches, with small or no white side bands (Figs. 178, 180, 493); prolongation on retrolateral edge of base of embolus blunt or small (Fig. 494) where sympatric with *diplacis*; British Columbia to California east to Idaho and central Arizona ..... 40. *mannii*
– Carapace and abdomen with more extensive white side bands (Figs. 182, 503); cheek band not distinct from side band (Fig. 503); prolongation of retrolateral edge of base of embolus distinct and long (Figs. 504, 505); along Pacific Coast of southern California and Baja California ..... 41. *diplacis* (part)

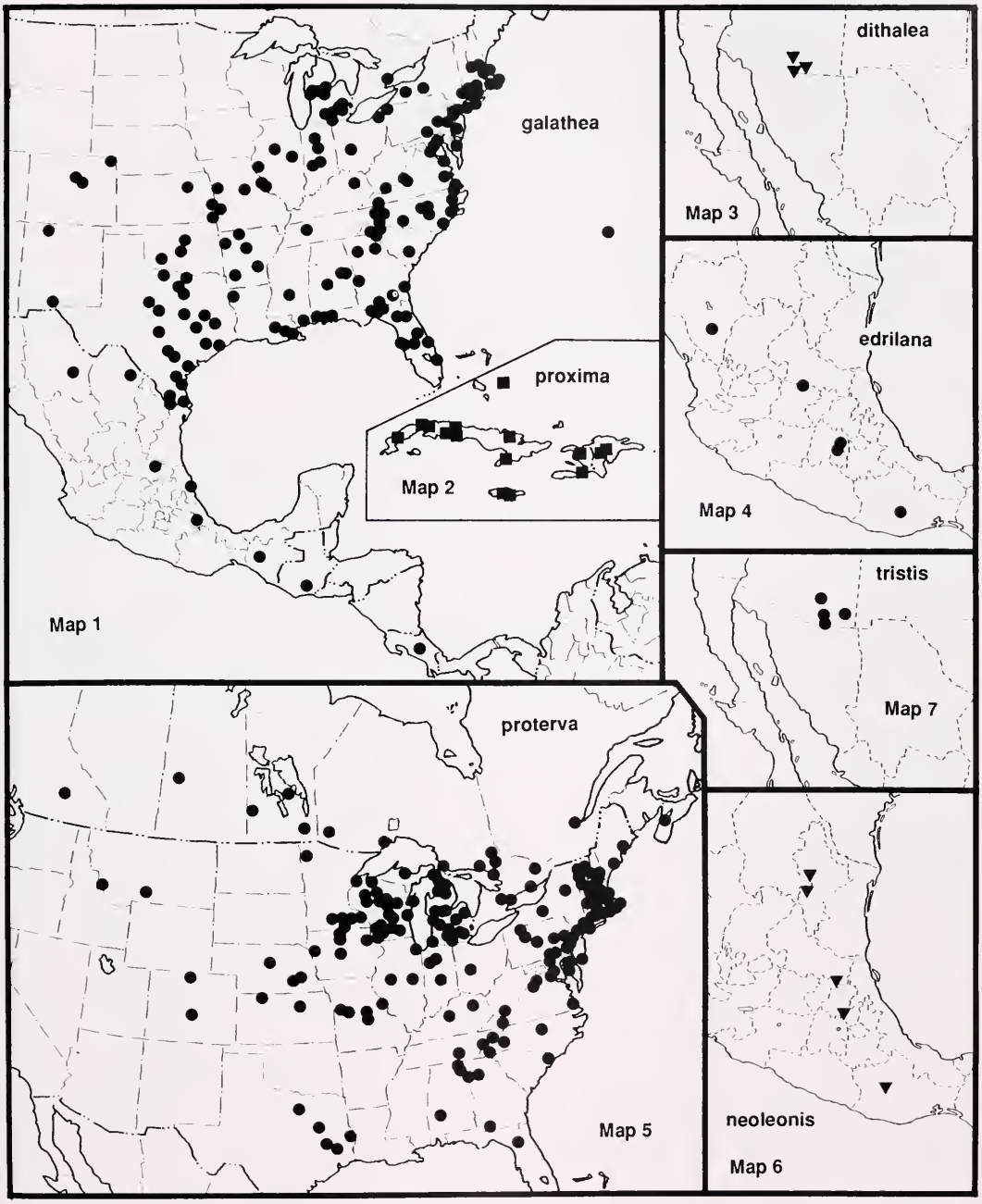
6(3). Erect portion of embolus straight (Fig. 233); face dark under eyes (Fig. 514) ..... 43. *chera*
– Erect portion of embolus curves ventrally (Fig. 234); face extensively covered with white scales (Fig. 529) except in Baja California Sur ..... 44. *carmenensis*

7(2). Erect portion of embolus obliquely truncated, broad at base (Figs. 227, 484); carapace and abdomen dusted with beige to light brown scales (Figs. 172, 483); Arizona and México ..... 38. *orestes* (part)
– Erect portion of embolus not so broad or truncated (Figs. 505, 510); markings dark brown with white (Figs. 182, 184, 503, 509) or mostly yellow (Fig. 176) 8

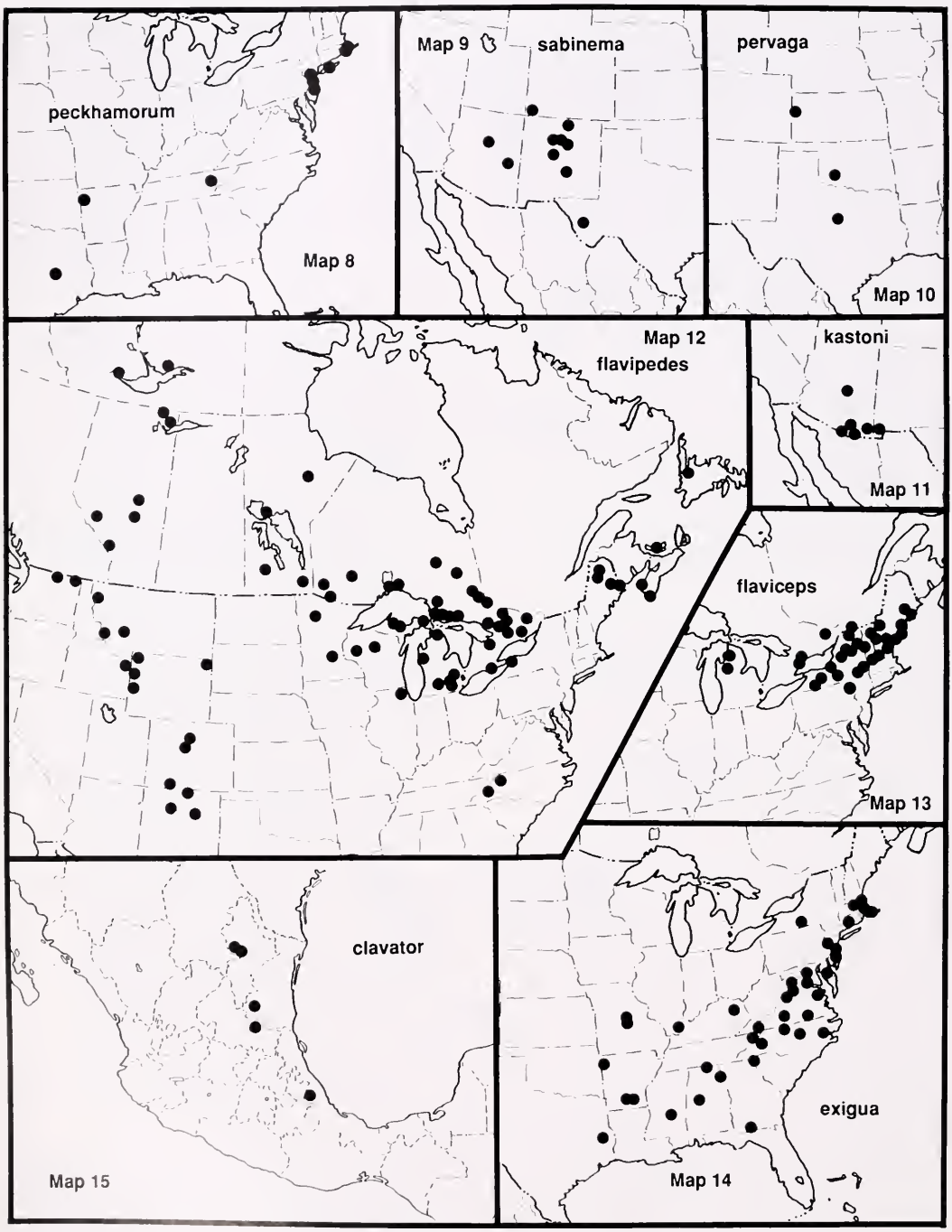
8(7). Legs yellow, first legs fringed with white (Fig. 176); anterior median eyes ringed with red; chelicerae vertical and relatively weak (Fig. 534); erect portion of embolus very thin (Fig. 535); southern California to New Mexico ..... 45. *emmiltus* (part)
– Legs with dark brown markings (Figs. 182, 184, 503, 509); anterior median eyes ringed with dark setae; chelicerae at least slightly divergent; embolus thick or thin; Pacific Coast of California and Baja California 9

9(8). Embolus wide at base of erect portion (Figs. 231, 504, 505); scales on chelicerae white; body with bronze reflections (Fig. 182); prolongation on retrolateral edge of base of embolus large and distinct (Figs. 504, 505); southern California and México ..... 41. *diplacis* (part)
– Embolus thin (Figs. 232, 510); scales on

* The *mannii* group species in México and Central America are not included; they can be distinguished from *Pelegrina* by their narrower embolus tip, which lacks the two rami. *Nagaina incunda*, described later, is brown and yellow striped with the first legs brown and the posterior legs yellow (Fig. 174).



Maps 1–7. Distributions of *Pelegrina* species. 1. *Pelegrina galathea* in North and Central America. 2. *P. proxima* in the Caribbean. 3. *P. dithalea* in Arizona. 4. *P. edrilana* in México. 5. *P. proterva* in North America. 6. *P. neoleonis* in México. 7. *P. tristis* in Arizona.



Maps 8–15. Distributions of *Pelegrina* species. 8. *P. peckhamorum* in the eastern United States. 9. *P. sabinema* in the southwestern United States. 10. *P. pervaga* in the central United States. 11. *P. kastoni* in the southwestern United States. 12. *P flavipedes* in North America. 13. *P. flaviceps* in eastern North America. 14. *P. exigua* in the eastern United States. 15. *P. clavator* in México.

chelicerae orange; body dark and dull (Fig. 184); prolongation on retrolateral edge of base of embolus small or absent (Fig. 510); central and northern California ..... 42. *tricolor*

10(1). Clypeus with patch of white or yellow scales between AMEs (not merely hairs overhanging chelicerae or circling anterior median eyes) 11

– Clypeus without white or yellow setae between AMEs, except perhaps for hairs surrounding anterior median eyes and overhanging chelicerae 17

11(10). Chelicerae with large white or yellow patch of scales medially, at least for ½ length of chelicerae (Figs. 159, 437, 442, 457); México and Central America 12

– Chelicerae lacking pale scales (Figs. 282, 288, 319, 334); United States east of Rocky Mountains and Canada 14

12(11). Retrolateral ramus of embolus much longer than prolateral (Fig. 221) ..... 32. *pallidata*

– Retrolateral ramus of embolus small, subequal to prolateral (Figs. 220, 224) 13

13(12). Pale markings usually yellowish; embolus small and tapers to tip (Fig. 224); lowland ..... 35. *sandaracina*

– Pale markings white; embolus broadly truncate (Fig. 220); montane ..... 31. *clavator* (part)

14(11). Chelicerae yellow (Figs. 319, 334); embolus deeply divided (Figs. 320, 330); cymbium lacks white scales; dwellers on conifers 15

– Chelicerae brown (Figs. 282, 288); embolus not deeply divided (Figs. 260, 266); cymbium with dorsal patch of white scales; habitat varies 16

15(14). First tibia yellow or with thin black stripe; retrolateral ramus of embolus thick, only slightly thinner than prolateral (Figs. 201, 320) ..... 12. *flavipedes*

– First tibia dark; retrolateral ramus much thinner than prolateral (Figs. 203, 330) ..... 14. *exigua* (part)

16(14). Embolus tapers to tip (Fig. 284), with long hooked retrolateral ramus (Fig. 283) ..... 5. *proterva*

– Embolus very broad at tip (Fig. 290), retrolateral ramus short (Fig. 289) ..... 6. *peckhamorum*

17(10). Chelicerae yellow (Figs. 304, 309, 314, 324, 329, 534); dwellers on conifer and spanish moss 18

– Chelicerae brown (e.g., Figs. 258, 264) 24

18(17). Medial black spot on chelicerae (Figs. 324, 329); embolus deeply divided (Figs. 325, 330); eastern and central United States and Canada 19

– No medial black spot on chelicerae (Figs. 304, 309, 314, 534); southern United States and northern México 20

19(18). Forehead flat (Fig. 329); forehead dark brown in alcohol; body and legs brown (Fig. 146); chelicerae yellow laterally (Fig. 329); southeastern United States north to Massachusetts and New York ..... 14. *exigua* (part)

– Forehead bulbous (Fig. 324); forehead yellow in alcohol; body and legs pale (Fig. 144); chelicerae with dark spot laterally (Fig. 324); northeastern United States and southeastern Canada ..... 13. *flaviceps*

20(18). Erect portion of embolus very thin (Fig. 535); AMEs ringed with red; first legs fringed with white (Fig. 176) ..... 45. *emmiltus* (part)

– Erect portion of embolus thicker (Figs. 305, 310, 315, 474); AMEs ringed with white or brown; legs not fringed 21

21(20). Cymbium yellow; band of dark setae under carapace side band (Figs. 304, 309, 324); embolus wide at tip (Figs. 305, 310, 315); dwelling on conifer; Kansas west to Arizona 22

– Cymbium dark distally; no band of dark setae under carapace side band (Fig. 472); embolus tapers to narrow tip (Fig. 474); dwelling on spanish moss, Florida and North Carolina west to Texas ..... 36. *tillandsiae* (part)

22(21). Clypeus brown (Figs. 304, 309); retrolateral ramus of embolus long (Figs. 198, 199, 305, 310); embolus broad at base of erect portion 23

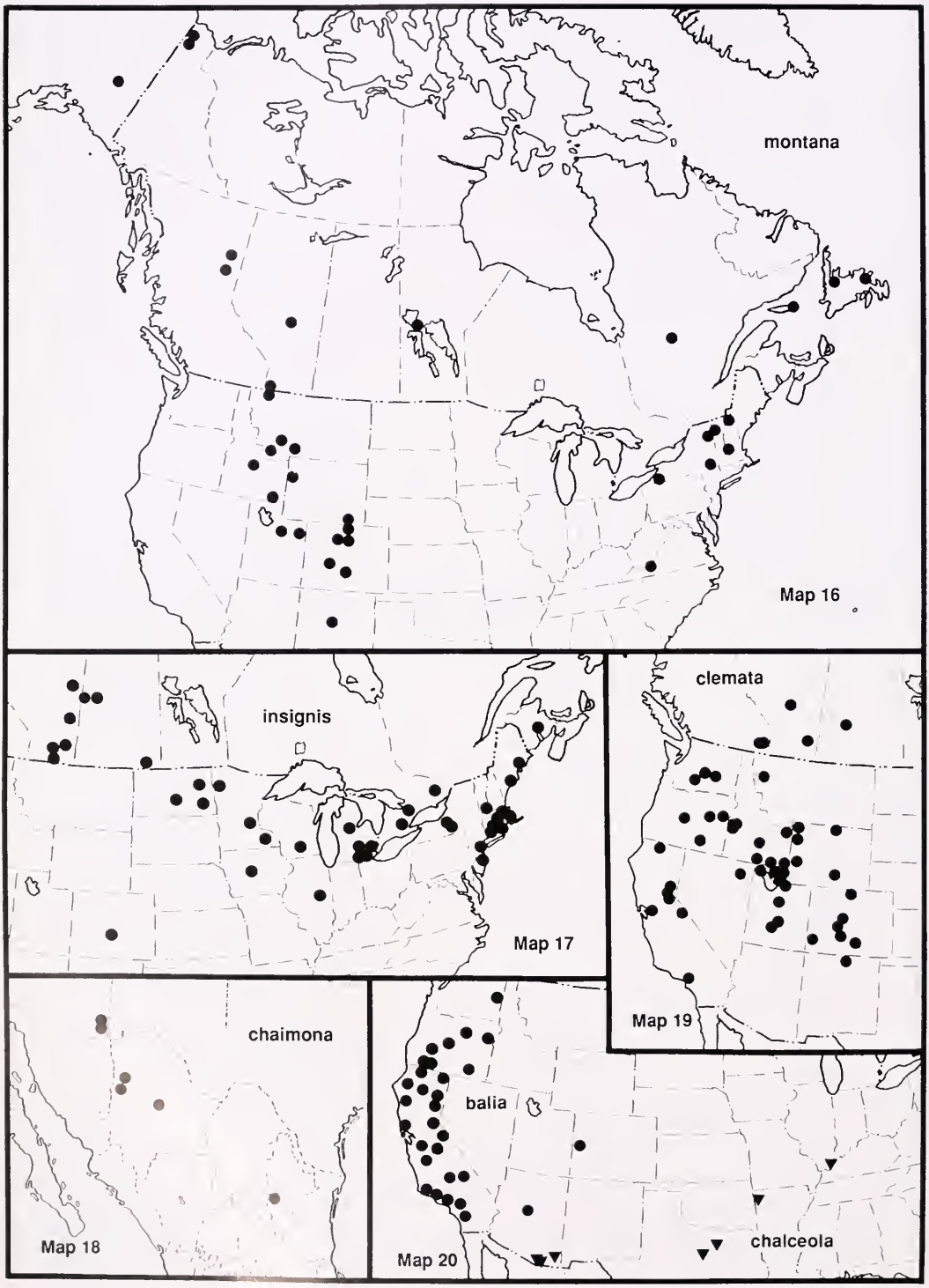
– Clypeus with white band except centrally (Fig. 314); retrolateral ramus of embolus short (Fig. 200); embolus rectangular, narrow, and displaced retrolaterally (Fig. 315) ..... 11. *kastoni*

23(22). Abdomen brown above; embolus (Fig. 305) wider than in *pervaga* 9. *sabinema*

– Abdomen with central longitudinal pale stripe as in females (Fig. 313); embolus (Fig. 310) narrower than *sabinema* ..... 10. *pervaga*

24(17). Ridge under tibial apophysis usually developed into acute second apophysis (Fig. 389); wrinkles on embolic base transverse or ascending apically toward the retrolateral edge (Figs. 390, 404, 406, 411, 416); southwestern United States to Panamá (*furcata* group) 25

– At most small ridge or broad flange under tibial apophysis (Figs. 78, 421, 427); wrinkles on embolic base descending basally toward the retrolateral edge


montana
Map 16
insignis
Map 17
clemata
Map 19
chaimona
Map 18
balia
Map 20
chalceola

(e.g., Figs. 315, 438); widely distributed 29

25(24). Rami of embolus small and subequal (Figs. 213, 214) 26

– Retrolateral ramus of embolus long, much longer than prolateral (Figs. 212, 215, 216) 27

26(25). White patches on chelicerae extend to at least ½ their length (Fig. 403); embolus more or less straight (Figs. 213, 404); Panamá ..... 23. *volcana*

– White patches on chelicerae small (Fig. 405); embolus bent to retrolateral (Figs. 214, 406); Guatemala and México ..... 24. *bicuspidata*

27(25). Retrolateral ramus curls to prolateral (Figs. 215, 411) ..... 26. *morelos*

– Retrolateral ramus points retrolaterally or distally (Figs. 212, 216, 390–394, 416) 28

28(27). Retrolateral ramus points more distally, about twice as long as prolateral ramus (Figs. 212, 390–394); widely distributed ..... 22. *furcata* (part)

– Retrolateral ramus points more retrolaterally, more than four times longer than prolateral ramus (Figs. 216, 416); southern Arizona ..... 27. *huachuca*

29(24). Large white patches on chelicerae at least to ½ their length (Figs. 437, 447, 452, 478); embolus twists to tip; Arizona, México, and Central America 30

– Chelicerae with at most a small medial-basal patch of scales (e.g., Figs. 258, 348); embolus varied; widely distributed geographically 33

30(29). Embolus broad and truncated (Figs. 220, 438); dorsum of abdomen mostly brown between side bands (Fig. 164); montane ..... 31. *clavator* (part)

– Embolus narrower, tapers to tip; dorsum of abdomen may have large white spots (Fig. 166); varied habitats 31

31(30). Embolus tapers to narrow tip with terminal opening (Fig. 226); abdominal dorsum brown between white side bands (Fig. 170); montane habitats ..... 37. *bunites* (part)

– Embolus tip wider, opening subterminal (Figs. 223, 224); abdominal dorsum with mixed pale and dark spots (Fig. 166) as in female; deserts and tropical lowlands 32

32(31). Side and cheek bands fused (Fig. 447); chelicerae robust; embolus appears to taper in ventral view but in an oblique view the two small subequal rami are easily seen (Fig. 222); abdomen with strong white spots (Fig. 166); arid regions of México and Central America ..... 33. *variegata* (part)

– Side and cheek bands separate (Fig. 452); chelicerae narrower; embolus weaker with two rami not easily visible; abdomen with unusual transverse bands (Fig. 169); seasonal tropical forests of Yucatán Peninsula ..... 34. *yucatecana*

33(29). Embolus with long retrolateral ramus (e.g., Figs. 196, 197, 209); western United States and México 34

– Embolus with short retrolateral ramus (e.g., Figs. 190, 206, 210), or rami not distinct (e.g., Figs. 219, 225); widely distributed 38

34(33). Retrolateral ramus curled prolaterally (Figs. 196, 197); embolus very broad at base 35

– Retrolateral ramus erect or pointing prolaterally (Figs. 193, 209, 212); embolus narrower at base 36

35(34). Prolateral ramus of embolus obtuse (Figs. 196, 259); retrolateral ramus blunt and with bump (Fig. 295); embolus narrower at base than in *tritis* (Fig. 196); México ..... 8. *neoleonis*

– Prolateral ramus acute (Figs. 197, 300); retrolateral ramus sharp; embolus broader at base (Fig. 197); Arizona ..... 7. *tristis*

36(34). Side and forehead bands on carapace reduced or absent (Figs. 156, 365); western United States and Canada ..... 19. *aeneola* (part)

– Side and forehead bands on carapace well developed (Figs. 158, 276, 388); southwestern United States, México, and Central America 37

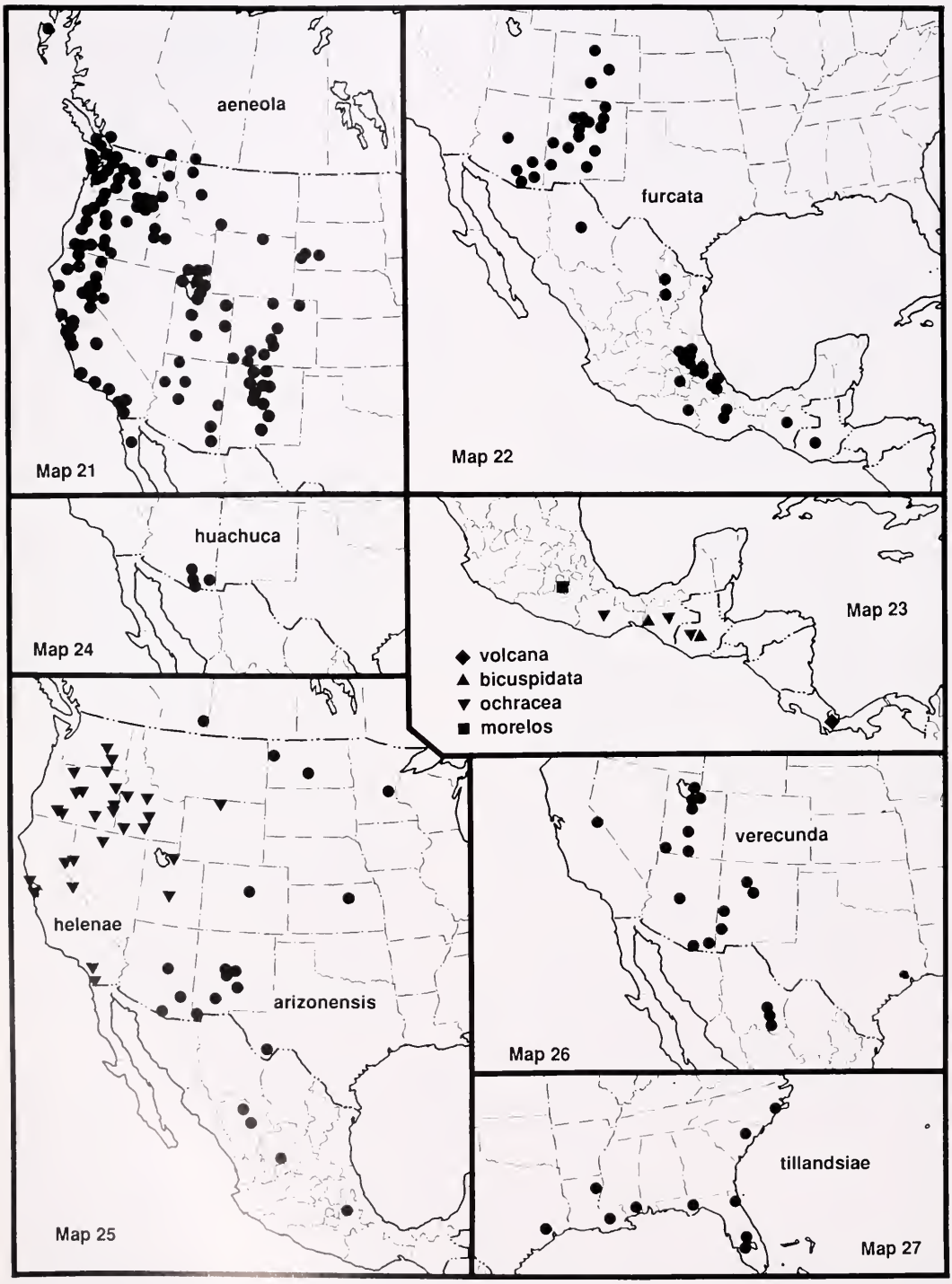
37(36). Retrolateral ramus of embolus longer and diverging from prolateral (Fig. 212); widely distributed ..... 22. *furcata* (part)

– Retrolateral ramus of embolus vertical (Fig. 193); embolus narrows abruptly near tip; central México ..... 4. *edrilana* (part)

38(33). Erect portion of embolus arises on retrolateral side (Figs. 422, 428); flange under tibial apophysis (Figs. 421, 427; *arizonensis* group) 39

←

Maps 16–20. Distributions of *Pelegrina* species. 16. *P. montana* in North America. 17. *P. insignis* in North America. 18. *P. chaimona* in México and Arizona. 19. *P. clemata* in western North America. 20. *P. balia* and *P. chalceola* in western North America.


aeneola
Map 21
furcata
Map 22
huachuca
Map 24
Map 23
volcana
bicuspidata
ochracea
morelos
helenae
arizonensis
Map 25
verecunda
Map 26
tillandsiae
Map 27

– Erect portion of embolus arises centrally; ridge under tibial apophysis not developed into flange (Fig. 78) 40

39(38). Embolus tip sharp (Fig. 422); tibial apophysis flange broad and short (Fig. 421) ..... 28. *arizonensis*

– Embolus tip blunt (Fig. 428); tibial apophysis flange narrow and elongate (Fig. 427) ..... 29. *helenae*

40(38). Chelicerae lacking pale scales 41

– Chelicerae with small patch of white or yellow scales 46

41(40). Embolus narrows abruptly just basal to opening (Fig. 190); retrolateral ramus is small hook (Fig. 259); southern Ontario, eastern United States south to Central America ..... 1. *galathea*

– Embolus parallel-sided or widens near tip; retrolateral ramus is small angle or apparently absent; Canada and mountainous areas of United States 42

42(41). Retrolateral ramus of embolus longer than prolateral and leaning retrolaterally (Figs. 208, 209); forehead band absent ..... 19. *aeneola* (part)

– Both rami of embolus small; forehead band present or absent 43

43(42). Embolus swollen near tip (Figs. 204, 344) ..... 15. *montana*

– Embolus with sides parallel or slightly tapering near tip (Figs. 207, 210, 211) 44

44(43). Forehead band well developed and contacting AMEs (Figs. 152, 359); tegulum with prominent prolateral bump (Fig. 361) ..... 18. *clemata* (part)

– Forehead band absent or if present then not contacting AMEs (Figs. 378, 383); tegulum with at most small prolateral bump (Figs. 379, 384) 45

45(44). Cheliceral fang with flange (Fig. 378); carapace side bands broad (Fig. 378), embolus bends slightly (Figs. 210, 379); California and northern Arizona north to Washington ..... 20. *balia*

– Cheliceral fang lacking flange (Fig. 383); side bands narrower (Fig. 383); embolus straight (Figs. 207, 211); southern Arizona to southern Illinois ..... 21. *chalceola*

46(40). Abdomen with striking lineate markings as in female (Fig. 477); embolus tapering to sharp tip in ventral view; living on Spanish moss ..... 36. *tillandsiae* (part)

– Abdomen brown or spotted above; embolus usually broad at tip though varies; habitat varied 47

47(46). Erect portion of embolus very thin (Fig. 535); anterior median eyes ringed with red; first legs yellow fringed with white (Fig. 176) ..... 45. *emmiltus* (part)

– Erect portion of embolus thicker; eyes ringed with white or brown; legs not fringed 48

48(47). Abdomen with paired black spots on brown dorsum; pale markings yellowish; embolus long and rectangular, leaning slightly retrolaterally (Figs. 205, 349, 350) truncate at tip and with retrolateral ramus apparently absent (Fig. 205); Canada and northeastern United States ..... 16. *insignis*

– Abdomen lacking distinct black spots; pale markings white or yellowish; embolus shorter (Fig. 219) or if long, then straight and with more prominent rami (e.g., Figs. 192, 206, 207, 222) 49

49(48). Abdomen with large and distinct paired white spots as in female (Fig. 166); side and cheek bands fused (Fig. 447); chelicerae robust (Fig. 447); erect portion of embolus parallel-sided and with two subequal rami (Fig. 222); deserts of México and Central America ..... 33. *variegata* (part)

– Abdomen with only small (Figs. 130, 132, 152) or indistinct (Figs. 162, 172) paired pale spots, side and cheek bands separate; chelicerae not so robust; embolus varied 50

50(49). Side bands of carapace and abdomen weak or absent and abdomen mottled (Figs. 162, 172); embolus small, lacking two distinct rami (Figs. 219, 227) 51

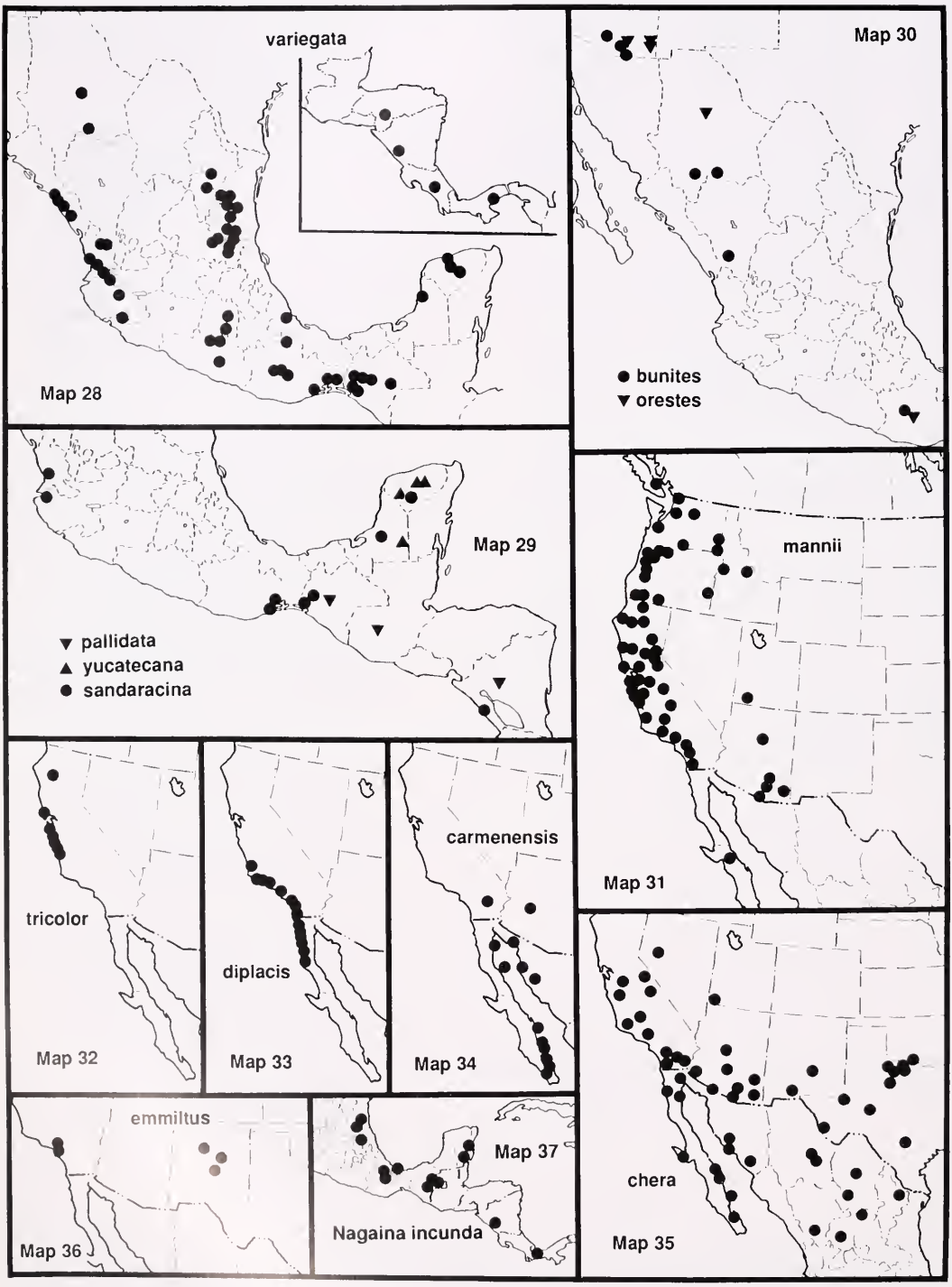
– Side bands well developed and abdomen not mottled (Figs. 130, 132, 152) 52

51(50). Pale markings white or gray; erect portion of embolus widens gradually on prolateral lside as it contacts basal portion (Fig. 433); tip of embolus rounded (Fig. 219) ..... 30. *verecunda*

– Pale markings orange or tan; erect portion of embolus widens abruptly on prolateral side as it contacts basal por-

←

Maps 21–27. Distributions of *Pelegrina* species. 21. *P. aeneola* in western North America. 22. *P. furcata* in México and the southwestern United States. 23. *P. furcata* group members in México and Central America. 24. *P. huachuca* in Arizona. 25. *P. arizonensis* and *P. helenae* in western North America (see Cutler and Jennings, 1985, for additional records). 26. *P. verecunda* in western North America. 27. *P. tillandsiae* in southeastern North America.


variegata
Map 28
Map 30
● bunites
▼ orestes
Map 29
▼ pallidata
▲ yucatecana
● sandaracina
mannii
Map 31
tricolor
Map 32
diplacis
Map 33
carmenensis
Map 34
emmiltus
Map 36
Map 37
Nagaina incunda
chera
Map 35

tion so as to make a distinct corner (Fig. 484); tip of embolus pointed retrolateral to opening (Fig. 227) ..... 38. *orestes* (part)

52(50). Retrolateral ramus longer than prolateral (Figs. 190, 193) 53

– Rami subequal (Figs. 191, 192, 206, 207) 54

53(52). Embolus sides parallel below opening (Fig. 190); retrolateral ramus narrow (Fig. 259); widespread ..... 1. *galathea* (part)

– Embolus inflated below opening (Fig. 193); retrolateral ramus wide (Fig. 277); central México ..... 4. *edrilana* (part)

54(52). Abdomen with two central broken longitudinal pale stripes in addition to side bands as in female (Fig. 269); Caribbean ..... 2. *proxima*

– Abdomen lacking central longitudinal bands; western North America 55

55(54). Embolus parallel-sided or tapers slightly to tip (Figs. 207, 360, 361); basal to opening the prolateral side is straight (Fig. 207); sagebrush of western Untied States and Canada ..... 18. *clemata* (part)

– Embolus widens slightly near tip (Figs. 192, 206); just basal to opening on prolateral side is angle (Figs. 192, 206); Arizona and México 56

56(55). Rami of embolus well separated (Fig. 192); side bands have extensions joining between posterior eyes (Fig. 132); no denticles on exposed surface of embolus (Fig. 192) ..... 3. *dithalea*

– Rami close together (Fig. 206); side bands without extensions; surface of embolus with denticles (Fig. 206) ..... 17. *chaimona*

Key to the Female *Pelegrina* of the Eastern United States and Canada (East of the Mississippi River and Manitoba)

1. Posterior margin of epigynal flap truncated so as to be transverse, and standing high over surface behind it (Figs. 236, 262); epigynal flaps convex, parallel; legs distinctly annulate (Fig. 131); abdomen marked with four pairs of prominent white spots with small black spots behind them (Figs. 131, 263) ..... 1. *galathea*

– Posterior margin of epigynal flap rounded, not transverse, or if transverse then flaps flat and flush with surface behind them (Figs. 238, 239, 241–245, 254); legs not distinctly annulate; abdomen with white spots smaller, often thinner and elongate (e.g., Figs. 287, 323, 353) 2

2(1). Abdomen with prominent paired black spots on orange-brown background (Figs. 161, 353); epigynal flaps divergent (Fig. 352); epigynal surface rises dramatically from low area around flaps to high posterior margin (Fig. 245); legs and face yellowish; mostly northern ..... 16. *insignis*

– Abdomen lacking prominent paired black spots though may have brown or reddish patches; epigynal flaps parallel, convergent, or divergent; epigynal surface in most species with little relief (e.g., Figs. 238, 241); legs and face varied; locality varied 3

3(2). Epigynum with ridge just behind each flap (Figs. 244, 346); posterior notch often rectangular; body large and dark with very small paired white spots on dark abdominal dorsum (Fig. 347); Canada and mountains of United States ..... 15. *montana*

– Epigynum lacking ridges behind flaps; posterior notch triangular; body smaller; abdomen varied 4

4(3). Abdomen strongly striped longitudinally yellow and brown (Fig. 477); epigynal flaps pale; living on spanish moss of the southeastern United States ..... 36. *tillandsiae*

– Abdomen not striped yellow and brown longitudinally, usually spotted; epigynal flaps varied 5

5(4). Epigynal surface and flaps very flat (Figs. 241–243); flaps not much darker than rest of epigynum except for narrow rim (Figs. 322, 327, 332); carapace often with shiny scales and pale spot above and between anterior median eyes (e.g., Fig. 143); conifer dwellers (*flavipedes* group) 6

– Epigynal surface and flaps with more relief (Figs. 237, 238); flaps usually distinctly darker than rest of epigynum (Figs. 286, 292); carapace lacking shiny scales 8

6(5). Forehead dark above and between AMEs; head often bulbous; legs pale yellow, usually with thin longitudinal dark lines on

←

Maps 28–37. Distributions of species of *Pelegrina*, the *Metaphidippus mannii* species group, and *Nagaina incunda*. 28. *P. variegata* in México and Central America. 29. *P. pallidata*, *P. yucetecana*, and *P. sandaracina* in México and Central America. 30. *P. bunites* and *P. orestes* in Arizona and western México. 31. *M. mannii* in western North America. 32. *M. tricolor* in California. 33. *M. diplacis* in California and Baja California. 34. *M. carmenensis* in México and the southwestern United States. 35. *M. chera* in México and the southwestern United States. 36. *P. emmiltus* in California and New Mexico. 37. *Nagaina incunda* in México and Central America.

femora; epigynum with second curve of spermathecal duct wider than in *flavipedes* but no so wide as in *exigua* (Figs. 340, 341); northeastern United States bordering Canada and southeastern Canada ..... 13. *flaviceps*

– Forehead with pale spot above and between anterior median eyes; head not bulbous; legs generally lacking longitudinal lines or if persent then wide and mostly on anterior legs; epigynum otherwise; distribution generally farther north or farther south than *flaviceps* 7

7(6). Epigynal flaps parallel (Figs. 241, 322); second curve of spermathecal duct narrow and oblique (Figs. 321, 338, 339); carapace narrow; mostly northern (Canada and northern United States) though found occasionally on southern mountains ..... 12. *flavipedes*

– Epigynal flaps convergent (Figs. 243, 332); second curve of spermathecal duct very broad and transverse (Figs. 331, 336, 337) carapace broader; mostly southern United States north to Massachusetts and New York ..... 14. *exigua*

8(5). Abdomen marked with large square brown spots on or between paired pale spots (Figs. 2, 135, 287); epigynal flaps convergent and fairly flat, short (Figs. 238, 286); surface rises quickly behind flaps to broad mound (Fig. 238) ..... 5. *proterva*

– Abdomen uniformly light brown with small white spots (Figs. 137, 293); epigynal flaps long and fairly convex (Figs. 239, 292); surface rises gradually behind flaps to mound at posterior (Fig. 239) ..... 6. *peckhamorum*

Key to the Female *Pelegrina* of the Great Plains (between the Rocky Mountains and the Mississippi River)*

1. Epigynal flaps rotated 180° (Fig. 424); abdomen with strongly lineate markings (Fig. 425) ..... 28. *arizonensis*

– Epigynal flaps rotated at most 45°; abdominal markings not so clearly lineate 2

2(1). Legs distinctly annulate, and abdomen marked with four pairs of prominent white spots with small black spots behind them (Figs. 131, 263); epigynal flaps convex, parallel, posterior margin truncated so as to be transverse and standing high over surface (Figs. 236, 262) ..... 1. *galathea*

– Legs not distinctly annulate; abdomen with more prominent dark areas on either side of smaller pale spots (though *pervaga* with pale spots coalesced into single large spot); epigynal flaps varied, but posterior margin not truncated 3

3(2). Area behind epigynal flaps raised into high mound (Figs. 245, 246); carapace densely covered with white or yellow scales (Figs. 153, 161) 4

– Area behind epigynal flaps more or less flat (Figs. 238, 240); carapace thinly covered with pale scales (e.g., Fig. 135) 5

4(3). Scales on carapace white; legs beige and brown; abdomen with large dark patches on either side of central paired spots but lacking strong black spots (Fig. 364), anteriormost pale spots fused into short longitudinal bands; epigynal surface behind flaps raised into broad dark shiny round mound (Fig. 246); flaps convergent (Figs. 246, 363); usually collected from sagebrush ..... 18. *clemata*

– Scales on carapace yellowish; legs yellow; abdomen with paired black spots (Fig. 353); epigynal surface behind flaps raised gradually but steeply into high mound along posterior of epigynum (Fig. 245); flaps divergent (Figs. 245, 352); low herbs in fields and bogs ..... 16. *insignis*

5(3). Abdomen marked with large square brown spots between small paired pale bands (Figs. 135, 287); epigynal flaps convergent and fairly flat, short and dark (Figs. 238, 286); surface rises quickly behind flaps to broad mound (Fig. 238); carapace narrow; widespread ..... (5) *proterva*

– Abdomen with large central pale spot (Fig. 313); epigynal flaps large and flat, fairly pale (Figs. 240, 312); carapace very wide; Kansas to Texas ..... 10. *pervaga*

Key to the Female *Pelegrina* of the Pacific Coast of the United States and Western Canada*

1. Epigynal flaps rotated 270° so that flaps are transverse (Fig. 430); abdomen with lineate markings (Figs. 155, 431); commonly found on sagebrush ..... 29. *helenae*

– Epigynal flaps rotated less than 45°; abdo-

* Not included are some tree-dwelling species whose ranges reach into the Great Plains: *Pelegrina flavipedes* and *exigua*, which occur on conifers in the north and east; *P. peckhamorum*, on oaks in the southeast; and *chalceola*, in Texas to extreme southern Illinois.

* Includes California, Nevada, Oregon, Washington, Idaho, British Columbia, and Alberta. Included is *Metaphidippus mannii*, as well, but not the other *mannii* group species, which are restricted to the southern part of the area of the key. Not included is *P. verecunda* (see Arizona key).

men with markings not lineate except occasionally in *clemata*; habitat varied 2

2(1). Epigynal surface and flaps very flat (Figs. 241, 256); body with shiny bronze or copper scales (Figs. 143, 179) 3

– Epigynal flaps more convex and epigynal surface with more relief (Figs. 238, 244–248); flaps usually distinctly darker than rest of epigynum; body usually without metallic sheen; habitat varied 4

3(2). Orange scales between and beside AMEs just above clypeus; body fairly smooth with shiny coppery scales (Fig. 179); usually on oaks, holly, *Arctostaphylos*, and other shrubs and trees with leathery leaves ..... 40. *mannii*

– White or dark scales around eyes; carapace often with pale spot above and between AMEs (e.g., Fig. 143); body with rougher appearance; on conifers ..... 12. *flavipedes*

4(2). Epigynal flap angled where flap bends down toward opening (Figs. 247, 374, 376); surface rises immediately behind flap to broad plateau covering posterior of epigynum (Fig. 247); carapace thinly covered with white scales that often form an inverted T behind the AMEs (Fig. 157); abdomen often with anterior medial paired spots coalesced into one large white spot (Figs. 157, 377); common on various plants including conifers ..... 19. *aeneola*

– Epigynal flaps not angled; surface of epigynum varied; carapace lacking T-shaped marking on head; abdomen with anterior medial paired spots separate (Figs. 347, 364, 382); habitat varied 5

5(4). Scales on carapace yellowish; legs yellow; abdomen with paired black spots (Fig. 353); epigynal surface behind flaps raised gradually but steeply into high mound along posterior of epigynum (Fig. 245); flaps divergent (Figs. 245, 352); low herbs in fields and bogs ..... 16. *insignis*

– Scales on carapace white, beige, or tan; epigynal surface behind flaps either more or less flat (Figs. 244, 248) or raised quickly behind flaps into mound (Figs. 238, 246); habitat varied 6

6(5). Area behind epigynal flaps raised into a broad mound (Figs. 238, 246); flaps convergent; carapace with whitish scales 7

– Area behind flaps more nearly flat or concave (Figs. 244, 248); flaps divergent or convergent; carapace dark or covered with yellowish scales 8

7(6). Area behind epigynal flaps strongly raised into round dark shiny mound (Figs. 246, 363); flaps convergent; carapace densely covered with white scales (Fig. 153); abdomen with large dark patches on either side of central paired spots (Fig. 364), anteriormost pale spots fused into short longitudinal bands; commonly found on sagebrush ..... 18. *clemata*

– Area behind flaps only moderately raised into broad mound (Fig. 238); carapace not densely covered with white; abdomen marked with large square brown spots between paired pale spots (Figs. 2, 135, 287); found on various shrubs and trees ..... 5. *proterva*

8(6). Body dark, with very small pale spots on abdomen (Fig. 347); white scales between AMEs; epigynum dark; surface rising immediately behind flap to ridge (Fig. 244); collected from waterside shrubs and trees ..... 15. *montana*

– Body mottled beige and tan, with large yellowish spots on abdomen (Fig. 382), orange scales between AMEs; epigynum pale; surface rising gradually behind flaps (Fig. 248); juniper-dwelling ..... 20. *balia*

Key to the Female *Pelegrina* and *mannii* group of Arizona*

1. Epigynal flaps thin and rotated 90°, lying in cavity (Fig. 317); markings gold and beige; junipers of southern mountains ..... 11. *kastoni*

– Epigynal flaps rotated less than 60° (or, if rotated 90°, rarely in *tristis*, then flaps very broad); markings varied 2

2(1). Epigynal flaps broad and flat (Figs. 302, 307); epigynal surface more or less flat 3

– Epigynal flaps narrower; epigynal surface varied 4

3(2). Anterior end of epigynal opening deep, with the surface there pale and descending deeply under flap; flaps dark brown; southern Arizona ..... 7. *tristis*

– Anterior end of epigynal opening shallow, with the surface not so shallow nor descending so deeply as in *tristis*; flaps usually light brown; northern Arizona and New Mexico ..... 9. *sabinema*

4(2). Epigynal surface flat or convex behind flaps (Figs. 247, 252, 255–257); flaps often flat 5

– Epigynal surface concave behind flaps (Figs. 248–250); flaps convex 14

5(4). Epigynal flaps narrow and flat (Fig. 257), often transparent and difficult to see

---

* Not included in the key are northern species that may occur in Arizona but have been at most rarely collected there: *Pelegrina montana*, *flavipedes*, *insignis*, and *clemata*. *Metaphidippus carmenensis* is a species similar to *chera* with one known specimen from Arizona. It is not included in the key.

(Figs. 525, 526); flaps divergent; common in desert vegetation though occurs at higher elevations ..... 43. *chera*

– Epigynal flaps wider and more pigmented, usually more robust than in *chera*; flaps parallel, convergent or divergent; generally found in oak-conifer habitats above 1,200 m elevation 6

6(5). Epigynal flaps narrow, flat and mostly parallel except for sharp bend inward near posterior end (Figs. 255, 481); body yellow, sometimes with paired dark spots on abdomen almost as in *insignis* (Fig. 171) ..... 37. *bunites*

– Epigynal flaps without sharp posterior bend; if abdomen yellow then lacking large paired dark spots 7

7(6). Abdomen very pale, yellowish, with markings consisting of little more than small dark speckles (Figs. 436, 487, 502) 8

– Abdomen more darkly marked with brown or gray (Figs. 275, 358, 377, 387) 10

8(7). Epigynal flaps divergent and narrow (Fig. 501) ..... 40. *mannii* (part)

– Epigynal flaps parallel or convergent (Figs. 435, 486) 9

9(8). Epigynal flaps pale (Fig. 486) ..... 38. *orestes*

– Epigynal flaps small and dark (Fig. 435) ..... 30. *verecunda*

10(7). Epigynal flap angled about midway along its length where flap bends down toward opening (Fig. 247); surface rises immediately behind flap to broad plateau covering posterior of epigynum (Fig. 247); carapace thinly covered with white scales that often form an inverted T behind the AMEs (Fig. 157); abdomen often with anterior medial paired spots coalesced into one large white spot (Fig. 157) ..... 19. *aeneola*

– Epigynal flaps not angled so abruptly in middle; epigynal surface varied; carapace lacking T-shaped marking on head; abdomen with paired spots separate 11

11(10). Epigynal flaps divergent and narrow (Fig. 501) ..... 40. *mannii* (part)

– Epigynal flaps parallel or convergent, not so narrow (Figs. 274, 357, 386) 12

12(11). Abdomen marked much as in *galathea*, with four pairs of prominent white spots with small black spots behind them (Figs. 133, 275); epigynal flaps short, fairly flat, and parallel (Fig. 274) ..... 3. *dithalea*

– Abdomen dark areas more prominent than paired white spots (Figs. 358, 387); epigynal flaps varied 13

13(12). Carapace covered with reflective scales; abdomen brown with large paired darker brown spots (Fig. 387), setae around AMEs darkest dorsally ..... 21. *chalceola* (part)

– Carapace covered with white scales; abdomen with pale longitudinal side bands enclosing brown dorsum with paired white spots (Fig. 358), setae around AMEs all white ..... 17. *chaimona* (part)

14(4). Epigynal flaps dark, long, narrow, and convex (Fig. 418); epigynal surface with strong relief consisting of raised bumps just medial to each flap, a concavity behind flaps rising to posterior edge (Fig. 418); first curve of epigynal ducts broad and long (Fig. 417) ..... 27. *huachuca*

– Epigynal flaps not so long, nor is epigynal surface so strongly sculptured; first curve of ducts narrower 15

15(14). Epigynal flaps strongly convex (Figs. 249, 250); posterior end rounded and standing high above surface (Figs. 249, 250); second curve of duct broad (Figs. 397, 400) ..... 22. *furcata*

– Epigynal flaps less convex (Figs. 248, 357, 381, 386); posterior end not standing high above surface (Fig. 248); second curve of duct narrower (Figs. 356, 380, 385) 16

16(15). Abdomen marked with large round white spots (Fig. 382); carapace wide; epigynal flaps narrow and pale (Fig. 381) ..... 20. *balia*

– Abdomen with small white spots if any (Figs. 358, 387); carapace varied; epigynal flaps broader and shorter (Figs. 357, 386) 17

17(16). Carapace covered with brown reflective scales; abdomen brown with large paired darker brown spots (Fig. 387); setae around anterior median eyes darkest dorsally ..... 21. *chalceola* (part)

– Carapace covered with white scales, abdomen with pale longitudinal side bands enclosing brown dorsum with paired white spots (Fig. 358); setae around anterior median eyes all white ..... 17. *chaimona* (part)

Key to the *Pelegrina* and *Nagaina* females of Mexico and Central America*

1. Body and legs mostly yellow (Fig. 163, 173, 175, 436, 461, 487, 492), with small

* Females of the *Metaphidippus mannii* groups are not included. These can usually be distinguished from *Pelegrina* females by their weaker epigynal flaps, which descend into the openings posteriorly.

dark markings if any; epigynum and flaps mostly flat (Figs. 252, 253, 255) 2

– Body and legs well marked with brown and gray (e.g., Figs. 298, 318, 409, 414, 425); epigynal surface flat or more or less concave (e.g., Fig. 250) 9

2(1). First femur, patella, and/or tibia with small subterminal dark transverse bar (e.g., Peckham and Peckham, 1896: fig. 10); clypeus covered with yellow scales except for barren patch beneath AMEs, beneath which on chelicera is dark line; epigynal flaps weak (Fig. 491); disturbed lowland habitats 39. *Nagaina incunda*

– Legs uniform in color or if annulate, with dark annulae more extensive; clypeus densely covered with pale scales even below AMEs; habitat varied 3

3(2). Epigynal surface more or less flat except for longitudinal ridge between flaps (Fig. 253); flaps convergent, narrow, only slightly convex (Figs. 253, 450) 33. *variegata* (part)

– Epigynal surface lacking central ridge (Figs. 252, 255); flaps varied 4

4(3). Body and legs uniformly orange-yellow except sometimes for discrete small dark spots on abdomen; epigynum transparent so that spermathecae easily visible without dissection (Figs. 460, 463); flaps convergent; southern México and Central America 35. *sandaracina*

– Body and legs pale yellowish beige, not so orange; epigynum varied 5

5(4). Abdomen uniformly yellowish, with small discrete dark speckles only (Figs. 436, 487) 6

– Abdomen mostly yellow but any dark markings are larger spots and patches (e.g., Figs. 171, 409, 446) 7

6(5). Epigynal flaps pale, transparent (Fig. 486), convergent 38. *orestes*

– Epigynal flaps dark (Fig. 435), convergent to divergent 30. *verecunda*

7(5). Epigynal flaps strongly convex (Fig. 408); epigynum concave behind flaps 25. *ochracea*

– Epigynal flaps flat (Figs. 255, 482, 445); epigynal surface more or less flat 8

8(7). Epigynal flaps narrow, with abrupt bend near posterior end (Figs. 255, 481); Arizona to Oaxaca 37. *bunites* (part)

– Epigynal flaps wider, convergent, but without abrupt bend (Fig. 445); Chiapas to Nicaragua 32. *pallidata* (part)

9(1). Epigynal flaps rotated 180° (Fig. 424); abdomen with strong lineate markings (Fig. 425) 28. *arizonensis*

– Epigynal flaps rotated at most 90°; abdominal markings not so clearly lineate 10

10(9). Epigynal flaps dark, wide, flat, and strongly convergent (Fig. 297); montane 8. *neoleonis*

– Epigynal flaps not so dark and wide; habitat varied 11

11(10). Epigynal flaps rotated 90° and in pits (Fig. 317); body yellowish (Fig. 141); northern México, on junipers 11. *kastoni*

– Epigynal flaps rotated less than 60°; body varied; distribution varied 12

12(11). Abdomen with peculiar transverse markings (Figs. 169, 456); fourth pair of spots in particular a transverse stripe; legs strongly annulate (Fig. 169); face thinly covered with pale scales; epigynal flaps pale and convergent (Fig. 455); Yucatán Peninsula 34. *yucatecana*

– Abdomen without such transverse markings; fourth pair of spots not a transverse stripe; legs, face and epigynal flaps varied 13

13(12). Epigynal flaps with abrupt bend near posterior end (Figs. 255, 481); epigynal flaps and surface more or less flat 37. *bunites* (part)

– Epigynal flaps without abrupt bend near posterior end; epigynal surface varied 14

14(13). Epigynal surface more or less flat except for longitudinal ridge between flaps (Fig. 253); flaps convergent, narrow, only slightly convex; abdomen marked with large white spots (Figs. 167, 451) 33. *variegata* (part)

– Epigynal surface usually rises to posterior edge; if flat then lacking longitudinal ridge; flaps varied; markings varied 15

15(14). Epigynal flaps strongly convex (e.g., Figs. 236, 249, 250), parallel or slightly convergent 16

– Epigynal flaps flat or only slightly convex (similar to those in Figs. 247, 252); may be strongly convergent 20

16(15). Epigynal surface concave behind flaps (Figs. 249, 250), rising gradually to posterior margin (*furcata* group) 17

– Epigynal surface rises quickly behind flaps to mound covering most of posterior (Fig. 236) 19

17(16). Epigynal flaps fairly short, pale (Fig. 408); southern México and Guatemala 25. *ochracea*

– Epigynal flaps generally longer, dark (Figs. 298, 413) 18

18(17). First curve of duct narrow, second curve very broad (Figs. 397, 400); abdominal markings shiny, pale spots generally small (Figs. 396, 398, 402) 22. *furcata*

– First curve of duct wide, second curve narrow (Fig. 412); strong pale spots on dark abdominal dorsum (Fig. 414) ..... 26. *morelos*

19(16). Epigynal flaps long and convergent, not truncate posteriorly (Figs. 4, 280); longitudinal dark bands on abdomen prominent (Fig. 281) ..... 4. *edrilana*

– Epigynal flaps shorter, parallel, truncate posteriorly (Figs. 236, 262); abdomen marked with prominent white spots, without prominent dark bands (Figs. 131, 263) ..... 1. *galathea* (part)

20(15). Epigynal flaps convergent, higher medially and tilted down laterally (Fig. 440); epigynal surface high between and behind teardrops, lower lateral to this (Fig. 440) ..... 31. *clavator*

– Epigynal flaps not so tilted; epigynal surface flat or only slightly higher medially than laterally 21

21(20). Epigynal flaps truncate posteriorly (Fig. 236), high above surface at posterior end ..... 1. *galathea* (part)

– Epigynal flaps not truncate posteriorly nor so high above surface 22

22(21). Abdomen marked much as in *galathea*, with four pairs of prominent white spots with small black spots behind them (Figs. 133, 275); epigynal flaps fairly flat and parallel (Fig. 274) ..... 3. *dithalea*

– Abdomen with smaller white spots (Figs. 358, 446); epigynal flaps usually convergent (Figs. 357, 445) 23

23(22). Epigynum very flat (as in *verecunda*, Fig. 252); dark band along inner margin of epigynal opening very wide (Fig. 444) ..... 32. *pallidata* (part)

– Epigynum with some relief; dark band along inner margin of epigynal opening narrow (Fig. 356) ..... 17. *chaimona**

DESCRIPTIONS OF THE SPECIES OF *PELEGRINA*

The *Pelegrina* species of Canada and the northern and eastern United States can be considered reasonably well known, but the same cannot be said for the species of Arizona, México and Central America. In Arizona are many species, some poorly collected such as *P. huachuca*, *P. chaimona*, *P. tristis*, *P. chalceola*, and *P. dithalea*. Even if no additional species are discovered in Arizona, there is the danger that males and females of some of the known species have been mismatched. In México and Central America, the situation is worse, where there are probably several species that will remain undescribed for some time to come. Already there are known some female *Pelegrina* from southern and central México that apparently represent species not described here. I shall not give names to them here so as to avoid making more species names based on difficult to determine females and because with adequate collecting we may discover that they are females of already-described males. I do, however, give figures of some of them (Figs. 464–471). Figures 464–466 show a single female from Neriaco, México (state unknown), which may represent an extreme southern form of *P. chalceola*. Figures 467 and 468 show a form from Guerrero, Jalisco, and Michoacan that may be a southern form of *P. dithalea*. Figures 469–471 show a form occurring in collections from Durango.

The descriptions follow a more or less consistent format except that occasionally a feature is noted in a few species that is not noted in any others: for instance, strongly annulate legs are noted under *P. yucatecana*, but leg annulation is usually not even mentioned, and in *P. balia* the flange on the cheliceral fang is noted but the fang is ignored in most other descriptions. In the case of leg annulation and male abdominal markings, the species should be assumed to be characterized by the usual *Pelegrina* condition (legs annulate, but fairly indistinctly, and male abdomen brown above, with at most small white spots, and ringed by white side bands) unless otherwise mentioned. In the case of the other characters, such as the flange in *balia*, the distribution of the feature in all species is not fully known. Such a character is described to aid in separating the species from similar species that are known to lack it (in this example, *chalceola* lacks the flange).

* A number of unmatched females from México may be *P. chaimona* or a species easily confused with it.

Information on the labels of type material is cited, and, where possible, the author of handwritten labels is identified. Banks, Chamberlin, Kaston, and Levi types still have with them the author's original labels, handwritten except those of Kaston, whose typewriter was distinctive. F. Pickard-Cambridge's and some of the Peckhams' types no longer have their original labels. F.P.-Cambridge's labels have been replaced by labels handwritten in pencil, perhaps by Pocock or Browning (Levi, personal communication). Some of the Peckhams' labels were rewritten by Bryant, but most labels of *Pelegrina* types are apparently original. Some are in George Peckham's handwriting, but most are in a handwriting that is probably that of Elizabeth Peckham, for it occurs in other original labels in the Peckham Collection and in some of George Peckham's correspondence to Henshaw.

1. *Pelegrina galathea* (Walckenaer, 1837) new combination

Figures 5, 10, 11, 13, 35, 78, 125, 130, 131, 190, 236, 258–263; Map 1

Attus galathea Walckenaer, 1805: 23 (cites Bosc's MS figure, pl. 1, fig. 4, ♀) (nomen nudum).

Attus galathea Walckenaer, 1837: 456, sp. 100. Type material lost or destroyed. Walckenaer (1837) cited Bosc's MS pl. 1, fig. 4, and also Abbott's fig. 405 (♀), but as Walckenaer (1805) refered only to Bosc's figure, this is to be taken as figure of type. Insofar as *A. galathea* is such a common and well-known species, and Bosc's ambiguous figure could be interpreted as another species, a NEOTYPE is here designated, 1♂ in MCZ with label "NORTH CAROLINA: Raleigh, garden, 24–31 May 1943, Brimley."

Attus nubilis Hentz, 1846: 358, pl. 21, fig. 15, ♀. Type material lost or destroyed.

Euophrys leucophaea C. L. Koch, 1846: 216, fig. 1261, ♂. Holotype 1♂ from Pennsylvania in ZMB with labels "E. Leucophaea ZMB 1794," "1794," "Holotypus," examined. Was dried; now rehydrated. NEW SYNONYMY.

Icius crassiventer Keyserling, 1884: 503, fig. 11, ♀. Holotype in MCZ 1♀ with labels "18 Icius crassiventer Keys., ♀ Massachusetts." and "18.", examined. NEW SYNONYMY.

Dendryphantes ornatus Banks, 1892: 75, pl. 4, fig. 29a, pl. 5, fig. 29, ♀. Holotype in MCZ 1♀ with labels "Dendryphantes ornatus Bks type," "Ithaca, N. Y." and "Nathan Banks Coll.," examined.

Dendryphantes hondurensis:—G. & E. Peckham, 1896, in part: 48, pl. 4, fig. 4a, ♀. Type material in MCZ 2♀ from Belize labeled "449 Dendryphantes hondurensis Peck., Type, British Honduras ♀ 1423, G. W. & E. G. Peckham Coll." (in Bryant's handwriting) which both belong to the genus *Gastromicans*, and 1♂ 2♀ labeled "461 Dendryphantes hondurensis Peck., Guatemala, G. W. & E. G. Peckham Coll." (in Bryant's handwriting), of which 1♂ 1♀ are *P. galathea* and 1♀ is in the genus *Messua*, examined. One *Gastromicans* ♀ from Belize is here designated LECTOTYPE of *D. hondurensis*, and thus *D. hondurensis* is not properly a synonym of *P. galathea*.

Metaphidippus capitatus:—F. P.-Cambridge, 1901: 272; Bonnet, 1957: 2810, in part.

Metaphidippus digitatus F. P.-Cambridge, 1901: 269, pl. 24, figs. 12, 12a–c, ♂. Type material in BMNH 1♂ and fragments of two other ♂ labeled "Dendryphantes digitatus, sp. n. Type ♂, Guatemala (Sarg.)" and 2♂ labeled "Dendryphantes digitatus, sp. n. ♂'s, México (Teapa) H. S.", examined. NEW SYNONYMY.

