

THE SPIDER GENUS *LOXOSCELES*
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THE WEST INDIES
(ARANEAE, LOXOSCELIDAE)

WILLIS J. GERTSCH AND FRANKLIN ENNIK

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ABSTRACT

The present paper deals with the brown spiders of the genus *Loxosceles* (family Loxoscelidae) as they occur over temperate and tropical North America. These haplogynes spin irregular webs, serving as retreats and snares, under ground objects of many kinds, and in houses and buildings and in the human litter around them. Since all species of *Loxosceles* are presumed to be venomous and at least five from our area have some kind of medical record, a brief review of their status in the Nearctic Region is presented. The terms Haplogynae and Entelegynae are defined and discussed in reference to their copulatory patterns. In a section on various systematic problems in *Loxosceles* the status of numerous specific taxa is analyzed with the conclusion that they adequately fulfill all the requirements of valid species. The systematic account of the genus *Loxosceles* as it occurs in continental and insular North America supplants an earlier work (Gertsch, 1958) in which the then known 18 species were described and illustrated. The presently known 54 species from this wide area are characterized as follows: two species (*rufipes* and *panama*) are related to the *laeta* group of South America and are endemics in Central America; two species that can be called "cosmopolitan" have been brought into North America by trade vehicles: *laeta* is now established in Central America and southern California, and *rufescens* is now widely distributed as a house spider over much of the United States; and the re-

maining 50 species of the *reclusa* group forming the endemic fauna over much of the United States, Mexico, and adjacent countries of Central America, and on the islands of the West Indies. Descriptions, illustrations, distribution maps, and keys to the taxa are offered under various geographical subdivisions. The *Loxosceles* of the United States now number 11 species of which seven are described as new; six of these have limited ranges southward into Mexico. The *Loxosceles* of Mexico and adjacent Central America now number 38 species of which 20 are described as new: nine mostly from the southern part of Baja California, four from the Sonoran enclave, and seven from the rest of Mexico and adjacent Central America; the species *bolivari* Gertsch, based on the male holotype from Cueva García in Nuevo León, is a synonym of *devia* Gertsch and Mulaik; only one of the Mexican species, *yucatan* Chamberlin and Ivie, ranges into Central America to increase its endemics of the *reclusa* group to three species. The *Loxosceles* of the West Indies now number six species of which four are described as new; two species from Jamaica show moderate cave adaptation. The name *unicolor* Keyserling with spurious type locality, widely and improperly used by many authors for species from both North and South America, is abandoned as dubious. The southwestern species earlier given that name was renamed *deserta* by Gertsch.

INTRODUCTION

The brown spiders of the genus *Loxosceles* (sometimes called violin spiders because of the dusky maculation on the carapace) are known from two principal world areas—temperate southern Africa northward through the tropics into the Mediterranean region and southern Europe; and from temperate and tropical zones of North and South America. The African fauna of about 20 described species is quite uniform and presents few differences of taxonomic importance separating them from those of the Americas. The genus *Loxosceles* is strongly represented in South America where 30 species were listed in 1967

by Gertsch. Eight of these belong to distinctive minor groups but the great majority make up the homogeneous series comprising the *laeta* complex. The fauna of continental North America and the adjacent islands is the subject of the present paper, which brings up to date an earlier consideration of this diverse area (Gertsch, 1958). Only two of the endemic species are close relatives of South American groups, and these are the similar *rufipes* and *panama* found in Guatemala and Panama. The continental North American fauna has been further enriched by two exotic species that have spread widely by trade into

many parts of the world and are still continuing their active dispersal. Both are mainly domestic spiders that live in buildings and accumulated litter outside them and both are becoming closer to being called ubiquitous or cosmopolitan. The first of these is the South American *laeta*, a spider with its original home in western South America that spread into many parts of that continent, notably in coastal areas of agreeable climate. It has been carried by trade into Central America and northward into the United States. An immature specimen found in a hotel room in Vancouver, British Columbia, is the only authenticated Canadian record. Colonies of this venomous spider have been established indoors in Massachusetts and southern California, but so far there have been no authenticated records of bites. *Loxosceles laeta* is known to have moved into as far places as Finland and Australia. The second exotic species, *rufescens*, was likely derived from North Africa but since has been distributed by travel and trade vehicles to many parts of the world. It is the common and seemingly the only species known from Europe, and also ranges widely into temperate portions of the Holarctic region. It is a common spider of the Pacific islands, including the Hawaiian Islands, and was recently reported to be widespread in South Australia.

The North American fauna is dominated by species of the *reclusa* group, a homogeneous series which has undergone remarkable adaptive radiation and now numbers 50 species from all parts of the continent and adjacent islands (map 1). The present systematic account of the genus *Loxosceles* as it occurs in continental and insular North America supplants an earlier work (Gertsch, 1958) in which the then known 18 species were described and illustrated. The present study is based on reappraisal of the earlier material and the new collections that have become available since that time. The loxoscelids occupy a great variety of habitats in natural and domestic situations (Gertsch, 1967, p. 122) where they spin irregular webs and usually remain in close contact with them. Many collections came from cave entrances and superficial parts of caves, which afford attractive habitats for these nocturnal spiders. Cave

existence under diverse situations does not seem to have modified them in any substantial way, and they can be classified at most as troglaphiles. Exceptions are two species from Jamaica which show some loss of dark pigment and eye reduction. The present study enlarges the species representation for the broad area covered to 54 species, of which all but the two ubiquitous species mentioned above are endemics.

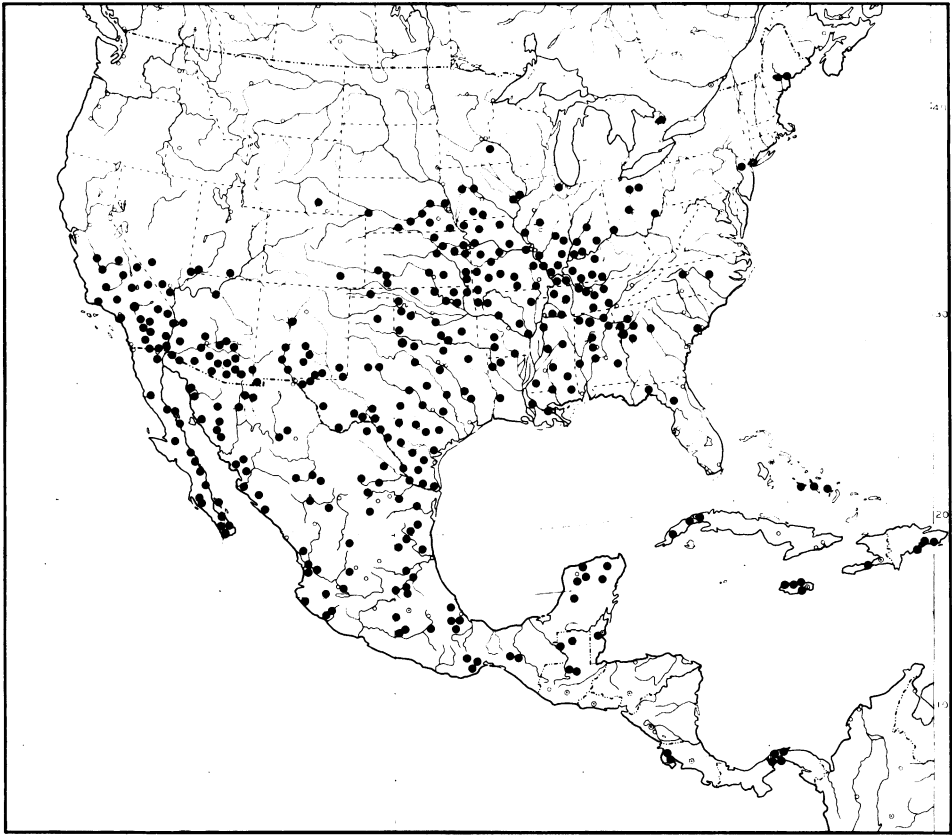
Since the loxoscelids are generalized haplogyne spiders a discussion of the terms Haplogynae, haplogyne, entelegyne, etc. is presented. The conclusion is again reached that these are meaningful terms and serve to make more concise our understanding of the rank and position of many spiders.

In another section (see The Species Problem in *Loxosceles*) response is given to the authors Bächerl and Brignoli who have challenged the validity of the many *Loxosceles* taxa of Gertsch from North and South America; they contend that these taxa do not conform to biological species and are instead merely "populations" of a smaller number of species. It is not clear from their accounts that their "populations" are geographical entities and perhaps subspecies in the general meaning of that word. We have reappraised these species and have found that many occur in distinctive life areas in sympatric relationships and many others of allopatric range, but all are morphologically distinct and worthy of specific rank. This does not diminish the difficulty of dealing with the many closely allied forms. The above authors have failed to understand the morphological details offered in the descriptions, have had few examples available of the species concerned, and have based their conclusions on inadequate study and false assumptions.

Some of the brown spiders have become notorious for their toxic venoms capable of injuring man, so a brief review of their status is offered in the section on a Medical Review of *Loxosceles* in the Nearctic Region.

ACKNOWLEDGMENTS

The present paper is based on *Loxosceles* material considered in the previous revision of Gertsch (1958) and includes the large num-



MAP 1. Distribution of *Loxosceles* in North America, Central America and the West Indies.

ber of new specimens accumulated since that date. We are grateful to all those colleagues, collaborators, and friends who, through gifts and loans during a long period, have assembled what now seems to be a representative collection worthy of a new revision. We are grateful to those caretakers of the major collections who have made available types and study material in their charge: Dr. Norman Platnick of the American Museum of Natural History (AMNH), New York, wherein a large part of the present study material is deposited; Dr. Herbert W. Levi of the Museum of Comparative Zoology (MCZ) of Harvard University in Cambridge, Massachusetts, whose special cooperation is always appreciated; Drs. George Lindsay, E. S. Ross, Paul Arnaud, and Hugh Leech of the California Academy of Sciences (CAS) in San Francisco, California, for many special courtesies; and

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bringing in the study material for the laboratory systematist. As far as possible he is mentioned as part of the locality data and not noted only for some of the common species where such data add little to the understanding of the species. A large part of the cited material in this paper is deposited in the American Museum of Natural History, the Museum of Comparative Zoology, and the California Academy of Sciences. Depositories are indicated only for type specimens and some of the more notable collections.

AN ANALYSIS OF HAPLOGYNAE AND ENTELEGYNAE

A study of the genus *Loxosceles* can be profitably preceded by definitions and discussions of usage of such terms as Haplogynae, Entelegynae, epigynum, and especially of the adjectives "haplogyne" and "entelegyne." The names of Simon's subgroups were based on obvious features of the female genitalia. The Haplogynae (the term derived from the Greek *haploos*, single or simple, and *gyne*, woman or female) comprises a series of cribellate families with simple female genitalia like those of the mygalomorph spiders. The principal character of this subgroup was the presence of a single pair of internal fertilization canals and the lack of external copulatory components: in other words the lack of an epigynum as defined by Simon. In these spiders the male palpus typically is simple and lacks hematodochae to facilitate emission of the semen. The male haplogyne introduces semen from his palpi into the female receptacles where it is held until egg laying, at which time it goes through the same fertilization canals into the uterus to fertilize eggs.

Contrasted with these generalized types of spiders were the numerous families assigned by Simon to the subgroup Entelegynae (based on the Greek *en*, on or near; *telios*, whole or perfect; and *gyne*, woman or female), spiders with females bearing more complicated genitalia and seemingly more advanced features. In these the basic pair of internal fertilization canals has been subdivided to leave an in-

ternal pair for fertilization and a secondary pair of copulatory canals which receive the emboli of the male palpi. The copulatory canals gradually migrated to the surface and present two more or less distinct openings, these often with accompanying modifications: in other words an epigynum is present. The male entelegyne forces semen from his palpi through the external orifices into the receptacles of the female where it is held until the proper time to release it through the internal fertilization canals into the uterus.

The cribellatae, Simon's major grouping, comprises those spiders with cribellum and calamistrum. Simon excluded the families Hypochilidae and Filistatidae from the Haplogynae even though they possessed the same primitive genitalia. On the other hand, the families Pholcidae and Teragnathidae were considered to be entelegyne, more complicated, in spite of their halogyne genitalia.

The presently known genitalia of our spiders are derivative elements representing a prolonged interaction of the physical components of both male and female. The gonopore of spiders (and also of other arachnids) is a single transverse fissure lying in the middle of the epigastric furrow near the base of the abdomen. This opening communicates with the oviducts of the female or testes of the male by a short sleeve-like tube. The lower part of this tube, variously called vagina, uterus, etc., is moderately sclerotized and de-

marked from the oviductal portion by a transverse thickening called here the uterine valve. In early or primitive spiders, the sperm globule of the male (the spermatophore of most arachnids is merely an evolved device for carrying the sperm globule) may have been pressed through the gonopore into the uterine chamber by the tarsi of the male palpi during copulation, perhaps near the time of egg laying, and held there until this occurred. The forceful and simultaneous use of both palpal tarsi may have imprinted invaginations on the front of the uterine wall as sperm pockets, one for the tarsus of each side. These protoreceptacles can be visualized at first as shallow vessels communicating with the uterus by broad openings and sharing the deposited semen. Progressively these pockets were changed into sclerotized sperm vessels destined to hold the semen more firmly, which was now being deposited by the male through derivative components of the palpi evolved to hold the semen and transfer it to the female receptacles. At the time of egg laying the sperm held in the receptacles was released through the two fertilization canals into the collateral fluid of the uterus to fertilize the eggs as they were laid. The homologue of the fertilization canal was at first the uterus itself, then the wide openings of the sperm pockets, and finally the much smaller sclerotized fertilization canals with small openings on the uterine wall. This series of components identifies the haplogyne condition of female spiders. Some students (Platnick and Gertsch, 1976) have suggested that the palpi of the earliest spiders left doubled imprints on the protoreceptacles of the females, these representing marks for the embolus and accompanying conductor of each palpus. This doubled condition on each side, standard for the atypoid families and the araneomorph Hypochilidae, has been lost in entelegyne families.

Simon's Haplogynae has long been controversial among spider students and few have accepted it as an exclusively valid grouping. Petrunkevitch (1923) concluded that all true spiders were once cribellate and he combined cribellate families with ecribellates in his system, thus stressing the relationship of the Hypochilidae and Filistatidae to the Sicariidae

and other haplogyne families. Later Petrunkevitch (1928, pp. 13–14; 1939, pp. 155–190) further separated the relative families into three distinctive but now largely abandoned suborders: Hypochilomorphae for the Hypochilidae; Apneumonomorphae for the lungless Telemidae and Caponiidae; and Dipneumonomorphae for the cribellate Filistatidae and the remaining haplogyne families of Simon. Bristowe (1938, pp. 304–311) discussed the relationship of the haplogyne families and concluded that they formed two discrete series, the Dysderoidea and the Scytodoidea; and with the latter he included the family Pholcidae.

Few students have agreed fully with Simon. Lucien Berland in his excellent book (1932, pp. 308, 314) offered his opinion that the Haplogynae of Simon was a homogeneous unit and he would not subdivide it or add the two cribellate families as was done by Petrunkevitch. More recently Wiehle (1967, p. 183) accepted the subgroups Haplogynae and Entelegynae and then proceeded to demonstrate morphological intergradation between the two subgroups. In his resumé of the Haplogynae he characterized the internal genital organ of the female and diagrammed the simple gonopore leading to the seminal receptacle on each side. He found it necessary to include the families Pholcidae and Tetragnathidae in the Haplogynae based on their genital structure. He also found in the orbweavers of the group Meteae an intermediate condition between the haplogyne and entelegyne organs and, presumably influenced by the accepted position of the families in the prevailing system, called the genital pattern "semientelegyne." For *Meta segmentata* he found that the receptacles were situated on the outside of the "epigynum" and that fertilization canals were not present. In other words, the sperms were injected into the receptacles and then later voided through the same openings into the external uterus. A more acceptable term would have been "semihaplogyne" inasmuch as the diagrams of the group are essentially equal in prime diagnostic features—in other words absence of separate fertilization canals. Wiehle could not find fertilization canals in *Nesticus*, where

the first author found them difficult to distinguish but presumed to be there, but he considered the epigynum of *Nephila* to be entelegyne. Other instances of seeming intermediacy were voiced in the same year by Gertsch (1967, p. 131) and included such families as the Mimetidae and Nesticidae in which the genital orifice is hidden under the posterior lip of the genital groove. A more recent study of spider genitalia was that of Cooke (1969 [1970], pp. 142–146) who rejected the Haplogynae as a valid category since it excluded various families with similar genitalia in widely separated parts of the system. Excellent diagrams of haplogyne and entelegyne epigyna (figs. 1 and 2 on p. 144) were presented by Cooke. Still another objection to Haplogynae as a valid taxonomic grouping was voiced by Platnick (1975, pp. 30–32) who considered the “haplogynes to represent primitive ends of several different lineages, and that ‘haplogyne’ and ‘entelegyne’ are, at best, artificially and poorly delimited stages in the evolution of spider genitalia, and are probably nothing more than substitute terms for ‘simple’ and ‘complex’.” He also found that the Palpimanidae were haplogyne and the stenochilids to have entelegyne males and haplogyne females. In a similar vein Opell (1979) has shown that some uloborid genera have haplogyne epigyna.

In summary we can say that more modern students of spiders reject the Haplogynae for various but mostly the same general reasons. On the other hand the use of the adjective “haplogyne” is considered by some students as quite appropriate to describe the simple female genital organ of the following large series of generalized spiders: all the liphistiid and mygalomorph families; the hypochilid families; the filistatids of the cribellate spiders; the families placed by Simon in his Haplogynae; and from his Entelegynae at least the families Pholcidae, Tetragnathidae, and Palpimanidae. Similarly the adjective “entelegyne” designates a more complicated female genital organ in which the basic fertilization canals have been subdivided into fertilization and copulation canals, these latter brought to the surface in many spiders to form external orifices.

Simon defined the term epigynum (*epigyne*) as the ensemble of external organs of the female genitalia and thus essentially limited the usage to his Entelegynae. In most of these spiders the genital organ is more or less apparent, being a formal ridge with orifices and guides, or variously equipped with rims, foveae, scapes, etc., all designed to facilitate positioning of elements of the male palpus. This usage has been rather scrupulously followed by students and implies approval of the subgroup Entelegynae; they call epigynum the external aspect of the organ and use vulva, seminal receptacles, internal genitalia or some other term for the internal structure. The thesis that a single term is appropriate to cover the entire female genital organ has been proposed by Gertsch in several places (1958, p. 3; 1967, p. 130) and preference was given to “epigynum” as a single suitable word (based on the Greek *epi*, upon, over, and *gyne*, woman, female) to cover its meaning. In a study of the plectreurid spiders Gertsch (1958, p. 4) declared that

There is every intergradation in spider families from the simplest internal genital organ, with its receptacles opening directly into the vagina, and the most complicated organ, with internal fertilization ducts and external orifices leading to the receptacles. In the intermediate families, such as the Mimetidae, Nesticidae, and numerous others, there can be seen stages in the subdivision of the primary genital tubes into the fertilization ducts and the tubes leading to the external orifices. A single term could appropriately cover this whole system. The term “epigynum” when used to designate only the superficial facies of what is obviously a single unit is an unnecessary luxury. It would be more usefully used as an exact synonym of female genital organ.

Whereas some objections have been raised to the heterogeneous Haplogynae of Simon, few can be charged to the obvious close relationship of the various families of his Sicariidae. The several families established for this group seem now to be fully as valid from the angle of systematic proportion as are many families of other groups accepted by modern students. The family Losoxcelidae was established by a simple listing in 1949 (Gertsch,

pp. 234, 266) and that name is now widely accepted for this group of six-eyed spiders and is used here. Later, in consideration of the genus *Loxosceles* in both North and South America (Gertsch, 1958, p. 3; 1967, p. 130), the subfamily name *Loxoscelinae* was used within a modified family *Scytodidae*, comprising *Scytodes*, *Drymusa*, and *Loxosceles*. This arrangement still must be further au-

thenticated and is not followed in this paper. The principal feature that identifies the several families of this series is the structure of the chelicerae. These are bound together from front to back for about half their length with a tough, flexible white membrane; and accompanying this along the inner margin is a thin, transparent membrane which is enlarged and darkened into an apical tooth.

THE SPECIES PROBLEM IN *LOXOSCELES*

According to Brignoli (1976, p. 136) the greatest problem in the genus *Loxosceles* derives from the conflict of opinion between the two authors who have devoted most attention to it: Bücherl in Brazil and Gertsch in the United States. This confrontation between workers, each holding his own ideas on the proper use of the name *laeta* and the limits of the species category, remained throughout the several exchanges completely impersonal and friendly. Brignoli now finds himself on the side of Bücherl. Along with the present revision of the continental and insular fauna of *Loxosceles*, we have found it imperative to reappraise the opposing positions and again conclude by rejecting the concepts of both of those authors.

For many years Bücherl's principal interest had been centered on the medical status and venomology of the South American loxoscelids and very little on their systematics. His concepts of spider and scorpion species were quite different from those of other students. In his important paper of 1964 (which largely comprehends earlier ones) Bücherl came to the following conclusions: that only three species of *Loxosceles* existed in Brazil and, further, that at most four species offered a faithful picture of the loxoscelids in the entire South American continent. By contrast, Gertsch in 1967 was able to recognize 30 species on the basis of male and female genitalia and various other morphological characters. Response to Bücherl's simplistic ideas on the South American fauna was offered by Gertsch (1967, pp. 125-126) and is briefly summarized here. For his study Bücherl had

before him a large collection of *Loxosceles* from various museums but the bulk of it came from eastern South America where only one species of the *laeta* group occurs. From the western part he had modest numbers from Chile (where only *laeta* itself is common) and few specimens from Peru where a high percentage of the *laeta* complex occurs in enclaves bordering the high mountains. Bücherl's material consisted mainly of specimens he and colleagues had collected from domestic situations in large population areas and included little critical material from more remote localities. No doubt influenced by his unrepresentative collections, he concluded that the 15 specific names in the literature, proposed during 100 years by various students and based on meager verbal and illustrative data, were synonyms. He did this without study of types, topotypes, or authentic specimens of any of them. For the four species recognized he used unsound nomenclature. The name *rufescens*, a Mediterranean and exotic species still unknown from South America and already well depicted by many European and some American authors, was used for the common local species *gaucho*, one obviously and strikingly different on the basis of his own illustrations. He used the name *rufipes*, instead of *laeta*, for the species causing loxoscelism in Brazil, in spite of the fact that *rufipes* had previously been used for several different species and now was essentially restricted to a species from Guatemala. His third species, *spadicea*, must be applied to a spider from the high mountains of Bolivia and not to any species known to occur

in Brazil at present; instead, his illustrations were of the spider called *intermedia* by Mello-Leitão. Finally, his fourth species, *lutea*, was tentatively accepted on the basis of a verbal description and details of the measurements. This simplistic solution of the difficult problem of the South American *Loxosceles* resulted from failure to discriminate between related species and from reliance on three or four characters to solve all problems.

On one occasion Bücherl expressed amazement that arachnologists had needed as many as 30 names to cover the entire world fauna of *Loxosceles*, acknowledged by most students to be a monotonously uniform group of spiders. In response to his criticism of the number of species then recognized and described from North America, Gertsch (1967) responded as follows:

Bücherl's conservatism is also reflected in his analysis of the species described by me from North and Central America. He confessed with frankness his inability to distinguish between such pairs of species as *reclusa* and *devia* (Gertsch, 1958, figs. 21–23 and 24–26), *arizonica* and *unicolor* (*ibid.*, figs. 27–29 and 30–32), *yucatanica* and *zapoteca* (*ibid.*, figs. 33–35 and 36–38), and *boneti* and *zapoteca* (*ibid.*, figs. 39–41 and 42–44) on the basis of what he called "excellent" illustrations of the male palpi. Similarly he was not convinced that the seminal receptacles of the females offered valid features for separation of the species. He denied that *arizonica* (*ibid.*, fig. 90) or any species had six seminal receptacles and suggested that these and other figures were a reflection of errors in technical preparation. Finally, he thought it desirable, perhaps to regard these populations as merely regional types (*apenas populações regionais*) or polytypic expressions of few species. With this conclusion came the implication that they were needless names.

In 1969 Brignoli analyzed the single species *rufescens* in Italy on the basis of the series of characters used by Gertsch in his North and South American papers. Brignoli's most important conclusion was that two other European taxa, *distincta* and *compactilis*, were synonyms and that probably only one species occurred in all of southern Europe. In his analysis of features of coloration, chaetotaxy, eye relationship, length and breadth mea-

surements of carapace and legs, and even the male and female genitalia of *rufescens* he found little to considerable intraspecific and interpopulation variability and had to conclude that the taxonomy of *Loxosceles* was singularly difficult. Gertsch (1958, pp. 5–7) had long held these conclusions and had recognized the nature of variability in all of these features, and urged that even those of the genitalia must be used with caution. In our analysis of Brignoli's genitalic data we have come to somewhat different conclusions and find that the variation is modest and falls within reasonable limits, and that neither male palpus or epigynum come very close to any other species. The seven illustrations of the male palpi (Brignoli, 1969, figs. 19–25) show variability in features of embolus and tibia but the whole aspect is that of normal variability within a species. The same is true of the long series of epigynal outlines (*ibid.*, pp. 145–146, figs. 26–58); of these only three (figs. 26, 40, 46) fall outside the normal range of variation possible in a single species and these three are likely subadult progenitors of the mature organ. Our conclusion is that *Loxosceles rufescens* is a typical Old World species with intraspecific and interpopulation variability well within the limits of most normal species and that its recognition by students anywhere in the world on the basis of genitalic drawings is relatively easy. Similar or even more extreme variation has been noted in American species known from long series and widespread localities, and this must be taken into account when considering related or unnamed species. For those species based on a single or few examples the student must call upon his best taxonomic discretion with full knowledge that his judgment will be tested in time. In this same paper Brignoli takes exception to the many Gertsch species from the South American fauna, thus implying agreement with Bücherl that these are not valid species but are instead "populations" of fewer species or geographical expressions of them, i.e., subspecies. We reject his conclusions for the same reasons as those offered for the opinions of Bücherl.

Brignoli (1976) considered the genus *Loxosceles* on a worldwide basis, listed the species

from known geographical areas, and offered drawings of the genitalia, mostly epigyna, of a few known and unknown species. It was his opinion that Gertsch's work on *Loxosceles* was strictly typological: "Meiner Meinung nach ist die Methodik von Gertsch strikt typologisch." He alleged that the form of the genitalia was used by Gertsch without attention to the possible purpose of slight differences in form. He found no proof that taxa so difficult to distinguish morphologically would correspond to biological species and asked what isolating mechanisms could separate these from one another, and then added certainly not mechanical ones. To these statements we are forced to plead guilty and accept them as the lot of all zoologists confronted with thousands of preserved specimens. We admit that we and most taxonomists (and we do not exclude Bücherl and Brignoli), in spite of the ideals of modern systematics, are forced to depend upon comparative morphology for primary data, and then try to fit other kinds of information, such as from genetics, biogeography, ecology, etc., into our primarily morphological analysis and description. The taxa of *Loxosceles* suffer from the fact that the "degrees of difference" in genitalic characters are less great or perhaps less easy to describe verbally or pictorially than those of some other spiders, and an explosive adaptive radiation has produced many closely allied species. In this genus we have made use of combinations of characters to recognize what we believe are distinct morphological species. We have found the genitalia of the females just as significant as those of the male and in many cases more readily diagnostic than those of the male.

In a summary statement Brignoli (1976, p. 184) succinctly stated his conclusions on the species concept at present operative in the genera *Loxosceles* and *Scytodes* as follows: "All characters not based on the morphology of the genitalia are of small or unknown biological meaning; their use, at the actual state of our knowledge, is not recommended." And "Also the morphology of the genitalia does not have the same value in this group as in other families of spiders; in all *Loxosceles* and in most *Scytodes* the validity of the 'lock

key principle' is doubtful. From this derives the probable lack of value of many described species (esp. in *Loxosceles*)." We disagree completely with these generalizations in the belief that the small differences in both male and female genitalia are matched in many haplogyne families and are not much more explicit and meaningful in many entelegyne groups. Further, we reject the long discredited "lock and key" principle of Leon Dufour that morphological differences of genitalia preclude the crossing of these spider species, in this case the physical failure of the palpus to open the epigynal lock. Instead we prefer to believe that the species are kept apart by fundamental instinctive patterns probably based on chemotactic stimuli. Gering (1953) found little mechanical preclusion in cross mating in the North American entelegyne genus *Agelenopsis* and concluded that "morphological incompatibility, if it exists at all, will be found to be the exception rather than the rule within the other genera of Agelenidae."

Brignoli's objections are that some species are known from few specimens (in some instances from only one sex) and that they are difficult to separate on the basis of descriptions and illustrations and a paucity of material and literature. Of the North and Central American species his observed material has been three females and some immatures of *yucatanana*, one female and immatures of *boneti*, and eight juveniles of unknown species from caves. In other words, only female examples of two species and not a single male of the *reclusa* group have been seen by him; in the systematic section of this paper we enumerate 50 species, many with long series, from this large area. Of the South American taxa Brignoli has had available as observed material two males and a female of *intermedia*, three females of *spadicea*, two females and two immatures of *variegata*, and one female of *gaucho* from Tunisia, an inadequate sample on which to base conclusions about the rich fauna of at least 30 species. Not a single male or female of any of the 17 species forming the *laeta* group was available to him and no effort was made to borrow types or study material bearing on species suggested as being probable synonyms. An interesting

record of Brignoli's is a female of *gaucho* from Tunisia, the first discovery of this species outside of South America, and if verifiable in the future this emphasizes the easy transport of these loxoscelids into distant areas by trade.

In his consideration of the South American fauna, Brignoli readily recognizes the distinctions when the degrees of difference are wide: admitted are four species of the *gaucho* group with heavily sclerotized epigyna, comprising *variegata*, *gaucho*, *similis*, and *adelaida*, all from eastern South America; the distinctive *amazonica* is considered to be an isolated form, thought by him to belong to the *gaucho* complex, but to our minds widely separated; the small series of *spadicea*, *hirsuta*, and *intermedia* is seen as a very homogeneous one and he suggests that there are too little data: we agree with this and suggest that *hirsuta* and *spadicea* might be geographical expressions of a single species.

It is with the *laeta* complex that Brignoli takes sharp exception to the Gertsch conclusions and declares that some taxa are "impossible to separate" in female or male features, and in his opinion Gertsch has dealt only with Peruvian populations of *laeta*. His *laeta* complex comprises the seven taxa *laeta*, *julia*, *blancasi*, *weyrauchi*, *surca*, *herrerri*, and *conococha*. It is clear that his failure to note the distinctive morphological features along with the (to us) easily recognizable differences in the genitalia is the reason for his simplistic conclusion. A few examples will suffice to show that such species as *weyrauchi*, *herrerri*, and *conococha* are quickly separated from *laeta* on the basis of morphological characters. The male *laeta* with leg formula almost invariably 4213 has the fourth leg longer than the second, has the first metatarsus straight, and the femur of the male palpus eight to 10 times as long as broad. The male *herrerri* with leg formula 2413 has the second leg longer than the first, the first metatarsus with a sinuous curve in the middle portion, and the femur of the male palpus six times as long as broad. The male *weyrauchi* with leg formula 2413 has the second leg longer than the fourth, the first metatarsus straight, and the femur of the male palpus six times as long as broad. The male *conococha* with leg formula 2413

has the second leg longer than the fourth, the first metatarsus straight, and the femur of the male palpus six times as long as broad, and its tibia materially more thickened than the other species. The females of these species differ in size, color pattern, some leg proportions, and in the details of the epigyna. The same failures of identification are apparent in the *bettyae* complex of Brignoli, comprising *bettyae*, *gloria*, *piura*, *harrietae*, and *rosana*; of these only males of *bettyae*, *gloria*, and *piura* are known and these Brignoli said resembled each other strongly. Brignoli seems to recognize these mostly as good species and we have no difficulty in so doing on the basis of palpi and epigyna and supplemental characters. More difficult for Brignoli is his *accepta* complex comprising *accepta*, *aliceae* (thought to be of the same general type), and what he regards as the close species *lutea* and *frizzelli*. We fail to see any close relationship of this group to the *rufescens* group of the Mediterranean region and find all the included species readily separable on genitalia of both sexes. A fourth *rufipes* complex comprises *rufipes*, *pucara*, and *lawrencei* (and we add *inca* and *taeniopalpus* as well as the Central American species *panama*). Unplaced by him were *olmea* of Peru, known from a single female and thought by him to be immature in spite of the well-developed, sclerotized receptacles of the epigynum, *coquimbo* from Chile (only the second *Loxosceles* from that country), and *taeniopalpis* from southern Ecuador, which last two were thought to resemble species from North America (*yucatanana* of Yucatan and *caribbaea* from Puerto Rico, respectively). These two species actually belong to the distinctive *reclusa* group and are not at all related to any from South America. In summary we can say that except for the limited *laeta* complex Brignoli seems to recognize as full species most of the names of his several complexes and he fails to restate his belief that most of the Gertsch species are merely populations of a smaller number of species.

Brignoli (1976, pp. 138–139) has given a short overview of the known species from continental and insular North America comprising the taxa from the 1958 paper of

Gertsch and other species described later (Gertsch, 1973) and lists 25 species; of these 23 species are endemic and only two, *laeta* and *rufescens*, introduced from other faunas. All but five of the listed species are known from both sexes and 21 species belong to the *reclusa* group. As was done with the South American taxa, Brignoli assigned various species to a *devia* complex, a *yucatanana* complex, and then discarded as relatively problematic several other species. His conclusions are startling! He declared that the male palpi and epigyna of the *devia* complex (*devia*, *reclusa*, *deserta*, *arizonica*, *belli*, *aurea*, and *tenango*) are indistinguishable. He said the same for the *yucatanana* complex, comprising *yucatanana*, *zapoteca*, *bolivari*, *cubana*, *valdosa*, *boneti*, *colima*, and perhaps *cubana*. Regarded as relatively distinct are *panama*, *misteca*, and *caribbaea*, and he suggested that *panama* and *caribbaea* could correspond to Neotropical forms.

Brignoli commented further on the status of taxa of the North American fauna. He stated that his *devia* complex, comprising *devia*, *reclusa*, *arizonica*, and *deserta* (with partly allopatric forms), may correspond to geographic races of a single species which extends eastward from California to Alabama, and then south into nearly all the northern states of Mexico under different names. He considered these names merely to be populations of the same type as proposed by Bücherl. Our analysis of these species in their natural ranges brings us to quite different conclusions and illustrates Brignoli's failure to understand the biogeography of the broad North American continent, as well as the distinctive taxonomic characters of each species. *Loxosceles deserta* (for many years called *unicolor*, a name now unavailable) is a long-legged species from the deserts and foothills of western Arizona and southern California and, living widely in the center of this range mostly in Arizona, one finds the shorter-legged *arizonica*. These are sympatric species with different genitalia and cannot be dismissed as merely geographical populations. At the eastern end of Brignoli's proposed range occur *reclusa* in the midwestern woodlands and adjacent grassland from Illinois to

southern Texas, and *devia* with broad sympatry in the southern part of this distribution and ranging southward deep into Tamaulipas and adjacent states of northern Mexico. These species have more sympatric occurrence demonstrating distinct specificity and present good palpal differences along with even more striking ones in the epigyna: the genital groove of *devia* is far wider than that of *reclusa*, a condition marked by the wide separation of the internal receptacles. Brignoli would further guess that such species as *aurea*, *belli*, and *tenango* could correspond to extreme southerly populations of the species *devia*. He concludes his consideration of the North American taxa with a few that he considers problematical, but it is clear that his statements are mere guesses on the true status of the ones named. Some with marked differences in the male palpi (such as *caribbaea*, *tehuana*, *panama*, and *misteca*) he allows as perhaps "good species." In other of his such assignments we find garbling of taxa of the *laeta* and *reclusa* groups: assigned as Central American populations of a Neotropical species are *panama* and *tehuana*, this latter belonging to the distinctive *reclusa* group; and finally *coquimbo* of Chile and *taeniopalpis* of Ecuador, both of the *laeta* complex, are said to resemble *yucatanana* of Yucatan and *caribbaea* of the West Indies, both typical *reclusa* elements.

A few thoughts are offered in summary of this section on the species problem of *Loxosceles*. The haplogyne spiders have long been recognized as difficult taxonomic subjects because of the simplicity, uniformity, and conservatism of their somatic characters, especially of the genitalia. In *Loxosceles* (seemingly the only valid genus assigned to the family) useful characters are more meager than usual and made more difficult to assess because of the quite remarkable adaptive radiation that has resulted in many closely allied taxa. This is especially true in the *laeta* group in Peru and the *reclusa* group in the southern United States and Mexico. *Loxosceles* is no exception among the haplogynes in basing the species mainly on the genitalia. These are simple and subject to moderate variation in both sexes. The epigyna of fe-

males, hidden under the integument and available to the male embolus through two simple ducts, present the two seminal receptacles in various designs; these are subject in some species to accessory adventitious lobes complicating their outlines, but these rarely mask the basic pattern. The male palpi present distinctive features in all segments but truly diagnostic ones are reserved for details of the emboli. Specific identification of either sex offers few problems where dealing with few taxa but becomes a problem in the quite uniform series of 50 species of the *reclusa* group, mostly based on the conservative epigynal and palpal outlines. These have been solved by using combinations of characters and geographic clues in the making of keys.

The validity of the specific category as used by Gertsch was first questioned by Bücherl, and we regard this as a natural and healthy expression of interest and concern. Bücherl's own simplistic ideas on the makeup of both the South American and North American faunas were rejected by Gertsch (1967). More recently Brignoli has supported, in large part,

the conclusions of Bücherl. We reject these as being without merit and based on erroneous data. These authors have failed to understand the information offered in the verbal descriptions, have based conclusions mainly on diagrams of genitalia, and have not had representative collections for attentive study. The suggestion that the many names of Gertsch represent merely geographical populations (subspecies?) of a few valid species is based on unsound generalizations. The principle of sympatry is ignored in spite of the fact that some species live close together in the same life zones. Within the California range of *deserta* live the species *martha*, *russelli*, *arizonica*, and *palma*; and in the Arizona range of that species occur *arizonica*, *sabina*, and *kaiba*. The suggestion of Brignoli that *deserta*, *arizonica*, *reclusa*, and *devia* represent a single polytypic species fails to mention the obvious sympatry of two species at each end of the range and the isolation of the taxa in distinctive life zones with extreme climatic differences.

MEDICAL REVIEW OF *LOXOSCELES* IN THE NEARCTIC REGION

Since 1872 physicians have recognized a peculiar skin lesion (Macchiavello, 1947) now referred to as "necrotic arachnidism" or more specifically "loxoscelism." Macchiavello (1937) in South America, and Atkins, Wingo, and Sodeman (1957) in the United States first presented convincing evidence connecting the bites of these spiders with the cutaneous necrosis observed in man, although unidentified spider bites of this nature had been previously reported (Presley, 1896; Schmaus, 1929; Gotten and MacGowan, 1940). Since then *Loxosceles* spiders and their venom have been the subject of considerable interest and study.

Excellent summaries of the extent and severity of symptoms and treatment of loxoscelism can be found in Berger (1973), Millikan and Berger (1974), Russell (1974), Majeski and Durst (1976), Schenone and

Suarez (1978) and Foil and Norment (1979). Comprehensive literature reviews are given in some of these papers, and will not be repeated here.

The cytotoxic, and to a lesser extent haemotoxic and neurotoxic, nature of *Loxosceles* venom has been established and documented with clinical and experimental evidence. Clinical signs ranging from mild cutaneous necrosis to serious systemic reactions and death have been reported (Berger, 1973, and others). Immune protection and the presence of serum antibodies have been produced experimentally in the laboratory. Although circulating antibodies have not yet been demonstrated in humans, in two cases with multiple bites each subsequent injury was less severe than the previous one (Berger, Millikan, and Conway, 1973).

At the present time at least five species of

Loxosceles found in the Nearctic region (*arizonica*, *deserta*, *laeta*, *reclusa*, and *rufescens*) are known to be venomous, but it appears certain that the venoms of all species of the genus are toxic. Although spiders were not identified, a presumed human case of loxoscelism based upon clinical diagnosis was reported from Cuba (Fernandez and Diaz-Pinto, 1972) and human cases were reported from the Mexican states of Veracruz, Puebla, and Morelos (Biagi, 1974).

Up to 1977 over 200 human cases of loxoscelism, with at least six deaths, were tabulated for the Nearctic Region. The mortalities and most of the reported morbidity have occurred in the United States (Schenone and Suarez, 1978). These data are conservative estimates since many bite cases are either unreported by the patient or simply lack the clinical signs (Berger, 1973). It should be noted that reporting of human bite cases in medical literature has decreased markedly since 1970. This suggests that reporting injuries caused by these spiders is no longer as noteworthy as it once was and that medical attention is now focused upon finding a definitive treatment and a better understanding of the venom.

Unexplained cases of cutaneous necrosis are often attributed to *Loxosceles* spider bites in geographic areas outside their known distribution. Bites by other spiders commonly

found in close association with man in homes and in gardens may develop into small necrotic lesions in man, but these are usually not severe and patients recover without complications. It should be noted also that other arthropod bites, caused by ticks, cone-nose bugs, mites, biting flies, and the like, may produce bullous lesions in some people that are often clinically mistaken for spider bites. It has been estimated that 80 percent of approximately 600 suspected spider bites examined at the Los Angeles County/University of Southern California Medical Center were actually caused by arthropods other than spiders or by some other disease state (F. E. Russell, personal commun.). Other dermatological disease states commonly attributed to spider bites include complications or allergic reactions due to the presence of a foreign substance or environmental stress.

Little information is known about the pharmacological effects of spider venoms other than *Latrodectus* and *Loxosceles*. For that reason we urge persons who are bitten to bring the offending spider with them to the physician's office. Diagnosis and treatment can proceed with more confidence when positive identifications are made. Suspected spider bites should be investigated epidemiologically by a knowledgeable entomologist or araneologist for evidence that supports the clinical diagnosis.

SYSTEMATIC SECTION

FAMILY LOXOSCELIDAE

Sicariidae Simon, 1893, p. 261.

Loxoscelinae Simon, 1893, p. 271. Gertsch, 1958, p. 3.

Loxoscelidae Gertsch, 1949, pp. 234, 266.

DIAGNOSIS: Ecribellate haplogyne spiders of the infraorder Araneomorphae, comprising single generic taxon *Loxosceles*. Respiratory system consisting of pair of book lungs with their external openings (figs. 9, 10) at base of abdomen and tracheal tubes opening through single transverse orifice in front of spinnerets. Eyes six, forming transverse row,

in three diads. Colulus conspicuous, apically pointed finger half as long as inferior spinnerets. Chelicerae (fig. 6) without boss, tied together along inner side for about half their length with white membrane; inner margin with transparent whitish membrane apically thickened and darkened in tooth form. Tarsal claws two, set with single series of long teeth more numerous on front legs; several serrated bristles present on each tarsus, which bears small onychium. Female pedipalp without claw. Female copulatory organ (epigynum) of haplogyne type with single broad gonopore

serving as access to two sperm storage receptacles and later as fertilization canals during egg laying. Male copulatory organ (palpus) with simple bulb lacking hematodocha, bearing embolus as a thin spine and lacking conductory or accessory elements; accompanied by carinate lamina in *spadicea* group of South America.

GENUS *LOXOSCELES* HEINECKEN AND LOWE

Loxosceles Heinecken and Lowe, 1832 [1835], p. 321. Simon, 1893, p. 272. Comstock, 1912 [1913], p. 304. Roewer, 1942, p. 319 (*Loxoscelis*). Bonnet, 1957, p. 2572.

Omosites Walckenaer, 1833, p. 438.

Loxoscella Strand, 1906, p. 668.

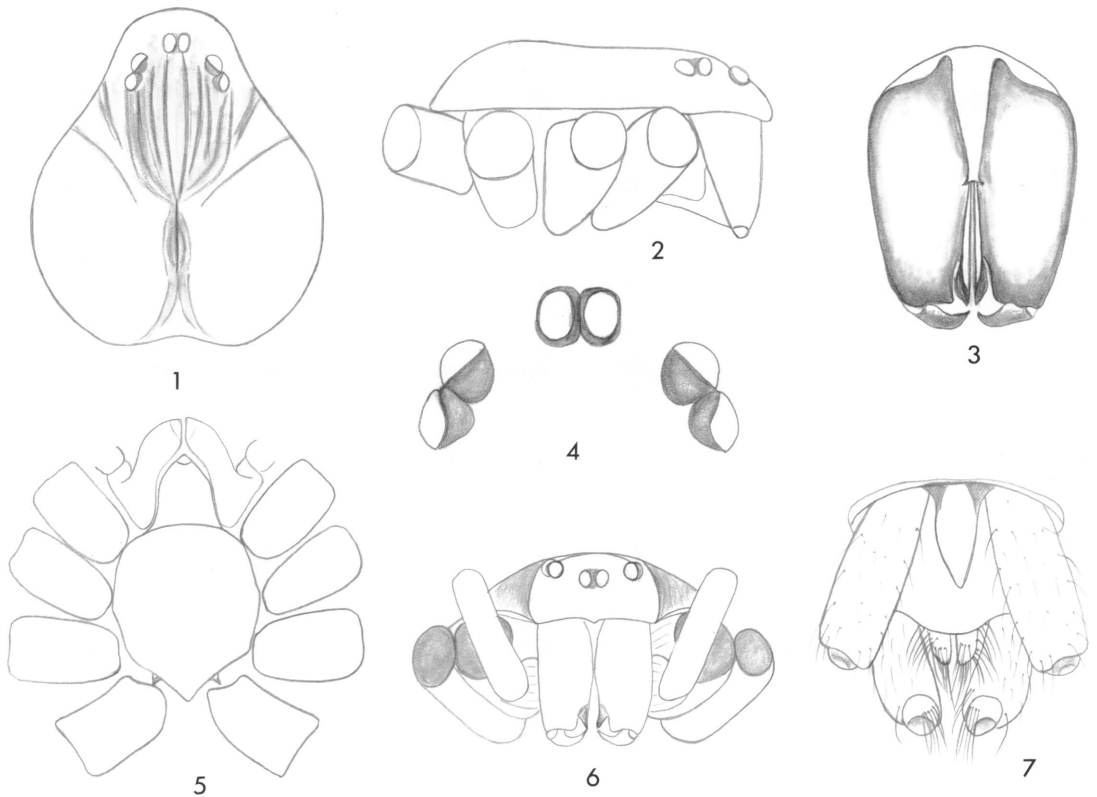
DIAGNOSIS: Characters of family supplemented by features of standard species, *L. devia* Gertsch and Mulaik, as shown in figures 1–7. Spinnerets (fig. 7) of medium size, six in number, set close together; inferior and superior pairs long, two-segmented, with conical apical segments; median spinnerets small, one-segmented. Outer side of chelicera with stridulatory file of coarse grooves activated by single black pin near base on pro-lateral side of femur or pedipalp. Labium longer than broad, free, relatively flexible membranous suture joining it to sternum distinct; endites long, convergent in front around labium. Eyes six in three diads; anterior median eyes lost; lateral diads of eyes and median diad (posterior median eyes having migrated to forward position) now forming strongly recurved row. Carapace (figs. 1, 8, 10) longer than broad, relatively flat, with conspicuous, deeply impressed linear groove. Legs and body clothed thickly with two kinds of covering hairs: 1. long, suberect, denticulate hairs, those on tibiae, metatarsi and tarsi in eight rows, two on each surface, and some of these on tibiae and metatarsi shorter and thickened; 2. fine, procumbent, basally feathered hairs lying between the suberect ones. Trichobothria as follows: on metatarsus one dorsal at apex twice as long as depth of segment; on tibiae one dorsal at apex and one subdorsal not far behind; trichobothria and other setae often rubbed off.

TYPE SPECIES: *Loxosceles rufescens* Dufour.

SEXUAL BIOLOGY: The most instructive information on mating stance and pattern in *Loxosceles* was that of Gerhardt (1928, pp. 585–589, fig. 3) who studied the European *rufescens*. He found that during mating the two palpi of the male are applied simultaneously to the paired receptacles of the female epigynum. It follows, then that the right embolus of the male palpus enters the left receptacle, and the left embolus enters the right receptacle of the female genital organ. This insertion patterns seems to be the same for mygalomorph and haplogyne spiders; but in all the former and some of the latter, the palpi are inserted one at a time. In all the higher true spiders (entelegynes) the right embolus is inserted into the right receptacle of the female, and vice versa. Additional descriptive details of the mating stance, procedures, and duration of various stages are given for *reclusa* (Hite et al., 1966, pp. 12–15, figs. A–C), *laeta* (Galiano, 1967, pp. 448–450; Galiano and Hall, 1973, pp. 277–288) and *deserta* (= *unicolor*) (Ennik, 1971, pp. 7–8).

