

**THE SPIDER FAMILY NESTICIDAE (ARANEAE)
IN NORTH AMERICA, CENTRAL AMERICA,
AND THE WEST INDIES**

Willis J. Gertsch

BULLETIN 31

**Texas Memorial Museum
The University of Texas at Austin**



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Shown on the cover is a troglobitic *Eidmannella* species, photographed by Robert W. Mitchell.

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The Spider Family Nesticidae (Araneae) in North America, Central America, and the West Indies

Willis J. Gertsch¹

Abstract

A systematic review of the spiders of the family Nesticidae from North America, Central America, and the West Indies is presented with analyses of their features and relationships. The sedentary nesticids spin small tangled webs in dark places beneath ground objects, in leaf and other detritus, in underground spaces, and especially in many parts of caves. Three genera and more than 50 species are now known from the area under consideration. The exclusively American genus *Gaucelmus*, with five species, ranges from our southeastern states and Texas southward through Mexico and much of Central America. Most *Gaucelmus* are cavernicoles, but only one species, *cavernicola* of Jamaica, is somewhat modified by cave existence.

The worldwide genus *Nesticus* is strongly represented in North America where the distribution of its 40 species is disjunct. The European *Nesticus cellulanus*, introduced into North America by trade many years ago, occurs sparingly from New York to Maine and Nova Scotia. Two distinct species represent the West Indies, one from Cuba and the other from Hispaniola. The continental *Nesticus* occur in three widely separated enclaves: the southern Appalachian mountains, the Pacific Northwest, and eastern Mexico. A large and rich fauna of 24 species (representative of the rejected genus *Ivesia*) ranges in Appalachia from Kentucky and West Virginia through the parallel ranges into central Alabama. These form a distinctive series with specialized paracymbia and interesting tegular fragmentation of the male palpi. Most are cavernicoles, and some have the eyes reduced in size or obsolete: five of these, *furtivus*, *barri*, *stygius*, *jonesi*, and *georgia*, are claimed to be troglobites; four others, *dilutus*, *valentinei*, *barrowsi*, and *holsingeri*, also probably deserve this classification. This fauna of Appalachia was probably derived from a single basic stock that fragmented during the long history of the region. All the cavernicoles are allopatric, living in single caves or cave systems.

The second center for endemic *Nesticus* in the United States is the coastal and Sierra Nevada area from central California northward into Vancouver Island, British

Columbia. The three species form a group distinct from those of Appalachia and eastern Mexico and appear to resemble most closely the fauna of Japan and adjacent Oriental countries. One of the species, *potterius* from Potter Creek Cave, Shasta County, California, is an eyeless troglobite.

The third American center for *Nesticus* is the mountainous terrain of eastern Mexico where ten species occur, all of which are so far known only from caves. These mostly larger types present distinctive features in the male and female genitalia. Two small, eyeless species, *arganoi* and *caverna*, come from caves in Veracruz and Puebla, respectively. The tenth Mexican species, *reddelli* from Cueva de Apoala in Oaxaca, is known only from the female, which lacks anterior median eyes; its systematic position must remain uncertain.

The genus *Eidmannella* is an American genus comprising seven taxa possessing genitalia which mark them as distinct from *Nesticus*, the genus to which some of the specimens were previously assigned. The genotype *pallida* is a variable species that ranges from Canada southward through Mexico, Central America, and the West Indies, and sparsely down into South America. This species has been introduced by trade into England, the Spanish Balearic Islands, and probably into Bermuda as well. Five essentially eyeless species from the Edwards Plateau and adjacent karst areas of Central Texas, herein named *rostrata*, *reclusa*, *delicata*, *nasuta*, and *bullata*, are claimed to be troglobites. The conservative genitalia of *Eidmannella* offer radical differences only in a small species, *pachona*, from Cueva del Pachón in Tamaulipas, Mexico.

Introduction

This bulletin presents a systematic report on the spiders of the family Nesticidae found in North America, Central America and the West Indies. This relatively uncommon group has no better common name than nesticid. A high percentage of the known species live in caves, and many of these have responded to the sheltered monotony of cave life by reduction in size or complete loss of their

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eyes. The term "troglobite" usually describes depigmented, blind cavernicoles that are restricted to their special cave or cave system and irreversibly obligated to further life there. "Troglophiles" are considered to be those species that are capable of surviving and completing their life cycle either on the surface or in caves. The nesticids are sedentary weavers that share the basic characters of such higher spiders as the Argiopidae, Linyphiidae and Theridiidae. By general agreement they now form a family of their own, but one quite reminiscent of primitive stock from which the Theridiidae may have been derived. They differ little from these several families; various authors, notably Wiehle (1953: 52), have found most nesticid features to be the same as those of the Theridiidae and their appearance and habits to be remarkably similar. Holm (1940: 121) reported that the first postembryonal stadium of *Nesticus* resembled that of *Theridion redimitum* (Clerck) [= *Enoplognatha ovata* (Clerck)] in lacking claws on the palp and leg tarsi.

The nesticids are aerial web spinners that hang back-downward suspended by their tarsal claws from fine reticular webs comparable to those of pholcids, theridiids and linyphiids. The web, placed in some protected crevice of a substratum, is both a domicile and a capturing device. The web spun by *Nesticus cellulanus* (Clerck) (Holm, 1940, Fig. 171; Wiehle, 1953: 52-55) consists of two principal elements: a tangled series of fine dry lines forming a thin net or platform from which the spider hangs and a few longer dry lines with series of small viscid droplets near their point of attachment to the substratum—means for impeding or entangling prey. This type of web is typical for most Theridiidae. The loosely meshed, tangled webs of the nesticids hang in dark areas of buildings and in all parts of caves, mines and subterranean stations, from the entrances to regions of total darkness. In epigeal situations the webs are placed in animal burrows, under stones and litter or deeply into ground detritus in forested areas.

Mating data are available for only the well-known *Nesticus cellulanus* (Gerhardt, 1927, Fig. 114; Wiehle, 1953: 55). Courting activities usually begin at nightfall. The male first spins a tiny, four-cornered sperm web and takes the sperm into his palpi by direct application of the emboli. Courtship consists of plucking the threads of the web and stroking the body of the female with the front legs. The female responds by similar stroking with her front legs. The male crawls beneath the abdomen of the female, facing in the same direction (position 1), and applies the palpi to her epigynum one at a time. It is presumed that the right palpus is applied to the left orifice of the epigynum and vice versa, as in most higher spiders. The several insertions of the male palpi last only a few minutes.

The egg sacs of the various nesticid species show little variability. That of *Nesticus cellulanus* (Wiehle, 1953: 56) is spherical, about 4 mm in diameter, and thinly covered with whitish transparent silk. The sac holds as many as 96 eggs. Females are known to drag their egg sacs with them, attached to the spinnerets in the manner of wolf spiders. Since nesticids stray but short distances from their webs, holding the egg sacs may serve a protective function.

The nesticids are predominantly northern spiders; few have been reported from the Southern Hemisphere. *Eid-*

mannella pallida (Emerton) is known from some localities in South America and *Nesticus unicolor* Simon, a *nomen nudum* of uncertain status, has been reported from Venezuela. In the north, distribution of the Nesticidae is discontinuous, with sizable gaps between major areas of occurrence. In North America only *Eidmannella* exhibits widely ranging species with *Nesticus* and *Gaucelmus* occurring primarily in small disjunct areas. Such a distribution pattern is often taken as evidence of primitivism, and the nesticids are considered by some to be relict types. The distribution pattern of *Nesticus* is similar to that of the Leptonetidae and the important geographical centers are much the same for both groups.

American nesticids have been little noticed in the past. The present study comes as a result of material accumulated through many years. The more than 50 species show that our fauna is large and varied and compares favorably with that of other regions. At the same time it is plain that additional species will be found when more intensive collecting is done in critical areas. A large percentage of the present material came from caves, and there is still much to be done in these habitats. The goals of the present study are to give cave students specific names for use in biological and distributional studies and also to prompt araneologists to greater interest in these spiders. The study is to be considered a preliminary one, in many respects, as will be obvious from the sparse material on some species from Appalachia and Mexico.

Acknowledgments

This paper is based on collections made over a period of many years by friends and colleagues whose names are listed with distribution records for each species. Many years ago Dr. William A. Barrows, formerly of Ohio State University in Columbus, presented to me several new species of *Nesticus*, and informally we resolved to do a revisional study of the genus. He died before we had taken any firm steps in this direction, but I mention him here as a generous friend to whom I have dedicated one of these species.

The study material for this family of spiders, taken largely from caves difficult to find and representing arduous and sometimes dangerous excursions, was brought together by people who possessed deep dedication to caves and their biota. Many years ago, Drs. W. B. Jones and A. F. Archer, then of the Alabama Museum of Natural History in Tuscaloosa, collected from scores of Alabama caves rich in nesticids and gave me all their material. Dr. Thomas Barr of the University of Kentucky, one of the great students of Appalachian caves, collected actively in my behalf and inspired many of his students to do the same. Dr. John Holsinger of the Old Dominion University in Norfolk, Virginia, has sent me many spiders from caves in Virginia and nearby states. Dr. Stewart Peck of Carleton University, Ottawa, Canada, has collected actively during several years in the Appalachian region, in Mexico, Central America and some of the West Indies and has provided this valuable material.

More recently, and as a continuing project, Dr. Robert Mitchell of Texas Tech University, Lubbock, Texas, and James Reddell of the Texas Memorial Museum, Austin, Texas, with the aid of many students, have brought

together huge collections of cave animals from hundreds of caves of Texas and Mexico. To Mr. Reddell I offer special thanks for his efforts to secure much needed nesticid material from specific caves in Texas and Mexico, without which this paper would be far less complete. To Dr. Richard C. Graham of Ramapo College, Mahwah, New Jersey, companion and friend during many caving trips in California (where we were joined by dedicated cavers Arthur A. Lange, Raymond DeSaussure and Edward Danehy), I offer thanks for many interesting collections from that state. Dr. Martin A. Muma, active years ago in the study of cave faunas, provided literature and specimens from eastern caves. To the following I offer thanks for loans and contributions of material from their respective areas and institutions: Dr. Herbert Levi of the Museum of Comparative Zoology, Harvard University; Dr. William Shear of Hampden-Sydney College, Hampden-Sydney, Virginia; Vincent Roth of the Southwestern Research Station, Portal, Arizona; the late Wilton Ivie of New York, friend and collecting companion of many years; Dr. Karl H. Krekeler, Valparaiso University, Valparaiso, Indiana; Richard Franz and Arnold Norden of Baltimore, Maryland; Brother G. Nicholas, F. S. C., University of Notre Dame, South Bend, Indiana; Dr. John E. Cooper of the North Carolina State Museum of Natural History in Raleigh, for many gifts through the years; Lyle G. Conrad, Chevy Chase, Maryland; Jerry A. Payne of Byron, Georgia, who gave much time to collecting fine new species; Jeffrey Black of Norman, Oklahoma; Richard C. Harrell, Guthrie, Oklahoma, who investigated the fauna of Wild Woman Cave in his state; and W. Calvin Welbourn of Albuquerque, New Mexico, specialist on the caves of his state. Production personnel at Texas Memorial Museum included Jane Sullivan, series editor, Kit Fontaine, manuscript editor and book designer, typesetters Ruth Rodriguez and Gail Tosto-Geiger, and layout artist Kathleen Robertson.

To all these friends, colleagues, and collaborators I offer my thanks for bringing together an outstanding and representative collection of these interesting spiders. The types of new species, unless otherwise indicated, are deposited in the American Museum of Natural History in New York.

Systematic Section

Family Nesticidae

Nesticidae Simon, 1894: 710–733.

Nesticidae Dahl, 1926: 19; Kratochvil, 1933: 1; Kaston, 1938: 643; Gerhardt and Kastner, 1938: 556, 575, 607; Wiehle, 1953: 52–56.

Nesticinae Petrunkevitch, 1928: 46, 121; Petrunkevitch, 1939: 173; Bonnet, 1958: 3092.

DIAGNOSIS.—Sedentary cribellate spiders of suborder Araneomorphae. Respiratory system consists of pair of booklungs at base of abdomen and tracheae opening through single spiracle immediately in front of spinnerets. Labium rebordered. Legs without true spines; tarsi of fourth legs with comb of curved bristles like those of Theridiidae. Six spinnerets and colulus present.

FEATURES APPLYING TO ALL MEMBERS OF GROUP.—Carapace longer than broad, broadly rounded on sides, subtruncated behind, highest near cervical groove as seen in side view, clothed sparsely with black

hairs and a few heavier bristles on pars cephalica; cephalic sutures, weakly indicated grooves, and cervical groove a shallow, rounded depression. Pars cephalica subtriangular, widely rounded at front margin; clypeus high, sloping, equal to two-to-four diameters of lateral eye. Eight eyes usually present, heterogeneous, in two rows; eye group occupying five-sevenths width of pars cephalica; lateral eyes of each side on confluent tubercles; median eyes on small, separated tubercles. Front eye row essentially straight, somewhat narrower than posterior row; median eyes small, about one-third diameter of lateral eyes but relatively much larger in *Gaucelmus*; posterior eye row slightly to moderately procurved, more rarely slightly recurved; median eyes farther apart than distance to lateral eyes. Median ocular quadrangle three-fourths as long as broad, narrowed in front to half its width; anterior median eyes typically much smaller, sometimes missing. All eyes reduced in size or obsolete in some cave spiders. Sternum subcordate, only slightly longer than broad, produced behind to small rounded or truncated lobe between posterior coxae, usually with sparse covering of suberect setae. Labium twice as broad as long, rebordered, with pale, slightly thickened anterior margin, with few apical hairs and weak transverse series below front margin. Endites longer than broad, subparallel, rounded at apex, with thin covering of hairs. Chelicerae quite similar in both sexes, with subparallel sides, slightly narrowed at apex; promargin with three sharp, moderately stout teeth and row of about a dozen long bristles above; retromargin with 6 or 7 to 12 or more small teeth on weak elevation lying opposite the teeth of promargin and with 12 simple, curved tactile or barbed bristles overhanging claw of chelicera.

Legs thin, of medium to extreme length, longest in troglobites; leg formula 1423, rarely 1243. Legs densely clothed with rows of dark and pale setae: numerous forwardly directed dark hairs from prominent alveolae on all surfaces; tibiae, metatarsi and tarsi with four rows of pale, willowy, laterally directed hairs from small alveolae in subdorsal and subventral position and with single subdistal trichobothrium on tarsi or none, single submedian trichobothrium on metatarsus, and two rows of three or more on tibiae; all trichobothria dorsal in position and originating from broad, flat alveolae. Female pedipalp short and thin, bearing single claw, long and slightly curved, with single row of about a dozen fine teeth. Legs with 3 claws; paired claws slightly curved, with single row of 6 to 12 fine teeth; unpaired claw geniculate, with or without 1 or 2 tiny denticles at base. Tarsal comb consisting of 12 curved, finely serrated hairs and a few spurious claws at end of tarsus. Abdomen suboval, of medium height in males, subglobose or suboval in females, clothed rather densely with fine subprocumbent dark hairs. Epigynum of variable development, in most species prominently ridged and with inconspicuous atrio-bursal orifices below posterior lip of genital groove. Male palpi large with well-developed paracymbium and with bulb and accessory processes often of complicated design. Spinnerets six (Fig. 2); anterior and posterior lateral pairs short, thick, subconical, two-segmented, with apical segments short caps; posterior median spinnerets one-segmented, small, hidden in spinneret cluster. Colulus triangular lobe set with curved row of six or seven small setae.

TYPE OF FAMILY.—*Nesticus* Thorell.

DISCUSSION.—The nesticids have long been enigmatic to the systematist, largely as a consequence of their weak diagnostic characters. Failure to note the weakly rebordered labium, along with inexperience with the group and study of single specimens, resulted in assignment through the years to six different families (Yaginuma, 1969: 3). Distinctive generic names have been given to most of the species groups from various parts of the world, but most of these have been rejected as synonyms. In the above-cited paper Yaginuma listed seven presumed synonyms of *Nesticus* and several uncertain names associated with the genus. All known species were assigned to *Nesticus*, under which he listed 47 species from all parts of the world; additional species have been added to that number by other authors.

Male and Female Genitalia

PALPUS.—Experience has shown that assignment to the genera and species of the Nesticidae are best based on the genitalia; the detailed morphology of these organs thus has acquired special significance in the systematics. The male palpus is complicated in appearance and has some unusual features, but in general shows relationship to that structure in the linyphiid and related entelegyne families. The basal segments present little of special interest and the tibia never possesses a tibial apophysis. The tarsal segment is modified in conventional fashion with the cymbium, a shallow, oval vessel, shielding the bulb and its elements. The palpal bulb appears complicated but is basically simple with no apical or accessory processes present beyond the embolus and conductor. The three types of palpi of the American fauna are shown in Figure 1 (A, C, and E).

Seemingly most simple but with some unusual features is the palpus of *Gaucelmus* (Fig. 1,A). The paracymbium is a short, posteriorly curved process set with short setae at the apex. The embolus is heavy at its base, where it is encased in a wide truncus, but it is apically free as a thin tube curving behind the apical element to lie at its base in a smooth area. This apical element is presumed to be the conductor of the embolus, or it may possibly be, though with less likelihood, a fused median apophysis and conductor. The median apophysis is here assumed not to be present. The special features of *Gaucelmus* seem to be relatively simple paracymbium, the lack of a median apophysis of the bulb, and no development of tegular processes. Among the five known species of the genus, significant differences are observed only in the shapes of the conductors.

The most derivative palpal development is found in the genus *Nesticus*. This development is well illustrated in the palpus of *Nesticus paynei* (Fig. 1,C). The paracymbium is a complicated, laterally curved process nearly as long as the cymbium and furnished with dorsal and ventral processes. The subtegulum is a heavy ring with prominent lobe on the retrolateral side near the anterior end. The heavily sclerotized, slightly convex tegulum, through which the seminal tube is plainly evident, has two thin, finger-like processes on the prolateral side. Closely fitted to a groove in the tegulum is a large median apophysis free for half its length as a prominent spur. Arising from a common base is a beak-like conductor free for most of its length and protruding forward

from the front margin of the bulb. The embolus is a relatively slender tube arising from beneath the tegulum and forming a rounded curve which passes to the dorsal side of the conductor to lie in a whitish membrane. The special features of *Nesticus* include a large paracymbium, often with complicated processes, the presence of a distinctive median apophysis, and striking development of tegular processes. The many features of these sclerites provide excellent clues to identification of the species. For instance, in some species, notably *Nesticus archeri*, the processes of the paracymbium and tegulum show an extraordinary degree of development. Distinct differences in these features are to be found among *Nesticus* from the three distribution refugia in North America.

The palpus of *Eidmannella* (Fig. 1,E) is of medium development but approximates that of *Nesticus*. The paracymbium is a short, curved process armed at the apex with weak spurs differing little among the species. The subtegulum is a broad oval ring with heavy lobe on the retrolateral margin. The tegulum is quite small, armed with a short tegular process on the prolateral margin. A median apophysis is lacking. The conductor of the embolus is a prominent lamina furnished with apical spur or beak. The quite heavy embolus, which originates at the posterior margin of the tegulum, forms a broad curve and then a small coil to lie on the apical margin of the conductor. Special features of *Eidmannella* are the simple paracymbium, lack of a median apophysis and the presence of a single tegular process. The diagnostic features of the few species are to be found in the size of the conductor, the shape of the tegular process, and in small details of the tip of the paracymbium.

EPIGYNUM.—The female genital system is like that of typical entelegyne spiders as exemplified by the linyphiids and their relatives. As in previous papers (Gertsch, 1958: 4; 1967: 131), the term "epigynum" is used here as an exact synonym of "female genital organ." The nesticid epigynum has the following features: presence or absence of external septa and grooves presumably for positioning parts of the male palpus during mating; atrio-bursal orifices present below the anterior lip of the genital groove, which lead to internal seminal receptacles, usually one on each side with an accessory lobe; and presence of small fertilization canals opening on the vaginal wall. The presence of fertilization canals marks the nesticid as entelegyne even though the atrio-bursal canals have not migrated to a more dorsal position. The three types of epigyna found in American nesticids are shown in Figure 1 (B, D, and F).

The epigynum of *Gaucelmus augustinus* (Fig. 1,B), typically small and occupying only the central part of the genital groove, is quite generalized with few notable external features. No septa, grooves or foveae are evident, but details of the internal receptacles can often be discerned through the lightly sclerotized integument. The lip overhanging the genital groove is somewhat thicker and, just below, the pair of atrio-bursal orifices leads to the double receptacles. The epigyna of the four species of *Gaucelmus* are quite similar and, except for *calidus*, offer little assistance in making specific determinations.

The epigyna of typical *Nesticus* are marked by strongly developed external septa, grooves and foveae on an often markedly convex, darkened organ occupying most of the width of the genital groove. The epigynum of *Nesticus*

paynei (Fig. 1,D), though specifically identified with the Appalachian fauna, is quite representative of the whole genus. The external aspect presents a moderately elevated, usually paler median septum that forms a rounded caudal lobe overhanging the genital groove. On each side is a broad, suboval, slightly depressed fovea bearing distinctive grooves. The atriobursal orifices are barely visible from above, where their presence is indicated by small darkened pits or grooves. The internal structure of receptacles and tubes is difficult to see in most specimens because of the strong sclerotization of the whole organ, nevertheless, the principal receptacles and accessory lobes, along with fertilization canals, are present. The epigynal drawings illustrate the external, internal and posterior views of these organs. Specific differences are to be seen in the size, position and pattern of the septa and foveae and especially in development of the lobes overhanging the genital groove. In spite of the uniformity

of these organs throughout the species in the Appalachian group, the differences between species seem to be relatively constant. The epigyna of species of *Nesticus* from the Californian, Mexican and West Indian faunas, based on the few species involved, present differences much easier to define than those of the Appalachian fauna.

The epigynum of *Eidmannella* (Fig. 1,F) is uniform in the few known species. In general it closely approximates that of *Nesticus*. The external epigynum presents a distinctive septal development consisting of a small angle or lobe in front and a weak elevation to its juncture with a transverse, inverted T-shaped piece. The internal structure is similarly simple with the presence of a thin atriobursal tube leading both to a small receptacle and a massive receptacle on each side. The atriobursal orifices are located on either side below and at the corners of the transverse piece.

Key to American Genera of Nesticidae

1. Eyes of front row subequal in size; median eye four-fifths diameter of lateral; fang of chelicera with basal enlargement; epigynum inconspicuous, small lip at posterior margin about one-fourth width of genital groove *Gaucelmus* Keyserling
- Eyes of front row unequal or absent; median eyes (when present) about one-third diameter of lateral; fang of chelicera with trivial enlargement at base; epigynum conspicuous, with large posterior lip, occupying one-half to most of genital groove 2
2. Male palpus with short curved paracymbium (Fig. 251) and median apophysis of bulb missing; epigynum (Fig. 249) with small septal element in front and inverted T-shaped piece behind *Eidmannella* Roewer
- Male palpus with large paracymbium typically broader than width of cymbium and bulb with median apophysis; epigynum usually prominent, occupying most of width of genital groove *Nesticus* Thorell

Genus *Gaucelmus* Keyserling

Gaucelmus Keyserling, 1884: 99; Marx, 1890: 521; Banks, 1900: 533; Banks, 1904: 127; Banks, 1910: 21; Yaginuma, 1969: 5; Brignoli, 1972: 145.

Nesticus: Simon, 1894: 739 (part); Bonnet, 1958: 3093; Petrunkevitch, 1911: 382 (part).

Theridionexus Petrunkevitch, 1910: 209; Petrunkevitch, 1911: 211.

DIAGNOSIS.—Medium sized, 3 to 10 mm long, dusky to orange brown spiders with long legs. Eyes subequal in size; slightly smaller, dark anterior median eyes four-fifths diameter of anterior lateral eyes; both eye rows weakly recurved, appearing essentially straight. Median ocular quadrangle slightly broader than long and moderately narrowed in front. Chelicerae stout; promargin of furrow with three subcontiguous teeth in females, with one long apical tooth and usually two smaller separated denticles in males; retromargin with two rows of denticles or with compound tooth bearing several serrations; fang short, moderately thickened at base in females, with

conspicuous bulbous enlargement in males (Fig. 10). Leg formula 1243; legs very long and thin; first legs from 5 to 11 times as long as carapace. Paired claws of tarsi with single row of five or six teeth; unpaired claw with one or two tiny denticles. Abdomen oval in males, of medium height, subglobose and strongly elevated in females. Epigynum simple, with trivial lip overhanging genital groove visible from above; two seminal receptacles present, each with lateral accessory pouch at base; atriobursal orifices form transverse slits under posterior lip; fertilization canals present as sclerotized tubes above receptacles. Male palpus simple, without tibial apophysis; cymbium shallow receptacle bearing small paracymbium at base; embolus wide coil; conductor fairly large plate with small apical spur; median apophysis missing.

TYPES OF GENERA.—Of *Gaucelmus*, *augustinus* Keyserling; of *Theridionexus*, *cavernicolus* Petrunkevitch.

DISCUSSION.—Although sharing many of its features, *Gaucelmus* falls well outside the limits of the genus *Nesticus*. Both eye rows are essentially straight. The eyes of the front row are subequal in size, with the anterior

medians proportionately much larger than those of any *Nesticus*, where they are reduced in size or often lost. The epigynum is small contrasted with that voluminous organ in *Nesticus*. The male palpi present special differences: the paracymbium is a small, somewhat twisted spur instead of a broad, multitoothed lamina; the simple bulb lacks tegular apophyses and has as its most distinctive feature a large, centrally placed conductor. The legs of *Gaucelmus* are typically thinner and longer than those of *Nesticus*.

This is a distinctive American genus comprising five species presently known only from continental North America and some of the West Indies. These species are

readily separated by details of the conductor of the male palpus and, usually, by the epigyna of the females. The species of *Gaucelmus* are mostly known as troglomorphic cave spiders that show some specific adaptations to this habitat in their long legs and orange coloration. For the most part they have been collected in caves in the north, and there are few records of their occurrence outside of caves except in Mexico and Central America. They favor mesic habitats and, outside of caves, can be expected to live in recesses under embedded rocks and ground debris, in sheltered rock slide areas, and under overhangs along stream beds.

Key to the Species of *Gaucelmus*

- | | |
|---|------------------------------------|
| 1. Females | 2 |
| Males | 5 |
| 2. Epigynum with dark longitudinal septum on posterior lip
(Fig. 31) | <i>calidus</i> Gertsch |
| Epigynum without such dark septum..... | 3 |
| 3. Epigynum (Fig. 34) with small transverse bar below lip;
Chilibrillo Cave, Panama | <i>tropicus</i> , new species |
| Not so | 4 |
| 4. Epigynum (Figs. 23–24) with suboval receptacles typically
separated by half their width; Florida to Texas to Panama, West
Indies | <i>augustinus</i> Keyserling |
| Epigynum (Figs. 26–27) with rounded receptacles closer together;
Jamaica, West Indies | <i>cavernicola</i> (Petrunkevitch) |
| 5. Conductor of embolus elongate-oval | 6 |
| Conductor of embolus produced apically to single sharp spur or
bifid process..... | 7 |
| 6. Conductor evenly rounded at apex (Fig. 15) | <i>augustinus</i> Keyserling |
| Conductor narrowed at apex (Fig. 17) | <i>cavernicola</i> (Petrunkevitch) |
| 7. Conductor with single apical process (Fig. 21) | <i>tropicus</i> , new species |
| Conductor with two apical processes | 8 |
| 8. Processes asymmetrical (Fig. 19) | <i>calidus</i> Gertsch |
| Processes about same size (Fig. 298) | <i>pygmaeus</i> , new species. |

Gaucelmus augustinus Keyserling

Gaucelmus augustinus Keyserling, 1884: 99, pl. 5, fig. 65; Marx, 1890: 521; Banks, 1900: 533 (*angustinus*); Banks, 1904: 127; Banks, 1910: 21; Archer, 1940: 28; Reddell, 1965: 174; Reddell, 1970: 46; Vogel, 1970: 14.

Nesticus augustinus: Simon, 1894: 739; Comstock, 1903: 33; Petrunkevitch, 1911: 382; Comstock, 1913: 425; Bonnet, 1958: 3093; Yaginuma, 1969: 8.

Theridium eigenmanni Banks, 1902: 97; Eigenmann, 1900: 230 (*nomen nudum*); Ulrich, 1902: 85; Banks, 1910: 19; Petrunkevitch, 1911: 195; Wolf, 1936: 549; Bonnet, 1959: 4470.

Theridium cavernarum: Wolf, 1936: 507 (*nomen nudum*, imaginary name).

Theridium santaanae Kraus, 1955: 16, pl. 2, figs. 31–33.

DIAGNOSIS.—Widespread species of genus with the following special features: epigynum simple, without median septum on posterior margin of genital groove, with typical rounded receptacles separated by half their

width and small accessory lobes above near base; conductor of male palpus a thin suboval plate bearing small black spine at apex.

ETYMOLOGY.—Named for St. Augustine, Florida.

DISCUSSION.—Keyserling based his *Gaucelmus augustinus* on specimens from the cellars of the old fort in St. Augustine, Florida. The name is here applied to a somewhat variable but widespread species found from Florida to Texas and south through Mexico and Central America to at least northern Panama. Only small genitalic differences seem to be present in specimens from these locality extremes and all males feature an oval conductor of the embolus with a small terminal black spine. In the United States *G. augustinus* seems to be largely limited to caves since few records of outside habitats are available; more evidence is needed, however, to show that this with cave collecting. Florida populations consist of dark, long-legged types: the first legs of the females are about 9 times as long as the carapace and the first femur 2.9

times as long; the males have even thinner legs with respective measurements about 10 and 3 times the length of the carapace. Texas examples are mostly similar to those of Florida but with slightly shorter legs: the first legs of the females are about 8 times as long as the carapace and the first femur 2.5 times as long; the males have these respective measurements, 9 times and 2.7 times. Specimens from Mingus Root Cave in Kerr County, Texas, have leg/carapace proportions like those of Florida specimens.

Examples of *G. augustinus* from northern Mexico appear to be somewhat paler than Florida or Texas specimens, and their legs are proportionately shorter: the first legs of the females are about 6.5 times as long as the carapace and the first femur twice as long; the males have the first leg 7.6 times as long as the carapace and the first femur 2.18 times as long as long as the carapace. Specimens from southern Mexico and Central America are quickly recognized by their smaller size and shorter legs. Twelve females from Chiapas and Colima in Mexico and south into Panama have the following statistics: range of carapace length, 1.8 mm to 2.1 mm, with average of 2.0 mm; range of first femur length, 3.3 mm to 4.25 mm, with average near 3.8 mm; carapace/femur comparison ranging from 1.8 to 2.2 mm with average about 1.85 mm. Almost none of the specimens from Central America and southern Mexico come from cave localities; these presumably were found in ground detritus, under stones or in similar situations. The greater length of the legs of northern specimens may be accounted for in terms of preference for and response to the habitat. Although there is a break in the extremes of these populations, it is partially bridged in northern Mexico, where most of the available material has come from caves, and seems to form an essentially clinal pattern from Florida to Panama. For this reason the name *G. santaanae* given to the species in El Salvador is not accorded specific rank.

ECOLOGY.—*Gaucelmus augustinus* is a common species usually found hanging from the walls and ceilings of caves, where its small webs are placed in appropriate crevices. Specimens from outside caves, largely from Mexico and Central America, live in dark, epigeal situations, under stones and ground litter. Reddell (1965:174) says of *G. augustinus*: "This is one of the most common troglaphiles in Texas caves. It hangs from webs along walls and vertical slabs of breakdown. In August thousands of newly hatched spiders were found in webs throughout all parts of Three-Mile Cave."

DESCRIPTION.—Length of mature females, 4.0 to 9.0 mm. Length of adult males, 3.0 to 5.0 mm. Pedipalps of penultimate males with thickened, fusiform tarsal segments.

Female from Dudley Cave, Alachua County, Florida.—Total length 6.00 mm. Carapace 2.46 mm long, 2.05 mm wide. Abdomen 4.00 mm long, 4.25 mm wide.

Integument of carapace uniformly bright orange-brown, without contrasting markings except for narrow black eye tubercles, sparsely clothed with rows of short black hairs, those on cephalic portion stouter. Sternum, coxae and mouthparts all essentially concolorous with carapace, sparsely clothed with erect black hairs. Legs also are concolorous, set with more numerous black

hairs. Abdomen gray to reddish brown indistinctly reticulated in white; other specimens occasionally marked with distinct pattern of dusky chevrons and faint, pale, median longitudinal stripe; venter paler.

Carapace (Figs. 4–5) longer than broad, moderate in height, broadly rounded on sides and subtruncate behind. Cephalic sutures moderately distinct; cervical groove a shallow transverse depression. Pars cephalica weakly elevated, highest behind eyes, broad in front. Eyes (Fig. 3) set on low, inconspicuous tubercle occupying four-fifths width of head. Clypeus subvertical, with prominent groove below eyes, broadly rounded in front, rather high (0.4 mm), equal in height to scarcely four diameters of anterior median eyes (16/55). Eye group as shown in Figure 3. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 20:16:20:19$$

Front eye row slightly narrower than posterior row, gently recurved as seen from front, in recurved line as seen from above; dark median eyes separated by their diameter, nearer lateral eyes. Posterior eye row slightly recurved; median eyes separated by more than their diameter (19/29), one diameter from lateral eyes. Median ocular quadrangle broader than long (34/26), narrowed in front in same ratio; anterior median eyes slightly smaller. Underside of carapace as shown in Figure 8. Sternum subtriangular, smooth, narrowed behind to blunt, rounded lobe between hind coxae. Labium wider than long, truncated in front, joined to sternum by broad, rough, transverse suture. Endites large, subparallel, rounded at apex. Chelicerae robust: sides essentially parallel as seen from front; upper margin of furrow (Fig. 7) armed with three stout teeth in close-set series; lower margin (Fig. 9) with two parallel rows of denticles, five or six in each row; fang slightly curved, moderately incrassated at base.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	7.25	5.30	3.30	5.35	0.92
Patella	1.25	1.15	1.00	1.15	0.31
Tibia	6.70	4.50	2.20	4.10	0.49
Metatarsus	6.20	4.35	2.50	3.80	—
Tarsus	2.40	2.00	1.35	1.70	0.90
Total	23.80	17.30	10.35	16.10	2.62

Leg formula, 1243. First femur 2.9 times, first leg 9.2 times as long as carapace. Third metatarsus as long as carapace. Legs clothed evenly with rows of fine setiform hairs of moderate length. Fourth tarsus armed with ventral tarsal comb of ten toothed hairs of uniform size, longer and stouter than other hairs of that segment. Palpal claw long, gently curved and armed with eight teeth, distal ones long and basal ones minute. Tarsal claws quite small, moderately curved and armed with single row of five or six teeth, distal ones longer. Unpaired tarsal claws strongly geniculate, with one or two tiny denticles. Tip of tarsus with four serrate bristles, or spurious claws, a ventral pair and one on each side.

