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ABSTRACT

The American diplurid genus *Euagrus,* distributed from Arizona south to Costa Rica, is revised for the first time. *Euagrus* is defined to include those euagrine diplurids with the following character states: no australotheline crescent; terminal cymbial spines; interlocking spinule patches on male femora I and II; a ventral, proximal, nonspatulate, tibia II mating apophysis with one or more large apical spines; two or three ventral mating keels on metatarsus II; no macrosetae brush on the prolateral surface of male tibia II; and two or more sclerotized stalks with unsclerotized bulbs on each (unsclerotized) spermathecal trunk. The relationships of *Euagrus* to other euagrine genera are discussed. A cladogram (based on outgroup comparison with the sister genus, *Phyxioschema*), a key, diagnoses, descriptions, tables of quantitative character values, illustrations, analyses of variation, natural history information, locality records, and distribution maps are provided for the 20 recognized species of *Euagrus.* Eight of these species are newly described: *E. carlos, E. charcus, E. garnicus, E. gertschi, E. gus, E. leones, E. rothi,* and *E. zacus.* Six specific names are newly synonymized: *E. ravenus* Gertsch and Mulaik, *E. apacheus* Gertsch and Mulaik, and *E. ritaensis* Chamberlin and Ivie with *E. chisoseus* Gertsch; *E. empiricus* Chamberlin and *E. scepticus* Chamberlin with *E. josephus* Chamberlin; and *E. pragmaticus* Chamberlin with *E. rubrigularis* Simon.

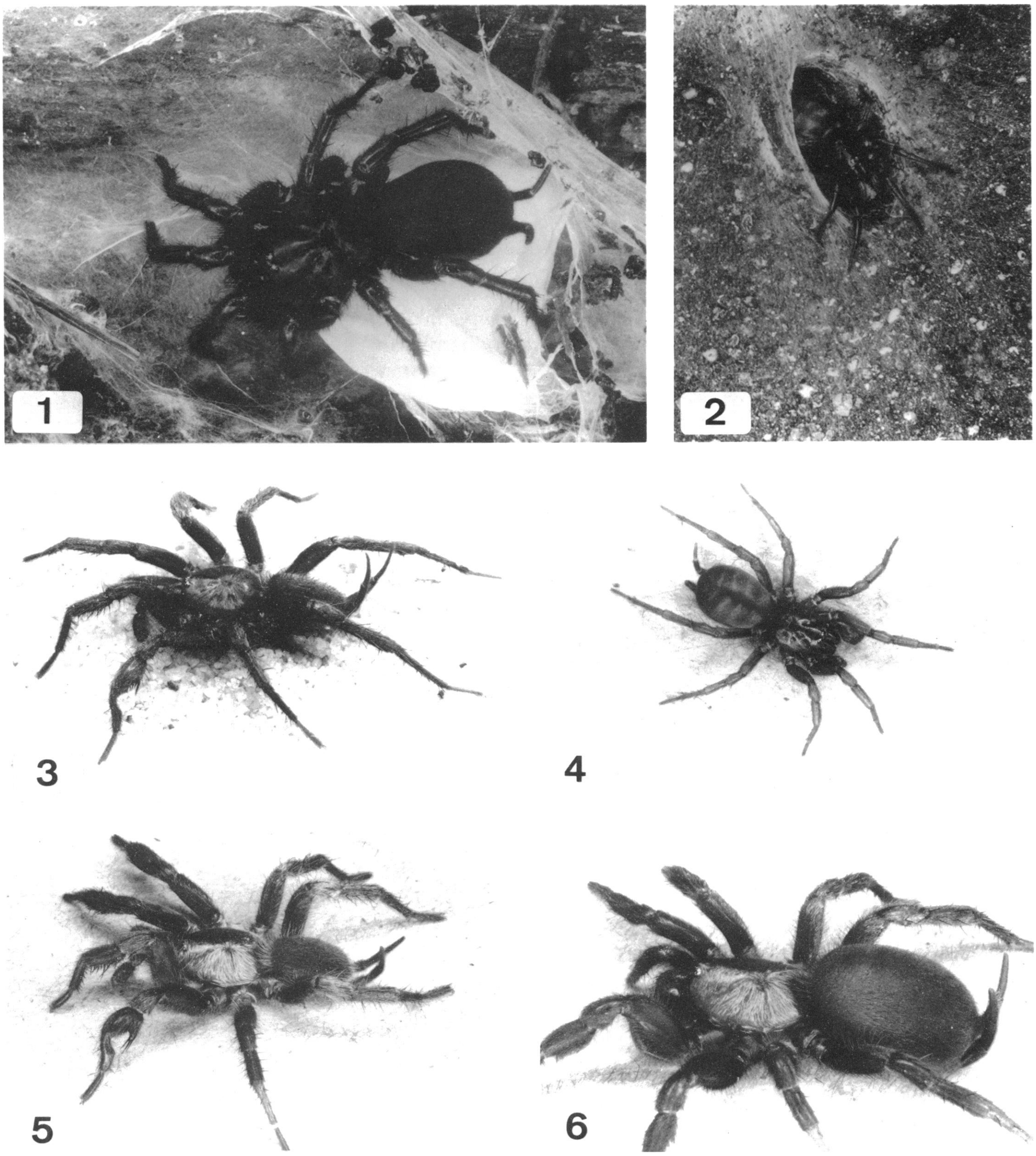
INTRODUCTION

Euagrus spiders (figs. 1–6) are the most abundant mygalomorph spiders in Mexico (Gertsch, 1971, 1979), and probably in all of America north of Panama. In spite of this abundance and their especially interesting anatomical diversity and wide variety of habitat associations (deserts to moist montane forests to caves), these spiders have received surprisingly little attention from arachnologists. Since Ausserer (1875) first described the genus, 21 *Euagrus* species have been described. Presented by 13 different authors or sets of authors in 16 separate publications, these descriptions are based on very small samples, are usually brief, are poorly illustrated, and were typically produced without examination of the type specimens of previously described species. This revision is the first systematic study of the entire genus.

Although many specimens were available at the outset of this study, primarily through the collecting and curatorial efforts of Dr. Willis J. Gertsch, I spent two months collecting *Euagrus* in the southwestern United States, Mexico, and Costa Rica in order to increase sample sizes, characterize *Euagrus* habitats, and observe behavior. With these samples, I systematically analyzed intrapopulation and interpopulation variation in selected quantitative and qualitative characters and have thereby tested hypotheses (and proposed new ones) about the reproductive integrity of these populations and sets of populations and about the evolutionary relationships of the species. I have tried to present both the data and the hypotheses in such a way that (1) future systematists will be able to effectively test my hypotheses and (2) these spiders will be readily accessible to researchers in other biological disciplines, for, as the following synopsis reveals, *Euagrus* is a taxon with the potential to yield much information relevant to several important biological questions.

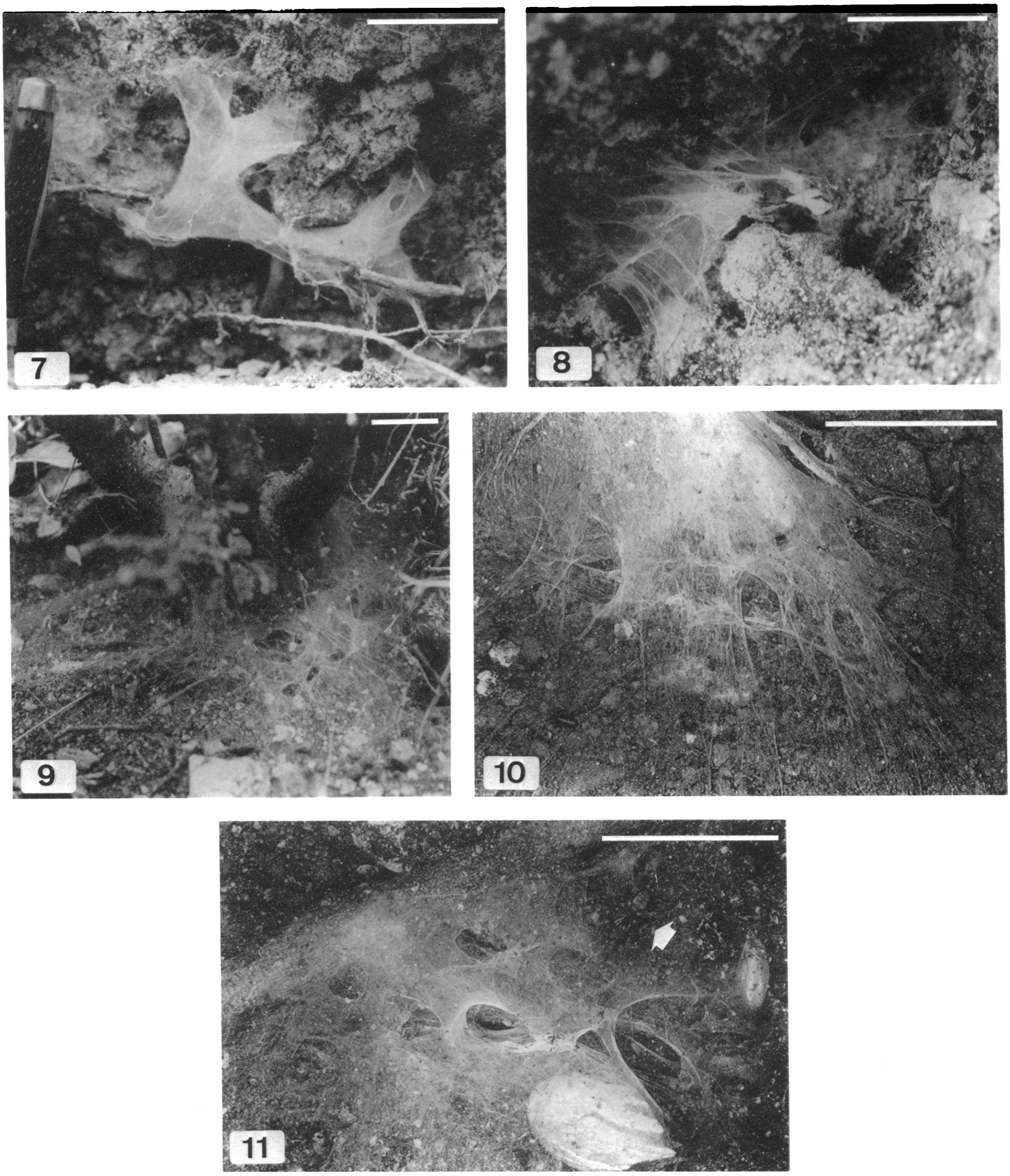
Building upon the work of Stevenson (1908), who described silk gland and spinneret morphology in *Euagrus chisoseus,* and Montgomery (1909), who described the embryonic development of *E. chisoseus* spinnerets, Palmer (1985) has recently used histochemistry, amino acid analysis, and scanning electron microscopy to reveal interesting information about the chemistry and physics of *Euagrus* silk (the core and coating structure of the incipient thread, the high percentage of short side-chain amino acids, thread fibrillation, etc.), which begins to help us understand the mechanics of *Euagrus* entrapment webs.

A typical *Euagrus* web consists of an irregular, sometimes branching, tubular retreat (fig. 7) hidden under a rock, in the soil, or in some other sheltered microhabitat, and an exposed entrapment web (figs. 8–11) composed of an irregular mixture of funnels and sheets extending out from the mouth of the



Figs. 1–6. Photographs of living *Euagrus* spiders. **1.** *E. leones,* new species, female from Desierto de los Leones on egg sac in retreat. **2.** *E. gus,* new species, female, from Grutas de Cacahuamilpa on web. **3.** *E. pristinus* O. P.-Cambridge, male from 2 mi NE El Punto, Oaxaca. **4.** *E. gus,* new species, female from Grutas de Cacahuamilpa. **5, 6.** *E. mexicanus* Ausserer. **5.** Male from 9.5 mi W Perote, Veracruz. **6.** Female from 15.5 mi SE Acatlán, Puebla.

retreat. The thin but surprisingly strong mesh of these funnels and sheets consists of extremely fine anastomosing filaments (many of which are only 0.2–0.3 microns in diameter) that adhere to smooth surfaces. These funnels and sheets serve to entangle insects at least temporarily, to transmit vibrations which alert and guide the spider, and to support the spider above the immediate substrate during its attack and retreat. Knowl-



Figs. 7–11. Photographs of *Euagrus* webs; scale lines = 5 cm. 7, 8. *E. pristinus* O. P.-Cambridge, from near El Punto, Oaxaca. **7.** Portion of retreat exposed by dissecting away capture web and soil on road bank. **8.** Capture web in crevice on road bank. **9.** *E. mexicanus* Ausserer capture web at base of *Acacia* bush at 15.5 mi SE Acatlán, Puebla. **10, 11.** Webs of *E. gus,* new species, on cave floor in Grutas de Cacahuamilpa. **11.** Arrow pinpoints female on periphery of web.

edge about *Euagrus* web structure was recently summarized by Coyle (1986a). Further information about the web structure of individual *Euagrus* species can be found, along with other observations about their ecology, behavior, and reproductive biology, in the natural history sections at the end of most species descriptions in the present paper.

A preliminary study of courtship and mating in three species of *Euagrus* (Coyle, 1986b) has revealed several interesting phenomena worthy of further study. Vibrations generated by "jerk-quivers" of the approaching male and transmitted through the female web appear to be important courtship signals. The unusually strongly modified, species specific, male leg II mating claspers (fig. 24) hold the female during mating. The equally unusual male femur I and II spinule patches (figs. 39–43) serve to anchor his outstretched and spinose leg I to the clasping leg (leg II) and thereby presumably better defend the male from a possible female attack. The adaptive significance of the entire clasping mechanism, including the possibility that it is partly the product of sexual selection by female choice, was discussed by Eberhard (1985) and Coyle (1986b).

Another remarkable feature of *Euagrus* biology is the extent to which its species have adapted to cave environments. When Gertsch (1981) described the third eyeless, elongate-appendaged, cave species of *Euagrus*, these three *Euagrus* species comprised one-fourth of the known mygalomorph troglobite species in the world. Other *Euagrus* species are troglophiles with some populations living in caves and exhibiting significant degrees of appendage elongation when compared with their epigean conspecifics (figs. 16, 19, 20, 22, 23).

It is important to point out now, as will become clear to those who use this revision, that it is generally easier to test hypotheses about reproductive isolation and relationships in *Euagrus* and to identify *Euagrus* species by using male characters than by using female characters. Consequently, I have not been able to assign a number of female population samples to any of the species described herein; the assignment of these samples must await the discovery of syntopic males and/or better resolution of the patterns of female character variation than has been possible in this study. Many taxonomic discoveries remain for those who continue to study this genus; I hope that this revision will greatly accelerate that discovery process.

ACKNOWLEDGMENTS

The following persons and institutions kindly loaned *Euagrus* specimens for this study (each collection is identified by an abbreviation): Dr. N. I. Platnick, American Museum of Natural History (AMNH); Mr. P. Hillyard, British Museum (Natural History) (BMNH); Dr. W. J. Pulawski, California Academy of Sciences (CAS); Dr. C. E. Griswold (CEG); Dr. C. Dondale, Canadian National Museum (CNM); Dr. W. B. Peck, Exline-Peck Collection (EFP) (now housed at CAS); Mr. M. J. Scoble, Hope Entomological Collections, Oxford University (HEC); Dr. J. A. Beatty (JAB); Mr. J. A. Kochalka (JAK); Mr. J. C. Cokendolpher (JCC); Mr. D. A. Rossman, Louisiana State University Museum of Zoology (LSUMZ); Dr. H. W. Levi, Museum of Comparative Zoology (MCZ); Dr. N. V. Horner (NVH); Mr. J. Reddell, Texas Memorial Museum (TMM); Dr. O. Francke, Texas Tech University (TT); Mr. S. I. Frommer, University of California at Riverside (UCAR); Dr. C. E. Griswold, University of California at Berkeley (UCB); Dr. C. Valerio, University of Costa Rica (UCR); Dr. A. Hoffmann and Ms. L. Jiménez, Universidad Nacional Autónoma De Mexico (UNAM).

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Zoology. I thank Drs. Norman I. Platnick and Robert J. Raven for reviewing a draft of this paper. This study was supported by National Science Foundation Grant DEB-8104682.

RELATIONSHIPS

Raven (1979) grouped *Euagrus* together with *Phyxioschema* (a monotypic genus from western Asia), *Allothele* (an African genus), and *Cethegus* (an Australian genus) to form the tribe Euagrini. Later he added four more Australian genera (*Stenygrocercus, Australothele, Carrai,* and *Namirea*) to the tribe (Raven, 1984). I postulated (Coyle, 1984) that *Euagrus, Phyxioschema,* and *Allothele* form a monophyletic group united by two synapomorphies: interlocking spinule patches on male femora I and II and a nonterminal male tibia II mating apophysis. Subsequently Raven (1985) rejected the second synapomorphy and presented two synapomorphies uniting *Allothele* with the five Australian genera, thereby falsifying my hypothesis.

Consequently, Raven's (1985) current hypothesis about the relationship of *Euagrus* is that it and *Phyxioschema* form a monophyletic group on the basis of a synapomorphic male tibia II copulatory apophysis and that this group of two genera is the sister-group of the other six euagrine genera, including *Allothele,* combined. I accept this hypothesis and add three more synapomorphies which support the monophyly of *Euagrus* plus *Phyxioschema.* The first of these is the presence of longitudinal ventral keels on male metatarsus II. Contrary to Raven's (1981, 1985) observations, *Phyxioschema* has not two, but three such keels (a large median keel and a smaller keel on each side of this keel) (Coyle, in prep.). Two *Euagrus* species (*E. josephus* and *E. rubrigularis*) have three metatarsus II keels (figs. 51–53, 65, 66, 73–77), while the rest lack a median keel and have only a retrolateral and a prolateral keel. These keels are clearly functionally related to the tibia II apophysis; all these structures are part of the clasper that holds the female during mating (Coyle, 1986b). The second additional synapomorphy is the presence of male femur I and II spinule patches (figs. 39–43; Coyle 1986b: fig. 7). These spinule patches are also functionally related to the two mating clasper synapomorphies; they function to lock male leg I to his clasping leg (leg II) so that leg I can presumably better protect the male from an attack by his mate (Coyle, 1986b). In both *Euagrus* and *Phyxioschema* the femur I spinule patch is located on the distodorsal portion of that femur's retrolateral surface and the femur II patch is located on the distoventral portion of that femur's prolateral surface. In *Allothele* the femur spinule patches are positioned on the proximal half of each femur and neither dorsally nor ventrally (Coyle, 1984: figs. 60, 61), and these patches are shaped differently from, and the spinules are markedly weaker than, those of *Euagrus* and *Phyxioschema.* These differences support the hypothesis that the femur spinule patches arose independently in *Allothele* and in the common ancestor of *Euagrus* and *Phyxioschema.* The additional synapomorphy uniting *Euagrus* and *Phyxioschema* is the presence of sclerotized spermathecal stalks, a condition present in few other diplurid genera.

Phyxioschema is defined by one unequivocal autapomorphy, the presence of a long narrow brush of strong setae on the prolateral surface of male tibia II, and by another probable autapomorphy, the unique, bilobed, spatulate tip of the male tibia II mating apophysis. The autapomorphy proposed by Raven (1985), the "pseudosegmented" nature of the terminal article of the lateral spinnerets, is a character state also present in several *Euagrus* species (figs. 15, 17) and therefore, if apomorphic, might be another synapomorphy uniting *Euagrus* and *Phyxioschema.*

To date, no one has proposed a synapomorphy which supports the monophyly of the species of *Euagrus.* One character state which helps define *Euagrus,* and which might be apomorphic, is the presence of terminal spines on the cymbium (figs. 27–31). Contrary to Raven's view (1981), no such spines are present in *Phyxioschema* (Coyle, in prep.). However, Raven (1985) argued rather persuasively that terminal cymbial spines are plesiomorphic in the Dipluridae. Another possible *Euagrus* synapomorphy is that the distance which the terminal lobe of the cym-

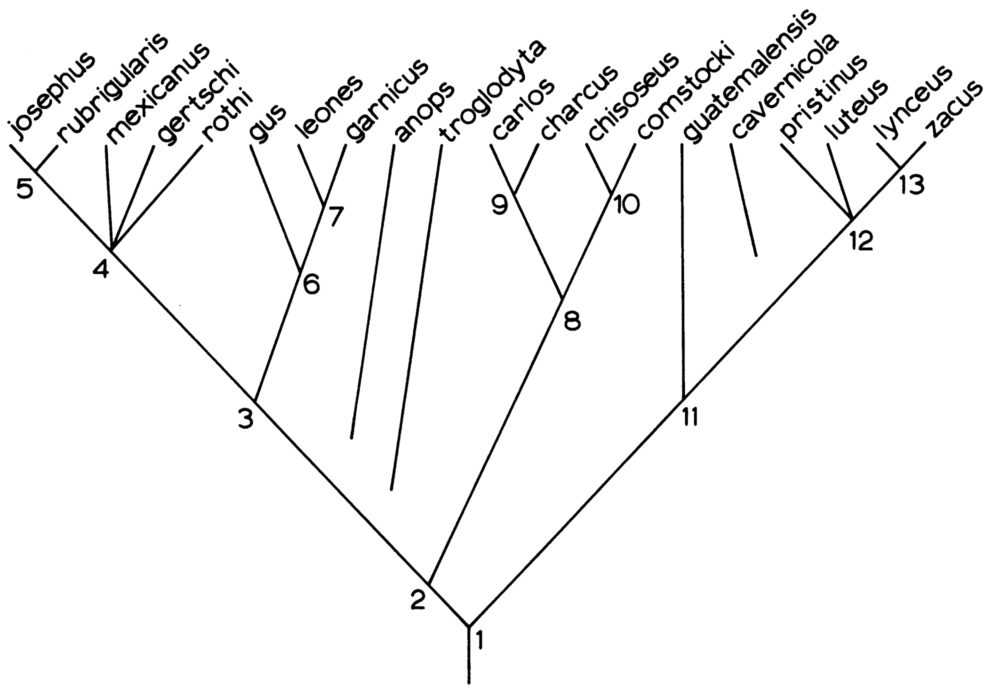


Fig. 12. Cladogram of *Euagrus* species. Synapomorphies defining each of the numbered cladogram components are described and discussed in text.

bium extends beyond the prolateral lobe (figs. 28–31) is somewhat greater than in *Phyxioschema.*

Figure 12 is a cladogram presenting my hypotheses about the interrelationships of *Euagrus* species. I have based my decisions about the polarities of character transformation series almost exclusively on outgroup comparison, with *Phyxioschema* as the outgroup. This cladogram is the most parsimonious of several alternatives constructed with the available data. The synapomorphic character states defining each of the numbered cladogram components (fig. 12) are described and discussed below.

As mentioned above, no synapomorphy has been identified which defines component 1, the genus *Euagrus.* Component 2 is defined by one synapomorphy: the terminal article of the lateral spinnerets is only slightly tapered, without constrictions, and nonflexible (figs. 5, 18). The plesiomorphic state, present in *Phyxioschema* and component 11, is a more strongly tapered, usually proportionally long, article that is flexible because of irregular constrictions along the distal one-half to three-fourths of its length (figs. 3, 17). Component 3 is defined by two synapomorphies: (1) femur I spinule patch relatively short and wide (vs. long and narrow) [see IFSW(100)/IFSL in table 1], and (2) longitudinal ridges present on embolus (figs. 54–58, 173–175) (vs. no ridges; figs. 197–199). Component 4 is defined by four synapomorphies: (1) base of embolus broad and not clearly differentiated from bulb (figs. 54–58) (vs. base of embolus narrower and more clearly differentiated from bulb; figs. 142–147), (2) embolus ridges enlarged and more numerous (figs. 54–58) (vs. weak and not numerous; figs. 173–175), (3) spines present on ventral surface of tibia distal of apophysis (figs. 51–53) (vs. absent from that surface; figs. 136–140), and (4) femur I spinule patch very short and wide (vs. longer and narrower) [see IFSW(100)/IFSL in table 1]. I have found no synapomorphies which help to resolve the interrelationships of *E. mexicanus, E. gertschi,* and *E. rothi.* Component 5 is defined by one putative synapomorphy, the presence of a median keel on male metatarsus II (figs. 51–53, 65, 66). Even though a median metatarsus II keel is present in *Phyxioschema,* postulating that this keel arose independently in *Phyxioschema* and again in component 5 of *Euagrus* or that it was lost in the ancestral *Euagrus* and reappeared in component 5 results in a more parsimonious cladogram than if it is assumed that this keel is plesiomorphic for *Euagrus* and was lost independently at least four different times (in the ancestor of *E. mexicanus, E. gertschi,* and *E. rothi*; and in components 6, 8, and 11). The hypothesis that *E. josephus* and *E. rubrigularis,* which are separated by the Gulf of California, are sister species rather recently derived from a common ancestor by vicariance is consistent with evidence that Baja California rafted apart from mainland Mexico during Pliocene times (Atwater, 1970).

Component 6 is defined by one synapomorphy, the presence of four or more foveal setae (fig. 148) (vs. two such setae; fig. 15). That two foveal setae is the plesiomorphic condition is supported not only by outgroup comparison but also by ontogeny; *E. gus* spiderlings have only two foveal setae. Component 7 is defined by one synapomorphy, a strong transverse ridge that connects the distal ends of the retrolateral and prolateral keels of male metatarsus II (figs. 176, 177, 185, 186) (vs. no such ridge; figs. 136, 138). Component 8 is defined by one synapomorphy, a reduction in the size of the male tibia II apophysis (figs. 194–196) [vs. a proportionally more massive apophysis; figs. 51–53; see IITT(100)/IITL in table 1]. Component 9 is defined by two synapomorphies: (1) spines on distal face of male tibia II apophysis (figs. 194–196) (vs. spines absent from this surface; figs. 223, 224), and (2) spinose hairs on prolateral surface of male tibia II (vs. no such hairs). I have found no synapomorphies to define component 10, but *E. chisoseus* and *E. comstocki* are clearly sibling species.

Component 11 is defined by three synapomorphies: (1) preening combs on male metatarsus II (figs. 263, 264, 272) and female metatarsus I (preening combs are present on at least some of the other legs also, but I did not systematically examine all of these) (vs. preening combs absent from all metatarsi), (2) embolus tip curved upward (fig. 265) (vs. curved downward; figs. 229, 231), and (3) male tibia II apophysis reduced in size (figs. 263, 264) [vs. a more massive apophysis; figs. 51–53; see IITT(100)/IITL in table 1]. Component 12 is defined by two synapomorphies: (1) the presence of spines distal of the male tibia II apophysis (figs. 271–274) (vs. spines absent from this area), and (2) anterior genital lip of female with median sclerotized patch with lateral winglike extensions (figs. 295, 325, 326) (vs. no sclerotized patch on anterior genital lip or much smaller patch without such lateral extensions). I have found no characters to help resolve the trichotomy of component 12. Component 13 is defined by one synapomorphy, a segmentally arranged series of prominent, paired, transverse, light marks on the abdominal dorsum (figs. 309–311, 321) (vs. no such marks or only very small faint marks).

No males are known for the three troglobites, *E. troglodyta, E. anops,* and *E. cavernicola,* or for *E. luteus* or *E. zacus.* The placement of these species, particularly the troglobites, which have been subject to some striking evolutionary changes, is therefore especially tentative. I am placing *E. troglodyta* and *E. anops* in component 2 because of their proportionally short, only weakly tapered, and nonflexible (weakly flexible?) terminal lateral spinneret articles (fig. 16) and because they lack metatarsal preening combs. However, I hasten to add that the spermathecae of these two species (figs. 191–193) are more similar to those of component 11 than to component 2 spermathecae. Also, it might be argued that the preening combs could have been lost during evolution in the cave environment (cave-dwelling individuals of troglophilic *E. lynceus* tend to have fewer, more weakly developed combs than their epigean conspecifics), although the fact that the eyeless troglobite *E. cavernicola* has not lost its preening combs weakens that argument. I have placed *E. cavernicola* in component 11 because of its preening combs and flexible, terminal lateral spinneret article.

METHODS AND ABBREVIATIONS

The quantitative characters used in this study are abbreviated and defined as follows (in alphabetical order):

AMD — transverse diameter of left anterior median eye pupil
AMS — minimum distance between anterior median eye pupils
BD — palpus bulb diameter in ventral view (fig. 26)
CD — number of cheliceral denticles
CL — carapace length
CT — number of cheliceral teeth
CW — carapace width
IFL — femur I length
IFSL —femur I spinule patch length
IFSW — femur I spinule patch width
IFT — maximum diameter of femur I in retrolateral view along line perpendicular to IFL line
IIML — male metatarsus II length (fig. 24)
IITAS — number of spines on the male tibia II apophysis, including those on the proximal and distal slopes
IITL — male tibia II length (fig. 24)
IITS — number of spines on the entire ventral surface of male tibia II, including those on the apophysis
IITT — maximum diameter of male tibia II in retrolateral view along line perpendicular to IITL line (fig. 24)
IML — metatarsus I length
ITarL — tarsus I length
ITarS — number of spines on tarsus I
ITL — tibia I length
ITS — total number of spines on the ventral and prolateral surfaces of male tibia I
LCTI — number of teeth on the retrolateral claw of leg I
LSL1, LSL2, LSL3 — lengths of each posterior lateral spinneret article (basal, middle, and terminal article, respectively) measured along its midventral line
MCTI — number of teeth on the middle (inferior) claw of leg I
MKP, MKR — distances along the IIML line from proximal end of male metatarsus II to the 90° intersection with lines passing through the prolateral keel apex and the retrolateral keel apex, respectively (fig. 24)
PL — palpus length in retrolateral view (fig. 25)

All carapace and eye measurements were performed with the lateral borders of the carapace on the horizontal plane. The length of each leg article was measured in retrolateral view and equals the distance from the proximal point of articulation to the most distodorsal point of the article (in the case of IFL the distal point of the measurement is the tip of the condyle, which is often a little proximal of the most distal point of the article). The femur I spinule patch is measured with the patch in the horizontal plane; the length of the patch is nearly parallel to the longitudinal axis of the femur. Sometimes it was necessary to pull the posterior lateral spinneret away from the abdomen to expose the entire ventral surface of the basal article for measurement. All appendage character states were recorded from the left appendage (unless missing, damaged, or not fully regenerated) except for IITS, IITAS, ITS, CT, and CD, which were recorded from both right and left appendages. Egg diameters were recorded five years after the eggs had been preserved in 80 percent ethanol.

I took measurements with a Wild M-5 stereomicroscope with 20× eyepiece lenses and an eyepiece micrometer scale. AMD, AMS, PL, BD, and egg measurements are accurate to 0.009 mm; IFSL, IFSW, LSL1, LSL2, and LSL3 measurements are accurate to 0.018 mm; all other measurements are accurate to 0.038 mm. All measurements are given in millimeters.

Spermathecae were examined by removing with forceps and dissecting needles the portion of the body wall to which they are attached, clearing in 85 percent lactic acid, teasing off any overlying or underlying nontransparent tissues, placing the preparation dorsal-side-up in lactic acid under a cover slip on a glass slide, and viewing through a compound light microscope at 400×. Spermathecae were then drawn with the aid of a drawing tube.

Most drawings of male legs II and palpal organs are of left appendages and are drawn as such, but some of these male character drawings are made from right appendages but reversed so as to appear as left appendages and therefore more easily compared. Rarely, both right and left spermathecae are illustrated; usually only the right spermatheca is illustrated (or occasionally the left one, which is reversed to appear to be a right spermatheca). In all the illustration plates a 1.0 mm scale defines male leg II article size, a 0.5 mm scale defines palpal organ size, and a 0.1 mm scale defines spermatheca size.

Each species description is a composite of all the adult specimens examined. The quantitative character values recorded in tables 1–3 for samples of males and females and for type specimens are an integral part of each description. When using the key it is important to remember that any ranges of quantitative character values given are ranges for the sample examined in this study, some of which are quite small. Unless otherwise noted, color descriptions are based on preserved specimens observed under alcohol and illuminated by an incandescent microscope bulb; most *Euagrus* species are markedly darker in life. The scanning electron microscope character descriptions (in the genus description) are based on an examination of one female from each of four species: *E. mexicanus, E. gus, E. carlos,* and *E. pristinus.*

EUAGRUS Ausserer

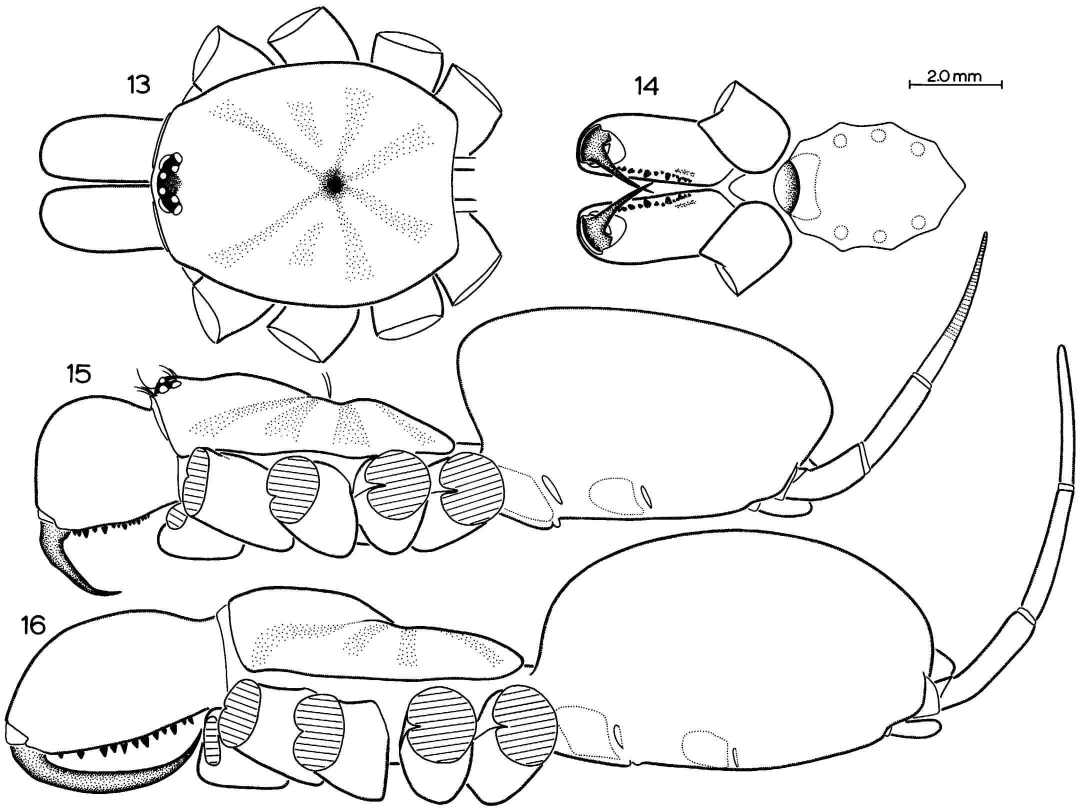
Euagrus Ausserer, 1875: 1160 (type species by monotypy *Euagrus mexicanus* Ausserer). — Brignoli, 1983: 124. — Coyle, 1984: 1, 2, 5, 8. — Raven, 1985: 8, 29, 52–54, 73, 78, 160.

Evagrus (unjustified emendation): Simon, 1891: 320; 1928: 182, 183, 185. — Bonnet, 1956: 1847. — Raven, 1979: 634; 1984: 5.

REMARKS: According to the *International Code of Zoological Nomenclature, "Euagrus"* is the correct original spelling because it does not "contravene a mandatory provision of Articles 26 to 30" and there is no evidence of an "inadvertent error" in Ausserer's (1875) original publication. Consequently, "Evagrus," first used by Simon (1891) and subsequently (but far from universally) by other authors, is an unjustified emendation [in spite of Bonnet's (1969) plea against the reestablishment of "incorrectly spelt names"]. This conclusion has recently been expressed by Brignoli (1983), Coyle (1984), and Raven (1985).

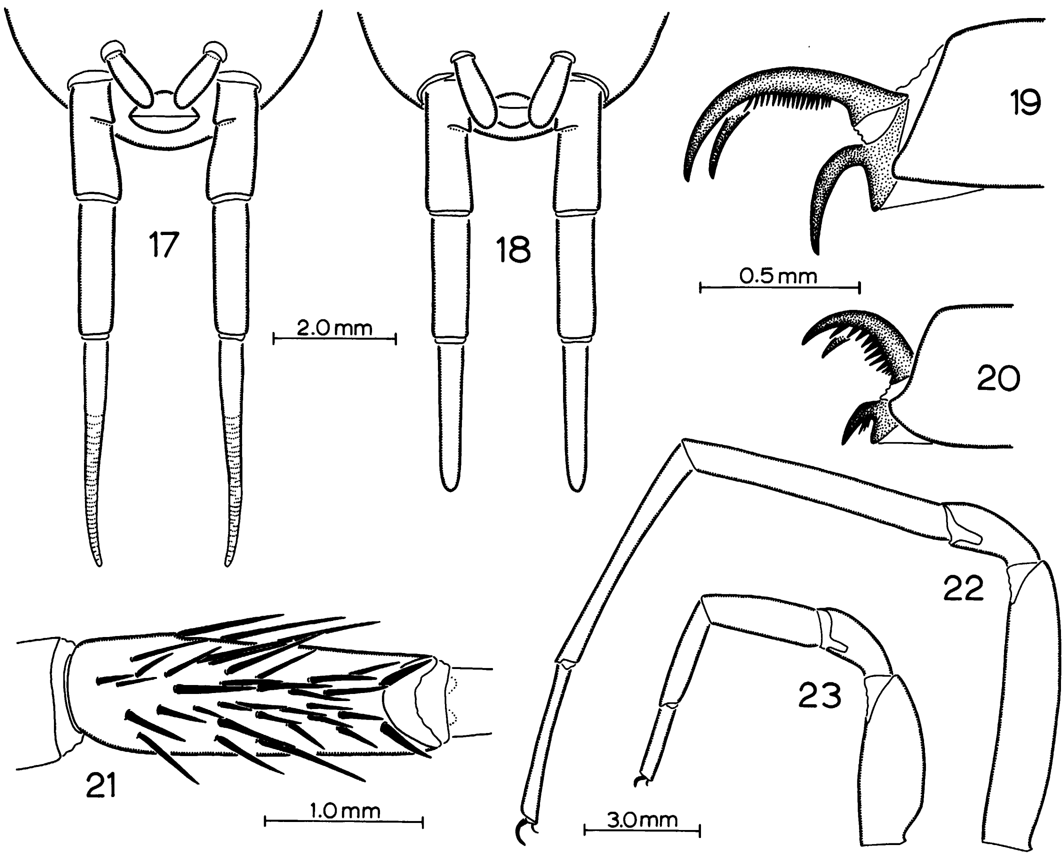
DIAGNOSIS: *Euagrus* males and females can be easily distinguished from genera of the Diplurinae and Ischnothelinae by the absence of maxillary cuspules and from most of the more closely related genera by the absence of an australotheline crescent (a crescent-shaped hirsute sclerite just anterior to the base of each posterior median spinneret). Other diagnostic character states which help identify *Euagrus* males are the presence of (1) spines on the tip of the cymbium (figs. 27–31), (2) a prominent ventral apophysis (with one or more large apical spines) occupying the proximal half to two-thirds of tibia II (fig. 24), (3) two or three ventral keels on metatarsus II (fig. 24), and (4) patches of prominent curved spinules on opposing lateral surfaces of femora I and II (one spinule patch is located in the dorsodistal quadrant of the retrolateral surface of femur I; the other patch is located chiefly in the ventrodistal quadrant of the prolateral surface of femur II) (figs. 39–43). Males of the similar Asian sister genus, *Phyxioschema,* lack terminal cymbial spines, have a distinctively expanded spatulate tip on the tibia II apophysis, and have a unique, prominent, long narrow patch of macrosetae on the prolateral surface of tibia II just above the base of the apophysis. *Euagrus* females have distinctive spermathecae, with unsclerotized trunks and two or more partly or fully sclerotized stalks per trunk, each stalk terminating in an unsclerotized bulb (fig. 59). Only *Phyxioschema* females have similar spermathecae (Coyle, in prep.), but, unlike the conformation found in *Euagrus,* each *Phyxioschema* trunk and its single dominant stalk bend ectally, forming an angle of 45° or less with the genital slit.

DESCRIPTION: Body size small to large (CL = 2.0–9.2) (figs. 1–6, 15, 16). Carapace with sparse to dense covering of relatively long, thin, recumbent to semirecumbent hairs; two or more (usually two but occasionally four or more in two longitudinal rows) large erect foveal setae just in front of fovea (figs. 15, 148); several moderately prominent erect setae centrally on, and in front of, ocular prom-



Figs. 13–16. 13–15. *Euagrus pristinus* O. P.-Cambridge, female. **13.** Carapace and chelicerae, dorsal view. **14.** Chelicerae, maxillae, labium, and sternum, ventral view. **15.** Body, lateral view. **16.** *E. troglodyta* Gertsch, female, lateral view of body.

inence. Pars cephalica usually elevated slightly to markedly, but occasionally not at all, above pars thoracica. Fovea a shallow depression to deep pit (usually moderately deep to deep) (fig. 13); usually roughly circular, broadly triangular, or transversely rectangular; occasionally a transverse groove with steep procurved front wall. Eight eyes forming compact quadrangle approximately twice as wide as long and elevated on median prominence (figs. 13, 15); anterior row procurved, posterior row straight or slightly recurved; interocular region of quadrangle dark brown or black; some cave-adapted species without eyes (fig. 16). Sternum longer than wide (fig. 14); six small circular sigilla on lateral margins; large transverse seta-less area behind labium formed by two fused labiosternal sigilla; long erect setae distributed over entire sternum. Labium approximately two times wider than long; moderately to steeply inclined from plane of sternum; without cuspules. Chelicerae usually with row of 9 to 17 mostly large teeth on promargin of fang furrow and 7 to 54 denticles grouped along proximal one-third to half of this row on its retrolateral side (figs. 14–16); most distal and retrolateral of these denticles usually larger than others; some cave-adapted species with fewer and smaller teeth and/or fewer denticles. No rastellum. Numerous long downcurved setae on dorsal and frontal surfaces of chelicerae. Maxillae without cuspules; maxillary lobe short and triangular or rounded (fig. 14); serrula a broad band tapering at both ends (fig. 32); serrula teeth sharp and conical. Pedipalp claw with single row of many teeth. Pedipalp of adult male with patella and tibia each markedly shorter than femur (fig. 27); proximal half to two-thirds



Figs. 17–23. 17, 18. Female spinnerets, ventral view, 2.0 mm scale. **17.** *Euagrus pristinus* O. P.-Cambridge. **18.** *E. mexicanus* Ausserer. 19, 20. Left leg I claws of female, retrolateral view, 0.5 mm scale. **19.** *E. troglodyta* Gertsch. **20.** *E. pristinus* O. P.-Cambridge. **21.** Left tibia I of male *E. pristinus* O. P.-Cambridge, ventral view, 1.0 mm scale. **22, 23.** Left leg I of two females with same CL, retrolateral view, 3.0 mm scale. **22.** *E. troglodyta* Gertsch. **23.** *E. pristinus* O. P.-Cambridge.

of tibia swollen ventrally; many long erect setae extend downward from this swelling; cymbium (tarsus) tip extends well beyond base of palpal organ; a few spines on tip of cymbium, one to three spines proximally on retrolateral surface, and one to three on prolateral lobe of cymbium (figs. 27–31). Bulb of palpal organ simple, generally pyriform; embolus simple, long, tapering, terminally very slender (figs. 25–31). Legs with three tarsal claws (figs. 19, 20, 38); single row of many teeth on each superior claw (except cave-adapted *E. anops*); row of zero to five teeth on inferior claw. Tarsi not pseudosegmented. Tarsus I of female with zero to 26 spines ventrally in up to three rows (on prolateral, medial, and retrolateral aspects of ventral surface). Tarsal organ a mound with one or two sets of concentric ridges, each set surrounding a central depression with a small protrusion in its center (figs. 33–35). No scopulae. Metatarsal preening combs present on some species, not on others. Two rows of trichobothria on dorsal surface of each tibia, single row dorsally on each metatarsus and tarsus. Trichobothrial bases corrugiform (figs. 36, 37). Male tibia I proportionally rather thick; 8–78 spines distributed over most of ventral surface and onto prolateral surface (fig. 21). Male femur I with dense patch of curved spinules on distodorsal portion of retrolateral surface; male femur II with similar patch of curved spinules on distoventral portion of prolateral surface (figs. 39–43). Male

TABLE 1

Quantitative Character Values for Adult Males of *Euagrus* Species

Character abbreviations defined in Methods section of text. Range, mean, and standard deviation given. IITS, IITAS, and ITS values include data from both left and right legs. * Values of each ratio character have been multiplied by 100.