THE MALE AND FEMALE GENITALIA

Immature *Loxosceles* are typically yellowish or brownish with few contrasting markings and are not obviously assignable to either sex. The males become evident in the penultimate stage when the tarsi of the palpi become moderately to distinctly enlarged in the basal and median portions. The mature male palpi are moderately elongated appendages of stereotyped design which show differences in the proportions of the segments. The femur is a long cylinder varying from four to eight times as long as broad. The small patella is little thickened and rarely exceeds the femur in breadth and is only a third of its length or less. The tibia varies widely in length and girth and may be thin, elongated, only moderately thickened, sometimes more than three times its length, or at the other extreme inflated to a bulbous segment only slightly longer than broad. The proportions of the tibia are relatively constant in most species, but in some “more masculine” males they are robust. The tarsus is a relatively short segment: in the *reclusa* group broader than long

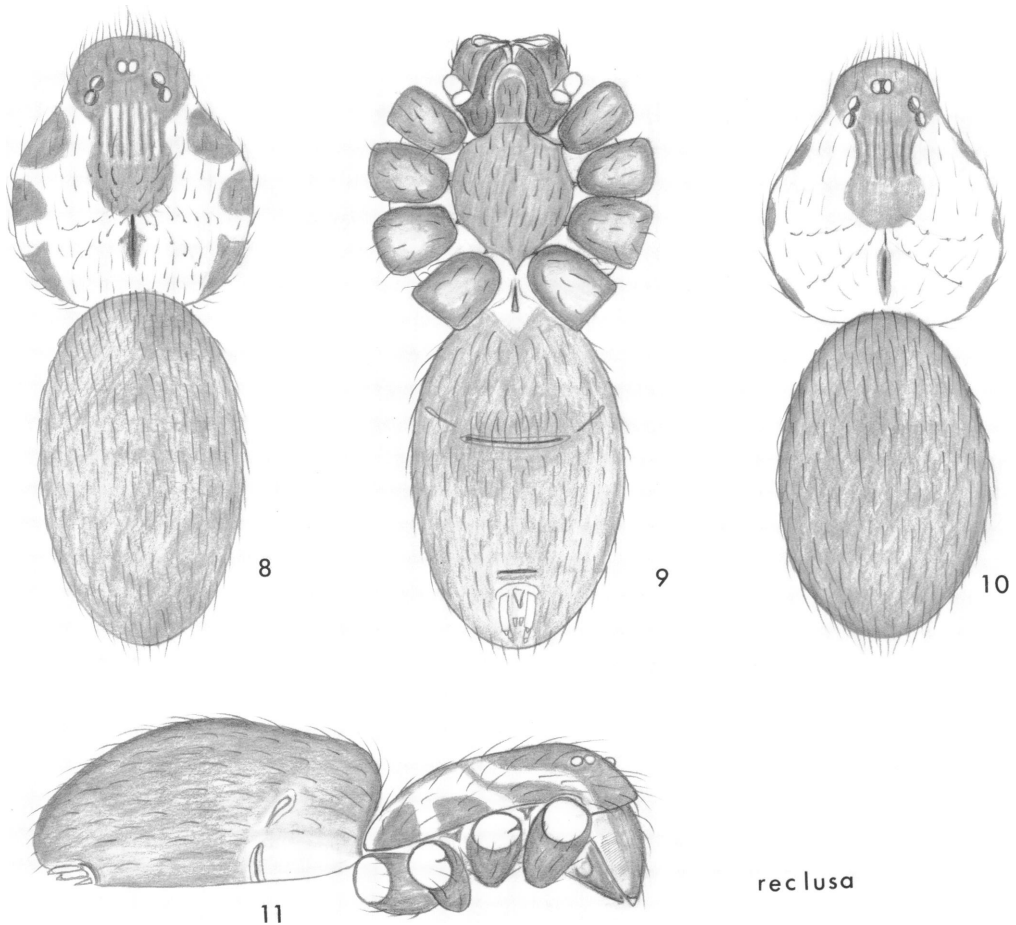


FIGS. 1–7. *Loxosceles devia* Gertsch and Mulaik, male. 1. Carapace, dorsal view. 2. Cephalothorax, lateral view. 3. Chelicerae, frontal view. 4. Eyes, dorsal view. 5. Cephalothorax, ventral view. 6. Cephalothorax, frontal view. 7. Spinnerets, ventral view.

and forming a rounded lobe on the prolateral side; in *rufescens* and *laeta* more elongated, and in some exotic species essentially as long and robust as the tibia. The embolus is typically a quite thin, curved spine of variable length of which the following features are of most importance: breadth and thickness, especially at the attachment to the bulb; details of the tip which may end as a simple attenuate spine, be abruptly ended as a curved hook, or provided with a subterminal spur (see *palma*, fig. 113). The palpi of some males are typically of pale uniform coloration, but in some other species the terminal segments are dark reddish brown.

Maturity of females is usually apparent by heavier sclerotization, sometimes reddish coloration of the lips of the genital groove,

and by the presence of heavier setae margining the groove. Females can also be recognized as such in the penultimate stage by the reddish coloration of the tibia and tarsus of their pedipalps. The principal details of the female genitalia are shown in figures 12–16. The seminal receptacles are often apparent through the cleared integument or noticed by pressing open the genital groove (fig. 12). The bursa copulatrix (bursa) is a broad, narrow atrium immediately in front of the genital groove (fig. 12, BC), and from this open the typically darker, sclerotized receptacles. There are two seminal receptacles which lie more or less widely separated from each other in the transverse bursa (see figs. 13, 16). Each seminal receptacle is a pouchlike chamber provided (as typified in the *reclusa* group)



FIGS. 8-11. *Loxosceles reclusa* Gertsch and Mulaik. 8. Carapace and abdomen of female, dorsal view. 9. Cephalothorax and abdomen of female, ventral view. 10. Carapace and abdomen of male, dorsal view. 11. Cephalothorax and abdomen of female, lateral view.

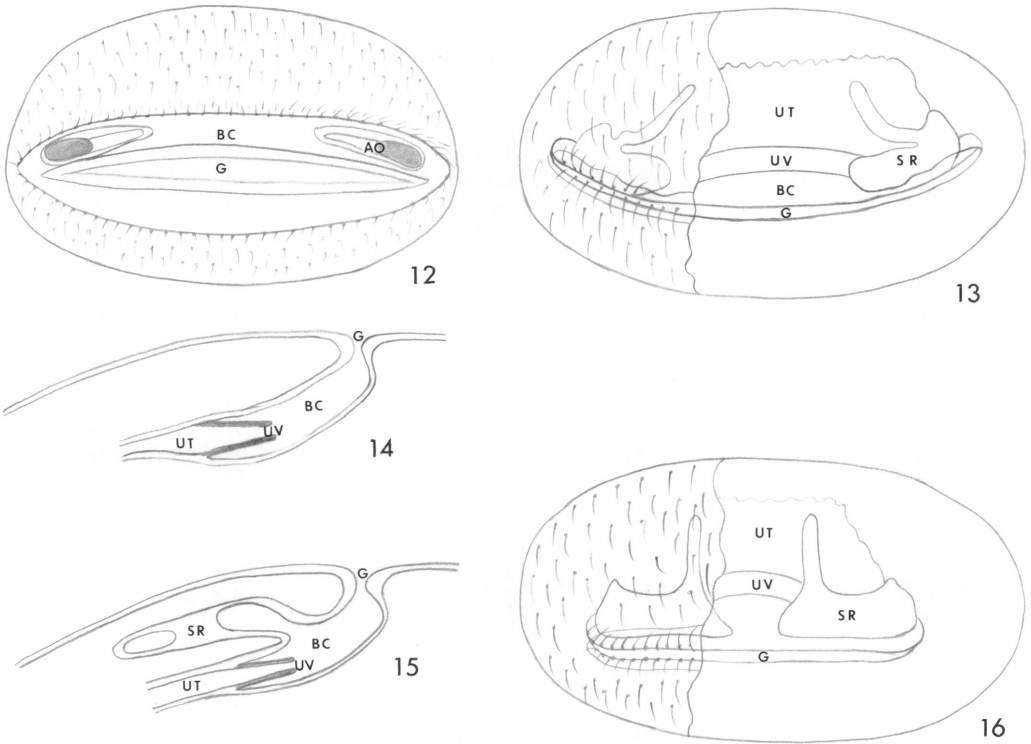
with one or more finger-like lobes. Most often there is a single lobe on each receptacle but in some species there are multiple elements (see *sonora*, *russelli*, figs. 181, 118). The form of the seminal receptacles is diagnostic for each species and their basic patterns are rarely intergradient to related species. The details of the female genital organs offer useful taxonomic features that often make identification easy and even exceed the usefulness of the male palpi in separating some taxa.

KEY TO SPECIES GROUPS

The North American species of *Loxosceles* can be divided into two natural series (Gertsch, 1958,

p. 6) on the basis of characters of the male palpi. Few exclusively diagnostic features of the females so far noted make assignment to one or the other series explicit.

1. Tarsus of male palpus broader than long and broadly lobed on the prolateral side (figs. 21, 25, etc.); eyes of anterior row larger, in less recurved row, with anterior median eyes separated from anterior laterals by one diameter or less (fig. 4); species from North America, adjacent areas of Central America, and the West Indies the *reclusa* Group
- Tarsus of male palpus about as long or longer than broad, rounded, suboval or elongated, not prolaterally developed (figs. 339, 342); eyes of anterior row smaller, in more re-



FIGS. 12-15. *Loxosceles devia* Gertsch and Mulaik, female. 12. Genital groove, pressed open. 13. Partially exposed epigynum, showing relationship of parts. 14. Section through middle of epigynum. 15. Section through receptacle of epigynum.

FIG. 16. *Loxosceles reclusa* Gertsch and Mulaik, partially exposed epigynum, showing relationship of parts.

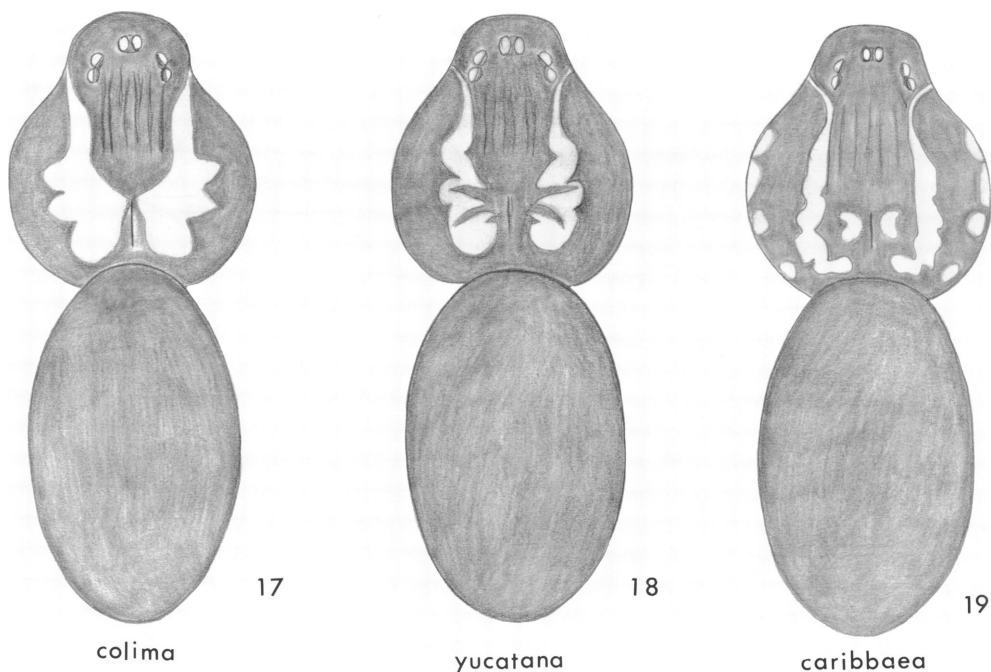
Abbreviations: BC, bursa copulatrix; G, gonopore; S, seminal receptacle; UT, uterus; UV, uterine valve.

curved row, with anterior median eyes separated from anterior laterals by 1.5 to 2 diameters (figs. 344, 348); epigyna variable in form (figs. 346, 347, 349, 353); species from Central and South America, Africa, and the cosmopolitan *rufescens* the *laeta* and *rufescens* Groups

THE *RECLUSA* GROUP

The *reclusa* group makes up the natural fauna of the United States, Mexico, adjacent Central America, and the major West Indian islands. It comprises 50 species closely allied in general appearance and genitalic features. The lateral development of the palpal tarsus of the mature male, which is distinctly broad-

er than long and produced prolaterally into a conspicuous rounded lobe, readily identifies all members of that sex. The pattern of the seminal receptacles of the female genital organ (epigynum) provides an excellent basis for separation of the taxa of that sex. The various species differ somewhat in size, coloration and pattern, eye relations, and leg proportions, but the variability of some of these characters lessens their usefulness. Some differences in eye size and position are present but they are difficult to define, and to some extent are variable within the species. The leg lengths and proportions are useful for separation of species, but these also are subject to moderate variation within each species. All the leg measurements have been made



FIGS. 17-19. Carapace patterns and abdominal outlines of *Loxosceles*, dorsal views. 17. *L. colima* Gertsch. 18. *L. yucatanana* Chamberlin and Ivie. 19. *L. caribbaea* Gertsch.

with cross-hatched millimeter reticules under medium magnification, so the relation of segmental length to that of the carapace can be easily derived. The measurements given are most often those for what seem to be average specimens of each species. The availability of excellent series of many species has made possible a good understanding of their variability.

The following features of the *reclusa* group are shared by all included species: The coloration of living specimens is grayish to yellowish brown or blackish (the tone often an effect of the covering hairs) but this is often changed in preserved specimens to dull yellow, orange, reddish brown, or dusky by wetting in preservative and frequent loss of covering hairs. The color patterns of the carapace show little variability but some groups have standard patterns (figs. 17-19), typically with a central Y-shaped dark mark on the pars cephalica and median groove, and dark marginal bands on the sides of the pars thoracica;

these markings are reduced in males and often faint or absent in either sex, especially in specimens from arid regions and some caves. The eye tubercles are black and narrowly ring the eyes. The carapace of fresh specimens is covered with a thin or thick mat of subprocumbent black hairs and setae, these often rubbed off in preserved specimens, and with heavier bristles in ocular and postocular areas. The labium and endites are reddish brown with numerous covering bristles. The sternum is yellowish to dusky brown, with a thin dusky line along the side margins and a sparse covering of dark hairs. The chelicerae are dark reddish brown. The legs are yellowish to red, often more reddish in the distal segments and especially so in males, and thickly clothed with dark procumbent bristles set in longitudinal rows, these interspersed with fine to thick bristles but few approaching spine status. The palpi of young or subadult specimens are usually uniform yellowish, clothed with procumbent hairs and suberect dark bristles;

the palpi of mature females have the tibiae and tarsi dark reddish brown; the palpi of mature males are usually dark brown but in some species dark reddish to mahogany brown.

The range of size in both sexes of *Loxosceles* taxa is variable (in *deserta* from 5 to 19 mm. in total length) and much of the difference is due to the status of the abdomen. The carapace is slightly longer than broad, narrowed in front to about half of the greatest width, has rounded sides, is truncated behind, and bears a prominent, impressed linear cervical groove. The clypeus slopes forward, is equal to about two long diameters of the median eyes in females, but is typically narrower in males. The eyes are subequal in size, lie in three diads of two; the median diad (posterior median eyes) typically is placed closely in front of a line along the front edges of the anterior lateral eyes and is usually separated from those eyes by about one diameter. The eye size and pattern show only minor variability among the species and offer few features useful in separation of species. The eyes of some cave occupants are smaller and more widely separated than those of epigeal specimens. The long, thin legs are in typical formulae 2413 or 2143 for males and females; the fourth leg is longer in some females with formula 4213. The leg lengths are moderately variable but offer good differences when compared with lengths of the carapace. All measurements are in millimeters.

The 50 taxa of the *reclusa* group offer a stereotyped morphology with few features that separate them into definable subdivisions. Except for strikingly distinct characters in some taxa, the male and female genitalia are only of minor use for group separation. Small details of color pattern are present in the series from the West Indies, but coloration and pattern differences are of limited use in other groups because of variation within each species. It is clear that the closely allied and uniform species of the *reclusa* group provide only a modest number of features readily usable in an identification key. Because of this we have turned to basic geography as a practical means of limiting keys to a smaller number of taxa occurring within each geograph-

ical segment. The West Indies represents a disjunct area with only six endemic species. Less precise is the broad area comprising continental North America, which is herein divided by political boundaries and other considerations. The section dealing with the fauna of the United States with 11 distinctive species is, although used as a political expedient, one of surprising geographic and faunal unity. The large number of species that live south of the border in Mexico, at least 36, occupy natural areas into which only a few taxa penetrate from the north. Two of these areas, Baja California and Sonora, are enclaves with exclusive faunas that can be given special treatment separate from other parts of Mexico. Finally, Central America, with only three endemic species so far discovered in countries bordering Mexico, represents the southernmost extension of the *reclusa* group. The few species that overlap the respective centers are treated in keys of both areas. This has made necessary a minimal duplication of informational data.

The faunas of the various geographic centers are considered under the following headings: The *reclusa* group in the United States; The *reclusa* group in Mexico and adjacent Central America; Species of Baja California; Species of Sonora; Species of the rest of Mexico and adjacent Central America; The *reclusa* group in the West Indies.

THE *reclusa* GROUP IN THE UNITED STATES

Only four species of *Loxosceles* were recorded from the United States north of Mexico in the earlier revision (Gertsch, 1958). The species *reclusa*, the first North American species publicized for its negative medical properties, gained widespread attention of serious students and the lay public. Its natural distribution covers a broad area from the 100th meridian east to about the 85th, and southward from about Illinois to southern Texas and some of the Gulf states. Only two records in Tamaulipas suggest a limited penetration into eastern Mexico. All records outside the stated range of *reclusa* are based on specimens known to be, or presumed to be,

carried there by commerce, or falsely reported by doctors and the media. The superficially similar, sympatric species *devia* is common in southern Texas and the adjacent Mexican states of Tamaulipas and Nuevo León. Both of these typically dusky spiders are more closely related to structure to eastern Mexican species than to those found in the western United States and adjacent Mexico.

The two additional species credited to the United States by Gertsch in 1958 were *arizonica* and *unicolor*. These taxa have undergone changeable nomenclatorial interpretations during their subsequent histories and have proved on the basis of more attentive studies to be complexes of related species. The species *arizonica* was given a very broad range in the previous revision but it is now restricted almost entirely to a population within southern Arizona. It should be noted here that some previous locality records of *arizonica* have proved to be spurious; these are now as far as possible assigned to their proper places in the revised systematic treatment.

The name *Loxosceles unicolor* Keyserling (1887, p. 474) was based on specimens labeled from Punta del Agua, Torrance County, New Mexico, south of Albuquerque. The type vial in the United States National Museum contains a male with both palpi missing (designated lectotype by Gertsch in 1958) and an immature female, both in fragmented condition. Keyserling's figure of the palpus is not diagnostic enough to identify it with any species from the western United States or Mexico. It is now clear that the listed type locality is spurious and that the valid locality is unknown, probably in Mexico. In June 1971, Ennik visited the presumed type locality and searched intensively for additional material but without success. Other species not conforming to the *unicolor* type specimens or description occur south of the area in southern Arizona, New Mexico, and adjacent Mexico. The name *unicolor* is further clouded by the fact that the type specimens were handled by and forwarded to Keyserling by Dr. George Marx. During his tenure at the United States National Museum Marx became notorious for his unsystematic style of

labeling and managing the arachnid collections (see Gertsch, 1961, p. 366), with the result that there were numerous gross errors of locality assignment in all arachnid groups. To clear up this taxonomic predicament Gertsch (1973, p. 159) abandoned *unicolor* as a dubious and likely unidentifiable taxon and assigned the new name *Loxosceles deserta* to the widely distributed form from the deserts of California and Arizona, formerly called *unicolor*.

The taxonomic history of the name *unicolor* has been changeable, based on misidentification by various arachnologists on the basis of inadequate descriptions in literature. Simon in 1907 assigned it as a synonym of the South American *rufipes*, a taxon found far outside the range of any species of the *reclusa* group. He was followed by Petrunkevitch (1911, p. 118) and various North American students. In the 1958 revision Gertsch (p. 15) reestablished *unicolor* as a southwestern species on the basis of the presumed type locality and listed *rufipes* and *rufescens* as unavailable names used for it. In the present revision, records from western Mexico and Baja California are now assigned to other species as a result of reappraisal.

The *Loxosceles* fauna of the *reclusa* group from north of Mexico now totals 11 species and they are taken up in the following key. One of these, *sabina*, is based only on a few mature females.

KEY TO MALES AND FEMALES

1. Females 2
Males 12
2. Seminal receptacles with more than one finger-like lobe 3
Seminal receptacles with only one distinctive lobe 6
3. Leg formula 4213; principal lobe of receptacle spherical at apex (figs. 118–121); Death Valley area, California
..... *russelli*, new species
Leg formula 2413; lobes of epigynum variously formed, not spherical at apexes ... 4
4. Fourth metatarsus about as long as second; epigynum (fig. 122); mountains near Tucson, Arizona *sabina*, new species
Fourth metatarsi much longer than second 5

- 5. Seminal receptacles (fig. 133) with four principal lobes; Grand Canyon National Park, Arizona *kaiba*, new species
Seminal receptacles (figs. 122–128) with two principal lobes; palm canyons of southern California and adjacent Baja California Norte *palma*, new species
- 6. Seminal receptacles (figs. 36–46) more widely separated; species of central United States 7
Seminal receptacles (figs. 72–86, 91–101) little separated; species of western United States 8
- 7. Seminal receptacles (figs. 42–46) widely separated, with principal lobe directed laterally; southern Texas and adjacent Mexico *devia* Gertsch and Mulaik
Seminal receptacles moderately separated, with principal lobe directed forward (figs. 36–41); Illinois to southern Texas and Gulf states *reclusa* Gertsch and Mulaik
- 8. Principal lobe of seminal receptacle (figs. 72–86, 89–91) typically situated on inner side 9
Principal lobe typically thicker and situated nearer the middle 10
- 9. Seminal receptacle (figs. 29–32) with small spurs on outer margin; leg formula 4213, fourth leg much longer than second; Riverside County, California
..... *martha*, new species
Seminal receptacle (figs. 72–86) without small spurs; Mojave and Sonoran deserts, and lower San Joaquin Valley
..... *deserta* Gertsch
- 10. Species of Sonoran desert of Arizona; seminal receptacles (figs. 87–91)
..... *arizonica* Gertsch and Mulaik
Species of eastern Arizona and adjacent states and Mexico 11
- 11. Seminal lobes shorter (figs. 92–96); species of Chihuahuan Desert
..... *apachea*, new species
Seminal lobes longer (figs. 97–101); southeastern New Mexico and western Texas
..... *blanda*, new species
- 12. Tibia of palpus thick, at most 1.7 times as long as wide 13
Tibia of palpus twice or more times as long as wide 14
- 13. Embolus of palpus (figs. 20, 22) much longer than width of bulb
..... *reclusa* Gertsch and Mulaik
Embolus of palpus (figs. 28, 30) thicker, about as long as width of bulb
..... *devia* Gertsch and Mulaik
- 14. Embolus of palpus (figs. 108, 109) with small

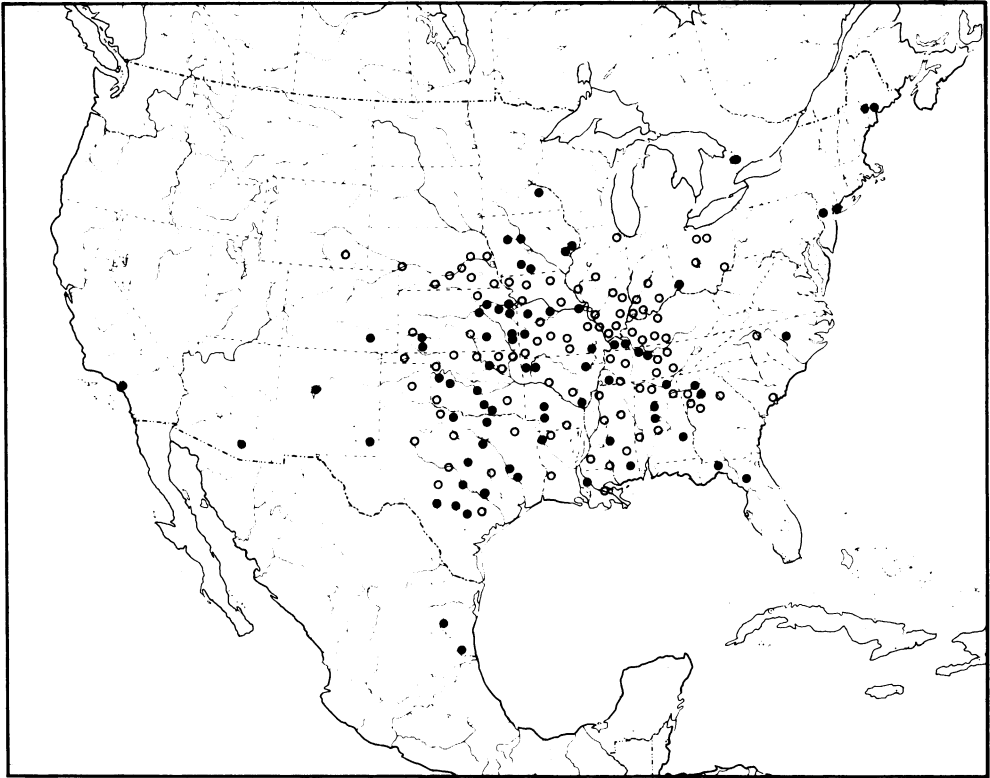
- cusp at apex; palm canyons of southern California and adjacent Baja California Norte *palma*, new species
Embolus without such cusp at apex 15
- 15. Embolus (figs. 59, 61) about as long as width of bulb *arizonica* Gertsch and Mulaik
Embolus clearly longer than width of bulb 16
- 16. Embolus (figs. 114, 116) twice as long as width of bulb *martha*, new species
Embolus shorter 17
- 17. Embolus with small hook at apex 18
Embolus straight or lightly curved at apex 19
- 18. Embolus (figs. 55–58) thickened, grooved at apex *deserta* Gertsch
Embolus (figs. 112, 113) not thickened at apex
..... *kaiba*, new species
- 19. Embolus (figs. 66, 67) thick at base
..... *apachea*, new species
Embolus thinner 20
- 20. Embolus (figs. 70, 71) of medium length; eastern New Mexico and western Texas
..... *blanda*, new species
Embolus (figs. 104, 105) longer; Death Valley area, California *russelli*, new species

Loxosceles reclusa Gertsch and Mulaik
Figures 8–11, 16, 20–23, 36–41; Map 2

Loxosceles rufescens: Banks, 1910, p. 5. Petrunkevitch, 1911, p. 118. Comstock, 1912 (1913), p. 305, figs. 291–293; 1940, *op. cit.*, p. 316, figs. 291–293. Banks, Newport, and Bird, 1932, p. 14. Ewing, 1933, p. 187, pl. 6, fig. 1.
Loxosceles rufipes: Jones, 1936, p. 69.
Loxosceles reclusus Gertsch and Mulaik [*sic*], 1940, p. 317.
Loxosceles reclusa Gertsch, 1958, p. 7, figs. 1, 4–6, 9–10, 21–23, 91–93. Hite, 1964, p. 10. Horner and Stewart, 1967, p. 333. Waldron and Russell, 1967, p. 57. Gorham, 1968, p. 171. Parker, 1969, p. 268. Dorris, 1972, p. 83. Dorris and McGaha, 1973, p. 46. Brignoli, 1976, p. 178. (Only pertinent records are given above.)

DIAGNOSIS: Dusky species of central United States; receptacles of epigynum (figs. 16, 36–41) moderately separated at midline, with prominent finger-like lobe at inner margin and often additional smaller lobes on outside; male palpus (figs. 20–23) with tibia thickened and embolus much longer than width of bulb.

FEMALE (Austin, Texas): Length 9. Carapace 4 long, 3.32 wide. Abdomen 5.3 long, 3 wide. Dorsal view of well-marked female (fig. 8). Carapace pale yellowish to dark or-



MAP 2. North America, showing distribution of *Loxosceles reclusa*: literature citations (open circles), specimens examined (filled circles).

ange or reddish brown, marked with darker pattern as follows: pars cephalica reddish brown, sometimes paler at center and enclosing series of dark and pale streaks, and continuing behind by narrow dark stripe along median groove (the whole forming a Y-shaped or violin-shaped figure); sides of pars thoracica with three dusky patches close together to form marginal dark band; space between dark markings on carapace forming irregular pale band beginning narrowly at sides of pars cephalica and expanding behind to broad stripe running to posterior margin. Dusky pattern often faint or seemingly missing in young and subadult or badly preserved specimens. Abdomen whitish to gray or blackish. Eye group about two-thirds width of head at front eye row. Clypeus 0.5 long, equal to about two and one-half diameters of median eyes; eyes about 0.2 in long diameter; median eyes nearly touching line along front edges of an-

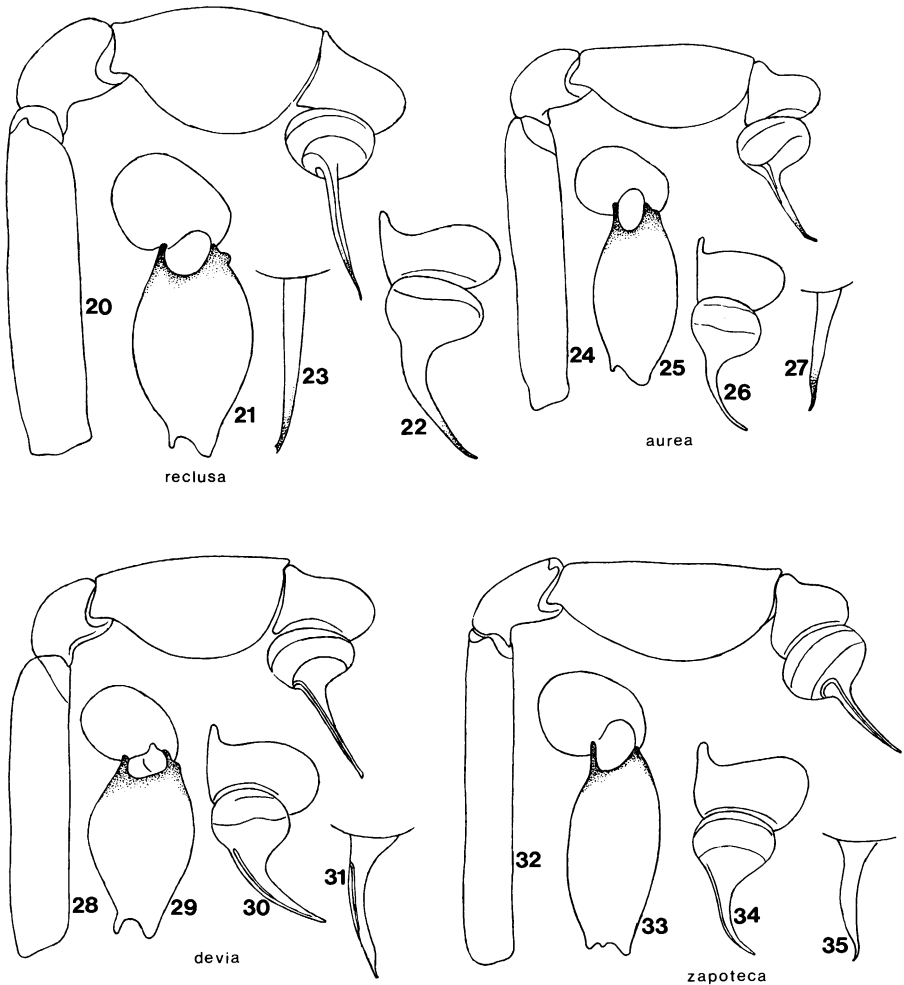
terior lateral eyes and separated from them by more than long diameter (23/20).

	I	II	III	IV	Palp
Femur	4.70	5.25	4.35	5.00	1.48
Patella	1.25	1.30	1.20	1.25	0.55
Tibia	4.80	5.25	3.95	4.55	1.00
Metatarsus	4.75	5.30	4.50	5.20	—
Tarsus	1.20	1.20	1.00	1.20	1.20
Total	16.70	18.30	15.00	17.20	4.23

Leg formula 2413. First leg 4.17 times, first femur 1.17 times, second leg 4.57 times, second femur 1.3 times as long as carapace.

EPIGYNUM (figs. 36–41): Receptacles slightly to moderately separated at midline, each with prominent, finger-like lobe arising from inner margin and irregular series of trivial projections along outer margin.

MALE HOLOTYPE (Austin, Texas): Length 8. Carapace 3.25 long, 2.9 wide. Abdomen



FIGS. 20–23. *Loxosceles reclusa* Gertsch and Mulaik (Arlington, Kentucky), right male palpus. 20. Retrolateral view. 21. Tibia and tarsus, dorsal view. 22. Embolus, prolateral view. 23. Tarsus and bulb, apical view.

FIGS 24–27. *Loxosceles aurea* Gertsch (Cueva del Guano, Durango), right male palpus. 24. Retro-lateral view. 25. Tibia and tarsus, dorsal view. 26. Tarsus and bulb, apical view. 27. Embolus, prolateral view.

FIGS. 28–31. *Loxosceles devia* Gertsch and Mulaik (Uvalde, Texas), right male palpus. 28. Retro-lateral view. 29. Tibia and tarsus, dorsal view. 30. Tarsus and bulb, apical view. 31. Embolus, prolateral view.

FIGS. 32–35. *Loxosceles zapoteca* Gertsch (38 mi. S Iguala, Guerrero), right male palpus. 32. Retrolateral view. 33. Tibia and tarsus, dorsal view. 34. Tarsus and bulb, apical view. 35. Embolus, prolateral view.

4.5 long, 2.7 wide. Color pattern (fig. 10) similar to that of female but side patches on pars thoracica much reduced. Clypeus 0.4 long, equal to about two long diameters of median

eye; eyes subequal in size, 0.2 in long diameter; median eyes about touching line along front edges of anterior lateral eyes and separated from them by long diameter.

	I	II	III	IV	Palp
Femur	5.30	6.30	4.85	5.15	1.60
Patella	1.25	1.20	1.15	1.15	0.64
Tibia	5.85	7.40	4.50	5.05	1.00
Metatarsus	6.15	8.20	5.65	6.25	—
Tarsus	1.30	1.30	1.10	1.25	0.55
Total	19.85	24.40	17.25	18.85	3.79

Leg formula 2143. First leg 6.1 times, first femur 1.58 times, second leg 7.5 times, second femur 1.8 times as long as carapace.

MALE PALPUS (figs. 20–23): Femur about four times as long as wide; tibia thick, less than twice as long as deep; bulb broadly oval with thin, curved embolus much longer than width of bulb (65/44).

TYPE DATA: Male holotype from Austin, Texas, in AMNH.

DISTRIBUTION AND COMMENTS: *Loxosceles reclusa* is a common species of the central United States (map 2) with a natural range from about the 100th meridian eastward to about the 85th, and from Iowa and Illinois southward to the Gulf states and the Mexican border. Only two records from the state of Tamaulipas are so far known from below the Mexican border. All peripheral records of the United States are regarded as being based on specimens transported by commerce and most of these have been identified by the first author with information on their transient histories. Since this spider received much attention in the news media and in medical journals, some records were probably based on spurious specimens and misidentifications. In more southern areas *reclusa* lives under rocks and ground litter and in all kinds of buildings. Specimens from northern states are often found in domestic situations, houses, and buildings. This species was generally believed to have become much more numerous and to have spread beyond its normal range during the last few decades. However, its discovery beyond all corners of its natural range is likely due to more collecting attention by students and more awareness by the lay public. As is true of such brown spiders as *rufescens* and *laeta*, the domestic habits of *reclusa* make it a favorable subject to be carried around in baggage and vehicles by commerce; so far there are no records for its transport outside the United States.

SELECTED RECORDS: UNITED STATES:

Gertsch (1958, p. 10) listed this species from nine states. Numerous records from 27 states are to be found in the Cooperative Economic Insect Report (CEIR) from 1959 to 1976; general mention of these and various documented new records follow: **Alabama:** 21 counties listed by CEIR. *Jefferson Co.:* Birmingham, 2 Sept. 1969, ♂. **Arizona:** *Pima Co.:* Tucson, 19 Aug. 1966, a bite case, ♀ spider removed from man's clothes, identified by W. J. Gertsch. **Arkansas:** 6 counties listed by CEIR. *Craighead Co.:* Jonesboro, 17 Mar. 1962 (N. Causey), ♀; 4 July 1968 (J. Y. Sandoval), ♂, ♀♀, ○. *Hempstead Co.:* Hope, 5 Aug. 1935 (L. Knobel), 3♂♂, ○. *Madison Co.:* Marble, 3 July 1968 (J. Y. Sandoval), ♀. *Phillips Co.:* Helena, 3 Mar. 1954 (W. Benton), ♂♂, ♀♀. *Washington Co.:* 15 mi. S Prairie Grove, Boston Mountains, 1000 Feet, Aug.–Sept. 1958 (M. Hite), ♂♂, ♀♀, ○. **California:** *Los Angeles Co.:* San Gabriel, 21 Apr. 1967 (W. G. Waldron). **Colorado:** *Otero Co.:* Rocky Ford, 10 July 1968 (C. Fenton), ♂ from basement. **Florida:** *Alachua Co.:* 10 Jan 1969 (Kryn Uyverberg), from automobile. *Jefferson Co.:* Monticello, 21 Aug. 1968, ○ from spare tire in car trunk. **Georgia:** 10 counties listed by CEIR. *Cobb Co.:* Powder Springs, 21 Aug. 1969 (H. F. Cross), ♀. *Henry Co.:* 2 May 1969 (W. S. Armstead), ♂, ○. **Illinois:** 18 counties listed by CEIR. 39 counties by Illinois natural History Survey (John D. Unziker). **Indiana:** 10 counties listed by CEIR. Almost any county in southern half of state (Sherman Minton). **Iowa:** 7 counties listed by CEIR. *Carroll Co.:* Carroll, 10 Oct. 1960 (P. Fasbender), ○ in office restroom. *Decatur Co.:* Davis City, 1969 (D. Hill), ♂; 1 mi. W Davis City, 12 Aug. 1969 (H. Gunderson, H. Stockdale), ♀. *Muscatine Co.:* Muscatine, 29 Sept. 1969 (R. E. Anderson), ♂, ○ in box of envelopes; 5 Oct. 1969 (R. A. Poyer), ○○ in house. *Scott Co.:* Davenport, 6 Nov. 1969, ♂ from loading dock. *Story Co.:* Ames, 17 Oct. 1965 (R. Dickson), ○ from box of books; 4 Jan. 1970 (R. Dickson), penultimate ♂ in camping gear in garage. *Union Co.:* Creston, 10 Nov. 1969, ♀ from filing cabinet of warehouse office. **Kansas:** 3 counties listed by CEIR. *Bourbon Co.:* Redfield, 1961 (M. Jackson), ♂; 13 July 1966 (J. and W. Ivie), ○. *Butler Co.:* El Dorado, 11 Aug. 1959 (H. Levi), ♀. *Crawford Co.:* Pittsburg, Apr. 1967 (F. E. Lane), ♂.

Dickerson Co.: Herington, Feb. 1972 (H. Koephe), ♂. *Douglas Co.*: Lawrence, Aug. 1968 (R. D. Barre), ♂. *Gray Co.*: 22 Apr. 1972 (Brawner), 2♂♂; Oct. 1972 (J. McLaughlin, B. Hoskinson), 2♂♂, ♀. *Johnson Co.*: Roseland Park, 25 Aug. 1961 (A. R. Brady), ♂, ♀; Sept. 1962 (A. R. Brady), ♀, ○ in basement. *Meade Co.*: Meade State Park, Meade, 1 July 1968 (Ranger Stevens), ♀ in cabinet. *Riley Co.*: 1971 (N. Herbford), ♂♂, ♀♀; Manhattan, 15 May 1966 (Spangler, Hayward, Eshbaugh), ♂♂, ♀♀. *Wyandotte Co.*: Kansas City, Feb. 1964 (R. W. Hamilton), ♀. **Kentucky**: 3 counties listed by CEIR. *Calloway Co.*: Murray, 23 Sept. 1967 (M. E. Sish), 2♀♀, ○ in house. *Carlisle Co.*: Arlington, 21 Jan. 1968 (M. E. Sish), ♂, ○ in garage. *Hickman Co.*: 2 mi. S Columbus, 14 Jan. 1968 (M. E. Sish), ♂, ♀♀ from corn crib. **Louisiana**: 2 parishes listed by CEIR. *Caddo Par.*: Shreveport (N. Banks), ♂, ♀. *East Baton Rouge Par.*: June 1955 (Roddy), ♀ sweeping grass. **Maine**: *Waldo Co.*: Bangor, ♂; Fairfield, ♀ in house. **Minnesota**: *Wabasha Co.*: Lake City, 1953 (M. Rebarchik), 2♂♂, ○ from floor of downtown apartment. **Mississippi**: All counties cited by CEIR. *Scott Co.*: Forkville, 25 May 1970 (H. F. Cross), ♂, ♀. **Missouri**: 33 counties listed by CEIR. *Boone Co.*: Columbia, 1 Aug. 1966 (B. Fagan), ♂, ♀; 14 Aug. 1961, ♂. *Johnson Co.*: Warrensburg, Oct. 1971 (W. Peck), ♂, ♀. *Stoddard Co.*: 12 Aug. 1969 (N. Banks), ♂ in old fruit jar. *Vernon Co.*: Nevada, 12 June 1962 (J. W. McReynolds), ♀, ○ in house on carpet; 19 Aug. 1959 (D. Lamore), ♂. Nevada area, 2, 16 Sept. 1961 (D. and J. McReynolds), ♂, ♀, ○. **Nebraska**: 16 counties listed by CEIR. **New Jersey**: *Somerset Co.*: Bound Brook, ♂ from baggage. **New Mexico**: *Lee Co.*: Hobbs, 20 June 1969 (J. J. Durken), ♂ in house (identified by W. Ivie). *Bernalillo Co.*: Albuquerque, 1970 (C. C. Hoff), ♀ from house. **New York**: Manhattan, 14 Aug. 1981 (S. Green), ♂ from Beekman Hotel. **North Carolina**: 2 counties listed by CEIR. *Forsyth Co.*: Winston Salem, ♂. *Johnston Co.*: NE Princeton Junction, ♂, ♀♀. **Ohio**: 5 counties listed by CEIR. *Hamilton Co.*: Loveland, 18 June 1969 (W. Lee), cast skins in cellar. **Oklahoma**: 52 counties listed by CEIR. Arrowhead State Park, 17 July 1966 (J. and W. Ivie), ○. *Beckham Co.*: Elk City, 4 Aug. 1969 (S. Riechert), ♂, ○. *Cleveland Co.*: Norman, 15 Sept. (J. Ward), ♂. *Marshall Co.*:

University of Oklahoma Biological Station, 3 July 1969 (R. H. Arnett, Jr.), penultimate ♂♂, ○ in laboratory. *Murray Co.*: Davis, 1 July 1968 (J. V. Sandoval), ♀. *Payne Co.*: Stillwater, Aug. 1968, ♂, ♀♀, ○. *Wichita Co.*: Wichita National Forest, 1928 (N. M. Newport), ♂. **Tennessee**: 26 counties listed by CEIR. *Davidson Co.*: Nashville, 14 Aug. 1955 (Amelia R. Laskey), ♂, ○ in house. **Texas**: Gertsch and Mulaik (1940, p. 317) reported this species from two counties; Horner and Stewart (1967) listed 12 counties; 9 counties listed by GEIR. *Bexar Co.*: 0.5 mi. N Helotes, 4 May 1960 (D. Campbell, P. R. Craig), ♂♂, ♀♀ on the scenic loop. *Grayson Co.*: 6 mi. SW Pottsboro, 19 Sept. 1965 (K. W. Haller), ♀. Sherman, May 1966 (K. W. Haller), ♂, ♀♀, ○. *Houston Co.*: Grapeland, 20 June 1970 (Ms. H. Butcher), ♀. *Polk Co.*: 12 mi. W Livingston, 27 Mar. 1959 (A. R. Brady), ♂♂, ○. *Wichita Co.*: Wichita Falls, 28 June, July 1968 (J. Y. Sandoval), ♂, ♀. *Wilson Co.*: 4 mi. SE Poth, 2 May 1961 (J. F. Quinlan), ♂. **Wyoming**: *Albany Co.*: 18 Sept. 1969 intercepted in furniture shipment from out of state (CEIR).

CANADA: **Ontario**: Royal Ontario Museum basement, Toronto (D. Barr), ♂, determined C. D. Dondale.

MEXICO: **Tamaulipas**: Guayalejo, 18 Feb. 1973 (J. P. Webb), ♀. Ciudad Mante, 17 Apr. 1963 (W. J. Gertsch, W. Ivie), ♂.

Loxosceles devia Gertsch and Mulaik
Figures 1–7, 12–15, 28–31, 42–46; Map 5

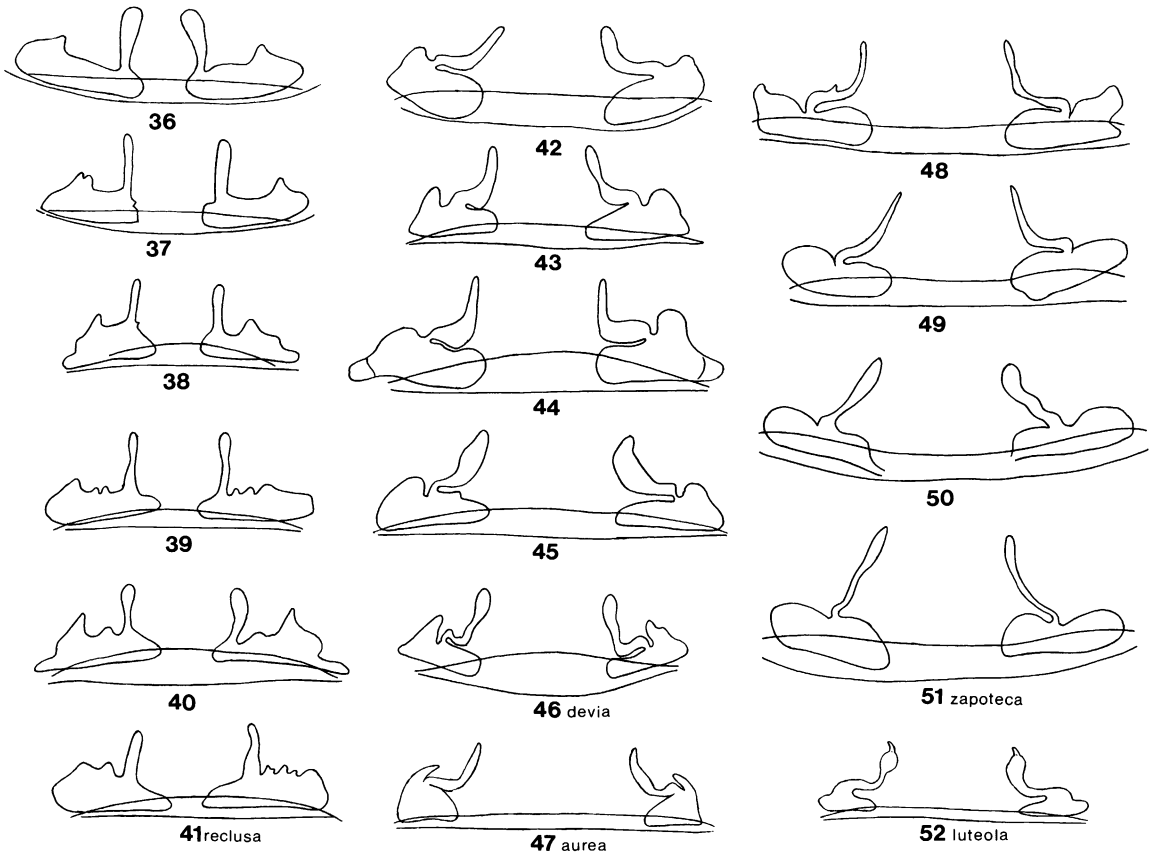
Loxosceles devius Gertsch and Mulaik, [sic] 1940, p. 316.

Loxosceles devia Gertsch, 1958, p. 11, figs. 2, 7–8, 12–14, 16–20, 24–26; 1973, p. 158. Brignoli, 1976, p. 178.

Loxosceles bolivari Gertsch, 1958, p. 22, figs. 42–44; male holotype, not female. NEW SYNONYMY. Reddell and Mitchell, 1971, p. 147. Gertsch, 1973, p. 158.

DIAGNOSIS: Sympatric relative of *reclusa* with distinctive genitalia: receptacles of epigynum (figs. 13, 42–46) widely separated, with curved finger-like lobe directed toward midline.

FEMALE (Sinton, Texas): Length 8.5. Carapace 3.6 long, 3 wide. Abdomen 5.2 long, 3 wide. Coloration more variable than that of *reclusa*, with same dark pattern on carapace but this often reduced to dusky Y-shaped



FIGS. 36–41. *Loxosceles reclusa* Gertsch and Mulaik, epigyna. Texas: 36. Austin. 37. Llano. 38–39. Sherman. 40. Kansas: Riley Co. Tennessee: 41. Nashville.

FIGS. 42–46. *Loxosceles devia* Gertsch and Mulaik, epigyna. Texas: 42. Edinburg. 43. Driscoll. 44. Sinton, Tamaulipas; 45. Cueva de los Cuartos. Nuevo León: 46. Bustamente.

FIG. 47. *Loxosceles aurea* Gertsch (Cueva del Guano, Durango), epigynum.

FIGS. 48–51. *Loxosceles zapoteca* Gertsch, epigyna. Guerrero: 48, 49. 38 mi. S Iguala. 51. Cocula. Puebla: 50. Acatlan.

FIG. 52. *Loxosceles luteola* Gertsch (Gruta Sur de San Bartolo, Nuevo León), epigynum.

marking. Clypeus 0.4 long, equal to about two diameters of median eye; eyes 0.19 in long diameter; median eyes touching line along front edges of anterior lateral eyes and separated from them by long diameter.