Female from Cueva del Nacimiento del Río Frío, Tamaulipas.—Carapace, 2.3 mm; first femur, 4.6 mm; first leg, 15.5. First leg 6.5 times, first femur twice times as long as carapace.

TABLE 1.—Comparison of first legs of females from Texas Caves (measurements in millimeters).

Limb Segment	Flemming Cave KIMBLE COUNTY	Heidrich's Cave COMAL COUNTY	Three-Mile Cave WILLIAMSON COUNTY	Orell Crevice Cave REAL COUNTY	Mingus Root Cave KERR COUNTY
Femur	6.25	6.50	7.35	6.50	7.25
Patella	1.20	1.20	1.25	1.15	1.25
Tibia	5.75	5.95	6.70	6.20	6.90
Metarsus	5.25	5.35	6.10	5.60	6.15
Tarsus	2.15	2.15	2.40	2.35	2.35
Total	20.60	21.15	23.80	21.80	23.90
Carapace length	2.60	2.70	2.80	2.60	2.70
Carapace/leg length	7.9	8.1	8.5	8.4	9.0
Carapace/femur	2.4	2.5	2.6	2.5	2.7

Abdomen subglobose, often strongly elevated (Figs. 4–5), clothed evenly with fine black hairs. Openings to booklungs small, transverse slits, widely separated from inconspicuous epigynum (Fig. 6). Spinnerets in close cluster at apex of abdomen (Fig. 2) and colulus a small subtriangular finger, gently rounded at apex, bearing six to eight fine setae.

Epigynum (Fig. 23) small, occupying only one-fifth of width of genital and lung groove; largely hidden beneath integument; presenting, in dorsal view, pale transverse arch overhanging genital groove and in posterior view (Fig. 25) a simple grooved area without septum. Epigynal area often encrusted with blackish material. Two seminal receptacles visible through integument as oval or round vessels separated by about half their width, each bearing at the base a small accessory lobe, often collapsed. Atriobursal orifices difficult to see; pale grooves on arch inside genital groove. Fertilization canals present as small tubules on ventral side of large receptacles.

TABLE 2.—Comparison of carapace and first femur of females from Mexico and Central America (measurements in millimeters)*.

Locality	Carapace length	First femur	Comparison*
Tamaulipas	2.3	4.8	2.1
	2.5	5.2	2.1
Hidalgo	1.8	4.4	2.5
	2.2	4.9	2.2
Nuevo León	2.1	4.2	2.0
	2.2	4.8	2.2
Guerrero	2.3	5.0	2.2
Colima	2.0	3.7	1.9
Oaxaca	2.1	3.7	1.8
	2.0	3.7	1.9
Chiapas	2.0	3.7	1.9
	1.8	3.3	1.8
	1.8	3.6	2.0
Guatemala	2.0	4.2	2.1
Costa Rica	2.1	4.0	1.9
	2.0	3.7	1.9
	2.0	3.6	1.8
	2.1	3.7	1.8
El Salvador	1.8	4.0	2.2

*The average for the 19 females is almost exactly two.

Male from Caverns State Park, Jackson County, Florida.—Total length, 4.75 mm. Carapace 2.15 mm long, 1.75 mm wide. Abdomen 2.60 mm long, 2.15 wide.

Coloration and structure similar to those of female except as noted below. Pars cephalica narrower in front, and eyes somewhat closer together; three long bristles projecting forward from above anterior median eyes. Clypeus equal in height to three full diameters of anterior median eye. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 17:15:18:18$$

Anterior median eyes separated by full diameter, two-thirds as far from lateral eyes, which are subequal in size. (Anterior median eyes of damaged male from Chiapas, Mexico, widely separated by two diameters, presumably an aberrant condition.) Oval posterior median eyes separated by little more than diameter (18/22), slightly less than diameter from equal-sized lateral eyes. Sternum proportionately narrower and posterior coxae even less separated. Chelicerae like those of female except as follows: promargin with three stout, more widely separated teeth with apical tooth much longer; retromargin with weak compound tooth bearing four or five serrations; fang greatly thickened, bulbous in basal portion, with thin tip of fang turned to nearly right angle.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	6.35	4.70	3.15	4.50	0.72
Patella	1.00	0.90	0.70	0.80	0.20
Tibia	6.45	4.45	2.20	3.55	0.24
Metatarsus	5.70	4.10	2.35	3.30	—
Tarsus	2.25	1.70	1.15	1.55	0.45
Total	21.75	15.85	9.55	13.70	1.61

Leg formula, 1243. First femur about 3 times, first leg about 10 times as long as carapace. Third metatarsus somewhat longer than carapace. Tarsal claws and tarsal combs like those of female. Abdomen rounded, less elevated.

Male palpus (Figs. 15–16) small, short appendage, sparsely set with setae. Femur cylindrical, about four times as long as width at apex. Patella and tibia short, bulbous segments, together somewhat more than half of femoral length. Cymbium a shallow, spoon-shaped receptacle bearing short, slightly twisted, apically denticulate

TABLE 3.—Comparison of first legs of males from Texas, Mexico and El Salvador (measurements in millimeters).

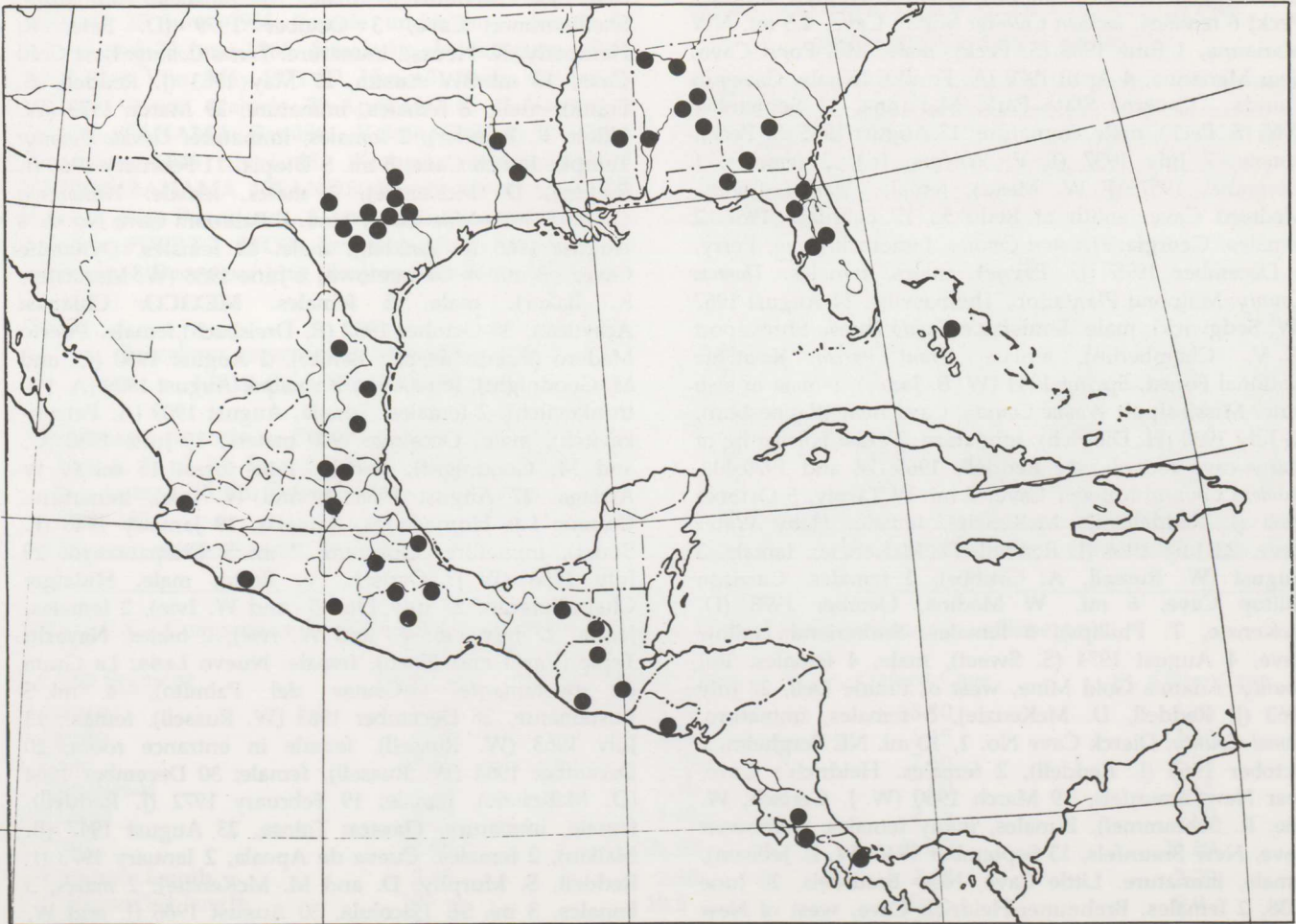
Limb Segment	Flemming Cave Kimble County TEXAS	Jacala Hidalgo MEXICO	Chilpancingo Guerrero MEXICO	Tonalá Chiapas MEXICO	Finca San Jorge Santa Ana EL SALVADOR
Femur	5.70	3.70	3.80	3.50	4.00
Patella	1.10	0.75	0.80	0.75	0.80
Tibia	5.65	3.70	3.60	3.35	3.90
Metatarsus	5.00	3.30	3.25	2.70	3.30
Tarsus	1.90	1.47	1.35	1.50	1.40
Total	19.35	12.92	12.80	11.80	13.40
Carapace length	2.10	1.70	1.70	1.50	1.80
Carapace/leg length	9.2	7.6	9.2	8.0	5.6
Carapace/femur	2.7	2.18	2.23	2.3	1.71

paracymbium on retrolateral side. Bulb suboval; embolus a small coil, wide at juncture to bulb and thinly curved around to subapical position behind conductor; conductor fairly large, slightly concave, thin oval plate bearing small black spine near apex.

TYPE DATA.—Of *Gaucelmus augustinus* Keyserling, female syntypes from cellars of Fort St. Augustine, Florida (G. Marx), in United States National Museum (seen); of *Theridion eigenmanni* Banks, female syntypes from Beaver Cave and Ezell's Cave, near San Marcos,

Texas (C. H. Eigenmann), in the Museum of Comparative Zoology, Cambridge, Massachusetts (seen); of *Theridion santaanae* Kraus, male holotype from Finca San Jorge, 1,000 meters, Santa Ana, El Salvador, 25 April 1951, in Forschungs-Institut Senckenberg, Frankfurt-am-Main, Germany (not seen).

DISTRIBUTION.—Florida and Gulf States to Texas, south through Mexico to Panama. West Indies: Bahama Islands and Puerto Rico. (See Map 1.)

Map 1.—Distribution of *Gaucelmus augustinus* Keyserling.

RECORDS.—UNITED STATES: **Alabama:** *Blount County:* Dixon Cave, 1 mi. SE Brooksville, 14 July 1951 (W. B. Jones), female. Catfish Cave, 1 mi. SE Blount Springs, 5 April 1967 (S. Peck), female. *Clarke County:* McVey Cave, 9 November 1946 (W. B. Jones), female. Broadenax Cave, 9 April 1948 (W. B. Jones), immature. *Colbert County:* Wolf Den Cave, 25 September 1940 (W. B. Jones, A. Archer), male. *Jefferson County:* Crystal Caverns, 1 mi. N Clay, 12 July 1959 (W. B. Jones), female. *Lee County:* Auburn, female. *Marshall County:* Lime Point Cave, 2 mi. S Guntersville, 24 August 1968 (S. Peck, A. Dobson), male. Lower 4 Lane Cave, 2 mi. S Guntersville, 14 August 1967 (S. Peck, A. Fiske), immature. *Morgan County:* Lipscomb Cave, near Lacey's Spring, 13 June 1942 (W. B. Jones), 3 females. Ivey Hollow Cave, 4 mi. S Hillsboro, 28 March 1942 (W. B. Jones), female. Lost Mule Cave, Trinity Mountains, 13 September 1940 (W. B. Jones), male. **Florida:** (This updates the list for Florida of Peck, 1970) *Alachua County:* Dudley Cave, 12 February 1937 (H. Hobbs), female; 18 March 1938 (W. J. Gertsch, H. K. Wallace), 8 females; 25 April 1934 (H. K. Wallace), 4 females. Squirrel Chimney Cave, near Gainesville, 27 March 1970 (A. Fronk), 3 females, immature. Warren's Cave, 9 mi. W Gainesville, 28 December 1965 (S. Peck), female. Bat Cave, Newberry, 2 November 1963 (R. Moore), female. *Citrus County:* In cave (N. Banks Collection), 4 females; no specific locality (H. K. Wallace), female. Small cave 5 mi. N Dames Cave, 1 August 1977 (S. Peck), 2 females. Dames Cave, 2 August 1971 (S. Peck) 6 females. *Jackson County:* Milton Cave, 4.5 mi. NW Marianna, 1 June 1968 (S. Peck), male. Mill Pond Cave, near Marianna, 4 April 1970 (A. Fronk), female. Caves in Florida Caverns State Park, Marianna, 11 September 1965 (S. Peck), male, immature; 13 August 1965 (S. Peck), female; 7 July 1957 (E. V. Weems, Jr.), 2 females; 1 December 1957 (F. W. Mead), female. *Marion County:* Medford Cave, south of Reddick, 17 February 1957, 2 females. **Georgia:** *Houston County:* Limerock Cave, Perry, 6 December 1975 (J. Payne), males, females. *Thomas County:* Millpond Plantation, Thomasville, 14 August 1967 (W. Sedgwick), male. **Louisiana:** *Caddo Parish:* Shreveport (R. V. Chamberlin), female. *Grant Parish:* Kisatchie National Forest, Spring 1941 (W. B. Jones), female in slab pine. **Mississippi:** *Wayne County:* Cave near Waynesboro, 23 July 1930 (H. Dietrich), immature. **Texas:** For listing of many cave records see Reddell, 1965:174 and 1970:406. *Bandera County:* Mueller Cave, 2 mi. W Tarply, 5 October 1963 (J. Reddell, D. McKenzie), female. Haby Water Cave, 23 July 1966 (J. Reddell, D. McKenzie), female; 3 August (W. Russell, A. Grubbs), 2 females. Garrison Hilltop Cave, 6 mi. W Medina, October 1973 (D. McKenzie, T. Phillips), 6 females. Sutherland Hollow Cave, 4 August 1974 (S. Sweet), male, 4 females. *Bell County:* Adam's Gold Mine, west of Prairie Dell, 27 July 1963 (J. Reddell, D. McKenzie), 5 females, immature. *Comal County:* Dierck Cave No. 1, 10 mi. NE Bergheim, 2 October 1965 (J. Reddell), 2 females. Heidrich's Cave, near New Braunfels, 19 March 1960 (W. J. Gertsch, W. Ivie, R. Schrammel), 2 males, many females. Brehmmer Cave, New Braunfels, 13 September 1940 (W. L. Jellison), female, immature. Little Cave, New Braunfels, 20 June 1938, 2 females. Brehmmer-Heidrich Cave, west of New Braunfels, 19 January 1963 (D. McKenzie), 3 females. *Hays County:* Boyett's Cave, south of Wimberley, 30

March 1963 (J. Reddell, W. Russell), 4 females, immature. Ezell's Cave, near San Marcos (C. H. Eigenmann, 1900), females; 5 June 1963 (T. Barr), 4 females, egg sacs; 7 September 1963 (J. Reddell, D. McKenzie, R. Ballinger), male, 2 females, immature; 28 October 1967 (J. Reddell), 2 females; 6 January 1939 (O. Sanders), 3 females; January to November 1978 (J. Davis) male, females, immature. Cricket Cave, San Marcos, 9 June 1938, 3 females. Beaver Cave (=Wonder Cave), near San Marcos, 11 November 1899 (C. H. Eigenmann, 1900), females. Vogel-sang's Camp, San Marcos, 21 April 1935 (Adair), female. Wimberly Bat Cave, south of Wimberley, 16 September 1963 (D. McKenzie, W. Russell), male, 6 females; 17 December 1972 (W. Russell), male, 6 females; no specific locality, 15 April 1939 (D. and S. Mulaik), 8 females. Bear Cave, 1 April 1976 (R. Mitchell et al.), 5 females. *Kerr County:* Smith Cave, 10 mi. SW Kerrville, 1 September 1968 (J. Reddell, S. Fowler), 4 females, immature. Wilson Ranch Cave, 6 mi. NW Hunt, 29 December 1956 (W. McAlister, K. Baker, R. Selander), female. Mingus Root Cave, 28 April 1968 (J. Reddell, S. Fowler), 4 females, immature. *Kimble County:* Flemming Bat Cave, 2 mi. S Telegraph, 3 September 1967 (J. Reddell, C. Russell), 4 males, 10 females, immature. 700 Springs Cave, 3 mi. S Telegraph, 4 September 1967 (J. Reddell), 2 females. 14 mi. SW Junction, 11 July 1954 (R. E. Ryckman, C. P. Christianson, D. Spencer), 4 females. *Real County:* Orell Crevice Cave, 5 mi. N Leakey, 18 August 1963 (J. Reddell, D. McKenzie), male, 6 females, immature. Shellhammer Cave, 3 October 1979 (D. Pate, R. Hemperly, K. Heuss), immature. *Travis County:* Lost Gold Cave, 13 mi. SW Austin, 27 May 1963 (J. Reddell, B. Frank), male, 3 females, immature; 29 March 1973 (W. Elliott, R. Fieseler), 2 females, immature. *Uvalde County:* Tampke Ranch Cave, 5 mi. S Utopia, 11 February 1966 (J. Reddell, D. McKenzie), 3 males, female. *Williamson County:* Three-Mile Cave, 1 mi. E Ballroom Cave No. 2, 4 August 1965 (J. Reddell), male, 12 females. Dynamite Cave, 3 mi. W Georgetown, 6 June 1956 (W. McAlister, K. Baker), male, 5 females. **MEXICO:** **Chiapas:** Acayucán, 30 October 1957 (R. Dreisbach), female. Puerto Madero (Puerto de San Benito), 2 August 1950 (C. and M. Goodnight), female. La Zacualpa, August 1909 (A. Petrunkevitch), 2 females. Tonalá, August 1909 (A. Petrunkevitch), male. Ocosingo, 900 meters, 15 June 1950 (C. and M. Goodnight), female. Pine forest 15 mi. N W Arriaga, 27 August 1966 (J. and W. Ivie), immature. **Colima:** Las Humedades, Armeria, 19 January 1948 (F. Bonet), immature. **Guerrero:** 7 mi. S Chilpancingo, 29 July 1956 (W. J. Gertsch, V. Roth), male. **Hidalgo:** Chapulhuacán, 27 July 1966 (J. and W. Ivie), 2 females. Jacala, 27 July 1966 (J. and W. Ivie), 2 males. **Nayarit:** Tepic (Vaslit and Eisen), female. **Nuevo León:** La Gruta de Bustamante (=Grutas del Palmito), 4 mi. S Bustamante, 26 December 1963 (W. Russell), female; 13 July 1963 (W. Russell), female in entrance room; 20 December 1964 (W. Russell), female; 30 December 1964 (D. McKenzie), female; 19 February 1972 (J. Reddell), female, immature. **Oaxaca:** Tolosa, 23 August 1947 (B. Malkin), 2 females. Cueva de Apoala, 2 January 1973 (J. Reddell, S. Murphy, D. and M. McKenzie), 2 males, 3 females. 3 mi. SE Tlacolula, 30 August 1966 (J. and W. Ivie), 2 females. Oaxaca de Juárez, 15 June–15 August 1970 (M. R. Bogert), male around house. Cueva del Llano

Grande, 25 mi. N Sola de Vega, 31 December 1972 (J. Reddell, D. McKenzie, S. Murphy), male, 8 females, immature. **Puebla:** Cueva de Tasalolpan, 5 km SW Cuetzalan, 22 December 1976 (J. Reddell, A. Grubbs, C. Soileau, D. McKenzie), 2 females. **Querétaro:** Cueva de Chevrón, 1.7 mi. E Pinal de Amoles, 15 July 1969 (S. Peck), female. Sótano de Tilaco, 500 m N Tilaco, 24 March 1980 (Peter Sprouse), 2 males, 3 immatures; 24 March 1980 (D. Honea, D. Pate, R. Rumer, T. Treacy), 1 female, immature. **San Luis Potosí:** La Cueva de Llanura, 3 km W Micos (27 km NW Ciudad Valles), 21 July 1970 (W. Russell, D. McKenzie), 2 females. Sótano de Elías, 2 January 1976 (D. Barnes, M. Cossey, M. Grubbs, J. Rodemaker), female. **Tamaulipas:** Cueva de los Cuarteles, 10 km S Aldama, December 1948 (C. Bolívar), female; January 1978 (J. Reddell, A. Grubbs), female. Cueva Nacimiento, Gómez Farías, 29 June 1969 (W. Peck), 2 females. Crystal Cave, Rancho del Cielo, 19 January 1977 (J. Reddell, J. Cooke, S. Wiley, V. Tipton), female. **Veracruz:** Fortín, 28 April 1944 (C. Bolívar, I. Piña), 2 females. Sótano del Hombre Invencible, Soledad Atzompa, 4 January 1973 (W. Elliott), 3 females. **CENTRAL AMERICA: GUATEMALA:** Huehuetenango: Cueva Agua Escondida, El Tabacal December 1972 (M. Shawcross), 2 females. **EL SALVADOR:** Finca San Jorge, Santa Ana, 1,000 meters, 25 April 1951, male holotype of *Theridion santaanae*, and immature; Institut, San Salvador, 700 meters, 11 November 1951 (Kraus, 1955:17), 2 females. **COSTA RICA:** San José (Enrique Schmidt), 2 females: 27 June 1966, female under logs; female in debris, and 29 June 1966, female in old cut grass (all S. Peck). San Vito, May 1971 (D. Howell), male. Grutas de Venado, Grecia, Alajuela, 29 April 1972 (E. E. Valerio), 2 females. **PANAMA:** Bambito, Volcán Chiriqui Province, December 1946 (N. L. H. Krauss), female. **WEST INDIES: BAHAMA ISLANDS:** Hunt's Cave, 4 mi. SW Nassau, New Providence, 8 April 1953 (Hayden, Rabb), 2 females. **PUERTO RICO:** Empalme Cave, Bayaney, 14 February, 8 December 1964 (Brother Nicholas), 2 females.

Gaucelmus cavernicola (Petrunkevitch)
NEW COMBINATION

Theridionexus cavernicolus Petrunkevitch, 1910: 209, pl. 22, Figs. 6, 7, pl. 23, Figs. 30-34, 37; Petrunkevitch, 1911: 211; Lutz, 1915: 86; Petrunkevitch, 1928: 249; Nicholas, 1962: 183.

Nesticus cavernicola: Bonnet, 1958: 3093.

DIAGNOSIS.—Near relative of *G. augustinus*, distinguished by following features: epigynum with rounded receptacles close together and accessory lobes proportionately larger; conductor of male palpus narrowed at apex and provided with heavier spur; promargin of male chelicerae with enlarged, curved apical tooth and two small teeth above; slightly longer, thinner legs in both sexes; groove below eyes inconspicuous.

ETYMOLOGY.—Specific name from Latin *caverna*, cave, and *colo*, to inhabit.

ECOLOGY.—This long-legged species has so far been taken only in caves, but it is probably a troglophile. Petrunkevitch (1910) "found the spiders at a considerable distance from the entrance" to (Peru) cave where "they were hanging in loose webs on the wall of the cave. The webs consisted of a few irregular threads" and the spiders were feeding on the small flies present in the cave.

DESCRIPTION.—Length of mature females, 4 to 6.5 mm.

Female from St. Claire Cave, Jamaica:—Total length, 5.80 mm. Carapace 2.50 mm long, 1.85 mm wide. Abdomen 3.50 mm long, 3.00 mm wide.

Coloration and structure in close agreement with those of *G. augustinus* unless otherwise noted. Carapace and appendages light orange brown; abdomen uniform whitish to gray. Eye curvature and relations similar but eyes smaller. Clypeus sloping moderately forward, equal in height to about five diameters of anterior median eye (13/60), with slight groove below eyes. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 17:13:17:17$$

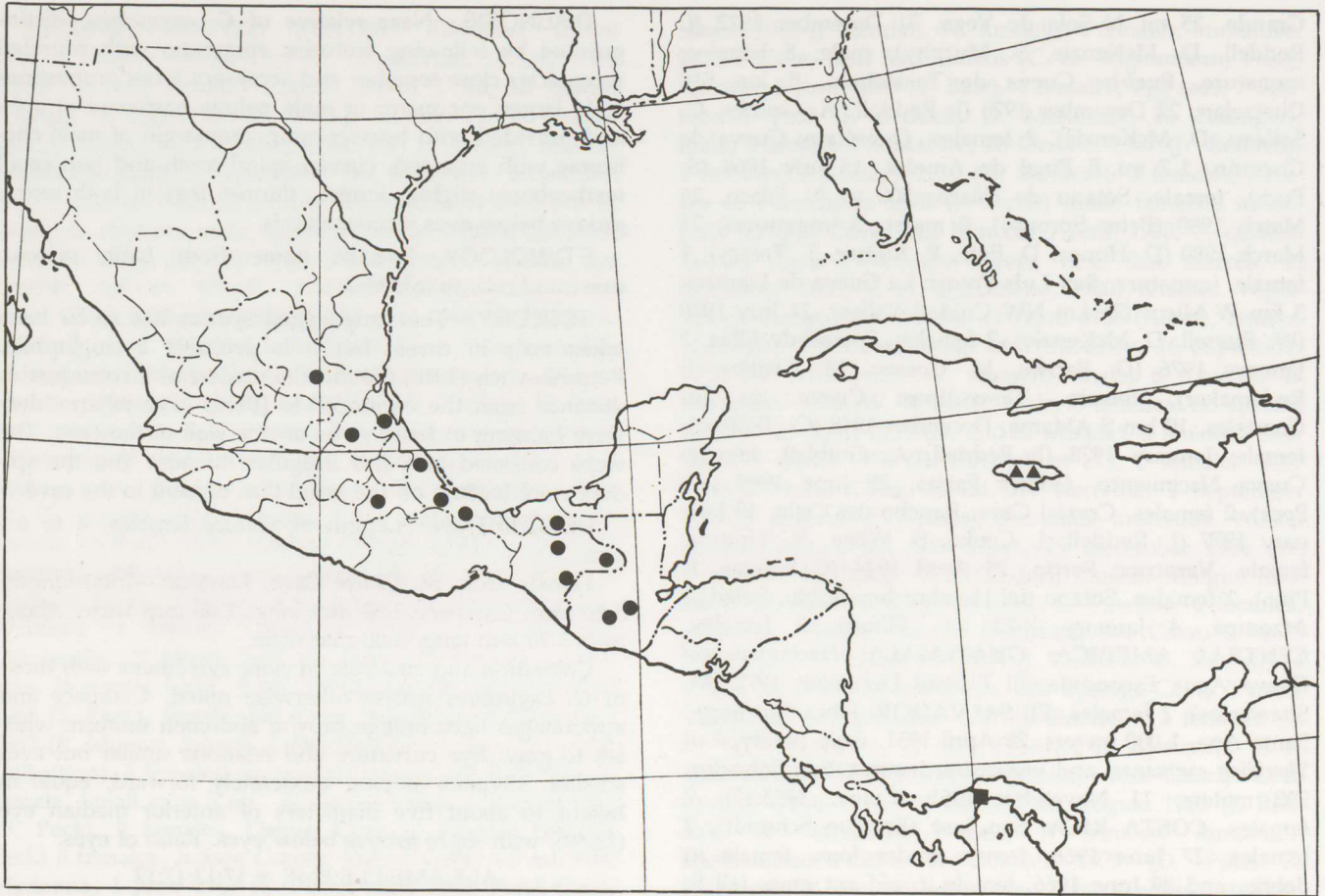
Anterior median eyes separated by more than diameter (13/18), about diameter from broadly oval lateral eyes. Oval posterior median eyes separated by more than diameter (17/24), closer to oval lateral eyes. Median ocular quadrangle broader than long (45/41), narrowed in front in same ratio.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	7.15	5.35	3.25	5.00	1.25
Patella	1.10	1.00	0.80	1.00	0.65
Tibia	6.70	4.65	2.15	3.85	0.60
Metatarsus	6.35	4.35	2.65	3.75	—
Tarsus	2.60	2.00	1.35	1.60	1.10
Total	23.90	17.35	10.20	15.20	3.66

Leg formula, 1243. First leg 9.56 times, first femur 2.85 times as long as carapace. Third metatarsus longer than

TABLE 4.—Comparison of first legs of females from caves in Jamaica (measurements in millimeters).

Limb Segment	Drip Cave	Oxford Cave	Oxford Cave	St. Claire Cave
Femur	8.15	7.70	8.10	6.60
Patella	1.20	1.10	1.15	1.10
Tibia	7.80	7.75	7.60	6.25
Metatarsus	7.15	7.10	7.00	5.85
Tarsus	2.70	2.65	2.55	2.00
Total	27.00	26.30	26.40	21.80
Carapace length	2.65	2.50	2.60	2.20
Carapace/leg length	10	10.5	10	9.9
Carapace/femur	3	3	3.1	3



Map 2.—Distribution of *Gaucelmus* species: *calidus* Gertsch (●); *cavernicola* (Petrunkevitch) (▲); *tropicus*, n. sp.; and *pygmaeus*, n. sp. (■).

carapace. Legs thinner and slightly longer than those of *G. augustinus* from eastern part of range, much longer than those from Mexico and Central America.

Epigynum (Figs. 26–28) like that of *G. augustinus* except as follows: oval seminal receptacles usually closer together and accessory receptacles larger, half the diameter of the principal ones; posterior margin without septum and with distinct pattern as shown in Figure 28.

Male from St. Claire Cave, Jamaica.—Total length, 4.20 mm. Carapace 2.15 mm long, 1.70 mm wide. Abdomen 2.35 mm long, 1.50 mm wide.

Coloration and structure like those of female except as noted below. Pars cephalica narrower in front and eyes closer together. Clypeus subvertical, equal in height to three diameters of anterior median eye (17/50), with inconspicuous groove below eyes. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 18:17:18:18$$

Anterior median eyes separated by less than diameter (17/13), nearer lateral eyes (17/10). Posterior median eyes separated by more than diameter (18/20), full diameter from lateral eyes. Median ocular quadrangle broader than long (23/20), narrower in front in same ratio. Chelicera of medium size, with parallel sides; promargin with long, curved tooth at apex and two small teeth just above; retromargin with low compound tooth armed with weak denticles; fang moderately incrassated at base (Fig. 14).

Some legs missing from male from St. Claire Cave so measurements of Petrunkevitch (1910: 210) are given: Length of carapace of this male, 2.3 mm.

	Limb Segment Lengths (mm)			
	I	II	III	IV
Femur	8.6	6.7	3.9	5.5
Patella and Tibia	9.3	7.2	3.8	5.1
Metatarsus	8.1	6.2	3.4	4.4
Tarsus	2.9	2.4	1.1	4.4
Total	28.9	22.5	12.2	16.9

Leg formula, 1243. First leg 12.5 times, first femur 3.7 times as long as carapace. Third metatarsus much longer than carapace.

Male palpus (Figs. 17–18) like that of *G. augustinus* except as follows: conductor narrowed near apex where provided with thicker terminal spur with bifid tip.

TYPE DATA.—Male and five female syntypes from Peru Cave, near Malvern, Santa Cruz Mountains, Jamaica, 12 May 1905 (A. Petrunkevitch), in the United States National Museum (seen).

DISTRIBUTION.—Known only from Jamaica. (See Map 2.)

RECORDS.—**JAMAICA.** (Additional data on Jamaican caves is in Peck, 1975.) *Clarendon Parish*: Pedro Great

Cave, Pedro, 20 December 1972 (S. Peck), 11 females, immature; 17 August 1974 (S. Peck), male, 14 females, immature; 25 March 1973 (R. Norton, R. Zimmerman), male, 4 females. *Manchester Parish*: Oxford Cave, Auchtembeddie, 10 August 1941 (W. G. Lynn), female; 4, 8 April 1958 (S. Peck, A. Fiske), 7 females, immature; 24, 30 December 1972 (S. and J. Peck), 3 males, 4 females, immature; 27 July 1974 (S. Peck), male, 4 females, immature; 30 March 1973 (R. Norton, R. Zimmerman), male, 4 females, immature. *St. Ann Parish*: Mosely Hall, near Blackstonedged, 14 December 1952 (R. P. Bengry), immature female from cave. Runaway Caves, Runaway Bay, 29 December 1972 (S. and J. Peck), 4 females; Bambribo Cave, Douglas Castle, 20 December 1972 (S. and J. Peck), immature; 18 August 1974 (S. Peck), 7 females. Mosley Hall Cave, near Guys Hill, 27 December 1972 (S. and J. Peck), male, 2 immatures. Mt. Plenty Cave, Goshen, 20 August 1974 (S. Peck), 6 females, immature. Norwood Rat Hole Cave, near Aeon Town, 2 September 1974 (S. Peck), male, 7 females, immature. Hutchinson Hole Cave, 27 March 1973 (R. Norton, R. Zimmerman), 4 males, 8 females. Cave River Cave, Aeon Town, 2 September 1974 (S. Peck), 4 females, immature. Ken Connell Hole, 8 mi. S Claremont, 19 August 1974 (S. Peck), female, immature. *St. Catherine Parish*: St. Claire Cave, 1.5 mi. W Ewarton, January 1906 (S. Kern), male, 5 females; 7 April 1968 (S. Peck, A. Fiske), 7 females, immature. Swansea Cave, Worthy Park Estate, 4 November 1973 (R. Norton), female, immature. *St. Elizabeth Parish*: Peru Cave, 5 mi. NE Santa Cruz, 23 December 1972 (S. and J. Peck), female, immature. Wallingford Sink Cave, Wallingford, 27 August 1974 (S. Peck), 3 males, 6 females, immature. Duanwarie Cave No. 1, 29 October 1973 (R. Norton), immature. *St. James Parish*: Rota Cave, Maroon Town, 3 September 1974 (S. Peck), immature. Mocho Cave, 30 October 1973 (R. Norton), 3 females. *St. Mary Parish*: Lucky Hill Farm Cave, Lucky Hill, 25 December 1972 (S. and J. Peck), immature. Rock Springs Cave, Pear Tree Grove, 21 August 1974 (S. Peck), female, immature. Mt. Plenty Cave, 31 March 1973 (R. Norton, R. Zimmerman), male, 7 females. *St. Thomas Parish*: Old mine, Whitfield Hall, 7 August 1974 (S. Peck), 4 females. *Trelawny Parish*: Drip Cave, 1.5 mi. SE Stewart Town, 2 April 1968 (S. Peck, A. Fiske), female; 25 August 1974 (S. Peck), male, 3 females; 28 March 1973 (R. Norton, R. Zimmerman), 2 females. Deeside Cave, Deeside, 20 August 1974 (S. Peck), 2 males, 4 females, immature. Windsor Great Cave, Windsor, 10 mi. S Falmouth, 5 April 1968 (S. Peck, A. Fiske), immature. Harties Cave, Spring Garden, 4 September 1974 (S. Peck), immature. Dromilly Cave, 2 mi. NE Deeside, 28 August 1974 (S. Peck), 2 males, 14 females. Carambie Cave, Spring Garden, 4 September 1974 (S. Peck), 3 females. Printed Circuit Cave, 30 March 1973 (R. Norton, R. Zimmerman), 3 females. *Westmorland Parish*: Roaring River Cave, 7 mi. NE Savanna la Mar, 29 August 1974 (S. Peck), 2 females.