Beata digitata:—Simon, 1903: 841. Roewer, 1954: 1007. Bonnet, 1955: 873.

Dendryphantes capitatus:—G. & E. Peckham, 1909: 469, pl. 38, fig. 5, possibly also pl. 36, figs. 4, 4a, ♀.

Metaphidippus galathea:—Chamberlin and Ivie, 1944: 203. Kaston, 1973: 117, figs. 47–50, ♂♀.

Dendryphantes galathea:—Roewer, 1954: 1203.

Notes on Synonymy. (1) I interpret Bosc's ambiguous figure (photograph of plates in MNHN Paris seen) as the species we call *P. galathea*, following recent usage. Abbott's figure 405 probably shows a ♀ *proterva*. (2) Walckenaer's *Attus attentus* and *Attus furtivus* might also refer to this species. (3) The epigynum figured by the Peckhams for *D. hondurensis* was that of a *P. galathea* female, but despite this the female *Gastromicans* from Belize was chosen as lectotype because of the name *hondurensis* (suggesting British Honduras was intended as type locality), the label "Type," and because their figure 5 is not of *P. galathea*. Their description appears to apply to the mixture of species in the vials. (4) Kaston used the name *nubilis* for his numerous identifications of material around 1940.

Diagnosis. A widespread species, formerly confused with others in eastern North America, from which it is distin-

guished by the embolus shape of males and speckled abdominal dorsum, annulate legs, and convex epigynal flaps of females. Carapace wider than in most eastern species. Similar especially to the Caribbean *proxima* and southwestern *dithalea*. Can be separated from *proterva* by (males) the narrower embolus with smaller hook, darker face, and broader carapace and by (females) the abdominal markings and convex epigynal flaps.

Male. Palpus (Figs. 190, 259, 260): Embolus rectangular, narrowing abruptly just basal to opening, with small pointed, curving hook at retrolateral tip (Figs. 190, 259). *Markings* (Figs. 130, 258): Forehead band often well developed, with each branch forked and extending back to posterior eyes (Fig. 258). Cheek band weak. Clypeus brown, lacking central white spot on clypeus, with hairs overhanging chelicerae dark except sometimes a few white hairs medially. White forehead band contacts AMEs dorsally 10:30–12:30. Chelicerae lacking pale scales except in some southern males. Femur of palpus only slightly paler than more distal segments, cymbium dark brown and lacking white scales except in some southern males. Femora of second, third, and fourth legs often more uniformly dark than in *proterva*, light brown base graduating to dark brown apex, though in some ♂♂, especially in south, base abruptly pale. Abdomen shows trace of white spot pattern of ♀♀. *Measurements:* Body length 3.0(3.4–3.8)4.0 mm; carapace length 1.4(1.6–1.8)2.0 mm, width/length 0.77(0.79)8.1; n = 6♂ from Michigan and Georgia.

Female. Epigynum (Figs. 261, 262): Flaps convex (Fig. 236), inner edges often parallel and close together, back edge often perpendicular to body axis and standing much higher than surface immediately behind it (Fig. 236). Surface rises fairly quickly behind flaps so that posterior surface is mostly raised, unlike the more concave surface of *proxima* and *peckhamorum* though not so uniformly high as in *proterva*. First curve of duct broad, but not so much as in *proterva*; second curve proceeds medially. *Markings* (Figs. 131, 263): Carapace covered above with white to gray scales. Clypeus relatively thinly covered with white setae. Abdominal markings dominated by central pale spots each of which is shadowed by dark behind. *Measurements:* Body length 4.0(4.6)5.7 mm; carapace length 1.7(1.8)1.9 mm, width/length 0.78(0.82)0.82; n = 5♀ from Georgia, Alabama, and Michigan.

Chromosomes. 2n♂ = 26 acrocentrics + XXO (1♂ with full count plus 1♂ with only XXO observed, Toronto, Ontario).

Courtship (7♂ observed from seven locations: Rowan Co., Kentucky; San Jacinto, Gonzales, and Hidalgo Co., Texas; San Luis Potosí: 99°42′W, 22°28′N; near Tuxpan, Veracruz; and north of Ciudad Camargo, Chihuahua). *Raisedspread* (n = 9, 5♂). *Crouch* (Fig. 125; n = 14, 6♂): Body low (n = 5, 3♂) and horizontal (n = 14, 6♂). First legs held forward and horizontal (n = 12, 5♂), or slightly raised (n = 1), or raised about 45° (n = 1); bowed and touching or almost touching at tips (n = 9, 4♂), or straight forward (n = 4, 1♂), or slightly spread, though more parallel and lower as ♂ gets closer (n = 1). First legs flicker (n = 12, 6♂) on each series (n = 4, 2♂) up and down (n = 4, 2♂) and alternately back and forth at tips (n = 1), vigorously (ca. 5 c/s) (n = 1) but at low amplitude (n = 5, 3♂). Palpi held down (n = 9, 5♂), either resting on first leg femora (n = 1), tucked beside chelicerae (n = 3, 1♂) or over chelicerae (n = 2, 1♂) and pointing inward (n = 4, 2♂). Palpi waved (n = 10, 4♂) up and down (n = 3, 1♂) on each series (n = 6, 2♂) vigorously (ca. 5 c/s) but at low amplitude (n = 1). *Repertoires:* 1♂ raisedspread only; 2♂ crouch only; 4♂ raisedspread and crouch.

Distribution (Map 1). Eastern North American north to southern Ontario, west to the Rocky Mountains, south to Florida and Costa Rica.

Records. Many specimens, especially in MCZ and AMNH, from: *CANADA:* ONTARIO: Burlington, Hamilton, Port Credit, Windsor. *UNITED STATES* (county records): NEW HAMPSHIRE: Cheshire,

Hillsborough, Strafford; VERMONT: Windham; MASSACHUSETTS: Barnstable, Dukes, Essex, Middlesex, Nantucket, Norfolk, Suffolk; RHODE ISLAND: Newport; CONNECTICUT: Fairfield, Hartford, Litchfield, Middlesex, New Haven, Tolland; NEW YORK: Dutchess, Nassau, Suffolk, Tompkins, Wyoming; NEW JERSEY: Bergen, Cape May, Gloucester, Hunterdon, Middlesex, Morris; PENNSYLVANIA: Adams, Berks, Bucks, Erie, Montgomery; OHIO: Ashtabula, Champaign; DELAWARE: Sussex; MARYLAND: Baltimore, Montgomery, Washington; DISTRICT OF COLUMBIA: Washington; WEST VIRGINIA: Mercer; VIRGINIA: Allegheny, Botetourt, Fairfax, Suffolk, Surry, Portsmouth, Richmond, Washington; KENTUCKY: Rowan; TENNESSEE: Benton, Unicoi; NORTH CAROLINA: Avery, Buncombe, Camden, Craven, Durham, Johnston, Macon, Mecklenburg, Nash, New Hanover, Pender, Transylvania, Wake, Washington, Yancey; SOUTH CAROLINA: Oconee, Orangeburg; GEORGIA: Chattahoochee, Clarke, Cobb, Glynn, Thomas, Ware; FLORIDA: Alachua, Escambia, Hillsborough, Indian River, Jefferson, Leon, Madison, Orange, Palm Beach, Pinellas, Polk, Putnam; ALABAMA: Baldwin, Colb, Coosa, Dallas, Mobile, Tallapoosa; MISSISSIPPI: Harrison, Rankin; LOUISIANA: Baton Rouge, Caddo, Jefferson, St. Charles; MICHIGAN: Calhoun, Gratiot, Hillsdale, Jackson, Livingston, Micosta, Midland, Montcalm, Muskegon, Newaygo, Oakland, Washtenaw, Wayne; INDIANA: Clay, Howard, Marion, Starke; ILLINOIS: Adams, Champaign, Peoria; MISSOURI: Berry, Boone, Jackson, Nevada, St. Charles, St. Louis, Vernon; ARKANSAS: Carroll, Conway, Hempstead, Lincoln, Washington; KANSAS: Bourbon, Cherokee, Jefferson, Riley; OKLAHOMA: Cleveland, Kiowa, Payne; TEXAS: Aransas, Bexar, Brazos, Cameron, Comanche, Dallas, Denton, Galveston, Grayson, Harris, Hidalgo, Jim Wells, Karnes, Kleberg, Leon, Llano, McLennan, Nueces, Taylor, San Jacinto, San Patricio, Wichita; COLORADO: Boulder, Denver, Sedgwick; NEW MEXICO: Doña Anna, Rio Arriba. *MÉXICO:* TAMAULIPAS: Santa Gracia, Reynosa; SAN LUIS POTOSÍ: near Ciudad del Maiz; NUEVO LEON: Villa de Santiago; COAHUILA: Gloria; CHIHUAHUA: 21 km N of Ciudad Camargo, Delicias; VERACRUZ: just S of Tuxpan, Fortin; CHIAPAS: Tuxtla Gutierrez. *GUATEMALA:* Amatitlan, Capetillo. *COSTA RICA:* Chiral Paraiso, Cartago. *BERMUDA:* Grasmere.

Natural History. In eastern North America, this species is generally found in sunlit places such as oldfields, in contrast to *P. proterva*, which is generally more of a forest dweller. In Chihuahua, *P. galathea* lives in riparian vegetation. Horner (1972) has investigated the bionomics and importance of *P. galathea* in biological control in sorghum. Steiner and Greenstone (1991) examined segregation of isozyme markers in *P. galathea.*

2. *Pelegrina proxima* (G. & E. Peckham, 1901) new combination

Figures 191, 237, 264–269; Map 2

Dendryphantes proxima G. & E. Peckham, 1901b (January; see G. & E. Peckham, 1909: 457): 327, pl. 28, figs. 3, 3a, ♂♀. Types in MCZ 1♂ 1♀ 2imm. "Dendryphantes proxima Pkm, 1901. Cuba Type. ♂ ♀." and "G. W. Peckham Coll." (label is original; handwritten, probably by Elizabeth Peckham), examined. The type vial also contains one palpus of another species, perhaps *Metaphidippus mannii*, which is probably misplaced.

Dendryphantes prudens G. & E. Peckham, 1901a (May): 15, pl. 4, figs. 13, 13a, 13b, ♂. Types in MCZ 2♂ 1♀ with labels "1131 Dendryphantes prudens Peckhams, B.0155, Jamaica, Kingston ♂1423, ♀4123" (in George Peckham's handwriting) and "B.0155," examined. Roewer, 1954: 1199.

Dendryphantes (*Metaphidippus*) *proximus:*—Petrunkevitch, 1911: 640.

Pelegrina geniculata Franganillo, 1930: 45, fig. 17, ♀. Types from Sierra Maestra, Cuba, in IESC, originally labeled only by a numerical code but 1♀ here designated as lectotype with labels "PF 548," "Pelegrina geniculata Franganillo, Lectotype, desig. W. Maddison 1990" (see comments regarding the generic name *Pelegrina*, earlier). 4♀ here designated as paralectotypes, 3 deposited in IESC, and 1 deposited in MCZ. Franganillo, 1936: 138,fig. 76. NEW SYNONYMY.

Metaphidippus proximus:—Bryant, 1940: 501 (= *prudens*). Bonnet, 1957: 2817.

Metaphidippus prudens:—Bryant, 1943: 496, figs. 56, 57, 63, ♂♀. Bryant, 1950: 189. Bonnet, 1957: 2817.

Dendryphantes proximus:—Roewer, 1954: 1199.

Notes on Synonymy. Bryant synonymized *prudens* with *proxima* in 1940 but then, in 1943 and 1950, used the name *prudens* without explanation. The synonymy of *Pelegrina geniculata* is based on Franganillo's description and an examination of all surviving specimens of the Franganillo collection, kindly sent to me from the IESC by Luis F. de Armas via Herbert Levi and Charles Dondale. The collection consists of 26 numbered vials containing at least 17 species (Table 4). The number and diversity of species represented is approximately what might be expected from Franganillo's papers; thus,

TABLE 4. FRANGANILLO'S COLLECTIONS OF SALTICIDS. THE IDENTIFICATIONS ARE BY ME (WITH VIAL NUMBER; E.G., PF 548, IN PARENTHESES).

Agobardus cubensis (Franganillo) *sensu* Bryant: 1 penultimale ♂ 2♀ (PF 546)
Agobardus sp.: 1♀ (PF 551)
Corythalia cf. *arcuata sensu* Bryant: 1♀ (PF 539)
Corythalia cf. *squamata* Bryant: 2♂ (PF 540)
Corythalia sp. (not *C. arcuata sensu* Bryant): 2♂ 4♀, 1 imm. (PF 539), 2♂ 1♀ (PF 540)
Hentzia palmarum: 1♂ (PF 543)
Hentzia cf. *tibialis*: 1♂
Hentzia sp.: 1♀ (PF 544), 1♀ (PF 544-2), 1♀ (PF 562), 1 imm. (PF 564)
Lyssomanes antillanus: 2♀, 2 imm. (PF 535), 3♀ (PF 536), 5♂ 1♀ (PF 542), 1♀, 4 imm. (PF 543)
Lyssomanes sp., 1 imm. (PF 532)
Menemerus bivittatus: 3♀, 1 imm. (PF 541), 1 penultimate ♀ (PF 567), 1 penultimate ♂, 1♀ (PF 568), 1♂ (PF 569)
Metacyrba taeniola: 2♀ (PF 575)
Metacyrba sp., 1♀ (PF 575)
Pelegrina proxima, 5♀ (PF 548), 1♂ (PF 569)
Nilakantha or *Thiodina* sp.: 1 penultimate ♂ (PF 538)
Nilakantha sp.: 1♀ (PF 544-2)
Phidippus audax: 1♂, 1 penultimate ♂ (PF 571)
Platycryptus sp., 1♂ (PF 560)
Plexippus paykulli: 2♂ (PF 534), 3♀ (PF 535), 1♀ (PF 566)
Synemosyna smithii: 1♀ (PF 550).

the collection may remain more or less complete. The collection lacks labels indicating locality or species (Alayón, 1982); thus, it is possible that we will never identify the type specimens of *Pelegrina geniculata* with complete certainty. However, I will argue that *Pelegrina geniculata* is a junior synonym of *Dendryphantes proximus* and that, in particular, the types are the females in vial PF 548. Franganillo's description is rather detailed in some respects, and a figure of the epigynum was provided. The described size, shape of the carapace, nature of the clypeus, chelicerae, sternum, eyes, and legs all fig *proxima*. The placement of *Pelegrina* in the Unidentati implies a single simple tooth on the retromargin of the cheliceral fang furrow, consistent with *proxima* and inconsistent with some genera such as *Hentzia*. The description of *Pelegrina geniculata* contains nothing that would rule out *proxima*, and several features that in particular point to this species. These are as follows:

1. *Leg spination:* Franganillo's description of the spination of the first and fourth legs can apply only to *P. proxima* among the species in Franganillo's collection. Table 5 lists species in his collection and their spination. The spination of 3-3 on the tibia and 2-2 on the metatarsus described for *Pelegrina geniculata* narrows down the species to a dendryphantine, and the fourth tibia spination matches *P. proxima* exactly. Table 5 also lists a few other Cuban salticids not in Franganillo's collection. Among species known from Cuba but not listed in the table, Bryant's (1940) descriptions indicate that none have the leg spination described for *Pelegrina*, except *Sidusa turquinensis*, *Icius wickhami*, *Phidippus* spp., and *Neon nigriceps*, which can be ruled out as *Pelegrina geniculata* on other grounds. Though spination can sometimes be unreliable (Maddison, 1987), spination differences such as those seen between dendryphantines and the other subfamilies listed in Table 5 are reasonably reliable.
2. *Epigynum:* Franganillo's (1930) epigynal figure shows two dark teardrop-shaped objects and posterior notch. No

Table 5. Leg spination of Cuban salticids. Specimens marked by asterisk (*) are from Franganiro's collection. All specimens in Franganillo's collection are included except *Lyssomanes* and *Synemosyna*, which are clearly not *Pelegrina* by the description. The spination pattern of *Pelegrina geniculata* is taken from Franganillo's (1939) description.[a]

	First Pair Tibia				Metatarsus				Fourth Pair Tibia				Metatarsus Nonterminal
	av	pv	al	pl	av	pv	al	pl	av	pv	al	pl	
Pelegrina geniculata, (Franganillo's description)	3	3	0	0	2	2	0	0	2	1	0	2	1
Dendryphantinae													
*Pelegrina proxima**	3	3	0	0	2	2	0	0	2	1	0	2	0
Hentzia sp., 2♀*	3	3	0	0	2	2	0	0	1	1	0	0	0
Phidippus audax, 1♂ 1p♂*	3	3	0	0	2	2	0	0	2	1	1	2	3–4
Eris flava	3	3	0	0	2	2	0	0	1	1	1	1	2
Zygoballus sp.	3	3	0	0	2	2	0	0	2	1	1	1	?
Euophryinae													
Agobardus cubensis, 2♀*	4	4	0	0	2	2	2	2	2	1	3	3	4
Agobardus sp., 1♀*	4	4	2	0	3	3	1	1	2	1	3	3	4
Corythalia sp. A, 2♀*	2	3	2	0	2	2	2	2	2	1	2	2	5
Others													
Habronattus spp.	3	2	0	0	2	2	0	0	2	1	2	3	?
Marpissa pikei	4	4	0	0	?	?	?	?	1	0	0	0	0
Menemerus bivittatus, 3♀*	4	2	0	0	2	2	0	0	1	1	0	0	0
Metacyrba taeniola, 2♀*	2	0	0	0	2	2	0	0	0	0	0	0	0
Metacyrba sp., 1♀*	2	0	0	0	2	2	0	0	0	0	0	0	0
Nilakantha sp.*	2	1	0	0	2	2	0	0	0	0	1	1	0
Platycryptus sp.*	4	3	0	0	2	2	0	0	1	1	0	1	0
Plexippus paykulli, 3♀*	4	3	0	0	2	2	0	0	2	1	3	3	7

[a] Abbreviations: av, pv, al, pl, anterior of ventral and lateral; p♂, penultimate male.

epigynum from Cuba known to me would have this appearance except that of *P. proxima*, whose long epigynal flaps and posterior notch are unique on Cuba. Interpreting the teardrop-shaped objects as spermathecae or other structures cannot help the figure to be applied to any other Cuban species known to me. Certainly no euophryines have epigyna like this, nor any of the other dendryphantines known from Cuba. The only difficulty with considering the epigynal figure conclusive is that in 1936 the same figure was published inverted as figure 76, 2. If the 1936 orientation were correct, then the epigynum would not apply to *P. proxima*, but it would also not apply to any other salticid known to me.

3. *Abdominal markings:* Franganillo describes a series of longitudinal bands. Centrally, there is one band described as "*leonada*." L. Avilés (personal communication) suggests that this term may mean "the color of a lion," namely, light brown. According to the description, this central band is flanked by pale bands, which are flanked by more light brown bands. The pale bands are toothed and have one particularly large, oblique, curved tooth near the spinnerets. This describes *P. proxima* females exactly (Fig. 269), the large teeth being the fourth pair of spots (see Fig. 2). Other Cuban salticids that have somewhat similar markings are *Platycryptus* sp., *Menemerus bivittatus*, and some of the *Agobardus* species, but their markings are not exact matches and these species can be ruled out on other grounds such as size and spines.
4. *Specimens cited:* Vial PF 548 contains

several adults, all females of *P. proxima*. The description notes the material being six females; the vial contains five females. No other vial in the collection contains so many females without accompanying males or immatures.

This evidence taken together indicates that the description of *Pelegrina geniculata* applies to *P. proxima* and in particular to the females in vial PF 548. Accordingly, one of these females has been designated as a lectotype of *Pelegrina geniculata*.

Diagnosis. The only known Caribbean *Pelegrina*, differing from the similar *galathea* in having more lineate abdominal markings and in details of genitalia.

Male. Palpus (Figs. 191, 265, 266): Embolus rectangular, not narrowing so abruptly near the opening as in *galathea*; retrolateral ramus an angle not prolonged into a hook (Figs. 191, 265). *Markings* (Fig. 264): Cheek band very weak. Clypeus brown, with hairs overhanging chelicerae dark with a few white medially. White forehead band contacts AMEs dorsally 10:30 to 12:30. Chelicerae with small medial patch of pale scales. Cymbium usually lacking white scales. Abdomen often showing a trace of the longitudinal white bands of females. *Measurements:* Body length 2.8(3.0)4.2 mm; carapace length 1.5(1.6)2.1 mm, width/length 0.78(0.79)0.80; n = 5♂ from Havana, Cuba.

Female. Epigynum (Figs. 237, 267, 268): Flaps long, fairly convex, dark, not truncated behind as in *galathea*. Surface behind flaps more or less concave, rising gradually so that posterior mound restricted to guide area or absent (Fig. 237). First curve of duct narrow; second curve proceeds medially. *Markings* (Fig. 269): Carapace covered above thinly with white scales. Clypeus densely covered with white scales. Abdominal white spots arranged into two median longitudinal white bands on brown background. *Measurements:* Body length 3.5(3.7)4.8 mm; carapace length 1.5(1.6)1.9 mm, width/length 0.76(0.76) 0.79; n = 5♀ from Havana, Cuba.

Distribution (Map 2). Known from the larger Caribbean islands.

Records. BAHAMAS: Grand Bahama Island, Freeport (1♀, AMNH); Rum Cay, near Port Nelson (2♂, AMNH). *CUBA:* Havana (many ♂♀, MCZ); Havana: Santiago de las Vegas (6♂ 5♀, MCZ); Marianao Habana (2♀, AMNH); Soledad, Cienfuegos (5♂ 4♀, MCZ, AMNH); Oriente: Santiago de Cuba (1♀, MCZ); Trinidad Mtns., Hanabanillo Falls (1♂, MCZ); Holquin (♂♀, MCZ); Banes (1♀, MCZ); 7 km N of Vinales (2♂ 1♀, AMNH); Vega Alta, Santa Clara (4♂, AMNH); San Vicente, Pinar del Rio (4♂ 2♀, AMNH). *JAMAICA:* Christiana (1♀, AMNH); Claremont (1♂, AMNH); Spanish Town (2♀, MCZ); St. Andrew: Mona (5♂ 1♀, MCZ); St. Andrew: Liquanea (1♀, MCZ); St. Ann, 1.6 km E of Moneague (1♀, MCZ). *DOMINICAN REPUBLIC:* S. O. de las Matas (1♂, MCZ); La Vega (1♀, MCZ); Ciudad Trujillo (1♀, MCZ). *HAITI:* Diquini (1♂, MCZ); Enery, Bata (1♂, AMNH); hills nr. Port-au-Prince (1♂, MCZ); Ouest (1♂ 1♀, MCZ).

3. *Pelegrina dithalea* new species
Figures 132, 133, 192, 270–275; Map 3

Holotype male and paratype female in MCZ, with label "ARIZONA: Santa Cruz Co., Sycamore Canyon, ca. 9 mi [14 km] W of Peña Blanca Lake, W of Nogales, ca. 4000 ft. el. [1,220 m], 19 Jun 1985 W. Maddison 85-060, sweeping in canyon where stream flowing."

Etymology. An arbitrary combination of letters, to be treated as a noun in apposition.

Diagnosis. Similar in markings to *galathea*, from which it differs by the embolus that lacks the hooklike retrolateral ramus and that widens toward the tip. Embolus resembles that of *chaimona*, but the rami are farther apart (Figs. 192, 206).

Male. Palpus (Figs. 192, 271, 272): Embolus widens slightly from near base to near tip. Rami subequal, though retrolateral is more prominent. *Markings* (Figs. 132, 270): On carapace, white bars from side bands to fovea usually strong and fused into inverted V mark. Cheek band weak. Clypeus brown, hairs overhanging chelicerae white centrally, dark laterally. White forehead band contacts AMEs dorsally 10:30–12:30. Chelicerae with small medial patch of white scales. Cymbium with few white scales. Legs fairly distinctly annulate. Abdomen shows traces of white spots

of female. *Measurements:* Body length 3.6(4.0)4.2 mm; carapace length 1.9(2.0)2.1 mm, width/length 0.77(0.78)0.81; n = 5♂ from Sycamore Canyon, Arizona.

Female. Epigynum (Figs. 273, 274): Flaps slightly convex; posterior edge not standing so high above surface behind them as in *galathea*. Surface rises immediately into gentle mound covering all of posterior. Second curve of duct proceeds medially. *Markings* (Figs. 133, 275): Carapace covered by scales mostly gray-white, and some brown scales around fovea, and just medial to posterior eyes. Clypeus densely covered with white scales. Abdominal markings gray-brown with large white spots and small dark spots, much like *galathea* (Fig. 275). *Measurements:* Body length 3.9, 4.3, 5.3 mm; carapace length 2.0, 2.1, 2.1 mm, width/length 0.75, 0.77, 0.79; n = 3♀ from Santa Cruz and Pima Counties, Arizona.

Male/Female Matching. The two sexes were co-collected in Sycamore Canyon and Kitt Peak, have similar markings on the abdomen, and are similar in markings and form to *galathea*.

Courtship (2♂ observed from Sycamore Canyon, Arizona). *Crouch* (n = 8, 2♂): Body low and horizontal (n = 2, 1♂). First legs fairly wide to bowed and parallel (n = 6, 2♂), low (n = 8, 2♂) to raised a bit (n = 4, 1♂), waved on series (n = 8, 2♂) at low amplitude (n = 4, 2♂). Palpi held down (n = 2, 1♂), waved up and down on series so as to drum on substrate (n = 2, 1♂), still on pause (n = 2, 1♂).

Distribution (Map 3). Southern Arizona.

Records. UNITED STATES: ARIZONA: Pima Co.: Quinlan Mtns., picnic area nr. Kitt Peak Observatory, 1,900–2,000 m el., 20 June 1985 (3♂ 1♀, MCZ); Santa Cruz Co.: Sycamore Canyon, ca. 14 km W of Peña Blanca Lake, ca. 1,200 m el., 19 June 1985 (12♂ 1♀, MCZ); Santa Rita Mtns., Madera Canyon, nr. Bog Springs Cmpgd., ca. 1,500 m el., 17 June 1985 (1♀, MCZ).

Natural History. In oak woodland at all three Arizona localities. At Sycamore Canyon, beating vegetation, especially shaded, deep in canyon where stream still flowing in June. At Kitt Peak, beating oaks and other shrubs and trees.

4. *Pelegrina edrilana* new species
Figures 4, 193, 276–281; Map 4

Holotype male with one immature in AMNH with label "MEXICO: Tlalpam, D.F. [Distrito Federal], Apr.17, 1946, J. C. Pallister."

Etymology. An arbitrary combination of letters, to be treated as an adjective.

Diagnosis. An enigmatic species from southcentral México with a palpus in some ways resembling each of *galathea*, *proterva*, and *peckhamorum*. The swollen base of the erect portion of the embolus is wider than in *galathea*, thought not so extreme as in *proterva*. The retrolateral ramus is wider than in *galathea*, though not so long and hooked as in *proterva*.

Male. Palpus (Figs. 193, 277, 278): Embolus swollen at the base of the erect portion; narrowing distally near opening. Retrolateral ramus extended into short stout hook (Figs. 193, 277). *Markings* (Fig. 276): Cheek band fairly dense but not so dense as *proterva*. Clypeus brown; hairs overhanging chelicerae dark except for few white medially. White forehead band contacts AMEs dorsally 10:30–12:30. Chelicerae with narrow medial patch of pale scales from base to ½ length. Cymbium lacking white scales. *Measurements:* Body length 3.7(3.7–3.8)3.9 mm; carapace length 1.7(1.8)1.9 mm, width/length 0.72(0.76) 0.78; n = 5♂ from Distrito Federal and Durango, México.

Female. Epigynum (Figs. 4, 279, 280): Flaps long and convex, turning slightly inward, shiny and generally pale. Surface rises to mound quickly behind flaps; in many specimens the mound has two distinct front corners (Fig. 280). Females from Oaxaca (Figs. 4, 279), which may represent a distinct species, have somewhat longer epigynal flaps and a gentler mound on the posterior surface. First curve of duct wide; second curve proceeds obliquely anteriorly. *Markings* (Fig. 281): Carapace covered with white scales. Clyp-

eus densely covered with white scales. Abdomen marked somewhat as *proterva*, with brown background having white side bands and central spots. *Measurements:* Body length 3.4(4.8–5.2)5.4 mm; carapace length 1.7(1.9)2.0 mm, width/length 0.75(0.77) 0.80; n = 7♀ from Distrito Federal, México.

Male/Female Matching. Males and females were co-collected and have a common distribution; they have similar size and markings.

Distribution (Map 4). México. Most specimens from the Distrito Federal; also known from Durango, Oaxaca, and San Luis Potosí.

Records. MÉXICO: SAN LUIS POTOSÍ: Guanajuato border on Hwy 57, ca. 100°45′W, 21°35′N (1♀, MCZ); DURANGO: Palos Colorados, 5 August 1947 (1♂ 1♀, AMNH); DISTRITO FEDERAL: Contreras, 2,500 m, 23 July 1947 (2♀, AMNH); México City, January 1941 (1♂, AMNH); Pedregal, 8 August 1947 (1♂, AMNH); San Jeronimo, 11 June, 21 June, and 1 July 1946 (2♂ 8♀, AMNH); Tlalpam, 2,300 m, 21 July 1947 (1♀, AMNH); 17 April 1946 (1♂, AMNH); OAXACA: 2 km S of El Tule, 1,500 m el., ca. 96°40′W, 17°02′N (3♀, MCZ).

Natural History. Collected from Acacia savannah in Oaxaca and from mesquite in San Luis Potosí.

5. *Pelegrina proterva* (Walckenaer, 1837) new combination

Figues 2, 3, 6–9, 15, 34, 134, 135, 194, 238, 282–287; Map 5

Attus protervus Walckenaer, 1837: 443. Type 1♂, lost, shown in figure 402 of Abbot (1792), whose caption reads "Taken 8th June, in a Dirt daubers Nest the only one I have seen."

?*Attus capitatus* Hentz, 1845: 200, pl. 17, fig. 15, ♂.

?*Attus octavus* Hentz, 1846: 365, pl. 22, fig 15, ♀.

Attus aestivalis G. & E. Peckham, 1883: 2, figs. 2, 2a–c, ♂♀. Types lost or destroyed (Bryant, 1941).

Dendryphantes capitatus:—G. & E. Peckham, 1909: 469, pl. 36, figs. 4b, c, pl. 38, fig. 5a, possibly also pl. 36, figs. 4, 4a, ♂♀. Roewer, 1954: 1202.

Dendryphantes atopodon Chamberlin, 1925a: 234. Holotype in MCZ 1♂ with label "Dendryphantes atopodon Chamb., ♂ holotype, Va.: Scott's Runn, July, R. V. Chamberlin, Coll.", examined. Roewer, 1954: 1206. Bonnet, 1956: 1392.

Metaphidippus protervus:—Chamberlin and Ivie, 1944: 204 (not fig. 23). Kaston, 1973: 117, figs. 43–46, ♂♀.

Metaphidippus capitatus:—Bonnet, 1957: 2810, in part.

Notes on Synonymy. (1) Walckenaer's first description of *Attus protervus* (p. 443, after Abbot's fig. 402) probably refers to this *Pelegrina*; his second (p. 465, after Abbot's fig. 463) probably to *Maevia inclemens* (see Walckenaer, 1837: 425; Chamberlin and Ivie, 1941: fig. 23). *Attus attentus* Walckenaer (species number 61, Abbot's fig. 157) may also be *P. proterva*. *Attus capitatus* Hentz, though considered a synonym of *proterva* by Chamberlin and Ivie (1941), might equally well be *P. galathea*, *Eris militaris*, or another species. (2) *Euophrys concolor* Banks was synonymized with *P. proterva* by Edwards (1980), apparently because one of the two specimens in the type vial is a ♀ *P. proterva*. Banks' description clearly refers to the other specimen (by color, length of fourth leg, and epigynum with single opening and two posterior circles), which is therefore the holotype. This holotype is of the species now called *Sitticus cursor* Barrows, which should henceforth be called *Sitticus concolor* (NEW COMBINATION), with the name *cursor* relegated to synonymy (NEW SYNONYMY). Since Banks refers to only a single female, the *proterva* ♀ was probably added to the vial subsequently. (3) Kaston used the name *octavus* for his numerous identifications of material around 1940.

Diagnosis. The white face markings of males, abdominal markings of females, and the genitalia distinguish this species, which is abundant in woodlands throughout much of Canada and found south to Florida. Long confused with *galathea* under the name *capitatus*, the two species are similar in embolus but distinct in numerous ways. *Pelegrina proterva* can be separated from *galathea* by (males) the broader embolus with larger hook, strongly marked face, and narrower carapace and by (females) the abdominal markings and flat epigynal flaps. Male markings much like those of *peckhamorum*, from which *proterva* dif-

fers in having a narrower embolus and flatter epigynum. Palpus much like that of the central Mexican *edrilana*, differing in details.

Male. Palpus (Figs. 3, 6–9, 283, 284): Erect portion of embolus inflated basally, wide and transparent centrally. Terminal portion near opening much narrower than basal portion. Retrolateral ramus a long curved hook (Fig. 283). *Markings* (Figs. 134, 282): Carapace with strong white markings, including forehead and side bands. Cheek band dense and distinct from side bands. Clypeus with prominent diamond of white scales between AMEs and overhanging chelicerae; lateral to this the clypeus and hairs overhanging chelicerae are dark. White forehead band contacts AMEs dorsally; setae ringing AMEs white 7:00–12:00 and 2:00–4:00. Chelicerae lacking pale scales. Femur of palpus distinctly paler than more distal segments. Cymbium with generally dense patch of white scales centrally. Second, third, and fourth legs with femur bases abruptly pale. Abdominal dorsum usually light brown with dark spots between side bands. *Measurements:* Body length 3.3(3.6)4.2 mm; carapace length 1.6(1.6)1.9 mm, width/length 0.74(0.78)0.81; n = 7♂ from Ontario, Iowa, and Saskatchewan.

Female. Epigynum (Figs. 238, 285, 286): Flaps fairly flat, dark, and slightly convergent. Surface smooth, rises fairly abruptly behind flaps into wide though gentle mound covering most of posterior. First curve of duct broad; second curve proceeds obliquely anteriorly. *Markings* (Figs. 2, 135, 287): Carapace covered with white and some brown scales. Face somewhat darker than *galathea*, relatively thinly covered with white scales, especially in southern females. Legs only slightly annulate, beige to light brown with darker markings reddish brown markings. Abdomen pale on sides, with two reddish brown longitudinal bands above broken by oblique to transverse white stripes. *Measurements:* Body length 4.4(5.1–5.3)5.6 mm; carapace length 1.6(1.9)2.0 mm, width/length 0.75(0.76)0.79; n = 6♀ from Iowa and Ontario.

Geographical Variation. Southern females have a darker carapace with distinct side bands, a face more sparsely covered with pale scales, and an abdomen with the central pale spots coalesced medially into a chevron stripe, which is also seen in some southern males. Some males from Florida, Georgia, and South Carolina have a narrower embolus and lack the white scales between the AMEs on the clypeus.

Chromosomes. 2n♂ = 26 acrocentrics + XXO (1♂, Hollis, New Hampshire).

Courtship (10♂ observed from Shenandoah Co., Virginia; Middlesex and Barnstable Counties, Massachusetts; Dorchester and Caroline Counties, Maryland; Thunder Bay, Ontario; Binscarth, Manitoba; see also Peckham and Peckham, 1889: 45, fig. 18). Has the crouch display with body often high and first legs low. *Raisedspread* (n = 13, 5♂). *Crouch* (Fig. 134; n = 15, 7♂): Body horizontal, held low (n = 1), at about normal height (n = 6, 3♂) or high (n = 8, 3 ♂). First legs forward and low (n = 15, 7♂), either horizontal (n = 3, 2♂) or even lower than body (n = 10, 4♂), bowed and parallel (n = 4, 2♂), or slightly spread (n = 3, 1♂). On one observation the legs were slightly raised at first but just before he touched ♀ they were lower than body. First legs waving little if a all (n = 2, 1♂) or not at all (n = 4, 1♂). Palpi held down (n = 7, 4♂) or forward (n = 7, 3♂); moved forward (n = 10, 5♂) and waved up and down on each series (n = 15, 7♂). Abdomen depressed on each series (n = 1), twitches at least occasionally (n = 4, 1♂). *Repertoires:* 3♂ raisedspread only; 5♂ crouch only; 2♂ raisedspread and crouch. Several times the display proceeded directly from the raisedspread stage to touching the female without a distinct crouch display (n = 8, 4♂).

Distribution (Map 5). Across much of Canada and northeastern United States, south in the east to Florida and Texas. Although the following records include only few from Canada, this is due to my

examining only collections at museums in the United States; *proterva* is actually very common throughout much of Canada.

Records. Many specimens, especially in MCZ and AMNH, from: *CANADA:* NOVA SCOTIA: Kentville; QUEBEC: St. Louis de France, Quebec City; ONTARIO: Martin River 58 km N of North Bay, Ottawa, Belleville, Barrie, 36 km E of Thunder Bay, Sudbury Dist.: Espanola, 15 km E of Espanola, nr. Bruce Mines nr. Sault St. Marie, 14 km S of Pte. Au Baril (Parry Sound Dist.), 20 km E of Manitoba border on Hwy 17; Lake Temagami, Port Credit; SASKATCHEWAN: Waskana Creek, North Battleford; MANITOBA: Sandilands Provincial Forest, Binscarth, Gypsumville; BRITISH COLUMBIA: Salmon Arm. *UNITED STATES* (county records): MAINE: Hancock, Lincoln; NEW HAMPSHIRE: Belknap, Carroll, Cheshire, Grafton, Hillsborough, Sullivan; VERMONT: Addison, Caledonia, Chittenden, Rutland, Windham, Windsor; MASSACHUSETTS: Barnstable, Berkshire, Dukes, Essex, Franklin, Hampden, Middlesex, Nantucket, Norfolk, Suffolk, Worcester; RHODE ISLAND: Washington; CONNECTICUT: Fairfield, Middlesex, New Haven, New London, Tolland; NEW YORK: Hamilton, Nassau, New York City, Thompkins, Westchester; NEW JERSEY: Bergen, Cape May, Hunterdon, Passaic; PENNSYLVANIA: Adams, Bucks, Carbon, Centre, Forest, Monroe, Montgomery, Schuylkill, Warren, York; OHIO: Champaign; MARYLAND: Caroline, Charles, Dorchester; WEST VIRGINIA: Mercer; VIRGINIA: Fairfax, Rockingham, Shenandoah, Suffolk, Washington; KENTUCKY: Hardin, Rowan; TENNESSEE: Grundy, Sevier, Unicoi; NORTH CAROLINA: Buncombe, Durham, Macon; SOUTH CAROLINA: Horry; GEORGIA: Cobb, Polk, Thomas; FLORIDA: Alachua; ALABAMA: Clarke, Dekalb, Jackson; MICHIGAN: Berrien, Calhoun, Charlevoix, Cheboygan, Crawford, Eaton, Emmet, Genesee, Hillsdale, Isabella, Jackson, Kent, Lake, Livingston, Mackinac, Marquette, Midland, Muskegon, Osceola, Sanilac, Washtenaw, Wayne; INDIANA: Jasper, Marion, Starke; WISCONSIN: Ashland, Chippewa, Crawford, Dane, Door, Douglas, Grant, Green Lake, Iowa, Jefferson, Lincoln, Manitowac, Marathon, Price, Richland, Rusk, Sauk, Shawano, Taylor, Waushara; ILLINOIS: Champaign, Cook, Mason; MINNESOTA: Blue Earth, Freeborn, Marshall, Olmsted, Steele, Winona; IOWA: Boone, Clayton, Hancock, Winnebago, Woodbury; MISSOURI: Boone, Cole, Jackson, Johnson, St. Louis; NEBRASKA: Lancaster, Loup, Saline; KANSAS: Decateur, Riley; TEXAS: Anderson, Denton, Hardin, Sabine, San Jacinto; MONTANA: Ravalli, Stillwater; COLORADO: Fremont, Larimer.

Natural History. Found on various trees and shrubs, usually in or near forests; less often found in fields and on herbs than is *P. galathea.* Dondale (1961) describes the life history of *P. proterva* in Nova Scotia.

6. *Pelegrina peckhamorum* (Kaston, 1973) new combination

Figures 126, 136, 137, 195, 239, 288–293; Map 8

Metaphidippus peckhamorum Kaston, 1973: 115, figs. 39–42, ♂♀. Holotype ♂ and paratype ♀ in AMNH with labels "Holotype ♂ + allotype ♀, Metaphidippus peckhamorum n. sp., det by B. J. Kaston (1949)" and "col. by B. Malkin, Lakehurst, N. J. 25 May 1941," examined. Brignoli, 1983: 643.

Diagnosis. A relatively rare eastern species with male body form and markings very much like *proterva* but outstanding for its very broad embolus. The female is best distinguished from other eastern species by the indistinct markings and large, slightly concave epigynum, with flaps that are more convex than in *proterva* and that have the posterior edge not truncate as in *galathea.*

Male. Palpus (Figs. 195, 289, 290): Embolus very broad, tapering but still broad at tip. Rami well separated; retrolateral ramus not elongate as in *proterva. Markings* (Figs. 136, 288): Cheek band dense and discrete. Clypeus with prominent diamond of white scales between AMEs and overhanging chelicerae; lateral to this the clypeus and hairs overhanging chelicerae are dark. White forehead band contacts AMEs dorsally; setae ringing AMEs white 7:00–12:30 and 2:00–4:00. Chelicerae lacking pale scales. Femur of palpus distinctly paler than more distal segments. Cymbium with white scales centrally. Leg femora distinctly paler basally. *Measurements:* Body length 3.0(3.6)3.7 mm; carapace length 1.4(1.7)1.8 mm, width/length 0.74(0.76)0.78; n = 5♂ from Barnstable County, Massachusetts.

Female. Epigynum (Figs. 239, 291, 292): Large. Flaps long, fairly convex, usually convergent. Surface rises very gradually behind flaps; most of posterior area concave. First curve of duct broad; second

curve proceeds obliquely anteriorly. *Markings* (Figs. 137, 293): Carapace covered with yellowish scales. Clypeus covered thinly with yellowish white scales. Abdomen more uniform in color than *proterva*, light brown with pale spots. *Measurements:* Body length 3.6(4.0)5.4 mm; carapace length 1.7(1.9)2.1 mm, width/length 0.73(0.77)0.78; n = 5♀ from Massachusetts and Arkansas.

Male/Female Matching. Males and females have been co-collected in New Jersey, Arkansas, and Massachusetts; otherwise, they are the only unmatched ♂♀ in the northeast.

Courtship (4♂ observed from Cape Cod, Massachusetts). Has the crouch display with body high and first legs low as in *P. proterva. Raisedspread* (n = 17, 3♂). *Crouch* (Fig. 126; n = 12, 3♂): Body held normal-high (n = 6, 1♂) or high (n = 6, 2♂). First legs held horizontal (n = 12, 3♂) and lower than body (n = 3, 1♂), waved little if at all (n = 9, 2♂). Palpi held down (n = 12, 3♂); still on pause (n = 2, 1♂), waved on series (n = 4, 2♂) up and down (n = 5, 1♂), specifically from down to forward (n = 2, 2♂), with medium-high amplitude (n = 5, 1♂). Abdomen still on series (n = 4, 2♂) but twitched on pause (n = 4, 2♂). *Repertoires:* 1♂ raisedspread only; 2♂ raisedspread and crouch; 1♂ crouch only.

Distribution (Map 8). Known from Massachusetts, New York, New Jersey, Ohio (Kaston, 1973), Indiana (Kaston, 1973), Tennessee, Arkansas, and Texas.

Records. UNITED STATES: MASSACHUSETTS: Barnstable Co.: Chatham (1♂ 3♀, MCZ), South Chatham (6♂, MCZ), nr. North Truro at junction of Hwy 6 and Head of the Meadow Road (10♂ 3♀, MCZ); Dukes Co.: Oak Bluffs (1♂, MCZ); NEW YORK: Davisville; Suffolk Co.: Riverhead (2♂, AMNH), Coram (2♂ 1♀, AMNH); NEW JERSEY: Burlington Co.: 11 km W of New Gretna (4♂ 2♀; AMNH), Lebanon State Forest (1♂, AMNH); Middlesex Co.: Old Bridge (1♂, AMNH); Morris Co.: Chatham, Great Swamp (1♀, AMNH); Ocean Co.: Lakehurst (22♂ 11♀, AMNH), Lake Horicon nr. Lakehurst (3♀, AMNH), 6 km W of Lakehurst (2♂ 3♀, AMNH); TENNESSEE: Knox Co.: University of Tennessee farm 3 (1♂, AMNH); ARKANSAS: Washington Co.: 24 km S of Prairie Grove in Cove Creek Valley of the Boston Mtns. (28♂ 6♀, MCZ), 24 km W of Prairie Grove (5♂ 1♀, MCZ); TEXAS: Leon Co.: SW of Oakwood (1♂, AMNH).

Natural History. May specialize on oaks. On Cape Cod, Massachusetts, collected by beating oaks and cranberries in understory of pine forest (1 record), sweeping oak-pitch pine (2 records), and beating oaks (1 record).

7. *Pelegrina neoleonis* new species
Figures 138, 196, 294–298; Map 6

Holotype male and paratype female in MCZ with label "MEXICO: NUEVO LEON: Chipinque Mesa just S of Monterrey, ca. 4500 ft. [1,370 m]; ca. 100.4°W 25.6°N, 2 Jun 1983 W. Maddison & R. S. Anderson 83-034, beating and sweeping forest understory."

Etymology. After the state from which most known specimens come.

Diagnosis. A Mexican species similar to *tristis* with a distinctive long, curved retrolateral ramus on the embolus. The erect portion of the embolus is narrower than in *tristis.* No characters have yet been found to distinguish the female from that of *tristis,* except locality.

Male (from Nuevo León). Palpus (Figs. 196, 295): Embolus distinctive; broad, with retrolateral ramus extended into long hook, much as in *tristis,* but ramus bears small bump and is blunt at tip; prolateral ramus obtuse or only slightly acute. *Markings* (Figs. 138, 294): Cheek band weak. Clypeus brown; hairs overhanging chelicerae dark. White forehead band contacts AMEs dorsally 10:30–12:30. Chelicerae lack pale scales. Femur of palpus distinctly pale than more distal segments. Cymbium with none to few white scales. Femur of third leg pale on basal ⅓. *Measurements:* Body length 3.6, 3.7 mm; carapace length 1.7, 1.8, 1.9 mm, width/length 0.75, 0.75, 0.76; n = 3♂ from Nuevo León and San Luis Potosí.

Female. Epigynum (Figs. 296, 297): Flaps large and dark, flat and inwardly rotated. Surface gently convex, highest medially behind flaps, except for surface diving deeply under flaps. First curve of duct very broad, expanded to the side and

posterior so that second curve begins well posteriad of posteriormost portion of flap (in contrast with the sympatric *clavator*); second curve proceeds anteriorly. Inner surface of third curve rough, with numerous projections. *Markings* (Fig. 298): Carapace dark above, covered with transparent reflective scales; sides covered thinly with white scales. Clypeus densely covered with white scales. Legs brown. Abdomen fairly dark, with only small pale spots. *Measurements:* Body length 4.3(5.9–6.1)6.2 mm; carapace length 1.9(2.2–2.3)2.3 mm, width/length 0.74(0.77–0.79)0.83; n = 4♀ from Nuevo León, Hidalgo, and Oaxaca.

Male/Female Matching. This association is indicated by co-collecting in Nuevo León; by the large epigynal flaps, which would be expected in a species with such a robust embolus; and by the similarity of male and female with those of *tristis*.

Geographical Variation. The single male from San Luis Potosí differs from those of Nuevo León in having a sharper retrolateral prong on the embolus, more extensive white scales surrounding AMEs, a small patch of pale scales medially on chelicerae, and the femur of palpus relatively dark.

Courtship (3♂ observed from Chipinque Mesa, Nuevo León; Cerro Potosí, Nuevo León; and Xilitla, San Luis Potosí). *Raised-spread* (n = 3, 2♂). *Crouch* (n = 6, 3♂): Body held in normal to low position (n = 1). First legs bowed and forward (n = 4, 2♂), raised to ca. 30° (n = 2, 2♂), or horizontal (n = 1), or femora low but tips curl upward (n = 1). Leg tips not touching (n = 2, 2♂), apparently not waved (n = 3, 2♂), or waved only slightly (n = 2, 1♂) on series (n = 1). Palpi down (n = 6, 3♂), over chelicerae (n = 1) or curled under tips of chelicerae (n = 1), waved (n = 6, 3♂) up and down (n = 1) or outward (n = 1) on series (n = 3, 2♂) ca. 5–7 c/s (n = 1). Abdomen depressed a bit on series (n = 1), or at end of series (n = 1). *Repertoires:* 1♂ crouch only; 2♂ raisedspread and crouch.

Distribution (Map 6). Northeastern México south to Oaxaca.

Records. MÉXICO: SAN LUIS POTOSÍ: 21 km W of Xilitla on Hwy 120, 99°05′W, 21°18′N, 12 June 1983 (1♂, MCZ); NUEVO LEÓN: Chipinque Mesa just S of Monterrey, 100.4°W, 25.6°N, 2 June 1983 (1♂ 1♀, MCZ); Cerro Potosí, ca. 100°14′W, 24°52′N, 4 June 1983 (1♂ 1♀, MCZ); HIDALGO: Pachuca (1♀, MCZ); OAXACA: 50 km NW of Oaxaca, 97°00′W, 17°14′N, 6 August 1983 (2♀, MCZ).

Natural History. Beating oaks and pines in oak-pine area (3 records); sweeping shrubs, cloud forest (1 record). Elevations at four locations in Nuevo León and San Luis Potosí from 1,400 to 2,900 m.

8. *Pelegrina tristis* new species
Figures 197, 299–303; Map 7

Holotype male and paratype female in AMNH with labels "ARIZONA: Cochise Co., Round Park, Chiricahua Mtns., June 28, 1967. 9300 ft. [2,840 m], Gertsch, Hastings."

Etymology. Latin adjective for "sad," referring to the large size of the teardrop-shaped flaps over the epigynal openings.

Diagnosis. A large, dark, plainly marked species known from southern Arizona, similar in genitalia to *neoleonis* and *sabinema*. The erect portion of the embolus is broader than in either of those species, and the rami are sharper than in *neoleonis*. Females are generally not so yellow as in *sabinema*, and the epigynal openings are deeper, in that the surface descends more deeply under the anterior part of the flaps.

Male. Palpus (Figs. 197, 300): Embolus extremely broad, so that retrolateral margin joins without angle to retromargin of embolar base. Both rami sharply pointed; retrolateral ramus extended into long hook, lacking subterminal bump. *Markings* (Fig. 299): Carapace dark, with reduced forehead band. Cheek band very weak to absent. Clypeus brown, with dark hairs overhanging chelicerae. White forehead band absent or much reduced, fails to contact AMEs, which are ringed with dark above. Chelicerae lacking pale scales. Palpus almost uniformly brown, femur not distinctly paler. Cymbium lacking white scales. Legs relatively uniform brown, femora entirely dark. *Measurements:* Body length 3.7(4.3)4.6 mm; carapace length 1.8(2.1)2.1

mm, width/length 0.75(0.76)0.82; n = 4♂ from Chiricahua and Santa Catalina Mtns., Arizona.

Female. Epigynum (Figs. 301, 302): Flaps large, dark, and convergent, often far rotated, sometimes as far rotated as in *neoleonis* (Fig. 297). Just medial to the flap at the anterior end the surface is pale and descends deep under flap (Fig. 302, arrow). Except for this concavity, the epigynal surface is gently convex, highest medially behind flaps. First curve of duct very broad; second curve proceeds anteriorly. *Markings* (Fig. 303): Carapace covered above thinly with white to dark transparent reflective scales.Clypeus densely covered with white scales. Abdomen light to medium brown with small central pale spots. Narrow dark brown spots beside these pale spots form longitudinal dark stripes. *Measurements:* Body length 5.0(5.7)6.2 mm; carapace length 1.8(2.0)2.3 mm, width/length 0.77(0.78)0.82; n = 5♀ from Chiricahua, Huachuca, and Santa Rita Mtns., Arizona.

Male/Female Matching. This matching is indicated by microsympatry in Chiricahua Mtns., by robust embolus and flaps, by similar large size, and by similarity of genitalia to male and female of *sabinema*, which are reasonably surely matched.

Distribution (Map 7). Southern Arizona.

Records. UNITED STATES: ARIZONA: Santa Rita Mtns.: Madera Canyon (4♀, AMNH, MCZ); Huachuca Mtns.: Garden Canyon (1♀, AMNH); Santa Catalina Mtns.: Bear Wallow to Mt. Lemmon (1♀, AMNH), Chiricahua Mtns.: Round Park, Southwestern Research Station 8 km W of Portal, Barfoot Park, and Rustler's Park (3♂ 4♀, AMNH).

Natural History. Collected at 1,500–2,800 m elevation (3 records). Females have been collected in June (2 records), July (4 records), and August (3 records).

9. *Pelegrina sabinema* new species
Figures 198, 304–308; Map 9

Holotype male in AMNH with label "ARIZONA, Showlow, July 1967, W. J. Gertsch."

Etymology. An arbitrary combination of letters, to be treated as an adjective.

Notes on Specific Distinctness. Pelegrina sabinema is much like *pervaga*, and indeed I long considered it only the western form of *pervaga*, but the more strongly developed white-black-white carapace stripes and narrower embolus of *pervaga* suggest that *pervaga* may be the sister species to *kastoni*, with *sabinema* the sister to those two. The embolus and markings of *P. sabinema* are slightly more like those of *tristis* and *neoleonis*, which may be considered outgroups.

Diagnosis. Differs from *pervaga* in having less swollen carapace sides, an abdomen lacking the pale central stripe on the abdomen, wider embolus, weaker male cheek band, less dense band of dark hairs beneath male carapace side bands, darker and more robust epigynal flaps, and yellow female legs. Differs from *tristis* in having yellow legs, yellow male chelicerae, narrower embolus, dense covering of pale scales on female carapace, and shallower epigynal openings.

Male. Palpus (Figs. 198, 305): Embolus very wide at base of erect portion, thought still with a distinct angle between retromargins of erect portion and base; retrolateral ramus long and blunt. *Carapace* often broad though sides not swollen as in *pervaga*. *Markings* (Fig. 304): Cheek band weak, runs horizontally and posteriorly beneath band of dark hairs beneath white side bands. Clypeus brown, hairs overhanging chelicerae dark. White forehead band contacts AMEs rather far medially, from 9:00 to 12:00. Chelicerae yellow, lacking pale scales. Palpus yellow with white scales on femur, tibia and cymbium interrupted by dark hairs on patella and base of cymbium. Legs uniformly yellow. Abdomen brown centrally with white side bands, showing trace of paired dark spots of female. *Measurements:* Body length 3.3(3.6)3.8 mm; carapace length 1.7(1.7)1.9 mm, width/length 0.78(0.80)0.83; n = 5♂ from New Mexico and Arizona.

Female. Epigynum (Figs. 306, 307): Flaps flat and large, often far rotated, as in *tristis* and *neoleonis*, though usually not

so dark as in those species. Openings shallower than in *tristis*; that is, just medial to the flap at the anterior end the surface is not so pale and does not dive deep under flap. Epigynal surface flat. First curve of duct very broad; second curve proceeds less anteriorly than in *tristis*. *Markings* (Fig. 308): Carapace well covered with white to yellowish scales. Clypeus very densely covered with white scales. Legs yellow. Abdomen yellowish with brown centrally, paired white spots. Usually paired dark brown spots in posterior half are beside white spots. *Measurements:* Body length 4.0(4.2)5.5 mm; carapace length 1.6(1.7–1.8)1.9 mm, width/length 0.78(0.80–0.81)0.86; n = 6♀ from New Mexico and Arizona.

Male/Female Matching. Male and females were matched by similar yellow color, by robust embolus and flaps, and by co-collecting and common distribution in New Mexico and northern Arizona, where no other unmatched females and males are known.

Distribution (Map 9). New Mexico, northern Arizona, southern Colorado, and western Texas.

Records. UNITED STATES: TEXAS: Jeff Davis Co.: 24 km NW of Fort Davis (1♀, AMNH); COLORADO: Montezuma Co.: Mesa Verde National Park (1♂, AMNH); NEW MEXICO: Bernalillo Co. (2♀, AMNH); Lincoln Co.: nr. Ruidoso, Ruidoso Cmpgd. (2♀, AMNH); Los Alamos Co.: nr. Los Alamos (1♀, AMNH); Sandoval Co.: (1♀, AMNH), Sandia Mtns., Juan Tabo area (2♀, AMNH); Santa Fe Co. (2♂ 1♀, AMNH), Glorieta Mesa nr. Rowe (1♂ 1♀, AMNH), 5 km N of Galiseo (1♂, AMNH), Route 66 just E of Edgewood (1♀, AMNH), 19 km S of Lamy (1♀, AMNH); Taos Co.: 27 km S of Taos (1♂ 1♀, AMNH); ARIZONA: Coconino Co.: Flagstaff (1♂ 1♀, UCB), Navajo Co.: Showlow (1♂, AMNH).

Natural History. Collected at 7,000 ft elevation (2 records), from pinyon pine-juniper (1 record).

10. *Pelegrina pervaga* (G. & E. Peckham, 1909) new combination

Figures 199, 240, 309–313; Map 10

Dendryphantes pervagus G. & E. Peckham, 1909: 474, pl. 37, figs. 9, 9a, ♀. Holotype in MCZ 1♀ with labels "Dendryphantes pervagus P., ♀ Wallace, Kansas type" (label is original; handwritten, probably by Elizabeth Peckham) and "G. W. Peckham Coll.", examined. Roewer, 1954: 1214.

Dendryphantes (Metaphidippus) prevagus [*sic*]:—Petrunkevitch, 1911: 640.

Metaphidippus pervagus:—Bonnet, 1957: 2817.

Diagnosis. A striking species with swollen carapace sides and central pale stripe on the abdomen in both sexes. Very similar to *sabinema*, from which it is distinguished by the features discussed under that species.

Male. Palpus (Figs. 199, 310); Embolus wide basally; retrolateral ramus long, pointing distally, having subterminal bump. *Carapace* sides swollen. *Markings* (Fig. 309): White carapace side band bordered below by narrow band of black hairs. Below this, the dense white cheek bands do not reach clypeus, which is dark. Hairs overhanging chelicerae dark. White forehead band contacts AMEs far medially, from 9:00 to 11:00. Chelicerae yellow, lacking pale scales. Palpus yellow, with white scales on end of femur, on tibia and cymbium, interrupted by dark hairs on patella. Legs light yellowish brown with some darker annulations. Abdomen with central longitudinal pale stripe as in female. *Measurements:* Body length 3.7(3.9)4.4 mm; carapace length 1.8(1.8)2.0 mm, width/length 0.83(0.85)0.88; n = 5♂ from Erath Co., Texas.

Female. Epigynum (Figs. 240, 311, 312): Flaps fairly large and flat, generally pale. Surface flat. First curve of duct wide; second curve proceeds obliquely anteriorly. *Markings* (Fig. 313): Carapace wide and covered with whitish scales. Clypeus covered densely with white scales. Abdomen with distinctive pale patch on middle of dorsum. *Measurements:* Body length 4.3(4.8)5.9 mm; carapace length 1.8(2.0)2.2 mm, width/length 0.80(0.82)0.85; n = 5♀ from Erath Co., Texas.

Distribution (Map 10). Texas, Oklahoma, and Kansas.

Records. UNITED STATES: KANSAS: Wallace Co.: Wallace (1♀, MCZ); OKLAHOMA: Commanche Co.: Visitor's Center, Wichita Mtns. (1♂, WPM); TEX-

AS: Erath Co.: 11 km NE of Stephenville (6♂ 7♀, TXAM).

Natural History. Collected from junipers in Texas (three records).

11. *Pelegrina kastoni* new species
Figures 140, 141, 200, 314–318; Map 11

Metaphidippus n. sp. nr. *aeneolus:*—Jung and Roth, 1974: 33 (specimens identified by W. J. Gertsch, examined).

Holotype male and paratype female in MCZ with label "ARIZONA: Santa Cruz Co., Santa Rita Mtns., gate at 26 km of Whipple Obs[ervatory]. Rd. on Mt. Hopkins 7100 ft el. [2,170 m], 17 June 1985 W. Maddison 85-059, beating Cercocarpus and juniper."

Etymology. This beautiful species is named after the late B. J. Kaston, whose excellent work on the eastern species of *Pelegrina* added much to our understanding of the genus.

Diagnosis. The yellowish appendages and carapace stripes of males are similar to those of *pervaga* and *sabinema,* but the embolus and white bands on clypeus failing to meet at center are distinctive. The golden and beige females have distinctive epigynal flaps rotated 90° inward.

Male. Palpus. (Figs. 200, 315): Embolus rectangular but twisted at tip, relatively narrow, arising from retrolateral side of base. *Markings* (Figs. 140, 314): White carapace side band is bordered below by narrow band of black hairs, as in *pervaga.* Below this are thin, dense white cheek bands that extend across clypeus like Clark Gable moustache, broken in center. White forehead band either fails to contact AMEs, or at most contacts AMEs locally at 10:30–12:30. Chelicerae yellow, lacking pale scales. Palpus yellow, with markings much as *pervaga* and *sabinema,* with white scales on end of femur, on tibia and cymbium alternating with dark hairs on patella and base of cymbium. Legs yellow to light brown except first metatarsus distinctly darker, brown to black. *Measurements:* Body length 4.1(4.2)4.5 mm; carapace length 2.1(2.1)2.2 mm, width/length 0.79(0.80)0.83; n = 5♂ from Santa Rita Mtns., Arizona.

Female. Epigynum (Figs. 316, 317): Flaps rotated a full 90°, with deep openings just anterior to them, resting in pits, almost as in *Dendryphantes nigromaculatus* though flaps maintain their prominence as in other *Pelegrina.* Surface flat or slightly convex except for pits containing flaps. First curve of duct narrow and proceeding medially. *Markings* (Figs. 141, 318): Carapace wide, covered with yellowish scales. Clypeus densely covered with white scales. Legs light orange-brown. Abdomen brassy with beige markings. *Measurements:* Body length 4.9(5.2)6.5 mm; carapace length 2.1(2.3)2.4 mm, width/length 0.80(0.81)0.83; n = 5♀ from Santa Rita Mtns., Arizona.

Male/Female Matching. The matching is indicated by extensive co-collecting on junipers in Arizona, by the wide carapace and yellowish color, and by the correlated retrolateral shift of the embolus and rotation of flaps.

Chromosomes. 2n♂ = 26? acrocentrics + XXO (1♂, Madera Canyon, Arizona).

Courtship (3♂ observed from Santa Rita Mountains, Arizona). The side-to-side waving of legs and palpi during crouch is distinctive. There is no clear distinction between raisedspread and crouch displays, but what may be *raisedspread* stage occurred as follows (n = 2, 2♂): First legs bowed and forward, tips apart (n = 1) to nearly touching (n = 3, 2♂), not moving (n = 3, 2♂). Palpi down (n = 3, 2♂), waving irregularly (n = 2, 1♂). *Crouch* (n = 9, 1♂): Body low (n = 8, 1♂) or at normal height (n = 1). First legs forward and bowed with tips touching, femora approximately horizontal but leg raised distally (n = 8, 1♂). First legs waving at very low amplitude very high frequency (n = 8, 1♂). Later, as he gets closer, the first legs are more parallel, and the first legs and palpi are waved slowly, ca. 1–2 c/s, all four first to right then to left (n = 1). Palpi when close (late crouch) held forward and waved left to right as noted above (n = 1). Abdomen twitching (n = 8, 1♂). *Repertoires:* 2♂

raisedspread or early crouch only; 1♂ crouch only.

Distribution (Map 11). Southern Arizona, southwestern New Mexico, and Chihuahua.

Records. UNITED STATES: ARIZONA: Santa Cruz Co.: Madera Canyon (6♂ 15♀, AMNH, MCZ), Mt. Hopkins (3♂ 5♀, MCZ), Sycamore Canyon W of Nogales (2♂ 2♀, MCZ), 29 km E of Nogales (1♀, AMNH); Cochise Co.: Chiricahua Mtns., Southwestern Research Station 8 km W of Portal (8♂ 5♀, AMNH), 5 km N or Portal (1♀, AMNH), Cave Creek Canyon (1♂, AMNH), Cienega Lake (1♀, AMNH), Huahucha Mtns., Garden Canyon (1♀, AMNH); Gila Co.: Tonto Creek Camp nr. Kahb's ranch (2♂ 1♀, AMNH). NEW MEXICO: Hidalgo Co.: Animas Valley (1♂, AMNH). *MEXICO:* Chihuahua (1♂, MCZ).

Natural History. Primarily found on juniper. In my collections (17–19 June 1985) from oak-juniper-pine woodlands in south-central Arizona, 9♂ 17♀ were beaten from junipers, 2♀ from oaks, and 1♂ 3♀ from Cercocarpus. Collected at elevations from 1,200 to 2,200 m. Most males collected in June (May—2 records, June—8, July—2, November—1); most females in June and July (June—7 records, July—5, August—2). Jung and Roth (1974) collected this species in their zone 2 in the Chiricahua Mountains (1,460–1,700 m elevation).