	I	II	III	IV	Palp
Femur	4.20	4.60	3.75	4.50	1.15
Patella	1.10	1.20	1.15	1.15	0.50
Tibia	4.30	4.50	3.35	4.00	0.75
Metatarsus	4.00	4.65	4.00	4.75	—
Tarsus	1.15	1.20	1.10	1.20	1.15
Total	14.75	16.15	13.35	15.60	3.55

Leg formula 2413. First leg 4.1 times, first

femur 1.17 times, second leg 4.5 times, second femur 1.28 times as long as carapace.

EPIGYNUM (figs. 42–46): Genital groove 1.08 wide; receptacles subtriangular, separated by width or more, surmounted by principal finger-like lobe directed toward midline and additional small fold or lobe.

MALE (Uvalde, Texas): Length 8.4. Carapace 3.8 long, 3.4 wide. Abdomen 5 long, 2.8 wide. Clypeus 0.4 long, equal to two long diameters of median eye; eyes subequal in size, 0.2 in long diameter; median eyes separated from anterior lateral eyes by long diameter.

	I	II	III	IV	Palp
Femur	6.00	6.70	5.35	5.80	1.70
Patella	1.35	1.40	1.30	1.30	0.70
Tibia	6.60	7.35	5.20	5.70	1.15
Metatarsus	6.40	8.00	6.00	6.80	—
Tarsus	1.40	1.50	1.25	1.25	0.55
Total	21.75	24.95	19.10	20.85	4.10

Leg formula 2143. First leg 5.7 times, first femur 1.58 times, second leg 6.5 times, second femur about 1.8 times as long as carapace.

MALE PALPUS (figs. 28–31): Femur about four times as long as broad; tibia thick, less than twice as long as deep (115/66); bulb oval with thin curved embolus longer than width of bulb (57/45).

TYPE DATA: Male holotype of *Loxosceles devia* from Edinburg, Texas, in AMNH; male holotype of *Loxosceles bolivari* from Cueva García, Nuevo León, Mexico, in AMNH.

DISTRIBUTION: Southern Texas to Tamaulipas and Nuevo León, Mexico (map 5).

RECORDS: UNITED STATES: Texas: Gertsch and Mulaik (1940) reported this species from seven counties of southern Texas. Additional selected records: *Bexar Co.:* Somerset, 17 Mar. 1937 (A. J. Kern), ♀♀. *Brooks Co.:* 6.2 mi. N Encino, 30 Apr. 1960 (D. Campbell, P. R. Craig), ♀, ○. *Cameron Co.:* Laguna Madre, 25 mi. SW Harlingen, May to Sept. (Hardy and Wooley), ♂♂ and ♀♀ from nests of *Neotoma micropus*. *Hidalgo Co.:* 8 mi. N San Manuel, 20 Apr. 1960, (C. Campbell, P. R. Craig), ♂, ♀♀, ○. *Bentsen-Rio Grande State Park,* 17 June 1963 (J. A. Beatty), 5♂♂, ♀. *Jim Wells Co.:* 15 mi. NW Alice, 17 June 1965 (R. O. Albert), ♀. *Kennedy Co.:* Olmos Creek, 12 Feb. 1953 (N. Causey), 4♀♀. *Kerr Co.:* Raven Ranch, Nov. 1939 (S. and S. Mulaik), ♀♀, ○. *Nueces Co.:* Driscoll, 14 Aug. 1963 (W. J. Gertsch, W. Ivie), ♂, 3♀♀. *San Patricio Co.:* Lake Corpus Christi, 15 June 1963 (J. A. Beatty), ♂, 2♀♀. 8 mi. NE Sinton, 12 Aug. 1964 (J. and W. Ivie), ♀. *Terrell Co.:* Dryden, 27 Mar. 1946 (C. D. Michener), ♂♂, ♀♀, ○. *Uvalde Co.:* Tampke Ranch Cave, 11 Feb. 1966 (J. Reddell, D. McKenzie), ♀. *Webb Co.:* La Mesa Ranch, 28 Dec. 1955 (L. J. Boltimer), ♂, ♀, ○. *Wilson Co.:* Kenedy, 7 Mar. 1939 (C. E. Heard), ♂.

MEXICO: Nuevo León: 3 mi. S Bustamente, July 1963 (J. Reddell), ♀; China, 28

Nov. 1937 (L. I. Davis), ♀; Cueva García (holotype of *L. bolivari*), Herras, 27 Nov. 1935 (A. M. and L. I. Davis), ♀♀, ♂♂; Horsetail Falls, 20 June 1963 (J. A. Beatty), ♂; Linares, 22 May 1952 (W. J. Gertsch), ♂; Montemorelos, 23 May 1952 (W. J. Gertsch), ♀♀, ○; 28 mi. N Monterey, 7 July 1936 (L. I. Davis), ♂♂, ♀♀; 42 mi. N Monterey, 7 July 1936 (L. I. Davis), ♀, ○. **Tamaulipas:** Mera Llera, near summit, 16 Apr. 1963 (W. J. Gertsch and W. Ivie), ♀, ○; Mera Llera, 14 Aug. 1964 (J. and W. Ivie), 4♀♀, ○; Cueva de los Cuarteles, 10 km. SW Aldama, 6 Dec. 1945 (Bolívar, Bonet, Alvarez), ♂, 4♀♀, ○; Cueva de los Cuarteles, 10 km. SW Aldama (J. Reddell, D. and M. McKenzie and S. Murphy), ♂♂, 4♀♀; N end Ciudad Victoria, 15 Apr. 1963 (W. J. Gertsch and W. Ivie), 3♀♀, ○; 6 mi. S Ciudad Victoria, 16 Apr. 1963 (W. J. Gertsch and W. Ivie), ♀♀, ○; 28 mi. S Ciudad Victoria, 25 Nov. 1946 (E. S. Ross), ♀, ○ in CAS; El Tinieblo, 15 Feb. 1970 (J. A. L. Cooke) (in stones by side of roadside in cactus scrub), 3♀♀, ♂; road cut near Gomez Farias, 15 Mar. 1972 (R. W. Mitchell et al.), ○; 2 mi. E Nueva Morelos, 2 Dec. 1939 (A. M. Davis), ♂♂, ♀♀, ○; Palmillas, 3 Dec. 1964 (T. Raines), ♀; 10 mi. S Renosa, 15 May 1952 (W. S. Creighton), ♀; San Fernando, 28 Mar. 1937 (L. I. Davis), ♀; San Pedro, 26 May 1936 (S. Mulaik), ♀; Santander Jiménez, 15 May 1952 (W. J. Gertsch), ♂♂, ♀♀; Sótano de Abasolo, Cerro el Ave, 11 July 1964 (P. Russell), ○ 10 mi. N Tula, 2 Jan. 1971, ♂; 5 mi. S Tres Palos, 15 Apr. 1963 (W. J. Gertsch and W. Ivie), ♀, 3○○.

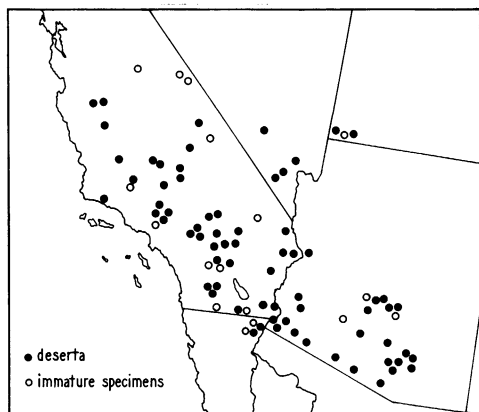
Loxosceles deserta Gertsch

Figures 53–58, 72–86; Map 3

Loxosceles unicolor: Kaston, 1954, p. 41; 1972, p. 88. Gertsch, 1958, p. 15. Russell, Waldron, and Madon, 1969, p. 109. (Only selected records are noted.)

Loxosceles deserta Gertsch, 1973, p. 159. Gertsch and Russell, 1975, p. 203. Brignoli, 1976, p. 180. Kaston, 1978, p. 89.

DIAGNOSIS: Pale, long-legged species of Mojave and Sonoran deserts and foothills of southern Nevada and Utah, Arizona, California and adjacent Mexico: receptacles of epigynum (fig. 72–86) with single tubular lobe; thick embolus of male palpus (figs. 53–58) with trivial apical hook.



MAP 3. Southwestern United States and adjacent Mexico, showing distribution of *Loxosceles deserta*: mature specimens (filled circles), immature specimens (open circles).

FEMALE (Twenty Nine Palms, California): Length 7.5. Carapace 3.2 long, 2.7 wide. Abdomen 4.4 long, 2.3 wide. Carapace yellowish to pale orange, usually without darker pattern except for black eye tubercles, more rarely with dusky pars cephalica. Clypeus 0.45 long, equal to about three diameters of anterior median eye; eyes subequal, about 0.16 in long diameter; median eyes nearly touching line along front edges of anterior lateral eyes, about long diameter from lateral eyes (16/15).

	I	II	III	IV	Palp
Femur	4.50	4.75	4.25	5.15	1.15
Patella	1.00	1.00	1.00	1.00	0.40
Tibia	4.50	5.00	3.85	4.75	0.80
Metatarsus	4.60	5.00	4.10	5.75	—
Tarsus	1.25	1.50	1.15	1.35	1.00
Total	15.85	17.25	14.35	18.00	3.35

Leg formula 2413; second and fourth legs subequal. First leg about five times, first femur 1.4 times, second leg about 5.4 times, second femur about 1.5 times as long as carapace.

EPIGYNUM (figs. 72–86): Subtriangular receptacles close together at midline, each with robust, tubular, forwardly directed lobe nearer inner side. (The 15 epigyna (figs. 72–86) based on specimens from Arizona, California, Nevada, and Utah cover rather fully the range of variation of this organ. The basic shape is mostly standard and adventitious

lobes few. The most aberrant epigynum (fig. 86) came from a mature female from Washington County, Utah.)

MALE (Twenty Nine Palms, California): Length 7.5. Carapace 3.35 long, 2.9 wide. Coloration and general structure like those of female.

	I	II	III	IV	Palp
Femur	7.10	7.80	6.75	7.30	1.90
Patella	1.20	1.25	1.10	1.15	0.50
Tibia	8.00	9.15	6.50	7.50	1.15
Metatarsus	8.25	9.50	8.20	10.00	—
Tarsus	1.75	1.75	1.50	1.50	0.35
Total	26.30	29.45	24.05	27.45	3.90

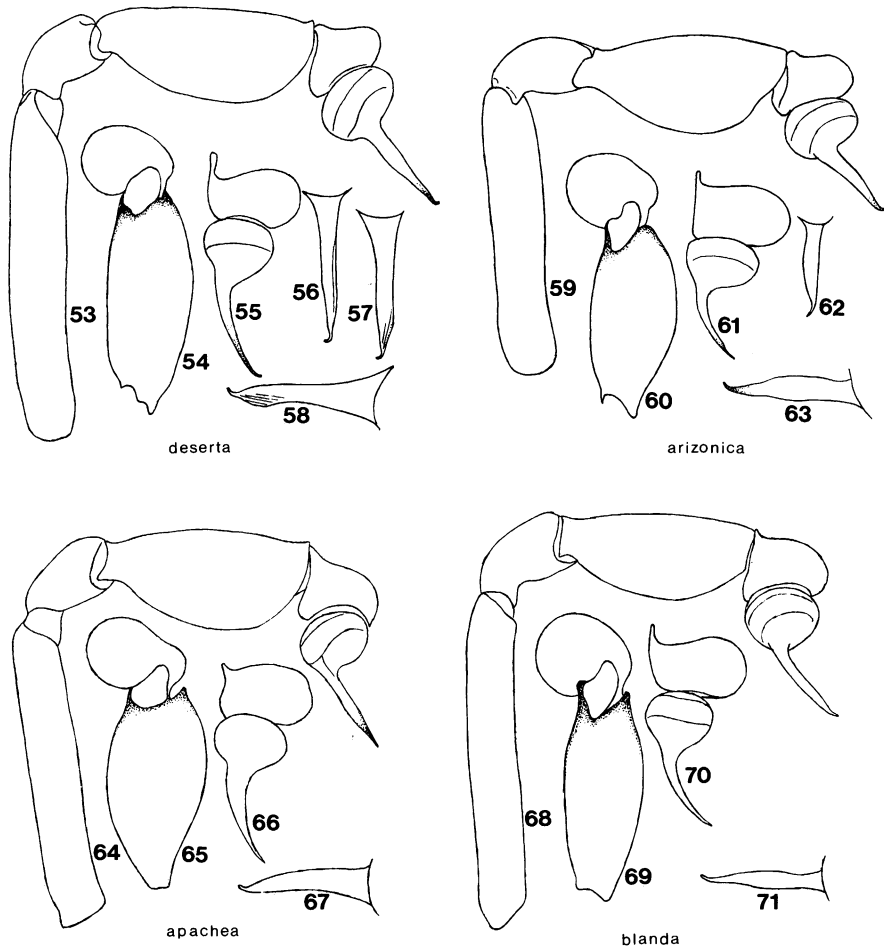
Leg formula 2413; second leg much longer than fourth. First leg 7.8 times, first femur 2.1 times, second leg 8.8 times, second femur 2.3 times as long as carapace.

MALE PALPUS (figs. 53–58): Tibia 2.25 times as long as wide and deep; bulb broadly oval, as broad as tarsal length and nearly as broad as tibial depth; embolus thick at base, longer than bulbal width (5/4), thick through most of length but apically narrowed to small curved hook. Embolus rarely more strongly widened and apically grooved as shown in figures 57, 58 based on males from Beaver Dam Wash, Washington County, Utah, and Fellows, Kern County, California.

TYPE DATA: Male holotype from Twenty Nine Palms, San Bernardino County, California, May 1954 (J. H. Branch), in AMNH.

DISTRIBUTION: Widely distributed in Mojave and Sonoran deserts of southern Utah, Nevada, California, Arizona, and Baja California Norte at elevations below 5000 feet and in arid foothills of southern San Joaquin Valley (map 3). This species is also presumed to exist in the adjacent Mexican State of Sonora, but no specimens are yet known from that locality.

MATERIAL EXAMINED: One hundred fifty-four ♂♂, 185 ♀♀ and 4000 from: **Arizona:** Maricopa Co.: Gila Bend; N of Scottsdale; Utery Pass; Tempe; South Mountain Park, Phoenix; Phoenix; W of Casa Grande; junction of Salt and Verde rivers; Peralta Road in Superstition Mts.; Glendale near Agua Fria River; Paradise Valley, NE of Cave Creek. **Mohave Co.:** 23 and 26 mi. S Pierce Ferry. **Pima Co.:** Papago Well; Organ Pipe National Monument; San Xavier Indian Reservation



FIGS. 53–58. *Loxosceles deserta* Gertsch: 53–56. (Twenty nine Palms, California), right male palpus. 53. Retrolateral view. 54. Tibia and tarsus, dorsal view. 55. Tarsus and bulb, apical view. 56. Embolus, prolateral view. 57. Embolus (Beaver Dam Wash, Utah), prolateral view. 58. Embolus (Fellows, California), prolateral view.

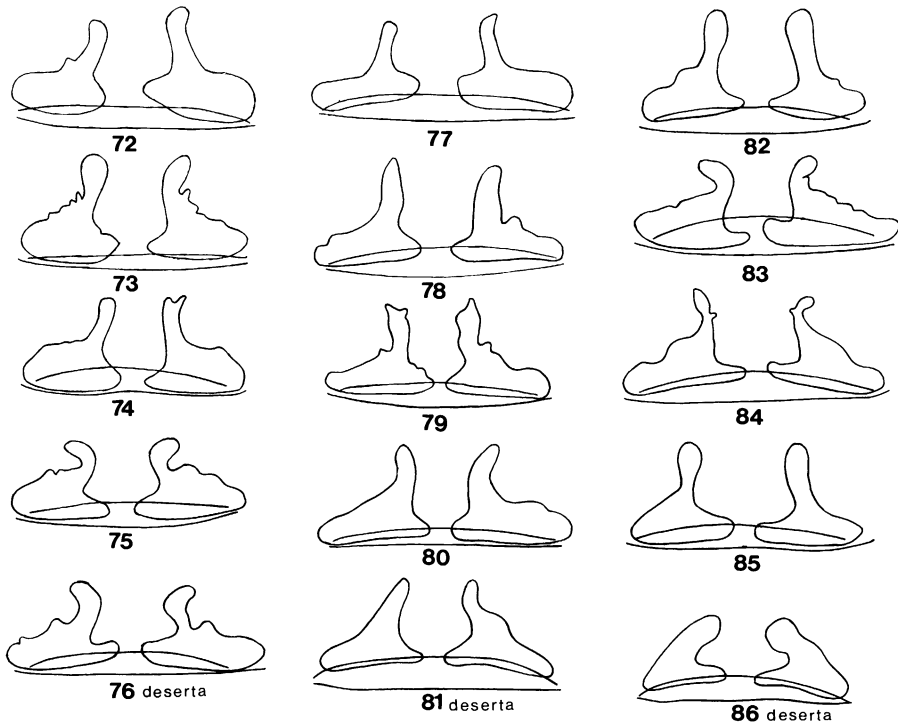
FIGS. 59–63. *Loxosceles arizonica* Gertsch and Mulaik (N of Roosevelt Dam, Arizona), right male palpus. 59. Retrolateral view. 60. Tibia and tarsus, dorsal view. 61. Tarsus and bulb, apical view. 62. Embolus, prolateral view. 63. Embolus, prolateral view.

FIGS. 64–67. *Loxosceles apachea*, new species (Carrizozo, New Mexico), right male palpus. 64. Retrolateral view. 65. Tibia and tarsus, dorsal view. 66. Tarsus and bulb, apical view. 67. Embolus, prolateral view.

FIGS. 68–71. *Loxosceles blanda*, new species (Sanderson, Texas), right male palpus. 68. Retrolateral view. 69. Tibia and tarsus, dorsal view. 70. Tarsus and bulb, apical view. 71. Embolus, prolateral view.

near Tucson; Santa Catalina Mts.; Tucson; Sabino Canyon. *Pinal Co.*: 6.4 km. W Superior; 32 km. NE Apache Junction; Picacho State Park. *Yavapai Co.*: Congress Junction camp area, 1 mi. S Congress Junction. *Yuma Co.*: 16 km. E Gila Valley; Sierra Pinta; Kofa Mts.; Monument 180; Tule Well; Sheep Tank

Mine; Yuma Fairgrounds; Buckskin Mt., Colorado State Park near Parker Dam. **California**: *Fresno Co.*: Jacalitos Canyon, 8 km. S Coalinga; Panoche Creek Canyon. *Imperial Co.*: 70 km. E Winterhaven, Gold Rock Ranch; near Picacho; Mt. Signal; Calexico. *Inyo Co.*: 8 km. N Olancho; Townes Pass/



FIGS. 72–86. *Loxosceles deserta* Gertsch, epigyna. Arizona: 72. Sheep Tank Mine, Yuma Co. 73, 75. Peralta Road, Superstition Mts. 74, 76. Usery Pass, Maricopa Co. 77. Scottsdale. 78. Phoenix. 80. Tule Well, Yuma Co. Utah: 81, 86. Beaver Dam, Washington Co. Nevada: 82. Granary Cave, Moapa. California: 79. Picacho, Imperial Co. 83, 84. Borrego Valley. 85. Twenty Nine Palms.

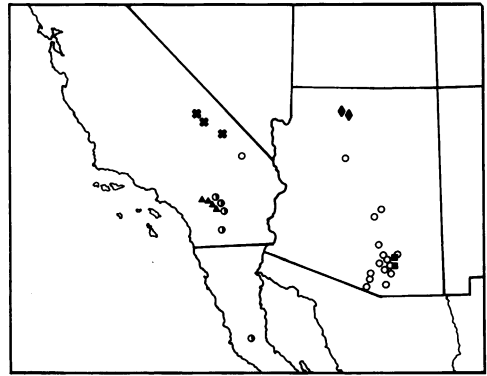
Hwy. 190; Saline Valley, Racetrack Road. *Kern Co.*: Mojave; NE edge of El Paso Mts., 1.6 km. W Hwy. 395; 13 km. S Blackwells Corner; Taft; McKittrick; Lake Isabella (reservoir); Onyx; 1.6 km. N Fellows. *King Co.*: Avenal. *Los Angeles Co.*: Lovejoy Springs; Big Tujunga Canyon; Palmdale; 8 km. S Palmdale; 1.8 km. S Agua Dulce Canyon on Hwy. 6; Mulholland Drive, west Los Angeles; Lancaster. *Mariposa Co.*: El Portal. *Mono Co.*: Chalfant; Hammil Station. *Riverside Co.*: Coachella Valley; Cox; Thousand Palms Canyon; Squaw Tank, Joshua Tree National Monument; Pinyon Flats, San Jacinto Mts.; 14 km. NW Blythe; *San Benito Co.*: Big Panoché Canyon. *San Bernardino Co.*: Twenty Nine Palms; Mule Canyon, Calico Mts.; Apple Valley; Lucerne Valley; 8 km. N Yucca Valley; Tecopa Cave (Mitchell Cave); Pisgah Crater; Amboy Crater lava flow; Newberry; Yermo; Hinkley; Barstow; 27 km. W Needles;

San Bernardino; Vidal Junction; Copper Basin Creek, Whipple Mts. *San Diego Co.*: Borrego State Park; Borrego Valley; Borrego Springs; upper end Chariot Canyon; Jacumba. *Santa Barbara Co.*: San Marcos Pass, Santa Barbara. *Nevada*: *Clark Co.*: 13 km. W Arden; Las Vegas; Granary Cave, Moapa. *Nye Co.*: Mercury; Rock Valley. *Utah*: *Washington Co.*: Zion National Park; Beaver Dam Wash.

MEXICO: Baja California Norte: 32 km. S Palaco (S of Mexicali), 4 Apr. 1939, ♂, ♀. Tajo-Cantil Canyon 20 mi. S of Laramarosa, 26 Mar. 1975 (F. Ennik), ○. Cocopa Mts., 12 Mar. 1961 (V. Roth) from small bat cave, under rocks, ♀, ○. 1 mi. W Pozo Amara, Laguna Salada, 25 May 1971 (J. Cross), ♀. El Mayor, 4 Apr. 1939 (E. S. Ross), ♀ in CAS. Roca Blanca, 6 May 1944 (B. Osorio), ○. Tres Pozos, S end Laguna Salada, 24 Nov. 1960 (V. Roth), ♂.

NATURAL HISTORY: *Loxosceles deserta* in all growth stages are found in limited habitats under debris and accumulations of rocks in dry washes, on talus slopes, and in abandoned mines. They are also found associated with the stick huts of the desert species of the wood rat *Neotoma*. On several occasions adults and immatures were obtained from rodent burrows, which suggests that in extremely arid conditions desert populations might maintain themselves in these microhabitats. The greatest concentrations of spiders are found under debris around and in abandoned man-made structures, such as farm and roadside buildings, and in trash dumps. These abandoned and collapsed structures provide excellent harborage in areas often devoid of natural surface objects. Spiders of all stages of development are found together under the latter conditions and during all seasons of the year. In contrast, there is a gradual decline in the numbers found under single objects of debris or rocks in late summer months, probably due to increased temperature and arid conditions. Adult and subadult spiders are most often found during the winter months, with females predominating. Immatures are prevalent during the spring and early summer months. Observations of the life cycle of reared *Loxosceles deserta* (=unicolor) have been reported by Ennik (1971).

A close association appears to exist between the known localities of *Loxosceles deserta* and certain plant communities of the southwestern deserts. Using a Potential Natural Vegetation Map (Kuchler, 1966), we outlined the presumed distribution for this species. Based upon this relationship, *deserta* is likely to be found in these Western Scrub plant associations: creosote bush, bur sage, palo verde-cactus scrub, joshua tree woodland, and chaparral. In reference to altitude, the upper limit of this species appears to extend into piñon-juniper woodland. In the San Joaquin Valley, *Loxosceles deserta* occurs in California steppe (*Stipa*) grassland, but, owing to a lack of records, we suspect its distribution stops or becomes discontinuous north of Fresno and Madera counties. It is not likely to be found in plant associations such as saltbush-grease wood and Great Basin greasewood.



MAP 4. Southwestern United States and adjacent Mexico, showing distributions of *Loxosceles russelli* (crosses), *L. kaiba* (diamonds), *L. arizonica* (open circles), *L. sabina* (squares), *L. palma* (half-filled circles), and *L. martha* (triangles).

Loxosceles arizonica Gertsch and Mulaik
Figures 59–63, 87–91; Map 4

Loxosceles arizonicus Gertsch and Mulaik [sic], 1940, p. 317.

Loxosceles arizonica Gertsch, 1958, p. 13 (part: not fig. 90; Arizona locality records only). Brignoli, 1976, p. 178.

DIAGNOSIS: Sympatric relative of *deserta* from Sonoran desert of Arizona: receptacles of epigynum with lobes (figs. 87–91) nearer middle; male palpal elements shorter, and tibia and tarsus typically dark reddish brown.

FEMALE (Saguaro National Monument, E of Tucson): Length 9. Carapace 4 long, 3.4 wide. Abdomen 5.5 long, 3.5 wide. Carapace orange-brown with dusky pars cephalic and cervical grooves and dusky patches along sides of pars thoracica. Anterior median eyes long diameter from lateral eyes.

	I	II	III	IV	Palp
Femur	4.95	5.15	5.00	5.30	1.40
Patella	1.25	1.30	1.25	1.25	0.55
Tibia	5.15	5.50	4.25	5.30	1.00
Metatarsus	5.00	5.50	5.00	6.10	—
Tarsus	1.50	1.50	1.35	1.50	1.40
Total	17.85	18.95	16.85	19.45	4.35

Leg formula 4213. First leg 4.4 times, first femur 1.2 times, second leg 4.7 times, second femur 1.28 times as long as carapace.

EPIGYNUM (figs. 87–91): Seminal recepta-

cles nearly contiguous at inner side, each with short stout lobe arising from near middle.

MALE (Superstition Mts., Maricopa Co., Arizona): Length 8. Carapace 3.5 long, 3 wide. Abdomen 4.7 long, 3.7 wide. Carapace with reddish brown pars cephalica; pars thoracica yellowish with vague brownish patches along sides and brownish line in cervical groove. Tibia and tarsus of palpus dark reddish brown. Anterior median eyes about long diameter from lateral eyes (18/16).

	I	II	III	IV	Palp
Femur	6.15	6.75	5.75	6.30	1.80
Patella	1.25	1.25	1.20	1.20	0.70
Tibia	6.75	7.60	5.20	6.80	1.20
Metatarsus	6.40	7.70	6.35	6.60	—
Tarsus	1.35	1.50	1.25	1.55	0.40
Total	21.90	24.80	19.75	22.45	4.10

Leg formula 2413. First leg 6.2 times, first femur 1.7 times, second leg 7.1 times, second femur 1.9 times as long as carapace.

MALE PALPUS (figs. 59–63): Tibia twice as long as broad and deep; bulb oval, slightly narrower than tarsal length and narrower than tibial length (50/53); embolus of medium thickness at base, as long as bulbal width, narrowed to thin curved spine at apex.

TYPE DATA: Male holotype from Tucson, Arizona, in AMNH.

DISTRIBUTION: Sonoran desert and foothills of southern Arizona (map 4); one uncertain record from southeastern California. All previous records for New Mexico, Texas, and southwestern Mexican States (Gertsch, 1958, p. 14, fig. 2) are now referred to other species. Full information data are given below only for selected records. Observations on the biology of *Arizonica* have been reported by Richman (1973).

RECORDS: **Arizona:** *Coconino Co.*: Beaver Creek Campground, near Sedona, 25 July 1970 (Tom Lutz), ♀, o. *Gila Co.*: 8 mi. N Roosevelt Dam, 11 Apr. 1965 (W. Ivie), ♂♂, ♀♀. *Maricopa Co.*: Superstition Mts.: Usery Pass; Peralta Road, 20 Nov. 1929 (L. Honetschlager), ♂, ♀. *Pima Co.*: Baboquivari Mts.: Brown Canyon, 9 June 1952 (W. J. Gertsch), ♂♂, ♀♀; Kit's Peak, 3500 ft., 5 Aug. 1966 (W. J. Gertsch), o; Forestry Cabin; Rancho El Mirador. Tucson and environs: Tucson, July–Aug. 1935 (P. Steckler), ♂♂, ♀♀, o; Saguaro National Monument, 20 Feb. (V. and S.

Roth), ♂♂, ♀♀. Santa Catalina Mts.: Sabino Canyon; upper Sabino Canyon, Bear Canyon, Molina Basin, 4300 ft., 31 July 1953 (J. Beatty), 3♂♂, ♀; Sabino Pass, 2700 ft., 10 July 1962 (J. Beatty), ♀; Magee Road, 4 mi. N Tucson, 23 Oct. 1960 (A. Aschwanden), from *Neotoma* nest. Cienega Wash, 30 mi. E Tucson. Near Oracle. Redington, 13 Feb. 1970 (W. J. Gertsch), ♂. Bass Ranch, 15 mi. W Tucson, 6 Mar. 1935 (J. A. Griswold), ♂♂, ♀♀. Quitobaquito, 20 Dec. 1954 (K. M. Haller), 2♀♀, o. *Pinal Co.*: Middle Pioneer Campground, 16 Aug. 1950 (M. A. Cazier), ♂. *Graham Co.*: End Aravaipa Canyon, 17 Mar. 1975 (V. Roth), male. *Santa Cruz Co.*: Roundup Camp, Madera Canyon, 23 Mar. 1960 (W. J. Gertsch), ♀♀, o. **California:** *San Bernardino Co.*: 10 mi. W Kelso, 15 Apr. 1961 (V. Roth), ♀.

Loxosceles apachea, new species

Figures 64–67, 92–96; Map 5

Loxosceles arizonica: Gertsch, 1958, pp. 13–14 (part: locality records of eastern Arizona, New Mexico, western Texas, Chihuahua, Zacatecas, and Durango).

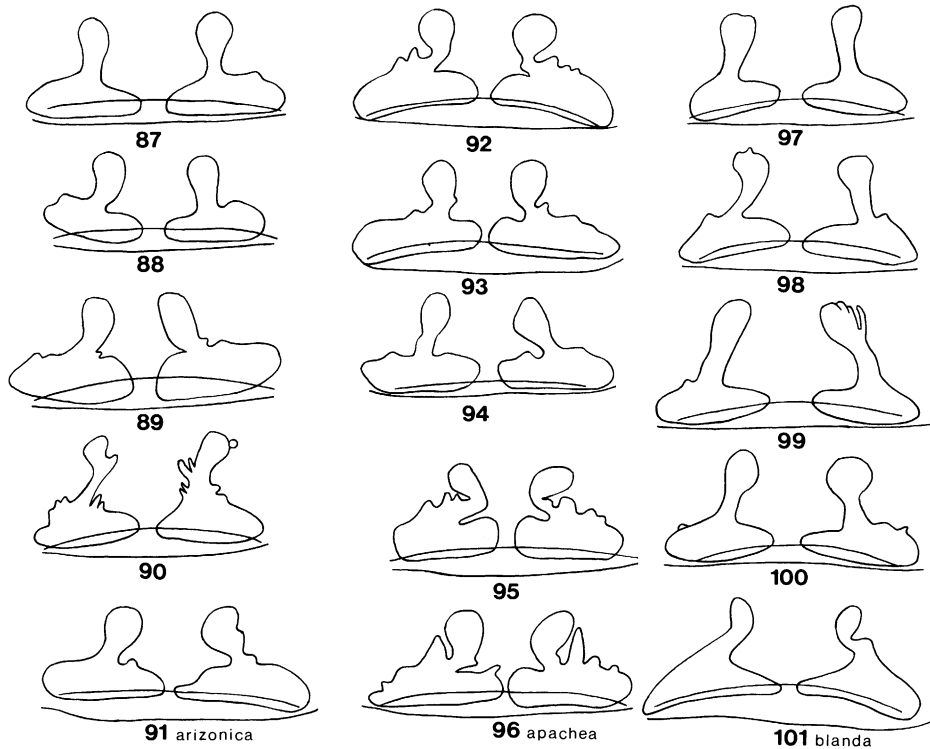
DIAGNOSIS: Relative of *arizonica* from Chihuahuan desert: receptacles of epigynum (figs. 92–96) with short, stout lobes; typically nearer inner lobe; embolus of male palpus (fig. 67) longer than bulbal width and widened in inner part.

ETYMOLOGY: Specific name for Apache Indians.

FEMALE (Portal, Arizona): Length 9.2. Carapace 3.75 long, 3.2 wide. Abdomen 5.8 long, 3.7 wide. Carapace yellowish to dull orange, usually with duskiess on pars cephalica and median groove but without lateral markings on pars thoracica. Median eyes slightly in advance of line along front edges of anterior lateral eyes and separated by long diameter from anterior lateral eyes.

	I	II	III	IV	Palp
Femur	4.60	4.85	4.50	5.15	1.25
Patella	1.15	1.25	1.20	1.15	0.50
Tibia	4.70	4.85	3.75	4.70	0.85
Metatarsus	4.75	5.15	4.50	5.75	—
Tarsus	1.35	1.35	1.15	1.35	1.20
Total	16.55	17.45	15.10	18.10	3.80

Leg formula 4213. First leg 4.4 times, first femur 1.2 times, second leg 4.6 times, second femur 1.22 times as long as carapace.



FIGS. 87-91. *Loxosceles arizonica* Gertsch and Mulaik, epigyna. Arizona: 87. Roosevelt Dam. 88. Beaver Creek Camp, Sedona. 89. Usery Pass, Maricopa Co. 90. Roundup Camp, Madera Canyon. California: 91. Kelso, San Bernardino Co.

FIGS. 92-96. *Loxosceles apachea*, new species, epigyna. Texas: 92, 93. El Paso. Arizona: 94. Mt. Graham, near Safford. 95, 96. Portal, Cochise Co.

FIGS. 97-101. *Loxosceles blanda*, new species, epigyna. New Mexico: 97-99. White's City, Eddy Co. 100, 101. Texas: The Basin, Chisos Mts.

EPIGYNUM: Receptacles close together at midline, with principal lobe like that of *arizonica*, often accompanied by numerous adventitious projections.

MALE (Portal, Arizona): Length 6.2. Carapace 3.1 long, 2.75 wide. Abdomen 3.6 long, 2 wide. Coloration like that of female. Median eyes touching line along front edges of anterior lateral eyes and separated from them by short diameter (14/19).

	I	II	III	IV	Palp
Femur	5.50	5.80	5.00	5.50	1.20
Patella	1.15	1.15	1.10	1.10	0.50
Tibia	5.80	6.15	4.60	5.25	0.90
Metatarsus	5.50	6.25	5.60	6.75	—
Tarsus	1.35	1.40	1.25	1.45	0.40
Total	19.30	20.75	17.55	20.05	3.00

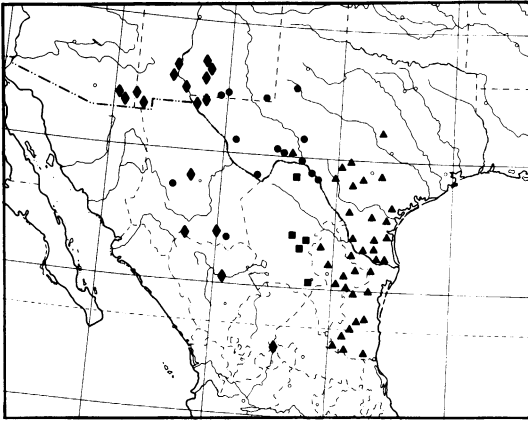
Leg formula 2413. First leg 6.2 times, first femur 1.77 times, second leg 6.6 times, second femur 1.86 times as long as carapace.

MALE PALPUS (figs. 64-67): Femur four times as long as wide (1.20/0.29); tibia nearly twice as long as deep (0.9/0.48); bulb oval, with embolus quite thick through middle part and longer than bulbal width (0.42/0.35).

TYPE DATA: Male holotype from Portal, Arizona, 1 July 1965 (W. J. Gertsch), deposited in AMNH.

DISTRIBUTION: Species of Chihuahuan desert region from Cochise County, Arizona, New Mexico, west Texas, Chihuahua, and adjacent states of Mexico (map 5).

RECORDS: **Arizona:** *Cochise Co.:* Portal and environs, May to Sept. (V. Roth, W. J. Gertsch, M. Cazier), numerous ♂♂, ♀♀, ○ from



MAP 5. Southern United States and adjacent Mexico, showing distributions of *Loxosceles apachea* (diamonds), *L. blanda* (circles), *L. devia* (triangles), and *L. belli* (squares).

underground objects, in packrat nest, and buildings. Fort Bowie, 5 Apr. 1972 (V. Roth), ♀. Apache, 1 Sept. 1971 (W. J. Gertsch), ♀. **New Mexico:** *Hidalgo Co.:* 15 mi. S Road Forks, 20 Apr. 1961 (W. J. Gertsch), ♂, ♀. Big Hatchet Ranch: Thompson Canyon, 30 May–28 June 1977 (P. L. Packard), 5♂♂, ♀; Doyle Tank, 19 June 1977 (P. L. Packard), ♂ from cantrap in creosote bush; New Hatchet Well, 14 June 1977 (P. L. Packard), ♂ from cantrap in mesquite flatlands; Doyle Well, 3, 24 July 1977 (P. L. Packard), 3♂♂. *Lincoln Co.:* 2 mi. W Carrizozo, Valley of Fires National Park, 15 June 1971 (F. Ennik), 2♂♂, ♀ in lava flow. Carrizozo, June 1978 (S. Riechert), 3♂♂, 2♀♀. *Otero Co.:* Alamogordo, 28 Sept. 1969 (W. Wade), ♂. *Sierra Co.:* Caballo State Park, 15 June 1971 (F. Ennik), 2♂♂, 2♀♀. Truth or Consequences, 15 June 1971 (F. Ennik), 3♀♀. **Texas:** *Hudspeth Co.:* El Paso, Dec. 1944 (W. T. Schwarting), ♂♂, ♀♀; 20 Mar. 1961 (W. J. Gertsch, W. Ivie, R. Schrammell), ♀, ♀ from trash pile on dry hillside. Hueco, 5 June 1974 (O. F. Francke), ♂. 0.6 mi. W Hueco, 5 June 1974 (P. F. Francke), ♂.

MEXICO: *Chihuahua:* Cañon-Prieto, near Primavera, 30 June 1947 (W. J. Gertsch), ♀♀, ♀; northwestern Chihuahua, 8 Sept. 1964 (J. and W. Ivie), ♀; Cueva del Diablo, 23 July 1947 (W. J. Gertsch) (in darkness, near entrance), ♀; Ciudad Jiménez, 7 Sept. 1964 (J.

and W. Ivie), ♀; 22 mi. N Hildago del Parral (V. Roth, W. J. Gertsch), ♂♂, ♀; Salaiques, 5 Aug. 1954 (W. J. Gertsch), ♀, ♀; Salaiques, 22 July 1965 (J. Reddell, J. Fish), ♀; Durango: 5 mi. S Rodeo, 10 Sept. 1967 (R. E. Leech), ♀; San Juan del Rio, 1 Aug. 1947 (W. J. Gertsch), ♀, ♀; Zacatecas: Ojo Caliente, 3 Aug. 1954 (W. J. Gertsch), ♂.

Loxosceles blanda, new species

Figures 68–71, 97–101; Map 5

Loxosceles arizonica: Gertsch, 1958, pp. 13–14 (part: some locality records of eastern New Mexico and west Texas).

DIAGNOSIS: Species similar to *apachea*: receptacles of epigynum (figs. 97–101) with longer lobes originating from near middle, and embolus of male palpus (fig. 71) thinner, little widened through middle part.

ETYMOLOGY: Specific name from Latin *blandus*, flattering.

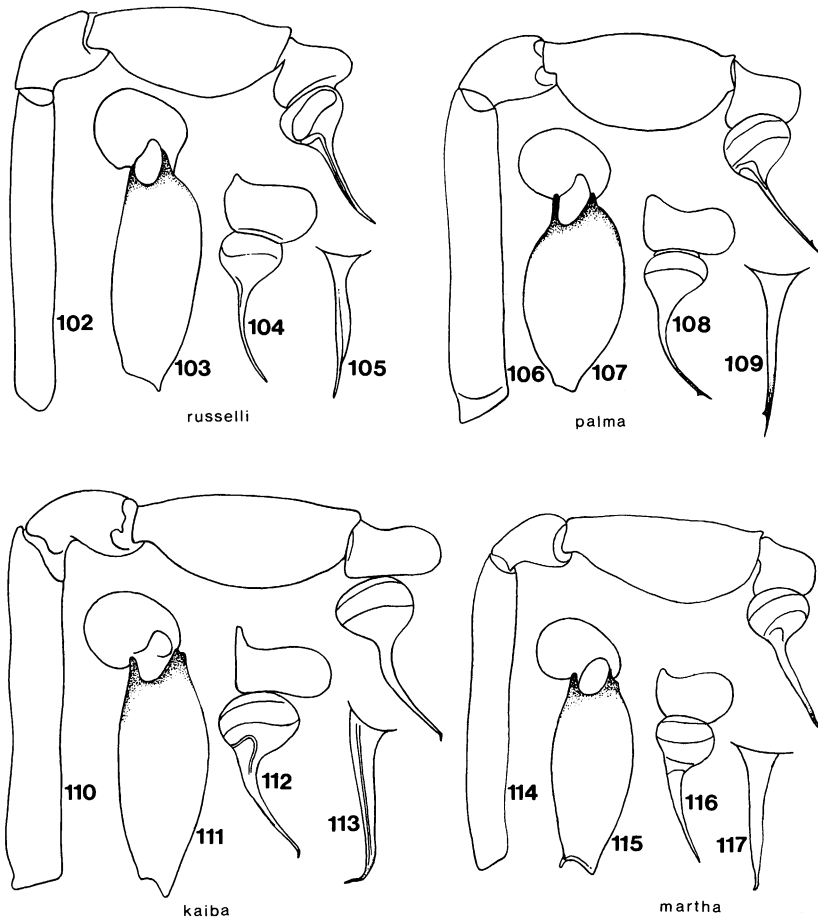
FEMALE (White's City, Eddy County, New Mexico): Length 7. Carapace 3 long, 2.7 wide. Abdomen 4 long, 2.2 wide. Carapace yellowish, with inconspicuous dusky pars cephalica and dusky smudges along sides of pars thoracica. Median eyes only slightly in front of line along front edges of lateral eyes and separated from them by slightly more than long diameter (20/18).

	I	II	III	IV	Palp
Femur	4.30	4.65	4.15	4.60	1.20
Patella	1.00	1.00	1.00	1.00	0.50
Tibia	4.00	4.75	3.60	4.35	0.80
Metatarsus	4.25	4.75	4.10	5.25	—
Tarsus	1.15	1.30	1.10	1.35	1.20
Total	14.70	16.45	13.95	16.55	3.70

Leg formula 4213. First leg 4.7 times, first femur 1.43 times, second leg about 5.5 times, second femur 1.55 times as long as carapace.

EPIGYNUM (figs. 97–101): Broad, slightly separated receptacles from which originate single heavy, usually apically somewhat enlarged lobes.

MALE HOLOTYPE: Length 7.5. Carapace 3.3 long, 2.85 wide. Abdomen 4.2 long, 2.5 wide. Median eyes separated from anterior lateral eyes by more than long diameter (20/16).



FIGS. 102-105. *Loxosceles russelli*, new species (Saratoga Springs, California), right male palpus. 102. Retrolateral view. 103. Tibia and tarsus, dorsal view. 104. Tarsus and bulb, apical view. 105. Embolus, prolateral view.

FIGS. 106-109. *Loxosceles palma*, new species (Deep Canyon, San Jacinto Mts., California), right male palpus. 106. Retrolateral view. 107. Tibia and tarsus, dorsal view. 108. Tarsus and bulb, apical view. 109. Embolus, prolateral view.

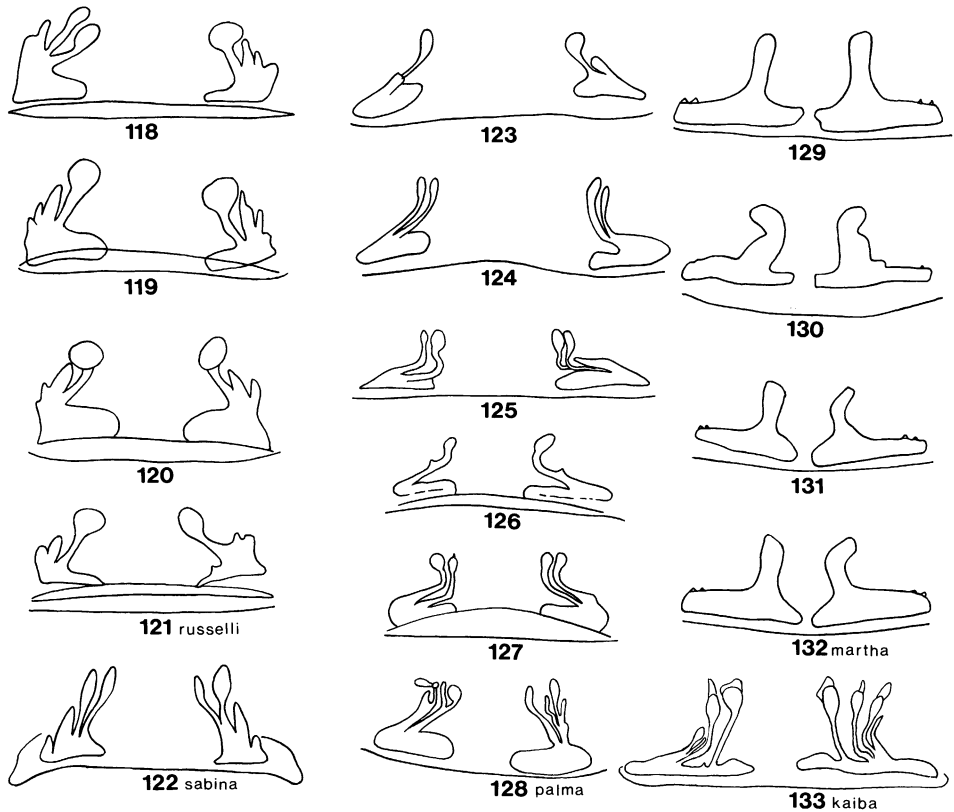
FIGS. 110-113. *Loxosceles kaiba*, new species (Thunder Cave, Grand Canyon National Park, Arizona), right male palpus. 110. Retrolateral view. 111. Tibia and tarsus, dorsal view. 112. Tarsus and bulb, apical view. 113. Embolus, prolateral view.

FIGS. 114-116. *Loxosceles martha*, new species (Indian Wells, Riverside Co., California), right male palpus. 114. Retrolateral view. 115. Tibia and tarsus, dorsal view. 116. Tarsus and bulb, apical view. 117. Embolus, prolateral view.

	I	II	III	IV	Palp
Femur	6.00	6.50	5.50	6.25	1.75
Patella	1.15	1.15	1.10	1.10	0.60
Tibia	6.80	7.80	5.25	6.00	1.65
Metatarsus	6.75	7.80	6.50	7.75	—
Tarsus	1.60	1.60	1.20	1.50	0.45
Total	22.30	24.85	19.55	22.60	4.45

Leg formula 2413. First leg 6.7 times, first femur 1.8 times, second leg 7.5 times, second femur 1.9 times as long as carapace.

MALE PALPUS (figs. 68-71): Tibia about twice as long as wide or deep; embolus longer than oval bulb (50/38), of medium width at



FIGS. 118–121. *Loxosceles russelli*, new species, epigyna. (Saratoga Springs, Death Valley National Park, California).

FIG. 122. *Loxosceles sabina*, new species, epigynum (Sabino Canyon, Pima Co., Arizona).

FIGS. 123–128. *Loxosceles palma*, new species, epigyna. California: 123–125. Deep Canyon, San Jacinto Mts. 126. Tahquitz Canyon, Palm Springs. 127. Andreas Canyon, Palm Canyon. Baja California: 128. Nakipa.

FIGS. 129–132. *Loxosceles martha*, new species, epigyna. California: 129. Whitewater Canyon, Riverside Co. 130. Indian Wells, Riverside Co. 131–132. Palm Springs, Riverside Co.

FIG. 133. *Loxosceles kaiba*, new species, epigynum (Thunder Cave, Grand Canyon National Park, Arizona).

base, only gradually narrowed to thin apical spine.

TYPE DATA: Male holotype from Sander-son, Terrell County, Texas, 26 May 1952 (W. J. Gertsch), deposited in AMNH.

DISTRIBUTION: Southeastern New Mexico and western Texas (map 5).

RECORDS: **New Mexico:** *Eddy Co.:* Carlsbad National Park, 2 July 1969 (R. Mavek), ♀. *White's City*, 24 Sept. 1950 (W. J. Gertsch), 2♂♂, ♀, 4, 5 Oct. 1961 (W. J. Gertsch, W. Ivie), ♀♀, ♀, ♂. *Lea Co.:* 20 June 1969 (J. J. Durkin), ♂. **Texas:** *Crockett Co.:* Lancaster Hill, 6 May

1958 (W. H. McAlister), 2 penultimate ♂♂. *Brewster Co.:* Big Bend National Park, Chisos Mountains: Chisos Basin, 28 Sept. 1950 (W. J. Gertsch), ♂, ♀♀, ♀; 28 May 1952 (W. J. Gertsch), ♀; 24 May 1965 (K. W. Haller), ♀. *Cat Tail Canyon*, 20 Mar. 1977 (V. and B. Roth), ♀; *Grapevine Hills*, 22 Mar. 1977 (V. and B. Roth), ♀. *Jeff Davis Co.:* 1.2 mi. SW on Hwy. 183 from junction with Hwy. 17, 20 Mar. 1978 (C. Rudolph, J. Mato), ♀, ♀. *Terrell Co.:* Sanderson, 8 Apr. 1937 (A. Morson), ♂ under rock; 26 May 1952 (W. J. Gertsch), 2♂♂, ♀. *Bendel's Uncave*, 19 mi. NE

Dryden, 27 June 1963 (J. Reddell, W. Russell), \circ 10 ft. from entrance. *Terry Co.*: Brownfield, 27 Apr. (L. Jordan), male in house. *Val Verde Co.*: Comstock, 26 May 1952 (W. J. Gertsch), δ , \circ . Del Rio, δ , φ . Langtry, 26 June 1971 (Tomberlin), δ . Oriente Milestone, Molasses Bat Cave, about 20 mi. NE Del Rio, 25 Jan. 1964 (J. Reddell, D. McKenzie, J. Porter), \circ under rocks beyond bat house.