Gaucelmus calidus Gertsch

Gaucelmus calidus Gertsch, 1971: 96, Figs. 149–150.

DIAGNOSIS.—Distinctive species occurring within southern range of *G. augustinus* and distinguished by following features: legs proportionately thicker and often with faint reddish annulae; epigynum larger, with large

accessory lobes and distinct dark septum on margin of genital groove; conductor of male palpus with deep groove in apical half to form rounded lobe and longer, curved retrolateral process with divided spur at apex.

ETYMOLOGY.—Specific name from the Latin *calidus*, warm or hot, having reference to occurrence of the species in warm climates.

ECOLOGY.—So far this species has been taken from the walls of caves but its occurrence in appropriate external localities is to be expected.

DESCRIPTION.—Length of mature females, 4 to 9 mm.

Female from Grutas de Zapaluta, Chiapas, Mexico.—Total length 7 mm. Carapace 2.75 mm long, 2.35 mm wide. Abdomen 4.30 mm long, 3.50 mm wide.

Integument of carapace dull to bright orange brown, with faint dusky shadings of cephalic and cervical grooves and radiations on pars thoracica, with sparse covering of black hairs mostly present on pars cephalica; eyes narrowly ringed with black. Underside of cephalothorax, legs, and carapace essentially concolorous; legs variable, plain or faintly marked with reddish annulae. Abdomen dull white to yellowish, with dusky dorsal pattern in some specimens.

Structure similar to that of *G. augustinus* unless otherwise indicated. Clypeus sloping forward, equal in height to three full diameters (19/62) of anterior median eyes with distinct groove below eyes. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 21:19:21:20$$

Anterior median eyes separated by less than diameter (19/16), nearer lateral eyes (19/10). Oval posterior median eyes separated by more than diameter (20/30), separated from lateral eye by long diameter. Median ocular quadrangle broader than long (60/50), narrowed in front by same ratio. Chelicera like that of *G. augustinus*; retromargin with small lobe covered with denticles.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	7.35	5.35	3.25	5.30	1.10
Patella	1.25	1.20	1.00	1.20	0.35
Tibia	6.65	4.50	2.15	3.80	0.55
Metatarsus	6.60	4.55	2.50	3.70	—
Tarsus	2.50	2.00	1.35	1.65	1.15
Total	24.35	17.60	10.35	15.65	3.15

Leg formula, 1243. First leg about 9 times, first femur 2.6 times as long as carapace. Third metatarsus shorter than carapace.

Epigynum (Figs. 29–31) larger than that of *G. augustinus* and showing following differences: seminal receptacles large, oval, separated by half their width and bearing large accessory lobe at base outside; posterior margin with distinctive sclerotized pattern and conspicuous dark median septum.

Male from Grutas de Zapaluta, Chiapas, Mexico.—Total length, 4.65 mm. Carapace, 2.35 mm long, 2.15 mm wide. Abdomen 2.30 mm long, 1.60 mm wide.

Coloration and structure like those of female unless otherwise noted. Pars cephalica narrower, but eye relations and curvature like those of female. Clypeus subvertical, equal in height to three full diameters of anterior median eye, with shallow groove below eyes.

TABLE 5.—Comparison of first legs of females from Mexico and Guatemala (measurements in millimeters).

Limb Segment	Cueva de El Tenango HIDALGO, MEXICO	Milliped Cave OAXACA, MEXICO	Cueva de Ojo de Agua de Tlilapan VERACRUZ, MEXICO	Cueva del Tio Ticho CHIAPAS, MEXICO	Viejo Sumidero GUATEMALA
Femur	7.40	8.35	7.25	6.40	8.25
Patella	1.25	1.35	1.25	1.20	1.35
Tibia	6.85	7.35	6.65	6.15	7.70
Metatarsus	6.65	7.50	6.60	6.10	7.65
Tarsus	2.50	2.75	2.35	2.30	2.75
Total	24.65	27.30	24.10	22.15	27.70
Carapace length	2.75	3.00	2.80	2.50	3.00
Carapace/leg length	9.0	9.1	8.6	8.9	9.2
Carapace/femur	2.6	2.8	2.6	2.5	2.7

Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 20:18:20:20$$

Anterior median eyes separated by less than diameter (18/13), nearer the lateral eyes (18/10). Oval posterior median eyes separated by more than diameter (20/15), full diameter from posterior lateral eyes. Median ocular quadrangle broader than long (60/45), narrowed in front in same ratio. Chelicerae stouter than those of *G. augustinus*; promargin (Fig. 13) with three teeth but distal one enlarged, slightly sinuous, and basal pair reduced in size; retromargin (Fig. 12) with denticulate compound tooth; fang with typical bulbous enlargement at base.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	7.80	5.70	3.50	5.40	0.90
Patella	1.15	1.60	0.90	1.00	0.27
Tibia	8.10	5.35	2.50	4.25	0.30
Metatarsus	7.50	5.25	2.75	4.20	—
Tarsus	2.75	2.15	1.40	1.70	0.55
Total	27.30	19.55	11.05	16.55	2.02

Leg formula, 1243. First leg 11.6 times, first femur 3.4 times as long as carapace. Third metatarsus longer than carapace.

Male palpus (Figs. 19–20) like that of *G. augustinus* except as follows: conductor deeply divided to form rounded lobe and longer curved process, bifid at apex.

TYPE DATA.—Male holotype from Grutas de Zapaluta, 4 mi. SE Zapaluta, Chiapas, Mexico, 19 July 1950 (C. and M. Goodnight) in the American Museum of Natural History.

DISTRIBUTION.—Northeastern Mexico (Hidalgo and San Luis Potosí) south to Guatemala. (See Map 2.)

RECORDS.—MEXICO: **Chiapas:** Grutas de Zapaluta, 4 mi. SE Zapaluta, 19 July 1950 (C. and M. Goodnight), 2 males, females; 20 August 1967 (J. Reddell, J. Fish, T. R. Evans), females, immature; 2 February 1972 (D. McKenzie), male, 3 females; 28 August 1973 (R. Mitchell, J. Cooke), 8 females, immature Cueva del Tío Ticho, 1 mi. S Comitán, 21 August 1967 (J. Reddell, J. Fish, T. R. Evans), 2 females, immature. Sumidero del Camino, 10 mi. NE Comitán, 22 August 1967 (J. Reddell, J. Fish),

females. Cueva Chica de Hunchabien (Hun Chabín), 1 mi. N Comitán, 21 August 1967 (J. Reddell), female. Cueva de Colonia Rincón, 60 mi. N Chiapa de Corzo, 30 May 1972 (D. McKenzie), immature. Sumidero Yochib, near San Cristóbal de las Casas, 8, 18 March 1977 (C. Soileau), 2 males, 5 females, immature. Cueva El Chorreadero, 24 December 1973 (R. Syme), female, immature. La Cueva de San Francisco, Trinitaria, 1 August 1974 (C. Goodnight), 2 females. **Hidalgo:** Cueva de El Tenango, 4 mi. S Chapulhuacán, 18 August 1965 (J. Reddell, J. Fish, W. Bell), 5 females on walls above stream passage. **Oaxaca:** Cueva Bonita del Presidente, 1 mi. N Huautla, 12 August 1967 (J. Reddell, J. Fish, T. R. Evans), female. Milliped Cave, 5 mi. N Huautla, June 1965 (W. Russell), male, 2 females. Cueva del Camino, Puente del Fierro, 13 August 1967 (J. Reddell), 5 females. **Puebla:** Sima Octimaxal Sur No. 1, 3 km SW Cuetzalan, 27 December 1973 (J. Reddell, W. Elliott), 5 females, immature. Cueva de Tasalolpan, 5 mi. SW Cuetzalan, 22 December 1976 (J. Reddell, A. Grubbs, C. Soileau, D. McKenzie), 2 penultimate males. Grutas de Jonotla, 7 mi. SW Cuetzalan, 26 December 1973 (J. Reddell, D. McKenzie, R. Jameson, W. Elliott), 5 females. **San Luis Potosí:** Cueva de la Laja, 2 km E Ahuacatlán, 26 November 1972 (J. Reddell, T. Raines, J. White), male, 3 females. **Tabasco:** Cueva del Azufre, 3 km N Tapijulapa, 15 June 1975 (J. Reddell, D. McKenzie, S. Wiley), 3 females, penultimate male. **Veracruz:** Cueva de Ojo de Agua de Tlilapan, August 1967 (J. Reddell, J. Fish, T. R. Evans), 3 males, many females; 3 August 1967 (J. Reddell), 4 females; 8 August 1969 (S. and J. Peck), male, 7 females; 4 March 1973 (J. Reddell et al.), 4 females. Cave at Fortín de las Flores, 27 June 1963 (R. E. Woodruff), 6 females; 28 April 1944 (C. Bolívar, I. Piña), 2 females. Sótano de Sphodrini, Tequila, 6 August 1967 (J. Reddell, T. Evans), immature. Cueva del Nacimiento Grande, 10 km N Potrero Viejo, 22 August 1965 (J. Reddell, J. Fish, W. Bell), female. Cueva Macinga, 5 March 1973 (J. Reddell, M. McKenzie, S. M. Butterwick), 2 females, immature. Sótano de las Golondrinas, Manzanilla, 11 km N Potrero, 8 January 1977 (A. Grubbs), male, 3 females. Sótano de la Palma, Rancho Nuevo, 14 km N Potrero, 7 January 1977 (J. Reddell, D. McKenzie), female. Sótano de los Perros, 10 km N Potrero, Manzanilla, 7 January

1977 (D. McKenzie), immature. **CENTRAL AMERICA: GUATEMALA:** Huehuetenango: Viejo Sumidero, south of El Tabacal, February 1968 (F. Harding), 2 females. **Sololá:** La Cueva Camán, near Lake Atitlán, 11 June 1959 (L. Varnedoe), 2 females.

Gaucelmus tropicus, new species

DIAGNOSIS.—Relative of *G. augustinus* readily separated by following features: epigynum without median septum, with small transverse dark spot on edge of posterior margin; conductor of male palpus small, with sharp, curved hook at apex; promargin of male chelicera with long, curved tooth at apex and two denticles above.

ETYMOLOGY.—Specific name based on Latin *tropicus*, having reference to the Torrid Zone.

ECOLOGY.—This troglomorphic species so far has been collected only in the Chilibrillo Caves, where it hangs its small webs in crevices on the walls and ceiling. It probably also lives in suitable situations outside cave habitats.

DESCRIPTION.—Length of mature females, 4 to 8 mm.

Female from Chilibrillo Caves, Panama.—Total length: 5.8 mm. Carapace 2.30 mm long, 1.85 mm wide. Abdomen 3.50 mm long, 3.00 mm wide.

Carapace dull to bright orange-brown, with reddish shadings defining grooves, with usual sparse clothing of short black hairs; eyes narrowly ringed with black. Underside of cephalothorax and legs concolorous, latter with rows of black hairs. Abdomen gray, plain or with dusky spots forming faint chevrons on dorsum, thinly clothed with fine black hairs.

Structure like that of *G. augustinus* except where noted. Clypeus subvertical, equal in height to three full diameters of anterior median eye, with shallow groove below eyes. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 20:17:20:19$$

Anterior median eyes separated by their diameter, nearer anterior lateral eyes (17/10). Oval posterior median eyes separated by more than diameter (19/26), nearer posterior lateral eyes (19/16). Median ocular quadrangle broader than long (30/25), narrowed in front in same ratio. Chelicera with three large, subcontiguous teeth on promargin and broad compound tooth with five serrations on retromargin of furrow; fang slightly enlarged at base.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	6.80	4.65	2.85	5.00	0.90
Patella	1.10	1.00	0.85	1.00	0.30
Tibia	6.35	4.00	1.75	3.65	0.45
Metatarsus	6.15	3.85	2.25	3.60	—
Tarsus	2.50	1.70	1.25	1.65	0.95
Total	22.90	15.20	8.95	14.90	2.60

Leg formula, 1243. First leg 10 times, first femur about 3 times as long as carapace. Third metatarsus slightly shorter than carapace.

Epigynum (Figs. 32–34) similar to that of *G. augustinus*. Posterior margin with distinctive pattern, without septum but with small transverse, sclerotized band.

Male from Chilibrillo Caves, Panama.—Total length, 4.6 mm. Carapace 2.2 mm long, 1.8 mm wide. Abdomen 2.5 mm long, 2.0 mm wide.

Coloration and structure like those of females unless otherwise noted. Pars cephalica narrower than usual but eye relations the same. Clypeus subvertical, equal in height to three full diameters of anterior median eyes, with trivial groove below eyes. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 20:16:20:19$$

Anterior median eyes separated by diameter, nearer anterior lateral eyes (16/10). Oval posterior median eyes separated by more than diameter (19/26), by diameter from posterior lateral eyes. Median ocular triangle broader than long (58/48), narrowed in front in same ratio. Chelicera like that of *G. cavernicola*; promargin with long apical tooth and two denticles; retromargin with compound tooth bearing four serrations; fang with basal enlargement of moderate development.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	7.25	5.25	3.20	5.15	0.63
Patella	1.00	0.90	0.75	0.85	0.21
Tibia	7.30	4.85	2.15	4.00	0.22
Metatarsus	7.10	4.65	2.45	3.90	—
Tarsus	2.65	2.10	1.35	1.70	0.50
Total	25.30	17.75	9.90	15.60	1.56

Leg formula, 1243. First leg 11.5 times, first femur 3.3 times as long as carapace. Third metatarsus longer than carapace.

Male palpus (Figs. 21–22) like that of *G. augustinus* except as follows: conductor smaller, narrower sclerite drawn at apex to a curved point.

TYPE DATA.—Male holotype from Chilibrillo Cave, Buenos Aires, Canal Zone, Panama (H. Trapido), in the American Museum of Natural History.

DISTRIBUTION.—Known only from Chilibrillo Caves, but likely of wider range in Panama. (See Map 2.)

RECORDS.—**PANAMA:** Chilibrillo Caves, Buenos Aires, Canal Zone, February 1931 (A. L. Brody), male, females; 25 February 1945 (C. D. Michener), male; 26 May 1935 (A. E. Emerson), males, females; 8 April 1945, and December 1946 (H. Trapido), many males and females; 21 July 1939 (A. M. Chickering), males, females.

Gaucelmus pygmaeus, new species

DIAGNOSIS.—Small, yellowish species (male 1.65 mm long) from Canal Zone of Panama, with symmetrically bifid tip of conductor of male palpus.

ETYMOLOGY.—Specific name from Latin *pygmaeus*, small, dwarfish.

DESCRIPTION

Male Holotype.—Total length 1.65 mm. Carapace 0.82 mm long, 0.75 mm wide. Abdomen 0.84 mm long, 0.7 mm wide.

Cephalothorax and appendages uniformly yellow in old specimen; carapace with indistinct dusky shadings; anterior median eyes with subintegumental black spots, others pale. Abdomen grayish.

Structure quite typical in spite of small size. Clypeus equal in height to three diameters of anterior median eye;

single long black seta projecting upward from anterior median eyes. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 8:6:8:7$$

Anterior eye row straight; median eyes separated by about diameter, half as far from lateral eyes. Posterior eye row slightly recurved; median eyes separated by long diameter, about half as far from lateral eyes. Median ocular quadrangle broader than long (22/17), narrowed in front by about same ratio. Chelicera of medium size, with tooth formula like that of female *G. augustinus*: promargin with three small teeth; retromargin with two rows of fine denticles; fang moderately thickened at base, without bulbous enlargement.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	1.75	1.40	0.93	1.43	0.23
Patella	0.45	0.35	0.30	0.35	0.11
Tibia	1.50	1.15	0.65	1.00	0.11
Metatarsus	1.30	1.00	0.65	0.95	—
Tarsus	0.70	0.70	0.45	0.60	0.23
Total	5.70	4.60	2.98	4.33	0.68

Leg formula, 1243. First femur 2.1 times, first leg 7 times as long as carapace.

Male palpus (Fig. 298) very small, suggestive of that of *G. tropicus* but distinct in following features: paracymbium short oval lobe; conductor suboval, with bifid tip, each spur of nearly same size.

TYPE DATA.—Male holotype from Pedro Miguel, Canal Zone, Panama, 5 July 1950 (A. M. Chickering), in the Museum of Comparative Zoology.

DISTRIBUTION.—Known only from above specimen. (See Map 2.)

Gaucelmus strinatii Brignoli

Gaucelmus strinatii Brignoli, 1979: 437, Figs. 5, 8.

COMMENT.—This taxon, recently described and too late to be included in the present revision, was based on females only and represents a species closely allied to *G. augustinus* and the species herein described as *G. tropicus*. *Gaucelmus strinatii* comes from within the known distribution of *G. augustinus* which ranges through Costa Rica into the Chiriqui Province of Panama. So far *G. tropicus* has been taken only in Chilibrillo Cave in the Panama Canal Zone. The eventual placement of *G. strinatii* will probably rest on discovery of its male.

TYPE LOCALITY.—Female holotype from Cueva Chirrepeck, Alta Verapaz, Guatemala, 6–8 April 1973 (P. Strinati), in the Muséum d'Histoire Naturelle de Genève, Switzerland.

Genus *Nesticus* Thorell

Nesticus Thorell, 1869: 76, 88; Marx, 1890: 521; Banks, 1910: 32; Petrunkevitch, 1911: 322 (part); Petrunkevitch, 1928: 121; Comstock, 1913: 417, 424; Kratochvil, 1933: 34, 62; Gerhardt and Kästner, 1938: 607; Roewer, 1942: 509 (part); Bonnet, 1958: 3092 (part); Yaginuma, 1969: 1–12; Brignoli, 1972: 145.

Ivesia Petrunkevitch, 1925: 32.

Tuganobia Chamberlin, 1933: 122.

(Students are referred to Bonnet, 1958, for a more complete bibliography.)

DIAGNOSIS.—Medium sized, 2 to 7 mm long, whitish, yellow or dusky spiders with medium to long legs. Eyes eight, six or none; typical eye pattern: anterior row essentially straight with anterior median eyes small, about one-third diameter of lateral eyes; posterior eye row moderately procurved, rarely straight or slightly recurved, with eyes subequal in size; median ocular quadrangle half as wide in front as behind. Eyes of cavernicoles sometimes greatly reduced in size (microphthalmic), in such cases often lacking anterior median eyes, or all eyes essentially or completely obsolete (anophthalmic). Pars cephalica of eyeless species less elevated, sloping forward. Chelicerae normal, similar in both sexes, with subparallel sides, narrowed at apex. Fang with trivial enlargement at base; promargin with three subequal sharp teeth and row of seven to ten bristles above them in regular series as follows: one tactile at base, then two to five barbed ones, followed by three tactile ones; retromargin with closely set cluster of 6 to 20 or more tiny teeth, or denticles, and a few simple bristles nearby.

Leg formula 1243 or 1423; legs long and thin; first legs about five to nine times as long as carapace. Abdomen suboval, moderately to strongly elevated. Epigynum prominent, heavily sclerotized, often with shallow oval or elongate foveae, with heavy posterior lip, whole organ typically occupying most of width of genital groove. Male palpus large, complicated, with heavy, curved paracymbium broader than width of cymbium; bulb and accessory processes of complicated design, with median apophysis present and tegulum often fragmented into processes.

TYPES OF GENERA.—Of *Nesticus*, *cellulanus* Clerck; of *Ivesia*, *tennesseensis* Petrunkevitch; of *Tuganobia*, *potterii* Chamberlin.

DISCUSSION.—The American species of *Nesticus* so far have been found only in five quite discretely separated regions: 1) the single species *Nesticus cellulanus* Clerck from northeastern United States and adjacent Canada, introduced to this region from Europe many years ago but still restricted in range; 2) two West Indies species, one from Cuba and one from the Dominican Republic, known only from their sparse type series; 3) a rich fauna of 24 species from the southern Appalachian Mountains of southeastern United States, most from cave habitats; 4) three species from California; and 5) nine species from caves of eastern Mexico ranging from Nuevo León to Oaxaca. Each of these regions has its distinctive species, none occurring outside each region's explicit area. Because of this distribution pattern, and inasmuch as this study is largely based on genitalic features best understood through drawings, each fauna is treated separately.

The Northeastern Fauna

The only representative of this faunal area is the European *Nesticus cellulanus* (Clerck), introduced by trade into this country more than a hundred years ago. It has not much expanded its beachhead during this period and lives as a rare species from Massachusetts to western New York. As the genotype of *Nesticus*, *cellulanus* truly

represents the mean of the genus, and its habitus compares favorably with epigeal and cavernicole representatives from other parts of the world. The European fauna consists of more than 20 species; most of these were well described and depicted by Kratochvil (1933). Most are cavernicoles but some of these live in suitable mesic situations outside caves. Three European species are eyeless troglobites: *N. absoloni* Kratochvil of Hungary and Yugoslavia; *N. lusitanicus* Fage of Portugal, and *N. (Typhlonesticus) parvus* (Kulczynski) of Yugoslavia. Additional species from Palearctica are known, and numerous species from Japan and adjacent Asia have been described recently.

Nesticus cellulanus (Clerck)

Araneus cellulanus Clerck, 1757: 62.

Nesticus cellulanus: Emerton, 1926: 116, Figs. 3a, 3b; Locket and Millidge, 1953: 92; Lindroth, 1957: 96; Bonnet, 1958: 3094 (includes more complete bibliography of this European species).

Theridion terrestre Emerton, 1924: 140, Figs. 1a, 1b; Bonnet, 1959: 4541; Levi, 1957: 21. (Not *Nesticus terrestris* Yaginuma, 1970, junior synonym, now renamed *mogera* Yaginuma.)

DIAGNOSIS.—Medium-sized species with dusky or black pattern, distinguished by features of genitalia: epigynum (Fig. 41) with widely separated sclerotized grooves; male palpus (Figs. 50–52) with heavy curved paracymbium, prominent notched tegular apophysis, three-pronged conductor and slender, laterally directed median apophysis.

ECOLOGY.—This common, often domestic spider of southern Europe occurs in caves, grottoes, tunnels and buildings, as well as in epigeal situations. Locket and Millidge (1953: 93) state that it is "distributed throughout the British Isles but confined to damp and dark localities such as cellars, crevices under stones in woods and wet places. Often many are found together. It is probable that mating occurs out-of-doors in August and September; adults are found at varying seasons (e.g. April, August, September) indoors." In North America the species seems to be quite rare and so far it has been recorded only from buildings. Its cave status is that of a troglophile. The dark pattern, relatively large eyes, particularly the anterior median, and legs of medium length show few adaptations for life in cave habitats.

DESCRIPTION

Female from Germany.—Total length, 2.60 mm. Carapace 2.00 mm long, 1.72 mm wide. Abdomen 2.80 mm long, 2.35 mm wide.

Color pattern of carapace and abdomen as illustrated in Figure 45. Integument of carapace pale yellow to orange-brown, bordered with narrow black seam and with median longitudinal scalloped dark band from clypeus to posterior margin. Eye tubercles blackish. Clothing of carapace, a few black hairs, and on pars cephalica, a few longer setae. Sternum pale yellow, irregularly margined in black. Legs yellowish with faint to distinct black annulae. Abdomen grayish, overlaid with black pattern as illustrated in Figure 45. Clothed with dark hairs.

Carapace (Fig. 36) longer than broad, rather low; cephalic sutures well marked and cervical groove a rather large depression without impressed fissures. Pars cephal-

ica moderately elevated, convex, with highest point behind eyes. Clypeus sloping forward gently, equal in length to slightly less than four diameters of anterior median eye (42/12). Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 22:12:21:21$$

First row of eyes (Fig. 3) with centers in straight line, median eyes separated by scarcely their diameter (10/12), nearer lateral eyes (8/12). Posterior eye row moderately procurved; broadly oval median eyes separated by scarcely a long diameter (18/21), near lateral eyes (12/21). Lateral eyes of each side subcontiguous, on elevated, confluent tubercles. Median ocular tubercle broader than long (54/47), narrowed in front (54/36); anterior median eyes much smaller.

Sternum subtriangular, longer than broad, bluntly rounded between posterior coxae, separated by their width. Chelicera (Figs. 37–38) twice as long as broad; promargin of furrow with three stout teeth; retromargin with row of 8 or 10 tiny teeth flanked by rows of minute denticles. Claw of chelicera evenly rounded, normal, without incassation at base.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	4.50	3.25	2.50	3.75	1.05
Patella	1.00	0.90	0.75	0.85	0.40
Tibia	4.55	2.85	1.80	3.00	0.55
Metatarsus	4.20	2.75	2.10	2.85	—
Tarsus	1.85	1.30	0.95	1.20	1.20
Total	16.10	11.05	8.10	11.65	3.20

Leg formula, 1423. First leg 8 times, first femur 2.25 times as long as carapace. Third metatarsus slightly longer than carapace. Legs clothed evenly with rows of hairs but without true spines. Fourth tarsi with tarsal comb composed of 10 to 12 toothed setae somewhat longer than diameter of segment. Palpal claw long, gently curved, set with 12 fine teeth. Three tarsal claws; unpaired claw geniculate, with row of one or two weak denticles; paired claws of first three tarsi essentially similar (Fig. 43), curved, armed with 11 to 13 teeth; paired claws of fourth tarsi somewhat dissimilar: proclaw (Fig. 44) with about eight teeth and retroclaw with only five.

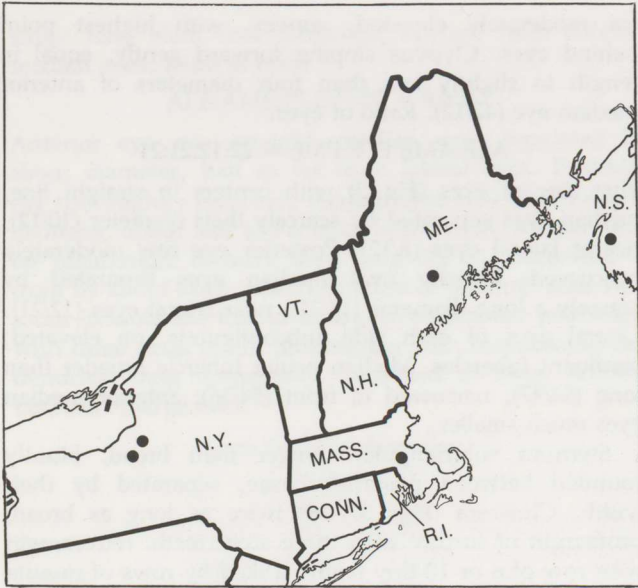
Abdomen somewhat wider than long, elevated, subglobose in some females. Colulus small, subconical process bearing two short setae. Six spinnerets in close-set group: anterior and posterior lateral pairs two-segmented, with apical segment a short cone; posterior median pair small, one-segmented.

Epigynum (Figs. 40–41) large, occupying more than half transverse area of genital and lung groove, presenting dark pattern of internal, sclerotized structure.

Male from Germany.—Total length, 4.35 mm. Carapace 1.85 mm long, 1.65 mm wide. Abdomen 2.60 mm long, 1.80 mm wide.

Coloration and structure similar to those of female except as noted below. Dark color pattern less strongly marked. Clypeus sloping forward moderately, slightly less in height than four diameters of anterior median eyes (12/40). Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 18:12:18:19$$



Map 3.—Distribution of *Nesticus cellulanus* (Clerck).

Front eye row straight; anterior median eyes separated by less than diameter (12/8), about same distance from anterior lateral eyes. Posterior eye row more strongly recurved than that of female; broadly oval posterior median eyes separated by less than diameter (19/17), and nearer to posterior lateral eyes (19/10). Median ocular quadrangle broader than long (48/43), narrowed in front (48/32). Sternum nearly as broad as long. Chelicera toothed like that of female, without special modifications of teeth or fang. Abdomen suboval, longer than broad, less elevated.

Limb Segment Lengths
(mm)

Femur	4.70	3.25	2.50	3.65	1.20
Patella	0.85	0.80	0.65	0.70	0.40
Tibia	4.70	3.15	2.00	3.20	0.43
Metatarsus	4.30	2.75	2.00	2.80	—
Tarsus	1.65	1.30	1.00	1.20	0.80
Total	16.20	11.25	8.15	11.55	2.83

Leg formula, 1423. First leg 8.7 times, first femur 2.5 times as long as carapace. Legs only slightly longer than those of female and with tarsal comb and claws like those of that sex.

Male palpus (Figs. 50–52) large, complicated, with various unusual features: paracymbium heavy, sharply curved to apical position; tegulum reduced in size and presenting single heavy, notched process; median apophysis a slender, apically curved, pale spur pointed retrolaterally far beyond cymbium; conductor a three-pronged process pulled to essentially lateral position, with groove behind sheathing embolus.

TYPE DATA.—Original material of *Araneus cellulanus* Clerck possibly still extant in Stockholm Museum. Female type of *Theridion terrestre* Emerton from Holliston, Massachusetts (N. Banks collection), in Museum of Comparative Zoology, Cambridge, Massachusetts (seen).

DISTRIBUTION.—Widespread in Europe; introduced into northeastern United States and Canada. (See Map 3.)

RECORDS.—**CANADA:** Nova Scotia: Weymouth, August 1924, (E. B. Bryant), male (Emerton, 1926:116).

UNITED STATES: **Maine:** Without specific locality or year, 11 July (H. Britcher), females in barn. **Massachusetts:** Holliston (N. Banks), female, immature. **New York:** Onondaga County: Jamesville, 22 October 1900 (H. Britcher), immature female. Plattsburg, 5 September 1910 (S. C. Bishop collection), female.

The West Indies Fauna

Although several islands in the West Indies have been quite intensively collected, only two species of *Nesticus* are known. Both species have typical genitalia and fall easily within the norm of the genus. *Nesticus antillanus* Bryant of Cuba has a male palpus with features superficially resembling those of *cellulanus*; only the male is known. *Nesticus maculatus* Bryant of the Dominican Republic exhibits unusual somatic characters in that the elongated abdomen is truncated at the apex. The male and female genitalia are normal for the genus.

In addition to these species of *Nesticus*, two other nesticids are known from the West Indies: *Eidmannella pallida* (Emerton) is abundant on most of the islands; and *Gaucelmus augustinus* Keyserling is represented by sparse material from the Bahama Islands and Puerto Rico.

Nesticus antillanus Bryant

Nesticus antillanus Bryant, 1940: 320, Fig. 90; Yaginuma, 1969: 8 (antellans).

DIAGNOSIS.—Small, well-marked species, showing some similarities to *Nesticus cellulanus* but readily separated by following features of male palpus (Figs. 55–57): tegulum with two rather short lobes; median apophysis a long, curved, apically thin process projecting prolaterally beyond edge of palpus; paracymbium complicated, showing in ventral view a rounded lobe and in dorsal view a thin sinuous process.

DESCRIPTION

Male holotype.—Total length, 2.60 mm. Carapace, 1.45 mm long, 1.25 mm wide. Abdomen 1.70 mm long, 1.10 mm wide.

Dorsal view of carapace and abdomen as shown in Figure 49. Carapace pale yellowish brown, with longitudinal, scalloped, blackish stripe from clypeus to posterior margin; eye tubercles black. Sternum dull yellow, with marginal dusky spots forming bands along sides. Legs dull yellow, with broad dusky rings. Abdomen dusky yellow, distinct dorsal pattern as shown; venter with black spots at base and one in front of spinnerets.

Structure typical (Fig. 49); clypeus subvertical, equal in height to two diameters of anterior lateral eye. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 17:12:17:18$$

Front eye row weakly recurved as seen from in front, with lower edges of eyes in straight line; median eyes separated by about the radius, and as far from larger lateral eyes. Posterior eye row moderately procurved; median eyes separated by more than radius (18/12), nearer lateral eyes (18/9). Median ocular quadrangle as long as broad, narrowed in front (20/15); front eyes much smaller. Carapace of average height with depression beginning at trivial cervical pit and running back to posterior margin.

Second leg: femur, 2.2 mm; patella, 0.5 mm; tibia, 2 mm; metatarsus, 2 mm; tarsus, 1.8 mm; total, 8.5 mm. Fourth leg: femur, 2.3 mm; patella, 0.5 mm; tibia, 1.7 mm; metatarsus, 2.2 mm; tarsus, 1.7 mm; total, 8.4 mm. Legs of medium length; second leg 5.8 times as long as carapace.

Male palpus (Figs. 55–57) of complicated design: tegulum with two short, fingerlike apophyses; median apophysis an elongated, apically narrowed finger protruding well beyond edge of cymbium; conductor a large, revolved structure; embolus very thick, originating on retrolateral side of bulb and continuing as thick tube around margin to rest in conductor; paracymbium with rounded lobe and sinuous process as illustrated.

TYPE DATA.—Male holotype south side of Pico Turquino, Cuba, June 1936 (P. Darlington), in Museum of Comparative Zoology.

DISTRIBUTION.—Known only from above specimen.

Nesticus maculatus Bryant

Nesticus maculatus Bryant, 1948: 384, Figs. 60, 63.

DIAGNOSIS.—Small species with elongated, apically truncated abdomen marked by seven small dusky spots (Fig. 48), recognized by distinctive genitalia: epigynum (Fig. 27) small rounded plate with oval opening on each side and distinctive pattern of internal receptacles; male palpus (Figs. 53–54) with single, pointed tegular process, median apophysis with small tooth at truncated apex, and broad paracymbium with distinctive dorsal and ventral lobes.

DESCRIPTION

Male holotype.—Total length, 2.7 mm. Carapace 1.1 mm long, 1.0 mm wide. Abdomen 1.6 mm long, 0.9 mm wide.