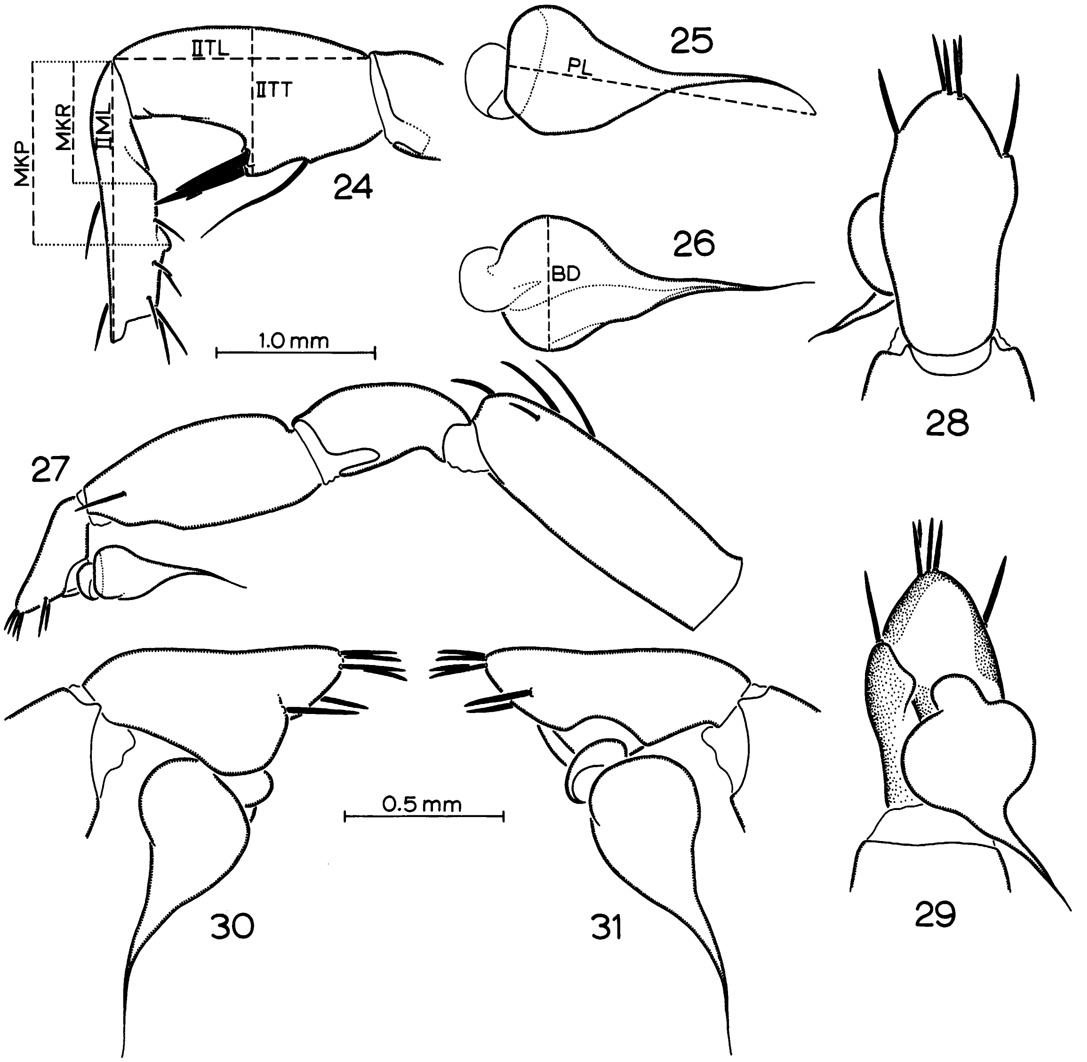
	N	IITS	IITAS	ITS	CL	CW	AMD	AMS
josephus	7	14–26	5–8	37–58	4.1–6.7	3.1–5.4	0.06–0.14	0.07–0.13
		19.5±4.3	6.5±1.0	49.0±6.5	5.29±0.91	4.20±0.77	0.10±0.027	0.10±0.019
rubrigularis	16	8–27	4–11	24–58	3.5–7.2	2.8–6.1	0.09–0.16	0.07–0.18
		16.5±5.1	7.8±1.7	45.2±8.5	5.60±1.12	4.64±1.00	0.12±0.022	0.12±0.030
mexicanus	22	8–40	2–11	33–78	4.2–7.2	3.4–6.2	0.09–0.16	0.09–0.19
		24.2±8.3	7.9±2.2	56.1±12.6	5.55±0.65	4.60±0.59	0.13±0.019	0.13±0.026
gertschi	3	8–18	4–11	25–38	2.6–5.1	2.2–4.0	0.08–0.14	0.06–0.09
		12.8	7.3	33.2	4.18	3.33	0.11	0.08
rothi	2	10–14	5–7	32–39	3.2–3.4	2.5–2.7	0.07–0.08	0.07
gus	10	3–9	3–9	21–48	3.0–4.1	2.4–3.2	0.06–0.10	0.04–0.10
		6.0±1.6	6.0±1.6	33.0±7.3	3.47±0.39	2.73±0.29	0.08±0.014	0.08±0.019
leones	5	3–5	3–5	23–39	3.0–3.5	2.4–2.8	0.06–0.08	0.07–0.09
		4.1±0.6	4.1±0.6	31.3±5.0	3.23±0.19	2.57±0.16	0.07±0.012	0.08±0.007
garnicus	1	3	3	29–33	4.2	3.5	0.08	0.10
carlos	10	5–8	5–8	17–33	2.7–5.6	2.1–4.6	0.09–0.15	0.06–0.13
		6.4±0.9	6.4±0.9	26.5±4.5	4.66±0.85	3.76±0.69	0.13±0.019	0.10±0.022
charcus	12	4–8	4–8	20–26	3.3–5.6	2.6–4.5	0.07–0.13	0.08–0.12
		6.0±1.1	6.0±1.1	23.7±2.8	4.45±0.61	3.58±0.49	0.11±0.016	0.10±0.013
chisoseus	72	2–7	2–7	13–31	2.7–4.9	2.2–3.8	0.06–0.11	0.06–0.14
		3.9±0.7	3.9±0.7	20.4±3.3	3.49±0.46	2.80±0.38	0.08±0.013	0.09±0.019
comstocki	4	3–5	3–5	20–23	2.9–3.8	2.2–2.9	0.09–0.11	0.06–0.13
		4.3±0.8	4.3±0.8	21.1±1.3	3.41±0.35	2.61±0.32	0.10±0.010	0.09±0.031
guatemalensis	1	5, 5	5, 5	41, 41	4.5	3.8	0.13	0.11
pristinus	30	5–17	2–9	16–47	2.5–5.8	1.9–4.7	0.07–0.17	0.05–0.12
		9.2±2.5	4.6±1.4	28.4±7.1	4.02±0.71	3.17±0.58	0.11±0.022	0.08±0.017
lynceus	7	4–9	2–4	8–19	2.3–3.2	1.9–2.5	0.08–0.12	0.02–0.11
		6.2±1.6	2.7±1.0	13.1±3.1	2.79±0.33	2.24±0.25	0.10±0.015	0.06±0.028

TABLE 1—(*Continued*)

	IITL	IITT	IIML	MKR	MKP	IFSL	IFSW
josephus	1.77–2.77	1.58–2.50	2.08–3.23	0.92–1.39	0.92–1.46	0.67–0.93	0.62–0.85
	2.34±0.35	2.01±0.30	2.75±0.41	1.14±0.15	1.19±0.17	0.80±0.11	0.76±0.09
rubrigularis	1.66–3.23	1.35–2.89	1.77–3.70	0.77–2.00	1.04–2.70	0.52–1.11	0.24–0.85
	2.42±0.49	2.21±0.55	2.75±0.58	1.48±0.49	1.93±0.47	0.80±0.17	0.56±0.16
mexicanus	1.96–3.31	1.66–3.20	2.19–3.39	1.00–1.69	1.54–2.46	0.63–1.22	0.44–1.11
	2.49±0.32	2.40±0.35	2.66±0.29	1.36±0.16	1.95±0.22	0.89±0.13	0.75±0.14
gertschi	1.16–2.08	0.81–1.77	1.31–2.27	0.73–1.16	0.92–1.62	0.37–0.59	0.30–0.56
	1.75	1.39	1.95	0.94	1.27	0.47	0.44
rothi	1.35–1.39	0.92–1.00	1.62–1.77	0.69	1.16	0.63	0.46–0.44
gus	1.31–1.89	0.92–1.46	1.27–2.00	0.73–1.08	0.96–1.46	0.56–0.89	0.22–0.44
	1.56±0.19	1.19±0.18	1.58±0.23	0.90±0.13	1.20±0.18	0.75±0.10	0.29±0.06
leones	1.42–1.62	1.04–1.23	1.27–1.42	0.78–0.92	0.89–1.04	0.52–0.67	0.22–0.28
	1.52±0.08	1.13±0.08	1.33±0.06	0.84±0.06	0.98±0.06	0.58±0.06	0.25±0.02
garnicus	1.77	1.50	1.85	1.39	1.39	0.63	0.30
carlos	1.23–2.54	0.69–1.69	1.31–2.85	0.65–1.58	0.92–2.00	0.81–1.89	0.19–0.41
	2.19±0.38	1.38±0.30	2.43±0.43	1.27±0.25	1.66±0.30	1.60±0.32	0.35±0.07
charcus	1.54–2.50	0.85–1.62	1.66–3.00	0.89–1.62	1.16–2.04	0.85–1.67	0.28–0.48
	2.12±0.27	1.24±0.20	2.42±0.35	1.37±0.19	1.75±0.23	1.37±0.23	0.40±0.07
chisoseus	1.19–2.19	0.69–1.42	1.39–2.58	0.65–1.19	0.92–1.62	0.63–1.33	0.19–0.37
	1.64±0.24	0.97±0.16	1.85±0.29	0.88±0.14	1.21±0.18	0.97±0.15	0.27±0.05
comstocki	1.31–1.54	0.69–0.92	1.46–1.73	0.81–1.00	1.00–1.23	0.81–1.00	0.22–0.30
	1.45±0.10	0.83±0.10	1.63±0.12	0.94±0.09	1.16±0.11	0.93±0.08	0.25±0.04
guatemalensis	2.08	1.27	2.43	1.23	1.62	1.37	0.30
pristinus	1.08–2.85	0.65–1.69	1.23–3.54	0.69–1.93	0.92–2.46	0.70–1.92	0.19–0.48
	1.93±0.37	1.10±0.21	2.21±0.44	1.19±0.23	1.57±0.30	1.21±0.27	0.29±0.07
lynceus	1.12–1.50	0.58–0.87	1.35–1.77	0.62–0.85	0.81–1.08	0.70–0.89	0.13–0.26
	1.35±0.13	0.71±0.11	1.59±0.16	0.75±0.09	0.97±0.10	0.82±0.08	0.19±0.04

TABLE 1—(*Continued*)

	IFL	PL	BD	IITT/ IITL*	IFLS/ IFL*	IFSW/ IFSL*	MKR/ IIML*	BD/ PL*
josephus	3.00–4.62	0.89–1.17	0.37–0.54	77–91	19–23	91–106	38–45	41–48
	3.85±0.56	1.04±0.11	0.46±0.06	86.0±5.3	21.5±1.8	96.5±5.7	41.5±2.9	44.0±2.5
rubrigularis	2.66–5.20	0.76–1.44	0.34–0.57	74–100	17–24	46–96	39–67	38–49
	3.96±0.80	1.13±0.21	0.49±0.07	90.1±6.9	21.0±1.9	70.4±14.4	53.6±8.8	43.4±3.42
mexicanus	3.08–5.24	0.98–1.31	0.41–0.65	84–103	19–27	70–100	44–54	41–49
	4.05±0.19	1.13±0.10	0.51±0.05	96.1±4.5	22.8±1.7	83.7±8.2	51.2±2.4	45.3±1.9
gertschi	1.89–3.31	0.67–0.96	0.27–0.41	70–85	15–22	73–115	41–56	40–48
	2.79	0.83	0.36	78.0	19.0	92.6	49.3	43.3
rothi	2.31–2.46	0.70–0.80	0.30–0.32	69–72	27–28	68–71	39–43	41–42
gus	2.08–2.93	0.61–0.81	0.26–0.33	63–81	26–38	31–50	54–64	41–47
	2.41±0.29	0.70±0.08	0.29±0.02	74.9±5.5	32.5±3.2	39.3±7.0	57.8±3.4	42.4±2.1
leones	2.08–2.35	0.63-0.68	0.28–0.31	73–76	25–30	41–47	61–65	43–46
	2.22±0.10	0.65±0.02	0.29±0.02	74.6±1.1	27.4±2.3	42.6±2.7	63.2±1.8	44.4±1.5
garnicus	2.85	0.76	0.33	85	23	47	75	44
carlos	1.93–4.00	0.59–1.20	0.27–0.47	56–68	44–53	18–26	50–56	36–45
	3.36±0.58	1.04±0.18	0.42±0.07	62.6±4.1	49.2±3.3	22.0±2.1	52.2±2.0	40.6±2.3
charcus	2.31–3.89	0.72–1.11	0.31–0.52	55–67	38–50	26–33	51–61	44–48
	3.23±0.45	0.95±0.11	0.43±0.06	58.8±3.1	44.0±3.6	29.2±1.8	56.4±2.7	45.9±1.3
chisoseus	1.96–3.39	0.61–1.00	0.26–0.42	51–67	30–48	21–37	41–53	36–45
	2.54±0.35	0.77±0.09	0.33±0.04	59.0±3.2	39.9±2.9	27.3±2.8	47.4±2.2	42.1±1.8
comstocki	2.12–2.58	0.57–0.65	0.30–0.32	53–62	41–49	23–30	55–60	48–52
	2.38±0.20	0.62±0.04	0.31±0.01	57.0±3.9	45.3±4.4	27.0±2.9	58.0±2.2	49.8±1.7
guatemalensis	3.43	1.11	0.44	61	40	22	51	40
pristinus	1.85–4.47	0.67–1.30	0.24–0.54	49–65	32–50	19–29	40–61	35–43
	3.09±0.55	0.97±0.15	0.39±0.06	57.3±3.7	40.6±3.8	24.2±2.4	53.5±5.0	40.5±2.0
lynceus	1.81–2.31	0.51–0.72	0.24–0.32	46–64	39–43	18–29	41–54	43–47
	2.10±0.20	0.62±0.07	0.28±0.03	52.7±6.8	40.6±1.4	23.4±3.7	47.6±4.3	45.1±1.3



Figs. 24–31. 24–26. Male *Euagrus chisoseus* Gertsch. **24.** Left tibia and metatarsus II, retrolateral view, showing measurement characters defined in text, 1.0 mm scale. **25, 26.** Left palpal organ, showing measurement characters defined in text, 0.5 mm scale. **25.** Retrolateral view. **26.** Ventral view. 27–31. Male *E. pristinus* O. P.-Cambridge. **27.** Left pedipalp, retrolateral view, 1.0 mm scale. **28–31.** Left palpal organ and cymbium, 0.5 mm scale. **28.** Dorsal view. **29.** Ventral view. **30.** Prolateral view. **31.** Retrolateral view.

tibia II with prominent ventral apophysis occupying proximal half to two-thirds of the article and with apex near midpoint of article; one or more long, thick, distally directed spines extending from apophysis apex; sometimes several to many smaller spines on proximal and/or distal slopes of apophysis and on ventral tibial surface distal of apophysis (figs. 24, 51–53). Male metatarsus II with two or three ventral keel-like projections (figs. 24, 51–53). Anterior face of abdomen with many long strong setae that curve dorsoposteriorly with contour of abdomen; similar, fairly large, semierect setae usually distributed less densely over abdominal dorsum. Two unsclerotized spermathecal trunks, one on each side, open into simple, shallow, slitlike bursa copulatrix just inside and dorsal to anterior gen-

TABLE 2
Quantitative Character Values for Adult Females of *Euagrus* Species
Character abbreviations defined in Methods section of text. Range, mean, and standard deviation given. CT and CD values include data from both left and right chelicerae. *E. cavernicola* specimen is a juvenile female. * Values of each ratio character have been multiplied by 100.

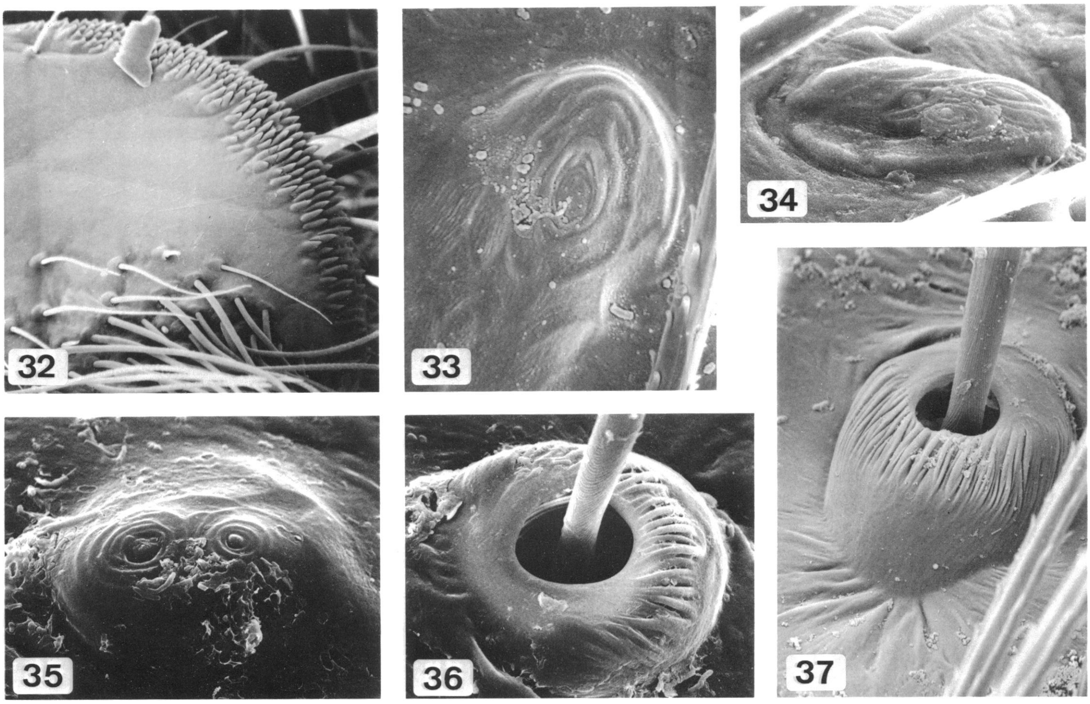
	N	CT	CD	LCTI	MCTI	ITarS	CL	CW
josephus	10	9–15 11.8±1.2	13–38 23.7±8.0	9–11 9.8±0.8	0–3 1.9±1.0	10–26 17.2±4.5	3.9–7.6 5.96±1.26	2.8–6.4 4.58±1.12
rubrigularis	16	11–14 12.0±0.9	17–54 30.9±10.3	9–12 10.3±0.9	1–3 2.4±0.6	11–25 16.4±3.9	3.9–7.9 6.00±1.19	3.0–6.3 4.69±1.0
mexicanus	20	11–15 12.0±1.0	7–32 18.2±6.2	9–13 10.8±1.0	0–3 2.1±1.0	13–21 16.7±2.2	4.6–9.2 7.31±1.19	3.5–7.6 5.86±1.04
gertschi	12	9–13 11.6±0.9	17–35 24.8±5.9	9–12 10.5±0.9	2–3 2.5±0.5	4–12 9.1±2.4	2.7–5.3 4.26±0.88	2.1–4.1 3.27±0.67
rothi	5	11–12 11.4±0.5	25–40 32.4±6.6	9–11 10.0±0.7	2–4 2.8±0.8	7–14 10.2±2.6	3.0–5.0 3.64±0.82	2.2–3.8 2.75±0.61
gus	20	10–14 11.9±1.0	14–37 22.0±6.6	8–11 9.4±0.8	1–2 1.7±0.4	4–12 7.9±2.0	3.0–6.4 4.30±0.87	2.3–5.0 3.24±0.70
leones	10	10–13 12.1±1.1	14–28 20.9±4.54	9–11 10.1±0.9	0–2 1.2±0.6	4–12 6.9±2.2	3.3–5.7 4.35±0.74	2.5–4.4 3.30±0.55
garnicus	2	12–14	28–34	10	1	7–8	4.1–5.3	3.0–3.9
anops	1	7–8	4–7	2	0	0	2.0	1.7
troglodyta	2	11–12	0–4	14–17	0	4	6.4–6.7	5.5–5.7
carlos	17	11–15 12.3±2.4	17–46 28.7±9.2	9–13 9.9±2.9	2–4 2.7±1.1	0–17 7.6±5.1	2.5–7.5 4.80±1.92	1.8–5.7 3.78±1.52
charcus	15	9–14 11.4±1.1	15–51 25.9±8.3	10–12 10.9±0.5	1–4 2.4±0.9	10–20 13.5±3.0	4.2–7.0 5.44±1.00	3.2–5.6 4.27±0.87
chisoseus	21	11–15 12.5±1.1	15–41 26.6±6.2	9–11 10.0±0.6	2–3 2.7±0.5	4–13 8.6±2.1	2.9–5.4 4.35±0.60	2.2–4.1 3.36±0.46
comstocki	7	10–14 12.1±1.1	13–25 18.4±3.5	9–11 10.1±0.7	2–3 2.9±0.4	7–9 7.4±0.8	3.1–4.4 3.93±0.45	2.2–3.4 2.96±0.40
guatemalensis	2	11–14	11–18	12–13	2	4	4.6–4.9	3.7–3.9
cavernicola	1	14–15	12–13	16	2	4	3.2	2.5
pristinus	25	11–17 13.2±1.4	15–38 26.7±5.5	10–13 11.3±1.0	1–4 2.4±0.7	2–19 8.1±3.7	2.8–6.9 5.20±1.00	2.3–5.4 4.05±0.80
luteus	7	12–15 13.6±3.7	15–22 19.1±2.0	13–19 14.0±2.2	1–3 2.6±0.8	2–5 3.4±1.0	3.5–5.2 4.20±0.60	2.7–3.9 3.23±0.49
lynceus	17	12–17 13.4±2.4	11–32 18.4±4.8	9–13 11.4±1.2	1–5 2.9±1.0	0–5 2.2±2.0	2.4–5.0 3.37±0.89	1.8–4.0 2.68±0.75
zacus	5	12–14 11.3±3.9	11–20 15.2±3.7	11–14 12.6±1.1	3–4 3.2±0.4	0–4 2.4±1.5	2.8–4.6 3.60±0.72	2.1–3.5 2.72±0.60

TABLE 2—(*Continued*)

	AMD	AMS	IFL	IFT	ITL	IML	ITarL
josephus	0.08–0.15	0.07–0.17	3.16–5.24	1.35–2.39	2.08–3.35	1.96–3.08	1.16–1.54
	0.12±0.019	0.11±0.027	4.06±0.69	1.74±0.34	2.66±0.41	2.47±0.37	1.36±0.15
rubrigularis	0.09–0.15	0.07–0.19	2.62–5.31	1.08–2.27	1.73–3.43	1.62–3.16	1.00–1.81
	0.12±0.017	0.13±0.037	3.96±0.79	1.68±0.38	2.55±0.48	2.36±0.44	1.39±0.23
mexicanus	0.10–0.19	0.11–0.20	3.08–6.35	1.35–2.70	1.93–3.85	1.85–3.54	1.16–2.00
	0.14±0.020	0.16±0.026	5.01±0.82	2.18±0.36	3.09±0.49	2.80±0.42	1.61±0.20
gertschi	0.07–0.13	0.06–0.14	1.77–3.54	0.73–1.46	1.16–2.23	1.04–2.08	0.69–1.23
	0.11±0.016	0.09±0.023	2.77±0.56	1.17±0.26	1.79±0.35	1.68±0.33	1.01±0.17
rothi	0.70–0.10	0.06–0.12	1.96–3.39	0.81–1.31	1.27–2.23	1.19–2.08	0.77–1.23
	0.09±0.012	0.08±0.026	2.44±0.59	0.96±0.21	1.59±0.40	1.52±0.36	0.95±0.19
gus	0.07–0.11	0.06–0.15	2.08–4.35	0.85–1.69	1.39–2.81	1.27–2.58	0.77–1.39
	0.09±0.011	0.10±0.021	2.83±0.61	1.18±0.25	1.84±0.40	1.71±0.37	1.04±0.16
leones	0.06–0.10	0.07–0.13	2.23–3.73	0.89–1.54	1.46–2.39	1.35–2.08	0.85–1.35
	0.08±0.014	0.11±0.018	2.83±0.46	1.14±0.19	1.85±0.30	1.67±0.24	1.04±0.15
garnicus	0.08–0.09	0.09–0.10	2.73–3.47	1.08–1.39	1.69–2.23	1.54–2.04	1.00–1.23
anops	—	—	2.16	0.46	1.93	2.00	1.19
troglodyta	—	—	6.81–7.39	1.35–1.46	6.01–6.85	6.01–6.55	3.70–4.04
carlos	0.07–0.17	0.08–0.20	1.69–4.93	0.62–2.00	1.08–3.35	1.00–3.12	0.69–1.77
	0.13±0.032	0.13±0.035	3.56±1.09	1.39±0.46	2.39±0.76	2.14±0.84	1.30±0.31
charcus	0.09–0.14	0.10–0.17	2.77–4.66	1.16–2.08	1.73–2.93	1.69–2.77	1.08–1.62
	0.12±0.018	0.13±0.021	3.40±1.06	1.42±0.45	2.30±0.36	2.21±0.35	1.28±0.17
chisoseus	0.07–0.11	0.07–0.16	1.85–3.47	0.77–1.46	1.23–2.39	1.16–2.35	0.77–1.27
	0.10±0.012	0.11±0.021	2.87±0.40	1.16±0.16	1.90±0.27	1.83±0.28	1.06±0.12
comstocki	0.08–0.10	0.07–0.13	1.93–2.89	0.85–1.19	1.23–1.85	1.16–1.69	0.73–1.00
	0.09±0.008	0.10±0.018	2.54±0.34	1.03±0.12	1.61±0.23	1.55±0.20	0.95±0.10
guatemalensis	0.13–0.15	0.12–0.13	3.08–3.31	1.16–1.27	2.00–2.16	2.00–2.16	1.23–1.31
cavernicola	—	—	3.00	0.73	2.50	2.39	1.58
pristinus	0.09–0.16	0.06–0.18	2.00–4.58	0.77–1.85	1.37–3.08	1.42–3.00	0.92–1.85
	0.12±0.019	0.11±0.025	3.54±0.65	1.36±0.28	2.40±0.43	2.41±0.41	1.44±0.22
luteus	0.06–0.11	0.08–0.13	2.85–4.39	0.85–1.16	2.16–3.47	2.08–3.35	1.31–2.04
	0.09±0.018	0.10±0.015	3.38±0.57	1.00±0.13	2.60±0.49	2.58±0.50	1.61±0.24
lynceus	0.07–0.16	0.06–0.16	1.54–3.93	0.62–1.19	1.04–2.85	1.00–3.00	0.69–1.77
	0.11±0.024	0.09±0.030	2.52±0.80	0.84±0.20	1.80±0.63	1.86±0.69	1.12±0.35
zacus	0.07–0.10	0.07–0.13	1.93–3.08	0.73–1.08	1.31–2.23	1.23–2.08	0.69–1.31
	0.08±0.013	0.09±0.021	2.42±0.48	0.86±0.15	1.68±0.39	1.60±0.35	0.96±0.21

TABLE 2—(*Continued*)

	LSL1	LSL2	LSL3	IFT/IFL*	ITL/CL*	LSL3/CL*	LSL3/LSL2*	AMD/CW*
jospheus	1.33–2.59	1.33–2.18	1.48–2.63	39–46	40–46	31–40	108–133	1.8–3.1
	2.00±0.39	1.76±0.33	2.09±0.39	42.7±1.9	43.0±2.1	36.9±2.8	119.0±7.9	2.29±0.45
rubrigularis	1.44–2.74	1.37–2.48	1.55–2.85	38–48	38–45	34–45	112–132	2.2–3.6
	1.97±0.39	1.85±0.38	2.15±0.40	43.0±2.5	42.6±2.1	37.9±3.1	117.0±7.1	2.79±0.37
mexicanus	1.74–3.15	1.59–2.89	1.67–3.52	41–45	40–44	34–43	104–137	2.1–3.3
	2.50±0.36	2.28±0.34	2.69±0.45	43.4±1.4	42.4±1.5	38.4±2.4	117.6±7.0	2.60±0.30
gertschi	0.96–1.92	0.85–1.85	1.00–2.07	40–45	40–45	35–42	94–133	2.9–4.3
	1.52±0.30	1.39±0.33	1.60±0.31	42.1±1.4	42.2±1.4	39.5±2.7	116.9±10.2	3.47±0.43
rothi	0.93–1.60	0.89–1.44	1.11–1.85	38–41	42–45	37–39	118–128	2.1–4.3
	1.23±0.25	1.12±0.23	1.34±0.44	39.6±1.1	43.4±1.3	38.0±1.0	123.7±5.1	2.92±0.92
gus	0.89–1.85	0.74–1.70	1.00–2.04	39–45	39–48	27–40	105–144	1.9–4.2
	1.28±0.23	1.10±0.26	1.34±0.25	41.8±1.9	42.9±2.5	33.2±3.6	123.1±10.8	2.90±0.48
leones	1.00–1.67	0.78–1.41	1.04–1.63	38–42	39–44	29–34	116–133	2.0–3.2
	1.27±0.19	1.05±0.21	1.30±0.20	40.4±1.3	42.5±1.4	31.2±1.6	124.3±6.4	2.63±0.40
garnicus	1.22–1.59	1.00–1.33	1.22–1.48	39–40	42	29–31	111–122	2.5–2.8
anops	0.74	0.74	0.78	21	96	40	105	—
troglodyta	2.63–2.74	2.52–2.81	2.85–3.07	20	94–102	46–48	109–113	—
carlos	0.85–2.70	0.74–2.52	0.85–3.03	34–42	37–53	35–49	108–137	2.3–4.3
	1.72±0.68	1.64±0.67	2.11±0.63	38.6±2.7	45.6±4.4	40.8±4.1	119.0±7.3	3.35±0.57
charcus	1.48–2.33	1.22–2.07	1.44–2.66	39–45	39–46	33–40	110–129	2.5–3.4
	1.82±0.33	1.60±0.30	1.89±0.38	42.3±1.7	42.5±2.0	36.6±2.2	118.6±6.0	2.92±0.31
chisoseus	0.96–1.89	0.91–1.81	1.04–1.89	38–42	40–47	34–43	100–126	2.4–3.7
	1.52±0.25	1.43±0.21	1.57±0.23	40.4±1.2	43.7±1.9	37.9±2.3	110.9±6.1	3.03±0.34
comstocki	1.07–1.52	0.91–1.52	1.11–1.48	37–44	36–42	30–38	86–114	2.8–4.0
	1.38±0.16	1.26±0.21	1.35±0.19	40.7±2.4	40.7±2.2	34.3±3.2	102.5±10.2	3.31±0.35
guatemalensis	1.26–1.33	0.93–1.11	1.67–1.92	38	43–44	38–41	173–180	3.6–4.0
cavernicola	1.74	1.74	2.04	24	78	66	117	—
pristinus	1.30–2.15	1.18–2.11	1.78–3.70	32–41	40–60	41–65	143–192	2.3–4.2
	1.76±0.26	1.64±0.28	2.70±0.58	38.4±1.8	46.3±3.9	53.3±7.2	164.9±14.4	3.19±0.43
luteus	1.41–2.41	1.85–2.33	2.29–3.33	27–32	54–67	63–80	124–150	2.0–3.4
	1.82±0.42	2.13	2.81	29.9±1.9	61.4±4.0	71.5	137.0	2.81±0.46
lynceus	0.78–2.22	0.70–2.22	0.91–3.48	27–40	44–67	37–74	123–175	3.4–6.3
	1.29±0.43	1.19±0.47	1.71±0.82	34.0±3.9	52.4±6.9	54.4±13.3	143.6±14.9	4.41±0.67
zacus	0.96–1.63	0.81–1.44	1.07–2.48	34–38	44–48	39–56	126–172	2.9–3.7
	1.23±0.30	1.08±0.28	1.67±0.61	35.8±1.6	46.4±1.5	47.0±8.3	150.8±18.1	3.24±0.32



Figs. 32–37. **32.** Serrula of female *Euagrus pristinus* O. P.-Cambridge, 140×. 33–35. Tarsal organ of female. **33.** *E. pristinus* O. P.-Cambridge, 1215×. **34.** *E. gus,* new species, 1110×. **35.** *E. carlos,* new species, 1315×. **36,** **37.** Trichobothrial base on tarsus I of female. **36.** *E. carlos,* new species, 1465×. **37.** *E. mexicanus* Ausserer, 1020×.

ital lip; two or more partly or fully sclerotized stalks, each terminating in an unsclerotized bulb, open into each trunk (fig. 59). Four spinnerets (figs. 15–18); median pair short, unsegmented, without crescent-shaped sclerite at base; lateral pair long (80–170% of CL; usually about equal to CL), with terminal article equal to (occasionally), or (much more commonly) slightly to markedly longer than, basal article, and with middle article slightly shorter than basal; terminal article either nearly untapered, nonflexible, and with relatively smooth cuticle (figs. 16, 18), or flexible and tapering markedly and gradually, with irregular weakly sclerotized constrictions throughout distal half to three-fourths its length (figs. 15, 17). Only one type of spigot on all spinnerets (figs. 44–50); inflated bulbous base with longitudinal puckers and folds; long slender shaft (gently curved distally) with surface of overlapping scalelike folds sculpted with parallel longitudinal ridges; tip constricted and slightly bent, marked with parallel ridges, and with a circular opening. Form and histochemistry of silk glands described by Palmer (1985).

Misplaced Species: As I have previously demonstrated (Coyle, 1984), *Evagrus atropurpureus* Purcell (1903) is neither a species of *Euagrus* nor of *Allothele.* Both *Evagrus caffer* Pocock (1902) and *Evagrus regnardi* Benoit (1964) are species of *Allothele* (Coyle, 1984). The holotype of *Euagrus formosanus* Saito (1933), a female, was apparently "lost in Hokkaido during World War II" (T. Yaginuma, personal commun.). The published description and illustrations are not very informative (there is no information on the spermathecae), but are sufficient to show that this spider is not a species of *Euagrus* (its carapace was hairless, its anterior eyes formed a straight row, "strong spines" were present on the base of the maxilla and on the apex of the labium, and the sternum was "nearly square").

TABLE 3
Quantitative Character Values for Type Specimens of *Euagrus* Species
Holotypes and lectotypes only. Character abbreviations defined in Methods section.

	IITS	IITAS	ITS	CL	CW	AMD	AMS	IITL	IITT	IIML	MKR
josephus	18, 19	6, 5	50, 57	5.6	4.3	0.11	0.12	2.54	1.96	3.00	1.16
mexicanus	40, –	9, –	66, 65	6.3	5.3	0.16	0.10	2.93	2.85	3.00	1.58
gertschi	18, 11	9, 8	38, 35	5.1	4.0	0.12	0.09	2.08	1.77	2.27	1.16
rothi	11, 14	5, 7	32, 33	3.2	2.5	0.07	0.07	1.35	0.92	1.62	0.69
gus	7, 8	7, 8	48, 40	3.5	2.7	0.08	0.06	1.54	1.19	1.58	0.89
leones	4, 4	4, 4	33, 34	3.3	2.7	0.08	0.08	1.54	1.16	1.35	0.85
garnicus	3, –	3, –	29, 33	4.2	3.5	0.08	0.10	1.77	1.50	1.85	1.39
carlos	8, 7	8, 7	28, 27	5.2	4.3	0.15	0.11	2.46	1.62	2.73	1.42
charcus	7, 6	7, 6	25, 26	4.4	3.5	0.11	0.10	2.00	1.16	2.31	1.35
chisoseus	5, 4	5, 4	–, 22	3.5	2.8	0.10	0.06	1.73	0.92	2.08	0.85
comstocki	3, –	3, –	20, 21	3.8	2.9	0.11	0.07	1.54	0.85	1.73	1.00
guatemalensis	5, 5	5, 5	41, 41	4.5	3.8	0.13	0.11	2.08	1.27	2.43	1.23
pristinus	12, –	5, –	24, 27	4.2	3.4	–	–	2.16	1.16	2.39	1.23
lynceus	6, 5	2, 2	15, 15	2.9	2.4	0.08	0.11	1.35	0.81	1.58	0.85
	CT	CD	LCTI	MCTI	ITarS	CL	CW	AMD	AMS	IFL	IFT
rubrigularis	12, 13	52, 54	10	2	15	7.3	5.7	0.15	0.15	4.62	2.23
anops	7, 8	7, 4	2	0	0	2.0	1.7	–	–	2.16	0.46
troglodyta	11, 12	4, 3	14	0	4	6.4	5.5	–	–	6.81	1.35
cavernicola	14, 15	12, 13	16	2	4	3.2	2.5	–	–	3.00	0.73
luteus	12, 14	20, 18	14	3	3	3.8	2.8	0.07	0.09	3.08	0.89
zacus	13, 12	17, 15	12	4	4	4.6	3.5	0.10	0.13	3.08	1.08

KEY TO *EUAGRUS* SPECIES

1. Eyeless troglobites (males unknown) 2
   Eight eyes present 4
2. Metatarsus I with preening combs; proportionally long and markedly tapering terminal article on lateral spinneret [LSL3(100)/CL = 66]; many cheliceral denticles (CD = 12, 13); caves in Sierra de Guatemala, Tamaulipas, Mexico (map 4) .... *cavernicola*
   No preening combs; terminal lateral spinneret article proportionally not as long [LSL3 (100)/CL = 40–48] or as strongly tapered; fewer cheliceral denticles (CD = 0–7); caves in southeastern San Luis Potosí, Mexico (map 4) 3
3. Large body (CL = 6.4, 6.7); strongly elevated pars cephalica (fig. 16); LCTI = 14, 17; median and lateral spermathecal stalks about equal in length and diameter (figs. 192, 193) .... *troglodyta*
   Small body (CL = 2.0); pars cephalica weakly elevated; LCTI = 2; median spermathecal stalk much longer and narrower than lateral stalk (fig. 191) .... *anops*
4. Males (those of *luteus* and *zacus* unknown) 5
   Females 19
5. No spines on distal face of tibia II apophysis or distal of apophysis (figs. 223, 263) .. 6
   Spines present on distal face of tibia II apophysis (and may also occur distal of apophysis) (figs. 51, 136) 8
6. Preening combs on metatarsus II (fig. 264); tip of embolus curves upward (fig. 265); ITM = 41 .... *guatemalensis*
   No preening combs; tip of embolus curves downward (figs. 229, 237); ITM = 13–31 7
7. Embolus proportionally longer [BD(100)/PL = 36–45], less strongly curved in lateral view, and more sinuous in ventral view (figs. 229–241); metatarsus II keels less distal [MKR(100)/IIML = 41–53] (figs. 223–226) .... *chisoseus*
   Embolus proportionally shorter [BD(100)/PL = 48–52], more strongly curved in lateral view, and straighter in ventral view (figs. 253, 254); metatarsus II keels more distal [MKR(100)/IML = 55–60] (fig. 252) .... *comstocki*

TABLE 3—(*Continued*)

MKP	IFSL	IFSW	IFL	PL	BD
1.16	0.81	0.74	4.00	1.11	0.46
2.16	1.11	0.81	4.70	1.28	0.61
1.62	0.48	0.56	3.31	0.96	0.41
1.16	0.63	0.46	2.31	0.70	0.30
1.16	0.70	0.31	2.39	0.70	0.29
1.00	0.56	0.26	2.27	0.67	0.29
1.39	0.63	0.30	2.85	0.76	0.33
1.85	1.89	0.39	3.81	1.17	0.47
1.77	1.52	0.44	3.16	0.87	0.40
1.19	0.93	0.22	2.58	0.83	0.31
1.23	1.00	0.30	2.58	0.65	0.32
1.62	1.37	0.30	3.43	1.11	0.44
1.62	1.30	0.37	3.16	1.02	0.43
1.08	0.85	0.20	2.08	0.59	0.26
ITL	IML	ITarL	LSL1	LSL2	LSL3
2.77	2.54	1.54	—	—	—
1.93	2.00	1.19	0.74	0.74	0.78
6.01	6.01	3.70	2.63	2.52	2.85
2.50	2.39	1.58	1.74	1.74	2.04
2.35	2.39	1.54	1.60	1.85	2.29
2.23	2.08	1.31	1.63	1.44	2.48

8. Spines present only on tibia II apophysis (including distal face of apophysis) but never distal of apophysis (figs. 136–140, 194–196) 9

   Spines present distal of apophysis (figs. 51–53, 271, 272) 13

9. Femur I spinule patch elongate [IFSL(100)/IFL = 38–53] [IFSW(100)/IFSL = 18–33]; prolateral surface of tibia II with many spinose hairs; tibia II apophysis only moderately large [IITT(100)/IITL = 55–68] (figs. 194–196, 207, 208) 10

   Femur I spinule patch not so elongate [IFSL(100)/IFL = 23–38] [IFSW(100)/IFSL = 31–50]; no spinose hairs on prolateral surface of tibia II; tibia II apophysis proportionally larger [IITT(100)/IITL = 63–85] (figs. 136–140) 11

10. All spines on distal face of tibia II apophysis are gradually tapered to long very sharp tips (figs. 207–209); small subapical spine on median face of prolateral keel of metatarsus II (figs. 207–209); no spine attached medial to and at the proximal end of the retrolateral keel of metatarsus II (figs. 207–209) .... *charcus*

    All spines on distal face of tibia II apophysis are abruptly tapered at tips, almost blunt (figs. 194–196); no spine on median face of prolateral keel of metatarsus II (figs. 194–196); prominent spine attached medial to and at proximal end of retrolateral keel of metatarsus II (figs. 194–196) ..... *carlos*

11. Retrolateral keel of metatarsus II relatively high, with an angular apex relatively close to metatarsus midpoint [MKR(100)/IIML = 54–64], and does not hide prolateral keel in retrolateral view (figs. 136, 138); prolateral keel relatively tall, not distally truncate, and not joined to retrolateral keel by transverse ridge (figs. 136–138) .. *gus*

    Retrolateral keel hides prolateral keel in retrolateral view and is joined distally to the prolateral keel by a high, transverse ridge (figs. 176, 177, 185, 186) 12

12. Retrolateral keel very high, thin, rounded in profile, and distally truncate (fig. 176); apex of keel not much distal of metatarsus midpoint [MKR(100)/IIML = 61–65) ... . *leones*

    Retrolateral keel relatively low and thick with apex at its distal end (fig. 185); apex of keel far distal of metatarsus midpoint [MKR(100)/IIML = 75] .... *garnicus*

13. Tibia II apophysis relatively small with gently sloping distal face (figs. 271–274, 301–304); preening combs present on metatarsus II (fig. 272); femur I spinule patch long and narrow [IFSW(100)/IFSL = 18–29]; embolus relatively narrow at base so that bulb-embolus junction distinct (figs. 275–285, 305–308) 14

    Tibia II protuberance large with strongly sloping distal face (figs. 51–53, 129, 130); no preening combs on metatarsus II; femur I spinule patch short and wide [IFSW(100)/IFSL = 46–115]; embolus basally broad and narrows only gradually so that bulb-embolus junction indistinct (figs. 54–58, 131, 132) 15

14. Abdominal dorsum without prominent transverse light markings (fig. 3); no retrolateral preening comb on metatarsus II; palpal organ rather elongate [BD(100)/PL = 35–43] (figs. 275–285); body size usually larger (CL = 2.5–5.8) .... *pristinus*

    Abdominal dorsum with prominent transverse light markings (figs. 309, 310); retrolateral preening comb present on metatarsus II; palpal organ not as elongate [BD(100)/PL = 43–47] (figs. 305–308); body size usually smaller (CL = 2.3–3.2) .... *lynceus*

15. Metatarsus II with median keel (figs. 51–53, 65, 66, 73–75) 16

Metatarsus II without median keel (figs. 100–102) 17

16. Prolateral keel of metatarsus II at or proximal of metatarsus midpoint [MKP(100)/IIML = 38–48] (fig. 52); prolateral keel low, thick, short (almost knoblike), and transversely oriented (fig. 52) .... *josephus*

Prolateral keel of metatarsus II distal of metatarsus midpoint [MKP(100)/IIML = 59–81] (figs. 66, 74, 77); prolateral keel longer and not transversely oriented (figs. 66, 74, 77) .... *rubrigularis*

17. Tibia II apophysis proportionally long [IITT(100)/IITL = 84–103] and apically slender (figs. 100–102); large spine on retrolateral surface of tibia II apophysis well separated from apical spine(s) (figs. 100, 102); ridges on palpal organ widely separated (figs. 103–105); carapace usually with very dense covering of silver-gold hairs (figs. 5, 6) .... *mexicanus*

Tibia II apophysis proportionally shorter [IITT(100)/IITL = 69–85] and apically thicker (figs. 114, 115, 129, 130); large spine on retrolateral surface of tibia II apophysis very close to apical spine(s) (figs. 114, 129); palpal organ ridges close together (figs. 116, 117, 131, 132); carapace without silver-gold pilosity 18

18. Retrolateral keel of metatarsus II weak and prolateral keel relatively tall (figs. 129, 130); distal part of embolus curves strongly downward (fig. 131); IFSL(100)/IFL = 27–28 .... *rothi*

Retrolateral keel of metatarsus II prominent and prolateral keel only moderately tall (figs. 114, 115); distal part of embolus with weak downward curve (fig. 116); IFSL(100)/IFL = 15–22 .... *gertschi*

19. Terminal article of lateral spinneret usually relatively long [LSL3(100)/CL = 37–80] [LSL3(100)/LSL2 = 123–192], always tapered, and always with irregular constrictions along its distal one-half to three-fourths which cause it to be flexible (figs. 15, 17); preening combs present on metatarsus I 20

Terminal article of lateral spinneret proportionally short [LSL3(100)/CL = 27–49] [LSL3(100/LSL2 = 86–144], relatively thick, without constrictions, and therefore not flexible (figs. 6, 18); no preening combs 24

20. The *combined* presence of prominent, light, paired, transverse markings on the abdominal dorsum (figs. 311, 321) *and* a very short, straight, primary lateral spermathecal stalk that is much shorter than the median stalk (figs. 312, 326) 21

Abdominal dorsum without prominent light markings, *or,* if these are present, the primary lateral spermathecal stalk is not nearly as short as above (figs. 268, 269) .. 22

21. Two (rarely one) straight median spermathecal stalks (figs. 322–326); anterior median eyes proportionally small [AMD(100)/CW = 2.9–3.7] .... *zacus*

One sinuous or coiled median spermathecal stalk (figs. 312–320); anterior median eyes usually proportionally larger [AMD(100)/CW = 3.4–6.3] .... *lynceus*

22. Femur I relatively slender [IFT(100)/IFL = 27–32]; two spermathecal stalks, lateral stalk very short (figs. 299, 300) .... *luteus*

Femur I not as slender [IFT(100)/IFL = 32–41]; often more than two spermathecal stalks, but if only two then lateral stalk usually not very short (figs. 268, 269, 287, 289, 290) 23

23. Two spermathecal stalks on relatively narrow trunk (figs. 268, 269) ..... *guatemalensis*

Usually more than two spermathecal stalks (figs. 286–297); if only two, these are attached to a relatively wide trunk (figs. 287, 289, 290) .... *pristinus*

24. Four or more long foveal setae (fig. 148) 25

Only two (rarely three) foveal setae (fig. 15) 26

25. Lateral spermathecal bulbs very reduced (figs. 189, 190) .... *garnicus*

Lateral spermathecal bulbs much larger (figs. 149–172, 178–184); I have found no characters which separate the females of these two species .... *gus* and *leones*

26. Carapace covered with dense silver-gold pilosity (fig. 6); south-central Mexico (map 1); spermathecae as in figs. 106–112 .... *mexicanus*

Carapace not as hairy and not appearing silver-gold 27

27. Primary lateral spermathecal stalk nearly straight, long, and at least slightly wider than primary median stalk (figs. 133–135, 201–206, 215–222) 28

Primary lateral stalk crooked, sinuous, looped, not long, or not wider than primary median stalk 30

28. Primary lateral spermathecal stalk unsclerotized (figs. 133–135); southern Arizona .. .. *rothi*

Primary lateral spermathecal stalk sclerotized at least distally at base of bulb (figs. 201–206, 215–222); Mexico south to Costa Rica 29

29. Primary lateral spermathecal bulb never elongate, usually broader than long, and strongly constricted at its base (figs. 215–222);

lateral stalk unsclerotized except distally at base of bulb .... *charcus*
Primary lateral spermathecal bulb often quite elongate, always longer than broad, and unconstricted or only weakly constricted at its base (figs. 201–206); lateral stalk sclerotized for one-third or more of its length .... *carlos*
30. Southwestern United States and adjacent northern edge of Mexico 31
Mexico 32
31. Median spermathecal stalk relatively short and sinuous or weakly looped (figs. 256–269); spermathecal trunk usually as wide as long; tibia I proportionally short [ITL(100)/CL = 36–42]; extreme southern Texas (map 2) . ... *comstocki*
Median spermathecal stalk usually longer and more strongly looped (figs. 242–251); spermathecal trunk usually clearly longer than wide; tibia I usually proportionally longer [ITL(100)/CL = 40–47]; central Texas west to southeastern Arizona and adjacent Mexico (map 2) .... *chisoseus*
32. Relatively long and narrow spermathecal trunk; slender primary lateral stalk that is sclerotized throughout its length (figs. 118–128); ITarM = 4–12 .... *gertschi*
Proportionally shorter and wide spermathecal trunk; wider primary lateral stalk not as slender as above and not sclerotized for its full length, or if it is sclerotized for full length, then its bulb is apically flattened (figs. 59–64, 78–97); ITarM = 10–26 33
33. Baja California and adjacent islands (map 1) .... *josephus*
Mainland Mexico (map 1) .... *rubrigularis*

Euagrus josephus Chamberlin
Figures 51–64; Map 1

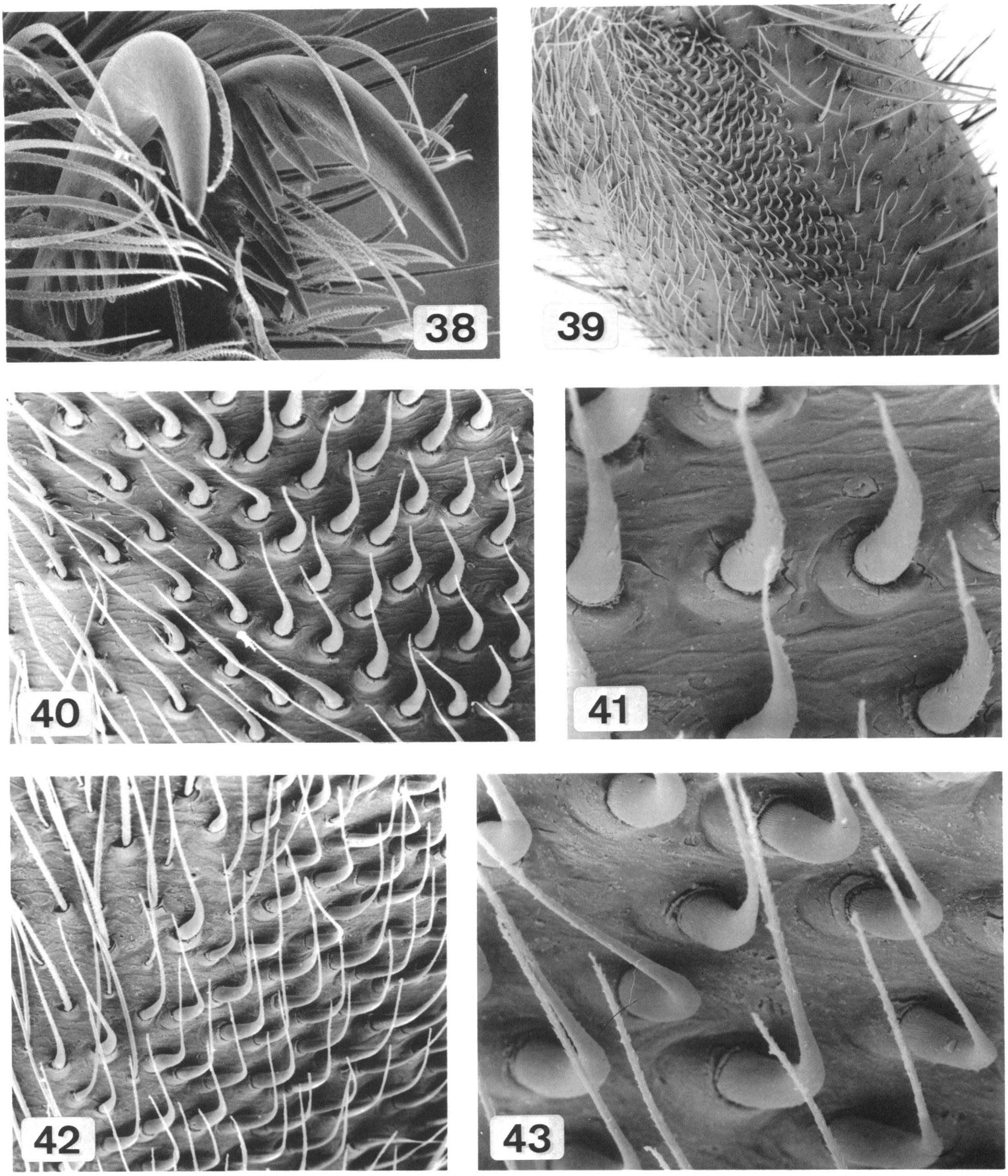
Evagrus josephus Chamberlin, 1924: 577, figs. 2–3 (male holotype and juvenile paratype from Tortuga Island, Gulf of California, Baja California Sur, Mexico, and male paratype from Ballena Island, Gulf of California, Baja California Sur, Mexico, in MCZ, examined).

Evagrus empiricus Chamberlin, 1924: 576 (female holotype from Mulege, Baja California Sur, Mexico, in MCZ, examined). NEW SYNONYMY.

Evagrus scepticus Chamberlin, 1924: 578 (male holotype and one female and two juvenile paratypes from San Marcos Island, Gulf of California, Baja California Sur, Mexico, in MCZ, examined). NEW SYNONYMY.

DIAGNOSIS: Males of *E. josephus* can be distinguished from males of all other *Euagrus* species except the close relative, *E. rubrigularis,* by the presence of a median keel on metatarsus II (figs. 51–53). The position of the *E. josephus* prolateral metatarsus II keel at or proximal to the metatarsus II midpoint [MKP(100)/IIML = 38–48; fig. 52] and the low, thick, short (almost knoblike), transversely oriented form of this keel distinguish *E. josephus* males from *E. rubrigularis* males, with their more distal [MKP(100)/IIML = 59–81; figs. 66, 74, 77], longer, and nontransverse prolateral metatarsus II keel. *E. josephus* females are so similar to those of *E. rubrigularis* that they can be readily distinguished only on the basis of geography; *E. josephus* is restricted to, and the only *Euagrus* species known from, Baja California (map 1). In nearly all *E. josephus* females the bulb on the primary lateral spermathecal stalk is broad and apically flattened (figs. 59–64); except in Sonora and Chihuahua, *E. rubrigularis* females rarely possess this character state (figs. 78–97).