12. *Pelegrina flavipedes* (G. & E. Peckham, 1888) new combination

Figures 142, 143, 201, 241, 319–323, 338, 339; Map 12

Dendryphantes flavipedes G. & E. Peckham, 1888: 42, pl. 3, fig. 29a, ♂. Holotype in MCZ 1♂ with labels "Dendryphantes flavipedes Pkm, 1888. Canada. Type. ♂" (label is original; handwritten, probably by Elizabeth Peckham) and "G. W. Peckham Coll.", examined. G. & E. Peckham, 1909: 471, pl. 38, figs. 3, 3a–c, ♂♀. Roewer, 1954: 1210.

Dendryphantes (*Metaphidippus*) *flavipedes*:—Petrunkevitch, 1911: 630.

Metaphidippus flavipedes:—Chickering, 1944: 174, figs. 66–69, ♂♀. Bonnet, 1957: 2813. Kaston, 1973: 112, figs. 21–25, ♂♀.

The *flavipedes* group at first glance appears to consist of three easily distinguished species (Kaston, 1973): a striped species distributed across Canada (*flavipedes*), a yellow species with bulbous head in the northeastern United States (*flaviceps*), and a dark southern species (*exigua*). The situation is not nearly so simple as this, however, for hybridization may occur at the borders of their ranges (discussed under *flaviceps*) and two species may be confused under the name *exigua* (discussed under *exigua*).

Diagnosis. The handsomely striped yellow and brown males of *flavipedes* are distinguished from *flaviceps* and most *exigua* by the strong cheek band, three white spots above anterior eyes, narrow carapace, smaller medial black spot on the chelicerae, and lack of bulbous head. The striped form of *exigua* might be confused for *flavipedes* except by the much broader retrolateral ramus of the embolus of *flavipedes*. The females have a brassy sheen distinguishing them from other northern *Pelegrina*. *Pelegrina flavipedes* females differ from *flaviceps* females in being darker and having a narrower, more obliquely directed second curve of the epigynal ducts; they differ from *exigua* females in having more parallel epigynal flaps and a much narrower second curve of the epigynal ducts. See notes under *flaviceps* regarding possible hybridization.

Male. Palpus (Figs. 201, 320): Embolus divided deeply into two rami; prolateral ramus of embolus twisted at tip; retrolateral ramus thick. *Markings* (Figs. 142, 319): Carapace well marked with dense side band, wide, dense cheek band, and three patches of white scales on forehead, a large one between two AMEs and smaller ones between each AME and ALE. Because the forehead band contacts AMEs medially, the setae ringing the AMEs above are dark from 10:30 to 1:30. Clypeus with patch of white scales between AMEs; hairs overhanging chelicerae white medially brown laterally. Chelicerae yellow, with a small black spot medially. Femur of palpus through tibia yellow, contrasting with brown cymbium, which lacks white scales. Legs generally yellowish with more or less distinct longitudinal stripe on first femur; in a few specimens with stripes on all femora but not as thin as *flaviceps*. *Measure-*

ments: Body length 3.6(3.7)4.3 mm; carapace length 1.7(1.9)2.0 mm, width/length 0.74(0.76)0.79; n = 5♂ from Neepawa, Manitoba.

Female. Epigynum (Figs. 241, 321, 322): Flaps flat, parallel or only slightly convergent. Surface flat. First curve of duct broad; second curve narrow, beginning from posterior end of first curve and proceeding anteriorly toward the midline; flowerlike gland openings on dorsal face of duct. *Markings* (Figs. 143, 323): Carapace covered with transparent brown scales with a brassy sheen. Beige spots on forehead between and beside AMEs recall white spots of male and are usually stronger than in *exigua*. Setae directly above AMEs brown. Clypeus generally densely covered with white scales. Abdomen with brassy sheen and fourth pair of white spots formed into distinct chevron. *Measurements:* Body length 4.4(4.7)4.8 mm; carapace length 1.8(1.9)2.0 mm, width/length 0.74(0.77) 0.77; n = 5♀ from Neepawa, Manitoba.

Chromosomes. 2n♂ = 26 acrocentrics + XXO (1♂ Nipigon, Ontario; 1♂ Edmonton, Alberta).

Courtship (4♂ observed from Edmonton, Alberta, and Neepawa, Manitoba). With unusual alternate waving of palpi during crouch display. *Raisedspread* (n = 1). *Crouch* (n = 7, 4♂): Body held at normal height (n = 5, 2♂) or somewhat raised (n = 1). First legs forward and horizontal (n = 2, 2♂) with tips raised (n = 1) or not (n = 1), or whole leg raised slightly (n = 5, 2♂). First legs apparently not waving (n = 2, 2♂). Palpi held down (n = 1) and somewhat forward (n = 2, 2♂). Palpi wave (n = 6, 3♂) up and down alternately (n = 5, 2♂), fairly slowly, on series (n = 1); specifically, palpi tips wave in small circles (n = 1), left clockwise and right counterclockwise or vice versa (n = 1). Abdomen twitches with low amplitude on series (n = 1). *Repertoires:* 3♂ crouch only; 1♂ raisedspread and crouch.

Distribution (Map 12). Across much of Canada and northeastern United States, south along the Rocky and Appalachian Mountains.

Records. Many specimens, especially in MCZ and AMNH, from: *CANADA:* NORTHWEST TERRITORIES: Mackenzie: Prelude Lake 113°55′W, 62°33′N; Lady Evelyn Falls 117°19′W, 60°57′N; NEWFOUNDLAND: Humber River; PRINCE EDWARD ISLAND: Tracadie; QUEBEC: Quebec City; NOVA SCOTIA: Weymouth, Barrington, Baddeck (Cape Breton), North Sydney; ONTARIO: Ottawa, Marten River 58 km N of North Bay, Parry Sound Dist.: 14 km S of Pte. Au Baril Station, Algoma Dist.: near Bruce Mines; Sudbury Dist.: Espanola; Thunder Bay Dist.: 7 km E of Nipigon; Kenora Dist.: Granite Lake; Lakefield, Chapleau, Sowerby, Lake Temagami, 56 km E of Hearst, Sioux Lookout, Gawas Bay, Kamiskotia Lake, Turkey Point, Moberly, Uxbridge, Spanish River, Iron Bridge, St. Williams, Batchawana, Nipigon, Dorset, L. Opeongo, Cababogie (Tweed), Haileybury, Pancake Bay nr. Batchawana, Emo, Fairbank Lake Province Park, Nestorville, Golden Lake, Minden, SouthTea Lake (Algonquin); MANITOBA: Kettle Rapids, Cedar Lake, Lyons Lake, 19 km E of Neepawa, Sandilands Provincial Forest; ALBERTA: Edmonton, Jasper, Banff, Athabasca Landing, Fitzgerald, North Lake Athabasca; BRITISH COLUMBIA: Wells Cray Park, Columbia Lake, Salmon Arm, Arrow Lakes. *UNITED STATES* (county records): MAINE: Aroostook, Penobscot, Piscataquis, Washington; NORTH CAROLINA: Avery, Buncombe; MICHIGAN: Allegan, Baraga, Calhoun, Charlevoix, Cheboygan, Chippewa, Crawford, Delta, Emmett, Grand Traverse, Ingham, Mackinac, Marquette, Oakland, Washtenaw; WISCONSIN: Chippewa, Lincoln; ILLINOIS: Lake; MINNESOTA: Clearwater, Hennepin; MONTANA: Jefferson, Ravalli, Sanders; IDAHO: Fremont; WYOMING: Crook, Lincoln, Park, Teton; COLORADO: Archuleta, Boulder, Gilpin; NEW MEXICO: Sandoval, San Miguel, Taos; WASHINGTON: Okanagan, Stevens.

Natural History. A conifer dweller, collected from spruce (11 records from Ontario, Manitoba, and Alberta), including white spruce (2 records); pines (4 records from Ontario, British Columbia, and Michigan), including lodgepole pine (1 record) and jackpine (1 record); junipers (3 records from Ontario); and larch (2 records from Ontario and Illinois).

13. *Pelegrina flaviceps* (Kaston, 1973) new combination

Figures 144, 145, 202, 242, 324–328, 340, 341; Map 13

Metaphidippus flaviceps Kaston, 1973: 110, figs. 15–20, ♂♀. Holotype ♂ and paratype ♀ in AMNH with labels "Holotype ♂ + allotype ♀, Metaphidippus flaviceps n.sp., det by B. J. Kaston (1949)" and

"Clarendon, Vt., 2 Sept. 1939, E. M. Greenspan," examined. Brignoli, 1983: 643.

Notes on Specific Distinctness. Apparent hybridization between this species and the other two in the group makes their separation doubtful. Males from northern Massachusetts (Pepperell, Groton, East Templeton), southern New Hampshire (Hollis), and Ithaca, New York, show grades of intermediacy between *exigua* and *flaviceps*. Of 25 males collected at one site in Pepperell, 9 have dark legs and a flat cephalic area (as in *exigua* farther south), 10 have dark legs and a bulbous cephalic area, 1 has yellow legs and a flat cephalic area, and 5 have yellow legs and a bulbous cephalic area (as in *flaviceps* farther north). At this site, even those with yellow legs and bulbous carapace have a wider carapace than is usual for *flaviceps*. Courtship behavior of the apparent hybrids from Pepperell appears like that of *flaviceps* and *exigua* (3♂ observed). In Michigan and Maine, on the northern edge of the range of *flaviceps*, males otherwise like *flavipedes* have been found with the bulbous cephalic area.

Diagnosis. Males can be distinguished from those of *flavipedes* and *exigua* by the bulbous cephalic area, dark lateral spots on the chelicerae (Fig. 324), carapace dusted with pale scales (Fig. 144), and pale yellow legs. Females can be difficult to distinguish from those of *flavipedes* and *exigua*; they are generally paler, lack white spots on the forehead, often have narrow dark lines on the femora, and may have the cephalic area slightly swollen. The epigynal flaps and ducts are intermediate between those of *flavipedes* and *exigua*. The medial black spot on the chelicerae is much more distinct in *flaviceps* females than in *flavipedes* females.

Male. Palpus (Figs. 202, 325): Embolus divided deeply into two rami; prolateral ramus of embolus not as twisted as in *exigua*. *Carapace* is swollen dorsally in cephalic area; carapace narrowest of group, especially at front. *Markings* (Figs. 144, 324): Carapace and abdomen dusted with pale scales, so as to make side bands indistinct. Lacks white spots on forehead. Cephalic area appears yellow in alcohol, though may be dark in life (Fig. 144) and is covered with small dark hairs. Cheek band dense and wide. Clypeus brown, hairs overhanging chelicerae dark. Setae surrounding AMEs brown to light brown entirely. Chelicerae yellow with long, deep, dark black spot medially, and brown spot laterally near the base. Just lateral to the medial black spot the surface is flat to slightly concave. Palpus light brown throughout, cymbium not noticeably darker. Cymbium lacks white scales. Legs pale yellow with thin black prolateral longitudinal stripe on all femora except sometimes lacking on posterior legs. First leg with fringe of white hairs. *Measurements:* Body length 3.7(3.8)3.8 mm; carapace length 1.8(1.8)1.9 mm, width/length 0.72(0.73)0.74; n = 5♂ from Sagadahoc Co., Maine.

Female. Epigynum (Figs. 326, 327, 340, 341): Flaps parallel to convergent. Epigynal surface flat. First curve of duct broad, not so long as in *flavipedes*; second curve broader and more medially directed than in *flavipedes*, though not nearly so broad as in *exigua*; flowerlike gland openings on dorsal face of duct. *Carapace:* Sometimes with swollen cephalic area. *Markings* (Fig. 328): Carapace uniformly dark on forehead, lacking patches of pale scales behind anterior eyes. Clypeus densely covered with white scales. Chelicerae with prominent medial black spot reminiscent of males. Some females with thin longitudinal lines on leg femora. Abdomen usually indistinctly marked, sometimes with dark areas formed into longitudinal bands on either side of middle paler area. *Measurements:* Body length 3.7(4.0)4.6 mm; carapace length 1.7(1.8)1.9 mm, width/length 0.74(0.74)0.75; n = 5♀ from Sagadahoc Co., Maine, and Durham, New Hampshire.

Courtship (4♂ observed from Reid State Park, Maine). With unusual alternate circling of palpi during crouch stage. *Raised-spread* (n = 2, 2♂): continued until 2 or 3 body lengths from female when male went into crouch stage (n = 2, 2♂). *Crouch* (n =

10, 4♂): Body held high (n = 6, 2♂) or low (n = 1). First legs forward and bowed (n = 5, 3♂), tips close (n = 2, 1♂); legs move more parallel as he gets close (n = 1). Femur low but raised distally (n = 5, 3♂), or legs may be horizontal and lower than body (n = 4, 1♂). Palpi down and forward (n = 3, 1♂). Palpi flicker (n = 9, 4♂) for few seconds (n = 4, 3♂), then pause for few seconds (n = 3, 2♂). Flicker–pause cycle repeats (n = 5, 3♂), 3–4 (n = 1) or more than 8 times (n = 1). Palpus flicker is of low amplitude and high frequency (n = 2, 2♂) and is superimposed on larger up and down slightly circular wave; right palpus moving up as left down and vice versa (n = 2, 2♂). Abdomen twitched occasionally (n = 9, 4♂) when palpi flickered (n = 5, 3♂). For much of display, male stood without walking, thought when he did palpi and abdomen were flickered during series (n = 1) and during pause (n = 3, 2♂). Once, male proceeded to mount after about 3–4 palpus flicker cycles of crouch (n = 1). *Repertoires:* 2♂ crouch only; 2♂ raised-spread and crouch.

Distribution (Map 13). Northeastern United States and southeastern Canada.

Records. Over 100♂ 100♀ in AMNH and MCZ from: *CANADA:* QUEBEC: Lake Champlain; ONTARIO: Toronto, Newmarket, Ottawa. *UNITED STATES* (county records): MAINE: Cumberland, Hancock, Penobscot, Sagadahoc, Waldo; NEW HAMPSHIRE: Carroll, Cheshire, Coos, Grafton, Strafford; VERMONT: Caledonia, Rutland, Windham; NEW YORK: Albany, Cortland, Essex, Franklin, Greene, Hamilton, Lewis, Nassau, Oneida, Onondaga, Schoharie, Steuben, Tompkins, Yates; PENNSYLVANIA: Pike; WEST VIRGINIA: Preston; MICHIGAN: Charlevoix, Kalkaska.

Natural History. A conifer dweller, collected from spruce (2 records), junipers and pine (1 record), spruces, firs, and pine (1 record), and hemlocks (1 record).

14. *Pelegrina exigua* (Banks, 1892) new combination

Figures 127, 146–149, 203, 243, 329–337, 342; Map 14

Dendryphantes exiguus Banks, 1892: 75, pl. 5, fig. 30, ♀. Holotype in MCZ 1♀ with labels "Dendryphantes exiguus Bks type," "Ithaca, N.Y.," and "Nathan Banks Coll.", examined. Roewer, 1954: 1209.

Dendryphantes virginis Chamberlin, 1925a: 233. Type material said to be in MCZ by Chamberlin but no holotype found therein. Paratypes from Woodridge, District of Columbia (3♂ 1♀), Bladenburg, Maryland (2♂), examined. Bonnet, 1956: 1402.

Metaphidippus virginis:—Muma, 1944: 11.

Metaphidippus exiguus:—Kaston, 1945: 10. Kaston, 1973: 112, figs. 26–29, ♂♀.

Metaphidippus flavipedes:—Bonnet, 1957: 2813.

Notes on Synonymy. The holotype female of *D. exiguus* is peculiar in having the palpus tarsi swollen, as in antepenultimate instar males, yet has a well-developed epigynum. There is doubt as to the placement of this specimen, for the epigynum is much more like that of *flaviceps* than of southern species that has been called *exiguus,* with the flowerlike glands on the face of the duct, not hidden by a fold, and the duct not nearly so broad (Fig. 342) as is usual in the southern species. However, the markings of the type are like those of the southern species (white scales between anterior eyes on forehead, no stripes on legs, wide carapace, abdominal markings more uniformly dark). Males collected from Ithaca, New York (including a male in the MCZ with a Bryant label indicating that it was collected with Banks's female type of *exiguus*), are in most respects like *exigua* but have a head bump like *flaviceps.* It therefore appears that the type locality of *exigua* is along the hybrid zone with *flaviceps* (see notes under *flaviceps*). Specimens of pure *flaviceps* occur in towns near Ithaca. Until variation at the type locality is better understood, Kaston's application of the name *exigua* to the southern species will be maintained.

To further complicate the application of the name *exigua,* two distinct color forms are found in the south that may very well represent distinct species. The typical (dull) form (Figs. 146–147, 329, 333) is more uniformly dark in carapace and appendages; the striped form (Figs. 148, 149, 334, 335) has much more extensive white markings and distinct markings on the legs. The two forms appear perfectly discrete: all undamaged specimens are easily sorted to

one or the other. However, no clear differences in genitalia have been found, both forms having the embolus and spermathecae as considered diagnostic for *exigua*. The spermathecal ducts may be more convoluted in the dull form, but an adequate and convincing characterization of any difference has proved elusive. The only convincing structural difference so far noted is in the width of the dark depression on the inner margin of the male's chelicera. The one striped male observed had a courtship display as in dull males, to the level of detail observed. Only the dull form has been seen from some coastal states (New York, New Jersey, North Carolina), while only the striped form has been seen from Missouri and Illinois. However, the two forms occur sympatrically in Virginia, Maryland, and Arkansas. In Virginia and Maryland, they have even been caught from conifer trees in the same field. In Massachusetts, there is variation in the amount of white markings but the variation does not appear to sort itself into two discrete forms. Until stronger evidence is available to separate the forms, they will be kept under the name *P. exigua*. The name *D. exiguus* and apparently also *D. virginis* apply to the dull form. In the following description the markings of the two forms will be described separately.

Diagnosis. Males of *exigua* can be distinguished from *flavipedes* and *flaviceps* by the mostly dark brown legs, the thin retrolateral ramus (Chamberlin, 1925a), and the more twisted prolateral ramus. The black spot on the chelicerae is much broader than in *flavipedes*. Females of *exigua* have more strongly convergent epigynal flaps and an extremely broad second curve of the internal ducts.

Male. Palpus (Figs. 203, 330): Embolus divided deeply into two rami; retrolateral ramus thinner than prolateral; prolateral ramus strongly twisted. *Markings: Dull form* (Figs. 146, 329): Carapace relatively dark, area above first eye row brown. Cheek band much reduced, to streak beside ALEs. Clypeus brown, hairs overhanging chelicerae dark. Setae surrounding AMEs white laterally 2:00–4:00, often medially 9:00–10:00; brown otherwise. Chelicerae yellow with front surface slightly concave and with black patch on inner margin shorter than in *flaviceps* but nonetheless deep, distinct, and wide; chelicera lacks prominent basal lateral brown spot. Palpus brown, basal segments not distinctly paler. Patella, tibia, and cymbium lack white scales. Legs more or less uniformly dark, without distinct longitudinal lines. Abdomen dorsum brown, with weak side bands. *Striped form* (Figs. 148, 334): Carapace with white spots between eyes of anterior eye row as in *flavipedes*. Cheek band thin but long. Clypeus with patch of white scales between AMEs, hairs overhanging chelicerae white centrally and dark laterally. Setae surrounding AMEs white laterally 2:00–4:00, medially 7:00–11:00; brown otherwise. Chelicerae yellow with black depression on inner margin narrower than in dull form. Basal segments of palpus paler than cymbium. Palpus femur, patella, and tibia with white scales; cymbium lacking white scales. First leg femur and patella dark ventrally but with white scales dorsally; tibia mostly dark especially on anterior surface. Other legs pale with dark markings. Abdomen dorsum dark brown, with strong white side bands. *Measurements:* Body length 4.4(4.5)4.9 mm; carapace length 1.9(2.0)2.2 mm, width/length 0.81(0.84)0.84; n = 5♂ from Massachusetts, Maryland, Virginia, Kentucky, and North Carolina.

Female. Epigynum (Figs. 243, 331, 332, 336, 337, 342): Flaps convergent, posteriorly at about 45° rotation. Epigynal surface flat. Ducts most notable for the very broad second curve such that the anterior edge of this curve begins near anterior end of flap; flowerlike gland openings along anterior edge of curve. *Markings: Dull form* (Figs. 147, 333): Carapace brown, covered with transparent brown scales except for some beige to white scales. Like *flavipedes*, there are patches of pale scales behind and between eyes of anterior row;

scales surrounding AMEs dark dorsally. Clypeus densely covered with white scales. Abdomen almost uniform brown, with chevrons not so distinct as in *flavipedes*. *Striped form* (Figs. 149, 335): Carapace often darker than in dull form, covered with transparent brown scales except for some beige to white scales. Behind and between anterior eyes are patches of pale scales; scales surrounding AMEs dark dorsally. Clypeus densely covered with white scales. Legs pale with some dark markings; first tibia dark as in males. Abdomen dark centrally, with contrasting pale side bands. *Measurements:* Body length 5.3(5.7)5.8 mm; carapace length 2.0(2.1)2.2 mm, width/length 0.79(0.80)0.82; n = 5♀ (dull form) from Rowan Co., Kentucky.

Courtship (7♂ observed from Shenandoah Co., Virginia; Caroline and Montgomery Counties, Maryland; all dull form except one ♂ striped from Montgomery Co.). With unusual alternate waving of palpi during crouch display. *Raisedspread* (n = 16, 7♂). *Crouch* (n = 10, 5♂): Body low (n = 3, 2♂) or raised (n = 1). Male walks in series with long pauses during which palpi are waved (n = 1), or walk is more or less continuous with constant palpus and leg waving and abdomen twitching (n = 2, 1♂). First legs forward and parallel (n = 9, 4♂), slightly bowed (n = 2, 2♂) or stretched forward (n = 7, 3♂), with tips almost touching (n = 3, 2♂) or not (n = 2, 1♂). First legs horizontal (n = 2, 1♂: apparently in intense display), or slightly raised (n = 6, 3♂), to ca. 30° (n = 2, 2♂). Tips of first legs moved side to side (both same direction) during leg waving (n = 5, 3♂), in phase with palpus waving (n = 1). Palpi forward (n = 3, 3♂) and down (n = 1) or slightly raised (n = 2, 2♂). Palpi waved alternately (n = 5, 3♂) up and down (n = 5, 3♂) several times at about 2 left and 2 right palpus waves per second for 2–5 sec (n = 1). Abdomen twitched (n = 3, 2♂) while palpi waved (n = 2, 2♂). *Repertoires:* 2♂ raisedspread only; 5♂ raisedspread and crouch.

Distribution (Map 14). Eastern United States except for far north.

Records. Many specimens, especially in MCZ and AMNH, from: *UNITED STATES* (county records): *Dull form:* MASSACHUSETTS: Barnstable, Essex; CONNECTICUT: Fairfield, New Haven; NEW YORK: Nassau, Suffolk, Tompkins; NEW JERSEY: Burlington, Hunterdon, Ocean; WEST VIRGINIA: Jefferson; VIRGINIA: Augusta, Bedford, Brunswick, Essex, Fairfax, Norfolk, Page, Shenandoah, Washington; MARYLAND: Caroline, Montgomery, Prince Georges; DISTRICT OF COLUMBIA: Woodridge; KENTUCKY: Rowan; TENNESSEE: Unicoi; NORTH CAROLINA: Burke, Craven, Durham, Rockingham; SOUTH CAROLINA: Oconee; GEORGIA: Thomas; ALABAMA: DeKalb, Tuscaloosa; MISSISSIPPI: Scott; ARKANSAS: Bradley, Calhoun; TEXAS: San Augustine. *Striped form:* VIRGINIA: Augusta, Essex, Washington; MARYLAND: Georges, Montgomery; ALABAMA: Madison; ILLINOIS: Hardin; MISSOURI: Boone, Cole; ARKANSAS: Washington. *Form not distinguished:* MASSACHUSETTS: Barnstable, Essex, Middlesex, Norfolk, Suffolk.

Natural History. Usually found on conifers, known from pines (8 records), junipers (8 records), occasionally on other plants such as oak (1 record) and walnut (2 records).

15. *Pelegrina montana* (Emerton, 1891) new combination

Figures 1, 154, 204, 244, 343–347; Map 16

Dendryphantes montanus Emerton, 1891: 11. Types in MCZ 2♂ 2♀ with labels "Dendryphantes montanus [underlined in red], Mt. Washington, N. H." and "J. H. Emerton Coll.", examined. G. & E. Peckham, 1909: 459, pl. 37, figs. 4, 4a–c, ♂♀. Roewer, 1954: 1213. Bonnet, 1956: 1396.

Dendryphantes (*Metaphidippus*) *montanus:*—Petrunkevitch, 1911: 636.

Metaphidippus montanus:—Chickering and Bacorn, 1933: 526. Kaston, 1973: 115, figs. 37, 38, ♂♀.

Diagnosis. A large, dark northern and montane species. The embolus that expands near tip and the rough epigynum with ridges behind the flaps are diagnostic.

Male. Palpus (Figs. 204, 344): Embolus narrow near base and flares at tip, almost spoon-shaped, concave dorsally. Retrolateral ramus reduced. Small denticles cover the embolus surface basally. *Markings* (Figs. 1, 154, 343): Carapace with diffuse

white side band and white forehead band. Cheek band very weak to absent. Clypeus brown; hairs overhanging chelicerae dark. White forehead band contacts AMEs dorsally 10:30–1:00. Chelicerae lacking pale scales. Cymbium lacking white scales. Abdomen more or less uniformly dark dorsally, much darker than *insignis*; anterior white spots absent and posterior reduced to thin lateral bars. *Measurements:* Body length 4.1(4.6)5.3 mm; carapace length 2.0(2.1)2.5 mm, width/length 0.74(0.80) 0.82; n = 5♂ from Colorado, Vermont, New Hampshire, and Quebec.

Female. Epigynum (Figs. 244, 345, 346): Flaps short, convex, parallel or divergent. Most distinctive are the small but conspicuous ridges (seen as dark streaks in Fig. 346) immediately behind and lateral to flaps. Surface not raised into a bulge posteriorly. Notch usually deep, sometimes longer than flaps, often shaped like a rounded rectangle. First curve of duct very narrow; second curve proceeds obliquely posteriorly unlike most other members of genus. *Markings* (Fig. 347): Carapace dark, thinly to sparsely covered with white scales. Clypeus densely covered with white scales. Abdominal dorsum largely brown, medially slightly paler, with only small paired white spots, without black spots; white laterally. *Measurements:* Body length 5.5(5.9–6.9)7.1 mm; carapace length 2.4(2.5)2.7 mm, width/length 0.75(0.78) 0.79; n = 5♀ from Colorado, Vermont, and New Hampshire.

Courtship (1♂ observed from Butte, Montana). *Crouch* (n = 6): Body low (n = 4). First legs horizontal (n = 4) and parallel (n = 4); not waving (n = 6). Palpi tucked in to side (n = 4), down (n = 2); waved slightly (n = 6). Abdomen twitching occasionally (n = 6).

Distribution (Map 16). Newfoundland west to British Columbia, Yukon Territory south to Colorado in the west and New Hampshire and New York in the east. Kaston's (1973) report of a record from Illinois is probably based on a pair of *insignis* from Urbana in the AMNH identified by him in 1949 as *montana*; the male has the tip of both emboli broken (see Cutler, 1979) and thus resembles *montana*.

Records. Most in MCZ, from: *CANADA:* YUKON: Tklo-Klut, 10 km E Old Crow (1♂ 4♀), King Edward range N of Old Crow (1♂); NEWFOUNDLAND: Indian River (2♂ 1♀), Terra Nova National Park (1♂); QUEBEC: Anticosti, Fox Bay (2♂ 1♀), Lake Mistassini, Ayikwapit Peninsula (1♂); MANITOBA: Cedar Lake (1♂ 1♀), H. B. Railway 214 (1♂); ALBERTA: Edmonton (1♀), Waterton Lakes National Park, nr. Waterton Lake (1♂, WPM), Jasper (1♀); BRITISH COLUMBIA: Pink Mountain (3♀), Muskeg nr. Little Prairie (2♀). *UNITED STATES* (county records): NEW HAMPSHIRE: Chesire (1♂), Coos (2♂ 3♀); VERMONT: Chittenden (1♂ 2♀); NEW YORK: Cattaraugus (2♂, AMNH), Essex (1♂ 1♀, AMNH), Greene (2♂, AMNH); VIRGINIA: Giles (1♀); MONTANA: Beaverhead (3♀), Glacier (1♀), Jefferson (1♀), Park (1♀); IDAHO: Custer (1♂ 4♀), Franklin (1♀); WYOMING: Albany (1♀), Teton (1♂ 3♀); COLORADO: Boulder (6♀), Custer (1♂), Grand (1♂), Gunnison (1♂), Larimer (1♂); UTAH: Uinta (1♀), Wasatch (1♀); NEW MEXICO: Bernalillo (1♀); ALASKA: Shaw Creek, mile 289 Richardson Hwy (1♂).

Natural History. From birch, willow, poplar, and other deciduous bushes and trees beside streams and rivers and in bogs in British Columbia, Yukon, Montana (4 records). In aspen-lodgepole pine meadow in Colorado (1 records). In Yukon below 450 m elevation (1 record), Montana and Idaho 1,800–2,000 m (2 records), Colorado, Utah, and Wyoming 2,400–2,900 m (9 records).

16. *Pelegrina insignis* (Banks, 1892) new combination
Figures 128, 150, 151, 205, 245, 348–353; Map 17

Dendryphantes insignis Banks, 1892:74, pl. 5, figs. 28, 28a, ♀. Holotype in MCZ 1♀ with labels "Dendryphantes insignis Bks type," "Ithaca, N. Y.," and "Nathan Banks Coll.", examined.

Metaphidippus montanus:—Chickering, 1944: 176, figs. 70–73, ♂♀.

Metaphidippus octavus:—Kaston, 1945: 10.

Metaphidippus insignis:—Kaston, 1948: 476, figs. 1750–1752, ♂♀. Kaston, 1973: 114, figs. 34–36, ♂♀. Cutler, 1979: 279–274.

Dendryphantes capitatus:—Roewer, 1954: 1202.

Metaphidippus clematus:—Levi and Levi, 1951, in part: 232, possibly figure 39 (paratype series includes *insignis* females).

Metaplidippus capitatus:—Bonnet, 1957: 2810, in part.

Notes on Synonymy. The specimen cited above may be labeled incorrectly as holotype, for Banks's description and figures seem to depict females of *proterva* because of the white pubescence (not yellow as in what we now call "*insignis*"), the red-ringed leg segments (not uniformly yellowish), the large reddish spots on the abdomen (not smaller and black), and the long, parallel epigynal flaps (not short and divergent). Nonetheless, since the specimen marked holotype is clearly of the species we now call "*insignis*," it seems best to leave the matter as it stands and presume that Banks was somewhat erroneous in this description.

Diagnosis. Notable for the yellowish markings with strong black spots on the abdomen. *Pelegrina montana* and *clemata* are similar but the long spatulate embolus and epigynal topography of *insignis* are distinctive.

Male. Palpus (Figs. 205, 349, 350): Embolus flares slightly in distal half; usually bent slightly toward the retrolateral. Retrolateral ramus reduced. The tip of the embolus is very thin and sometimes partially or entirely broken off (see Cutler, 1979). Small denticles cover the embolus surface basal to opening. *Markings* (Figs. 150, 348): Carapace often suffused with brassy scales dorsally, with patches of white between the fovea and posterior eyes in addition to ample white side bands and V mark behind AMEs. Cheek band weak. Clypeus brown; hairs overhanging chelicerae dark. White forehead band contacts AMEs dorsally 10:30–12:30. Chelicerae with small patch of yellowish scales medially near base. Palpus femur covered with white scales; more distal segments darker and usually without white scales. Cymbium with none to a few white scales. Abdomen shows paired black spots of female; anterior paired medial white spots distinct; brassy sheen medially. *Measurements:* Body length 3.4(3.6)4.1 mm; carapace length 1.7(1.8)2.1 mm, width/length 0.77(0.77)0.79; n = 5♂ from New Brunswick, Massachusetts, Minnesota, and Saskatchewan.

Female. Epigynum (Figs. 245, 351, 352): Flaps short and divergent or parallel. Surface behind flaps raised into bulge only medially and posteriorly, so that surface rises gradually behind flaps, or if surface rises abruptly it does so at some distance behind flaps. Posterior bulge often considerably higher than level of flaps. Notch triangular and sharp. First curve of duct narrow; second curve proceeds obliquely posteriorly or medially. *Markings* (Figs. 151, 353): Carapace covered densely with yellowish white scales. Clypeus densely covered with yellow scales. Legs more or less uniformly yellow. Abdomen dorsum with prominent paired black spots, otherwise yellow-brown to red-brown with paired spots and lateral markings of yellow and white scales. *Measurements:* Body length 3.8(4.1)5.3 mm; carapace length 1.7(1.9)2.1 mm, width/length 0.74(0.78) 0.79; n = 5♀ from Saskatchewan and Minnesota.

Chromosomes. 2n♂ = 26 acrocentrics + XXO (1♂ from Taber, Alberta).

Courtship (2♂ observed from Taber, Alberta, and North Battleford, Saskatchewan). With triangular leg position during crouch display. *Raisedspread* (n = 1). *Crouch* (Fig. 128; n = 8, 2♂): Body at low (n = 5, 1♂) to normal (n = 3, 1♂) height. First legs horizontal and forward (n = 8, 2♂), spread slightly (n = 3, 1♂) or bowed with tips close (n = 5, 1♂). First legs extended forward on series and waved slightly; on pauses, first legs held back so as to form a roughly triangular shape as in *verecunda* and *aeneola* (n = 5, 1♂), though the leading leg is sometimes held in during series (n = 3, 1♂). Palpi down (n = 8, 2♂) and tucked in (n = 5, 1♂); waved up and down (n = 8, 2♂), on series (n = 5, 1♂). *Repertoires:* 1♂ crouch only; 1♂ raised-spread and crouch.

Distribution (Map 17). New Brunswick west to Alberta, south to New York and Colorado.

Records. In AMNH, MCZ, and WPM from: *CANADA:* NEW BRUNSWICK: nr. Chipman; ONTARIO: Barrie; 5 km S of Richmond near Ottawa; Cambridge; SASKATCHEWAN: Wells Lake nr. Alberta border; North Battleford; Estevan; ALBERTA: Islay; 8 km W of Writing-on-Stone Provincial Park; Medicine Hat; betw. Cereal and Oyen; Taber. *UNITED STATES* (county records): MAINE: Hancock, Lincoln; VERMONT: Windham; MASSACHUSETTS: Middlesex, Norfolk, Worcester; CONNECTICUT: Fairfield, Hartford, New Haven, New London, Tolland; NEW YORK: Seneca, Tompkins; NEW JERSEY: Bergen, Ocean; MICHIGAN: Hillsdale, Ingham, Lenawee, Midland, Oakland; WISCONSIN: Dane; ILLINOIS: Champaign; MINNESOTA: Hennepin, Olmsted, Polk, Ramsey; IOWA: Boone; NORTH DAKOTA: Burleigh, Nelson, Ransom; COLORADO: Fremont.

Natural History. On *Chamaedaphne, Betula,* and other vegetation in bogs in New Brunswick and Ontario; in oldfields and prairies in Ontario, Alberta, Minnesota, and Wisconsin. In an open habitat in North Battleford, Saskatchewan, *P. proterva* was common and restricted to the taller shrubs (taller than 1 m), whereas *P.insignis* was common and restricted to the short shrubs (shorter than 0.5 m) among the grasses. In habitats in Alberta and Massachusetts, *P. insignis* has also been found on short shrubs and herbs. In late June near Templeton, Massachusetts, numerous females were found with egg sacs in nests in living but curled leaves of goldenrod and other herbs.

17. *Pelegrina chaimona* new species
Figures 206, 354–358; Map 18

Metaphidippus n. sp. nr. *verecundus:*—Jung and Roth, 1974: 33 (specimens identified by W. J. Gertsch, examined).

Holotype male in AMNH with label "ARIZONA: 5 mi [8 km] W of Portal, Cochise County, SWRS [Southwestern Research Station], June 9, 1968, V. Roth."

Etymology. An arbitrary combination of letters, to be treated as an adjective.

Diagnosis. Male closely resembles *P. montana,* but erect portion of embolus is more or less parallel-sided. The embolus is shorter and stouter than that of *insignis* and has a distinct retrolateral ramus. The embolus bears some resemblance to that of *dithalea,* but the rami are closer together (Figs. 206, 192). The female of *chaimona* is poorly known.

Male. Palpus (Figs. 206, 355): Embolus rectangular, widening gradually to base on retromargin so that there is no distinct angle between erect portion and base. Rami small and not much separated. Erect portion of embolus arises more retrolaterally than in *dithalea.* Embolus surface with small denticles basally. *Markings* (Fig. 354): Cheek band generally weak. Clypeus brown; hairs overhanging chelicerae dark except white medially. White forehead band contacts AMEs dorsally 10:30–12:30. Chelicerae with small medial patch of white scales. Cymbium with none to a few white scales. *Measurements:* Body length 3.9(4.1–4.2)4.3 mm; carapace length 1.6(2.0)2.1 mm, width/length 0.77(0.78) 0.80; n = 5♂ from Chiricahua Mtns., Arizona.

Female. Epigynum (Figs. 356, 357): Flaps fairly short, convergent or parallel. Surface raised just inside flaps midway along their length; behind flaps surface low, rises into prominent mound posteriorly. First curve of duct narrow; second curve proceeds medially. *Markings* (Fig. 358): Carapace with white scales dorsally. Clypeus densely covered with white scales. Abdomen pale laterally and dark centrally with paired white spots. *Measurements:* Body length 4.6, 5.0, 54. mm; carapace length 1.8, 1.8, 2.1 mm, width/length 0.78, 0.78, 0.79; n = 3♀ from Arizona and Chihuahua.

Male/Female Matching. With the females of *chalceola, dithalea,* and *kastoni* well associated with males, there remain two males (*chaimona* and *huachuca*) and two females unmatched in southern Arizona. The matching of these is in doubt, but the following evidence supports the matching of the females described above with the male of *chaimona*: the flaps of the female are of typical robustness, as would be expected to match the embolus of *chaimona*; the first curve of the epigynal duct is narrow like the related *in-*

signis and *montana*; the cephalic plate is somewhat rugose as in males; these females have only been found in extreme eastern Arizona and south, as have the males.

Distribution (Map 18). Southeastern Arizona, Chihuahua, and Nuevo León.

Records. UNITED STATES: ARIZONA: Cochise Co.: Chiricahua Mtns.: Southwestern Research Station 8 km W of Portal (7♂ 1♀, AMNH), Cottonwood Creek, Rucker Canyon (1♂, AMNH), Cave Creek Canyon (1♂, AMNH). *MÉXICO:* CHIHUAHUA: Primavera (1♂, AMNH), San Jose Babicora (2♂, AMNH), summit NE of San Jose Babicora (1♀, AMNH), Madera (1♀, AMNH); NUEVO LEÓN: Cerro Potosí (1♂, MCZ).

Natural History. Collected from *Chrysothamnus* (1♂) and sweeping herbs (1♂) at elevations from 1,650 to 3,200 m. Males collected in May (1♂), June (6♂), July (3♂); females collected in July (3♀). Jung and Roth (1974) collected this species in their zone 2 in the Chiricahua Mountains (1,460–1,700 m elevation).

18. *Pelegrina clemata* (Levi & Levi, 1951) new combination
Figures 152, 153, 207, 246, 359–364; Map 19

Metaphidippus clematus Levi and Levi, 1951: 232, figs. 37, 39, 40, 42 (fig. 39 may be *insignis*), ♂♀. Holotype ♂ and paratype ♀ in AMNH with label "Metaphidippus clematus Levi ♀ ♂, ♂ holotype ♀ allotype, Medicine Hat, Alta., Aug. Carr," examined.

Dendryphantes clematus:—Roewer, 1954: 1209.

Diagnosis. Markings whitish instead of yellow distinguish it from *insignis*. Embolus narrower at tip than in *montana*, *insignis*, *chaimona*, and *dithalea*, much as in *baila* and *chalceola*, though these have different markings and a wider carapace than *clemata*. The tegulum's prominent bulge is unusual. The dark epigynum with a prominent shiny mound behind the flaps is distinctive.

Male. Palpus (Figs. 207, 360, 361): Erect portion of embolus straight, tapering or of equal width from base to tip, with small rami at tip; prolateral ramus is more prominent than retrolateral ramus, which is small and not projecting retrolaterally. Embolus lacks the spoonlike dorsal concavity present in the *montana* group. Tegulum swollen prolaterally into prominent bump. *Markings* (Figs. 152, 359): Carapace with white side bands and white V mark behind AMEs; sometimes with a weak marginal white band. Cheek band weak. Clypeus brown; hairs overhanging chelicerae dark. White forehead band contacts AMEs dorsally 10:30–12:30. Chelicerae occasionally with a few white scales medially. Palpus femur and distal segments including cymbium all with at least some white scales. Abdomen without central paired white spots; some males show paired black spots. *Measurements:* Body length 3.8(4.0)4.2 mm; carapace length 1.9(2.0)2.2 mm, width/length 0.76(0.77) 0.79; n = 5♂ from Outlook, Saskatchewan.

Female. Epigynum (Figs. 246, 362, 363): Dark and shiny. Flaps convergent. Entire area behind flaps raised into a bulge, so that surface rises abruptly behind flaps. Notch triangular or rounded and short, often only half the length of flaps. First curve of duct narrow; second curve goes medially. *Markings* (Figs. 153, 364): Carapace covered with white scales. Clypeus densely covered with white scales. Abdomen dorsum brown with white paired spots and lateral markings; usually with paired black spots, though not so distinct as *insignis*. The first three pairs of white spots may be joined to form two longitudinal bands. *Measurements:* Body length 4.7(5.8)5.8 mm; carapace length 1.9(2.1)2.1 mm, width/length 0.73(0.76)0.79; n = 5♀ from Outlook, Saskatchewan.

Chromosomes. 2n♂ = 26 acrocentrics + XXO (1♂ from Richfield, Utah).

Courtship (14♂ observed from Outlook, Saskatchewan; Morrin, Alberta; and Piute Co., Utah). *Raisedspread* (n = 21, 11♂). *Crouch* (n = 29, 9♂): Body at normal height (n = 8, 3♂) to low (n = 2, 1♂). First legs forward and horizontal (n = 15, 7♂) or slightly raised (n = 8, 3♂), or raised to 45° with femur low (n = 3, 2♂); nearly parallel (n = 5, 2♂), or spread fairly wide (n = 4, 2♂). First legs not waved (n = 11, 4♂). Palpi

down (n = 23, 8♂) and beside chelicerae (n = 3, 1♂) or curled under (n = 5, 1♂); flickered during series (n = 23, 8♂), vigorously (n = 5, 1♂) up and down (n = 4, 2♂), still on pause (n = 4, 2♂). Abdomen twitched (n = 15, 5♂) during series (n = 9, 3♂), or perhaps at end of series (n = 3, 1♂), still on pause (n = 4, 2♂); twitched continuously when walking to mount (n = 1). *Repertoires:* 3♂ raisedspread only; 2♂ crouch only; 8♂ raisedspread and crouch.

Distribution (Map 19). Western Canada and United States.

Records. In MCZ, AMNH, UWBM, MSU, and WPM from: *CANADA:* SASKATCHEWAN: Outlook; ALBERTA: Medicine Hat; Morrin Recreation Area on Red Deer River; BRITISH COLUMBIA: Bull River, ca. 115.5° W, 49.5° N; Cranbrook. *UNITED STATES* (county records): MONTANA: Sanders; WYOMING: Carbon, Lincoln, Park, Sheridan, Teton; COLORADO: Dolores, Gunnison, Huerfano, Lake, Larimer, Saguache; UTAH: Box Elder, Cache, Millard, Piute, Rich, Sevier, Summit, Utah, Weber; IDAHO: Bear Lake, Blaine, Canyon, Cassia, Fremont, Gem, Oneida, Payette; NEVADA: Elko; NEW MEXICO: Taos; WASHINGTON: Grant, Kittitas, Yakima; OREGON: Baker, Deschutes, Grant, Harney, Malheur; CALIFORNIA: Contra Costa, Eldorado, Los Angeles, Mono, Placer, Sierra, Siskiyou.

Natural History. From sagebrush (*Artemisia*) in Washington, Oregon, Colorado, Utah, and Wyoming (10 records). Also taken from field vegetation (Washington), *Purshia* (Oregon), *Chrysothamnus* (California), *Haplopappus*, and *Sarcobatus* (Utah), 1 record each.

19. *Pelegrina aeneola* (Curtis, 1892) new combination
Figures 156, 157, 208, 209, 247, 365–377; Map 21

Dendryphantes aeneolus Curtis, 1892: 332. Types in MCZ 3♂, 6♀ with labels "Dendryphantes aeneolus Curtis 1892. California. Co-type. ♂ ♀" (label is original; handwritten, probably by Elizabeth Peckham) and "G. W. Peckham Coll.", examined. Curtis (1892: 335) implies that the type locality is the San Francisco Bay area. G. & E. Peckham, 1909: 468, pl. 36, figs. 1–1b, and pl. 38, 6, 6a, ♂♀. Roewer, 1954: 1205.

Dendryphantes bifida Banks, 1895: 96. Types in MCZ 2♀, 3 p♂ with labels "Dendryphantes bifida Bks. type", "Olympia, Wash" and "Nathan Banks Coll.", examined. This type series is incomplete, for Banks described the adult male.

Dendryphantes (Metaphidippus) aeneolus:—Petrunkevitch, 1911: 622.

Dendryphantes uteanus Chamberlin and Gertsch, 1929: 110, figs. 50, 51, ♂. Holotype in AMNH 1♂ with labels "Dendryphantes uteanus, ♂ holotype," "Metaphidippus aeneolus (Curtis), ♂ w111.n40, HOLOTYPE Dendryphantes uteanus Chamb. & Gert.", "Utah: Lamb's Can 6-10-28 W. J. G.", and "28Ff. N40:W111," examined. Roewer, 1954: 1216. Bonnet, 1956: 1402. NEW SYNONYMY.

Metaphidippus aeneolus:—Chamberlin and Ivie, 1941: 26. Bonnet, 1957: 2809.

Diagnosis. A common species of the western United States and Canada. Males are notable for their dark markings, with reduced white scales on the carapace. The rami of the embolus are more widely separated than in *clemata*, *balia*, or *chalceola*. Females can be identified by carapace and abdominal markings, the epigynal topography and angled flaps. The epigynal surface rises more abruptly behind the flaps than in *balia*, but not so raised in a bulge as in *insignis* or *clemata*. The epigynal flaps are much more robust than in the sympatric *Metaphidippus mannii*, from which *aeneola* also differs in markings, including having white scales between AMEs.

Male. Palpus (Figs. 208, 209, 366–372): Embolus leaning toward the retrolateral, broadest at tip; two rami widely separated. *Markings* (Figs. 156, 365): Carapace dark and shiny, with few or no white scales except beneath ALEs and small eyes (occasional ♂♂ have white side bands, though usually sparse). Clypeus brown; hairs overhanging chelicerae dark brown. Forehead band absent; setae ringing AMEs white at least laterally 2:00–3:00; otherwise, thin scales brown to white. Chelicerae lack pale scales. Cymbium lacking white scales. Abdomen dark; white side bands often faint or absent posteriorly. *Measurements:* Body length 4.2(4.3)4.7 mm; carapace length 2.0(2.1)2.2 mm, width/length 0.75(0.79) 0.81; n = 7♂ from Oregon, Nevada, and Utah.

Female. Epigynum (Figs. 247, 373–376): Flap with inner edge angled where the posterior half of flap bends down into depression. Surface rises abruptly, almost immediately posterior to the flaps, but pos-

terior portion of epigynum is fairly flat. Notch often triangular with a sharp anterior point, but many ♀♀ have rounded notch. First curve of duct narrow; second curve proceeds medially. *Markings* (Figs. 157, 377): Carapace only thinly covered with white scales; bronze scales also especially on cephalic plate. Most females with inverted T marking on cephalic plate consisting of white band of scales starting between AMEs, proceeding posteriorly, then spreading laterally to behind small eyes. Otherwise, bronze behind AMEs and ALEs, and bronze between posterior eyes. Clypeus densely covered with white scales, paler between AMEs than in *balia* and *mannii*, which have orange scales. Abdomen white markings usually small except often large central pale spot. Background dark, often bronze or gray, occasionally with paired dark spots on either side of the midline.*Measurements:* Body length 4.5(4.8)6.1 mm; carapace length 2.0(2.1)2.3 mm, width/length 0.77(0.79)0.85; n = 7♀ from Oregon and Arizona.

Geographical Variation. In western ♂♂ (*aeneola* proper, British Columbia, Washington, Oregon, California), embolus narrow with prolateral face gently curved or slightly bent (Fig. 208); in eastern ♂♂ (form *uteanus*, South Dakota, Montana, Wyoming, Colorado, Utah, New Mexico, Arizona), embolus is wider with prominent angle on prolateral face just basal to the opening, and rami more divergent (Fig. 209). The few specimens available from the intermediate area (Idaho, Nevada, and southeastern California) and occasional specimens from Oregon show some intergradation. No other differences in ♂♂ and none in ♀♀ have been found between western and eastern populations; hence, I consider them conspecific. ♂♂ from the Columbia basin of Washington, some from southern California, and occasional males from Oregon and northern California have extensive but not very dense white side bands on the carapace.

Chromosomes. 2n♂ = 26 acrocentrics + XXO (2♂ from Apple Canyon, Riverside Co., California).

Courtship (9♂ observed from Yakima and Kittitas Counties, Washington, and Riverside Co., California). First legs make triangular shape during crouch display, as in *P. verecunda*. *Raisedspread* (n = 21, 5♂). *Crouch* (n = 22, 8♂): Body low (n = 6, 3♂). First legs horizontal (n = 17, 7♂) but femora held back and to sides and distal segments pointed forward and with tarsi nearly touching so as to make a triangle shape (n = 12, 5♂), though occasionally femora held forward and tips not touching (n = 3, 1♂). First legs flickered on series (n = 9, 4♂), but only slightly (n = 3, 1♂) or not waved (n = 7, 3♂); also flickered when very close (n = 6, 4♂) at which time legs extended (n = 4, 3♂). Palpi tucked in (n = 6, 2♂), flickering on series (n = 6, 2♂) or when male very close (n = 2, 2♂). *Repertoires:* 1♂ raisedspread only; 4♂ crouch only; 4♂ raisedspread and crouch.

Distribution (Map 21). Western United States, extending into Canada and México.

Records. Many specimens, especially in MCZ, AMNH, UWBM, and UCB, from: *CANADA:* BRITISH COLUMBIA: Alice Lake Province Park; Creston; Furry Creek; Massett; Victoria; Wellington, Qualicum, Nanaimo; ALBERTA: Waterton Lakes National Park. *UNITED STATES* (county records): SOUTH DAKOTA: Custer, Horsethief, Jackson, Pennington; MONTANA: Flathead, Lewis and Clark, Park; IDAHO: Bear Lake, Boise, Bonner, Franklin, Latah, Oneida, Payette, Washington; WYOMING: Sheridan; COLORADO: Alamosa, Custer, Douglas, Fremont, Hinsdale, Juab, La Plata, Larimer, Logan, Montezuma, Utah; UTAH: Box Elder, Cache, Davis, Grand, Juab, Piute, Salt Lake, Uinta, Weber; NEVADA: Washoe; NEW MEXICO: Bernalillo, Lincoln, Otero, Rio Arriba, Sandoval, San Miguel, Santa Fe, Taos, Torrance, Valencia; ARIZONA: Apache, Cochise, Coconino, Graham, Mohave, Yavapai; WASHINGTON: Asotin, Chelan, Clallam, Columbia, Douglas, Grant, Grays Harbor, Jefferson, King, Kittitas, Pierce, San Juan, Skagit, Skamania, Snohomish, Stevens, Thurston, Walla Walla, Yakima; OREGON: Benton, Deschutes, Douglas, Grant, Harney, Jackson, Jefferson, Josephine, Klamath, Lake, Lane, Marion, Multinomah, Umatilla, Union, Wallowa; CALIFORNIA: Alameda, Contra Costa, El Dorado, Kern, Lassen, Los Angeles, Marin, Mendocino, Modoc, Monterey, Nevada, Orange, Plumas, Riverside, San Bernardino, San Diego, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Santa Cruz Island, Shasta, Sierra, Siskiyou, Trinity, Tulare, Ventura, Yuba. *MÉXICO:* BAJA CALIFORNIA DEL NORTE: Parque Nacional Sierra San Pedro Martin.

Natural History. Habitat: In Washington, collected from pines including *Pinus ponderosa*, understory of riparian poplar woodland, understory ferns, *Ceanothus*, alders in bog, lakeside marsh, houses; at elevations of less than 50 m to more than 1,700 m. More than 15 adults males and females were recovered by D. H. Mann and others on snow at 1,700–3,000 m, apparently having ballooned (Pierce Co., Washington). In Oregon, commonly collected from *Abies grandis* and *Pinus ponderosa*; also from *Pseudotsuga*, *Picea*, *Pinus contorta*, hemlock, alder, *Salix*, bracken fern, *Calocedrus*, *Taxus*, oak, *Ceanothus*, and *Larix occidentalis*. Curtis (1892) reported it common in San Francisco area gardens on honeysuckle, rose bushes, live oaks, and *Laurestina*. In Nevada, beating pinyon pine; in Arizona on pine. *Life cycle:* In Oregon's Malheur National Forest, B. Fichter and A. Moldenke collected 44♂ 77♀ from 12 to 17 June 1982, 6♂ 25♀ from 18 to 23 July 1982, and 81♀ from 20 to 29 September 1982. In the San Francisco area, "males and females appear as adults as early as April, but the former become rare after the first of June and the latter after the first of September. The females begin laying eggs in May" (Curtis, 1892: 335). Curtis reported one or two egg sacs per females with about 50 eggs that hatched on average in 25 days. In Los Angeles County, California, the 20♂♂ examined by me were collected from November through June; the 21♀♀ from February through June plus two in September. *Behavior:* Curtis (1892) described the spider's entrance to and defense of its retreat, its ballooning, and its reaction to a sluggish pet lizard. Land (1969a, b, 1971) investigated visual behavior and eye structure and function of *P. aeneola*.

20. *Pelegrina balia* new species
Figures 210, 248, 378–382; Map 20

Holotype male and paratype female in UCB with label "CA[lifornia]: S[an]ta. Barbara Co., Ballinger Cyn., 17 mi. [27 km] SE. New Cuyama, el. 3000' [915 m], V-9-1980, C. E. Griswold."

Etymology. After the Greek adjective *balios*, meaning "dappled" (Woods, 1966).

Diagnosis. A large western species with light brown and beige markings. The male can be identified by the broad side bands of the carapace and the flange on the fang. The embolus is narrow, very similar to that of *chalceola*, but it leans slightly and the erect portion broadens gradually into base. The tibial apophysis of *balia* usually points more distally than in *chalceola*. The female can be identified by the spotted abdomen and the epigynum, which differs from that of the sympatric *aeneola* in having the surface rise gradually behind the flaps.

Male. Palpus (Figs. 210, 379): Embolus narrow and tall, leaning slightly to retrolateral; erect portion broadens gradually into base. Retrolateral ramus points retrolaterally. Retrolateral edge of embolic base with membranous fold, unlike *chalceola*. *Chelicerae* robust and divergent; fang with pronounced flange on cutting edge (Fig. 378, arrow). *Markings* (Fig. 378): unlike most other *Pelegrina* males in having markings more spotted than striped. Carapace with distinctive, broad creamy white side bands. Cheek band weak and broad. Clypeus brown; hairs overhanging chelicerae dark with some white medially. White forehead band fails to contact AMEs dorsally, which are ringed by dark or at most thin white setae. Chelicerae lacking pale scales. Cymbium lacking white scales. Abdomen either mottled as in female, with conspicuous basal band and second lateral bar, or with side spots fused into very wide cream side bands. *Measurements:* Body length 3.8(4.3)5.1 mm; carapace length 1.8(2.1–2.3)2.3 mm, width/length 0.79 (0.81–0.82)0.85; n = 6♂ from California, Oregon, and Washington.

Female. Epigynum (Figs. 248, 380, 381): Flaps usually light brown, convergent, though sometimes dark. Epigynal surface mostly concave except or bump just medial to flaps; surface rises behind flaps gradually to a medial and posterior bulge. First curve of duct pale; second curve goes me-

dially; third curve smooth on inner surface. *Markings* (Fig. 382): Carapace covered densely with yellow-white scales, often with dark streak on thorax side. Clypeus densely covered with white, between AMEs orange or tan (white in some Oregon ♀♀). Abdomen mottled with large pale spots: with pale basal band fused to first lateral bar; second oblique bar swollen; posterior lateral bars inconspicuous; central pale spots round, edge or connected with dark brown. *Measurements:* Body length 4.7(5.2)6.1 mm; carapace length 2.1(2.2)2.3 mm, width/length 0.79(0.80) 0.81; n = 5♀ from California.

Male/Female Matching. This matching is indicated by the similarity in robust carapace and mottled markings and by cocollecting.

Distribution (Map 20). California, north to Washington and east to Arizona and Colorado.

Records. About 70 specimens in AMNH, UCB, and MCZ from: *UNITED STATES* (county records): WASHINGTON: Spokane; OREGON: Baker, Deschutes, Harney, Jackson, Klamath, Lane, Wheeler; CALIFORNIA: El Dorado, Fresno, Inyo, Kern, Lassen, Los Angeles, Mariposa, Mendocino, Modoc, Mono, Plumas, Riverside, San Bernardino, Santa Barbara, Shasta, Siskiyou, Sonoma, Stanislaus, Trinity, Ventura; COLORADO: Mesa; ARIZONA: Yavapai.

Natural History. On *Juniperus occidentalis* (3 records), *Pseudotsuga* (2 records), *Cupressus macnabiana* (1 record), *Abies* (1 record), and *Calocedrus* (1 record) in Oregon and northern California. From juniper woodland in California (5 records). Over the entire range, 3♂ were collected in April, 10 in May, 3 in June and 1 in September.

21. *Pelegrina chalceola* new species
Figures 139, 211, 383–387; Map 20

Metaphidippus n. sp. nr. *montanus:*—Jung and Roth, 1974: 33 (specimens identified by W. J. Gertsch, examined).

Holotype male and several immatures in MCZ with label "ARIZONA: Santa Cruz Co., upper Madera Canyon, Santa Rita Mtns., ca. 5500 ft [1,680 m]. 13 Aug 1983. W. Maddison 83-158 oak woodland, beating oaks."

Etymology. An arbitrary combination of letters designed to resemble the name of the similar species *P. aeneola* both in structure and in referring to the bronze color (Greek, *chalceos*).

Diagnosis. A dark, shiny southwestern species resembling *aeneola* and *balia*. The narrow, tall embolus is much like that of *balia*, from which *chalceola* differs by the lack of the pronounced flange on the male fang, and the much darker body with a bronze sheen in both males and females.

Male. Palpus (Figs. 211, 384): Erect portion of embolus narrow and tall, straight, usually broadens abruptly into embolic base so as to leave angle between erect portion and base. Retrolateral ramus points retrolaterally. Retrolateral edge of embolic base is simple and schlerotized, lacking the fold seen in *balia*. *Markings* (Figs. 139, 383): Carapace dark, with narrow white side bands often reduced behind posterior eyes. Cephalic area with transparent bronze scales. Forehead lacks white band, though in some males there is small patch of pale scales between and behind AMEs. Cheek band weak to almost absent. Clypeus brown; hairs overhanging chelicerae white centrally and tan laterally, to all brown. Setae ringing AMEs brown dorsally. Chelicerae robust but vertical, with none to a few pale scales medially. Cymbium lacking pale scales. Third leg dark on distal ⅔ to entirely dark. Abdomen dorsally brown with paired black spots and thin white side bands; third and fourth pairs of white spots when present are laterally directed bars. *Measurements:* Body length 3.9(4.0)4.9 mm; carapace length 1.8(2.1)2.3 mm, width/length 0.80(0.82) 0.83; n = 5♂ from Arizona.

Female. Epigynum (Figs. 385, 386): Flaps short, slightly convergent, posteriorly in concavity. Epigynal surface gently convex behind flaps. Second curve of duct goes medially; third curve with rough inner surface. *Markings* (Fig. 387): Brown with bronze sheen. Carapace covered with reflective white to tan scales. Spots of pale scales between anterior eyes similar to *fla-*

vipedes. Clypeus densely covered with white scales. AME eye ring darkest dorsally, tan to brown, as in male. Abdomen with large paired dark spots. *Measurements:* Body length 4.4, 4.4, 4.7, 4.7 mm; carapace length 2.1, 2.2, 2.3, 2.3 mm, width/length 0.78, 0.78, 0.81; n = 4♀ from Arizona.

Male/Female Matching. Among Arizonan species, the female and male share a distinctive wide box-shaped carapace, dark bronzed appearance, and markings on abdomen. The AME ring dark above and light elsewhere also unites male and female. The underside of the abdomen is also fairly pale, distinguishing it from the female of *huachuca.*

Geographical Variation. Two male *Pelegrina* from Durango tentatively identified as *chalceola* differ from specimens from the United States in being large (body length 5.2,5.2 mm; carapace length 2.5,2.5 mm, width/length 0.82,0.83), with embolus shorter and leaning more to the retrolateral in the distal half, and with a bump on the side of the chelicera almost as in the *mannii* group but not so well developed.

Courtship (1♂ observed from Madera Canyon, Arizona). *Raisedspread* (n = 6): Carapace high (n = 6); abdomen down (n = 6) and trailing (n = 2). First legs raised, forward, spread (n = 6), but legs moved to more parallel as he got closer (n = 4), waved little if at all (n = 6). Palpi down, waving little if at all (n = 6). Male proceeded directly from raisedspread to reaching to touch the female, without going through a crouch display (n = 4).

Distribution (Map 20). Southern Arizona east to southern Illinois.

Records. UNITED STATES: ARIZONA: Cochise Co.: Chiricahua Mtns., Southwestern Research Station (8♂, AMNH); Chiricahua Mtns. (1♀, AMNH); Huachuca Mtns., Montezuma Pass (1♂, AMNH); Santa Cruz Co.: Santa Rita Mtns., Madera Canyon (1♂, MCZ; 1♂, AMNH), Santa Rita Mtns. (2♀, AMNH); TEXAS: Denton Co.: Lake Dallas opposite Hatchery (1♂, MCZ); Erath Co.: Stephenville (3♂, TXAM); ARKANSAS: Washington Co.: Boston Mtns., Cove Creek Valley, 24 km S of Prairie Grove (1♂, MCZ); ILLINOIS: Hardin (♀).

Natural History. Collected beating oaks in oak woodland (1♂, Arizona) and from juniper (1♂, Texas) at altitudes from 300 m (Arkansas) to 1,650 m (Arizona). Jung and Roth (1974) collected this species in their zones 1 and 2 in the Chiricahua Mountains (1,200–1,700 m).

22. *Pelegrina furcata* (F. P.-Cambridge, 1901) new combination

Figures 158, 159, 212, 249, 250, 388–402; Map 22

Metaphidippus furcatus F.P.-Cambridge, 1901: 267, pl. 24, figs. 8, 8a, ♂. Type material in BMNH 2♂ with label "Dendryphantes furcatus, sp. n. m's, Orizaba, Mexico (H. S.)" and 2♂ with label "Dendryphantes furcatus, sp. n. Type ♂, Syntype ♂., Guatemala (Sarg)," examined. Despite the type label on the latter specimens, the holotype may be better considered to be among the former, given Cambridge's indication of the distribution as Orizaba. Bonnet, 1957: 2813.

Dendryphantes furcatus:—G. & E. Peckham, 1909: 473. Roewer, 1954: 1203.

Dendryphantes mimus Chamberlin, 1925b: 135, figs. 53, 54, ♂. Holotype in MCZ 1♂ with label "Dendryphantes mimus Chamb., ♂ holotype, N. M.: Pecos, R. V. Chamberlin Coll. 1047," examined. Roewer, 1954: 1212. Bonnet, 1956: 1396. NEW SYNONYMY.

Diagnosis. A species common in the Mexican highlands, with a striking courtship display and distinctive embolus having two blunt rami. The epigynum, with convex flaps, concave surface, and wide second curve of the ducts, is distinctive.

Male. Palpus (Figs. 212, 389–394): Embolus heavy and slanting, with retrolateral ramus extended and truncate. *Markings* (Figs. 158, 88): dark brown with distinct sheen and contrasting white side bands. Carapace side bands usually connect to white scales over anterior eye row to make a continuous band of white encircling the front of the carapace (though not seen in male drawn, Fig. 388). Cheek band moderately weak. Clypeus brown; hairs overhanging chelicerae brown to white medially, brown laterally. White forehead

band contacts AMEs dorsally 10:30–12:30 or 1:00. Chelicerae with some pale scales medially. Cymbium lacking pale scales. *Measurements:* Southern Arizona: Body length 3.5(4.2)4.5 mm; carapace length 1.7(2.1)2.2 mm, width/length 0.74(0.77) 0.77; n = 5♂ from Santa Rita Mtns., Arizona. Northern Arizona: body length 3.5, 3.6, 3.9 mm; carapace length 1.7, 1.8, 1.8 mm, width/length 0.75, 0.78, 0.79; n = 3♂ from Yavapai Co., Arizona.