Dorsal view of carapace and abdomen as shown in Figure 48. Cephalothorax and appendages pale yellow; carapace with narrow dusky marginal seam and indistinct dusky streaks radiating from cervical groove; eye tubercles black; legs with indistinct brown annulae on patella and at apices of tibiae and metatarsi. Abdomen dull yellow, with three pairs of small dusky spots and larger spot at center of dorsum; venter unmarked.

Structure (Fig. 48) typical. Carapace longer than broad, narrowly rounded on sides and narrowed to less than half its width in front, where eyes occupy full width. Eyes set far forward on pars cephalica; ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 15:6:15:15$$

Anterior eye row essentially straight, with small median eyes separated by two-thirds diameter, and by their radius from large lateral eyes. Posterior row gently recurved, with median eyes separated by diameter and contiguous with lateral eyes. Clypeus vertical, equal in height to one and two-thirds the diameter of lateral eye. Median ocular quadrangle broader than long (36/25), narrowed in front (36/10); front eyes small. Chelicera with three teeth on promargin and row of minute denticles on retromargin.

Leg formula, 1243. First leg: femur, 3.45 mm; patella, 0.5 mm; tibia, 3.2 mm; metatarsus, 3.65 mm; tarsus, 1.3 mm; total, 12.10 mm. First femur 3 times, first leg 11 times as long as carapace.

Abdomen nearly twice as long as broad, narrowly rounded on sides, high and truncated behind, where a weak rounded lobe occurs on each corner.

Male palpus (Figs. 53–54) with following features: bulb of medium size, with small, pointed tegular apophysis, median apophysis truncated at end and bearing sharp spur; coiled conductor; and paracymbium broad, with clear round lamina below and toothed process on dorsal side.

Female allotype.—Total length, 3.65 mm. Carapace, 1.15 mm long, 0.95 mm wide. Abdomen, 2.5 mm long, 1.6 mm wide.

Coloration and structure like those of male except as noted. Abdomen with fine reticulate pattern and dorsal spots less distinct. Posterior eye row slightly recurved, essentially straight, with median eyes separated by narrow diameter. Abdomen large, wider on sides, produced above and behind spinnerets as quite large lobe with rounded angle on each corner.

First leg: femur, 4.2 mm; patella, 0.5 mm; tibia, 4 mm; metatarsus, 4.2 mm; tarsus, 1.5 mm; total, 14.4 mm. First femur 3.6 times, first leg 12 times as long as carapace.

Epigynum as shown in Figures 46–47.

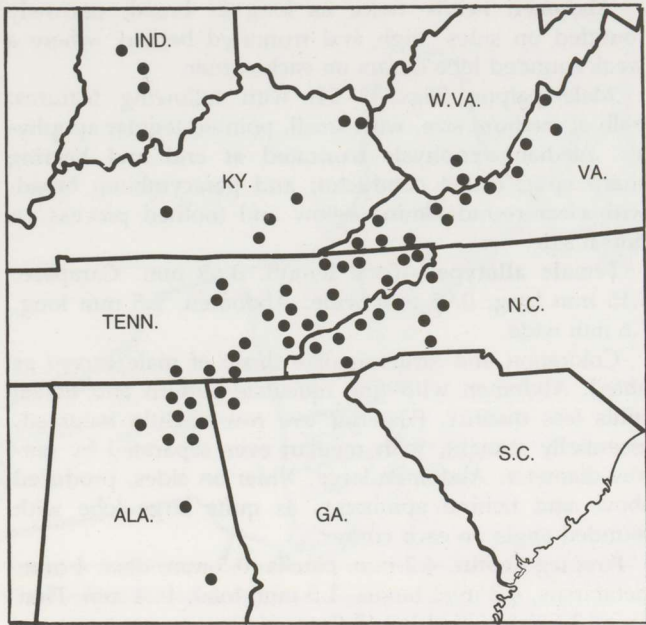
TYPE DATA.—Male holotype and immature male from Loma Viega, Cordillera Central, south of Constanza, 6,000 feet, Dominican Republic, August 1938 (P. Darlington), in Museum of Comparative Zoology.

DISTRIBUTION.—Dominican Republic.

RECORDS.—DOMINICAN REPUBLIC: S of Valle Nuevo, Cordillera Central, over 6,000 feet, August 1938 (P. Darlington), female allotype and female in rain forest.

The Appalachian Fauna

The southern Appalachian Mountains, comprising a series of subparallel ranges and valleys running from the Virginias into Alabama and northwestern Georgia, lie in an immensely rich biological area. These unglaciated highlands and valleys with deep rich soils support an outstanding flora and fauna matched in few temperate regions. Thousands of caves—some of great size, notably the Mammoth Cave of Kentucky—support the richest and most varied cave faunas of the continent. The distribution of the genus *Nesticus* in Appalachia is shown on Map 4. Each of the spots may represent a single cave or cover one to a dozen separate records of occurrence. Only one species (*N. carteri*) occurs in Kentucky and adjacent Indiana, whereas the principal mountain chains from the Virginias to Alabama host most species. Currently 24 species of cavernicole and epigean *Nesticus* are known from this area; others are likely to be found. The 8 or 10 epigean species live in the rich ground litter in mesic situations in woodlands. Primarily darkly pigmented, the species is small to medium in size, with relatively short legs and with eye size above the mean for the genus. Many other species are cavernicoles with paler bodies, longer legs, and eye size below the mean for the genus. In a few instances (notably *N. tennesseensis* and *N. carteri*), cavernicolous species also live in epigean situations, but much collecting still needs to be done to get exact information. The cavernicoles have eyes reduced in size to various degrees, and a few are essentially or completely



Map 4.—Distribution of *Nesticus* in Appalachia.

eyeless. The following species are claimed to be trogllobites: *furtivus*, *barri*, *stygius*, *jonesi* and *georgia*. Some others with greatly reduced eyes may eventually be found to be trogllobites: *dilutus*, *valentinei*, *barrowsi* and *holsingeri*. Exact classification of species based on sparse material must await further study.

The series of species appearing in Appalachia probably derived from a single basic stock that ranged widely dur-

ing the early development of the group and later fragmented in response to geologic isolation and climatic pressures. At present only a single species of the group is known to occur in any specific cave or cave system, therefore all appear to be allopatric in range. The basic characters of Appalachian *Nesticus* differ little from the general habitus of *N. cellulanus* and other species of the Palearctic region. Petrunkevitch's genus *Ivesia*, separated from *Nesticus* by absence of the anterior median eyes, has long been regarded as a synonym of *Nesticus*. However, the species inhabiting Appalachia represent a geographical expression of *Nesticus* not quite matched by the fauna of any other center. In North America no related species occur in the limestone area of central Texas, in the Californian region or in eastern Mexico.

The species of Appalachia feature large, specialized paracymbia on the male palpi and interesting fragmentation of the tegula to produce distinctive tegular processes. Although the median apophysis, conductor and other sclerites show differences in every species, they are of somewhat stereotyped structure. An exception is *N. archeri* which, in addition to having a remarkably complicated paracymbium, has a conductor radically different from those of all other species. The males are easy to identify on the basis of numerous palpal features (see the following key). The females are best separated by close study of the epigyna from three views—the ventral, the internal or dorsal, and the posterior aspect. Geography is also a practical and useful expedient in sorting out the species, most of which live in a single cave or cave system.

Key to the Males: Appalachian *Nesticus*

1. Paracymbium with one or more distinctive dorsal processes3
 Paracymbium without distinctive dorsal processes2
2. Tegulum with single heavy enlargement (Fig. 157); eyeless trogllobite from caves of Dade County, Georgia.....*georgia*, new species
 Tegulum with two principal processes (Fig. 153); eyeless trogllobite from Cave Spring Cave, Morgan County, Alabama.....*jonesi*, new species
3. Dorsal process of paracymbium with few spines or spinose at apex.....4
 Dorsal process of paracymbium not spinose at apex8
4. Dorsal process of paracymbium straight, with small apical spines (Fig. 127); caves of Rutherford County, North Carolina*brimleyi*, new species
 Dorsal process of paracymbium curved, slender, spinose at apex5
5. Dorsal process slender at base, sinuous apically (Fig. 70)6
 Dorsal process much broader at base (Fig. 62)7
6. Lateral tegular process heavy, of medium length (Fig. 70); caves of McDowell County, North Carolina*carolinensis* (Bishop)
 Lateral tegular process longer (Fig. 64); southwestern Virginia and adjacent North Carolina.....*mimus*, new species
7. Subapical median process typically broader than long (Fig. 62); caves of Tennessee and the Virginias.....*tennesseensis* (Petrunkevitch)
 Subapical median process of different form (Fig. 66); caves of Scott, Lee and Wise counties, Virginia.....*holsingeri*, new species

(Key continues on page 21.)

(Continued from page 20)

8. Dorsal process of paracymbium heavy lobe9
 Dorsal process of paracymbium thin, typically sharp spur10
9. Dorsal process irregularly rounded lobe near distal process (Fig. 134);
 caves of Swain County, North Carolina*cooperi*, new species
 Dorsal process heavy curved lobe (Fig. 160) caves of northeastern
 Tennessee and adjacent Virginia*paynei*, new species
10. Dorsal process short, laterally directed spur with trivial apical notch
 (Fig. 124); Indiana and Kentucky to Virginias*carteri* Emerton
 Dorsal process thin, suberect, fairly sharp spur11
11. Conductor of embolus flared to broad subtriangular form (Fig. 129);
 epigeal species from Mt. Cheaha, Talladega County,
 Alabama*archeri*, new species
 Conductor of embolus not as above12
12. Basal tegular apophysis present13
 Basal tegular apophysis absent15
13. Basal tegular apophysis single thin spur (Fig. 79); Joyce Kilmer
 Memorial Forest, Graham County, North Carolina*sheari*, new species
 Basal tegular apophysis adjacent to groove or emargination14
14. Base of tegulum with wide emargination (Fig. 75); dark epigeal species
 from Great Smoky Mountains*reclusus*, new species
 Base of tegulum with thin groove (Fig. 71); cavernicole from White Oak
 Sinks, Great Smoky Mountain National Park*stupkai*, new species
15. Apex of paracymbium thin process (Figs. 121–122); eyeless
 troglobite from caves of northern Alabama and adjacent
 Tennessee*barri*, new species
 Apex of paracymbium emarginated (Figs. 118–119); essentially
 eyeless troglobite from caves in Great Smoky Mountains of
 Tennessee*barrowsi*, new species

Key to the Females: Appalachian *Nesticus*

1. Species with dusky pattern, shorter legs, and eight eyes present;
 epigeal habitats2
 Species with little dark pigment, longer legs, and eyes often reduced
 in size or missing; cave habitats11
2. First femur less than twice length of carapace3
 First femur at least twice length of carapace8
3. Median septum of epigynum elongate, nasute process elevated at
 posterior margin (Fig. 112); Great Smoky Mountains of
 Tennessee*secretus*, new species
 Not so4
4. Lateral foveae of epigynum broadly oval, widely separated (Fig. 173);
 Mt. Mitchell, Yancey County, North Carolina*crosbyi*, new species
 Not so5
5. Lateral foveae of epigynum subparallel6
 Lateral foveae angled, narrowing median septum behind7
6. Median septum of epigynum broad, projecting behind (Fig. 141); Haywood
 and Madison counties, North Carolina*silvanus*, new species
 Median septum narrower, shorter than lateral lobes (Fig. 109); Great Smoky
 Mountains of Tennessee and North Carolina*reclusus*, new species

(Key continues on page 22.)

(Continued from page 21)

7. Epigynum (Fig. 135); Joyce Kilmer Memorial Forest, Graham County,
North Carolina *sheari*, new species
- Epigynum (Fig. 147); Highlands, Macon County, North
Carolina *bishopi*, new species
8. Epigynum conspicuously vaulted behind (Figs. 115–117); Mt. Cheaha,
Talladega County, Alabama *archeri*, new species
Not so 9
9. Median septum of epigynum narrowed behind to slender point (Fig. 175);
Indiana and Kentucky to Virginia *carteri* Emerton
Median septum broader than above 10
10. Median septum of epigynum slightly exceeding lateral lobes (Fig. 82);
Tennessee to Virginias *tennesseensis* (Petrunkevitch)
Median septum shorter than lateral lobes (Fig. 85); Indiana, Virginia,
North Carolina *mimus*, new species
11. Median septum of epigynum narrowed behind to slender point (Fig. 175);
Indiana, Kentucky to Virginias *carteri* Emerton
Median septum not as above 12
12. Essentially eyeless troglobite from Dade County, Georgia; epigynum
(Fig. 164) *georgia*, new species
Not as above 13
13. Essentially eyeless troglobite from Cave Spring Cave, Morgan County,
Alabama; epigynum (Fig. 167) *jonesi*, new species
Not as above 14
14. Eyeless species from Overton and Putnam counties, Tennessee; epigynum
(Fig. 170) *stygius*, new species
Not as above 15
15. Eyeless troglobite from Crystal Caverns, Hamilton County, Tennessee;
epigynum (Fig. 97) *furtivus*, new species
Not as above 16
16. Essentially eyeless troglobite from northern Alabama and adjacent
regions of Tennessee; epigynum (Fig. 161) *barri*, new species
17. Essentially eyeless, long-legged, presumed troglobite from
Great Smoky Mountains of Tennessee; epigynum (Fig. 103) *barrowsi*, new species
Not as above 18
18. Probable troglobite from Grassy Creek Cave, Rhea County, Tennessee,
with anterior and posterior median eyes missing; epigynum
(Fig. 94) *dilutus*, new species
Not as above 19
19. Long legged (first femur 2.6 times as long as carapace), probable
troglobite from Monteagle Cave, Tennessee, with reduced eyes;
epigynum (Fig. 190) *valentinei*, new species
Not as above 20
20. Median septum of epigynum forming rounded lobe 21
Median septum not as above 25
21. Median septum prominent nasute projection flanked by deep round
depressions in lateral foveae (Fig. 138); caves of Rutherford
County, North Carolina *brimleyi*, new species
Not as above 22
22. Median septum evenly rounded projection beyond lateral lobes
(Fig. 100); caves of northeastern Tennessee and adjacent
Virginia *paynei*, new species
Median septum not as above 23

(Key concludes on page 23.)

(Continued from page 22)

- 23. Median septum of epigynum narrowed behind but flared on posterior margin into dark ridges (Figs. 106); White Oak Sinks, Great Smoky Mountains National Park, Tennessee*stupkai*, new species
 Median septum evenly rounded between rounded lateral lobes (Fig. 144); caves of Swain County, North Carolina*cooperi*, new species
- 24. Lateral lobes of epigynum enlarged, with shorter median septum in deep emargination behind (Fig. 91); caves of southwestern Virginia*holsingeri*, new species
 Lateral lobes not as above25
- 25. Median septum of epigynum projecting slightly behind lateral lobes (Fig. 82); Tennessee to Virginias*tennesseensis* (Petrunkevitch)
 Median septum about as long as lateral lobes26
- 26. Epigynum (Fig. 88); caves of McDowell County, North Carolina*carolinensis* (Bishop)
 Epigynum (Fig. 85); southwestern Virginia and adjacent North Carolina*mimus*, new species

Nesticus tennesseensis (Petrunkevitch)

Ivesia tennesseensis Petrunkevitch, 1925: 32, Figs. 4, 7-10; Petrunkevitch, 1928: 121; Ives, 1930: 117, 119; Ives, 1934: 150; Roewer, 1942: 509; Bonnet, 1957: 2319; Nicholas, 1960: 156.

Yvesella tennesseensis: Arndt, 1928: 84; Wolf, 1936: 552; Bonnet, 1959: 4906, footnote.

Nesticus tennesseensis: Jackson, 1944: 57; Barr, 1961: 36; Holsinger, 1963: 35; Yaginuma, 1969: 8.

DIAGNOSIS.—Nominate species of *tennesseensis* group ranging from Tennessee, where paler with reduced eyes and longer legs, to Virginia where somewhat darker with larger eyes and shorter legs. Paracymbium of male palpus (Fig. 61) with relatively broad, transparent dorsal spur produced at apex to thin filament directed toward cymbium, with dark median spur longer than broad. Lateral foveae of epigynum as broad as median septum.

ETYMOLOGY.—Named for the state of Tennessee.

DISCUSSION.—*Ivesia tennesseensis* Petrunkevitch was based on males and females of a long-legged, pale nestid with only six eyes, the anterior median missing and the others evanescent. The small series was taken by Professor J. D. Ives from a mound of bat guano in the zone of total darkness one-quarter mile inside Indian Cave, near New Market, Tennessee. Specimens from nearer the entrance of Indian Cave, sent to me at a later date by Professor Ives, have the anterior median eyes present and moderately pigmented. Specimens assigned to the species from other caves most often have eight eyes. Except for three epigeal collections, each consisting of a single specimen, one male and two females from three localities in West Virginia and Virginia, all the listed localities for *N. tennesseensis* are from cave habitats. In Tennessee specimens could be labeled as probable troglonites and those from Virginia and West Virginia as troglonophiles, but much more material from epigeal and subterranean stations is necessary before definite classification can be assigned.

Nesticus tennesseensis is the stem species of a series of four in which the dorsal spur of the paracymbium is

drawn out to a thin, somewhat sinuous spine armed with fine denticles. This spur is broad in *N. tennesseensis* and *N. holsingeri* but much narrower in *N. carolinensis* and *N. mimus*. The principal tegular processes of the four taxa present differences that supplement those of the paracymbium. In this series the female epigyna offer excellent characters for separating the taxa and testify to the validity of the palpal features of the males.

DESCRIPTION

Female from Indian Cave, Tennessee.—Total length 3.7 mm. Carapace 1.8 mm long, 1.5 mm wide. Abdomen 2.7 mm long, 2.2 mm wide.

Carapace and appendages whitish to pale yellow; eye tubercles at most smudged with gray. Abdomen gray, without pattern.

Clypeus 0.3 mm, equal in height to about four diameters of anterior lateral eyes. Eyes sometimes evanescent; anterior median eyes obsolete, present as vestiges, or moderately developed. Ratio of eyes:

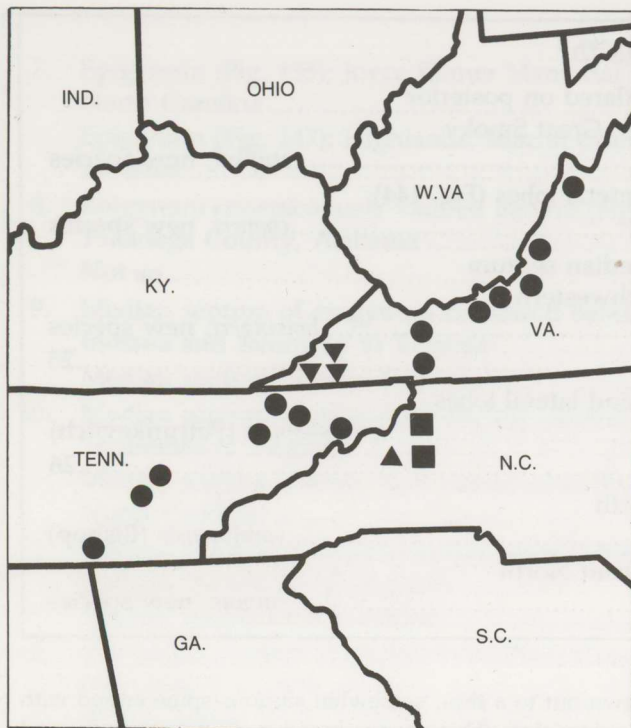
$$\text{ALE:AME:PLE:PME} = 12:4:12:12$$

Anterior median eyes (spots) separated by diameter, twice as far from lateral eyes. Posterior median eyes separated by more than diameter (12/16), half as far from lateral eyes.

	Limb Segment Lengths (mm)				
	Femur	Patella	Tibia	Metatarsus	Tarsus
Femur	3.50	2.90	2.35	3.40	0.80
Patella	0.75	0.70	0.65	0.70	0.30
Tibia	3.35	2.65	1.75	2.75	0.50
Metatarsus	3.00	2.85	1.80	2.60	—
Tarsus	1.80	1.25	1.00	1.25	1.05
Total	12.40	10.35	7.55	10.70	2.65

First leg about 6.9 times, first femur about twice as long as carapace.

Epigynum (Figs. 82-84) somewhat variable, with lateral foveae suboval, each as broad as pale median septum; posterior margin of median septum gently rounded, as long as or moderately produced beyond dark lateral lobes.



Map 5.—Distribution of *Nesticus tennesseensis* complex: *tennesseensis* (Petrunkevitch) (●); *holsingeri*, n. sp. (▼); *carolinensis* (Bishop), n. comb. (▲); *mimus*, n. sp. (■).

Male from Indian Cave, Tennessee.—Carapace, 1.60 mm long.

Coloration and structure like those of female. Clypeus equal in height to nearly four diameters of anterior lateral eye (11/40). Anterior median eyes obsolete or nearly so.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	3.50	2.70	2.35	3.20	0.95
Patella	0.75	0.70	0.60	0.70	0.20
Tibia	3.50	2.70	2.00	2.65	0.25
Metatarsus	3.10	2.40	1.80	2.30	—
Tarsus	1.20	1.10	0.90	1.10	0.90
Total	12.05	9.60	7.65	10.15	2.25

Leg formula 1423. First leg 7.5 times, first femur 2.2 times as long as carapace.

Male palpus (Figs. 58–63) with following features: principal tegular apophysis (Fig. 58) of medium length; paracymbium with knobbed apical spur denticulate at apex, dorsal spur fairly broad at base (Figs. 61–62) and produced at apex into thin filament denticulate above, median spur longer than broad, and typical rounded ventral spur.

Female from Fish Hatchery Cave, Virginia.—Total length, 3.70 mm. Carapace 1.75 mm long, 1.55 mm wide. Abdomen 2.00 mm long, 1.50 mm wide.

Carapace and appendages bright yellow to orange; eyes ringed with black. Abdomen grayish, without distinct pattern.

Clypeus equal in height to more than two diameters of anterior lateral eye (14/33). Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 14:5:14:13$$

Anterior median eyes separated by diameter, nearly twice as far from lateral eyes (5/9). Posterior median eyes separated by more than diameter (13/17), nearer lateral eyes (13/11). Epigynum of typical form.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	2.85	2.35	2.10	2.75	0.75
Patella	0.70	0.70	0.60	0.70	0.22
Tibia	2.70	2.10	1.50	2.35	0.45
Metatarsus	2.50	2.00	1.60	2.10	—
Tarsus	1.15	1.00	0.85	1.10	0.85
Total	9.90	8.15	6.65	9.00	2.27

Leg formula 1423. First leg 5.8 times, first femur about 1.7 times as long as carapace.

Male from Fish Hatchery Cave, Virginia.—Total length 3.35 mm. Carapace 1.70 mm long, 1.50 mm wide. Abdomen 1.70 mm long, 1.30 mm wide.

Coloration and structure like those of female. Anterior median eyes nearly obsolete, represented by two small pigment patches under integument. Clypeus equal in height to three diameters of anterior lateral eye. Posterior median eyes separated by their diameter, a little nearer lateral eyes. Male palpus typical in form.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	3.35	2.85	2.85	3.15	0.87
Patella	0.70	0.70	0.65	0.70	0.23
Tibia	3.35	2.50	1.85	2.65	0.32
Metatarsus	3.20	2.50	1.85	2.60	—
Tarsus	1.20	1.15	1.00	1.15	0.70
Total	11.80	9.70	7.70	10.25	2.12

Leg formula 1423. First leg 6.9 times, first femur twice as long as carapace.

TYPE DATA.—Male lectotype, male and female paratypes from Indian Cave, about five miles northwest of New Market, Tennessee (J. D. Ives), in the United States National Museum.

DISTRIBUTION.—Tennessee, Virginia and West Virginia (See Map 5.)

RECORDS.—**Tennessee:** *Hawkins County:* Sensabaugh Saltpeter Cave, 31 April 1967 (J. Holsinger), penultimate males and immature presumed to be this species. *Grainger County:* Indian Cave, 5 mi. NW Newmarket (J. D. Ives), type-series from deep inside cave, other specimens from nearer entrance. *Roane County:* Cave by Clinch River, 31 January 1958, female from 175 ft. inside, under narrow ledge. *Sullivan County:* Potter's Cave, 14 July 1979 (J. Holsinger), on damp wood. **Virginia:** *Alleghany County:* Rumbold's Cave, Callahan, 20 January 1950, 2 females from area of total darkness. *Craig County:* Fish Hatchery Cave, Newcastle, 30 October 1943 (Jackson, 1944), males, females from twilight zone. Walkthrough Cave, Newcastle (Fowler, 1946), male, 2 females. *Giles County:* Starnes Cave, 3 August 1958 (T. C. Barr), male, 4 females, immature. Glenlyn Cave, 11 August 1957 (C. Krekeler, J. Rittman), 2 females, immature. Straley's Cave No. 1, 6 September 1958 (T. C. Barr), penultimate male, immature. Cascades of Little Stony Creek, 5 mi. N Pembroke, 26 September 1970 (W. Shear), female from ground litter. Giant Caverns, Narrows, 31

March 1931 (J. M. Valentine), 5 females. Ballard's Cave, 5 Pearisburg, 29 June 1974 (J. Holsinger, L. Ferguson), female. Harris Cave, 8.5 mi. S Pearisburg, 29 June 1974 (J. Holsinger, L. Ferguson), female, immature. *Highland County*: Locust Springs Camp, 11 mi. N Monterey, 18 June 1969 (W. Shear), female from ground litter. *Smyth County*: Sugar Grove Cave, 12 July 1970 (L. M. and B. L. Ferguson), female. *Tazewell County*: Fallen Rock Cave, 9 November 1968 (J. Holsinger), male, 3 females, immature. Cassell Farm Cave, 2 mi. W Burkes Garden Post Office, 12 April 1963 (J. Holsinger), male. Chimney Rock Cave, 28 July 1974 (J. Holsinger, D. Culver), female. Steele's Cave, 15 August 1972 (J. Holsinger, D. Culver), 2 males, 2 females. **West Virginia**: *Raleigh County*: Grandview State Park, 21 May 1966 (W. O. Pendleton), male from near caves.

Nesticus holsingeri, new species

DIAGNOSIS.—Near relative of *N. tennesseensis* with reduced eyes, probable troglobite, known from caves in extreme southwestern Virginia, differing by following features: median spur (Fig. 66) near apex of paracymbium of male palpus broader than long; lateral lobes of epigynum (Fig. 91) enlarged, projecting far behind straight septal margin.

ETYMOLOGY.—Named for Dr. John Holsinger of Old Dominion University, Norfolk, Virginia, who has collected many cave spiders and published important works on Appalachian caves and cave faunas.

DISCUSSION.—*Nesticus holsingeri* is a geographical representative of the *tennesseensis* complex presenting substantial differences in the female epigynum and is presumed to have become reproductively isolated. The male palpus is essentially similar to that of *N. tennesseensis* but the shape of the median spur of the paracymbium is likely to be constant, a point not verifiable without more material.

DESCRIPTION

Female from Taylor Cave No. 1, Virginia.—Total length 4.5 mm. Carapace 1.8 mm long, 1.5 mm wide. Abdomen 3.0 mm long, 2.0 mm wide.

Carapace and appendages pale yellowish; eye tubercles and eyes lacking dark pigment in specimens from most caves but with dusky smudges in some, or narrowly ringed with black. Abdomen gray, without pattern.

Clypeus 0.25 mm high. Anterior median eyes missing in most specimens, present in others as dark subintegumental spots or tiny round eyes. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 9:0:9:9$$

Posterior eye row moderately procurved; posterior median eyes separated by 1.5 diameters, by diameter from lateral eyes.

Limb Segment Lengths (mm)

	I	II	III	IV	PALP
Femur	3.70	3.05	2.35	3.35	0.90
Patella	0.80	0.75	0.65	0.75	0.30
Tibia	3.65	2.75	1.95	2.80	0.56
Metatarsus	3.20	2.60	2.10	2.60	—
Tarsus	1.45	1.30	1.00	1.20	1.03
Total	12.80	10.45	8.05	10.70	2.79

Leg formula 1423. First leg seven times, first femur twice as long as carapace.

Epigynum (Figs. 91–93) with area much broader than long; lateral foveae oval, each narrower than pale median septum; median septum lightly inflated above straight posterior margin; lateral lobes prominent, produced conspicuously beyond posterior margin of median septum.

Male from Pond Cave, Virginia.—Total length 3.25 mm. Carapace 1.50 mm long, 1.35 mm wide. Abdomen 2.00 mm long, 1.50 mm wide.

Coloration and structure like those of female.

Limb Segment Lengths (mm)

	I	II	III	IV	PALP
Femur	3.35	2.80	2.35	3.00	0.80
Patella	0.70	0.65	0.65	0.65	0.20
Tibia	3.35	2.60	1.80	2.60	0.30
Metatarsus	3.15	2.35	1.80	2.35	—
Tarsus	1.30	1.20	1.00	1.15	0.82
Total	11.85	9.60	7.60	9.75	2.12

Leg formula 1423. First leg about eight times, first femur 2.2 times as long as carapace. Third metatarsus longer than carapace.

Male palpus like that of *N. tennesseensis* except as follows: dark median spur of paracymbium (Fig. 66) broader than long, rounded on distal margin; principal tegular process (Fig. 67) similar in length but less sharply pointed at apex.

TYPE DATA.—Male holotype from Pond Cave, Scott County, Virginia, 5 November 1966 (J. Holsinger, S. Taylor), in the American Museum of Natural History.

DISTRIBUTION.—Southwestern Virginia. (See Map 5.)

RECORDS.—**Virginia**: *Lee County*: Bowling Cave (J. Holsinger, D. Finley, J. Tichenor), 3 juveniles probably this species. Gibson Cave No. 1, 30 July 1967 (J. Holsinger, D. Finley, J. Tichenor), immature probably this species. *Scott County*: Taylor Cave No. 1, near Natural Tunnel, 6 May 1967 (J. Holsinger), 3 females, immature. Pond Cave, 5 November 1966 (J. Holsinger, S. Taylor), female, immature. Alley Cave, 27 June 1963 (J. Holsinger), female, immature. Coley Cave No. 2, 3 June 1967 (J. Holsinger), immature. Jackson Cave, 13 November 1966, immature. McDavid's Cave, 2 mi. E Natural Tunnel, 30 April 1967 (J. Holsinger, S. Pinkerton), female. Blair-Collins Cave, 8 October 1967 (J. Holsinger, G. Titcomb), immature probably this species. *Wise County*: Burton's Cave, St. Paul, 14 November 1932 (J. M. Valentine), female.

Nesticus carolinensis (Bishop)

NEW COMBINATION

Ivesia carolinensis Bishop, 1950: 9, pl. 2, Figs. 1–4.

DIAGNOSIS.—Distinct species of *tennesseensis* group, presumed troglophile, known from caves of McDowell County, North Carolina, readily recognized by following genitalic features: much thinner, sinuous spur on paracymbium of male palpus; principal cymbial apophysis of paracymbium produced to thin apical spur; epigynum with very narrow lateral foveae and thin median septum.

ETYMOLOGY.—Named for the state of North Carolina.

DESCRIPTION

Female.—Total length 3.5 mm. Carapace 1.70 mm long, 1.35 mm wide. Abdomen 2.50 mm long, 1.85 mm wide.

Cephalothorax and appendages whitish to pale yellow; carapace with dusky V-shaped spot at middle and indistinct dusky patches along side margins; eye tubercles blackish, narrowly ringed all eyes. Abdomen whitish, marked above by five or six pairs of large, faint gray spots and below by indistinct grayish spots.

Clypeus 0.2 mm high. Anterior median eyes present, well developed. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 11:5:11:11$$

Anterior eye row essentially straight; anterior median eyes separated by about 1.5 diameters, slightly nearer lateral eyes. Posterior eye row moderately procurved; posterior median eyes set obliquely, separated by more than diameter (14/11), half as far from lateral eyes. Median ocular quadrangle longer than broad (38/28), narrowed in front (38/22).

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	3.35	2.70	2.50	3.15	0.95
Patella	0.75	0.70	0.70	0.65	0.25
Tibia	3.60	2.50	1.70	2.70	0.50
Metatarsus	4.10	2.40	1.75	2.60	—
Tarsus	1.30	1.10	0.95	1.10	1.00
Total	13.10	9.40	7.40	10.20	2.70

Leg formula 1423. First leg 7.7 times, first femur twice as long as carapace.

Epigynum (Figs. 88–90) much broader than long; lateral foveae narrowly suboval, each about as wide as narrow median septum; lateral lobes prominent, rounded behind, about as long as posterior margin of septum.

Male.—Total length 4 mm. Carapace 1.85 mm long, 1.65 mm wide. Abdomen 2.50 mm long, 1.75 mm wide.

Carapace and appendages bright yellow with dusky spotting of female. Structure like that of female except as noted.

Clypeus 0.28 mm high. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 15:7:15:16$$

Anterior median eyes separated by more than diameter (7/10), as far from lateral eyes. Posterior median eyes suboval, separated by more than diameter (18/15), nearer lateral eyes (18/10). Median ocular quadrangle broader than long (42/30), narrowed in front (42/22).

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	4.10	3.35	2.35	2.70	1.10
Patella	0.75	0.70	0.70	0.75	0.25
Tibia	4.60	3.35	2.25	3.35	0.35
Metatarsus	3.90	3.20	2.60	3.10	—
Tarsus	1.55	1.10	0.85	1.05	1.10
Total	14.90	11.70	8.75	11.95	2.80

Leg formula 1423. First leg eight times, first femur 2.2 times as long as carapace.

Male palpus (Figs. 68–70) like that of *N. tennesseensis* except as follows: dark median spur of paracymbium rounded around sides and at apex; dorsal spur of

paracymbium narrow at base and forming thin, sinuous filament; principal tegular process produced at apex to narrow spur.

TYPE DATA.—Male holotype and female allotype from Linville Cave, near Linville Falls, North Carolina, 6 April 1947 (S. C. Bishop), in American Museum of Natural History.

DISTRIBUTION.—Known only from caves of McDowell County, N. C. (See Map 5.)

RECORDS.—**North Carolina:** *McDowell County:* Linville Cave, 19 June 1961 (Lyle G. Conrad), male, immature female. Staircase Cave, 16 June 1977 (P. Hertl), male, 4 females, immature. Limekiln Cave, 16 June 1977 (P. Hertl), female, immature.

***Nesticus mimus*, new species**
(Figs. 85–87, 64–65)

DIAGNOSIS.—Near relative of *N. carolinensis* differing by following features: median spur near apex of paracymbium of male palpus longer than broad; principal tegular process of palpus quite broad at apex, its tip near apex of median apophysis; epigynum with small oval foveae and broader median septum.

ETYMOLOGY.—Specific name from Latin *mimus*, mimic.

DISCUSSION.—This new taxon is known from only two males differing from *N. carolinensis* in minor details of male palpus especially in the distinctive form of the much enlarged principal process of the tegulum. A single female is provisionally assigned to the males, with details of the epigynum as illustrated. Two specimens were taken from epigeal stations, but the third came from a cave.