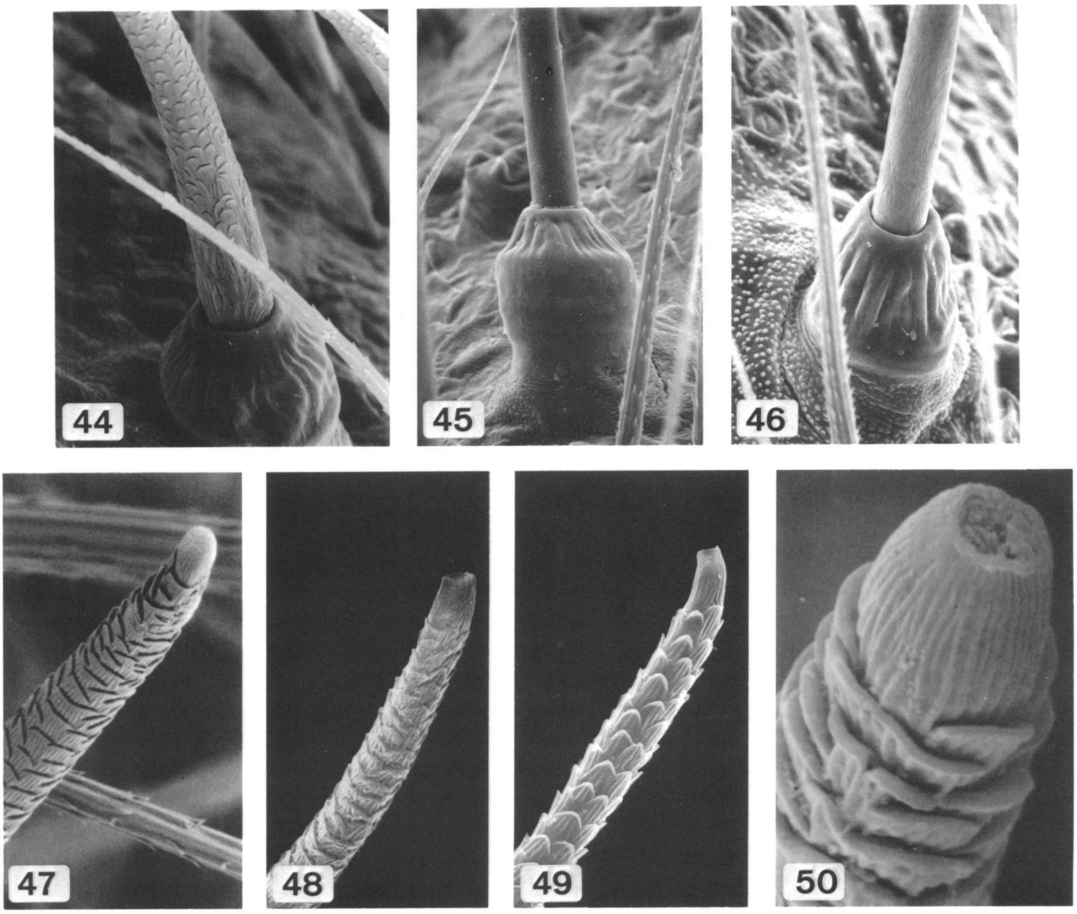
MALES: Tables 1 and 3. Palpus (figs. 54–58) with relatively large-diameter bulb tapering gradually into proximally broad embolus that tapers gradually toward tip; sometimes a slight proximal keel-like protuberance on retrolateral aspect of ventral surface of embolus (fig. 57); prominent, close-spaced ridges on proximal half to two-thirds of embolus; distal third of embolus with moderate (fig. 54) to strong (figs. 56, 58) ventrally directed curvature. Tibia II (figs. 51–53) with very large ventral apophysis with 2 long, very thick, subequal apical spines, occasionally one moderately large subapical retrolateral spine, and one moderately large spine on retrolateral face of apophysis; a few short stout spines on distal face of apophysis; cluster of several to many short stout spines on retrolateral aspect of ventral surface of tibia distal to apophysis, the most retrolateral of these attached to a strong cuticular ridge. Metatarsus II (figs. 51–53) with a prominent, relatively high, and fairly thin median keel, a very low thick retrolateral keel, and a low, thick, short, and mostly transverse (almost knoblike) prolateral keel; all keels about equidistant from proximal end of metatarsus and proximal of midpoint; no preening combs. Femur I spinule patch short and wide; spinules short, stout, and very closely spaced. Fovea moderately deep to deep, round to elongate-tri-



Figs. 38–43. **38.** Lateral claws of leg I, *Euagrus gus*, new species, 285×. 39–43. Male femur spinule patches, *E. chisoseus* Gertsch. **39.** Entire patch, femur II, 45×. **40, 41.** Portion of femur II patch, 180×, 575×. **42, 43.** Portion of femur I patch, 180×, 575×.

angular. Carapace with moderately dense covering of fine, semirecumbent, light brown setae. Carapace light yellow-brown to chestnut brown. Chelicerae, pedipalps, and legs like carapace or slightly darker. Abdominal dorsum light brown to darker purple-brown.

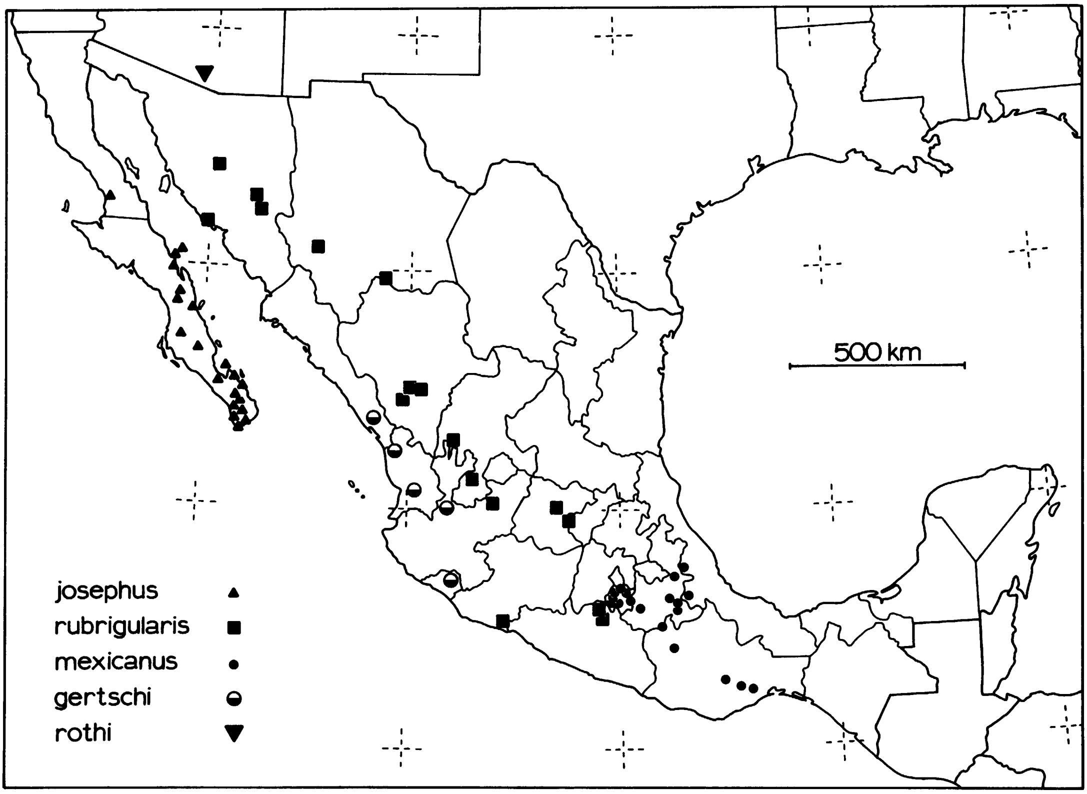
FEMALES: Table 2. Two primary spermathecal stalks on each side (figs. 59–64). Median stalk long; distal part sclerotized and weakly to strongly sinuous or looped; bulb slightly to markedly elongate. Lateral stalk short to moderately long; most or all of stalk



Figs. 44–50. Spigots, *Euagrus* females, lateral spinneret. 44–46. Spigot base. **44.** *E. mexicanus* Ausserer, 855×. **45.** *E. carlos,* new species, 990×. **46.** *E. gus,* new species, 1305×. 47–50. Spigot tips. **47.** *E. mexicanus* Ausserer, 1615×. **48.** *E. carlos,* new species, 2870×. **49.** *E. gus,* new species, 3545×. **50.** *E. chisoseus* Gertsch, 7300×.

and usually base of bulb well sclerotized; straight to slightly sinuous; bulb almost always flattened apically, rarely oval. Trunk varies from as long as broad to nearly twice as long as broad. One to four smaller secondary stalks/bulbs attached to trunk and occasionally to the median stalk; rarely a secondary bulb on median side of median stalk has a large sclerotized stalk (fig. 60). Anterior genital lip unsclerotized or weakly sclerotized. No metatarsus I preening combs. Fovea moderately deep to deep; circular to triangular. Carapace with moderately dense covering of slender, semirecumbent, pale to light brown setae. Carapace orange-tan to dark chestnut brown. Chelicerae slightly darker than, pedipalps and legs similar to, carapace. Abdominal dorsum light gray-brown to dark purple-brown; rarely a few pairs of small, faint, light transverse marks.

REMARKS: Unfortunately, the holotype male of *E. scepticus* Chamberlin is missing all legs I and II. However, all of its remaining character states fall within the rather narrow range of variation of the other six males I have assigned to *E. josephus.* Likewise, the holotype female of *E. empiricus* Chamberlin is similar in spermathecal form and other characters to the *E. scepticus* paratype and the other *Euagrus* females from Baja California. Since all three synonyms were first published in the same paper (Chamberlin, 1924), I have designated as having priority the one that will result in the most stability;

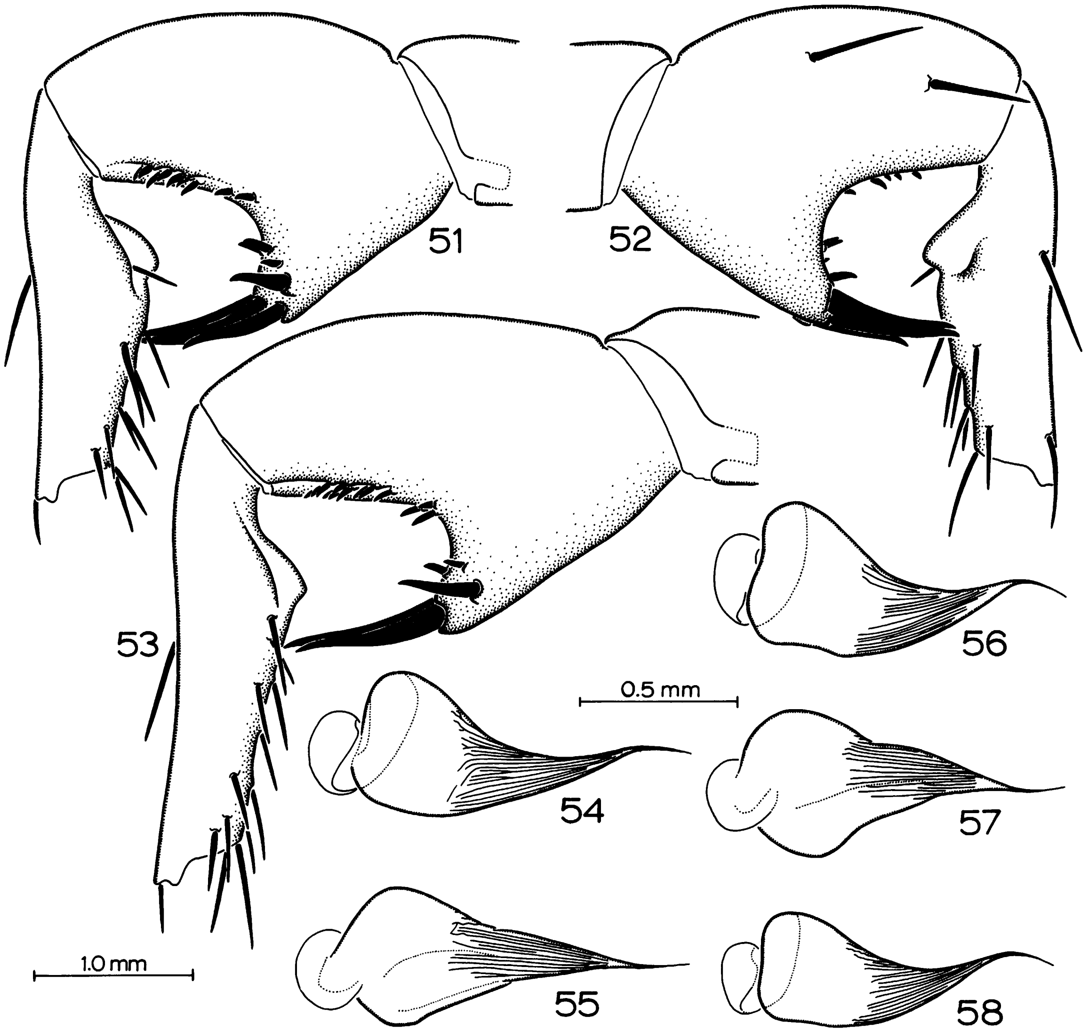


Map 1. Mexico and southern United States, showing distribution of *Euagrus josephus* Chamberlin, *E. rubrigularis* Simon, *E. mexicanus* Ausserer, *E. gertschi*, new species, and *E. rothi*, new species.

this is *E. josephus*, which is based on a holotype male with all of its appendages intact.

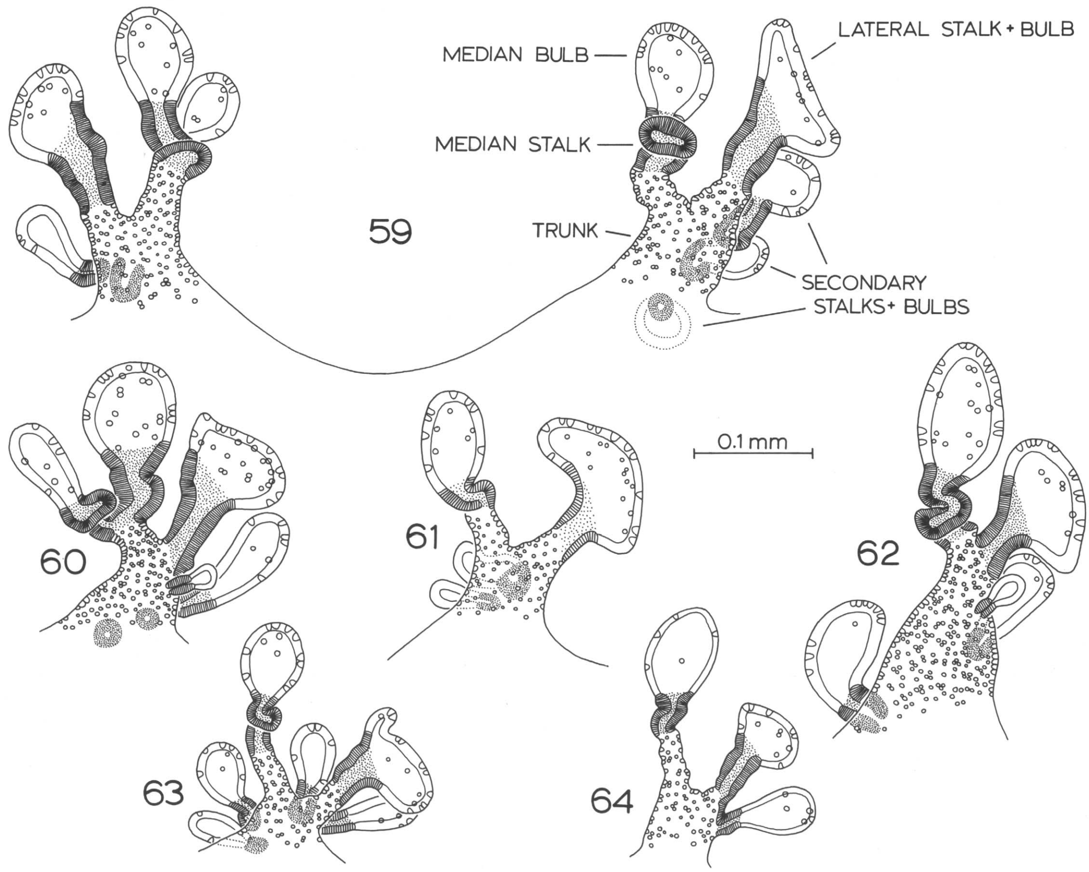
DISTRIBUTION: Southern half of the Mexican peninsula of Baja California and adjacent islands (map 1).

MATERIAL EXAMINED (Since considerable evidence indicates that *E. josephus* is the only *Euagrus* species in Baja California, I have included some records based only on juveniles.): MEXICO: **Baja California Norte:** 34 mi NNW Manuela, elev. 500 ft, June 22, 1968 (Williams, Cazier, Bentzien, Fox, Bigelow; CAS), 1♀. **Baja California Sur:** Ballena Island, near Isla Espíritu Santo, June 9, 1921 (J. Chamberlin, MCZ), 1♂ (paratype); Boca de la Sierra, near Miraflores, 23°20'N, 109°45'W, Feb. 10, 1966 (V. Roth, AMNH), juvs.; Cabo San Lucas, Mar. 16, 1953 (J. Figg, Hoblyn; AMNH), juv., Feb. 5–8, 1966 (V. Roth, AMNH), juv.; 10–12 mi N Cabo San Lucas, Feb. 6, 1966 (V. Roth, AMNH), 1♀, juv.; 12 mi N and E Cabo San Lucas, in palm oasis, Feb. 7, 1966 (V. Roth, AMNH), 3♀, juvs.; 3 mi S Colonia Calles, 23°15'N, 110°30'W, Feb. 5, 1966 (V. Roth, AMNH), 1♀, juvs.; El Triunfo, S La Paz, Feb. 3, 1965 (V. Roth, AMNH), 1♀, juvs.; 3 mi W El Triunfo, 23°45'N, 110°W, Feb. 11, 1966 (V. Roth, AMNH), juvs.; Isla Magdalena, Bahía Santa María, 1.5 km N Punta Hughes at Smart Peak, July 9, 1983 (D. Weissman, V. Lee; CAS), juv.; La Laguna, Nov. 4, 1944 (M. Correa, AMNH), 1♀, juvs.; La Laguna, Sierra Laguna, Oct. 14, 1941 (Ross, Bohart; CAS), 2♀, juvs.; La Paz, Jan. 31, 1965 (V. Roth, AMNH), juv.; E of La Paz, near Las Cruces, Arroyo Saltito, Jan. 23, 1959 (H. Leech, CAS), juvs.; 40 km N La Paz on rt. 1, May 14, 1977 (R. Seib, CAS), 1♂; 230 km N La Paz, *Neotoma* 8460, July 10, 1957 (Ryckman and Spencer, AMNH), juv.; 36.4 mi S La Paz on road to Todos Santos, Dec. 24, 1958 (H. Leech, CAS), 1♀; Las Lagunitas, 15 mi ESE El Crucero, 25°N, 111°20'W, Feb. 14, 1966



Figs. 51–58. *Euagrus josephus* Chamberlin, males. 51–53. Tibia and metatarsus II. 51, 52. San Vicotia, B. Calif. Sur. **51.** Retrolateral view. **52.** Prolateral view. **53.** Holotype, retrolateral view. 54–58. Palpal organ. 54, 55. Holotype. **54.** Retrolateral view. **55.** Ventral view. 56, 57. San Vicotia, B. Calif. Sur. **56.** Retrolateral view. **57.** Ventral view. **58.** E Todos Santos, B. Calif. Sur, retrolateral view.

(AMNH), 3♀, juv.; 8 mi S Loreto, base of La Giganta, Jan. 27, 1965 (V. Roth, AMNH), juv.; 12 mi S Loreto, Rancho de Parras, Jan. 29, 1965 (V. Roth, AMNH), juv.; 8.8 mi NE Los Planes, junc. of Punta Arena and Bahía de los Muertos roads, Dec. 20, 1958 (A. Leviton, CAS), juvs.; Mission San Luis Gonzaga, 25°N, 111°W, Feb. 14, 1966 (V. Roth, AMNH), 1♀, juv.; 5 mi W Mission San Luis Gonzaga, Feb. 14, 1966 (V. Roth, AMNH), 1 ♀; Mulege, May 14, 1921 (J. Chamberlin, MCZ), 1♀ (*E. empiricus* holotype); 3 mi NW San Antonio, thorn forest, Dec. 13, 1977 (C. Griswold, L. Vincent; UCB), 1♂ (collected in web under rock and molted to adult June 1–10, 1978), 1♀; San Ignacio Mission, Jan. 21–25, 1965 (V. Roth, AMNH), juvs.; San José del Cabo, 1896 (N. Banks, MCZ), 1♀; San José de Comondú Canyon, 26°N, 112°W, Feb. 15, 1966 (V. Roth, AMNH), 1♀; 22 mi N San José de Comondú, 26°20′N, 111°40′W, Feb. 16, 1966 (V. Roth, AMNH), juv.; San Marcos Island, June 18, 1921 (J. Chamberlin, MCZ), 1♂ (*E. scepticus* holotype), 1♀ (para-



Figs. 59–64. *Euagrus josephus* Chamberlin, spermathecae. **59.** 3 mi NW San Antonio, B. Calif. Sur, both spermathecae. 60–64. Right spermatheca. **60.** 34 mi NNW Manuela, B. Calif. Norte. **61.** San Marcos Island, B. Calif. Sur (*E. scepticus* Chamberlin paratype). **62.** 12 mi NE Cabo San Lucas, B. Calif. Sur. **63.** San José de Comondú Canyon, B. Calif. Sur. **64.** 8.8 mi NE Los Planes, B. Calif. Sur.

type); Santa María Bay, Mar. 15, 1953 (B. Firstman, AMNH), penult. ♂; Santa Vicotia, La Laguna, May 4–7, 1973 (E. Sleeper, MCZ), 1♂; Sierra Laguna, La Laguna, 17 air mi ENE Todos Santos, elev. 6000 ft, Dec. 12–18, 1979 (C. Griswold, UCB), 3♀, juvs.; Sierra San Lazaro, Sept. 1896 (MCZ), juvs.; E Todos Santos, elev. 1880 ft, Oct. 20, 1972 (D. Marqua, AMNH), 1♂ (penult. molt in vial suggests that this specimen was kept alive and matured after collection date); 11 mi S Todos Santos, Feb. 5, 1966 (V. Roth, AMNH), juv.; 17 mi N Todos Santos, Hondo Arroyo, Feb. 4, 1966 (V. Roth, AMNH), 1♀; Tortuga Island, Gulf of California, May 11, 1921 (J. Chamberlin, MCZ), 1♂ (holotype), juv.

NATURAL HISTORY: This species occurs over a wide range of elevations from near sea level to at least 1800 m. The only two habitat records are "palm oasis" and "thorn forest," but locality records indicate that in addition to living in some very arid habitats, *E. josephus* also occurs in some parts of the temperate forest on the upper slopes of the Sierra Laguna Mountains. The six males for which reliable dates are available all were collected as adults or matured in captivity during May and June.

Euagrus rubrigularis Simon

Figures 65–99; Map 1

Evagrus rubrigularis Simon, 1891: 320 (female holotype erroneously labeled "Ft. Hall, Idaho," in USNM, examined) (see Remarks section below for discussion of type locality). — Gertsch, 1961: 367.

Evagrus pragmaticus Chamberlin, 1924: 576, fig. 1 (male holotype and two female and one juvenile paratypes from San Pedro Bay, Sonora, Mexico, in MCZ, examined). NEW SYNONYMY.

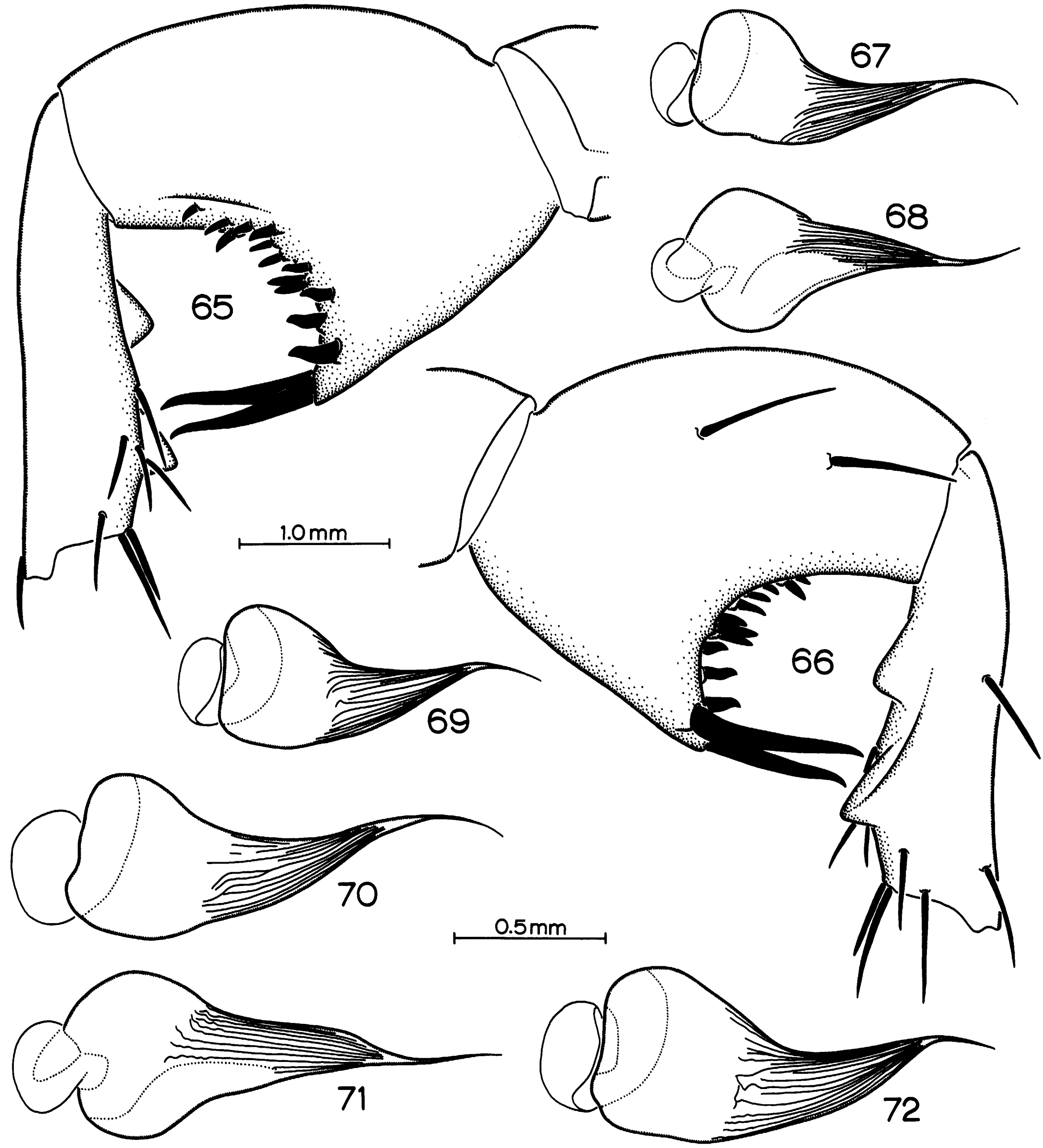
DIAGNOSIS: Males of *E. rubrigularis* can be distinguished from males of all other *Euagrus* species except *E. josephus* by the presence of a median keel (occasionally small) on metatarsus II (figs. 65, 66, 73–77). To distinguish *E. rubrigularis* males and females from those of closely related *E. josephus,* refer to the diagnosis for *E. josephus.* To distinguish *E. rubrigularis* females from those of the similar and parapatric (sympatric?) species, *E. mexicanus,* see the *E. mexicanus* diagnosis.

MALES: Table 1. Palpus (figs. 67–72) with relatively large-diameter bulb tapering gradually into proximally broad embolus that tapers gradually toward tip; sometimes a proximal, keel-like, retrolateral expansion of the embolus that can be seen in ventral view (fig. 71); prominent close-spaced ridges run along proximal half to two-thirds of embolus; distal third of embolus with moderate to strong ventrally directed curvature. Tibia II (figs. 65, 66, 73–75) with large to very large ventral apophysis with 2 long, very thick, subequal, apical spines, occasionally a medium to large subapical spine on retrolateral or prolateral side, and one thick, short to moderately long spine on retrolateral face of apophysis; several to many smaller stout spines on distal face of apophysis and on retrolateral one-third to two-thirds of adjacent ventral surface of tibia. Metatarsus II (figs. 65, 66, 73–77) with a low to tall, triangular, and rather thin median keel near metatarsus midpoint; retrolateral keel long and low in lateral view but sometimes with a prominent apex in dorsal view (fig. 76); prolateral keel varies from low and weak to tall and strong, but always markedly distal of midpoint; no preening combs. Femur I spinule patch short and wide; spinules short, stout, and closely spaced. Fovea a moderately deep to deep, circular or slightly elongate or triangular pit. Carapace with moderately dense covering of fine, recumbent to semirecumbent, yellow to light brown setae. Carapace light orange-brown to dark chestnut brown. Chelicerae, pedipalps, and legs like carapace or slightly darker. Abdominal dorsum medium brown to dark brown, sometimes with a purple cast.

FEMALES: Tables 2 and 3. Two primary spermathecal stalks on each side (figs. 78–97), although rarely the median and occasionally the lateral stalk may be split into two nearly equal branches (figs. 78, 80, 88, 89). Median stalk moderately long to long, longer than lateral stalk; distal portion sclerotized and sinuous to strongly looped, usually looped; bulb usually longer than wide. Lateral stalk short to long; distal portion sclerotized and straight to sinuous (rarely strongly sinuous); bulb varies from distally flattened (and often foot-shaped), to spheroid, to much longer than wide. Trunk varies from three times as broad as long to twice as long as broad. One to seven secondary stalks/bulbs attached to trunk and occasionally to lateral and/or median stalks. Anterior lip of genital opening unsclerotized or only very weakly sclerotized. No metatarsus I preening combs. Fovea a moderately deep to deep, circular to trapezoidal pit. Two long foveal setae. Carapace with moderately dense covering of fine, semirecumbent, light brown setae. Carapace orange-tan to rich chestnut brown. Chelicerae slightly darker than, pedipalps and legs similar to, carapace. Abdominal dorsum light brown to dark brown, often with a red or purple cast; rarely a few pairs of very thin, light, faint, transverse marks.

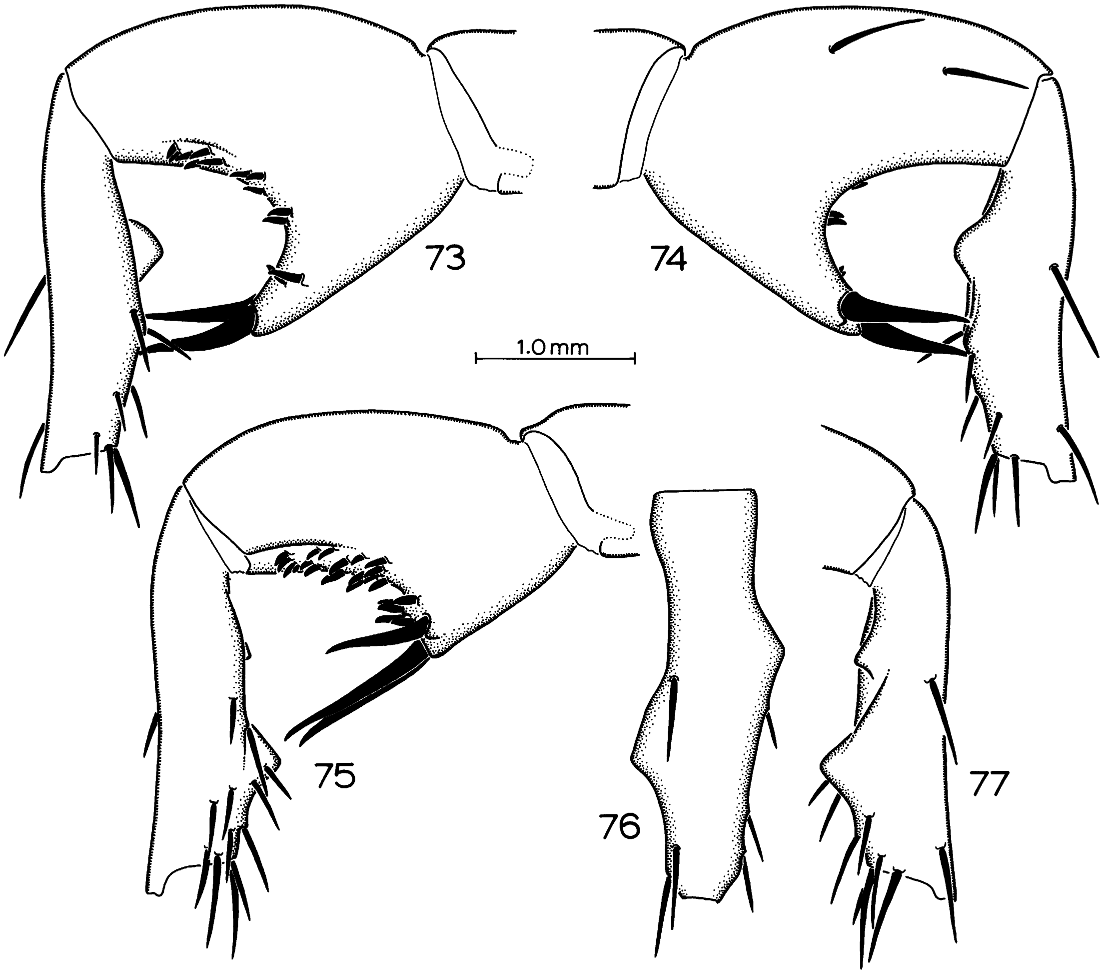
REMARKS: Simon (1891) described *E. rubrigularis* from a female sent to him by George Marx. The grossly erroneous locality data that accompany the holotype are the result of Marx's notoriously careless handling of specimen data (Gertsch, 1961). The type locality will never be known, but must lie somewhere in Mexico, probably within the presently known species range. The holotype seems most similar to the females from Guanajuato, especially in spermathecal form (figs. 91, 97) and the large number of cheliceral denticles.

Chamberlin's (1924) description of the *E. pragmaticus* holotype contains some errors; (1) in line 3 he says "anterior median eyes" but means anterior lateral eyes, (2) in line 10 he says "tibia" but means metatarsus, and (3) he compares *E. pragmaticus* three times to the nonexistent species "*clarus,*" by which he almost certainly means *E. josephus.*



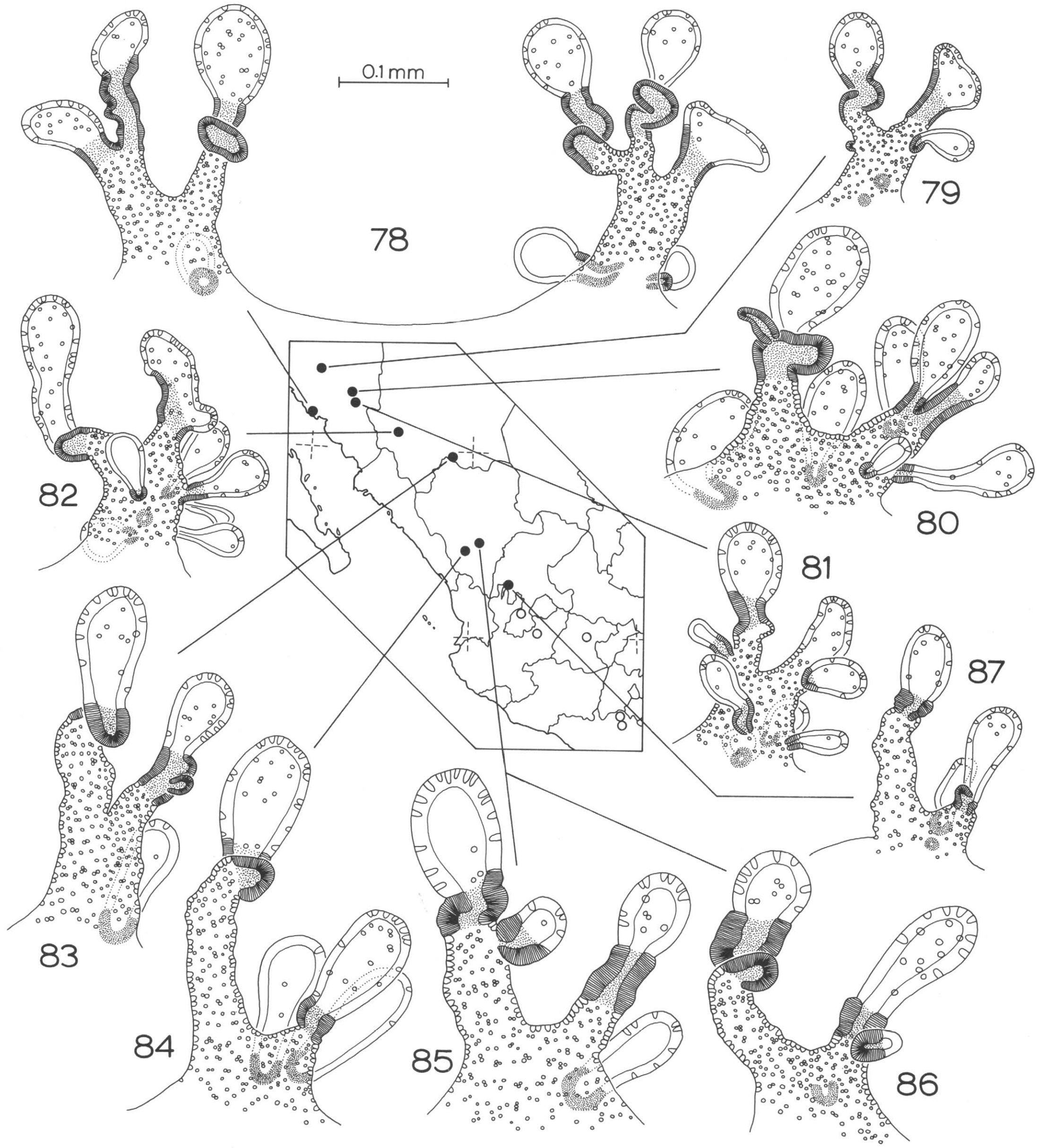
Figs. 65–72. *Euagrus rubrigularis* Simon, males. 65, 66. Tibia and metatarsus II, Otinapa, Durango. **65.** Retrolateral view. **66.** Prolateral view. 67–72. Palpal organ. 67, 68. *E. pragmaticus* Chamberlin holotype. **67.** Retrolateral view. **68.** Ventral view. **69.** Santa Rosa, Guanajuato, retrolateral view. 70, 71. 10 mi E El Salto, Durango. **70.** Retrolateral view. **71.** Ventral view. **72.** Taxco, Guerrero, retrolateral view.

VARIATION: *Euagrus rubrigularis* exhibits marked geographic variation in several male characters. Of the five males from northern Guerrero, the four from Taxco each have a more slender (elongate) ventral tibia II apophysis (figs. 73, 74) than do all the other *E. rubrigularis* males (figs. 65, 66, 75). However, in the fifth male (from south of Iguala) this apophysis is only moderately elongate, very similar to the condition found in the



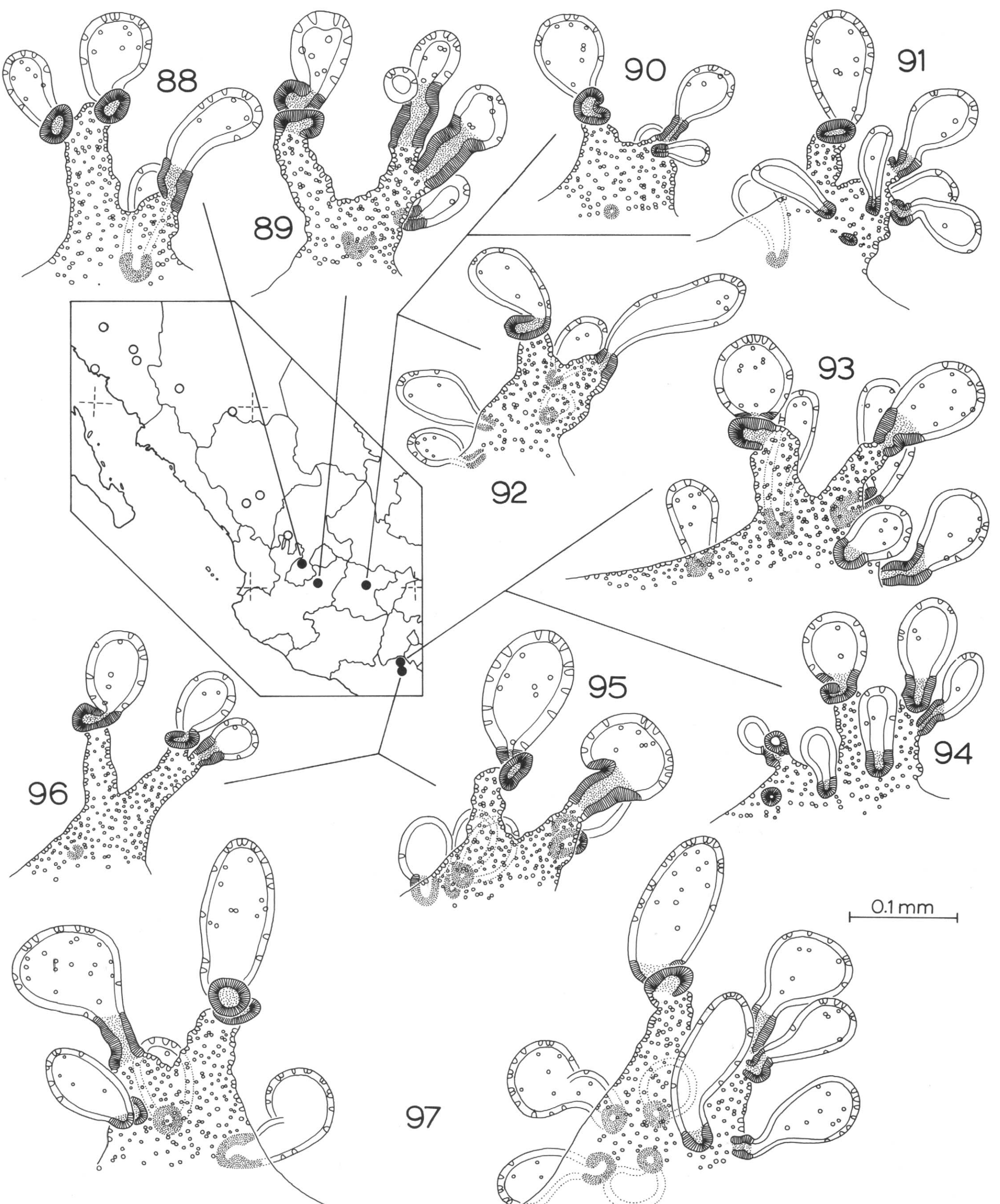
Figs. 73–77. *Euagrus rubrigularis* Simon, males. 73–77. Tibia and metatarsus II. 73, 74. Taxco, Guerrero. **73.** Retrolateral view. **74.** Prolateral view. 75–77. *E. pragmaticus* Chamberlin holotype. **75.** Retrolateral view. 76, 77. Metatarsus II. **76.** Dorsal view. **77.** Prolateral view.

males from Santa Rosa, Guanajuato, and Divisadero, Chihuahua. The southernmost males (the five Guerrero specimens and the one from Playa Azul, Michoacan) all have the spines on the ventral surface of tibia II (distal to the apophysis) concentrated on the retrolateral one-third of this surface, whereas in all other *E. rubrigularis* males these spines are distributed more widely over the retrolateral one-half to two-thirds of the ventral surface. The position and shape of the metatarsus II prolateral keel varies greatly; the five Guerrero males have a distinctly more proximal keel (figs. 74, 98) than all other specimens (fig. 66) except for the male from Jalisco and the *E. pragmaticus* holotype male from Sonora (fig. 77), which exhibit an intermediate state for this character (fig. 98), and these same Guerrero males have a markedly smaller keel (fig. 74) than do any of the other specimens (figs. 66, 77) except for the male from Jalisco. The Guerrero males have the stoutest palpi (figs. 72, 99) [BD(100)/PL = 45–49] and the five specimens from Durango and the one from Jalisco have the most elongate palpi (figs. 70, 71) [BD(100)/PL = 38–41], but the other specimens bridge this gap in shape range (figs. 67–69, 99) [BD(100)/PL = 42–46]. In the five Guerrero males the proximal portion of the embolus is more ro-



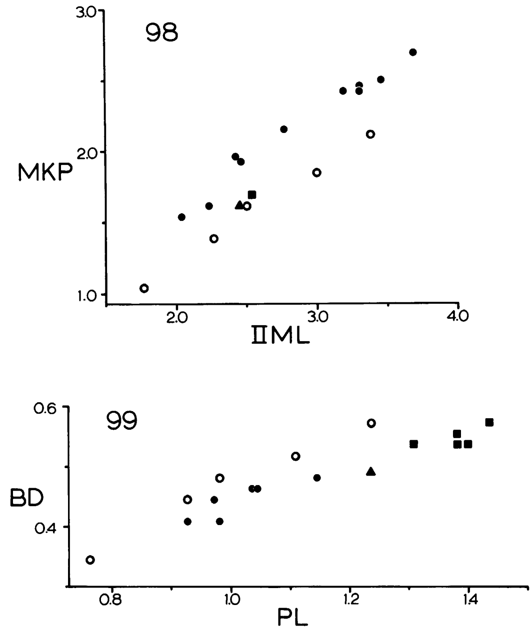
Figs. 78–87. *Euagrus rubrigularis* Simon, spermathecae. **78.** *E. pragmaticus* Chamberlin paratype, both spermathecae. 79–87. Right spermatheca. **79.** 2 mi S San Miguel de Horcasitas, Sonora. **80.** Near 28°55′N, 109°45′W, Sonora. **81.** Near 28°30′N, 109°30′W, Sonora. **82.** Divisidero, Chihuahua. **83.** Santa Barbara, Chihuahua. **84.** 10 mi E El Salto, Durango. **85, 86.** Palos Colorados, Durango. **87.** 25 km SW Valparaiso, Zacatecas.

bust and the slender terminal portion is proportionally shorter and less evenly curved in retrolateral view (fig. 72) than in other males, but the males from Guanajuato and Querétero are intermediate in these characters (fig. 69) between the Guerrero condition and the more elongate and evenly curved embolus (figs. 67, 70) characteristic of all other males.



Figs. 88–97. *Euagrus rubrigularis* Simon, spermathecae. 88–96. Right spermatheca. **88.** 20 km E Tlaltenango, Zacatecas. **89.** 17 mi SW Jalostotitlán, Jalisco. **90–92.** Santa Rosa, Guanajuato. **93, 94.** Taxco, Guerrero. **95, 96.** 12 mi S Iguala, Guerrero. **97.** Holotype, both spermathecae.

Most of the five Durango specimens have a peculiar flattening of the basal portion of the embolus which results in a retrolateral keel (fig. 71).



Figs. 98, 99. Scatter diagrams of male characters for *Euagrus rubrigularis* Simon, N = 17. Measurement scales in mm. **98.** MKP plotted against IIML; open circles for Guerrero males, triangle for Jalisco male, and square for Sonora male. **99.** BD plotted against PL; open circles for Guerrero males, triangle for Jalisco male, squares for Durango males.

Several of these observations suggest that the Guerrero populations are phenotypically and, by inference, genetically divergent from the other populations sampled. However, since for all these characters, other specimens possess character states that are similar to or intermediate between the Guerrero sample's state and the states exhibited by the rest of the species sample, I hypothesize that the Guerrero population is not separated by intrinsic reproductive isolating mechanisms from the other populations of this species.

The male from Jalisco differs from all the other males in two characters; the metatarsus II prolateral keel is so reduced that it appears absent unless observed carefully and there are only one (left leg) or two (right leg) spines on the ventral surface of tibia II distal of the apophysis. However, the first character state is not greatly different from the condition in the Guerrero males (fig. 74) and the second condition is simply at one extreme of a broad continuum (the male from Querétero has only three such spines on its right tibia II and a male from Guerrero and one from Zacatecas have only four such spines on their right second tibiae).

Spermathecal form varies widely within some populations and geographically (figs. 78–97), but this variation is continuous. It is important to point out that within some individuals there are major differences between the spermathecae on the right and those on the left side (figs. 78, 97). Figures 90–92 illustrate some of the wide intrapopulation variation in a relatively well-sampled population at Santa Rosa, Guanajuato, and figures 93–96 illustrate some of the marked variation in the cluster of populations in the Taxco-Iguala area of northern Guerrero where the number of secondary stalks/bulbs and the ratio of trunk width over trunk length increase with body size. In the northwestern populations (Sonora and Chihuahua) there is a tendency for the lateral bulb to be flattened apically (figs. 78, 79, 81, 82), a condition which is rare in the rest of the species' geographic range and which is similar to that of *E. josephus,* the sister species of *E. rubrigularis.*

The holotype female differs from the rest of the *E. rubrigularis* female sample (N = 15) in a few characters: it has more cheliceral denticles (CD = 52, 54 vs. 17–46), its leg I articles are proportionally shorter [ITL(100)/CL = 38 vs. 41–45], and its first femur is stouter [IFT(100)/IFL = 48 vs. 38–46]. In spite of these differences, the close resemblance of this specimen to the rest of the species sample of females in spermathecal form and all other characters studied supports my hypothesis that all these females are conspecific.