Female. Epigynum (Figs. 249, 250, 395, 397, 398, 400, 401): Flaps strongly convex and often dark. Surface concave behind flaps, without mound, rising gradually to lip at back edge. First curve of duct narrow; second curve broad initially but narrows as it proceeds medially. *Markings* (Figs. 159, 396, 399, 402): Body often with slight bronze sheen; variable in markings. Carapace covered with brassy reflective scales, sometimes dark, sometimes mixed with white. Clypeus only thinly covered with white scales except in northernmost populations (form *mimus*). *Measurements:* Southern Arizona: Body length 4.5(4.7–4.9)5.4 mm; carapace length 2.0(2.1)2.2 mm, width/length 0.75(0.78–0.79)0.79; n = 6♀ from Santa Rita Mtns., Arizona. Northern Arizona: Body length 4.0(4.6)5.7 mm; carapace length 1.8(1.8)2.0 mm, width/length 0.72(0.75)0.77; n = 5♀ from Yavapai Co., Arizona.

Geographical Variation. Four geographical forms might be recognized. (1) The most widespread form occurs from Guatemala north to northern México, with narrower embolus and thinner epigynal flaps that are divergent or parallel (*furcata s.s.*,; Fig. 393). The retrolateral ramus of the embolus is truncated obliquely. Most females through this range are well marked with pale spots, as in form *mimus* (Fig. 396). (2) A second form, very similar to the widespread form, occurs in the Santa Rita, Santa Catalina, and Chiricahua Mountains of southern Arizona and probably in northern México (Figs. 392, 397–399). The embolus is also narrow and the flaps divergent or parallel, but the retrolateral ramus of the embolus is truncated transversely, so that its distal tip makes a line perpendicular to the axis of the palpus. Females are dark. (3) A third form occurs in northern Arizona (Yavapai Co.), Colorado, and New Mexico, having a wider embolus and convergent flaps (*mimus*: Figs. 390, 391, 395, 396). The retrolateral ramus of the embolus is truncated transversely, as in form (2). The difference between the northern (*mimus*) and southern (*furcata*) Arizona specimens is rather striking, for the females are also smaller and paler in the north. Though *mimus* might be considered a distinct species, specimens in New Mexico present a confusing mixture of characteristics of forms (1), (2), and (3). (4) A fourth form is found in western Oaxaca (4♂ 15♀, 31 km N or Guelatao de Juarez, ca. 96.5°W, 17.5°N, 2,600 m el., 3 August 1983, W. Maddison & R. S. Anderson, MCZ), with very wide embolus, dark females, and extremely robust flaps (Figs. 388, 400–402).This form occurs within 50 km of the widespread form. In total, the variation among these populations is confusing, and though several species may be present, only one will be recognized until better studied.

Chromosomes. 2n♂ = 26 acrocentrics + XXO (2♂ from Madera Canyon, Arizona).

Courtship (10♂ observed from Nuevo León, Hidalgo, Queretaro, Puebla, Oaxaca, Chiapas, and the Santa Rita Mountains of Arizona). Very unusual for the genus, with vigorous leg waving and body jerking in a stage I will call the semaphore stage. *Semaphore* (n = 24, 10♂): Body high to very high (n = 24, 10♂). Male walked sidling (n = 19, 8♂) in series (n = 14, 5♂). First legs wide, nearly 180° apart, approximately horizontal (n = 21, 8♂) or below horizontal (n = 1), though occasionally not much more than 90° apart and raised to 60° (n = 1), waved vigorously up and down almost to vertical (n = 21, 9♂), though sometimes only to ca. 40° (n = 1), at ca. 3–4 c/s (n = 2, 2♂) or 5 c/s (n = 1) on each sidle (n = 9, 4♂). The leg wave is vertical and slightly posterior to bring the legs up

and back (n =7, 4♂); the left and right sides wave in unison (n = 4, 3♂), or occasionally asynchronously (n = 1). Palpi hanging down (n = 18, 8♂) and parallel (n = 9, 4♂) and a bit forward (n = 7, 3♂). Palpi wave with low-medium amplitude (n = 5, 3♂) on each sidle (n = 4, 2♂), up and down like pushing and pulling motion (n = 1), or largely still (n = 1, 2♂). Abdomen trails a bit on sidles (n = 5, 2♂), ca. 10–30° (n = 3, 1♂), but more or less horizontal (n = 16, 5♂). Occasionally ♂ pauses from vigorous leg waving and jerks whole body (n = 11, 6♂) approximately 4–5 times (n = 3, 3♂) or 3 times (n = 1) while the first legs are spread wide and horizontal (n = 11, 6♂). These jerks came after a few sidles (n = 1). The body may be lowered for the jerks (n = 1). *Reach* (n = 3, 2♂): The male proceeded directly from this semaphore stage into the reach to touch the female (n = 3, 2♂). During reach, body jerked a few times (n = 1). First legs held parallel and forward (n = 2, 2♂). Palpi held parallel and forward (n = 2, 2♂).

This description is from the widespread form (1) with the following exceptions. Displays of 4♂ from the distinctive population from Guelatao de Juarez, Oaxaca (form (4)), showed the same form of semaphore display with legs spread wide, vigorously waved up during series (n = 11, 4♂). No whole-body jerks were noted, however. One male from southern Arizona (form (2)) showed the same semaphore display (n = 4), though no whole-body jerks were noted.

Distribution (Map 22). Throughout the highlands of México, extending north to Colorado and south to Guatemala.

Records. Mostly in MCZ and AMNH: *UNITED STATES* (county records): COLORADO: Boulder (4♂), El Paso (1♂), Rio Grande (1♂); NEW MEXICO: Bernalillo (1♂ 3♀), Catron (1♂), Colfax (2♂ 1♀), Grant (1♂), Lincoln (3♂ 4♀), Los Alamos (1♂), Mora (2♀), Otero (1♂ 2♀), Sandoval (1♂ 2♀), San Miguel (1♂), Santa Fe (1♂), Socorro (2♂), Valencia (1♂ 3♀); ARIZONA: Cochise (more than 15 ♂ 9♀), Santa Cruz (18♂ 17♀), Graham (1♀), Pima (3♂ 2♀), Yavapai (5♂ 8♀). *MÉXICO:* NUEVO LEÓN: Cerro Potosí (2♂ 4♀); Monterrery (1♂); CHIHUAHUA: Canon Prieta, near Primavera (1♀); HIDALGO: 4 km NE of Tlanchinol (2♂ 6♀); 3.4 km SW of Cuesta Colorada (4♂ 2♀); 10 km SW of Santa María, 99°00'W, 21°06'N (1♂); 8 km N of Encarnacion, 99.12°W, 20.55°N (2♀); Huachinango (1♀); Apulco (1♂ 2♀); Champuhuacan (1♀); Maguey Verde, 99.12°W, 20.49°N; PUEBLA: 8 km N of Teziutlan (1♂ 3♀); near Xicotepec de Juarez, 97°59'W, 20°17'N (1♂) 5 km N of Hwy 130 on road to Naupan (1♂); QUERETARO: ca. 99°10'W, 21°15'N (5♂ 3♀); GUERRERO: Chilapa (1♀); VERACRUZ: 3 km N of Fortin de las Flores (1♂); 6 km NE of Coscomatepec (2♂); 7 km N of Huatusco (1♂ 3♀); Orizaba (♂♂♀♀); DISTRITO FEDERAL: Santa Rose (1♂), Contreras (1♂); OAXACA: 23 km SW of Valle Nacional on Hwy 175 (4♂ 5♀); 27 km SW of Valle Nacional on Hwy 175 (1♂ 2♀); 31 km N of Guelatao de Juarez (4♂ 15♀); CHIAPAS: 5 km W of San Cristóbal de las Casas (3♂ 3♀); Grutas de San Cristóbal (1♀); San Cristóbal (4♂ 4♀). *GUATEMALA:* locality unknown (2♂).

Natural History. Collected from oak (7 records), grasses, herbs, and shrubs in clearings (5 records), pine (3 records), juniper (1 record), *Ceanothus* (1 record), *Cercocarpus* (1 record), in oak-pine cloud forest zones. Collected at elevations of 1,000–1,400 m (8 records, 1,500–2,000 m (7 records), and 2,100–3,000 m (7 records).

23. *Pelegrina volcana* new species
Figures 213, 403, 404; Map 23

Holotype male in MCZ with labels: "PANAMA: El Volcán, A. M Chickering" and "R. P. El Volcán, Aug. 9–14, 1950."

Etymology. An arbitrary combination of letters referring to the type locality, to be treated as an adjective.

Diagnosis. Known from only two males from Panamá; much like *bicuspidata* but the long embolus is not so bent as in that species.

Male. Palpus (Figs. 213, 404): Erect portion of embolus broadens gradually into base; rami small and subequal. Tibial apophysis appears double because ridge prolonged into second apophysis, more extreme than in *furcata* (Fig. 389). *Markings* (Fig. 403): Typical for genus with carapace side bands, forehead band. Cheek band dense. Clypeus brown; hairs overhanging chelicerae white medially and brown laterally. White forehead band con-

tacts AMEs dorsally 10:30–12:30. Chelicerae with long medial patch running almost at least ⅔ length. Palpus femur distinctly paler than more distal segments. Cymbium with none or few white scales. Legs fairly distinctly annulate. Anterior three pairs of abdominal spots longitudinally directed, 4 through 6 transverse. Strong abdominal side bands. *Measurements:* Body length 3.5, 3.7 mm; carapace length 1.7, 1.8 mm, width/length 0.76, 0.77; n = 2♂ from Panamá.

24. *Pelegrina bicuspidata* (F. P.-Cambridge, 1901) new combination
Figures 214, 405, 406; Map 23

Metaphidippus bicuspidatus F. P.-Cambridge, 1901: 269, pl. 24, figs. 13, 13a, b, ♂. Holotype in BMNH 1♂ with labels "Dendryphantes bicuspidatus, sp. Type ♂, Guatemala (Sarg)" and "1905, 268.", examined. Bonnet, 1957: 2810.
Dendryphantes bicuspidatus:—Roewer, 1954: 1191.

Diagnosis. A rarely collected species from southern México and Guatemala. The distinctive embolus is long and bent, unlike that of *volcana*.

Male. Palpus (Figs. 214, 406): Embolus heavy, abruptly bends basal to opening. Rami small and subequal. Tibial apophysis appears double because ridge prolonged into second apophysis, more extreme than in *furcata* (Fig. 389). *Markings* (Fig. 405): Typical for the genus, with white cheek, forehead, and side bands. Cheek band moderately dense. Clypeus brown; hairs overhanging chelicerae white medially, brown laterally. White forehead band contacts AMEs dorsally 10:00–12:30. Chelicerae with thin patch of pale white scales medially extending to ⅔ length. Palpus femur distinctly paler than more distal segments. Cymbium lacking white scales. Legs with fairly distinct annulation; back of tibia 2 uniformly pale; femur 3 dark in distal ⅓. Abdomen dorsum more or less solid brown, without trace of dark spots, surrounded by discrete white side bands on abdomen. (Description based mostly on Chiapas ♂.) *Measurements:* Body length 2.7, 3.2 mm; carapace length 1.3, 1.5 mm, width/length 0.77, 0.83; n = 2♂ from Chiapas and Guatemala.

Female. None matched to male. Cambridge's *P. ochracea* may represent the female of *P. bicuspidata*.

Records (Map 23). In addition to the holotype, one other male is known, from México: Chiapas: pine forest, 24 km NW of Arriaga 94.01°W, 16.25°N, 27 August 1966 (AMNH).

25. *Pelegrina ochracea* (F. P.-Cambridge, 1901) new combination
Figures 407–409; Map 23

Metaphidippus ochraceus F. P.-Cambridge, 1901: 272, pl. 25, figs. 6, 6a, ♀. Holotype in BMNH 1♀ with label "Dendryphantes ochraceus, sp. n. Type ♀, Guat. (Sarg)," examined. Bonnet, 1957: 2816. Chickering's *M. ochraceus* (1946: 312) is not the same as this species, nor is it a *Pelegrina*.
Dendryphantes ochraceus:—Roewer, 1954: 1198.

Diagnosis. The epigynum is similar to that of *P. furcata*, but the flaps are not quite so convex and are shorter. As already noted, this could be the female of *P. bicuspidata*.

Female. Epigynum (Figs. 407, 408): Flaps convex, parallel, and fairly short; light brown; behind them the surface is gently concave with mound restricted to near posterior margin, and median ridge extending from flaps to posterior mound. First curve of duct narrow; second curve proceeds medially. *Markings* (Fig. 409): Carapace red-brown, thinly covered with white scales. Clypeus covered with white scales, scales surrounding AMEs white. Legs lacking strong annulae, tan to light brown. Abdomen light brown with pale markings (Fig. 409). *Measurements:* Holotype body length 4.0 mm; carapace length 1.6 mm, width/length 0.75.

Records (Map 23). MÉXICO: OAXACA: Oaxaca, Base San Felipe Mtn., 16–17 September 1947 (1♀, AMNH); CHIAPAS: San Cristóbal, 13 September 1947 (1♀, AMNH). *GUATEMALA* (1♀, BMNH).

26. *Pelegrina morelos* new species
Figures 215, 410–414; Map 23

Holotype male in AMNH with label "7 mi [11 km] N Cuernavaca, Morelos, Mexico, July 3, 1941, A M and L I Davis."

Etymology. A noun in apposition, after the type locality.

Diagnosis. Much like *furcata,* but the retrolateral ramus of the embolus is prolonged and curves to the prolateral. The female matched to the holotype has much more contrasting markings than in *furcata* and epigynal ducts with a much narrower second curve.

Male. Palpus (Figs. 215, 411): Embolus with two blunt rami much like those of *furcata,* but the retrolateral is long and curves to the prolateral. Tibial apophysis appears double because ridge prolonged into second apophysis. *Markings* (Fig. 410): Carapace side bands dense and discrete. Cheek bands weak. Clypeus brown; setae overhanging chelicerae dark except a few white hairs medially. White forehead band contacts AMEs dorsally 10:30–12:30. Chelicerae with a few white scales medially. Palpus cymbium brown, lacks white scales. Abdomen with white side bands and paired white spots reminiscent of female. *Measurements:* Body length 38 mm; carapace length 1.9 mm, width/length 0.78.

Female. Epigynum (Figs. 412, 413): Flaps long and convex, dark. Epigynal surface slightly concave, rises gradually behind flaps to higher posterior margin. First curve of duct broad; second curve narrow, proceeds medially. *Markings* (Fig. 414): Carapace brown, thinly covered with white scales. Clypeus covered with white scales though scales surrounding AMEs are orange laterally and medially. Legs annulate. Abdomen strongly marked with four distinct pairs of white spots on dark background; fourth pair large and transverse. *Measurements:* Body length 4.7 mm; carapace length 1.9 mm, width/length 0.80.

Male/Female Matching. The female described is matched tentatively with the male, for both are similar to *furcata* in genitalia, they have similar abdominal markings with strong lateral fourth pair of spots, and they occur sympatrically.

Records (Map 23). In addition to the male holotype, the single female known is from: México: Morelos: Cuernavaca, July 1953 (AMNH).

27. *Pelegrina huachuca* new species
Figures 216, 415–419; Map 24

Holotype male in AMNH with label "ARIZONA: 8000 ft. [2,440 m], Carr Canyon, Huachuca Mts., June 3, 1952."

Etymology. A noun in apposition, after the type locality.

Diagnosis. Most distinctive for its large branched embolus bearing some resemblance to that of *P. furcata.* Females matched with the male have long flaps in a distinctively sculptured epigynum.

Male. Palpus (Figs. 216, 416): Embolus large and unusual, with retrolateral ramus extended retrolaterally as a long blade. Tibial apophysis appears double because ridge prolonged into second apophysis. *Markings:* Typical for the genus, with cheek, side, and forehead bands on the carapace and side bands on the abdomen. Cheek band moderately dense. Clypeus brown; hairs overhanging chelicerae dark with some white centrally. White forehead band contacts AMEs dorsally. Chelicerae with a few pale scales medially. Legs with indistinct annulation. *Measurements:* Body length 3.7 mm; carapace length 1.8 mm, width/length 0.77; n = 1♂ from Huachuca Mtns., Arizona.

Female. Epigynum (Figs. 417, 418): Flaps dark, long, and parallel. Surface bulges just medial to flaps about half way along their length; behind this the surface is concave, rising gradually into pronounced medial and posterior bulge. First curve of ducts very broad; second curve goes anteriomedially. *Markings* (Fig. 419): Carapace covered with white scales with some light brown. Clypeus densely white; white between AMEs. AME scales yellowish white above, white below. Abdomen brown; central pale spots are laterally directed bars, side bands. *Measurements:* Body length 4.5, 5.1 mm; carapace length

2.1, 2.2 mm, width/length 0.79, 0.80; n = 2♀ from Santa Catalina and Santa Rita Mtns., Arizona.

Male/Female Matching. As discussed under *P. chaimona*, there is doubt regarding the male/female association of *chaimona* and *huachuca*. The following evidence supports the matching of the females already described with the male of *huachuca*: the flaps of the female are long and convex, the surface has distinct concavities and bulges, and the first curve of the duct is very broad, as would be expected to match the robust embolus of *huachuca*; the cephalic plate is smoother than in *chaimona* males and females, as in the male *huachuca*; the females have been found in central Arizona, as was the male.

Distribution (Map 24). Southcentral and southeastern Arizona.

Records. UNITED STATES: ARIZONA: Cochise Co.: Huachuca Mtns., Garden Canyon Road, base of Sawmill Canyon, 19 March 1989 (3♂, MCZ), Huachuca Mtns., Carr Canyon, 3 June 1952, 2,400 m el. (1♂, AMNH), Chiricahua Mtns., upper Cave Creek, 10 May 1969, 1,800 m el. (1♀, AMNH), Chiricahua Mtns., Onion Saddle, 2,370 m el., 20 March 1989; Pima Co.: Santa Catalina Mtns. (1♀, AMNH); Santa Cruz Co.: Santa Rita Mtns., upper Madera Canyon, 1,700 m el., 13 August 1983 (1♀, MCZ).

Natural History. Collected from oaks (4 records).

28. *Pelegrina arizonensis* (G. & E. Peckham, 1901) new combination

Figures 160, 161, 217, 251, 420–425; Map 25

Dendryphantes arizonensis G. & E. Peckham, 1901b: 326, pl. 28, fig. 2, ♂. Holotype in MCZ 1♂ with 1 imm. with labels "Dendryphantes arizonensis Pkm, 1901. Arizona. Type. ♂." (label is original; handwritten, probably by Elizabeth Peckham) and "G. W. Peckham Coll.", examined. G. & E. Peckham, 1909: 463, pl. 36, fig. 7, ♂. Roewer, 1954: 1206.

Dendryphantes glacialis Scheffer, 1905, figs. 3, 4, 8, ♂♀. Type material lost (Cutler and Jennings, 1985), though the Peckham collection has some material labeled *Dendryphantes glacialis* from Manhattan, Kansas, possibly sent by Scheffer, examined. G. & E. Peckham, 1909: 463, pl. 37, figs. 7, 7a, b, ♂♀. Roewer, 1954: 1210.

Dendryphantes (Metaphidippus) arizonensis:—Petrunkevitch, 1911: 622.

Dendryphantes mimus:—Chamberlin, 1925b, in part: 135, fig. 52 ♀.

Metaphidippus arizonensis:—Bonnet, 1957: 2810. Cutler and Jennings, 1985: 3, figs. 3–11, ♂♀.

Metaphidippus glacialis:—Bonnet, 1957: 2814.

Diagnosis. Like *helenae* this species has genitalia unusual for the genus, with the erect portion of the embolus arising retrolaterally and the epigynal flaps far rotated. Differs from *helenae* in having a sharp pointed embolus, short tibial apophysis, and flaps rotated only 180°.

Male. Palpus (Figs. 217, 421, 422): Embolus arising toward retrolateral side, blade-shaped and with exposed surface concave, with retrolateral ridge extending into distal point. Tibial apophysis almost hidden behind wide flange beneath it. *Markings* (Figs. 160, 420): Cheek bands weak. Markings on face quite variable. Clypeus brown, sometimes with a few white hairs, hairs overhanging chelicerae white to brown. White forehead band contacts AMEs dorsally 10:30–12:00. Chelicerae lacking pale scales Cymbium with none to a few white scales. Abdomen showing lineate markings of females, with two medial longitudinal stripes in addition to the side bands. *Measurements:* Body length 4.0(4.3)4.3 mm; carapace length 2.0(2.0)2.0 mm, width/length 0.80(0.81) 0.83; n = 5 ♂ from Minnesota.

Female. Epigynum (Figs. 251, 423, 424): Flaps rotated 180° so that ancestrally posterior end is anterior. Surface flat except for concavity in front of flaps. First curve of duct broad, on medial side of opening because of flap rotation; second curve proceeds laterally. *Markings* (Figs. 161, 425): Carapace with white scales dorsally. Clypeus densely covered with white scales. Abdominal markings strikingly lineate, with two central pale bands flanked by two thin rows of dark spots, flanked by brown bands and pale side bands. *Measurements:* Body length 4.7(4.9)5.9 mm; carapace length 2.0(2.0)2.2 mm, width/length 0.77(0.80) 0.84; n = 5♀ from Minnesota.

Courtship (1♂ observed from Anoka Co.,

Minnesota): The one male observed showed no crouch display. *Raisespread* (n = 16): Abdomen twitched on pause (n = 3). First legs waved irregularly on series (n = 9); as he got closer legs lowered, put forward and more parallel but no discrete crouch display was seen (n = 7). Palpi wave irregularly on series (n = 4).

Distribution (Map 25). Minnesota and Alberta south to Zacatecas and Tlaxcala.

Records. CANADA: ALBERTA: Medicine Hat (1♂ 1♀, AMNH). *UNITED STATES:* MINNESOTA: Anoka Co.: 5 km E of Bethel (1♂ 3♀, MCZ; 1♂ 3♀, AMNH); NORTH DAKOTA: Burleigh Co.: Menoken Indian Village (1♂, MCZ); Williams Co.: Williston (1♂ 3♀, WPM); KANSAS: Riley Co.: Manhattan (1♂ 1♀, MCZ); COLORADO: Denver (1♂, MCZ); TEXAS: Brewster Co.: Marathon (1♂ 1♀, AMNH); Alpine (1♂, AMNH); NEW MEXICO: Bernalillo Co.: Sandia Mtns. (2♂, AMNH); Hidalgo Co.: 3 km N of Rodeo (1♂, AMNH); Lincoln Co.: T6N R6ES74 (1♂); near Nogal (1♂); Sierra Co.: 5 km E Hillsborough (1♂, MCZ); 24 km N of Ruidoso (7♂ 6♀, AMNH); Torrance Co.: 1.6 km E Clines Corners (1♀, AMNH); Valencia Co.: 3 km E of Grants (1♂ 1♀, AMNH); ARIZONA: Coconino Co.: Sitgreaves National Forest (1♂, AMNH); Graham Co.: Thatcher (1♂ 2♀, MCZ); Santa Cruz Co.: 29 km NW of Nogales (1♀, AMNH). *MÉXICO:* ZACATECAS: 11 km SE of Salinas (San Luis Potosí) on Hwy 45, ca. 101°39'W, 22°34'N (2♀, MCZ); DURANGO: Rodeo (5♀, AMNH); Santa María del Oro (1♀, AMNH); TLAXCALA: 13 km W of Calpulapan (2♀, AMNH). Cutler and Jennings (1985) give additional records.

Natural History: Collected from sand prairie (Minnesota, 1 record), *Hymenoclea* (New Mexico, 1 record), ponderosa pine (Arizona, 2 records), grass-mesquite (Arizona, 1 record), and beating junipers (1 record, New Mexico) at elevations of 1,700–2,200 m in Arizona, Zacatecas, and Durango. Jennings (1973) describes egg retreats of this species in *Tragopogon* and *Pinus ponderosa*. Cutler and Jennings (1985) give additional habitat information and characterize *P. arizonensis* as a species of grasslands.

29. *Pelegrina helenae* (Banks, 1921) new combination

Figures 155, 218, 426–431; Map 25

Dendryphantes helenae Banks, 1921: 101, fig. 5, ♂♀. Type material in CAS 1♂ 1♀ with labels "Dendryphantes helenae Bks type," "San Francisco, Cal. IV-7-'18," and "Coll and don by Helen Van Duzee," examined. Roewer, 1954: 1211.

Dendryphantes sausalitanus Chamberlin, 1925b: 137, figs. 57, 58, ♂. Type in MCZ 1♂ with label "Dendryphantes sausalitanus Ch, ♂ holotype, Cal.: Sausalito 1909, R. V. Chamberlin Coll., 1045," examined.

Metaphidippus helenae:—Gertsch, 1934: 18. Bonnet, 1957: 2814. Cutler and Jennings, 1985: 5, figs. 12–17, ♂♀.

Diagnosis. Differs from *arizonensis* in having blunt embolus, tibial apophysis on an elongate projection, and epigynal laps rotated very far, to 270°.

Male. Palpus (Figs. 218, 427, 428): Erect portion of embolus is blade-shaped and blunt and arises toward retrolateral side of base. Tibial apophysis and flange elevated on narrow projection (Fig. 427). *Markings* (Fig. 426): generally dark with weak white side bands on carapace and abdomen. Cheek band very weak. Clypeus brown; hairs overhanging chelicerae dark, sometimes pale medially. White forehead band contacts AMEs dorsally 10:30–1:00. Chelicerae lacking pale scales. Cymbium with none to a few white scales. Longitudinal markings on abdominal dorsum, with central longitudinal lighter brown band flanked by black bands. *Measurements:* Body length 4.0(4.2)4.3 mm; carapace length 1.8(2.0)2.1 mm, width/length 0.77(0.80)0.82; n = 5♂ from Nevada and Oregon.

Female. Epigynum (Figs. 429, 430): Flaps rotated 270°, so that ancestrally posterior end is lateral. Surface flat. First curve of duct anterior to opening because of flap rotation; second curve proceeds posteriorly. *Markings* (Figs. 155, 431): Carapace thinly to densely covered with white or gray scales. Clypeus densely covered with white scales. Abdominal markings somewhat lineate, but not so strongly as in *arizonensis*, with the posterior dark spots more prominent. *Measurements:* Body length 4.2(5.0)5.5 mm; carapace length 1.9(2.0)2.2 mm, width/length 0.76(0.80) 0.82; n = 5♀ from Oregon, Nevada, and Washington.

Distribution (Map 25). Wyoming to Washington south to Utah and California.

Records. UNITED STATES: IDAHO: Blaine Co.: Carey (1♂, AMNH); Custer Co.: Salmon River, 19 km N Challis (1♀, AMNH); Gem Co.: 11 km W of Horseshoe Bend, 116°18′W, 43°57′N (3♂, AMNH); 13 km W of Horseshoe Bend (1♀, AMNH); Jerome Co.: Twin Falls (1♂, AMNH); Owyhee Co.: Bruneau Canyon Hot Creek Falls (1♀, AMNH); WYOMING: Bighorn Co.: 10 km E of Shell (1♂ 2♀, WPM); UTAH: Little Cottonwood Campground, near Salt Lake City (3♂, AMNH); Sevier Co.: Richfield (1♂ 2♀, AMNH); NEVADA: Humboldt Co.: 48 km N of Winnemucca (1♀, AMNH); Washoe Co.: N of Reno (3♂ 1♀, MCZ); Reno (2♂, MCZ); WASHINGTON: Franklin Co.: just W of Palouse Falls, 46.66°N, 118.23°W, (3♀, MCZ); Grant Co.: Wahluke Wildlife Recreation Area, 46.705°N, 119.421°W (2♀, MCZ); OREGON: Baker Co.: Baker (1♀, AMNH); Crook Co.: 8 km W of Prineville (2♂ 7♀, AMNH); Deschutes Co.: Redmond (4♀, AMNH); Harney Co.: Tencent Lake (1♂ 3♀, AMNH), Manns Lake (1♂, AMNH); Klamath Co.: above Algoma (1♂, AMNH), Bly Mountain (1♀, AMNH); Malheur Co.: Succor Creek Canyon (2♂ 1♀, AMNH); E of Ontario, 116°57′W, 44°2′N (1♀, AMNH); Umatilla Co.: 19 km SW of Echo (1♀, AMNH); Wasco Co.: Mosier (1♀, AMNH); CALIFORNIA: Marin Co.: Sausalito (♂, MCZ); Mono Co.: Benton (2♀, AMNH); Riverside Co.: Lake Hemet 116°59′W, 33°43′N; San Diego Co.: 3 km E of Pine Springs (1♂, AMNH); Pine Valley (1♀, AMNH); San Francisco Co.: San Francisco (1♂ 2♀ MCZ); Sierra Co.: Peavine (3♀, AMNH). Additional records are given by Cutler and Jennings (1985).

Natural History. Collected from sagebrush (*Artemisia tridentata*; 7 records). Cutler and Jennings (1985) give additional habitat information.

30. *Pelegrina verecunda* (Chamberlin & Gertsch, 1930) new combination

Figures 162, 163, 219, 252, 432–436; Map 26

Sassacus uteanus:—Chamberlin and Gertsch, 1929, in part: fig. 54 (this figure may have been misplaced, given that it is unlikely the authors would have confused their species *S. uteanus* and *D. verecundus*).

Dendryphantes verecundus Chamberlin and Gertsch, 1930: 144. Holotype 1♂ in AMNH with labels "*Dendryphantes verecundus* ♂ / Utah: Dry Canyon Holotype/ 6-14-29 Gertsch" and "29Bb. N40 : W111," examined.

Dendryphantes verecundus:—Roewer, 1954: 1216. Bonnet, 1956: 1402.

Metaphidippus verecundus:—Jung and Roth, 1974: 33.

Diagnosis. A small indistinctly marked species with dark males and pale females from the southwest. May be confused with the sympatric *orestes* but smaller, more gray than orange, lacking the lateral cheliceral ridge, and having the short embolus broadening gradually into base prolaterally.

Male. Palpus (Figs. 219, 433): Embolus short, obliquely truncate, broadens gradually into base prolaterally; rami indistinct. *Markings* (Figs. 162, 432): Carapace with scattered white scales; side bands weak. Cheek band weak. Clypeus brown; thin white to brown hairs overhanging chelicerae. White forehead band contacts AMEs dorsally 10:30–12:30. Chelicerae with some pale scales, scattered but especially medially. Palpus entirely brown, with femur not distinctly paler than cymbium. Cymbium lacking white scales. Abdomen side bands indistinct, often with white markings centrally. *Measurements:* Body length 2.7(3.1)3.6 mm; carapace length 1.3(1.5)1.7 mm, width/length 0.77(0.79)0.80; n = 5♂ from Yavapai Co., Arizona.

Female. Epigynum (Figs. 252, 434, 435): Flaps dark, parallel, slightly convex, posteriorly flush with surface. Surface flat. First curve of duct relatively narrow, dark; second curve proceeds slightly anteriorly. *Markings* (Figs. 163, 436): Carapace covered with white scales. Clypeus densely covered with white. Legs pale yellowish. Abdomen pale, with many small dark speckles sometimes coalescing into *galathea*-like pattern. *Measurements:* Body length 3.7(4.0)4.5 mm; carapace length 1.5(1.6)1.8 mm, width/length 0.77(0.78) 0.80; n = 5♀ from Yavapai Co., Arizona.

Male/Female Matching. This association is indicated by co-collecting, distribution, similar size, and indistinctness of markings.

Courtship (2♂ observed from Yavapai Co., Arizona). First legs held in a triangular bowed position during pause of crouch display, as in *P. aeneola*. *Crouch* (n = 15, 2♂): Body horizontal (n = 15, 2♂) and low (n = 13, 2♂) to high (n = 1). First legs held low and forward, bowed, with

tips almost touching (n = 15, 2♂); on series legs extended forward and waved vigorously (n = 15, 2♂) though somewhat irregularly (n = 8, 1♂); on pause legs retracted (n = 12, 2♂) or not (n = 3, 1♂). Palpi held down (n = 11, 2♂). On series palpi held in and under and motionless (n = 3, 1♂); at end of series/start of pause palpi hang down and wave a few times (n = 3, 1♂). *Repertoires:* 2♂ crouch only.

Distribution (Map 26). Utah south into northern México.

Records. UNITED STATES (county records): UTAH: Kane (1♀, AMNH), Salt Lake (17♂ 1♀, AMNH), Sevier (3♂, AMNH), Utah (3♂ 7♀, AMNH), Wasatch (11♂ 3♀, AMNH), Washington (9♂ 1♀, AMNH, MCZ), Weber (2♂, AMNH); ARIZONA: Cochise (5♂ 12♀, AMNH, MCZ), Coconino (1♂, AMNH), Santa Cruz (1♀, MCZ), Yavapai (8♂ 11♀, AMNH, MCZ); NEW MEXICO: Bernalillo (2♂, AMNH), Catron (1♀, AMNH), Grant (3♀, AMNH), Sandoval (1♂, AMNH); CALIFORNIA: Mono (1♂, AMNH). *MÉXICO:* CHIHUAHUA: Las Delicias (1♂ 4♀, AMNH); ?Primavera (1♀, AMNH); 21 km N of Ciudad Camargo on Hwy 45, 105°13'W, 27°52'N (2♀, MCZ); ?40 km SW of Camargo (1♀, AMNH); ?DURANGO: Ojo de los Encinos (1♀, AMNH).

Natural History. Specimens collected at elevations from 1,100 to 1,800 m (12 records). In Arizona, beaten from *Quercus, Cercocarpus, Alnus, Salix, Chrysothamnus*, pine, and spruce (6 records). Jung and Roth (1974) found this species in their zone 2 of the Chiricahua Mountains.

31. *Pelegrina clavator* new species
Figures 164, 165, 220, 437–441; Map 15

Holotype male and paratype female with label "MEXICO: NUEVO LEON: Chipinque Mesa just S of Monterrey, ca. 4500 ft. [1,370 m]; ca. 100.4°W 25.6°N, 2 Jun 1983, W. Maddison & R. S. Anderson 83-034, beating and sweeping forest understory."

Etymology. A Latin noun in apposition, "club-bearer," referring to the large blunt embolus.

Diagnosis. A Mexican species having a distinctive broad, truncate embolus and angled flaps flanking a central mound on the epigynal surface.

Male. Palpus (Figs. 220, 438): Embolus broad, truncate, with rami small. Embolus twists toward tip. *Markings* (Figs. 164, 437): Carapace with large forehead band. Cheek band dense and distinct from side band. Clypeus brown in two specimens, brown with white scales between AMEs in another specimen; hairs overhanging chelicerae brown to tan. White forehead band contacts AMEs dorsally; setae ringing AMEs white except 12:00–1:30. Chelicerae with dense patch of white scales from base to ⅔ length, longer and wider than in *variegata*. Cymbium lacking white scales. *Measurements:* Body length 4.1, 4.2, 4.3, 4.4 mm; carapace length 2.1, 2.1, 2.1, 2.2 mm, width/length 0.76, 0.77, 0.77, 0.80; n = 4♂ from Nuevo León.

Female. Epigynum (Figs. 439, 440): Flaps flat and convergent, medial edge at level of high central plateau and lateral edge in concavity so that flap slopes down laterally. Epigynal surface high between flaps as noted. First curve of duct broad but does not extend so far posterior as in the sympatric *neoleonis*, so that second curve begins at or only a bit posterior to posteriormost portion of flap; second curve proceeds obliquely medial-anterior. Flowerlike gland opening on anterior face of second curve. Inner surface of third curve fairly smooth. *Markings* (Fig. 441): Carapace covered above with white scales. Clypeus covered densely with white scales. Abdomen marked somewhat like *P. galathea. Measurements:* Body length 4.0, 4.2 mm; carapace length 2.0, 2.0 mm; width/length 0.76, 0.77; n = 2♀ from Nuevo León.

Male/Female Matching. Males and females were matched by co-collecting at two localities in Nuevo León, by common distribution; and by the similar robust carapace and abdominal markings.

Geographical Variation. Females from Tamaulipas and Veracruz have smaller flaps less deeply set into epigynum, with less flaring ducts, and may represent another species.

Courtship (2♂ observed from Chipinque Mesa, Nuevo León). *Raisedspread* (n = 3, 1♂). *Crouch* (n = 3, 2♂): First legs foward, slightly spread, horizontal (n = 1) or raised

fairly high to ca. 40° (n = 2, 1♂), lowered when close (n = 2, 1♂); not noticeably waved (n = 3, 2♂). Palpi down (n = 3, 2♂), waved on series (n = 3, 2♂) and when very close and reaching (n = 2, 1♂). Abdomen twitched occasionally, possibly at pause (n = 2, 1♂). *Repertoires:* 1♂ crouch only; 1♂ raisedspread and crouch.

Distribution (Map 15). Nuevo León south to Veracruz.

Records. MÉXICO: TAMAULIPAS: ca. 1.5 km E of Tula, 99.5°W, 22.9°N, 8 June 1983 (1♀, MCZ); Sierra de Tamaulipas, 4–7 August 1945 (1♂, AMNH); SAN LUIS POTOSI: 32 km E of Ciudad del Mais, 23 March 1940 (1♀, AMNH); NUEVO LEÓN: Chipinque Mesa, just S of Monterrey, 100.4°W, 25.6°N, 2 June 1983 and 7 April 1946 (3♂ 1♀, MCZ; 1♀ AMNH); Villa de Santiago, Hacienda Vista Hermosa, 19 June 1940 (1♂, MCZ); VERACRUZ: 2 km SE of Naolinco on Hwy 127, 96.9°W, 19.6°N, 20 June 1983 (1♀, MCZ).

Natural History. Collected from understory shrubs of broadlead forest at ca. 1,400 m elevation (2 records); also known from 600 to 800 m elevation (3 records).

32. *Pelegrina pallidata* (F. P.-Cambridge, 1901) new combination

Figures 221, 442–446; Map 29

Metaphidippus pallidatus F. P.-Cambridge, 1901: 270, pl. 24, figs. 17, 17a, ♀. Holotype in BMNH 1♀ with label "Dendryphantes pallidatus, sp. nov. Guat. Sarg Type ♀," examined. Bonnet, 1957: 2816.
Dendryphantes pallidatus:—Roewer, 1954: 1198.

Notes on Synonymy. The specimens described here are identified with Cambridge's *pallidata* primarily on the basis of similarities in the details of the epigynum. This identification is made with some hesitation, for the type material of *pallidata* consists of a single poorly marked female whose epigynum was lost by me in the course of examination, but my notes and the figures of C. L. Scioscia (personal communication) regarding the epigynum are fairly detailed and provide evidence for the identification. Compared to the other Mexican and Central American species with small, convergent flaps and a fairly flat epigynal surface (*variegata, sandaracina, yucatecana, verecunda*) the females described below and the type of *pallidata* are unique in having (1) an unusually broad dark band along the margin of the opening (Fig. 445), (2) first curve of duct wide and long, (3) the flowerlike gland openings placed on the anterior surface of the second curve and more medially (closer to junction with third curve than first curve), and (4) fertilization ducts arising anterior to the center of the lumen of the spermatheca.

Male (Tentatively Associated with Female). Palpus (Figs. 221, 443): Embolus twists apically. Retrolateral ramus relatively long and curved, as in *P. pervaga* and *tristis*, but embolus much smaller than in those species. *Markings* (Fig. 442): Carapace medium to pale brown, with well-developed side and cheek bands. Clypeus brown except for patch of white scales between AMEs that overhangs chelicerae. White forehead band contacts AMEs dorsally 10:30–12:00. Chelicerae with white scales medially. Cymbium with some white scales. Legs beige with brown annulae. Abdomen shows white spots of female. *Measurements:* Body length 3.4 mm; carapace length 1.7 mm, width/length 0.77, n = 1♂.

Female. Epigynum (Figs. 444, 445): Flaps convergent, not very convex. Epigynal surface flat. First curve of duct fairly broad and long; second curve goes anteriomedially. As already noted, there is an unusually broad band along the margin of the opening (Fig. 445, arrow), the flowerlike gland openings are placed on the anterior surface of the second curve close to junction with third curve, and the fertilization ducts arise anterior to the center of the lumen of the spermatheca. *Markings* (Fig. 446): Cambridge's holotype is now uniformly pale, though may be partly faded. The other available specimens have the carapace covered with yellowish white scales, though not densely. Clypeus densely covered with white scales; AMEs entirely ringed by white scales. Legs uniform orange-brown except Nicaragua ♀, which has some brown spots. Sternum distinctly

darker than coxae. Abdomen with paired white spots on brown dorsum; each spot in first pair fused with spot in second pair. Venter dark between epigynum and spinnerets. *Measurements:* Body length 4.0, 4.3 mm; carapace length 1.6, 1.7 mm, width/length 0.76, 0.78; n = 2♀, female holotype and 1♀ from Nicaragua.

Male/Female Matching. This is indicated by co-collecting in Nicaragua and similarity of markings.

Distribution (Map 29). Southern México to Nicaragua.

Records. MÉXICO: CHIAPAS: 5 km W of San Cristóbal de Las Casas on Hwy 190, ca. 92°41'W, 16°44'N, 27–28 July 1983, W. Maddison & R. S. Anderson (1♀, MCZ). *GUATEMALA* (1♀, BMNH); Chichicastenango, 6–7 August 1947, C. & P. Vaurie (2♀, AMNH). *NICARAGUA:* Matagalpa, 4 October 1952, R. B. Swain (1♂ 1♀, AMNH).

Natural History. The female from near San Cristóbal was collected beating oak, madroño, and pine in oak-pine woodland at 2,100 m elevation.

33. *Pelegrina variegata* (F. P.-Cambridge, 1901) new combination

Figures 166, 167, 222, 253, 447–451; Map 28

Metaphidippus variegatus F. P.-Cambridge, 1901: 268, pl. 24, figs. 10, 10a, 11, 11a, ♂♀. Holotype in BMNH 1♂ with 1♀ with label "Philaeus variegatus F.Cb., Type ♂, gynetype ♀ Mexico. Amula [Guerrero]. H. S.", examined.

Beata variegata:—Simon, 1903: 841. Roewer, 1954: 1008. Bonnet, 1955: 874. Chickering's *Beata variegata* (1946: 267, figs. 226, 227) is not this species, nor is it a *Pelegrina*.

Diagnosis. Probably the most commonly collected Mexican species, reminiscent of *galathea*. Males distinctive for their strong white spotting on the abdomen and robust chelicerae. Females can be identified by the epigynal topography.

Male. Palpus (Figs. 222, 448): Embolus relatively narrow, parallel-sided, twisted so that tip appears to taper in ventral view, but oblique view shows two small, subequal rami; embolus widens abruptly at its base on retrolateral side, so as to make distinct angle. *Markings* (Figs. 166, 447): Carapace with extensive white markings. Cheek band broad and dense, fused with side band. Clypeus brown, with setae overhanging chelicerae white medially, some brown hairs laterally. White forehead band contacts AMEs dorsally; setae ringing AMEs white except from 12:30 to 2:00. Chelicerae robust, though not elongate, with white patch on medial surface from base to about ½ length. Cymbium with central patch of white scales. Legs distinctly annulate. Abdomen not striped as in most *Pelegrina* males but rather with paired white spots almost as in ♀. *Measurements:* Body length 3.4(3.9–4.2)4.4 mm; carapace length 1.7(1.9–2.1)2.2 mm, width/length 0.79(0.80–0.81)0.84; n = 6♂ from Oaxaca, Nuevo León, and Nayarit.

Female. Epigynum (Figs. 253, 449, 450): Flaps slightly convex, usually convergent and somewhat rotated. Epigynal surface rather flat, without pronounced posterior mound; medial surface at about same height throughout. Between the flaps is a medial longitudinal ridge; nearer the flaps, the surface is lower. First curve of duct pale, narrow; second curve proceeds medially, bearing flowerlike gland opening on dorsal surface of duct. *Markings* (Figs. 167, 451): Carapace covered with gray-white scales, sometimes mixed with light brown. Clypeus densely covered with yellowish white scales. Abdominal markings much like *galathea*, with white or beige spots on tan to gray background. *Measurements:* Body length 3.5(4.1–4.2)4.9 mm; carapace length 1.6(1.8)1.8 mm, width/length 0.76(0.78)0.83; n = 7♀ from Oaxaca.

Male/Female Matching. This association is indicated by extensive co-collecting and by the similarity of markings on abdomen.

Courtship (4♂ observed from two locations in Tamaulipas and Oaxaca): *Raised-spread* (n = 3, 3♂). *Crouch* (n = 19, 4♂): Body horizontal (n = 19, 4♂), normal to low height (n = 2, 1♂). First legs held for-

ward, horizontal to 10° raised, bowed, tips slightly convergent, parallel or slightly spread, not touching (n = 19, 4♂). On each series legs flickered (n = 9, 1♂) noticeably (n = 1) or with fairly low amplitude (n = 7, 3♂) or perhaps not at all (n = 3, 1♂). Palpi held down (n = 12, 4♂), pointing inward and resting over chelicerae (n = 7, 2♂), on each series flickered with fairly low amplitude (n = 12, 1♂) outward (n = 1) or up and down (n = 7, 2♂). Abdomen twitches (n = 6, 1♂) at end of each series (n = 3, 1♂) or in pause (n = 4, 2♂).

Distribution (Map 28). Nuevo León south to Panamá.

Records. Most in AMNH; some in MCZ, from: *MÉXICO:* TAMAULIPAS: 11 km E of Ocampo, 99°16′W, 22°49′N (1♀); 35 km SSW of Mante (3♂); Paso del Abra 99.01°W, 22.45°N (1♂); Mante (1♂ 5♀); 23 km S of Villa Juarez (1♀); Hidalgo (1♂); 19 km SE of Ciudad Victoria (1♀); Rio Guajolotes, 64 km S of Victoria (2♂ 2♀); Sisal, 24 km S of Victoria (2♂ 2♀); Ciudad Victoria (1♂ 3♀); 18 km N of Victoria (1♂); SAN LUIS POTOSÍ: Covadonga, WSW of Valles 99.05°W, 21.57°N (1♀); Valles (2♀); Taninul, Valles (1♂ 1♀); El Salto (1♂); 19 km E Ciudad del Maiz (1♀); Pujal (1♀); NUEVO LEÓN: Santa Rosa Canyon 29 km W of Linares (2♂ 2♀); Montemorelos (1♀); CHIHUAHUA: 8 km S of Chihuahua (1♂); Catarinas (1♂); SINALOA: 64 km S of Culiacan (1♂); 48 km N of Mazatlan (1♂ 1♀); 10 km E of Villa Union (1♂); Culiacancito 107.32°W, 24.50°N (2♂); DISTRITO FEDERAL: Xochimilco (1♂); MORELOS: Cuernavaca (1♀); NAYARIT: Tepic (14♂ 11♀); 43 km S of Tepic (1♀); 56 km S of Tepic (1♂ 1♀); La Mesa de Nayarit (2♀); San Blas (1♂); Jalisco (1♀); Jesús María (2♂); JALISCO: Zapotlanejo (1♂); Zapotlanejo (1♂); COLIMA: 32 km N of Colima (1♂ 1♀); GUERRERO: Iguala (1♂ 1♀); Chilpancingo (1♂); Teloloapan (7♀); VERACRUZ: Plan del Rio (2♂ 1♀); Tierra Colorado (2♂ 1♀); OAXACA: 2 km S of El Tule (2♂ 8♀); 3 km W of Tapanatepec (1♂); Oaxaca (1♂); San Felipe, N of Oaxaca City (3♂ 4♀); Paso Real, Rio Tonto (1♀); Tehuantepec (4♂); Monte Alban (1♂); 3 km SE of Niltepec, 94.33°W, 16.32°N (1♂); Soladad (2♂); CAMPECHE: Campeche (2♂ 5♀); YUCATÁN: Progresso (1♂); Motul (1♂); Chichen Itza (2♂); CHIAPAS: Arriaga, N of Arriaga Mtns. (1♀); 24 km NW of Arriaga 94.01°W, 16.25°N; Cintalapa (8♂ 9♀); Ocozucuantla (3♂ 4♀); Rio de las Flores, 30 km NE of Cintalapa (7♂ 8♀); Tuxtla Gutierrez (4♂ 1♀); Las Cruzes (3♂ 1♀). *HONDURAS:* Zamorano. *NICARAGUA:* San Marcos (1♂ 4♀). *COSTA RICA:* San Jose (1♀). *PANAMA:* 8 km S of El Valle (2♂).

Natural History. Collected beating *Acacia,* composites, and other vegetation in desert scrub at 1,500 m elevation (Oaxaca); beating shrubs and trees in fairly dry bottom of river valley at 600 m elevation (Nuevo León); and from a pine forest (Chiapas). Known from 220 to 1,700 m elevation throughout México (8 records).

34. *Pelegrina yucatecana* new species
Figures 169, 223, 452–456; Map 29

Holotype male and paratype female in MCZ with labels "MEXICO: YUCATAN: 3 km E of Chichen Itza ruins on Hwy 180, ca. 88°34′W 20°40′N, 19–20 July 1983 W. Maddison & R. S. Anderson, 83-115 seasonal forest, beating understory and trailside shrubs and small trees."

Etymology. An adjective, formed after *yucateco* (Spanish) or yucatecan (English), referring to the Yucatán Peninsula.

Diagnosis. An interesting species with unusual transverse abdominal markings; in genitalia resembling *variegata* and *sandaracina* but differing from both in details.

Male. Palpus (Figs. 223, 453): Embolus short, with rami very small. Erect portion of embolus with sides parallel; widens abruptly at base so that a distinct angle is made between the erect portion and base along the prolateral margin. *Markings* (Fig. 452): As only known ♂ is teneral, its proper colors are not exactly known, though appears brown with white markings. Marginal band well developed. Carapace with forehead band an acute V, proceeding more posteriorly from AMEs than laterally. Cheek band dense, and distinct from side band. Clypeus brown, with setae overhanging chelicerae dark. White forehead band contacts AMEs dorsally 10:30–12:00. Chelicerae with dense medial patch of white scales from base to ½ length. Cymbium dark basally, paler at tip; lacking white scales; patella and tibia dark. Legs strongly annulate, differing from *sandaracina* in having the back 2 annulate instead of longitudinally striped. Abdomen shows transverse pattern similar to ♀. *Measurements:* Body length 3.4 mm; carapace length 1.7 mm, width/length 0.82.

Female. Epigynum (Figs. 454, 455): Flaps very pale and slightly convergent,

long, about half as long as epigynum. Surface flat. First curve of duct pale, fairly narrow; second curve proceeds slightly anteriorly. *Markings* (Figs. 169, 456): Carapace brown dorsally except three white transverse bands: between small eyes, just in front of fovea, and just behind fovea; the first two are sometimes connected by two small white longitudinal bands. Face dark, with only scattered pale scales. In particular, the clypeus lacks white beneath the AMEs except for setae overhanging chelicerae and ringing AMEs. Legs strongly annulate. Abdominal markings unusual transverse dark spots. *Measurements:* Body length 3.4(3.8–4.0)4.9 mm; carapace length 1.7(1.8)1.9 mm, width/length 0.77(0.81) 0.83; n = 4♀ from Yucatán and Campeche.

Male/Female Matching. Males and females have similar markings on abdomen and similarly annulate legs; the thin embolus would be expected matched to a female with weak flaps; and they are microsympatric at Chichen Itza.

Distribution (Map 29). Yucatán Peninsula.

Records. MEXICO: YUCATÁN: 3 km E of Chichen Itza, 88°34′W, 20°40′N, 19–20 July 1983 (1♂ 1♀, MCZ); 4 km N of Xocenpich, 88°34′W, 20°47′N, 20 July 1983 (1♀, MCZ); 12 km S of Muna on Hwy 261, 89°46′W, 20°24′N, 21 July 1983 (1♀, MCZ); CAMPECHE: Chicanna ruins 8 km W of Xpujil, 89°31′W, 18°32′N, 12–14 July 1983 (1♀, MCZ).

Natural History. One of the few lowland tropical species of *Pelegrina*. All known specimens were collected beating shrubs and small trees in understory and along trails through short tropical forest.

35. *Pelegrina sandaracina* new species
Figures 168, 224, 457–463; Map 29

Holotype male in MCZ with label "MEXICO: CAMPECHE: 6 km W of Francisco Escarcega, "El Tormento" forest station, ca. 90°48′W, 18°37′N. 11–12 July 1983 W. Maddison 83-107, beating understory shrubs of forest of small trees."

Etymology. Latinized from the Greek *sandaracinos*, orange-colored (Woods, 1966).

Diagnosis. This Mexican and Central American species shares with the sympatric *yucatecana* and *variegatus* prominent pale patches on the chelicerae of the male and a relatively small embolus but differs from both in having a patch on the clypeus between the AMEs of distinctly yellow scales and in lacking prominent pale patches on the abdominal dorsum. The erect portion of the embolus broadens more gradually into the base than in *yucatecana*. The female is orange, superficially bearing close resemblance to *Nagaina incunda* but differs in having yellow scales on the face even under the AMEs, and in having stronger epigynal flaps. See also comments under *P. pallidata*.

Male. Palpus (Figs. 224, 458): Embolus small, wider at base and tapering to tip, broadens gradually into embolar base so that along prolateral margin there is no angle distinctly marking embolus from its base. *Markings* (Figs. 168, 457): Carapace well marked with discrete bands of yellow scales. Marginal band weak or absent. Cheek band broad and dense though distinct from side bands, unlike *variegatus*. Clypeus with prominent patch of yellow scales between AMEs and overhanging the chelicerae, otherwise brown. Yellow forehead band contacts AMEs dorsally 11:00–1:00. Chelicerae with long dense patch of yellow scales on medial edge from base to ¾ length. Cymbium dark, lacking white scales; tibia and patella paler. Legs orange with strongly contrasting markings of dark brown. On posterior lateral face of second leg tibia is a longitudinal dark band. Dark on femur 3 restricted to subterminal spot on front and back. Abdomen in some males with distinct paired dark spots. *Measurements:* Body length 3.0(3.1)3.6 mm; carapace length 1.4(1.5)1.9 mm, width/length 0.78(0.80–0.81)0.81; n = 4♂ from Campeche, Oaxaca, Jalisco, and "Managna," México.

Female. Epigynum (Figs. 459, 460, 462, 463): Flaps convergent, shorter than those of sympatric *yucatecana*, less than half length of epigynum. Surface flat. First

curve of duct pale in Yucatán ♀, dark in others; second curve proceeds a bit anteriorly, unlike *Nagaina incunda*, in which second curve proceeds more posteriorly. *Markings* (Fig. 461): Solid yellow-orange in color except for small speckles and paired dark spots on abdomen of southern females. Carapace covered with yellow scales. Face thickly covered with yellow to yellowish white scales. *Measurements:* Body length 3.2 mm; carapce length 1.5 mm, width/length 0.78; n = 1♀ from Yucatán.

Male/Female Matching. This matching is tentative, made partly because the female's scales are yellow as are the markings of males. Most members of the genus have white scales on the female clypeus and on male markings, and where the male has yellow markings (*P. insignis, Nagaina incunda*) so does the female. The males and females matched are also sympatric, and the weak embolus of the male matches the weak epigynal flaps of the female. Also, the geographic variation in paired abdominal spots is parallel in the males and females.

Geographical Variation. The holotype male and single female known from the Yucatán have the abdomen uniformly brown or orange (except for the male's side bands), in contrast to both males and females from farther south and west (Chiapas, Jalisco, Oaxaca), which have in addition paired dark brown dots on dorsum. The southern and western males also differ in having a longer embolus, and the females in having darker and more convergent flaps (Figs. 462, 463).

Courtship (1♂ observed from Francisco Escarcega, Campeche). No crouch display observed. *Raisedspread* (n = 5): Carapace high (n = 5); abdomen depressed (n = 4). First legs spread wide (n = 5); femur raised but distal segments horizontal (n = 4); legs moved to more parallel as he got closer (n = 1); waved little if at all (n = 1). Palpi down (n = 4).

Distribution (Map 29). Southern México to Nicaragua.

Records. MÉXICO: YUCATÁN: Grutas de Loltun, 7 km S of Oxkutzcab, 89°27′W, 20°15′N, 22 July 1983 (1♀, MCZ); CAMPECHE: 6 km W of Francisco Escarcega, "El Tormento" forest station, 90°48′W, 18°37′N, 11–12 July 1983 (1♂, MCZ); CHIAPAS: Arriaga, S of Arriaga Mtns., low coast, 1 September 1947 (1♀, AMNH); Tuxtla Gutierrez, 9 September 1947 (1–, AMNH); OAXACA: Tuchitan, 30 August 1947 (1♀, AMNH); Tehuantepec, 21 January 1948 (1♀, AMNH); Salina Cruz, 27 August 1947 (2♂, AMNH); JALISCO: Puerto Vallarta, August–September 1957 (1♂, AMNH); NAYARIT: La Libertad, 6 August 1947 (1♀, AMNH). *NICARAGUA:* Masachapa, September 1953 (1♂, AMNH).

Natural History. One of the few lowland tropical species of *Pelegrina*. Beating understory shrubs of open forest of small trees (1 record).

36. *Pelegrina tillandsiae* (Kaston, 1973) new combination
Figures 225, 254, 472–477; Map 27

Metaphidippus tillandsiae Kaston, 1973: 112, figs. 30–33, ♂♀. Holotype ♂ and paratype ♀ in AMNH with labels "Holotype ♂ + allotype ♀, Metaphidippus tillandsiae n. sp., det. by B. J. Kaston (1949)" and "Polluckville, N. C. 24 Oct 26, in Spanish moss," examined. Brignoli, 1983: 644.

Diagnosis. An unusual species with strongly lineate yellow and dark markings on abdomen, living in spanish moss in the southeastern United States. The lack of two distinct rami on the embolus makes its placement in *Pelegrina* problematic.

Male. Palpus (Figs. 225, 473, 474): Embolus narrow and tapering, prolonged beyond opening, lacking two rami. Embolar base bent distally on retrolateral side. *Markings* (Fig. 472): Cheek band dense but narrow. Clypeus with tan hairs, hairs overhanging chelicerae tan. White forehead band contacts AMEs dorsally 10:30–12:30. Chelicerae with erect tan hairs on front surface, especially basally. Palpus uniformly light brown to yellow with dark brown cymbium tip. Cymbium with white scales. Legs light brown to yellow, fairly uniform; many specimens with first tarsus dark dorsally. Abdomen shows longitudinal striping of female. *Measurements:* South Carolina: body length 3.7, 3.7, 3.8,

4.2 mm; carapace length 1.7, 1.7, 1.8, 1.9 mm, width/length 0.74, 0.74, 0.75, 0.77; n = 4♂ from Cooper, South Carolina. Florida: body length 3.1, 3.2, 3.2 mm; carapace length 1.4, 1.4, 1.5 mm, width/length 0.74, 0.75, 0.77; n = 3♂ from Florida.

Female. Epigynum (Figs. 254, 475, 476): Flaps pale, only slightly convex. Surface flat. First curve of duct pale; second curve proceeds medially and slightly anteriorly. *Markings* (Fig. 477): Carapace covered with white and some tan scales dorsally, side bands distinct. Clypeus densely covered with white scales. Abdomen with central longitudinal pale stripe flanked by dark stripes flanked by pale stripes. *Measurements:* South Carolina: body length 4.3, 4.4, 4.4, 4.6 mm; carapace length 1.9, 1.9, 2.0, 2.0 mm, width/length 0.76, 0.76, 0.78, 0.78; n = 4♀ from Cooper, South Carolina. Florida: body length 3.6(4.0)4.1 mm; carapace length 1.7(1.7)1.7 mm, width/length 0.75(0.76)0.79; n = 5♀ from Lake Placid, Florida.

Geographical Variation. Specimens from central Florida are distinctly smaller and paler than more northerly specimens and appear more yellow than brown. Males from central Florida have the cymbium yellow with a discrete brown spot at the tip and an embolus that is apparently slightly wider than in northern males.

Distribution (Map 27). North Carolina south to Florida, west to Texas.

Records. UNITED STATES: NORTH CAROLINA: Polluckville, 24 October 1926 (8♂ 5♀, AMNH); SOUTH CAROLINA: Cooper, 25 December 1928 (15♂ 13♀, AMNH); FLORIDA: Lake Placid, Archbold Biological Station, 26 March 1968 (7♀, MCZ) and 1 October 1962 (1♂, AMNH); Mariana, Blue Springs, 12 March 1936 (1♀, AMNH); Ortega (1♂, AMNH); Glades Co.: Fish Eating Creek, 23 February 1951 (1♂, AMNH); MISSISSIPPI: Vancleave, Pascagoula River, Wards Bayou (1♂, AMNH); LOUISIANA: Baton Rouge (1♂ 1♀, MCZ); Tallulah, 9 March 1925 (1♂ 12♀, AMNH); TEXAS: Harris Co.: Clear Lake, nr. Seabrook, 5 December 1958 (1♀, MCZ).

Natural History. Preferred habitat appears to be Spanish moss (*Tillandsia usneoides*; 3 records, and see Kaston, 1973).

37. *Pelegrina bunites* new species
Figures 170, 171, 226, 255, 478–482; Map 30

Holotype male and paratype female in MCZ with label "ARIZONA: Santa Cruz Co., Santa Rita Mts., gate at 26 km of Whipple Obs[ervatory]. Rd. on Mt. Hopkins 7100 ft [2,170 m] el. 17 June 1985 W. Maddison 85-059, beating Cerocarpus montanus."

Etymology. Latinized from the Greek *bounites*, hill-dweller.

Diagnosis. In general appearance, strongly resembles other *Pelegrina* species but lacks the characteristic *Pelegrina* embolus with subterminal opening and two rami. The most distinctive features are the embolus whose erect portion twists and tapers toward tip and the distinct bend on the epigynal flaps. This species is only tentatively placed in *Pelegrina*, for the embolus has its opening terminal and lacks two distinct rami.

Male. Palpus (Figs. 226, 479): Erect portion of embolus twists and tapers toward tip. Embolus with only one ramus near the opening, which is almost terminal. *Markings* (Figs. 170, 478): Carapace side bands and forehead band well developed. Cheek band broad, dense and distinct from side bands. Clypeus brown, with brown to white hairs overhanging chelicerae. Forehead band contacts AMEs dorsally 10:30–12:30. Chelicerae with long medial patch of white scales in Arizona males; Oaxaca male with shorter patch. Cymbium brown, lacking pale scales. Legs mostly beige except for mostly dark brown first pair and brown marking on more posterior pairs. Abdomen brown dorsally with distinct white side bands. *Mesurements:* Body length 3.4, 4.1, 4.4, 4.6 mm; carapace length 1.5(2.1)2.2 mm; width/length 0.77(0.79) 0.81; n = 5♂ from Mount Hopkins, Arizona.

Female. Epigynum (Figs. 255, 480, 481): Flaps thin, depigmented in Arizona females, with distinct bend medially near posterior end, opposite which the epigynum is darkly pigmented. Epigynal surface flat. First curve of duct fairly narrow; second curve proceeds medially. *Markings*

(Figs. 171, 482): Yellow to light brown. Oaxaca females are generally darker than Arizona females. Carapace covered thinly with beige scales. Clypeus covered with white to yellowish scales. Legs more or less uniformly beige to light yellow brown in Arizona females, orange-brown in Oaxaca females. Abdomen often with paired dark spots posteriorly, similar to *insignis*. *Measurements:* Body length 3.6(4.5)4.7 mm; carapace length 1.9(2.0)2.0 mm; width/length 0.76(0.80)0.81; n = 5♀ from Mount Hopkins and Kitt Peak, Arizona.

Chromosomes. 2n♂ = 26 acrocentrics + XXO (1♂ from Mount Hopkins, Arizona).

Courtship (3♂ observed from Santa Rita Mtns., Arizona, and near Oaxaca City, Oaxaca). Has crouch display with exaggerated leg waving during pauses. *Raised-spread* (n = 3, 2♂). *Crouch* (n = 7, 3♂): Body held normal to low (n = 2, 2♂) or high (n = 1). First legs forward, spread slightly, horizontal (n = 2, 1♂), or slightly raised (n = 1), or slightly lowered (n = 2, 2♂) flickered rapidly with low amplitude (ca. 5–10°?, [n = 1]) on series (n = 5, 3♂), but waved up and down with higher amplitude (ca. 30°? [n = 1]) ca. 3–7 times (n = 3, 1♂) or a few times (n = 1) during pause (n = 3, 1♂) or at end of series (n = 3, 2♂). During series legs spread slightly but distal segments parallel; during pause legs held wider then parallel (n = 3, 1♂); as he got closer he reached legs to parallel (n = 2, 2♂). Palpi down (n = 2, 2♂) and curled beside chelicerae (n = 1), flickered with low amplitude on series (n = 3, 2♂). Abdomen bobs very little if at all (n = 1). *Repertoires:* 1♂ crouch only, 2♂ raised-spread and crouch.

Distribution (Map 30). Southern Arizona south to Oaxaca.