DESCRIPTION

Female.—Total length 3.4 mm. Carapace 1.50 mm long, 1.25 mm wide. Abdomen 2.15 mm long, 1.50 mm wide.

Coloration and structure similar to those of *N. carolinensis*. First femur 2.6 mm, 1.7 times as long as carapace.

Epigynum (Figs. 85–87) with small lateral foveae each at most half as wide as broad median septum.

Male holotype.—Total length 3.5 mm. Carapace 1.70 mm long, 1.52 mm wide. Abdomen 2.00 mm long, 1.30 mm wide.

Whole spider dull yellow; eyes narrowly ringed with black; abdomen with vague dusky pattern. Structure like that of female. Clypeus 0.28 mm high. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 12:6:12:12$$

Posterior median eyes suboval, separated by more than diameter (16/12), nearer lateral eyes (10/12).

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	2.65	3.20	2.70	3.35	0.85
Patella	0.80	0.70	0.65	0.70	0.25
Tibia	3.75	3.10	2.25	3.20	0.35
Metatarsus	3.30	2.80	2.15	2.75	—
Tarsus	1.50	1.20	0.10	1.25	1.00
Total	13.20	11.00	7.85	11.35	2.45

Leg formula 1423. First leg 7.7 times, first femur 2.1 times as long as carapace. Third metatarsus much longer than carapace.

Male palpus (Figs. 64–65) like that of *N. carolinensis* except as follows: principal tegular process broad lamina only slightly narrowed at apex, extending to apex of median apophysis.

TYPE DATA.—Male holotype from Shiloh School Cave, southeast of Abingdon, Washington County, Virginia, 25 November 1960 (C. W. Greever), in American Museum of Natural History.

DISTRIBUTION.—Southwestern Virginia and adjacent North Carolina. (See Map 5.)

RECORDS.—**North Carolina:** *Burke County:* Table Rock Mountain, 1 female from wet situation. *Watauga County:* Upper slopes of Grandfather Mountain, 12 October 1923 (S. C. Bishop), male, immature. **Virginia:** *Washington County:* Fritz Breathing (Lowe) Cave, 7 October 1979 (J. Holsinger, V. Tipton), male, two females, two immature.

***Nesticus silvanus*, new species**

DIAGNOSIS.—Dusky epigeal species related to *N. mimus*, distinguished by rounded projection of median septum of epigynum (Fig. 141).

ETYMOLOGY.—Specific name from Latin *Silvanus*, god of woods and forests.

DESCRIPTION

Female holotype.—Total length 3.2 mm. Carapace 1.50 mm long, 1.25 mm wide. Abdomen 2.00 mm long, 1.80 mm wide.

Coloration and structure like that of *N. mimus*; eye tubercles black; anterior median eyes well developed; two rows of dark spots on dorsum of abdomen, leaving pale central stripe.

Limb Segment Lengths (mm)

	I	II	III	IV	PALP
Femur	2.25	2.15	1.85	2.20	0.60
Patella	0.65	0.60	0.60	0.60	0.25
Tibia	2.35	1.75	1.65	2.00	0.40
Metatarsus	2.00	1.60	1.50	1.65	—
Tarsus	1.00	0.80	0.90	0.80	0.65
Total	8.25	6.90	6.50	7.25	1.80

Leg formula 1423. First leg 5.5 times, first femur 1.5 times as long as carapace.

Epigynum (Figs. 141–143) with narrowly elongated, subparallel lateral foveae, each narrower than median septum; distal end of median septum forming broad, blunt point protruding well beyond lateral margin of receptacles.

TYPE DATA.—Female holotype from Water Rock Knob summit, 6,292 ft., Haywood-Jackson counties, North Carolina, 30 October 1969 (W. Shear), from under rock in fir forest, in the American Museum of Natural History.

DISTRIBUTION.—Known from Haywood and Madison counties of North Carolina.

RECORDS.—**North Carolina:** *Haywood County:* Steestachee Bald Slope, mile 438 on BR Parkway, 5,600 ft. 7 October 1977 (F. Coyle, W. Shear), 2 females, immature from moss on rocks in birch boulderfield

community. *Madison County:* Mine Hollow Cave, 17 July 1977 (W. Hertl), female.

***Nesticus dilutus*, new species**

DIAGNOSIS.—Possible troglobite with median eyes of both rows missing and lateral eyes evanescent, near relative of *N. tennesseensis*, distinguished by epigynum with narrow lateral foveae and broad median septum.

ETYMOLOGY.—Specific name from Latin *dilutus*, past participle of *diluere*, to dilute.

DISCUSSION.—The exact status of this taxon, based on a single female with quite distinctive epigynum, can be ascertained with certainty only after discovery of the male.

DESCRIPTION

Female holotype.—Total length 3.65 mm. Carapace 1.75 mm long, 1.5 mm wide. Abdomen 2.2 mm long, 1.7 mm wide.

Cephalothorax and appendages bright yellow; abdomen grayish, without trace of darker pattern.

Clypeus 0.24 mm high, equal to 3.5 diameters of anterior lateral eye. Median eyes of both rows missing; white lateral eyes reduced in size, evanescent, without dark rings or smudging. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 10:0:10:0$$

Lateral eyes of each side only slightly separated.

Limb Segment Lengths (mm)

	I	II	III	IV	PALP
Femur	3.40	2.70	2.35	3.25	0.87
Patella	0.75	0.70	0.65	0.75	0.25
Tibia	3.35	2.60	1.75	2.65	0.50
Metatarsus	3.15	2.40	1.80	2.45	—
Tarsus	1.50	1.15	0.85	1.15	0.90
Total	12.15	9.55	7.40	10.25	2.52

Leg formula 1423. First leg seven times, first femur twice as long as carapace. Third metatarsus about as long as carapace.

Epigynum (Figs. 94–96) nearly twice as long as broad, with small lateral foveae and very broad median septum.

TYPE DATA.—Female holotype from Grassy Creek Cave, Rhea County, Tennessee, 5 October 1959 (T. S. Barr, S-B154), in American Museum of Natural History.

DISTRIBUTION.—Known only from above specimen.

***Nesticus furtivus*, new species**

DIAGNOSIS.—Pale, eyeless, long-legged troglobite related to *N. tennesseensis*, readily distinguished by distinctive epigynum (Fig. 97) with narrowly angled tubercle at posterior margin.

ETYMOLOGY.—Specific name from Latin *furtivus*, furtive, concealed.

DESCRIPTION

Female holotype.—Total length 3.50 mm. Carapace 1.55 mm long, 1.30 mm wide. Abdomen 2.20 mm long, 1.77 mm wide.

Cephalothorax and appendages whitish, without pattern; abdomen gray.

Eyes obsolete. Other structure like that of *N. tennesseensis*.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	3.55	2.75	2.20	3.15	0.80
Patella	0.70	0.65	0.60	0.65	0.22
Tibia	—	2.50	1.70	2.60	0.42
Metatarsus	—	2.20	2.00	2.35	—
Tarsus	—	1.30	0.75	1.10	0.85
Total	—	9.40	7.25	9.85	2.29

First femur about 2.3 times as long as carapace. Third metatarsus much longer than carapace.

Epigynum (Figs. 97–99) with large, suboval, subparallel lateral foveae and narrow median septum; median septum produced at posterior end into narrowly rounded projection.

TYPE DATA.—Female holotype from Crystal Caverns (originally Tennessee Caverns, later Crystal City Caves) in Black Creek Valley, Raccoon Mountains, Hamilton County, Tennessee, 14 April 1938 (J. M. Valentine), in American Museum of Natural History.

Nesticus paynei, new species

DIAGNOSIS.—Typical species of *tennesseensis* group from northeastern Tennessee and adjacent Virginia with all eight eyes present, readily distinguished by genitalic features: dorsal process of paracymbium of male is conspicuous rounded lamina; median septum of epigynum bulbous, produced somewhat beyond lateral lobes.

ETYMOLOGY.—Named for Jerry A. Payne, formerly of Clemson University, Clemson, South Carolina, who first brought this fine species to my attention and collected it from many caves in northeastern Tennessee.

DESCRIPTION

Female from Reeder's Cave, Anderson County, Tennessee.—Total length 4.15 mm. Carapace 1.75 mm, 1.50 mm wide. Abdomen 2.60 mm long, 2.00 mm wide.

Cephalothorax and appendages dull to bright yellow; eyes narrowly ringed with black; carapace yellowish with dusky V-shaped mark at middle, traces of dusky spots along sides and faint dark marginal seam; abdomen whitish with broken dusky chevrons above usually forming five or six pairs of spots; some females without marking on carapace or abdomen.

Clypeus 0.3 mm high, equal to 2.5 diameters of anterior lateral eye. Eyes well developed; anterior median pair quite small, often reduced to black spots. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 15:5:15:15$$

Anterior median eyes separated by about diameter, twice as far from lateral eyes. Posterior median eyes nearly round, separated by about diameter (15/16), nearer lateral eyes (15/10). Median ocular quadrangle broader than long (44/31), narrowed in front (44/16).

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	3.70	3.15	2.70	3.50	0.92
Patella	0.80	0.75	0.68	0.75	0.30
Tibia	3.70	2.80	1.95	3.00	0.52
Metatarsus	3.30	2.50	1.90	2.60	—
Tarsus	1.50	1.25	1.00	1.20	1.03
Total	13.00	10.45	8.23	11.05	2.77

Leg formula 1423. First leg 7.4 times, first femur 2.1 times as long as carapace.

Epigynum (Figs 153–155) with small oval foveae that are continued as narrow grooves to posterior margin, broad median septum as wide as lateral lobes bulbous above and rounded behind usually extending somewhat beyond lateral lobes.

Male from Reeder's Cave, Anderson County, Tennessee.—Total length 3.30 mm. Carapace 1.60 mm long, 1.35 mm wide. Abdomen 1.75 mm, 1.20 mm wide.

Coloration and structure like those of female. Clypeus 0.3 mm high, equal to three diameters of anterior lateral eye. Posterior median eyes suboval, separated by long diameter.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	3.70	3.15	2.70	3.40	0.83
Patella	0.75	0.70	0.65	0.70	0.23
Tibia	3.80	3.00	2.15	3.10	0.30
Metatarsus	3.40	2.65	2.20	2.80	—
Tarsus	1.50	1.45	0.85	1.15	0.83
Total	13.15	10.95	8.55	11.15	2.19

Leg formula 1423. First leg 8.2 times, first femur 2.8 times as long as carapace. Third metatarsus much longer than carapace.

Male palpus (Figs. 159–160) with following features: principal tegular process bifid at apex with rounded inner spur and longer spine; dorsal spur of paracymbium conspicuous rounded lamina curved toward cymbium.

TYPE DATA.—Male holotype from Reeder's Cave, 2 mi. N Clinton, Anderson County, Tennessee, 10 March 1965 (J. A. Payne), in American Museum of Natural History.

DISTRIBUTION.—Northeastern Tennessee and Scott, Hancock, and Sullivan counties, Virginia.

RECORDS.—**Tennessee:** *Anderson County:* Reeder's Cave, 2 mi. N Clinton, 6 February to 15 December 1964–1965 (J. A. Payne), numerous males, females, immature from entrance to 100 ft. inside cave, on walls and floor, under rocks and ground debris. Offutt's Cave, 2 mi. N Clinton, 10 April to 11 July 1964–1965 (J. A. Payne), males, females from interior of cave, under rotten wood on ground. Wallace's Cave, 5 mi. N Clinton, 4 April 1965 (J. A. Payne), 3 females, immature from 100 ft. inside entrance. Sinking Springs Saltpeter Cave, 4 mi. N Clinton, 9 April 1965 (J. A. Payne), 2 males, 6 females from wall 100 ft. inside cave. Garden's Cave, Clinton, 24 January 1964 (J. A. Payne), 4 females 100 ft. from entrance. Creeder's Cave, Clinton, 3 November 1964 (J. A. Payne), 2 males, 2 females from near mouth. Bee Hole Cave, 4 mi. N Clinton, 2, 30 May 1965 (J. A. Payne), 4 males, 5 females, immature from walls 100 ft. inside cave. Markli's Cave, 5 mi. S Clinton, 9 March, 31 May 1965 (J. A. Payne), male, 12 females on walls. Weaver's Cave, 4 mi. N Clinton, 17 April 1965 (J. A. Payne), 5 females, immature under rocks and wood on floor 100 to 200 ft. inside cave. *Campbell County:* Norris Dam Cave, 2 mi. N Norris, 16 April 1965 (J. A. Payne), penultimate male from under rocks 200 ft. inside. Hammer's Cave, 7 mi. N Norris, 16 December 1965 (J. A. Payne), female on floor 100 ft. inside. *Carter County:* Crystal Cave, 16 July 1960 (T. C. Barr), female. Grindstaff

Cave, Hampton, 16 July 1960 (T. C. Barr), male, 2 females; 3 December 1960 (M. C. Bowling), female. *Hancock County*: Cantwell Valley Cave, 28 October 1960 (J. Holsinger, C. Maus), female, immature. *Knox County*: Roaring Spring Cave, 1.5 mi. SW Beech Grove, 25 March 1967 (J. D. Story), male, 2 females on stone walls 200 ft. inside. *Sullivan County*: Morrill Cave, 12 November 1960 (J. Holsinger), female, immature. *Union County*: Ridenour Pit Cave, Andersonville, 8 February 1965 (J. A. Payne), male, 6 females taken 50 ft. from entrance; 8 June 1965 (J. A. Payne), 3 females on walls 100 ft. inside entrance. Coppock's Cave, east of Andersonville, 8 February 1965 (J. A. Payne), 4 females 100 ft. from entrance. *Virginia*: *Scott County*: Wolfe Cave, near Speers Ferry, 14 August 1969 (J. Holsinger, D. and A. Powers), female.

Nesticus valentinei, new species

DIAGNOSIS.—Essentially eyeless troglóbite with anterior median eyes missing and others reduced in size, evanescent, distinguished from *N. tennesseensis* as follows: size much smaller, for single female 2.5 mm; legs much longer and thinner than those of known species, first one 9.1 times as long as carapace; epigynum with narrow median septum.

ETYMOLOGY.—Named for Dr. J. M. Valentine, student of American cave beetles and collector of many cave spiders.

DISCUSSION.—Although based on a single female in rather poor condition, the special features of this taxon seem to be certain enough to establish its validity. The collection of the male is awaited with interest.

DESCRIPTION

Female holotype.—Total length 2.5 mm. Carapace 1.2 mm long, 1.0 mm wide. Abdomen 1.7 mm long, 1.3 mm wide.

Cephalothorax and appendages dull yellowish; abdomen gray, without dusky pattern.

Clypeus 0.2 mm high, equal to three diameters of anterior lateral eye. Anterior median eyes missing, others reduced in size, evanescent. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 6:0:6:5$$

Posterior median eyes round, separated by two diameters, about as far from lateral eyes. Lateral eyes of each side separated by radius.

Limb Segment Lengths (mm)

	I	II	III	IV	PALP
Femur	3.20	2.35	2.00	2.70	0.65
Patella	0.70	0.65	0.50	0.70	0.25
Tibia	3.20	2.35	1.50	2.25	0.35
Metatarsus	2.80	2.00	1.60	2.15	—
Tarsus	1.10	1.00	0.70	1.00	0.80
Total	11.00	8.35	6.30	8.80	2.05

Leg formula 1423. First leg 9.1 times, first femur 2.6 times as long as carapace.

Epigynum (Figs. 150–152) with lateral foveae of medium size, each as wide as narrow median septum.

TYPE DATA.—Female holotype from Monteagle Saltpeter Cave, 3.9 mi. SE Monteagle, Marion County, Tennessee, 30 May 1937 (J. M. Valentine), in American Museum of Natural History.

DISTRIBUTION.—Known only from above specimen.

Nesticus reclusus, new species

DIAGNOSIS.—Small, dark epigeal species with large eyes and legs of medium length, readily separated by distinctive genitalic features: tegulum of male palpus with sharp accessory process and deep groove at posterior margin as well as thin, truncated principal tegular process; dorsal spur of paracymbium sharp spine similar in size to apical spur; epigynum with septum narrowed behind to half frontal width.

ETYMOLOGY.—Specific name from Latin *recludere*, to close off, a recluse.

DESCRIPTION

Female from Little Pigeon River, Tennessee.—Total length 2.70 mm. Carapace 1.35 mm long, 1.20 mm wide. Abdomen 1.70 mm long, 1.45 mm wide.

Base color of cephalothorax and appendages dusky orange; eyes ringed with black and with dusky smudges; carapace with dark V-shaped marking outlining pars cephalica, some duskiess on sides and narrow black marginal seam; abdomen with black pattern of chevrons or spots covering most of dorsum, but venter unmarked.

Clypeus 0.18 mm high, equal to two diameters of anterior lateral eye. Eyes relatively large, close together; anterior median eyes always present. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 15:6:15:15$$

Anterior median eyes separated by diameter, about as far from lateral eyes. Suboval posterior median eyes separated by short diameter (10/15), half as far from lateral eyes. Median ocular quadrangle broader than long (32/24), narrowed in front (32/13).

Limb Segment Lengths (mm)

	I	II	III	IV	PALP
Femur	2.20	1.90	1.75	2.15	0.60
Patella	0.65	0.60	0.50	0.60	0.20
Tibia	2.10	1.65	1.15	1.75	0.40
Metatarsus	1.80	1.50	1.20	1.60	—
Tarsus	1.00	0.80	0.75	0.80	0.70
Total	7.75	6.45	5.35	6.85	1.90

Leg formula 1423. First leg 5.7 times, first femur 1.6 times as long as carapace. Third metatarsus shorter than carapace.

Epigynum (Figs. 109–111) with oval lateral foveae set obliquely, about as wide as median septum in front, wider behind where septum narrows to half width of fovea.

Male from Little Pigeon River, Tennessee.—Total length 2.75 mm. Carapace 1.35 mm long, 1.25 mm wide. Abdomen 1.75 mm long, 1.15 mm wide.

Coloration and structure like those of female. Legs proportionately longer as shown below.

Limb Segment Lengths (mm)

	I	II	III	IV	PALP
Femur	2.60	2.10	2.00	2.45	0.70
Patella	0.65	0.60	0.50	0.60	0.10
Tibia	2.70	2.00	1.50	2.15	0.28
Metatarsus	2.40	1.85	1.60	2.15	—
Tarsus	1.15	1.00	0.75	0.80	0.63
Total	9.50	7.55	6.35	8.15	1.71

Leg formula 1423. First leg 6.8 times, first femur 1.8 times as long as carapace.

Male palpus (Figs. 75–78) with following special features: principal tegular process thin and truncated at apex, lying adjacent to sharp spur at base of median apophysis; secondary tegular process present as sharp spur and rounded groove at lower margin of cymbium; dorsal spur of paracymbium, sharp spine forming bifid tip with apical spur; ventral spur of paracymbium rounded, enlarged lamina.

TYPE DATA.—Male holotype from Andrews Bald, Great Smoky Mountains National Park, Swain County, Tennessee (W. M. Barrows), in American Museum of Natural History.

DISTRIBUTION.—Great Smoky Mountains and adjacent areas of Tennessee and North Carolina.

RECORDS.—**North Carolina:** *McDowell County:* Montreat, 16 October 1923, female. *Swain County:* Deep Creek, near Bryson City, 26 August 1930 (P. H. Darlington), female; 8 July 1933 (W. Ivie), female and immature under rocks in damp places. **Tennessee:** *Sevier County:* Newfound Gap, 5,000 ft., 13 October 1970 (W. Shear), male from Spruce forest. Great Smoky Mountains National Park: Little Pigeon River, 9 July 1933 (W. J. Gertsch), 8 males, 13 females from ground detritus of deep woods. Top of Mt. Leconte, 10 October 1926, female. Sides of Mt. Leconte, 7 September 1928 (W. M. Barrows), penultimate male. Clingman's Dome, 22 June 1941 (C. and M. Goodnight), male. Sugarlands, 3 September 1936 (A. Stupka), female.

Nesticus cooperi, new species

DIAGNOSIS.—Small cavernicole relative of *N. reclusus* from Swain County, North Carolina, with distinctive genitalia: principal tegular process rounded lobe flanking deep tegular groove (Fig. 132); paracymbium (Fig. 133) with distinctive distal processes; epigynum (Fig. 144) with rounded lobe flanked by narrow, deeply incised grooves.

ETYMOLOGY.—Named for Dr. John E. Cooper, Director of Research and Collections, North Carolina State Museum of Natural History in Raleigh.

DESCRIPTION

Female from Lost Nantahala Cave.—Total length 3.5 mm. Carapace 1.5 mm long, 1.3 mm wide. Abdomen 1.8 mm long, 1.5 mm wide.

Carapace whitish to dull yellow; pars cephalica with inverted V-shaped dusky maculation in front of cervical groove; eyes ringed with black; pars thoracica with some dusky shadings and inconspicuous dusky lines on margins. Appendages and underside of carapace yellowish. Abdomen whitish to gray; dorsum with five pairs of incomplete, dusky spots.

Clypeus 0.25 mm high, equal to 2.5 diameters of anterior lateral eyes. Eyes small, moderately separated; anterior median eyes much smaller than others. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 10:4:10:10$$

Anterior median eyes separated by full diameter, twice as far from lateral eyes. Posterior median eyes broadly oval, separated by long diameter, half as far from lateral eyes.

Limb Segment Lengths (mm)

	I	II	III	IV	PALP
Femur	3.10	2.45	1.85	2.70	0.75
Patella	0.65	0.65	0.50	0.60	0.25
Tibia	2.75	2.15	1.50	2.35	0.50
Metatarsus	2.50	2.10	1.60	2.00	—
Tarsus	1.10	0.90	0.75	1.00	1.00
Total	10.10	8.25	6.20	8.65	2.50

Leg formula 1423. First leg 6.5 times, first femur about twice as long as carapace.

Epigynum (Figs. 144–146) with inconspicuous lateral foveae outlining suboval internal receptacles; median septum narrow for its length; posterior margin forming rounded lobe, deeply incised at atrio-bursal grooves, this slightly longer at lateral lobes.

Male holotype from Lost Nantahala Cave.—Total length 3.50 mm. Carapace 1.75 mm long, 1.50 mm wide. Abdomen 1.75 mm long, 1.30 mm wide.

Coloration and structure like those of female; dusky patch on pars cephalica missing.

Limb Segment Lengths (mm)

	I	II	III	IV	PALP
Femur	3.50	3.15	2.40	3.35	0.85
Patella	0.70	0.70	0.60	0.75	0.23
Tibia	3.70	2.75	2.00	2.90	0.30
Metatarsus	3.25	2.50	2.20	2.65	—
Tarsus	1.35	1.20	0.85	1.15	0.75
Total	12.50	10.30	8.05	10.90	2.13

Leg formula 1423. First leg 7 times, first femur twice as long as carapace.

Male palpus (Figs. 132–134) with following features: principal tegular process, a rounded lobe lateral to similar rounded groove in tegulum; dorsal and median processes of paracymbium small spur and rounded lobe; distal process a pointed spur flanked by principal lateral spur of similar size.

TYPE DATA.—Male holotype and two females from Lost Nantahala Cave, near Nantahala, Swain County, North Carolina, 17 May 1979 (P. T. Hertl, S. P. Plantani, C. O. Holler), in American Museum of Natural History courtesy of Dr. John Cooper.

DISTRIBUTION.—Known only from above specimens from caves of Swain County, North Carolina.

RECORD.—**North Carolina:** *Swain County:* Blowing Springs Cave, 22 March 1979 (S. Plantani, D. Billard), male.

Nesticus brimleyi, new species

DIAGNOSIS.—Pale cavernicole from Rutherford County, North Carolina, with following genitalic features: principal tegular process of male palpus (Fig. 126) round lobe, closely joined to one lying under median apophysis armed with sharp spur; paracymbium massive, with distinctive dorsal processes and spatulate process as shown in Figure 127; epigynum (Fig. 138) with prominent nasute median septum flanked by deep rounded depressions.

ETYMOLOGY.—Named for the Brimley brothers, Herbert and Clement, pioneer naturalists and scientists

responsible for assembling a wealth of zoological material and published information during their long lives in North Carolina. Specific name used in the singular.

DESCRIPTION

Female from Breakdown Cave.—Total length 4.50 mm. Carapace 1.75 mm long, 1.60 mm wide. Abdomen 2.50 mm long, 1.60 mm wide.

Carapace and appendages bright, unmarked yellow; eyes narrowly ringed with black; abdomen gray.

Clypeus 0.28 mm high, equal to three diameters of anterior lateral eye. Eyes small, moderately separated; anterior median eyes very small. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 10:3:10:10$$

Small anterior median eyes separated by two full diameters, as far from anterior lateral eyes. Posterior median eyes suboval, separated by more than long diameter (10/13), nearer lateral eyes (10/8).

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	3.50	3.00	2.50	3.25	1.00
Patella	0.80	0.75	0.70	0.75	0.25
Tibia	3.75	2.75	1.85	2.75	0.55
Metatarsus	3.35	2.60	1.90	2.60	—
Tarsus	1.35	1.15	1.00	1.10	1.15
Total	12.70	10.25	7.90	10.45	2.95

Leg formula 1423. First leg 7.3 times, first femur twice as long as carapace.

Epigynum (Figs. 138–140) with broad lateral foveae featuring deep round openings, each as wide as median septum; median septum conspicuous nasute projection overhanging posterior edge, narrowed posteriorly and most covering excised grooves.

Male holotype from Ice Cave.—Total length 4.00 mm. Carapace 2.00 mm long, 1.75 mm wide. Abdomen 2.15 mm long, 1.25 mm wide.

Coloration and structure like those of female except as follows: clypeus 0.35 mm high, equal to three diameters of anterior lateral eye; anterior median eyes larger, separated by slightly more than their diameter, about as far from lateral eyes.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	4.80	4.00	3.25	4.20	1.15
Patella	1.00	0.80	0.70	0.80	0.25
Tibia	5.15	3.70	2.60	3.75	0.50
Metatarsus	4.50	3.60	2.75	3.70	—
Tarsus	1.50	1.50	1.10	1.35	1.10
Total	16.95	13.60	10.40	13.80	3.00

Leg formula 1423. First leg 8.47 times, first femur 2.4 times as long as carapace. Third metatarsus longer than carapace.

Male palpus (Figs. 126–128) very large, with following features: principal tegular process a subtriangular lobe, closely jointed by smaller element below median apophysis; conductor with prominent long beak; paracymbium massive, with three dorsal processes as shown and long, spatuliform apical process thin and somewhat transparent, with numerous denticles along edge.

TYPE DATA.—Male holotype from Rumbling Bald Cave, Lake Lure, Rumbling Bald Mountain, Rutherford County, North Carolina, 2 July 1977 (P. Hertl), in American Museum of Natural History, courtesy of Dr. John E. Cooper.

DISTRIBUTION.—Known only from above caves of Rutherford County, North Carolina.

RECORDS.—**North Carolina:** Rutherford County: Lake Lure, Rumbling Bald Mountain: Ice Cave, 2, 3 July 1977 (P. Hertl), male, female, immature; Breakdown Cave, 8 July 1977 (P. Hertl), female; Spring Cave, 8 July 1977 (P. Hertl), female; Rumbling Bald Cave, 2 July 1977 (P. Hertl), male, female, immature; Bat Cave, in dark zone, 7 June 1977 (P. Hertl), 2 immatures.

Nesticus stupkai, new species

DIAGNOSIS.—Near relative of *N. reclusus* with large eyes, legs of medium length, readily separated by genitalic features as follows: tegulum of male palpus with accessory process lying by thin groove at posterior margin; median spur of paracymbium doubled; epigynum with very deeply incised atriobursal grooves.

ETYMOLOGY.—Named for Arthur S. Stupka, former Chief Naturalist of Great Smoky Mountain National Park.

DESCRIPTION

Female.—Total length 3.7 mm. Carapace 1.75 mm long, 1.6 mm wide. Abdomen 2 mm long, 1.5 mm wide.

Base color of cephalothorax and appendages whitish to pale yellow; eyes ringed with black; carapace with faint dusky pattern like that of *N. reclusus*; abdomen largely gray, with faint, reduced pattern of dusky chevrons.

Clypeus 0.25 mm high, equal to 2.5 diameters of anterior lateral eye. Eyes large, moderately separated; anterior median eyes well developed. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 15:6:15:16$$

Anterior median eyes separated by full diameter, little farther from lateral eyes. Posterior median eyes broadly suboval, separated by about diameter (16/15), nearer lateral eyes (16/10).

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	3.35	2.80	2.20	3.20	0.80
Patella	0.75	0.75	0.65	0.70	0.25
Tibia	3.35	2.50	1.65	2.60	0.48
Metatarsus	2.85	2.25	1.75	2.35	—
Tarsus	1.25	1.15	0.95	1.15	0.95
Total	11.55	9.45	7.10	10.00	2.48

Leg formula 1423. First leg 6.6 times, first femur about twice as long as carapace. Third metatarsus as long as carapace.

Epigynum (Figs. 106–108) with elongate oval foveae set obliquely, separated in front by more than width; median septum narrowed at apex to half width as the front; posterior margin broad, rounded lobe very deeply incised at atriobursal grooves.

Male.—Total length 3.50 mm. Carapace 1.65 mm long, 1.40 mm wide. Abdomen 2.10 mm long, 1.30 mm wide.

Coloration and structure like those of female. Legs mostly missing.

Male palpus (Figs. 71–74) with following special features: principal tegular process a short truncated projection lying below bluntly pointed median apophysis; secondary tegular process a bluntly pointed spur and thin groove at lower margin of tegulum; dorsal spur of paracymbium a long thin spine adjacent to truncated apical spur; median spur doubled, both longer than broad.

TYPE DATA.—Male holotype and two females from White Oak Sinks, Great Smoky Mountains National Park, Tennessee, 21 July 1937 (A. Stupka), in American Museum of Natural History.

DISTRIBUTION.—Known only from above specimens.

Nesticus sheari, new species

DIAGNOSIS.—Small, dusky epigeal species similar to *N. reclusus*, with genitalia most similar to *N. stupkai*: tegulum of male palpus with slender accessory process and dorsal spur of paracymbium a sharp, curved blade; epigynum with deeply incised grooves on narrowed posterior margin.

ETYMOLOGY.—Named for Dr. William Shear of Hampden-Sydney College, Hampden-Sydney, Virginia.

DESCRIPTION

Female.—Total length 1.80 mm. Carapace 1.35 mm long, 1.15 mm wide. Abdomen 1.65 mm long, 1.15 mm wide. Coloration and structure in close agreement with those of *N. reclusus* and relatives. Anterior median eyes well developed; posterior median eyes suboval, separated by short diameter.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	2.20	1.85	1.40	2.10	0.65
Patella	0.65	0.50	0.35	0.65	0.25
Tibia	2.15	1.15	1.10	1.70	0.35
Metatarsus	1.85	1.35	1.15	1.50	—
Tarsus	1.00	0.70	0.70	0.70	0.70
Total	7.85	5.55	4.70	6.65	1.95

Leg formula 1423. First leg 5.7 times, first femur 1.6 times as long as carapace.

Epigynum (Figs. 135–137) broader than long, broadly subtriangular; lateral foveae suboval, set obliquely, separated by width; median septum as broad in front as fovea, narrowed behind; posterior margin, a broad lobe with deeply incised atrial grooves.

Male.—Total length 2.40 mm. Carapace 1.30 mm long, 1.15 mm wide. Abdomen 1.50 mm long, 0.80 mm wide.

Coloration and structure essentially like those of female.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	2.65	2.30	1.80	2.75	0.70
Patella	0.55	0.50	0.50	0.55	0.20
Tibia	2.80	2.10	1.35	2.20	0.25
Metatarsus	2.50	1.80	1.40	2.15	—
Tarsus	1.50	1.10	0.70	1.80	0.75
Total	10.00	7.80	5.75	9.45	1.90

Leg formula 1423. First leg 7.7 times, first femur about twice as long as carapace.

Male palpus (Figs. 79–81) with following special features: principal tegular process medium-sized, truncated at apex, adjacent to median apophysis; secondary tegular process a thin spine on rounded base of tegulum; dorsal spur of paracymbium curved back forming bifid tip with thin, spined apical spur; ventral spur of paracymbium a pale rounded lamina.

TYPE DATA.—Male holotype from Poplar Cove, Joyce Kilmer Memorial Forest, Graham County, North Carolina, 30 May 1975 (W. A. Shear), in American Museum of Natural History.

DISTRIBUTION.—Known only from Joyce Kilmer Memorial Park.

RECORD.—**North Carolina:** *Graham County:* Joyce Kilmer Memorial Park, 20 May 1970 (W. A. Shear), 2 females from virgin cove hardwood forest; 26 April 1976 (H. W. Levi), female.

Nesticus archeri, new species

DIAGNOSIS.—Dusky, long-legged epigeal species with following distinctive genitalic features: tegulum of male palpus much broader than long, with double processes (Fig. 129); paracymbium with all spurs distinctively developed (Fig. 130); epigynum strongly vaulted behind (Figs. 116–117).

ETYMOLOGY.—Named for Dr. Allan F. Archer of Tift College, Forsyth, Georgia, good friend and respected colleague.

DESCRIPTION

Female.—Total length 3.45 mm. Carapace 1.65 mm long, 1.35 mm wide. Abdomen 2.20 mm long, 1.50 mm wide.

Base color of cephalothorax and appendages dull yellow; carapace with indistinct dusky figure at middle and duskiess along side margins; eyes ringed with black. Abdomen gray, with indistinct dusky chevrons above.

Structure like that of *N. reclusus* and relatives. Eyes large, close together, with median eyes well developed. Clypeus 0.25 mm high, equal to 2.5 diameters of anterior lateral eyes. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 14:5:14:14$$

Anterior eye row straight; anterior median eyes separated by diameter, slightly farther from lateral eyes (7/5). Posterior eye row moderately procurved; posterior median eyes suboval, separated by narrow diameter (14/12), nearer lateral eyes (14/10). Median ocular quadrangle broader than long (40/30), narrowed in front (40/16).

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	3.35	2.70	2.15	3.15	0.70
Patella	0.70	0.65	0.60	0.70	0.20
Tibia	3.30	2.35	1.50	2.50	0.40
Metatarsus	3.00	2.15	1.60	2.15	—
Tarsus	1.25	1.00	0.80	1.20	0.75
Total	11.60	8.85	6.65	9.70	2.05

Leg formula 1423. First leg seven times, first femur twice as long as carapace.

Epigynum (Figs. 115–117) subtriangular in outline, protruding strongly as seen in side view; lateral foveae very large, roundly suboval, set obliquely and touching at midline; median septum narrow, vaulted to right angle behind.