DISTRIBUTION: Western Mexico from Sonora south to Guerrero (map 1).

MATERIAL EXAMINED: MEXICO: **Chihuahua:** Divisidero, elev. 8000 ft, Nov. 30, 1976 (W. Peck, EPC), 1♂, Apr. 20, 1986 (V. and B. Roth, AMNH), 1♀, juvs.; Santa Barbara, elev. 6000 ft, July 3, 1947 (G. Bradt, AMNH), 2♀. **Durango:** vicinity of Durango, Sept. 3, 1979 (G. Mallick, CAS), 1♀; 6 mi NE El Salto, Aug. 11, 1947 (W. Gertsch, AMNH), 1♀, juvs.; 10 mi E El Salto, Aug. 8, 1947 (W. Gertsch, AMNH), 1♂, 4♀, juvs.; Otinapa, elev. 8200 ft, Aug. 12, 1947 (W. Gertsch, AMNH), 2♂, 3♀, juvs.; Palos Colorados, elev. 8000 ft, Aug. 5, 1947 (W. Gertsch, AMNH), 2♂, 6♀, juvs. **Guanajuato:** Santa Rosa, elev. 2500 m, Sept. 23, 1941 (C. Bolívar, AMNH), 1♂, 4♀. **Guerrero:** 12 mi S Iguala, July 29, 1956 (V. Roth, W. Gertsch; AMNH), 1♂, 2♀, juvs.; Taxco, Aug. 15, 1943 (Bolívar, Pelaez, Osorio; AMNH), 1♀, Oct. 1945 (L. Isaacs, AMNH), 1♀, Jan. 1946 (L. Isaacs, AMNH), 1♀, Apr. 1946 (L. Isaacs, AMNH), 4♂, July 28–29, 1956 (W. Gertsch, V. Roth; AMNH), 1♀, juvs., Sept. 2, 1966 (J. and W. Ivie, AMNH), 1♂, juvs. **Jalisco:** 17 mi SW Jalostotitlán, Aug. 30, 1965 (Gertsch, Hastings; AMNH), 1♂, 7♀, juvs. **Michoacan:** 5 mi N Playa Azul, elev. 300 m, Jan. 17, 1975 (C. Rudolph, J. Rowland; AMNH), 1♂. **Querétaro:** 5 mi N Querétaro, Azteca Motel, under rocks, Dec. 31, 1976 (TMM), 1♂. **Sonora:** near 28°55′N, 109°45′W, pine forest, Sept. 18, 1982 (V. Roth, AMNH), 3♀, juvs.; near 28°30′N, 109°30′W, Río Canyon, thorn forest, Sept. 19, 1982 (V. Roth, AMNH), 1♀, juvs.; 2 mi S San Miguel de Horcasitas, 29°30′N, 110°45′W, in cave shelter, Oct. 4, 1966 (V. Roth, AMNH), 1♀, juv.; San Pedro Bay, July 7, 1921 (J. Chamberlin, MCZ), 1♂ (holotype), 2♀, juv. (paratypes); E. side Sierra Alamos, Nov. 12, 1972 (V. Roth, AMNH), 3♀, juvs. **Zacatecas:** 20 km E Tlaltenango, Sept. 14, 1984 (W. Pulawski, CAS), 1♀; 25 km SW Valparaiso, Sept. 6, 1984 (W. Pulawski, CAS), 2♂ (both had molted just before they were collected), 1♀, juvs.

NATURAL HISTORY: *Euagrus rubrigularis* has been collected over a wide range of elevations (near sea level to 2500 m) and habitats, from arid scrub and thorn forest, to tropical deciduous forest, to pine forest. Webs are usually found under rocks and in crevices in rock outcrops, from which they are especially difficult to extract. The retreat tube of the web is often quite long. There are two distinct peaks of adult male collection records during the year; one in April and one in August and September. Baerg (1929) observed the effects of the bite of specimens he collected near Durango; a white rat and a guinea pig experienced only mild short-term effects, and a brief bite on Baerg's little finger caused one hour of sharp local pain.

Euagrus mexicanus Ausserer

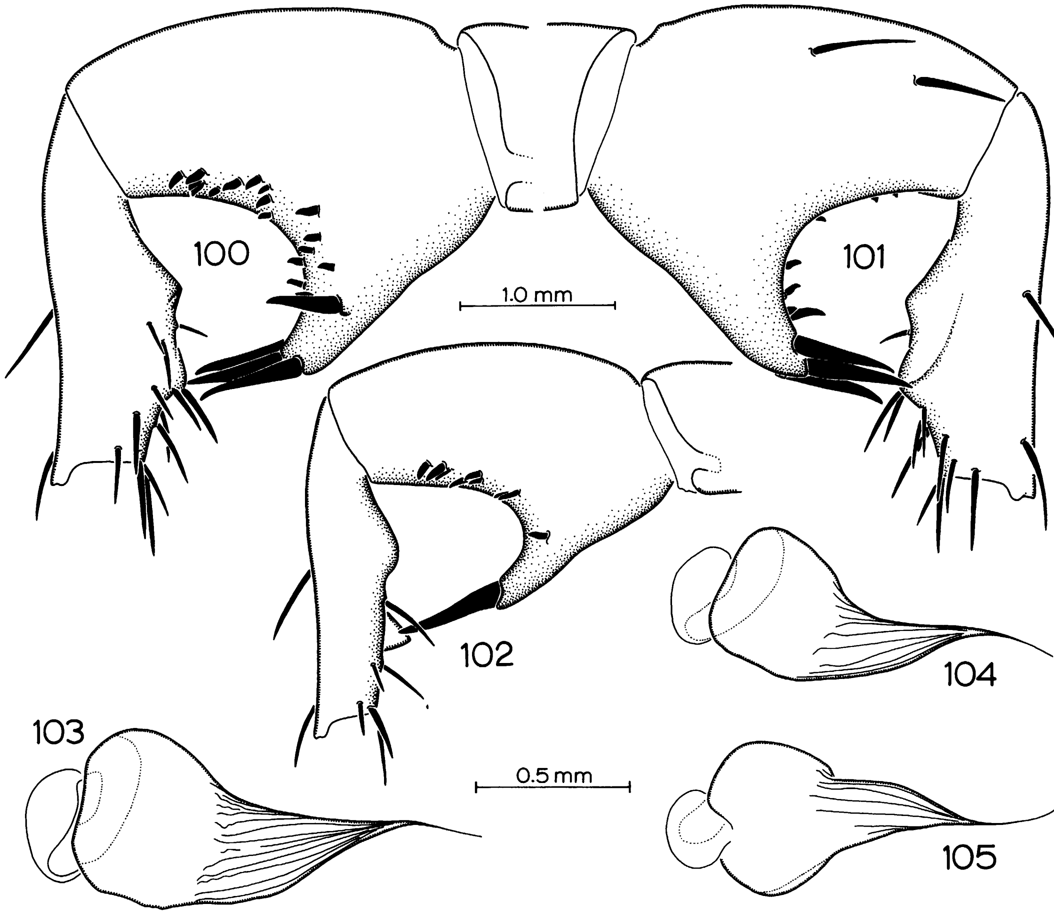
Figures 5, 6, 9, 18, 37, 44, 47, 100–113; Map 1

Euagrus mexicanus Ausserer, 1875: 160, figs. 13–16 (male lectotype, here designated, and female paralectotype from Mexico, in HEC, examined). — F. P.-Cambridge, 1897: 39, pl. 2, figs. 4–4b. — Brignoli, 1974: 199.

Evagrus mexicanus: Simon, 1891: 320.

DIAGNOSIS: Males of *E. mexicanus* (figs. 100–102) lack the median keel that is always present on the ventral surface of metatarsus II in males of the close relatives, *E. josephus* and *E. rubrigularis* (figs. 51–53, 65, 66). In addition, in *E. mexicanus* the palpus ridges are farther apart and more prominent (figs. 103–105) than in these other two species (figs. 54–58, 67–72). Also, the metatarsus II prolateral keel is proportionally more distal in *E. mexicanus* males [MKP(100)/IIML = 70–77] than in the *E. rubrigularis* males that are geographically nearest *E. mexicanus,* those from Guerrero [MKP(100)/IIML = 59–65]. It is difficult to distinguish *E. mexicanus* females from those of *E. rubrigularis,* but *E. mexicanus* females usually have fewer cheliceral denticles (CD = 7–32; 18.2 ± 6.22) in spite of their larger average body size (CD/CL = 0.9–4.5; 2.50 ± 0.87) than do *E. rubrigularis* females (CD = 17–54; 30.9 ± 10.31) (CD/CL = 2.8–7.7; 5.19 ± 1.38). Also most *E. mexicanus* adults (both sexes) have a very dense covering of long slender gold hairs on their carapace which gives the carapace a striking silver-gold, gold, or gold-brown color in life (figs. 5, 6); *E. rubrigularis* has a darker colored carapace. To separate *E. mexicanus* specimens from those of the related species, *E. gertschi* and *E. rothi,* refer to the diagnoses of those species.

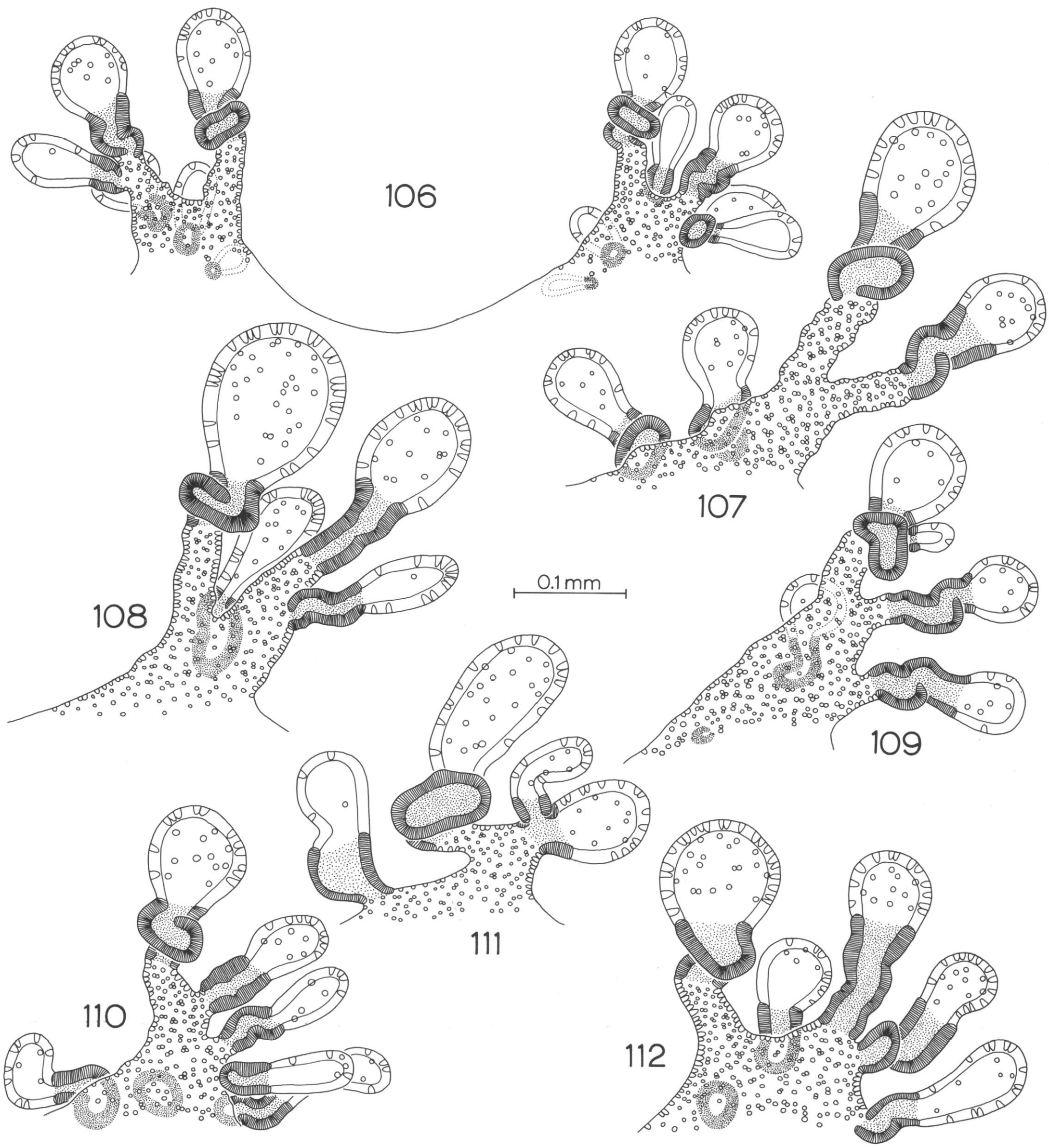
MALES: Tables 1 and 3. Palpus (figs. 103–105) strongly pyriform; relatively large-diameter bulb tapering gradually into proximally broad embolus which tapers gradually toward tip; prominent well-separated ridges run along proximal half to two-thirds of embolus; distal third of embolus in retrolateral view with a rather strong ventrally directed curvature proximally but only slightly curved or straight for rest of length. Tibia II (figs. 100–102) with very large ventral apophysis with three (occasionally one, two, or four)



Figs. 100–105. *Euagrus mexicanus* Ausserer, males. 100–102. Tibia and metatarsus II. 100, 101. Santiago Tepetlapa, Morelos. **100.** Retrolateral view. **101.** Prolateral view. **102.** 15.5 mi SE Acatlán, Puebla, retrolateral view. 103–105. Palpal organ. **103.** Lectotype, retrolateral view. 104, 105. Santiago Tepetlapa, Morelos. **104.** Retrolateral view. **105.** Ventral view.

long, very thick, subequal, apical spines; nearly always one moderately long (sometimes almost as large as apical spines) spine on retrolateral surface of apophysis; numerous smaller stout spines on distal face of apophysis and retrolateral side of adjacent ventral surface of tibia. Metatarsus II (figs. 100–102) with prominent retrolateral keel near metatarsus midpoint; prolateral keel more distal, usually with rather low but prominent broad-based peak connected to retrolateral keel by saddle-shaped ridge; no preening combs. Femur I spinule patch short and wide; spinules short, stout, and closely spaced. Fovea a deep to very deep triangular, round, or slightly elongate-oval pit. Carapace with moderately dense to dense covering of long, slender, gold, recumbent hairs. Carapace light orange-brown (uncommon) to dark chestnut brown; silver-gold in life because of hairs. Chelicerae, pedipalps, and legs usually a little darker than carapace. Abdominal dorsum brown to dark brown. Living male from 9.5 mi W Perote, Veracruz with carapace and coxae covered by shiny silver-gold mantle of hair; chelicerae, legs, and abdomen dark brown (fig. 5).

FEMALES: Table 2. Two primary spermathecal stalks on each side (figs. 106–112). Median stalk moderately long to long, longer than lateral stalk; distal half to two-thirds sclerotized and looped or at least strongly



Figs. 106–112. *Euagrus mexicanus* Ausserer, spermathecae. **106.** Cocoyoc, Morelos, both spermathecae. 107–112. Right spermatheca. **107.** Amacuzac, Morelos. **108.** 3 mi NE Zacatecas, Puebla. **109.** Amacuzac, Morelos. **110.** Azumbilla, Puebla. **111.** 36.8 mi NW Tehuantepec, Oaxaca. **112.** 15 mi SE Acatlán, Puebla.

sinuous; bulb larger than lateral bulb, usually slightly longer than wide, occasionally more elongate or spherical. Primary lateral stalk short to long; distal half to two-thirds (rarely entire length) sclerotized and slightly sinuous (rarely straight); bulb varies from slightly wider than long (uncommon) to slightly longer than wide (common) to more elongate (uncommon). One to five secondary stalks/bulbs attached to trunk and occasionally also to lateral and/or median stalks. Trunk varies from two times as broad as long to equally

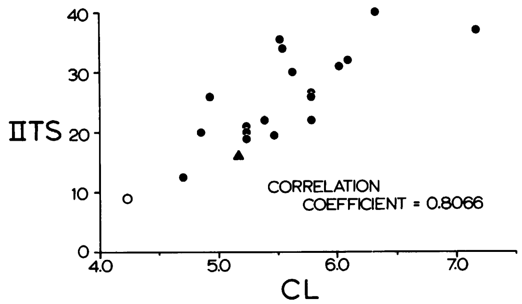


Fig. 113. IITS plotted against CL for *Euagrus mexicanus* Ausserer males, N = 20. IITS values represent mean of counts from both right and left legs; CL in mm. Open circle represents Acatlán (Puebia) male, triangle represents Oaxaca male.

as long as broad. Anterior genital lip unsclerotized or occasionally with small median sclerotized patch. No metatarsus I preening combs. Fovea a deep to very deep, circular, triangular, or slightly transverse pit. Two long foveal setae. Carapace with moderately (uncommon) to very dense (common) covering of long, slender, gold, recumbent hairs. Carapace orange-tan to chestnut; silver-gold to gold-brown in life because of hairs (fig. 6). Chelicerae usually darker than, pedipalps and legs similar to, carapace. Abdominal dorsum light purple-brown to dark purple-brown or dark gray-brown; occasionally a faint anterior-median, transverse, light-colored area.

REMARKS: Ausserer (1875) described *E. mexicanus* from a male and female which O. P.-Cambridge had loaned to him, but the whereabouts of these types have been unknown for many years. Thanks to some detective work and searching by Audrey Smith, M. J. Scoble, and I. Lansbury, these types were recently discovered in a vial with a theraphosid in the O. P.-Cambridge collection at the HEC. In all characters both specimens conform to the large sample of specimens I have examined from Morelos and to Ausserer's description and drawings. Leg II on the right side of the male type is malformed, probably because it was regenerated. The locality data with the specimens add no new information to Ausserer's (1875) vague "from Mexico."

VARIATION: The southernmost males, one from near Acatlán, Puebla, and one from near Tehuantepec, Oaxaca, differ markedly from the rest of the species sample (N = 20) in a few characters. The Acatlán male has fewer tibia II spines than any other specimen (figs. 102, 113). This is especially true of the spines on the ventral apophysis; the left tibia has only one apical spine on the apophysis, the right tibia only two, and there is only a small spine on the retrolateral surface of each apophysis, an area that in all other specimens possesses a much larger spine. This low number of spines, however, appears to represent simply one end of a continuous distribution of tibia II spine number, a character which is rather closely correlated with body size (fig. 113). The Acatlán male also has a proportionally shorter ventral apophysis [IITT(100)/IITL = 84] than do all other specimens [IITT(100)/IITL = 90–103]. In the Acatlán and Tehuantepec males the metatarsus II retrolateral keel is a little more proximal [MKR(100)/IIML = 46, 44] and the prolateral keel is taller and more sharply pointed (fig. 102) than on any other specimen [MKR(100)/IIML = 50–54] (fig. 100). The Tehuantepec male's palpal ridges are a little closer together and less prominent than on all other specimens. The only adult female collected from southern Oaxaca (36.8 mi NW of Tehuantepec) has the most divergent spermathecal form observed in the entire *E. mexicanus* sample (fig. 111). My current hypothesis, that these specimens represent populations that, although variant, are not reproductively isolated from the other *E. mexicanus* populations, needs to be tested by examining more and larger samples from Oaxaca and southern Puebla.

DISTRIBUTION: South central Mexico from Morelos and Puebla south and east to the Isthmus of Tehuantepec (map 1).

MATERIAL EXAMINED: MEXICO: No specific locality or date (HEC), 1♂ (lectotype), 1♀ (paralectotype). **Morelos:** Acatlipa, Aug. 10, 1946 (Bolívar, Bonet, Goodnight; AMNH), 1♂, 3♀, juvs.; Ahuehuetzingo, elev. 975 m, Nov. 2, 1976 (E. Ross, CAS), 7♀; Alpuyeca, July 28, 1956 (Gertsch, Roth; AMNH), 3♂, many ♀; Amacuzac, June 18, 1981 (UNAM), 1♂, 4♀, juvs.; 5.5 mi E Amayuca, July 25, 1973 (L. Erickson, M. Soleglad; AMNH), 2♀, juvs.; 11 km S Amayuca, elev. 1158 m, Aug. 23, 1976 (E. Ross, CAS), 1♀; Cañón de Lobos, under rocks, June 12, 1976 (UNAM), 5♀, juvs.; Cocoyoc, July 28, 1956 (Gertsch, Roth; AMNH), 3♂, 7♀, juvs.; Cuatla, Dec. 6, 1943 (M. Cardenas, AMNH), 1♀; Cuernavaca, Oct. 5, 1940 (J. Honey, AMNH), 1♀, Sept. 1944 (N. Krauss, AMNH), 2♀, July 31, 1956 (Gertsch, Roth; AMNH), 1♂, 5♀, juvs., April 1959 (N. Krauss, AMNH), 1♀, juvs., Aug. 1959 (N. Krauss, AMNH), 1♀, July 1965 (N. Krauss, AMNH), 2♀, juvs., Nov. 1966 (N. Krauss, AMNH), 1♀; N Cuernavaca, 99°14′W, 18°56′N, May 6, 1963 (Gertsch, Ivie; AMNH), 2♀; 5 mi S Cuernavaca, Nov. 19, 1946 (E. Ross, CAS), 1♀, juv.; 9 mi S Cuernavaca, Dec. 9, 1948 (E. Ross, CAS), 2♀; Oaxtepec, elev. 1500 m, May 17, 1942 (C. Bolívar, AMNH), 3♀, June 25, 1942 (AMNH), 3♀, May 17, 1943 (C. Bolívar, AMNH), 1♀, July 4, 1943 (Bolívar, Osorio, Diaz; AMNH), 3♀, July 11, 1943 (Bolívar, Osorio, Pelaez; AMNH), 1♂, 1♀, juvs., July 9, 1944 (C. Bolívar, AMNH), 1♀; Ocotitlan, near Cueva del Diablo, Dec. 4, 1977 (Palocios, UNAM), 1♀; Palo Bolero, elev. 1200 m, Aug. 7, 1961 (B. Malkin, AMNH), 8♀; Puente de Ixtla, Aug. 1, 1943 (Bolívar, Bonet, Osorio; AMNH), 1♂; Santiago Tepetlapa, Jan. 21, 1978 (A. Zaldivar, UNAM), 1♂, 1♀, juv.; Temixco, June 6, 1981 (Duckworth, UNAM), 1♂; 10 km S Temixco, July 28, 1956 (Gertsch, Roth; AMNH), 2♂, 6♀, juvs.; Tepoztlán, elev. 1600 m, Aug. 6–7, 1961 (B. Malkin, AMNH), 1♂, 3♀, juv., May 10, 1962 (Bolívar, Velo; AMNH), 2♀, May 5, 1963 (Gertsch, Ivie; AMNH), 1♀, juvs., July 9, 1975 (Zool. III, UNAM), 3♀; 1.4 mi E Tepoztlán intersec. on rt. 115D, elev. 1700 m, June 10, 1982 (F. Coyle, AMNH), 2♀; Xochitepec, July 8, 1975 (Zool. III, UNAM), 1♂, 2♀, juvs.; 6 km N Yautepec, elev. 1128 m, Aug. 23, 1976 (E. Ross, CAS), 1♀; Zacatepec, June 30, 1981 (E. Yanez, UNAM), 1♂, 1♀. **Oaxaca:** Distrito de Tlaxiaco, 4 mi SW San Martin Huamelulpan, elev. 7100 ft, Aug. 26, 1966 (C. Bogert, AMNH), 4♀; 12 mi W Tehuantepec, Apr. 29, 1963 (Gertsch, Ivie; AMNH), 1♂; 36.8 mi by rt. 190 NW Tehuantepec, under rocks, July 8, 1963 (Beatty, Coyle; JAB), 1♀, juv. **Puebla:** 15 mi by rt. 190 SE Acatlán, July 10, 1963 (Beatty, Coyle; JAB), 2♀, juvs.; 15.5 mi SE Acatlán on rt. 190, elev. 1400 m, June 11, 1982 (F. Coyle, AMNH), 1♂, 1♀; Azumbilla, 97°25′W, 18°37′N, Apr. 25, 1963 (Gertsch, Ivie; AMNH), 8♀, juvs.; 8 mi S Izucar de Matamoros, Dec. 10, 1948 (H. Leech, CAS), 2♀; Tehuacan, Nov. 8, 1939 (C. Bogert, H. Vokes; AMNH), 2♀, Oct. 17–24, 1944 (H. Wagner, AMNH), 1♀, June 18, 1954 (Causey, AMNH), 1♀, July 24, 1956 (Gertsch, Roth; AMNH), 1♀, juvs.; 5 mi N Tehaucán, 97°24′W, 19°35′N, Aug. 3, 1966 (J. and W. Ivie, AMNH), 4♀, juvs.; 10 mi N Tehuacán, 97°23′W, 19°40′N, Aug. 3, 1966 (J. and W. Ivie, AMNH), 5♀, juvs.; 6 mi SW Tehuacán, July 30, 1973 (L. Erickson, M. Soleglad; AMNH), 1♀; Tlacotepec, July 24, 1956 (Roth, Gertsch; AMNH), 8♀, juvs.; 3 mi NE Zacatepec, June 30, 1963 (Beatty, Coyle; AMNH), 6♀, juv.; 4.2 mi NE Zacatepec on rt. 140 at pass, elev. 2550 m, 26 June 1982 (F. Coyle, AMNH), 3♀, juv. **Veracruz:** 2 mi NE Acultzingo, July 4, 1963 (Beatty, Coyle; JAB), 3♀, juvs.; highway 150, 2 mi above Acultzingo, Dec. 14, 1948 (H. Leech, CAS), 1♀, juvs.; Perote, June 30, 1946 (H. Wagner, AMNH), 6♀, juvs.; road from Perote to peak of Cofre de Perote, May 27, 1984 (W. Sissom, C. Colwell; AMNH), 1♀; 9.5 mi W Perote on rt. 140, elev. 2400 m, June 26, 1982 (F. Coyle, AMNH), 1♂, 2♀, juvs.

NATURAL HISTORY: The known elevation range of *E. mexicanus* is 500–2550 m. I have observed *E. mexicanus* in five different habitats, all arid: arid tropical scrub, low scrubby tropical deciduous forest, pasture adjacent to dry oak forest, tree yucca grassland, and dry open pine-oak forest. The webs are usually under rocks, but have also been found on low vertical banks along pasture paths and on the ground at the bases of shrubs (fig. 9) or cacti.

The large adult females of this species have correspondingly large exposed capture webs and large-diameter retreats which vary greatly in length. The retreat tube (occasionally there are two) follows natural crevices and other spaces down into the soil; an adult female retreat may be from 5 to 30 cm long. The exposed capture web (fig. 9) typically consists of two to four funnels (that lead from the one or two retreat tubes) and a system of interconnected sheet and line extensions onto which these funnels open and which are attached to surrounding rock, soil, and plant surfaces. The capture webs of adult females typically cover 400–900 cm^2. The capture web silk is somewhat sticky; it adheres with moderate force to a stick or pencil touched lightly to the silk and then pulled away. These spiders will rush up onto the capture web even in daylight and attempt to capture a gently vibrating stick that is touching the web. Parts of exoskeletons of the following arthropod prey were common in four webs that were collected: beetles, millipedes, ants, roaches, hemipterans, grasshoppers, and caterpillars.

All but 2 of the 21 males listed above with collecting dates were found during the rainy season in June, July, and August. An egg sac was found two-thirds of the way down the retreat of a female 15.5 mi southeast of Acatlán, Puebla, on June 11; 574 recently hatched spiderlings (without claws, fangs, or spigots) and four eggs ready to hatch were in this sac. A brood of active spiderlings was found outside the egg sac in the retreat of an *E. mexicanus* web collected 1.1 mi northwest of Totolapan, Oaxaca, on June 14. Two *E. mexicanus* egg sacs collected on July 24 at Tlacatepec, Puebla, contained 330 ± 10 and 405 ± 5 eggs each. The remains of one large juvenile (or small adult female) from 4.2 mi northeast of Zacatepec, Puebla, was found in its retreat with a cocoon of a pompillid wasp larva lying beside it.

Euagrus gertschi, new species

Figures 114–128; Map 1

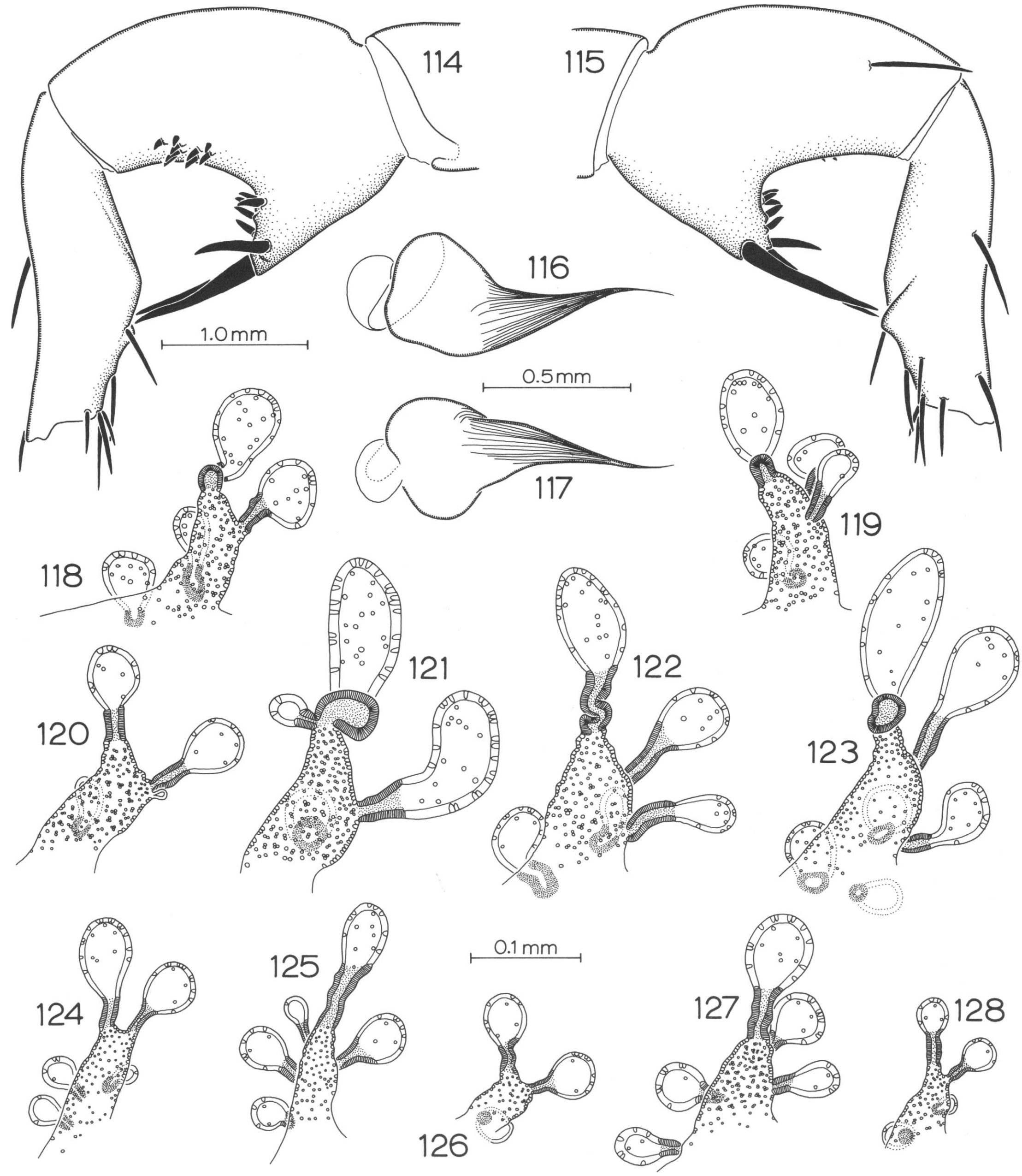
TYPES: Male holotype and one male and one female paratype from 8 mi SW of Colima, Colima, Mexico (May 10, 1963; W. Gertsch, W. Ivie), deposited in AMNH.

ETYMOLOGY: The specific name is a patronym in honor of Dr. Willis J. Gertsch, eminent arachnologist, collector of the type specimens, and collector of many specimens used in this revision.

DIAGNOSIS: Males of *E. gertschi* can be distinguished from those of its close relative, *E. mexicanus*, by the following characters: (1) The tibia II ventral apophysis is proportionally shorter [IITT(100)/IITL = 70–85; 78.0] and less slender apically (figs. 114, 115) than in *E. mexicanus* [IITT(100)/IITL = 84–103; 96.1 ± 4.51] (figs. 100–102). (2) The moderately large spine on the retrolateral surface of the tibia II apophysis is positioned much closer to the apical spine(s) in *E. gertschi* (fig. 114) than in *E. mexicanus* (figs. 100, 102). (3) In *E. gertschi* the palpus ridges are much more closely spaced (figs. 116, 117) than in *E. mexicanus* (figs. 103–105). *Euagrus gertschi* males and females lack the very dense covering of silver-gold carapace hairs characteristic of nearly all *E. mexicanus* adults. Females of *E. gertschi* can also be distinguished from those of *E. mexicanus* by their distinctively narrow spermathecal trunks with, at best, only a weak lateral lobe of the trunk at the base of the primary lateral stalk (figs. 118–128), by their lower number of tarsus I spines (ITarM = 4–12; 9.1 ± 2.43) (*E. mexicanus* ITarM = 13–21; 16.7 ± 2.20), and by their normally smaller size (CL = 2.7–5.3; 4.26 ± 0.88) (*E. mexicanus* CL = 4.6–9.2; 7.31 ± 1.19). To distinguish *E. gertschi* from its relative, *E. rothi*, see the *E. rothi* diagnosis.

MALES: Tables 1 and 3. Palpus (figs. 116, 117) strongly pyriform; relatively large-diameter bulb tapering gradually into proximally broad embolus which tapers gradually toward tip; prominent closely spaced ridges run along proximal two-thirds of embolus; distal third of embolus weakly curved downward and in a retrolateral direction. Tibia II (figs. 114, 115) with large ventral apophysis with one or two long, thick, subequal, apical spines; one moderately long subapical spine (very close to apical spine) on retrolateral surface of apophysis; sometimes one or two long slender spines on proximal slope of apophysis; cluster of two to several smaller stout spines on distal face of apophysis; another cluster of small stout spines on retrolateral side of ventral surface of tibia distal to the apophysis. Metatarsus II (figs. 114, 115) with prominent, rather thick, retrolateral keel with apex at or proximal to metatarsus midpoint; triangular prolateral keel with apex located more distally; no preening combs. Femur I spinule patch short and wide; spinules short, stout, and closely spaced. Fovea a deep round or triangular pit. Carapace with sparse to moderately dense population of long, slender, blond to brown, recumbent hairs. Carapace tan to chestnut brown. Chelicerae and pedipalps slightly lighter than carapace; legs like carapace or slightly darker. Abdominal dorsum pale brown to dark gray-brown; usually a pair of small, faint, unpigmented spots anteriorly.

FEMALES: Table 2. Two primary sper-



Figs. 114–128. *Euagrus gertschi,* new species. 114, 115. Male tibia and metatarsus II, holotype. **114.** Retrolateral view. **115.** Prolateral view. 116, 117. Palpal organ, holotype. **116.** Retrolateral view. **117.** Ventral view. 118–128. Right spermatheca. **118, 119.** 6 mi E Villa Unión, Sinaloa. **120.** 9 mi S Tepic, Nayarit. **121.** 26 mi N Rosa Morada, Nayarit. **122.** 5–8 mi E Magdalena, Jalisco. **123–125.** 10 mi S Colima, Colima. **126.** 8 mi SW Colima, Colima. **127.** 7 mi S Colima, Colima. **128.** 5 mi SW Colima, Colima.

mathecal stalks on each side (figs. 118–128). Median stalk sclerotized for most of its length; straight, sinuous, or looped; bulb slightly elongate-oval to clearly elongate. Lateral stalk thinner and shorter than median stalk; straight and sclerotized for its full length; usually attached directly to side of trunk; bulb same size as or smaller than median bulb, nearly spherical or elongate. Trunk relatively narrow, always longer than broad; usually tapers gradually to base of primary median stalk; no more than a weak lobe at base of lateral stalk or none at all. One to four secondary stalks/bulbs attached to trunk. Anterior genital lip unsclerotized or with median ill-defined sclerotized area. No metatarsus I preening combs. Fovea a moderately deep to deep, round or transversely triangular pit. Two long foveal setae. Carapace with sparse to moderately dense covering of slender, blond to brown, recumbent hairs. Carapace orange-tan to chestnut brown. Chelicerae, pedipalps, and legs lighter than (usually) or like carapace. Abdominal dorsum medium red-brown to dark purple-brown or dark gray-brown; occasionally an anterior pair of faint spots as in male.

VARIATION: The two males from Colima differ greatly in size and in some characters which are probably developmentally dependent on size. The larger male (holotype, CL = 5.1) has markedly higher values of the following characters than the smaller male (CL = 2.6): IITMA = 9 vs. 4; IITM = 18 vs. 9; IITT(100)/IITL = 85 vs. 70. The larger male has two apical spines on the ventral apophysis of each tibia II, whereas the small male has only one such spine. The femur I spinule patch of the holotype is proportionally much wider [IFSW(100)/IFSL = 115 (left), 107 (right)] than is the same patch on the small specimen [IFSW(100)/IFSL = 73 (left), 80 (right)]. In spite of these differences, I confidently conclude, on the basis of their very similar palpus form, their similar leg II form and spine placement patterns, and the wide and continuous distribution of body size values and only slightly and continuously varying spermathecal form (figs. 123–128) exhibited by the females collected within a 3-mile radius of the same locality, that these two males are conspecific.

The Sinaloa male differs rather markedly from the two Colima males in several characters: (1) It is darker. (2) It has either one or two slender spines on the proximal slope of the tibia II apophysis; the Colima males have none. (3) Its metatarsal keels are more proximally positioned [MKR(100)/IIML = 41; MKP(100)/IIML = 56] than are the corresponding keels of the Colima specimens [MKR(100)/IIML = 51, 56; MKP(100)/IIML = 71, 71]. (4) Its palpus is proportionally shorter [BD(100)/PL = 48] than that of either Colima male [BD(100)/PL = 40, 42]. Nevertheless, I predict that these character state distribution gaps will disappear when these and geographically intermediate populations are better sampled. Females from the same Sinaloa locality and from Nayarit and Jalisco are very similar to Colima females in all characters studied, including spermathecal form (figs. 118–128).

DISTRIBUTION: Western Mexico from southern Sinaloa south to Colima (map 1).

MATERIAL EXAMINED: MEXICO: **Colima:** 5 mi SW Colima, July 30, 1964 (Gertsch, Woods; AMNH), 4♀; 7 mi S Colima, Aug. 2, 1956 (Gertsch, Roth; AMNH), 1♀, Aug. 28, 1965 (Gertsch, Hastings; AMNH), 1♀; 8 mi SW Colima, 103°45′W, 19°10′N, May 10, 1963 (Gertsch, Ivie; AMNH), 2♂, 1♀; 10 mi S Colima, July 31–Aug. 1, 1954 (Gertsch, AMNH), 6♀, juvs.; 10 mi SW Colima on rt. 110, elev. 450 m, May 31, 1982 (F. Coyle, AMNH), 1♀; Nevado de Colima, Jan. 20, 1943 (F. Bonet, AMNH), 1♀. **Jalisco:** 5–8 mi E Magdalena, July 31, 1964 (Gertsch, Woods; AMNH), 1♀. **Nayarit:** 26 mi N Rosa Morada, July 2, 1964 (Gertsch, Woods; AMNH), 2♀, juvs.; 9 mi S Tepic, July 29, 1964 (Gertsch, Woods; AMNH), 4♀, juvs. **Sinaloa:** 20 mi E Mazatlán, Aug. 5, 1956 (Gertsch, Roth; AMNH), 4♀, juvs.; 6 mi E Villa Unión, July 23, 1954 (Gertsch, AMNH), 4♀, juvs.; 6.1 mi E Villa Unión on rt. 40, elev. 200 m, May 23, 1982 (F. Coyle, AMNH), 1♂.

NATURAL HISTORY: Both sites where I have collected *E. gertschi,* 6.1 mi east of Villa Unión in Sinaloa and 10 mi southwest of Colima in Colima, are at similarly low elevations (200 and 450 m, respectively) and support a deciduous thorn forest community with very dry and rocky soil. Most webs were under large rocks, but some were at the soil/trunk interface at the base of trees. Each web consisted of a thin- to moderately thick-walled, irregular, tubular retreat which usually extended down a tunnel or crevice well into the soil, and an exposed capture web consisting of one to several small irregular funnels fanning outward from the retreat and attached to the soil and rock edge or trunk. One of the largest of these exposed capture webs covered a 10 by 25 cm area and its retreat extended 15 cm down into the soil. Because the soil was so rocky and dry, it was very difficult to successfully excavate the spiders from these retreats; only one of about every ten attempts was successful. During May in three of the larger webs, I found clusters of spiderlings about half-way down the retreat tubes; when disturbed, these spiderlings ran rapidly in all directions. It is likely that these spiderlings were waiting until the onset of the rainy season (July) before dispersing.

Euagrus rothi, new species

Figures 129–135; Map 1

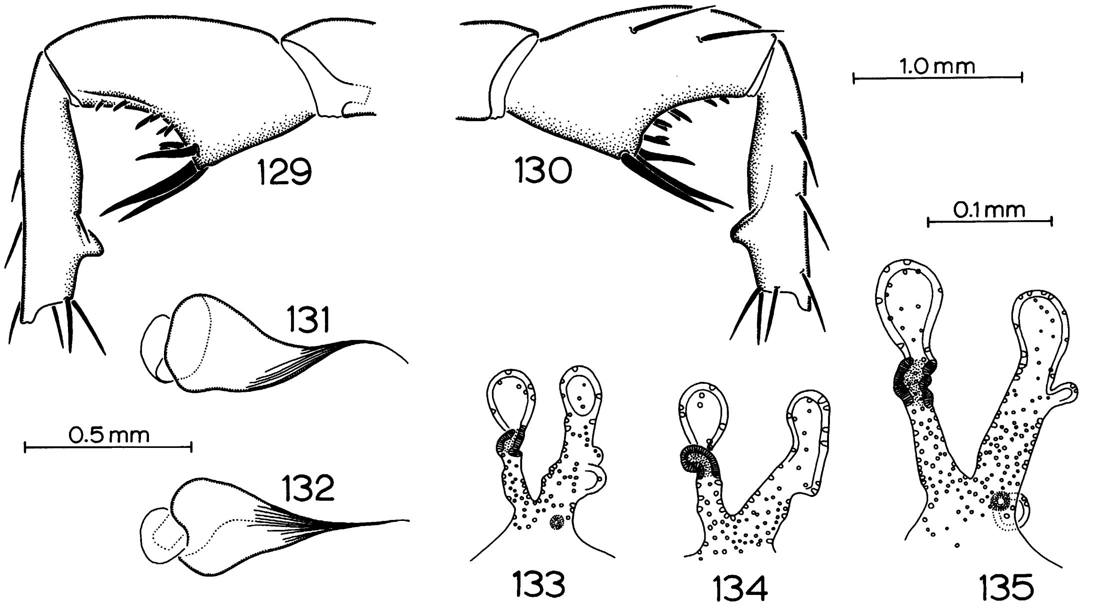
TYPES: Male holotype and one male and two female paratypes from 4800 ft elev., Thomas Canyon Ranch, Baboquivari Mtns., Pima Co., Arizona (Oct. 20, 1984; V. Roth), deposited in AMNH.

ETYMOLOGY: The specific name is a patronym in honor of Vincent D. Roth, collector of the type series and of numerous other *Euagrus* specimens.

DIAGNOSIS: *Euagrus rothi* can be distinguished from most *Euagrus* species by virtue of (1) the relatively large male tibia II ventral apophysis with spines on its distal face and on the ventral surface of the tibia distal of the apophysis (figs. 129, 130), (2) the indistinct bulb-embolus junction and the ridges on the palpal organ (figs. 131, 132), (3) the absence of a median keel on male metatarsus II, (4) the absence of metatarsal preening combs, and (5) the relatively long and virtually unsclerotized lateral spermathecal stalks (figs. 133–135). *Euagrus rothi* males differ from males of the related species, *E. mexicanus,* in the following ways: (1) The tibia II ventral apophysis is proportionally shorter [IITT(100)/IITL = 69–72] and less slender apically (figs. 129, 130) than in *E. mexicanus* [IITT(100)/IITL = 84–103; 96.1 ± 4.51] (figs. 100–102). (2) The moderately large spine on the retrolateral surface of the tibia II apophysis is positioned much closer to the apical spines (fig. 129) than in *E. mexicanus* (figs. 100, 102). (3) The palpal organ ridges are much closer together (figs. 131, 132) than in *E. mexicanus* (figs. 103–105). *Euagrus rothi* females are usually smaller (CL = 3.0–5.0; 3.64 ± 0.82) than *E. mexicanus* females (CL = 4.6–9.2; 7.31 ± 1.19), lack the silver-gold carapace pilosity of *E. mexicanus,* and have distinctively unsclerotized and elongate lateral spermathecal stalks (figs. 133–135). Males of *E. rothi* can be distinguished from males of the related species, *E. gertschi,* by the weaker retrolateral metatarsus II keel and taller prolateral keel of *E. rothi* (figs. 129, 130) (compare to *E. gertschi* figs. 114, 115), by the proportionally longer femur I spinule patch of *E. rothi* [IFSL(100)/IFL = 27–28] [*E. gertschi* IFSL(100)/IFL = 15–22], and by the stronger downward curve of the distal part of the *E. rothi* embolus (fig. 131) (compare to *E. gertschi* fig. 116). *Euagrus rothi* females have very different spermathecae (figs. 133–135) from those of *E. gertschi* (figs. 118–128).

MALES: Tables 1 and 3. Palpus (figs. 131, 132) with relatively large-diameter bulb tapering gradually into embolus; proximal half to two-thirds of embolus ridged; distal half of embolus strongly and evenly curved in lateral view. Tibia II (figs. 129, 130) with moderately large ventral apophysis with two long, thick, subequal apical spines and one moderately large retrolateral spine; several shorter spines distributed rather evenly on distal face of apophysis and adjacent ventral surface of tibia. Metatarsus II (figs. 129, 130) with a relatively thick low retrolateral keel with apex clearly proximal of metatarsus midpoint; high strong prolateral keel with prominent apex well distal of metatarsus midpoint. Femur I spinule patch short and wide; spinules stout. Fovea a moderately deep rounded pit. Carapace with sparse, long, slender, light brown semirecumbent hairs. Carapace pale yellow-tan; chelicerae, pedipalps, and legs a little darker tan; abdominal dorsum medium brown.

FEMALES: Table 2. Two primary spermathecal stalks on each side (figs. 133–135). Median stalk long; distal part sclerotized and slightly to moderately sinuous; bulb elongate. Lateral stalk as long or almost as long as median; unsclerotized; bulb elongate; small bulbs attached to distal and (often) basal part of



Figs. 129–135. *Euagrus rothi,* new species. 129–132. Holotype male. 129, 130. Tibia and metatarsus II. **129.** Retrolateral view. **130.** Prolateral view. 131, 132. Palpal organ. **131.** Retrolateral view. **132.** Ventral view. 133–135. Right spermatheca. **133.** Paratype. **134, 135.** Brown Canyon.

stalk. Fovea a shallow to moderately deep rounded pit. Carapace pale yellow-tan to darker orange-tan; chelicerae, pedipalps, and legs slightly darker; abdominal dorsum light brown or light purple-brown.

DISTRIBUTION: Known only from the Baboquivari Mountains in extreme southern Arizona (map 1).

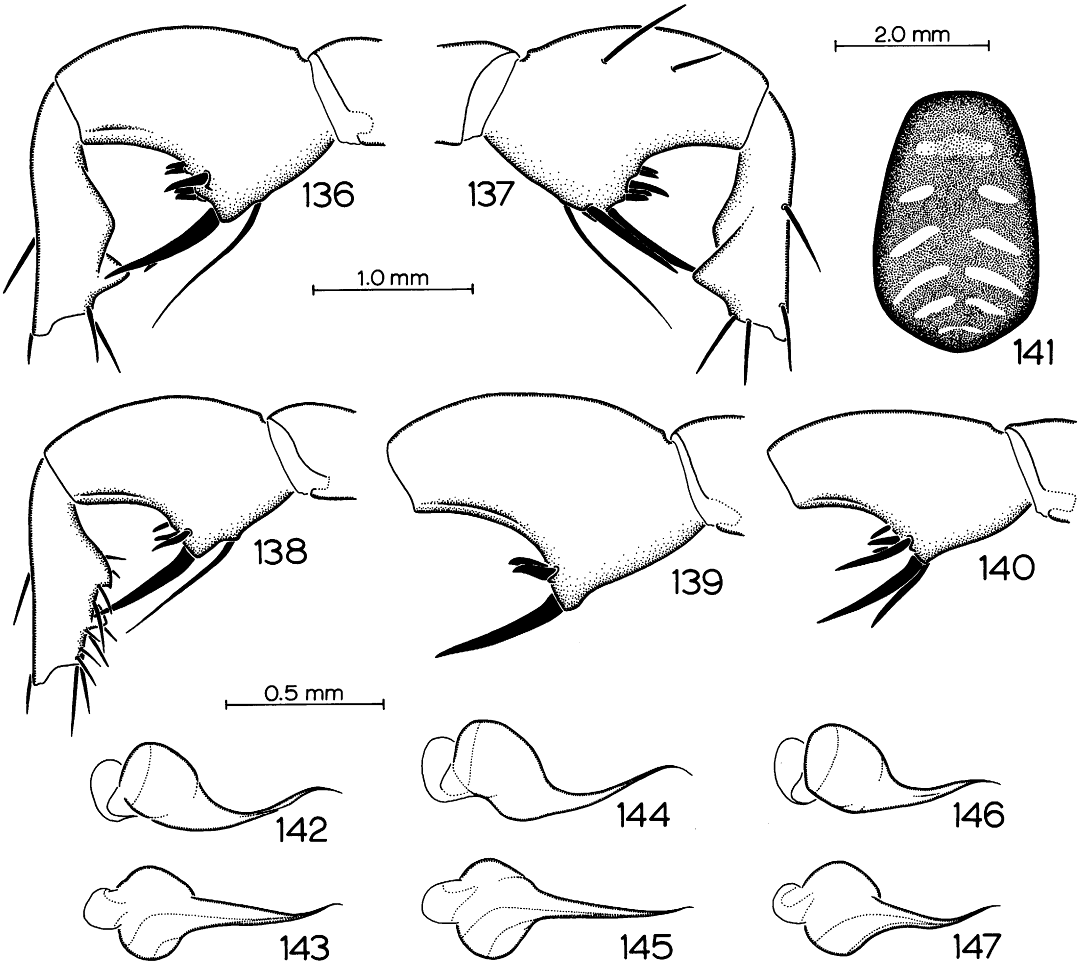
MATERIAL EXAMINED: UNITED STATES: **Arizona:** Pima Co.: Baboquivari Mtns., Brown Canyon, elev. 5300 ft, Sept. 4, 1951 (W. Creighton, AMNH), juv., elev. 5500 ft, Sept. 17, 1951 (W. Creighton, AMNH), juv., June 8–9, 1952 (W. Gertsch, AMNH), 1♀, juvs., July 19, 1959 (V. Roth, AMNH), 2♀, juvs.; Thomas Canyon Ranch, elev. 4800 ft, Oct. 20, 1984 (V. Roth, AMNH), 2♂, 2♀ (types).