Records. UNITED STATES: ARIZONA: Santa Rita Mtns., Sweetwater, 1,800 m, 25 June–2 July 1951 (1♀, AMNH); Cochise Co.: Huachuca Mtns., 18 July 1936 (1♀, AMNH); Pima Co.: Quinlan Mtns., picnic area near Kitt Peak Observatory, 1,950 m elevation, 20 June 1985 (4♂ 3♀, MCZ); Madera Canyon, 8 September 1978 (1♀, MCZ); Santa Cruz Co.: Santa Rita Mtns., 2,150 m el. on Whipple Observatory Road, Mt. Hopkins, 17 June 1985 (8♂ 5♀, MCZ). *MÉXICO:* CHIHUAHUA: Pelayo, 101 km W of Santa Barbara, 20 July 1947 (1♀, AMNH); Santa Barbara, 18 July 1947 (1♀, AMNH); DURANGO: 16 km E of El Salto, 8 August 1947 (1♂, AMNH); OAXACA: 50 km NW of Oaxaca on Hwy 190, ca. 97°00′W, 17°14′N, ca. 2,000 m, 6 August 1983 (1♂ 6♀, MCZ).

Natural History. Beating *Cercocarpus montanus* on Mount Hopkins, Arizona; beating pine trees in clearing in oak-pine forest in Oaxaca. At elevations from 1,800 to 2,200 m in Arizona and Oaxaca (4 records).

38. *Pelegrina orestes* new species
Figures 172, 173, 227, 483–487; Map 30

Holotype male and paratype female in MCZ with label "ARIZONA: Santa Cruz Co., upper Madera Canyon, Santa Rita Mts., ca. 5500 ft. [1,680 m] 13 Aug 1983. W. Maddison 83-158 oak woodland, beating oaks, especially Q. hypoleucoides."

Etymology. Greek, mountaineer.

Diagnosis. Resembling the sympatric *verecundus* but larger and more orange; also differing in the more abrupt angle between the erect portion of the embolus and the base. The lack of a second ramus near the embolic opening makes the placement of this species in *Pelegrina* tentative.

Male. Palpus (Figs. 227, 484): Embolus widens abruptly into base on prolateral side to yield a sharp discontinuity between erect portion and base. Embolus with only one ramus retrolateral to opening. *Chelicerae:* Outer edge in some males bears a slight ridge similar to that seen in the *mannii* group. *Markings* (Figs. 172, 483): Indistinct beige marks on brown to orange background. Carapace side bands with extension toward fovea. Cheek band distinct from side band. Clypeus brown, hairs overhanging chelicerae tan to brown. Forehead band does not reach AMEs, so that setae surrounding AMEs are brown above. Chelicerae with small medial patch of pale scales. Cymbium brown, lacking pale scales. Legs beige and brown, with annulate markings. Abdominal dorsum darker than side bands but not distinctly so, dusted with pale scales. *Measurements:* Body length 3.8(4.2)4.8 mm; carapace

length 1.8(2.0)2.4 mm; width/length 0.78(0.81)0.84; n = 5♂ from Santa Cruz Co., Arizona.

Female. Epigynum (Figs. 485, 486): Flaps depigmented, convergent; at their posterior end the flaps lie beneath well-pigmented medial rim of opening. Epigynal surface more or less flat. *Markings* (Figs. 173, 487): Pale, yellow-orange, with little hint of markings. Carapace thinly covered with yellow-white scales. Clypeus covered with white scales. Legs more or less uniform beige to light yellow-brown. Abdomen with small speckles somewhat as in *verecundus*, otherwise pale. *Measurements:* Body length 5.0(5.2)5.7 mm; carapace length 2.1, 2.1, 2.2, 2.2 mm; width/length 0.79, 0.79, 0.80, 0.81; n = 4♀ from Santa Cruz and Cochise Co., Arizona.

Chromosomes. 2n♂ = 26 acrocentrics + XXO (2♂ from Madera Canyon, Arizona).

Courtship (3♂ observed from Santa Rita Mtns., Arizona, and near Oaxaca City, Oaxaca). Has crouch display with unusual walking motion. *Raisedspread* (n = 3, 1♂). *Crouch* (n = 11, 3♂): Body normal height (n = 8, 2♂). First legs bowed and forward (n = 10, 2♂). At distance: legs below horizontal with tips on ground (n = 8, 2♂); flickered while walking to yield strange combined motion (n = 6, 2♂). Within 1–2 body lengths: first legs off ground to horizontal and no longer involved in walking, flickered with low amplitude during series, still during pause (n = 8, 3♂). Palpi down (n = 5, 3♂), and curled to side of chelicerae (n = 1); flickered during series, still during pause (n = 6, 2♂). *Repertoires:* 2♂ crouch only, 1♂ raisedspread and crouch.

Distribution (Map 30). Southern Arizona to Oaxaca.

Records. UNITED STATES: ARIZONA: Cochise Co.: Cave Creek Canyon, above Portal, 9 June 1977 (1♂, MCZ); Chiricahua Mtns., South Fork Cave Creek, 13 June 1958 (2♂, AMNH); Chiricahua Mtns., July 1985 (1♀, AMNH); Santa Cruz Co.: Santa Rita Mtns., Madera Canyon nr. Bog Springs Cmpgd., 13 August 1983 and 17 June 1985 (6♂ 3♀, MCZ); Madera Canyon, 16–24 July 1951 (1♂, AMNH). *MÉXICO:* CHIHUAHUA: Canon Prieta nr. Primavera, 30 June 1947 (1♂, AMNH); OAXACA: 39 km NW of Oaxaca on Hwy 190, ca. 96°57'W, 17°17'N, 6 August 1983 (1♂, MCZ).

Natural History. At Madera Canyon in Arizona, beating oaks, especially *Quercus hypoleucoides*, in oak woodland. Also collected from oaks at other localities (2 records, Arizona and Oaxaca). Collected from 1,200 to 1,900 m elevation in Arizona and Oaxaca (5 records). At Madera Canyon, this species was common in August (5♂ 3♀) but rare in June (1♂).

THE GENUS *NAGAINA* G. & E. PECKHAM, 1896

This genus has received little attention, but its type species (by monotypy), *N. incunda*, is a common Central American species that has usually gone by different names (e.g., *Metaphidippus flavolineatus*). It is described here to resolve the taxonomic confusion surrounding it and because it may be confused for sympatric *Pelegrina* species. The status of the genus *Nagaina* awaits further study. As noted in the discussion of the *mannii* group, *N. incunda* resembles species of both the *mannii* group and the genus *Eris*, but the shared characteristics may be plesiomorphies. It is also not clear whether or not the other species described in the genus (*N. diademata* Simon, *N. tricincta* Simon, *N. modesta* di Caporiacco, *N. berlandi* Soares & Camargo, *N. olivacea* Franganillo) belong with *N. incunda*.

39. *Nagaina incunda* G. & E. Peckham, 1896
Figures 174, 175, 228, 488–492; Map 37

Nagaina incunda G. & E. Peckham, 1896: 55, pl. 4, figs. 10, 10a–c, ♀. Holotype in MCZ 1♀ with label "883 Nagaina incunda Peck, Guatemala ♀ 4312 Type, G. W. & E. G. Peckham Coll." (in Bryant's handwriting), from the east coast to Guatemala (G. & E. Peckham, 1896), examined. Roewer, 1954: 1022. Bonnet, 1958: 3027.

Dendryphantes vegetus G. & E. Peckham, 1901b: 323, pl. 28, figs. 7, 7a, ♀. Types in MCZ 24♀ 5 im. with labels "476 Dendryphantes vegetus Peck. Type, Mexico; San Rafael ♀ 4132, G. W. & E. G. Peckham Coll." (in Bryant's handwriting), examined. Roew-

er, 1954: 1201. Bonnet, 1957: 2818. NEW SYNONYMY.

Metaphidippus flavolineatus F. P.-Cambridge, 1901: 268, pl. 24, figs. 9, 9a–c, ♂. Types in BMNH 3♂ with labels "Philaeus flavolineatus, F. Cb., Type ♂. Panamá, Bugaba (Champion)" and "1905., 265.", examined. NEW SYNONYMY.

Metaphidippus expallidatus F. P.-Cambridge, 1901: 270, pl. 24, figs. 18, 18a, ♀. Holotype in BMNH 1♀ with labels "Dendryphantes expallidatus, sp. n. Type ♀, Panamá - Bugaba (Champion)" and "1905, 241," examined. Roewer, 1954: 1193. Bonnet, 1957: 2812. NEW SYNONYMY.

Beata flavolineata:—Simon, 1903: 838. Roewer, 1954: 1007. Bonnet, 1955: 873.

Diagnosis. The male is distinctive for its brown and yellow striped markings. The female is mostly orange-yellow; most distinctive are the dark spots under the AMEs and on the chelicerae, and the narrow subterminal dark annuli on the first leg segments, most unusual on the femur, and the bicuspid tooth.

Male. Palpus (Figs. 228, 489): Embolus much as in *mannii* group, thin and curving somewhat ventrally at tip. Embolar base shoulder usually weaker than in figure. *Markings* (Figs. 174, 488): Body brown with markings of yellow scales. Carapace with large yellow forehead spot and side bands extending broadly onto cheek area. Clypeus mostly covered with yellow scales, including prominent patch between AMEs overhanging chelicerae, but immediately beneath AMEs scales are usually absent. Forehead band contacts AMEs dorsally 10:00–12:30. Chelicerae lacking yellow scales. Basal segments of palpus pale yellow; tibia and cymbium dark brown and lacking pale scales. First legs brown; posterior legs yellow, in some specimens with longitudinal lark lines. Abdomen brown with yellow side bands and central longitudinal stripe. *Measurements:* Body length 3.0(3.5)4.0 mm; carapace length 1.5(1.7)1.9 mm; width/length 0.76(0.80)0.85; n = 5♂ from Veracruz, Oaxaca, and Quintana Roo.

Female. Epigynum (Figs. 490, 491): Epigynal flaps very weak, somewhat convergent, only slightly pigmented. Epigynal surface more or less flat. *Markings* (Figs. 175, 492): Carapace covered with yellow scales. Clypeus dark below AMEs, lacking scales, just above vertical dark line on each chelicera, but between AMEs a triangular patch of yellow scales projects from clypeus over chelicerae as in male. Legs yellow, with distinctive narrow, dark, subterminal annulus on first femur, patella and tibia, though annulus may be lacking on one or more of these segments. Abdomen orange-yellow, sometimes with indistinct brown markings. Bicuspid tooth on retromargin of chelicera. *Measurements:* Body length 3.5(3.9)4.3 mm; carapace length 1.4(1.6)1.7 mm; width/length 0.78(0.78)0.79; n = 5♀ from Quintana Roo, Chiapas, and Tamaulipas.

Courtship (3♂ observed from Las Abritas, San Luis Potosi). With crouch display as in *Eris* and *Pelegrina*. In both raised-spread and crouch displays the male walked in an unusual seemingly nervous walk in which the body and appendages vibrate together at low amplitude (n = 10, 3♂). *Raisedspread* (n = 8, 3♂): Body high (n = 2, 2♂). First legs raised and spread wide (n = 5, 1♂). Palpi down (n = 3, 2♂). First legs and palpi motionless except for vibration and walking motion (n = 7, 3♂). Abdomen depressed (n = 2, 2♂), trails a bit (n = 4, 1♂). Gradually, male moved into crouch stage. *Crouch* (n = 10, 3♂): Body held high (n = 2, 1♂) or normal (n = 4, 2♂) or normal-low (n = 4, 1♂). First legs forward and horizontal (n = 10, 3♂), slightly spread (n = 9, 2♂). Except for the vibration, the first legs were still (n = 10, 1♂). Palpi down and forward (n = 10, 3♂); wave occasionally (n = 1). Abdomen horizontal (n = 10, 3♂).

Distribution (Map 37). México south to Panamá.

Records. MÉXICO: TAMAULIPAS: nr. Gomez Farias 99.1°W, 23.1°N (1♀, MCZ); SAN LUIS POTOSÍ: 16 km SW of Tamazunchale, 98°53′W, 21°11′N (1♂, MCZ); 1 km E of Las Abritas on Hwy 80, 99°23′W, 22°29′N (1♂, MCZ); Xilitla (3♂ 2♀, MCZ); VERACRUZ: Estacion de Biologia Tropical "Los Tuxtlas," 95°07′W, 18°36′N (2♂, MCZ); San Andres Tuxtla, 95°13′W, 18°26′N (1♀, MCZ); OAXACA: 17 km SW of Valle Nacional, 96.4°W, 17.6°N (3♂, MCZ); Temascal, 96°25′W, 18°14′N (1♀, MCZ); QUINTANA

ROO: 31 km NE of Felipe Carrillo Puerto, 87°52′W, 19°48′N (1♀, MCZ); Kohunlich ruins, 88°48′W, 18°26′N (2♂ 3♀, MCZ); CHIAPAS: Palenque ruins, 92°01′W, 17°29′N (3♀, MCZ); 77 km SE of Palenque on road to Bonampak 91.5°W, 17.1°N (4♂, MCZ); 105 km SE of Palenque on road to Bonampak, 91.3°W, 17.0°N (1♂ 2♀, MCZ); 76 km S of Palenque on road to Ococingo, 92.2°W, 17.1°N (4♂, MCZ). *NICARAGUA:* San Marcos (3♂, MCZ). *PANAMÁ:* Boquete (10♂, MCZ).

Natural History. Common in the tropical lowlands of México, in vegetation along roadsides, and in other disturbed habitats.

SPECIES OF THE *MANNII* GROUP OF THE UNITED STATES AND CANADA

Probably closely allied to *Pelegrina* is the *mannii* group, which occurs in western North America and includes a number of small to medium-sized species (*Metaphidippus mannii, M. diplacis, M. tricolor, M. chera, M. bispinosus, M. carmenensis, M. lanceolatus,* and *M. emmiltus*). Their markings are much as in *Pelegrina* species, except that the forehead band does not contact the AMEs (except in *M. emmiltus* males from California) and in many species the cheek band is not distinct from the side band. The chelicerae of males of several species have large patches of pale scales, distinguishing them from most *Pelegrina* species north of México. The embolus tip is narrower and lacks the two rami seen in most *Pelegrina* species. The epigynal flaps are narrow, flat, and descend into the openings.

The exact limits of the group, and whether or not it should be included within *Pelegrina,* are difficult to determine. One character that may delimit a group is the prominent ridged bulge on the distal lateral surface of the chelicerae of males (Fig. 493), though it is lacking in *M. emmiltus.* In those species listed above, including *M. emmiltus* though perhaps not in *M. lanceolatus,* there is also a bulge just dorsal to the base of the tibial apophysis (Fig. 515). This bulge is absent in *Pelegrina,* including *P. orestes* and *P. bunites, Eris, Nagaina,* and other dendryphantines examined. As already noted, there are two species placed in *Pelegrina, P. bunites* and *P. orestes* that may rather belong to the *mannii* group. Tentatively, the *mannii* group is considered to exclude these. Described here are the six *mannii* group species occurring in the United States and Canada: *mannii, diplacis, tricolor, chera, carmenensis,* and *emmiltus.*

The *mannii* group shares with *Pelegrina* the distinct male cheek bands, the crouch display in courtship, and a very similar general appearance. Indeed, *Metaphidippus mannii* and *Pelegrina aeneola* are often confused by inexperienced workers. However, the cheek bands are often not distinct in the *mannii* group, the crouch display is also seen in other dendryphantines, and the *mannii* group also shows similarities to other genera such as *Nagaina* and *Eris* (including *Paraphidippus*) in having a relatively robust carapace and a simple embolus whose distal portion is a simple erect spike. One might be tempted to combine all these into the genus *Eris,* but the robust carapace and simple embolus are probably primitive for a large group of dendryphantines, and thus the genus would probably not be monophyletic. A new genus might be described for the group, but it seems too likely that it would soon fall into synonymy with *Pelegrina, Eris, Nagaina,* or some other existing genus (in this respect the *mannii* group is unlike *Terralonus* and *Ghelna,* which seem unlikely to find older synonyms in the near future). I have therefore chosen, with some reluctance, to leave the *mannii* group in *Metaphidippus,* with the understanding that it is looking for another home.

40. *Metaphidippus mannii* (G. & E. Peckham, 1888)

Figures 178–181, 229, 230, 256, 493–502; Map 31

Attus imperialis G. & E. Peckham, 1888: 44, pl. 3, figs. 31, 31a, ♂. Types in MCZ 2♂ with labels "Attus imperialis Pkm. 1888. California. Type ♂." (label is original; handwritten, probably by Elizabeth

Peckham) and "G.W. Peckham Coll.", examined. Both ♂ lack palpi; 1 is a ♂ *mannii*, other is *diplacis*; the Peckhams' description indicates *mannii*. (Junior primary homonym of *Attus imperialis* Rossi.)

Dendryphantes manii G. & E. Peckham, 1901b: 326, pl. 28, figs. 1, 1a, ♂. Holotype in MCZ 1♂ with labels "Dendryphantes Mannii Pkm 1901. Arizona. Type. ♂." (label is original; handwritten, probably by Elizabeth Peckham) and "G.W. Peckham Coll.", examined.

Dendryphantes manni:—Roewer, 1954: 1212.

Dendryphantes imperialis:—G. & E. Peckham, 1909: 459, pl. 37, figs. 2b–d and possibly 2a, ♂.

Dendryphantes versicolor G. & E. Peckham, 1909: 475, pl. 36, figs. 6, 6a, ♀. Types in MCZ 5♀♀ with labels "Dendryphantes versicolor P. ♀ Salem Oregon Type" (label is original; handwritten, probably by Elizabeth Peckham) and "G. W. Peckham Coll.", examined. Roewer, 1954: 1216. NEW SYNONYMY.

Dendryphantes diplacis:—Chamberlin, 1924, in part: 686 (Arizona paratype).

Metaphidippus imperialis:—Gertsch, 1935: 29. Bonnet, 1957: 2814.

Metaphidippus versicolor:—Bonnet, 1957: 2818.

Notes on Synonymy. G. E. Peckham (1901b) described *mannii* as having yellow legs and palpi with restricted brown markings and extensive white on the side of the carapace, and they figured a narrow embolus with the embolic base rounded retrolateral to the erect portion of the embolus; in these respects, the description seems to match *chera* better than the species here considered *mannii*, but the specimen labeled as type is clearly of the species described here as *mannii*. Though in 1901 the Peckhams spelled the name *manii*, the collector's name (Mann) and their subsequent spelling (1909) indicate their intention to spell the name *mannii*.

Diagnosis. The common species of oak woodland of the Pacific coastal United States. Dense white patches on chelicerae and cheek bands that contrast against a dark, shiny body distinguish males immediately. The smooth carapace, weak epigynal flaps, and orange scales between the AMEs distinguish females from Pacific Coast *Pelegrina*. Epigynal flaps shorter than in *diplacis*, more robust than in *chera* and *carmenensis*. Female markings less longitudinally arranged than in *diplacis* and *tricolor*, usually darker than *carmenensis* and *chera*.

Male. Palpus (Figs. 23, 229, 230, 494, 498, 499): Embolus more or less straight; blade-shaped, fairly thin and triangular viewed ventrally but wide when viewed laterally. Base of embolus sclerotized along retrolateral margin and, especially in Arizonan males (Fig. 230), extended into prong. *Markings* (Figs. 178, 180, 493): Carapace dark, side bands generally absent or much reduced (Figs. 178, 493) except in Arizona (Fig. 180). Cheek band dense and white, makes striking contrast against dark body. Clypeus brown. Forehead band absent. Setae surrounding AMEs dark except white laterally. Chelicerae with dense patch of white scales. Palpus medium to dark brown with discrete white band across the distal end of the femur. Cymbium brown, lacking white scales. Legs light to medium brown with darker but indistinct annulae. Abdomen side bands often incomplete posteriorly. *Measurements:* Body length 3.5(4.2)4.8 mm; carapace length 1.7(1.9)2.2 mm; width/length 0.78(0.81)0.85; n = 5♂ from California.

Female. Epigynum (Figs. 256, 495, 496, 500, 501): Flaps dark, narrow and flat. Epigynal surface more or less flat. *Markings* (Figs. 179, 181, 497, 502): Except in Arizona, carapace shiny brown, because integument smooth and transparent bronze scales usually dominate cephalic area. Clypeus covered with white scales, but at least in coastal females the area between the AMEs is covered with orange scales. Legs with light to dark brown markings in coastal females, not distinctly annulate. Abdomen in coastal females brown with prominent paired dark spots; Arizona females may have the abdomen partly covered with yellow scales. *Measurements:* Body length 4.3(4.5)4.9 mm; carapace length 1.9(1.9)2.0 mm; width/length 077(0.79)0.80; n = 5♀ from California.

Geographical Variation. Two distinct forms might be recognized, an inland form (*mannii s.s.*, in Arizona; Figs. 180, 181, 230, 498–502) and a coastal form (*versi-*

color, from California to British Columbia; Figs. 178, 179, 229, 493–497). In the coastal form, males are dark brown and generally lack white side bands on the carapace, and the retrolateral side of the base of embolus is little if at all prolonged into a spike. Females are medium to dark brown and have more or less parallel epigynal flaps. In the inland form, males have dense white side bands on the carapace, the retrolateral portion of embolar base prolonged into a pronounced spike, almost as in *diplacis* though projecting more parallel to axis of palpus. Arizona females are often covered with yellow scales (and could be confused with *chera* except for their stronger epigynal flaps) and have more robust and divergent epigynal flaps. A variable population including pale and dark ♀♀ has been found near Tuscon, Arizona. Until better evidence is found to distinguish them, the two forms will be considered as one species.

Chromosomes. 2n♂ = 26 acrocentrics + XXO (2♂ from Apple Canyon, Riverside Co., California).

Courtship (5♂ observed from near Nogales, Arizona, and Riverside Co., California). Males of both the inland form (Arizona) and the coastal form (California) have a typical crouch display. *Raised-spread* (n = 7, 3♂). *Crouch* (Arizona: n = 9, 3♂; California: n = 13, 2♂): Body low (n = 7, 3♂). First legs forward and bowed, horizontal (n = 18, 4♂) or raised (n = 1), on series flickered legs with high frequency (n = 13, 2♂) low amplitude (n = 19, 4♂) while legs are pushed a bit closer together (n = 6, 2♂) or not (n = 3, 1♂). First legs moved closer as he got closer (n = 13, 2♂) until tips almost touching (n = 10, 1♂), legs motionless on pause (n = 3, 1♂). Palpi hanging extended forward, down and to side (n = 1, 3♂), or just hanging down to side (n = 3, 1♂); on series flickering slightly (n = 22, 5♂) at high frequency low amplitude (n = 13, 2♂), or only slightly as palpi pushed forward (n = 3, 1♂), palpi motionless on pause (n = 6, 2♂). *Repertoires:* 2♂ crouch only; 3♂ raisedspread and crouch.

Distribution (Map 31.) British Columbia south to Baja California and east to central Arizona.

Records. Many specimens, especially in CAS, AMNH, and MCZ: Form *mannii: UNITED STATES:* UTAH: Zion National Park (1♂); ARIZONA: Cochise Co.: Chiricahua Mtns. (1♀); Coconino Co.: Mormon Lake (1♀); Pima Co.: Santa Catalina Mtns., 12.7 km from Tuscon on Catalina highway toward Mt. Lemmon (8♀); Tuscon (1♀); Santa Cruz Co.: Sycamore Canyon, 14 km W Peña Blanca Lake (5♂ 8♀); 1.6 km S of Peña Blanca Lake (1♂). Form *versicolor: CANADA:* BRITISH COLUMBIA: Vancouver Island: Wellington, Mt. Benson. *UNITED STATES* (county records): WASHINGTON: Asotin, Chelan, King, Klickitat, Thurston, Whatcom, Whitman; IDAHO: Adams, Lemhi; OREGON: Benton, Douglas, Hood River, Jackson, Josephine, Klamath, Lane, Malheur, Marion, Multnomah, Polk; CALIFORNIA: Alameda, Amador, El Dorado, Fresno, Kern, Humboldt, Lake, Los Angeles, Marin, Mariposa, Mendocino, Monterey, Placer, Plumas, Riverside, San Benito, San Bernardino, San Diego, San Luis Obispo, San Mateo, Santa Clara, Santa Cruz, Shasta, Siskiyou, Solano, Stanislaus, Trinity, Tulare, Ventura, Yuba; *MEXICO:* BAJA CALIFORNIA: 12 km S Santo Tomás.

Natural History. Form *versicolor* collected from oaks (9 records), including *Quercus agrifolia, Q. douglasi, Q. kelloggii,* and *Q. wislezenii, Arctostaphylos* (4 records), pine (2 records), and one record each from *Ribes,* willows, *Adenostema,* holly, and raspberry, at elevations from 15 to 100 m (8 records), 100 to 1,000 m (8 records), and 1,000 to 1,500 m (5 records). Form *mannii* collected from oaks (5 records) and *Cerocarpus* (1 record), at elevations from 1,200 to 1,700 m (4 records).

41. *Metaphidippus diplacis* (Chamberlin, 1924)
Figures 182, 183, 231, 503–508; Map 33

Dendryphantes diplacis Chamberlin, 1924: 686, figs. 130–132, ♂. Holotype in MCZ 1♂ with label "Dendryphantes diplacis Chamb., ♂ holotype [in faded red ink], Cal.: near San Diego, R. V. Chamberlin Coll. 1049," examined. Roewer, 1954: 1193. Bonnet, 1956: 1393.

Metaphidippus franciscanus Schenkel, 1951: 39, figs. 42a, b, ♀. Type material in Naturhistorisches Museum, Basel, from Mission Bay near San Diego, California. NEW SYNONYMY.

Dendryphantes franciscanus:—Roewer, 1954: 1210.

Metaphidippus diplacis:—Richman and Cutler, 1978: 89.

Notes on Synonymy. (1) The type material of *M. franciscanus* Schenkel remains to be examined; however, the synonymy is clear on the basis of his description and subsequent collecting at Mission Bay, where *M. diplacis* is very common. (2) The Peckhams' (1909) figures of the female of *Dendryphantes imperialis* (pl. 37, figs. 2, 2a) may actually be of *M. diplacis*.

Diagnosis. Among specimens of the *mannii* group collected along the Pacific Coast, only *M. diplacis* has the retrolateral basal edge of the embolus so prolonged (though inland *M. mannii* are similar in this). *Metaphidippus diplacis* males differ from *mannii* in having more extensive side bands and much weaker white patches on the chelicerae; females by the more lineate abdominal markings and the longer epigynal flaps. *Metaphidippis diplacis* can be separated from the more northerly but similar *tricolor* by the wider embolus, more robust tibial apophysis, the shinier body in both sexes, and the more extensive white markings in males, and darker epigynal flaps.

Male. Palpus (Figs. 231, 504, 505): Embolus blade-shaped, thin in ventral view and wide in lateral. Embolic base with sclerotized retrolateral projection. Tibial apophysis robust. *Markings* (Figs. 182, 503): Body brown, with bronze sheen. White carapace side bands extending backward almost to posterior margin. Cheek band broad and short, mostly fused with side band. Clypeus brown. Forehead band lacking or rudimentary. Setae surrounding AMEs dark except for a few white scales laterally. Chelicerae with patch of pale scales restricted to basal half, as in *tricolor*, but generally white. Palpus brown with scattered white setae near end of femur. Abdomen brown dorsally with paired dark brown spots forming two longitudinal lines; side bands complete. *Measurements:* Body length 3.5(4.4)4.6 mm; carapace length 1.9(2.1)2.2 mm; width/length 0.77(0.80)0.81; n = 5♂ from California.

Female. Epigynum (Figs. 506, 507): Flaps usually at least half as long as epigynum, generally longer than other *mannii* group ♀♀. Epigynal surface more or less flat. Notch usually narrow. *Markings* (Figs. 183, 507, 508): Carapace orange-brown with bronze scales, covered with yellowish white scales densest on upper sides, giving hint of side bands as in ♂. Clypeus covered densely with white scales; between anterior eyes are usually orange-brown setae. Abdomen with somewhat lineate markings, with pale medial band flanked by light brown with paired elongate dark spots. *Measurements:* Body length 5.0(5.3)6.2 mm; carapace length 2.0(2.1)2.3 mm; width/length 0.78(0.79)0.80; n = 5♀ from California.

Chromosomes. 2n♂ = 26 acrocentrics + XXO (2♂ from San Diego, California).

Courtship (2♂ observed from San Diego and Santa Barbara Cos., California). No apparent crouch display seen. *Raised-spread* (n = 24, 2♂): First legs waving irregularly (n = 8, 1♂) up and down (n = 8, 2♂) with high amplitude (n = 5, 1♂). Palpi waving at low amplitude and irregularly (n = 5, 1♂). Abdomen horizontal (n = 5, 1♂) or down and trailing (n = 3, 1♂). As he got closer legs gradually lowered into reach with no discrete crouch display (n = 21, 2♂). *Reach* (n = 8, 2♂): Short stage with gradual transition from raisedspread (not discrete crouch) (n = 8, 2♂). First legs forward and parallel, waving alternately but irregularly (n = 5, 1♂). Palpi forward (n = 5, 1♂). *Repertoires:* 2♂ raisedspread only.

Distribution (Map 33). Pacific Coast of southern California and Baja California Norte.

Records. UNITED STATES: CALIFORNIA: Los Angeles Co.: South Huntington Beach (1♂, AMNH); Orange Co.: Laguna Beach 117.47/33.33 (1♂, AMNH); San Diego Co.: E of Lake Hodges, Escondido (1♀, MCZ); Oceanside (2♀, MCZ); San Diego, Mission Bay, Fiesta Island (4♂ 21♀, MCZ; 2♂ 2♀, UCB); near San Diego (6♂, MCZ); San Luis Obispo Co.: Pismo Beach (1♂, UCB); Santa Barbara Co.: NW edge of El Estero marsh just E of Carpinteria (1♂ 5♀, MCZ); Gaviota (2♀, AMNH); Goleta (1♂, AMNH). *MÉXICO:* BAJA CALIFORNIA NORTE: Arroyo Soccorro dunes, S of San Quintin (1♀, UCB); El Rosario (2♀, AMNH); En-

senada (1♂, AMNH); Rancho Las Parritas, 16 km S of San Quintin (4♂ 3♀, UCB); Santa María, 37 km S of Colonia Guerrero (1♀, AMNH); San Telmo de Arriba (1♀, AMNH); Santo Tomás (1♀, AMNH).

Natural History. On *Baccharis* (3 records, Fiesta Island, San Diego) and dunes (2 records, BCN). Appears to be restricted to localities near the seashore; not found so far inland as *mannii*.

42. *Metaphidippus tricolor* Chamberlin & Ivie, 1941
Figures 184, 185, 232, 509–513; Map 32

Metaphidippus tricolor Chamberlin and Ivie, 1941: 29, figs. 30–32, ♂. Type in AMNH 1♂ from 122°5′W, 37°5′N, Ben Lomond, California.

Dendryphantes iviei Roewer, 1951: 453 (n. nov. for *tricolor* Chamberlin and Ivie, junior secondary homonym of *Plexippus tricolor* C. L. Koch, 1846, both placed in *Dendryphantes* by Roewer). Roewer, 1954: 1212.

Notes on Synonymy. The name *tricolor* is maintained despite the ICZN's rule (1985 code Art. 59(b)) that junior secondary homonyms rejected before 1961 must remain rejected. The placement of almost all New World dendryphantines into *Dendryphantes* was a practice mostly of cataloguers (Petrunkevitch, 1911; Roewer, 1954) and not of practicing North American systematists. Roewer's new name and the placement of the two *tricolors* together in *Dendryphantes* are better considered temporary anomalies rather than long-accepted changes that need to be protected by the code, for neither his new name *iviei* nor its placement in *Dendryphantes* have been since accepted (e.g., Richman and Cutler, 1978). *Plexippus tricolor* C. L. Koch, at least by Koch's figures, appears to be near *Eris aurantia* and, thus, not now considered congeneric with the *mannii* group. Until a generally accepted secondary homonymy occurs, it serves little purpose to allow Roewer's changes to return and haunt us, and so *tricolor* Chamberlain & Ivie will be maintained.

Diagnosis. A dark species restricted to the coast of central and northern California, in some respects intermediate between *diplacis* and *chera*. Whether or not *tricolor* grades into *diplacis* in the south is not now clear. Females are notable for their lineate markings; males for the dark face.

Male. Palpus (Figs. 232, 510): Embolus narrow, though slightly wider than in *chera*, and sclerotized retrolateral projection on embolar base better developed. Tegulum bulbous prolaterally, in which respects it approaches *diplacis*. *Markings* (Figs. 184, 509): Body dark brown with white side bands often poorly developed. Cheek band broad but weak, fused to side band. Clypeus brown. Forehead band lacking. Setae surrounding AMEs dark except for a few white scales laterally. Chelicerae with inconspicuous orange-brown patch of pale scales restricted to basal half. Palpus dark, with few white scales and none on cymbium. Legs dark, with indistinct annulations. Abdomen brown dorsally with two longitudinal dark bands. *Measurements:* Body length 3.5(4.1)4.6 mm; carapace length 1.7(1.9)2.3 mm; width/length 0.80(0.80)0.82; n = 5♂ from Monterey Co., California.

Female. Epigynum (Figs. 511, 512): Flaps long, lightly pigmented. Epigynal surface more or less flat. First curve of ducts long, pale. Notch broad. *Markings* (Figs. 185, 513): Body scales dull, not shiny as in *diplacis*. Carapace surface not as shiny as *mannii*, with brown or gray scales above, darker than *chera*. Clypeus densely covered with white scales; between anterior eyes are orange-brown setae. Abdominal markings strikingly linear, central pale stripe flanked by black stripes flanked by lateral pale stripe. *Measurements:* Body length 4.3(5.2)5.4 mm; carapace length 1.9(1.9)2.0 mm; width/length 0.78(0.79) 0.82; n = 5♀ from Monterey Co., California.

Chromosomes. 2n♂ = ? + XXO (2♂ from Lucia, California).

Courtship (2♂ observed from Monterey Co., California). With typical crouch display. *Raisedspread* (n = 7, 2♂). *Crouch* (n = 6, 3♂): Body low-normal (n = 5, 2♂). First legs forward and horizontal (n = 6, 3♂),

spread slightly (n = 1), or bowed (n = 5, 2♂) though may sometimes be raised (n = 4, 1♂); waved little if at all (n = 3, 1♂) or tips of legs flickered at high frequency low amplitude (n = 2, 1♂). Palpi down (n = 3, 1♂) waved/flickered on each series (n = 6, 3♂) rapidly (n = 2, 1♂). *Repertoires:* 1♂ raisedspread only, 2♂ crouch only, 1♂ raisedspread and crouch.

Distribution (Map 32). Pacific Coast of central and northern California.

Records. UNITED STATES: CALIFORNIA: Marin Co.: Pt. Reyes (1♂ 2♀, UCB); North Beach, Pt. Reyes National Seashore (2♂ 4♀, MSUW, UCB); Monterey Co.: Hastings Natural History Reserve (1♂ 1♀, AMNH); 12.2 km N of Lucia on Hwy 1 (7♂ 9♀, MCZ); on Nacimiento–Fergusson Road 0.3–1.4 km from Hwy 1 (1♂ 2♀, MCZ); ocean-facing slopes of Santa Lucia Mtns., 5 km NW of San Luis Obispo State Border on Hwy 1 (1♂ 2♀, MCZ); Pacific Grove, 121.55°W, 36.38°N (1♀, AMNH); Pebble Beach (1♀, AMNH); 8 km N of Point Sur (1♂, AMNH); Santa Cruz Co.: Ben Lomond, 122.05°W, 37.05°N (2 imm, AMNH); Trinity Co.: 72 km W of Redding (1♂, AMNH).

Natural History. On *Baccharis* and other shrubs in coastal scrub (4 records, Monterey Co.) and from *Lupinus* on beach (2 records, Marin Co.).

43. *Metaphidippus chera* (Chamberlin, 1924) new combination

Figures 33, 186, 187, 233, 257, 514–528; Map 35

Dendryphantes chera Chamberlin, 1924: 683; fig. 124, ♀, Holotype in CAS 1♀ with labels "Dendryphantes chera Chamb., ♀ type, San Joseph Id. 6/10/21, 165 J. C. Chamberlin" and "1462," examined. Chamberlin cites the type locality as San Josef Island, Gulf of California. I interpret this as San José Island, Baja California Sur. Roewer, 1954: 1192. Bonnet, 1956: 1393.

Metaphidippus manni:—Carpenter, 1972: 163. Richman and Roth, 1976: 201. Gertsch and Riechert, 1976: 7.

Diagnosis. One of the most common salticids in the southwestern United States and northern México, this species is usually identified as *mannii. Metaphidippus chera* can be easily distinguished from *mannii,* as well as from *diplacis* and *tricolor,* in having much more extensive pale markings, annulate legs in males, a narrower embolus, narrower tegulum, thinner tibial apophysis, and weaker, shorter, and depigmented epigynal flaps. The female abdominal markings are never so lineate as in *tricolor.* The scales covering the female carapace are not shiny as in *mannii* or *diplacis,* nor as dark as *tricolor. Metaphidippus chera* is perhaps most likely confused with *carmenensis* but differs in having the embolus straighter in retrolateral view, and the left and right epigynal ducts meeting at midline before going posteriorly. Though the male is easily distinguished from that of *emmiltus* by markings and cheliceral size, the female is much like that of *emmiltus* but the epigynal ducts are wider and meet at midline before going posteriorly.

Male. Palpus (Figs. 33, 233, 515–523): Embolus thin and straight; usually lacking sclerotized projection on retrolateral side of base embolar base, though this varies considerably (Figs. 518–523). Tegulum fairly narrow, not bulbous prolaterally. *Markings* (Figs. 186, 514): Carapace with strong side bands often with thoracic projections toward fovea. Cheek band usually distinct from side band. Clypeus with orange-brown scales; some white setae overhanging chelicerae. Forehead band does not reach AMEs; setae surrounding AMEs orange-brown except laterally. Chelicerae with prominent white patch extending usually more than half length of chelicerae. Cymbium dark brown, often with a few white scales. Legs strongly annulate. Abdomen with strong side bands; dorsally variable as in females, either solid light brown or with brown spots, which are sometimes fused into longitudinal dark bands flanking central pale stripe. *Measurements:* Body length 3.4(4.3)4.8 mm; carapace length 1.6(2.0)2.3 mm; width/length 0.81(0.82)0.84; n = 5♂ from New Mexico.

Female. Epigynum (Figs. 257, 524–526): Flaps depigmented and short. Epigynal surface flat. Ducts meet at midline at junction of second and third curves. *Markings*

(Figs. 187, 527, 528): Very variable, in some populations solid yellow, in others darker with annulate legs and dotted or somewhat lineate abdominal markings. Carapace covered with mostly white to yellow-white scales, not shiny. Clypeus covered densely with yellow-white scales. Legs uniformly yellow to strongly annulate. Abdomen sometimes entirely yellow, otherwise variously marked (Figs. 187, 527, 528). *Measurements:* Body length 3.4(4.1)5.0 mm; carapace length 1.6(1.8)2.0 mm; width/length 0.79(0.79)0.84; n = 5♀ from New Mexico.

Chromosomes. 2n♂ = 26 acrocentrics + XXO (1♂ from Imperial Dam, California).

Courtship (14♂ observed from Texas, New Mexico, Arizona, California, Nuevo León, San Luis Potosí, and Zacatecas). With strong crouch display. A brief description of the courtship was given by Richman (1982: 38, figs. 1–3), under the name *Metaphidippus manni. Raisedspread* (n = 6, 2♂). *Crouch* (n = 28, 13♂). Body raised slightly (n = 6, 3♂) or low (n = 2, 1♂) or at normal height (n = 3, 1♂). First legs forward, spread wide (n = 12, 5♂), even greater than 90° apart, especially when male at a distance (n = 6, 2♂) to more or less parallel (n = 9, 3♂), especially when close to female (n = 6, 2♂). First legs horizontal (n = 20, 10♂), sometimes with tips on ground (n = 3, 1♂), or slightly raised (n = 7, 3♂). On series, legs flickered (n = 17, 9♂) with low amplitude (n = 10, 5♂) and high frequency (n = 3, 1♂); on pause, legs motionless (n = 17, 9♂). On series, legs pushed medially together (n = 7, 4♂), raised slightly (n = 3, 2♂), and pushed forward (n = 2, 1♂). Sometimes legs not raised (n = 1) or not pushed together, rather kept parallel (n = 4, 2♂), espeically when close to female (n = 2, 1♂). Sometimes legs held slightly asymmetrically, one more extended than other (n = 2, 1♂). Palpi down (n = 9, 5♂), and over chelicerae (n = 1) or curled to side (n = 1), on each series pushed forward (n = 10, 4♂) and waved (n = 21, 10♂), up and down (n = 5, 3♂); still on pause (n = 21, 10♂). Abdomen bobbed occasionally (n = 4, 2♂), specifically after series (n = 1), sometimes trailed a bit on sidles (n = 2, 2♂). *Repertoires:* 1♂ raisedspread only, 12♂ crouch only, 1♂ raisedspread and crouch.

Distribution (Map 35). Texas west to California, Nevada south to Baja California del Sur and San Luis Potosí.

Records. Many specimens in AMNH, MCZ, UCB, and MSU, from: *UNITED STATES* (county records): OKLAHOMA: Jefferson; TEXAS: Archer, Baylor, Bexar, Foard, Haskell, Presidio, Reagan, Wichita, Winkler; UTAH: Washington; NEVADA: Churchill; NEW MEXICO: Doña Ana, Lincoln; ARIZONA: Cochise, Coconino, Graham, Maricopa, Mohave, Pima, Santa Cruz, Yavapai, Yuma; CALIFORNIA: Fresno, Imperial, Inyo (nr. Bishop), Kern, Los Angeles, Mono, Riverside, Santa Barbara, San Benito, San Bernardino, San Diego, San Luis Obispo, Stanislaus, Ventura. *MÉXICO:* TAMAULIPAS: Victoria; 16 km S of Reynosa; SAN LUIS POTOSÍ: Guanajuato border on Hwy 57 (100°45′W, 23°19′N); NUEVO LEÓN: 41 km NE of China (98°54′W, 25°51′N); COAHUILA: 16 km E of Cuatro Cienega; San Pedro; ZACATECAS: 20 km N of Fresnillo (102°57′W, 23°19′N); 15 km NE Concepcion de Ora; CHIHUAHUA: Las Delicias; 21 km N of Ciudad Camargo (105°13′W, 27°52′N); 40 km W of Camargo; SONORA: 25 km S of Hermosillo; Sonoyta; 1.6 km W of San Carlos Bay; 10 km S of Presa, Obregon; BAJA CALIFORNIA NORTE: 11 km SE of Mexicali; Rancho Santa Cecelia nr. El Progresso; San Jose, Meling Ranch; San Felipe; 12 km S of Santo Tomás; BAJA CALIFORNIA SUR: Conception Bay; 3 km S of La Paz; 42 km S of Loreto; San Franciscito Bay; San José Island; DURANGO: Durango.

Natural History. Common on desert vegetation, including mesquite, tamarisk, *Acacia*, creosote bush, oaks, and *Chilopsis*. Elevations recorded from −70 to 1,000 m (5 records), 1,000 to 1,500 m (5 records), and 1,500 to 2,100 m (4 records), though these may not be representative because elevations are probably often not recorded for lowland localities. Where living on the same hillside with *mannii* in Arizona, there is a clear division in habitat: *M. chera* on mesquite and other typically desert shrubs and trees and *M. mannii* on oaks.

44. *Metaphidippus carmenensis* (Chamberlin, 1924) new combination

Figures 188, 189, 234, 529–533; Map 34

Dendryphantes carmenensis Chamberlin, 1924: 682, figs. 122, 123, ♂. Type in CAS 1♂ and (its right

palpus in MCZ) with labels "Dendryphantes carmenensis Chamb., ♂ holotype, Carmen Id. 6/16/21. #177 J. C. Chamberlin " and "1461." Chamberlin reports the type locality as Salinas Bay, Carmen Island, Gulf of California. Roewer, 1954: 1192. Bonnet, 1956: 1392.

Dendryphantes imperialis:—Chamberlin, 1924, in part: 681 (Isla Angel de la Guarda and San José Island records).

Dendryphantes chera:—Chamberlin, 1924, in part: 683 (San Diego Island record).

Diagnosis. Much like *chera*, but with more curved embolus and left and right epigynal ducts failing to meet at midline at junction of second and third curves. Northern specimens are further distinct by their extensive covering of pale scales.

Male. Palpus (Figs. 234, 530): Erect portion of embolus thin, curving strongly toward the ventral. *Markings* (Figs. 188, 529): Very pale with dense covering of white and orange scales in northern males, though southern males darker. Carapace in northern males covered mostly with white except orange around eyes and in middle of thorax; in southern males marked more as in *chera*. Clypeus of northern ♂ densely covered with white scales except orange immediately under AMEs; southern males darker, only white setae are those overhanging chelicerae. Setae surrounding AMEs entirely orange in northern males; some white scales laterally in southern males. Chelicerae with patch of white scales, patch very broad in northern ♂. Cymbium beige to light brown dorsally and with white scales, darker brown on anterior lateral edge. Legs pale tan with dark brown annulae that are especially narrow in northern males. Abdomen orange above with wide white side bands in north; brown above with paired dark brown spots in south. *Measurements:* Body length 3.8(4.9)5.1 mm; carapace length 1.8(2.2)2.6 mm; width/length 0.80(0.82) 0.87; n = 5♂ from Baja California Sur, Baja California Norte, and California.

Female. Epigynum (Figs. 531, 532): Flaps weak and depigmented. Epigynal surface flat. Second curve of duct very short, so that ducts proceed posteriorly without meeting first at midline. *Markings* (Figs. 189, 533): Carapace covered with white scales. Clypeus covered densely with white scales. Legs uniformly yellow. Abdomen uniformly pale, with white scales, in northern females; with paired dark brown spots in southern females. *Measurements:* Body length 4.1(4.8)5.6 mm; carapace length 2.0(2.0)2.4 mm; width/length 0.79(0.79)0.83; n = 5♀ from Baja California Sur, Baja California Norte, and California.

Geographical Variation. Northern specimens (California; Baja California Norte; Sonora) are large and pale, especially ♂♂, whose faces are covered with white. Southern form (Baja California Sur) is smaller and darker, almost indistinguishable from *chera* except by genitalia.

Courtship (2♂ from Imperial Co., California). The five displays observed showed only an apparently low-intensity raised-spread stage. *Raisedspread* (n = 5, 2♂): First legs waved slowly and irregularly (n = 5, 2♂) up and down (n = 1); as he got closer legs moved more parallel until he reached to touch her (n = 1).

Distribution (Map 34). Baja California and Sonora extending north into California and Arizona.

Records. UNITED STATES: CALIFORNIA: Riverside Co.: Desert Beach (1♂, AMNH); Desert Beach Cmpgd (2♂ 5♀, MCZ); ARIZONA: Maricopa Co.: Wickenburg (1♀, AMNH). *MÉXICO:* BAJA CALIFORNIA NORTE: Isla Angel de la Guarda (3♂ 1♀); San Felipe (13♂ 22♀, AMNH); BAJA CALIFORNIA SUR: La Burrera, 19 air km ENE of Todos Santos (4♂ 3♀, UCB); Isla Carmen (1♂, CAS); south side Isla Partida (1♂ 3♀, AMNH); 3 km S of La Paz (1♂, UCB); San Diego Island (1♀, MCZ); San Jose Island (1♀, MCZ); 79 km S of Santa Rita (1♀, UCB); Todos Santos (1♂, AMNH); SONORA: Cholla Bay, 10 km N of Puerto Penasco (2♀, MCZ); La Choya (1♂ 3♀, AMNH); Desemboque (1♂ 2♀, AMNH); Hermosillo (2♀, AMNH).

Natural History. Collected with *M. chera* on tamarisk bordering the Salton Sea at Desert Beach, California, at −70 m elevation.

45. *Metaphidippus emmiltus* new species
Figures 176, 177, 235, 534–538; Map 36

Holotype male and paratype female in MCZ with label "NEW MEXICO: Guadalupe Co., along S[tate]

R[oad] 219, 6.0 mi [9.7 km] N of Pastura 5500 ft. el. [1,680 m], 22 Sept. 1983, D. Richman, WPM#83-173 on juniper."

Etymology. After the Greek *emmiltos,* referring to the reddish scales around the eyes.

Diagnosis. A beautiful species living on juniper, bearing superficial resemblance to the *pervaga* group of *Pelegrina.* The white-fringed legs, dense and distinct marginal and side bands on the carapace, and red-ringed anterior median eyes are distinctive. The female differs from that of *chera* in the failure of the second curves of the epigynal ducts to meet at the midline, the large fourth pair of white spots on the abdomen, and in New Mexican specimens the swollen carapace behind the anterior lateral eyes. The bend between the second and third curves is more distinct than in *carmenensis.*

Male. Palpus (Figs. 235, 535): Erect portion of embolus thin. *Carapace:* Bulges slightly at ALEs and narrowed behind ALEs in New Mexico males. *Markings* (Figs. 176, 534): Generally yellowish. Carapace with distinctive black stripe on forehead in New Mexico males, with V-shaped white forehead band in California males. Cheek band long and marginal, separated from side band by band of dark hairs. Clypeus orange-brown. Setae surrounding AMEs red; entirely red in New Mexico males, in California males red with some white scales laterally and where forehead band contacts AMEs dorsally 10:30–12:30. Chelicerae yellow-brown with orange scales except for small medial basal spot of white scales. Palpus pale yellowish, with dense patch of white scales on femur. Legs yellowish, with white fringe on first pair. Abdomen brown dorsally, paler centrally and with white side band and fourth pair of white spots prominent. *Measurements:* Body length 3.6, 3.7, 3.7, 3.8 mm; carapace length 1.8, 1.8, 1.9, 1.9 mm; width/length 0.79, 0.79, 0.80, 0.80; n = 4♂ from New Mexico.

Female. Epigynum (Figs. 536, 537): Flaps weak and depigmented. Epigynal surface flat. Second curve of left and right ducts do not meet at midline; bend between second and third curves abrupt; second and third curves narrow. *Markings* (Figs. 177, 538): Carapace covered with beige to tan scales. Clypeus densely covered with white scales. Legs more or less uniformly beige to light brown. Abdomen tan to light brown, dorsally darker and with paired white spots; fourth pair of spots unusually large. *Measurements:* Body length 4.2, 4.5, 4.8 mm; carapace length 1.9, 2.0, 2.1 mm; width/length 0.79, 0.81, 0.82; n = 3♀ from New Mexico.

Geographical Variation. Males from New Mexico and California differ in carapace shape and forehead markings, as already noted.

Distribution (Map 36). New Mexico west to southern California.

Records. UNITED STATES: NEW MEXICO: Guadalupe Co.: along SR 219, 9.7 km N of Pastura, 22 September 1983, on juniper (2♂ 1♀, MCZ); Lincoln Co.: T6N R6E S24, 21 June 1974, beating junipers (1♀, AMNH); T6N R10E S25, 24 May 1971 (1♂, AMNH); Sandoval Co.: northwest of Bernalillo (1♂, AMNH); Santa Fe Co.: 16 km S of Santa Fe (1♂ 1♀, AMNH); CALIFORNIA: Los Angeles Co.: 1.6 km W of Desert Springs, 1 June 1957, montane forest (1♂, AMNH); Palmdale, 5.6 km S of Hwy 6, 26 May 1957, juniper woodland, creosote bush scrub (1♂ 1♀, AMNH).

LITERATURE CITED

ABBOT, J. 1792. Drawings of the Insects of Georgia, in America, Vol. 14, Spiders. Unpublished manuscript in the British Museum, London (copy seen).

ALAYÓN, G. 1982. Redescripción de *Dolomedes fuscus* Franganillo (Arachnida: Araneae: Pisauridae). Poeyana, **250:** 1–7.

BANKS, N. 1892. The spider fauna of the Upper Cayuga Lake Basin. Proceedings of the Academy of Natural Sciences, Philadelphia, **1892:** 11–81, 5 pls.

———. 1895. Some new Attidae. Canadian Entomologist, **27:** 96–102.

———. 1921. New Californian spiders. Proceedings of the California Academy of Sciences, 4th series, **11:** 99–102.

BARNES, R. D. 1955. North American jumping spiders of the genus *Maevia.* American Museum Novitates, **1746:** 1–13.

———. 1958. North American jumping spiders of the subfamily Marpissinae (Araneae, Salticidae). American Museum Novitates **1867:** 1–50.

BAUAB-VIANNA, M. J., AND B. A. M. SOARES. 1982.

Contribuição ao estudo dos Salticidae (Araneae) do Brasil. IX. Revista Brasileira de Entomologia, **26**(1): 87–91.

Bhatnagar, R. D. S., and J. G. Rempel. 1962. The structure, function and postembryonic development of the male and female copulatory organs of the black widow spider *Latrodectus curacaviensis* (Müller). Canadian Journal of Zoology, **40:** 465–510.

Blest, A. D. 1983. Ultrastructure of secondary retinae of primitive and advanced jumping spiders (Araneae, Salticidae). Zoomorphology, **102**(2): 125–141.

Blest, A. D., and C. Sigmund. 1984. Retinal mosaics of the principal eyes of two primitive jumping spiders, *Yaginumanis* and *Lyssomanes*: clues to the evolutin of Salticid vision. Proceedings of the Royal Society of London B, **221:** 111–125.

Bonnet, P. 1955–59. Bibliographia Araneorum, A-B (1955), C-F (1956), G-M (1957), N-S (1958), T-Z (1959). Analyse Methodique de toute la literature araneologique jusqu'en 1939. Toulouse, Paris.

Brignoli, P. M. 1983. A catalogue of the Araneae described between 1940 and 1981. Manchester: Manchester Univ. Press. 755 pp.

Bryant, E. B. 1940. Cuban spiders in the Museum of Comparative Zoology. Bulletin of the Museum of Comparative Zoology, **86:** 259–532.

———. 1941. Notes on the spider fauna of New England. Psyche, **48:** 129–146.

———. 1943. The salticid spiders of Hispaniola. Bulletin of the Museum of Comparative Zoology, **92:** 445–522.

———. 1950. The salticid spiders of Jamaica. Bulletin of the Museum of Comparative Zoology, **103:** 163–209.

Cambridge, F. O. P. 1901. Arachnida–Araneida, pp. 173–312. *In* F. D. Godman and O. Salvin (eds.), Biologia Centrali-Americana, Vol. 2. London.

Carpenter, R. 1972. The jumping spiders (Salticidae) of Wichita County, Texas. The Southwestern Naturalist, **17**(2): 161–168.

Chamberlin, R. V. 1924. The spider fauna of the shores and islands of the Gulf of California. Proceedings of the California Academy of Sciences, **12:** 678–694.

———. 1925a. Diagnoses of new American Arachnida. Bulletin of the Museum of Comparative Zoology, **67:** 211–248.

———. 1925b. New North American spiders. Proceedings of the California Academy of Sciences, (4) **14**(7): 105–142.

Chamberlin, R. V., and W. J. Gertsch. 1929. New spiders from Utah and California. Journal of Entomology and Zoology, Pomona College, Claremont, **21:** 101–112.

———. 1930. On fifteen new North American spiders. Proceedings of the Biological Society of Washington, **43:** 137–144.

Chamberlin, R. V., and W. Ivie. 1941. Spiders collected by L. W. Saylor and others, mostly in California. Bulletin of the University of Utah, Biological Series, **31**(8): 1–49.

———. 1944. Spiders of the Georgia region of North America. Bulletin of the University of Utah, Biological Series, **35**(9): 1–267.

Chickering, A. M. 1944. The Salticidae (jumping spiders) of Michigan. Papers of the Michigan Academy of Sciences, Arts and Letters, **29:** 139–222.

———. 1946. The Salticidae (spiders) of Panama. Bulletin of the Museum of Comparative Zoology, **97:** 1–474.

Chickering, A. M., and G. Bacorn. 1933. Notes and studies on Arachnida. V. Additions to the list of Araneae from Michigan. Papers of the Michigan Academy of Sciences **17:** 521–528.

Crane, J. 1949a. Comparative biology of Salticid spiders at Rancho Grande, Venezuela. Part III. Systematics and behavior in representative new species. Zoologica, **34**(2): 31–52.

———. 1949b. Comparative biology of Salticid spiders at Rancho Grande, Venezuela. Part IV. An analysis of display. Zoologica, **34**(4): 159–214.

Curtis, J. L. 1892. A new jumping spider. Zoe, **3:** 332–337.

Cutler, B. E. 1979. Variation in the embolus of *Metaphidippus insignis* (Banks) (Araneae: Salticidae). New York Entomological Society, **87:** 270–274.

———. 1981a. A revision of the spider genus *Paradamoetas* (Araneae, Salticidae). Bulletin of the American Museum of Natural History, **170:** 207–215.

———. 1981b. Key to late instar immatures of *Metaphidippus* and *Eris* (Salticidae) in Minnesota. Peckhamia, **2**(2): 31–32.

———. 1987. A revision of the American species of the antlike jumping spider genus *Synageles* (Araneae, Salticidae). Journal of Arachnology, **15**(3): 321–348.

Cutler, B. E., and D. T. Jennings. 1985. A revision of the *Metaphidippus arizonensis* group (Araneae, Salticidae). Journal of Arachnology, **13**(): 1–8.

Dondale, C. D. 1961. Life histories of some common spiders from trees and shrubs in Nova Scotia. Canadian Journal of Zoology, **39:** 777–787.

Eakin, R. M., and J. L. Brandenburger. 1971. Fine structure of the eyes of jumping spiders. Journal of Ultrastructure Research, **37:** 616–663.

Edwards, G. B. 1977. Comments on some genus and species problems in the Salticidae, including Walckenaerian names. Peckhamia, Gainesville, **1**(2): 21–23.

———. 1980. Jumping spiders of the United States and Canada: changes in the key and list (4). Peckhamia, Gainesville, **2**(1): 11–14.

Emerton, J. H. 1891. New England spiders of the family Attidae. Transactions of the Connecticut Academy, **8:** 1–34.

FRANGANILLO BALBOA, P. 1930. Arácnidos de Cuba. Mas arácnidos nuevos de la Isla de Cuba. Memorias del Instituto Nacional de Investigaciones Cientificos, Havana, **1:** 47–99.

———. 1936. Los Arácnidos de Cuba hasta 1936. Havana: Cultural. 180 pp.

GALIANO, M. E. 1963. Las especies americanas de arañas de la familia *Salticidae*, descriptas por Eugène Simon. Redescripciones basadas en los ejemplares típicos. Physis (Buenos Aires), **23**(66): 273–470.

———. 1980. Catalogo de los especimenes tipicos de Salticidae (Araneae) descriptos por Candido F. de Mello-Leitão. Primera Parte. Physis (Buenos Aires), Secc. C, **39**(96): 31, 40.

GERTSCH, W. J. 1934. Further notes on American spiders. American Museum Novitates, **726:** 1–26.

———. 1935. Spiders from the southwestern United States, with descriptions of new species. American Museum Novitates, **792:** 1–31.

GERTSCH, W. J., AND W. IVIE. 1955. The spider genus *Neon* in North America. American Museum Novitates, **1743:** 1–17.

GERTSCH, W. J., AND S. E. RIECHERT. 1976. The spatial and temporal partitioning of a desert spider community, with descriptions of new species. American Museum Novitates, **2604:** 1–25.

GRISWOLD, C. E. 1987. A revision of the jumping spider genus *Habronattus* F.O.P.-Cambridge (Araneae; Salticidae), with phenetic and cladistic analyses. University of California Publications, Entomology, **107:** 1–344.

HENTZ, N. M. 1845. Descriptions and figures of the Araneides of the United States. Boston Journal of Natural History, **5:** 189–202.

———. 1846. Descriptions and figures of the Araneides of the United States. Boston Journal of Natural History, **5:** 352–370.

HILL, D. E. 1977a. The mating of *Phidippus princeps*. Peckhamia, **1**(1): 5–7.

———. 1977b. The pretarsus of salticid spiders. Zoological Journal of the Linnean Society, **60:** 319–338.

———. 1979. The scales of salticid spiders. Zoological Journal of the Linnean Society, **65:** 193–218.

HORNER, N. V. 1972. the bionomics of the spider *Metaphidippus galathea* (Walckenaer) and its significance as a biological control agent in sorghum. Dissertation Abstracts International (B), **33**(2): 766–767.

INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE. 1985. International Code of Zoological Nomenclature, 3rd ed., Adopted by the 20th General Assembly of the International Union of Biological Sciences. 338 pp.

JACKSON, R. R. 1978. An analysis of alternative mating tactics of the jumping spider *Phidippus johnsoni* (Araneae, Salticidae). Journal of Arachnology, **5:** 185–230.

JENNINGS, D. T. 1973. Egg retreat of *Metaphidippus arizonensis* (Peckham) (Araneae: Salticidae) in a hollow stem. Entomological News, **84:** 317–320.

JUNG, A. K. S., AND V. D. ROTH. 1974. Spiders of the Chiracahua Mountain Area, Cochise Co., Arizona. Journal of the Arizona Academy of Sciences, **9:** 29–34.

KASTON, B. J. 1945. New spiders in the group Dionycha with notes on other species. American Museum Novitates, **1290:** 1–25.

———. 1948. Spiders of Connecticut. Bulletin of the Connecticut State Geological and Natural History Survey, **70:** 1–874.

———. 1973. Four new species of *Metaphidippus*, with notes on related jumping spiders (Araneae: Salticidae) from the eastern and central United States. Transactions of the American Microscopical Society, **92:** 106–122.

KEYSERLING, E. G. 1884. Neue Spinnen aus Amerika. VI. Verhandlungen. Zoologisch-botanische Gesellshaft in Wien, **34:** 489–534.

KOCH, C. L. 1846. Die Arachniden. Dreizehnter Band. Nürnberg, pp. 1–234.

LAND, M. F. 1969a. Structure of the retinae of the principal eyes of jumping spiders (Salticidae: Dendryphantinae) in relation to visual optics. Journal of Experimental Biology, **51:** 443–470.

———. 1969b. Movements of the retinae of jumping spiders (Salticidae: Dendryphantinae) in response to visual stimuli. Journal of Experimental Biology, **51:** 471–493.

———. 1971. Orientation of jumping spiders in the absence of visual feedback. Journal of Experimental Biology, **54:** 119–139.

LEVI, H. W. 1985. The spiny orb-weaver genera *Micrathena* and *Chaetacis* (Araneae: Araneidae). Bulletin of the Museum of Comparative Zoology, **150:** 429–618.

LEVI, H. W., AND L. R. LEVI. 1951. Report on a collection of spiders and harvestmen from Wyoming and neighboring states. Zoologica (New York), **36:** 219–237.

MACHADO, A. DE BARROS. 1951. Ochyroceratidae (Araneae) de l'Angola. Publicaçoes culturais da Companhia de Diamantes de Angola, **8:** 9–87.

MADDISON, W. P. 1982. XXXY sex chromosomes in males of the jumping spider genus *Pellenes* (Araneae: Salticidae). Chromosoma (Berlin), **85:** 23–37.

———. 1987. *Marchena* and other jumping spiders with an apparent leg-carapace stridulatory mechanism (Araneae: Salticidae: Heliophaninae and Thiodininae). Bulletin of the British Arachnological Society, **7:** 101–106.

———. 1988. A revision of jumping spider species groups formerly placed in the genus *Metaphidippus*, with a discussion of salticid phylogeny (Araneae). Ph.D. thesis, Harvard University, Cambridge.

MADDISON, W. P., M. J. DONOGHUE, AND D. R. MAD-

DISON. 1984. Outgroup analysis and parsimony. Systematic Zoology, **33**(1): 83–103.

Maddison, W. P., and G. E. Stratton. 1988. A common method of sound production by courting jumping spiders (Araneae: Salticidae). Journal of Arachnology, **16:** 267–270.

Muma, M. H. 1944. A report on Maryland spiders. American Museum Novitates, **1257:** 1–14.

Osterloh, A. 1922. Beiträge zur Kenntnis des Kopulationsapparates einiger Spinnen. Zeitschrift für wissenschaftliche Zoologie, **119:** 326–421.

Peckham, G. W., and E. G. Peckham. 1883. Descriptions of new or little known spiders of the family Attidae, from various parts of the United States of North America. Milwaukee, Wisconsin. 33 pp.

———. 1888. Attidae of North America. Transactions of the Wisconsin Academy of Sciences, Arts and Letters, **7:** 3–104.

———. 1889. Observations on sexual selection in spiders of the family Attidae. Occasional Papers of the Natural History Society of Wisconsin, **1**(1): 1–60.

———. 1890. Additional observations on sexual selection in spiders of the family Attidae, with some remarks on Mr. Wallace's theory of sexual ornamentation. Occasional Papers of the Natural History Society of Wisconsin, **1**(3): 117–151.

———. 1896. Spiders of the family Attidae from Central America and Mexico. Occasional Papers of the Natural History Society of Wisconsin, **3:** 1–101.

———. 1901a. On spiders of the family Attidae found in Jamaica. Proceedings of the Zoological Society of London, **1901:** 6–16.