Male Holotype.—Total length 3.25 mm. Carapace 1.50 mm long; 1.30 mm wide. Abdomen 1.80 mm long, 1.25 mm wide.

Coloration and structure like those of female.

First leg: femur, 3.35 mm; patella, 0.70 mm; tibia, 3.55 mm; metatarsus, 3.20 mm; tarsus, 1.25 mm; total length, 12.05 mm. First leg 8.0 times, first femur 2.2 times as long as carapace.

Male palpus (Figs. 129–131) probably most derivative of *tennesseensis* group, with following features: tegulum modified to transverse form with heavy dark principal tegular process appressed to median apophysis and accessory tegular process a heavy spur pointing prolaterad; conductor a clear mushroom-shaped lamina enclosing tip of curved embolus; paracymbium with striking development of spurs: apical spur a thin process flared at apex; dorsal spur a thin blade; inner spur a dark blade; ventral spur a thin lamina with two folds.

TYPE DATA.—Male holotype from Mt. Cheaha State Park, Talladega County, Alabama, 21 April 1947 (A. F. Archer), in American Museum of Natural History.

DISTRIBUTION.—So far known only from type locality.

RECORDS.—**Alabama:** Talladega County: Mt. Cheaha State Park, 21 April 1947 (A. F. Archer), male, 4 females in heavy talus of ravine; June 1940 (A. F. Archer), 2 females, immature.

Nesticus secretus, new species

DIAGNOSIS.—Small, dusky epigeal species with short legs distinguished by distinctive epigynum as shown in Figures 112–114.

ETYMOLOGY.—Specific name from Latin *secretus*, secret.

DESCRIPTION

Female Holotype.—Total length 3.00 mm. Carapace 1.50 mm long 1.30 mm wide. Abdomen 1.75 mm long, 1.40 mm wide.

Coloration and structure like those of *N. reclusus*. Male unknown.

Legs mostly missing: First femur, 2.25 mm. Second leg: femur, 1.85 mm; patella, 0.60 mm; tibia, 1.70 mm; metatarsus, 10.50 mm; tarsus, 0.95 mm; total length, 6.15 mm. First femur 1.5 times as long as carapace.

Epigynum (Figs. 112–114) broadly triangular, with large narrow lateral foveae set obliquely and leaving broad median septum; apex of median septum prominent, bulbous, well elevated above its atriobursal grooves.

TYPE DATA.—Female holotype from Little Pigeon River, Great Smoky Mountains National Park, Sevier County, Tennessee, 8 July 1933 (W. J. Gertsch), in American Museum of Natural History.

DISTRIBUTION.—Known only from above specimen.

Nesticus crosbyi, new species

DIAGNOSIS.—Medium-sized, dusky epigeal species with short reddish legs readily recognized by distinctive epigynum (Fig. 173).

ETYMOLOGY.—Named for the late Professor C. R. Crosby of Cornell University.

DESCRIPTION

Female Holotype.—Total length 4.75 mm. Carapace 2.00 mm long, 1.75 mm wide. Abdomen 3.50 mm long, 2.70 mm wide.

Base color of cephalothorax and appendages bright orange to reddish; carapace with bold black pattern like that of *N. reclusus*; eye tubercles black and clypeal area smudged with black; dorsum of abdomen with heavy black spotting over gray base and median black marking on venter.

Structure like that of *N. reclusus*. Clypeus 0.35 mm high, equal to three diameters of anterior lateral eye. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 15:9:15:15$$

Front eye row gently recurved, essentially straight; anterior median eyes separated by diameter, about as far from anterior lateral eyes. Posterior eye row moderately procurved; posterior median eyes oval, separated by about long diameter (15/18), nearer lateral eyes (15/10). Median ocular quadrangle broader than long (45/32), narrowed in front (45/22).

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	3.20	2.75	2.50	3.10	1.05
Patella	0.80	0.80	0.75	0.80	0.33
Tibia	3.00	2.50	1.85	2.70	0.45
Metatarsus	2.80	2.35	1.95	2.60	—
Tarsus	1.15	1.15	0.95	1.15	1.05
Total	10.95	9.55	8.00	10.35	2.88

Leg formula 1423. First leg 5.5 times, first femur 1.6 times as long as carapace.

Epigynum (Figs. 173–174) broadly subtriangular, with prominent oval lateral foveae set obliquely, leaving broad median septum in front, strongly narrowing behind; posterior margin of median septum a broad, rounded lobe flanked by small lobes at ends of atriobursal grooves.

TYPE DATA.—Female holotype from Commissary Ridge Trail, 100 yards west of main peak of Mt. Mitchell, Yancey County, North Carolina, 22 August 1960 (T. C. Barr), in American Museum of Natural History.

Nesticus bishopi, new species

DIAGNOSIS.—Small, dark epigeal species from North Carolina mountains readily separated from *N. reclusus* by its distinctive epigynum (Fig. 147).

ETYMOLOGY.—Named for the late Professor S. C. Bishop of the University of Rochester.

DESCRIPTION

Female Holotype.—Total length 2.75 mm. Carapace 1.25 mm long, 1.00 mm wide. Abdomen 1.75 mm long, 1.35 mm wide.

Coloration and structure in close agreement with those of *N. reclusus*. Anterior median eyes well developed; posterior median eyes suboval, separated by their long diameter.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	2.10	1.70	1.35	1.80	0.60
Patella	0.65	0.55	0.50	0.55	0.22
Tibia	2.00	1.55	1.00	1.60	0.32
Metatarsus	1.70	1.35	1.10	1.50	—
Tarsus	0.90	0.80	0.65	0.75	0.63
Total	7.35	5.95	4.60	6.20	1.77

Leg formula 1423. First leg 5.8 times, first femur about 1.7 times as long as carapace.

Epigynum (Figs. 147–149) much broader than long; lateral foveae narrow, elongated, set obliquely, widely separated in front by subtriangular median septum; caudal margin of median septum forming broad, rounded lobe incised on sides by conspicuous atriobursal grooves.

TYPE DATA.—Female holotype, female and two immatures from Highlands, Macon County, North Carolina, 6 April 1929 (S. C. Bishop collection), in American Museum of Natural History.

DISTRIBUTION.—Known only from type locality.

RECORDS.—**North Carolina:** *Macon County:* Highlands, 25 June 1977 (N. I. Platnick), female.

Nesticus carteri Emerton.

Nesticus carteri Emerton, 1875: 279, pl. 1, fig. 28; Packard, 1875: 275; Packard 1888: 16, 57; Simon, 1894: 739; Banks, 1896: 204; Banta, 1932: 425; Wolf, 1936: 573; Roewer, 1942: 512; Dearolf, 1953: 229; Nicholas, 1960: 156; Barr, 1961: 36; Holsinger, 1963: 35; Bonnet, 1968: 3093.

DIAGNOSIS.—Distinctive dusky troglophile and epigean species with following genitalic features: tegulum of male palpus with bluntly rounded process and curved spur at base of median apophysis; dorsal spur of paracymbium a short process directed prolaterad; epigynum with large oval lateral foveae and narrow median septum.

ETYMOLOGY.—Named for Carter County, Kentucky.

DISCUSSION.—*Nesticus carteri*, the first species of this group to be named, was based by Emerton on females only. In the past *N. carteri* has been listed as a troglobite but this is an error. It has relatively large eyes and a dusky or blackish pattern on both carapace and abdomen. It is a troglophile living both inside caves, where it is often much paler, and in epigean situations, where it is often strongly marked.

DESCRIPTION

Female from Carter Cave, Kentucky.—Total length 3.2 mm. Carapace 1.6 mm long, 1.3 mm wide. Abdomen 2.0 mm long, 1.5 mm wide.

Cephalothorax and appendages pale to bright yellow; carapace with faint duskiness around margins; eyes narrowly ringed with black. Abdomen gray, with dusky shadings on dorsum, uniformly pale below. Epigean specimens more variable, some being as pale as cave examples, others with bold dusky to blackish pattern on carapace and abdomen.

Structure like that of *N. reclusus* and relatives. Eyes large, close together; anterior median eyes well developed. Clypeus 0.27 mm high, equal to three diameters of anterior lateral eyes. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 12:6:12:12$$

Front eye row straight; anterior median eyes separated by diameter, slightly farther from lateral eyes. Posterior eye row moderately procurved; posterior median eyes round, separated by full diameter, somewhat nearer lateral eyes (12/9). Median ocular quadrangle broader than long (37/27), narrowed in front (37/9).

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	3.15	2.60	2.10	3.00	0.70
Patella	0.65	0.65	0.50	0.65	0.25
Tibia	3.00	2.25	1.50	2.35	0.40
Metatarsus	2.70	2.15	1.60	2.20	—
Tarsus	1.25	1.00	0.80	1.00	0.85
Total	10.75	8.65	6.50	9.20	2.20

Leg formula 1423. First leg 6.7 times, first femur twice as long as carapace.

Epigynum (Figs. 175–177) broadly subtriangular, with large suboval lateral foveae and narrow median septum diminishing at apex to point.

Male from Carter Cave, Kentucky.—Total length 2.60 mm. Carapace 1.30 mm long, 1.15 mm wide. Abdomen 1.50 mm long, 1.00 mm wide.

Structure like that of female. Eyes closer together; posterior median eyes separated by two-thirds diameter.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	3.20	2.60	2.10	2.90	0.60
Patella	0.65	0.60	0.55	0.60	0.20
Tibia	3.25	2.35	1.60	2.40	0.22
Metatarsus	3.10	2.25	1.40	2.35	—
Tarsus	1.20	1.00	0.80	1.10	0.60
Total	11.40	8.80	6.45	9.35	1.60

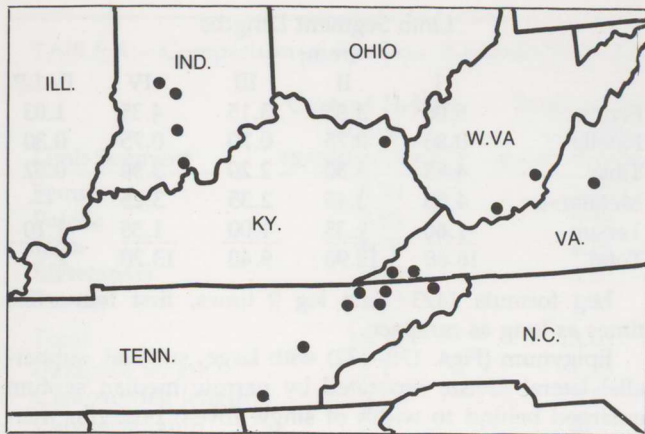
Leg formula 1423. First leg 8.7 times, first femur 2.4 times as long as carapace.

Male palpus (Figs. 124–125) of typical design but with following features: tegulum with bluntly rounded process and adjacent curved spur lying close to base of median apophysis; paracymbium relatively simple including apical spur bluntly pointed, dorsal spur short process directed prolaterad, and behind it, short accessory spur, possibly median spur; ventral spur rounded lamina.

TYPE DATA.—Female cotypes from Bat Cave and Zwingle's Cave (=Saltpeter Cave), Carter County, Kentucky (A. S. Packard), in Museum of Comparative Zoology.

DISTRIBUTION.—Southern Indiana, Kentucky, Tennessee and eastward to West Virginia and Virginia (Map 6).

RECORDS.—**Indiana:** *Crawford County:* Bradford Cave (probably Stierstadter's Cave), near New Albany (Packard, 1875). Marengo Cave (Blatchley, 1896). **Monroe County:** Mayfield's Cave, near Bloomington, and Truett's



Map 6.—Distribution of *Nesticus carteri* Emerton.

Cave (Banta, 1907). Owen County: Porter's Cave (Blatchley, 1896). Kentucky: Breathitt County: Quicksand, 23 June 1925 (S. C. Bishop), female from ground detritus. Carter County: Bat Cave. Carter Cave, near Olive Hill, 16 June 1937 (W. M. Barrows), male, 6 females. Cascade Cave, 30 August 1928 (Jeannel), female, immature. Laurel Cave, Carter Caves State Park, 10 mi. NE Olive Hill, 19 September 1950 (W. B. Jones, J. M. Valentine), 3 females, penultimate male. Jessamine County: Daniel Boone's Cave, Camp Nelson, 1 July 1957 (C. Krekeler), female, immature. Lee County: Pinnacle Cave (T. C. Barr), male, immature. Pulaski County: Tater Cave, 17 December 1956 (T. C. Barr), female, immature. Wayne County: Cooper Cave, 3 mi. SW Mill Springs, 20 September 1951 (W. B. Jones, J. M. Valentine), 2 females. Tennessee: Claiborne County: English Cave, south of Cumberland Gap, August 1931 (J. M. Valentine), 4 females, immature; 19 May 1957 (J. M. Valentine), females, immature; 10 August 1973 (J. Holsinger, D. Culver), immature. Tom Ball's Cave, 11 August 1973 (J. Holsinger, D. Culver), immature. Chadwell's Cave, 10 August 1973 (J. Holsinger, D. Culver), immature. Keck's Cave No. 1, 20 August 1972 (J. Holsinger, D. Culver), male. Hamilton County: Tumbling Shoals Cave, 21 March 1959 (T. C. Barr), 5 females. Lookout Mountain Cave, near Chattanooga, 1 July 1937 (Dearolf, 1953). Hancock County: Suber's Cave, 5 mi. SSW Ewing, Virginia, 25 August 1972 (J. Holsinger), female. Sullivan County: Bristol Caverns, 1 November 1942 (T. Daggy), 3 females; 9 December 1967 (J. Holsinger), female, 17 immatures. Union County: Lost Creek Cave, 19 August 1978 (J. Holsinger), female, immature. Oaks Cave, 22 August 1972 (J. Holsinger, D. Culver), female. Virginia: Dickerson County: Breaks Interstate Park, trail to the Notches, 25 May 1967 (W. Shear), female from surface detritus. Lee County: Cudjo's Cavern, (formerly King Solomon Cave), Cumberland Gap, April 1948 (L. Lutz), 4 females, immature; 21 April 1962 (L. Lutz), female; November 1947 (L. Lutz), female; 23 June 1950, female, immature; 18 August 1962 (J. Holsinger), 2 females, immature; 14 March 1932 (J. M. Valentine), 4 females, immature. Cope Cave, 5 mi. WSW Jonesville, 23 August 1969 (J. Holsinger), 9 females, immature. Kinzer Hollow Cave, 1 August 1967 (J. Holsinger, J. Tichenor), male, female, immature. McClure Cave, 9 August 1973 (J. Holsinger, D. Culver), male, immature. Roadside Cave No.

1, 8 mi. SW Jonesville, 31 July 1974 (J. Holsinger, D. Culver), 2 females, immature from deep rotting wood. Taylor Pit, 19 July 1976 (J. Holsinger), male, immature. Gilliam Cave, 21 July 1976 (J. Holsinger), female, immature. Skylight Cave, 18 August 1962 (J. Holsinger), female. Skull Cave, 27 November 1975 (J. Holsinger), female, immature. Sheep Cave, 27 July 1975 (J. Holsinger), immature. Sweet Potato Cave, 8 August 1973 (J. Holsinger, D. Culver), 10 immature. Frazier Cave, 20 July 1976 (J. Holsinger), female, immature. Thompson Cave, 19 August 1965 (J. Holsinger), female. Molly Wagle Cave, 16 July 1979 (J. Holsinger), 2 females. Rockbridge County: Buckhill Cave, Natural Bridge (M. Muma), male, 2 females. Doll House Cave, 1963 (J. Holsinger), female, immature. Scott County: Greears Sweet Potato Cave, 6 October and 22 November 1979 (J. Holsinger), 2 females, immature. Kerns Cave No. 1, 5 mi. ENE Rye Coves, 23 July 1969 (J. Holsinger, J. Beck), female, immature. Blowing Hole Cave, 26 August 1962 (J. Holsinger), 2 females. Smyth County: Atwell's Tunnel Cave, 13 June 1970 (L. and B. Ferguson), male, female. Stowes Cave No. 2, 12–13 June 1970 (L. and B. Ferguson), female. Tazewell County: Quarry Cave, near Tazewell, 16 July 1969 (J. Holsinger, P. Hauer), female. Wagoner Cave, 19 August 1967 (J. Holsinger, D. Culver, P. Starr), 2 females. West Virginia: Greenbrier County: McLaughlin-Unus Cave, 14 August 1966 (J. Holsinger, W. Biggers), female. Mercer County: all county records from epigeal situations under surface detritus, collected by W. Shear: Athens, 30 June 1969, 2 males, female. Camp Creek State Forest, 9 May 1970, male, immature; 11 September 1970, male, 4 females. Brush Creek Falls, 15 June 1967, female. Jackson's Park, Athens, 18 May 1967, 3 females. Cove Branch Hollow, 18 March 1968, immature.

Nesticus barrowsi, new species

DIAGNOSIS.—Essentially eyeless, long-legged, presumed troglobite with following genitalic features: principal tegular process of male palpus thin, pointed lamina shielding base of median apophysis; paracymbium with bifid apical process and median spur a trivial tooth; epigynum with parallel, oval lateral foveae and small rounded lobes at posterior end of median septum.

ETYMOLOGY.—Named for the late Professor W. M. Barrows of Ohio State University, good friend and colleague who first interested me in the Nesticidae and contributed important material to this study.

DESCRIPTION

Female from Gregory Cave, Tennessee.—Total length 4.35 mm. Carapace 1.75 mm long, 1.40 mm. wide. Abdomen 3.00 mm long, 2.00 mm wide.

Cephalothorax and appendages pale yellow without darker pattern; abdomen uniform gray.

Eyes obsolete or nearly so; anterior median eyes always absent, others evanescent, reduced to trivial vestiges. Clypeus 0.36 mm high. Anterior lateral eye vestiges pearly white, separated by four or more diameters. Posterior lateral eye vestiges separated by six diameters. Posterior median eyes barely discernible.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	3.75	3.10	2.70	3.60	1.00
Patella	0.80	0.80	0.75	0.75	0.33
Tibia	3.90	3.10	2.15	3.20	0.60
Metatarsus	3.70	2.75	2.10	2.75	—
Tarsus	1.60	1.30	1.00	1.15	1.03
Total	13.75	11.05	8.70	11.45	2.96

Leg formula 1423. First leg about 8 times, first femur 2.1 times as long as carapace. Third metatarsus longer than carapace.

Epigynum (Figs. 103–105) with parallel, oval lateral foveae, each wider behind than median septum; distal end of median septum gently rounded and flanked by small lobes.

Male from Great Smoky Caverns, Tennessee.—Total length 4.50 mm. Carapace 1.85 mm long, 1.60 mm wide. Abdomen 2.70 mm long, 2.00 mm wide.

Coloration and structure like those of female.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	4.15	3.35	3.00	3.75	0.97
Patella	0.80	0.70	0.70	0.75	0.25
Tibia	4.20	3.20	2.25	3.20	0.40
Metatarsus	4.00	3.00	2.30	3.00	—
Tarsus	1.40	1.20	1.00	1.15	0.83
Total	14.55	11.45	8.25	11.85	2.45

Leg formula 1423. First leg about 8 times, first femur 2.2 times as long as carapace.

Male palpus (Figs. 118–120) with following special features: principal tegular process curved, pointed lamina shielding rounded base of median apophysis; spurs of paracymbium: dorsal spur a thin curved spine; apical spur notched at apex; inner spur a trivial tooth; ventral spur enlarged.

TYPE DATA.—Male holotype and six females and immatures from Tuckaleeche Caverns (formerly Great Smoky Caverns), Tuckaleeche Cove, Blount County, Tennessee, 1 November 1938 (W. B. Jones), in American Museum of Natural History.

DISTRIBUTION.—Known only from caves in the Great Smoky Mountains, Tennessee.

RECORD.—**Tennessee:** *Blount County:* Gregory Cave, Cades Cove, 1 November 1935 (W. B. Jones), 2 males, 3 females, immature.

Nesticus stygius, new species

DIAGNOSIS.—Pale, eyeless, long-legged troglobite readily distinguished by distinctive epigynum (Fig. 170).

ETYMOLOGY.—Specific name from Latin *stygius*, stygian, infernal.

DESCRIPTION

Female holotype.—Total length 4.85 mm. Carapace 1.85 mm long, 1.60 mm wide. Abdomen 3.00 mm long, 2.35 mm wide.

Cephalothorax and appendages bright yellow, without pattern. Abdomen grayish.

Structure like those of *N. barrowsi* and relatives. Eyes obsolete or nearly so; some specimens with faint pattern of silvery subintegumental spots.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	5.00	3.85	3.15	4.35	1.03
Patella	0.80	0.75	0.70	0.75	0.30
Tibia	4.85	3.50	2.20	3.50	0.52
Metatarsus	4.35	3.45	2.35	3.25	—
Tarsus	1.60	1.35	1.00	1.35	1.10
Total	16.60	12.90	9.40	13.20	2.95

Leg formula 1423. First leg 9 times, first femur 2.8 times as long as carapace.

Epigynum (Figs. 170–172) with large, suboval, subparallel lateral foveae separated by narrow median septum enlarged behind to width of single fovea; posterior margin of median septum forms large, inverted T-shaped figure.

TYPE DATA.—Female holotype from Obe Lee Cave, Overton County, Tennessee, 21 December 1958 (T. C. Barr et al.), in American Museum of Natural History.

DISTRIBUTION.—Caves of Overton and Putnam Counties, Tennessee.

RECORDS.—**Tennessee:** *Overton County:* Obe Lee Cave, 23 October 1958 (T. C. Barr), 3 females; 21 December 1958 (T. C. Barr, F. Breeding, C. Kacsur), 8 females, 2 immatures. Raven Bluff Cave, 28 February 1959 (T. C. Barr), female. Three Forks Cave, 22 March 1949 (W. B. Jones, A. F. Archer), female. *Putnam County:* Webb Cave, 5 March 1961, female.

Nesticus barri, new species

DIAGNOSIS.—Pale, essentially eyeless, long-legged troglobite of southwestern Tennessee and adjacent Alabama, related to *N. barrowsi*, with following genitalic features: principal tegular process a heavy triangular projection; paracymbium with simple apical spur and completely lacking median spur; epigynum with narrow median septum narrowly rounded and somewhat bulbous at posterior margin.

ETYMOLOGY.—Named for Dr. T. C. Barr, good friend and outstanding student of caves and cave beetles.

DESCRIPTION

Female from Nickajack Cave, Tennessee.—Total length 4.70 mm. Carapace 1.85 mm long, 1.60 mm wide. Abdomen 3.00 mm long, 2.30 mm wide.

Cephalothorax and appendages pale to bright yellow, with few contrasting markings; abdomen gray, without pattern.

Eye pattern like that of *N. barrowsi*; anterior median eyes always absent, but other eyes faintly apparent as whitish spots, evanescent, reduced to trivial vestiges. Anterior lateral eyes separated by about four diameters. Posterior median eyes separated by two diameters.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	4.25	3.55	2.75	4.00	1.00
Patella	0.85	0.80	0.65	0.80	0.32
Tibia	4.20	3.15	2.15	3.35	0.60
Metatarsus	4.15	3.00	2.20	3.00	—
Tarsus	1.75	1.45	1.15	1.30	1.25
Total	15.20	11.95	8.90	12.45	2.17

TABLE 6.—Comparison of first legs of females from Tennessee Caves (measurements in millimeters).

Limb Segment	Custard Hollow Cave	Tuckaleechee Caverns	Honeycutt Cave	Lost Cove Cave	Salt peter Cave
	FRANKLIN COUNTY	BLOUNT COUNTY	MARION COUNTY	FRANKLIN COUNTY	FRANKLIN COUNTY
Femur	5.30	3.85	3.60	4.50	5.00
Patella	0.85	0.90	0.75	0.90	0.85
Tibia	5.70	4.15	3.65	4.60	5.00
Metatarsus	5.25	3.60	3.35	4.35	4.80
Tarsus	1.85	1.35	1.30	1.75	1.75
Total	18.95	13.85	12.65	16.10	17.40
Carapace length	2.1	1.85	1.7	1.8	1.9
Carapace/leg length	9	7.5	8	9	9
Carapace/femur	2.5	2	2.1	2.5	2.6

Leg formula 1423. First leg 8.7 times, first femur 2.4 times as long as carapace. Third metatarsus much longer than carapace. Following measurements of females from Tennessee and Alabama caves showing variation in first leg lengths from 7.5 to 9.7 times length of carapace and of first femur lengths from 2 to 2.6 times length of carapace.

Epigynum (Figs. 161–163) with subparallel, suboval lateral foveae much broader than narrow median septum; distal end of median septum narrowly rounded, somewhat bulbous, with atriobursal grooves barely visible from above.

Male from Mokay Cave, Tennessee.—Total length 4.60 mm. Carapace 2.00 mm long, 1.75 mm wide. Abdomen 2.70 mm long, 2.00 mm wide.

Coloration and structure like those of female.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	5.00	4.15	3.35	4.50	1.00
Patella	0.90	0.80	0.65	0.75	0.25
Tibia	5.15	3.85	2.65	3.85	0.40
Metatarsus	5.10	3.65	2.70	3.65	—
Tarsus	1.85	1.60	1.15	1.45	0.90
Total	18.00	14.05	10.50	14.20	2.55

Leg formula 1423; second and fourth legs subequal in length. First leg 9 times, first femur 2.5 times as long as carapace.

Male palpus (Figs. 121–123) with following special features: principal tegular process conspicuous and triangular with pointed spine below; spurs of paracymbium: apical spur simple heavy projection; dorsal spur curved spine; median spur obsolete; ventral spur enlarged curved lamina.

TYPE DATA.—Male holotype from Mokay Cave, Franklin County, Tennessee, 16 October 1955 (T. C. Barr), in American Museum of Natural History.

DISTRIBUTION.—South central Tennessee and adjacent Alabama.

RECORDS.—**Alabama:** *Jackson County:* Salt River Cave, 4 mi. N Anderson, 17 August 1967 (S. Peck, A. Fiske), male, 4 females, immature. Russell Cave National Monument: Riddley Cave, 10 August 1967 (S. Peck, A. Fiske), male, penultimate male; Pig entrance, Russell Cave, 17 August 1967 (S. Peck, A. Fiske), male, immature. Happy Hollow Cave, 6 mi. W Stevenson, 16 August 1967 (S. Peck, A. Fiske), male, 9 females, immature. Steele Salt peter Cave, 9 mi. W Stevenson, 11 August 1967 (S. Peck, A. Fiske), penultimate male. Rainbow Cave, 2 mi. W Stevenson, 16 August 1967 (S. Peck, A. Fiske), 2 males, 6 females, 10 immatures. Wynne Cave, 5 mi. NNE Stevenson, 10 August 1967 (S. Peck, A. Fiske), immature female. Talley Ditch Cave, 5 mi. NNW Stevenson, 1 August 1967 (S. Peck, A. Fiske), immature. Pigpen Cave, 2 mi. NNE Woodville, 20 July 1967 (S. Peck, A.

TABLE 7.—Comparison of first legs of females from Alabama Caves (measurements in millimeters).

Limb Segment	Happy Hollow Cave	Indian Rock Cave	Isbell Spring Cave	Cathedral Caverns	Devil Dungeon Cave
	JACKSON COUNTY	JACKSON COUNTY	JACKSON COUNTY	MARSHALL COUNTY	MARSHALL COUNTY
Femur	5.15	4.35	5.00	3.50	4.50
Patella	0.90	0.75	0.85	0.70	0.80
Tibia	5.15	4.40	4.70	3.50	4.45
Metatarsus	4.85	4.35	4.50	3.30	4.15
Tarsus	1.90	1.70	1.65	1.25	1.65
Total	17.95	15.55	16.70	12.25	15.55
Carapace length	2.10	1.6	2.0	1.6	1.8
Carapace/leg length	8.5	9.7	8.3	7.6	8.6
Carapace/femur	2.4	2.7	2.2	2.5	2.4

Fiske), 2 females, immature; 6 August 1967 (S. Peck, A. Fiske), penultimate male. Gross Cave, 9 mi. SW Scottsboro, 13 August 1967 (S. Peck, A. Fiske), male, penultimate male. Out Cave, near Grosse Cave, 9 mi. SW Scottsboro, 13 August 1967 (S. Peck, A. Fiske), penultimate male, immature. Driftwood Cave, 9 mi. N Scottsboro, 4 September 1965 (S. Peck), female, immature. Indian Rocks Cave, 3.5 mi. S Skyline, 7 August 1967 (S. Peck, A. Fiske), female. Cornelson Cave 2, 3 mi. SE Skyline, 7 August 1967 (S. Peck, A. Fiske), 3 females. Horseskull Cave, 2 mi. E Bridgeport, 3 August 1967 (S. Peck, A. Fiske), immature. Kennamer Cave, 15 March 1966 (S. Peck), male, penultimate male, 3 females. Boxes Cove Cave, 20 March 1966 (S. Peck), penultimate male, immature. Tate Cave 324, 3 mi. E Hytop, 3 September 1965 (S. Peck), male, 2 females, immature. Limrock Blowing Cave, 17 August 1965 (S. Peck), female; 30 November 1977 (W. Torode), 4 females, immature. Guess Creek Cave, 3 mi. E Trenton, 5 September 1965 (S. Peck, T. C. Barr), 2 females, 2 penultimate males, immature. Tumbling Rock Cave, 3 September 1965 (S. Peck), immature. Salt River Cave, 2 September 1965 (S. Peck), 5 females, immature. Montagne Cave, 11 August 1965 (Kroeger), immature. Jess Elliott Cave, 5 mi. E Hytop, 3 September 1965 (S. Peck), penultimate male, female, immature. Kyle Cave, 31 July 1965 (S. Peck), immature; 20 March 1966 (S. Peck), 2 females. Fern Cave, 14 June 1967 (J. Fish, T. R. Evans), female. Bat Cave, Grant, female, immature. Shiffman Cave, 3 mi. NW Limrock, 27 January 1967 (S. Peck), 6 females, immature. Larkin Cave, Limrock, 23 August to 14 September 1968 (S. Peck), 2 males, 3 females. Isbell Spring Cave, 2 July 1963 (R. Brandon), female; 30 November 1977 (W. Torode), male. Sheldon's Cave, 25 January 1967 (S. Peck), female; 9 September 1973 (W. Torode), male. Moody Cave, 9 July 1973 (S. Peck), female. Hall Cave, 8 July 1973 (S. Peck), female, immature. *Marshall County*: Keller Cave, 2.5 mi. S New Hope, 10 July 1967 (S. Peck, A. Fiske), male; 26 June 1967 (S. Peck, A. Fiske), 5 females, immature. Devil's Dungeon Cave, 11 mi. SE Scottsboro, 30 July 1967 (R. Graham), 2 females. Bishop Cave, 3 mi. NE Guntersville Dam, 14 August 1967 (S. Peck, A. Fiske), 2 penultimate males. Cathedral Caverns, 15 August 1967 (S. Peck, A. Fiske), female; 12 May 1957 (T. C. Barr), 5 females; 13 November 1954 (T. C. Barr), immature. McHardin Cave, 1 mi. NE Guntersville Dame, 4 August 1967 (S. Peck, A. Fiske), female, penultimate male, immature. Porch's Spring Cave, 17 March 1966 (S. Peck), female. Quarry Cave, 17 March 1966 (S. Peck), female. Honeycomb Cave, Guntersville, 11 January 1939 (A. F. Archer), 3 females. Guffey Cave, 11 February 1961 (T. C. Barr), female. Royal Shaft, February 1971 (W. Torode), female. Kristy's Cave, 16 April 1970 (W. Torode), penultimate male. *Tennessee: Blount County*: Tuckaleechee Caverns, 18 April 1959 (T. C. and C. K. Barr), female, penultimate male; 11 April 1958 (S. Peck), female. *Franklin County*: Lost Cove Cave, 14 July 1954 (T. C. Barr), female; 13 April 1958 (S. Lazell), male, 6 females; 27 August 1968 (S. Peck), 2 females. Crownover Saltpeter Cave, NE Anderson School (T. C. Barr), 2 females in webs 100 yds. from mouth in wet place on flowstone. Ranie Willis Cave, 13 January 1957 (T. C. Barr), 4 females. Custard Hollow Cave, 24 April 1960 (T. C. Barr), 5 females, immature. Fishtrap Cave, 4 mi. NW South

Pittsburg, 28 August 1968, female, penultimate male. *Marion County*: Honeycutt Cave, 7 mi. NW South Pittsburg, 28 August 1968 (S. Peck), female. Nickajack Cave, 0.5 mi. W Shellmound, 2, 29 July 1967 (S. Peck, A. Fiske), 5 females, immature.

Nesticus jonesi, new species

DIAGNOSIS.—Pale, long-legged troglomite with evanescent eyes, anterior median pair missing, others reduced in size, with following genitalic features: tegulum of male palpus with distinctive principal and accessory processes; dorsal spur of paracymbium missing; epigynum with suboval lateral foveae and wide median septum with somewhat bulbous enlargement at posterior margin.

ETYMOLOGY.—Named for Dr. Walter B. Jones, former State Geologist of Alabama, and collector of many cave animals.

DESCRIPTION

Female.—Total length 5.0 mm. Carapace 2.0 mm long, 1.7 mm wide. Abdomen 3.0 mm long, 2.5 mm wide.

Base color of cephalothorax and appendages bright yellow without markings; abdomen gray, without darker pattern.

Eye pattern like that of *N. barrowsi* and *N. barri*, but with eyes larger; anterior median eyes missing, represented in some specimens by faint subintegumental dusky spots. Clypeus 0.35 mm high, equal to about five diameters of anterior lateral eye. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 9:0:9:9$$

Anterior lateral eyes separated by four diameters. Posterior median eyes separated by two full diameters, nearer lateral eyes (10/9).

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	4.80	3.85	3.15	4.25	1.03
Patella	0.85	0.80	0.70	0.75	0.30
Tibia	4.70	3.45	2.15	3.50	0.58
Metatarsus	4.30	3.30	2.40	3.15	—
Tarsus	1.75	1.50	1.10	1.40	1.10
Total	16.40	12.90	9.50	13.05	3.01

Leg formula 1421. First leg 8.2 times, first femur 2.4 times as long as carapace. Third metatarsus longer than carapace.

Epigynum (Figs. 167–169) with large suboval lateral foveae set somewhat obliquely, each about as broad as median septum; distal end of median septum a broad, somewhat protuberant, rounded lobe.

Male holotype.—Total length 3.40 mm. Carapace 1.65 mm long, 1.45 mm wide. Abdomen 2.00 mm long, 1.35 mm wide.

Coloration and structure like those of female.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	4.30	3.50	2.75	—	0.85
Patella	0.85	0.70	0.60	—	0.25
Tibia	4.35	3.15	2.20	—	0.35
Metatarsus	4.00	3.00	2.20	—	—
Tarsus	1.60	1.25	1.10	—	0.80
Total	15.10	11.60	8.85	—	2.25

Leg formula presumably 1423 but fourth legs missing. First leg 9 times, first femur nearly 2.6 times as long as carapace.