Euagrus gus, new species
Figures 2, 4, 10, 11, 34, 38, 46, 49, 136–172; Map 2

TYPES: Male holotype and female paratype from the south slope of Mt. Chichinautzin, Morelos, Mexico (Jan. 22, 1978; L. Gamboa), deposited in AMNH.

ETYMOLOGY: The specific name is a noun in apposition taken from the name of a beloved pet dog.

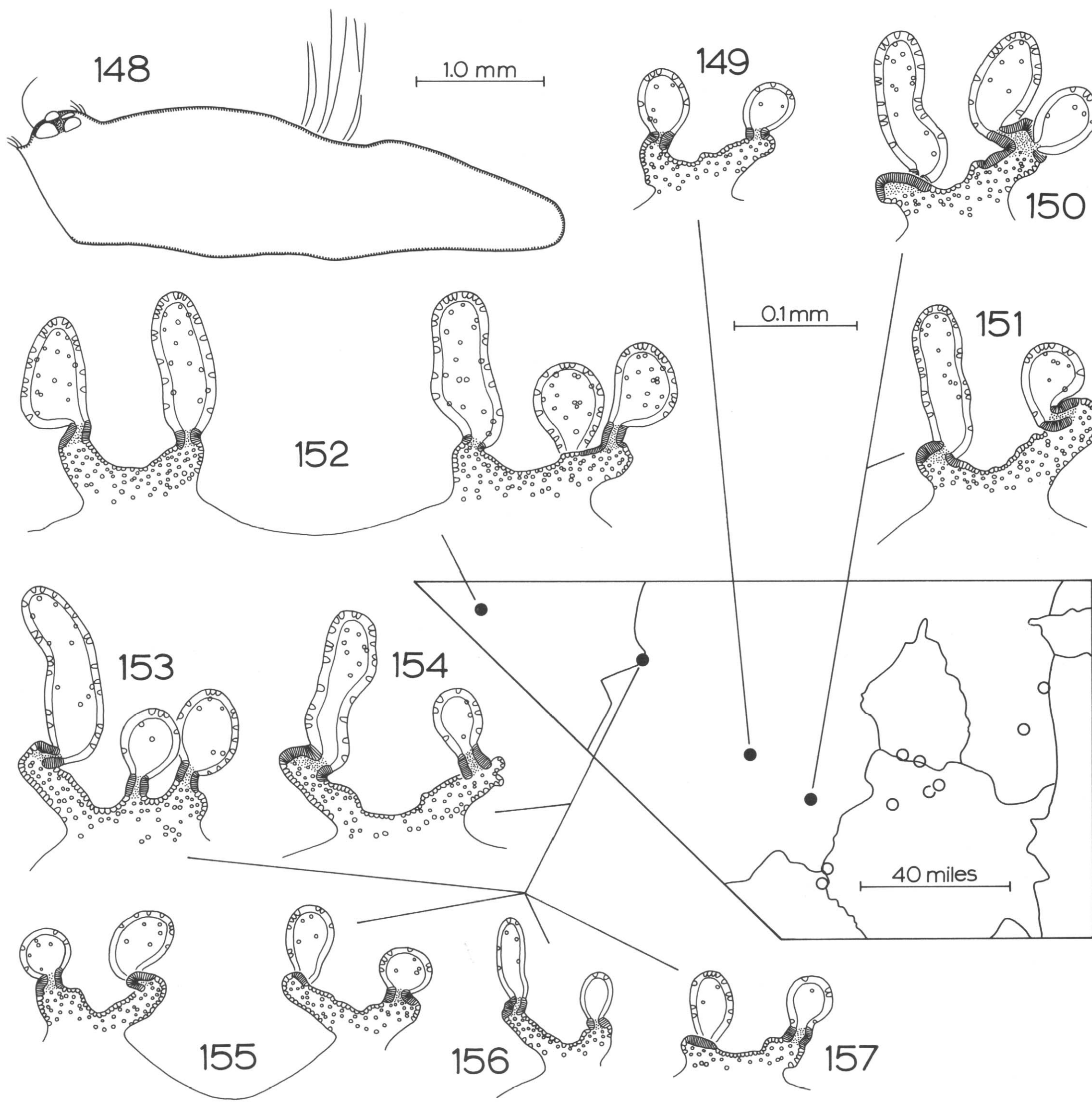
DIAGNOSIS: *Euagrus gus* males are distinguished from males of the closely related species *E. leones* and *E. garnicus* by their distinctively shaped metatarsus II keels (figs. 136–138). The retrolateral keel is relatively high, triangular or rounded in profile, and always has an angular apex; this keel does not hide the prolateral keel in retrolateral view. The prolateral keel is relatively tall, triangular, not distally truncate, and not joined distally to the retrolateral keel by a transverse ridge. The apex of the retrolateral keel is closer to the metatarsus midpoint in *E. gus* [MKR(100)/IIML = 54–64] than in *E. garnicus* [MKR(100)/IIML = 75]. I have found no characters that distinguish *E. gus* females from those of *E. leones,* but the primary lateral spermathecal bulb of *E. gus* females (figs. 149–172) is much larger than any of the lateral bulbs found in the two known *E. garnicus* females (figs. 189, 190). *Euagrus gus* males and females can be distinguished from those of all other, less closely related, *Euagrus* species by male leg II and palpus characters,



Figs. 136–147. *Euagrus gus,* new species, males. 136–140. Tibia and metatarsus II. 136, 137. Holotype. **136.** Retrolateral view. **137.** Prolateral view. **138.** Grutas de Cacahuamilpa, Guerrero, retrolateral view. **139.** Mil Cumbres, Michoacan, retrolateral view. **140.** Cueva del Diablo, Morelos, retrolateral view. **141.** Abdominal dorsum, Cueva del Diablo, Morelos, 2.0 mm scale. 142–147. Palpal organ. **142, 143.** Holotype. **144, 145.** Mil Cumbres, Michoacan. **146, 147.** Río Frio, Mexico. 142, 144, 146. Retrolateral view. 143, 145, 147. Prolateral view.

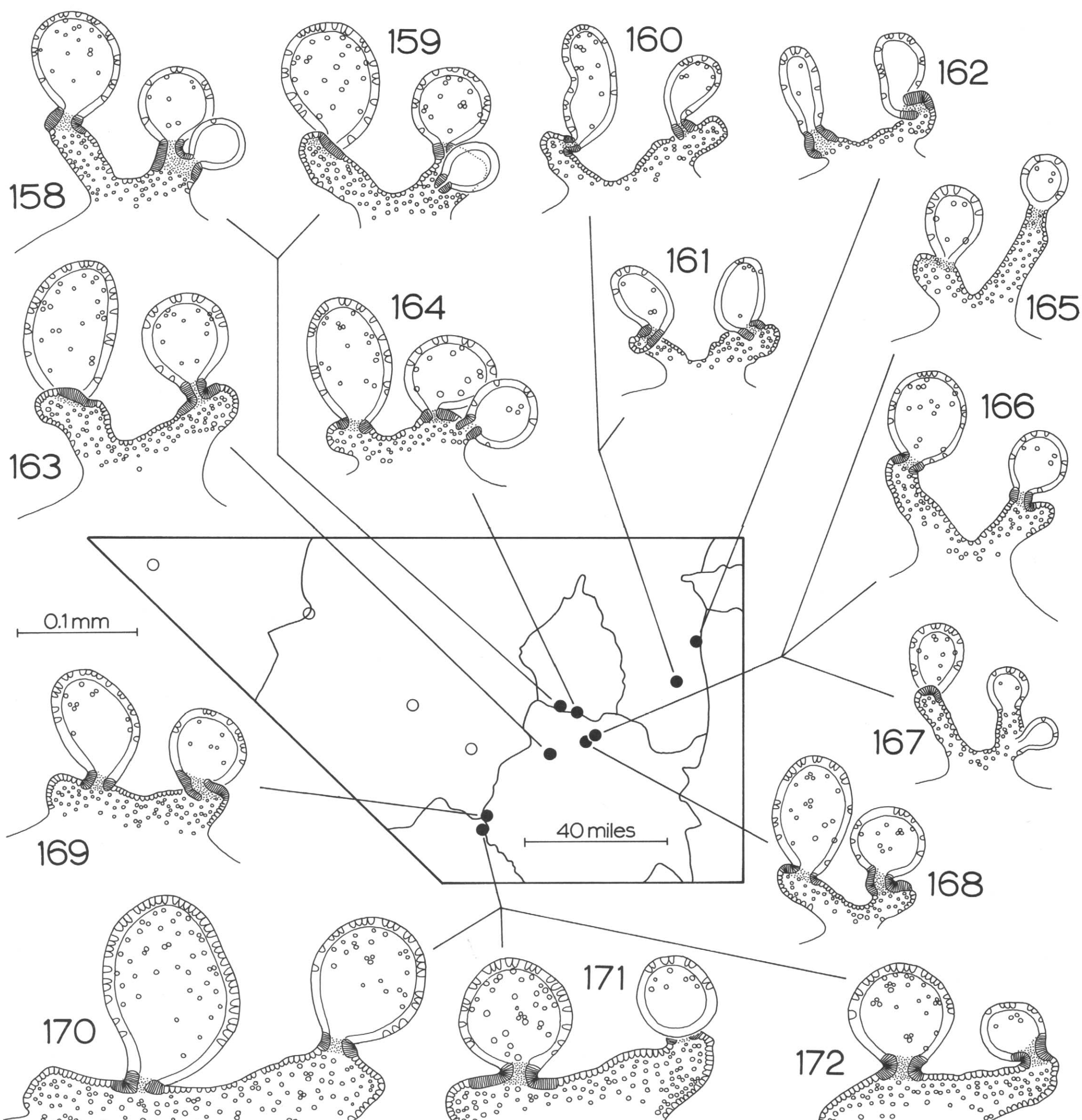
by spermathecal form, and, most easily, by the presence, on females, of four or more (rather than two or three) long foveal setae (fig. 148).

MALES: Tables 1 and 3. Palpus (figs. 142–147) bulb narrows rather abruptly into embolus base; embolus rather long and slender, curving upward for most of its length but curving slightly to strongly downward near tip; basal one-half to two-thirds of embolus sometimes flattened and thus wider in ventral than in lateral view; very weak ridges sometimes on embolus, one or two of which may form thin keel at one-half to two-thirds distance from embolus base. Tibia II (figs. 136–140) with large ventral apophysis with one long, thick, apical spine; often a smaller, but rather large, subapical spine on prolateral face of apophysis; two to eight smaller spines on distal slope of apophysis, the most retrolateral of these usually markedly larger than rest; no spines distal of apophysis; occasionally a prominent, long, slender, spinelike macroseta on proximal slope of ventral apophysis. Metatarsus II (figs. 136–138) with a prominent, long, usually triangular, retrolateral keel



Figs. 148–157. *Euagrus gus,* new species, females. **148.** Carapace, lateral view, 11 mi W Malinalco, Mexico, 1.0 mm scale. 149–151, 153, 154, 156, 157. Right spermatheca. 152, 155. Both spermathecae. **149.** Nevada de Toluca, Mexico. **150, 151.** 11 mi W Malinalco, Mexico. **152.** 2 mi W Mil Cumbres, Michoacan. **153–157.** Lengua de Vaca and Bosencheve National Park, Mexico.

(apex occasionally turned distally and proximal slope rounded) with apex just distal of metatarsus midpoint; tall, strong, triangular, prolateral keel with apex markedly more distal than that of retrolateral keel; no preening combs. Femur I spinule patch of moderate length and width; spinules quite stout. Fovea a deep, circular to slightly transverse pit. Carapace with moderately dense covering of thin, semirecumbent, brown setae. Carapace yellow-tan to orange-yellow; darker around edge. Chelicerae, pedipalps, and legs slightly lighter to slightly darker than carapace. Abdominal dorsum (fig. 141) medium to dark brown, usually with 6–7 broad, white to tan, transverse (usually paired) bands; these may be thin or absent, except for persistent pair of faint anterior spots joined by pale central area.



Figs. 158–172. *Euagrus gus,* new species, right spermatheca. **158, 159.** 15 mi S El Guarda, Morelos. **160, 161.** San Rafael, Mexico. **162.** Río Frio, Mexico. **163.** Cuernavaca, Morelos. **164.** Paratype. **165, 167.** Cueva del Diablo, Morelos. **166.** Ocotitlán, Morelos. **168.** Tepoztlán, Morelos. **169.** Michapa, Morelos. **170–172.** Grutas de Cacahuamilpa, Guerrero.

Living male from Grutas de Cacahuamilpa, Guerrero, with shiny medium chestnut brown carapace and appendages; abdominal dorsum brown with prominent transverse pale brown markings as described above.

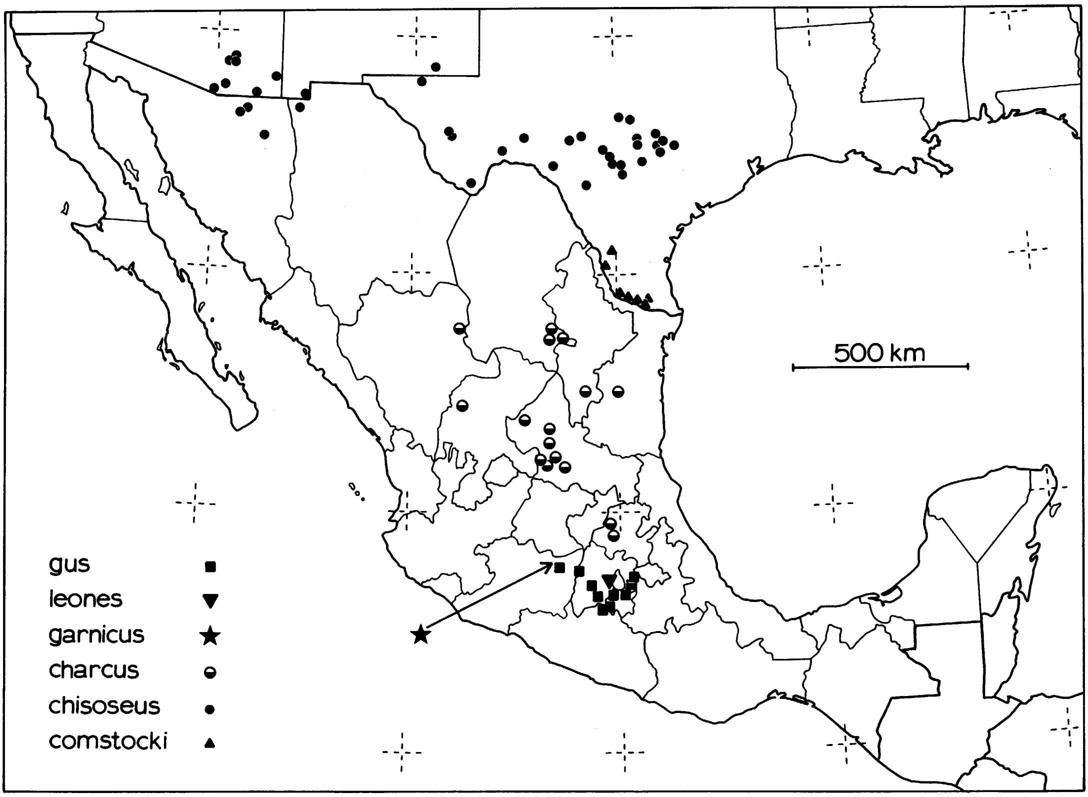
FEMALES: Table 2. Two primary spermathecal stalks on each side (figs. 149–172). Median stalk short to long, straight to strongly sinuous, rarely with single distal loop; forms a median shoulder; usually sclerotized for only a short length at distal end; bulb spherical to very elongate. Lateral stalk short to long, usually slightly curved to sinuous; forms a lateral shoulder; usually sclerotized only distally near base of bulb; bulb usually nearly spherical, occasionally elongate, nearly always smaller than median bulb. Often a secondary bulb attached to, or close to, primary lateral stalk. Trunk relatively low and broad. No sclerotized area on anterior genital lip. No metatarsus I preening comb. Fovea a deep, circular, triangular, or transverse pit. Four or more long foveal setae (fig. 148). Carapace with sparse to moderately dense covering of thin, recumbent and semirecumbent, light brown to brown setae. Carapace light yellow-brown or orange-tan to moderately dark orange-brown. Chelicerae a little darker than carapace. Pedipalps and legs like, or a little lighter than, carapace. Abdominal dorsum light brown, medium brown, purple-brown, or deep purple; usually with 6–8, paired, white or tan, transverse markings as in males (figs. 2, 4, 141), although frequently these markings are thin and faint, rarely they are absent.

VARIATION: The male from Río Frio, Mexico, and the one from west of Malinalco, Mexico, have proportionally shorter emboli and proportionally wider bulbs [BD(100)/PL = 47, 45, respectively; figs. 146, 147], and proportionally shorter metatarsi II [IIML-(100)/CL = 42, 41, respectively] than do those of the other eight *E. gus* males [BD(100)/PL = 41–43; figs. 142–145] [IIML(100)/CL = 45–49]. These same males (from Río Frio and west of Malinalco) lack the striking light-colored dorsal abdominal markings that all other observed *E. gus* males, except the one from Ocotitlán, Morelos (this male has very thin markings), possess (fig. 141). Although the Río Frio and Malinalco males differ concordantly from the rest of the species sample in these characters, these differences are not great and the samples are small; consequently, I postulate that these two specimens do not represent a different species.

The male from Michapa, Morelos, and the one from nearby Grutas de Cacahuamilpa, Guerrero, both have rather distinctive retrolateral keels on metatarsus II (fig. 138); the apex is turned distally, is sharply pointed, and the proximal slope of the keel is rounded in profile. The Grutas de Cacahuamilpa male's metatarsus II is markedly more spinose (fig. 138) than that of other *E. gus* males (fig. 136). I suspect that these character states will come to fall within the corresponding character state ranges of other populations when larger sample sizes are available.

Figures 149–172 illustrate the wide range of spermathecal form variation observed in *E. gus*. The median stalk varies from extremely short (Grutas de Cacahuamilpa, Michapa; figs. 169–172) or short (some Lengua de Vaca–Bosencheve, Chichinautzin; figs. 157, 164) to very long (some Lengua de Vaca–Bosencheve, S El Guarda, Ocotitlán; figs. 153–156, 158, 159, 166, 167). The median bulb varies from spherical (some Grutas de Cacahuamilpa, figs. 171, 172) to very elongate (W Malinalco, W Mil Cumbres, some Lengua de Vaca–Bosencheve, some San Rafael; figs. 150–154, 160). The primary lateral stalk is usually short or only moderately long, but rarely quite long (one Cueva del Diablo, fig. 165). The primary lateral bulb, although usually spherical or nearly so, is occasionally elongate (one W Malinalco, Río Frio, figs. 150, 162). Much of the total observed range of variation in each of these characters is present in the one sample of spermathecae I observed in the Lengua de Vaca–Bosencheve population. The most nearly distinctive population samples are those from Grutas de Cacahuamilpa (figs. 170–172) and nearby Michapa (fig. 169), which feature a very wide trunk and a rudimentary median stalk, but these character states are closely approached by some specimens at other localities (Lengua de Vaca–Bosencheve, Chichinautzin; figs. 157, 164).

Within some population samples of adult females, there is much variation in pigmentation of the dorsal surface of the abdomen. In the especially large sample from Lengua de Vaca–Bosencheve, the entire species range for this character is represented, from the absence of light marks (rare) to the presence of very thin and faint light marks (common) to the condition of six to eight sets of conspicuous, broad light marks (common). Some population samples contain only faintly marked (or virtually unmarked) females: Nevada de Toluca, W Malinalco, San Rafael, and Río Frio. Other population samples consist mostly of conspicuously marked females:



Map 2. Mexico and southern United States, showing distribution of *Euagrus gus,* new species, *E. leones,* new species, *E. garnicus,* new species, *E. charcus,* new species, *E. chisoseus* Gertsch, and *E. comstocki* Gertsch.

Mil Cumbres, Tenaningo, Grutas de Cacahuamilpa, Cuernavaca, 15 mi S El Guarda, Tepoztlán, Ocotitlán, and Cueva del Diablo.

A small degree of appendage elongation is apparent in the two cave populations (from Grutas de Cacahuamilpa, Guerrero, and Cueva del Diablo, near Ocotitlán, Morelos) when compared to the epigean populations of *E. gus* (table 4). There are no noticeable differences between these cave and epigean samples in other features, such as pigmentation or eye size, which have been altered in some other *Euagrus* cave populations.

DISTRIBUTION: That portion of the Central Highlands of Mexico centered around the states of Mexico and Morelos (map 2).

MATERIAL EXAMINED: MEXICO: **Guerrero:** Grutas de Cacahuamilpa, June 23, 1940 (D. Palaez, AMNH), 1♀, juvs., entrance zone, May 4, 1963 (Gertsch, Ivie; AMNH), 10♀,

TABLE 4
A Comparison of Relative Appendage Length in Cave-dwelling and Epigean *Euagrus gus* Females
Cave samples are from Grutas de Cacahuamilpa, Guerrero (N = 5), and Cueva del Diablo, Morelos (N = 2). Range, mean, and standard deviation given.

	Cave specimens (N = 7)	Epigean specimens (N = 13)
IFT(100)/IFL	39–41 (39.9 ± 0.90)	41–45 (42.9 ± 1.31)
ITL(100)/CL	43–48 (45.4 ± 1.72)	39–44 (41.5 ± 1.68)
LSL3(100)/CL	33–40 (36.4 ± 2.64)	27–35 (31.2 ± 2.40)

juvs., Sept. 2, 1966 (J. and W. Ivie, AMNH), 1♀, juvs., in dark part of entrance zone, June 9, 1982 (F. Coyle, AMNH), 1♂ (molted to adult Dec. 1982), 12♀, juvs. **Mexico:** Bosencheve National Park, May 7, 1963 (Gertsch, Ivie; AMNH), many ♀, juvs., elev. 2900 m, June 3, 1982 (F. Coyle, AMNH), 2♀, juvs.; Lengua de Vaca, Aug. 1, 1956 (Gertsch, Roth; AMNH), 3♀, juvs.; 11 mi W Malinalco, Oct. 25, 1973 (Williams, Mullinex; CAS), 1♂, 2♀, juvs.; Nevada de Toluca, elev. 10,500 ft, Aug. 7, 1951 (C. Bogert, AMNH), 1♀, juv., elev. about 14,000 ft, Sept. 7–9, 1969 (S. and J. Peck, AMNH), 4♀; Río Frio, May 1, 1941 (M. Cardenas, M. Correa; AMNH), 1♀, under pine bark, Jan. 4, 1976 (M. Jaunzems, TMM), 1♀; W Río Frio, elev. 9700 ft, Aug. 22, 1964 (J. and W. Ivie, AMNH), 1♂; San Rafael, elev. 2700–3000 m, Feb. 1, 1942 (C. Bolívar, AMNH), 4♀, juvs.; Tenango de Valle, elev. 2400 m, Aug. 25–26, 1946 (H. Wagner, AMNH), 1♀; Tenaningo, elev. 2050 m, Sept. 6–15, 1946 (H. Wagner, AMNH), 4♀, juvs. **Michoacan:** Lengua de Vaca, 12 mi E Zitacuaro, elev. 9000 ft, pine-oak-fir forest, carrion-dung traps, Sept. 8–10, 1969 (S. and J. Peck, MCZ), 1♀; Mil Cumbres, 70 km E Morelia, elev. 9000 ft, dung-carrion traps in pine-oak forest, Sept. 8–10, 1969 (S. and J. Peck, MCZ), 1♂; 2 mi W Mil Cumbres on rt. 15, elev. 2600 m, June 3, 1982 (F. Coyle, AMNH), 2♀. **Morelos:** S slope of Mt. Chichinautzin, Jan. 22, 1978 (L. Gamboa, AMNH), 1♂ (holotype); Cuernavaca, July 31, 1956 (Gertsch, Roth; AMNH), 2♀, juvs.; N Cuernavaca, 99°14′W, 18°56′N, May 6, 1963 (W. Gertsch, W. Ivie; AMNH), 2♀, juvs.; 15 mi S El Guarda, Nov. 14, 1946 (E. Ross, AMNH), 1♂, 4♀, juvs.; Michapa, Resumidero Río S. Geronimo, Oct. 18, 1942 (C. Bolívar, C. Tellez; AMNH), 1♂, 2♀; Ocotitlán, Jan. 24, 1978 (J. Gutierrez, UM), 1♀ (A. Mendez, UM), 1♂, May 23, 1978 (UM), 1♀; near Ocotitlán, Cueva del Diablo, June 3, 1978 (M. Vena, UM), 1♂, many ♀ and juvs. from Cueva del Diablo on many dates by many collectors (UM); Tepoztlán, elev. 1600 m, Aug. 2, 1942 (C. Bolívar, AMNH), 1♀, juv., elev. 1750 m, Aug. 18, 1946 (C. Bolívar, I. Pina; AMNH), 2♀, Oct. 29, 1976 (UM), juv.; 0.5 mi W Tepoztlán—rt 115D interchange on road to Ocotepec, elev. 1800 m, June 10, 1982 (F. Coyle, AMNH), 1♂ (molted to adult Sept. 14, 1982), juvs. **Puebla:** highway 190 E Río Frio, elev. 2900 m, pine forest, Aug. 7, 1965 (Cornell U. field party, MCZ), 1♀.

NATURAL HISTORY: Most of the known epigean populations of *E. gus* live at elevations from 1600 to 4200 m and in forest habitats, including oak, pine, pine-oak-fir, and pine-fir forests. At Bosencheve Park, Mexico, in a pine-fir forest and near Mil Cumbres, Michoacan, in a pine-oak-fir forest, all webs were flattened irregular tubes in and under rotting logs; exposed capture webs were perhaps either small and overlooked or not present. In a lower-elevation oak forest habitat near Tepoztlán, Morelos, *E. gus* webs were common on the lower part of a tall rock outcrop. The retreats of these spiders were irregular tubes extending only 3–5 cm into crevices in the thin soil that was anchored to much of the rock surface by moss and other small plants; the small exposed capture webs of tiny funnels plus sheets each covered no more than 50 cm^2.

A female from Bosencheve Park constructed an egg sac and deposited eggs soon after she was collected. The sac had the cup plus lid type of construction which Stevenson (1908) described in *E. chisoseus*.

The Grutas de Cacahuamilpa population of *E. gus* was nearly as dense as the densest epigean population I have observed. No individuals were found outside, at, or immediately inside the cave entrance but were very common on the floor of the dark middle one-third of the huge entrance room; I did not explore the inner one-third of this room or any deeper into the cave. The webs of these cave spiders were markedly different from those of their epigean relatives (figs. 4, 10, 11). Webs which were associated with rocks included only a short retreat under the rock but a relatively large complex of tubes and sheets covering the soil in front of the retreat and a large number of silk lines radiating out from this complex for 10–30 cm from the retreat opening. These lines were not lying limp on the soil surface but were stretched tight just above the surface. Frequently webs were not associated with rocks; some were associated in a similar way to the insulated electrical cables that lay on the cave floor, but many other webs were lying unsheltered on the soil surface. These webs usually had a roughly central, flattened, complex of one or a few retreat tubes and sheets lightly covered with soil and horizontal sheetlike peripheral areas with lines stretching out from these. One to three retreat openings allowed the spider easy access to the upper surface of the web complex. The spiders appeared to spend much of their time on the exposed part of the web outside the retreat tubes (fig. 11). Parts of millipede and beetle exoskeletons were found in the webs. Egg sacs were often positioned outside the retreats. Five of these egg sacs were collected; four had been abandoned by the spiderlings and contained only shed exoskeletons; one contained 76 unpigmented (except for eye region) spiderlings with apparently functional claws, fangs, and spigots.

Nine of the ten known males of *E. gus* were collected as adults or molted to adulthood during the 6-month period from August through January.

Euagrus leones, new species

Figures 1, 173–184; Map 2

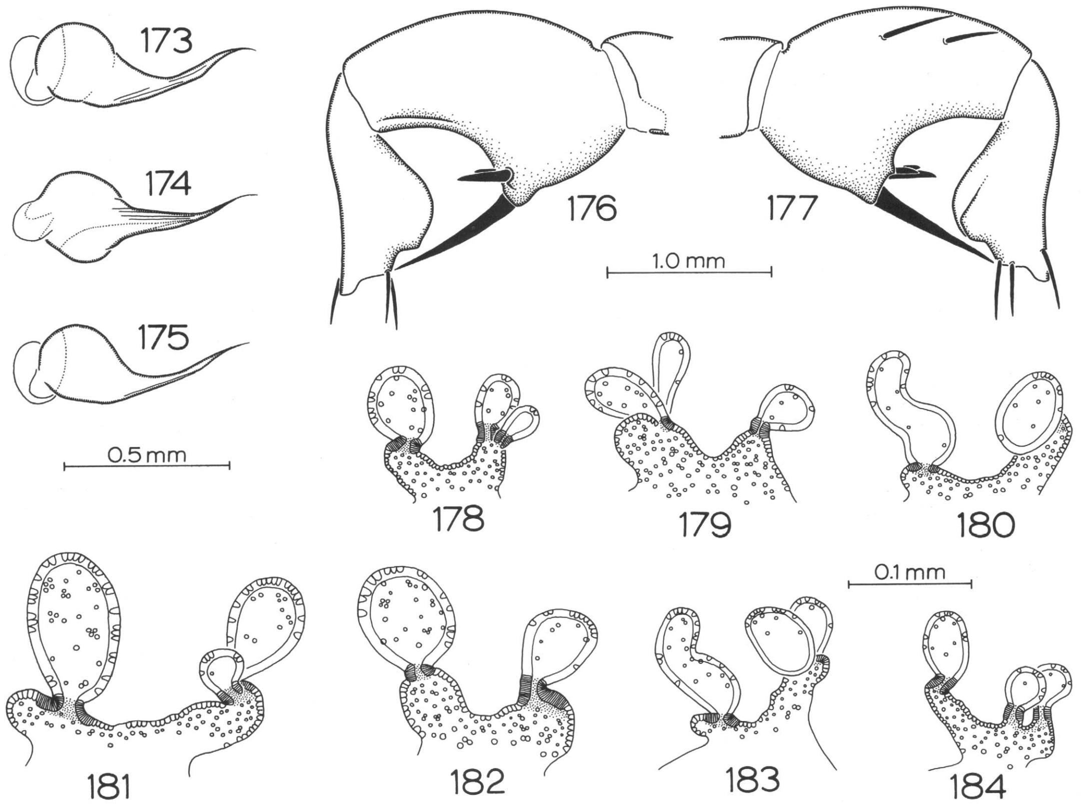
TYPES: Male holotype and two female paratypes from Desierto de los Leones, Distrito Federal, Mexico (Aug. 5, 1946; Goodnight, Bolívar, Bonet), deposited in AMNH.

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

DIAGNOSIS: *Euagrus leones* males are distinguished from males of the closely related species *E. gus* and *E. garnicus* by their distinctively shaped metatarsus II keels (figs. 176, 177). The retrolateral keel is very large, thin, rounded in profile, and distally truncate; this keel hides the prolateral keel in retrolateral view. The prolateral keel is also relatively tall and distally truncate, its apex is not at the distal end, and it is joined distally to the retrolateral keel by a high transverse ridge. The apex of the retrolateral keel is positioned proportionally further from the distal end of the metatarsus in *E. leones* [MKR(100)/IIML = 61–65] than in *E. garnicus* [MKR(100)/IIML = 75]. I have found no characters that can be used to separate *E. leones* females from those of *E. gus*, but the primary lateral spermathecal bulb of *E. leones* females (figs. 178–184) is much larger than any of the lateral bulbs found in the two known *E. garnicus* females (figs. 189, 190). *Euagrus leones* males and females can be distinguished from those of other, less closely related, *Euagrus* species by male tibia II, metatarsus II, and palpus character states, by spermathecal form, and, most easily, by the presence, on females, of six or more (rather than two or three) long foveal setae.

MALES: Tables 1 and 3. Palpus (figs. 173–175) bulb narrows relatively quickly into embolus base; embolus relatively long and slender, curving upward for most of its length but curving slightly to moderately downward near tip; weak thin ridges on embolus, one of which is expanded into thin ventral keel at one-half to two-thirds distance from embolus base. Tibia II (figs. 176, 177) with large ventral apophysis with one long, thick, apical spine; rarely also a smaller, but rather large, subapical spine on prolateral face of apophysis; two to four smaller spines on distal slope of apophysis, the most retrolateral of these the largest; no spines distal of apophysis. Metatarsus II (figs. 176, 177) with very large, elongate retrolateral keel which is rounded ventrally, truncate distally, and hiding prolateral keel in retrolateral view; angular prolateral keel truncate distally and connected to distal end of retrolateral keel by high transverse ridge; no preening combs. Femur I spinule patch of moderate length and width; spinules quite stout. Fovea a deep, slightly transverse pit. Carapace with sparse to moderately dense population of thin, semirecumbent, brown setae. Carapace light orange-brown to medium brown; darker around edge. Chelicerae, pedipalps, and legs pale tan to orange-brown; mostly similar to carapace. Abdominal dorsum medium to dark brown with anterior pair of small light spots and very thin, paired, transverse, light markings positioned as in *E. gus*.

FEMALES: Table 2. Two primary spermathecal stalks on each side (figs. 178–184). Median stalk short to long, straight except for median shoulder (usually present); sclerotized only near base of bulb; bulb nearly spherical to very elongate. Primary lateral stalk short to long, usually with lateral shoulder; sclerotized distally near base of bulb; bulb smaller than median bulb and roughly oval. Smaller secondary bulb/stalk often present and attached to lateral stalk or rarely to median stalk. Trunk relatively low and



Figs. 173–184. *Euagrus leones,* new species. 173–175. Palpal organ. 173, 174. Holotype. **173.** Retrolateral view. **174.** Ventral view. **175.** Desierto de Los Leones, Distrito Federal, retrolateral view. 176, 177. Male tibia and metatarsus II, holotype. **176.** Retrolateral view. **177.** Prolateral view. 178–184. Right spermatheca. **178–182.** Desierto de Los Leones, Distrito Federal. **183, 184.** Contreras, Distrito Federal.

broad. No sclerotized area on anterior genital lip. No metatarsus I preening comb. Fovea a deep transverse pit. Six or more long foveal setae. Carapace with relatively sparse population of thin, recumbent and semirecumbent, light brown to brown setae. Carapace medium orange-brown to dark red-brown. Chelicerae like carapace or a little darker. Pedipalps and legs like carapace or a little lighter. Abdominal dorsum medium brown to dark red-brown; usually with anterior pair of small light spots and 3–5 pairs of very thin, faint, transverse, light markings positioned as in *E. gus.*

Variation: There is rather wide variation in spermathecal form in each of the two sampled populations, especially in the length and shape of the median stalk and bulb (figs. 178–184). However, in the better sampled Desierto de los Leones sample this variation is virtually continuous (figs. 178–182).

Remarks: When more and larger samples of *E. leones* and *E. gus* males are collected and examined, it is possible that the observed hiatus in metatarsus II keel form will disappear and that my current hypothesis—that *E. leones* populations are reproductively isolated from *E. gus* populations—will be rejected.

Distribution: Known only from the type locality and two other localities, all on the southwestern edge of Mexico City (map 2).

Material Examined: MEXICO: **Distrito Federal:** Contreras, Aug. 20, 1939 (C. Bolívar, D. Pelaez; AMNH), 1♀, Mar. 4, 1944 (M. Cardenas, AMNH), 1♀, Aug. 14, 1946 (Goodnight, Bordas; AMNH), 1♀, juv.; Desierto de los Leones, Aug. 13, 1939 (C. Bolívar, AMNH), 2♂, 2♀, juvs., Jan. 21, 1940 (D. Pelaez, AMNH), 2♀, Mar. 22, 1941 (M. Cardenas, M. Borrea; AMNH), 1♀, elev. 2900 m, Aug. 15–29, 1941 (H. Wagner, AMNH), 1♂, Mar. 12, 1944 (M. Cardenas, AMNH), 1♀, May 18, 1944 (Cardenas, AMNH), 1♀, Aug. 5, 1946 (Goodnight, Bolívar, Bonet; AMNH), 1♂ (holotype), 2♀ (paratypes), Aug. 28, 1946 (C. and M. Goodnight, AMNH), 2♀, juvs., below old convent, elev. 2900 m, June 4, 1982 (F. Coyle, AMNH), 3♀, juvs.; Santa Rosa, Oct.–Nov. 1942 (H. Wagner, AMNH), 1♂.

NATURAL HISTORY: In Desierto de los Leones, this species was collected at 2900 m elevation in a pine and fir forest dominated by pines, a forest apparently at the border between transition and Canadian zones. There was an understory of small trees, a moderately dense herbaceous ground cover, and a thick layer of needle and leaf litter. All specimens were found in two rotting logs which were covered by moss-covered bark. In one short log (1.0 × 0.5 m) were two females with egg sacs and three large juveniles. The webs were irregular tubes inside cavities in the soft wood; no exposed capture portions were seen. Each of the three females remained close to its egg sac without attempting to escape as it was being collected (fig. 1). Each egg sac was nearly round and flattened; one contained 37 eggs, another 53, and the third 136. Egg diameter ranged from 0.85 to 1.00 mm.

Euagrus garnicus, new species
Figures 185–190; Map 2

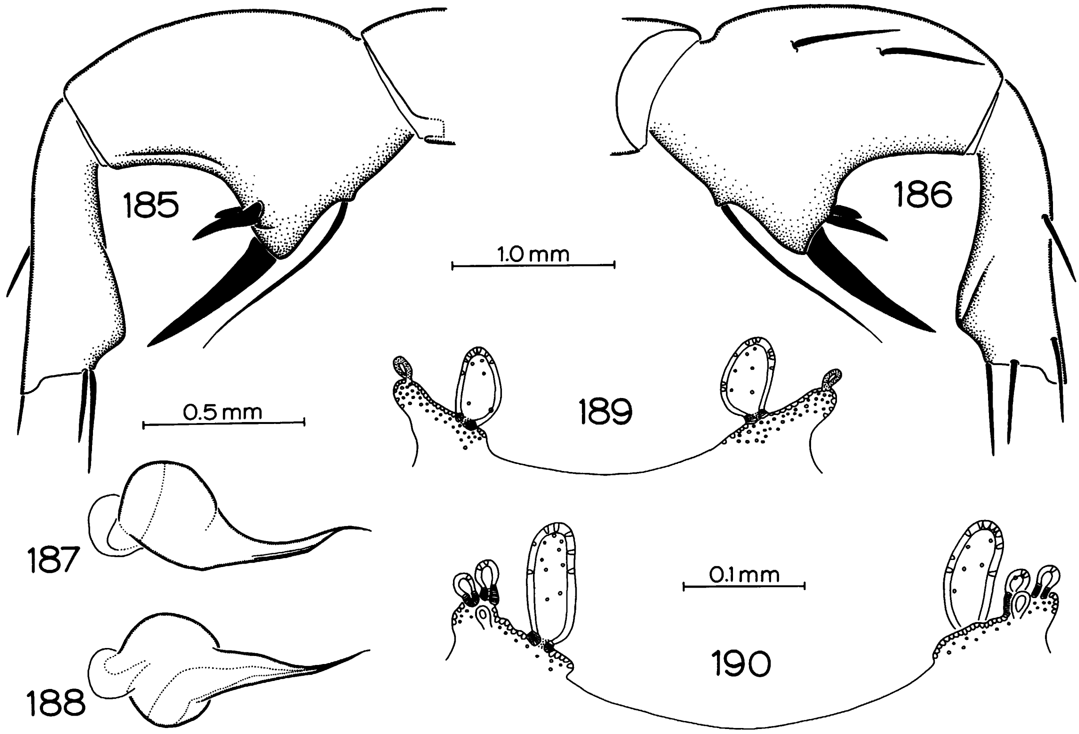
TYPES: Male holotype and two female paratypes from an elevation of 9300 ft at Garnica Pass (100°55′W, 19°40′N), Michoacan, Mexico (May 8, 1963; W. Gertsch, W. Ivie), deposited in AMNH.

ETYMOLOGY: The specific name is an arbitrary combination of letters.

DIAGNOSIS: The one known male of *E. garnicus* is distinguished from males of the very closely related species *E. gus* and *E. leones* by its distinctively shaped metatarsus II keels (figs. 185, 186). The retrolateral keel is relatively low and thick, its apex is at its distal end, and this keel hides the prolateral keel in retrolateral view. The prolateral keel is relatively low, its apex is also at its distal end, and it is joined distally to the retrolateral keel by a thick, high, transverse ridge. The apex of the retrolateral keel is positioned proportionally closer to the distal end of the metatarsus in *E. garnicus* [MKR(100)/IIML = 75] than in *E. gus* [MKR(100)/IIML = 54–64] and *E. leones* [MKR(100)/IIML = 61–65]. *E. garnicus* females have very reduced lateral spermathecal bulbs (figs. 189, 190) which are much smaller than the primary lateral spermathecal bulb of *E. gus* (figs. 149–172) and *E. leones* (figs. 178–184) females. *Euagrus garnicus* males and females can be distinguished from those of other, less closely related, *Euagrus* species by the above character states, by male tibia II and palpus character states, and, most easily, by the presence, on females, of six or more (rather than two or three) long foveal setae.

MALE: Tables 1 and 3. Palpus (figs. 187, 188) bulb narrows rather abruptly to embolus base; embolus rather long and moderately slender, curving upward for most of its length but slightly downward near tip; a few extremely faint ridges on middle one-third of embolus; embolus with a ventral keel-like area one-half to two-thirds distance from embolus base. Tibia II (figs. 185, 186) with large ventral apophysis with one long, thick, apical spine; two smaller spines on distal slope of apophysis, the more retrolateral of these the larger; no spines distal of apophysis; a long, slender, spinelike macroseta on proximal slope of ventral apophysis. Metatarsus II (figs. 185, 186) with relatively low, thick, retrolateral and prolateral keels with apices at their distal ends, three-fourths of the distance from proximal to distal end of metatarsus; distal ends of keels joined by thick, high, transverse ridge; no preening combs. Femur I spinule patch of moderate length and width; spinules rather stout. Fovea a deep rounded pit. Carapace with fairly sparse population of thin, semirecumbent, brown setae. Carapace medium orange-brown; darker around edge. Chelicerae, pedipalps, and legs similar to, but in places lighter than, carapace. Abdominal dorsum dark brown with anterior pair of small light spots and very thin, paired, transverse, light markings as in *E. leones*.

FEMALES: Table 2. Spermathecae (figs. 189, 190) on each side consist of large elongate oval median bulb on extremely reduced to



Figs. 185–190. *Euagrus garnicus,* new species. 185, 186. Male tibia and metatarsus II, holotype. **185.** Retrolateral view. **186.** Prolateral view. 187, 188. Palpal organ, holotype. **187.** Retrolateral view. **188.** Ventral view. **189, 190.** Both spermathecae, paratypes.

absent median stalk, one or more very small, oval, lateral bulbs on short stalks attached to lateral arm of broad spermathecal trunk; median side of trunk usually forms a median shoulder. No sclerotized area on anterior genital lip. No metatarsus I preening comb. Six or more long foveal setae. Carapace with fairly sparse population of thin, semirecumbent, brown setae. Carapace, pedipalps, and legs medium orange-tan to dark orange-tan. Chelicerae darker. Abdominal dorsum medium brown to purple-brown; with anterior pair of small light spots and 4–6 pairs of very thin, faint, transverse light markings as in *E. leones.*

REMARKS: The poorly sampled *E. garnicus* population may not be reproductively isolated from *E. gus* or *E. leones*; when a larger sample is available, *E. garnicus* may become a synonym of one or both of these close relatives. However, I believe that the known data pattern—*E. garnicus* metatarsal II keel form and spermathecal form are distinctly different from the corresponding characters of all other specimens of *E. gus* and *E. leones,* including the male and two females of *E. gus* collected at Mil Cumbres, only several miles from the type locality of *E. garnicus*—favors my current hypothesis.

DISTRIBUTION: Known only from the type locality in the central highlands of Mexico (map 2).

MATERIAL EXAMINED: Only the type specimens and two juveniles collected with them.

Euagrus anops Gertsch

Figure 191; Map 4

Euagrus anops Gertsch, 1973: 145, fig. 4 (female holotype from Cueva de la Porra, 5 km N Xilitla, San Luis Potosí, Mexico, in AMNH, examined). — Brignoli, 1974: 199. — Gertsch, 1981: 83, fig. 5. — Reddell, 1981: 133.

DIAGNOSIS: Females of this troglobitic species differ from those of all nontroglobitic *Euagrus* species by the absence of eyes and by their unusually elongate legs [ITL(100)/

CL = 96; IFT(100)/IFL = 21]. From both of the other known troglobitic *Euagrus* species (*E. troglodyta* and *E. cavernicola*), *E. anops* females can be distinguished by the very small size and low numbers of cheliceral teeth (CT = 7, 8) and lateral claw teeth (LCTI = 2). The median spermathecal stalk of *E. anops* is much longer and narrower than its lateral spermathecal stalk (fig. 191), a condition unlike that found in *E. troglodyta* (figs. 192, 193). See diagnoses of *E. troglodyta* and *E. cavernicola* for additional useful differences.

MALES: Unknown.

FEMALES: Tables 2 and 3. Two primary spermathecal stalks on each side; weakly sclerotized (fig. 191). Median stalk relatively long, narrow, and slightly sinuous; bulb oval. Lateral stalk short and rather wide; bulb larger than median bulb and wider than long. A very small secondary bulb attached to base of left median stalk. No preening combs on metatarsus I. Claws, fangs, and all appendages except spinnerets unusually elongate. Cheliceral teeth very small, sharp, spinelike, and widely spaced; form a reduced irregular row confined to proximal half of chelicera. Many lateral claws lack teeth; the 2 or 3 teeth on retrolateral claw of tarsus I are short, proximal, and difficult to see. Pars cephalica weakly elevated. Eyes absent; no trace of eye tubercle or pigmentation. Fovea a moderately deep, procurved, transverse groove. Carapace sparsely covered with fine, erect, light-colored hairs; hairs longer on carapace margin. One pair of very reduced foveal setae. Body and appendages pale yellow-tan.

REMARKS. Gertsch's (1973, 1981) descriptions of *E. anops* contain some important errors that misled Brignoli (1974) and need to be identified. He inverted the spermathecae, did not observe the spermathecal trunks or the one secondary bulb, said that the lateral spinnerets are much shorter than the carapace (they are longer), and made erroneous counts of the cheliceral teeth and denticles.

DISTRIBUTION: Known only from the type locality, a cave in the Xilitla karst region (Reddell, 1981) in southeastern San Luis Potosí, Mexico (map 4).

MATERIAL EXAMINED: MEXICO: **San Luis Potosí:** Cueva de la Porra, 5 km N Xilitla, July 19, 1969 (W. Elliott, S. Peck, D. Broussard, J. Peck; AMNH), 1♀ (holotype).

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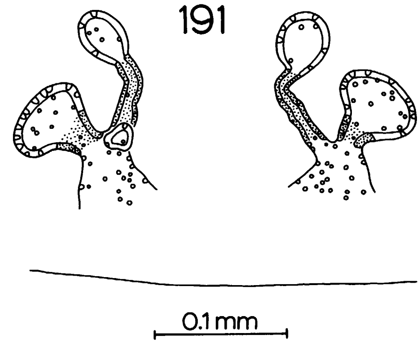


Fig. 191. *Euagrus anops* Gertsch, holotype, both spermathecae.

Euagrus troglodyta Gertsch

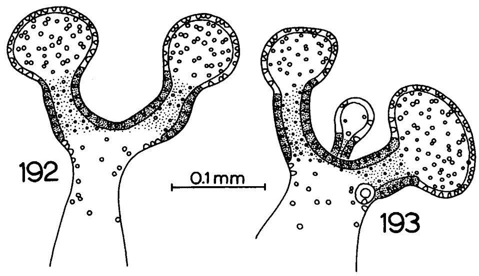
Figures 16, 19, 22, 192, 193; Map 4

Euagrus troglodyta Gertsch, 1981: 83, figs. 1–3 (female holotype from Cueva de Campamiento, 2 km E Cerro de La Luz, Querétaro, Mexico, in AMNH, examined).