———. 1901b. Spiders of the Phidippus group of the family Attidae. Transactions of the Wisconsin Academy of Sciences, Arts and Letters, **13:** 282–359.

———. 1909. Revision of the Attidae of North America. Transactions of the Wisconsin Academy of Sciences, Arts and Letters, **16:** 355–646.

Petrunkevitch, A. 1911. A synonymic index-catalogue of spiders of North, Central and South America with all adjacent islands, Greenland, Bermuda, West Indies, Terra del Fuego, Galapagos, etc. Bulletin of the American Museum of Natural History, **29:** 1–791.

Prószyński, J. 1968. Revision of the spider genus *Sitticus* Simon, 1901 (Araneida, Salticidae). I. The *terebratus* group. Annales Zoologici (Warsaw; Polska Akademia, Nauk, Instytut Zoologiczny), **25:** 391–407.

———. 1971a. Revision of the spider genus *Sitticus* Simon, 1901 (Araneida, Salticidae). II. *Sitticus saxicola* (C.L. Koch, 1848) and related forms. Annales Zoologici (Warsaw; Polska Akademia Nauk, Instytut Zoologiczny), **28:** 183–204.

———. 1971b. Redescriptions of A. E. Grube's east Siberian species of Salticidae (Aranei) in the collection of the Wroclaw Zoological Museum. Annales Zoologici (Warsaw; Polska Akademia Nauk, Instytut Zoologiczny), **28**(11): 205–226.

———. 1973a. Revision of the spider genus *Sitticus* Simon, 1901 (Aranei, Salticidae), III. *Sitticus penicillatus* (Simon, 1875) and related forms. Annales Zoologici (Warsaw; Polska Akademia Nauk, Instytut Zoologiczny), **30:** 71–95.

———. 1973b. Systematic studies on east palearctic Salticidae, II. Redescriptions of Japanese Salticidae of the Zoological Museum in Berlin. Annales Zoologici (Warsaw; Polska Akademia Nauk, Instytut Zoologiczny), **30**(5): 97–128.

———. 1976. Studium systematyczno-zoogeograficzne nad rodzina Salticidae (Aranei) Regionow Palearktycznego i Nearktycznego. Wyzsza Szkola Pedagogiczna w Siedlcach Rozprawy **6:** 1–260.

———. 1980. Revision of the spider genus *Sitticus* Simon, 1901 (Aranei, Salticidae), IV. *Sitticus floricola* (C. L. Koch) group. Annales Zoologici (Warsaw; Polska Akademia Nauk, Instytut Zoologiczny), **36:** 1–35.

———. 1982. Salticidae (Araneae) from Mongolia. Annalis Historico-naturales. Musei Nationales Hungerici, **74:** 273–294.

———. 1984. Atlas rysunkow diagnostycznych mnief znznych Salticidae [Diagnostic drawings of less known Salticidae (Araneae)—an atlas.] Siedlce: WSRP. 177 pp.

———. 1990. Catalogue of Salticidae (Araneae): synthesis of quotations in the world literature since 1940, with basic taxonomic data since 1758. Siedlce: WSRP. 366 pp.

Richman, D. B. 1981. A revision of the genus *Habrocestum* (Araneae, Salticidae) in North America. Bulletin of the American Museum of Natural History, **170:** 197–206.

———. 1982. Notes on the courtship of southwestern *Metaphidippus* and *Pellenes* (Araneae: Salticidae). Peckhamia, **2**(3): 38–40.

———. 1989. A revision of the genus *Hentzia* (Araneae, Salticidae). Journal of Arachnology, **17:** 285–344, 155ff.

Richman, D. B., and B. E. Cutler. 1978. A list of the jumping spiders (Araneae: Salticidae) of the United States and Canada. Peckhamia, **1**(5): 82–110.

Richman, D. B., and V. D. Roth. 1976. A revised list of the jumping spiders (Araneae: Salticidae) of Yuma County, Arizona. Southwestern Naturalist, **21:** 199–202.

Roewer, C. F. 1951. Neue Namen einiger Araneen-Arten. Abhandlungen. Naturwissenschaftlichen Verein zu Bremen, **32:** 437–456.

———. 1954. Katalog der Araneae von 1758 bis 1940, bsw. 1954. Institut Royal des Science Naturelles de Belgique, Bruxelles, **2b:** 927–1751.

Sadana, G. L. 1971. Method for expanding of the palpal organs of spiders. Science and Culture (Calcutta), **37:** 106–107.

Scheffer, T. H. 1905. Addition to the list of Kansas spiders. Industralist (Kansas), **31:** 435–444.

SCHENKEL, E. 1951. Spinnentiere aus dem westlichen Nordamerika, gesammelt von Dr. Hans Schenkel-Rudin. Verhandlungen der Naturforschenden Gesellschaft in Basel, Separatabdruck, **62:** 24–62.

SCHULT, J. 1980. Die Genitalstruckturen haplogyner Araneae unter phylogenetischem Aspekt (Arachnida). Dissertation, Biol., Univ. Hamburg.

SIMON, E. 1901. Histoire Naturelle des Araignées. Deuxième édition. Tome 2, fasc. 3. Paris, pp. 381–668.

———. 1903. Histoire Naturelle des Araignées. Deuxième édition. Tome 2, fasc. 4. Paris, pp. 669–1080.

STEINER, W. W. M., AND M. H. GREENSTONE. 1991. Segregation studies of isozyme variation in *Metaphidippus galathea* (Araneae, Salticidae). Journal of Arachnology, **19:** 157–160.

WALCKENAER, C. A. 1805. Tableau des Aranéides. Paris. 88 pp.

———. 1837. Histoire naturelle des Insectes. Aptères. Tome 1. Paris, pp. 1–682.

WANLESS, F. R. 1978. A revision of the spider genera *Belippo* and *Myrmarachne* (Araneae: Salticidae) in the Ethiopian region. Bulletin of the British Museum of Natural History (Zoology), **33:** 1–139.

———. 1984. A review of the spider subfamily Spartaeinae nom. n. (Araneae: Salticidae) with descriptions of six new genera. Bulletin of the British Museum of Natural History (Zoology), **46**(2): 135–205.

WHITEHEAD, W. F., AND J. G. REMPEL. 1959. A study of the musculature of the black widow spider, Latrodectus mactans (Fabr.). Canadian Journal of Zoology, **37:** 831–870.

WOODS, R. S. 1966. An English-Classical Dictionary for the Use of Taxonomists. Claremont, California: Pomona College.

Index

Listed are the names of genera, subfamilies, and species used in the text. For many names, only the first or most important pages are cited. Boldface indicates primary description of taxon.

Genera and Subfamilies

Species

Valid names are in italics.

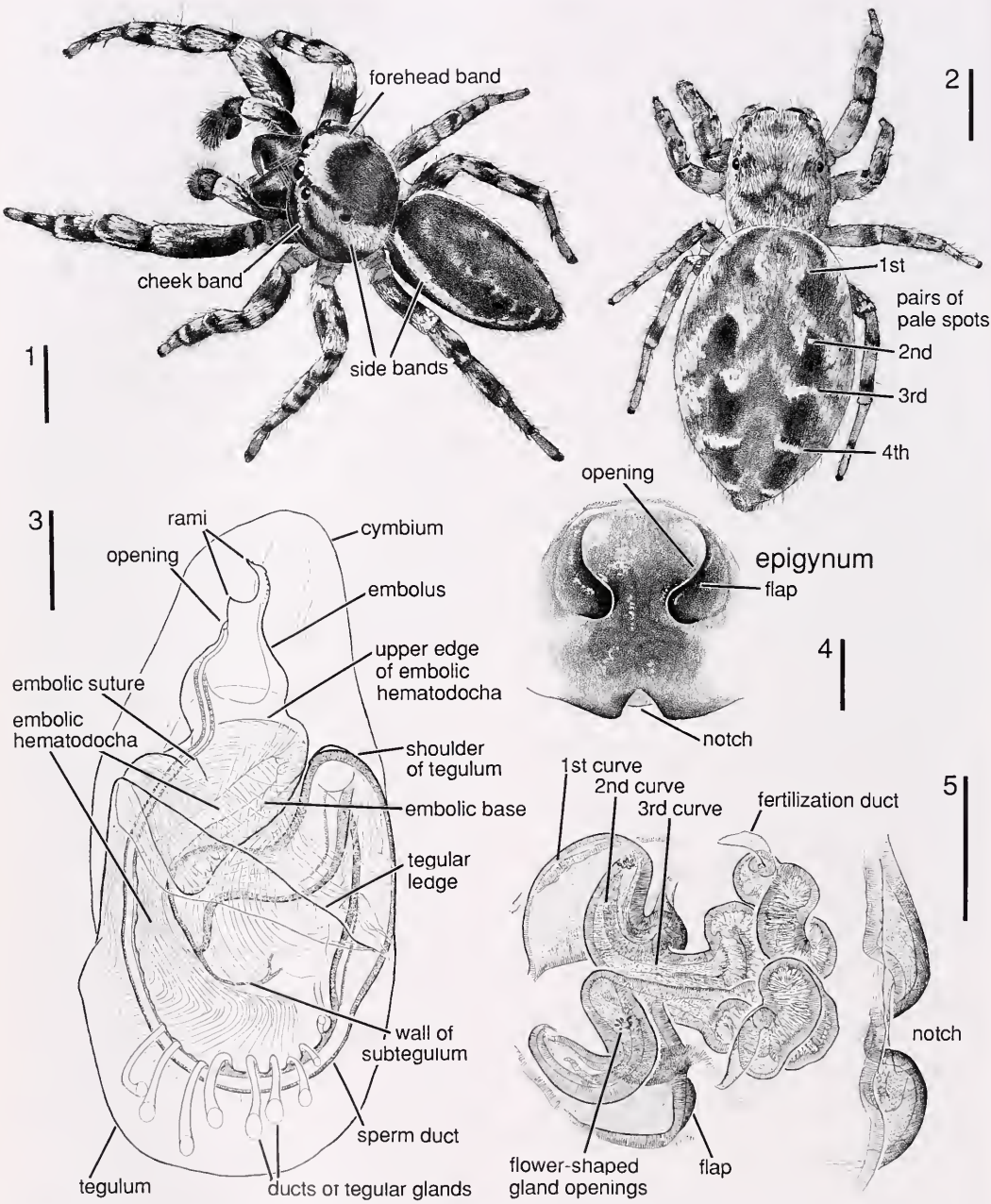


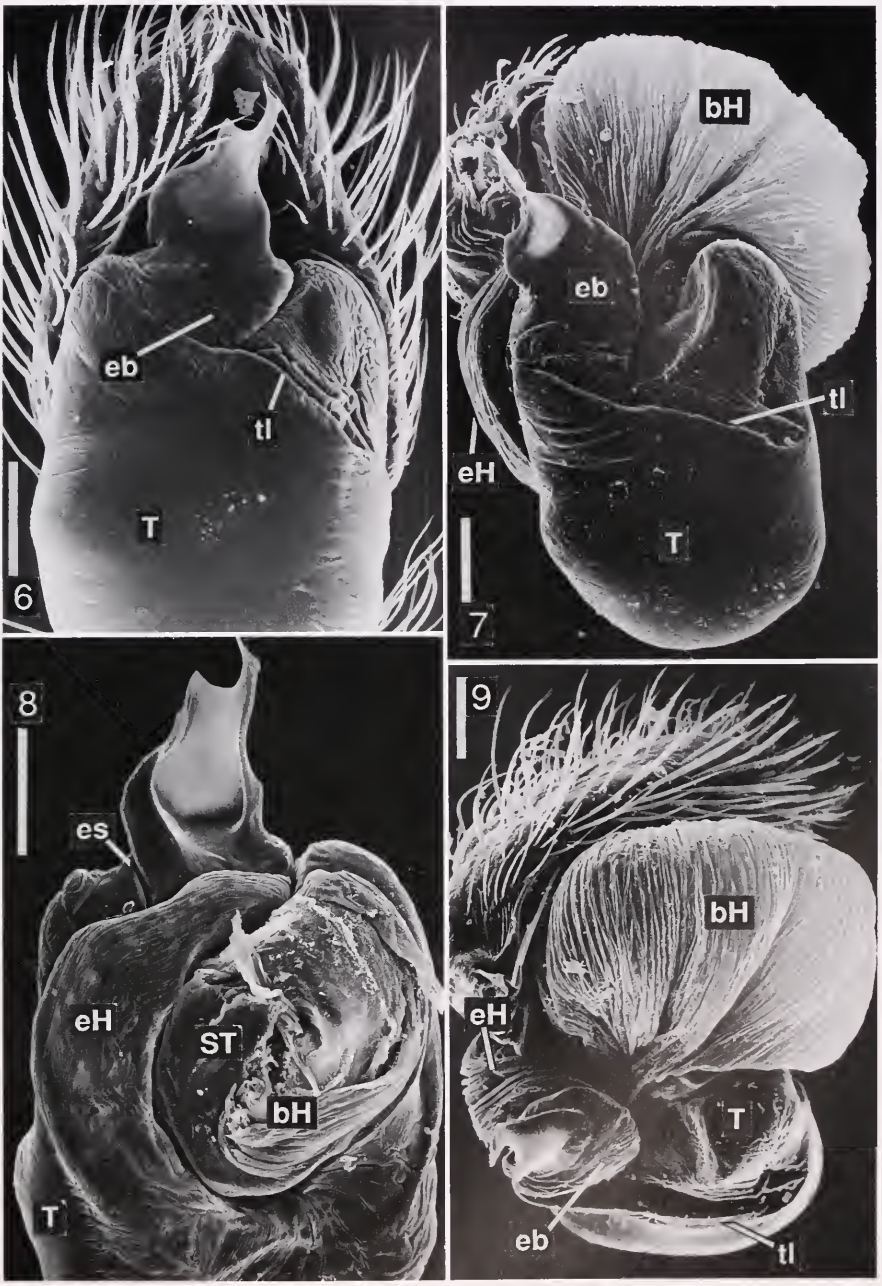
Figure 1. Adult male, *Pelegrina montana* (Montana: Jefferson Co.). Scale bar 1 mm.

Figure 2. Adult female, *Pelegrina proterva* (Pennsylvania: Adams Co.). Scale bar 1 mm.

Figure 3. Trypsin-cleared left palpus, ventral view, *Pelegrina proterva* (Massachusetts: Middlesex Co.). Scale bar 0.1 mm.

Figure 4. External view of epigynum, *Pelegrina edrilana* (Oaxaca: El Tule). Scale bar 0.1 mm.

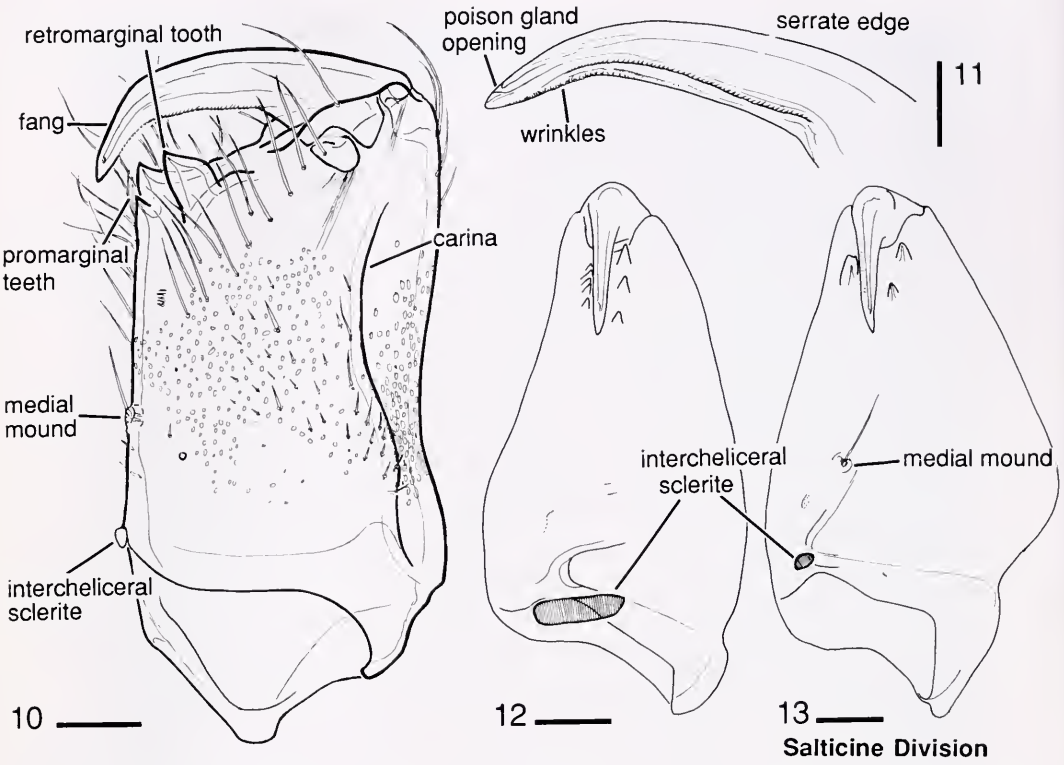
Figure 5. Trypsin-cleared epigynum, oblique internal view showing spermathecal ducts, *Pelegrina galathea* (Massachusetts: Middlesex Co.). Anterior is to left. Scale bar 0.1 mm.



Figures 6–9. Scanning electron micrographs of palpus of *Pelegrina proterva*. 6. Left palp, ventral view. 7. Left palp, expanded, ventral view. 8. Bulb of right palp, dissected from cymbium, dorsal view. 9. Left palp, expanded, apical view.

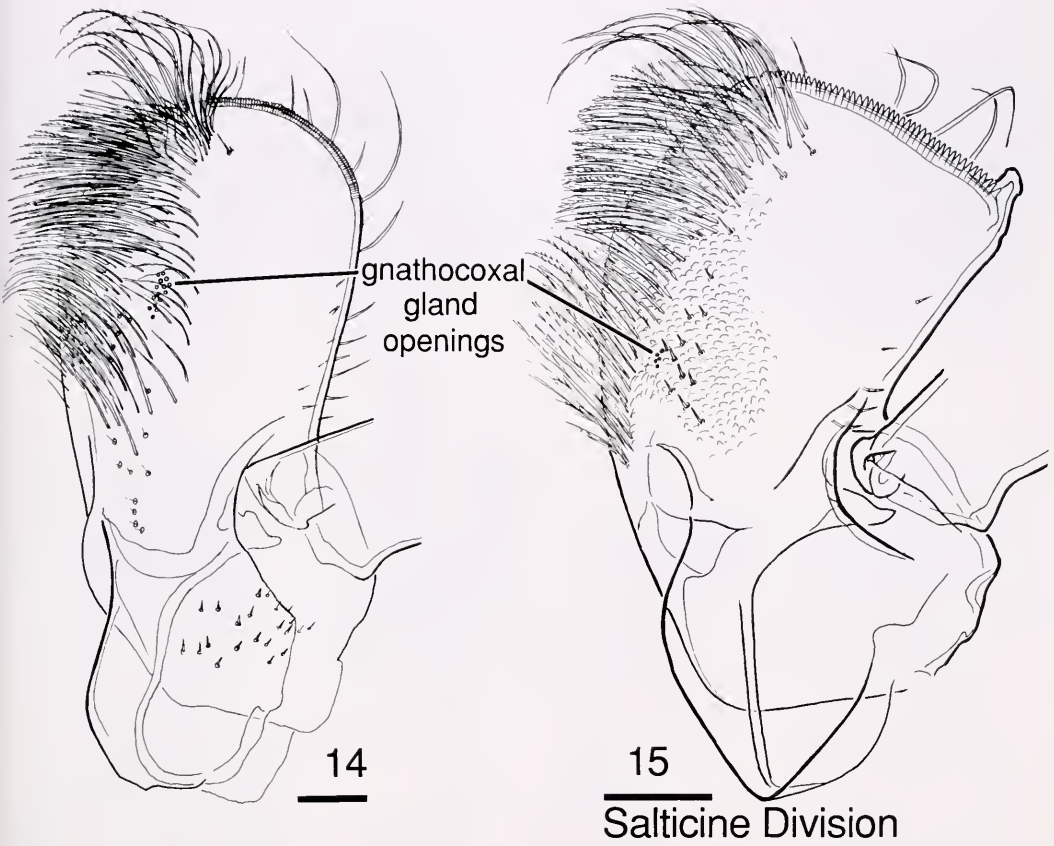
Abbreviations. bH, basal hematodocha; eb, embolic base; eH, embolic hematodocha; es, embolic suture; T, tegulum; tl, tegular ledge.

Scale bar. 0.1 mm.

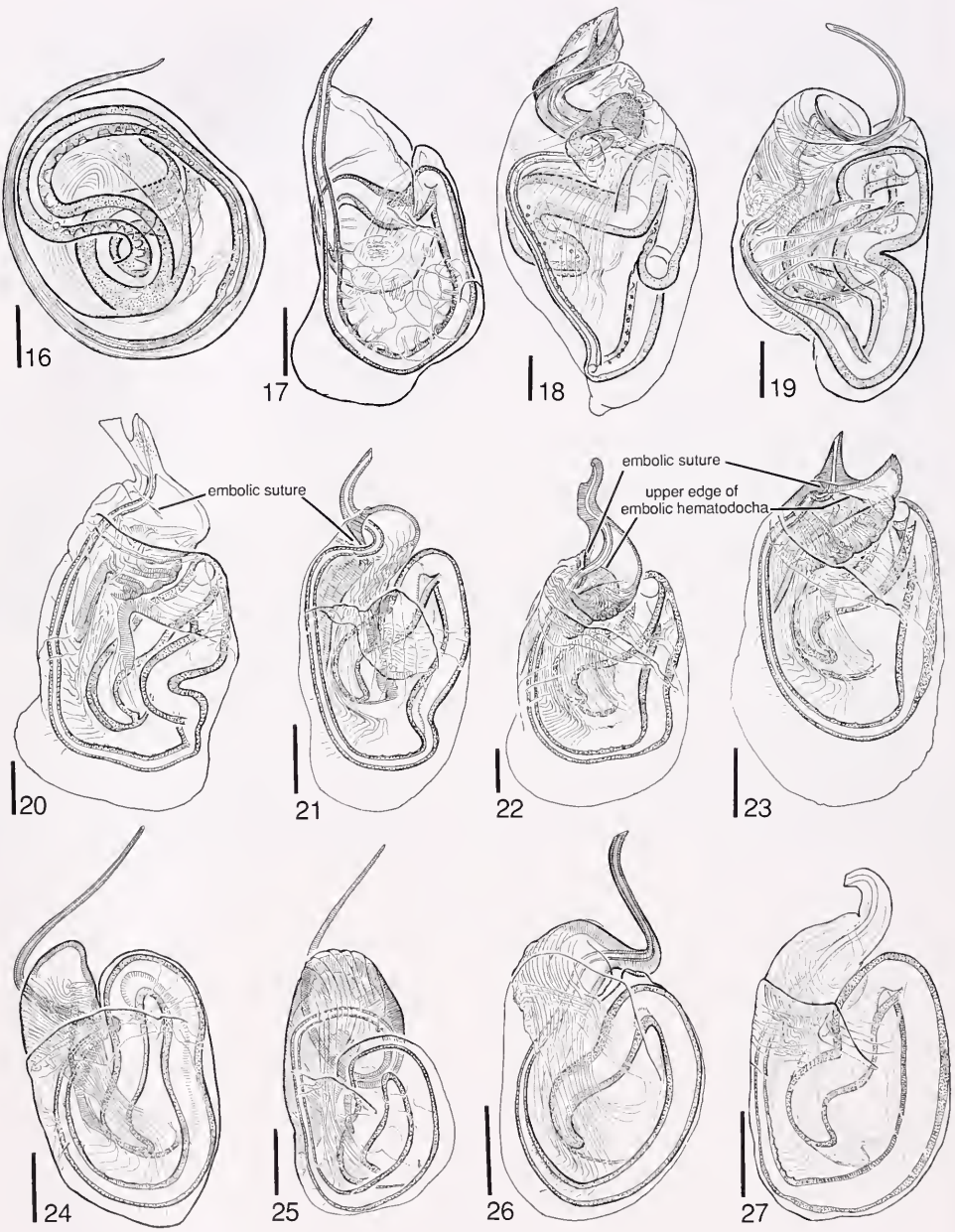


Figures 10–15. Mouthparts of salticids. 10. Left chelicera of male, posterior view, *Pelegrina proterva* (Massachusetts). 11. Fang of left chelicera of male, oblique view from the posterior, *Pelegrina galathea* (North Carolina). 12. Right chelicera of male, medial view, *Cyrba algerina* (Yugoslavia). 13. Right chelicera of female, medial view, *Pelegrina galathea* (Massachusetts). 14. Right endite of male, dorsal view, *Lyssomanes viridis* (Texas). 15. Right endite of male, dorsal view, *Pelegrina proterva* (Massachusetts).

Scale bars. 0.1 mm.

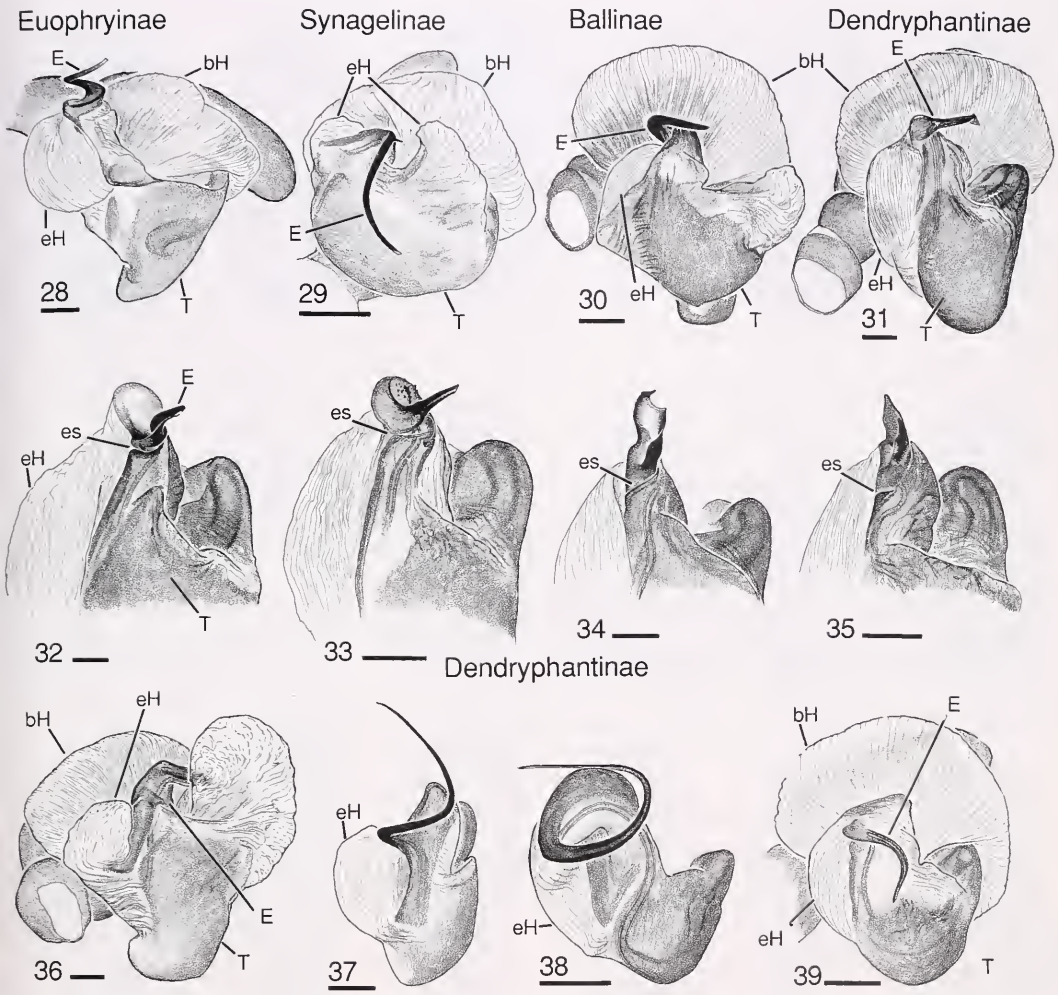


Figures 10–15. Continued.



Figures 16–27. Trypsin-cleared bulbs of left palpi of dendryphantes (Figs. 20–27) and other salticids (Figs. 16–19). 16. *Sitticus palustris* (British Columbia: nr. Fernie). 17. *Phintella* cf. *versicolor* (China: E. Kwantung). 18. *Phlegra fasciata* (Ontario: Long Point). 19. *Corythalia* sp. (Quintana Roo: 31 km NE of Felipe Carrillo Puerto). 20. *Phanias albeolus* (California: Monterey Co.). 21. *Anicius* sp. (Nuevo León: Chipinque Mesa). 22. *Terralonus mylothrus* (Colorado: Gunnison Co.). 23. *Metaphidippus mannii* (California: Riverside Co.). 24. *Hentzia palmarum* (Florida: Collier Co.). 25. *Zygoballus rufipes* (Tamaulipas: 99.1°W, 23.0°N). 26. *Zygoballus incertus* (Panamá: El Valle). 27. *Metaphidippus vitis* (Alberta: Taber).

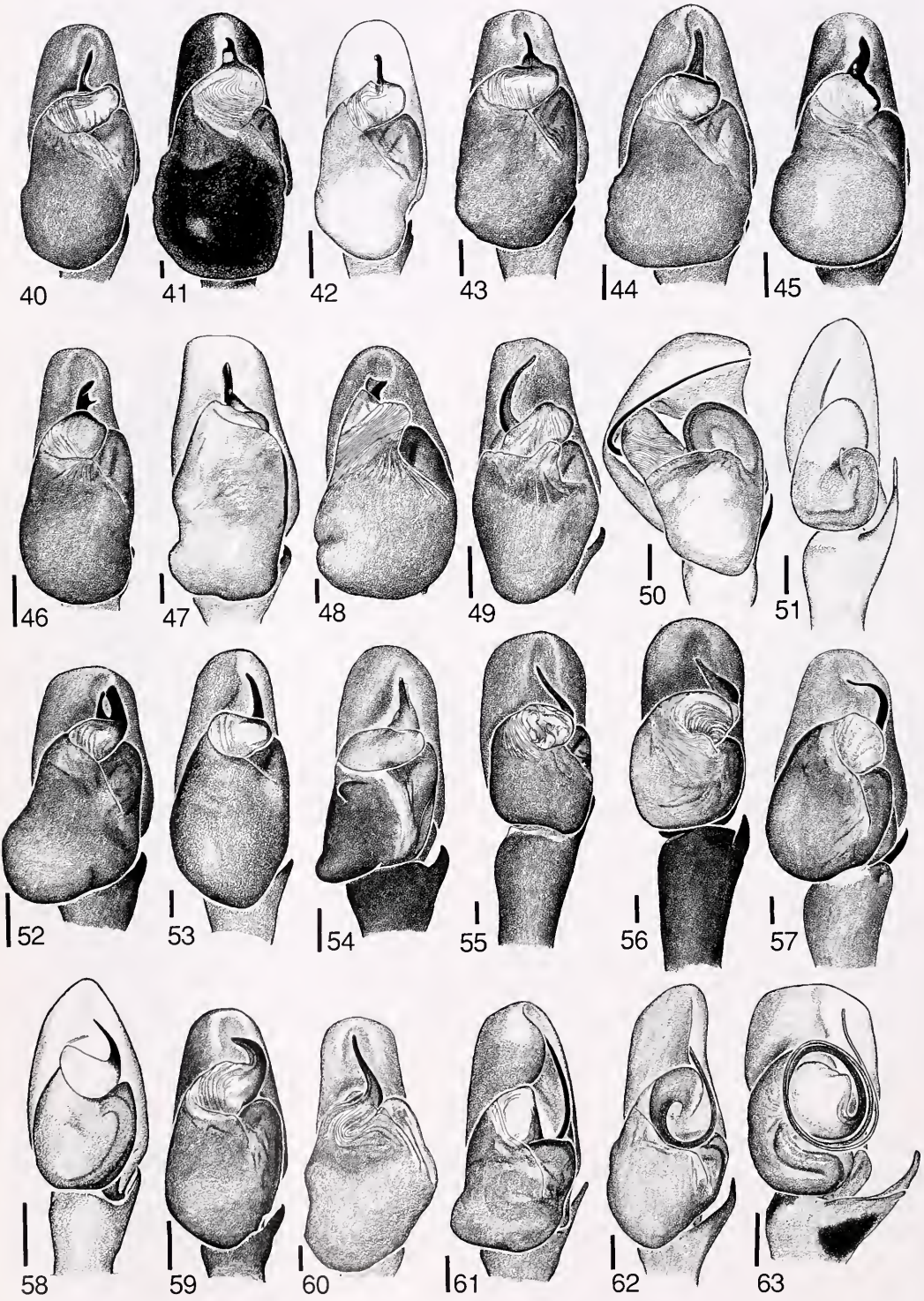
Scale bars. 0.1 mm.



Figures 28–39. Expanded palpi of dendryphantes (Figs. 31–39) and other salticids (Figs. 28–30). 28. *Corythalia* sp. (Chiapas: Palenque). 29. *Synageles noxiosus* (Florida: Alachua Co.). 30. *Admestina tibialis* (New Hampshire: Concord). 31. *Eris flava* (G. & E. Peckham) (Nebraska: Morrill Co.). 32. *Phidippus insignarius* C. L. Koch (Colorado: Logan Co.). 33. *Metaphidippus chera* (Nevada: Chruchill Co.). 34. *Pelegrina proterva* (Massachusetts: Middlesex Co.). 35. *Pelegrina galathea* (Colorado: Bent Co.). 36. *Phanias* sp. (Chiapas: San Cristóbal). 37. *Hentzia palmarum* (Florida: Monroe Co.). 38. *Zygoballus rufipes* (Veracruz: Los Tuxtlas). 39. Species near *Zygoballus incertus* (Quintana Roo: Kohunlich ruins).

Abbreviations. bH, basal hematodocha; E, embolus; eb, embolic base; eH, embolic hematodocha; es, embolic suture; T, tegulum.

Scale bars. 0.1 mm.


40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63

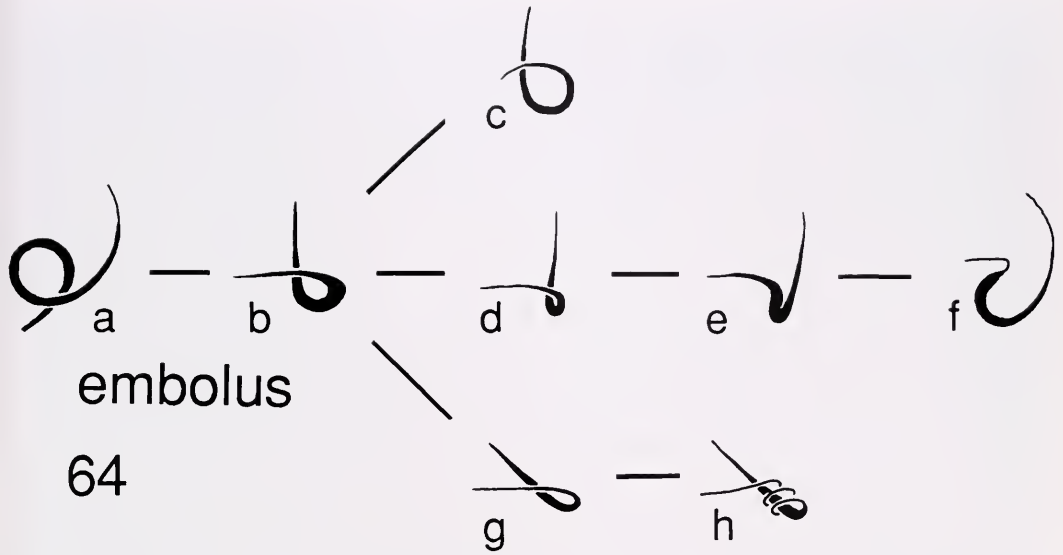
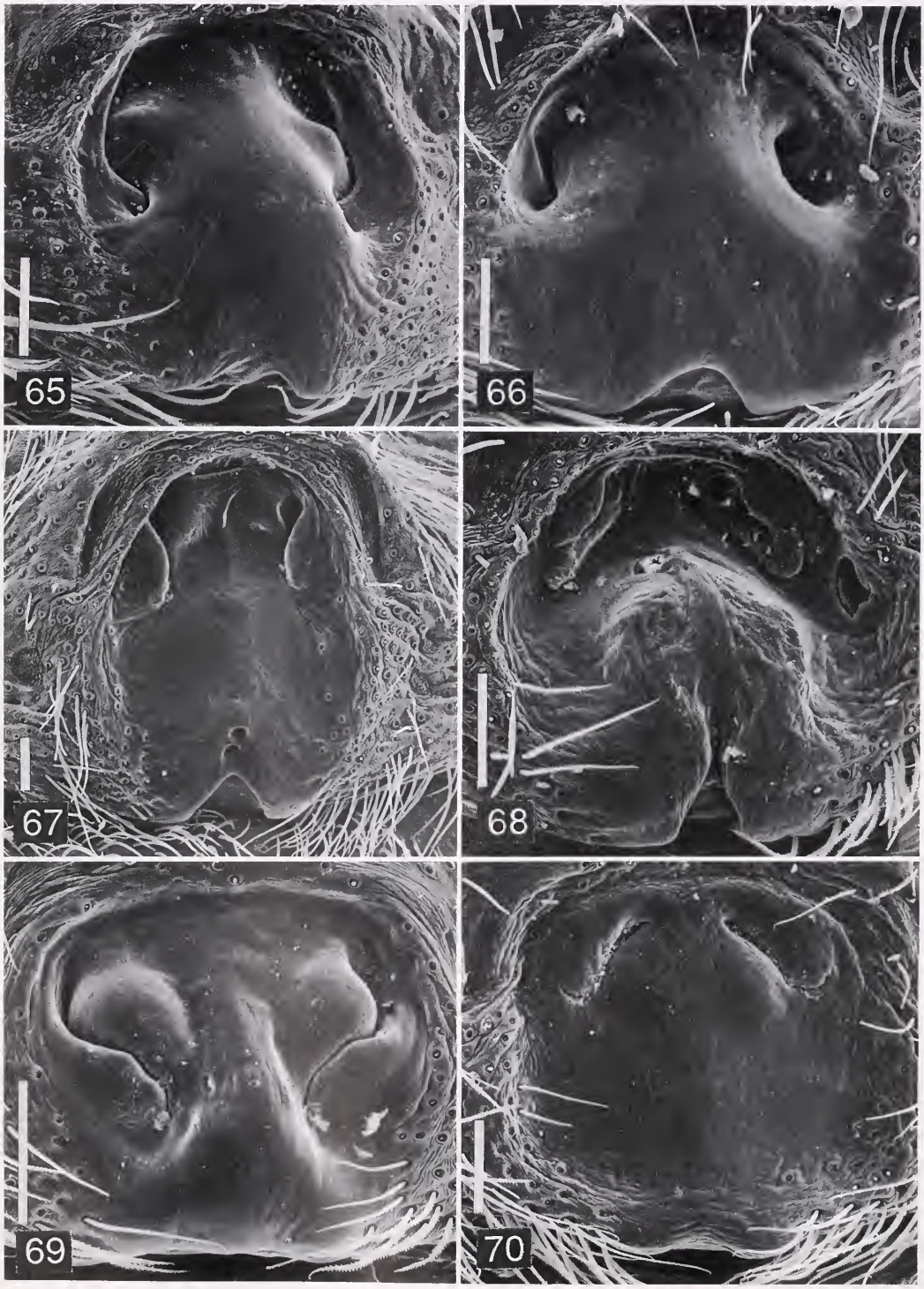


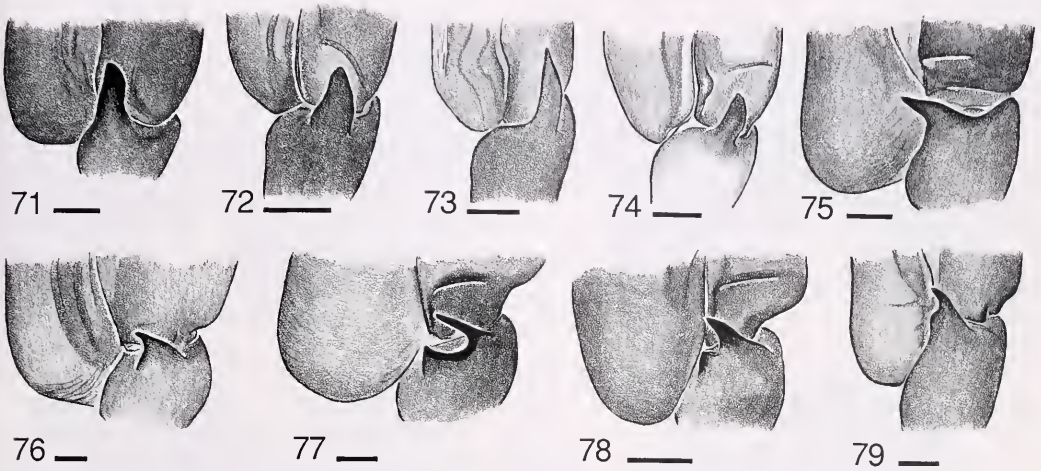
Figure 64. Hypothetical transformations among embolus types from the euophryine type (a) to the dendryphantine types (b–h). At the left or lower left of each of a–h is the base of the embolus; the tip of the embolus is at the top of each figure. Examples with these types are *Metaphidippus chera, Eris aurantia,* and *Bellota wheeleri* (b); *Hentzia* and *Zygoballus* (c); *Eris militaris* (d); *Paradamoetas* (e); *Dendryphantes tropicus* and *Mabellina* (f); *Metaphidippus mandibulatus* (g); and *Messua, Bagheera,* and *Gastromicans* (h).

←

Figures 40–63. Left palpi of various salticids of the subfamily Dendryphantinae. 40. *Eris* cf. *aurantia* (Chiapas: San Cristóbal). 41. *Phidippus audax* (Ontario: Burlington). 42. *Bellota wheeleri* (Oaxaca: SW of Valle Nacional). 43. "*Pseudicius*" *siticulosus* (Arizona: Yavapai Co.). 44. *Terralonus californicus* (California: Santa Cruz Co.). 45. *Sassacus papenhoei* (Nevada: Lander Co.). 46. *Tulpius hilarus* (Quintana Roo: Kohunlich ruins). 47. *Phanias harfordii* (California: San Mateo Co.). 48. *Ghelna castanea* (Virginia: Falls Church). 49. *Anicius dolius* Chamberlin (holotype; Jalisco: Guadalajara). 50. *Hentzia mitrata* (Hentz) (Minnesota: Washington Co.). 51. *Zygoballus rufipes* (Ontario: Essex Co.). 52. *Rhene* cf. *flavigera* (China: E. Kwantung: Yim Na San). 53. *Eris militaris* (Ontario: Port Elgin). 54. *Rudra geniculata* (Panamá: Canal Zone). 55. *Parnaenus recurvus* (paratype; Panamá: Barro Colorado Island). 56. "*Paraphidippus*" *validus* (paratype; Panamá: Barro Colorado Island). 57. Species near *Zygoballus incertus* (Quintana Roo: Kohunlich ruins). 58. *Paradamoetas fontana* (Ontario: Hastings Co.). 59. *Metaphidippus* cf. *vitis* (Puebla: nr. Xicotepec de Juarez). 60. *Dendryphantes perfectus* G. & E. Peckham (holotype; Brazil: Para). 61. "*Eris*" *nidicolens* (France: Marseille). 62. *Dendryphantes tropicus* G. & E. Peckham (holotype; Brazil: Chapoda). 63. *Mabellina prescotti* Chickering (paratype; Panamá: El Valle).

Scale bars. 0.1 mm.


65
66
67
68
69
70



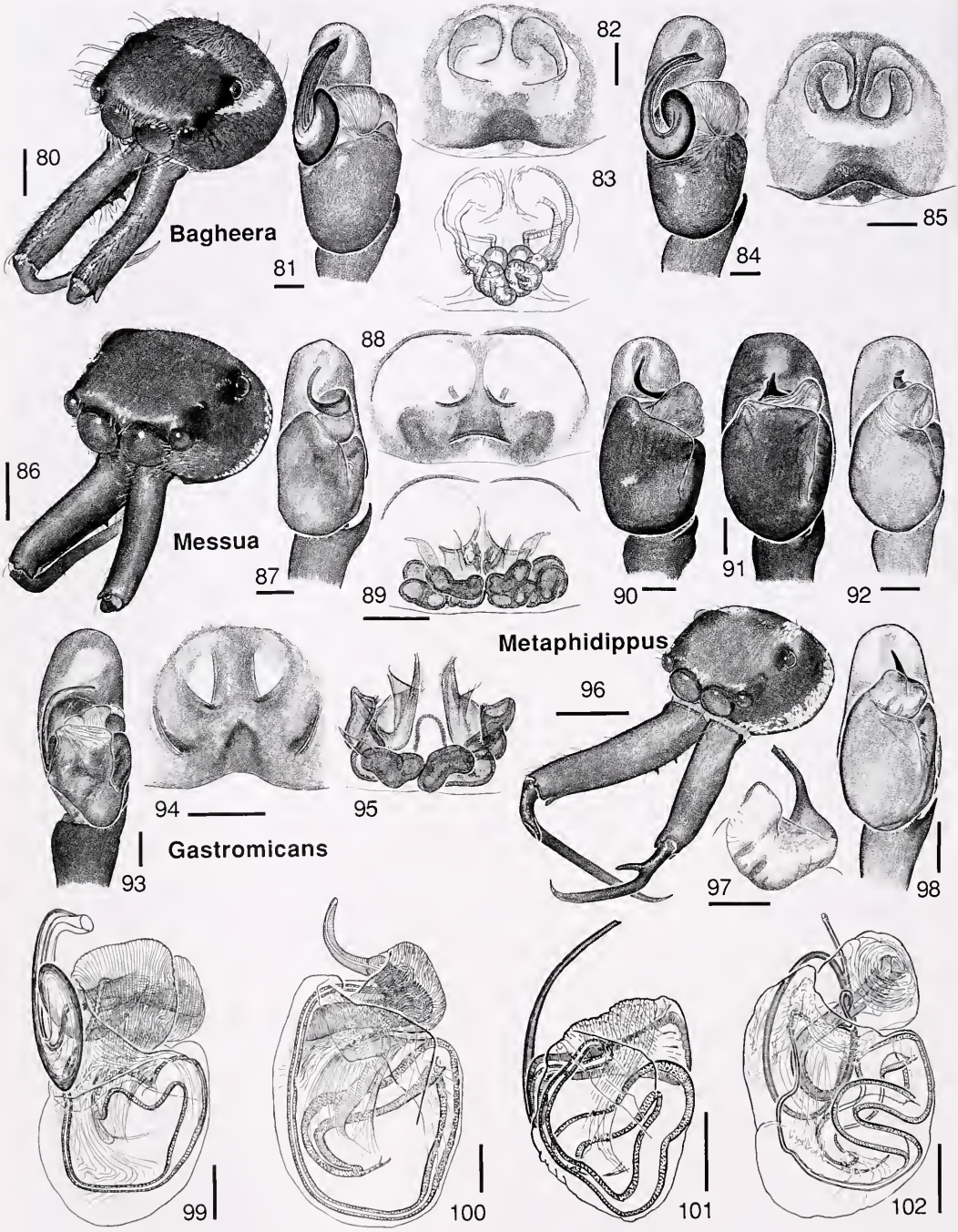
Figures 71–79. Tibial apophyses of left palpi of dendryphantines. 71. *Bagheera kiplingi* (Oaxaca: nr. Tuxtepec). 72. *Messua desidiosa* (Costa Rica: San Jose). 73. *Gastromicans levispina* (Panamá: El Valle). 74. *Metaphidippus mandibulatus* (holotype; Costa Rica). 75. *Phidippus audax* (Ontario: Halton Co.). 76. *Dendryphantes hastatus* (Poland: Smogorzew). 77. *Beata hispida* (Quintana Roo: Kohunlich ruins). 78. *Pelegrina galathea* (Texas: Bexar Co.). 79. *Eris militaris* (North Carolina).

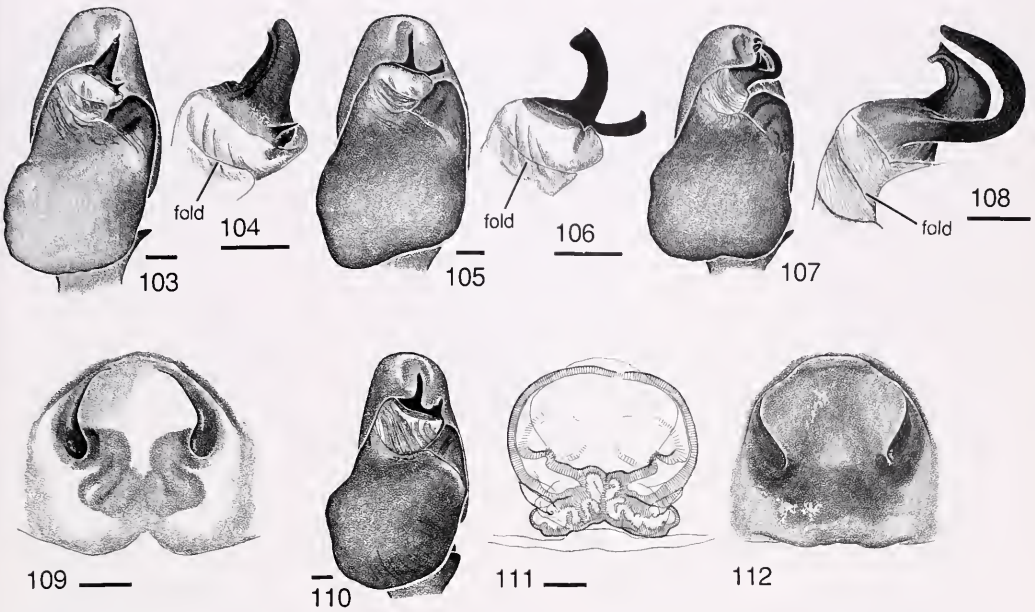
Scale bars. 0.1 mm.

←

Figures 65–70. Scanning electron micrographs of epigyna of dendryphantines, showing teardrop-shaped flaps over openings. View is mostly ventral, slightly oblique lateral. 65. *Dendryphantes rudis* (U.S.S.R.: Buzjatia). 66. *Eris militaris* (Michigan: Emmet Co.). 67. *Phidippus audax* (Minnesota: Rochester). 68. *Terralonus mylothrus* (Colorado: Pitkin Co.). 69. *Sassacus papenhoei* (California: Santa Barbara Co.). 70. *Phanias albeolus* (Oregon: Lane Co.).

Scale bars. 0.1 mm.


80
Bagheera
81
82
83
84
85
86
Messua
87
88
89
90
91
92
Metaphidippus
93
94
95
96
97
98
Gastromicans
99
100
101
102



Figures 103–108. *Dendryphantes* species, left palpi (Figs. 103, 105, 107) and emboli, oblique ventral-retrolateral view (Figs. 104, 106, 108). 103, 104. *Dendryphantes hastatus* (Poland: Smogorzew). 105, 106. *Dendryphantes rudis* (105, France; 106, Spain: Barcelona: Baga). 107, 108. *Dendryphantes nigromaculatus* (107, Colorado: Chaffee Co.; 108, Colorado: Gunnison Co.).

Figures 109–112. *Beata*. 109. *Beata magna* (one of the types; Panamá: Bugaba): ventral view of epigynum. 110–112. *Beata hispida* (Quintana Roo: Kohunlich ruins). 110. Left palpus; epigynum. 111. Dorsal view. 112. Ventral view.

Scale bars. 0.1 mm.

←

Figures 80–85. *Bagheera*. 80–83. *Bagheera kiplingi* (Oaxaca: nr. Tuxtepec): 80. Male face. 81. Left palpus; epigynum. 82. Ventral views. 83. Dorsal view. 84, 85. *Bagheera prosper* (Oaxaca: Valle Nacional). 84. Left palpus. 85. Epigynum, ventral view.

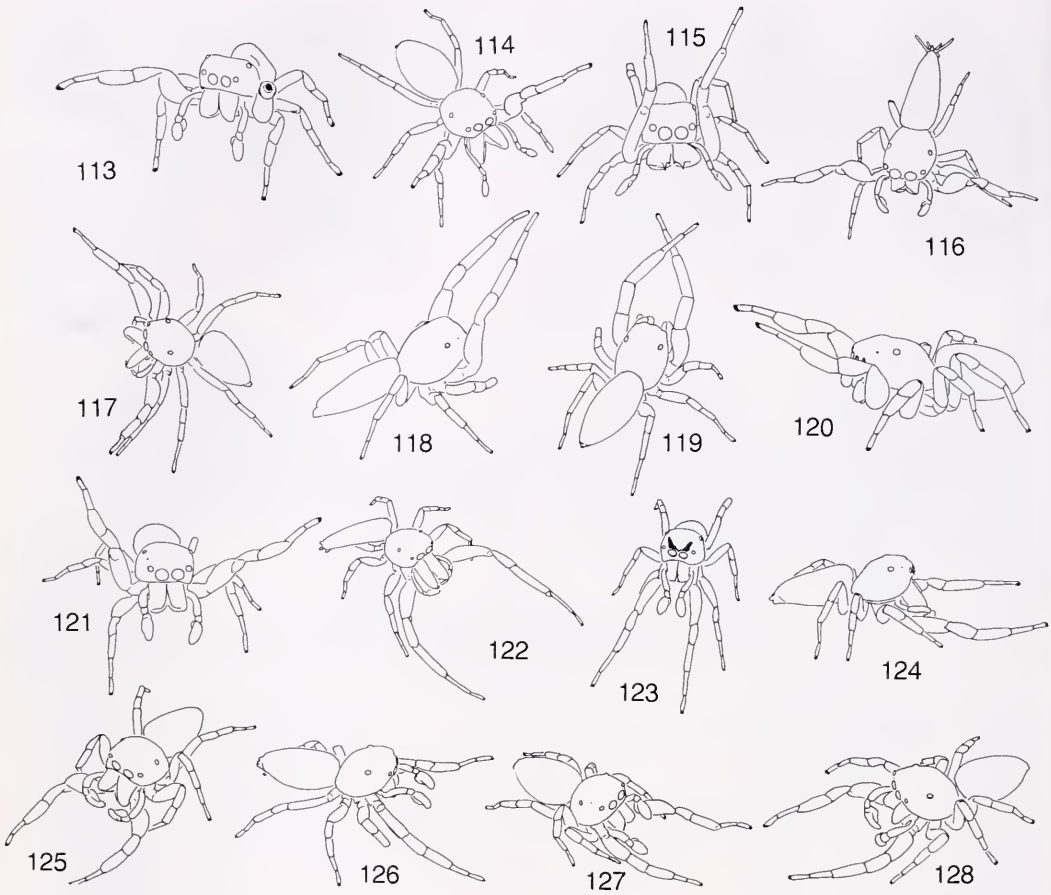
Figures 86–92. *Messua*. 86–89. *Messua desidiosa* (Costa Rica: San Jose). 86. Male face. 87. Left palpus; epigynum. 88. Ventral view. 89. Dorsal view. 90. *Messua limbata* (Quintana Roo: nr. Tulum ruins): left palpus. 91. *Messua* cf. *octonotata* (Chiapas: Palenque): left palpus. 92. *Messua* sp. cf. *Metaphidippus mandibulatus* (Costa Rica: Puntarenas Province): left palpus.

Figures 93–95. *Gastromicans levispina* (Panamá: El Valle). 93. Left palpus; epigynum. 94. Ventral view. 95. Dorsal view.

Figures 96–98. *Metaphidippus mandibulatus* (holotype; Costa Rica). 96. Male face. 97. Oblique ventral-retrolateral view of left embolus. 98. Left palpus.

Figures 99–102. Trypsin-cleared palpi of *Bagheera* and similar dendryphantines. 99. *Bagheera prosper* (Oaxaca: Valle Nacional). 100. *Messua limbata* (Arizona: Santa Cruz Co.). 101. *Gastromicans levispina*, right palp, image photographically reversed (Panamá: El Valle). 102. *Ashtabula dentata* (Panamá: El Valle).

Scale bars. 0.1 mm, except for male faces 0.5 mm.



Figures 113–128. Courtship poses of various dendryphantine males, traced from photographs. 113. *Phidippus audax* (Ontario: Halton Co.). 114. *Paradamoetas fontana* (Levi) (Ontario: Richmond). 115. *Zygoballus rufipes* (Arizona: Santa Cruz Co.). 116. *Tulpius hilarus* (Tamaulipas: 99.1°W, 23.0°N). 117. *Messua limbata* (Arizona: Santa Cruz Co.). 118. *Phanias watonus* (California: Los Angeles Co.). 119. "*Pseudicius*" *siticulosus* (Arizona: Yavapai Co.). 120. *Dendryphantes nigromaculatus* (Montana: Jefferson Co.). 121. *Pelegrina furcata* (Arizona: Santa Rita Mtns.). 122. *Hentzia mitrata* (Florida: Dade Co.). 123. *Tutelina similis* (Banks) (Alberta: Cypress Hills). 124. *Eris militaris* (Saskatchewan: Lanigan). 125. *Pelegrina galathea* (Chihuahua: 105.2°W, 27.9°N). 126. *Pelegrina peckhamorum* (Massachusetts: Barnstable Co.). 127. *Pelegrina* cf. *exigua* (from apparent *flaviceps-exigua* hybrid area; Massachusetts: Middlesex Co.). 128. *Pelegrina insignis* (Minnesota: Hennepin Co.).

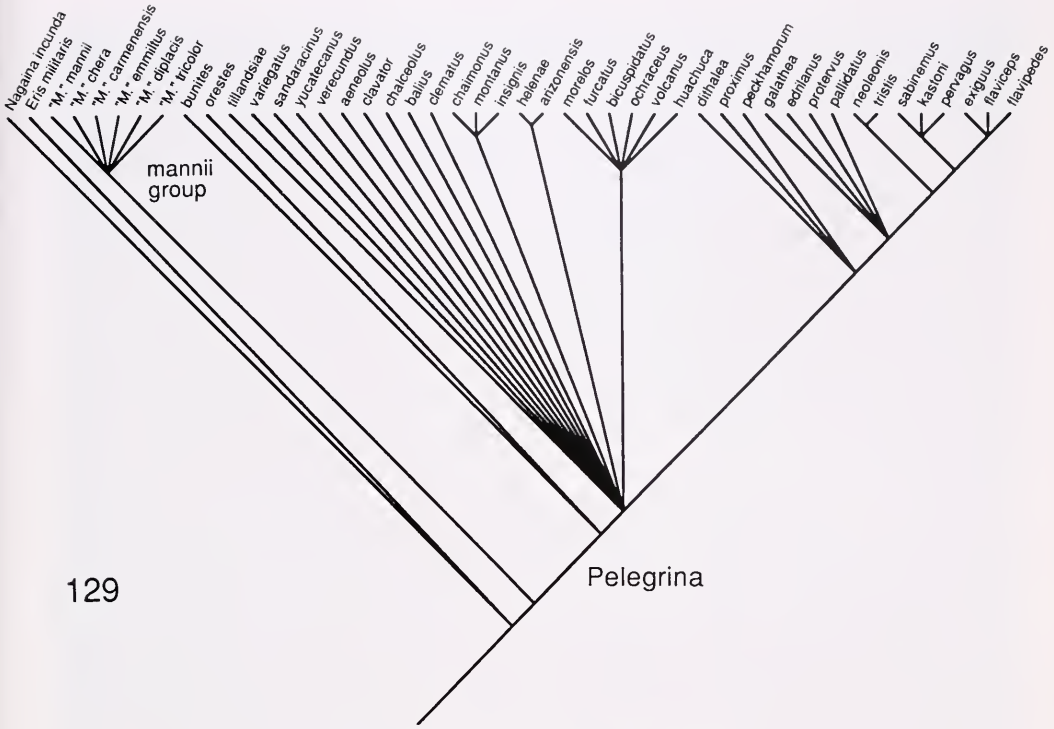
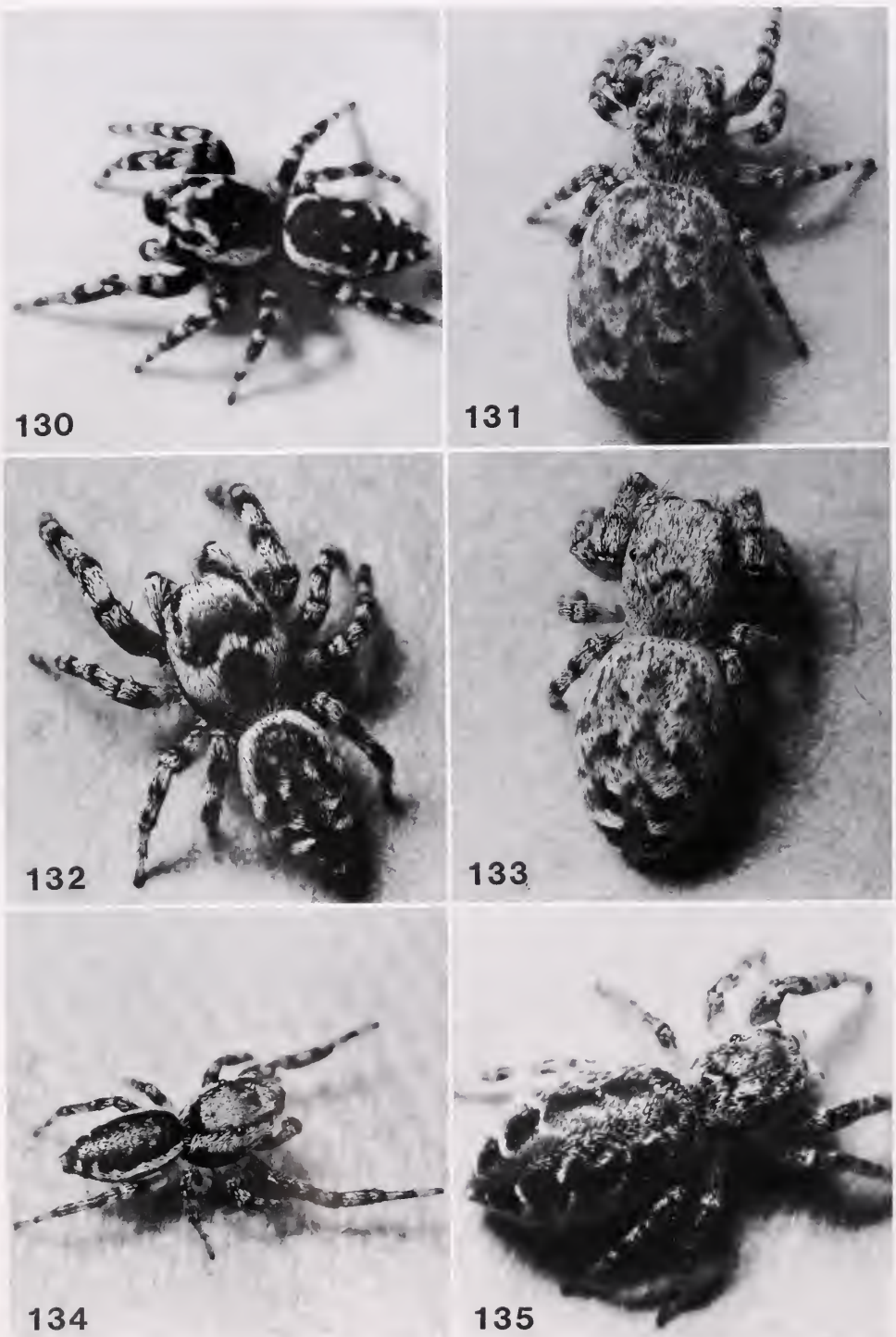
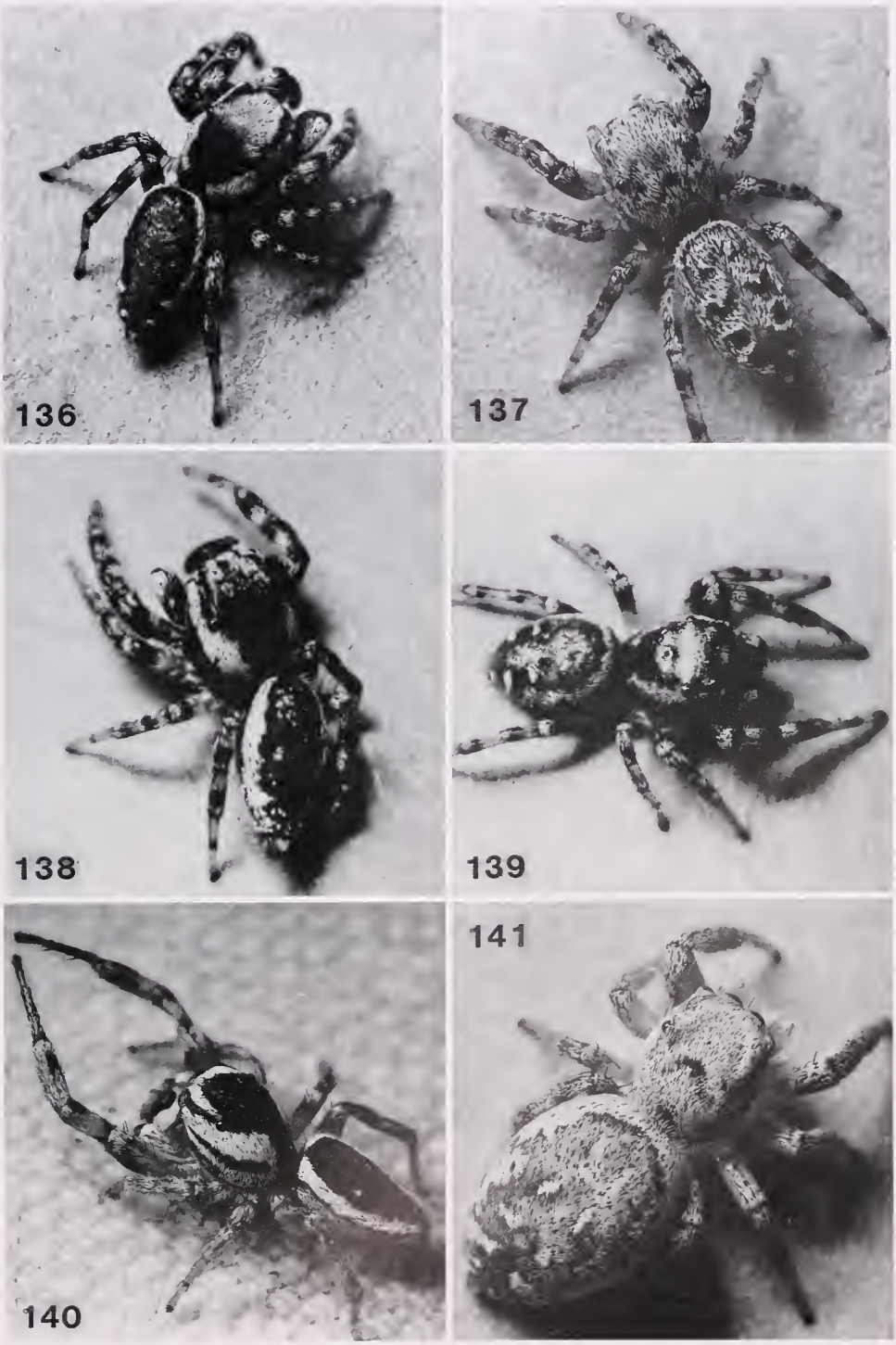


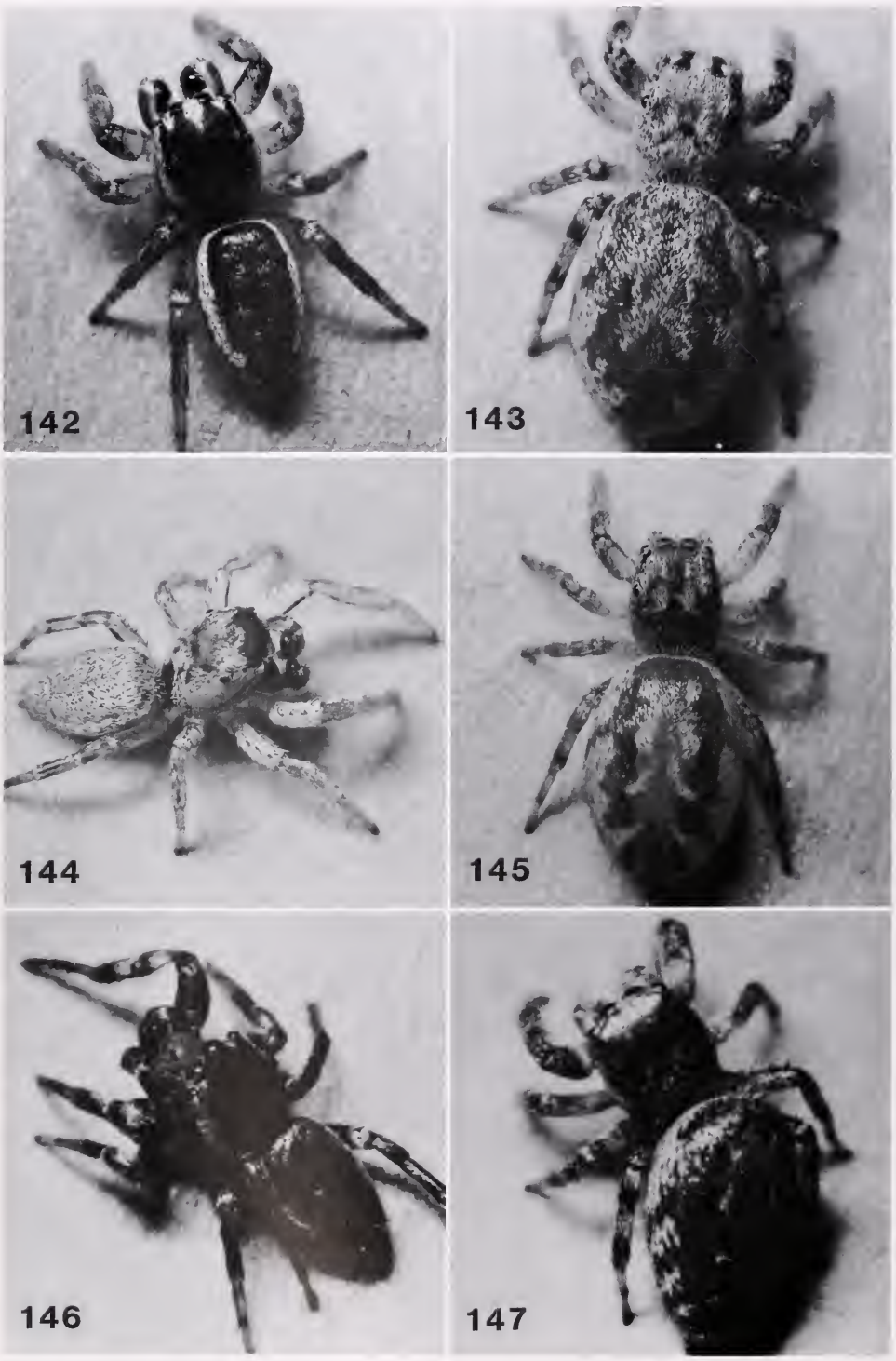
Figure 129. Cladogram for *Pelegrina* species.