Male palpus (Figs. 153–155) with following distinctive features: principal tegular process a curved hook around blunt base of median apophysis; secondary tegular process a bluntly rounded projection next to deep groove; spurs of paracymbium: dorsal and inner spurs missing or incorporated with ventral spur as a heavy process with three projections.

TYPE DATA.—Male holotype from Cave Spring Cave, Morgan County, Alabama, 2 May 1959 (W. B. Jones, et al.), in American Museum of Natural History.

DISTRIBUTION.—Known only from Cave Spring Cave.

RECORDS.—**Alabama:** *Morgan County:* Cave Spring Cave, 2 May 1959 (W. B. Jones, I. C. Royer, H. Steeves, T. C. Barr), 6 females; 2 December 1959 (W. B. Jones, A. F. Archer), 10 females; 1 August 1965 (S. Peck), female.

Nesticus georgia, new species

DIAGNOSIS.—Pale, long-legged, essentially eyeless troglobite of northwestern Georgia caves with following genitalic features: principal tegular process large and spatuliform; dorsal spur of paracymbium missing; epigynum with median septum produced behind to rounded projection.

ETYMOLOGY.—Named for the state of Georgia.

DESCRIPTION

Female from Sitton's Cave.—Total length 3.75 mm. Carapace 1.50 mm long, 1.30 mm wide. Abdomen 2.50 mm long, 2.00 mm wide.

Base color of cephalothorax and appendages pale yellow; eyes narrowly ringed with black; abdomen gray, without darker pattern.

Eye pattern like that of *N. barrowsi* and relatives; anterior median eyes missing or present as tiny dusky vestiges or subintegumental spots. Clypeus 0.25 mm high, equal to three diameters of anterior lateral eyes. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 9:4:10:9$$

Anterior eye row gently recurved and median eye spots separated by two diameters, slightly farther from anterior lateral eyes. Posterior eye row gently procurved; posterior median eyes separated by two diameters (17/9), nearer lateral eyes (12/9). Median ocular quadrangle broader than long (31/23), narrowed in front (31/19).

Limb Segment Lengths (mm)

	I	II	III	IV	PALP
Femur	3.75	2.80	2.20	3.20	0.80
Patella	0.70	0.65	0.62	0.65	0.25
Tibia	3.65	2.60	1.60	2.50	0.40
Metatarsus	3.40	2.40	1.65	2.25	—
Tarsus	1.40	1.15	0.85	1.10	0.90
Total	12.90	9.60	6.92	9.70	2.35

Leg formula 1423; second and fourth legs essentially equal in length. First leg 8.6 times, first femur 2.5 times as long as carapace. Third metatarsus longer than carapace. Right fourth leg has terminal segment much shorter than that of left fourth leg.

Epigynum (Figs. 164–166) with large suboval lateral foveae set somewhat obliquely, each broader than median septum; posterior end of median septum prominent rounded projecting process.

Male from Sitton's Cave.—Total length 3.15 mm. Carapace 1.60 mm long, 1.40 mm wide. Abdomen 2.00 mm long, 1.30 mm wide.

Coloration and structure like that of female. Anterior median eyes obsolete.

Limb Segment Lengths (mm)

	I	II	III	IV	PALP
Femur	4.10	3.10	2.90	3.45	0.82
Patella	0.70	0.65	0.55	0.65	0.22
Tibia	4.25	2.95	2.00	2.95	0.30
Metatarsus	4.10	2.85	2.00	2.65	—
Tarsus	1.50	1.20	0.95	1.20	0.80
Total	14.65	10.75	8.40	10.90	2.14

Leg formula 1423; first and fourth legs essentially equal in length. First leg 9.1 times, first femur 2.5 times as long as carapace.

Male palpus (Figs. 156–158) with following special features: principal tegular process broad and spatuliform, projecting prolaterally; spurs of paracymbium: apical spur heavy pointed process; dorsal spur missing and presumed median spur enlarged submarginal process making contact with curved ventral spur.

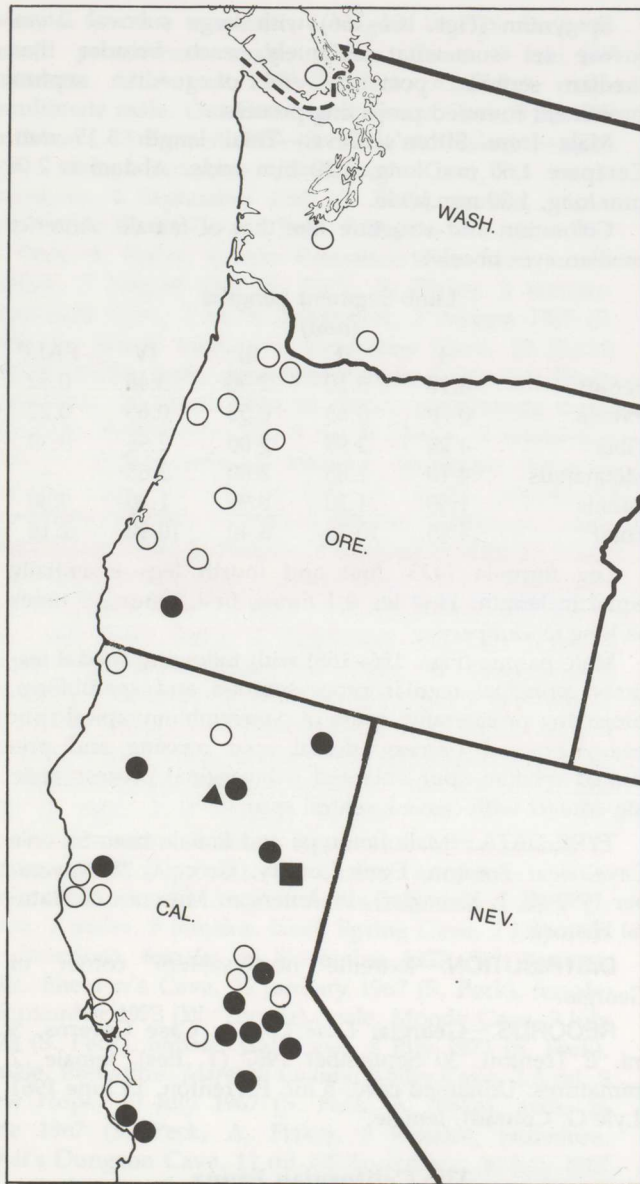
TYPE DATA.—Male holotype and female from Sitton's Cave, near Trenton, Dade County, Georgia, 28 November 1952 (E. J. Kuenzler), in American Museum of Natural History.

DISTRIBUTION.—Extreme northwestern corner of Georgia.

RECORDS.—**Georgia:** *Dade County:* Case Caverns, 3 mi. E Trenton, 30 September 1967 (T. Iles), female, 2 immatures. Unnamed cave, 5 mi. E Trenton, 13 June 1961 (Lyle G. Conrad), female.

The Californian Fauna

A second center for endemic *Nesticus* in the United States is the coastal and sierran area from central California north into British Columbia as shown on Map 7, where three well-marked species occur. The first to be described was *Nesticus silvestrii* Fage, now known to be a fairly common epigeal and cavernicole species found throughout the area. A second species, *Nesticus potterius* (Chamberlin), once given generic status as *Tuganobia*, is known only from Potter Creek Cave in Shasta County, California, but the species is likely to be found in nearby caves. This species, an eyeless troglobite, is readily recognized by derivative characters of the genitalia. The third species, *Nesticus sodanus*, new species, has been taken only in one small cave, Soda Springs Cave in Plumas County, California. The presence of well-developed eyes and dark pigmentation indicates that this species will eventually be found in other caves and suitable epigeal stations in the area. The members of this group share the basic features of *Nesticus* but are not closely related to the species of Appalachia. They form a distinctive group in themselves that seems to be closely allied to species of Japan and adjacent oriental countries. Descriptions and illustrations of the Japanese species *Nesticus mogera* Yaginuma, now



Map 7.—Distribution of *Nesticus silvestrii* group: *silvestrii* Fage—outside caves (○); *silvestrii* Fage—inside caves (●); *sodanus*, n. sp. (■); *potterius* (Chamberlin) (▲).

widespread in caves and epigeal situations in the Hawaiian Islands, are included in this paper as useful information for American students of the genus.

The Californian fauna presents features of special interest. The posterior eye row is slightly procurved. The paracymbia of the male palpi are more slender than those of Appalachia and have few prominent dorsal or ventral processes. The tegulum is reduced in size to half or less of the subtegulum and bears only small tegular processes or none. The median apophysis of each species and the conductors differ considerably from each other. The common *N. silvestrii* has responded to the cave habitat by striking elongation of the legs and reduction in eye size, but there are no accompanying differences in the genitalia of either sex.

Nesticus silvestrii Fage

Nesticus silvestrii Fage, 1929: 184, Fig. 2; Wolf, 1936: 577; Roewer, 1942: 509; Bonnet 1958: 3100.

DIAGNOSIS.—Small epigeal or troglomorphic cave species of Pacific Northwest readily recognized by distinctive genitalia: epigynum bluntly conical behind, with oval atrio-bursal orifices close together above genital groove; apical spur of conductor of male palpus produced to long spine.

DISCUSSION.—The name *silvestrii*, based on specimens from Oregon Cave, is used here for a relatively common species ranging from middle California north into British Columbia (see Map 7).

In spite of this wide range, the male and female genitalia were found to be of stereotyped design, presenting no distinctions of consequence. The coloration of populations is moderately variable, with specimens exhibiting a well-marked blackish pattern, while others with scarcely any marking occur in the same collections. Populations from the northern states and from the coastal regions of northern California usually have shorter legs, are likely to be more strongly marked and come mostly from epigeal habitats. The few cave specimens from this zone are paler but show few important differences from outside material. Although it appears that *N. silvestrii* is most uncommon outside cave habitats in the Sierra Nevada range, this impression is probably based on the availability of specimens from caves versus those from outside habitats. Most specimens from the Sierra Nevada in California came from caves as a result of a collecting emphasis on this special fauna and therefore few specimens are available from outside habitats. In any case, cave examples from the region have a distinctive appearance, may actually represent a montane subspecies and show adaptations to the cave habitat as follows: more pallid coloration with most of the dark pattern missing or diluted but often with at least a faint dusky marginal seam still persistent on the carapace; considerable reduction in size and wider separation of the eyes and loss of most pigment; much longer legs. Specimens from Mercer's Cave in Calaveras County, and Subway Cave, a large lava tube in Shasta County, are representative of the sierran type. On the other hand, females from one cave in the Coast Range, Empire Cave in Santa Cruz County, have legs fully as long as those from the Sierra Nevada. Specimens with legs of intermediate length were found in a small collection from deep ground detritus in a coniferous forest just east of McCloud, in Siskiyou County. Until more material from stations in critical areas becomes available, it seems best to use a single name for the entire *N. silvestrii* population.

DESCRIPTION

Female from Mendocino, California.—Total length 3.00 mm. Carapace 1.30 mm long, 1.10 mm wide. Abdomen 1.70 mm long, 1.25 mm wide.

The pattern of carapace and abdomen is illustrated in Figures 178 and 182. Base color of carapace and appendages yellowish to orange brown. Carapace with pattern of dusky patches or smudges on each side and narrow black marginal seam, but all these sometimes lacking; eye tubercles black. Clothing of carapace a few dark hairs and several longer ones on pars cephalica. Sternum dusky. Legs same color as carapace, without darker rings or markings. Abdomen gray, usually with dusky to blackish pattern of chevrons and paler side spots on all surfaces, but sometimes unmarked.

Key to the Species of Californian *Nesticus*

- 1. Eyeless troglobite from Potter Creek Cave, Shasta County, California; bulb of male palpus broadly encircled by long embolus (Fig. 193); epigynum (Fig. 188) broadly rounded behind*potterius* (Chamberlin) 2
Eight eyes present.....2
- 2. Males3
Females4
- 3. Paracymbium with thin apical process (Fig. 191); middle California to British Columbia*silvestrii* Fage
Paracymbium broadly flared at apex (Fig. 198); Soda Springs Cave, Plumas County, California.....*sodanus*, new species
- 4. Epigynum (Figs. 183–184) narrower behind, with atriobursal orifices close together; middle California to British Columbia.....*silvestrii* Fage
Epigynum (Figs. 186–187) broader behind, with atriobursal orifices more widely separated; Soda Springs Cave, Plumas County, California.....*sodanus*, new species

Carapace longer than broad, convex, with cephalic sutures usually apparent but cervical groove a shallow, indistinct depression. Pars cephalica of medium height, declining from highest point in front of cervical groove. Clypeus 0.2 mm long, sloping forward, equal to about three diameters of anterior median eye. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 10:7:14:11$$

Anterior eye row (Fig. 179) slightly procurved from in front, with centers above those of lateral eyes, moderately recurved as seen from above; anterior median eyes separated by one-third diameter, as far from lateral eyes. Posterior eye row slightly procurved; oval median eyes separated by about the longer diameter (9/11), much nearer lateral eyes (3/11). Lateral eyes of each side on moderately elevated, confluent tubercles, with eyes nearly touching. Median ocular quadrangle broader than long (28/22), narrowed in front (28/20); anterior median eyes much smaller. (Eyes of females from Mercer's and Empire caves shown in Figures 180 and 181.) Sternum covered with fine black hairs, subcordate, nearly as broad as long, bluntly rounded between and separating hind coxae by their width. Chelicerae twice as long as broad; promargin with three principal, subcontiguous teeth or

with middle one larger, and near base of claw small elevation bearing three stiff setae; retromargin with short curved row of about eight tiny denticles. Claws of chelicera evenly rounded and narrowed to fine point at apex, thick at base and with trivial basal incrassation.

Limb Segment Lengths (mm)

	I	II	III	IV	PALP
Femur	1.70	1.12	1.10	1.83	0.50
Patella	0.50	0.45	0.32	0.47	0.18
Tibia	1.55	1.37	0.82	1.43	0.28
Metatarsus	1.25	1.00	0.82	1.12	—
Tarsus	0.76	0.63	0.53	0.75	0.60
Total	5.76	4.57	3.59	5.60	1.56

Leg formula 1423. First leg 4.4 times, first femur 1.3 times as long as carapace. Third metatarsus about two-thirds length of carapace. Fourth tarsi with tarsal comb composed of eight toothed setae about twice as long as width of segment. Palpal claw long, gently curved, set with 12 fine teeth. Tarsal claws, three; unpaired claw strongly curved, with two or three tiny denticles near base; paired claws moderately curved, with series of six to eight very fine teeth in middle.

TABLE 8.—Comparison of first legs of females from California stations (measurements in millimeters).

Limb Segments	Mendocino MENDOCINO COUNTY	McCloud SISKIYOU COUNTY	Empire Cave SANTA CRUZ COUNTY	Mercer's Cave CALAVERAS COUNTY	Subway Cave SHASTA COUNTY
Femur	1.75	2.00	2.25	2.35	2.75
Patella	0.50	0.55	0.60	0.60	0.60
Tibia	1.50	1.80	2.20	2.20	2.60
Metatarsus	1.25	1.50	1.80	1.90	2.30
Tarsus	0.75	0.80	1.00	1.00	1.20
Total	5.75	6.65	7.85	8.05	9.45
Carapace lengths	1.25	1.35	1.20	1.35	1.30
Carapace/leg lengths	4.6	5	6.4	6	7.2

Abdomen suboval, moderately elevated and highest above base. Colulus a small, subtriangular process bearing three setae.

Epigynum (Figs. 183–184) brown, bluntly conical, with dark pattern of internal receptacles showing through, presenting in posterior view central groove with oval atribursal orifices quite close together.

Male from Mendocino, California.—Total length, 3.10 mm. Carapace 1.32 mm long, 1.12 mm wide. Abdomen 1.80 mm long, 0.05 mm wide.

Coloration and structure similar to those of female except as noted. Clypeus subvertical, 0.25 mm long, equal to about four diameters of anterior median eye. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 11:11:11:9$$

Posterior eye row faintly procurved, essentially straight; suboval posterior median eyes separated by their long diameter, half as far from lateral eyes. Median ocular quadrangle broader than long (32/27), narrowed in front (32/21). Chelicerae more narrow at apex but toothed like those of female.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	1.90	1.53	1.35	1.92	0.82
Patella	0.55	0.50	0.45	0.43	0.23
Tibia	1.82	1.35	1.02	1.70	0.30
Metatarsus	1.42	1.21	1.00	1.42	—
Tarsus	0.85	0.74	0.65	0.73	0.60
Total	6.54	5.33	4.47	6.20	1.95

Leg formula 1423. First leg about 5 times, first femur 1.44 times as long as carapace. Third metatarsus about three-fourths as long as carapace. Legs slightly longer but with tarsal comb and claws like those of female.

Male palpus (Figs. 190–192) large, with following features: paracymbium with long, thin apical spine and two lesser spurs on ventral edge; embolus produced from level of tegulum into well-separated parts; median apophysis a sharp spur; conductor bipartite, with pale rounded finger and coarse brown tooth at base.

Male from Subway Cave.—Total length 3.5 mm. Carapace 1.6 mm long, 1.35 mm wide. Abdomen 2 mm long, 1.15 mm wide. Eyes smaller and more widely separated; posterior median eyes separated by one and one half diameters (11/16).

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	3.00	2.60	2.00	3.00	0.90
Patella	0.65	0.65	0.60	0.60	0.25
Tibia	3.20	2.20	1.60	2.75	0.40
Metatarsus	2.70	2.00	1.65	2.35	—
Tarsus	1.20	1.10	0.85	1.00	0.62
Total	10.85	8.55	6.80	9.70	2.17

Leg formula 1423. First leg 6.77 times, first femur about 1.9 times as long as carapace.

TYPE DATA.—Male type from Oregon Cave, Cave Mountain, Josephine County, Oregon, elevation 1,300 feet (F. Silvestri), presumed to be in the Museum National d'Histoire Naturelle, Paris, France.

DISTRIBUTION.—Northern half of California north into southern British Columbia. (See Map 7.)

RECORDS.—**CANADA:** **British Columbia:** Sidney, Vancouver Island, 16 September 1935 (R. V. Chamberlin, W. Ivie), female. **UNITED STATES:** **California:** *Amador County:* Soldier Creek Cave, 3 September 1961 (R. Graham), 4 females, 2 immatures. Fiddler Cave, 6 mi. NW Volcano, 15 April 1979 (D. C. Rudolph, S. Winterath, E. vanIngen), penultimate male. Fern Frond Cave, 4 mi. NW Volcano, 15 April 1979 (D. C. Rudolph, S. Winterath, B. vanIngen, D. Cowan), 1 male, 3 females. Pearl Cave, 1 mi. N Volcano, 20 February 1979 (D. C. Rudolph, S. Winterath), 1 penultimate male. *Calaveras County:* Sink Cave, 3 September 1961 (R. Graham), 2 females, 14 subadult and immature. Shaw's Cave, 7 June 1958 (R. deSaussure), male on wall in total darkness; Mercer's Cave, 4 September 1961 (W. J. Gertsch, W. Ivie, R. Graham), 7 females, 4 immatures; 13 August 1962 (R. Graham), 4 males, 12 females, 34 immatures from twilight zone to total darkness; 20 August 1963 (R. Graham), male, 9 females, 9 immatures from twilight zone to total darkness; 30 August 1961 (R. Graham), 5 females, 8 immatures; 14 August 1962 (R. Graham), 4 females, 6 immatures from total darkness. *Del Norte County:* N Bank of Smith River, 25 November 1953 (V. Roth), 2 females from redwood duff. *El Dorado County:* 6 mi. E Camp Connell, 10 September 1959 (W. J. Gertsch, V. Roth), 6 females, penultimate male. Riverton, 11 July 1952 (W. J. Gertsch), female. E of Placerville, 15 July 1952 (W. J. Gertsch), female. Crystal Cosumnes Cave, 12 mi. SW Placerville, 8 September 1962 (L. Readdy), female, immature; 20 February 1979 (D. C. Rudolph, S. Winterath), 4 males, 3 females, immature. *Marin County:* Taylor State Park, 3 February 1958 (J. Helfer), female. Inverness, 8 November 1953 (V. Roth), female. *Mendocino County:* Mendocino, 7 March to 2 December 1953–1957 (J. Helfer), 7 males, 25 females, immature; 1 January 1958 (J. Helfer), 3 males, 2 females. Caspar, 7 March 1954 (J. Helfer), 2 females, 2 penultimate males. Little River, 4 August 1957 (J. Helfer), 2 females. Fault Rock Cave, 2 January 1960 (R. Graham), female, 3 immatures from area of total darkness. *Modoc County:* Mammoth Cave, 1 April 1954 (R. deSaussure), female from tree roots penetrating roof in total darkness. *Plumas County:* Juniper Cave (=Kloppenborg's Cave), 10 mi. SE Quincy, 19 July 1953 (R. deSaussure), female, immature from floor of Cavery Room at 200 ft.; 19 September 1959 (R. Graham), female. *San Joaquin County:* Lodi, 3 December 1956 (R. O. Schuster). *San Mateo County:* 6 mi. SE Half Moon Bay, 5 December 1953 (V. Roth), female. *Santa Cruz County:* Empire Cave, Santa Cruz, 7 August 1962 (R. Graham), 9 females, egg sac, immature from twilight zone and total darkness; 22 April 1979 (D. C. Rudolph, D. Cowan, B. vanIngen), 1 immature. IXL Cave, Santa Cruz, 20 October 1958 (R. deSaussure), female on floor just at end of twilight zone; 28 August 1963 (R. Graham), male, 3 females, immature; 21 April 1979 (D. C. Rudolph, D. Cowan, B. vanIngen), 9 females, 5 immatures. Stump Cave, Santa Cruz, 22 April 1979 (D. C. Rudolph, D. Cowan, B. vanIngen), 1 penultimate male. Dolloff Cave, Santa Cruz, 22 April 1979 (D. C. Rudolph, D. Cowan, B. vanIngen), 1 female, 3 immatures. *Shasta County:* Subway Cave, 23 June 1960 (R. Graham), 2 males, 4 females, immature; 6 September

1961 (W. J. Gertsch, W. Ivie, R. Graham), 3 females, 10 immatures. *Siskiyou County*: 3 mi. E McCloud, 2 September 1959 (W. J. Gertsch, V. Roth), 3 males, 6 females, immature. Lava Beds National Monument, 5–9 May 1975 (R. Ennik), 3 males, 11 females. *Trinity County*: Forest Glen Cave, under stone in first room, 28 November 1959 (R. Graham), penultimate male. *Tuolumne County*: Windler Cave, 10 mi. NE Sonora, 30 June 1931 (D. Price), female, immature from total darkness; 12 January 1978 (W. R. Elliott, A. G. Grubbs, S. A. Winterath), female, immature. Snell's Cave, 2.5 mi. N Columbia, 28 February 1977 (W. R. Elliott, A. G. Grubbs, S. A. Winterath), 4 females, 5 immatures; 24 March 1979 (D. C. Rudolph, B. Martin, S. Winterath), 1 female, immature; 6 March 1979 (D. C. Rudolph, B. Martin, S. Winterath), 2 females; 14 February 1979 (D. C. Rudolph, B. Martin, S. Winterath), 2 immatures. Zilch Cave, 2 mi. N Columbia, 24 March 1979 (D. C. Rudolph, B. Martin, S. Winterath), 1 female. **Oregon**: *Coos County*: Charleston, 28 August 1947 (I. Newell), immature female. *Douglas County*: 2 mi. W Ash, 11 December 1971 (E. Benedict), female. Bogus Creek, E of Glide, 23 July 1962 (V. Roth), female. *Josephine County*: Oregon Cave; type-locality of *silvestrii*. *Lane County*: 5 mi. N Elmira, 4 December 1971 (E. Benedict), female. *Lincoln County*: Nelscott Beach, 10 April 1949 (V. Roth), 4 females from under moss in fir forest. *Linn County*: 1 mi. W Cascadia, 23 July 1949 (V. Roth), female, egg sac. Lamb Creek, 17 mi. E Cascadia, 23 July 1940 (V. Roth, F. Beer), 3 females carrying egg sacs by spinnerets and one hind leg. *Washington County*: Tualatin, 200 ft., 1 January 1972 (E. Benedict), male, female. MacLeay Park, Portland, 8 June 1952 (V. Roth), 2 females. **Washington**: *Skamania County*: 10 mi. W Spirit Lake, 16 August 1955 (V. Roth), female, penultimate male. *Thurston County*: Puget, 28 October 1967 (E. Benedict), 2 females.

Nesticus sodanus, new species

DIAGNOSIS.—Distinct troglophile species related to *N. silvestrii* with well-developed eyes and moderate pigmentation, readily distinguished by following features: epigynum a prominent lobe arched over genital groove, hiding well-separated atriobursal orifices; male palpus with all elements distinctive (Fig. 198).

ETYMOLOGY.—Specific name based on Medieval Latin *soda*, *soda*, named for Soda Springs Cave.

DESCRIPTION

Female.—Total length, 3.70 mm. Carapace 1.55 mm long, 1.35 mm wide. Abdomen 3.50 mm long, 1.75 mm wide.

Base color of carapace and appendages bright yellow, without contrasting markings except dark brown eye tubercles. A few dark hairs on carapace, mostly on pars cephalica. Legs with rows of dark hairs. Abdomen whitish, with inconspicuous dark hairs; spinnerets yellowish; epigynum brown.

Carapace longer than broad, quite evenly convex, with cephalic sutures weakly developed and cervical groove a broad shallow depression. Pars cephalica subtriangular, broadly rounded in front, highest at posterior eye row. Clypeus 0.3 mm long, produced forward, equal to more than four diameters of anterior median eye. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 14:8:14:14$$

Front eye row faintly recurved as seen from front, essentially straight from above; anterior median eyes separated by their radius, about as far from lateral eyes. Posterior eye row straight; suboval, slightly oblique median eyes separated by narrow diameter, nearer lateral eyes (12/9). Median ocular quadrangle broader than long (38/30), narrowed in front (38/24); anterior median eyes much smaller. Sternum as broad as long, clothed with fine erect hairs. Chelicerae, tarsal comb and claws like those of *N. silvestrii*.

Limb Segment Lengths (mm)

	I	II	III	IV	PALP
Femur	4.35	3.30	2.50	3.40	0.72
Patella	0.75	0.65	0.60	0.65	0.20
Tibia	4.60	2.90	1.70	2.85	0.42
Metatarsus	3.90	2.70	1.80	2.35	—
Tarsus	1.35	1.10	1.95	1.00	0.92
Total	14.95	10.65	7.55	10.25	2.26

Leg formula 1243. First leg 9.6 times, first femur 2.8 times as long as carapace. Tarsal comb with 12 toothed setae.

Abdomen suboval, evenly rounded in side view, as high as broad.

Epigynum (Figs. 186–187) fairly large, transverse arch presenting small projecting lobe in posterior view flanked by grooves bearing atriobursal orifices.

Male holotype.—Total length, 3.20 mm. Carapace 1.38 mm long, 1.25 mm wide. Abdomen 2.00 mm long, 1.20 mm wide.

Coloration and structure like those of female except as noted below. Clypeus 0.25 mm long, equal to nearly six diameters of anterior median eye. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 14:7:14:14$$

Front eye row faintly procurved as seen from the front, with upper edges of median eyes nearly in line with those of lateral eyes; median eyes separated by radius, as far from lateral eyes. Posterior eye row moderately recurved; broadly oval median eyes separated by long diameter, about half as far from lateral eyes. Median ocular quadrangle broader than long (25/23), narrowed in front (25/21); front eyes half as large. Chelicera twice as long as broad, evenly narrowed, with sides quite straight, toothed like that of *N. silvestrii*.

Limb Segment Lengths (mm)

	I	II	III	IV	PALP
Femur	4.35	3.20	2.25	3.25	0.73
Patella	0.70	0.70	0.45	0.55	0.20
Tibia	4.80	2.80	1.65	2.70	0.27
Metatarsus	4.20	2.70	1.70	2.50	—
Tarsus	1.30	0.85	0.75	1.85	0.65
Total	15.35	10.25	6.80	10.85	1.85

Leg formula 1423. First leg 11 times, first femur 3 times as long as carapace. Legs longer but with tarsal comb and claws like those of female.

Male palpus (Fig. 198) with following features: paracymbium presenting two principal spurs, ventral one narrowly rounded, dorsal one broad; median apophysis forming a conspicuous, spade-shaped spur; conductor divided at apex into two thin curved prongs.

TYPE DATA.—Male holotype from Soda Springs Cave, Plumas County, California, 6 September 1961 (R. Graham), in the American Museum of Natural History.

DISTRIBUTION.—Known only from Soda Springs Cave but undoubtedly present in other caves of the area and suitable epigeal situations (Map 7).

RECORDS.—**California:** *Plumas County:* Soda Springs Cave, 5–6 September 1961, 4 females, 3 immature (R. Graham); 20 September 1959 (R. Graham), 2 females on webs on wall and overhang of ceiling.

Nesticus potterius (Chamberlin)

Tuganobia potteria Chamberlin, 1933: 124, Figs. 1–4; Bonnet, 1959: 4736; Nicholas, 1960: 156.

DIAGNOSIS.—Essentially eyeless troglobite related to *N. silvestrii*, readily separated by features of genitalia: male palpus very large, with thin embolus originating far forward on retrolateral side and widely encircling the bulb; epigynum an elevated projection with small atrio-bursal orifices visible beneath posterior lip.

ETYMOLOGY.—Specific name based on Potter Creek Cave, Shasta County, California.

DESCRIPTION

Female.—Total length, 3.25 mm. Carapace 1.35 mm long, 1.20 mm wide. Abdomen 2.00 mm long, 1.25 mm wide.

Base color of carapace and appendages pale yellowish, without contrasting markings. Abdomen whitish, with inconspicuous dark hairs; spinnerets pale yellow; epigynum dark brown.

Carapace longer than broad, evenly convex, with weak cephalic sutures and inconspicuous, shallow cervical groove. Pars cephalica of medium height, highest at position of posterior eyes. Clypeus 0.22 mm long, projecting forward. Eyes mostly lost; six eyes apparent as minute silvery subintegumental spots in some specimens or as minute corneal elevations in others; posterior row moderately procurved, with median eyes separated by about four diameters and about as far from lateral eyes; anterior median eyes lost.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	3.45	2.50	2.15	3.15	0.71
Patella	0.70	0.65	0.55	0.65	0.22
Tibia	3.35	2.15	2.00	2.60	0.40
Metatarsus	2.80	2.00	1.60	2.30	—
Tarsus	1.35	1.10	0.85	1.05	0.87
Total	11.65	8.40	7.15	9.75	2.20

Leg formula 1423. First leg 8.6 times, first femur 2.55 times as long as carapace. Tarsal comb with 12 or 13 toothed setae.

Abdomen elongate oval, about as high as wide.

Epigynum (Figs. 188–189) strongly sclerotized, elevated projection with pattern of tubes and receptacles visible from above and behind.

Male.—Total length, 3.60 mm. Carapace 1.65 mm long, 1.40 mm wide. Abdomen 2.20 mm long, 1.40 mm wide.

Structure of poorly preserved, fragmented specimen similar to that of female unless otherwise noted. Pars cephalica fairly well elevated, with cephalic and cervical

grooves well marked. Eyes essentially obsolete but visible as small paler spots on brown tinted integument. Clypeus about 0.3 mm high. Legs missing except for following parts: leg II, femur 2.75 mm, patella 0.70 mm, tibia 2.50 mm; leg III, femur 2.30 mm, patella 0.50 mm, tibia 1.80 mm, metatarsus 1.90 mm, tarsus 0.80 mm; total, 7.30 mm. Legs long like those of female; third metatarsus longer than carapace.

Male palpus (Figs. 193–194) of distinctive design as follows: paracymbium medium-sized, transversely directed process ending as sharp spur; embolus long, thin, originating far forward on retrolateral side, forming wide loop around bulb and curving ventrad to conductor; median apophysis an excavated lamina ending in a blunt spur; paracymbium a thin lamina enclosing embolus along prolateral side and ending in a blunt spur.

TYPE DATA.—Male holotype of *Tuganobia potteria* Chamberlin from Potter Creek Cave, Shasta County, California, 1903 (D. J. Sinclair) in the American Museum of Natural History (University of Utah Collection).

DISTRIBUTION.—Potter Creek Cave and Samwell Cave (?), Shasta County, California (Map 7).

RECORDS.—**California:** *Shasta County:* Potter Creek Cave on east side of Shasta Lake, 1903 (D. J. Sinclair), female allotype and 9 females; 7 September 1961 (R. Graham, W. J. Gertsch), 6 immature; 12 April 1960 (W. J. Gertsch), female, penultimate male. Samwell Cave, northeast end of Shasta Lake, 20 September 1950 (E. Danehy), eyeless female without abdomen probably this species. Shasta Lake Caverns, N Shasta Lake, 16 mi. NNE Redding, 10 April 1979 (D. C. Rudolph, B. Martin, S. Winterath), 1 female.

Nesticus mogera Yaginuma

Nesticus terrestris Yaginuma, 1970: 390, figs. 3–8. (Name preoccupied by *Theridion terrestre* Emerton = *Nesticus cellulanus* Clerck.)

Nesticus mogera Yaginuma, 1972: 621; Gertsch, 1973: 168, figs. 4–7.

DIAGNOSIS.—Small grayish species introduced to Hawaiian Islands from Japan, readily recognized by following genitalic features: male palpus (Fig. 196) with relatively short paracymbium set with sharp ventral process; epigynum (Fig. 185) subtriangular, with thin rounded lobe overhanging genital groove.

DESCRIPTION

Female from Kualoa Point, Oahu.—Total length 2.65 mm. Carapace 1.10 mm long, 0.97 mm wide. Abdomen 1.62 mm long, 1.50 mm wide.

Base color of carapace and appendages dusky yellow. Carapace dusky with faint lines of darker color outlining pars cephalica and radiating from cervical groove; eye tubercles and area inside eyes blackish. Carapace with sparse hair covering, with usual erect bristles on midline and in ocular region. Sternum dusky. Legs paler than carapace and paler apically, without rings or markings; femora dusky. Abdomen grayish, without pattern. Cave specimens whitish to pale yellow.