***Loxosceles sabina*, new species**

Figure 122; Map 4

DIAGNOSIS: Near relative of *russelli* with 2413 leg formula, fourth metatarsus as long as second, and receptacles of epigynum (fig. 122) with multiple receptacles. Male unknown.

ETYMOLOGY: Named for the type locality, Sabino Canyon, near Tucson, Arizona.

FEMALE HOLOTYPE: Length 8.5. Carapace 3.1 long, 2.7 wide. Abdomen 5.5 long, 3.2 wide. Cephalothorax and appendages yellowish to pale orange; carapace unmarked except for black eye tubercles. Anterior median eyes more than diameter from anterior lateral eyes (20/14).

	I	II	III	IV	Palp
Femur	4.75	5.35	4.35	5.10	1.15
Patella	1.00	1.10	1.00	1.20	0.35
Tibia	5.30	6.10	4.80	5.20	0.75
Metatarsus	5.00	5.75	4.70	5.75	—
Tarsus	1.35	1.35	1.25	1.35	1.25
Total	17.40	19.65	16.10	18.60	3.50

Leg formula 2413. First leg 5.6 times, first femur 1.4 times, second leg 6.5 times, second femur 1.7 times as long as carapace.

EPIGYNUM (fig. 122): Subtriangular receptacles widely separated by nearly twice their length, bearing two principal and one or two accessory lobes.

TYPE DATA: Female holotype from Sabino Pond, near mouth of Sabino Canyon, 2700–2800 feet, Pima Co., Arizona, 28 July 1963 (J. Beatty), deposited in AMNH courtesy of Dr. Beatty.

DISTRIBUTION: Pima County, Arizona (map 4).

RECORDS: **Arizona:** *Pima Co.*: Sabino Canyon, 24 Mar. 1960 (W. J. Gertsch, W. Ivie), φ under rock on dry hillside. Sabino Pond,

near mouth of Sabino Canyon, 28 July 1963 (J. Beatty), \circ . Esperero Canyon, Apr. 1938 (M. Bogert), φ , \circ . Colossal Cave, Vail, 15 Apr. 1953 (H. Dietrich), φ , \circ .

***Loxosceles russelli*, new species**

Figures 102–105, 118–121; Map 4

DIAGNOSIS: Relative of *deserta* and *palma* from Death Valley area: receptacles of epigynum (figs. 118–121) with multiple lobes, one enlarged and apically spherical; embolus of male palpus (fig. 105) drawn to thin spine.

ETYMOLOGY: Named for Dr. Findlay E. Russell, student of venoms.

FEMALE: Length 9. Carapace 3 long, 2.5 wide. Abdomen 6.5 long, 4 wide. Carapace yellow to pale orange, unmarked except for black eye tubercles. Median eyes, their radius in front of line along front edges of anterior lateral eyes, more than diameter from anterior lateral eyes (17/13).

	I	II	III	IV	Palp
Femur	5.00	5.30	4.75	5.40	1.15
Patella	1.00	1.10	1.00	1.00	0.50
Tibia	5.30	5.50	4.30	5.15	0.75
Metatarsus	4.90	5.40	5.00	6.20	—
Tarsus	1.25	1.35	1.20	1.40	1.15
Total	17.45	18.65	16.25	19.15	3.55

Leg formula 4213. First leg 5.8 times, first femur 1.6 times, second leg 6.2 times, second femur 1.8 times as long as carapace.

EPIGYNUM (figs. 118–121): Receptacles subquadrangular, widely separated, surmounted with two to four lobes, principal one long and apically spherical.

MALE HOLOTYPE: Length 6.3. Carapace 2.65 long, 2.35 wide. Abdomen 3.7 long, 2.3 wide. Coloration like that of female. Median eyes about full diameter from anterior lateral eyes (14/13).

	I	II	III	IV	Palp
Femur	6.50	7.00	5.75	6.75	1.80
Patella	1.00	1.10	1.00	1.10	0.55
Tibia	7.60	8.65	6.20	7.00	1.20
Metatarsus	7.30	8.25	7.20	8.70	—
Tarsus	1.50	1.60	1.30	1.60	0.35
Total	23.90	26.60	21.45	25.15	3.90

Leg formula 2413. First leg 9 times, first femur 2.4 times, second leg 10 times, second femur 2.6 times as long as carapace.

MALE PALPUS (figs. 102–105): Tibia 2.2 times as long as broad and deep; bulb suboval, narrower than tarsal length and much narrower than tibial depth (33/45); embolus thick at base but much narrowed at middle and apically a thin straight spine.

TYPE DATA: Male holotype from Saratoga Springs, Death Valley National Monument, San Bernardino Co., California, 4 June 1975 (F. Ennik), deposited in AMNH.

DISTRIBUTION: Death Valley region, California (map 4).

RECORDS: **California:** *San Bernardino Co.:* Death Valley National Monument, Saratoga Springs, 2 Dec. 1954 (W. McDonald), ♀, ♂; 19 Feb. 1955 (R. X. Schick, W. McDonald), 2♀♀, ♂; 3 June 1975 (F. and J. S. Ennik), 2♀♀; 3 June 1975 (F. and J. S. Ennik), 5♂♂, 2♀♀; all above from abandoned mine shaft. *Inyo Co.:* Myers Ranch, east of Trona, Panamint Mts., 27–29 Apr. 1980 (F. Ennik, M. B. Madon), 6♂♂, 5♀♀ from ranch buildings.

***Loxosceles palma*, new species**

Figures 106–109, 123–128; Maps 4, 6

DIAGNOSIS: Sympatric relative of *deserta*: receptacles of epigynum (figs. 123–128) typically widely separated, with two principal angled lobes or their vestiges; embolus of male palpus (fig. 109) with small cusp near tip.

ETYMOLOGY: Specific name from Latin *palma*, palm, used in apposition, named for palm canyons of California and Baja California.

FEMALE (Deep Canyon, San Jacinto Mountain, California): Length 7.6. Carapace 2.8 long, 2.3 wide. Abdomen 5 long, 3 wide. Carapace clear yellow to pale orange, without darker pattern except for black eye tubercles. Median eyes one-third diameter in front of line along front edges of anterior lateral eyes, about their long diameter from lateral eyes (14/13).

	I	II	III	IV	Palp
Femur	5.15	5.65	4.80	5.75	1.15
Patella	1.00	1.00	1.00	1.00	0.35
Tibia	5.40	5.85	4.35	5.20	0.75
Metatarsus	5.45	6.20	5.00	6.50	—
Tarsus	<u>1.40</u>	<u>1.40</u>	<u>1.35</u>	<u>1.40</u>	<u>1.00</u>
Total	18.40	20.10	16.50	19.85	3.25

Leg formula 2413. First leg 6.5 times, first

femur 1.8 times, second leg 7.1 times, second femur twice as long as carapace.

EPIGYNUM (figs. 123–128): Receptacles narrow, widely separated, each with pair of finger-like lobes arising from about middle; one from Tahquitz Canyon, near Palm Springs, with one lobe essentially aborted; one from S Tres Enriques, Baja California Norte, with multiple fingers on lobes.

MALE HOLOTYPE: Length 6.8. Carapace 3 long, 2.5 wide. Abdomen 4 long, 2.3 wide. Coloration and structure like those of female. Median eyes about diameter from lateral eyes (15/14).

	I	II	III	IV	Palp
Femur	6.70	7.95	6.60	7.00	1.75
Patella	1.27	1.45	1.20	1.20	0.70
Tibia	8.43	9.85	6.85	7.65	1.00
Metatarsus	8.00	10.15	8.20	9.35	—
Tarsus	<u>1.70</u>	<u>1.70</u>	<u>1.35</u>	<u>1.70</u>	<u>0.60</u>
Total	26.10	31.10	24.20	26.90	4.05

Leg formula 2413. First leg 8.7 times, first femur 2.23 times, second leg 10.3 times, second femur 2.65 times as long as carapace.

MALE PALPUS (figs. 106–109): tibia twice as long as wide and deep; bulb suboval, slightly smaller than tarsus; embolus longer than bulbal width (55/33), of medium thickness at juncture of bulb, tapering evenly to thin point bearing small cusp near tip.

TYPE DATA: Male holotype from Deep Canyon, San Jacinto Mountains, 16 April 1974 (W. Icenogle), deposited in AMNH.

DISTRIBUTION: Palm canyons and similar oases of southern California and Baja California Norte (maps 4, 6).

RECORDS: **UNITED STATES:** **California:** *Riverside Co.:* West side of San Jacinto Mts.: Deep Canyon, 0.5 mi. S Pinyon Crest turn-off, 3500 ft., 16 Apr. 1974 (W. Icenogle), ♂, ♀ under rocks; east side of San Jacinto Mts., 7 June 1974 (W. Icenogle), ♂, 2♀♀. Carrizo Creek, 4 mi. W Palm Desert, 9 July 1970 (W. Icenogle), ♀ under rock. Tahquitz Canyon, W Palm Springs, 12 July 1958 (V. Roth), ♀. Andreas Canyon, S Palm Springs, 26 Apr. 1954 (M. Wasbauer), ♂; 26 Mar. 1960 (W. J. Gertsch), ♀♀, ♂. *San Diego Co.:* Borrego Springs, 11 Mar. 1958 (D. E. Merkel), ♂.

MEXICO: **Baja California Norte:** 1.6 km S Tres Enriques (E of El Rosario), 1900 ft., 8 Apr. 1969 (S. C. Williams), ♀ in CAS. 13.2

mi. S El Rosario, 29 Nov. 1962 (P. R. Craig, D. L. Dailey), ♀ in CAS.

***Loxosceles kaiba*, new species**

Figures 110–113, 133; Map 4

DIAGNOSIS: Relative of *deserta* and *palma*: receptacles of epigynum (fig. 133) with three or four long finger-like lobes; embolus of male palpus (fig. 113) long, attenuated and ended in curved hook.

ETYMOLOGY: Specific name for Kaibab Plateau on north face of Grand Canyon.

FEMALE: Length 8.4. Carapace 3.5 long, 3.2 wide. Abdomen 5.2 long, 2.8 wide. Carapace and appendages mostly clear yellow to pale orange. Median eyes slightly behind line along front edges of anterior lateral eyes and separated from them by more than long diameter (20/18).

	I	II	III	IV	Palp
Femur	7.10	7.75	6.65	7.50	1.40
Patella	1.20	1.30	1.20	1.25	0.50
Tibia	7.90	8.80	6.70	7.50	1.10
Metatarsus	7.50	8.20	7.20	9.00	—
Tarsus	1.70	1.60	1.50	1.60	1.40
Total	25.40	27.65	23.25	26.85	4.40

Leg formula 2413. First leg 7.3 times, first femur twice, second leg 7.9 times, second femur 2.2 times as long as carapace.

EPIGYNUM (fig. 133): Receptacles thin transverse pouches surmounted by three principal and one accessory finger-like lobes.

MALE HOLOTYPE: Length 7.5. Carapace 3 long, 2.28 wide. Abdomen 4.7 long, 3 wide. Median eyes touching line along front edges of anterior lateral eyes and separated from them by long diameter (17/17).

	I	II	III	IV	Palp
Femur	9.10	9.50	7.60	8.00	1.85
Patella	1.20	1.15	1.20	1.15	0.65
Tibia	9.35	11.50	7.75	8.25	1.25
Metatarsus	9.10	11.35	8.70	10.25	—
Tarsus	1.75	1.60	1.60	1.60	0.40
Total	30.50	35.10	26.85	29.25	4.15

Leg formula 2143. First leg 10.1 times, first femur 3 times, second leg 11.7 times, second femur 3.16 times as long as carapace.

MALE PALPUS (figs. 110–113): Femur about six times as long as wide (0.3/1.85); tibia about three times as long as deep (48/125); bulb

oval with thick, curved embolus longer than width of bulb (42/62); tip of embolus thin curved prong.

TYPE DATA: Male holotype, female and four immatures from Thunder Cave, 3900 feet, near Monument Point, north rim of Grand Canyon National Park, Coconino County, Arizona, 15 September 1977 (S. Peck, D. Carlile), deposited in AMNH.

DISTRIBUTION: Grand Canyon National Park, Arizona (map 4).

OTHER RECORD: **Arizona:** *Coconino Co.:* Grand Canyon National Park, Cameron Cave, 5000 ft., 7 Dec. 1954 (R. de Saussure), ♂.

***Loxosceles martha*, new species**

Figures 114–116, 129–132; Map 4

DIAGNOSIS: Sympatric relative of *deserta* known only from area east of San Jacinto Mts. of California; leg formula 4213 in both sexes; receptacles of epigynum (figs. 129–132) with small cusps on outer margins; embolus of male palpus (fig. 117) much longer than width of bulb and ending in straight spine.

ETYMOLOGY: Named for Mrs. Martha Bort.

FEMALE: Length 8.5. Carapace 3 long, 2.5 wide. Abdomen 5.7 long, 3.3 wide. Carapace quite uniform yellowish to dull orange, without darker pattern except for black eye tubercles. Median eyes about long diameter from lateral eyes (15/14).

	I	II	III	IV	Palp
Femur	4.15	4.70	4.20	5.00	1.15
Patella	1.00	1.00	1.00	1.00	0.40
Tibia	4.35	4.60	3.70	4.50	0.75
Metatarsus	4.35	4.85	4.25	5.50	—
Tarsus	1.30	1.30	1.25	1.50	1.10
Total	15.15	16.45	14.40	17.50	3.40

Leg formula 4213. First leg 5 times, first femur 1.38 times, second leg 5.4 times, second femur 1.23 times as long as carapace.

EPIGYNUM (figs. 129–132): Similar to that of *deserta* with receptacles narrowly separated at midline, single prominent lobe, and small cusps on outer margins.

MALE HOLOTYPE: Length 5.5. Carapace 2.6 long, 2.3 wide. Abdomen 3 long, 1.5 wide. Median eyes separated from lateral eyes by long diameter.

	I	II	III	IV	Palp
Femur	4.85	5.15	4.50	5.15	1.65
Patella	0.80	1.00	0.85	0.85	0.50
Tibia	5.15	5.55	4.30	4.95	1.20
Metatarsus	5.00	5.60	5.20	6.50	—
Tarsus	1.35	1.30	1.25	1.40	0.35
Total	17.15	18.60	16.10	18.85	3.70

Leg formula 4213; second and fourth legs subequal. First leg 6.6 times, first femur 1.8 times, second leg 7.1 times, second femur about twice as long as carapace.

MALE PALPUS (figs. 114–116): Tibia 2.25 times as long as broad and deep; bulb oval, as broad as tarsal length; embolus narrow at base, twice as long as bulb width, evenly narrowed to fine point.

TYPE DATA: Male holotype, two males and one female and immature from Indian Wells, Riverside County, California, April 1938 (C. and M. Bogert), deposited in AMNH.

DISTRIBUTION: Riverside County, California (map 4).

RECORDS: **California:** *Riverside Co.:* Whitewater Canyon, 20 Apr. 1960 (W. J. Gertsch, W. Ivie), 2♀. Palm Springs, 31 Mar. 1947 (B. Malkin), ♀.

THE *reclusa* GROUP IN MEXICO AND ADJACENT CENTRAL AMERICA

The first *Loxosceles* described from Mexico, *yucatanica* Chamberlin and Ivie (1938, p. 126), was based on specimens collected by A. S. Pearse from the entrances and depths of Yucatan caves. This species is now known to be widespread in various Mexican states of the Yucatan Peninsula and in some adjacent countries of Central America. In the 1958 revision Gertsch added seven additional species to the Mexican fauna, and described six more in 1973. The name of one of these, *bolivari*, based on the male holotype from Cueva García of Nuevo León, has proved to be a synonym of *devia* Gertsch and Mulaik, and the paratype female and properly associated males have been assigned to *valdosa* Gertsch.

Up to the present writing, 14 species have been described from widely separated regions of Mexico. During the last dozen years additional collections of epigeal and cavernicole *Loxosceles* have increased the number of species known from Mexico to 36. This

number illustrates the wealth in species from the 18 major biotic provinces and numerous lesser subprovinces of Mexico that harbor many unique endemic animals and plants. Some major regions appear to exhibit clusters of species but in other areas few distinct forms have been found. One must await future collecting efforts before the rich *Loxosceles* fauna of the little explored territories of Mexico will be accurately sampled.

Five species from the United States fauna (considered in detail in that section) are also native to portions of the adjacent Mexican states, as follows: *reclusa* from the central United States has two records from Tamaulipas; *devia* of southern Texas is a common species in Tamaulipas and Nuevo León; *apachea* ranges from New Mexico and Texas into Chihuahua, Zacatecas, and Durango; *palma* of the palm canyons of southern California occurs in similar habitats in Baja California Norte; and finally *deserta* of southern Arizona and California extends into Mexico only in the eastern area of Baja California Norte and perhaps into Sonora. Not surprising is the fact that no examples of *Loxosceles rufescens* or *laeta* so far have been found in Mexico. Most of our available collections have come from natural environments and not from coastal and other trade areas where such introduced taxa are likely to be imported. The appearance of these two species in such areas would not be unexpected.

There are many notable ecological enclaves within the broad physical and climatic expanse of Mexico. Two areas from the western part, limited by geographic features, can conveniently be given subgroup status to help decrease the number of ecologic groups as they relate to a much larger number of taxa. Baja California is the first and is surrounded by aquatic borders except at its northern juncture with the Californian region. No species of continental Mexico occurs within its borders. The second enclave is the arid State of Sonora bordered by the Sierra Madre Occidental on the east and the Gulf of California on the west. None of the four species found in Sonora occur in Baja California or in any adjacent area of the rest of Mexico. Each of these subgroups deserve special attention because of past nomenclatural misadventures in listing its taxa. Finally a third

subgroup comprises the remainder of Mexico and adjacent Central America with 24 species ranging from the arid northern portions down into distinctive montane, plateau and tropical areas with diverse climates.

The three subgroups are reviewed under the following headings: The *reclusa* group in Baja California; The *reclusa* group in Sonora; The *reclusa* group in other parts of Mexico and adjacent Central America (see Contents for page numbers).

THE *reclusa* GROUP IN BAJA CALIFORNIA

At present nine species of *Loxosceles* are known from Baja California but the peninsula and its insular enclaves, a region noted for rich yields of spider and scorpion taxa, have been little exploited. The total is enlarged to 10 by including the species *insula* from Clarion Island of the Islas Revillagigedo group far out in the Pacific Ocean. This island group is part of Baja California only in the political sense. This relative of and presumed derivative species of *sonora* has similar multilobed seminal receptacles but is a larger, thicker-legged species. *Loxosceles insula* joins another notable, disjunct haplogyne taxon, *Kibramoa isolata* Gertsch of the family Plectreuridae, from Guadalupe Island off the coast of Baja California.

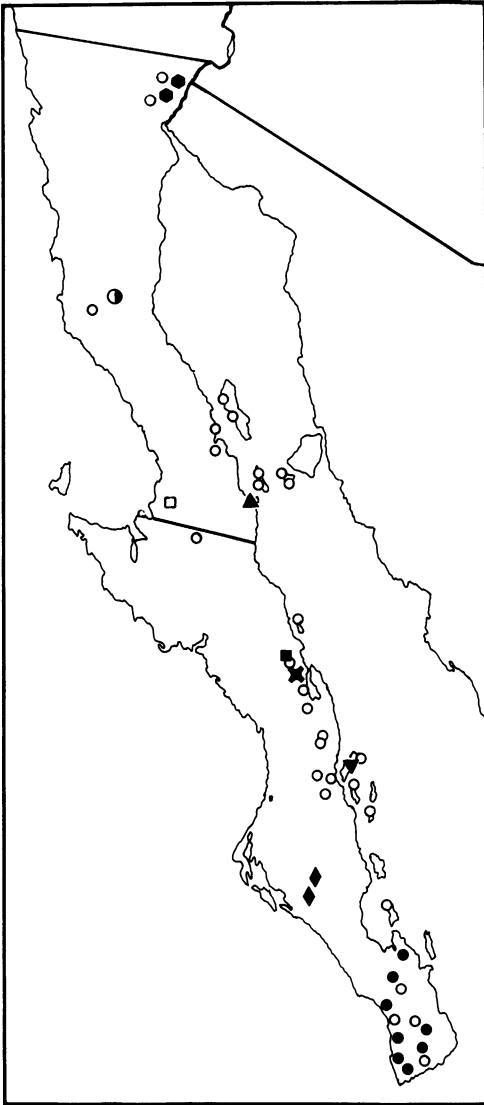
Following the conventional nomenclature of their times, Banks (1898) and later Chamberlin (1924) listed all records of *Loxosceles* from or in the vicinity of the Baja California peninsula under the name *Loxosceles rufescens* Dufour. This misunderstood, ubiquitous species has no valid records from this area. Most specimens from these citations were lost due to poor curatorial techniques or to the 1906 San Francisco earthquake and fire; these records must necessarily be disregarded in this paper. Most of the specimens still extant are immature and unsuitable for definitive study, but a few mature examples, as is indicated below, are still preserved in the Museum of Comparative Zoology. In the 1958 revision, Gertsch, without seeing any of the material, mapped and erroneously assigned these records to the taxon *unicolor* Keyserling. Accordingly, these records under this now abandoned name are disregarded. The material now available consists of recent

collections from various areas of the peninsula but the most distinctive species come from the southern part.

The species *deserta* and *palma* occur occasionally in Baja California Norte and are considered extensions of the fauna of southern California. Only basic information is offered for these species inasmuch as they are fully covered in the section dealing with *Loxosceles* of the United States.

KEY TO SPECIES OF BAJA CALIFORNIA

1. Females 2
Males 10
2. Receptacle of epigynum (fig. 186) with five principal lobes; Clarion Island, Islas Revillagigedo *insula*, new species
Receptacles with less than five principal lobes 3
3. Receptacle (fig. 163) with three lobes; southern Baja California Norte
..... *manuela*, new species
Receptacle with one or two principal lobes 4
4. Receptacle (figs. 123–128) with two lobes; southern California and Baja California Norte *palma*, new species
Receptacle with one principal lobe 5
5. Receptacles (figs. 160–161) widely separated by twice or more basal width; Baja California Sur *baja*, new species
Receptacles not so widely separated 6
6. Receptacles broad sacs wider than length of lobes 7
Receptacles (fig. 162) conical, much shorter than lobes; Santa Rosalia, Baja California Sur *barbara*, new species
7. Lobe of receptacle (figs. 72–86) projecting mostly forward; Mojave and Sonoran deserts of southwest and Baja California Norte *deserta* Gertsch
Lobe of receptacle thinner, inclined toward midline 8
8. Lobe of receptacle (fig. 164) coiled; Mulegé, Baja California Sur
..... *mulege*, new species
Lobe of receptacle not much coiled 9
9. Receptacle (fig. 159) with small spurs on outer side; Isla del Carmen, Baja California Sur *carmena*, new species
Receptacle (figs. 157–158) lobed, without such outer spurs; Baja California Sur
..... *rothi*, new species
10. Embolus of palpus (figs. 106–109) with small cusp at apex; palm canyons of southern Cal-



MAP 6. Baja California and adjacent areas, showing distributions of *Loxosceles deserta* (hexagonal), *L. palma* (half-filled circles), *L. manuela* (open square), *L. francisca* (filled, upright triangle), *L. mulege* (filled square), *L. barbara* (cross), *L. carmena* (filled, inverted triangle), *L. rothi* (diamonds), *L. baja* (filled circles), and *L. immatures* (open circles).

ifornia and adjacent Baja California Norte

..... *palma*, new species
 Embolus without such cusp at apex 11

11. Embolus (figs. 53–58) thickened, grooved at apex; Mojave and Sonoran deserts of southwest and adjacent Baja California Norte *deserta* Gertsch

- Embolus evenly attenuated to fine spine ... 12
 Tibia of palpus (figs. 142–145) two and one-half times as long as wide; San Francisco Bay, just north of Baja California Sur line *francisca*, new species
 Tibia of palpus about twice as long as deep 13
 13. Embolus of palpus (figs. 138–141) straight, about as long as bulbal width *baja*, new species
 Embolus (figs. 134–137) slightly curved, longer than bulbal width ... *rothi*, new species

***Loxosceles baja*, new species**

Figures 138–141, 160–161; Map 6

DIAGNOSIS: Small species with legs of medium length (first leg of female 4.1 times; of male 5.6 times as long as carapace); receptacles of epigynum (figs. 160–161) widely separated; male palpus (fig. 141) with shorter embolus.

ETYMOLOGY: Specific name for Spanish *baja*, low, under, vernacular name for Lower or Baja California.

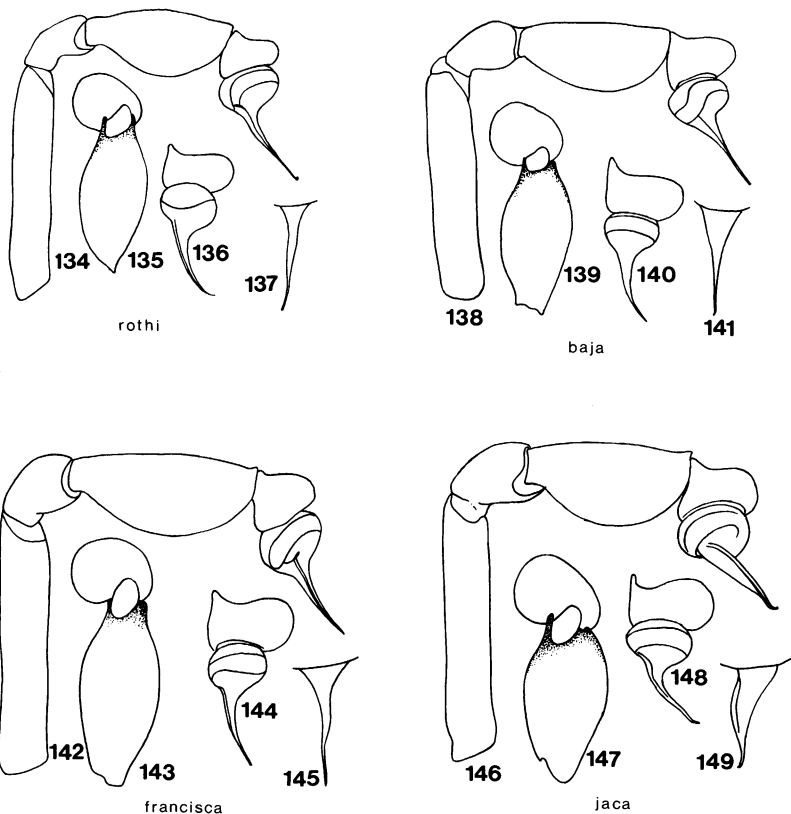
FEMALE HOLOTYPE: Length 6.95. Carapace 2.7 long, 2.25 wide. Abdomen 4.2 long, 2.7 wide. Cephalothorax and appendages yellow to orange. Carapace with distinct dusky maculation on pars cephalica and dusky marginal bands on sides of pars thoracica. Abdomen whitish. Anterior median eyes less than diameter from anterior lateral eyes (13/17).

	I	II	III	IV	Palp
Femur	3.20	3.40	3.05	3.45	0.85
Patella	0.80	0.85	0.80	0.80	0.35
Tibia	3.10	3.25	2.50	3.10	0.60
Metatarsus	3.05	3.40	3.00	3.75	—
Tarsus	0.95	0.95	0.85	0.95	0.80
Total	11.10	11.85	10.20	12.05	2.60

Leg formula 4213. First leg 4.1 times, first femur about 1.2 times, second leg 4.4 times, second femur twice as long as carapace.

EPIGYNUM (figs. 160–161): Receptacles widely separated, each with small rounded angle on outside and large lobe arising near inner side.

MALE (E of La Paz): Length 5.5. Carapace 2.5 long, 2.2 wide. Abdomen 3 long, 1.8 wide. Coloration and structure like those of female; legs longer and thinner with second pair longer than fourth.



FIGS. 134–137. *Loxosceles rothi*, new species (W Mission San Luis Gonzaga, Baja California Sur), right male palpus. 134. Retrolateral view. 135. Tibia and tarsus, dorsal view. 136. Tarsus and bulb, apical view. 137. Embolus, prolateral view.

FIGS. 138–141. *Loxosceles baja*, new species (Todos Santos, Baja California Sur), right male palpus. 138. Retrolateral view. 139. Tibia and tarsus, dorsal view. 140. Tarsus and bulb, apical view. 141. Embolus, prolateral view.

FIGS. 142–145. *Loxosceles francisca*, new species (San Francisquito Bay, Baja California Norte), right male palpus. 142. Retrolateral view. 143. Tibia and tarsus, dorsal view. 144. Tarsus and bulb, apical view. 145. Embolus, prolateral view.

FIGS. 146–149. *Loxosceles jaca*, new species (Jacala, Hidalgo), right male palpus. 146. Retrolateral view. 147. Tibia and tarsus, dorsal view. 148. Tarsus and bulb, apical view. 149. Embolus, subprolateral view.

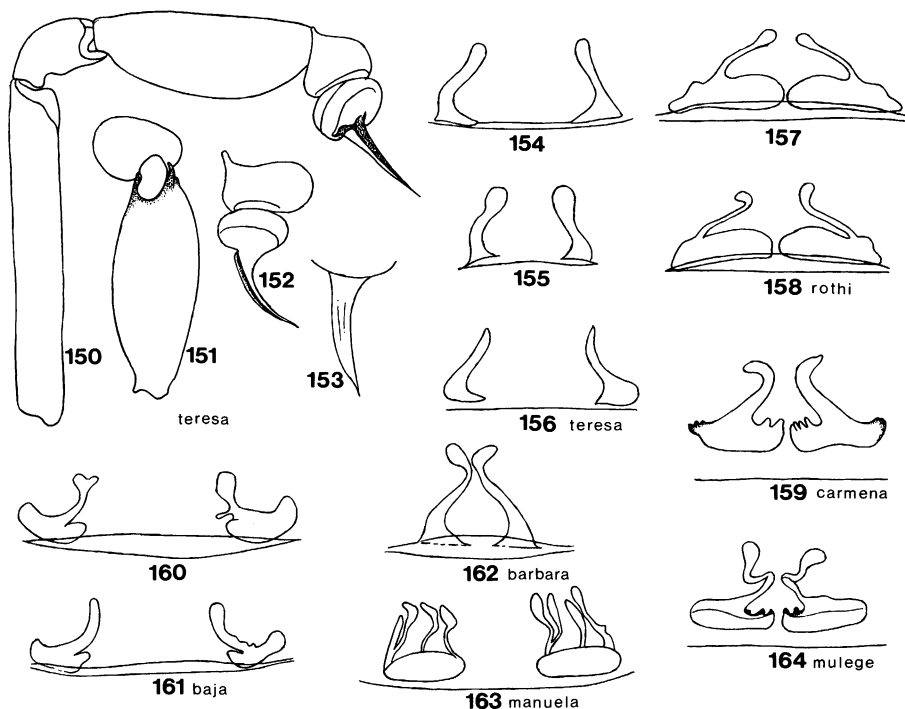
	I	II	III	IV	Palp
Femur	4.20	4.50	3.80	4.20	1.25
Patella	0.85	0.90	0.85	0.85	0.45
Tibia	4.45	4.90	3.50	4.05	0.85
Metatarsus	4.35	5.05	4.05	4.95	—
Tarsus	1.05	1.10	0.90	1.05	0.40
Total	14.90	16.45	13.10	15.10	2.95

Leg formula 2413. First leg 6 times, first femur 1.7 times, second leg 6.6 times, second femur 1.8 times as long as carapace.

MALE PALPUS (figs. 138–141): Tibia 2.4 times as long as wide, and 2.1 times as long as deep; bulb suboval, about as large as tarsus; embolus slightly longer than bulbal width (33/31), thick at juncture to bulb and drawn to thin point.

TYPE DATA: Female holotype from La Paz, Baja California Sur, 1–3 February 1965 (V. Roth), deposited in AMNH.

RECORDS: MEXICO: Baja California Sur: E of La Paz, 8 Sept. 1963 (P. R. and D. L.



FIGS. 150–153. *Loxosceles teresa*, new species (14 km. S Matamoros, Tamaulipas), left male palpus. 150. Retrolateral view. 151. Tibia and tarsus, dorsal view. 152. Tarsus and bulb, apical view. 153. Embolus, prolateral view.

FIGS. 154–156. *Loxosceles teresa*, new species, epigyna (10 mi. S Matamoros, Tamaulipas).

FIGS. 157–158. *Loxosceles rothi*, new species, epigyna. Baja California Sur: 157. E Mission San Luis Gonzaga. 158. Mulegé.

FIG. 159. *Loxosceles carmena*, new species, epigynum (Isla del Carmen, Baja California Sur).

FIGS. 160–161. *Loxosceles baja*, new species, epigyna. Baja California Sur: 160. La Ribera. 161. San José Del Cabo.

FIG. 162. *Loxosceles barbara*, new species, epigynum (4 mi. S Santa Rosalia, Baja California Sur).

FIG. 163. *Loxosceles manuella*, new species, epigynum (34 mi. N Manuela, Baja California Norte).

FIG. 164. *Loxosceles mulege*, new species, epigynum (Mulegé, Baja California Sur).

Craig, W. Hill, B. Illanes, 4♀♀ (CAS). La Paz, 1–3 Feb. 1965 (V. Roth), ♂, ♀. 40 mi. S La Paz (5 mi. S San Antonio), 31 Dec. 1976 (C. E. Griswold, L. S. Vincent), ♂ (UCB). 17 mi. N San José del Cabo, 9 Feb. 1966 (V. Roth), ♂, 2♀♀. 12 mi. NE Cabo San Lucas, 7 Feb. 1966 (V. Roth), 2♂♂ in palm oasis. Boca de la Sierra, near Miraflores, 10 Feb. 1966 (V. Roth), ♀, ♂. El Triunfo, S La Paz, 3 Feb. 1965 (V. Roth), 4♀♀, ♂. 30 mi. W El Triunfo, 11 Feb. 1966 (V. Roth), ♂. La Ribera, 10 Feb. 1966 (V. Roth), ♂, ♀. Hondo Arroyo, 17 mi. N Todos Santos, 4 Feb. 1966 (V. Roth), 4♂♂, 4♀♀. 22 km. N Todos Santos, 31 July 1974 (R. M. Haradon, W. E. Savory, V. F. Lee),

4♂♂. 5.9 mi. N Todos Santos, 24 July 1968 (S. Williams, Fox, Bentzien), ♂ under dead vegetation (UCB). 4 km. N Colonia Calles, 25 July 1974 (R. M. Haradon, W. E. Savory, V. F. Lee), ♂ (CAS). 12 km. W Santiago, Rancho Mata Gordo, 18 Dec. 1977 (L. S. Vincent, C. E. Griswold), ♀ (UCB).

Loxosceles rothi, new species

Figures 134–137, 157–158; Map 6

DIAGNOSIS: Small species similar to *baja*: receptacles of epigynum (figs. 157–158) nearly touching at midline; embolus of male palpus (fig. 137) longer and thinner.

ETYMOLOGY: Named for Vincent Roth who has collected much of the Baja California material for this paper.

FEMALE HOLOTYPE: Length 7.75. Carapace 2.75 long, 2.3 wide. Abdomen 5 long, 3.3 wide.

Clypeus 0.32 long, equal to two diameters of median eye; eyes subequal, of medium size, about 0.13 in long diameter; median eyes situated immediately in front of line along anterior median eyes and about long diameter from anterior lateral eyes (15/13).

	I	II	III	IV	Palp
Femur	3.75	3.95	3.60	4.00	0.80
Patella	0.85	0.85	0.80	0.85	0.60
Tibia	3.75	4.15	3.00	3.75	0.70
Metatarsus	3.90	4.25	3.65	4.65	—
Tarsus	1.15	1.20	1.00	1.20	0.80
Total	13.40	14.40	12.05	14.45	2.90

Leg formula 4213. Second and fourth legs subequal in length. First leg 4.85 times, first femur 1.36 times, second leg about 5 times, second femur about 1.43 times as long as carapace.

EPIGYNUM (figs. 157–158): Receptacles nearly touching at midline, each with trivial rounded angle on outside and single long, apically enlarged lobe arising from near middle.

MALE: Length 5. Carapace 2.55 long, 2.25 wide. Abdomen 2.7 long, 1.7 wide.

Coloration like that of female except for brighter reddish brown leg segments beyond femur. Anterior median eyes separated by narrow diameter from anterior lateral eyes (13/14).

	I	II	III	IV	Palp
Femur	5.50	5.85	4.85	5.60	1.17
Patella	0.85	1.00	0.85	0.95	0.40
Tibia	5.90	6.70	4.70	5.20	0.73
Metatarsus	6.15	6.90	5.75	7.10	—
Tarsus	1.35	1.35	1.10	1.30	0.28
Total	19.75	21.80	17.25	20.15	2.58

Leg formula 2413. First leg 7.7 times, first femur about 2.1 times, second leg 8.5 times, second femur about 2.3 times as long as carapace.

MALE PALPUS (figs. 134–137): Tibia twice as long as thick; oval bulb with embolus longer than bulbal width (42/30) and tip of embolus evenly drawn to tiny blunt point.

TYPE DATA: Female holotype, from 5 mi. W Mission San Luis Gonzaga, Baja California Sur, Mexico, 14 February 1966 (V. Roth), deposited in AMNH.

DISTRIBUTION: Baja California Sur (map 6).

RECORDS: MEXICO: **Baja California Sur:** 5 mi. W Mission San Luis Gonzaga, 14 Feb. 1966 (V. Roth), ♂, ♀. 4 mi. W El Refugio, 13 Feb. 1966 (V. Roth), ♀. 25 mi. S Loreto, 2 Jan. 1977 (L. S. Vincent, C. E. Griswold), ♀ (UCB).

***Loxosceles mulege*, new species**

Figure 164; Map 6

DIAGNOSIS: Small unmarked species with short legs (first pair only 4.4 times as long as carapace): receptacles of epigynum (fig. 164) nearly touching at midline, each with long lobe arising near outer side and directed toward midline. Male unknown.

ETYMOLOGY: Specific name for Mulegé, used in apposition.

FEMALE HOLOTYPE: Length 5.9. Carapace 2.4 long, 1.9 wide. Abdomen 3.5 long, 2.2 wide.

Cephalothorax and appendages bright orange, unmarked except for conspicuous black eye tubercles. Abdomen whitish. Anterior median eyes situated immediately in front of line along front edges of lateral eyes, nearly touching, and each median eye separated by about diameter from lateral eyes (13/13).

	I	II	III	IV	Palp
Femur	3.00	3.25	2.90	3.20	0.80
Patella	0.70	0.70	0.70	0.70	0.30
Tibia	3.00	3.50	2.70	3.20	0.55
Metatarsus	2.90	3.40	3.00	3.70	—
Tarsus	1.10	1.15	0.85	1.10	0.80
Total	10.70	12.00	10.15	11.90	2.45

Leg formula 2413. First leg 4.4 times, first femur about 1.2 times, second leg 5 times, second femur about 1.3 times as long as carapace.

EPIGYNUM (fig. 164): Receptacles slightly separated at midline, each rounded at outside and with single long, apically enlarged, coiled lobe arising from inner side of pouch.

TYPE DATA: Female holotype and immature male from Mulegé, Baja California Sur, 26 January 1965 (V. Roth), deposited in AMNH.

DISTRIBUTION: Baja California Sur (map 6).

Loxosceles barbara, new species

Figure 162; Map 6

DIAGNOSIS: Small species with legs of average length (first leg 5.1 times as long as carapace); receptacle of epigynum (fig. 162) with single, curved or coiled lobe projecting forward. Male unknown.

ETYMOLOGY: Named for Ms. Barbara Roth, collector of many Mexican spiders.

FEMALE HOLOTYPE: Length 8.5. Carapace 3.5 long, 2.8 wide. Abdomen 5 long, 3 wide. Carapace and appendages bright orange brown; pars cephalica slightly reddish brown. Abdomen grayish. Anterior median eyes about radius in front of line along front edges of anterior lateral eyes and separated from them by slightly more than long diameter (10/8).

	I	II	III	IV	Palp
Femur	5.00	5.70	5.00	5.50	1.10
Patella	1.00	1.00	1.00	1.00	0.30
Tibia	5.25	5.20	4.50	5.00	0.70
Metatarsus	5.00	5.50	5.00	5.50	—
Tarsus	1.30	1.25	1.10	1.25	1.15
Total	17.55	18.65	16.60	18.25	3.25

Leg formula 2413. First leg 5.1 times, first femur 1.4 times, second leg 5.3 times, second femur 1.6 times as long as carapace.

EPIGYNUM (fig. 162): Basally narrow receptacles moderately separated at midline, each projecting forward as slender, curved or coiled lobe enlarged at apex.

TYPE DATA: Female holotype, three females and four immatures from 4 mi. S Santa Rosalia, Baja California Sur, Mexico, 8 January 1982 (V. and B. Roth), from among fine soil-boulders, deposited in AMNH.

DISTRIBUTION: Baja California Sur (map 6).

Loxosceles carmena, new species

Figure 159; Map 6

DIAGNOSIS: Insular species similar to *mulege* of adjacent mainland, with longer legs (first leg about five times as long as carapace); epigynum with receptacles (fig. 159) stouter at base and with trivial apical enlargements. Male unknown.

ETYMOLOGY: Specific name based on Isla del Carmen, a Carmelite order.

FEMALE HOLOTYPE: Length 6.5. Carapace 2.8 long, 2.3 wide. Abdomen 3.5 long, 2 wide.

Whole spider tinted reddish brown by poor preservation. Eyes narrowly ringed with black and pars cephalica with traces of darker shading. Anterior median eyes situated about radius in front of line along front edges of anterior lateral eyes, more than diameter from lateral eyes (20/14).

	I	II	III	IV	Palp
Femur	3.75	4.00	3.70	4.20	1.00
Patella	1.00	0.95	0.85	1.00	0.65
Tibia	4.00	4.35	3.50	4.10	0.70
Metatarsus	3.65	3.85	3.85	4.65	—
Tarsus	1.20	1.20	0.95	1.20	1.00
Total	13.60	14.35	12.85	15.15	3.35

Leg formula 4213. First leg about 4.8 times, first femur 1.3 times, second leg 5.1 times, second femur 1.4 times as long as carapace.

EPIGYNUM (fig. 159): Like that of *mulege* with receptacles close together at midline, each toothed at inner and outer angles, with finger-like lobes stout at base, directed inward.

TYPE DATA: Female holotype and immature male from Isla del Carmen, Gulf of California, Baja California Sur, 21 May 1921 (J. C. Chamberlin), deposited in MCZ.

DISTRIBUTION: Baja California Sur (map 6).

Loxosceles manuela, new species

Figure 163; Map 6

DIAGNOSIS: Small species with legs of average length (first leg 5.3 times as long as carapace); receptacle of epigynum (fig. 163) with three apically enlarged lobes. Male unknown.

ETYMOLOGY: Specific name from type locality, *Manuela*, a girl's name.

FEMALE HOLOTYPE: Length 8. Carapace 3.5 long, 3 wide. Abdomen 4.5 long, 3 wide. Carapace and appendages bright orange brown; pars cephalica with slight duskiness. Abdomen grayish. Anterior median eyes touching line along front edges of anterior lateral eyes and separated from them by less than long diameter (5/7).

	I	II	III	IV	Palp
Femur	5.25	5.50	5.00	5.50	1.15
Patella	1.00	1.00	1.00	1.00	0.50
Tibia	5.50	5.80	4.50	5.30	0.85
Metatarsus	5.25	4.90	5.00	6.25	—
Tarsus	1.70	1.70	1.40	1.40	1.15
Total	18.70	18.90	16.90	19.45	3.65

Leg formula 4213. First leg 5.3 times, first femur 1.5 times, second leg 5.4 times, second femur 1.6 times as long as carapace.

EPIGYNUM (fig. 163): Suboval receptacles separated by about width, each bearing three slender, apically enlarged lobes.

TYPE DATA: Female holotype from 34 mi. N Manuela, Baja California Norte, Mexico, 22 June 1968 (S. C. Williams), deposited in CAS.

DISTRIBUTION: Baja California Norte (map 6).

RECORD: **Baja California Norte:** 13.2 mi. S El Rosario, 29 Nov. 1962 (P. R. Craig and D. L. Dailey), ♀.

***Loxosceles francisca*, new species**

Figures 142–145; Map 6

DIAGNOSIS: Relative of *baja*: male palpus (figs. 142–145) with tibia two and one-half times as long as deep and embolus proportionally longer. Female unknown.

ETYMOLOGY: Specific name from Spanish *Francisco*, a Franciscan, in reference to type locality.

MALE HOLOTYPE: Length 5.85. Carapace 2.85 long, 2.5 wide. Abdomen 3 long, 1.6 wide. Spider tinted reddish brown by poor preservation; pars cephalica darker brown and eye tubercles black. Anterior median eyes less than full diameter from anterior lateral eyes (13/15).

	I	II	III	IV	Palp
Femur	—	5.00	4.50	4.60	1.50
Patella	—	—	0.90	1.00	0.52
Tibia	—	3.90	4.00	4.35	1.00
Metatarsus	—	4.30	4.50	5.60	—
Tarsus	—	0.85	1.00	1.20	0.85
Total	—	—	14.90	16.75	3.87

Front legs mostly missing; fourth leg about 6 times, fourth femur 1.6 times as long as carapace.

MALE PALPUS (figs. 142–145): Femur about 5 times as long as wide (150/29); tibia two and one-half times as long as deep (10/4); embolus slightly longer than bulbal width.

TYPE DATA: Male holotype from San Francisco Bay, north of Sur line in Baja California Norte, Mexico, 2 May 1921 (J. C. Chamberlin), deposited in MCZ.

DISTRIBUTION: Baja California Norte (map 6).

***Loxosceles insula*, new species**

Figure 186

DIAGNOSIS: Large brownish species from Clarion Island, presumed derivative of *sonora*, with second leg longer than fourth and multiple lobes of epigynum (fig. 186) more robust. Male unknown.

ETYMOLOGY: Specific name from Latin *insula*, island, used in apposition.

FEMALE HOLOTYPE: Length 10.6. Carapace 4.6 long, 3.8 wide. Abdomen 6 long, 3.5 wide. Cephalothorax and appendages dusky orange. Carapace with pars cephalica dark reddish brown and faint brownish shadings along sides of pars thoracica. Abdomen grayish. Anterior median eyes slightly in front of line along front edges of lateral eyes and each median eye separated by more than diameter from side eyes (26/20).

	I	II	III	IV	Palp
Femur	6.00	6.65	5.80	6.30	1.60
Patella	1.35	1.50	1.40	1.40	0.55
Tibia	6.30	6.80	5.20	5.80	1.20
Metatarsus	6.15	6.75	5.65	7.00	—
Tarsus	1.65	1.65	1.20	1.65	1.60
Total	21.45	23.35	19.25	22.15	4.95

Leg formula 2413. First leg 4.6 times, first femur 1.3 times, second leg 5 times, second femur 1.4 times as long as carapace.

EPIGYNUM (fig. 186): Narrow receptacles along full width of base from which arise 10 finger-like lobes, outer one on each side shorter.

TYPE DATA: Female holotype from Clarion Island, Islas Revillagigedo, Baja California Sur, 7–8 May 1955 (W. McDonald, Blodgett), deposited in AMNH.

DISTRIBUTION: Known only from Clarion Island (not mapped).

***Loxosceles deserta* Gertsch**

Figures 53–58, 72–86; Map 3

Loxosceles deserta Gertsch, 1973, p. 159.

DISTRIBUTION: Baja California Norte: See Map 3.

INFORMATION DATA: The species *deserta* and *palma* occur sparingly in Baja California Norte as extensions of the fauna of southern California. For fuller synonymies, type localities, diagnoses, keys, descriptive information of males and females, and locality

records, see section on the *reclusa* group in the United States.

Loxosceles palma, new species
 Figures 106–109, 123–138; Map 4

DISTRIBUTION: Baja California Norte: See Map 4.

THE *reclusa* GROUP IN SONORA

The State of Sonora, Mexico is an ecologic enclave bordered on the east by the Sierra Madre Occidental and on the west by the Gulf of California. Four distinctive species, all of them pale, long-legged relatives of the *deserta* subgroup, are exclusively limited to this arid region of Mexico. A few immature specimens, probably belonging to *sonora*, have been collected in the northern part of adjacent Sinaloa but their taxonomic assignment is arbitrary. A single dusky species, *colima*, occurs much farther south and is representative of the taxa of tropical Mexico. No examples of the Arizona species *deserta*, *arizonica*, or *apachea* have been collected in adjacent Sonora, but this may be the result of incomplete collecting. Various distribution records assigned to *arizonica* in the 1958 revision of Gertsch were based erroneously on some of the Sonoran taxa. Their assignment to the proper species has been indicated in the distribution records of the four species concerned in this section.

The most distinctive female of the Sonora taxa is the species *sonora* which has multi-lobed seminal receptacles. The males have palpi without important deviations from the standard *deserta* pattern.