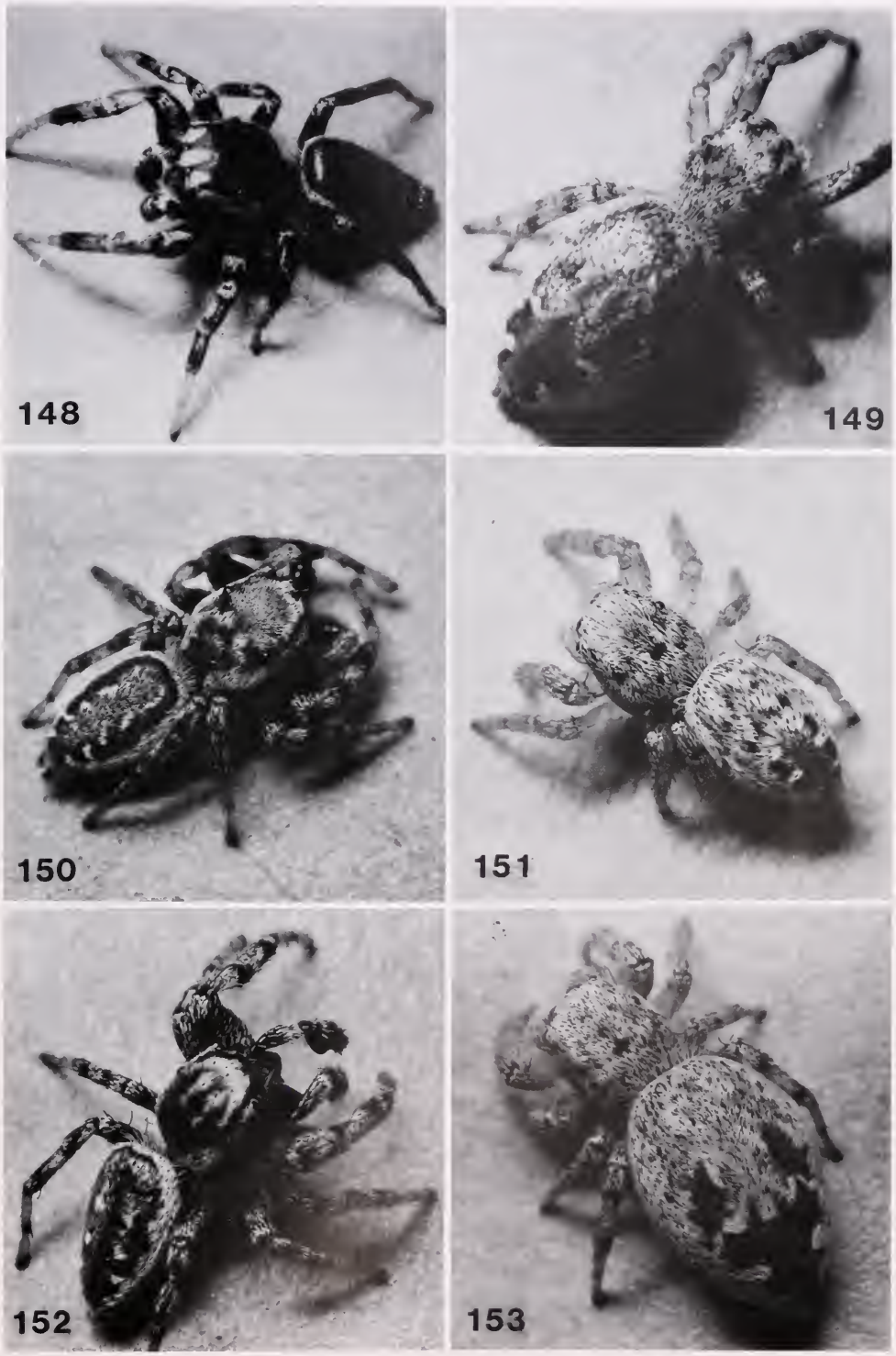
Figures 130–135. Photographs of living *Pelegrina*. 130, 131. *Pelegrina galathea* (sp. 1). 130. Male (Ontario: Mississauga). 131. Female (Massachusetts: Middlesex Co.). 132, 133. *Pelegrina dithalea* (sp. 3). 132. Male (holotype; Arizona: Sycamore Canyon). 133. Female (Arizona: Kitt Peak). 134, 135. *Pelegrina proterva* (sp. 5). 134. Male (Manitoba: Binscarth). 135. Female (Ontario: Sudbury District).



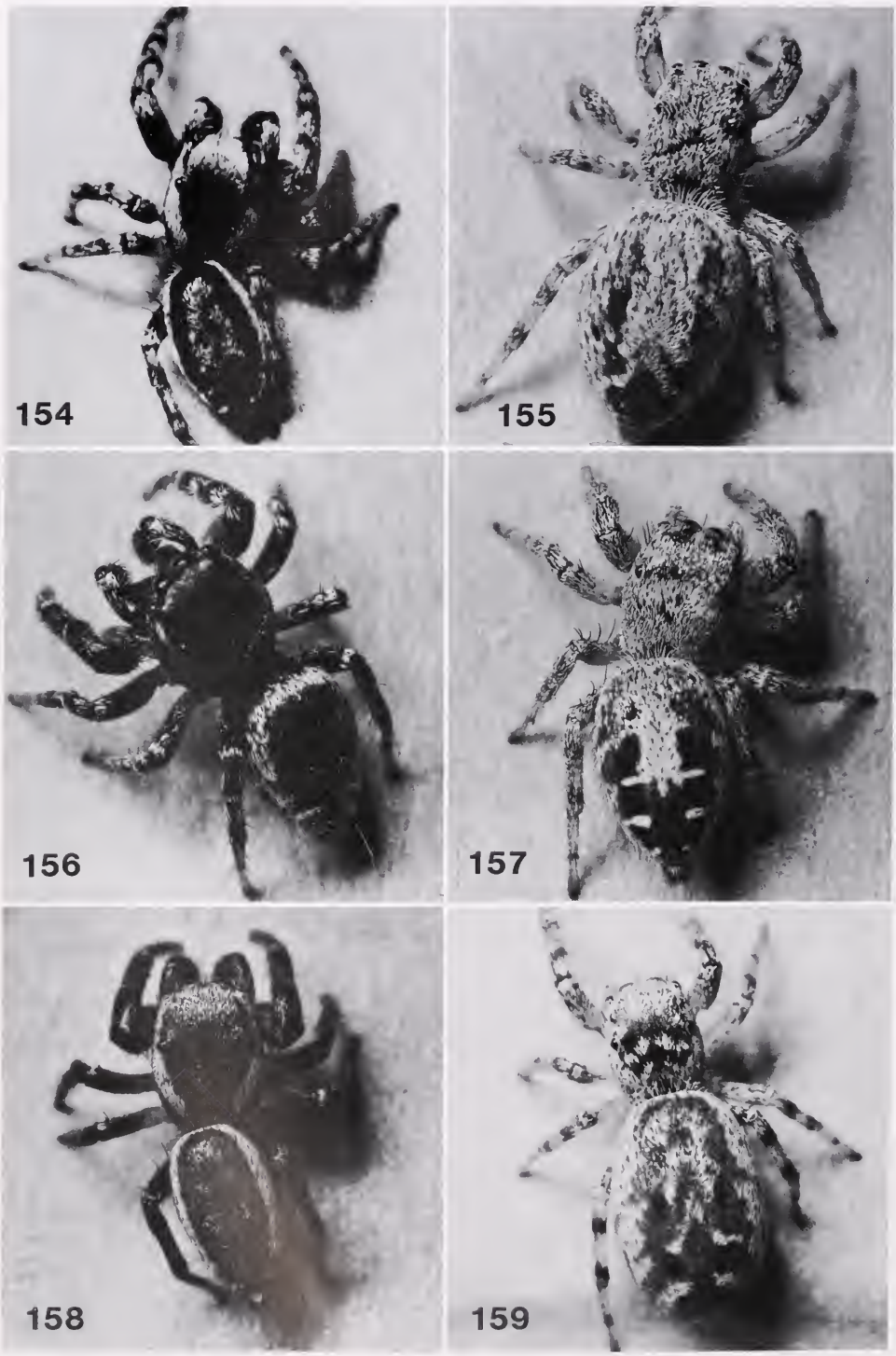
Figures 136–141. Photographs of living *Pelegrina*. 136, 137. *Pelegrina peckhamorum* (sp. 6); Massachusetts. 136. Male. 137. Female. 138. *Pelegrina neoleonis* (sp. 7): male (Nuevo León: Cerro Potosí). 139. *Pelegrina chalceola* (sp. 21): male (holotype: Arizona: Madera Canyon). 140, 141. *Pelegrina kastoni* (sp. 11). 140. Male (holotype; Arizona: Mount Hopkins). 141. Female (Arizona: Madera Canyon).



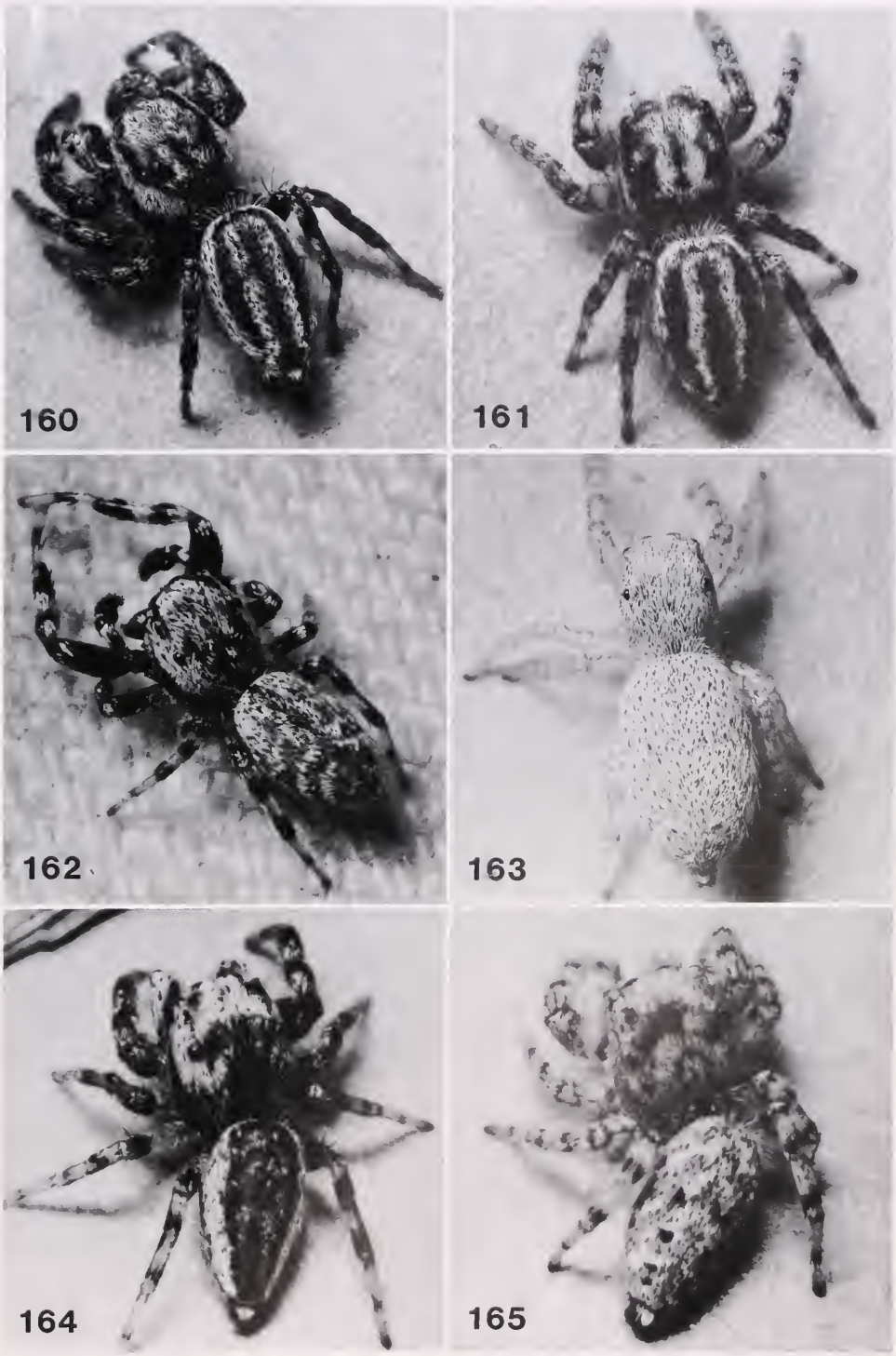
Figures 142–147. Photographs of living *Pelegrina*. 142, 143. *Pelegrina flavipedes* (sp. 12); Manitoba: nr. Neepawa). 142. Male. 143. Female. 144, 145. *Pelegrina flaviceps* (sp. 13). 144. Male (Maine: Sagadahoc Co.). 145. Female (New Hampshire: Durham). 146, 147. *Pelegrina exigua* (sp. 14) (dull form). 146. Male (Maryland: Montgomery Co.). 147. Female (Virginia: Shenandoah Co.).



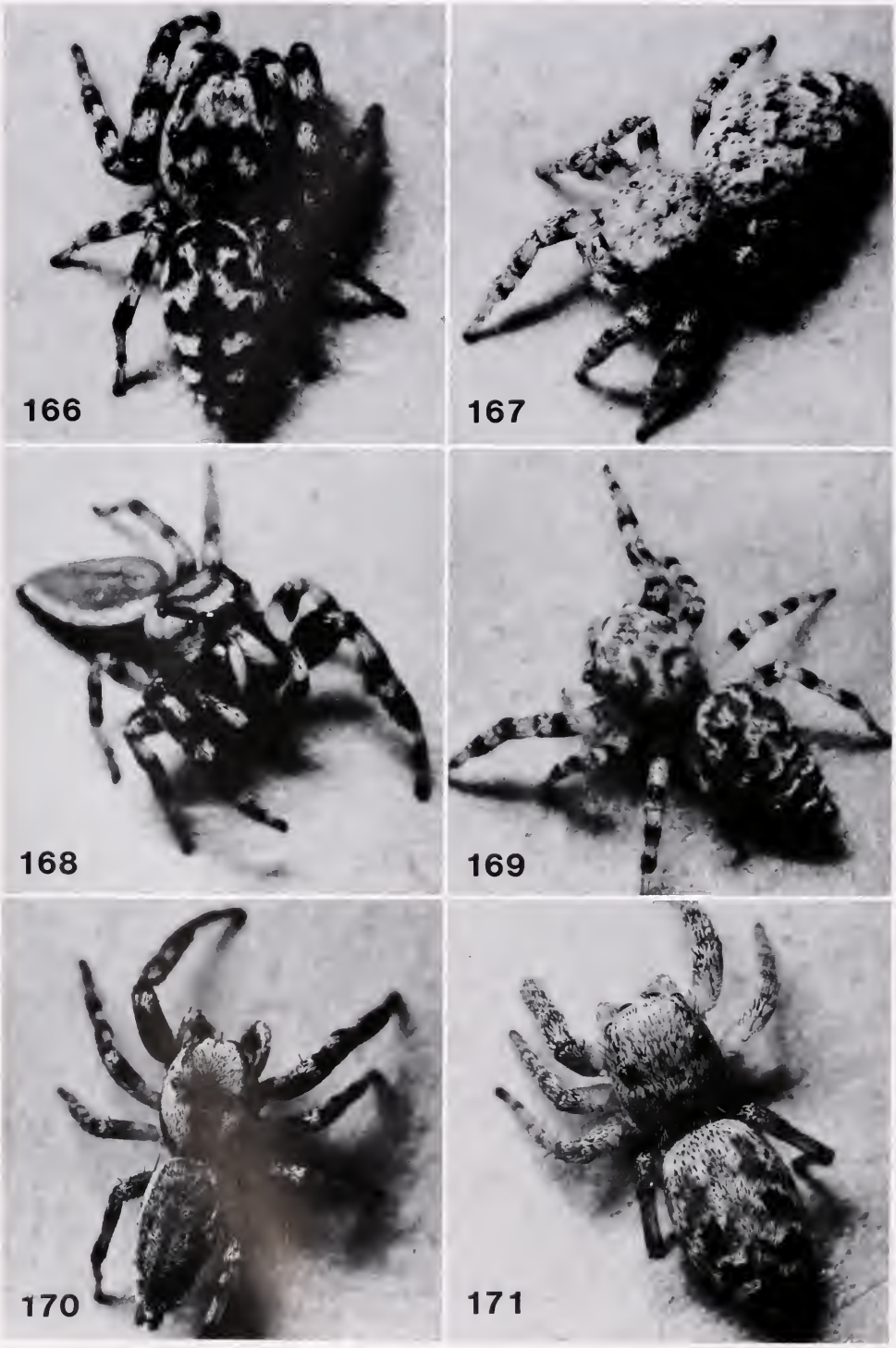
Figures 148–153. Photographs of living *Pelegrina*. 148, 149. *Pelegrina exigua* (sp. 14) (striped form). 148. Male (Maryland: Montgomery Co.). 149. Female (Virginia: Washington Co.). 150, 151. *Pelegrina insignis* (sp. 16; Minnesota: Hennepin). 150. Male. 151. Female. 152, 153. *Pelegrina clemata* (sp. 18; Saskatchewan: Outlook). 152. Male. 153. Female.



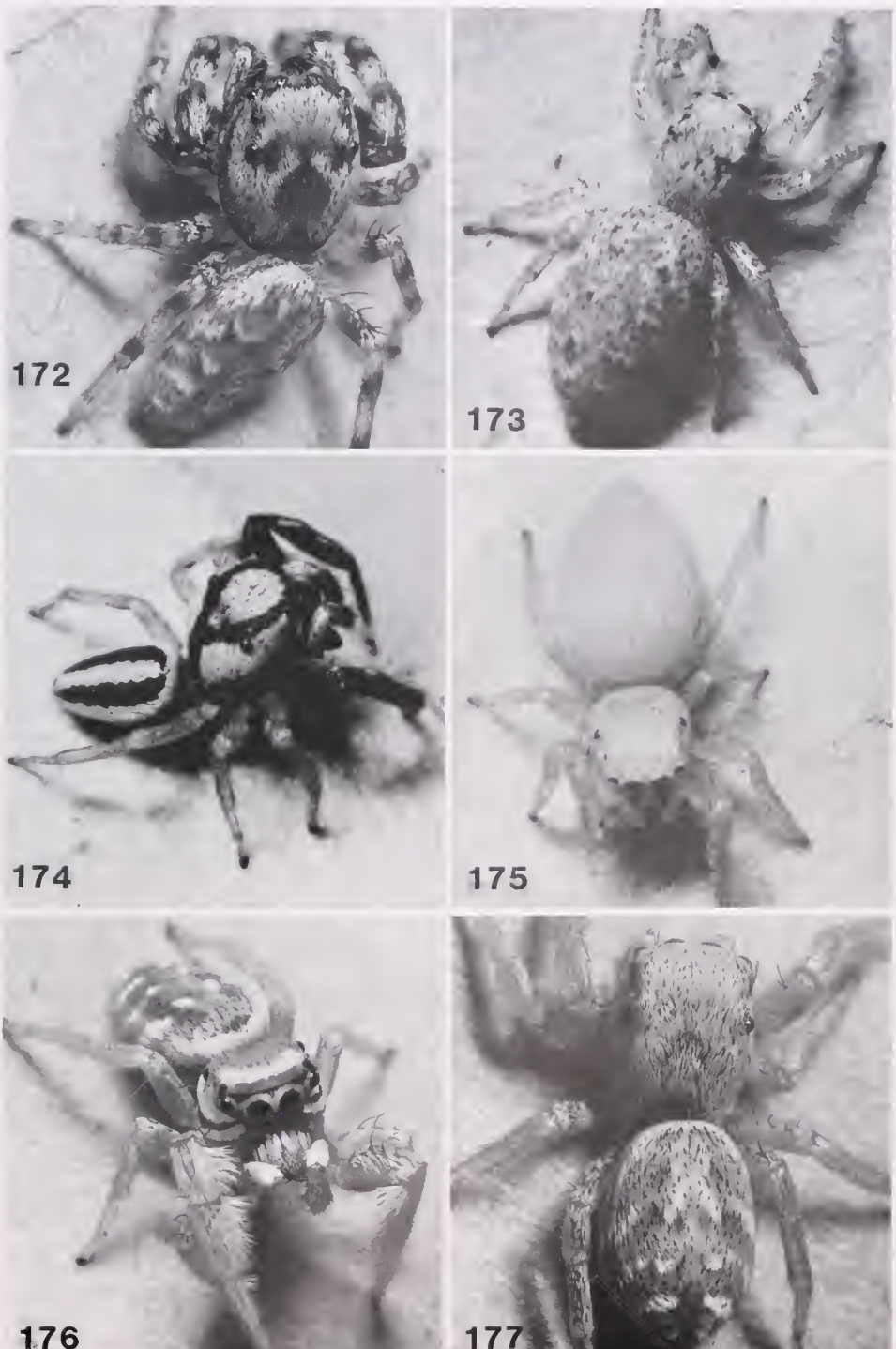
Figures 154–159. Photographs of living *Pelegrina*. 154. *Pelegrina montana* (sp. 15): male (Montana: Jefferson Co.). 155. *Pelegrina helenae* (sp. 29): female (Washington: Franklin Co.). 156, 157. *Pelegrina aeneola* (sp. 19; California: Riverside Co.). 156. Male. 157. Female. 158, 159. *Pelegrina furcata* (sp. 22). 158. Male (Arizona: Mount Hopkins). 159. Female (Arizona: Yavapai Co.).



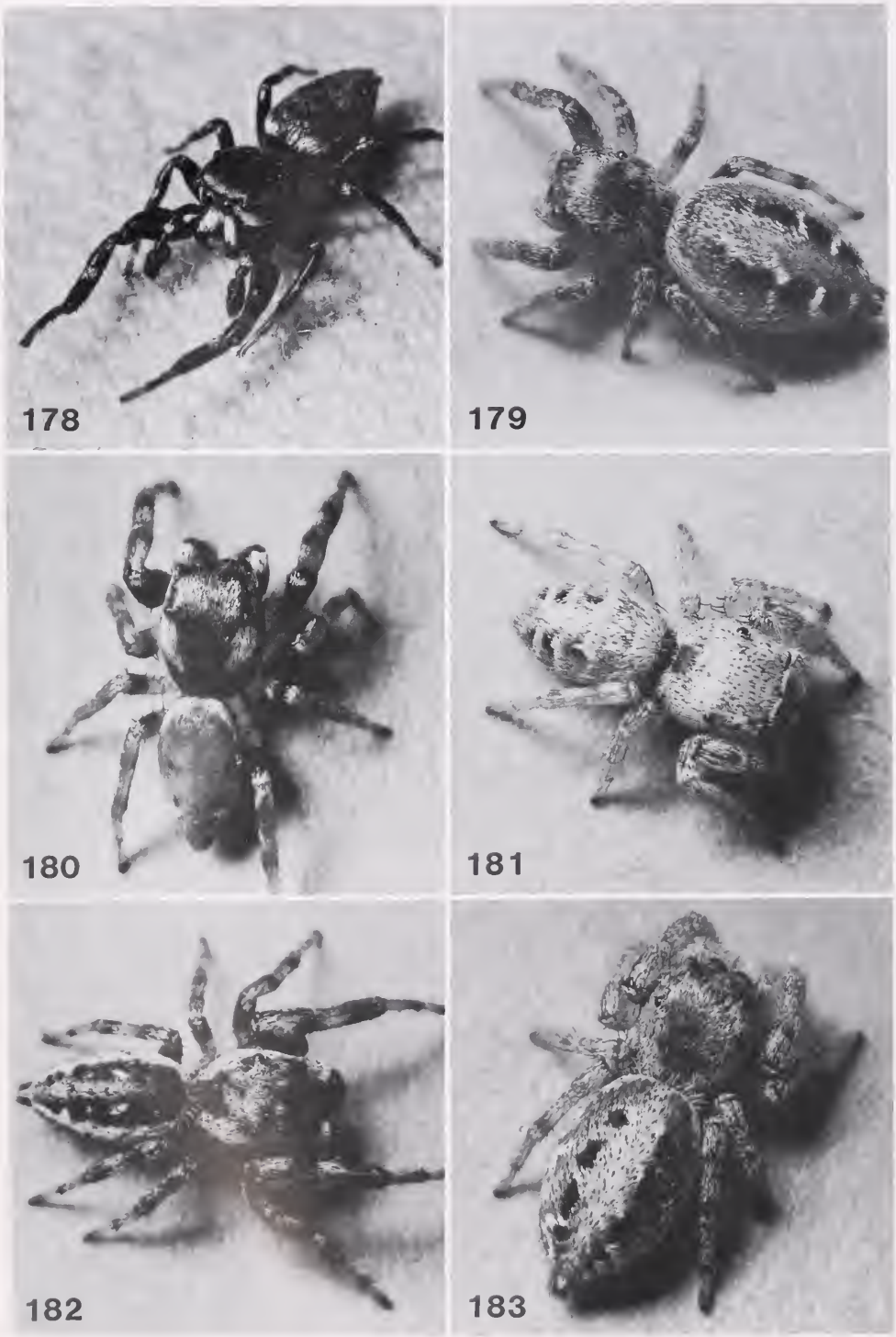
Figures 160–165. Photographs of living *Pelegrina*. 160, 161. *Pelegrina arizonensis* (sp. 28; Minnesota: Anoka Co.). 160. Male. 161. Female. 162, 163. *Pelegrina verecunda* (sp. 30; Arizona: Yavapai Co.). 162. Male. 163. Female. 164, 165. *Pelegrina clavator* (sp. 31). 164. Male (Nuevo León: Chipinque Mesa). 165. Female (Veracruz: Naolinco).



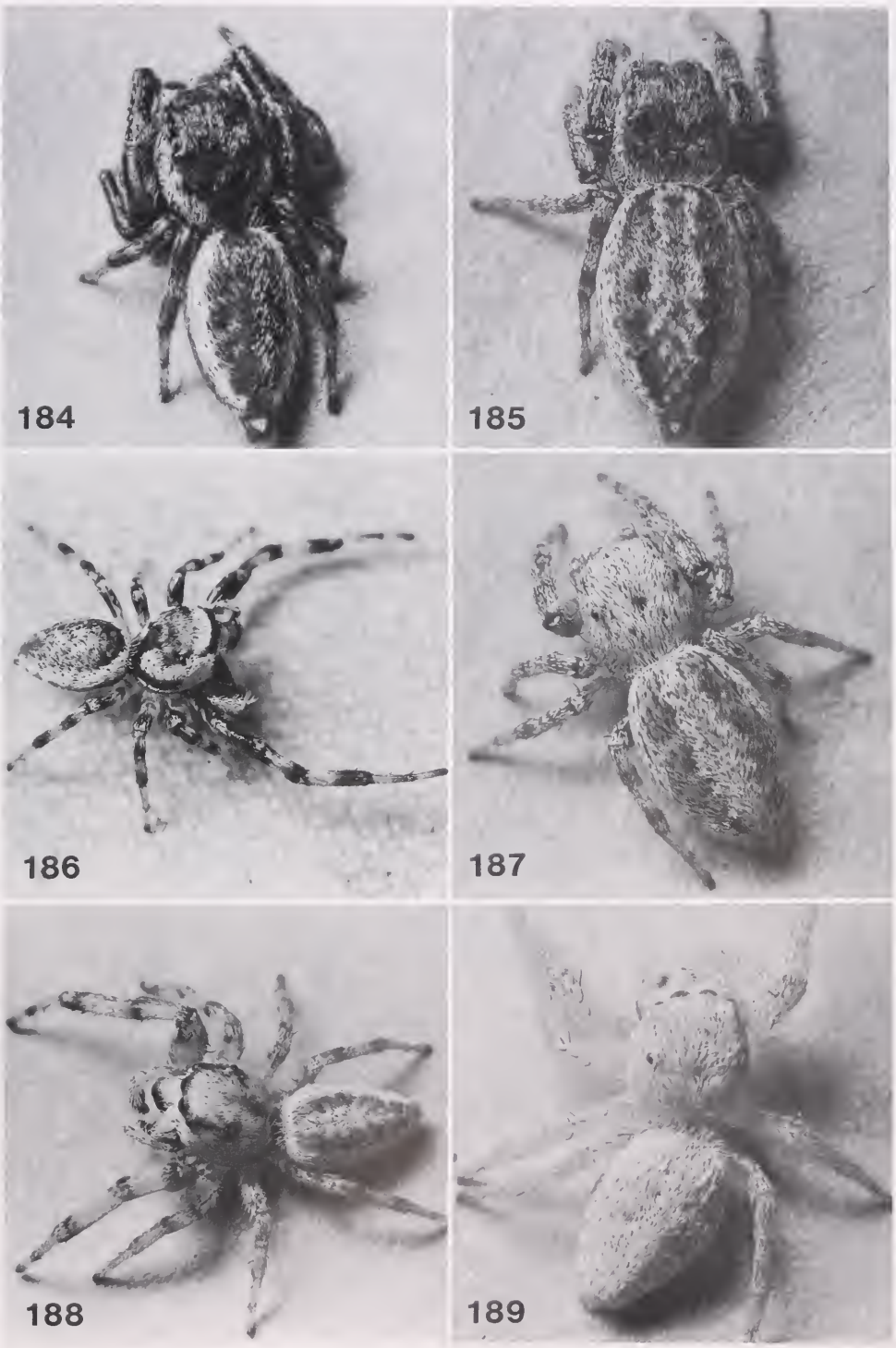
Figures 166–171. Photographs of living *Pelegrina*. 166, 167. *Pelegrina variegata* (sp. 33; Oaxaca: nr. El Tule). 166. Male. 167. Female. 168. *Pelegrina sandaracina* (sp. 35): male (holotype: Campeche: nr. Francisco Escarcega). 169. *Pelegrina yucatecana* (sp. 34): female (Campeche: Xpujil). 170, 171. *Pelegrina bunites* (sp. 37; Arizona: Mount Hopkins). 170. Male (holotype). 171. Female.



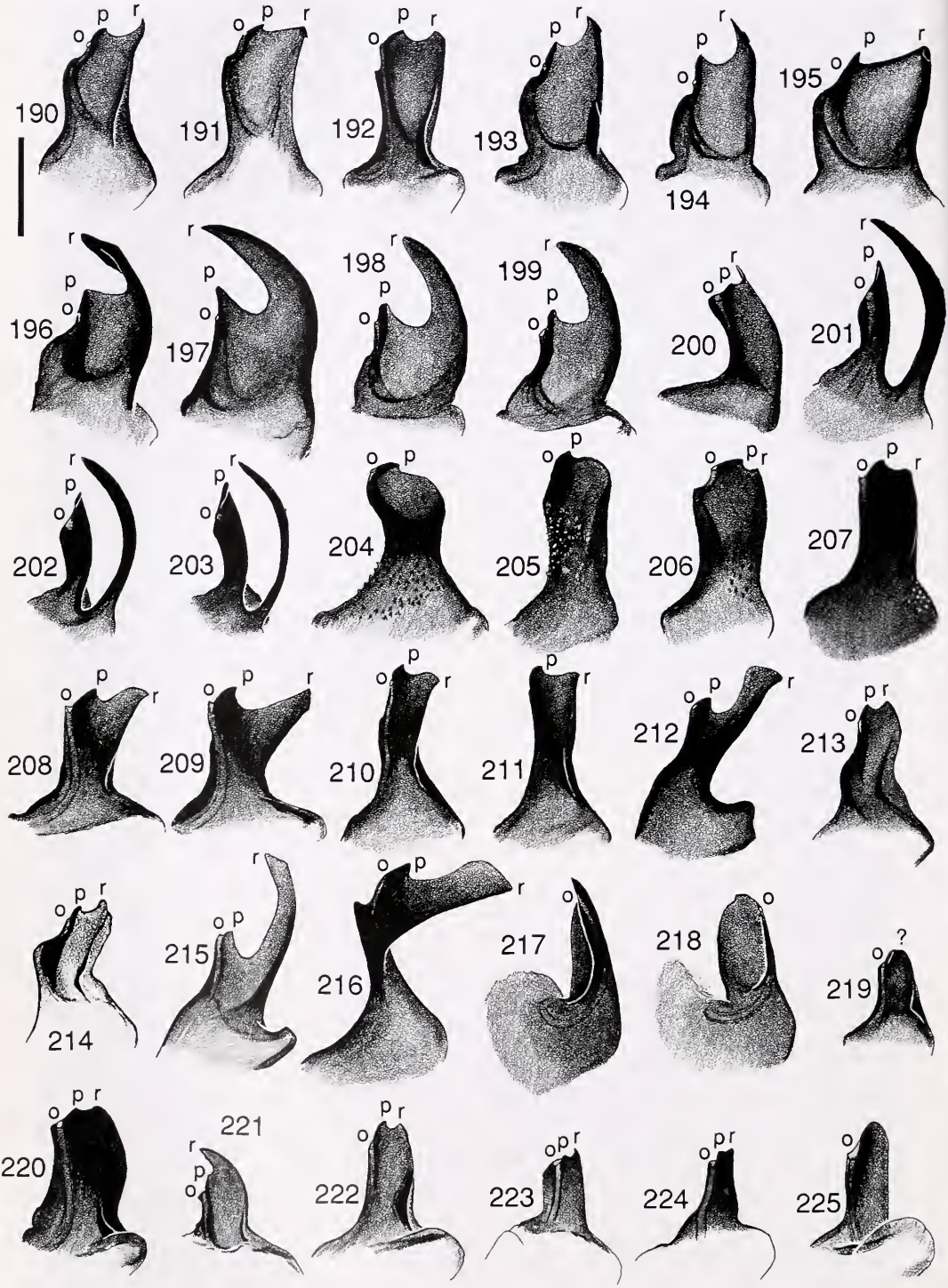
Figures 172–177. Photographs of living *Pelegrina*, *Nagaina*, and *Metaphidippus mannii* group species. 172, 173. *Pelegrina orestes* (sp. 38; Arizona: Madera Canyon). 172. Male. 173. Female. 174, 175. *Nagaina incunda* (sp. 39). 174. Male (San Luis Potosí: nr. Las Abritas). 175. Female (Tamaulipas: 99°04′W, 23°00′N). 176, 177. *Metaphidippus emmiltus* (sp. 45; New Mexico: Guadalupe Co.). 176. Male (holotype). 177. Female (paratype).

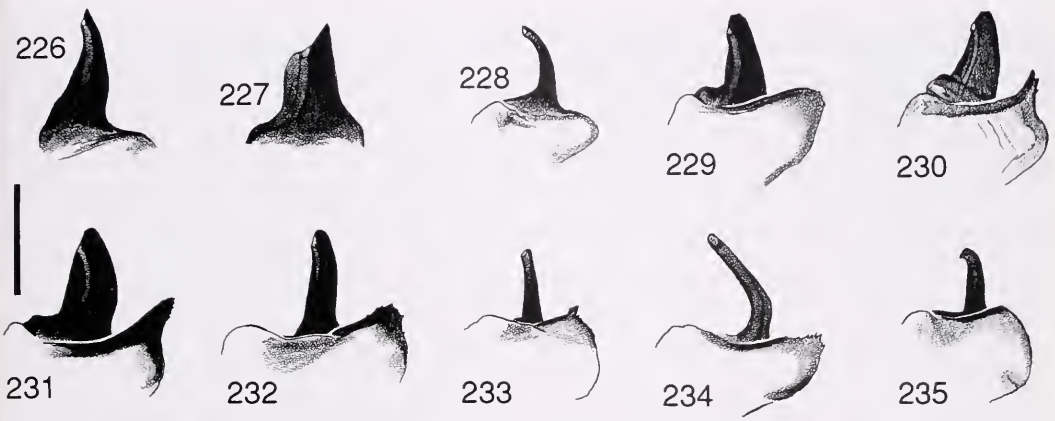


Figures 178–183. Photographs of living *Metaphidippus mannii* group species. 178, 179. *Metaphidippus mannii* (form *versicolor*) (sp. 40). 178. Male (California: Riverside Co.). 179. Female (Washington: Seattle). 180, 181. *Metaphidippus mannii* (form *mannii*) (sp. 40). 180. Male (Arizona: Sycamore Canyon). 181. Female (Arizona: Santa Catalina Mtns.). 182, 183. *Metaphidippus diplacis* (sp. 45). 182. Male (California: San Diego Co.). 183. Female (California: Santa Barbara Co.).



Figures 184–189. Photographs of living *Metaphidippus mannii* group species. 184, 185. *Metaphidippus tricolor* (sp. 42; California: Monterey Co.). 184. Male. 185. Female. 186, 187. *Metaphidippus chera* (sp. 43). 186. Male (California: San Luis Obispo Co.). 187. Female (California: Santa Barbara Co.). 188, 189. *Metaphidippus carmenensis* (sp. 44; California: Riverside Co.). 188. Male. 189. Female.

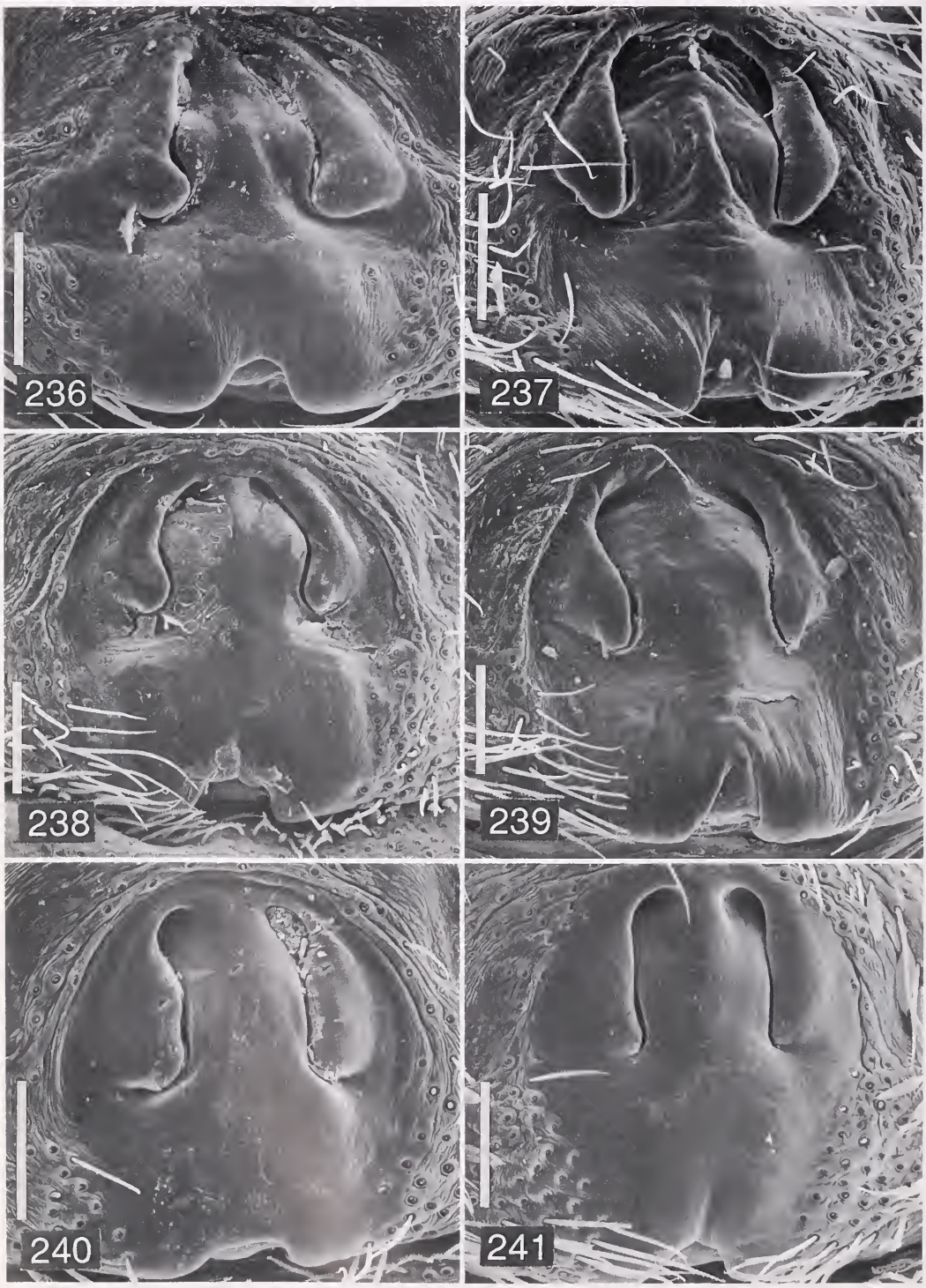

190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
o
p
r
?



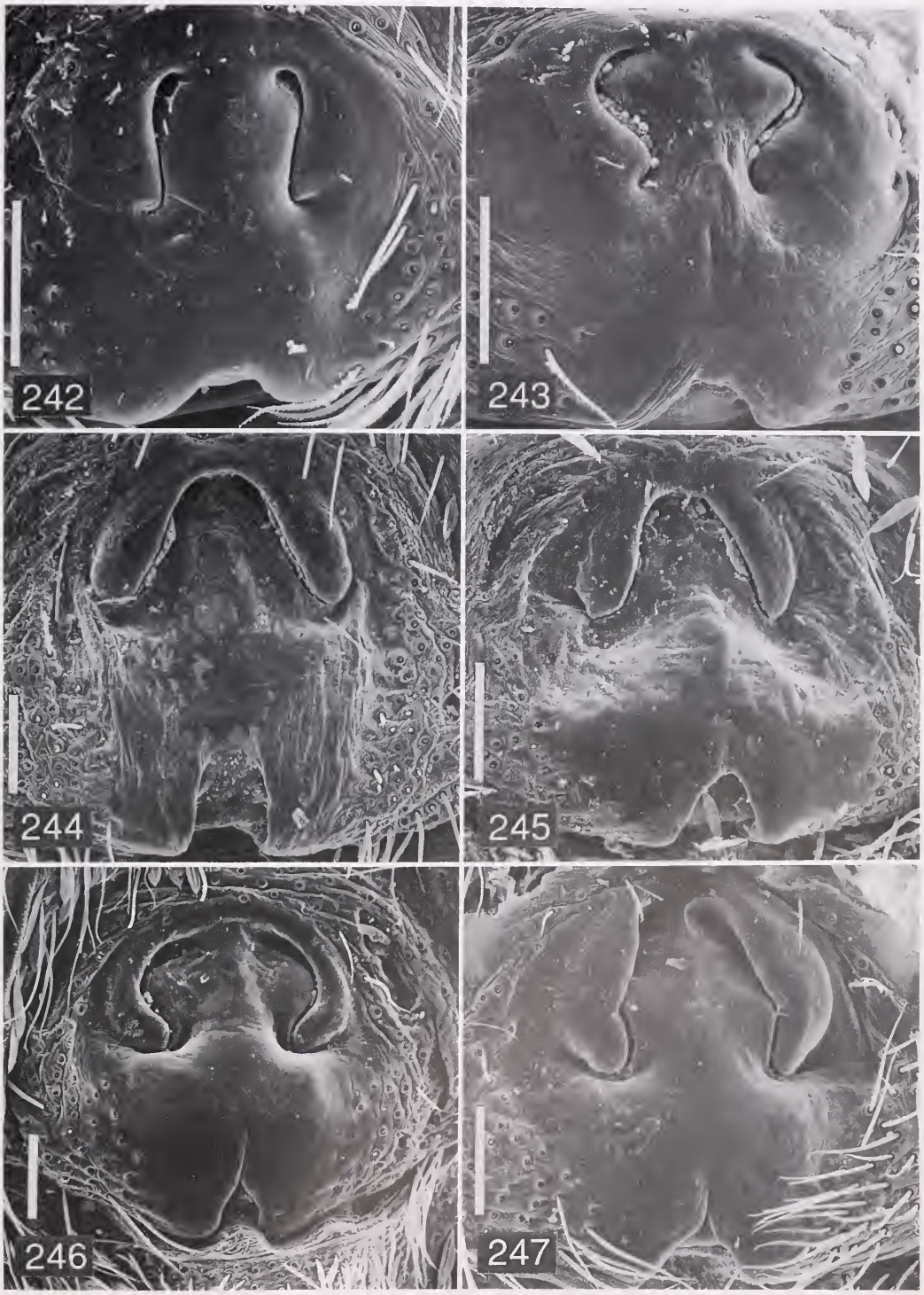
Figures 226–235. Embolus of left palpus, oblique ventral-retrolateral view, of *Pelegrina, Nagaina,* and *Metaphidippus mannii* group species. All figures to same scale; scale bar = 0.1 mm. 226. *Pelegrina bunites* (sp. 37; Arizona: Quinlan Mtns.). 227. *Pelegrina orestes* (sp. 38; Arizona: Madera Canyon). 228. *Nagaina incunda* (sp. 39; Quintana Roo: Kohunlich ruins). 229. *Metaphidippus mannii* (form *versicolor*) (sp. 40; California: Riverside Co.). 230. *Metaphidippus mannii* (form *mannii*) (sp. 40; Arizona: Santa Cruz Co.). 231. *Metaphidippus diplacis* (sp. 41; California: San Diego). 232. *Metaphidippus tricolor* (sp. 42; California: Monterey Co.). 233. *Metaphidippus chera* (sp. 43; Arizona: Pima Co.). 234. *Metaphidippus carmenensis* (sp. 44; Baja California Norte: Isla Angel de al Guardia). 235. *metaphidippus emmiltus* (sp. 45; holotype).

←

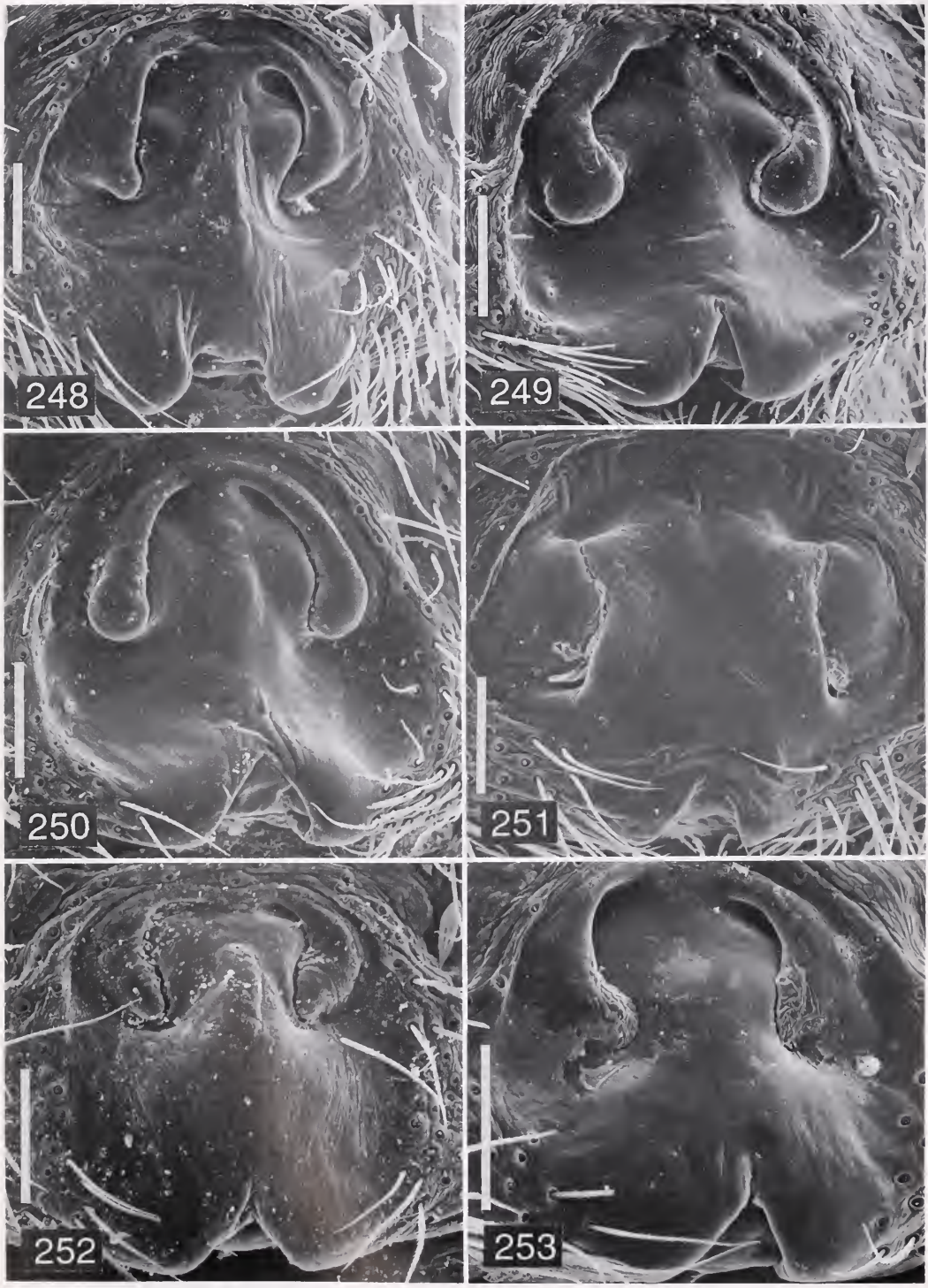
Figures 190–225. Embolus of left palpus, oblique ventral-retrolateral view, of *Pelegrina* species. The opening to the sperm duct, the prolateral ramus, and retrolateral ramus are labeled with "o," "p," and "r," respectively. All figures to same scale; scale bar 0.1 mm. 190. *P. galathea* (sp. 1; Chihuahua: 105.2°W, 27.9°N). 191. *P. proxima* (sp. 2 Cuba: Holquin). 192. *P. dithalea* (sp. 3; Arizona: Santa Cruz Co.). 193. *P. edrilana* (sp. 4; Distrito Federal: Tlalpam). 194. *P. protervav* (sp. 5; Ontario: Kenora District). 195. *P. peckhamorum* (sp. 6; Massachusetts: Barnstable Co.). 196. *P. neoleonis* (sp. 7; Nuevo León: Chipinque Mesa). 197. *P. tristis* (sp. 8; Arizona: Chiricahua Mtns.). 198. *P. sabinema* (sp. 9; Arizona: Coconino Co.). 199. *P. pervaga* (sp. 10; Texas: Erath Co.). 200. *P. kastoni* (sp. 11; Arizona: Chiricahua Mtns.). 201. *P. flavipedes* (sp. 12; Manitoba: 19 km E of Neepawa). 202. *P. flaviceps* (sp. 13; Maine: Sagadahoc Co.). 203. *P. exigua* (sp. 14; Massachusetts: Barnstable Co.). 204. *P. montana* (sp. 15; New Hampshire: Jeffrey). 205. *P. insignis* (sp. 16; Saskatchewan: North Battleford). 206. *P. chaimona* (sp. 17; Arizona: Chiricahua Mtns.). 207. *P. clemata* (sp. 18; Alberta: Morrin Recreational Area). 208. *P. aeneola* (*aeneola*) (sp. 19; Oregon: Lane Co.). 209. *P. aeneola* (*uteanus*) (sp. 19; South Dakota: Custer Co.). 210. *P. balia* (sp. 20; Oregon: Deschutes Co.). 211. *P. chalceola* (sp. 21; Arizona: Chiricahua Mtns.). 212. *P. furcata* (sp. 22; Arizona: Santa Rita Mtns.). 213. *P. volcana* (sp. 23; Panamá: El Volcán). 214. *P. bicuspidata* (sp. 24; right palp, image photographically reversed) (holotype; Guatemala). 215. *P. morelos* (sp. 26; holotype; Morelos: nr. Cernavaca). 216. *P. huachuca* (sp. 27; holotype; Arizona: Huachuca Mtns.). 217. *P. arizonensis* (sp. 28; New Mexico: Bernalillo Co.). 218. *P. helenae* (sp. 29; Oregon: nr. Prineville). 219. *P. verecunda* (sp. 30; Arizona: Yavapai Co.). 220. *P. clavator* (sp. 31; Nuevo León: Chipinque Mesa). 221. *P. pallidata* (sp. 32; Nicaragua: Matagalpa). 222. *P. variegata* (sp. 33; Oaxaca: El Tule). 223. *P. yucatecana* (sp. 34; holotype; Yucatán: Chichen Itza). 224. *P. sandaracina* (sp. 35; Holotype; Campeche: Francisco Escarcega). 225. *P. tillandsiae* (sp. 36; South Carolina: Cooper).

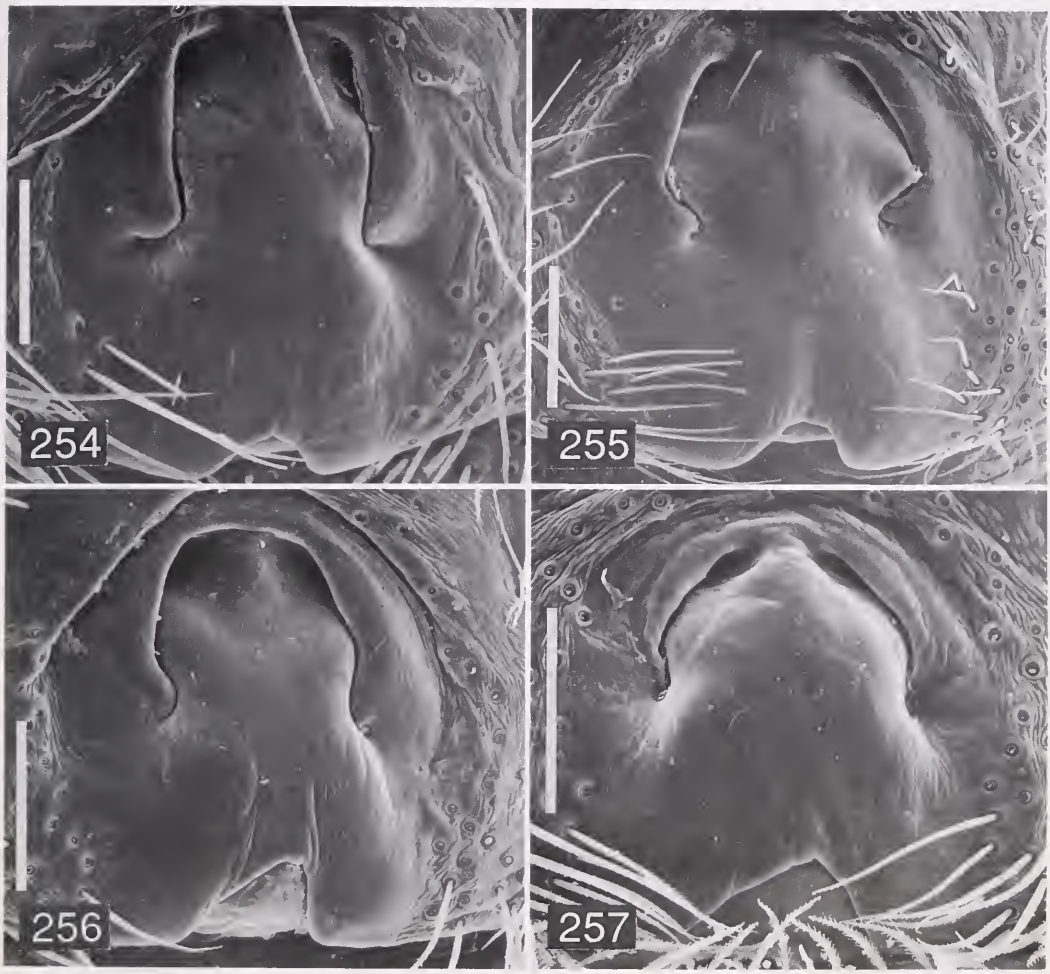


Figures 236–241. Scanning electron micrographs of female epigyna of *Pelegrina* species. View is mostly ventral, slightly oblique lateral. Scale bars 0.1 mm. 236. *P. galathea* (sp. 1; Michigan: Washtenaw Co.). 237. *P. proxima* (sp. 2; Cuba: Havana). 238. *P. proterva* (sp. 5; Iowa: Hancock Co.). 239. *P. peckhamorum* (sp. 6; Arkansas: Washington Co.). 240. *P. pervaga* (sp. 10; Texas: Erath Co.). 241. *P. flavipedes* (sp. 12; Alberta: Edmonton).



Figures 242–247. Scanning electron micrographs of female epigyna of *Pelegrina* species. View is mostly ventral, slightly oblique lateral. Scale bars 0.1 mm. 242. *P. flaviceps* (sp. 13; Maine: Sagadahoc Co.). 243. *P. exigua* (sp. 14; Virginia: Shenandoah Co.). 244. *P. montana* (sp. 15; Colorado: Boulder Co.). 245. *P. insignis* (sp. 16; New Hampshire: Cheshire Co.). 246. *P. clemata* (sp. 18; Colorado: Gunnison Co.). 247. *P. aeneola* (sp. 19; Oregon: Lane Co.).