DIAGNOSIS: Females of this troglobitic species differ from those of all nontroglobitic *Euagrus* species by the absence of eyes (fig. 16) and by their unusually elongate legs (fig. 22) [ITL(100)/CL = 94, 102; IFT(100)/IFL = 20]. *Euagrus troglodyta* females can be distinguished from those of the other known troglobitic species (*E. anops* and *E. cavernicola*) by their very large body size (CL = 6.4, 6.7) and by the strongly elevated pars cephalica (fig. 16). Unlike *E. anops* (fig. 191), *E. troglodyta* has median and lateral spermathecal stalks that are about equal in length and diameter (figs. 192, 193). See diagnoses of *E. anops* and *E. cavernicola* for additional useful differences.

MALES: Unknown.

FEMALES: Tables 2 and 3. Two primary spermathecal stalks on each side (figs. 192, 193). Median and lateral stalks about equal in length and diameter; straight or curved but without loops; walls rather thick but not heavily sclerotized. Median and lateral bulbs roughly spherical or broader than long; subequal or lateral bulb markedly larger. Sometimes one or two small secondary bulbs on short stalks attached near base of lateral stalk. No preening combs on metatarsus I. Claws, fangs, and all appendages unusually elongate (figs. 16, 19, 22). Pars cephalica strongly el-



Figs. 192, 193. *Euagrus troglodyta* Gertsch, right spermatheca. **192.** Sótano de la Silleta, San Luis Potosí. **193.** Holotype.

evated (fig. 16). Eyes absent; no trace of eye tubercle or pigmentation (fig. 16). Fovea a moderately deep transverse depression with front wall steep and procurved. Carapace sparsely covered with mostly erect, fine, light-colored hairs; margin of carapace with longer setae. One pair of very reduced foveal setae. Throughout body and appendages, setae are more slender and less numerous than on a typical epigean species of *Euagrus*. Carapace pale orange-tan with radiating grooves darker. Chelicerae slightly darker than carapace; pedipalps and legs like carapace. Abdominal dorsum pale yellow-gray.

REMARKS: Gertsch's (1981) measurements of the holotype's lateral spinneret were taken from the abnormally shortened right lateral spinneret. His drawing and description of the spermathecae are inaccurate and lack important details, such as the secondary bulbs.

DISTRIBUTION: Known only from two caves in the Xilitla karst region (Reddell, 1981) in southeastern San Luis Potosí and adjacent Querétaro, Mexico (map 4).

MATERIAL EXAMINED: MEXICO: **Querétaro:** Cueva de Campamiento, 2 km E Cerro de La Luz, June 8, 1976 (R. Jameson, AMNH), 1♀ (holotype). **San Luis Potosí:** Sótano de la Silleta, La Silleta, Mar. 30, 1980 (D. Honea, AMNH), 1♀.

Euagrus carlos, new species

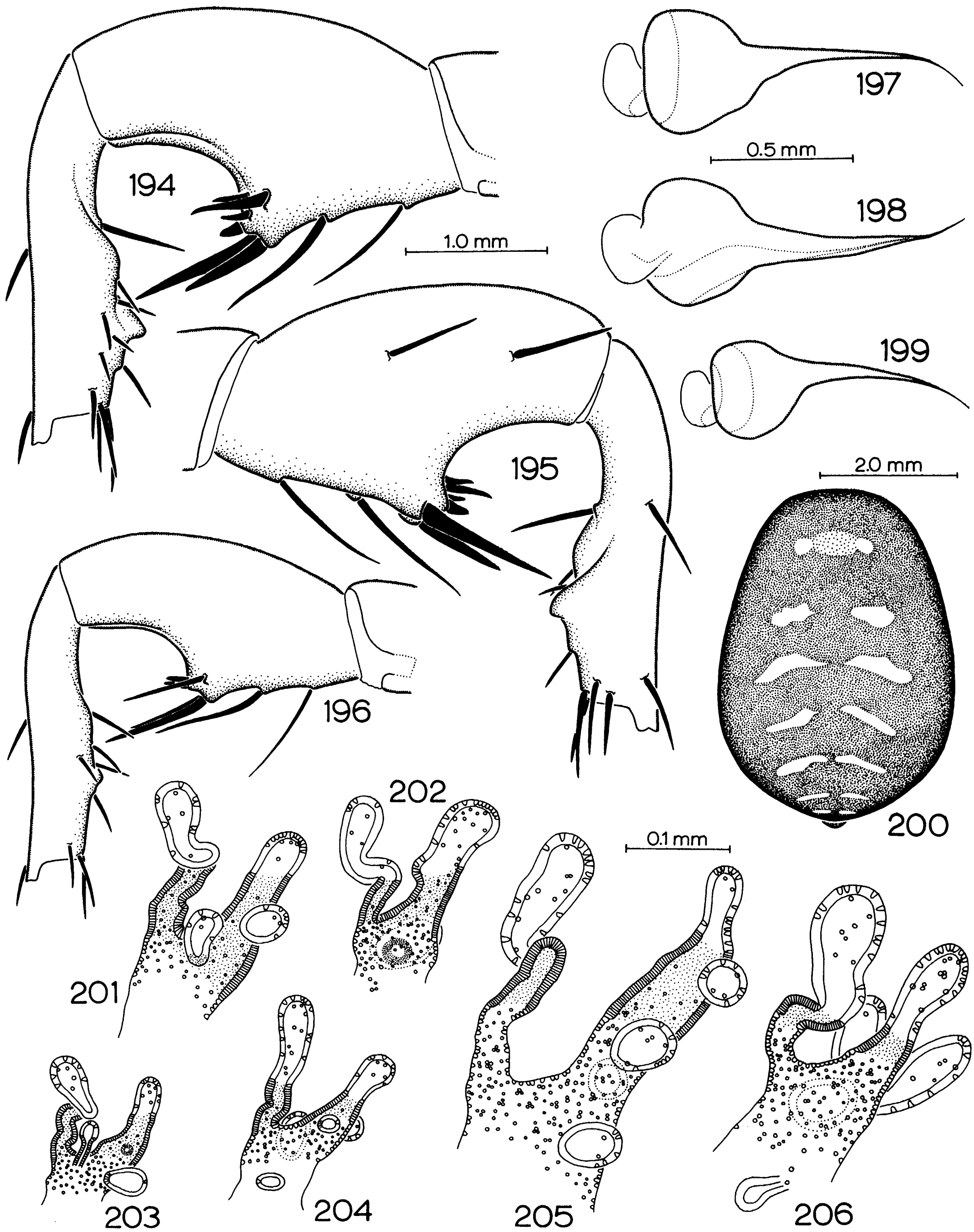
Figures 35, 36, 45, 48, 194–206; Map 3

TYPES: Male holotype and two male and four female paratypes from El Venado, San Carlos, Alajuela Prov., Costa Rica (Jan. 1980; C. E. Valerio), deposited in the AMNH.

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality and the first name of the collector of the type series, Carlos E. Valerio.

DIAGNOSIS: *Euagrus carlos* specimens can be distinguished from those of other *Euagrus* species, except for the closely related *E. charcus,* by the long and narrow femur I spinule patch [IFSW(100)/IFSL = 18–26], the shape and location of spines on male tibia II (figs. 194–196), the form and position of male metatarsus II keels (figs. 194–196), palpus form (figs. 197–199), and the distinctive spermathecae (figs. 201–206). To distinguish *E. carlos* specimens from those of *E. charcus,* see the *E. charcus* diagnosis.

MALES: Tables 1 and 3. Palpus (figs. 197–199) bulb tapers abruptly into embolus base; embolus relatively long and narrow, without ridges; proximal half to three-fourths of embolus flattened dorsoventrally and straight, rest rather strongly bent downward in lateral view and weakly bent in ventral view. Tibia II (figs. 194–196) with prominent ventral apophysis with two long thick apical spines (prolateral one usually longer and thicker) and usually one moderately large retrolateral spine; two or three (rarely one) short, thick, blunt-tipped spines subapically on distal face of apophysis; no spines distal of apophysis; one or two long slender spines on proximal slope of apophysis; prolateral surface of tibia with many spinose hairs. Metatarsus II (figs. 194–196) with moderately low retrolateral keel with apex at or just distal of metatarsus midpoint; prolateral keel higher, more pointed, more distal; prominent ventral spine medial and just proximal to retrolateral keel; no comb setae. Femur spinule patches long and narrow; spinules elongate with slender tips. Fovea a moderately deep to deep, broad, round, or triangular pit. Carapace with moderately dense covering of long, fine, semirecumbent, light brown setae. Carapace light yellow-brown to medium orange-brown. Chelicerae, pedipalps, and legs like carapace or slightly darker. Abdominal dorsum medium to dark purple-brown; sometimes with 8 white transverse (usually paired) markings (fig. 200); anteriormost pair of marks round and joined by a pale central area; other marks transverse and (especially the more posterior ones) the two members of each pair are nearly joined.



Figs. 194–206. *Euagrus carlos,* new species. 194–196. Male tibia and metatarsus II. **194, 195.** Holotype. **194.** Retrolateral view. **195.** Prolateral view. **196.** Los Chorros, El Salvador, retrolateral view. 197–199. Palpal organ. 197, 198. Holotype. **197.** Retrolateral view. **198.** Ventral view. **199.** Los Chorros, El Salvador, retrolateral view. **200.** Abdominal dorsum of male, Los Chorros, El Salvador, 2.0 mm scale. 201–206. Right spermatheca. **201.** Cueva del Tío Ticho, Chiapas. **202.** 10 mi W Totonicapán, Guatemala. **203.** Lanquín Cave, Guatemala. **204.** Santa Martha, Nicaragua. **205.** Tilaran, Costa Rica. **206.** Monteverde, Costa Rica.

FEMALES: Table 2. Two primary, rather elongate and weakly sclerotized, spermathecal stalks on each side (figs. 201–206). Median stalk sinuous or at least crooked; bulb elongate and relatively large; rarely a secondary bulb attached to distal end of stalk. Lateral stalk broader and straight; terminal bulb usually narrower, but never more than slightly wider than stalk; one to several other bulbs attached to lateral stalk and spermathecal trunk. No sclerotized area on anterior lip of genital opening. Fovea a shallow to deep circular or transversely rectangular depression or pit. Carapace with moderately dense to dense covering of thin, brown, recumbent and semirecumbent hairs. No metatarsus I preening combs. Carapace pale orange-tan to darker orange-tan. Chelicerae, pedipalps, and legs like carapace or slightly darker. Abdominal dorsum light brown to darker purple-brown with anterior median light-colored area and sometimes a few to 7 pairs of light transverse lines or bands serially arranged posteriorly to this.

VARIATION: The male from Guatemala and the one from El Salvador differ from the Costa Rican population sample (N = 8) in a few characters. The Guatemalan male is much smaller (CL = 2.7) and the El Salvadoran male slightly smaller (CL = 4.1) than the Costa Rican males (CL = 4.3–5.6). The Guatemalan and El Salvadoran males have the striking, transverse, white, dorsal abdominal markings (fig. 200), while the Costa Rican males have none or, at most (as in the Monteverde males), only very thin faint markings like these. These two males also have a slightly weaker tibia II ventral apophysis [IITT(100)/IITL = 56] (fig. 196) than do the Costa Rican males [IITT(100)/IITL = 61–68] (fig. 194). In addition, the spines on the proximal slope of the tibia II apophysis are more slender (fig. 196) and the embolus tip is bent ventrally less abruptly (fig. 199) in the Guatemalan and El Salvadoran specimens than in the Costa Rican specimens (fig. 194, 197).

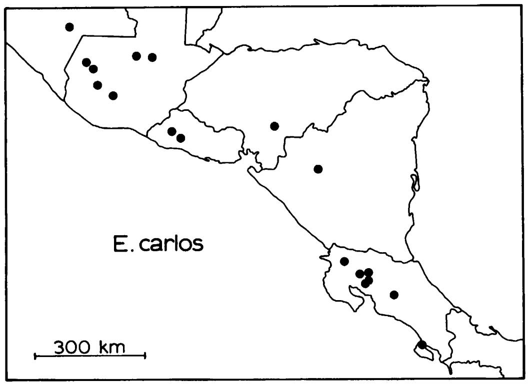
The size range of *E. carlos* females is exceptionally large (table 2), with the smallest specimens in Guatemala (CL = 2.9) and Honduras (CL = 2.5). However, the largest specimen is also from Guatemala (CL = 7.5), there are no major discontinuities in the size distribution, and even in one small sample (Tilaran, Costa Rica, N = 3) there is a very wide range of adult female body size (CL = 4.0–7.0). As is true for males, female body size and coloration are closely correlated. Although Costa Rican specimens are generally darker than those further north, all over the species range larger specimens are generally darker than small ones. Correspondingly, only a few Costa Rican females have the light transverse markings on the abdominal dorsum and, when present, these are very thin and inconspicuous. These markings are larger and more numerous on most of the specimens from north of Costa Rica; the most conspicuous such markings are found on the smallest (Guatemalan and Honduran) females. In the sample from Cueva del Tío Ticho in Mexico, the larger (older) the specimen, the smaller and less conspicuous these markings are. There is not much variation in the form of the primary spermathecal stalks (figs. 201–206) and the number of secondary bulbs appears to vary as much within some populations as among populations.

Although the two males from Guatemala and El Salvador are similar to each other and different from the rest of the *E. carlos* males in size, color, and a few sexual characters, I suspect that they do not represent populations that are reproductively isolated from the other populations of *E. carlos* because these differences are not large, the samples are very small, and major parts of the species range have not been sampled. This hypothesis is also supported by the absence of major discontinuities in the large size and color variation observed in *E. carlos* females.

The three cave specimens of *E. carlos* exhibit a small but obvious degree of appendage elongation, a condition characteristic of cave-adapted *Euagrus* species; these females (from Lanquín Cave, Guatemala, and Cueva del Tío Ticho, Mexico) have proportionally longer legs [ITL(100)/CL = 52–53] and spinnerets [PSL3(100)/CL = 44–49] than most other specimens [ITL(100)/CL = 37–47 and PSL3(100)/CL = 36–45]. However, these three specimens do not exhibit other character states, such as reduced pigmentation and tooth number, associated with adaptation to cave environments in other *Euagrus* species.

DISTRIBUTION: Central America from southern Costa Rica northwest to the state of Chiapas, Mexico (map 3).

MATERIAL EXAMINED: COSTA RICA: **Alajuela:** El Venado, San Carlos, Jan. 1980 (C. Valerio, AMNH), 3♂, 4♀, juv. (types). **Guanacaste:** Tilaran, Feb. 1963 (C. Valerio, UCR), 5♀, juvs., Feb. 1965 (C. Valerio, UCR), 1♂, 1♀, Dec. 26, 1979 (C. Valerio, UCR), 2♀; 4 km W Tilaran, elev. 500 m, under rotting logs in disturbed forest, Aug. 11, 1983 (F. Coyle, J. Carico; AMNH), 1♀, juvs.; several km N Tilaran, elev. 700 m, under rotting logs in dense forest and pasture, Aug. 12, 1983 (F. Coyle, J. Carico; AMNH), 3♀, juvs.; above Tilaran, litter in wet forest, July 14, 1966 (S. Peck, AMNH), 1♀; Volcán Rincón de la Vieja, rocky summit region, under rocks, elev. 1450–1916 m, June 4, 1987 (J. Kochalka, JAK), 1♂, 1♀, juvs. **Puntarenas:** Monteverde, Feb. 1960 (C. Palmer, AMNH), 2♂, Dec. 27, 1960 (C. Palmer, AMNH), 1♀, Jan. 3, 1961 (C. Palmer, AMNH), 1♀, Feb. 9, 1962 (C. Palmer, AMNH), 1♀, elev. 1219 m, Sept. 16, 1976 (E. Ross, CAS), 1♀; Monteverde Cloud Forest Reserve, on main road to reserve, elev. 1560 m, Mar. 16, 1977 (C. Craig, MCZ), 1♂; Monteverde, elev. 1400 m, second growth forest below Hotel de Montaña, Aug. 13, 1983 (F. Coyle, J. Carico; AMNH), 4♀, juvs.; Monteverde, elev. 1500 m, under logs in pasture, Aug. 13, 1983 (F. Coyle, J. Carico; AMNH), juvs.; Rincón, Osa, Feb. 24, 1972 (C. Valerio, UCR), 1♀; Santa Elena, Guácimal, Mar. 14, 1977 (C. Valerio, UCR), 1♀. **San Jose:** Planta Belen, Río Virilla, Feb. 22, 1968 (C. Valerio, UCR), 1♂, 1♀. EL SALVADOR: Los Chorros, June 20, 1963 (D. Cavagnaro, M. Irwin; CAS), 1♂. GUATEMALA: N Guatemala City, km 83, elev. 6600 ft, July 31, 1944 (Goodnight, AMNH), 1♀; 4 mi N Huehuetenango, under rock, Nov. 29, 1976 (G. Polis, AMNH), 1♀; Lanquín Cave, 1 km E Lanquín, Alta Vera Paz, Jan. 20, 1968 (N. Sullivan, AMNH), 1♀, juv.; Samac, Alta Vera Paz, Mar. 20, 1934 (K. Schmidt, AMNH), 1♂; Todos Santos Cuchumatan, elev. 8000 ft, Aug. 16, 1979 (C. Griswold, AMNH), 1♀; 10 mi W Totonicapán, elev. 9500 ft, Aug. 21, 1947 (B. Malkin, AMNH), 1♀. HONDURAS: Esc. Agr. Panam., 27 km S Tegucigalpa, El Volcán, elev. 5500–6500 ft, Mar. 1, 1946 (A. and M. Carr, MCZ), 1♀. MEXICO: **Chiapas:** Cueva del Tío Ticho, 1 mi S Comitán, Aug. 21, 1967 (J. Reddell, J. Fish, T. Evans; AMNH), 2♀, juvs. NICARAGUA: Santa Martha, 8 km N Matagalpa, elev. 1219 m, Sept. 12, 1976 (E. S. Ross, CAS), 1♀.



Map 3. Central America and southern Mexico, showing distribution of *E. carlos*, new species.

NATURAL HISTORY: *Euagrus carlos* has been collected from a wide range of elevations (near sea level to 3000 m). It appears to prefer forest habitats, but is found in very disturbed forests and even pastures where the climate is not too dry, and it is also known from two caves. Near Tilaran, Costa Rica, I found a sparse population in a moderately dry disturbed second growth forest on a hillside at 500 m elevation, none in the adjacent dry pasture, and a rather dense population in a moist second growth forest and adjacent pasture at 700 m elevation. At and near Monteverde, Costa Rica, I found at an elevation of 1400 m another rather dense population in moist second growth montane forest and in adjacent pastures.

In all of these Costa Rican localities, webs were found in similar microhabitats (in and under decomposing logs, in cavities in the litter and soil, or under rocks) and the webs were all similar in form. The irregular, sometimes branching, hidden retreat tubes were well developed (sometimes quite long), but the exposed capture webs (complexes of funnels and sheets at the log-ground interface) were relatively small or completely missing. It is likely that whenever there was no exposed web, an unexposed capture web, filling a space in or under the log or litter, was always present; at least this was observed to be true in several instances. The largest web observed had a single, 45-cm-long, horizontal retreat tube on the underside of a log and a 10-cm-diameter exposed capture web at the log-litter interface. Remains of millipedes and beetles were found in one web.

Nine of the eleven known *E. carlos* males were collected during the 3-month period of January to March. Two egg sacs were found in retreats of the spiders collected just north of Tilaran in August; one contained 65 spiderlings, the other 83. All of these spiderlings had functional spinnerets and chelicerae, and had black pigment between the eyes.

Euagrus charcus, new species

Figures 207–222; Map 2

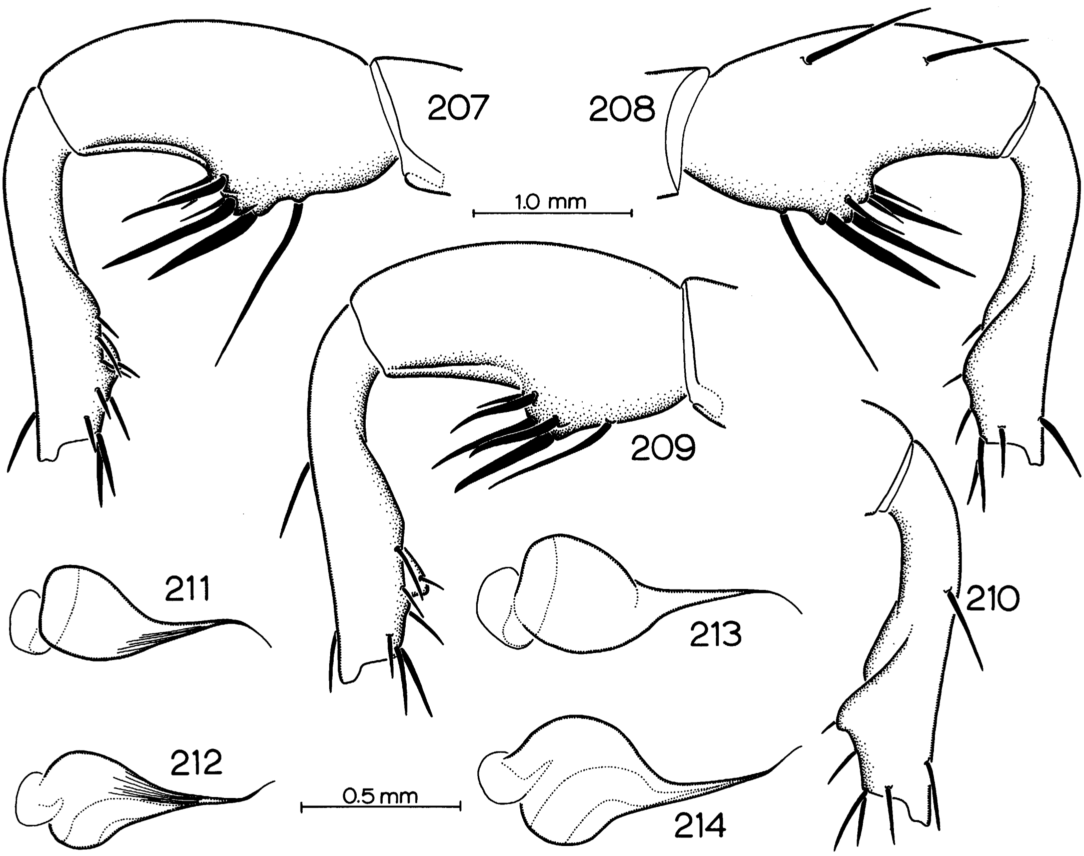
TYPES: Male holotype and two female paratypes from an elevation of 2200 m along route 49, 14.6 mi W of intersection with road to Charcas, San Luis Potosí, Mexico (May 25, 1982; F. Coyle), deposited in the AMNH.

ETYMOLOGY: The specific name is an arbitrary combination of letters.

DIAGNOSIS: Specimens of *E. charcus* can be distinguished from those of other *Euagrus* species, except the very closely related *E. carlos*, by the long and narrow male femur I spinule patch [IFSW(100)/IFSL = 26–33], the shape and location of spines on male tibia II (figs. 207–209), the form and position of male metatarsus II keels (figs. 207–210), palpus form (figs. 211–214), and the distinctive spermathecae (figs. 215–222). *Euagrus charcus* males differ from the similar *E. carlos* males in the following ways: (1) All spines on the distal face of the tibia II ventral apophysis are gradually tapered to long very sharp tips (figs. 207–209); the same spines are abruptly tapered, almost blunt, on *E. carlos* males (figs. 194–196). (2) There is a small subapical spine on the median face of the prolateral keel of metatarsus II (figs. 207–209); *E. carlos* males lack such a spine (figs. 194, 196). (3) There is no prominent spine attached to the ventral surface of metatarsus II medial to and at the proximal end of the retrolateral keel, as is the case in *E. carlos* (figs. 194–196). (4) The femur I spinule patch is proportionally wider [IFSW(100)/IFSL = 26–33] than in most *E. carlos* males [IFSW(100)/IFSL = 18–26]. (5) The palpus bulb is proportionally wider and the embolus less elongate [BD(100)/PL = 44–48] (figs. 211–214) than in most *E. carlos* males [BD(100)/PL = 36–45] (figs. 197–199). Females of *E. charcus* can best be distinguished from *E. carlos* females by the form of the primary lateral spermathecal bulb. In *E. charcus* females this bulb is never elongate, usually broader than long, and strongly constricted at its base (figs. 215–222); in *E. carlos* females this bulb is often quite elongate, always longer than broad, and unconstricted or only weakly constricted at its base (figs. 201–206). Also, the lateral spermathecal stalk is unsclerotized in *E. charcus* except distally at the bulb base, while in *E. carlos* this stalk is sclerotized for at least the distal one-third of its length.

MALES: Tables 1 and 3. Palpus (figs. 211–214) bulb tapers rather quickly into embolus base; embolus moderately long and narrow, without ridges (rarely weak ones); proximal half to two-thirds of embolus straight in lateral view, distal portion strongly bent ventrally and retrolaterally; embolus sometimes weakly sinuous in ventral view. Tibia II (figs. 207–209) with prominent ventral apophysis with three (rarely four) long strong spines (usually the most prolateral one the largest and the most retrolateral and distal one the smallest); one to four shorter spines with long, thin, sharp tips on distal face of ventral apophysis; no spines distal of apophysis; one (rarely 2 or 3) long slender spines on proximal slope of apophysis; prolateral surface of tibia with many spinose hairs. Metatarsus II (figs. 207–210) with moderately low retrolateral keel with apex at or a little distal of metatarsus midpoint; prolateral keel higher and more distal, with small subapical spine on its median face; no comb setae. Femur spinule patches long and narrow; spinules elongate with slender tips. Fovea a deep triangular or rounded pit. Carapace with moderately dense covering of long, fine, semirecumbent, brown setae. Carapace tan to chestnut brown. Chelicerae, pedipalps, and legs like carapace or slightly darker. Abdominal dorsum medium brown to dark purple-brown.

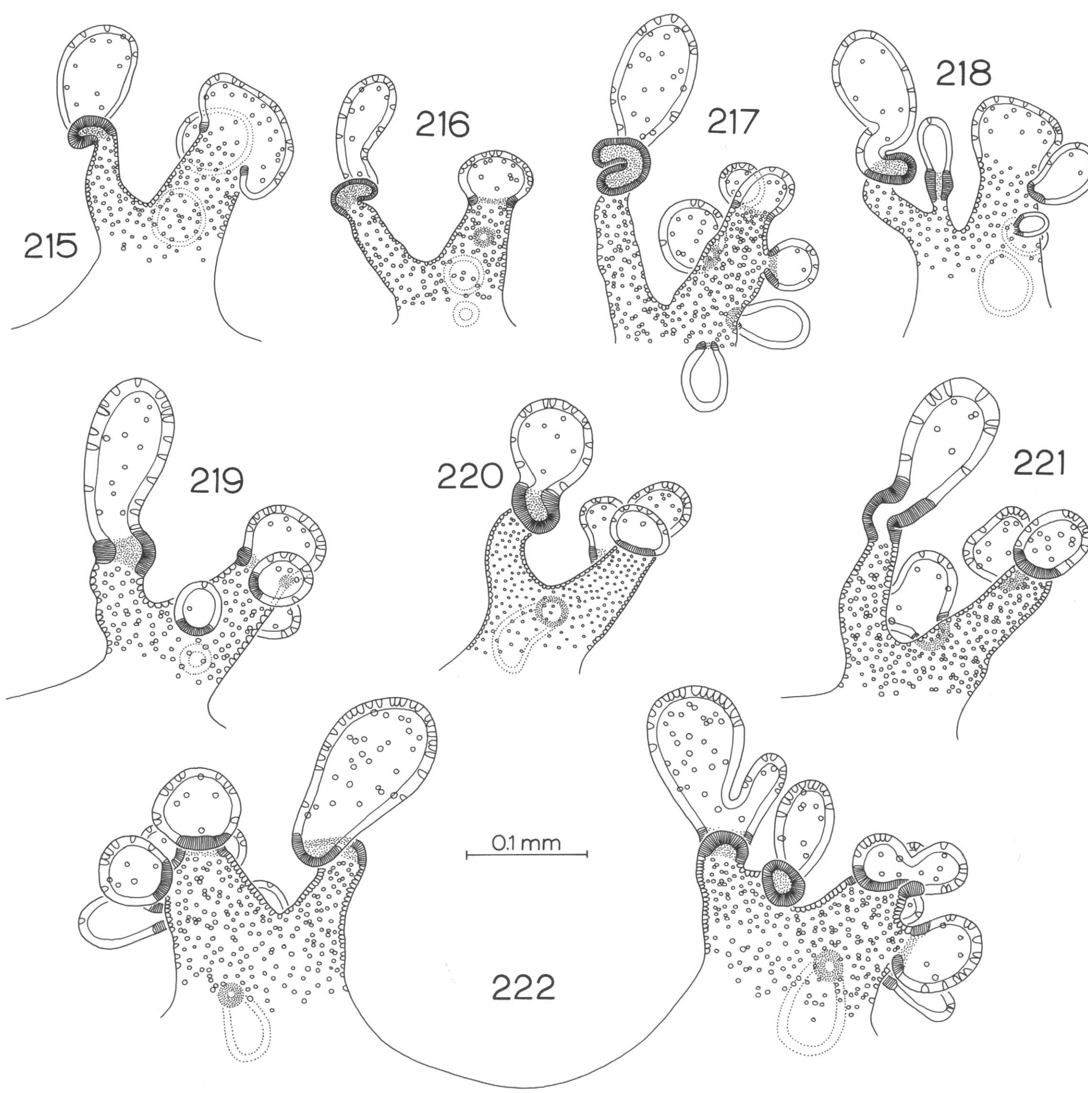
FEMALES: Table 2. Two primary, relatively long, spermathecal stalks on each side (figs. 215–222). Median stalk sinuous to strongly looped distally; distal part well sclerotized; longer and narrower than lateral stalk; bulb



Figs. 207–214. *Euagrus charcus,* new species, males. 207–210. Tibia and metatarsus II. 207, 208. Holotype. **207.** Retrolateral view. **208.** Prolateral view. 209, 210. 2 mi E Santo Domingo, San Luis Potosí. **209.** Retrolateral view. **210.** Prolateral view. 211–214. Palpal organ. 211, 212. Ixmiquilpan, Hidalgo. **211.** Retrolateral view. **212.** Ventral view. 213, 214. Holotype. **213.** Retrolateral view. **214.** Ventral view.

elongate (rarely almost spherical); occasionally one to four secondary short-stalked bulbs attached to median stalk. Lateral stalk broad and straight (rarely slightly crooked); sclerotized at base of primary (terminal) bulb which is slightly longer than wide (never elongate) to broader than long and is smaller than median bulb; two to six secondary bulbs attached to lateral stalk and (occasionally) lateral part of trunk. Trunk broad and relatively low. No sclerotized area on anterior lip of genital opening. Fovea shallow to deep, triangular to circular. Two long foveal setae. Carapace with moderately dense covering of thin, recumbent and semirecumbent, pale to brown setae. No metatarsus I preening combs. Carapace orange-tan to dark chestnut brown. Chelicerae like or a little darker than carapace. Pedipalps and legs like or a little lighter than carapace. Abdominal dorsum medium brown to dark brown or dark purple-brown; sometimes faint light markings (anterior pair of spots connected by median light area, followed sometimes by two or three very thin pairs of transverse marks).

VARIATION: Only one male (from Ixmiquilpan, Hidalgo) differs markedly from the rest in some characters. It is smaller (CL = 3.3) than the other males (CL = 3.9–5.6; 4.55 ± 0.53), has proportionally longer spines on the tibia II apophysis, and its palpus (figs. 211, 212) is distinguished by faint ridges on the ventral-retrolateral aspect of the embolus base and by a less abrupt tapering of the bulb into the embolus base. This specimen comes from the southern edge of the known range



Figs. 215–222. *Euagrus charcus,* new species, spermathecae. 215–221. Right spermatheca. **215.** 6 mi S Miconda de Presa, Nuevo León. **216, 217.** Km 14 highway 101, Tamaulipas. **218.** Paratype. **219.** 2.8 mi E San Francisco, San Luis Potosí. **220.** Few mi N Ixmiquilpan, Hidalgo. **221.** 1 mi E Zimapán, Hidalgo. **222.** 7 mi E Sombrerete, Zacatecas, both spermathecae.

of the species. Whether it represents a geographic variant population, a hybrid, or a reproductively isolated population, awaits further study of additional specimens; based on the available data, I postulate that it represents a population that is not reproductively isolated from other populations of *E. charcus.*

Although variation in nearly all aspects of spermathecal form is continuous, in one female (from near Ixmiquilpan, Hidalgo) the primary median bulbs are not elongate (fig. 220). At Zimapán, only 25 mi north of this locality, typical elongate median bulbs are found (fig. 221). Larger spiders tend to have proportionally broader spermathecae and more secondary bulbs (fig. 222).

DISTRIBUTION: Northeastern Mexico from Tamaulipas west to Durango and south to Hidalgo (map 2).

MATERIAL EXAMINED: MEXICO: **Coahuila:** 1 mi N El Tunal, elev. 2300 m, Aug. 10, 1977 (E. Schlinger, UCB), 1♀; Saltillo, July 18, 1937 (O. Sanders, AMNH), 1♀, May 23, 1952 (Cazier, Gertsch, Schrammel; AMNH), 1♀; 20 mi E Saltillo, July 18, 1956 (Gertsch, Roth; AMNH), 1♂, 2♀, juvs. **Durango:** Gòmez Pallacio, rt. 49, desert scrub, on ground in evening, July 8, 1965 (R. Schick, D. Schroeder; AMNH), 1♂. **Hidalgo:** Ixmiquilpan, July 6, 1944 (L. Davis, AMNH), 1♂; 25 mi S Zimapán on rt. 85, a few mi N Ixmiquilpan, elev. 1950 m, July 1, 1982 (F. Coyle, AMNH), 3♀, juvs.; 1 mi E Zimapán, June 24, 1963 (Beatty, Coyle; JAB), 3♀, juvs.; 5 mi N Zimapán, Nov. 21, 1946 (E. Ross, CAS), 3♀, juv. **Nuevo León:** 6 mi S Miconda de Presa, near 24°N, 100°2′W, creosote country, Feb. 17, 1984 (V. and B. Roth, AMNH), 1♂, 1♀, juvs. **San Luis Potosí:** Charcas, hillside, June 29–July 25, 1934 (MCZ), 4♂, 12♀, juvs.; road to Charcas, 30 mi N intersec. with rt. 49, elev. 2000 m, May 25, 1982 (F. Coyle, AMNH), 1♀, juvs.: rt. 49, 14.6 mi W intersec. with road to Charcas, elev. 2200 m, May 25, 1982 (F. Coyle, AMNH), 1♂ (holotype) (molted to adult early June 1982), 2♀; 2.8 mi E San Francisco on rt. 70, elev. 2000 m, May 26, 1982 (F. Coyle, AMNH), 1♀, juvs.; 3 mi E San Francisco, Oct. 17, 1972 (Roth, Firstman; AMNH), 2♀, juvs.; 15 km W San Luis Potosí on rt. 80, Mar. 18, 1972 (J. Roland, TT), 1♂, 1♀; 25 mi NE San Luis Potosí, Nov. 21, 1948 (H. Leech, CAS), 1♀; 2 mi E Santo Domingo, June 6, 1941 (A. and L. Davis, AMNH), 1♂. **Tamaulipas:** km 14 on rt. 101, Feb. 22, 1973 (W. Graham, T. Mollhagen, J. Webb; AMNH), 5♀; no specific locality, Mar. 18, 1972 (J. Cooke, AMNH), 1♂, 1♀. **Zacatecas:** 7 mi E Sombrerete, Aug. 31, 1965 (Gertsch, Hastings; AMNH), 3♀, juvs.

NATURAL HISTORY: *Euagrus charcus* is found primarily between 1900 and 2500 m elevation at locations in the Chihuahuan Desert and mesquite grassland communities that are rocky and support cactuses. *Opuntia* cactus and mesquite were both common in four of the five localities where I collected *E. charcus.* The webs are nearly always under rocks. An irregular flattened retreat tube extends roughly horizontally between the rock undersurface and soil and is continuous with one to three roughly vertical silk-lined underground tunnels. The spider almost always retreats to the bottom of one of these tunnels, which are sometimes difficult to excavate. At the edge of the rock, the main retreat tube opens into a relatively small and inconspicuous capture web of irregular funnels and sheets attached to the soil, litter (if present), and rock surfaces. Parts of beetle exoskeletons were commonly found in the webs. Nine of the twelve known males were collected as adults or matured in captivity during June and July; the other three adult males were collected in February and March.

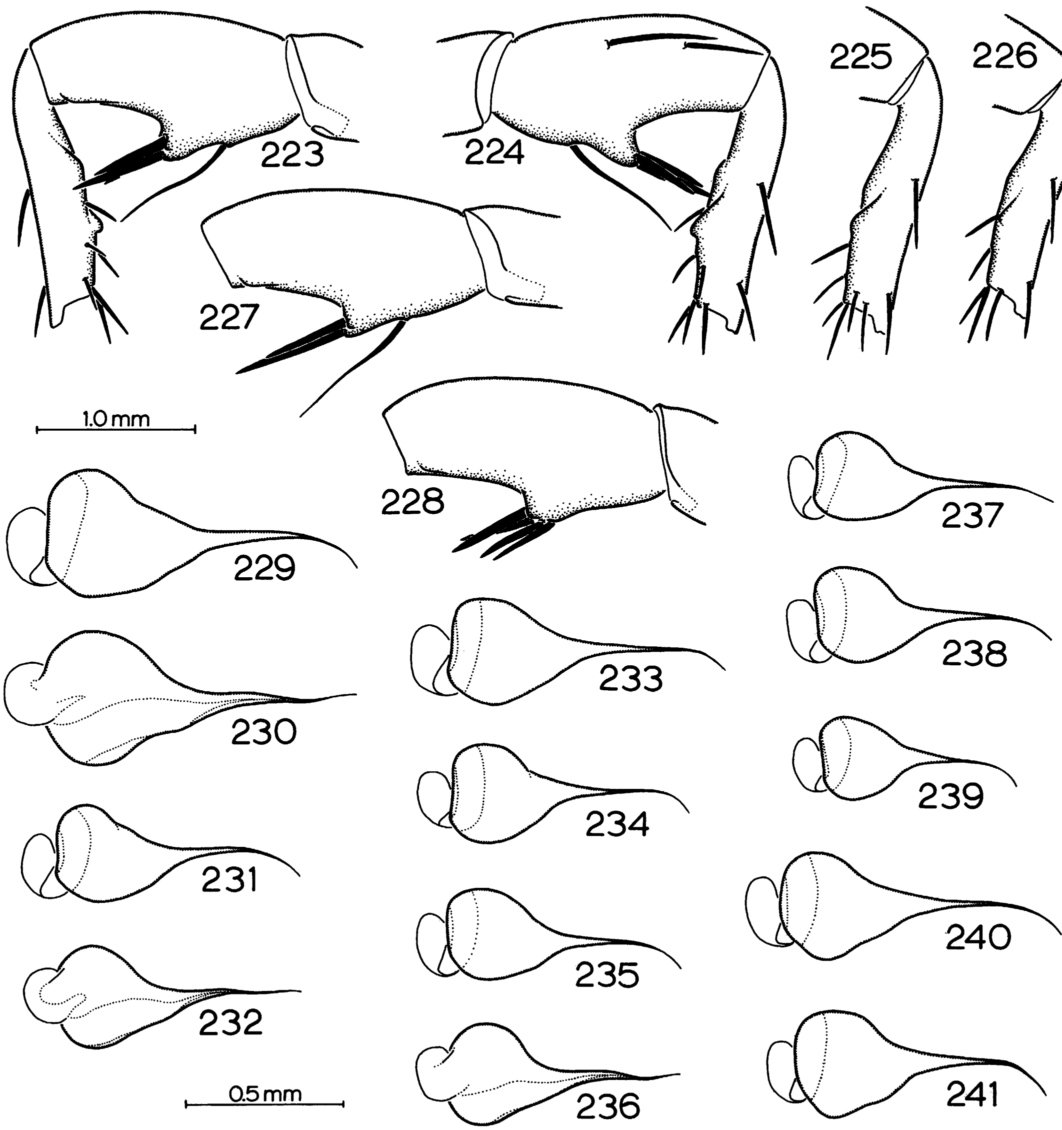
Euagrus chisoseus Gertsch

Figures 39–43, 50, 223–251, 260–262; Map 2

Euagrus chisoseus Gertsch, 1939: 21 (male holotype and two female paratypes from The Basin, Chisos Mountains, Big Bend National Park, Brewster Co., Texas, in AMNH, examined). — Gertsch and Mulaik, 1940: 308, fig. 9.
Euagrus ravenus Gertsch and Mulaik, 1940: 308, figs. 8 and 13 (male holotype and two female paratypes from Raven Ranch, Kerr Co., Texas, in AMNH, examined). NEW SYNONYMY.
Euagrus apacheus Gertsch and Mulaik, 1940: 309, figs. 7 and 12 (male holotype and one female and two male paratypes from Hays Co., Texas, in AMNH, examined). NEW SYNONYMY.
Euagrus ritaensis Chamberlin and Ivie, 1945: 555, figs. 19–21 (male holotype and numerous male and female paratypes from Roundup Camp, Madera Canyon, Santa Rita Mountains, Santa Cruz Co., Arizona, in AMNH, examined). — Brignoli, 1974: 200. NEW SYNONYMY.

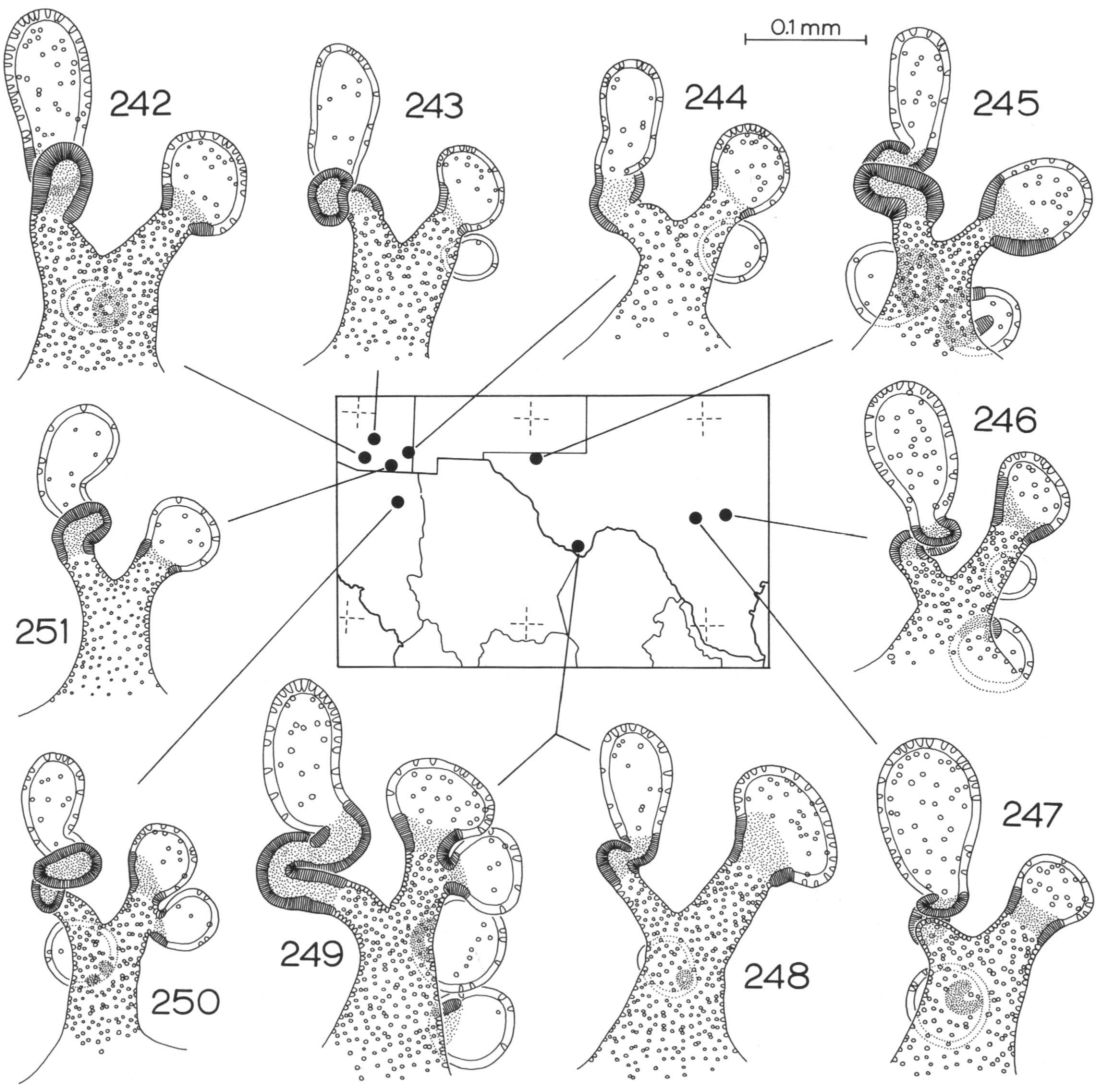
DIAGNOSIS: *E. chisoseus* and *E. comstocki* are very closely related and difficult to distinguish from one another; refer to the *E. comstocki* diagnosis for the distinguishing character states. *E. chisoseus* is best distinguished from other species by the form and spine patterns of male tibia II (there are no spines distal of the ventral apophysis apex) and metatarsus II (figs. 223–228) (several characters in table 1), palpal form (figs. 229–241), and spermathecal form (figs. 242–251).

MALES: Tables 1 and 3. Palpus (figs. 229–241) bulb tapers rather quickly into embolus base; embolus moderately long, rather strongly and evenly (usually) curved throughout its distal one-third to two-thirds in lateral view, sinuous in ventral view, and without ridges. Tibia II (figs. 223, 224, 227, 228) with



Figs. 223–241. *Euagrus chisoseus* Gertsch, males. 223–228. Tibia and metatarsus II. 223, 224, 227, 228. South Fork Cave Creek, Chiricahua Mtns., Arizona. **223, 227, 228.** Retrolateral view. **224.** Prolateral view. **225, 226.** Raven Ranch, Texas, prolateral view. 229–241. Palpal organ. 229, 230. Madera Canyon, Arizona. **229.** Retrolateral view. **230.** Ventral view. 231, 232. South Fork Cave Creek, Chiricahua Mtns., Arizona. **231.** Retrolateral view. **232.** Ventral view. **233.** Holotype, retrolateral view. **234.** Big Bend National Park, Texas, retrolateral view. 235–239. Raven Ranch, Texas. **235,** 237–239. Retrolateral view. 236. Ventral view. **235, 236.** Two views of same palpal organ. **237, 238.** Left and right palpus of one specimen. **240, 241.** Hays County, Texas. Retrolateral view.

moderately well-developed ventral apophysis with 3 (rarely 2, 4, 5, or 6) long, strong apical spines with middle spine longest and retrolateral spine at least slightly longer than prolateral spine; no spines distal of apophysis; usually one (sometimes 0 or 2) long slender spine on proximal slope of apophysis; very weak keel on retrolateral aspect of ventral surface of tibia near distal end. Metatarsus II (figs. 223–226) with rather low retro-



Figs. 242–251. *Euagrus chisoseus* Gertsch, right spermatheca. **242.** Madera Canyon, Arizona. **243.** Rose Lake, Santa Catalina Mtns., Arizona. **244.** South Fork Cave Creek, Chiricahua Mtns., Arizona. **245.** Guadalupe Mtn. National Park, Texas. **246.** Near Pedernales Falls, Texas. **247.** Raven Ranch, Texas. **248, 249.** Big Bend National Park, Texas. **250.** Near Nacozari, Sonora. **251.** Bisbee Summit, Arizona.

lateral keel with apex just proximal of or at metatarsus midpoint; prolateral keel weakly to moderately well developed and more distal; no preening combs. Femur spinule patches long and narrow; spinules elongate with slender tips. Fovea shallow to moderately deep, rounded or triangular. Carapace with moderately dense covering of fine, recumbent light brown setae. Carapace pale tan to darker orange-tan. Chelicerae, pedipalps, and legs like carapace or slightly darker. Abdominal dorsum light brown to medium brown; occasionally with pair of very faint whitish anterior spots merging medially, followed posteriorly by 2–5 pairs of very faint whitish transverse marks.

FEMALES: Table 2. Two primary spermathecal stalks on each side (figs. 242–251).

Median stalk moderately long; distal part moderately to strongly sclerotized and moderately to highly sinuous or looped; bulb elongate and at least a little broader than stalk. Lateral stalk straight and shorter than median stalk; distal end of stalk and base of bulb lightly to moderately sclerotized; bulb roughly spherical or broader than long. Trunk relatively long; usually longer than broad. Usually one or two (sometimes 3 or 4) short-stalked secondary bulbs present; attached to trunk and/or lateral stalk, never to median stalk. No sclerotized area on anterior lip of genital opening. No metatarsus I preening combs. Fovea shallow to deep; circular to rectangular. Carapace with moderately dense covering of thin, recumbent to suberect, pale to light brown setae. Carapace pale yellow-tan to light orange-brown. Chelicerae, pedipalps, and legs like or slightly darker than carapace. Abdominal dorsum pale yellow-gray to medium purple-brown.