KEY TO SPECIES OF SONORA

1. Females 2
 Males 5
2. Receptacle of epigynum with single principal lobe 3
 Receptacle with two or more principal lobes 4
3. Lobes of receptacles (figs. 187–190) straight fingers; northern Sonora ... *coyote*, new species
 Lobes (figs. 194–195) slightly curved apically; Coastal Sonora *seri*, new species
4. Receptacle (figs. 191–193) with two or three principal lobes; Alamos region
 *alamosa*, new species

- Receptacle (figs. 181–185) with five principal lobes; central and southern Sonora
 *sonora*, new species
5. Tibia of male palpus three times as long as wide; embolus (fig. 176) basally thickened, attenuated to thin spine; northern Sonora
 *coyote*, new species
- Tibia at most two and one-half times as long as wide 6
6. Embolus (fig. 172) about as long as bulbal width, with small enlargement near apex; Alamos region *alamosa*, new species
 Embolus longer than width of bulb 7
7. Embolus (fig. 168) thin, curved at apex; central and southern Sonora ... *sonora*, new species
 Embolus (fig. 180) thicker, widened to near apex; coast of Sonora *seri*, new species

Loxosceles sonora, new species
 Figures 165–168, 181–185; Map 7

Loxosceles arizonica Gertsch, 1958, p. 13, fig. 90; part: Sonora records.

DIAGNOSIS: Allopatric relative of *deserta*; narrow transverse receptacles of epigynum (figs. 181–185) with series of finger-like lobes; embolus of male palpus (fig. 167) thin, longer than width of bulb.

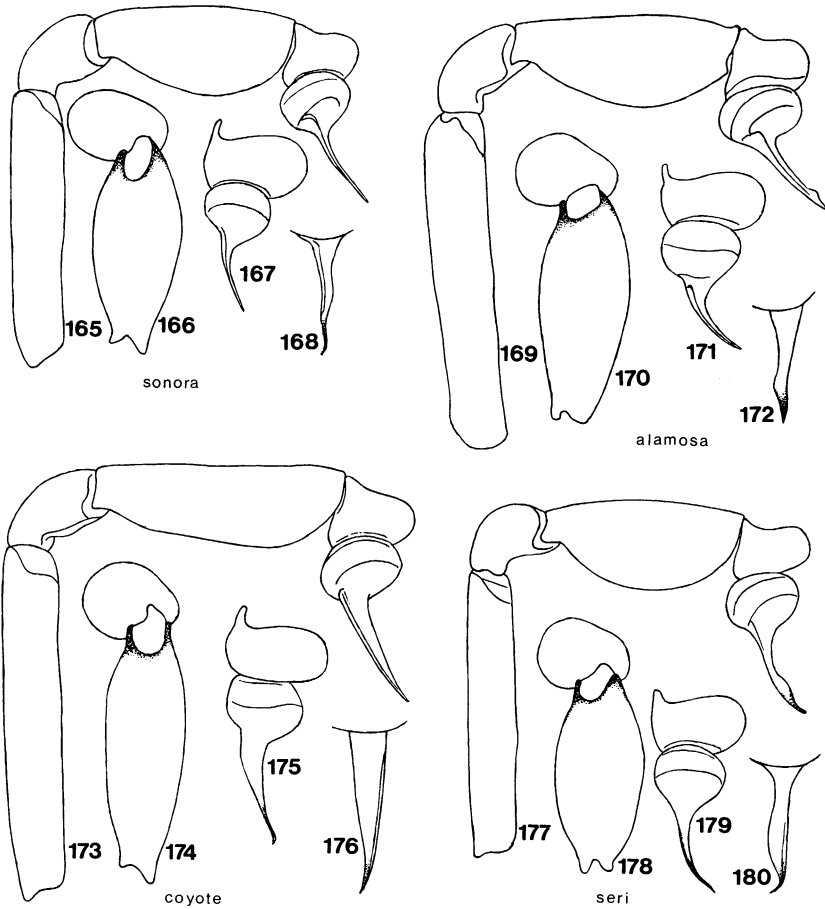
ETYMOLOGY: Specific name for Mexican state of Sonora, used in apposition.

FEMALE (30 mi. N Navajoa): Length 6.6. Carapace 3 long, 2.7 wide. Abdomen 4 long, 2.5 wide. Carapace dull orange, with dusky pars cephalica and faint dusky marginal spots on sides of pars thoracica. Clypeus 0.35 long, about twice as long as median eye; eyes subequal in size, about 0.18 in long diameter; median eyes nearly touching line along front edges of anterior lateral eyes and one diameter from anterior lateral eye.

	I	II	III	IV	Palp
Femur	3.75	4.00	3.60	3.90	1.15
Patella	1.00	1.10	0.90	1.10	0.50
Tibia	3.50	3.70	2.85	2.50	0.75
Metatarsus	3.50	3.80	3.00	4.20	—
Tarsus	1.15	1.10	1.00	1.10	1.00
Total	12.90	13.70	11.35	12.80	3.40

Leg formula 2143. First leg 4.3 times, first femur 1.25 times, second leg 3.56 times, second femur 1.33 times as long as carapace.

EPIGYNUM (figs. 181–185): Two narrow



FIGS. 165-168. *Loxosceles sonora*, new species (30 mi. N Navojoa, Sonora), right male palpus. 165. Retrolateral view. 166. Tibia and tarsus, dorsal view. 167. Tarsus and bulb, apical view. 168. Embolus, prolateral view.

FIGS. 169-172. *Loxosceles alamosa*, new species (10 mi. W Alamos, Sonora), right male palpus. 169. Retrolateral view. 170. Tibia and tarsus, dorsal view. 171. Tarsus and bulb, apical view. 172. Embolus, prolateral view.

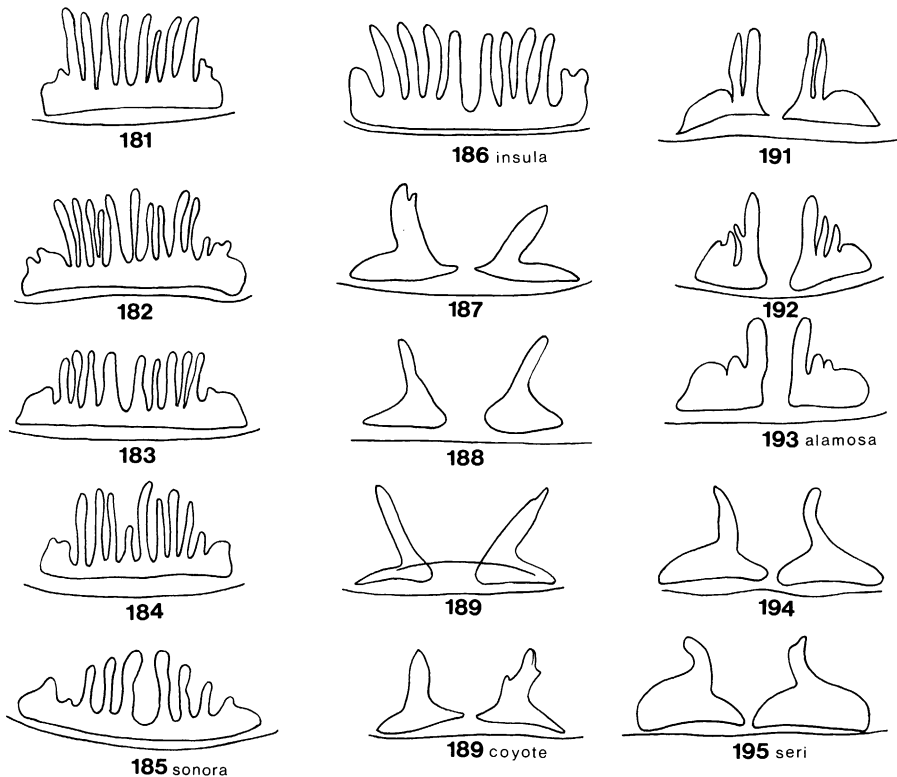
FIGS. 173-176. *Loxosceles coyote*, new species (El Coyote, Sonora), right male palpus. 173. Retrolateral view. 174. Tibia and tarsus, dorsal view. 175. Tarsus and bulb, apical view. 176. Embolus, prolateral view.

FIGS. 177-180. *Loxosceles seri*, new species (El Desemboque, Sonora), right male palpus. 177. Retrolateral view. 178. Tibia and tarsus, dorsal view. 179. Tarsus and bulb, apical view. 180. Embolus, prolateral view.

transverse receptacles confluent or connate at midline and each surmounted by four or five finger-like lobes.

MALE HOLOTYPE: Length 6.8. Carapace 3 long, 2.7 wide. Abdomen 4 long, 2.3 wide. Coloration and eye relations like those of female.

	I	II	III	IV	Palp
Femur	4.80	5.25	4.50	5.00	1.50
Patella	1.10	1.10	1.00	1.10	0.52
Tibia	5.15	6.00	4.00	4.75	1.00
Metatarsus	5.00	6.00	4.75	5.70	—
Tarsus	1.35	1.35	1.10	1.35	0.32
Total	17.40	19.70	15.35	17.90	3.34



FIGS. 181–185. *Loxosceles sonora*, new species, epigyna. Sonora: 181. 30 mi. N Navojoa. 182. 10 mi. W Navojoa. 183–185. 10 mi. W Alamos.

FIG. 186. *Loxosceles insula*, new species, epigynum (Clarion Island, Revillagigedo Islands).

FIGS. 187–190. *Loxosceles coyote*, new species, epigyna. Sonora: 187. El Coyote. 188–189. Rancho Los Banos. 190. Pulpito Mts., 70 mi. SW Agua Prieta.

FIGS. 191–193. *Loxosceles alamosa*, new species, epigyna. Sonora: 191–192. E side Sierra Alamos. 193. 10 mi. W Alamos.

FIGS. 194–195. *Loxosceles seri*, new species, epigyna. Sonora: 194. S Punta Tepoca. 195. 10 mi. E El Desemboque.

Leg formula 2413. First leg 5.8 times, first femur 1.6 times, second leg 6.56 times, second femur 1.75 times as long as carapace.

MALE PALPUS (figs. 181–185): Femur about five times as long as wide (150/28); tibia little more than twice as long as wide (100/45); oval bulb with thin, slightly curved embolus slightly longer than width of bulb.

TYPE DATA: Male holotype from 30 mi. N Navajoa, Sonora, Mexico, 5 February 1965 (V. Roth), deposited in AMNH.

DISTRIBUTION: Sonora and adjacent Sinaloa (map 7).

RECORDS: MEXICO: Sonora: 15 mi. S Her-

mosillo, 19 May 1963 (W. J. Gertsch, W. Ivie), 300. 45 mi. N Guaymas, 24 July 1964 (W. J. Gertsch, J. Woods), 300. San Carlos Bay, N Guaymas, 16 Aug. 1962 (J. A. Beatty), ♂; 1 Apr. 1965 (W. Shear), ♀, ○. 25 km. SW Navojoa, 22 Aug. 1954 (R. E. Ryckman, C. P. Christianson, D. Spencer), ♀. 50 mi. S Navajoa, 24 Aug. 1965 (W. J. Gertsch, R. Hastings), 300. 20 mi. N Hermosillo, 13 Sept. 1966 (J. and W. Ivie), 200. Guaymas, 3 Apr. 1964 (W. Shear), ♀, ○ under rocks on hillside. 10 mi. W Alamos, 19 July 1954 (W. J. Gertsch), 2♀♀, ○. Sinaloa: 12 mi. SE Guasave, 28 July 1967 (R. E. Leech), ♀. 6 mi. S Culia-

cán, 22 July 1954 (W. J. Gertsch), 200. 1 mi. to Hwy., 15 on Piaxtla River, 20–29 July 1957 (R. E. Leech), o.

***Loxosceles seri*, new species**
 Figures 177–180, 194–195; Map 7

Loxosceles arizonica Gertsch, 1958, p. 13; part: El Desemboque records.

DIAGNOSIS: Long-legged coastal species of Sonora: receptacles of epigynum (figs. 194–195) with single slightly curved lobe arising from near middle; embolus of male palpus (fig. 180) longer than width of bulb and enlarged in apical half.

ETYMOLOGY: Specific name for Seri Indians of coastal Sonora, used in apposition.

FEMALE (Campo Dolar, S Punta Tepoca): Length 5.7. Carapace 2.4 long, 2.2 wide. Abdomen 3.5 long, 2.5 wide. Coloration quite uniform golden yellow with duskiness outlining pars cephalica and median suture. Abdomen whitish. Anterior median eyes about diameter from anterior lateral eyes (14/16).

	I	II	III	IV	Palp
Femur	3.50	3.75	3.30	3.75	0.85
Patella	0.75	0.75	0.70	0.80	0.35
Tibia	3.70	3.75	3.00	3.50	0.65
Metatarsus	3.65	4.10	3.75	4.65	—
Tarsus	1.25	1.30	1.20	1.30	0.80
Total	12.85	13.65	11.95	14.00	2.65

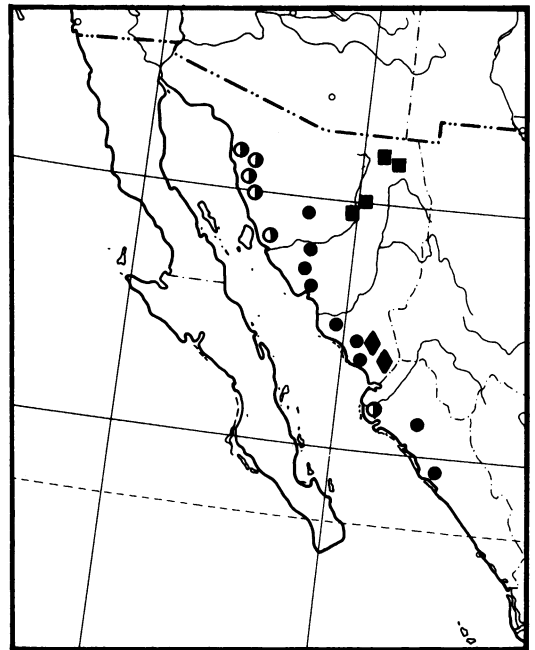
Leg formula 4213. First leg 5.3 times, first femur 1.4 times, second leg 5.7 times, second femur 1.5 times as long as carapace.

EPIGYNUM (figs. 194–195): Receptacle subtriangular with single prominent lobe projecting from near middle.

MALE HOLOTYPE: Length 5.8. Carapace 2.7 long, 2.3 wide. Abdomen 3.25 long, 1.7 wide. Coloration and structure like those of female.

	I	II	III	IV	Palp
Femur	5.65	6.15	5.25	5.75	1.45
Patella	1.00	1.10	1.00	1.00	0.45
Tibia	6.20	6.75	5.20	5.80	0.92
Metatarsus	6.50	7.25	6.50	7.80	—
Tarsus	1.60	1.60	1.35	1.65	0.35
Total	20.95	22.85	19.30	22.00	3.17

Leg formula 2413. First leg 7.7 times, first



MAP 7. Northwestern Mexico, showing distributions of Sonoran species of *Loxosceles*: *L. coyote* (squares), *L. seri* (half-filled circles), *L. alamosa* (diamonds), and *L. sonora* (filled circles).

femur 2.1 times, second leg 8.4 times, second femur 2.6 times as long as carapace.

MALE PALPUS (figs. 177–180): Femur about five times as long as wide (145/26); tibia twice as long as wide (92/45); oval bulb with quite thick embolus slightly enlarged in apical half and produced to thin spur, longer than width of bulb (45/35).

TYPE DATA: Male holotype from El Desemboque, Sonora, Mexico, 1–10 September 1953 (B. Malkin), deposited in AMNH.

DISTRIBUTION: Coastal Sonora and Sinaloa (map 7).

RECORDS: MEXICO: Sonora: Puerto Kino, Dec. 1963 (W. Eberhard), ♂ (MCZ). Estero de Sargente, 25 km. S El Desemboque, 11 Aug. 1953 (B. Malkin), o. 11 mi. N El Desemboque, 25 Feb. 1970 (V. and B. Roth), ♀. Campo Dolar, S Punta Tepoca, 26 Feb. 1970 (V. and B. Roth), 2♂♂, 2♀♀, o. **Sinaloa:** Topolobampo, coast near Los Mochis, 24 Nov. 1968 (J. Reddell), o from rocky hillside, probably this species.

Loxosceles alamosa, new species

Figures 169–172, 191–193; Map 7

Loxosceles arizonica Gertsch, 1958, p. 13; part: Alamos record.

DIAGNOSIS: Relative of *sonora*: receptacles of epigynum (figs. 191–193) moderately separated, each with principal lobe flanked by one or two lesser lobes; embolus of male palpus (fig. 172) thickened in apical half and as long as width of bulb.

ETYMOLOGY: Specific name from Spanish *alamos*, poplars, and the type locality.

FEMALE (E side of Sierra de Alamos): Length 10. Carapace 3.7 long, 3.1 wide. Abdomen 6.5 long, 3.5 wide. Carapace yellowish with pars cephalica and median groove brown and pairs of pars thoracica with broad lobed or dentate brown marginal band. Anterior median eyes about long diameter from anterior lateral eyes (20/18).

	I	II	III	IV	Palp
Femur	5.20	5.65	5.10	5.50	1.25
Patella	1.25	1.25	1.15	1.20	0.50
Tibia	5.60	5.75	4.50	5.25	0.95
Metatarsus	5.35	5.85	5.15	6.30	—
Tarsus	1.40	1.45	1.20	1.45	1.15
Total	18.80	19.95	17.10	19.70	3.85

Leg formula 2143. First leg 5 times, first femur 1.4 times, second leg 5.4 times, second femur 1.5 times as long as carapace.

EPIGYNUM (figs. 191–193): Receptacles moderately separated, each with long finger-like lobe arising from inner edge and this flanked by one or more smaller lobes (in *sonora* receptacles confluent and several lobes subequal in length).

MALE HOLOTYPE: Length 7.7. Carapace 3.5 long, 3 wide. Abdomen 4.3 long, 2.5 wide. Dark pattern of male less strongly marked. Anterior median eyes separated by less than full diameter from anterior lateral eyes (15/18).

	I	II	III	IV	Palp
Femur	7.10	7.80	5.40	6.80	1.63
Patella	1.30	1.35	1.20	1.25	0.58
Tibia	8.20	9.00	6.15	6.65	1.03
Metatarsus	7.60	8.70	6.75	8.10	—
Tarsus	1.70	1.65	1.35	1.50	0.38
Total	25.90	28.50	20.85	24.30	3.62

Leg formula 2143. First leg 7.4 times, first femur 2 times, second leg 8.1 times, second femur 2.2 times as long as carapace.

MALE PALPUS (figs. 169–172): Femur about five times as long as wide (163/30); tibia more than twice as long as broad (103/46); oval bulb with stout embolus as long as width of bulb, thicker in apical half and then narrowed to small spur.

TYPE DATA: Male holotype from 10 mi. W Alamos, Sonora, Mexico, 18 July 1954 (W. J. Gertsch), deposited in AMNH.

DISTRIBUTION: Alamos region of Sonora (map 7).

RECORDS: MEXICO: **Sonora:** Sierra de Alamos: 10 mi. W Alamos, 18 July 1954 (W. J. Gertsch), 3♀, ♂; Alamos, Jan. (V. Roth), ♂; E side of Sierra de Alamos, 12 Nov. 1972 (V. Roth), 2♀, ♂; N side of Sierra de Alamos, 2000 m., 13 Nov. 1972 (V. Roth), ♀.

Loxosceles coyote, new species

Figures 173–176, 187–190; Map 7

DIAGNOSIS: Long-legged relative of *deserta*: receptacle of epigynum (figs. 187–190) subtriangular, with thin elevated lobe; embolus of male palpus (fig. 176) thick, essentially straight, tapered to small hook.

ETYMOLOGY: Specific name from Mexican *coyote*, a small wolf, in reference to type locality, used in apposition.

FEMALE (El Coyote): Length 7.7. Carapace 3.6 long, 3 wide. Abdomen 4.5 long, 2.5 wide. Carapace dull orange with faint dusky markings outlining pars cephalica and faint dusky spots along side margins. Abdomen gray. Anterior median eyes less than full diameter from anterior lateral eyes (16/20).

	I	II	III	IV	Palp
Femur	4.50	4.80	4.30	4.75	1.20
Patella	1.00	1.10	1.00	1.00	0.35
Tibia	4.65	4.80	3.75	4.60	0.85
Metatarsus	4.65	5.00	4.40	5.65	—
Tarsus	1.35	1.35	1.20	1.35	1.10
Total	16.15	17.05	14.65	17.35	3.50

Leg formula 4213. First leg 4.26 times, first femur 1.25 times, second leg 4.7 times, second femur 1.3 times as long as carapace.

EPIGYNUM (figs. 187–190): Small receptacles moderately separated at midline, each

with thin projecting lobe about as long as width of receptacle.

MALE HOLOTYPE: Length 7.7. Carapace 3.6 long, 3 wide. Abdomen 4.3 long, 2.3 wide. Coloration and eye relations like those of female.

	I	II	III	IV	Palp
Femur	6.25	7.00	6.00	6.25	1.80
Patella	1.30	1.30	1.15	1.15	0.58
Tibia	7.15	8.00	5.75	6.25	1.22
Metatarsus	7.20	8.20	6.75	8.10	—
Tarsus	1.50	1.60	1.35	1.50	0.40
Total	23.40	26.10	21.00	23.25	4.00

Leg formula 2143. First leg 6.5 times, first femur 1.7 times, second leg 7.2 times, second femur 1.9 times as long as carapace.

MALE PALPUS (figs. 173–176): Femur six times as long as wide (180/28); tibia three times as long as wide (122/40); embolus longer than width of bulb, thick at base, nearly straight, evenly tapered to trivial apical hook.

TYPE DATA: Male holotype from El Coyote, 48 mi. NE Moctezuma, Sonora, Mexico, 25 July 1960 (J. A. Beatty), deposited in AMNH courtesy of Dr. Beatty.

DISTRIBUTION: Northern Sonora (map 7).

RECORDS: MEXICO: **Sonora:** El Coyote, 8 mi. NE Moctezuma, 22 July 1960 (J. A. Beatty), ♀; 25 July 1960 (J. A. Beatty), ♀. Rancho Los Banos, 9 May 1966 (V. Roth), 2♀♀, ♂; 21 Apr. 1967 (V. Roth), ♀. Pulpito Mts., 70 mi. SE Agua Prieta, 27 June 1972 (G. Dingerkus), 2♂♂, ♀.

THE *reclusa* GROUP IN OTHER PARTS OF MEXICO AND ADJACENT CENTRAL AMERICA

The wide geographic area of this subgroup is habitat for all the previously known species of Mexico recorded by Gertsch (1958, 1973), for some additional new ones described herein, and for the three species that occur in adjacent Central America. All these taxa conform fully in standard morphological and genitalic features to those of the *reclusa* group and few can be singled out for special comment because of unusual characters. *Loxosceles tehuana* of the Tehuantepec Biotic province is notable for the long thin embolus of the male palpus and the fine tubular lobes

of the epigynum of the females. The males of *misteca* have the emboli notably thickened but in this feature they are nearly matched by some other taxa. Some species difficult of explicit identification in one sex have genital characters in the other that emphasize the specific rank of the pair. In general, females are as easy or even easier to identify as are the males. Many of these spiders were collected from cave habitats but none of them show more than trivial cave adaptation; all are ranked at most as troglophiles. None of the Mexican species has gained a reputation for their venomous properties, in contrast to *arizonica*, *reclusa*, and *deserta* of the United States. This is in spite of the fact that *Loxosceles* spiders are abundant over most of Mexico and often live in close proximity to man (see additional comments in Medical Section). Only brief basic information is offered at the end of this section for those species that extend into Mexico from the United States since all are fully described in the section examining the *reclusa* group in the United States.

The following keys to the species are based largely on genitalic features of both sexes and geographic distribution.

KEY TO FEMALES

1. Species of Mexico 2
Species of Central America 23
2. Receptacles of epigynum (figs. 288–290) narrow linear trough confluent at midline, surmounted by slender tubes with apical bulbous enlargement; Oaxaca and Chiapas *tehuana* Gertsch
Receptacles suboval or linear pouches discretely separated at midline 3
3. Receptacles moderately or widely separated by one-half to three times basal width ... 4
Receptacles subcontiguous at midline, separated at most by one-fifth of basal width 15
4. Receptacles moderately separated by one-third to one-half basal width 5
Receptacles widely separated by one to three times basal width 6
5. Lobes of receptacles (figs. 291–292) prominent, forwardly directed, longer than basal width of receptacle; western Mexico: Nayarit to Colima *colima* Gertsch
Lobes of receptacles much shorter 8

6. Principal lobe (figs. 36–41) near inner side and lesser lobes on outside; two records from Tamaulipas . . . *reclusa* Gertsch and Mulaik
Principal lobe at middle of receptacle . . . 7
7. Principal lobe (figs. 260–263) coiled, flanked by variable accessory lobes; Guerrero and Mexico . . . *misteca* Gertsch
Principal lobe (figs. 220–222) straight, flanked by rounded or triangular lobes on each side; Hidalgo . . . *nahuana* Gertsch
8. Receptacles separated by basal width . . . 9
Receptacles separated by two or three times basal width . . . 13
9. Receptacles (figs. 281–285) with two subequal, forwardly directed lobes; Yucatan Peninsula . . . *yucatanana* Chamberlin and Ivie
Receptacles with one principal lobe . . . 10
10. Lobes of receptacles prominent, curved, inwardly directed . . . 11
Lobes of receptacles straight . . . 12
11. Lobes of receptacles (figs. 42–46) thick; S Texas, Tamaulipas, Nuevo Leon . . .
. . . *devia* Gertsch and Mulaik
Lobes of receptacles (figs. 48–51) thinner, longer; Guerrero and Puebla . . .
. . . *zapoteca* Gertsch
12. Principal lobe (fig. 223) with small black spur at apex and rounded accessory lobe at base; western San Luis Potosí . . .
. . . *huasteca*, new species
Principal lobe (figs. 248–251) long pointed finger at middle; Veracruz and Oaxaca . . .
. . . *chinateca*, new species
13. Receptacles (figs. 154–156) with single straight lobe; Tamaulipas . . . *teresa*, new species
Receptacles with curved, inwardly pointed lobes . . . 14
14. Receptacles (fig. 47) subtriangular, separated by three times basal width; inwardly pointed lobe flanked by small finger on outside; Durango and Coahuila . . . *aurea* Gertsch
Receptacles (fig. 52) narrowly suboval, separated by twice basal width, with single, curved, apically enlarged lobe, Gruta Sur de San Bartolo, Nuevo León . . .
. . . *luteola* Gertsch
15. Principal lobes coiled toward midline . . 16
Principal lobes essentially straight . . . 20
16. Principal lobes (figs. 218–219) with apical bulbous enlargement and triangular lobes on outer side; Oaxaca . . . *tlacolula*, new species
Principal lobes without apical bulbous enlargement . . . 17
17. Receptacles of epigynum (fig. 257) subquad-rangular; Sotano de Dos Aranas Grandes, Queretaro . . . *aranaea* Gertsch
Receptacles suboval . . . 18
18. Principal lobes of receptacles (figs. 240–243) little enlarged at apex; Guerrero, Puebla and Morelos . . . *boneti* Gertsch
Principal lobes enlarged at apex . . . 19
19. First leg 5.8 times, first femur 1.6 times as long as carapace; Hidalgo . . .
. . . *tenango* Gertsch
First leg 4.2 times, first femur 1.17 times as long as carapace; Hidalgo . . .
. . . *jaca*, new species
20. Principal lobes of receptacles (figs. 244–247) pointed at apex; typically with many trivial adventitious lobes; Tamaulipas and San Luis Potosí . . . *valdosa* Gertsch
Principal lobes enlarged at apex . . . 21
21. Principal lobes near middle of receptacles . . . 22
Principal lobes (figs. 92–96) on inner side of receptacles; Chihuahuan Desert of United States and Mexican States of Chihuahua, Zacatecas, and Durango . . .
. . . *apachea*, new species
22. Receptacles of epigynum (figs. 216–217) sub-oval, with trivial enlargement on outer side; Nuevo León . . . *candela*, new species
Receptacles (figs. 212–215) suboval, without lateral enlargements; Coahuila . . .
. . . *belli* Gertsch
23. Receptacles (figs. 293–294) with single forwardly directed lobe and series of cusps along outside margins; Costa Rica . . .
. . . *rica*, new species
Receptacles with two or three lobes . . . 24
24. Receptacles (figs. 281–285) widely separated, with two subequal, forwardly directed lobes; Yucatan Peninsula to Belize and Guatemala . . . *yucatanana* Chamberlin and Ivie
Receptacles (figs. 286–287) with three dissimilar lobes; Guatemala . . .
. . . *guatemala* Gertsch

KEY TO MALES

1. Species of Central America; tibia of palpus (figs. 264–265) 2.1 times as long as deep; Belize and Guatemala . . .
. . . *yucatanana* Chamberlin and Ivie
Species of Mexico . . . 2
2. Tibia of palpus twice or more times (2.0 to 2.4) as long as deep . . . 3
Tibia of palpus less than twice (1.5 to 1.9) as long as deep . . . 11
3. Species of northeastern states of Tamaulipas, Nuevo León, Coahuila, and San Luis Potosí . . . 4
Not so . . . 8

4. Tibia of palpus slightly longer than twice tibial depth (2.1); embolus (figs. 196–199) essentially straight, little longer than width of bulb; Coahuila *belli* Gertsch
Tibia of palpus clearly longer than twice tibial depth (2.25 to 2.4) 5
5. Embolus (figs. 24, 26) as long as width of bulb (40/40); Coahuila and adjacent Durango *aurea* Gertsch
Embolus clearly longer than width of bulb 6
6. Embolus (figs. 234–235) thick, curved; tibia of palpus 2.25 times longer than depth; caves of San Luis Potosí and Tamaulipas *valdosa* Gertsch
Embolus thinner, straighter; tibia of palpus 2.4 times as long as depth 7
7. Embolus (figs. 152–153) 1.3 times as long as width of bulb (46/36); S of Matamoros, Tamaulipas *teresa*, new species
Embolus (figs. 200, 202) 1.4 times as long as width of bulb, with small spur near tip; 70 mi. S Valles, San Luis Potosí *huasteca*, new species
8. Species of Yucatan Peninsula and adjacent Central American countries; tibia of palpus (figs. 264, 265) 2.1 times as long as deep; thin embolus slightly longer than width of bulb (40/35) *yucatanana* Chamberlin and Ivie
Not so 9
9. Species of southwestern states of Nayarit, Jalisco, and Colima; tibia of palpus twice as long as deep; embolus (figs. 224, 226) as long as width of bulb (40/40) *colima* Gertsch
Not so 10
10. Embolus (figs. 268, 270) heavy, drawn to small apical spur; tibia of palpus more than twice as long as deep (120/50); Guerrero, and Mexico *misteca* Gertsch
Embolus of different form 12
11. Tibia of palpus more than twice as long as deep (2.25 times); embolus (figs. 24, 26) as long as width of bulb (40/40); Durango, adjacent Coahuila *aurea* Gertsch
Tibia of palpus twice as long as deep; embolus (figs. 32, 34) slightly longer than width of bulb (45/40); Puebla and Guerrero *zapoteca* Gertsch
12. Species of northeastern states of Tamaulipas, Nuevo León, Coahuila and San Luis Potosí 13
Not so 15
13. Embolus of variable thickness, gradually attenuated to thin spine at apex 14
Embolus (figs. 208, 211) widely notched in apical third; Nuevo León *candela*, new species
14. Embolus (figs. 20, 22) much longer than width of bulb; common species of United States; two records from Tamaulipas *reclusa* Gertsch and Mulaik
Embolus (figs. 28, 30, 31) thicker, about as long as width of bulb; southern Texas to Tamaulipas and Nuevo León *devia* Gertsch and Mulaik
15. Species of State of Hidalgo 16
Not so 18
16. Embolus (figs. 204, 206, 207) thin in basal two-thirds, with wide notch in apical third *nahuana* Gertsch
Not so 17
17. Embolus (figs. 273, 275) as long as width of bulb (40/40); tibia of palpus (fig. 274) 1.9 times as long as deep; cavernicole and epigeal records *tenango* Gertsch
Embolus (figs. 146, 148) slightly longer than width of bulb (45/33) .. *jaca*, new species
18. Embolus (figs. 277, 278) thin, nearly twice as long as width of bulb; tibia of palpus three-fourths as deep as long; Oaxaca, Chiapas *tehuana* Gertsch
Embolus shorter 19
19. Species of Chihuahuan Desert of United States and Mexican states of Chihuahua, Zacatecas, and Durango; palpus (figs. 64–67) *apachea*, new species
Not so 20
20. Embolus longer than width of bulb (52/40); species of plateau states of Puebla, Guerrero, Morelos *boneti* Gertsch
Embolus as long as width of bulb (40/40); Oaxaca, Chiapas .. *chinateca*, new species
- Loxosceles zapoteca* Gertsch
Figures 32–35, 48–51; Map 10
- Loxosceles zapoteca* Gertsch, 1958, p. 28, figs. 36–38, 95.
- DIAGNOSIS: Long-legged species (first leg of female 5.4 times, of male 7.9 times as long as carapace); receptacles of epigynum (figs. 48–51); tibia of male palpus (figs. 32–33) twice as long as deep.
- FEMALE: Length 10. Carapace 4 long, 3.3 wide. Abdomen 6.6 long, 3.3 wide. Carapace yellowish to dusky, with dark pattern of *boneti* and *colima* often faintly evident in both sexes. Median eyes separated from anterior lateral eyes by about long diameter (22/20).

	I	II	III	IV	Palp
Femur	6.00	7.10	5.70	6.50	1.60
Patella	1.35	1.40	1.25	1.30	0.50
Tibia	6.35	7.00	5.15	6.25	1.25
Metatarsus	6.40	7.20	6.00	7.60	—
Tarsus	1.50	1.60	1.30	1.50	1.50
Total	21.60	24.30	19.40	23.15	4.85

Leg formula 2413. First leg 5.4 times, first femur 1.5 times, second leg 6 times, second femur 1.77 times as long as carapace.

EPIGYNUM (figs. 48–51): Narrow transverse receptacles separated by about their basal width, each with thin tubular lobe inclined toward inner side.

MALE HOLOTYPE: Length 7.7. Carapace 3.7 long, 3.1 wide. Abdomen 4.6 long, 2.3 wide. Coloration and structure like those of female. Median eyes separated from anterior lateral eyes by about long diameter (20/19).

	I	II	III	IV	Palp
Femur	7.70	8.75	7.10	7.35	1.80
Patella	1.40	1.50	1.35	1.50	0.55
Tibia	9.00	10.10	6.80	7.65	1.00
Metatarsus	8.50	11.80	8.25	9.70	—
Tarsus	1.75	1.85	1.50	1.70	0.45
Total	28.35	34.00	25.00	27.90	3.80

Leg formula 2143. First leg 7.6 times, first femur 2 times, second leg 9 times, second femur 2.3 times as long as carapace.

MALE PALPUS (figs. 32–35): Femur six times as long as broad; tibia twice as long as deep (10/5); bulb globose, with thin curved embolus slightly longer than bulbal width (45/40).

TYPE DATA: Male holotype from 38 mi. S Iguala, Guerrero, Mexico, 29 July 1956 (V. Roth, W. J. Gertsch), from shallow mine, in AMNH.

DISTRIBUTION: States of Guerrero and Puebla, Mexico (map 10).

RECORDS: MEXICO: **Guerrero**: 38 mi. S Iguala, 29 July 1956 (V. Roth, W. J. Gertsch), ♀♀ and ♂♂ from shallow mine. Cocula, 6 Feb. 1945 (C. Bolivar, D. Pelaez), 2♀♀. Iguala, 19 June 1936 (A. M. and L. I. Davis), ♂. **Puebla**: Acatlán, 24–27 Sept. 1946 (H. Wagner), ♀.

Loxosceles aurea Gertsch

Figures 24–27, 47; Map 8

Loxosceles aurea Gertsch, 1973, p. 159, fig. 36.

DIAGNOSIS: Pale yellow, unmarked species with long legs (first leg about 7 times as long

as carapace); receptacles of epigynum (fig. 47) widely separated by three times basal width; male palpus with thin embolus (figs. 26–27) as long as width of bulb.

FEMALE HOLOTYPE: Length 7.8. Carapace 3.2 long, 2.85 wide. Abdomen 5 long, 2.5 wide. Base color of entire spider golden yellow to orange except as follows: carapace with or without faint Y-shaped brownish marking; eyes narrowly ringed with black; abdomen whitish with yellow cast. Clypeus 0.37 long, equal to two diameters of median eyes; eyes subequal, about 0.16 in long diameter; median eyes just in front of line along edges of anterior lateral eyes and separated from them by slightly more than diameter (21/16).

	I	II	III	IV	Palp
Femur	6.35	7.20	5.70	6.70	1.20
Patella	1.10	1.20	1.10	1.20	0.35
Tibia	6.80	7.70	5.75	6.65	1.00
Metatarsus	6.30	7.65	6.25	7.60	—
Tarsus	1.50	1.60	1.25	1.60	1.20
Total	22.05	25.35	20.05	23.75	3.75

Leg formula 2413. First leg 6.9 times, first femur 2 times, second leg 7.9 times, second femur 2.2 times as long as carapace.

EPIGYNUM (fig. 47): Similar to that of *devia*: receptacles narrower at base, with curved tubular lobe and lesser one inside, widely separated by three times basal width.

MALE: Length 6.1. Carapace 2.75 long, 2.5 wide. Abdomen 3.35 long, 1.7 wide. Coloration like that of female.

	I	II	III	IV	Palp
Femur	5.50	6.15	5.20	5.90	1.30
Patella	1.00	1.10	0.90	1.00	0.50
Tibia	6.00	6.50	4.70	5.50	0.85
Metatarsus	5.70	6.50	5.70	7.20	—
Tarsus	1.50	1.35	1.25	1.50	0.35
Total	19.70	21.60	17.75	21.10	3.00

Leg formula 2413. First leg 7.1 times, first femur twice, second leg 7.8 times, second femur 2.2 times as long as carapace.

MALE PALPUS (figs. 24–27): Femur about five times as long as wide; tibia more than twice as long as wide or deep (9/4); embolus slightly curved, as long as width of bulb.

TYPE DATA: Female holotype from Cueva del Guano, 23 km. S Gómez Palacio, Durango, Mexico, 24 February 1966 (J. Reddell, W. Bell), in AMNH.

DISTRIBUTION: Durango and Coahuila (map 8).

RECORDS: MEXICO: **Durango:** Cueva del Guano, 23 km. S Gómez Palacio, 24 Feb. 1966 (J. Reddell, W. Bell), ♀, penultimate ♂, 200; 16–17 June 1972 (J. Reddell, W. Elliott, E. Alexander, C. Kunath), 2♀♀ from guano-covered breakdown. **Coahuila:** 75 km. SW Cuatro Ciénegas de Carranza, 18 July 1965 (J. Reddell, J. Fish), ♂, ○.

Loxosceles luteola Gertsch
Figure 52; Map 8

Loxosceles luteola Gertsch, 1973, p. 160, fig. 31.

DIAGNOSIS: Pale yellow, largely unmarked species similar to *aurea*, with shorter legs and distinctive epigynum (fig. 52). Male unknown.

FEMALE HOLOTYPE: Length 6.2. Carapace 2.7 long, 2.3 wide. Abdomen 3.5 long, 1.7 wide. Base color of cephalothorax and appendages yellow to orange; carapace with faint traces of Y-shaped marking; eyes narrowly ringed with black; abdomen whitish. Median eyes separated from anterior lateral eyes by slightly more than long diameter (16/13).

	I	II	III	IV	Palp
Femur	4.85	5.65	4.65	5.00	1.00
Patella	1.00	1.00	0.90	0.95	0.30
Tibia	5.40	6.00	4.25	4.95	0.75
Metatarsus	5.00	6.10	4.75	5.85	—
Tarsus	1.20	1.25	1.15	1.15	1.00
Total	17.45	20.00	15.70	17.90	3.05

Leg formula 2413. First leg 6.4 times, first femur 1.8 times, second leg 7.4 times, second femur 2.1 times as long as carapace.

EPIGYNUM (fig. 52): Receptacles low, separated by twice basal width, each with single curved, apically enlarged lobe.

TYPE DATA: Female holotype from Gruta Sur de San Bartolo, 11 km. SSE Santa Catalina, Nuevo León, Mexico, 3 December 1966 (T. Raines), in AMNH.

DISTRIBUTION: Known only from above specimen (map 8).

Loxosceles teresa, new species
Figures 150–156; Map 8

DIAGNOSIS: Pale species of eastern Tamaulipas: receptacles of epigynum (figs. 154–156) slender, lobes projecting forward; male palpus (figs. 150–153) with tibia more than twice as long as deep, and thin curved embolus longer than bulbal width.

ETYMOLOGY: Specific name from Spanish *Teresa*, a girl's name, also from Santa Teresa near type locality.

FEMALE (14 km. S Matamoros): Length 8.5. Carapace 3.5 long, 2.85 wide. Abdomen 5 long, 2.5 wide. Carapace orange with faint duskiness outlining pars cephalica and indistinct smudges along sides of pars thoracica. Anterior median eyes slightly in advance of line along front edges of anterior lateral eyes and more than long diameter from lateral eyes (20/15).

	I	II	III	IV	Palp
Femur	4.85	5.10	4.50	5.00	1.25
Patella	1.10	1.10	1.00	1.10	0.45
Tibia	5.30	5.40	4.00	4.65	0.85
Metatarsus	4.70	5.30	4.40	5.50	—
Tarsus	1.30	1.30	1.25	1.35	1.20
Total	17.25	18.20	15.15	17.60	3.75

Leg formula 2413. First leg about 5 times, first femur 1.4 times, second leg 5.2 times, second femur 1.45 times as long as carapace.

EPIGYNUM (figs. 154–156): Receptacles slender, narrowly subtriangular at base and widely separated at midline, each forming tubular, inwardly pointing lobe.

MALE HOLOTYPE: Length 6.6. Carapace 3.15 long, 2.85 wide. Coloration and general structure like those of female.

	I	II	III	IV	Palp
Femur	5.80	6.30	5.20	5.65	1.85
Patella	1.15	1.15	1.10	1.10	0.50
Tibia	7.15	7.50	4.80	5.50	1.20
Metatarsus	6.10	7.00	5.70	6.70	—
Tarsus	1.50	1.35	1.30	1.35	0.30
Total	21.70	23.30	18.10	20.30	3.85

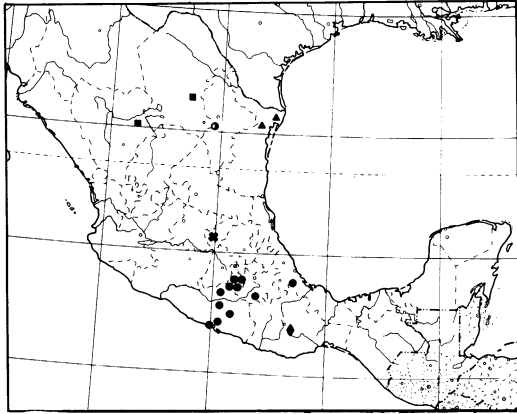
Leg formula 2143. First leg 6.9 times, first femur 1.8 times, fourth leg 7.4 times, fourth femur twice as long as carapace.

MALE PALPUS (figs. 150–153): Femur about six times as long as wide (185/31); tibia two and one-half times as long as deep (120/45); bulb suboval with thin curved embolus thickest at base, curved to fine point, longer than bulbal width (46/36).

TYPE DATA: Male holotype from Km. 14, Hwy. 101, about 10 mi. S Matamoros, Tamaulipas, 22 February 1973 (W. Graham), in AMNH.

DISTRIBUTION: Northeastern Tamaulipas (map 8).

RECORDS: MEXICO: **Tamaulipas:** 10 mi.



MAP 8. Mexico and adjacent areas, showing distributions of *Loxosceles tlacolula* (diamond), *L. luteola* (half-filled circle), *L. aurea* (squares), *L. teresa* (triangles), *L. boneti* (filled circles), and *L. aranea* (cross).

S Matamoros, 22 Feb. 1973 (W. Graham, T. R. Mollhagen, C. Connelly), 4♀♀. Km. 92 and Km. 93, 22 Feb. 1973 (T. R. Mollhagen, W. Graham), 3♂♂.

Loxosceles belli Gertsch

Figures 196–199, 212–215; Map 5

Loxosceles belli Gertsch, 1973, p. 141, figs. 37–38.

DIAGNOSIS: Species of Coahuila: receptacles of epigynum (figs. 212–215) with single quite massive lobe projecting forward; palpus of male (figs. 196–199) with tibia about twice as long as deep, weakly curved embolus slightly longer than bulbal width.

FEMALE (Cueva de Las Ánimas): Length 7.7. Carapace 3.2 long, 2.5 wide. Abdomen 4.5 long, 2.5 wide. Carapace yellowish with dusky Y-shaped marking on pars cephalica and median groove and with faint duskiness along side margins of pars thoracica. Median eyes separated from anterior lateral eyes by slightly more than long diameter (20/17).

	I	II	III	IV	Palp
Femur	4.50	4.75	4.20	4.85	1.25
Patella	1.10	1.10	1.00	1.10	0.50
Tibia	4.50	4.90	3.70	4.50	0.80
Metatarsus	4.50	5.00	4.40	5.60	—
Tarsus	1.35	1.30	1.20	1.35	1.20
Total	15.95	17.05	14.50	17.40	3.75

Leg formula 4213. First leg 5 times, first femur 1.4 times, second leg 5.3 times, second femur 1.5 times as long as carapace.

EPIGYNUM (figs. 212–215): Receptacles subtriangular, subcontiguous at midline, each with single, elongated, apically enlarged lobe at middle.

MALE HOLOTYPE: Length 6.1. Carapace 3.1 long, 2.7 wide. Abdomen 3 long, 1.5 wide. Coloration and general structure like those of female.

	I	II	III	IV	Palp
Femur	6.00	6.50	5.50	6.00	1.40
Patella	1.25	1.25	1.15	1.15	0.53
Tibia	7.00	7.75	5.35	6.15	0.90
Metatarsus	6.70	7.85	6.50	7.70	—
Tarsus	1.50	1.60	1.25	1.50	0.40
Total	22.45	24.95	19.75	22.50	3.23

Leg formula 2413. First leg 7.2 times, first femur 1.9 times, second leg 8 times, second femur 2.1 times as long as carapace.

MALE PALPUS (figs. 196–199): Femur 6.4 times as long as wide (160/25); tibia about twice as long as deep (90/43); bulb suboval with essentially straight embolus of medium thickness, drawn to fine point in apical fourth, slightly longer than width of bulb (42/40).

TYPE DATA: Male holotype from Cueva de Las Ánimas, 56 km. E Monclova, Coahuila, 21 February 1966 (W. Bell, J. H. Reddell), in AMNH.

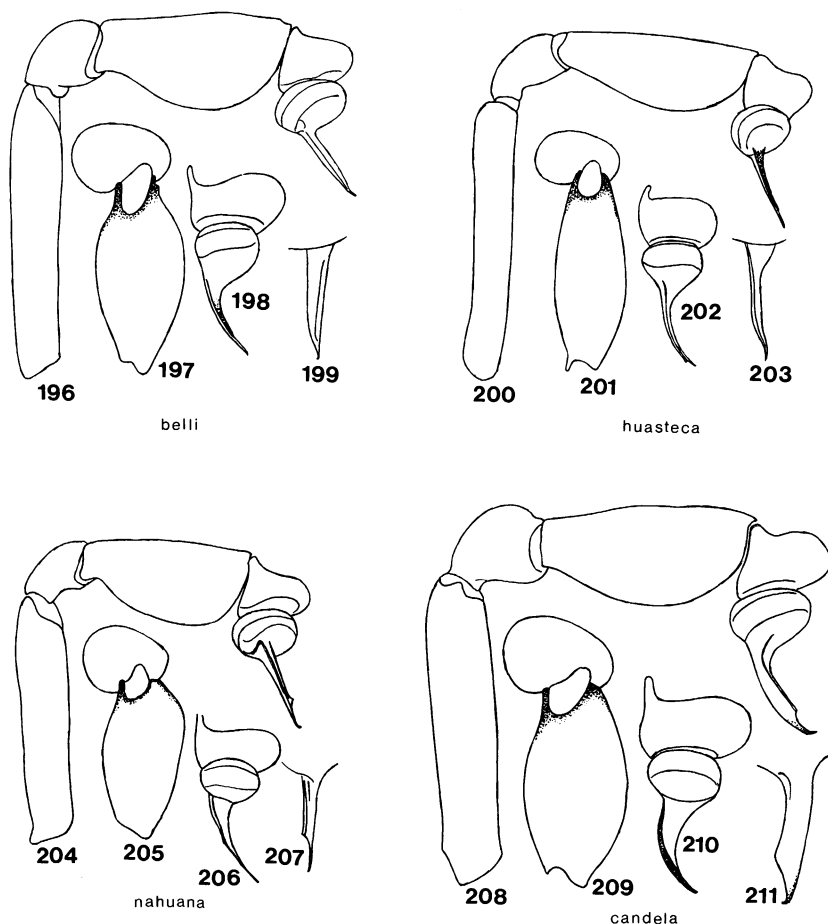
DISTRIBUTION: State of Coahuila, Mexico (map 5).

RECORDS: MEXICO: Coahuila: Cueva de Las Ánimas, 56 km. E Monclova, 14 Feb. 1966 (W. Bell, J. H. Reddell), ♀, ♂. Cueva de los Lagos, 25 km. NW Villa Acuna, 15 Nov. 1964 (J. Reddell, B. Martin), ♀. 10 mi. E Cuatro Ciénegas, 18 July 1965 (J. Reddell, J. Fish), ♀, ♂. Gloria, 24 Aug. 1947 (W. J. Gertsch), ♂. Saltillo, 23 May 1952 (W. J. Gertsch), ♀, ♂; 21, 23 Aug. 1947 (W. J. Gertsch), 2♂♂, 2♀♀, ♂. E. Saltillo, 29 July (W. J. Gertsch), 2♂♂, 2♀♀, ♂ from under yucca debris. 25 mi. SE San Pedro, 21 Aug. 1947 (W. J. Gertsch), ♂, 2♀♀.