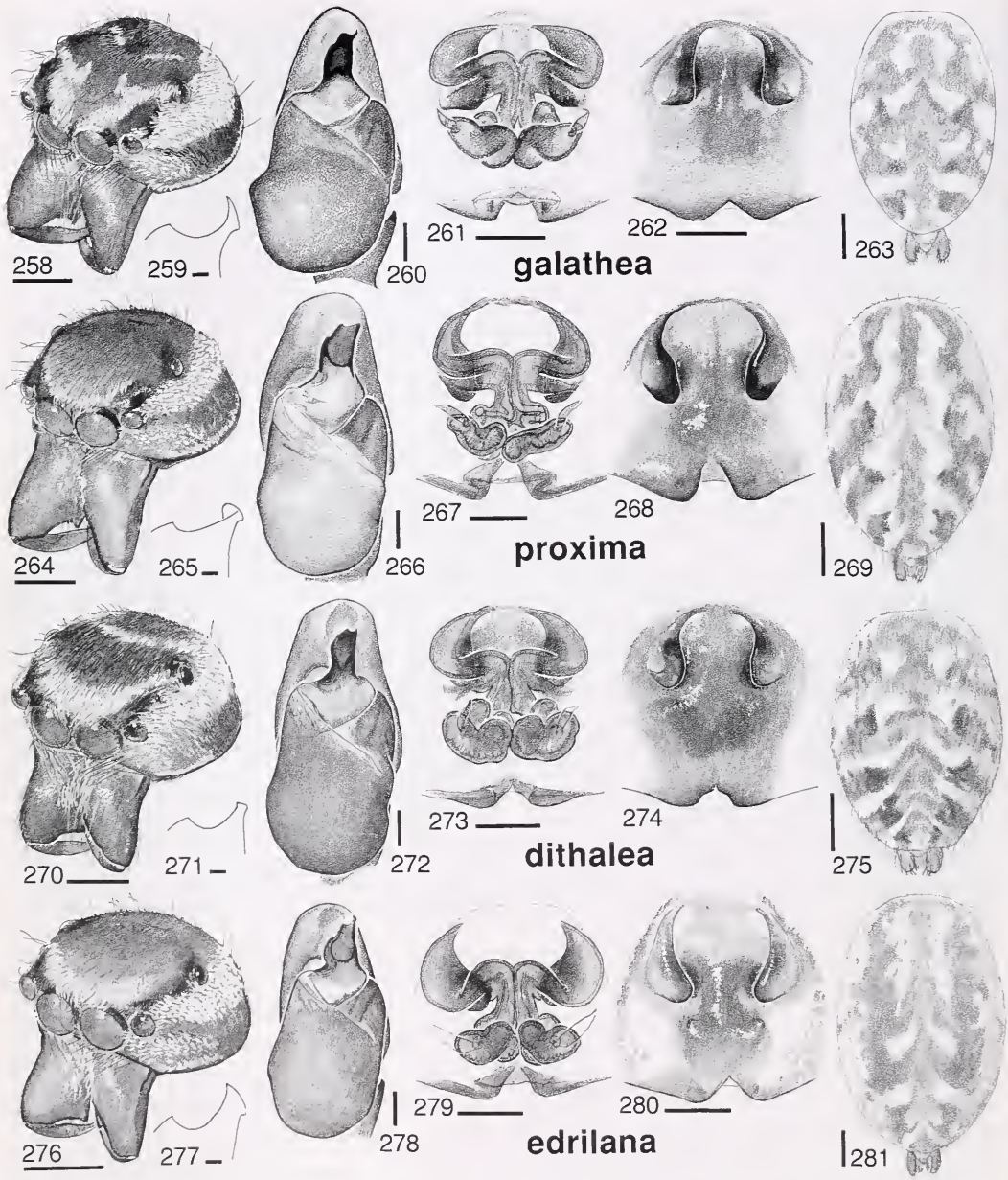

248
249
250
251
252
253



Figures 254–257. Scanning electron micrographs of female epigyna of *Pelegrina* and *Metaphidippus mannii* group species. View is mostly ventral, slightly oblique lateral. Scale bars 0.1 mm. 254. *P. tillandsiae* (sp. 36; South Carolina: Cooper). 255. *P. bunites* (sp. 37; Arizona: Mount Hopkins). 256. *Metaphidippus mannii* (sp. 40; Oregon: Lane Co.). 257. *Metaphidippus chera* (sp. 43; Arizona: Pima Co.).

←

Figures 248–253. Scanning electron micrographs of female epigyna of *Pelegrina* species. View is mostly ventral, slightly oblique lateral. Scale bars 0.1 mm. 248. *P. balia* (sp. 20; California: Plumas Co.). 249. *P. furcata* (form *mimus*; sp. 22; Arizona: Yavapai Co.). 250. *P. furcata* (sp. 22; Arizona: Yavapai Co.). 251. *P. arizonensis* (sp. 28; Minnesota: Anoka Co.). 252. *P. verecunda* (sp. 30; Arizona: Yavapai Co.). 253. *P. variegata* (sp. 33; Oaxaca: El Tule).



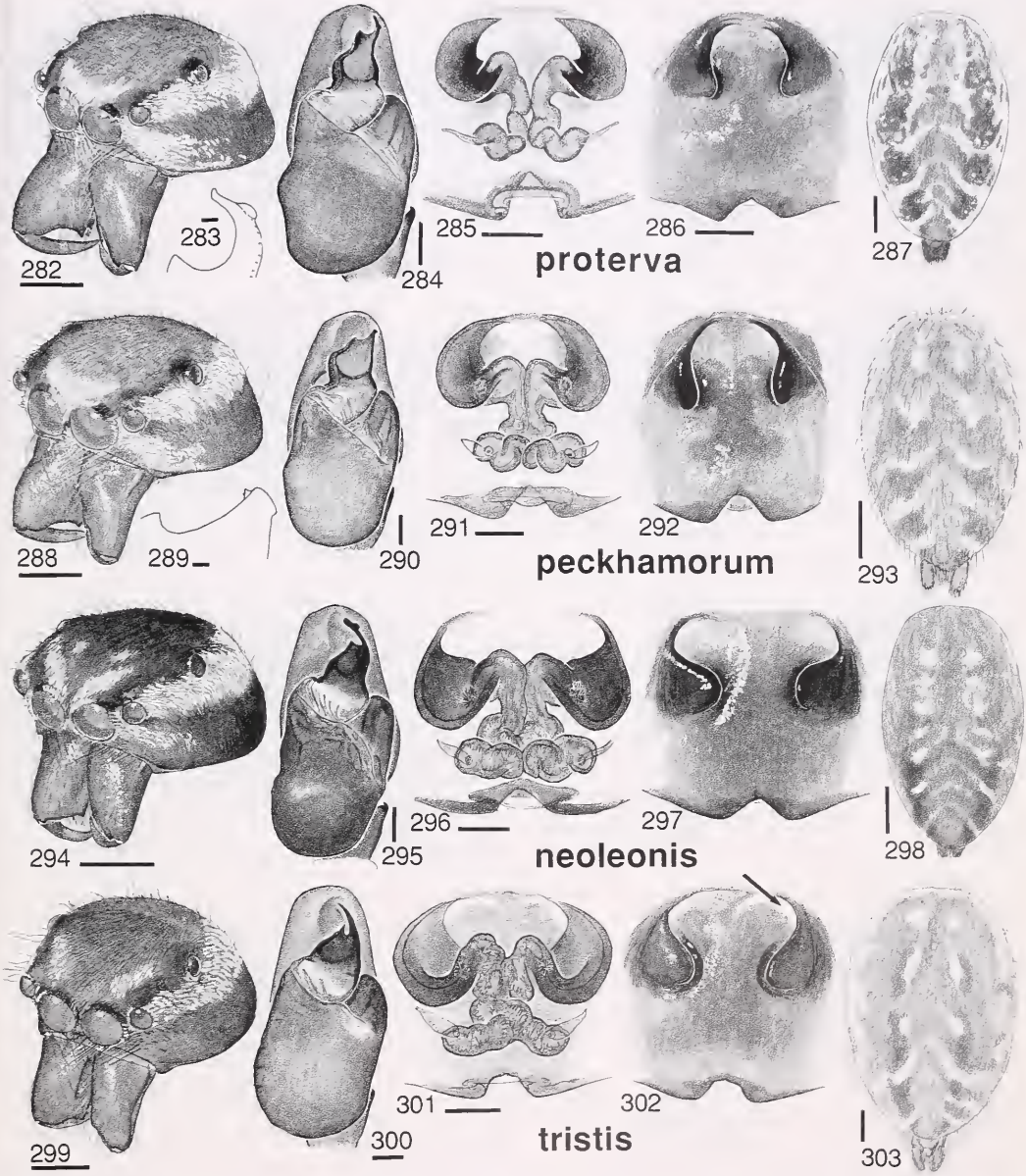
Figures 258–263. *Pelegrina galathea* (sp. 1). 258. ♂ face (Texas: San Patricio Co.). 259. Tip of embolus (Florida: Sebastian). 260. Palp (Ontario: Bruce Co.). 261, 262. Epigynum, dorsal (261) and ventral (262) (Arkansas: Washington Co.). 263. ♀ abdomen (Pennsylvania, Erie Co.).

Figures 264–269. *Pelegrina proxima* (sp. 2). 264. ♂ face (Jamaica: St. Andrew: Mona). 265. Tip of embolus (Cuba: Havana). 266. Palp (holotype; Cuba); 267, 268. Epigynum, dorsal (267) and ventral (268) (Cuba: Havana). 269. ♀ abdomen (Cuba: Soledad).

Figures 270–275. *Pelegrina dithalea* (sp. 3; Arizona: Santa Cruz Co., Sycamore Canyon). 270. ♂ face (holotype). 271. Tip of embolus. 272. Palp. 273, 274. Epigynum, dorsal (273) and ventral (274). 275. ♀ abdomen.

Figures 276–281. *Pelegrina edrilana* (sp. 4). 276–278. Holotype. 276. ♂ face. 277. Tip of embolus. 278. Palp. 279. Epigynum, dorsal (Oaxaca: nr. El Tule). 280. Epigynum, ventral (Distrito Federal: San Jeronimo; see also Fig. 4). 281. ♀ abdomen (Distrito Federal: San Jeronimo).

Scale bars. 0.1 mm, except for ♂ face and ♀ abdomen 0.5 mm and tip of embolus 0.01 mm.



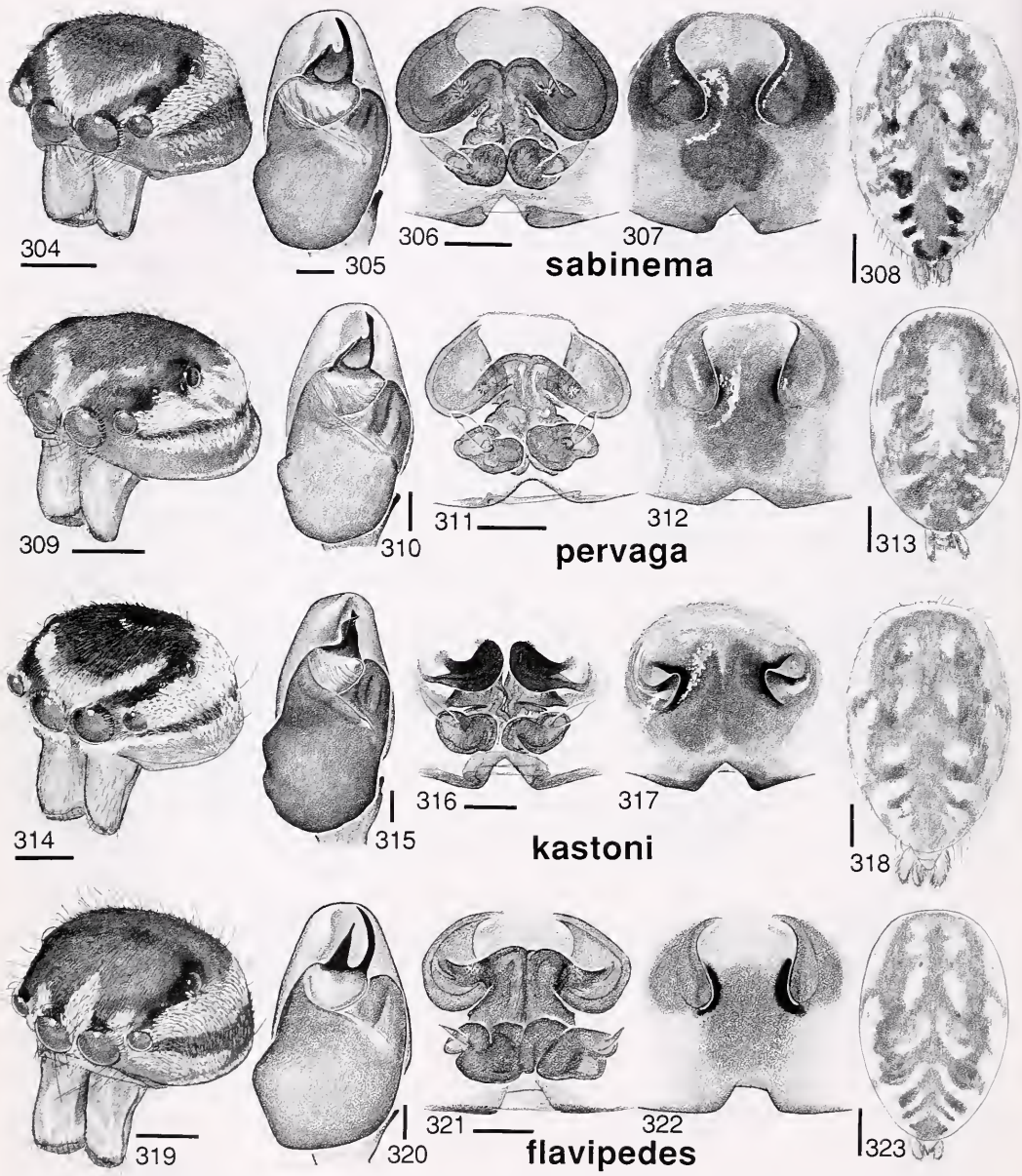
Figures 282–287. *Pelegrina proterva* (sp. 5). 282. ♂ face (Massachusetts: Dukes Co.). 283. Tip of embolus (Massachusetts: Middlesex Co.). 284. Palp (Ontario: near Barrie). 285. Epigynum, dorsal (Ontario: Muskoka District). 286. Epigynum, ventral (Iowa: Hancock Co.). 287. ♀ abdomen (Michigan: Mackinac Co.).

Figures 288–293. *Pelegrina peckhamorum* (sp. 6; Arkansas, except 289 and 293 Massachusetts). 288. ♂ face. 289. Tip of embolus. 290. Palp. 291. Epigynum, dorsal. 292. Epigynum, ventral. 293. ♀ abdomen.

Figures 294–298. *Pelegrina neoleonis* (sp. 7). 294. ♂ face (Chipinque Mesa). 295. Palp (Cerro Potosí). 296, 297. Epigynum, dorsal (296) and ventral (297) (Cerro Potosí). 298. ♀ abdomen (Oaxaca).

Figures 299–303. *Pelegrina tristis* (sp. 8). 299. ♂ face (holotype). 300. Palp (holotype). 301, 302. Epigynum, dorsal (301) and ventral (302) (paratype; arrow shows pale surface that descends deeply). 303. ♀ abdomen (Arizona: Madera Canyon).

Scale bars. 0.1 mm, except for ♂ face and ♀ abdomen 0.5 mm and tip of embolus 0.01 mm.



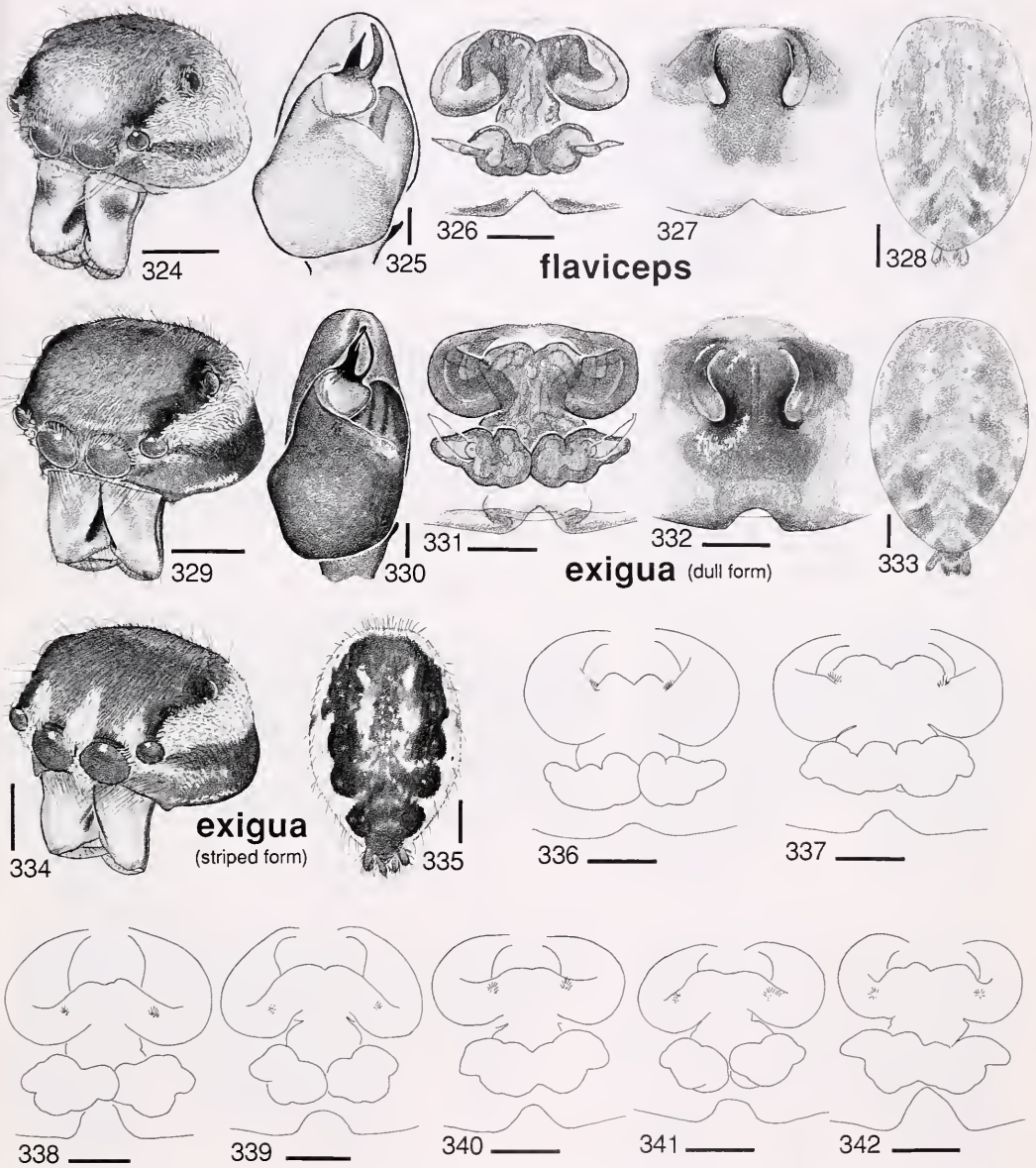
Figures 304–308. *Pelegrina sabinema* (sp. 9). 304. ♂ face (New Mexico: Santa Fe Co.). 305. Palp (Arizona: Coconino Co.). 306, 307. Epigynum, dorsal (306) and ventral (307) (New Mexico: Santa Fe Co.). 308. ♀ abdomen (New Mexico: nr. Edgewood).

Figures 309–313. *Pelegrina pervaga* (sp. 10). 309. ♂ face (Texas: Kerr Co.). 310. Palp (Texas: Kerr Co.). 311, 312. Epigynum, dorsal (311) and ventral (312) (Texas: Val Verde Co.). 313. ♀ abdomen (Texas: Val Verde Co.).

Figures 314–318. *Pelegrina kastoni* (sp. 11). 314. ♂ face (Arizona: Sycamore Canyon). 315. Palp (Arizona: Chiricahua Mtns.). 316, 317. Epigynum, dorsal (316) and ventral (317) (Arizona: nr. Cienega Lake). 318. ♀ abdomen (Arizona: Madera Canyon).

Figures 319–323. *Pelegrina flavipedes* (sp. 12). 319. ♂ face (Alberta: Cypress Hills). 320. Palp (Ontario: Muskoka District). 321, 322. Epigynum, dorsal (321) and ventral (322) (Ontario: Bruce Co.). 323. ♀ abdomen (Michigan: Crawford Co.). See also Figures 338 and 339.

Scale bars. 0.1 mm, except for ♂ face and ♀ abdomen 0.5 mm.

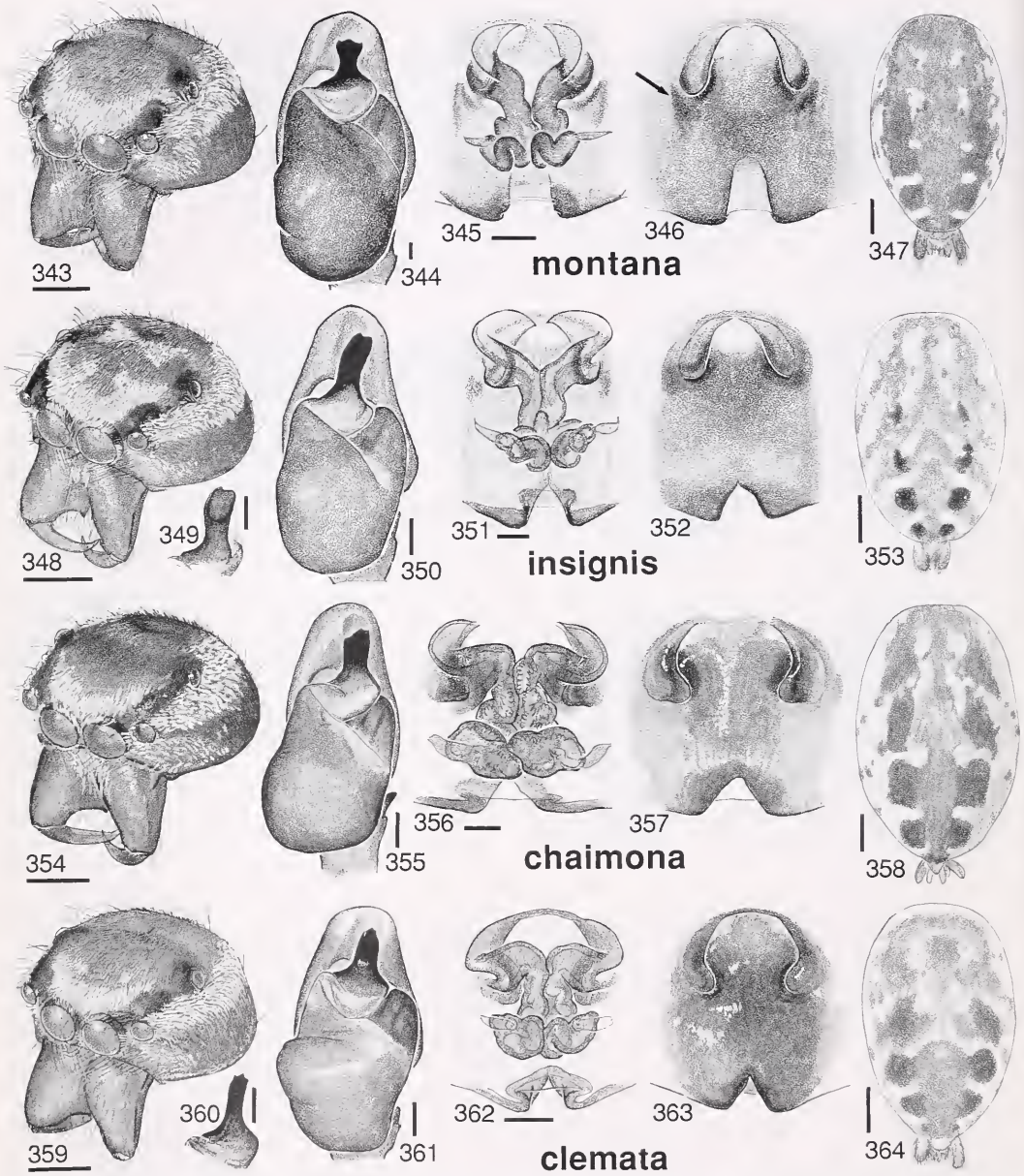


Figures 324–328. *Pelegrina flaviceps* (sp. 13; Ontario: Kingston, except 324 New Hampshire: Surry). 324. ♂ face. 325. Palp. 326. Epigynum, dorsal. 327. Epigynum, ventral. 328. ♀ abdomen. See also Figures 340 and 341.

Figures 329–335. *Pelegrina exigua* (sp. 14). 329–333. Dull form (Virginia: Shenandoah Co., except 333 Kentucky: Rowan Co.). 329. ♂ face. 330. Palp. 331. Epigynum, dorsal. 332. Epigynum, ventral. 333. ♀ abdomen. 334, 335. Striped form. 334. ♂ face (Maryland: Montgomery Co.). 400. ♀ abdomen (Missouri: Jefferson City). See also Figures 336, 337, and 342.

Figures 336–342. Spermathecal ducts of cleared epigyna, dorsal view, of *flavipedes* group species. 336, 337, 342. *P. exigua* (336, North Carolina: Durham Co.; 337, Kentucky: Rowan Co.; 342, holotype, New York: Ithaca). 338, 339. *P. flavipedes* (338, Ontario: Sudbury District; 339, Manitoba: Neepawa). 340, 341. *P. flaviceps* 340, Maine: Sagadahoc Co.; 341, New Hampshire: Strafford Co.

Scale bars. 0.1 mm, except for ♂ face and ♀ abdomen 0.5 mm.



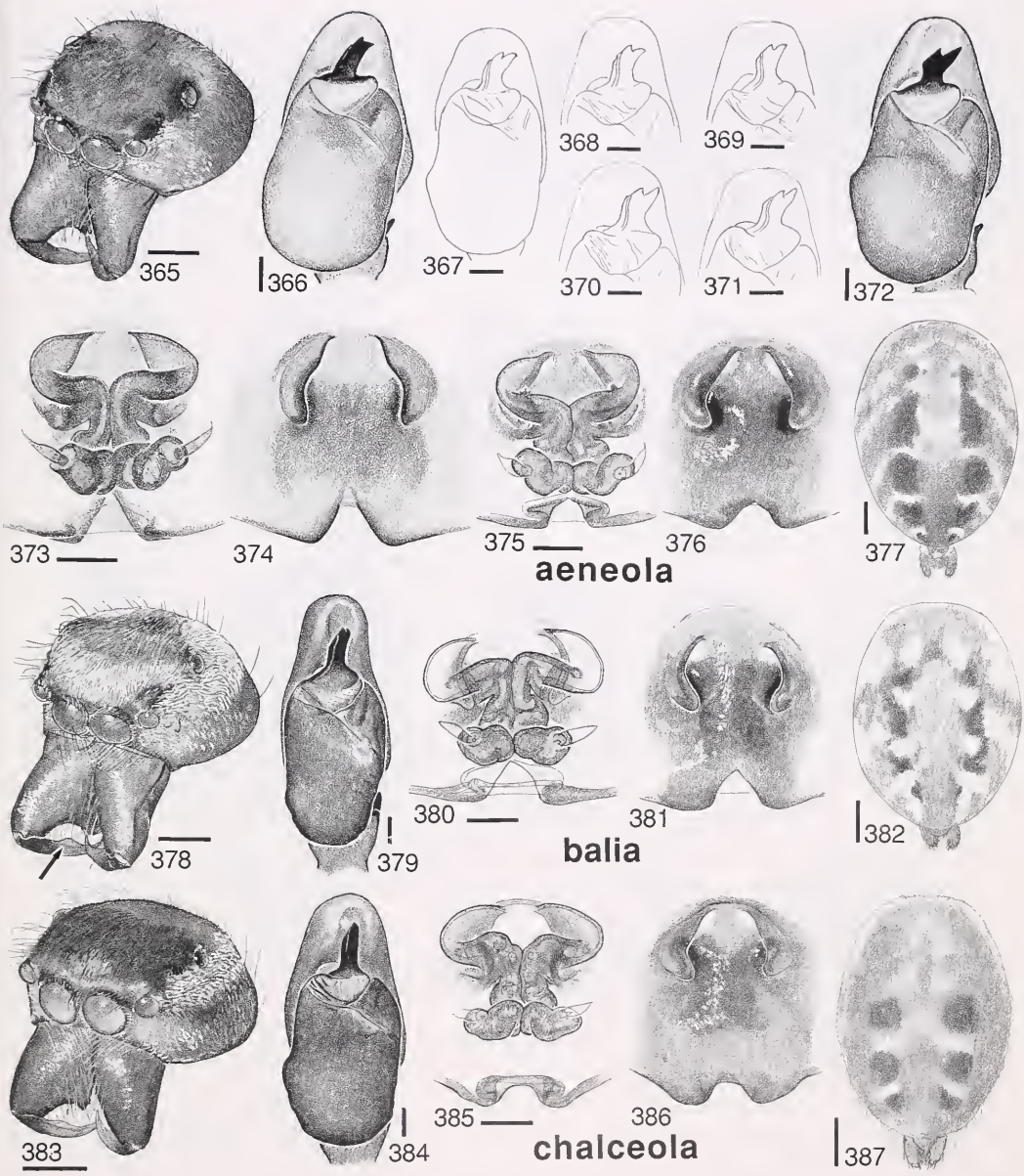
Figures 343–347. *Pelegrina montana* (sp. 15). 343. ♂ face (Vermont: Chittendon Co.). 344. Palp (Alberta: Waterton Lake). 345, 346. Epigynum, dorsal (345) and ventral (346) (Northwest Territories: Sawmill Bay). 347. ♀ abdomen (British Columbia: Pink Mtn.).

Figures 348–353. *Pelegrina insignis* (sp. 16). 348. ♂ face (New Brunswick: nr. Chipman). 349. Embolus (Michigan: Midland Co.). 350. Palp (Ontario: Barrie). 351, 352. Epigynum, dorsal (351) and ventral (352) (Barrie). 353. ♀ abdomen (Minnesota: Olmsted Co.).

Figures 354–358. *Pelegrina chaimona* (sp. 17). 354. ♂ face (holotype). 355. Palp (holotype). 356, 357. Epigynum, dorsal (356) and ventral (357) (Arizona: Cochise Co.). 358. ♀ abdomen (Arizona: Cochise Co.).

Figures 359–364. *Pelegrina clemata* (sp. 18; Colorado: Saguache Co., except 359 Colorado: Gunnison Co. and 360 Washington: Yakima Co.). 359. ♂ face. 360. Embolus. 361. Palp. 362. Epigynum, dorsal. 363. Epigynum, ventral. 364. ♀ abdomen.

Scale bars. 0.1 mm, except for ♂ face and ♀ abdomen 0.5 mm.

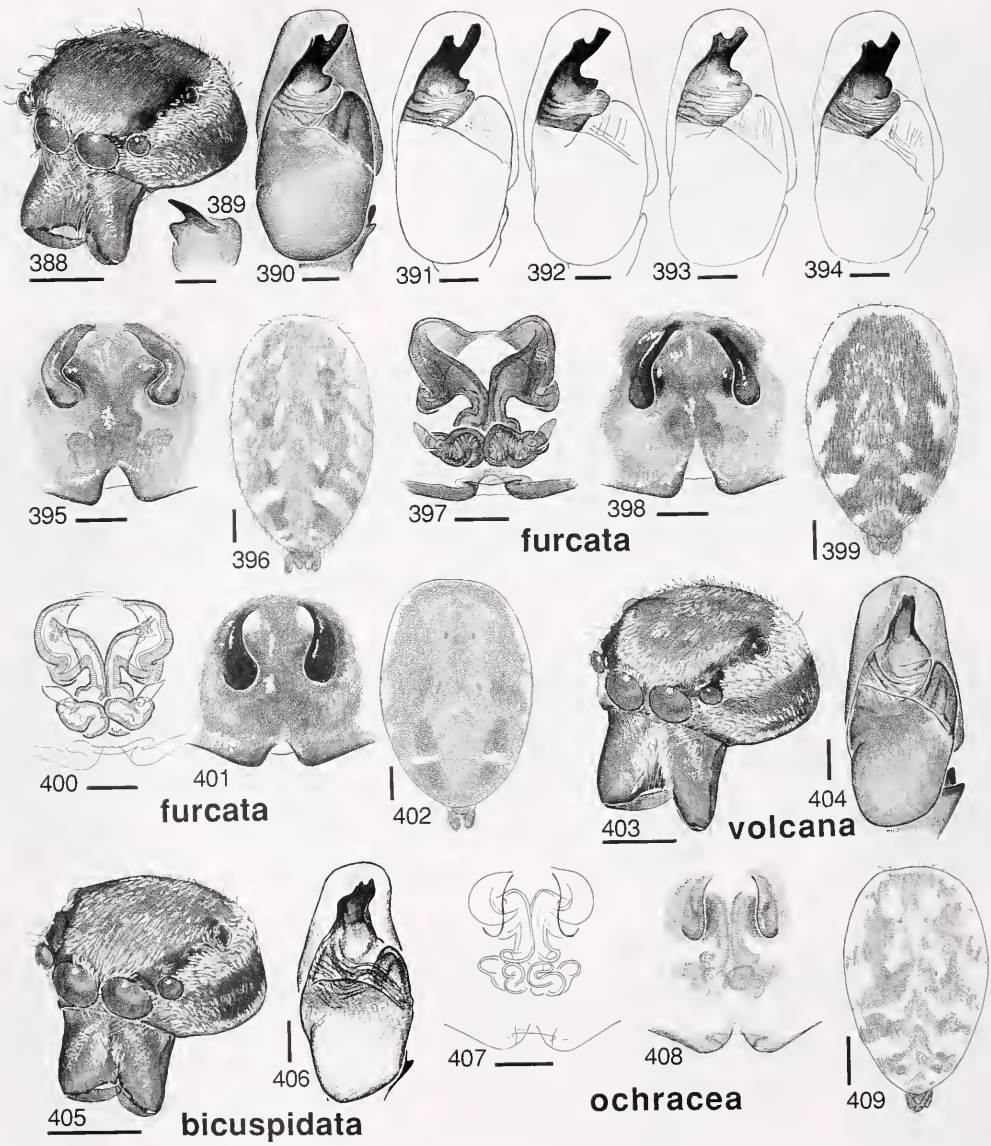


Figures 365–377. *Pelegrina aeneola* (sp. 19). 365. ♂ face (California: Ventura Co.). 366–372. Palpi (366, British Columbia: Fountain Valley; 367, California: Ventura co.; 368, 369, Oregon: Lake Co.; 370, 371 Idaho: Franklin Co.; 372 Wyoming: Sheridan Co.). 373, 374. Epigynum dorsal (373) and ventral (374) (British Columbia: Fountain Valley). 375, 376. Epigynum, dorsal (375) and ventral (376) (South Dakota: Custer Co.). 377. ♀ abdomen (South Dakota: Custer Co.).

Figures 378–382. *Pelegrina balia* (sp. 20; California: Santa Barbara Co., holotype and paratype). 378. ♂ face (arrow shows distinctive flange on fang). 379. Palp. 380. Epigynum, dorsal. 381. Epigynum, ventral. 382. ♀ abdomen.

Figures 383–387. *Pelegrina chalceola* (sp. 21). 383. ♂ face (holotype). 384. Palp (holotype). 385, 386. Epigynum, dorsal (385) and ventral (386) (Arizona: Chiricahua Mtns.). 387. ♀ abdomen (Arizona: Chiricahua Mtns.).

Scale bars. 0.1 mm, excpet for ♂ face and ♀ abdomen 0.5 mm.



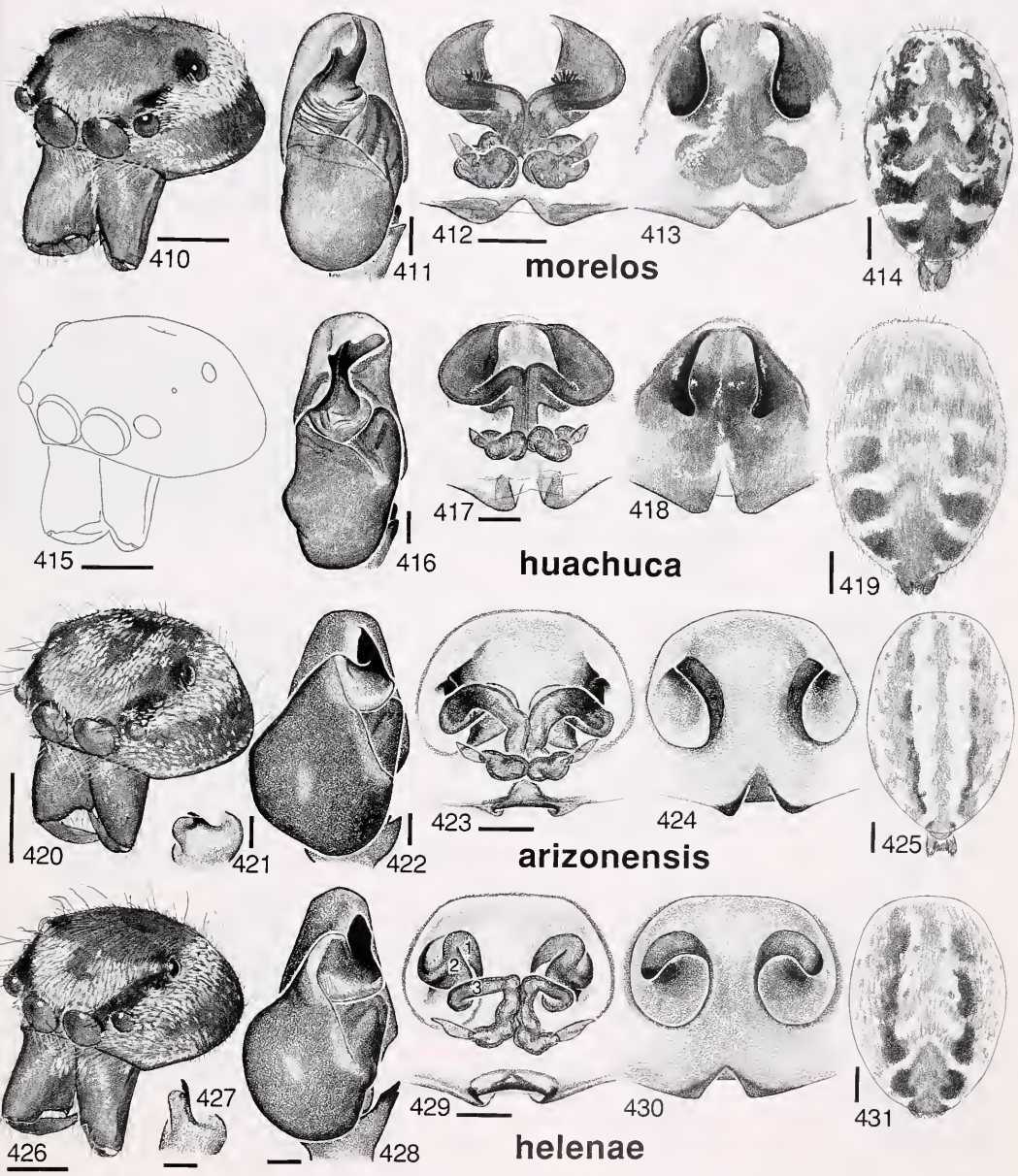
Figures 388–402. *Pelegrina furcata* (sp. 22). 388. ♂ face (Oaxaca: 31 km N of Guelatao de Jaurez). 389. Tibial apophysis (Puebla: nr. Xicotepec de Juarez). 390–394. Palpi (390, Colorado: El Paso Co.; 391, Arizona: Yavapai Co.; 392, Arizona: Santa Cruz Co.; 393, Guatemala; labeled "Type"; 394, Oaxaca: 31 km N of Guelatao de Juarez). 395, 396 (Arizona: Yavapai Co.). 395. Epigynum, ventral. 396. ♀ abdomen. 397–399 (Arizona: Santa Cruz Co.). 397. Epigynum, dorsal. 398. Epigynum, ventral. 399. ♀ abdomen. 400-402 (Oaxaca: 31 km N of Guelatao de Juarez). 400. Epigynum, dorsal. 401. Epigynum, ventral. 402. ♀ abdomen.

Figures 403, 404. *Pelegrina volcana* (sp. 23; Panamá: El Volcán). 403. ♂ face. 404. Palp.

Figures 405, 406. *Pelegrina bicuspidata* (sp. 24). 405. ♂ face (Chiapas: nr. Arriaga). 406. Right palp, image photographically reversed (holotype).

Figures 407–409. *Pelegrina ochracea* (sp. 25). 407, 408. Epigynum, ventral view after clearing (407) and before clearing (408) (holotype). 409. ♀ abdomen (Chiapas: San Cristóbal).

Scale bars. 0.1 mm, except for ♂ face and ♀ abdomen 0.5 mm.



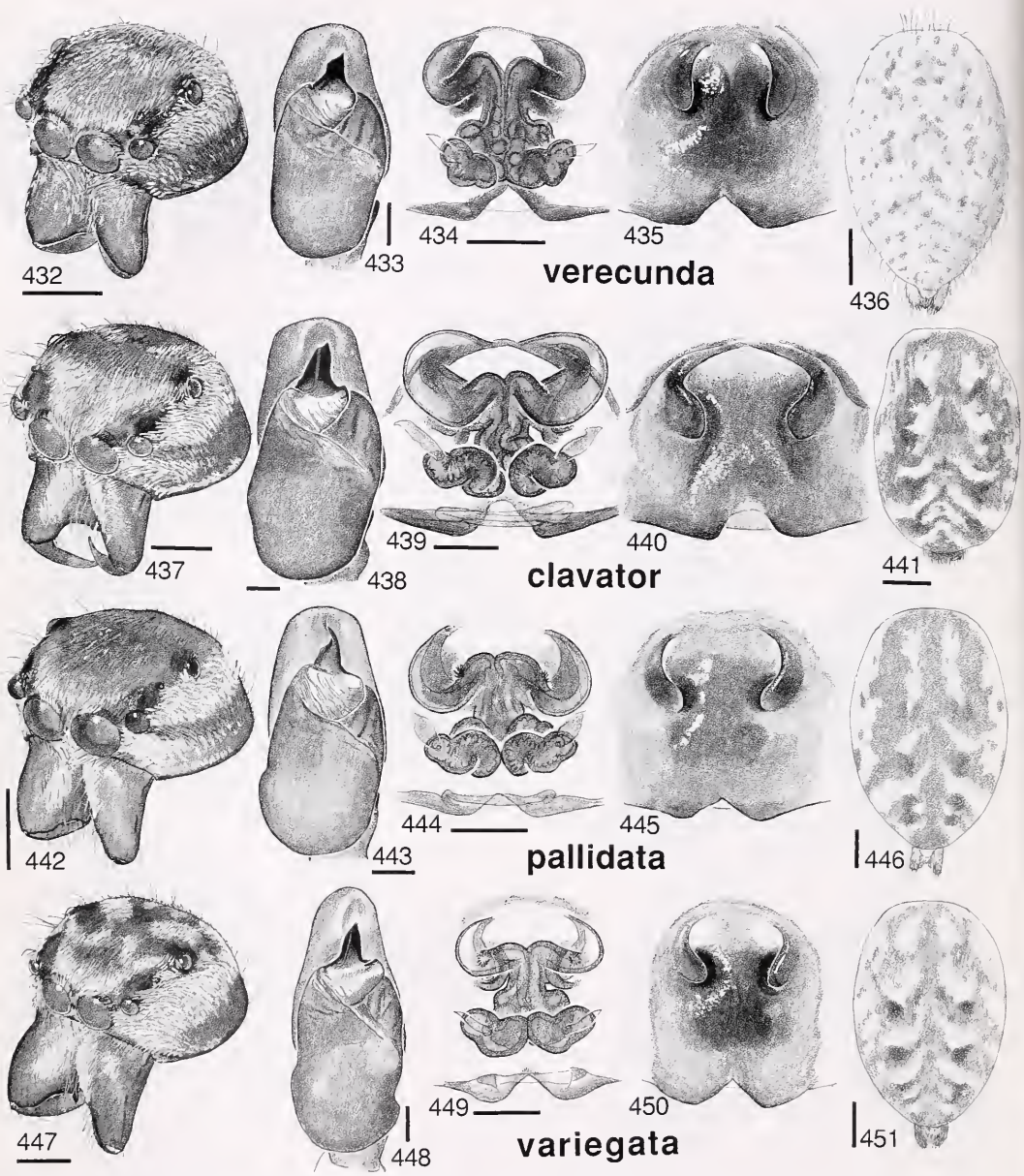
Figures 410–414. *Pelegrina morelos* (sp. 26; holotype and paratype). 410. ♂ face. 411. Palp. 412. Epigynum, dorsal. 413. Epigynum, ventral. 414. ♀ abdomen.

Figures 415–419. *Pelegrina huachuca* (sp. 27). 415. ♂ face (holotype). 416. Palp (holotype). 417, 418. Epigynum, dorsal (417) and ventral (418) (Arizona: Madera Canyon). 419. ♀ abdomen (Arizona: Santa Catalina Mtns.).

Figures 420–425. *Pelegrina arizonensis* (sp. 28; Minnesota: Anoka Co.). 420. ♂ face. 421. Tibial apophysis. 422. Palp. 423. Epigynum, dorsal. 424. Epigynum, ventral. 425. ♀ abdomen.

Figures 426–431. *Pelegrina helenae* (sp. 29). 426. ♂ face (Washington: Franklin Co.). 427–430 (Wyoming: Bighorn Co.). 427. Tibial apophysis. 428. Palp. 429. Epigynum, dorsal. 430. Epigynum, ventral. 431. ♀ abdomen (Nevada: Washoe Co.).

Scale bars. 0.1 mm, excpet for ♂ face and ♀ abdomen 0.5 mm.



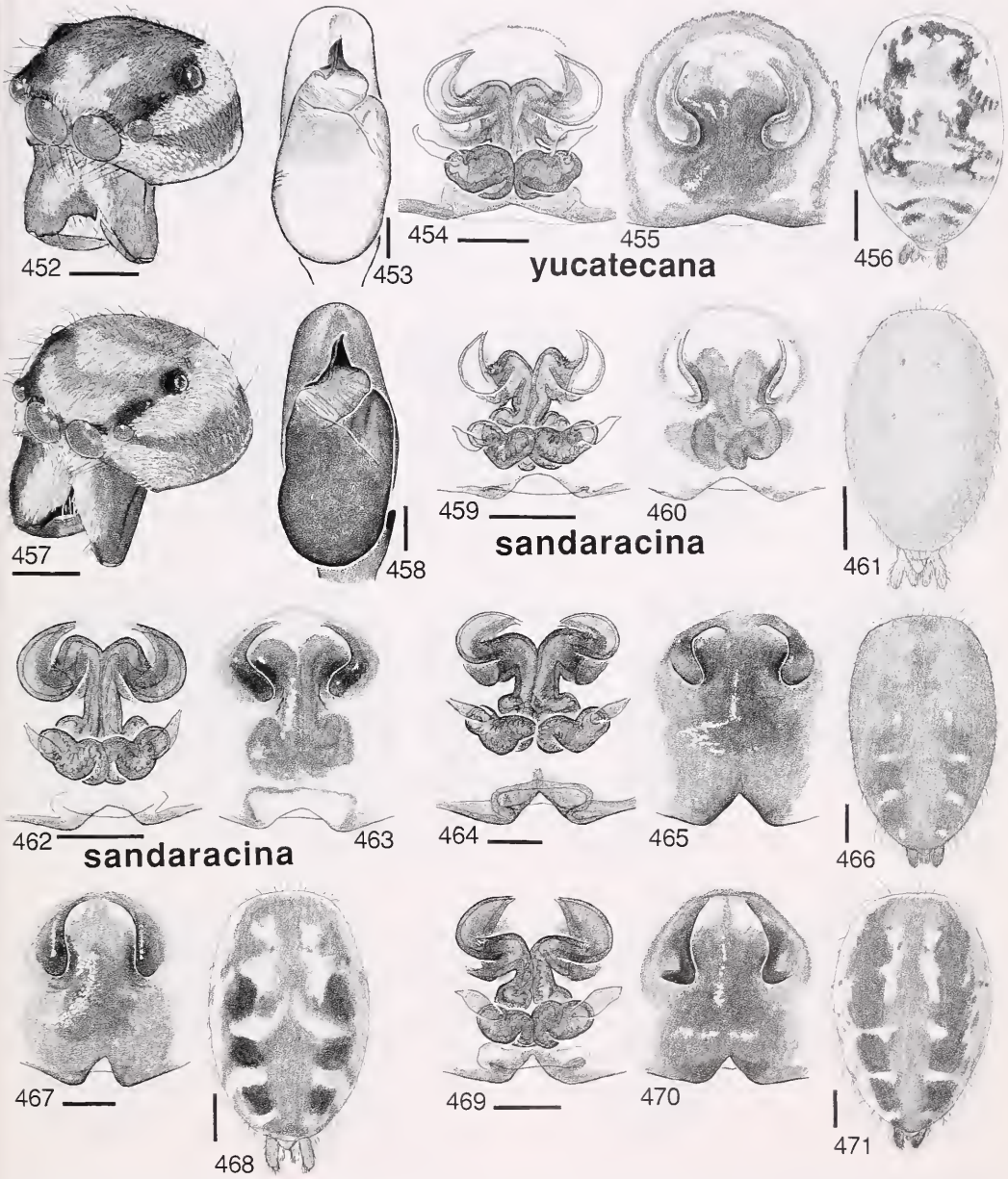
Figures 432–436. *Pelegrina verecunda* (sp. 30; Arizona: Yavapai Co., except 436 Arizona: Cochise Co.). 432. ♂ face. 433. Palp. 434. Epigynum, dorsal. 435. Epigynum, ventral. 436. ♀ abdomen.

Figures 437–441. *Pelegrina clavator* (sp. 31; Nuevo León: Chipinque Mesa). 437. ♂ face. 438. Palp. 439. Epigynum, dorsal. 440. Epigynum, ventral. 441. ♀ abdomen.

Figures 442–446. *Pelegrina pallidata* (sp. 32). 442. ♂ face (Nicaragua: Matagalpa). 443. Palp (Nicaragua: Matagalpa). 444, 445. Epigynum, dorsal (444) and ventral (445) (Guatemala: Chichicatenango). 446. ♀ abdomen (Chiapas: near San Cristóbal).

Figures 447–451. *Pelegrina variegata* (sp. 33; Oaxaca: nr. El Tule). 447. ♂ face. 448. Palp. 449. Epigynum, dorsal. 450. Epigynum, ventral. 451. ♀ abdomen.

Scale bars. 0.1 mm, except for ♂ face and ♀ abdomen 0.5 mm.

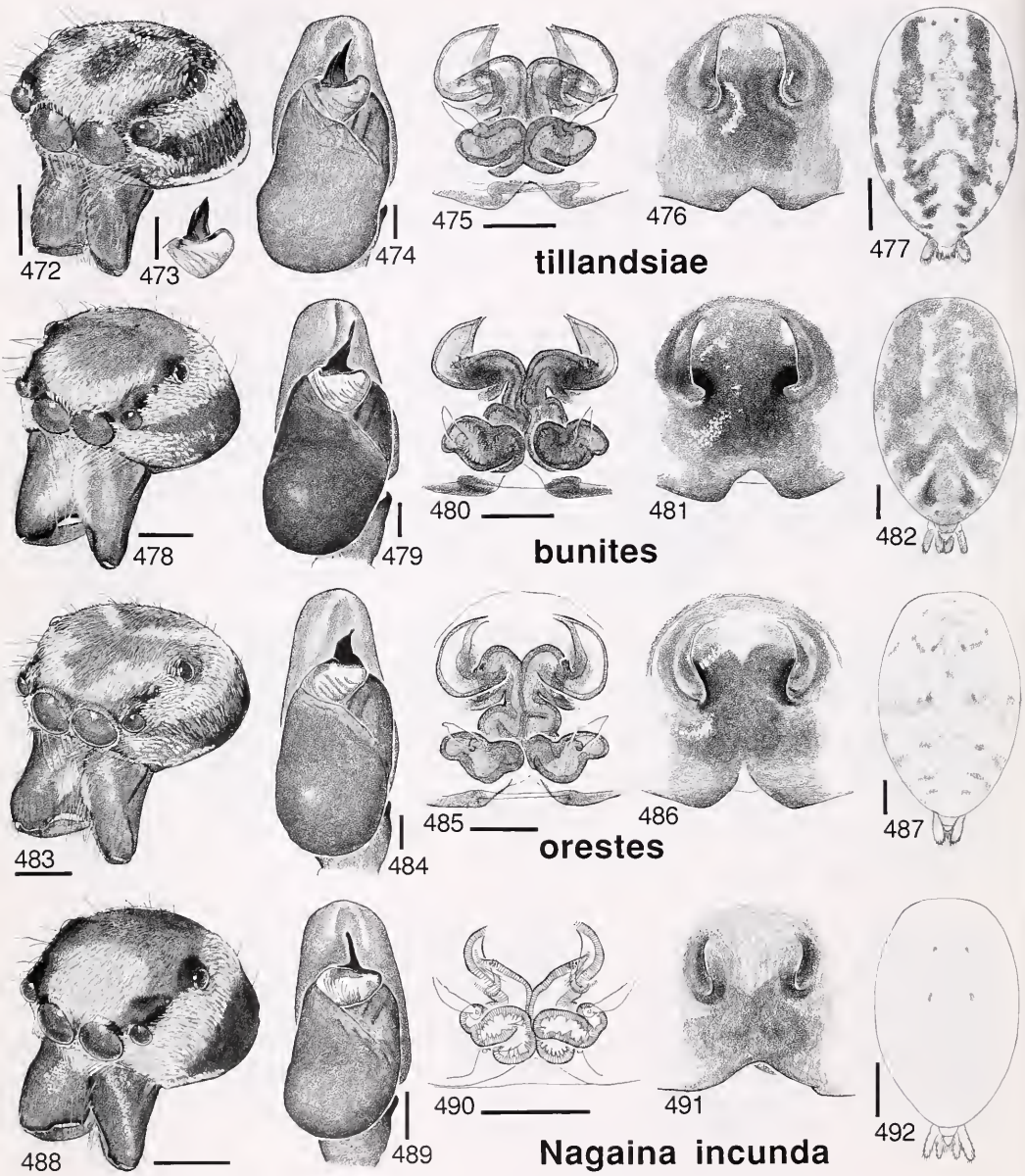


Figures 452–456. *Pelegrina yucatecana* (sp. 34). 452. ♂ face (holotype). 453. Palp (holotype). 454, 455. Epigynum, dorsal (454) and ventral (455) (Yucatán: nr. Xocenpich). 456. ♀ abdomen (Yucatán: nr. Chichen Itza).

Figures 457–463. *Pelegrina sandaracina* (sp. 35). 457. ♂ face (holotype). 458. Palp (holotype). 459–461 (Yucatán: Grutas de Loltun). 459. Epigynum, dorsal. 460. Epigynum, ventral. 461. ♀ abdomen. 462–463 (Chiapas: Arriaga). 462. Epigynum, dorsal. 463. Epigynum, ventral.

Figures 464–471. *Pelegrina* species. 464–466. From Neriaco, México. 464. Epigynum, dorsal. 465. Epigynum, ventral. 466. ♀ abdomen. 467, 468. From Jalisco and Guerrero. 467. Epigynum, ventral (Guerrero: 11 mi W of Chilpancingo). 468. ♀ abdomen (Jalisco: 3 mi S of Mazamitla). 469–471. From Durango (10 mi E of El Salto). 469. Epigynum, dorsal. 470. Epigynum, ventral. 471. ♀ abdomen.

Scale bars. 0.1 mm, except for ♂ face and ♀ abdomen 0.5 mm.



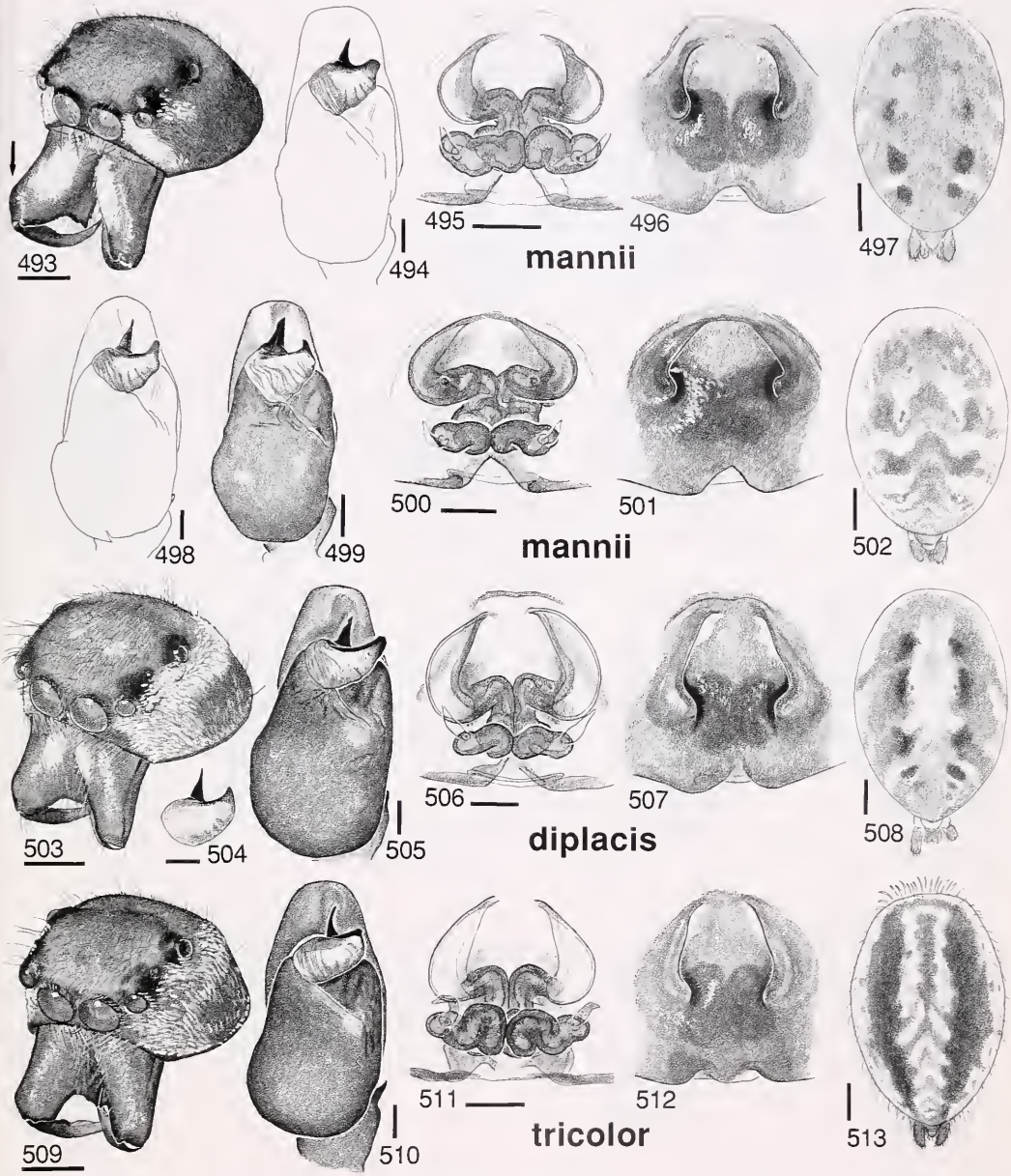
Figures 472–477. *Pelegrina tillandsiae* (sp. 36). 472. ♂ face (North Carolina: Polluckville). 473. Embolus (Florida: Lake Placid). 474. Palp (Louisiana: Baton Rouge). 475, 476. Epigynum, dorsal (475) and ventral (476) (Louisiana: Baton Rouge). 477. ♀ abdomen (Florida: Lake Placid).

Figures 478–482. *Pelegrina bunites* (sp. 37; Oaxaca: 50 km NW of Oaxaca, except 478 Arizona: Santa Cruz Co.). 478. ♂ face. 479. Palp. 480. Epigynum, dorsal. 481. Epigynum, ventral. 482. ♀ abdomen.

Figures 483–487. *Pelegrina orestes* (sp. 38; Arizona: Madera Canyon). 483. ♂ face. 484. Palp. 485. Epigynum, dorsal. 486. Epigynum, ventral. 487. ♀ abdomen.

Figures 488–492. *Nagaina incunda* (sp. 39). 488. ♂ face (Chiapas: 76 km S of Palenque). 489. Palp (Quintana Roo: Kohunlich ruins). 490, 491. Epigynum, dorsal (490) and ventral (491) (Quintana Roo: Kohunlich ruins). 492. ♀ abdomen (Chiapas: 105 km SE of Palenque).

Scale bars. 0.1 mm, except for ♂ face and ♀ abdomen 0.5 mm.

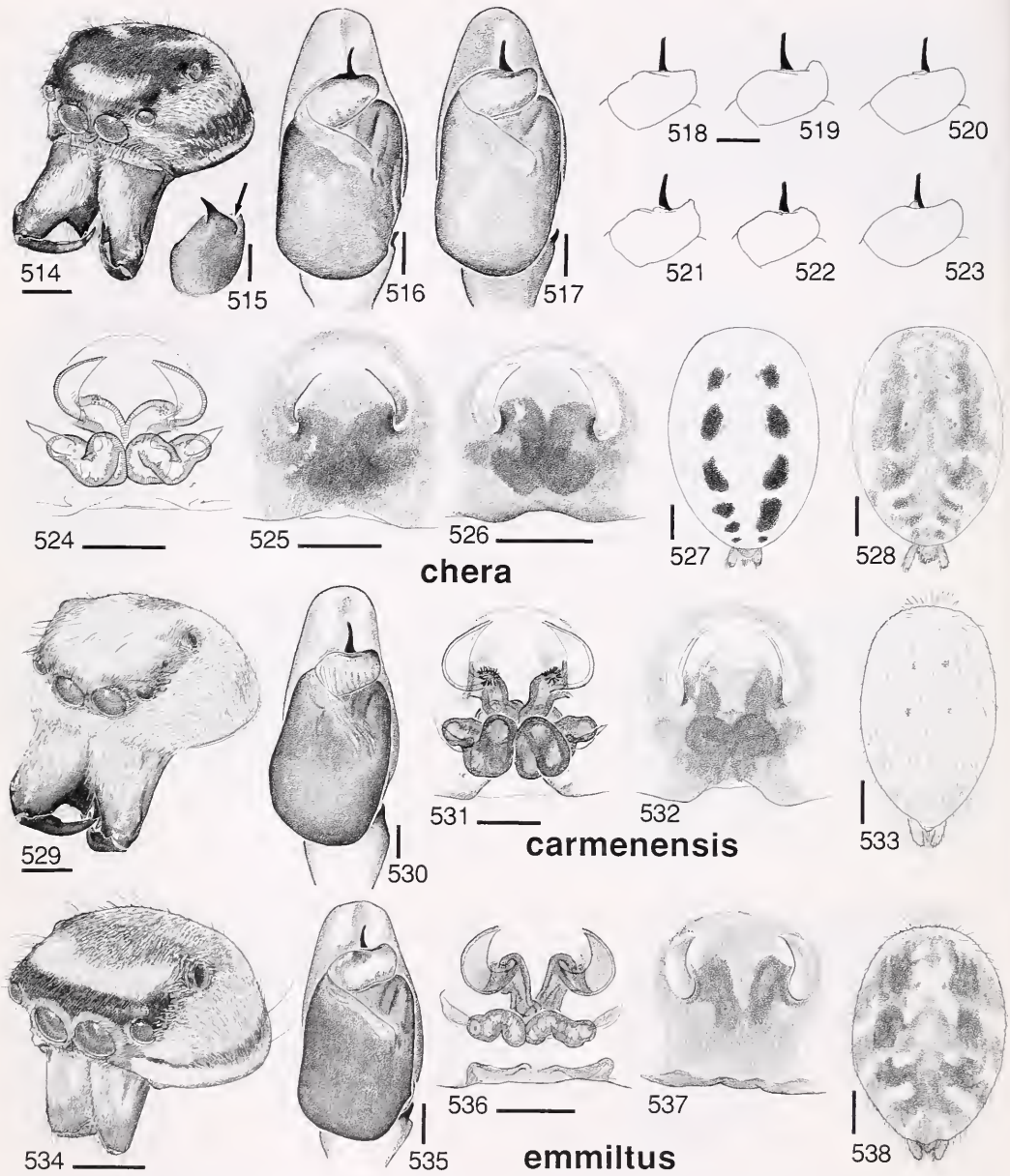


Figures 493–502. *Metaphidippus mannii* (sp. 40). 493–497. Form *versicolor* (California: Mendocino Co., except 495 and 496 Humboldt Co.). 493. ♂ face (arrow shows bulge on chelicerae typical of *mannii* group). 494. Palp. 495. Epigynum, dorsal. 496. Epigynum, ventral. 497. ♀ abdomen. 498–502. Form *mannii* (Arizona: Sycamore Canyon, except 498 holotype from Arizona). 498, 499. Palpi. 500. Epigynum, dorsal. 501. Epigynum, ventral. 502. ♀ abdomen.

Figures 503–508. *Metaphidippus diplacis* (sp. 41; Baja California: 10 mi S of San Quintin, except 504 holotype from San Diego, California). 503. ♂ face. 504. Embolus. 505. Palp. 506. Epigynum, dorsal. 507. Epigynum, ventral. 508. ♀ abdomen.

Figures 509–513. *Metaphidippus tricolor* (sp. 42; California: Marin Co., except 509 and 513 Monterey Co.). 509. ♂ face. 510. Palp. 511. Epigynum, dorsal. 512. Epigynum, ventral. 513. ♀ abdomen.

Scale bars. 0.1 mm, except for ♂ face and ♀ abdomen 0.5 mm.



Figures 514–528. *Metaphidippus chera* (sp. 43). 514. ♂ face (New Mexico: Doña Ana Co.). 515. Tibial apophysis (New Mexico: Doña Ana Co.). 516, 517. Palpi (Nevada: Churchill Co.; arrow in 516 shows bulge at base of tibial apophysis, typical of *mannii* group). 518–523. Emboli of ♂♂ from one locality showing variation in shape of embolus and embolic base (Texas: Wichita Co.). 524, 525. Epigynum, dorsal (524) and ventral (525) (Arizona: Pima Co.). 526. Epigynum, ventral (California: Riverside Co.). 527, 528. ♀ abdomen (Arizona: Pima Co.).

Figures 529–533. *Metaphidippus carmenensis* (sp. 44; Californa: Riverside Co., except 533, Baja California: San Felipe). 529. ♂ face. 530. Palp. 531. Epigynum, dorsal. 532. Epigynum, ventral. 533. ♀ abdomen.

Figures 534–538. *Metaphidippus emmiltus* (sp. 45; holotype and paratype). 534. ♂ face. 535. Palp. 536. Epigynum, dorsal. 537. Epigynum, ventral. 538. ♀ abdomen.

Scale bars. 0.1 mm, except for ♂ face and ♀ abdomen 0.5 mm.