VARIATION: The moderate and nearly continuous variation patterns observed (see, for example, figs. 229–241, 242–251, 260–262) for every character examined support the hypothesis that none of the sampled populations or groups of populations is reproductively isolated from the rest. The Kerr Co., Texas, males exhibit a noticeably larger range of variation than males taken from the other two well-sampled populations (Chiricahua Mtns., Arizona, and Madera Canyon, Arizona) in three characters: (1) the prolateral keel on metatarsus II varies from weak (fig. 226) to well developed (fig. 225); (2) the degree of embolus curvature varies considerably (figs. 235–239); (3) some individuals lack the whitish markings on the abdominal dorsum, others have a few faint anterior markings, and one has a "complete" set of very thin and faint marks (a pair of anterior spots and five pairs of transverse marks behind). The Madera Canyon, Arizona, male sample has a much higher mean body size (CL = 3.5–4.9; 4.06 ± 0.36) (N = 15) than the other two well-sampled populations from Kerr Co., Texas (CL = 2.7–3.9; 3.14 ± 0.36) (N = 16), and the Chiricahua Mtns., Arizona (CL = 2.9–3.9; 3.34 ± 0.27) (N = 25), but the ranges overlap.

REMARKS: Gertsch's (1939; Gertsch and Mulaik, 1940) decisions to divide the populations which my analysis now suggests are conspecific into three species (*E. chisoseus*, *E. ravenus*, and *E. apacheus*) were based upon extremely small sample sizes. He gave great weight to slight differences in male leg II structure, palpus shape, and eye proportions, differences which disappear with larger and more numerous samples. For example, he found that his specimens of *E. apacheus* (and *E. comstocki*) had much more widely separated posterior median eyes than his specimens of *E. chisoseus* and *E. ravenus*; with the samples I have, this difference vanishes. Similarly, Chamberlin and Ivie's (1945) decision to describe yet another species of *Euagrus* from the southwestern U.S. was based on a relatively small sample, anterior median eye proportions (which I have found to vary widely and continuously in that and other populations), and slight male leg II differences (which disappear as sample sizes increase).

In his *E. chisoseus* description Gertsch (1939) reported only 13 spines on the ventral and prolateral (he erroneously said retrolateral) surfaces of left tibia I and abnormally small length values for leg I articles because that left leg had been regenerated; my leg I character state values are taken from the right leg.

DISTRIBUTION: Southeastern Arizona and adjacent northeastern Sonora east to south-central Texas (map 2).

MATERIAL EXAMINED: MEXICO: **Chihuahua:** Nogales Ranch, Sierra de en Medio, elev. 5000–5700 ft, Sept. 25–Oct. 5, 1951 (W. Creighton, AMNH), 1♀. **Sonora:** 10 mi S Cananea, Sierra Manzanal, Sept. 25, 1970 (AMNH), 1♀; near Nacozari, Sierra San José, Oct. 13, 1970 (V. Roth, AMNH), 1♀, juv.; Sierra de los Ajos, 31°N, 110°W, June 1, 1971 (Roth, Halstead; AMNH), 1♀, juv. UNITED STATES: **Arizona:** Cochise Co.: Bisbee, in oak leaf litter, Apr. 10, 1973 (AMNH), 1♀; Bisbee Summit, Oct. 2, 1965 (J. and W. Ivie, AMNH), 1♀, juv.; Chiricahua Mts., Cave Cr., Idlewild Camp, Sept. 9, 1964 (J. and W. Ivie, AMNH), 1♂, 1♀, juvs.; Chiricahua Mtns., Cave Creek Canyon, June 1, 1952 (Cazier, Gertsch, Schrammel; AMNH), 1♀, elev. 5200 ft, July 27, 1963 (J. Beatty, JAB), 1♀, juvs., Aug. 22, 1963 (V. Roth, AMNH), 2♀, elev. 5100–5300 ft, can trap, Sept. 24, 1981 (V.

Roth, AMNH), 3♂; Chiricahua Mtns., Horseshoe Canyon, Aug. 6, 1976 (S. Johnson, AMNH), 1♀, juv.; Chiricahua Mtns., 7 mi W Portal, Aug. 4, 1955 (W. Gertsch, AMNH), 2♀, juv.; Chiricahua Mtns., South Fork Cave Creek, Sept. 11, 1950 (W. Gertsch, AMNH), 2♂, juvs., Aug. 23, 1955 (W. Gertsch, AMNH), 2♀, juvs., June 10, 1958 (W. and J. Gertsch, AMNH), 1♀, Apr. 17–19, 1961 (W. Gertsch, AMNH), 3♀, juvs., May 24, 1963 (Gertsch, Ivie; AMNH), 4♀, juv., July 13, 1963 (V. Roth, AMNH), 2♀, juvs., Sept. 9, 1964 (W. Gertsch, AMNH), 2♂, Aug. 25, 1966 (W. Gertsch, AMNH), 1♀, Aug. 20, 1974 (M. Favreau, AMNH), 1♀, elev. 5200 ft, May 16, 1982 (F. Coyle, V. Roth; AMNH), 11♂, 7♀, juvs., elev. 5200 ft, May 27, 1983 (J. Palmer, AMNH), 2♂, 1♀; Chiricahua Mtns., S side Silver Park, Oct. 27, 1981 (V. Roth, AMNH), 1♂; Chiricahua Mtns., Southwestern Research Station, 5 mi W Portal, July 6–20, 1955 (W. Gertsch, AMNH), 2♀, May 20–23, 1972 (D. Rentz, CAS), 1♀; Chiricahua Mtns., Upper Cave Creek, elev. 6800 ft, Oct. 29, 1963 (V. Roth, AMNH), 2♂, 2♀, juvs. Pima Co.: Santa Catalina Mtns., Bear Canyon, Apr. 16, 1936 (AMNH), 1♂, Bear Canyon at crossing of highway, elev. 5600 ft, riparian community, among leaves on ground in ravine, Mar. 27, 1960 (J. Beatty, JAB), juv.; Santa Catalina Mtns., Cherry Valley Ranch, elev. 4650 ft, rocky oak-grassland, under rock, Mar. 19, 1961 (J. Beatty, JAB), juv.; Santa Catalina Mtns., Hitchcock Picnic Area, elev. 6000 ft, oak-yellow pine, under rocks on slope, Aug. 26, 1960 (J. Beatty, JAB), juvs., July 31, 1963 (J. Beatty, F. Coyle; JAB), 1♀; Santa Catalina Mtns., Molino Basin, Nov. 27, 1976 (Roth and Schroepfer, AMNH), 1♂, 1♀, juv.; Santa Catalina Mtns., Rose Lake, elev. 6800 ft, yellow pine-oak, June 10, 1961 (J. Beatty, JAB), 2♀; Santa Catalina Mtns., Sabino Pond, elev. 2700 ft, under rocks, Aug. 21, 1960 (J. Beatty, JAB), juv., July 28, 1963 (J. Beatty, JAB), 1♂; Santa Catalina Mtns., San Pedro Vista, elev. 7500 ft, yellow pine-oak forest, Oct. 21, 1960 (J. Beatty, JAB), 1♂; Santa Catalina Mtns., upper Sabino Canyon, under rocks on dry hillside, Mar. 24, 1960 (Gertsch, Ivie, Schrammel; AMNH), juv.; Santa Catalina Mtns., 2.2 mi by road above Windy Point, under rocks and logs, Oct. 22, 1960 (J. Beatty, JAB), juvs. Pinal Co.: Santa Catalina Mtns., Peppersauce Canyon, elev. 4650 ft, riparian community, under rocks, Mar. 13, 1960 (J. Beatty, JAB), juv. Santa Cruz Co.: Atasca Mtns., Apr. 17, 1936 (AMNH), 1♀, juv.; Oro Blanco Mtns., 12 mi from Nogales, July 1937 (Steckler, AMNH), 1♀; Madera Canyon, Big Rock Camp, Sept. 10, 1941 (Ivie, AMNH), many ♀, juvs.; Madera Canyon, July 16, 1940 (Gertsch, Hook; AMNH), 4♀, juvs., Aug. 1940 (AMNH), 1♂, 2♀, elev. 5200 ft, May 18, 1941 (H. Ellsworth, AMNH), 1♀, July 27, 1949 (W. and J. Gertsch, AMNH), many ♀, juvs., June 7, 1952 (Cazier, Gertsch, Schrammel; AMNH), 1♂, many ♀, juvs., Aug. 15, 1955 (W. Gertsch, AMNH), 1♀, juvs., Aug. 18–19, 1955 (W. McDonald, AMNH), 1♀, Aug. 8–9, 1956 (Roth, Gertsch; AMNH), 5♀, juvs., Aug. 22, 1961 (J. Beatty, JAB), 2♀, juvs., July 19, 1962 (W. Gertsch, AMNH), 2♀, Sept. 13, 1963 (W. Gertsch, AMNH), 2♂, several ♀, juvs., under rocks by dry stream, July 14, 1971 (A. Jung, AMNH), 1♀; Madera Canyon, Roundup Camp, Sept. 9, 1941 (W. Ivie, AMNH), 1♂ (holotype *E. ritaensis*), 1♀ (paratype), Sept. 11, 1941 (W. Ivie, AMNH), 7♂ (paratypes), many ♀ (paratypes), juvs., Mar. 23, 1960 (Gertsch, Ivie, Schrammel; AMNH), 4♂, several ♀, juvs., May 20, 1963 (Gertsch, Ivie; AMNH), 1♀, juvs.; Madera Canyon High, July 11, 1962 (J. Beatty, JAB), 3♀, juvs. **New Mexico:** Eddy Co.: Carlsbad Caverns National Park, Musk Ox Cave, Nov. 28, 1975 (C. Welbourn, AMNH), juv. Hidalgo Co.: Alamo Huecos Mtns., May 17, 1977 (M. Muma, AMNH), juv. **Texas:** Bandera Co.: 10 mi NE Bandera, oak-juniper woods, Sept. 23, 1971 (A. Jung, CAS), juvs. Bastrop Co.: Bastrop State Park, in web in duff covered ravine bank, Aug. 31, 1974 (W. Icenogle, AMNH), 2♀, oak woods, carrion traps, May 24–27, 1983 (S. and J. Peck, AMNH), 3♂, berlese oak-pine litter, May 24–27, 1983 (S. and J. Peck, AMNH), 3♀, juvs. Bexar Co.: Helotes, Mar. 10, 1925 (A. Wright, AMNH), juv.; N of San Antonio, Balcones Escarpment, under stones in webs, Oct. 19, 1980 (F. Walker, EFP), 2♀. Blanco Co.: Pedernales Falls State Park, May 11, 1982 (F. Coyle, AMNH), 1♂, several ♀, juvs., May 19, 1983 (J. Palmer, AMNH), 3♂ (molted to adults in June and July 1983), several ♀, juvs.; 1 mi N rt. 290 on rt. 3232 to Pedernales Falls St. Pk., May 11, 1982 (F. Coyle, AMNH), 2♀, juvs. Brewster Co.: Altuda, about 1935 (AMNH), juvs.; Big Bend National Park, Chisos Mtns., July 25, 1933 (Mulaik, AMNH), 1♀, Dec. 14, 1954 (K. Haller, AMNH), 1♀, juv.; Big Bend National Park, Chisos Mtns., The Basin, Aug. 2, 1938 (AMNH), 1♂ (holotype *E. chisoseus*), 2♀ (paratypes), Sept. 28, 1950 (W. Gertsch, AMNH), many ♀, juvs., May 28, 1952 (AMNH), 4♀, juvs., Sept. 12, 1960 (C. Reid, MCZ), 1♀, elev. 5600 ft, under rocks, July 2–3, 1962 (J. Beatty, JAB), 1♂, 2♀, juvs., elev. 6000 ft, Aug. 25, 1967 (Gertsch, Hastings; AMNH), 1♀, juvs.; Big Bend National Park, Cat-Tail Canyon, Mar. 20, 1977 (Roth, Schroepfer; AMNH), 1♀; Big Bend National Park, South Rim Chisos Mtns., elev. 7000 ft (MCZ), 1♀. Burnett Co.: Inks Lake State Park, May 31, 1980 (G. Spicer, AMNH), 2♀, juv. Camal Co.: Guadalupe River, 3 mi SE Canyon Reservoir, under stones at edge of limestone creek in disturbed area, Feb. 14, 1970 (J. Cooke, AMNH), 2♀; Hancock, Mar. 27, 1948 (I. Anderson, EFP), juv.; Spring Branch, July 14, 1941 (S. and D. Mulaik, AMNH), juv. Crockett Co.: Lancaster Hill, May 6, 1958 (W. McAlister, AMNH), 1♀. Culberson Co.: Guadalupe Mtn. National Park, McKittrick Canyon, elev. 5200 ft, May 13, 1982 (F. Coyle, AMNH), 1♂, several ♀, juvs.; Guadalupe Mtn. National Park, Upper Dog Canyon, May 12, 1978 (O. Francke, J. Moody; TT), 3♀, juvs. Edwards Co.: near Name Cave, at surface, Jan. 30, 1970 (W. Elliott, AMNH), juv.; Punkin Cave, 8 mi S Carta Valley, Sept. 4, 1965 (J. Reddell, AMNH), 1♂, 2♀. Hays Co.: junction of Onion Creek and I35, Jan. 23, 1976 (M. Jaunzems, TMM), juvs.; no specific locality, Apr. 15, 1939 (D. and S. Mulaik, AMNH), 3♂ (holotype *E. apacheus* and paratypes), 1♀ (paratype). Jeff Davis Co.: Davis Mtns., Elbow Canyon Cr., on rt. 118 6 mi N of road to McDonald Observatory, May 12, 1982 (F. Coyle, AMNH), 1♂ (molted to adult 2 weeks later), 4♀, juvs., elev. 5800 ft (Gertsch, Hastings; AMNH), 2♀, Davis Mtns., rt. 118 1 mi S of road to McDonald Observatory, May 12, 1982 (F. Coyle, AMNH), juv.; rt. 118 1 mi W of Davis Mtns. State Park, in tubular-maze webs in crevices in steep road bank, Sept. 11, 1974 (W. Icenogle, AMNH), 2♀. Kendell Co.: Boerne, Dec. 1939 (D. and S. Mulaik, AMNH), juvs. Kimble Co.: no specific locality, under log, Apr. 15, 1972 (T. Kaspar, AMNH), 1♀. Kerr Co.: 15 mi W Hunt, Mo Ranch, Apr. 3, 1980 (W. Sanderson, AMNH), 1♀; Kerrville, June 30, 1941 (S. and D. Mulaik, AMNH), 1♀, juvs., July 7, 1941 (S. and D. Mulaik, AMNH), 1♂, 2♀, juv., under rocks, Oct. 11, 1975 (J. Cokendolpher, NVH), 1♂; 15 mi S Kerrville, June 30, 1941 (S. and D. Mulaik, AMNH), 2♀, juvs.; Raven Ranch, Aug. 1939 (D. Mulaik, AMNH), 2♂ (holotype *E. ravenus*), juvs. (paratypes), Nov. 1939 (S. and D. Mulaik, AMNH), 2♀, juvs., June 5–Aug. 19, 1940 (D. and S. Mulaik, AMNH), 1♀, juvs., June 1941 (R. Scott, AMNH), 1♂, 3♀, juvs., June 1941 (S. and D. Mulaik, AMNH), 2♂, 1♀, juvs., June 1941 (D. Gay, AMNH), 2♂, no date (Allen, Mulaik; AMNH), 1♂, no date (S. Mulaik, AMNH), 2♂, no date (AMNH), 4♂, many ♀, juvs.; Turtle Creek, Dec. 1939 (D. and S. Mulaik, AMNH), 1♀; no specific locality, by creek at night, Apr. 12, 1975 (M. Burton, NVH), 1♂. Llano Co.: no specific locality, Dec. 24, 1935 (Davis, AMNH), 1♀. Sutton Co., 7.6 mi from Kimble Co. line on US 290, under rock, Aug. 21, 1959 (W. and M. McAlister, TMM), 1♀. Terrall Co., Sanderson, July 4, 1934 (Mulaik, AMNH), 1♀. Travis Co.: Austin, Sept. 1909 (A. Petrunkevitch, AMNH), 2♀ (paratypes *E. ravenus*), Mar. 26, 1946 (A. Flury, AMNH), 2♀, July 21, 1947 (Exline-Frizzell, EFP), 2♀, juvs., May 15, 1948 (Exline-Frizzell, EFP), 1♀, juv.; Austin, Mt. Barker, Oct. 27, 1945 (Exline-Frizzell, EFP), 2♀, juvs.; Lake Travis, Travis Park, Mar. 10, 1946 (Exline-Frizzell, EFP), several ♀, juvs., Onion Creek, Apr. 1, 1946 (Exline-Frizzell, EFP), 2♀, juvs.; Upper Bull Creek, Mar. 17, 1941 (Exline-Frizzell, EFP), 1♀; Zilker Park, Austin, Mar. 21, 1946 (Exline-Frizzell, EFP), 1♀. Uvalde Co.: 12 mi NW Uvalde, Mar. 23, 1978 (Moody, Hall and Francke, TT), 1♂.

NATURAL HISTORY: *E. chisoseus* is most commonly collected in live oak–pinyon pine–juniper open woodland and in riparian forest communities. The elevation range for this species is from 500 ft near Austin, Texas, to 7500 ft in the Arizona mountains. In the Santa Catalina Mountains of Arizona, Beatty (1961) found that *E. chisoseus* ranges from desert riparian communities at 2700 ft elevation to yellow pine-oak forest at 7500 ft.

Webs are typically found under medium to large rocks lying on ground where there is at least some leaf litter. The web consists of two principal parts: (1) Under the rock it is a flattened irregular tube of silk which may have one or more branches extending in different directions; this portion of the web seems to serve primarily as a retreat. (2) Extending from this retreat a short distance out from under an edge of the rock is a small, often inconspicuous, three-dimensional web with irregular tubes and sheets penetrating openings in the leaf litter and even humus; this part of the web probably serves principally for prey detection and capture. All parts of the web are very thin, filmy, and characterized by a bluish cast.

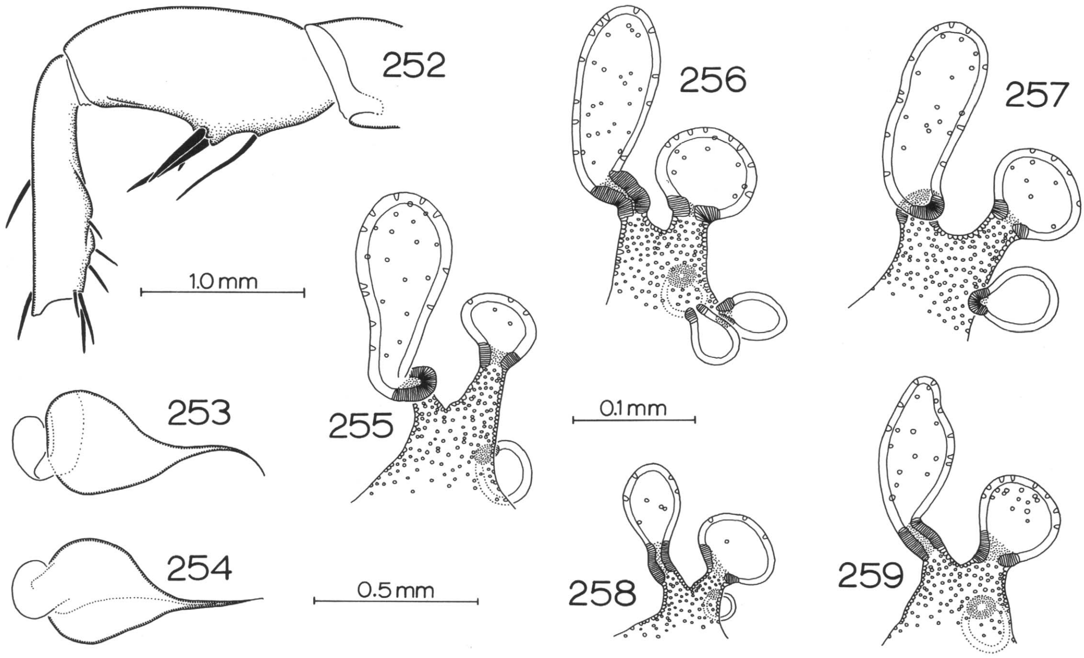
Adult males appear to be rather common at all times of the year, with two peak periods of collecting records (which may tell more about collecting activity than spider activity): (1) March through June, and (2) September plus October. The thin shrivelled abdomens of some of the males I collected in May in the Chiricahua Mountains, Arizona, suggest that they may have overwintered as adults. Courtship and mating behavior has been observed during May and was described by Coyle (1986b). The discovery (in the Chiricahua Mountains) of two female webs each also occupied by three adult males indicates that male competition and opportunities for female choice may be common in some populations of this species. Stevenson (1908) published a description of egg laying and egg sac construction by *E. chisoseus,* which first spins a cup-shaped container, deposits eggs into it, and then covers the opening with a flat lidlike layer of silk.

Euagrus comstocki Gertsch
Figures 252–262; Map 2

Euagrus comstocki Gertsch, 1935: 3, figs. 2, 7, and 8 (male holotype from Edinburg, Hidalgo Co., Texas, and female paratypes from 0.5 mi E of Rio Grande City, Starr Co., Texas, and 32 mi E of Laredo, Webb Co., Texas, in AMNH, examined). — Gertsch, 1939: 23. — Gertsch and Mulaik, 1940: 309. — Chamberlin and Ivie, 1945: 556.

DIAGNOSIS: *E. comstocki* and *E. chisoseus* are sibling species. The four known males of *E. comstocki* are distinguished from *E. chisoseus* males by the following character states: the embolus is proportionally shorter [BD(100)/PL = 48–52; figs. 253, 254, 260, 261], more strongly curved in lateral view, and straighter in ventral view than in *E. chisoseus* [BD(100)/PL = 36–45; figs. 229–241]; the metatarsus II keels are positioned more distally [MKR(100)/IIML = 55–60; figs. 252, 262] than in *E. chisoseus* [MKR(100)/IIML = 41–53; figs. 223–226]. *E. comstocki* females are very difficult to distinguish from those of *E. chisoseus* but the following character states are helpful: (1) the median spermathecal stalk is shorter and usually less strongly looped in *E. comstocki* (figs. 255–259) than in *E. chisoseus* (figs. 242–251); (2) in *E. comstocki* the spermathecal trunk is usually as wide as it is long, not clearly longer than wide, as is usually the case in *E. chisoseus*; (3) the *E. comstocki* tibia I is usually proportionally shorter [ITL(100)/CL = 36–42] than in *E. chisoseus* [ITL(100)/CL = 40–47]; and (4) *E. comstocki* females are usually lighter colored than are *E. chisoseus* females. Palpal form (figs. 253, 254) [BD(100)/PL = 48–52], the form and spination of male tibia II (there are no spines distal of the ventral apophysis apex) and metatarsus II (fig. 252), and spermathecal form (figs. 255–257) best distinguish *E. comstocki* from other, less closely related, species.

MALES: Tables 1 and 3. Palpus (figs. 253, 254) bulb tapers rather quickly into embolus base; embolus relatively short, strongly and evenly curved in lateral view, nearly straight in ventral view, and without ridges. Tibia II (fig. 252) with rather weakly developed ventral apophysis with 3 (occasionally 2) long, strong apical spines with middle spine longest and prolateral spine much the shortest; no spines distal of apophysis; 0–2 long slender spines on proximal slope of apophysis; very weak keel on retrolateral aspect of ventral surface of tibia near distal end. Metatarsus II (fig. 252) with rather low retrolateral and prolateral keels; apex of retrolateral keel just distal of metatarsus midpoint; no preening combs. Femur spinule patches long and narrow; spinules elongate with slender tips. Fovea shallow to moderately deep, rounded or triangular. Carapace with moderately dense covering of fine, recumbent light brown setae. Carapace pale yellow to tan. Chelicerae, pedipalps, and legs like carapace or slightly dark-



Figs. 252–259. *Euagrus comstocki* Gertsch. **252.** Male tibia and metatarsus II, Rio Grande City, Texas, retrolateral view. 253, 254. Palpal organ, holotype. **253.** Retrolateral view. **254.** Ventral view. 255–259. Right spermatheca. **255.** Paratype. **256.** 5 mi E Rio Grande City, Texas. **257.** Rio Grande City, Texas. **258.** 32 mi SE Laredo, Texas. **259.** 32 mi E Laredo, Texas.

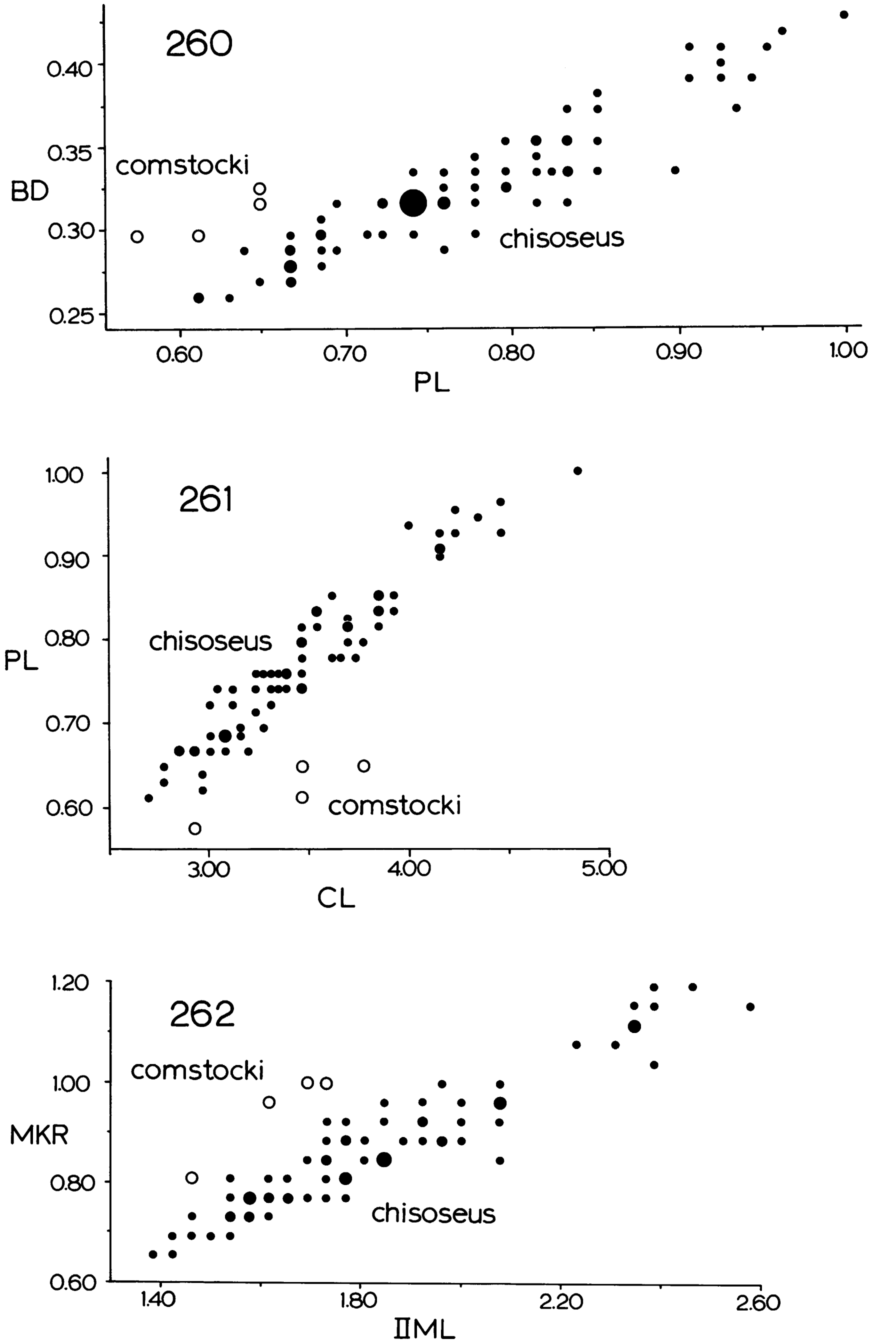
er. Abdominal dorsum gray-yellow to light brown.

FEMALES: Table 2. Two primary spermathecal stalks on each side (figs. 255–259). Median stalk rather short; distal part moderately sclerotized and slightly sinuous to weakly looped; bulb elongate but much broader than stalk. Lateral stalk straight and shorter than median stalk; distal end of stalk and base of bulb lightly to moderately sclerotized; bulb at least slightly broader than long. Trunk relatively wide, usually as wide as long. Usually one (sometimes 2 or 3) short, stalked secondary bulb attached to lateral half of trunk. No sclerotized area on anterior lip of genital opening. No metatarsus I preening comb. Fovea shallow to deep, circular to broadly rectangular. Carapace with moderately dense covering of thin, recumbent very light brown setae. Carapace, pedipalps, and legs pale yellow-tan to orange-tan. Chelicerae slightly darker. Abdominal dorsum pale tan to light brown.

REMARKS: Some of the females that Gertsch (1935) designated as *E. comstocki* paratypes (the one from Sanderson, Texas, and the few from Austin, Texas) are specimens of *E. chisoseus.*

DISTRIBUTION: Along the lower Rio Grande River in extreme southern Texas (map 2).

MATERIAL EXAMINED: UNITED STATES: **Texas:** Hidalgo Co.: Edinburg, Nov. 11, 1934 (S. Mulaik, AMNH), 1♂ (holotype), Jan. 10, 1935 (S. Mulaik, AMNH), 1♀; 30 mi W Edinburg, July 4, 1935 (S. Mulaik, AMNH), 2♀, juvs.; La Joya, Oct. 30, 1938 (L. Davis, AMNH), juv.; Mission (S. Mulaik, AMNH), juv. Starr Co.: Rio Grande City, July 1934 (S. Mulaik, AMNH), 1♀, Mar. 28, 1936 (AMNH), 1♂, 4♀; 0.5 mi E Rio Grande City, Nov. 11, 1934 (S. Mulaik, AMNH), 1♀ (paratype), juv.; 3 mi E Rio Grande City, Jan. 21,



Figs. 260–262. Scatter diagrams of male characters for *Euagrus comstocki* Gertsch (open circles, N = 4) and *E. chisoseus* Gertsch (black dots; N = 75 for figs. 260 and 262, N = 72 for fig. 261). Each small dot represents one *E. chisoseus* specimen; larger dot represents two or more specimens in proportion to dot diameter. Measurement scales in mm. **260.** BD plotted against PL. **261.** PL plotted against CL. **262.** MKR plotted against IIML.

1939 (S. Mulaik, AMNH), juvs.; 5 mi E Rio Grande City, Sept. 20, 1935 (S. Mulaik, AMNH), 1♀, Oct. 26–27, 1935 (S. Mulaik, AMNH), 1♀, juvs. 5 mi W. Rio Grande City, Apr. 10, 1936 (S. Mulaik, AMNH), 1♂, 1♀, juvs., Sept. 11, 1940 (S. and D. Mulaik, AMNH), 1♀, 2.5 mi W Sullivan City on rt. 83, elev. 200 ft, under shrubs, Sept. 7, 1974 (W. Icenogle, AMNH), 1♂. Webb Co.: 32 mi E Laredo, Nov. 11, 1934 (S. Mulaik, AMNH), 2♀, juvs. Zapata Co.: 32 mi SE Laredo, Apr. 10, 1936 (Haynes, AMNH), juv., June 4, 1941 (S. and D. Mulaik, AMNH), 1♀, juvs.

NATURAL HISTORY: The range of *E. comstocki* lies below an elevation of 300 m and within the acacia-mesquite grassland community which is quite distinct from the plant communities where *E. chisoseus* is found.

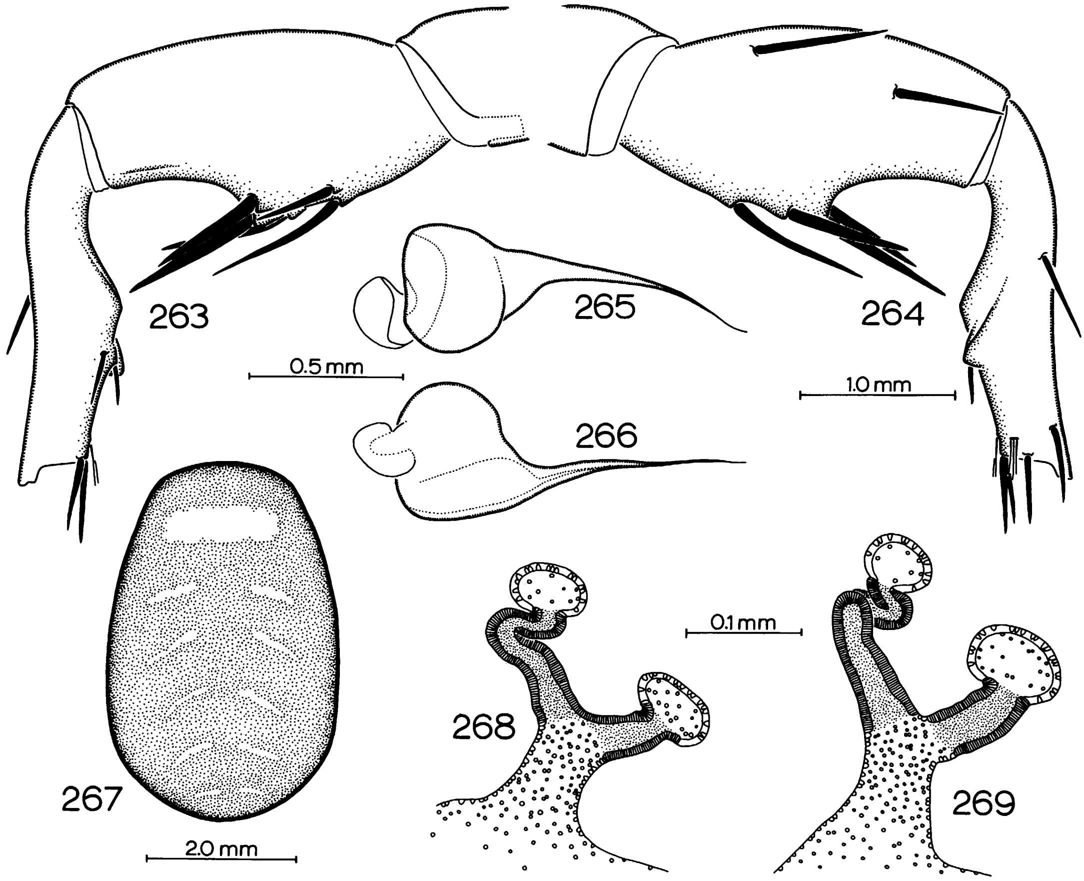
Euagrus guatemalensis F. P.-Cambridge
Figures 263–269

Euagrus guatemalensis F. P.-Cambridge, 1897: 39, figs. 7-7f (male holotype and two female and three juvenile paratypes from Guatemala, in BMNH, examined). — Brignoli, 1974: 199.

DIAGNOSIS: The one known male of *E. guatemalensis* is readily distinguished from males of many *Euagrus* species by the absence of spines from the ventral surface of tibia II distal of the ventral apophysis apex (figs. 263, 264). From the few other species with a similar pattern of tibia II spines, the *E. guatemalensis* male differs by the presence of metatarsus II preening combs (fig. 264). Males of the close relative, *E. pristinus*, have several spines distal of the ventral apophysis apex (figs. 271–274). Males of the related species, *E. lynceus*, also have a few to several spines distal of the ventral apophysis apex (figs. 301–304), are smaller (CL = 2.3–3.2) (*E. guatemalensis* CL = 4.5), have fewer ITM (8–19) (*E. guatemalensis* ITM = 41), and have a proportionally shorter and thicker palpal organ [BD(100)/PL = 43–47; figs. 305–308] [*E. guatemalensis* BD(100)/PL = 40; figs. 265, 266]. Females of *E. guatemalensis* have a moderately conspicuous pattern of light dorsal abdominal markings (fig. 267) and only two spermathecal stalks per side (figs. 268, 269), unlike *E. pristinus* females, which have no abdominal markings or extremely faint ones and usually have more than two stalks per side (figs. 286–297). The lateral spermathecal stalk is proportionally much longer in *E. guatemalensis* females (figs. 268, 269) than it is in *E. lynceus* females (figs. 312–320). Differences between females of *E. guatemalensis* and *E. luteus* are described in the *E. luteus* diagnosis.

MALE: Tables 1 and 3. Palpus (figs. 265, 266) bulb narrows rather abruptly to embolus base; retrolateral portion of bulb greatly swollen; embolus long and slender; in lateral view embolus with slight downward curve except near tip which curves gently upward; no ridges. Tibia II (figs. 263, 264) with moderately developed ventral apophysis with three or four long thick spines on or proximal of apex; one or two more slender spines on proximal slope of apophysis; no spines distal of apophysis apex. Metatarsus II (figs. 263, 264) with moderately well-developed retrolateral keel with apex at about metatarsus midpoint; prominent prolateral keel located more distally; prolateral preening comb of three setae; similar ventral comb on right leg, absent from left leg; no retrolateral comb. Femur spinule patches long and narrow; spinules elongate with slender tips. Fovea a deep triangular pit. Carapace with moderately dense covering of long, fine, semirecumbent, pale brown hairs. Carapace, chelicerae, and pedipalps orange-tan; legs slightly darker. Abdominal dorsum pale tan with very faint, lighter, transverse marks.

FEMALES: Table 2. Two spermathecal stalks on each side (figs. 268, 269). Median stalk long, sclerotized for entire length, and strongly sinuous distally; bulb spherical or wider than long. Lateral stalk much shorter, sclerotized for entire length, and nearly straight; bulb larger than median bulb, wider than long. Trunk relatively long. At most, only a small median sclerotized spot on anterior genital lip. Metatarsus I ventral (three setae) and prolateral (two or three setae) preening combs present; retrolateral comb absent. Terminal article of lateral spinnerets relatively long, gradually tapering, and with many irregular constrictions over distal three-fourths to half of length resulting in flexible appearance. Fovea a moderately deep, slightly transverse pit. Two or three long foveal setae. Carapace with scattered, thin, recumbent, light brown setae. Carapace, pedipalps, and legs orange-



Figs. 263–269. *Euagrus guatemalensis* F. P.-Cambridge. 263, 264. Male tibia and metatarsus II, holotype. **263.** Retrolateral view. **264.** Prolateral view. 265, 266. Papal organ, holotype. **265.** Retrolateral view. **266.** Ventral view. **267.** Abdominal dorsum of female paratype, 2.0 mm scale. **268, 269.** Right spermatheca, paratypes.

tan; chelicerae slightly darker. Abdominal dorsum light brown with moderately conspicuous pattern of light markings as follows (fig. 267): large, transverse anterior light patch with poorly defined borders, followed by five pairs of obliquely transverse light marks.

Distribution and Material Examined: Known only from the type specimens, collected by a "Mr. Sarg" somewhere in Guatemala.

Euagrus cavernicola Gertsch
Map 4

Euagrus cavernicola Gertsch, 1971: 48 (juvenile holotype from Cueva de la Capilla, El Porvenir, 13.5 km NW Gómez Farías, Tamaulipas, Mexico, in AMNH, examined). — Reddell and Mitchell, 1971: 186, 202, fig. 11. — Brignoli, 1974: 199. — Gertsch, 1981: 82. — Reddell, 1981: 134.

Diagnosis: Females of this troglobitic species differ from those of all nontroglobitic *Euagrus* species by the absence of eyes and by their unusually elongate legs [ITL(100)/CL = 78; IFT(100)/IFL = 24]. From both of the other known troglobitic *Euagrus* species (*E. troglodyta* and *E. anops*), *E. cavernicola* can be distinguished by the larger number of cheliceral denticles (CD = 12, 13), the presence of eye vestiges (faint humps of clear cuticle), and the presence of metatarsus I preening combs. See diagnoses of *E. troglodyta* and *E. anops* for additional useful differences.

MALES: Unknown.

FEMALES: This description is based on the holotype, which is a juvenile of undetermined sex. Tables 2 and 3. Three preening combs of 3 setae each are present on metatarsus I. Claws, fangs, and all appendages unusually elongate. Pars cephalica weakly elevated. Only a few faint humps of clear cuticle remain as eye vestiges; no pigment present. Fovea a moderately shallow, transverse, triangular pit. Semierect, thin, light brown hairs scattered sparsely over carapace; carapace margin with longer setae. Carapace and abdomen pale yellowish-tan. Appendages darker pale orange-tan. All other known specimens of *E. cavernicola* are very small juveniles; faint unpigmented eye vestiges and small metatarsus II preening combs are visible on a few of the larger of these specimens. An excellent photo of a live *E. cavernicola* juvenile has been published by Reddell and Mitchell (1971).

REMARKS: In his original description of the holotype, Gertsch (1971) erroneously claimed that there were no eye vestiges, mistook sockets of broken setae to be endite cuspules, and overlooked the cheliceral denticles, consequently reporting that the retromargin of the cheliceral fang furrow was "unarmed." His count of 8–10 teeth on each lateral claw is correct for all but the leg I claws, each of which has 15–16 teeth. In a later paper (Gertsch, 1981) he observed accurately that "vestiges of eyes [are] faintly discernible."

DISTRIBUTION: Known only from caves in the Sierra de Guatemala (Reddell, 1981) in southwestern Tamaulipas, Mexico (map 4).

MATERIAL EXAMINED: MEXICO: **Tamaulipas:** Cueva de la Capilla, El Porvenir, 13.5 km NW Gómez Farías, elev. 2040 m, Jan. 28, 1968 (J. Reddell, R. Mitchell, F. Rose, J. George; AMNH), 2 juvs., Jan. 13, 1971 (J. Reddell, J. Cooke, M. Brownfield; AMNH), 1 juv., May 16, 1971 (R. Mitchell, Abernathy, Barton, Wiley; AMNH), 1 juv. (holotype); Cueva de la Mina, 9 km NW Gómez Farías, Mar. 9, 1969 (J. Reddell, AMNH), 1 juv.; Harrison Sinkhole, Rancho del Cielo, 7 km NNW Gómez Farías, elev. 1160 m, Jan. 12, 1971 (J. Cooke, M. Brownfield, W. Elliott; AMNH), 7 juvs.

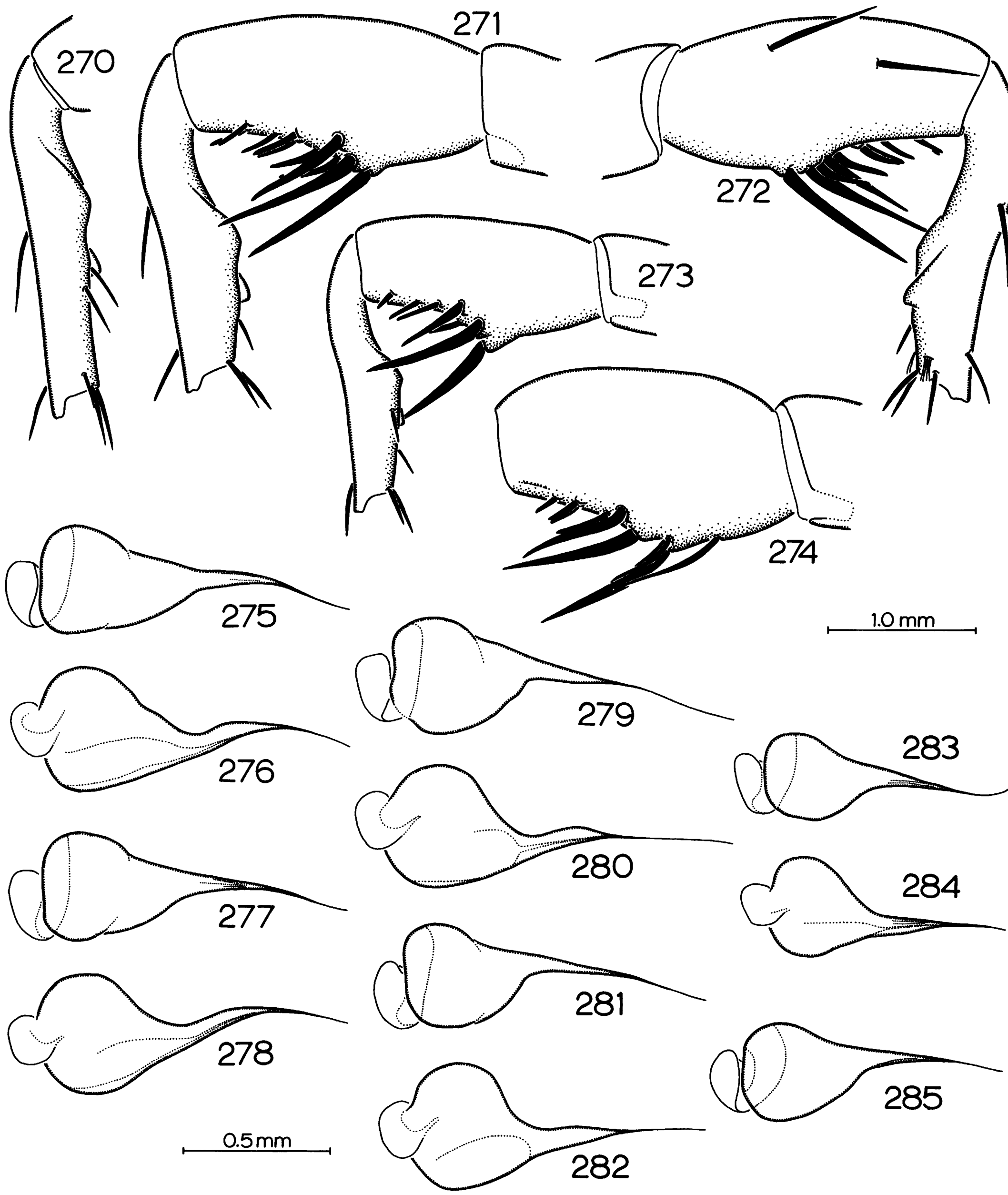
Euagrus pristinus O. P.-Cambridge

Figures 3, 7, 8, 13–15, 17, 20, 21, 23, 27–33, 270–298; Map 4

Evagrus pristinus O. P.-Cambridge, 1899: 519, fig. 1a–d [male holotype "from Bogotá" (see Remarks section below for discussion about the inaccuracy of this locality designation), in HEC, examined].

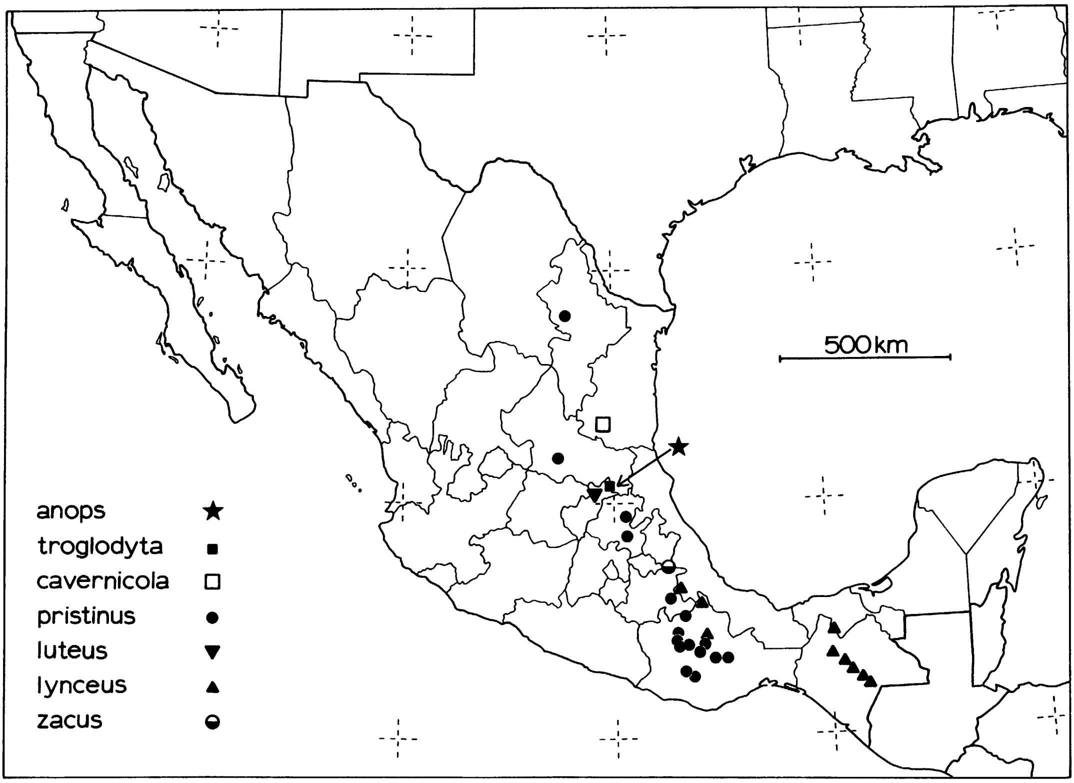
DIAGNOSIS: *Euagrus pristinus* is very closely related to *E. luteus*, known only from females; to distinguish these two species, refer to the *E. luteus* diagnosis. The following character states will help distinguish *E. pristinus* males from males of the closely related *E. lynceus*: (1) There is no metatarsus II retrolateral preening comb; in *E. lynceus* there is always a comb of two to four setae in this position. (2) There are no paired, transverse, light-colored markings on the abdominal dorsum (or, if present, they are extremely thin and faint); in *E. lynceus* these markings are prominent (figs. 309, 310). (3) BD(100)/PL = 35–43; in *E. lynceus* BD(100)/PL = 43–47. (4) *E. pristinus* males are usually larger (CL = 2.5–5.8) and usually have more ITS (16–47) than do *E. lynceus* males (CL = 2.3–3.2; ITS = 8–19). (5) The largest two spines on the tibia II ventral apophysis are seldom side-by-side and there is rarely a gap just distal of the tibia II ventral apophysis in the distribution of spines (figs. 271–274); in *E. lynceus*, however, the largest two spines are always side-by-side and there is always an area devoid of spines just distal of the ventral apophysis (figs. 301–304). *E. pristinus* females lack the prominent, light, dorsal abdominal markings of *E. lynceus* females (fig. 311), usually have more than the maximum of five ITarS found on *E. lynceus* females (table 2), and often have more (figs. 286–297) than the two spermathecal stalks per side found on all *E. lynceus* females (figs. 312–320).