Loxosceles tlacolula, new species

Figures 218–219; Map 8

DIAGNOSIS: Near relative of *nahuana* from Oaxaca with longer legs (first leg of female 5.2 times as long as carapace); receptacles of



FIGS. 196–199. *Loxosceles belli* Gertsch (Saltillo, Coahuila), right male palpus. 196. Retrolateral view. 197. Tibia and tarsus, dorsal view. 198. Tarsus and bulb, apical view. 199. Embolus, prolateral view.

FIGS. 200–203. *Loxosceles huasteca*, new species (70 mi. W Valles, San Luis Potosí), right male palpus. 200. Retrolateral view. 201. Tibia and tarsus, dorsal view. 202. Tarsus and bulb, apical view. 203. Embolus, prolateral view.

FIGS. 204–207. *Loxosceles nahuana* Gertsch (Taxquillo, Hidalgo), right male palpus. 204. Retrolateral view. 205. Tibia and tarsus, dorsal view. 206. Tarsus and bulb, apical view. 207. Embolus, prolateral view.

FIGS. 208–211. *Loxosceles candela*, new species (Cueva del Carrizal, Nuevo León), right male palpus. 208. Retrolateral view. 209. Tibia and tarsus, dorsal view. 210. Tarsus and bulb, apical view. 211. Embolus, prolateral view.

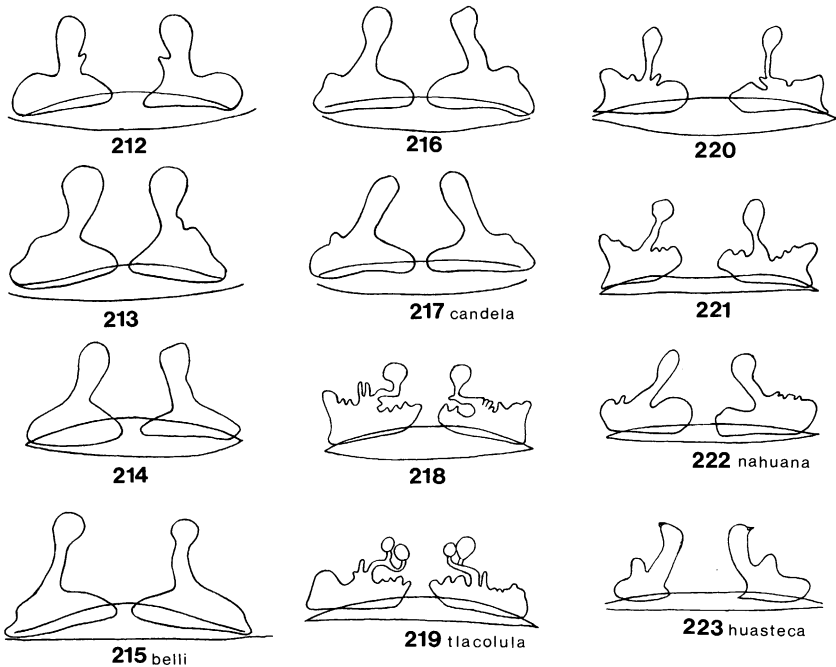
epigynum (figs. 218–219) with central lobes twisted laterally. Male unknown.

ETYMOLOGY: Specific name from type locality, used in apposition.

FEMALE HOLOTYPE: Length 6.5. Carapace 2.8 long, 2.5 wide. Abdomen 4 long, 2.2 wide. Carapace orange with faint duskiness of pars cephalica and median groove and along sides of pars thoracica. Median eyes touching line

along front edges of anterior median eyes and separated from them by long diameter.

	I	II	III	IV	Palp
Femur	4.20	4.50	3.90	4.40	1.10
Patella	1.00	1.00	1.00	1.00	0.35
Tibia	4.25	4.60	3.40	4.10	0.80
Metatarsus	4.00	4.35	3.85	4.70	—
Tarsus	1.20	1.35	1.10	1.25	1.10
Total	14.65	15.80	13.25	15.45	3.35



FIGS. 212–215. *Loxosceles belli* Gertsch, epigyna. Coahuila: 212, 214. Saltillo. 213. S San Pedro. 215. Cueva de las Animas.

FIGS. 216–217. *Loxosceles candela*, new species, epigyna (Cueva del Carrizal, Nuevo León).

FIGS. 218–219. *Loxosceles tlacolula*, new species, epigyna (Tlacolula, Oaxaca).

FIGS. 220–222. *Loxosceles nahuana* Gertsch, epigyna. Hidalgo: 220. Tarquillo. 221. 7 mi. SE Zimapan. 222. Barranca Tolivar, nr. Zimapan.

FIG. 223. *Loxosceles huasteca*, new species, epigynum (70 mi. W Valles, San Luis Potosí).

Leg formula 2413. First leg 5.2 times, first femur 1.5 times, second leg 5.6 times, second femur 1.6 times as long as carapace.

EPIGYNUM (figs. 218–219): Receptacles subquadrangular, irregularly dissected with small lobes, slightly separated at midline; each lobe with twisted median lobe enlarged at apex or apically doubled.

TYPE DATA: Female holotype and female from Tlacolula, Oaxaca, 30 April 1963 (W. J. Gertsch, W. Ivie), from under cliff, deposited in AMNH.

DISTRIBUTION: Known only from above specimens (map 8).

Loxosceles nahuana Gertsch
Figures 204–207, 220–222; Map 10

Loxosceles nahuana Gertsch, 1958, p. 29, fig. 80.

DIAGNOSIS: Species of Hidalgo with short legs: receptacles of epigynum (figs. 220–222)

with prominent lobe arising from middle; embolus (fig. 207) abruptly narrowed in distal third to thin spine.

FEMALE (Texquillo, Hidalgo): Length 7.5. Carapace 3 long, 2.6 wide. Abdomen 4.75 long, 2.7 wide. Carapace bright to dull orange with only faint traces of duskiness outlining pars cephalica and median groove. Median eyes more than long diameter from anterior lateral eyes (20/17).

	I	II	III	IV	Palp
Femur	3.50	3.75	3.35	3.85	1.00
Patella	0.85	0.95	0.85	0.85	0.40
Tibia	3.40	3.70	2.80	3.50	0.65
Metatarsus	3.20	3.40	3.10	3.75	—
Tarsus	1.15	1.10	0.85	1.15	1.00
Total	12.10	12.90	10.95	13.10	3.05

Leg formula 4213. First leg 4 times, first femur 1.16 times, second leg 4.3 times, second femur 1.25 times as long as carapace.

EPIGYNUM (figs. 220–222): Receptacles quadrangular, with irregular lobes on outer side and moderately separated at midline; each with central elongated lobe enlarged at apex.

MALE (Texquillo, Hidalgo): Length 5.7. Carapace 2.6 long, 2.25 wide. Abdomen 3.2 long, 1.8 wide. Median eyes just in front of line along front edges of anterior median eyes and separated from them by long diameter.

	I	II	III	IV	Palp
Femur	4.00	4.35	3.60	4.15	1.27
Patella	0.85	0.85	0.75	0.85	0.45
Tibia	4.65	5.00	3.35	4.00	0.80
Metatarsus	4.25	4.70	3.75	4.50	—
Tarsus	1.20	1.20	1.10	1.20	0.33
Total	14.95	16.10	12.55	14.70	2.85

Leg formula 2143. First leg 5.7 times, first femur 1.5 times, second leg 6.2 times, second femur 1.6 times as long as carapace.

MALE PALPUS (figs. 204–207): Femur nearly six times as long as broad (127/22); tibia nearly twice as long as broad (80/42); suboval bulb narrower than tibial depth, with thin embolus abruptly narrowed to thin spine in apical half.

TYPE DATA: Female holotype from 5 mi. S Zimapán, Hidalgo, deposited in AMNH.

DISTRIBUTION: State of Hidalgo, Mexico (map 10).

RECORDS: MEXICO: **Hidalgo**: Texquillo (Tzindejeh), 29 July 1966 (J. and W. Ivie), numerous ♂♂, ♀♀, ○. El Tablón, 7 mi. SE Zimapán, 19 Aug. 1964 (J. and W. Ivie), ♂♂, ♀♀, ○. 5 mi. N Zimapán, 21 Nov. 1946 (E. S. Ross), ♀ in CAS.

Loxosceles huasteca, new species

Figures 200–203, 223; Map 10

DIAGNOSIS: Species of western San Luis Potosí: epigynum (fig. 203) with long lobe arising from inner margin of receptacle; male palpus (figs. 200–203) with tibia more than twice as long as deep and thin embolus longer than bulbal width ending in thin curved spine.

ETYMOLOGY: Specific name for Huastec Indians of Mexico.

FEMALE: Length 8. Carapace 3.15 long, 2.75 wide. Abdomen 5 long, 3 wide. Carapace orange with pars cephalica and median groove brown, and brown marginal band of co-

alesced spots on pars thoracica. Median eyes half radius in front of line along front edges of anterior lateral eyes and separated from them by more than long diameter (20/15).

	I	II	III	IV	Palp
Femur	4.00	4.15	3.70	4.00	1.10
Patella	1.00	1.00	1.00	1.00	0.35
Tibia	4.10	4.30	3.15	3.70	0.75
Metatarsus	3.70	4.00	3.50	4.30	—
Tarsus	1.15	1.20	0.95	1.20	1.00
Total	13.95	14.65	12.30	14.20	3.20

Leg formula 2413. First leg 4.4 times, first femur 1.2 times, second leg 4.6 times, second femur 1.3 times as long as carapace.

EPIGYNUM (fig. 223): Narrow receptacles separated by width at base, each with elongated lobe above inner margin and smaller lobe near middle.

MALE HOLOTYPE: Length 5.2. Carapace 2.35 long, 2.15 wide. Abdomen 3 long, 1.7 wide. Carapace dull yellow with little duskiness of pars cephalica and only faint side bands on pars thoracica.

	I	II	III	IV	Palp
Femur	4.25	4.70	3.80	4.15	1.50
Patella	0.80	0.80	0.75	0.80	0.47
Tibia	4.80	5.35	3.30	4.00	0.94
Metatarsus	4.35	5.20	4.00	4.75	—
Tarsus	1.20	1.30	1.10	1.20	0.32
Total	15.40	17.35	12.95	14.90	3.23

Leg formula 2143. First leg 6.5 times, first femur 1.8 times, second leg 7.3 times, second femur twice as long as carapace.

MALE PALPUS (figs. 200–203): Femur about seven times as long as wide (150/21); tibia more than twice as long as deep (94/37); bulb suboval, about as broad as depth of tibia, with thin, slightly curved embolus longer than bulbal width (42/30).

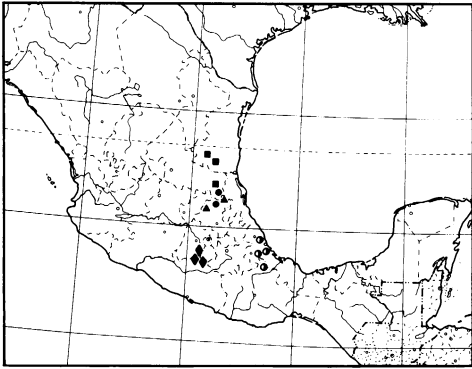
TYPE DATA: Male holotype, female, and three immatures from 70 mi. W Valles, Route 70, San Luis Potosí, 19 February 1970 (J. A. L. Cooke), deposited in AMNH.

DISTRIBUTION: Known only from above material (map 10).

Loxosceles candela, new species

Figures 208–211, 216–217; Map 10

Loxosceles bolivari: Gertsch, 1973, p. 158 (female record only).



MAP 9. Mexico and adjacent areas, showing distributions of *Loxosceles tenango* (circles), *L. jaca* (triangles), *L. misteca* (diamonds), *L. chinatoca* (half-filled circles), and *L. valdosa* (squares).

DIAGNOSIS: Species of western Nuevo León: receptacles of epigynum (figs. 216–217) with single stout lobe; male palpus (figs. 208–211) with heavy embolus narrowed to apical spur.

ETYMOLOGY: Specific name from Spanish *candela*, chestnut tree or its blossoms, used in apposition.

FEMALE (Cueva del Carrizal, Nuevo León): Length 8.5. Carapace 3.3 long, 2.7 wide. Abdomen 5.5 long, 3.5 wide. Carapace yellowish with brownish pars cephalica and median groove and with distinct brownish band on sides of pars thoracica. Clypeus 0.5 long, about two and one-half diameters of median eyes; eyes subequal, about 0.18 in long diameter. Median eyes touching line along front edges of anterior lateral eyes and separated from them by about long diameter (18/20).

	I	II	III	IV	Palp
Femur	4.80	5.25	4.50	5.15	1.00
Patella	1.15	1.15	1.10	1.10	0.40
Tibia	5.20	5.50	4.15	4.85	0.80
Metatarsus	5.00	5.35	4.35	5.90	—
Tarsus	1.35	1.35	1.20	1.35	1.00
Total	17.50	18.60	15.30	18.35	3.20

Leg formula 2413. First leg 5.3 times, first femur 1.4 times, second leg 5.6 times, second femur 1.6 times as long as carapace.

EPIGYNUM (figs. 216–217): Receptacles close together at midline, each with long, apically rounded lobe arising near middle and flanked by trivial lobe on outside.

MALE HOLOTYPE: Length 8. Carapace 3.35 long, 2.85 wide. Abdomen 4.8 long, 2.6 wide.

	I	II	III	IV	Palp
Femur	5.80	6.30	5.50	6.10	1.55
Patella	1.25	1.25	1.25	1.25	0.55
Tibia	6.75	7.20	5.15	6.00	1.00
Metatarsus	6.35	7.25	6.35	7.35	—
Tarsus	1.50	1.50	1.35	1.45	0.40
Total	21.65	23.50	19.60	22.15	3.50

Leg formula 2413. First leg 6.4 times, first femur 1.7 times, second leg 7 times, second femur 1.8 times as long as carapace.

MALE PALPUS (figs. 208–211): Femur five times as long as wide (155/30); tibia nearly twice as long as deep (100/52); bulb suboval with heavy, moderately curved embolus apically narrowed to heavy spur, longer than width of bulb (50/40).

TYPE DATA: Male holotype from Grutas de García, Nuevo León, Mexico, 28 Dec. 1975 (J. Richter), deposited in AMNH.

DISTRIBUTION: State of Nuevo León, Mexico (map 10).

RECORDS: MEXICO: Nuevo León: Grutas de García, 28 Dec. 1975 (J. Richter), ♀, ♂. Cueva del Carrizal, E Candela Mountain, 30 mi. N Bustamente, 2 Mar. 1963 (W. Russell), 2♀♀ from 300 ft. inside entrance. 20 mi. W Linares, near León, 8 Nov. 1946 (E. S. Ross), 3♂♂ in CAS.

Loxosceles valdosa Gertsch
 Figures 232–235, 244–247; Map 9

Loxosceles bolivari: Gertsch, 1958, p. 22, fig. 77 only, female.

Loxosceles valdosa Gertsch, 1973, p. 156, figs. 39–41.

DIAGNOSIS: Long-legged relative of *boneti* (first leg of female 6 times, of male 8.7 times as long as carapace): receptacles of epigynum (figs. 244–247) with principal lobe near middle; male palpus with embolus (fig. 232) longer than width of bulb.

FEMALE (Cueva de Valdosa, San Luis Potosí): Length 9.6. Carapace 3.8 long, 3.25 wide. Abdomen 5.8 long, 3 wide. Carapace yellowish to dull orange, with dark dentated side bands on pars thoracica like those of *colima* (fig. 17). Median eyes about radius in front of line along front edges of anterior lat-

eral eyes, more than diameter from lateral eyes (24/20).

	I	II	III	IV	Palp
Femur	6.75	7.50	6.20	6.60	1.35
Patella	1.25	1.30	1.20	1.20	0.35
Tibia	7.30	8.00	5.65	6.40	1.00
Metatarsus	6.10	8.25	6.60	7.35	—
Tarsus	1.50	1.75	1.50	1.60	1.25
Total	22.90	26.80	21.15	23.15	3.95

Leg formula 2413. First leg 6 times, first femur about 1.8 times, second leg 7 times, second femur about twice as long as carapace.

EPIGYNUM (figs. 244–247): Oval receptacles close together at midline; each receptacle with rounded angle on outside and principal forwardly directed lobe, the latter extremely variable by presence of adventitious lobes.

MALE HOLOTYPE: Length 7.9. Carapace 3.4 long, 3.1 wide. Abdomen 4.5 long, 2.5 wide.

	I	II	III	IV	Palp
Femur	7.75	9.00	7.00	7.50	1.70
Patella	1.25	1.35	1.25	1.15	0.60
Tibia	9.90	10.65	6.70	7.50	1.20
Metatarsus	8.90	10.50	7.65	9.35	—
Tarsus	1.75	1.75	1.15	1.70	0.40
Total	29.55	33.25	23.75	27.20	3.90

Leg formula 2143. First leg 9.7 times, first femur 2.27 times, second leg 9.7 times, second femur 2.6 times as long as carapace.

MALE PALPUS (figs. 232–235): Femur six times as long as wide (170/28); tibia more than twice as long as broad (12/5); bulb sub-oval with thin, curved embolus longer than bulbal width (45/38).

TYPE DATA: Male holotype from Cueva de Valdosa, 11 km. E Valles, San Luis Potosí, Mexico, 24 November 1967 (J. Reddell, S. Fowler), in AMNH.

DISTRIBUTION: Caves of San Luis Potosí and Tamaulipas (map 9).

RECORDS: MEXICO: **San Luis Potosí:** Gertsch (1973) recorded this species from the following caves: Cueva de Valdosa, Cueva de Los Sabinos, Cueva de Taninul, Sotano Escondido, Cueva de la Libertad, Cueva del Sotanito. **Tamaulipas:** Gertsch (1973) recorded this species from the following caves: Cueva del Abra, Cueva de San Rafael de los

Castros, Grutas de Quintero, and Sótano de Vásquez.

Loxosceles tenango Gertsch
 Figures 252–256, 273–276; Map 9

Loxosceles tenango Gertsch, 1973, p. 161, figs. 32–33.

DIAGNOSIS: Epigeian and troglophile species Hidalgo: receptacles of epigynum (figs. 252–256) subcontiguous at midline, with sinuous tubular lobe enlarged at apex; male palpus (figs. 273–275) with tibia about twice as long as deep and thick embolus about as long as bulbal width.

FEMALE (Cueva de El Tenango, Hidalgo): Length 8.35. Carapace 3.35 long, 3.1 wide. Abdomen 5 long, 3 wide. Cephalothorax and legs dusky orange; carapace with brownish Y-shaped marking and marginal dusky spots on sides of pars thoracica. Median eyes one-third diameter in front of line along front edges of anterior lateral eyes, more than diameter from lateral eyes (24/18).

	I	II	III	IV	Palp
Femur	5.70	6.35	5.50	5.75	1.15
Patella	1.20	1.20	1.15	1.15	0.46
Tibia	6.00	6.65	4.75	5.50	0.80
Metatarsus	5.50	6.25	5.15	6.00	—
Tarsus	1.10	1.40	1.15	1.35	1.10
Total	19.50	21.85	17.70	19.75	3.51

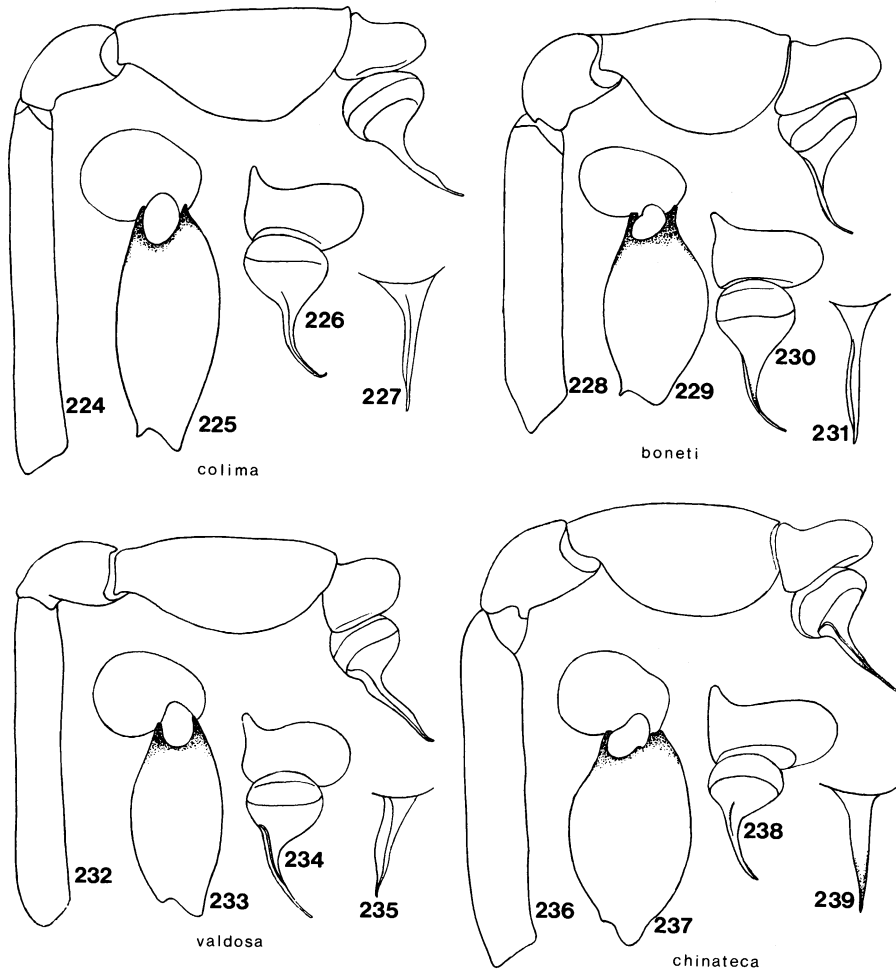
Leg formula 2413. First leg 5.8 times, first femur 1.7 times, second leg 6.5 times, second femur 1.9 times as long as carapace.

EPIGYNUM (figs. 252–253): Large, narrowly oval receptacles subcontiguous at midline, each with quite heavy, curved lobe with apical enlargement.

MALE HOLOTYPE: Length 7. Carapace 3 long, 2.7 wide. Abdomen 4 long, 2.3 wide.

	I	II	III	IV	Palp
Femur	6.30	7.00	5.60	5.80	1.40
Patella	1.15	1.15	1.10	1.00	0.50
Tibia	7.30	8.00	5.30	5.70	1.00
Metatarsus	6.50	7.60	5.70	6.80	—
Tarsus	1.35	1.40	1.20	1.35	0.35
Total	22.60	25.25	18.90	20.65	3.25

Leg formula 2143. First leg 7.5 times, first femur 2.1 times, second leg 8.4 times, second femur 2.3 times as long as carapace.



FIGS. 224–227. *Loxosceles colima* Gertsch, right male palpus. 224. Retrolateral view. 225. Tibia and tarsus, dorsal view. 226. Tarsus and bulb, apical view. 227. Embolus, prolateral view.

FIGS. 228–231. *Loxosceles boneti* Gertsch (Acapulco, Guerrero), right male palpus. 228. Retrolateral view. 229. Tibia and tarsus, dorsal view. 230. Tarsus and bulb, apical view. 231. Embolus, prolateral view.

FIGS. 232–235. *Loxosceles valdosa* Gertsch (Cueva de Valdosa, San Luis Potosí), right male palpus. 232. Retrolateral view. 233. Tibia and tarsus, dorsal view. 234. Tarsus and bulb, apical view. 235. Embolus, prolateral view.

FIGS. 236–239. *Loxosceles chinateca*, new species (Cueva Desaforaciendo, Oaxaca), right male palpus. 236. Retrolateral view. 237. Tibia and tarsus, dorsal view. 238. Tarsus and bulb, apical view. 239. Embolus, prolateral view.

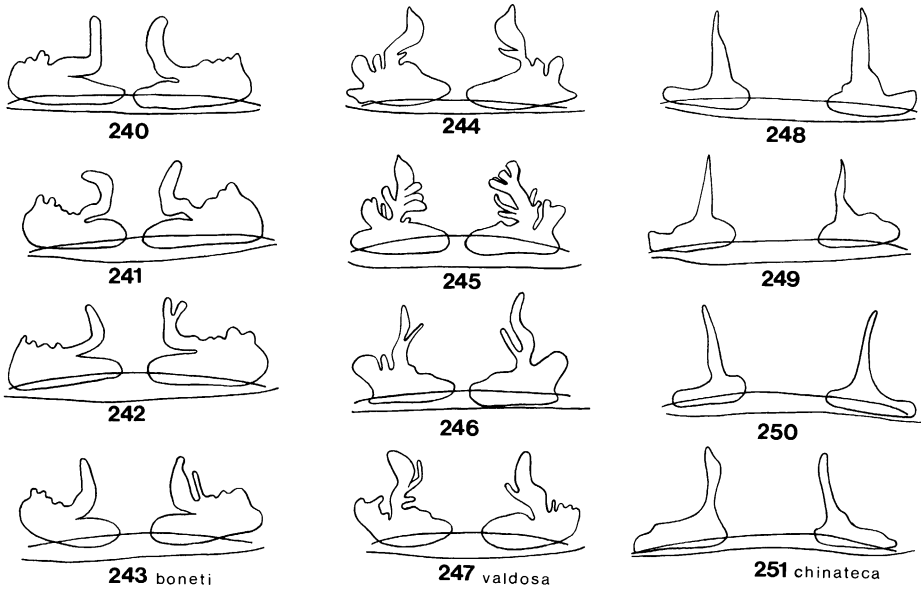
MALE PALPUS (figs. 273–276): Femur about five times as long as wide (53/10); tibia thickened, nearly twice as long as broad (100/52); embolus thick at base, narrowed to fine point, as long as width of bulb.

TYPE DATA: Male holotype from Cueva de

El Tenango, 6 km. S Chapulhuacán, Hidalgo, 18 August 1965 (J. Reddell, J. Fish, W. Bell), deposited in AMNH.

DISTRIBUTION: States of Hidalgo and San Luis Potosí, Mexico (map 9).

RECORDS: MEXICO: **Hidalgo:** Cueva de El



FIGS. 240–243. *Loxosceles boneti* Gertsch, epigyna. Morelos: 240. Palo Bolero. 241. 4 mi. S Cuernavaca. 242–243. Tepotzlan.
 FIGS. 244–247. *Loxosceles valdosa* Gertsch, epigyna. San Luis Potosí: 244. Cueva de Valdosa. Tamaulipas: 245–247. Cueva de El Abra.
 FIGS. 248–251. *Loxosceles chinateca*, new species, epigyna. Vera Cruz: 248–250. Cueva de Camposanto. Oaxaca: 251. Cueva Desaparaciendo.

Tenango, 6 km. S Chapulhuacán, 18 Aug. 1965 (J. Reddell, J. Fish, W. Bell), 6♀, 0. **San Luis Potosí:** Tamazunchale, 19 Aug. 1963 (W. J. Gertsch), 2♂♂, 4♀♀, 0; 17 Apr. 1964 (J. and W. Ivie), ♂, 2♀♀.

***Loxosceles jaca*, new species**

Figures 146–149, 258–259; Map 9

DIAGNOSIS: Small relative of *tenango* from State of Hidalgo with shorter legs: receptacles of epigynum (figs. 258–259); male palpus (figs. 146–149) with shorter segments and embolus much thicker at base.

ETYMOLOGY: Specific name from Spanish *jaca*, pony, used in apposition.

FEMALE (E side Jacala Hidalgo): Length 7.5. Carapace 3 long, 2.5 wide. Abdomen 5 long, 3.5 wide. Cephalothorax and legs dusky orange brown; carapace with typical dusky Y-shaped marking and dusky stripes on pars thoracica. Median eyes situated fourth of diameter in front of line along front edges of anterior lateral eyes, more than diameter from anterior lateral eyes (16/13).

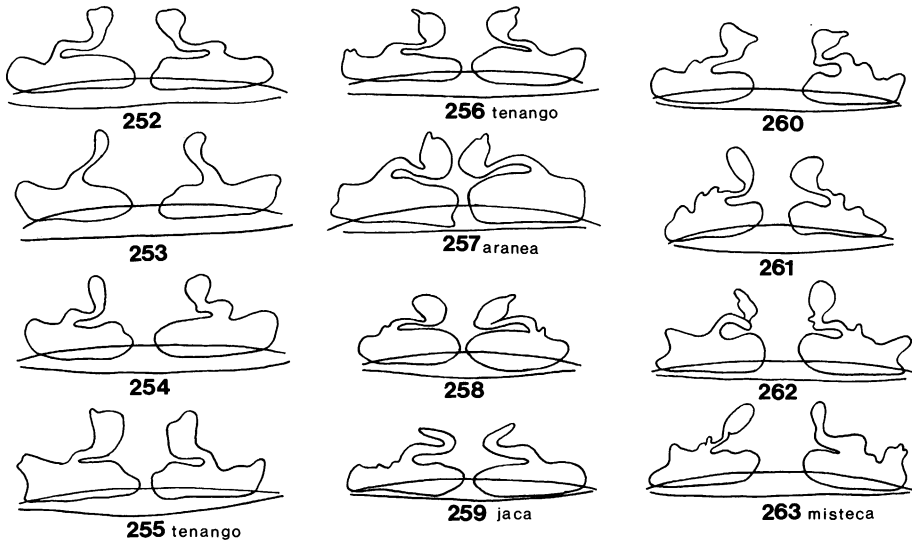
	I	II	III	IV	Palp
Femur	3.50	3.70	3.25	2.70	0.85
Patella	1.10	1.10	1.00	0.90	0.60
Tibia	3.70	2.80	3.35	3.70	0.70
Metatarsus	3.30	3.35	3.15	3.70	—
Tarsus	1.10	1.10	1.00	1.10	0.75
Total	12.70	12.05	11.75	12.10	2.90

Leg formula 2143. First leg 4.23 times, first femur 1.17 times, second leg 4.3 times, second femur 1.2 times as long as carapace.

EPIGYNUM (figs. 258–259): Large suboval receptacles subcontiguous at midline, each with thin S-shaped lobe with or without apical enlargement.

MALE HOLOTYPE: Length 5.7. Carapace 2.75 long, 2.5 wide. Abdomen 3.5 long, 2 wide.

	I	II	III	IV	Palp
Femur	4.70	5.00	4.25	4.50	1.30
Patella	1.00	1.00	0.90	1.00	0.45
Tibia	5.00	5.00	3.70	4.40	0.80
Metatarsus	4.60	5.30	4.15	5.10	—
Tarsus	1.30	1.25	1.10	1.20	0.33
Total	16.60	17.55	14.10	16.20	2.88



FIGS. 252–256. *Loxosceles tenango* Gertsch, epigyna. Hidalgo: 252–254. Cueva de El Tenango. San Luis Potosí: 255–256. Tamazunchale.

FIG. 257. *Loxosceles aranea* Gertsch, epigynum (Sotano de las Aranas, Queretaro).

FIGS. 258–259. *Loxosceles jaca*, new species, epigyna (Jacala, Hidalgo).

FIGS. 260–263. *Loxosceles misteca* Gertsch, epigyna. Guerrero: 260–261. Grutas de Cacahuamilpa. 262. Pozo Melendez. 263. Grutas de Mogote.

Leg formula 2143. First leg 6 times, first femur 1.7 times, second leg 6.3 times, second femur 1.8 times as long as carapace.

MALE PALPUS (figs. 146–149): Femur about five times as long as wide (130/24); tibia less than twice as long as deep (80/42); embolus stout longer than width of bulb (45/33).

TYPE DATA: Male holotype and male from Jacala, Hidalgo, Mexico, 20 April 1963 (W. J. Gertsch, W. Ivie), deposited in AMNH.

DISTRIBUTION: State of Hidalgo, Mexico (map 9).

RECORDS: MEXICO: Hidalgo: SW Jacala, 18 Aug. 1964 (J. and W. Ivie), 200. E Jacala, 27 July 1966 (J. and W. Ivie), ♀, 800. Chapulhuacán, 27 July 1966 (J. and W. Ivie), ♂.

Loxosceles aranea Gertsch

Figure 257; Map 8

Loxosceles aranea Gertsch, 1973, p. 160, fig. 35.

DIAGNOSIS: Pale troglophile with legs of medium length, distinguished by epigynum (fig. 257). Male unknown.

FEMALE HOLOTYPE: Length 7.5. Carapace 3.5 long, 3 wide. Abdomen 4 long, 2.5 wide.

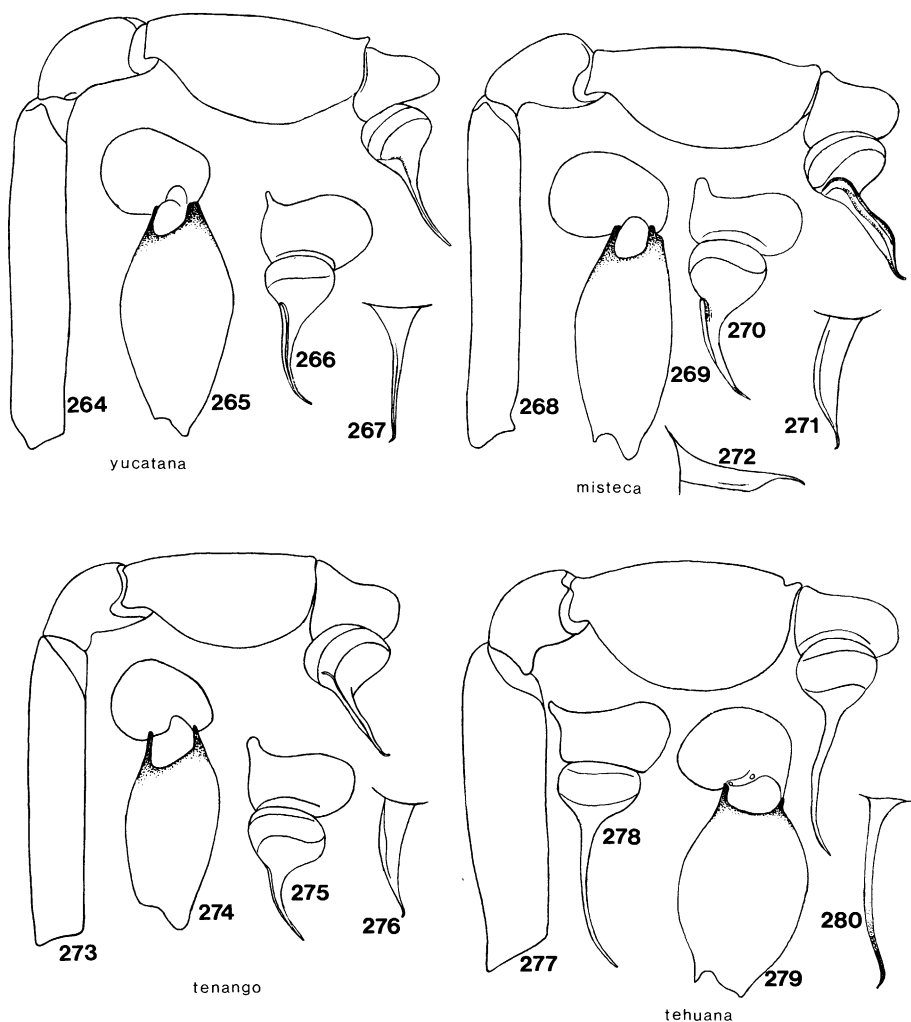
Cephalothorax and appendages yellow to orange; carapace with faint dusky Y-shaped marking and faint duskiness on side margins. Abdomen uniformly whitish. Median eyes nearly touching front edges of anterior lateral eyes and separated from them by little more than diameter (19/17).

	I	II	III	IV	Palp
Femur	5.60	5.70	5.00	5.50	1.25
Patella	1.20	1.20	1.20	1.15	0.50
Tibia	6.00	6.35	4.85	5.30	0.85
Metatarsus	5.35	6.15	5.00	6.00	—
Tarsus	1.30	1.35	1.20	1.20	1.10
Total	19.45	20.75	17.25	19.15	3.70

Leg formula 2413. First leg 5.5 times, first femur 1.6 times, second leg 5.9 times, second femur 1.6 times as long as carapace.

EPIGYNUM (fig. 257): Large rectangular receptacles nearly touching at midline, each with prominent tubular lobe arising outside of middle, strongly curved, enlarged near inner side.

TYPE DATA: Female holotype and three immatures from Sótano de Dos Aranas Grandes, 2 km. E Río Blanco, Querétaro



FIGS. 264–267. *Loxosceles yucatana* Chamberlin and Ivie (Rio Frio Cave, Belize), right male palpus. 264. Retrolateral view. 265. Tibia and tarsus, dorsal view. 266. Tarsus and bulb, apical view. 267. Embolus, prolateral view.

FIGS. 268–272. *Loxosceles misteca* Gertsch (Taxco, Guerrero), right male palpus. 268. Retrolateral view. 269. Tibia and tarsus, dorsal view. 270. Tarsus and bulb, apical view. 271. Embolus, prolateral view. 272. (Grutas de Cacahuamilpa), embolus, prolateral view.

FIGS. 273–276. *Loxosceles tenango* Gertsch (Cueva de El Tenango, Hidalgo), right male palpus. 273. Retrolateral view. 274. Tibia and tarsus, dorsal view. 275. Tarsus and bulb, apical view. 276. Embolus, prolateral view.

FIGS. 277–280. *Loxosceles tehuana* Gertsch (Juan Garcia, Oaxaca), right male palpus. 277. Retrolateral view. 278. Tarsus and bulb, apical view. 279. Tibia and tarsus, dorsal view. 280. Embolus, prolateral view.

Mexico, 9 July 1967 (J. Reddell, J. Fish), deposited in AMNH.

DISTRIBUTION: Known only from above material (map 8).

***Loxosceles chinateca*, new species**
Figures 236–239, 248–251; Map 9

DIAGNOSIS: Relative of *boneti* with distinctive genitalia: narrow receptacles of epig-

ynum (figs. 248–251) with single thin lobe directed forward; tibia of male palpus (figs. 236–237) less than twice as long as deep.

ETYMOLOGY: Specific name for Chinateca Indians of Oaxaca, used in apposition.

FEMALE (Cueva de Camposanto, Veracruz): Length 8.5. Carapace 3.6 long, 3 wide. Abdomen 5 long, 2.75 wide. Carapace dull yellowish with blackish pattern like that of *colima* (fig. 17). Abdomen gray to blackish. Median eyes touching line along front edges of anterior lateral eyes and separated from them by long diameter.

	I	II	III	IV	Palp
Femur	5.35	5.85	4.90	5.80	1.30
Patella	1.30	1.30	1.30	1.25	0.60
Tibia	5.50	5.75	4.45	5.00	0.85
Metatarsus	5.25	5.80	5.00	5.75	—
Tarsus	1.35	1.35	1.30	1.45	1.15
Total	18.75	20.05	16.95	19.25	3.90

Leg formula 2413. First leg 5.2 times, first femur 1.48 times, second leg 5.5 times, second femur 1.6 times as long as carapace.

EPIGYNUM (figs. 248–251): Narrow receptacles separated by basal width at midline, each with trivial rounded lobe on inner and outer margins, and prominent thin lobe as long as width at base.

MALE HOLOTYPE: Length 8.5. Carapace 3.75 long, 3.25 wide. Abdomen 4.7 long, 3 wide. Coloration paler than that of female but pattern same except for broader pale stripes on carapace. Median eyes touching line along front edges of anterior lateral eyes and separated from them by less than long diameter of median eye (21/15).

	I	II	III	IV	Palp
Femur	7.50	8.25	6.65	6.80	1.75
Patella	1.35	1.40	1.35	1.35	0.65
Tibia	8.35	8.75	6.15	6.85	1.15
Metatarsus	7.70	9.00	7.00	8.00	—
Tarsus	1.70	1.70	1.40	1.60	0.40
Total	26.60	29.10	22.55	24.60	3.95

Leg formula 2143. First leg 7 times, first femur 2 times, second leg 7.7 times, second femur 2.2 times as long as carapace.

MALE PALPUS (figs. 236–239): Femur not fully six times as long as wide (170/33); tibia thick, less than twice as long as deep (116/65); bulb broadly oval, with thin, slightly curved embolus as long as width of bulb (40/40).

TYPE DATA: Male holotype from Cueva Desafortaciendo, 2 km. S Acatlán, Oaxaca, Mexico, 26 December 1976 (J. Reddell, A. Grubbs, C. Soileau), deposited in AMNH.

DISTRIBUTION: States of Veracruz and Oaxaca, Mexico (map 9).

RECORDS: MEXICO: **Veracruz**: Cueva de Camposanto, 2 km. W Buena Vista, 23 December 1976, 5♀♀. Cueva de Sala de Agua, 5 km. N Cuitlahuac, 4 January 1977, 2♂♂ from entrance zone. Cueva del Infiernillo, 1 km. E Paso del Toro, 24 December 1976, ♂, 3♀♀, ○. Cueva de los Vampiros, 2 km. W Buena Vista, 23 December 1976, ♀, ○. (All collected by J. Reddell, C. Soileau, A. Grubbs, C. McKenzie.) **Oaxaca**: Cueva Desafortaciendo, 2 km. S Acatlán, 26 December 1976 (J. Reddell, A. Grubbs, C. Soileau), ♀.

Loxosceles colima Gertsch

Figures 17, 224–227, 291–292; Map 10

Loxosceles colima Gertsch, 1958, p. 24, figs. 11, 48–50, 96.

DIAGNOSIS: Dark species of western Mexico similar to *boneti*: receptacles of epigynum (figs. 291–292) with lobe about as long as width of base; male palpus (figs. 224–227) with tibia twice as long as deep and thin embolus as long as width of bulb.

FEMALE (10 mi. S Colima, Colima): Length 11. Carapace 4.75 long, 4 wide. Abdomen 6.7 long, 4 wide. Carapace typically dark brown with following features (fig. 17): on each side of pars cephalica narrow yellowish stripe becoming broader and running back to near posterior declivity; marginal dark bands rounded or dentate on inner sides; pars cephalica usually uniform brown but often enclosing yellowish patch behind and with dark lines running back from eye group. Abdomen gray to blackish. Median eyes separated from anterior lateral eyes by long diameter.

	I	II	III	IV	Palp
Femur	6.50	6.80	6.10	6.60	1.50
Patella	1.55	1.55	1.50	1.50	0.50
Tibia	6.70	7.00	5.00	6.10	1.15
Metatarsus	6.50	7.00	6.25	7.20	—
Tarsus	1.60	1.60	1.35	1.50	1.35
Total	22.85	23.95	20.20	22.90	4.50

Leg formula 2413. First leg 4.8 times, first femur 1.3 times, second leg 5 times, second femur 1.4 times as long as carapace.

EPIGYNUM (figs. 291–292): Receptacles separated by one-third to one-half width at midline, each with trivial rounded or pointed lobe on outer side and towering lobe from near middle longer than basal width.

MALE HOLOTYPE: Length 9.5. Carapace 4.5 long, 3.7 wide. Abdomen 5.5 long, 3 wide. Median eyes touching line along front edges of anterior lateral eyes and separated from them by less than long diameter (19/22).

	I	II	III	IV	Palp
Femur	7.70	8.60	7.00	7.50	2.15
Patella	1.65	1.65	1.50	1.50	0.65
Tibia	8.65	10.00	6.35	7.25	1.30
Metatarsus	8.85	11.30	8.15	8.25	—
Tarsus	1.80	1.75	1.45	1.65	0.50
Total	28.65	33.30	24.45	26.15	4.60

Leg formula 2143. First leg 6.3 times, first femur 1.7 times, second leg 7.4 times, second femur 1.9 times as long as carapace.

MALE PALPUS (figs. 224–227): Femur six times as long as wide (215/35); tibia twice as long as deep (130/65); bulb ovate, with thin curved embolus as long as width of bulb.

TYPE DATA: Male holotype from 10 mi. S Colima, Colima, 31 July 1954 (W. J. Gertsch), deposited in AMNH.

DISTRIBUTION: Western Mexican states of Colima, Jalisco, and Nayarit (map 10).

RECORDS: MEXICO: **Colima:** 10 mi. S Colima, 31 July 1954 (W. J. Gertsch), ♂♂, ♀♀, and ♂. 7 mi. S Colima, 2 Aug. 1956 (W. J. Gertsch, V. Roth), ♂, ♀♀, and ♂ paratypes. 5 mi. N Colima, 3 Aug. 1956 (W. J. Gertsch, V. Roth), ♀ paratype. 9 mi. S Colima, 29 July 1964 (W. J. Gertsch, J. Woods), ♀, ♂. 25 mi. E Mazamitla, 2 Aug. 1956 (W. J. Gertsch), ♂ and ♀ paratypes. Cueva de la Finca, Coquimatlán, 20 Jan. 1943 (F. Bonet), ♂ and ♀ paratypes. **Jalisco:** W side of Lake Sayula, SW of Guadalajara, 3 Aug. 1956 (W. J. Gertsch), ♀, ♂; 30 July 1964 (W. J. Gertsch, J. Woods), ♀, ♂. Ocotlán (L. H. Weld), ♂, ♂. 1 mi. W Plan de Barancas, 31 July 1964 (W. J. Gertsch, J. Woods), ♂. 1 mi. E San Juan Casola, 7 July 1959 (C. M. Bogert), ♂. 14 mi. SW Acatlán, 29 Aug. 1965 (W. J. Gertsch, R. Hastings), ♂, ♀♀, ♂; 53.5 mi. N Barra de Navidad (on Mex. 80), 13 Aug. 1960 (D. Campbell, J. Anderson), penultimate ♂. **Nayarit:** Aaponeta, 20 Nov. 1939 (C. M. Bogert, H. E. Vokes), ♀♀, ♂. Jesús Maria, 1–15 July 1955 (B. Malk-

in), ♂. 21 mi. S Tepic, 4 Aug. 1956 (W. J. Gertsch, V. Roth), ♂.

Loxosceles boneti Gertsch

Figures 228–231, 240–243; Map 8

Loxosceles boneti Gertsch, 1958, p. 23, figs. 39–41, 74–76. Brignoli, 1976, p. 137.

DIAGNOSIS: Receptacles of epigynum (figs. 240–243) bearing principal, curved lobe attached near middle; tibia of male palpus (figs. 228–231) less than half as long as deep, and curved embolus slightly longer than width of bulb.

FEMALE (Acapulco, Guerrero): Length 8.6. Carapace 3.6 long, 2.8 wide. Abdomen 5 long, 3.5 wide. Carapace dusky yellow to reddish brown with pattern of *colima* (fig. 17) distinctly marked on most specimens. Clypeus 0.48 long, more than two diameters of median eye; eyes 0.22 in long diameter. Median eyes separated from anterior lateral eyes by less than long diameter (19/22).

	I	II	III	IV	Palp
Femur	5.10	5.20	4.75	5.10	1.20
Patella	1.30	1.35	1.20	1.20	0.50
Tibia	5.00	5.30	4.00	4.60	0.85
Metatarsus	5.10	5.60	4.70	5.60	—
Tarsus	1.50	1.45	1.20	1.30	1.20
Total	18.00	18.90	15.85	17.80	3.75

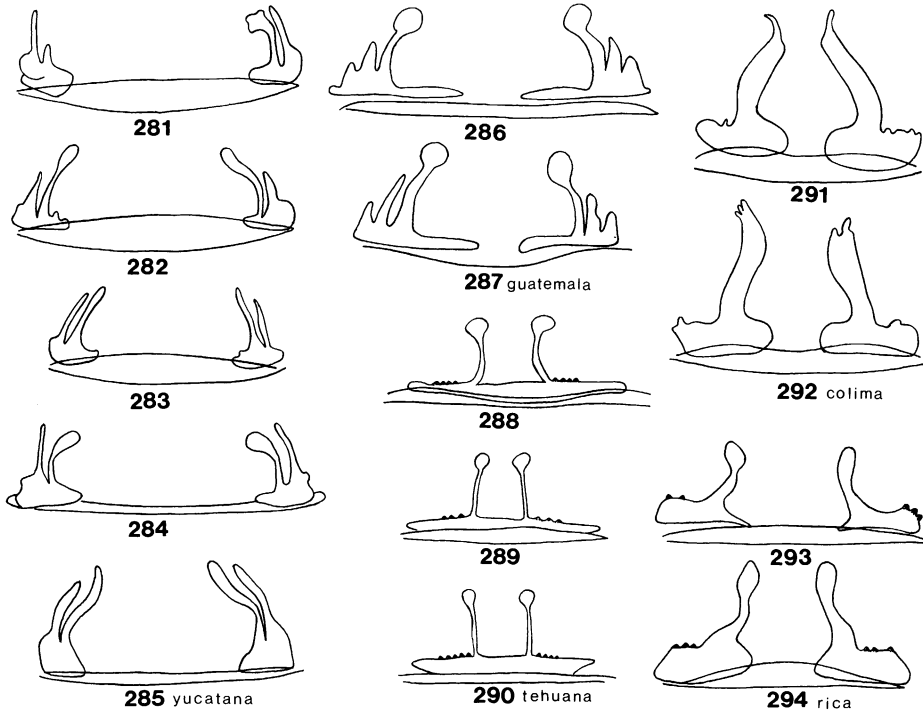
Leg formula 2143. First leg 5 times, first femur 1.4 times, second leg 5.2 times, second femur 1.44 times as long as carapace.

EPIGYNUM (figs. 240–243): Receptacles quite near together at midline, each receptacle with moderately elevated lobe on outside and principal tubular lobe curved from near middle.