MALES: Tables 1 and 3. Palpus (figs. 275–285) bulb tapers rather abruptly into embolus base; embolus long and slender; in retrolateral view a slight downward curve near embolus midpoint and then, distal to this, the slender tip is either straight or slightly to moderately curved upwards; proximally embolus usually flattened dorsoventrally and therefore wider in ventral than in retrolateral view (when pronounced, this flattened area



Figs. 270–285. *Euagrus pristinus* O. P.-Cambridge, males. 270–274. Tibia and metatarsus II. **270.** Grutas de San Sebastián, Oaxaca, retrolateral view. 271, 272. 2–3 mi NE El Punto, Oaxaca. **271.** Retrolateral view. **272.** Prolateral view. **273.** Juquila Mixes, Oaxaca. retrolateral view. **274.** El Chico, Hildalgo, retrolateral view. 275–285. Palpal organ. 275, 276. Holotype. **275.** Retrolateral view. **276.** Ventral view. 277, 278. 2–3 mi NE El Punto, Oaxaca. **277.** Retrolateral view. **278.** Ventral view. 279, 280. Grutas de García, Nuevo León. **279.** Retrolateral view. **280.** Ventral view. 281, 282. El Chico, Hildago. **281.** Retrolateral view. **282.** Ventral view. 283–285. Juquila Mixes, Oaxaca. **283.** Retrolateral view. **284.** Ventral view. **285.** Retrolateral view, another specimen.

often projects as retrolateral keel); weakly developed ridges often visible on embolus. Tibia II (figs. 271–274) with weakly to moderately developed ventral apophysis which



Map 4. Mexico and southern United States, showing distribution of *Euagrus anops* Gertsch, *E. troglodyta* Gertsch, *E. cavernicola* Gertsch, *E. pristinus* O. P.-Cambridge, *E. luteus* Gertsch, *E. lynceus* Brignoli, and *E. zacus,* new species.

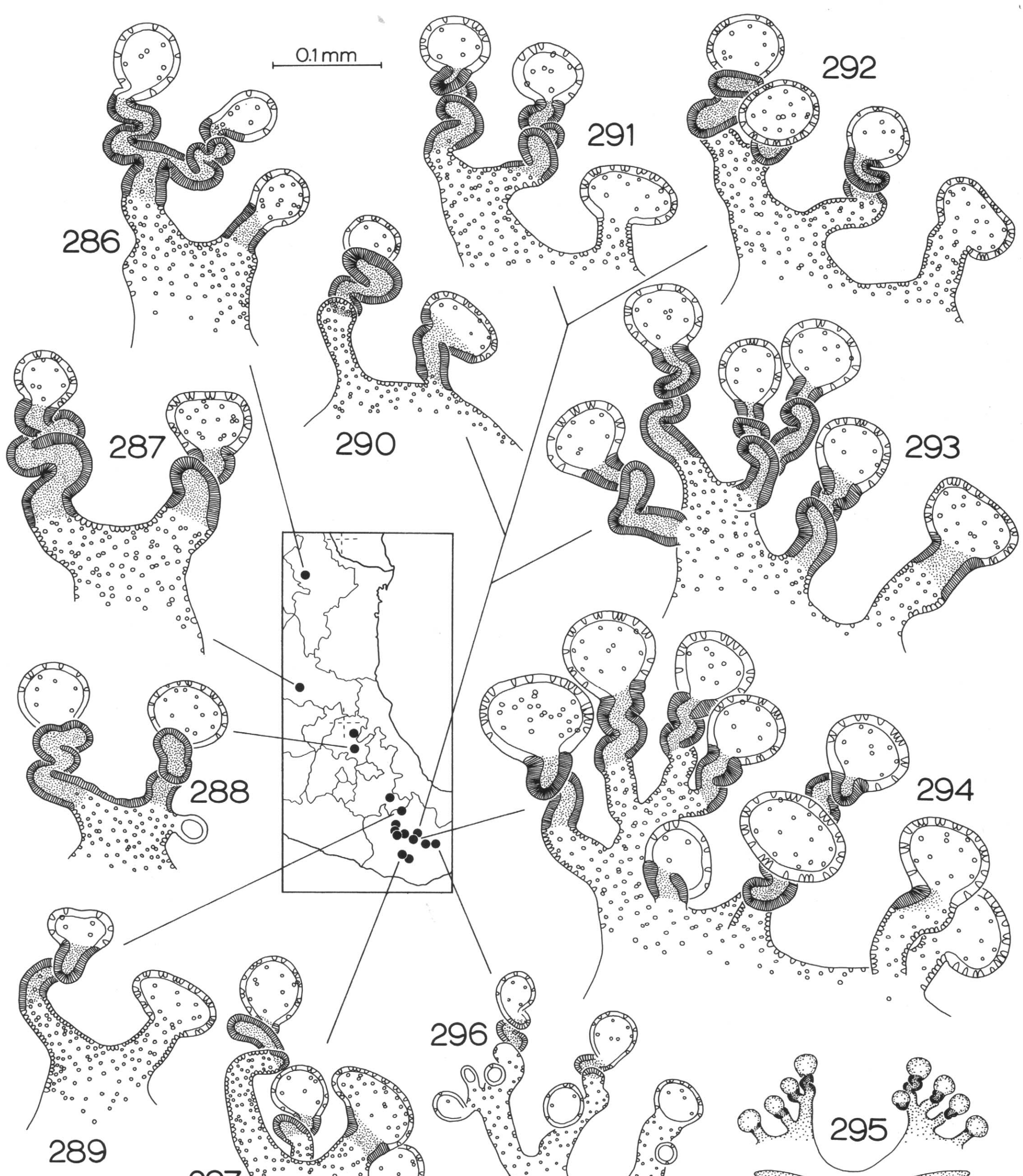
sometimes lacks a distinct apex; two very long strong spines on apex of apophysis and one (rarely two) shorter but moderately large spine just retrolateral and distal of these; occasionally one or two long slender spines on proximal slope of apophysis; smaller spines distributed from distal face of apophysis along ventral surface of tibia to near distal end of tibia and these decrease gradually in length with distance from apophysis; all spines are located on retrolateral half of ventral surface of tibia, except for large spine occasionally located on prolateral aspect of ventral apophysis. Metatarsus II (figs. 270–272) with moderately prominent retrolateral keel with rounded to angular apex located just short of to slightly beyond metatarsus midpoint; prominent prolateral keel located more distally; ventral and prolateral preening combs of two to six setae each; no retrolateral comb. Femur spinule patches long and narrow; spinules elongate with slender tips. Fovea shallow to deep; usually roughly circular but may be broad, triangular, or slightly longitudinal. Carapace with moderately dense covering of long, fine, semirecumbent, light to dark brown setae. Carapace light yellow-brown to moderately dark brown. Chelicerae, pedipalps, and legs like or slightly darker than carapace. Abdominal dorsum very light brown to purple-gray-brown; anterior median light-colored area and/or segmentally arranged series of very thin, faint, paired, transverse, light marks occasionally present. Living male from near El Punto, Oaxaca, with shiny dark chestnut brown carapace, darkest around margin; appendages also dark chestnut brown; abdominal dorsum dark gray-brown (fig. 3).

FEMALES: Table 2. Two primary spermathecal stalks on each side, but often one to several long stalks branch off from primary median stalk or close to its base and may be larger than the primary lateral stalk (figs. 286–297). Median stalks long, strongly sinuous to looped, and usually well sclerotized distally for one-half or more of length; bulbs approximately spherical or slightly wider than long. Lateral stalk shorter than primary median and less completely sclerotized, sometimes unsclerotized; straight to strongly sinuous; bulb usually wider than long and relatively large; occasionally a secondary stalk/bulb attached to or near lateral bulb. Trunk broad. Broad amber-colored sclerotized patch with lateral winglike extensions always present on anterior genital lip. Metatarsus I ventral preening comb of two to four setae always present; prolateral comb of two to four setae often present; retrolateral comb absent. Terminal article of lateral spinnerets relatively long, gradually and markedly tapering to tip; distal half to three-fourths flexible with many irregular unsclerotized constrictions (figs. 15, 17). Fovea shallow (rarely) to deep; circular, square, transversely oval, or transversely rectangular (fig. 13). Two or three long foveal setae (fig. 15). Carapace with moderately dense covering of thin, recumbent and semi-recumbent, light to medium brown setae. Carapace light orange-tan to chestnut brown; darker around edges. Chelicerae like carapace or a little darker. Pedipalps and legs like carapace or a little lighter. Abdominal dorsum light brown to dark purple-brown, sometimes with extremely faint dorsal markings as described for males.

VARIATION: The nine males from El Chico, Hidalgo, all have a relatively thick tibia II with a weakly developed ventral apophysis (fig. 274), whereas the six Juquila Mixes, Oaxaca, males have a markedly thinner tibia II with a more pronounced ventral apophysis with a distinct apex (fig. 274); however, these and all intermediate tibia II conditions (fig. 271) are found in the remainder of the *E. pristinus* species sample. The two males from Gutas de San Sebastián, Oaxaca, have distinctly more proximal metatarsus II keels (figs. 270, 298) [MKP(100)/IIML = 57, 59] [MKR(100)/IIML = 40, 42] than do all other specimens (figs. 271, 273, 298) [MKP(100)/IIML = 65–82; 71.9 ± 4.02] [MKR(100)/IIML = 47–61; 54.7 ± 3.53]. The El Chico males are at one end of the species range for both of these characters (fig. 298) [MKP(100)/IIML = 74–82] [MKR(100)/IIML = 56–61] and for IIML(100)/CL (=48–51), whereas Juquila Mixes males are near the other end of these ranges [MKP(100)/IIML = 65–70] [MKR(100)/IIML = 52–55] [IIML(100)/CL = 56–60]; however, other specimens of *E. pristinus* bridge these gaps. The moderately large range of variation in embolus shape (figs. 275–285) was summarized in the description and is continuous. The following two palpal form variants are the most noteworthy: (1) Some Juquila Mixes embolus tips are the most strongly upcurved (fig. 283) in the entire species sample, but others (fig. 285) are only weakly upcurved. (2) The distal face of the retrolateral surface of the palpal bulbs of the El Chico males (figs. 281, 282) is steeper than in all other population samples (figs. 275–280, 283–285).

Females from El Chico (N = 7) have proportionally shorter terminal lateral spinneret articles [LSL3(100)/CL = 41–46; 43.9 ± 2.12] than the other *E. pristinus* females examined (N = 18) [LSL3(100)/CL = 50–65; 57.2 ± 4.18]. The El Chico females also have proportionally smaller and more widely spaced anterior median eyes [AMD(100)/AMS = 73–93; 84.3 ± 7.69] than all other specimens (N = 18) [AMD(100)/AMS = 84–160; 121.6 ± 20.17] except for one female from Pico San Felipe, Oaxaca. The Grutas de San Sebastián female has proportionally longer appendages [IFT(100)/IFL = 32] [ITL(100)/CL = 60] [LSL3(100)/CL = 65] than do all other observed females (N = 24) [IFT(100)/IFL = 36–41; 38.7 ± 1.15] [ITL(100)/CL = 40–50; 45.7 ± 2.60] [LSL3(100)/CL = 41–63; 52.8 ± 6.91].

There is much variation in *E. pristinus* spermathecal form (figs. 286–297). As can be seen in table 5, females from north of Oaxaca usually have two spermathecal stalks on each side, whereas those from Oaxaca usually have four or more spermathecal stalks per side. However, a few individuals in the northern samples have 3- or 4-stalked spermathecae (figs. 286, 288) and a few individuals from Oaxaca have 2- or 3-stalked spermathecae (figs. 289–291). The wide range and continuous distribution of stalk (and bulb) numbers in the El Punto, Oaxaca, and nearby Pico San Felipe samples (figs. 290–295) suggest that there is much developmental flexibility in spermathecal form. Nevertheless, the form of individual bulbs and stalks, their general



Figs. 286–297. *Euagrus pristinus* O. P.-Cambridge, spermathecae. 286–294, 296, 297. Right spermatheca. **286.** Grutas de García, Nuevo León. **287.** 4.1 mi W San Francisco, San Luis Potosí. **288.** El Chico, Hidalgo. **289.** 20 mi W Huautla, Oaxaca. **290–293.** Vicinity of El Punto, Oaxaca. **294.** Pico San Felipe, Oaxaca. **295.** Both spermathecae, Pico San Felipe, Oaxaca, showing wing-shaped sclerotized area on anterior genital lip, scale four times smaller than for other figures. **296.** Juquila Mixes, Oaxaca. **297.** Grutas de San Sebastián, Oaxaca.

positional relationships, and the form of the sclerotized area on the anterior genital lip are relatively constant throughout these samples and, to a lesser extent, throughout the entire sample of *E. pristinus* females. Probably the most divergent sample in spermathecal form is that from Juquila Mixes (N = 2), in which the stalks are weakly sclerotized and a relatively high percentage of secondary stalks and bulbs are rudimentary (fig. 296).

As presently conceived, *E. pristinus* is a highly variable species; it may eventually prove to be a cluster of species. The phenotypically most distinctive samples are those from El Chico, Juquila Mixes, and Grutas de San Sebastián. The El Chico and Juquila Mixes samples are distinct from one another in several male characters but are "connected" by a continuum of intermediate states of these characters in the remainder of the *E. pristinus* sample. The El Chico females can be distinguished from all other females by relatively short terminal lateral spinneret articles and nearly distinctive anterior median eye diameter and spacing. The two Juquila Mixes females have fairly distinctive spermathecae. Apparently there is reduced gene flow between these populations and others that have been sampled. It is even possible that these populations are separated by intrinsic reproductive isolating mechanisms, but until that hypothesis can be more rigorously tested by searching for and analyzing additional samples of *E. pristinus* to the north and south of El Chico (between San Luis Potosí and Oaxaca) and in the vicinity of Juquila Mixes and other localities in south central Oaxaca, I am inferring that they are conspecific. Similarly, until more data are collected for analysis, I am postulating that the distinctively proximal metatarsal II keel positions and elongate appendages of the Grutas de San Sebastián sample are in large part the result of special selection pressures in cave environments and not indicative of a long-term absence of gene exchange with other populations.

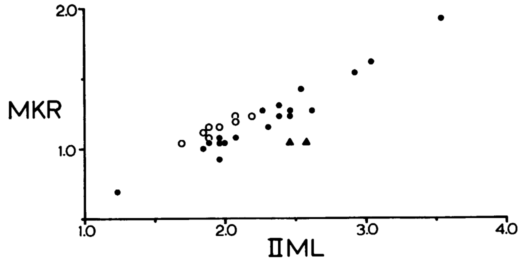


Fig. 298. Scatter diagram plotting MKR against IIML for males of *Euagrus pristinus* O. P.-Cambridge, N = 29. Measurement scales in mm. Triangles represent Grutas de San Sebastián, Oaxaca, males; open circles represent El Chico, Hidalgo, males.

REMARKS: I am confident that O. P.-Cambridge's (1899) published type locality designation of "Bogotá" (by which I assume he meant Bogotá, Colombia) is erroneous, because no *Euagrus* spiders have been collected

TABLE 5
Frequency Distribution of Spermathecal Stalk Number for *Euagrus pristinus* Population Samples

Locality	No. spec. examined	No. stalks per side 2	3	4	5	6	7	8	9	10
Nuevo León, Grutas de García	2	2	1	1						
San Luis Potosí, 4.1 mi W San Francisco	2	4								
Hidalgo, El Chico	5	9	1							
Oaxaca, 20 mi W Huatla	1	2								
Oaxaca, 9 mi SE Nochixtlán	1			1	1					
Oaxaca, Pico San Felipe	8			3	6	3	2	1	1	
Oaxaca, El Cumbre	1			2						
Oaxaca, near El Punto	8	2	2	5	1	2	2	2		
Oaxaca, 44.2 mi NE 175–190 intersec.	1					1		1		
Oaxaca, 2.5 mi E Cuajimoloya	1			1	1					
Oaxaca, 5 mi NE Mitla	1									2
Oaxaca, Juquila Mixes	2					1	1	2		
Oaxaca, S. Vicente Lachixio	1								2	
Oaxaca, Gr. de San Sebastián	1			1	1					

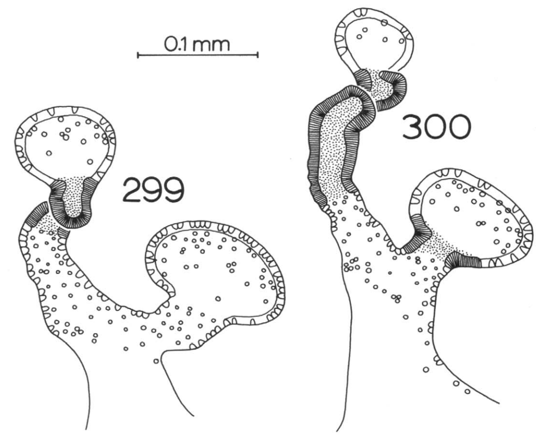
south of Costa Rica. Furthermore, M. J. Scoble (personal commun.) reports that erroneous specimen label data and specimens without labels are rather common in the O. P.-Cambridge collection.

DISTRIBUTION: Eastern interior of Mexico from Nuevo León south to central Oaxaca (map 4).

MATERIAL EXAMINED: MEXICO: **Hidalgo:** Cueva de los Murcielagos, Zacualtipán, March 17, 1981 (J. Reddell, T. Arcey, F. Andres, D. McKenzie; AMNH), 1♂; El Chico, Apr. 13, 1941 (M. Cardenas, AMNH), 1♀; El Chico, near Pachuca, coniferous woods, S-facing slope, Jan. 1, 1976 (S. Brown, MCZ), 5♂, juvs., fir mountainside (TMM), 1♂, 1♀, dense fir hillside under rocks and logs, Jan. 2, 1976 (C. Richardson, TMM), 2♂, 2♀, juvs.; El Chico Nat. Park, 6.4 mi N of rt. 105, El Chico exit, Jan. 2, 1976 (M. Jaunzems, TMM), 1♂, 2♀, juvs. **Nuevo León:** Grutas de García, in mesic oak-pine, Dec. 29, 1975 (M. Jaunzems, TMM), 2♂, 2♀, juv. **Oaxaca:** Cofradia, 8 mi S San Vicente Lachixo, elev. 8950–9000 ft, July 24, 1966 (C. Bogert, AMNH), 1 ♀; 2.5 mi beyond Cuajimoloyas, ridge N Teotitlán del Valle, elev. 10,200 ft, Sept. 20, 1962 (M. Bogert, AMNH), 1♀; El Cumbre, on ridge E Cerro San Felipe, elev. 8000–9000 ft, Sept. 28, 1961 (C. and M. Bogert, AMNH), 1♀, juv.; El Punto, N Continental Divide on road to Guelatao, elev. 7000–7500 ft, June 28, 1967 (M. Bogert, AMNH), 2♀; El Punto, road to Ixtlán de Juárez, Aug. 19, 1961 (C. and M. Bogert, AMNH), 1♀, juvs.; 1–5 mi NE El Punto, road to Ixtlán de Juárez, elev. 7500 ft, Sept. 3, 1961 (Millers, Bogerts; AMNH), 1♂, 5♀; 2–3 mi NE El Punto on rt. 175, elev. 2300 m, June 13, 1982 (F. Coyle, AMNH), 1♂ (molted to adult Oct. 1982), 3♀; 11.2 mi NE rt. 175–190 intersec. on rt. 175, elev. 2500 m, June 13, 1982 (F. Coyle, AMNH), 2♀, juvs.; 44.2 mi NE rt. 175–190 intersec. on rt. 175, elev. 2500 m, June 13, 1982 (F. Coyle, AMNH), 1♂ (molted to adult July 1, 1982), 5♀, juvs.; Grutas de San Sebastián, 55 km S Oaxaca, Sept. 1971 (W. Russell, AMNH), 1♀, juvs. Dec. 31, 1972 (J. Reddell, D. McKenzie, S. Murphy, M. McKenzie; AMNH), 2♂; 20 mi W Huautla de Jiménez, Aug. 10, 1967 (Reddell, Fish, Evans; AMNH); 1♀, juvs.; Ixtlán de Juárez, Aug. 27, 1962 (C. Bogert, AMNH), 3♀, juvs.; Juquila Mixes, 1962 (W. Miller, AMNH), 6♂, 1♀, 1977 (W. Miller, AMNH), 1♀; 5 mi NE Mitla near ruins called El Crucero, elev. 6800–7200 ft, Aug. 27, 1963 (Bogert, Sluder, Bucknall; AMNH), 1♀; 0.5 mi E Nochixtlán, Dec. 11, 1948 (E. Ross, AMNH), 1♂, juv.; 9 mi SE Nochixtlán, May 1, 1963 (Gertsch, Ivie; AMNH), 1♀; 12 mi SE Nochixtlán, Dec. 13, 1948 (E. Ross, AMNH), 2♀, juvs.; Oaxaca, July 8, 1947 (B. Malkin, AMNH), 1♀, juv., Sept. 13–20, 1947 (B. Malkin, AMNH), 1♀; Pico San Felipe, elev. 2100–3000 m, Sept. 5–12, 1945 (H. Wagner, AMNH), 2♂, 6♀; NE slope Cerro San Felipe, elev. 8200–9000 ft, Aug. 6, 1961 (M. Bogert, AMNH), 2♀; 1.5 km W San Andreas Zabache, Dist. de Ejutla, elev. 5050 ft, rocky slope near Río Atoyac, Aug. 15, 1970 (C. Bogert, AMNH), 1♀; 2.5 mi W San Vicente Lachixio, Dist. de Sola de Vega, elev. 7200 ft, in pine-oak-madrono, Aug. 16, 1963 (M. Bogert, AMNH), 1♀; Sótano de las Bellotas, 5 km NW Santiago Apoala, Jan. 3, 1973 (J. Reddell, AMNH), 1♂. **Puebla:** Santa Ana, 97°27′W, 18°33′N, Apr. 25, 1963 (Gertsch, Ivie; AMNH), 1♂, juvs. **San Luis Potosí:** 3 mi E San Francisco, near 100°30′W, 22°N, Oct. 17, 1972 (Roth, Firstman; AMNH), 1♂; 4.1 mi W San Francisco on rt. 70, elev. 2400 m, May 26, 1982 (F. Coyle, AMNH), 3♀.

NATURAL HISTORY: *Euagrus pristinus* occurs mostly between elevations of 1500 and 3000 m. It is a troglophile; three cave populations are known. Epigean habitats include oak, oak-pine (sometimes with large numbers of madrone and manzanita present), oak-fir, and fir forests. Webs are usually associated with crevices on rock outcrops or root-bound earthen road banks or are located under rocks (0.5 m or more in diameter) lying on the ground. At one site, webs were in cavities in a rotting pine log. The retreat tubes of webs on outcrops or road banks typically penetrate deep into a crevice, are often branched, and are frequently difficult to excavate completely (fig. 7). These webs usually have large conspicuous capture webs (fig. 8) that are 20–30 cm wide and composed of a dense maze of two to four interconnected funnels and sheets that extend out from the retreat tube and attach to surrounding rock, root, plant, or soil surfaces. Capture webs of *E. pristinus* spiders that live under rocks on the ground are considerably smaller than these. I demonstrated the adhesive nature of the *E. pristinus* web by dropping a few *Camponotus* ant soldiers in a large capture web and observing that they could not struggle free during the 10-minute period of observation.

Two egg sacs were collected from the retreat tubes of two females at 2–3 mi northeast of El Punto, Oaxaca, on June 13. One sac contained 224 eggs ranging from 0.70 to 0.78 mm in diameter; the other sac contained 468 eggs ranging from 0.70 to 0.81 mm in diameter.



Figs. 299, 300. *Euagrus luteus* Gertsch, right spermatheca. **299.** Sótano del Gobernador, Querétaro. **300.** Cueva de los Riscos, Querétaro.

Euagrus luteus Gertsch

Figures 299, 300; Map 4

Euagrus luteus Gertsch, 1973: 145, fig. 3 (female holotype from iron mine at road, 1.2 mi E of Pinal de Amoles, Querétaro, Mexico, in AMNH, examined). — Gertsch, 1981: 84, fig. 4. — Reddell, 1981: 134.

DIAGNOSIS: The following character states help distinguish *E. luteus* females from females of the very closely related species, *E. pristinus*: (1) The spermathecal trunks are narrow and only two stalks are present (figs. 299, 300); *E. pristinus* trunks are wide and often have more than two stalks (figs. 286–297). (2) LCTI = 13–19; in *E. pristinus* LCTI = 10–13. (3) IFT(100)/IFL = 27–32; in *E. pristinus* IFT(100)/IFL = 32–41. (4) LSL3(100)/CL = 63–80; in *E. pristinus* LSL3(100)/CL = 41–65. From the closely related *E. lynceus, E. luteus* females can be distinguished by the following character states: (1) There are no light markings on the abdominal dorsum; *E. lynceus* females have prominent transverse markings as in figure 312. (2) AMD(100)/CW = 2.0–3.4; in *E. lynceus* AMD(100)/CW = 3.4–6.3. (3) LCTI = 13–19; in *E. lynceus* LCTI = 9–13. (4) The spermathecal trunks of *E. luteus* are usually narrower and longer (figs. 299, 300) than those of *E. lynceus* (figs. 312–320). The following character states distinguish *E. luteus* females from those of *E. guatemalensis*: (1) The lateral spermathecal stalk is proportionally shorter (figs. 299, 300) than in *E. guatemalensis* (figs. 268, 269). (2) AMD(100)/CW = 2.0–3.4; in *E. guatemalensis* AMD(100)/CW = 3.5–4.2. (3) The appendages are more slender and elongate than in *E. guatemalensis* [see IFT(100)/IFL, ITL(100)/CL, and LSL3(100)/CL in table 2].

MALES: Unknown.

FEMALES: Tables 2 and 3. Two spermathecal stalks on each side (figs. 299, 300). Median stalk much longer than lateral; sinuous or coiled distally; bulb nearly spherical or apically slightly flattened, markedly smaller than lateral bulb. Lateral stalk short and straight or slightly crooked; bulb broader than long, two to three times the diameter of its stalk. Rather broad sclerotized area on anterior lip of genital opening often has lateral winglike extensions. Ventral metatarsus I preening comb of 2–6 setae always present; prolateral comb of 2–5 setae usually present; no retrolateral comb. Terminal article of lateral spinnerets relatively long, gradually tapering to tip; distal three-fourths or more flexible, with irregular pale constrictions. Eyes well developed, with black pigment between them. Fovea a shallow to deep, rounded to transverse, pit. Carapace with moderately dense covering of thin, recumbent to semierect, light brown hairs; setae on margin longer. Carapace, chelicerae, pedipalps, and legs yellow-tan to orange-tan. Abdominal dorsum pale yellow-gray to light gray-brown.

REMARKS: This species is similar to *E. pristinus* and might eventually, when males are discovered and more and larger population samples are examined, prove to be conspecific with *E. pristinus.*

The spermathecae have been dissected from the holotype, do not accompany it, and are presumed lost. However, based on my examination of the spermathecae of other *E. luteus* females (figs. 299, 300), I strongly suspect that the previously published drawings of the holotype spermathecae (Gertsch, 1973, 1981) misrepresent the spermathecal trunks and stalks as being narrower than they actually are.

DISTRIBUTION: Known only from the caves in the Pinal de Amoles region (Reddell, 1981) in northern Querétaro in central Mexico (map 4).

MATERIAL EXAMINED: MEXICO: **Querétaro:** Cave No. 29 (Cave No. 14), 20 km N Pinal de Amoles, June 6, 1972 (W. Russell, AMNH), 2♀, juv.; Cueva de los Riscos, 8 km SW Jalpan, Aug. 10, 1966 (J. Reddell, J. Fish, D. McKenzie; AMNH), 8♀, juv.; Cueva de Tejamanil, 0.5 km NE Tejamanil, 2.5 km SW Pinal de Amoles, Aug. 9, 1966 (D. McKenzie, J. Reddell; AMNH), 1♀, juvs.; iron(?) mine, 2 km E Pinal de Amoles, July 17, 1969 (S. Peck, AMNH), 1♀ (holotype), juv.; Sótano del Gobernador, 2 km S Pinal de Amoles, July 10, 1967 (J. Reddell, J. Fish; AMNH), 1♀; Sótano de el Tigre, 14 km by road SW Jalpan, July 11, 1967 (J. Fish, AMNH), juvs.

Euagrus lynceus Brignoli

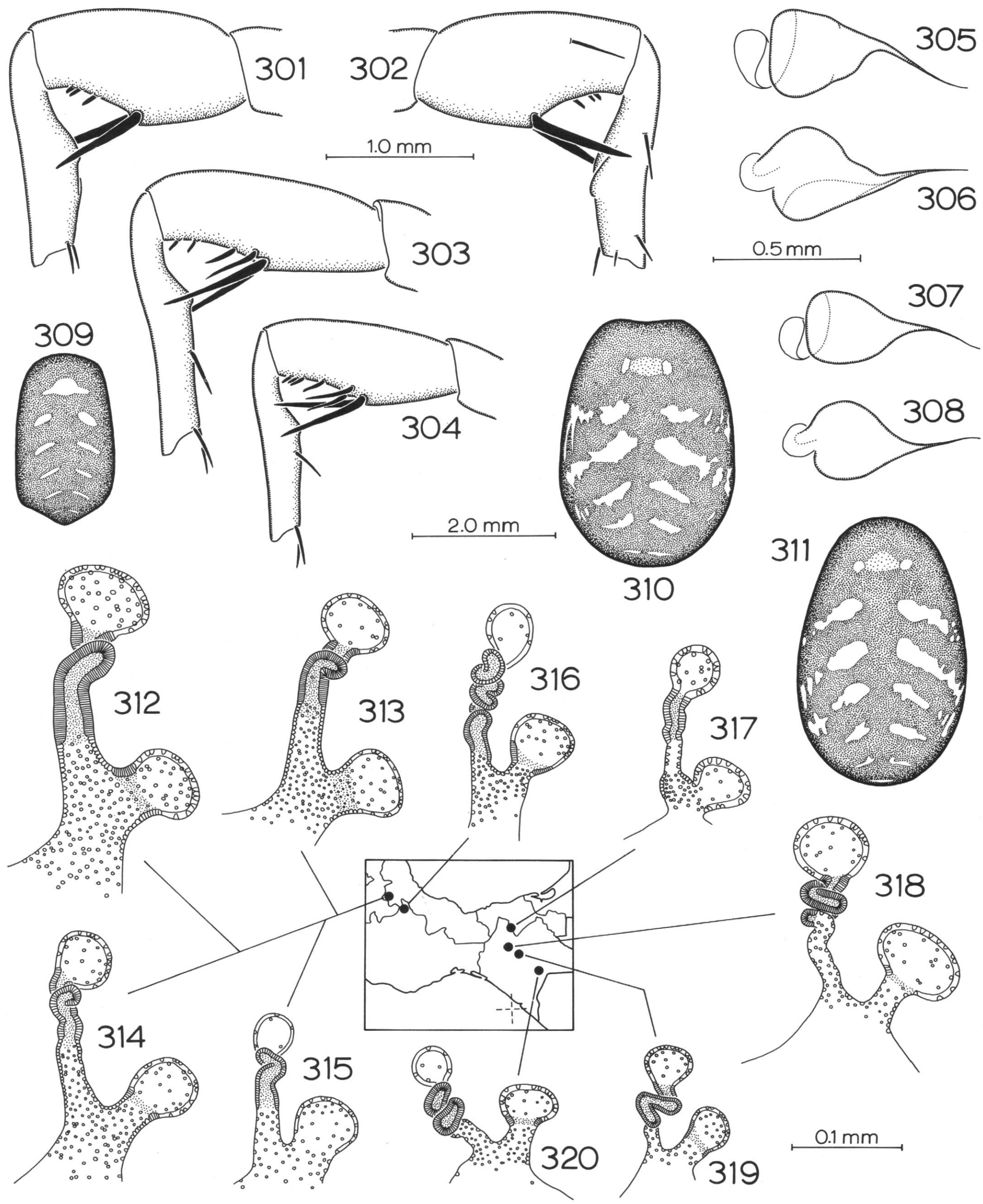
Figures 301–320; Map 4

Euagrus lynceus Brignoli, 1974: 196, fig. 1 A–E (male holotype and two female paratypes from S. Agostín, Comitán, Chiapas, Mexico, in IZUA, examined). — Reddell, 1981: 134.

DIAGNOSIS: Refer to the diagnoses for *E. zacus, E. pristinus,* and *E. luteus* for character states that distinguish *E. lynceus* from its closest relatives.

MALES: Tables 1 and 3. Palpus (figs. 305–308) bulb tapers rather abruptly into embolus base; embolus relatively long and narrow, slightly sinuous in lateral view, without ridges; distal one-third of embolus curves gently upward in lateral view. Tibia II (figs. 301–304) with weakly to moderately developed ventral apophysis with two very long, strong, subequal apical spines; sometimes two markedly shorter spines on distal slope of apophysis; one to seven short spines with obliquely truncate tips ventrally between apophysis and distal end of tibia. Metatarsus II (figs. 301–304) with rather low, thin retrolateral and prolateral keels; apex of retrolateral keel near metatarsus midpoint; three preening combs of 2–6 setae each at distal end. Femur spinule patches long and narrow; spinules elongate with slender tips. Terminal article of lateral spinnerets relatively long, gradually tapering to tip; distal half to three-fourths with irregular pale constrictions resulting in bumpy, flexible appearance. Two foveal setae. Fovea a shallow or moderately shallow rounded pit. Carapace covered with abundant slender, recumbent, pale to light brown setae. Carapace pale yellow to darker yellow; medium brown around edges. Chelicerae, pedipalps, and legs yellow like carapace. Abdominal dorsum (figs. 309, 310) medium to dark purple-brown, with 5–6 white transverse (usually paired) markings; anteriormost pair round and sometimes joined by pale central area; rest of markings transverse and may be associated with irregular lateral light areas (fig. 310).

FEMALES: Table 2. Two spermathecal stalks on each side (figs. 312–320). Median stalk long and sinuous and/or coiled distally; much longer than lateral; bulb oval to broader-than-long and smaller to slightly larger than lateral bulb. Lateral stalk straight, very short to short, and one-fourth to two-thirds diameter of lateral bulb; bulb spherical to broader-than-long. Sclerotized area on anterior lip of genital opening varies from small and pale to larger and darker with lateral winglike extensions. Ventral metatarsus I preening comb of 2–4 setae always present; prolateral (2–4 setae) and/or retrolateral (2–3 setae) comb also often present. Terminal article of lateral spinnerets relatively long, gradually tapering to tip; distal half to three-fourths flexible, with irregular pale constrictions. Fovea a shallow to deep (rarely) rounded pit, often slightly broader than long. Carapace with moderately dense covering of thin, mostly recumbent, light brown setae; setae on margin longer. Carapace tan or orange-tan to light brown; darker around edges. Chelicerae, pedipalps, and legs either like carapce and homogeneous or lighter with darkly pigmented blotches on



Figs. 301–320. *Euagrus lynceus* Brignoli. 301–304. Male tibia and metatarsus II. 301, 302. Holotype. **301.** Retrolateral view. **302.** Prolateral view. **303.** 32 mi S Valle National, Oaxaca, retrolateral view. **304.** Just N Jitotal, Chiapas, retrolateral view. 305–308. Palpal organ. 305, 306. 32 mi S Valle National, Oaxaca. **305.** Retrolateral view. **306.** Ventral view. 307, 308. Holotype. **307.** Retrolateral view. **308.** Ventral view. **309–311.** Abdominal dorsum, 2.0 mm scale. **309.** Male, just N Jitotal, Chiapas. **310.** Holotype male. **311.** Paratype female. 312–320. Right spermatheca. **312, 313.** Cueva del Ojo de Agua de Tlilapan, Veracruz. **314.** Soledad Atzompa, Veracruz. **315.** Near Acultzingo, Veracruz. **316.** Cueva de la Junta, Oaxaca. **317.** Grutas del Coconá, Tabasco. **318.** Just N Jitotal, Chiapas. **319.** 4 mi SE San Cristóbal, Chiapas. **320.** Paratype.

TABLE 6
Comparison of Relative Appendage Length in Cave-dwelling and Epigean *Euagrus lynceus* Females
Cave samples are from five different caves. Range, mean, and standard deviation given.

	Cave specimens (N = 9)	Epigean specimens (N = 8)
IFT(100)/IFL	27–35 (30.9 ± 2.42)	36–40 (37.5 ± 1.41)
ITL(100)/CL	50–67 (57.7 ± 4.90)	44–51 (46.5 ± 2.73)
LSL3(100)/CL	48–74 (65.3 ± 9.30)	33–48 (42.1 ± 5.46)

pedipalps and legs. Abdominal dorsum (fig. 311) as in males, with 5–8 light transverse markings.

VARIATION: The two males (including the holotype) from near Comitán, Chiapas, have a more robust tibia II [IITT(100)/ITL = 60, 64 vs. 46–52] (fig. 301 vs. figs. 303, 304) and a more distally positioned retrolateral keel on metatarsus II [MKR(100)/IIML = 52, 54 vs. 41–48] (fig. 301 vs. figs. 303, 304) than the five males from the other two populations sampled, but I suspect that these gaps in character value distributions will disappear as these populations (and others) are better collected.

Much of the large amount of variation observed in *E. lynceus* females is apparently the result of special selection pressures that act in cave environments but do not affect epigean populations, even those nearby. The appendages (legs and spinnerets) of *E. lynceus* females from caves are nearly always proportionally longer than those of epigean females (table 6). In all these characters, the epigean specimen collected from near Acultzingo, within 15 km of the Tlilapan area cave populations, resembles the epigean specimens from distant populations in Chiapas much more closely than the cave specimens. The Grutas del Coconá specimens, unlike the epigean populations not far to the south at Jitotal, Chiapas, have elongate appendages like those of the much more distant Tlilapan area cave specimens. The same pattern is also evident in the development of the metatarsus I preening combs, with the great majority of cave specimens having fewer, more weakly developed combs (4 have one comb, 3 have two combs, and 2 have three combs) than the epigean specimens (1 has two combs, the other 7 have all three combs).

Noteworthy variation in other characters does not appear to be largely or, in many cases, even minimally the result of the special constraints of cave environments. The 6 specimens from the Tlilapan area caves (Cueva Ojo de Agua de Tlilapan, Soledad Aztompa, and Sumidero Citlalapa) are markedly larger (CL = 4.0–5.0; 4.45 ± 0.46) than all 11 of the other specimens (CL = 2.4–3.3; 2.79 ± 0.30). The 4 specimens from Cueva Ojo de Agua de Tlilapan have more cheliceral denticles (CD = 21–32; 22.4 ± 7.19) than nearly all the other 13 *E. lynceus* females examined (CD = 11–21; 15.6 ± 4.32). While the six Tlilapan area cave specimens and the epigean specimen from nearby Acultzingo have 4 or 5 spines on tarsus I, all other *E. lynceus* females have fewer than 4 (ITarM = 0–3; 0.7 ± 1.06). The Chiapas specimens (all epigean) have blotches of fairly dark pigment on all leg and pedipalp articles and the two specimens from Grutas del Coconá, Tabasco, have similarly, but more contrastingly, mottled appendages; however the Oaxaca and Veracruz females lack these dark blotches or have only faint ones.

The spermathecae of the Tlilapan area cave and epigean specimens are somewhat different from those of the Chiapas specimens; the former (figs. 312–315) are characterized by a more weakly looped median stalk, a proportionally shorter and broader lateral stalk, and a proportionally narrower but more extensively perforate trunk than the latter (figs. 318–320). The spermathecae from two other populations, however, combine these features and therefore appear intermediate; Cueva de la Junta, Oaxaca, spermathecae (fig. 316) resemble those of the Tlilapan area specimens (figs. 312–315) in trunk form but are more like the Chiapas spermathecae (figs. 318–320) in stalk form; Grutas del Coconá, Tabasco, spermathecae (fig. 317) are similar to those of the Tlilapan area specimens in stalk form but more like the Chiapas spermathecae in trunk form.

The geographic variation patterns described above suggest that some of these populations may be reproductively isolated, but until more specimens, especially males, are available to further test this hypothesis, I postulate that *E. lynceus* is a variable species of both epigean and cave-dwelling populations which are not separated by intrinsic reproductive isolating mechanisms.

DISTRIBUTION: Southern Mexico from central Veracruz south and east to southern Chiapas (map 4). Brignoli (1974) included the record of a female collected from Cueva del Diablo near Yaxchilán, Guatemala (see also Reddell, 1981), but I have not been able to examine this specimen.

MATERIAL EXAMINED: MEXICO: **Chiapas:** Comitán, S Agostín, elev. 2300 m, Mar. 6, 1971 (A. Zullini, IZUA), 1♂, 2♀ (types); just N of Jitotol, 47.5 mi N jct. 190 and 195 on rt. 195, elev. 1650 m, June 17, 1982 (F. Coyle, AMNH), 3♂, 2♀, juvs.; Laguna Chamula microwave tower, between Comitán and Amatenango del Valle, elev. 2530 m, July 20, 1972 (C. Mullinex, K. Lucas; CAS), 1♀; 4 mi W San Cristóbal de las Casas on rt. 190, elev. 2400 m, June 16, 1982 (F. Coyle, AMNH), 3♀, juvs.; 4 mi SE San Cristóbal de las Casas, Aug. 23, 1966 (J. and W. Ivie, AMNH), 1♀, juv.; 17 mi SE San Cristóbal de las Casas, Sept. 2, 1972 (C. Mullinex, CAS), 4♀, juv.; 38 mi SE San Cristóbal de las Casas, near Palmira, Jan. 21, 1980 (B. and V. Roth, AMNH), 1♂, 1♀, juvs. **Oaxaca:** Cueva de la Junta, 6 km SW Acatlán, Dec. 27, 1972 (J. Reddell, D. McKenzie, S. Murphy; AMNH), 1♀, juv.; 32 mi S Valle National, elev. 2100 m, baited traps in mossy forest, May 21, 1971 (S. Peck, MCZ), 2♂. **Tabasco:** Grutas del Coconá, 3 km NE Teapa, elev. 40 m, July 24, 1973 (J. Reddell, J. Rowland; AMNH), 2♀, juvs. **Veracruz:** near Acultzingo, elev. 7200 ft, oak forest, July 1953 (C. Goodnight, AMNH), 1♀; Cueva de Ojo de Agua de Tlilapan, Tlilapan, elev. 1200 m, Aug. 4, 1967 (J. Reddell, J. Fish, T. Evans; AMNH), 3♀, juvs., Aug. 8, 1969 (S. and J. Peck, AMNH), 2♀, juvs., Mar. 4, 1973 (J. Reddell, D. and M. McKenzie, S. Murphy, M. Butterwick; AMNH), 2♀, juvs.; Rock Quarry, 6.1 mi on Tequila-Zongolica Road, Aug. 6, 1967 (J. Reddell, J. Fish, T. Evans; AMNH), juvs.; Soledad Atzompa, Jan. 5–6, 1974 (J. Reddell, X. Lopez; AMNH), 1♀, juv.; Sumidero de Citalapa, Zongolica, Mar. 23, 1981 (S. Robertson, P. Ackmann; AMNH), 1♀, juv.

NATURAL HISTORY: This species is a troglophile living in caves in Veracruz, Oaxaca, and Tabasco and also in epigean habitats in Veracruz, Oaxaca, and Chiapas. The known epigean populations are at rather high elevations (1650–2530 m) in cool and moist oak, pine, and pine-oak forest communities. Some cave populations, like those in Veracruz, are at elevations of 1000–1500 m, but the elevation of the Grutas de Coconá population in Tabasco is only 40 m. This cave, however, lies right at the base of the large mountain mass of Chiapas where the epigean populations thrive. Near San Cristóbal de las Casas, *E. lynceus* spiders were found in a partly logged, mature pine-oak forest where they lived in irregular tubular webs constructed under large chunks of pine bark lying on top of a thick litter of pine needles and oak leaves or constructed in the litter itself, often near rotting stumps. No exposed capture sheets or funnels were observed. In this same mountain mass, near Jitotol, I collected three males, two females, and juveniles under pine logs, branches, and rocks and inside lumps of pine needle and bark litter in a pasture in open pine forest. All but the males were in small irregular tubular webs. A large bodied species (undetermined) of *Euagrus* was found sharing these same habitats (but not microhabitats) with *E. lynceus* at these two sites.

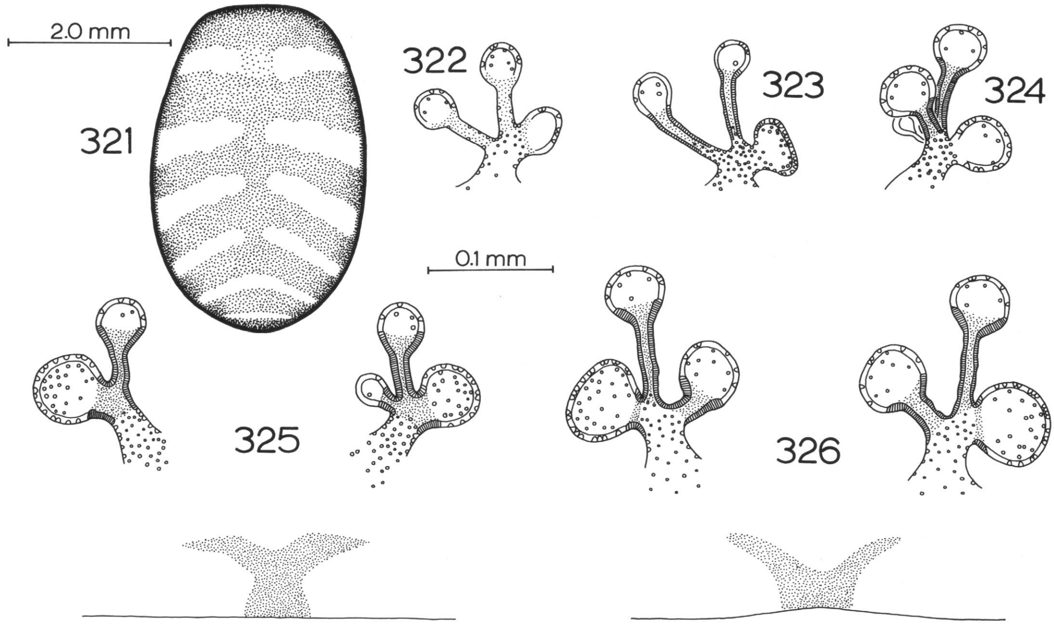
Euagrus zacus, new species

Figures 321–326; Map 4

TYPES: Female holotye and three female paratypes from 3 mi NE of Zacatepec, Puebla, Mexico (June 30, 1963; J. Beatty, F. Coyle), deposited in AMNH.

ETYMOLOGY: The specific name is an arbitrary combination of letters.

DIAGNOSIS: Females of *E. zacus* are distinguished by unique three-stalked spermathecae with straight median stalks (figs. 322–326), conspicuous, white, transverse, dorsal abdominal stripes (fig. 321), small size (table 2), and only two foveal setae. *Euagrus zacus* is very similar to its sister species, *E. lynceus*, but the two (rarely one) straight median stalks (figs. 322–326) and proportionally small anterior median eyes [AMD(100)/CW = 2.9–3.7; 3.24 ± 0.32] of *E. zacus* females help separate them from *E. lynceus* females, which



Figs. 321–326. *Euagrus zacus,* new species, females. **321.** Abdominal dorsum, paratype, 2.0 mm scale. 322–324. Right spermatheca. **322.** 4.2 mi NE Zacatepec at pass, Puebla. **323, 324.** Paratypes. 325, 326. Both spermathecae and wing-shaped sclerotized area on anterior genital lip. **325.** Paratype. **326.** Holotype.

have only a single sinuous or coiled median stalk (figs. 312–320) and anterior median eyes that are usually proportionally larger [AMD(100)/CW = 3.4–6.3; 4.41 ± 0.67] than the corresponding *E. zacus* eyes.

MALES: Unknown.

FEMALES: Tables 2 and 3. Three spermathecal stalks (rarely two or four) on each side (figs. 322–326). Lateral stalk very short and relatively wide; bulb roughly spherical or wider than long, relatively large. Primary median stalk (adjacent to lateral stalk) long, slender, and straight (or only slightly crooked); bulb smaller than lateral bulb and approximately spherical. Secondary median stalk almost always present; varies greatly in length but always straight; bulb approximately spherical. Sclerotized area on anterior genital lip usually prominent and with lateral winglike extensions, but may be small and lack lateral extensions. Metatarsus I ventral and prolateral preening combs (two or three setae each) always present; retrolateral comb of two to three setae sometimes present. Terminal article of lateral spinnerets relatively long and gradually tapering to tip; distal half to two-thirds with irregular pale constrictions resulting in bumpy, flexible appearance. Two foveal setae. Fovea a moderately deep triangular or rounded pit. Carapace with moderately dense covering of thin, semirecumbent, brown setae. Carapace orange-tan or gray-tan; darker around edges. Chelicerae, pedipalps, and legs similar to carapace. Abdominal dorsum (fig. 321) brown or purple-brown with six to eight pairs of prominent, broad, transverse, whitish bands; the most posterior of these usually fused medially and narrower than others.

DISTRIBUTION: Known only from the type locality (and a nearby locality) in the state of Puebla in the central highlands of Mexico (map 4).

MATERIAL EXAMINED: MEXICO: **Puebla:** 3 mi NE Zacatepec along rt. 140, June 30, 1963 (J. Beatty, F. Coyle; JAB, AMNH), 4♀ (types), juvs.; 4.2 mi NE Zacatepec along rt. 140, elev. 2550 m, June 26, 1982 (F. Coyle, AMNH), 1♀, juvs.

NATURAL HISTORY: These spiders were

collected in dry and open pine-oak forest mixed with tree yuccas, *Agave,* and *Opuntia. Euagrus mexicanus* was also present at this locality but did not occupy the same microhabitat as *E. zacus,* which was commonly found in irregular and branching tube webs in humid spaces between leaf bases of dead *Agave* and under dead yuccas lying on the ground. Two egg sacs were found on June 26; one contained 14 recently hatched spiderlings without claws, fangs, spigots, or ocular pigmentation, the other contained 18 active spiderlings with all of the aforementioned features developed.

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