MALE HOLOTYPE: Length 8.3. Carapace 3.6 long, 3 wide. Abdomen 4.7 long, 2.7 wide. Median eyes separated from lateral eyes by less than diameter (15/22).

	I	II	III	IV	Palp
Femur	6.35	6.75	5.75	6.15	1.70
Patella	1.30	1.30	1.25	1.25	0.65
Tibia	7.00	7.35	5.35	6.00	1.00
Metatarsus	7.00	8.00	6.50	7.30	—
Tarsus	1.60	1.50	1.25	1.45	0.60
Total	23.25	24.90	20.10	22.15	3.95

Leg formula 2143. First leg 6.4 times, first femur 1.7 times, second leg 6.9 times, second femur 1.8 times as long as carapace.



FIGS. 281–285. *Loxosceles yucatana* Chamberlin and Ivie, epigyna. Yucatan: 281. Pox Cave. 282–283. Tekax. 284. Kaua Cave. Guatemala: 285. Tikal, probably this species.

FIGS. 286–287. *Loxosceles guatemala* Gertsch, epigyna (Alto Verapaz, Guatemala).

FIGS. 288–290. *Loxosceles tehuana* Gertsch, epigyna. 288. Oaxaca: San Geronimo. 289–290. Juan Garcia.

FIGS. 291–292. *Loxosceles colima* Gertsch, epigyna. 291. Across from Colima line on Hwy. 110, Michoacan. 292. Colima, Colima.

FIGS. 293–294. *Loxosceles rica*, new species, epigyna. Costa Rica: 293. Tilaran, Las Canas. 294. No specific locality.

MALE PALPUS (figs. 228–231): Femur more than five times as long as wide (170/32); tibia stout, less than twice as long as deep (100/65); bulb broadly oval with thin, curved embolus slightly longer than width of bulb (45/40).

TYPE DATA: Male holotype from Acapulco, Guerrero, Mexico, 17 June 1938 (L. I. Davis), deposited in AMNH.

DISTRIBUTION: Gertsch (1958) recorded this species from 10 localities in the Mexican states of Guerrero, Puebla, and Morelos (map 8).

NEW RECORDS: MEXICO: Guerrero: Tierra Colorado, 22 July 1972 (A. R. Brady, A. Jung), ♀ from under rocks. 65 mi. N Acapulco, 18 Jan. 1976 (C. Rudolph, J. W. Row-

land), ♀. 10 mi. N Zumpango del Río, 23 July 1972 (A. R. Brady), ♀, 2 penultimate ♂♂ under rocks. **Puebla:** Acatero Canyon, 13 mi. N Acatlán, 21 July 1972 (A. Jung), ♂. **Morelos:** Cuernavaca, 3 May 1963 (W. J. Gertsch, W. Ivie), ♂. 5 mi. S Cuernavaca, 9 Dec. 1948 (E. S. Ross), ♀ in CAS. 4 mi. W Cuernavaca, 8 Dec. 1948 (E. S. Ross), ♀ in CAS. Palo Bolero, 7 Aug. 1961 (B. Malkin), 4♀♀. Tepotzlán, 6–7 Aug. 1961 (B. Malkin), 3♀♀, ♂. W. Huajmitlán, 6 May 1963 (W. J. Gertsch, W. Ivie), ♂.

Loxosceles misteca Gertsch
Figures 260–263, 268–272; Map 9

Loxosceles misteca Gertsch, 1958, p. 27, figs. 63–65; 1973, p. 158.

DIAGNOSIS: Receptacles of epigynum (figs. 260–263), with heavy curved lobe arising near middle; male palpus (figs. 268–272) with tibia about twice as long as deep and thick embolus longer than width of bulb.

FEMALE (Cacahuamilpa Cave, Guerrero): Length 8.3. Carapace 3.75 long, 3.5 wide. Abdomen 5 long, 3 wide. Base color of carapace yellowish to orange with dusky pattern like that of *colima* (fig. 17) faintly indicated but often shown only as dusky pars cephalica and median groove. Median eyes in advance of line along front edges of anterior lateral eyes by one-third diameter and separated from them by more than long diameter (23/18).

	I	II	III	IV	Palp
Femur	6.00	6.80	5.70	6.15	1.30
Patella	1.15	1.25	1.20	1.25	0.50
Tibia	7.00	7.60	5.15	6.10	0.95
Metatarsus	6.60	7.30	5.75	7.00	—
Tarsus	1.40	1.40	1.30	1.40	1.25
Total	22.15	24.35	19.10	21.90	4.00

Leg formula 2143. First leg 5.9 times, first femur 1.6 times, second leg 6.5 times, second femur 1.8 times as long as carapace.

EPIGYNUM (figs. 260–263): Receptacles separated by about half basal width at midline, with rounded lobes on inner and outer sides; heavy, apically enlarged lobe arising at middle and curved toward inner side.

MALE HOLOTYPE: Length 7. Carapace 3.25 long, 3 wide. Abdomen 4 long, 2.6 wide. Median eyes separated from anterior lateral eyes by long diameter.

	I	II	III	IV	Palp
Femur	5.00	6.70	5.40	5.85	1.75
Patella	1.25	1.25	1.15	1.15	0.75
Tibia	7.30	8.25	5.35	5.80	1.20
Metatarsus	6.50	7.50	5.85	6.50	—
Tarsus	1.50	1.55	1.20	1.35	0.45
Total	21.55	25.25	18.95	20.65	4.15

Leg formula 2143. First leg 6.6 times, first femur 1.5 times, second leg 7.7 times, second femur twice as long as carapace.

MALE PALPUS (figs. 268–272): Femur less than five times as long as broad (175/36); tibia more than twice as long as deep (120/55); bulb broadly oval with thick embolus

abruptly produced to thin spine in apical third, longer than width of bulb (52/40).

TYPE DATA: Male holotype from Taxco, Guerrero, Mexico, Fall 1946 (L. Isaacs), deposited in AMNH.

DISTRIBUTION: Mexican states of Guerrero and Mexico (map 9).

RECORDS: MEXICO: Guerrero: Gertsch (1973, p. 158) recorded *misteca* from the following caves: Grutas de Cacahuamilpa, Grutas de El Mogote, Pozo Meléndez, Cueva de Carlos Pacheco. Mexico: Gertsch (1973 p. 158) recorded *misteca* from Grutas de la Estrella.

Loxosceles yucatanana Chamberlin and Ivie
 Figures 18, 264–267, 281–285; Map 11

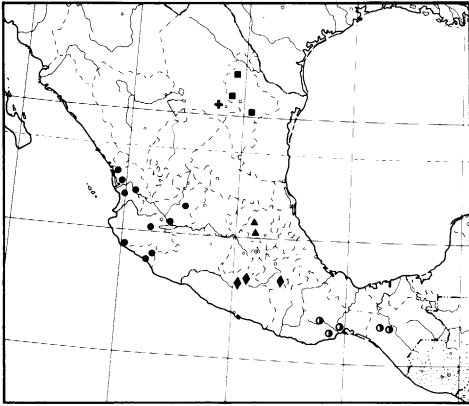
Loxosceles yucatanana Chamberlin and Ivie, 1938, p. 126, fig. 3. Roewer, 1942, p. 321. Bonnet, 1957, p. 2579. Gertsch, 1958, p. 20, figs. 33–35, 94; 1973, p. 161. Brignoli, 1976, p. 137.

DIAGNOSIS: Dark species of Yucatan Peninsula and adjacent areas; receptacles of epigynum (figs. 281–285) narrow, widely separated, each with two thin lobes; tibia of male palpus (figs. 264–267) more than twice as long as deep and thin embolus slightly longer than width of bulb.

FEMALE: Length 8.7. Carapace 3.7 long, 3 wide. Abdomen 5.5 long, 3.5 wide. Carapace uniform dull yellowish to bright orange with following pale markings (fig. 18): narrow band beginning on each side of pars cephalica, there widened and running irregularly back to near posterior declivity, about as wide as entire dark orange side band. Abdomen gray to dusky. Median eyes situated behind line along front edges of anterior lateral eyes and separated from them by less than long diameter (20/25).

	I	II	III	IV	Palp
Femur	5.50	5.80	5.00	5.50	1.35
Patella	1.25	1.30	1.25	1.20	0.60
Tibia	5.50	5.85	4.75	5.30	1.00
Metatarsus	5.15	5.50	4.80	5.75	—
Tarsus	1.35	1.35	1.15	1.35	1.25
Total	18.75	19.80	16.95	19.10	4.20

Leg formula 2413. First leg 5 times, first femur 1.5 times, second leg 5.3 times, second femur 1.6 times as long as carapace.



MAP 10. Mexico and adjacent areas, showing distributions of *Loxosceles colima* (circles), *L. candela* (square), *L. zapoteca* (diamonds), *L. nahuana* (triangles), *L. tehuana* (half-filled circles), and *L. huasteca* (cross).

EPIGYNUM (figs. 281–285): Narrow receptacles widely separated by two or more times basal width, each with two thin lobes of which inner ones apically enlarged.

MALE: Length 6.7. Carapace 3.2 long, 2.7 wide. Abdomen 4.2 long, 2.3 wide. Coloration most often paler than that of female, with pale lateral stripes distinct.

	I	II	III	IV	Palp
Femur	6.70	7.50	6.20	6.50	1.40
Patella	1.20	1.20	1.20	1.15	0.50
Tibia	7.50	8.40	5.70	6.50	0.90
Metatarsus	7.30	8.50	7.00	7.80	—
Tarsus	1.65	1.65	1.30	1.60	0.30
Total	24.35	27.25	21.40	23.55	3.10

Leg formula 2143. First leg 7.6 times, first femur 2.1 times, second leg 8.5 times, second femur 2.3 times as long as carapace.

MALE PALPUS (figs. 264–267): Femur more than five times as long as wide (140/25); tibia more than twice as long as deep (90/43); embolus subspherical with thin embolus not much longer than bulbal width (40/35).

TYPE DATA: Male holotype from Xtoloc Cenote Cave, Yucatán, Mexico, 16 June (A. S. Pearse), deposited in AMNH.

DISTRIBUTION: Mexican states of Campeche, Tabasco, Yucatán, and Quintana Roo; and Central American countries of Belize and Guatemala (map 11).

PUBLISHED RECORDS: MEXICO: Cham-

berlin and Ivie (1938, p. 126) recorded this species from 10 caves of Yucatán; Gertsch (1958, p. 21) four localities of Yucatán; Gertsch (1977, p. 104) from 19 caves of Yucatán and one locality in Campeche. BELIZE: Río Frio Cave A, Augustine, 458 m., 20 Aug. 1972 (S. Peck), ♂, 5♀♀, ○ (Gertsch, 1973, p. 161). GUATEMALA: Cueva Najohnaj Coholunich, El Petén, 14 km. SW Flores, 25 Aug. 1972 (S. and J. Peck), 8 subadults. (Gertsch, 1973, p. 161) El Peten: Uaxactun, March–Apr. 1961 (H. H. Bartlett), 6♀♀. Petén: Tikal, Sept. 1959 (N. L. H. Krauss), ♀. Cueva del Tepesciuntla, 240 m., Río Usuonacinta, Yaxchilán, 13 Mar. 1971 (V. Sbordoni), 3♀♀, 2○○ (Brignoli, 1976).

Loxosceles tehuana Gertsch

Figures 277–280, 288–290; Map 10

Loxosceles tehuana Gertsch, 1958, p. 26, figs. 45–47, 97; 1973, p. 158.

DIAGNOSIS: Reddish brown species with faint pale pattern and short legs (first leg of female 4.1 times, of male 5 times as long as carapace). Receptacles of epigynum (figs. 288–290) very thin finger-like lobes with terminal bulb; male palpus (figs. 277–280) with thickened femur and tibia and thin embolus nearly twice as long as width of bulb.

FEMALE: Length 9.6. Carapace 4.6 long, 3.6 wide. Abdomen 5.2 long, 4 wide. Carapace reddish brown with only faint indications of yellowish bands, suggestive of those of *yucatanana*, bordering pars cephalica and running back to posterior declivity. Abdomen gray. Median eyes about half radius in front of line along front edges of anterior lateral eyes and separated from them by more than full diameter (30/22).

	I	II	III	IV	Palp
Femur	5.25	5.60	5.00	5.50	1.50
Patella	1.45	1.50	1.50	1.50	0.60
Tibia	5.50	5.75	4.20	5.35	0.85
Metatarsus	5.50	5.75	5.25	6.50	—
Tarsus	1.25	1.25	1.15	1.25	1.50
Total	18.95	19.85	17.10	20.10	4.45

Leg formula 4213. First leg 4.1 times, first femur 1.1 times, second leg 4.3 times, second femur 1.2 times as long as carapace.

EPIGYNUM (figs. 288–290): Narrow transverse receptacles confluent at midline, each

with long thin forwardly directed tubular lobe bearing apical bulb.

MALE HOLOTYPE: Length 8. Carapace 4.2 long, 3.35 wide. Abdomen 4 long, 2.2 wide. Median eyes lying radius in front of line along front edges of anterior lateral eyes and separated from them by about one and one-half diameters.

	I	II	III	IV	Palp
Femur	5.70	6.50	5.60	5.90	1.75
Patella	1.50	1.50	1.35	1.35	0.65
Tibia	6.10	6.70	5.10	6.00	1.15
Metatarsus	6.35	7.20	6.20	7.50	—
Tarsus	<u>1.50</u>	<u>1.50</u>	<u>1.30</u>	<u>1.50</u>	<u>0.50</u>
Total	21.15	23.40	19.55	22.25	4.05

Leg formula 2413. First leg 5 times, first femur 1.35 times, second leg 5.5 times, second femur 1.5 times as long as carapace.

MALE PALPUS (figs. 277–280): Femur thick, more than three times as long as wide (175/50); tibia about 1.6 times longer than deep (115/70). Bulb subglobose, with thin embolus nearly twice as long as width of bulb (37/20).

TYPE DATA: Male holotype from Tehuantepec, Oaxaca, Mexico, 22 December 1947 (T. MacDougall), in AMNH; locality incorrectly cited in Gertsch, 1958, as from Chiapas.

DISTRIBUTION: States of Oaxaca and Chiapas, Mexico (map 10).

RECORDS: MEXICO: Oaxaca: Tehuantepec, 1 Sept. 1964 (J. and W. Ivie), 200. 12 mi. NW Tehuantepec, 1 Sept. 1964 (J. and W. Ivie), 200. Summit SW Najapa, 29 Aug. 1966 (J. and W. Ivie), ♀♀, 300. W Tequisistlán, 29 Apr. 1963 (W. J. Gertsch, W. Ivie), ♀. Juan García, 1 Sept. 1964 (J. and W. Ivie), ♂, ♀, ○. San Jeronimo, July 1909 (A. Petrunkovitch), female allotype (Gertsch, 1958), p. 27. **Chiapas:** Tuxtla Gutierrez, 23 June 1950 (C. L. Goodnight, L. J. Stannard), immature female. Cueva del Tempisque, 8 mi. W. Ocozocoautla, 17 August 1967 (J. Reddell, T. R. Evans), ♀ (Gertsch, 1973, p. 158).

Loxosceles guatemala Gertsch

Figures 286–287; Map 11

Loxosceles guatemala Gertsch, 1973, p. 161, fig. 34.

DIAGNOSIS: Typical species of *reclusa* group from Guatemala: receptacles of epigynum (figs. 286–287) moderately separated and with

two accessory lobes outside of principal, apically enlarged one. Male unknown.

FEMALE HOLOTYPE: Length 9.8. Carapace 4.2 long, 3.4 wide. Abdomen 5.6 long, 3.5 wide. Base color of cephalothorax and appendages bright orange with following markings: carapace with dusky brown Y-shaped marking and dusky bands along sides. Abdomen whitish. Median eyes separated from anterior lateral eyes by long diameter.

	I	II	III	IV	Palp
Femur	6.70	7.50	6.50	6.70	1.50
Patella	1.50	1.60	1.50	1.40	0.62
Tibia	7.40	7.85	6.00	6.75	1.10
Metatarsus	7.00	7.85	6.70	7.85	—
Tarsus	<u>1.70</u>	<u>1.70</u>	<u>1.50</u>	<u>1.65</u>	<u>1.50</u>
Total	24.30	26.50	22.20	24.35	4.72

Leg formula 2413. First leg 5.8 times, first femur 1.6 times, second leg 6.3 times, second femur 1.8 times as long as carapace.

EPIGYNUM (figs. 286–287): Receptacles narrow, moderately separated at midline, each with principal tubular lobe enlarged at apex and two smaller lobes on outer side.

TYPE DATA: Female holotype from Cueva Lanquin, Lanquin, Alta Verapaz, Guatemala, 28 August 1969 (S. and J. Peck), deposited in AMNH.

DISTRIBUTION: Guatemala (map 11).

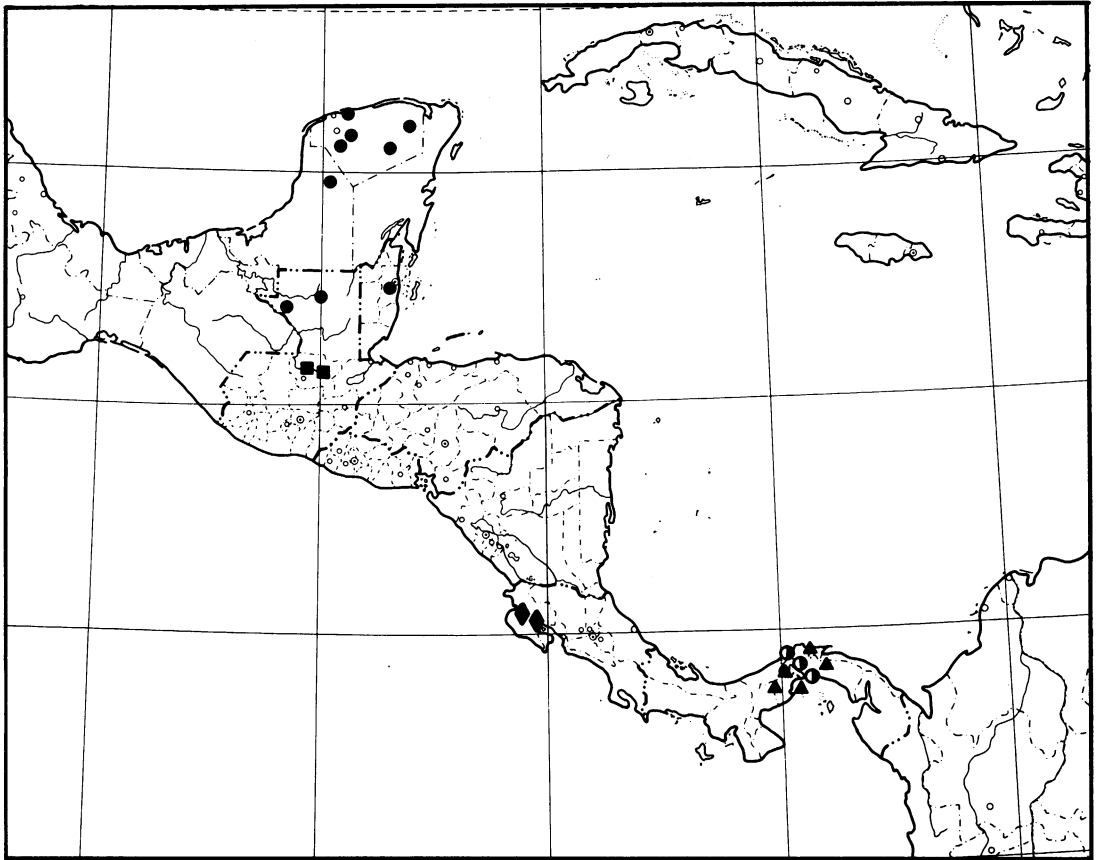
RECORDS: GUATEMALA: La Cueva del Camino, 5.3 mi. SW Flores, 20 June 1977 (R. W. Mitchell, F. E. Abernethy, W. L. Rhodes), 2♀♀, 300. Guatemala City, 15 Apr. 1938, 300. Alta Verapaz: Cueva Lanquin, Lanquin, 28 Aug. 1969 (S. and J. Peck), 3♀♀, ○; Cemetery Cave, Lanquin, 1022 ft. (N. Sullivan), ○.

Loxosceles rica, new species

Figures 293–294; Map 11

DIAGNOSIS: Typical species of *reclusa* group from Costa Rica: receptacles of epigynum with single prominent lobe arising from inner side. Male unknown.

FEMALE HOLOTYPE: Length 9. Carapace 4.1 long, 3.2 wide. Abdomen 5 long, 3 wide. Base color of carapace and appendages dark orange with following markings: carapace with dark brown Y-shaped marking and irregular brown marginal band along sides of pars thoracica. Abdomen dusky above. Median eyes separated from anterior lateral eyes by long diameter.



MAP 11. Southern Mexico and Central America, showing distribution of native *Loxosceles*: *L. yucatanana* (circles), *L. guatemala* (squares), *L. rica* (diamonds), *L. rufipes* (half-filled circles), and *L. panama* (triangles).

	I	II	III	IV	Palp
Femur	5.40	6.00	5.20	5.50	1.30
Patella	1.25	1.50	1.25	1.30	0.50
Tibia	5.50	6.00	4.50	5.45	0.80
Metatarsus	5.30	5.75	5.00	6.10	—
Tarsus	1.30	1.35	1.20	1.50	1.20
Total	18.75	20.60	17.15	19.85	3.80

Leg formula 2413. First leg 4.5 times, first femur 1.3 times, second leg 5 times, second femur 1.4 times as long as carapace.

EPIGYNUM (figs. 293–294): Receptacles separated at midline by about two-thirds width, each with principal lobe arising from inner side and outer margin with several small cusps.

TYPE DATA: Female holotype from Tilarán, Cañas, Costa Rica (Carlos E. Valerio),

deposited in Museo de Zoología, Universidad de Costa Rica, San José, Costa Rica.

DISTRIBUTION: Costa Rica (map 11).

RECORDS: COSTA RICA: ♀ with presumed locality data of holotype, in AMNH. Boca de Barranca, near Punta Arenas, 30 July 1975 (J. Hayes), subadult ♀ probably this species.

Loxosceles reclusa Gertsch and Mulaik

Figures 8–11, 16, 20–23, 36–41; Map 2

Loxosceles reclusa Gertsch, 1958, p. 7.

INFORMATION DATA: For fuller synonymies, type localities, diagnoses, keys, descriptive information of males and females, and locality records for *reclusa* and the following species *devia* and *apachea*, see The *reclusa* Group in the United States.

DISTRIBUTION: Central United States and northeastern Mexico. MEXICO: **Tamaulipas**: Only two records (map 2).

Loxosceles devia Gertsch and Mulaik
 Figures 1-7, 12-15, 28-31, 42-46; Map 5

Loxosceles devia Gertsch, 1958, p. 11.
Loxosceles bolivari Gertsch, 1958, p. 22, figs. 42-44; male holotype, not female.

DISTRIBUTION: Southern Texas and adjacent states of Tamaulipas and Nuevo León, Mexico (map 5).

Loxosceles apachea, new species
 Figures 64-67, 92-96; Map 5

Loxosceles arizonica: Gertsch, 1958, pp. 13-14;
 Part: locality records of Chihuahua, Zacatecas, and Durango.

DISTRIBUTION: Eastern Arizona, New Mexico, southward into adjacent states of Chihuahua, Zacatecas, and Durango, Mexico (map 5).

THE *RECLUSA* GROUP IN THE WEST INDIES

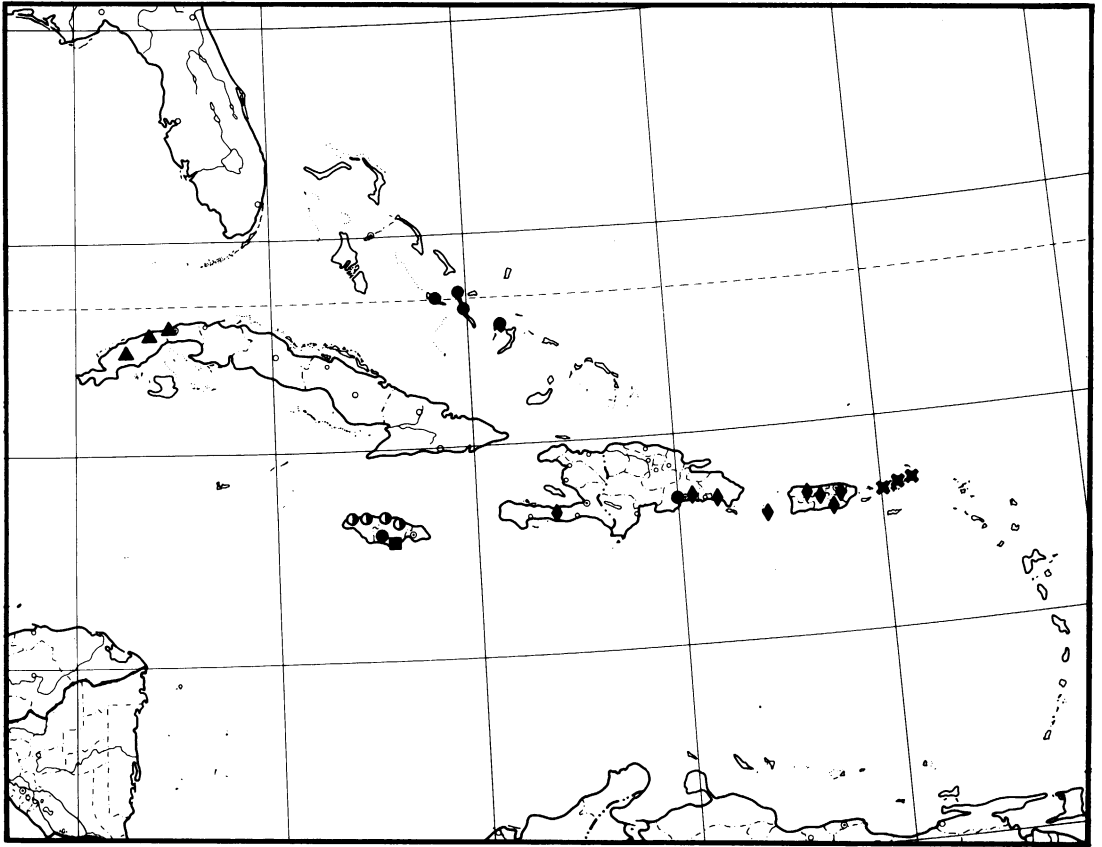
The first definitive record of *Loxosceles* from the West Indies was that of Petrunkevitch (1929). For the common species of that island he used the name *rufescens*, thus mistakenly following earlier workers who presumed that this European taxon was widely distributed in the Americas. In 1958 Gertsch revised the Puerto Rican species to which he gave the name *caribbaea*, and concluded that it was not even a close relative of *rufescens* but was a typical member of the exclusively North American *reclusa* group. Six species now are known from the West Indies on the basis of recent new collections. These resemble most closely such strongly marked species of eastern Mexico as *yucatanana* and *boneti* and they are presumed to have been derived from that continental fauna. The typical pattern of the group is shown for *caribbaea* (fig. 19) and features a series of pale spots enclosed in the dark side bands on the pars thoracica, giving the carapace a speckled appearance. This pattern is evident in immature specimens of all the species and in most of the adults, as well, but in mature *taino* the spotting is more or less masked by

uniform brown. The close relationship of the six taxa suggests that all are derivatives of a single colonization that occupied and adapted to the various islands.

As far as is known most West Indian *Loxosceles* live under objects and debris on the ground and in human litter but some are cave dwellers; since they live inside or outside of caves with apparent success, they can be classified at most as troglophiles. The cavernicoles of *caribbaea* from Puerto Rico differ little from those occupying surface habitats. On the other hand, those from caves of Jamaica (taken during recent expeditions by Dr. Stewart Peck and his associates) show more than superficial cave adaptation by loss of dark pigment and notable reduction of eye size and curvature change. The name *jamaica* is given to male and female specimens taken in several caves in six parishes of Jamaica. The taxon named *jarmila* features pale females with reduced eyes and derivative epigyna and obtained from two caves in Clarendon Parish. No surface examples of these relatives of *caribbaea* are yet known from Jamaica in spite of the fact that much intensive collecting has been done during recent years. The situation here is analogous to that of the nesticid *Gaucelmus cavernicola* (Petrunkevitch) which shows modest cave adaptation and seems to be exclusively limited to cave habitats of Jamaica. Finally, from the Bahama Islands and Jamaica, there is a large brownish epigeal species, herein named *taino*, which has the segments of the male palpus greatly thickened and large receptacles in the epigynum.

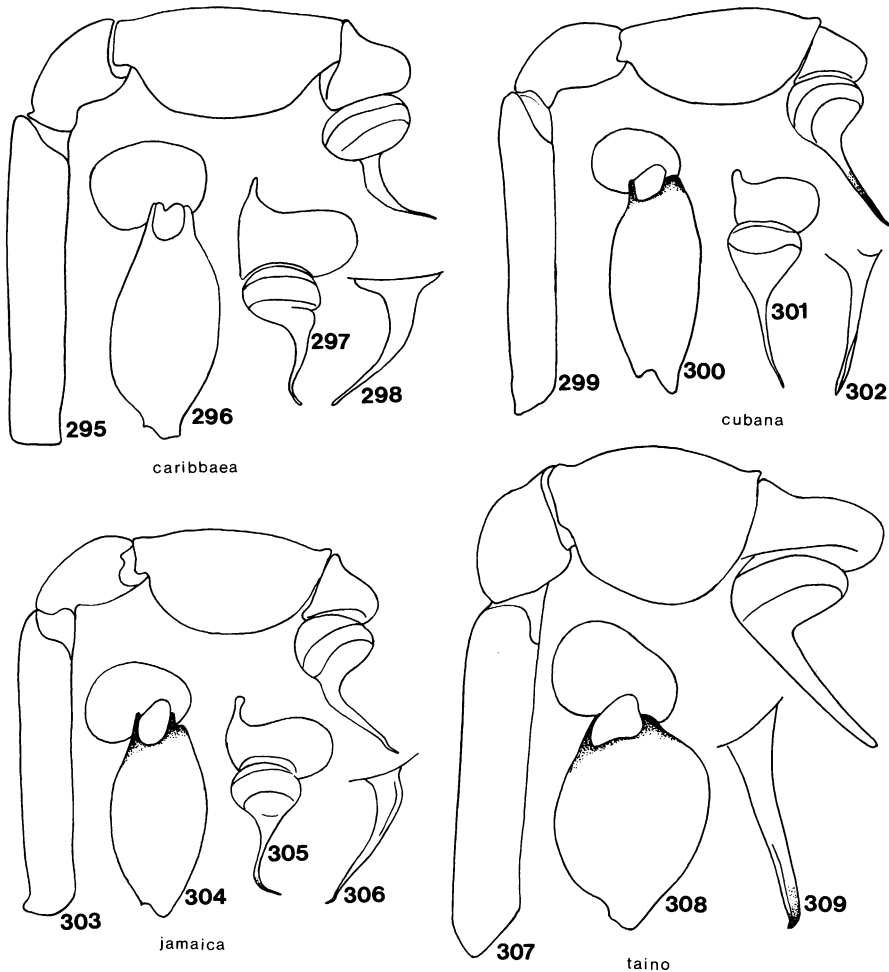
KEY TO WEST INDIAN SPECIES

1. Females 2
 Males 7
2. Receptacles of epigynum (figs. 310-313) voluminous, separated pouches with weakly elevated lobes; Bahama Islands and Jamaica *taino*, new species
 Receptacles narrow, closer together, with elevated finger-like lobes. 3
3. Median eyes separated from lateral eyes by two diameters; receptacle of epigynum (fig. 327) with single coiled lobe; Portland and Jackson Bay Caves of Jamaica *jarmila*, new species
 Median eyes separated from anterior lateral eyes by little more than long diameter 4



MAP 12. West Indies and adjacent areas, showing distribution of *Loxosceles cubana* (triangles), *L. jamaica* (half-filled circles), *L. jarmila* (square), *L. taino* (closed circles), *L. caribbaea* (diamonds), and *L. virgo* (crosses).

- | | |
|---|---|
| <p>4. Lobes of receptacles essentially straight fingers directed forward 5
 Lobes of receptacles coiled inwardly 6</p> <p>5. Lobes of about equal length, outer one heavier (figs. 314–317); Virgin Islands
 <i>virgo</i>, new species</p> <p>Outer lobe shorter (figs. 328–331); Cuba and Haiti
 <i>cubana</i> Gertsch</p> <p>6. Anterior eye row less recurved: median eyes touching line along front edges of anterior lateral eyes; epigyna variable (figs. 318–323); Puerto Rico
 <i>caribbaea</i> Gertsch</p> <p>Anterior eye row more recurved: median eyes full radius in front of line along front edges of anterior lateral eyes; epigyna variable (figs. 324–326); cave species of Jamaica
 <i>jamaica</i>, new species</p> <p>7. Male palpus (figs. 307–309) with subglobose tibia and thick straight embolus; Bahama Is-</p> | <p>lands, Jamaica and Dominican Republic ..
 <i>taino</i>, new species</p> <p>Male palpus with tibia about twice as long as deep 8</p> <p>8. Embolus essentially straight (figs. 301–302); Cuba and Haiti
 <i>cubana</i> Gertsch</p> <p>Embolus curved 9</p> <p>9. Embolus (figs. 297–298) shorter, less curved apically; Puerto Rico ..
 <i>caribbaea</i> Gertsch</p> <p>Embolus (figs. 305–306) longer, thinner and sinuous at apex; Jamaica
 <i>jamaica</i>, new species</p> <p style="text-align: center;"><i>Loxosceles caribbaea</i> Gertsch
 Figures 19, 295–298, 318–323; Map 12</p> <p><i>Loxosceles rufescens</i>: Petrunkevitch, 1929, p. 108, figs. 92–96.</p> <p><i>Drymusa nubila</i>: Lutz, 1915, p. 80.</p> |
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FIGS. 295–298. *Loxosceles caribbaea* Gertsch (Corozal, Puerto Rico), right male palpus. 295. Retrolateral view. 296. Tibia and tarsus, dorsal view. 297. Tarsus and bulb, apical view. 298. Embolus, prolateral view.

FIGS. 299–302. *Loxosceles cubana* Gertsch (Candela, Cuba), right male palpus. 299. Retrolateral view. 300. Tibia and tarsus, dorsal view. 301. Tarsus and bulb, apical view. 302. Embolus, prolateral view.

FIGS. 303–306. *Loxosceles jamaica*, new species (Runaway Caves, St. Ann Parish, Jamaica), right male palpus. 303. Retrolateral view. 304. Tibia and tarsus, dorsal view. 305. Tarsus and bulb, apical view. 306. Embolus, prolateral view.

FIGS. 307–309. *Loxosceles taino*, new species (Darby Island, Exuma Islands, Bahama Islands), right male palpus. 307. Retrolateral view. 308. Tibia and tarsus, dorsal view. 309. Embolus, prolateral view.

Loxosceles caribbaea Gertsch, 1958, p. 15, figs. 15, 54–56, 78–79. Part, not Jamaican record.

DIAGNOSIS: Standard species of *reclusa* group from West Indies; receptacles of epigynum (figs. 318–323) usually bearing single

elevated lobe and small accessory lobe on outer side; male palpus (figs. 295–298) bearing curved embolus longer than width of bulb.

FEMALE (Corozal, Puerto Rico): Length 8. Carapace 3.8 long, 3.3 wide. Abdomen 5.5

long, 3.3 wide. Cephalothorax and appendages yellowish brown. Carapace (fig. 19) orange-brown, darkest in mature specimens, with following yellowish bands: on margin of pars thoracica series of four or five pale marginal spots enclosed by dark side stripe; on each side of pars cephalica narrow pale stripe running from front back to posterior declivity; enclosed in median dark stripe and flanking median groove pair of small pale spots; pale markings usually enlarged in immature specimens and males. Abdomen gray. Clypeus 0.53 long, equal to two and one-half times as long as median eye; eyes oval, subequal, 0.20 in long diameter; median eyes touching line along front edges of anterior lateral eyes and separated from them by long diameter.

	I	II	III	IV	Palp
Femur	7.00	7.60	6.15	6.25	1.50
Patella	1.35	1.40	1.30	1.25	0.53
Tibia	7.45	8.25	5.25	5.80	1.05
Metatarsus	7.25	8.60	6.50	7.40	—
Tarsus	1.50	1.50	1.20	1.30	1.30
Total	24.55	27.35	20.40	22.00	4.38

Leg formula 2143. First leg 6.4 times, first femur 1.8 times, second leg 7.2 times, second femur twice as long as carapace.

EPIGYNUM OF COROZAL SPECIMENS (figs. 318–322): Presenting narrow transverse receptacles moderately separated at midline, bearing single elevated lobe rounded at apex and from which originate smaller lobes on outside. Epigynum of female from Mona Island (fig. 323).

MALE HOLOTYPE: Length 8. Carapace 3.6 long, 3.3 wide. Abdomen 4.8 long, 3 wide. Coloration like that of female. Clypeus 0.5 long, more than twice as long as median eye; eyes subequal, oval, 0.21 in long diameter; median eyes touching line along front edges of anterior lateral eyes and separated from them by narrow diameter (19/21).

	I	II	III	IV	Palp
Femur	8.60	10.15	7.50	7.50	1.60
Patella	1.60	1.60	1.50	1.50	0.65
Tibia	9.60	11.80	6.80	6.80	1.10
Metatarsus	9.65	12.50	8.60	9.30	—
Tarsus	1.65	1.70	1.25	1.45	0.35
Total	31.10	37.75	25.65	26.55	3.70

Leg formula 2143. First leg 8.6 times, first femur 2.4 times, second leg 10.5 times, second femur 2.8 times as long as carapace.

MALE PALPUS (figs. 295–298): Femur five times as long as wide; tibia about twice as long as deep (110/52); bulb suboval, with curved embolus longer than bulbal width (55/46), with tip small curved hook.

TYPE DATA: Male holotype from Corozal, Puerto Rico, in AMNH.

DISTRIBUTION: Puerto Rico and Dominican Republic (map 12).

RECORDS: PUERTO RICO: Corozal, 2 July 1915, ♂, numerous ♀♀; 31 Jan. 1931 (A. S. Mills), ♀, ♂ from cave. Cueva de Corozal, 1 Jan. 1967 (S. Peck), ♀, ♂♂ from cave entrance. Quebradillos: 6 Jan. 1967 (S. Peck), ♂; Tunnel Cave, 23 July 1915, ♂. Aguas Buenas Cave, Aguas Buenas, 13 Feb. 1968 (M. B. Fenton), ♂. Cueva de Cerro San José, Carolina, 24 Dec. 1966 (S. Peck), ♂. Cueva de los Alfaros, Barrio Mora, 28 July 1958 (A. F. Archer, F. J. Rolle), ♂. Cueva Murcielagos, Guanica Forest, 12–14 June 1974 (S. and J. Peck), 9♂♂. Singing Hole, Sardinera, 3 June 1974 (S. Peck), ♀. Cueva Pájaros, 7 June 1974 (S. Peck), ♂. Cueva Cabro, Camino Cabro, 4 June 1974 (S. Peck), 2♂♂. MONA ISLAND: 21 Feb. 1914, ♂. DOMINICAN REPUBLIC: Río Chavón: near La Romana, 20 July 1935 (W. G. Hassler); 31 July 1935 (W. G. Hassler), ♀. Ciudad Trujillo, 1916 (K. P. Schmidt), ♀.

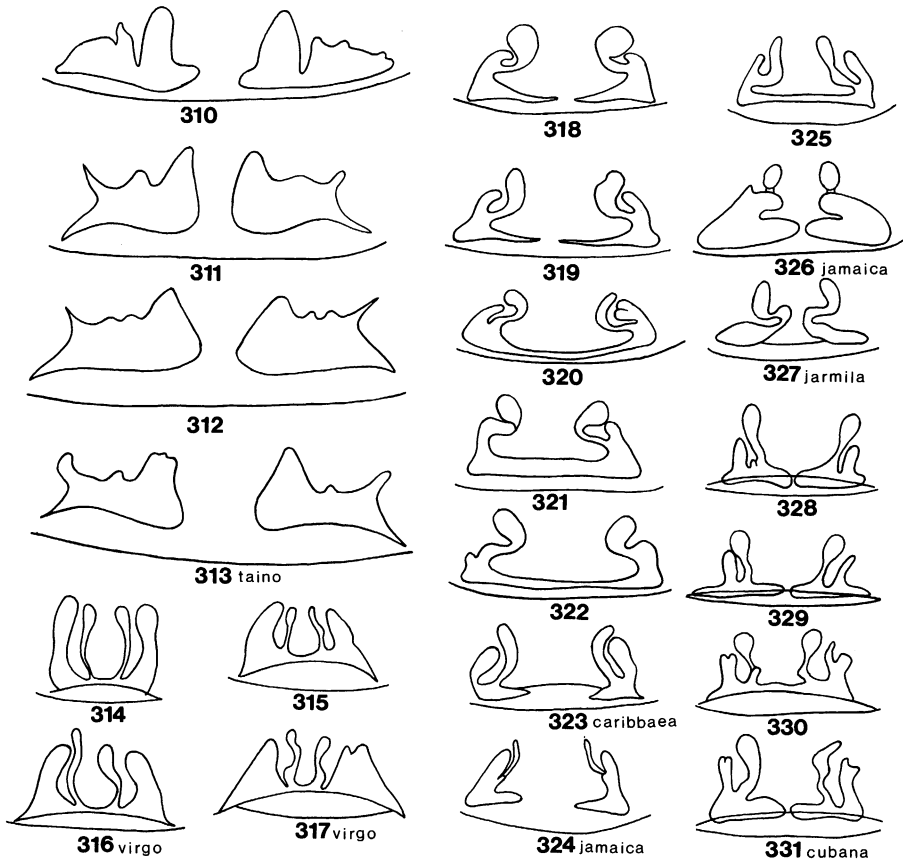
Loxosceles virgo, new species

Figures 314–317; Map 12

DIAGNOSIS: Near relative of *caribbaea* known only from Virgin Islands, with shorter legs and distinctive epigynum: receptacles (figs. 314–317) with outer lobe larger than inner one. Male unknown.

ETYMOLOGY: Specific name from Latin *virgo*, virgin, in reference to Virgin Islands.

FEMALE (Little Tobago Island): Length 9.1. Carapace 4 long, 3.8 wide. Abdomen 5.5 long, 2.8 wide. Coloration like that of *caribbaea*: carapace with typical yellowish spots and bands of pattern reduced in size but distinct against dark reddish brown base color. Median eyes full diameter from anterior lateral eyes (24/20).



FIGS. 310–313. *Loxosceles taino*, new species, epigyna. Bahama Islands: 310. Marsh Harbor. Jamaica: 311–313. Mandeville.

FIGS. 314–317. *Loxosceles virgo*, new species, epigyna. U.S. Virgin Islands: 314. Thatcher Cay. British Virgin Islands: 315–316. Tortola. 317. Little Jost Van Dyke.

FIGS. 318–323. *Loxosceles caribbaea* Gertsch, epigyna. Puerto Rico: 318–322. Corozal. 323. Mona Island.

FIGS. 324–326. *Loxosceles jamaica*, new species, epigyna. Jamaica: 324. Mt. Plenty Cave. 325. Runaway Cave. 326. Hope Gate Cave.

FIG. 327. *Loxosceles jarmila*, new species, epigynum (Portland Ridge Cave).

FIGS. 328–331. *Loxosceles cubana* Gertsch, epigyna. Haiti: 328. Near Miragoane, probably this species. Cuba: 329. Candela. 330. Soledad. 331. University Hill, Havana.

	I	II	III	IV	Palp
Femur	6.25	6.75	5.65	5.90	1.50
Patella	1.20	1.25	1.20	1.20	0.60
Tibia	6.20	7.25	4.85	5.50	1.15
Metatarsus	6.15	7.20	5.80	6.70	—
Tarsus	1.35	1.40	1.15	1.20	1.40
Total	21.15	23.85	18.65	20.50	4.65

Leg formula 2143. First leg 5.3 times, first

femur 1.5 times, second leg 5.9 times, second femur 1.7 times as long as carapace.

EPIGYNUM (figs. 314–317): Narrow transverse receptacles indistinctly divided at midline; each receptacle with voluminous outer lobe and smaller finger-like innerlobe.

TYPE DATA: Female holotype from Little Tobago Island, British Virgin Island, 4 April 1966, deposited in AMNH.

DISTRIBUTION: Known only from the Virgin Islands (map 12).

RECORDS: BRITISH VIRGIN ISLANDS: Tortola: Greater Camanoe Island, 1 July 1965, ♂; Prickly Pear Island, 6 June 1966, ♂. Virgin Gorda: Coppermine Train, 25 June 1966, ♂; Baths and Devil's Bay, 25 June 1966, ♂; Virgin Gorda Mountain, 25 May 1966, ♂; Ginger Island, 25 May 1966, ♂; Little Jost Van Dyke Island, 27 July 1965, ♀ (collected by University of Puerto Rico staff); Sage Mountain, 20 July 1965, ♀, ♂; Great Thatch Island, 30 June 1965, ♂ (collected by H. Heatwole, R. Levins, and F. Mackenzie). AMERICAN VIRGIN ISLANDS: Tobago Island, 2 Apr. 1966, 3♂♂. Hans Lollick Island, 6 Apr. 1966, ♂ (collected by University of Puerto Rico staff). Water Island, 13 Aug. 1966 (M. L. Presick), ♂.

Loxosceles cubana Gertsch

Figures 299–302, 328–331; Map 12

Loxosceles rufipes var *rufescens*: Franganillo, 1935, p. 76; 1936, p. 43.

Loxosceles rufescens: Bryant, 1940, p. 287.

Loxosceles cubana Gertsch, 1958, p. 19, figs. 51–53, 81.

DIAGNOSIS: Cuban relative of *caribbaea* with distinctive genitalia: receptacles of epigynum (figs. 328–331) with two principal lobes projecting forward, inner ones larger; embolus of male palpus (fig. 302) essentially straight.

FEMALE (Candela, Cuba): Length 7.5. Carapace 3.35 long, 3 wide. Abdomen 4.5 long, 2.5 wide. Coloration and structure like those of *caribbaea*. Median eyes about long diameter from anterior lateral eyes (20/21).

	I	II	III	IV	Palp
Femur	5.35	5.70	4.30	5.00	1.30
Patella	1.20	1.20	1.20	1.20	0.50
Tibia	5.40	6.00	4.20	4.70	0.90
Metatarsus	5.00	5.10	4.80	5.70	—
Tarsus	1.20	1.15	1.10	1.30	1.25
Total	18.15	19.15	15.60	17.90	3.95

Leg formula 2143. First leg 5.4 times, first femur 1.6 times, second leg 5.7 times, second femur 1.7 times as long as carapace.

EPIGYNUM (figs. 328–331): Narrow receptacles nearly touching at midline, each with two forwardly projecting lobes, outer one typically shorter.

MALE HOLOTYPE: Length 7.1. Carapace 3.3 long, 3 wide. Abdomen 4.3 long, 2 wide. Median eyes less than diameter from lateral eye (20/18).

	I	II	III	IV	Palp
Femur	5.85	6.50	5.20	5.40	1.60
Patella	1.30	1.25	1.15	1.10	0.60
Tibia	5.10	7.35	4.70	5.20	1.00
Metatarsus	5.40	7.25	5.75	6.30	—
Tarsus	1.25	1.20	1.15	1.20	0.26
Total	18.90	23.55	17.95	19.20	3.46

Leg formula 2413. First leg 5.7 times, first femur about 1.8 times, second leg 7.1 times, second femur 1.9 times as long as carapace.

MALE PALPUS (figs. 299–302): Femur nearly five times as long as wide; tibia twice as long as broad (100/46); suboval bulb with slightly curved embolus longer than bulbal width (45/40).

TYPE DATA: Male holotype from Candela, Cuba (P. Bermudez), in AMNH.

DISTRIBUTION: Cuba and Haiti (map 12).

RECORDS: CUBA: Candela (P. Bermudez), 3♀♀. University Hill, Havana, 6 Nov. 1915, ♀. Soledad, 20 July 1931 (L. G. Worley), ♀, ♂♂ from under rock in quarry, in MCZ. Vilches Cave, Soledad, 14 Aug. 1931 (L. G. Worley and N. Banks), ♀♀, in MCZ. HAITI: Near Miragoane, 30 Dec. 1973 (R. Bell), ♀.

Loxosceles jamaica, new species

Figures 303–306, 324–326; Map 12

DIAGNOSIS: Cavernicole relative of *caribbaea* known only from Jamaica, with thinner legs and distinctive genitalia: receptacles of epigynum (figs. 324–326) with two lobes of variable length; male palpus (figs. 303–306) with tarsal lobe more expanded, bulb ovate and embolus forming long sinuous curve.

ETYMOLOGY: Specific name for Jamaica, used in apposition.

FEMALE (Runaway Caves): Total length 8. Carapace 3.75 long, 3.3 wide. Abdomen 5 long, 3.5 wide. Coloration yellowish brown with pattern like that of *caribbaea* except as follows: lateral dark band more dissected, narrower, leaving pale stripes wider; median dark band faint or missing behind; in some specimens darker bands faintly indicated. Clypeus 0.5 long, equal to about two and one-half diameters of median eye; eyes subequal

in size, 0.18 in long diameter; median eyes full radius in front of line along front edges of anterior lateral eyes and more than diameter from anterior lateral eyes (28/18).

	I	II	III	IV	Palp
Femur	6.35	7.15	5.60	6.15	1.40
Patella	1.25	1.00	1.25	1.30	0.50
Tibia	6.60	7.10	5.00	6.00	0.75
Metatarsus	6.10	6.80	6.00	6.75	—
Tarsus	1.50	1.50	1.25	1.40	1.20
Total	21.80	23.55	19.10	21.60	3.85

Leg formula 2413. First leg 5.8 times, first femur 1.7 times, second leg 6.3 times, second femur 1.9 times as long as carapace.

EPIGYNUM (figs. 324–326): Receptacles variable in size, with two lobes of variable length, inner one not much enlarged at apex.

MALE HOLOTYPE: Length 7.4. Carapace 3.25 long, 3.15 wide. Abdomen 3.7 long, 2.5 wide. Coloration like that of female. Median eyes separated from anterior lateral eyes by full diameter.

	I	II	III	IV	Palp
Femur	6.25	7.30	5.70	5.80	1.75
Patella	1.25	1.25	1.20	1.20	0.60
Tibia	7.00	7.75	5.30	5.70	1.00
Metatarsus	6.50	8.15	6.25	7.00	—
Tarsus	1.45	1.60	1.35	1.35	0.30
Total	22.45	26.05	19.80	21.05	3.65

Leg formula 2143. First leg 6.9 times, first femur 1.9 times, second leg 8 times, second femur 2.2 times as long as carapace.

MALE PALPUS (figs. 303–306): Femur seven times as long as wide (175/25); tibia twice as long as deep (10/5); bulb oval with embolus curved sinuously, ending in fine point, longer than width of bulb (50/36).

TYPE DATA: Male holotype from Hope Gate Cave, 3.5 mi. E Falmouth, Trelawny Parish, 30 October 1973 (R. Norton), deposited in AMNH.

DISTRIBUTION: Caves of Jamaica (map 12).

RECORDS: JAMAICA: *St. Ann Par.*: Runaway Caves, Runaway Bay, 29 Dec. 1972 (S. and J. Peck), 2♂♂, 3♀♀, 10○○. Mt. Plenty Cave, Goshen, 20 Aug. 1974 (S. Peck), ♀, ○. *St. Mary Par.*: Rock Spring Cave, Pear Tree Grove, 21 Aug. 1974 (S. Peck), 3♂♂, 3♀♀, 4○○. *Clarendon Par.*: Providence Cave, Montego Bay, 5 Mar. 1911, ♂. *Hanover Par.*: Cousins

Cave Cave #1, Cousins Cove, 21 Aug. 1974 (W. Peck), ♀. *Trelawny Par.*: Hope Gate Cave, 3.5 mi. E Falmouth, 30 Oct. 1973 (N. Norton), ♀. Carambie Cave, Spring Garden, 4 Sept. 1974 (S. Peck), ♀.

Loxosceles jarmila, new species

Figure 327; Map 12

DIAGNOSIS: Cavernicole derivative of *jamaica* from Jackson Bay and Portland caves, Jamaica, with single coiled lobe on receptacle of epigynum (fig. 327). Male unknown.

ETYMOLOGY: Named for Mrs. Jarmila Peck.

FEMALE HOLOTYPE: Length 9. Carapace 3.5 long, and wide. Abdomen 5.5 long, 3.5 wide. Cephalothorax and carapace yellowish in base color; carapace with faint brownish markings in pattern of *jamaica* but sides of pars thoracica showing only faint smudges. Abdomen whitish. Clypeus 0.5 long, equal to two and one-half diameters of median eye; eyes round, subequal, about 0.13 in long diameter; median eyes full radius in front of line along front edges of anterior lateral eyes and two diameters from lateral eyes (13/26).

	I	II	III	IV	Palp
Femur	6.80	7.35	6.00	6.25	1.20
Patella	1.10	1.15	1.10	1.15	0.85
Tibia	7.30	7.60	5.50	6.35	0.40
Metatarsus	6.75	7.75	6.50	7.75	—
Tarsus	1.65	1.60	1.40	1.50	1.30
Total	23.60	25.45	20.50	23.00	3.75

Leg formula 2143. First leg 6.7 times, first femur 1.9 times, second leg 7.3 times, second femur 2.1 times as long as carapace.

EPIGYNUM (fig. 327): Narrow receptacles close together at midline, each with single inwardly coiled lobe.

TYPE DATA: Female holotype from Jackson Bay Cave, Jackson Bay, Clarendon Parish, December 1972 (S. and J. Peck), deposited in AMNH.

DISTRIBUTION: Jackson Bay Cave and Portland Caves of Clarendon Parish, Jamaica (map 12).

RECORDS: JAMAICA: *Clarendon Par.*: Jackson Bay Cave, Jackson Bay, 8 Aug. 1974 (S. Peck), ○; Dec. 1972 (S. and J. Peck), ♀. Portland Caves, Portland Ridge, 22 Dec. 1972 (S. and J. Peck), ○; 15 Aug. 1974 (S. Peck), 2♀♀, 5○○.

***Loxosceles taino*, new species**

Figures 307–313; Map 12

DIAGNOSIS: Large brown relative of *caribbaea* with derivative genitalia: receptacles of epigynum (figs. 310–313) thick pouches with rounded lobe on inner side and other variable lobes; male palpus (figs. 307–309) with all segments thickened and embolus longer than width of bulb.

ETYMOLOGY: Named for the extinct aboriginal people, Taino, formerly inhabiting the West Indies; name used in apposition.

FEMALE (Mandeville, Jamaica): Length 11. Carapace 4.7 long, 3.8 wide. Abdomen 6.5 long, 5 wide. Carapace dark reddish brown, with faint darker lines on pars cephalica, but typical yellowish markings of *caribbaea* largely masked by dark color. Clypeus 0.5 long, equal to about two diameters of anterior median eye; eyes subequal, about 0.23 in long diameter; anterior median eyes full radius in front of line along front edges of anterior lateral eyes and more than full diameter from anterior lateral eyes (35/23).

	I	II	III	IV	Palp
Femur	7.50	7.70	6.50	7.00	1.70
Patella	1.65	1.65	1.50	1.50	0.70
Tibia	7.75	8.00	5.70	6.50	1.20
Metatarsus	8.20	8.90	7.00	8.00	—
Tarsus	1.50	1.50	1.35	1.50	1.75
Total	26.60	27.75	22.05	24.50	5.35

Leg formula 2143. First leg 5.6 times, first femur 1.6 times, second leg 5.9 times, second femur 1.6 times as long as carapace.

EPIGYNUM (figs. 310–313): Heavy broad receptacles moderately to widely separated at midline. Each pouch with fairly large, rounded lobe on inner side and two smaller ones on outer portion; details variable in four epigyna illustrated.

MALE HOLOTYPE: Length 9. Carapace 4.3 long, 4 wide. Abdomen 5 long, 3 wide. Coloration, clypeus and eye relations like those of female.

	I	II	III	IV	Palp
Femur	8.50	9.75	8.00	8.10	2.00
Patella	1.70	1.75	1.70	1.70	0.75
Tibia	9.40	11.00	7.70	8.00	1.10
Metatarsus	10.65	12.50	9.75	10.60	—
Tarsus	1.80	1.80	1.80	1.80	0.12
Total	32.05	36.80	28.95	30.20	3.97

Leg formula 2143. First leg 7.45 times, first femur about twice, second leg 8.5 times, second femur 2.2 times as long as carapace.

MALE PALPUS (figs. 307–309): All segments thickened; femur four times as long as wide or deep; tibia subglobose, with narrow neck at base but remainder as broad and deep as long; bulb oval with thick embolus longer than width of bulb (80/63); tip of embolus slightly narrowed and grooved.

TYPE DATA: Male holotype from Darby Island, Exuma Islands, Bahamas, 18 January 1955 (E. B. Hayden), deposited in AMNH.

DISTRIBUTION: Bahama Islands, Jamaica, and Dominican Republic (map 12).

RECORDS: BAHAMA ISLANDS: Marsh Harbor, Great Abaco Island, 6 May 1953 (E. B. Hayden, Giovannoli), ♀, ♂, in AMNH. W Church Grove, Crooked Island, Sept. 1958 (A. W. Scott, Jr.), ♂ in MCZ. Clarence Town, Long Island, July 1936 (W. Clench), ♂ in MCZ; 14 Mar. 1953 (E. B. Hayden, Giovannoli), ♂ in AMNH. Simons, Long Island, 19 July 1936, ♂ in MCZ. JAMAICA: Mandeville (W. M. Mann), ♂, 3♀♀ in MCZ. DOMINICAN REPUBLIC: Ciudad Trujillo, ♀ in AMNH.

THE *LAETA* AND *RUFESCENS* GROUPS

Species of the *laeta* and *rufescens* groups (and all other *Loxosceles* from other parts of the world outside of North America) have the tarsi of the male palpi longitudinally developed. Their tarsi are typically as long or somewhat longer than wide as viewed from above, and not at all flared prolaterally into a rounded lobe, which is exclusive to the *reclusa* group. Most African species conform fully to this pattern but one of them, *speluncarum* Simon, from caves in South Africa (Newlands, 1975) has the palpal tarsus as long as the tibia. In terms of this feature this species can be seen as the most generalized or the most derivative member of the genus. Most South American species have the tarsi substantially shorter than the tibiae. The *laeta* group is strongly represented in South America with 24 described species mostly found in the western part. Only *rufipes* and *panama* are endemic taxa in Central America and these are relatives of such South American species as *lawrencei* Caporiacco of Venezuela and

inca Gertsch of Peru, and of various others (Gertsch, 1967). A third much larger species, *laeta*, is believed to have been brought by trade into Guatemala and Belize (formerly British Honduras) and is now established there and possibly in some other parts of Central America. The well-known wandering propensity of *laeta* led to its sporadic introduction into several locations in the United States and Canada. Finally, the fourth species of this section is *Loxosceles rufescens* (tentatively assigned full group status), which probably originally came from the Europe-North Africa fauna and is now established widely in many parts of the world, having been carried there by various trade vehicles.

In color pattern and basic somatic features the species of the *laeta* group present few differences from those of the *reclusa* group or other groups of the world. In general, the seminal receptacles of the epigyna are distinctive enough for the species but offer little of significance for group separation. Some differences of importance are found in the eye size and eye relations of the *laeta* group. The eyes are proportionally smaller with resulting greater recurvature of the front row: a line along the front edges of the anterior lateral eyes falls below the median eyes by half a diameter or more; and the median eyes are separated from the anterior lateral eyes by 1.5 to 2 full diameters. By contrast, the eyes of the *reclusa* group are a little larger with the front row less recurved and the median eyes rarely more than a diameter from the anterior lateral eyes. Most of the general information given for the *reclusa* group applies equally as well to the species of the *laeta* and *rufescens* groups.

The two exotic spiders of this section deserve special mention. The species *Loxosceles laeta* (Nicolet) has gained worldwide attention through the years for several reasons: 1. controversy over establishment of its proper specific name; 2. its increasingly active introduction into widely separated stations of the world; 3. its reputation as a dangerous spider with a venom causing necrotic loxoscelism (this subject is treated in the Medical Review of *Loxosceles* in the Nearctic Region section). The arguments relative to proper use of a specific name for the taxon were presented in friendly fashion by Bücherl

(1960, 1962, etc.) for *rufipes* (Lucas), and by Gertsch (1961) for *laeta* (Nicolet), and in summary of the issue by Gertsch (1967, p. 126). There were good arguments on both sides but the case of *rufipes* was weakened by inadequate descriptive data and loss of the original specimen from Guatemala on which the name was based. The case for *laeta* is much better by reason of the fact that Simon (1907) is believed to have had Nicolet's basic material when he assigned all the Nicolet material to the single name *laeta*. Most arachnologists now use *laeta* as the name of long standing, widely used in biological and medical literature, and as a practical expedient for stability of names.

Of more immediate interest is the introduction of *laeta* into various parts of the world by trade vehicles. In 1960 Dr. H. W. Levi found a living male in the basement of the large Museum of Comparative Zoology building of Harvard University in Cambridge, Massachusetts and this was followed by discoveries of other specimens in succeeding years. In a paper dealing with this first introduction of *laeta* in a North American locality, Levi and Spielman (1964, pp. 132-136) gave details of their discovery and subsequent studies on their biology and control. The spider presumably had been brought into the building in shipments of material from South America and had been living there unnoticed for a long time, perhaps for as long as 20 years. Efforts to find specimens in other buildings on the university campus were unsuccessful. The infestation was centered in the basement of the museum where more than 50 adult specimens were initially captured, but a much larger number was obviously there during the following three month observation period. Remains of many kinds of arthropods in the webs showed that the spider had largely controlled the arthropod population infesting the storage areas. In this situation it can be claimed that the spiders exerted a beneficial economic influence. In retrospect, their presence seemed to have made unnecessary the control of fire-brats (a pest thysanuran) in the basement area. Chemical control of the spider infestation was accomplished by use of lindane spray. There is no reason to believe that these exotic spiders could exist in an outside environment in Massachusetts.

In 1972 Dr. Veikko Huhta reported much the same story of establishment of *laeta* in the zoology building of the University of Helsinki, in Finland. He had known of the spider since 1963 but positive identification was not made until 1971. The whole ground floor of the zoology building was infested, but no additional specimens were found in nearby buildings or brought in by people aroused by public announcement of this dangerous spider. Huhta believed that the spider was brought into Finland by ship from Porto Alegre, Brazil, or some similar port. Importation of spiders and other animals into the United States and temperate areas was a common occurrence years ago but the advent of refrigeration has limited the survival of such mostly tropical animals. Following his experience Huhta remarked, perhaps prophetically that "On the other hand, I consider it unlikely that the zoological department building in Helsinki is the only place in Europe where it is to be found."

On May 27, 1969, a mature male of *laeta* was discovered (by Mel Thompson) in the main recreation building of Memorial Park in Sierra Madre, California. A thorough search by Thompson and other members of the Society of Arachnologists of the Southwest, revealed that the entire building was infested. The Park was closed by the late William G. Waldron of the Los Angeles Health Department. An intensive survey of other park buildings and adjacent businesses and residences by county and state health workers revealed a widespread infestation along a five-block area. Live spiders were found in 12 buildings, and webbing and cast skins (exuviae) were observed in 14 other structures. Infestations were found in older structures, and gaps in the distribution appeared to be where older buildings had been removed or replaced by new ones.

The search by health officials and interested volunteers, including D. C. Lowrie, was expanded to adjacent communities and infestation was quickly found in many homes and places of business in three cities (Waldron, 1969). Spiders were subsequently found in the older business sections of three additional communities in the San Gabriel Valley area of Los Angeles County (Waldron, Madon, and Suddarth, 1975). Of the approxi-

mately 700 premises searched in six cities, 127 (18%) exhibited positive signs of infestation by *L. laeta*. The widening area occupied by *laeta* made it clear that the spider was already firmly established in domestic situations in California. This habitat seems to be preferred even in Peru and Chile, the original home of the spider, as well as in other parts of the world where it now exists or has become established. The campaign to control the infestation supervised by Waldron was not successful. Eventually he wrote as follows: "It would appear that *L. laeta* will not be eradicated from the Los Angeles area in spite of stringent control efforts at each place it is located." Extermination ardor has been tempered by the fact that up to the present time there have been no authentic records of bites in the infested area. The situation was summed up in an article in the Los Angeles Times of January 14, 1980, as follows: "Post-script: The Violin Spider is Still Playing His Song in the San Gabriel Valley."

The exotic species *Loxosceles rufescens* (Dufour) often has been designated as a "cosmopolitan" or "ubiquitous" species but its distribution pattern is not quite so simple as these adjectives imply. Its original home was the Mediterranean region of North Africa and Europe, where the species continues to be very common in domestic and outdoor habitats. Its wide but spotty distribution over much of the world, a range continuing to widen, marks it as one of the relatively few spiders (Berland, 1932, p. 394) that have been transported involuntarily by man in his ships, planes, and ground vehicles and now lives mainly in and around human habitations over much of the world. No records for *rufescens* have been reported from coastal and inland areas presumably available to it by commerce even though they might seem ideal for the establishment of stable populations. There are no authentic records of the species from Mexico, Central America, or South America even though the spider may have been introduced repeatedly into these areas by trade.

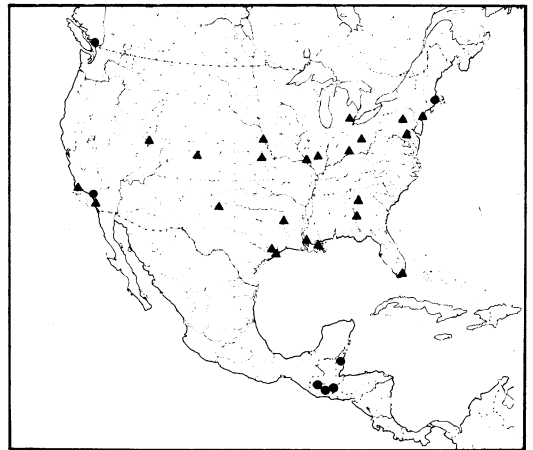
The name *rufescens* has been casually and quite incorrectly used by older workers in North and South America for eight or more species of *Loxosceles* belonging to very different species groups (Gertsch, 1967, p. 129). Petrunkevitch (1928) gave a detailed descrip-

tion of a species from Puerto Rico under that name and many authors, even including some from Europe, accepted this description as a comparison standard even though it belonged to a different species group. In North America *rufescens* occurs sparingly and mainly as a house spider in some of our northern states (map 13), where every year brings additional records of transfer by vehicles and in house effects, and more abundantly in domestic situations of the Gulf Coast area. It is the common and seemingly the only species found in Europe (Brignoli, 1976, p. 142) and also ranges widely into other temperate portions of the Holarctic Region, as far west as Japan. It has been introduced into many Pacific Islands, including the Hawaiian Islands (Suman, 1964; L. J. Pinter, personal commun.), and was reported by Gray (1974) and Southcott (1978) to be established in South Australia. Finally, it can be noted that *rufescens* is reputed to have a far less dangerous venom than that of *laeta*, *reclusa*, and some other species.

As a postscript to the above exotic wandering spiders, it can be noted that our endemic *reclusa* has been carried far outside its normal range by automobiles and other trade vehicles (map 2).

KEY TO SPECIES OF THE *LAETA*
AND *RUFESCENS* GROUPS

1. Females 2
Males 5
2. Receptacle of epigynum (fig. 347) with two lobes; Guatemala, Panama, and Colombia *rufipes* (Lucas)
Receptacle of epigynum with one principal lobe 3
3. Receptacle of epigynum (figs. 353–354) long, tubular, apically globose lobe; Guatemala, Belize, United States *laeta* (Nicolet)
Not so 4
4. Receptacle of epigynum (figs. 349–351) large rounded lobe near midline; introduced into United States (map 13)
..... *rufescens* (Dufour)
Receptacles of epigynum (figs. 345–346) short, widely separated; known only from Panama (map 11) *panama* Gertsch
5. Tibia of palpus (fig. 342) less than twice as long as depth; embolus shorter than width of bulb *rufescens* (Dufour)
Tibia of palpus more than twice as long as depth 6



MAP 13. North and Central America showing distribution of *Loxosceles rufescens* (triangles) and *L. laeta* (circles).

6. Embolus of palpus (fig. 337) thin, sinuous, more than twice as long as width of bulb; Guatemala, Panama, Colombia *rufipes* (Lucas)
Embolus shorter 7
7. Embolus of palpus (fig. 340) about as long as width of bulb; introduced into Guatemala, Belize, and United States (map 13)
..... *laeta* (Nicolet)
Embolus of palpus (fig. 334) much longer than width of bulb; known only from Panama (map 11) *panama* Gertsch

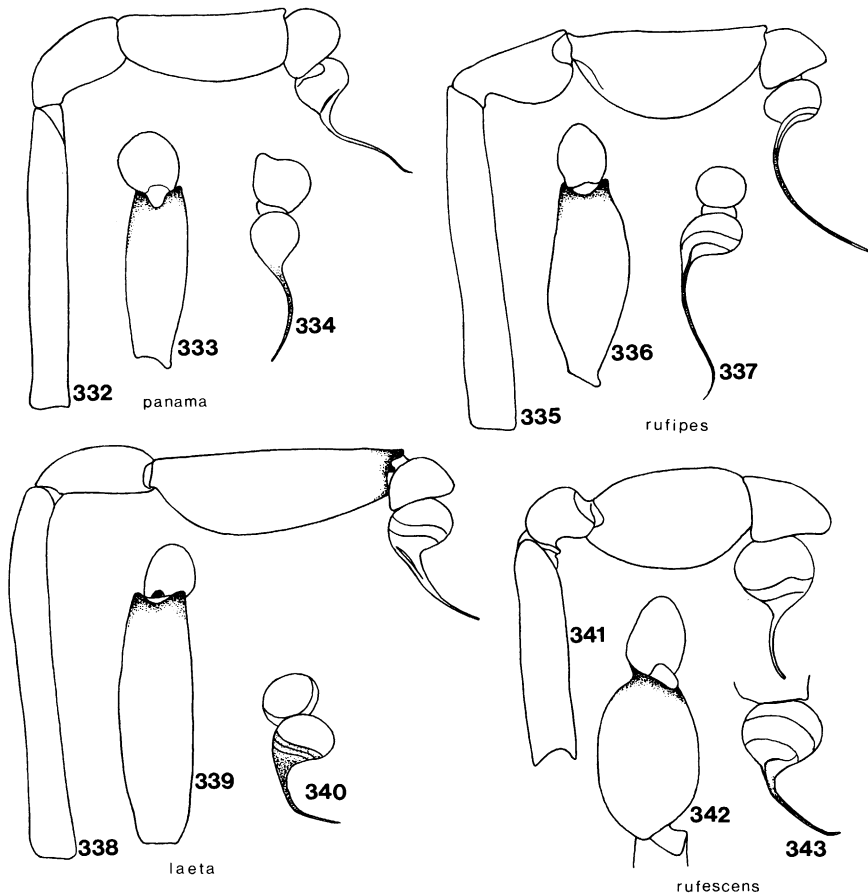
Loxosceles laeta (Nicolet)

Figures 338–340, 352–355; Map 13

Scytodes rufipes: Nicolet, in Gay, 1849, p. 348.
Scytodes laeta Nicolet, in Gay, 1849, p. 349.
Scytodes nigella Nicolet, in Gay, 1849, p. 350.
Loxosceles laeta: Simon, 1907, p. 246. Petrunkevitch, 1911, p. 118. Chamberlin, 1920, p. 40. Bonnet, 1957, p. 2574. Roewer, 1942, p. 320 (*Loxoscelis*). Gertsch, 1961, p. 2; 1967, p. 147. Galiano, 1967, p. 1. Galiano and Hall, 1973, p. 277. Levi and Spielman, 1964, p. 132. Brignoli, 1969, p. 140. Huhta, 1972, p. 152. (For fuller bibliographies of this widespread species, see Bonnet, 1957, and Gertsch, 1961.)

DIAGNOSIS: Nominate species of the *laeta* group with distinctive genitalia: epigynum (figs. 353–354) with slender tubular lobe with enlarged bulb at apex; male palpus (figs. 338–340) with long segments and curved embolus about as long as width of bulb.

FEMALE (Copan, Belize): Length 12. Car-



FIGS. 332-334. *Loxosceles panama* Gertsch (Barro Colorado Island, Panama), right male palpus. 332. Retrolateral view. 333. Tibia and tarsus, dorsal view. 334. Tarsus and bulb, apical view.

FIGS. 335-337. *Loxosceles rufipes* Dufour (Santa Rosa, Panama), right male palpus. 335. Retrolateral view. 336. Tibia and tarsus, dorsal view. 337. Tarsus and bulb, apical view.

FIGS. 338-340. *Loxosceles laeta* (Nicolet) (Guatemala City, Guatemala), right male palpus. 338. Retrolateral view. 339. Tibia and tarsus, dorsal view. 340. Tarsus and bulb, apical view.

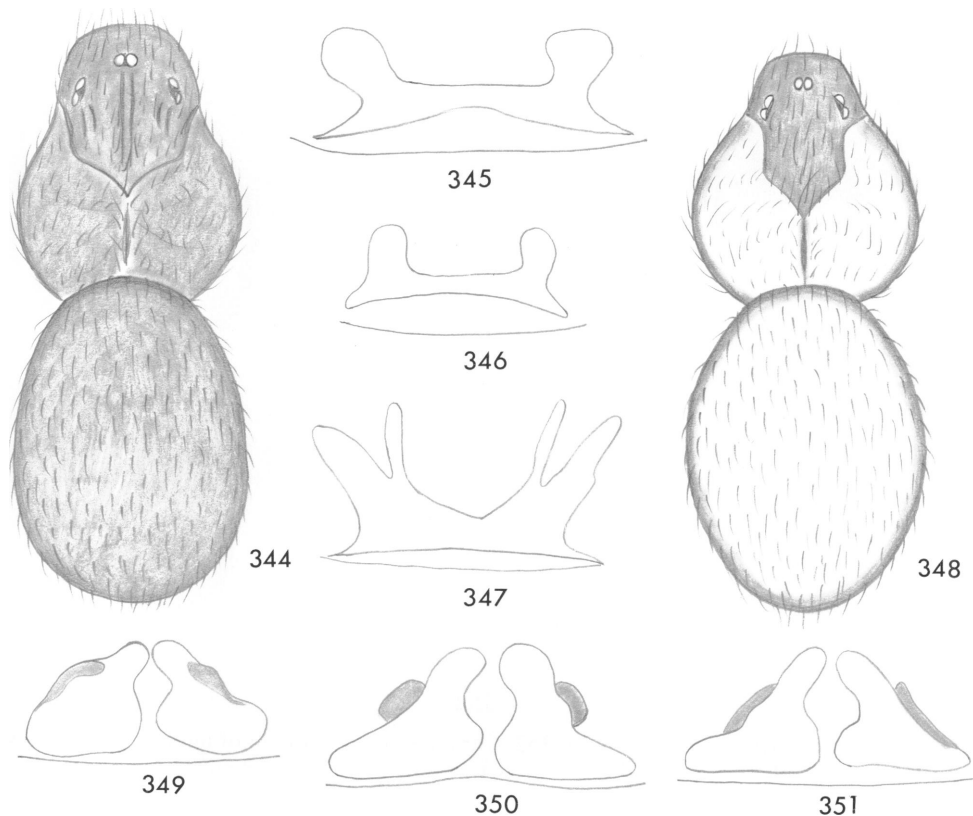
FIGS. 341-343. *Loxosceles rufescens* (Dufour) (Rome, Italy), right male palpus. 341. Retrolateral view. 342. Tibia and tarsus, dorsal view. 343. Bulb, apical view.

apace 5.6 long, 4.5 wide. Carapace and appendages bright yellowish to orange or reddish brown. Pars cephalica of female from Alhambra, California (fig. 352) with pattern of dark lines but often without traces of distinctive pattern. Abdomen gray to white, covered with black hairs to give dusky appearance. Clypeus 0.75 long, equal to three diameters of median eye; eyes rather small, 0.23 in long diameter, in quite strongly recurved row with line along front edges of anterior lateral eyes falling behind median eyes

by about radius; anterior median eyes separated from anterior median by 1.3 diameter.

	I	II	III	IV	Palp
Femur	6.15	6.50	6.30	7.20	2.00
Patella	2.00	2.00	1.85	2.00	0.80
Tibia	6.35	6.50	5.25	6.90	1.50
Metatarsus	6.20	6.80	6.50	8.10	—
Tarsus	1.80	1.85	1.75	2.00	2.00
Total	22.50	23.65	21.65	26.20	6.30

Leg formula 4213. First leg 4 times, first



FIGS. 344–346. *Loxosceles panama* Gertsch (Barro Colorado Island, Canal Zone, Panama), female. 344. Dorsal view, appendages omitted. 345. Epigynum (Panama City). 346. Epigynum (Chilibrillo Caves, Panama).

FIG. 347. *Loxosceles rufipes* Lucas, epigynum (Santa Rosa, Panama).

FIGS. 348–351. *Loxosceles rufescens* (Dufour), female. 348. Dorsal view, appendages omitted. 349–351. Epigyna: 349. Cincinnatti, Ohio. 350. Atlanta, Georgia. 351. Lubbock, Texas.

femur 1.1 times, second leg 4.2 times, second femur 1.1 times as long as carapace.

EPIGYNUM (figs. 353–354): Receptacles narrow at base, not much separated at midline, each with thin erect lobe with round apical enlargement.

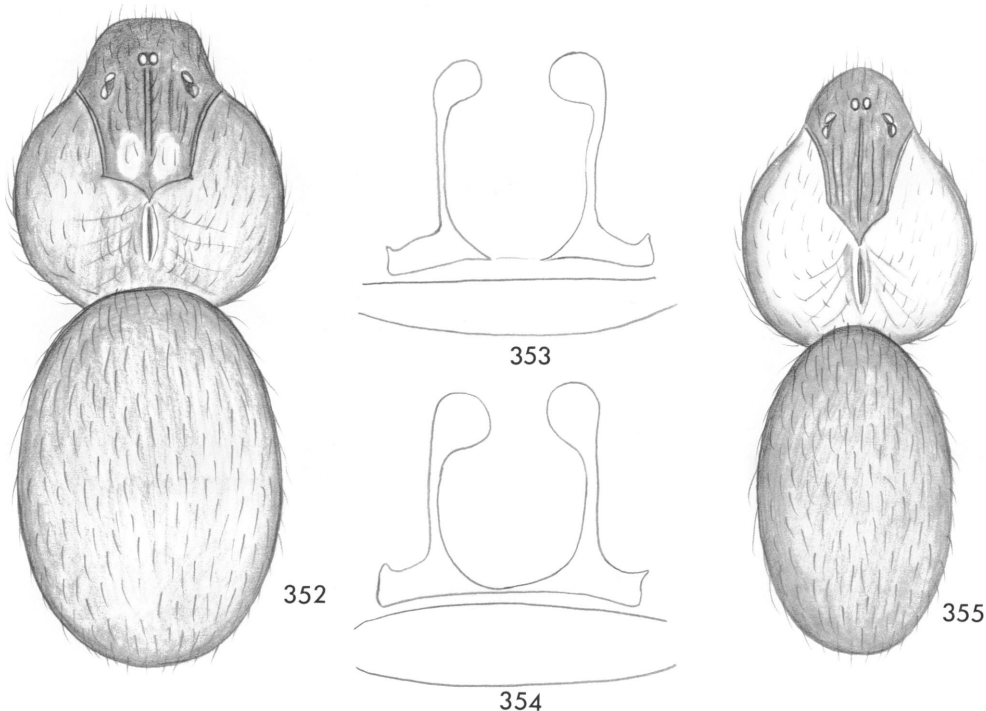
MALE (Copan, Belize): Length 9.4. Carapace 5 long, 4.1 wide. Abdomen 5 long, 2.7 wide. Coloration and structure (fig. 355) like those of female except as noted. Pars cephalica narrower; clypeus 0.5 long, equal to 2.3 times long diameter of median eye; front eye row less recurved with median eyes touching line along front edges of anterior lateral eyes and separated from them by less than full diameter.

	I	II	III	IV	Palp
Femur	7.00	8.00	7.10	8.40	4.20
Patella	1.80	1.80	1.75	1.80	1.30
Tibia	7.75	8.25	6.45	7.80	2.70
Metatarsus	8.00	9.00	7.70	9.75	—
Tarsus	2.15	2.25	1.80	2.20	0.50
Total	26.70	29.30	24.80	29.95	8.70

Leg formula 4213. First leg 5.3 times, first femur 1.4 times, second leg 5.8 times, second femur 1.6 times as long as carapace.

MALE PALPUS (figs. 338–340): Femur 8 times as long as wide; tibia about 3 times as long as deep; embolus curved, slightly longer than width of bulb.

TYPE DATA: Original specimens of *laeta*,



FIGS. 352–355. *Loxosceles laeta* (Nicolet). 352. Carapace and abdomen of female, dorsal view. 353. Epigynum (Alhambra, California). 354. Epigynum (Copan, Belize). 355. Carapace and abdomen of male, dorsal view.

nigella, and *rufipes* from Chile now lost. See Bonnet, 1957, p. 2574 and Gertsch, 1967, p. 147 for the many synonyms and locality information.

DISTRIBUTION: Species from Chile, Peru, Ecuador, and other parts of western South America; presumably introduced by trade into Argentina, Brazil, and adjacent countries, then northward from Colombia and Ecuador into Guatemala and Belize; more recently introduced by trade into the United States, Canada, Australia and Finland.

NORTH AMERICAN RECORDS (see map 13): **CANADA:** **British Columbia:** Vancouver, Summer 1961 (R. Leech), ♂ specimen found in house. **UNITED STATES:** **Massachusetts:** *Middlesex Co.:* Cambridge, Museum of Comparative Zoology buildings of Harvard Univ., Oct. 1960 (H. Levi), ♂; 1962 (R. Wheeler), ♀; Jan.–Feb. 1962 (H. Levi), ♂♂, ♀♀, ♂; Apr. 1962 (A. Spielman), ♂, ♀; 24 Apr. 1968 (C. Atlas), ♀. **Kansas:** Lawrence (T. B. Kurata), male in house (erroneously listed from

Toronto, Canada in Gertsch, 1967, p. 121). **California:** *Los Angeles Co.:* Alhambra, 14 July–19 Aug. 1969 (M. B. Madon, T. Suddarth), ♂♂, ♀♀; 11 Sept. 1969 (M. B. Madon, D. C. Lowrie, F. Ennik), ♂♂, ♀♀; 1 Nov. 1978 (F. Ennik), ♂♂, ♀♀. Highland Park, Monterey Park (M. B. Madon, T. Suddarth), ♂♂, ♀♀. San Gabriel City and Mission, 23 Sept. 1969, 28 Nov. 1969 (M. B. Madon, W. Waldron), ♂♂, ♀♀. Sierra Madre, 6, 27 June 1969 (M. B. Madon, T. Suddarth), ♂♂, ♀♀. **BELIZE:** Copán, 20 Mar. 1938 (P. Richard), ♂, ♀ and subadult ♂♂. **GUATEMALA:** Guatemala City, June–Oct. 1948 (B. Brown), ♂♂, ♀♀. San Pedro, Yecocapa, Mar.–June 1935 (H. Elishewitz), ♂. Chichicastenango, 6–7 Aug. 1947 (C. and P. Vaurie), ♂. Lake Atitlán, Mar. 1938 (P. Richard), subadult ♀♀.

Loxosceles rufipes (Lucas)
Figures 335–337, 347; Map 11

Scytodes rufipes Lucas, in, Guerin, 1834, p. 6.
Loxosceles rufipes: F. P.-Cambridge, 1899, p. 52.

Simon, 1907, p. 247. Petrunkevitch, 1911, p. 118 (Part). Chamberlin, 1920, p. 40. Caporiacco, 1938, p. 260. Bonnet, 1957, p. 2577. Roewer, 1942, p. 321 (*Loxoscelis*). Gertsch, 1958, p. 33; 1967, p. 166.

DIAGNOSIS: Relative of *panama* with shorter legs and distinctive genitalia: epigynum (fig. 347) with lobes of receptacles bifurcate; palpus (figs. 335–337) with patella incrassated and sinuous, embolus about three times as long as width of bulb.

FEMALE (Santa Rosa, Panama): Length 6.5. Carapace 2.6 long, 2.3 wide. Abdomen 3.9 long, 2.5 wide. Carapace dusky yellow to orange; pars cephalica dusky, with thin lines from eyes to cervical groove. Abdomen dusky. Clypeus 0.4 long, equal to nearly three diameters of median eye. Eyes small, about 0.16 in long diameter, in moderately recurved row with median eyes about half radius in front of line along front edges of anterior lateral eyes and separated from them by 1.5 diameters.

	I	II	III	IV	Palp
Femur	3.00	3.15	2.70	3.10	0.85
Patella	0.80	0.85	0.80	0.80	0.38
Tibia	2.75	3.00	2.25	2.75	0.70
Metatarsus	3.00	3.25	2.75	3.30	—
Tarsus	<u>1.10</u>	<u>1.00</u>	<u>0.80</u>	<u>1.00</u>	<u>0.92</u>
Total	10.65	11.25	9.30	10.95	2.85

Leg formula 2413. First leg 4.1 times, first femur 1.1 times, second leg 4.3 times, second femur 1.2 times as long as carapace.

EPIGYNUM (fig. 347): Receptacles confluent at midline, each with two principal lobes, inner one smaller.

MALE (Santa Rosa, Panama): Length 5.2. Carapace 2.5 long, 2.2 wide. Abdomen 2.7 long, 1.7 wide. Clypeus 0.3 long, about twice length of median eye. Eyes about 0.15 in long diameter, forming recurved row slightly above line along front edges of anterior lateral eyes and separated from them by long diameter.

	I	II	III	IV	Palp
Femur	4.00	4.25	3.50	4.00	1.70
Patella	0.80	0.80	0.80	0.80	0.70
Tibia	4.00	4.35	3.05	3.50	0.90
Metatarsus	4.40	4.70	4.00	4.70	—
Tarsus	<u>1.20</u>	<u>1.25</u>	<u>1.00</u>	<u>1.10</u>	<u>0.32</u>
Total	14.40	15.35	12.35	14.10	3.62

Leg formula 2143. First leg 5.8 times, first

femur 1.6 times, second leg 6.1 times, second femur 1.7 times as long as carapace.

MALE PALPUS (figs. 335–337): Femur thin, seven times as long as wide; patella as long as deep (70/32), inflated below; tibia about 2.5 times as long as deep (95/43); thin sinuate embolus about three times as long as width of bulb.

DISTRIBUTION: Guatemala, Panama, and Colombia (map 11).

RECORDS: GUATEMALA: No specific locality mentioned by Lucas (1834) for type female, or by F. P.-Cambridge (1899) of ♂♂ and ♀♀ in British Museum (Nat. Hist.). PANAMA: Santa Rosa, July 1945 (C. D. Michener), 2♂♂, 2♀♀. Panamá City, Feb. 1945 (C. D. Michener), ♂; 24 Dec. 1943 (D. L. Frizzell), ♀. Old Panamá City, 19 Aug. 1945 (C. D. Michener, E. Fichter), ♂, 2♀♀. COLOMBIA: Records not listed or mapped.

Loxosceles rufescens (Dufour)

Figures 341–343, 348–351; Map 13

Scytodes rufescens Dufour, 1820, p. 203.

Loxosceles rufescens: Simon, 1914, p. 75. Bonnet, 1957, p. 2575. Roewer, 1942, p. 319 (*Loxoscelis*). Gertsch, 1958, p. 31. Brignoli, 1969, pp. 140–161; 1976, pp. 129, 136. Madon and Hall, 1970, p. 91. Gray, 1974, p. 46. Southcott, 1976, p. 406; 1978, p. 5.

Loxosceles marylandica Muma, 1944, p. 2.

DIAGNOSIS: Species of Europe-North African fauna now with wide distribution in temperate and tropical areas, with distinctive genitalia: receptacles of epigynum (figs. 349–351) close together, produced into rounded lobes pointing to inner side; male palpus (figs. 341–343) with inflated tibia and curved embolus about as long as width of bulb.

FEMALE (Alto Douro, Portugal): Length 7.5. Carapace 3.2 long, 2.7 wide. Abdomen 4.5 long, 3 wide. Coloration and general appearance (fig. 348) like those of species of *reclusa* group. Carapace bright to dull orange-brown, often quite clear but sometimes showing lateral dusky lines on pars cephalica and dusky patches on sides of pars thoracica. Legs clear yellow to dusky orange, clothed with the usual rows of black hairs and setae. Abdomen gray to yellowish brown. Clypeus 0.15 long, more than 3 times long diameter of oval median eye. Eyes small, about 0.13 in long di-

ameter, in quite strongly procurved row; median eyes placed full diameter in front of line along front edges of lateral eyes and separated from them by two long diameters.

	I	II	III	IV	Palp
Femur	4.35	4.70	4.00	4.60	1.20
Patella	1.00	1.00	0.90	1.00	0.40
Tibia	4.50	4.80	3.60	4.20	0.80
Metatarsus	4.50	5.10	4.30	5.05	—
Tarsus	1.15	1.25	1.10	1.20	1.20
Total	15.50	16.85	13.90	16.05	3.60

Leg formula 2413. First leg 4.8 times, first femur 1.3 times, second leg 5.2 times, second femur 1.4 times as long as carapace.

EPIGYNUM (figs. 349–351): Receptacles large pouches nearly contiguous at midline, each with single large rounded lobe pointing to inner side and dark sclerotized band along outside face.

MALE (Rome, Italy): Length 7. Carapace 3 long, 2.6 wide. Abdomen 4 long, 2.5 wide. Coloration and structure much like those of female. Clypeus 0.4 long, equal to 3 diameters of oval anterior median eye. Eyes somewhat larger, closer together, in less procurved row; anterior median eyes nearly touching line along front edges of anterior lateral eyes and separated from them by full diameter.

	I	II	III	IV	Palp
Femur	5.40	6.25	5.00	5.30	1.30
Patella	1.05	1.10	1.00	1.00	0.40
Tibia	6.20	7.40	5.00	5.50	1.00
Metatarsus	6.20	7.60	6.00	7.00	—
Tarsus	1.30	1.35	1.15	1.40	0.50
Total	20.15	23.70	18.15	20.20	3.20

Leg formula 2413. First leg 6.7 times, first femur 1.8 times, second leg 7.9 times, second femur twice as long as carapace.

MALE PALPUS (figs. 341–343): Femur about 4 times as long as wide; tibia inflated, 1.5 times as long as deep; embolus curved, about as long as width of bulb.

TYPE DATA: Of *Scytodes rufescens* Dufour, near Sagunto, Valencia province, Spain, original specimens lost; of *Loxosceles marylandica* Muma, College Park, Maryland, male holotype in AMNH.

DISTRIBUTION: Said to be cosmopolitan, but of more sporadic occurrence as follows: Mediterranean region and islands of the Atlantic,

Madagascar, Japan, and many islands of the Pacific including the Hawaiian Islands, and Australia. In the Americas not as yet recorded from Mexico, Central and South America, but probably occurring there in coastal and trade areas; introduced into the United States and now established, mainly in buildings, in several eastern and Gulf states, and progressively being found in northern states from Michigan and Illinois across to Colorado, Utah and California. See map 13 for North American records.

RECORDS: UNITED STATES: **California:** *Orange Co.:* Laguna Beach, 7 June 1969, ♀. *Santa Barbara Co.:* Santa Barbara, Fall 1951 (H. Shantz), ♀. **Colorado:** *Denver Co.:* Denver, 21 Sept. 1976 (A. Connors), ♂ from Fitzsimmons Army Medical Center Building. **Florida:** *Dade Co.:* Lemon City, near Miami (E. J. Brown), ♂. **Georgia:** *Cobb Co.:* Atlanta, 19 Nov. 1945 (P. W. Fattig), ♂, ♀♀. *Muscogee Co.:* 12 June 1969, ♂. **Hawaii:** Oahu: Mt. Tantalus, Jan. 1950 (D. E. Hardy), ♀ on bark and foliage. Kauai: Russian Fort, 19 Aug. 1964 (T. Suman), ♀. Kawaihae Park at sea level, 13 June 1965 (T. Suman), ♂. **Illinois:** *Fayette Co.:* Vandalia, 19 Apr. 1971 (R. Waldrop), ♀ from office restroom. **Kansas:** Manhattan (N. Herybord), ♂♂, ♀♀ in insectary building. **Louisiana:** *Caddo Par.:* Baton Rouge, 20 Mar. 1903 (J. H. Comstock), ♀. Louisiana State College (J. H. Comstock), ♀. *Orleans Par.:* New Orleans, penultimate ♂. **Maryland:** *Prince George Co.:* College Park, 9 Apr. 1941 (M. Muma), ♂. **Michigan:** *Washtenaw Co.:* Ann Arbor, University of Michigan (L. Kirkendall), ♂♂, ♀♀ in Argus building. **Missouri:** *St. Louis Co.:* St. Louis, 1 Aug. 1940 (W. M. Gordon), ♂. **Nebraska:** *Douglas Co.:* Omaha, ♂. **New York:** Manhattan: 21 Aug. 1963 (B. Cutler), ♀ (E. Watts), 2♀♀ in roach traps; American Museum of Natural History building, Oct. 1969 (A. Gray), ♀; 7 May 1971 (A. Bordes), ♂♂, ♀. **North Carolina:** *Wake Co.:* Raleigh, 12 Aug. 1981 (A. L. Braswell), ♂ and subadult ♀ in N. C. Dept. Agriculture Bldg. **Ohio:** *Franklin Co.:* Columbia, 20 Mar. 1969, ♂. *Hamilton Co.:* Cincinnati, 29 May 1969 (C. Oehler), ♂, ♀ in house; Aug. 1970 (C. Oehler), ♂, ♀. **Pennsylvania:** *Centre Co.:* University Park, 4–11 Mar. 1970 (CEIR). *Luzerne Co.:* Wilkes-Barre, 29 Sept. 1969 (CEIR).

Texas: *Galveston Co.:* Galveston (D. W. Micks), ♂, ♀. *Harris Co.:* Houston, 30 Aug. 1957 (A. Yramategui), ♀. *Lubbock Co.:* Lubbock, 15 July 1969 (J. Reddell), ♀ in Geology Building at Texas Tech University. **Utah:** *Salt Lake Co.:* Salt Lake City (L. I. Nelson), in University of Utah building.

Loxosceles panama Gertsch
 Figures 332–334, 344–346; Map 11

Loxosceles rufipes: Petrunkevitch, 1925, p. 66. Banks, 1929, p. 56.

Loxosceles panama Gertsch, 1958, p. 35, figs. 57–59, 83.

DIAGNOSIS: Relative of *rufipes* with distinctive genitalia: epigynum (figs. 345–346) with widely separated, rounded lobes on thin receptacles; male palpus (figs. 332–334) with normal patella, and sinuate embolus three times as long as width of bulb.

FEMALE (Barro Colorado Island, Panama): Length 8.5. Carapace 3.55 long, 2.85 wide. Abdomen 5 long, 3.5 wide. Carapace dusky yellowish to orange brown; broad pars cephalica indistinctly marked with dusky lines and duskiness along sides of pars thoracica. Legs yellow to orange and femora usually dusky. Abdomen gray. Structure and general appearance as shown in figure 344. Pars cephalica wider than that of *rufipes*. Clypeus 0.82 long, equal in length to 2.7 diameters of median eye. Eyes small, oval, about 0.16 in long diameter, forming moderately recurved row; median eyes radius above line along front edges of anterior lateral eyes and separated from them by nearly two diameters.

	I	II	III	IV	Palp
Femur	4.80	5.00	4.45	4.85	1.40
Patella	1.17	1.17	1.17	1.17	0.45
Tibia	4.80	5.00	3.75	4.50	0.95
Metatarsus	4.70	5.00	4.40	5.05	—
Tarsus	1.25	1.17	1.05	1.17	1.20
Total	16.72	17.34	14.82	16.74	4.00

Leg formula 2413. First leg 4.7 times, first femur 1.3 times, second leg about 4.9 times, second femur 1.4 times as long as carapace.

EPIGYNUM (figs. 345–346): Receptacles forming narrow trough confluent at midline, each with rounded, widely separated lobes.

MALE HOLOTYPE: Length 6.6. Carapace 3.1

long, 2.7 wide. Abdomen 3.5 long, 2.2 wide. Coloration and structure essentially as in female. Clypeus 0.4 long, about 2.6 times as long as median eye. Eyes about 0.16 in long diameter, forming slightly curved row lying half radius in front of line along front edges of anterior median eyes and separated from them by 1.3 times long diameter.

	I	II	III	IV	Palp
Femur	5.85	6.35	5.15	5.55	1.80
Patella	1.10	1.10	1.10	1.10	0.60
Tibia	6.50	7.15	4.90	5.60	1.00
Metatarsus	6.85	7.65	6.00	6.85	—
Tarsus	1.70	1.70	1.25	1.40	0.32
Total	22.00	23.95	18.40	20.50	3.72

Leg formula 2143. First leg 7.1 times, first femur 1.9 times, second leg 7.7 times, second femur 2 times as long as carapace.

MALE PALPUS (figs. 332–334): Femur thin, seven times as long as wide; tibia nearly three times as long as deep (135/49); embolus somewhat sinuous, about twice as long as width of bulb.

TYPE DATA: Male holotype from Barro Colorado Island, Canal Zone, Panama, February 1936 (W. J. Gertsch), in AMNH.

DISTRIBUTION: Known only from Panama (map 11).

RECORDS: PANAMA: *Canal Zone:* Barro Colorado Island, 5–10 Feb. 1955 (O. Morris), ♂♂; Feb.–Mar. 1936 (W. J. Gertsch), many ♂♂, ♀♀; (K. W. Cooper), ♀♀; Jan. to Aug. 1934–1957 (A. M. Chickering), many ♂♂, ♀♀, ○○ in ground litter, in MCZ. Forest Preserve, 8, 29 Jan. 1958 (A. M. Chickering), 2♂♂, in MCZ. Madden Dam, 12 Feb. 1958 (A. M. Chickering), ♂, in MCZ. El Valle, 11 Jan. 1958 (A. M. Chickering), ♀, in MCZ. Ragano Region, Upper Río Mayo, 11 June 1976 (L. Kirkendall), 2♀♀ in holes in moist limestone, in MCZ. Madden Forest, 18 Jan. 1945 (C. D. Michener), ♀. S. Penenome, 14 Jan. 1971 (L. Johnson), ♂ under rock on hillside. Old Panamá City, 15 Aug. 1945 (Michener, Fichter), ♀. Panamá City, 24 Dec. 1943 (D. L. Frizzell), ♀. Chilibrillo Cave, Buenos Aires, 8 Apr. 1945 (H. Trapido), ♀♀, ○; 26 July 1966 (S. Peck), 2♀♀, ○. 3.5 mi. N Bejuco, 3 July 1962 (R. Zweifel), 2○○. Barbacoas Island, 14 Dec. 1965 (R. X. Schick, M. Moody), ♀, penultimate ♂ from tropical forest.

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