Carapace longer than broad, evenly convex, with only slight indication of cephalic grooves; cervical groove broad, inconspicuous depression. Clypeus 0.18 mm long,

inclined forward, equal to about three diameters of anterior median eye. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 12:9:12:12$$

Front eye row faintly procurved, essentially straight; anterior median eyes separated by radius, half as far from lateral eyes. Posterior eye row (Fig. 195) weakly procurved; oval median eyes separated by short diameter, half as far from lateral eyes. Median ocular quadrangle broader than long (31/24), narrowed in front (31/22). Chelicera typical: promargin with three subequal teeth; retromargin with series of trivial denticles.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	1.40	1.10	0.96	1.32	0.50
Patella	0.50	0.42	0.34	0.45	0.20
Tibia	1.33	0.90	0.65	1.14	0.27
Metatarsus	1.22	0.84	0.79	1.10	—
Tarsus	0.70	0.53	0.31	0.55	0.60
Total	5.15	3.89	3.10	4.56	1.57

Leg formula 1423. First leg 4.7 times, first femur 1.27 times as long as carapace. Third metatarsus 0.7 times length of carapace. Tarsal comb with eight toothed setae.

Abdomen suboval, as high as broad.

Epigynum (Fig. 185) small, subtriangular, with small median lobe projecting behind and dark tubules leading to small receptacles.

Male from Kualoa Point, Oahu.—Total length 2.00 mm. Carapace 1.00 mm long, 0.90 mm wide. Abdomen 1.20 mm long, 0.78 mm wide.

Coloration and structure like those of female except as noted below. Clypeus 0.15 mm high, equal to little more than two diameters of anterior median eye. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 13:10:13:13$$

Eyes like those of female but closer together; posterior row clearly procurved, with oval median eyes separated by narrow radius.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	1.30	1.10	0.92	1.05	0.43
Patella	0.43	0.36	0.33	0.39	0.14
Tibia	1.27	0.85	0.68	1.10	0.15
Metatarsus	1.20	0.85	0.70	1.00	—
Tarsus	0.60	0.56	0.50	0.60	0.30
Total	4.80	3.72	3.13	4.14	1.10

Leg formula 1423. First leg 4.8 times, first femur 1.3 times as long as carapace. Legs proportionately longer but tarsal comb and claws like those of female.

Male palpus (Figs. 196–197) with following features: paracymbium an excavated lamina with prominent thin spine lying across ventral aspect; median apophysis a thin, apically directed spine; conductor with two short spurs at apex; embolus a fine tube margining bulb and at apex strongly spiraled ventrad to meet conductor.

DISTRIBUTION.—Japanese Islands: introduced into Hawaiian Islands.

RECORDS.—**Hawaiian Islands.** *Oahu*: Kawaihapai, on north base of Waianae Range, 26 April 1942 (R. A. Schneider) 2 females. *Hawaii*: Kualoa Point, woods at

base of cliffs of Koolau Range, 26 June 1942 (R. A. Schneider), male, 2 females. Kazumura Cave, Hamakua Forest Reserve Cave (Gertsch, 1973). *Kauai*: Wakianaloe Cave, Knudsen Cave, Koloa Cave, Limestone Quarry Cave (Gertsch, 1973). *Maui*: Lower Waihoi Valley Cave; Trench Cave, Offal Cave (Gertsch, 1973).

The Mexican Fauna

The ten endemic *Nesticus* from eastern Mexico form a natural group featuring adaptive radiation productive of grades from troglophile to eyeless troglobite. The group differs materially from the faunas of Appalachia and the Californian region. So far the typically stouter-bodied, larger species from Mexico are known only from caves. However, epigeal representatives of some are likely to be found when more general collecting is undertaken in this region, since some of these specimens have been collected just inside cave mouths.

The Mexican species show few modifications from the generic standard of the world fauna; however, they do form a geographical species group, one of the few not yet burdened by a separate generic name. Most are medium-sized, 5 to 9 mm long, yellowish to orange-brown spiders with quite long legs (females 6 to 8 times as long as the carapace; males 5.5 to 8.9 times as long as carapace). The palpal segments are of medium stoutness in most species, but these appendages are substantially longer in *N. campus*. The eyes of the typical species are quite large with a characteristic pattern: the gently recurved front row has the anterior median eyes rarely less than half the diameter of the anterior lateral eyes; the posterior eye row is slightly procurved in most but essentially straight in a few; all eyes (Fig. 200) are present in typical species, such as *N. hoffmanni* and *N. vazquezae*, but reduced in size and obsolete in others. The eyes of *N. nahuanus* are evanescent, reduced in size and lacking pigment; it may be a troglobite. Probably the most interesting members of the group are the eyeless species, small whitish taxa represented by *N. arganoi* from a cave in Veracruz and the new species *N. caverna* from a cave in Puebla. The complicated palpi of the males show interesting and distinctive development of the sclerites. The paracymbia are curved spurs with short processes, but a dorsal one is not present. The tegulum is medium-sized and bears small processes on the prolateral side. The conductors and median apophyses present good differences for each species. The epigyna are prominently ridged structures with pale, elevated median septa flanked by foveal grooves diagnostic for each species. Supplementary characters in the complicated internal structure are sometimes necessary for definitive placement.

The tenth species from Mexico is based on a single mature female from Cueva de Apoala in Oaxaca, herein named *Nesticus reddelli*. This small yellowish species differs from the others in having only six quite large eyes in two lateral triads; the anterior median eyes are completely missing. Quite likely it belongs to a group different from the others, but the male sex is needed for explicit placement. In size and general appearance it resembles species of *Eidmannella*, but the form of the epigynum excludes it from that genus, prompting its classification in *Nesticus* until more material becomes available.

Key to Males and Females: Mexican *Nesticus*

- | | | |
|-----|---|-------------------------------|
| 1. | Eyes present..... | 3 |
| | Eyes absent..... | 2 |
| 2. | Eyeless troglobite from Cueva Macinga in Veracruz (Fig. 203);
male palpus (Fig. 244) with apical process of paracymbium
spatulate; epigynum (Fig. 246) produced behind to thin
lobe..... | <i>arganoi</i> Brignoli |
| | Eyeless troglobite from Horizontal Cave in Puebla; male unknown;
epigynum (Fig. 209) with median septum bluntly rounded
behind..... | <i>caverna</i> , new species |
| 3. | All eight eyes present..... | 4 |
| | Anterior median eyes lacking (Fig. 205); epigynum (Figs. 206–208);
Cueva de Apoala, Oaxaca..... | <i>reddelli</i> , new species |
| 4. | Males..... | 5 |
| | Females..... | 9 |
| 5. | Segments of palpus slender (Figs. 242–243); paracymbium small;
tibia three times as long as broad; Cueva de Campamiento,
Querétaro..... | <i>campus</i> , new species |
| | Segments of palpus robust: paracymbia larger; tibiae less than
twice as long as broad..... | 6 |
| 6. | Paracymbium heavy curved spur lacking median processes and embolus
twisted at middle (Fig. 215); caves of Hidalgo..... | <i>hoffmanni</i> Gertsch |
| | Not as above..... | 7 |
| 7. | Paracymbium bluntly rounded at apex and bulb with two small
rounded tegular processes (Fig. 239); caves of
Querétaro..... | <i>vazquezae</i> Gertsch |
| | Not as above..... | 8 |
| 8. | Eyes small, evanescent (Figs. 201–202); tegular processes
of palpal bulb two short spurs (Fig. 217); caves of Nuevo
León..... | <i>nahuanus</i> Gertsch |
| | Eyes of average size (Fig. 200); tegular processes of palpal
bulb differing in size (Fig. 219); caves of Tamaulipas and Nuevo
León..... | <i>rainesi</i> , new species |
| 9. | Median septum of epigynum narrowed behind, with trivial emargination
at middle..... | 10 |
| | Median septum of epigynum broad behind, without emargination at
middle..... | 11 |
| 10. | Pattern of epigynum (Figs. 224–226); caves of Nuevo
León..... | <i>nahuanus</i> Gertsch |
| | Pattern of epigynum (Figs. 227–229); caves of Tamaulipas and
Nuevo León..... | <i>rainesi</i> , new species |
| 11. | Posterior margin of epigynum with trivial lateral emarginations
at position of atriobursal orifices..... | 12 |
| | Posterior margin of epigynum straight or rounded, without lateral
emarginations..... | 13 |
| 12. | Pattern of epigynum (Figs. 221–223); Cueva de Campamiento,
Querétaro..... | <i>campus</i> , new species |
| | Pattern of epigynum (Figs. 230–232); caves of
Querétaro..... | <i>vazquezae</i> Gertsch |
| 13. | Posterior margin of epigynum rounded (Fig. 236) caves of
Hidalgo..... | <i>hoffmanni</i> Gertsch |
| | Posterior margin of epigynum essentially straight..... | 14 |

(Key concludes on page 47.)

(Continued from page 46)

14. Abdomen uniform gray; posterior eye row moderately procurved; atriobursal orifices slit-like (Fig. 234); caves of Querétaro..... *jamesoni*, new species
 Dorsum of abdomen with row of dusky spots; posterior eye row straight; atriobursal orifices short, curved openings (Fig. 212); Cueva de Llano de Conejo, Querétaro..... *sedatus*, new species

Nesticus nahuanus Gertsch

Nesticus nahuanus Gertsch, 1971: 99, Figs. 151, 156.

DIAGNOSIS.—Large species with stout body and appendages, readily separated from all known species by features of genitalia: epigynum (Figs. 224–226) with elevated central pale sclerite flanked by rounded depressions; paracymbium of male palpus (Figs. 217–218) with thin, finely toothed lamina at apex and three small processes on inner margin.

ETYMOLOGY.—Specific name from *nahua*, for the Nahuatl people of Mexico.

DESCRIPTION

Female from Cueva de la Boca.—Total length, 5.6 mm. Carapace 2.5 mm long, 2.0 mm wide. Abdomen 3.7 mm long, 2.7 mm wide.

Cephalothorax and appendages bright yellow to orange without contrasting markings; eye tubercles without dark pigment; abdomen gray, without pattern.

Structure typical; clypeus broad, sloping, equal in height to four diameters of anterior lateral eye. Eyes evanescent, small, widely separated, set on inconspicuous pale tubercles. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 10:6:10:9$$

Front eye row slightly recurved; anterior median eyes separated by full diameter, nearly twice as far from anterior lateral eyes. Posterior eye row moderately procurved; posterior median eyes separated by more than two diameters (9/21), nearer lateral eyes (9/13). Median ocular quadrangle longer than broad (33/25), narrowed in front (33/22). Chelicera with three large teeth on promargin and line of about 12 small denticles on retromargin.

Limb Segment Lengths (mm)

	I	II	III	IV	PALP
Femur	4.50	3.80	3.00	4.30	1.30
Patella	1.10	1.10	0.90	1.20	0.40
Tibia	4.50	3.60	2.40	3.50	0.70
Metatarsus	4.50	3.65	2.70	3.00	—
Tarsus	1.75	1.60	1.25	1.50	1.40
Total	16.35	13.75	10.25	13.70	3.80

Leg formula 1243. First leg 6.5 times, first femur 1.8 times as long as carapace.

Epigynum (Figs. 224–226) with distinctive elevated pale sclerite flanked by large lateral depressions; atriobursal orifices quite close together under posterior lip, leading to voluminous receptacles.

Male from Cueva de la Boca.—Total length, 5.5 mm. Carapace 2.7 mm long, 2.3 mm wide. Abdomen 3.2 mm long, 2.0 mm wide.

Coloration and structure essentially like those of female. Posterior eye row more weakly procurved.

Limb Segment Lengths

	(mm)				
	I	II	III	IV	PALP
Femur	5.00	4.35	3.70	4.70	1.25
Patella	1.25	1.20	1.00	1.20	0.30
Tibia	5.20	4.00	3.00	4.00	1.00
Metatarsus	5.30	4.20	3.20	4.10	—
Tarsus	1.90	1.65	1.35	1.50	1.25
Total	18.65	15.40	12.25	15.50	3.80

Leg formula 1423. First leg about 7 times, first femur 1.8 times as long as carapace.

Male palpus (Figs. 217–218) with following features: paracymbium large, curved, with thin spatulate lamina at apex and three small processes on inner margin; tegular processes two small triangular spurs; median apophysis short sclerite with thick hook at apex; conductor heavy triangular sclerite; embolus of average length, thick at base with small apical curve to conductor.

TYPE DATA.—Male holotype from Cueva de la Boca, 600 meters, 6 km SE Villa Santiago, Nuevo León, Mexico, 13 July 1942, in the American Museum of Natural History.

DISTRIBUTION.—Caves of Nuevo León, Mexico.

RECORDS.—**Nuevo León:** Cueva de la Boca, 6 km SE of Villa Santiago, 13 July 1942 (C. Bolívar, Maldonado, Osorio, Pelaez), 3 males, 7 females; 17 June 1944 (F. Bonet), 2 males; 1 May 1966 (J. Fish, E. Alexander), female; 22 January 1967 (T. Raines), male, penultimate male; 20 June 1969 (S. and J. Peck), female; 17 February 1973 (T. Mollhagen, C. McConnell, W. Graham, R. W. Mitchell, S. Wiley), 3 males, 7 females, immature. Resumidero de Pablillo, Pablillo, 4 June 1966 (J. Reddell, D. McKenzie), immature female. Small caves on Chipinque Mesa, 5,400 ft., Monterrey, 24 June 1969 (S. and J. Peck, R. Norton), male, 2 females, immature. Redondo Pit Cave, 40 mi. S Monterrey, September 1971 (D. Honea), 3 females.

Nesticus campus, new species

DIAGNOSIS.—Relative of *N. nahuanus* with much longer appendages and distinctive genitalia; epigynum (Figs. 221–223); male palpus (Figs. 242–243) slender (tibia three times as long as broad), with small paracymbium bearing two processes.

ETYMOLOGY.—Specific name from Latin *campus*, field, used in apposition.

DESCRIPTION

Female.—Total length 5.70 mm. Carapace 2.60 mm long, 2.10 mm wide. Abdomen 3.35 mm long, 2.35 mm wide.

Cephalothorax and appendages dull orange, with some dusky shadings on carapace; eye tubercles black; abdomen gray, without distinctive pattern.

Structure typical of group; clypeus broad, sloping, equal in height to three diameters of anterior lateral eye. Eyes of average size; ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 12:7:12:12$$

Anterior eye row moderately recurved; Anterior median eyes separated by more than their diameter (10/7), as far from lateral eyes. Posterior eye row moderately procurved; posterior median eyes separated by full diameter (12/12), slightly nearer lateral eyes (12/11). Median ocular quadrangle as long as broad (31/31), narrowed in front (31/21). Chelicera with three large teeth on promargin and line of eight denticles on retromargin.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	5.70	4.50	3.50	4.75	1.70
Patella	1.35	1.15	1.00	1.10	0.50
Tibia	5.60	3.85	2.50	3.65	1.20
Metatarsus	5.80	4.25	3.10	3.90	—
Tarsus	2.00	1.50	1.25	1.90	1.50
Total	20.45	15.25	11.35	15.30	4.90

Leg formula 1423. First leg 7.8 times, first femur about 2.5 times as long as carapace.

Epigynum (Figs. 221–223) with moderately elevated, pale sclerite flanked by narrow lateral depressions; atrio-bursal orifices widely separated and with small rounded projection on outer side.

Male holotype.—Total length 5.80 mm. Carapace 2.80 mm long, 2.15 mm wide. Abdomen 3.80 mm long, 2.50 mm wide.

Coloration and structure essentially like those of females; eyes closer together; posterior eye row more weakly procurved.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	6.75	5.20	4.25	5.70	2.20
Patella	1.30	1.20	1.00	1.10	0.50
Tibia	7.00	5.15	3.50	4.80	1.20
Metatarsus	7.50	5.65	4.10	5.25	—
Tarsus	2.35	1.75	1.50	1.50	1.30
Total	24.90	18.90	14.35	18.35	5.20

Leg formula 1423. First leg about 9 times, first femur 2.4 times as long as carapace. Tibia of male palpus about three times as long as broad.

Male palpus (Figs. 242–243) with following features: paracymbium of medium size, with rounded ventral spur continued to apex as blunt process; tegular processes two small spurs on inner margin; median apophysis short sclerite with erect sharp spur; conductor heavy revolved sclerite bearing sharp spine at apex; embolus of average length, thick at base, evenly curved around to conductor.

TYPE DATA.—Male holotype, 2 females and 5 sub-adult from Cueva de Campamiento, 2 km E of Cerro de la Luz, Querétaro, Mexico, 6 June 1976 (Roy Jameson), in the American Museum of Natural History.

DISTRIBUTION.—Known only from above material.

Nesticus rainesi, new species

DIAGNOSIS.—Relative of *N. nahuanus* distinguished by genitalia: epigynum (Figs. 227–229) with small emargination at middle of rounded posterior margin; male palpus (Figs. 219–220) with two dissimilar tegular processes on bulb.

ETYMOLOGY.—Named for Terry W. Raines, bio-speleologist and publication editor for the Association for Mexican Cave Studies.

DESCRIPTION

Female from Cueva de los Allarines.—Total length 7.20 mm. Carapace 2.95 mm long, 2.40 mm wide. Abdomen 4.70 mm long, 2.50 mm wide.

Carapace mostly white with some yellow on pars cephalica; eyes faintly ringed with dusky; legs and under side of carapace pale yellow. Abdomen uniform gray.

Structure typical of group: clypeus broad, sloping forward, equal in length to three diameters of anterior lateral eye. Eyes reduced in size, in following ratios:

$$\text{ALE:AME:PLE:PME} = 11:2:12:10$$

Anterior eye row moderately recurved; anterior median eyes very small, well separated, nearly as far from larger lateral eyes. Posterior eye row moderately procurved; posterior median eyes separated by two full diameters (10/22), nearer posterior lateral eyes (10/12). Median ocular quadrangle broader than long (40/28), narrowed in front (40/20). Chelicera with three large teeth on promargin and line of nine denticles on retromargin.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	5.65	4.70	3.80	5.20	1.50
Patella	1.35	1.25	1.15	1.35	0.50
Tibia	5.50	4.35	2.90	4.15	0.85
Metatarsus	5.95	4.70	3.30	4.35	—
Tarsus	2.10	1.80	1.45	1.65	1.70
Total	20.55	16.80	12.60	16.70	4.05

Leg formula 1243; second and fourth legs subequal. First leg 7 times, first femur 1.9 times as long as carapace.

Epigynum (Figs. 227–229) with trivial emargination at middle of rounded genital sclerite and distinctive internal pattern of receptacles as shown.

Male holotype.—Total length 6.00 mm. Carapace 2.50 mm long, 2.25 mm wide. Abdomen 4.00 mm long, 2.50 mm wide.

Coloration and structure essentially like those of female. Eyes like those of female but anterior median eyes proportionately larger and thus separated by only two diameters.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	5.30	4.50	3.70	4.80	1.25
Patella	1.15	1.10	1.00	1.10	0.35
Tibia	5.30	4.15	2.85	3.85	0.65
Metatarsus	6.50	5.00	3.35	4.20	—
Tarsus	2.00	1.75	1.65	1.35	1.15
Total	20.25	16.50	12.55	15.30	2.90

Leg formula 1243. First leg 8.1 times, first femur 2.1 times as long as carapace.

Male palpus (Figs. 219–220) with following features: paracymbium large, curved, with apical portion thin, denticulate lamina, and bearing three small inner processes and one principal dorsal process; tegular spurs two, one broad, other pointed; median apophysis heavy, apically pointed hook; conductor broad triangular sclerite; embolus heavy at base, with large apical coil to conductor.

TYPE DATA.—Male holotype, 4 females and immature from Cueva de los Allarines, Tamaulipas, Mexico, 8 March 1978 (Peter Sprouse), in American Museum of Natural History.

DISTRIBUTION.—Caves of Tamaulipas.

RECORDS.—**Tamaulipas:** Sótano de Rancho Nuevo No. 2, 29 August 1973 (R. Jameson, D. McKenzie), male, female, immature. Cueva de California, 4 mi. NE Rancho Nuevo, 23 August 1973 (D. McKenzie, R. Jameson), male. Cueva del Tecolote, Conrado Castillo, 24 August 1973 (R. Jameson, D. McKenzie, F. Pérez), female. Sistema Purificación, 18 April 1980 (Peter Sprouse), 1 female; Cueva del Brinco Section, Conrado Castillo, 24, 27 August 1973 (D. McKenzie, F. Pérez), 2 females, immature; 15 March 1977 (Peter Sprouse, G. Ediger), female; 2 May 1977 (T. Treacy), immature; Sumidero de Oyamel Section, 23, 25 November 1977 (Dale Pate), 3 females, immature; 19, 27 March 1978 (A. Grubbs et al.), female, penultimate male, immature; 5 November 1979 (P. Sprouse, T. Treacy), 1 female, 2 immatures; 28 October 1979 (T. Treacy, P. Sprouse), 1 male, 2 females, immature; 27 November 1979 (J. Lieberz, P. Sprouse), 1 male; 20 April 1980 (L. Wilk, D. Pate), 2 immatures; 10 April 1980 (D. Honea, D. Pate), 2 females; 11 April 1980 (T. Treacy, D. Broussard), 1 immature; Upstream World Beyond Section, 26 November 1979 (T. Treacy, P. Sprouse, J. Lieberz), 1 immature female; World Beyond Section, 26 November 1979 (J. Lieberz), 1 male, 1 female. Cueva del Borrego, 0.5 km S Conrado Castillo, 19 May 1980 (P. Sprouse, L. Wilk), 1 male, 1 female; 11 November 1979 (P. Sprouse), 1 immature. Cueva de los Allarines, Conrado Castillo, 13 October 1979 (P. Sprouse, T. Treacy), 4 females, immature. Cueva del Arado, Yerbabuena, 21 November 1979 (J. Reddell, D. McKenzie), male, 4 females, immature. Cueva de los Arcitos, Yerbabuena, 19 November 1979 (J. Reddell, D. McKenzie), female, 2 immatures. Sótano de las Calenturas, Yerbabuena, 20 November 1979 (J. Reddell, D. McKenzie), immature; 19 November 1979 (D. Pate, P. Strickland, P. Sprouse, J. Atkinson, J. Lieberz, S. Baldson, T. Treacy), 2 males, 6 females, immature; 19–22 November 1979 (D. Pate), 2 females, 3 immatures; 22–29 April 1980 (T. Treacy, P. Sprouse, D. Pate, L. Wilk), 1 male, 5 immatures; Entrada del Blazer Section, 22 November 1979 (J. Reddell, P. Sprouse), 1 immature. Pozo del Lagartijo, 0.5 km SW Fire Tower, Rancho Nuevo, 1 November 1979 (P. Sprouse), 1 male, immature. Pozo del Lodo Estratificado, 0.8 km SE Rancho Nuevo, 31 October 1979 (M. Shumate), 2 immatures. Cueva de Las Papitas, 800 m SE Revilla, 17 April 1980 (P. Sprouse, T. Treacy, D. Honea), 1 penultimate male. Cueva del Tecolote, Los San Pedro, 26 April 1980 (D. Honea, J. Williams, P. Sprouse, T. Treacy, P. Keys), 1 male, 2 females, immature. Pozo de Tinajas Prietas, 2 km NW Caballos, 20 April 1980 (P. Sprouse), 1 immature.

Cueva X, Conrado Castillo, 15 April 1980 (D. Pate), 1 male, 3 females, immature.

Nesticus hoffmanni Gertsch

Nesticus hoffmanni Gertsch, 1971: 100, Figs. 152, 157.

DIAGNOSIS.—Relative of *N. nahuanus* with larger eyes, well-marked dark pattern on abdomen, and longer legs; readily separated by features of genitalia: epigynum (Figs. 236–238), a simple rounded elevation with hidden atriobursal orifices well-separated on genital margin; paracymbium of male palpus (Figs. 215–216) short heavy curved spur without conspicuous processes.

ETYMOLOGY.—Named for the late Dr. Carlos Hoffmann, lepidopterist, of Mexico City.

DESCRIPTION.—Females, 5 to 8 mm long.

Female from Cueva El Ocote.—Total length, 6.0 mm. Carapace 2.8 mm long, 2.3 mm wide. Abdomen 4.0 mm long, 2.5 mm wide.

Carapace and abdomen as shown in Figure 199. Cephalothorax and appendages dull to bright orange; carapace with dusky shadings on pars cephalica and black eye tubercles; abdomen gray to yellow, with pattern of black chevrons thickly covering dorsum and with pale venter; legs with dusky rings as follows: distal one on femora, and basal and subdistal ones on tibiae.

Structure like that of *N. nahuanus* except as noted. Eyes (Fig. 200) well pigmented, on elevated tubercles. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 17:10:17:17$$

Front eye row slightly recurved; anterior median eyes separated by nearly diameter, as far from lateral eyes. Posterior eye row weakly procurved; Posterior median eyes separated by narrow diameter, slightly closer to lateral eyes. Median ocular quadrangle broader than long (23/20), narrowed in front (23/15). Eyes larger, darkly pigmented and closer together than those of *N. nahuanus*. Clothing of carapace sparse, with three rows of black setae on midline from cervical groove to eyes. Legs thickly set with row of fine hairs, heavier on apical segments, and with dusky rings as follows: subdistal one on femora, and basal and subdistal ones on tibiae. Dentition of chelicerae and tarsal claws like those of *nahuanus*.

Limb Segment Lengths (mm)

	I	II	III	IV	PALP
Femur	5.25	4.00	3.30	4.65	1.60
Patella	1.20	1.15	1.00	1.15	0.50
Tibia	5.15	3.70	2.50	3.65	0.80
Metatarsus	5.15	3.65	2.70	3.50	—
Tarsus	1.80	1.50	1.15	1.40	1.60
Total	18.35	14.00	10.65	14.35	4.50

Leg formula 1423. First leg about 7 times, first femur 1.9 times as long as carapace.

Epigynum (Figs. 236–238) large, convex, with pattern of internal receptacles showing through integument; atriobursal orifices small, well separated, leading to large trilobed receptacles.

Male from Cueva El Ocote.—Total length, 4.5 mm. Carapace 2.2 mm long, 2.1 mm wide. Abdomen 2.6 mm long, 1.7 mm wide.

Coloration and structure like those of female unless otherwise noted. Posterior eye row essentially straight.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	5.35	4.45	3.50	4.65	1.05
Patella	1.10	1.00	0.80	1.10	0.35
Tibia	5.70	4.10	2.70	3.85	0.50
Metatarsus	5.50	4.10	2.90	3.65	—
Tarsus	1.80	1.40	1.15	1.35	1.30
Total	19.45	15.05	11.05	14.60	3.20

Leg formula 1243. First leg about 9 times, first femur 2.4 times as long as carapace.

Male palpus (Figs. 215–216) with following features: paracymbium a short, thick, curved spur without conspicuous processes; two tegular processes, a rounded spur and curved blade; median apophysis a narrow sclerite with small apical hook; embolus thick at base, with distinct coil at center, becoming thin and making wide turn to conductor.

TYPE DATA.—Male holotype from Cueva El Ocote, 4.3 miles north of Kilometer 295, one mile north of Palomas (small roadside cave), Hidalgo, Mexico, 20 July 1956 (V. Roth, W. J. Gertsch), in the American Museum of Natural History.

DISTRIBUTION.—Known only from type locality.

RECORDS.—**Hidalgo:** Cueva El Ocote, 20 July 1956 (V. Roth, W. J. Gertsch), male, 6 females and immature taken with holotype; 18 August 1964 (J. and W. Ivie), female, immature; 11 August 1966 (J. Fish, J. Reddell), 3 females, immature; 16 July 1969 (S. and J. Peck), female, immature.

Nesticus vazquezae Gertsch

Nesticus vazquezae Gertsch, 1971: 101, Fig. 153.

DIAGNOSIS.—Near relative of *N. hoffmanni* with smaller, more widely spaced eyes and longer legs. Epigynum (Figs. 230–232) of distinctive design and male palpus (Figs. 239–241) with paracymbium bluntly rounded at apex.

ETYMOLOGY.—Named for Dra. Leonila Vázquez, lepidopterist with the Instituto de Biología of Mexico City.

DESCRIPTION

Female holotype from Sótano del Gobernador.—Total length 6.80 mm. Carapace 2.90 mm long, 2.35 mm wide. Abdomen 4.00 mm long, 2.75 mm wide.

Cephalothorax and appendages bright orange; eyes narrowly ringed with black; legs lacking dusky rings; abdomen uniform gray. Females from other caves with pars cephalica dusky and pattern of blackish spots and chevrons on dorsum of abdomen.

Structure like that of *N. hoffmanni* except as noted. Eyes of medium size in following ratio:

$$\text{ALE:AME:PLE:PME} = 16:10:16:16$$

First eye row moderately recurved; anterior median eyes separated by full diameter, as far from lateral eyes. Posterior eye row moderately procurved; posterior median eyes separated by more than diameter (16/20), narrow diameter from posterior lateral eyes. Median ocular quadrangle broader than long (23/20), narrowed in front in same ratio.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	6.20	5.10	3.75	5.50	1.70
Patella	1.35	1.20	1.10	1.20	0.50
Tibia	6.00	4.50	2.85	4.15	0.90
Metatarsus	5.75	4.50	3.10	4.10	—
Tarsus	2.15	1.70	1.35	1.70	1.70
Total	21.45	17.00	12.15	16.60	4.80

Leg formula 1243. First leg 7.4 times, first femur 2.1 times as long as carapace.

Epigynum (Figs. 230–232) with atriobursal orifices well-separated, leading to large reniform receptacles.

Male from Sótano del Buque.—Total length 5.50 mm. Carapace 2.50 mm long, 2.20 mm wide. Abdomen 3.00 mm long, 2.35 mm wide.

Cephalothorax and appendages of recently molted male dull white; pars cephalica dusky and eyes narrowly ringed with black; abdomen gray with faint dusky spots.

Structure essentially like that of female. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 20:10:20:19$$

Anterior eye row moderately recurved; anterior median eyes separated by more than diameter (10/13), about diameter from lateral eyes. Posterior eye row gently recurved; posterior median eyes separated by diameter, nearer lateral eyes (19/14). Median ocular quadrangle broader than long (53/40), narrowed in front (53/32).

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	6.15	5.10	4.10	5.35	1.60
Patella	1.15	1.10	0.85	1.05	0.35
Tibia	6.20	4.75	2.80	3.85	0.55
Metatarsus	6.50	5.00	3.35	4.35	—
Tarsus	2.20	2.10	1.00	1.70	1.20
Total	22.20	18.05	12.10	16.30	3.70

Leg formula 1243. First leg 8.9 times, first femur 2.4 times as long as carapace. Third metatarsus much longer than carapace.

Male palpus (Figs. 239–241) with following special features: paracymbium evenly curved to bluntly rounded apical spur, with two inner spurs and pale spur near base on ventral side; tegulum on inner side produced to two small rounded processes, inner one pale; median apophysis and conductor each bearing sharp black spine; embolus of average length and thickness, making sinuous curve to back of conductor.

TYPE DATA.—Female holotype from Sótano del Gobernador, Pinal de Amoles, Querétaro, Mexico, 10 March 1967 (J. Reddell, J. Fish), in the American Museum of Natural History.

DISTRIBUTION.—Caves of Querétaro, Mexico.

RECORDS.—**Querétaro:** Sótano del Gobernador, 10 March 1967 (J. Reddell, J. Fish), 2 females with holotype. Cueva del Mercurio, Tejamanil, 10 July 1967 (J. Reddell), female. Sótano de Tejamanil, Tejamanil, 9 August 1966 (J. Fish), 7 females, immature. Sótano del Buque, 20 km N Pinal de Amoles, 2 June 1972 (T. Raines, R. Ralph), male, 5 immature.

***Nesticus jamesoni*, new species**

DIAGNOSIS.—Relative of *N. vazquezae* and also inhabitant of Querétaro caves, distinguished by widely separated atrio-bursal orifices of epigynum (Fig. 235).

ETYMOLOGY.—Named for Roy Jameson, collector of this species and many other cave spiders.

DESCRIPTION

Female holotype.—Total length 8.00 mm. Carapace 3.75 mm long, 2.90 mm wide. Abdomen 5.00 mm long, 3.50 mm wide.

Cephalothorax and appendages bright orange; pars cephalica dull orange; eyes narrowly ringed with black. Abdomen uniformly gray.

Structure typical: clypeus broad, sloping forward, 0.55 mm, equal in height to nearly four diameters of posterior median eye. Eyes of average size in following ratios:

$$\text{ALE:AME:PLE:PME} = 15:8:14:15$$

Anterior eye row moderately recurved; anterior median eyes small, separated by less than two diameters (8/14), as far from large lateral eyes. Posterior eye row moderately procurved; median eyes separated by less than two diameters (15/24), nearer posterior lateral eyes (15/18). Median ocular quadrangle broader than long (52/28), narrowed in front (52/31), front eyes much smaller. Chelicera of females with typical dentition of three large teeth on promargin and line of about nine denticles on retromargin; type female with four large promarginal teeth.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	6.25	5.60	4.70	6.00	2.00
Patella	1.65	1.50	1.35	1.55	0.65
Tibia	6.35	5.20	3.40	4.85	0.65
Metatarsus	6.25	5.20	3.80	4.80	—
Tarsus	2.25	1.85	1.70	1.80	2.00
Total	22.75	19.35	14.95	19.00	5.85

Leg formula 1243. First leg 6 times, first femur about 1.7 times as long as carapace.

Epigynum (Figs. 233–235) with broadly rounded posterior margin flanked by widely separated orifices leading to distinctly coiled receptacles as shown.

TYPE DATA.—Female holotype, 3 females and 2 penultimate males from Cueva del Rincón, Lagunita, El Doctor Platform, Querétaro, Mexico, 21 November 1977 (Roy Jameson), in the American Museum of Natural History.

DISTRIBUTION.—Caves of Querétaro, Mexico.

RECORD.—**Querétaro:** Sótano de Herreras, San Joaquin, 26 November 1977 (Roy Jameson), female.

***Nesticus sedatus*, new species**

DIAGNOSIS.—Relative of *N. hoffmanni* with row of dusky spots on dorsum of abdomen, best distinguished by details of epigynum: median septum of moderate width, with straight posterior margin and bearing distinctive curved atrio-bursal orifices on each side below lip.

ETYMOLOGY.—Specific name from Latin *sedatus*, calm.

DESCRIPTION

Female holotype.—Total length 7.5 mm. Carapace 3.5 mm long, 2.8 mm wide. Abdomen 4.4 mm long, 2.7 mm wide.

Cephalothorax and appendages dull to bright orange; carapace with dusky shadings over most of pars cephalica and dusky radiations on pars thoracica; eyes narrowly ringed with black. Abdomen grayish; dorsum with five pairs of dusky spots.

Structure typical of group: clypeus 0.55 mm long, equal to about four diameters of anterior lateral eye. Eyes large, in following ratios:

$$\text{ALE:AME:PLE:PME} = 16:7:16:15$$

Anterior eye row moderately recurved as seen from in front and above; small median eyes separated by their diameter, two diameters from lateral eyes. Posterior eye row straight; posterior median eyes separated by full diameter and about as far from lateral eyes. Median ocular quadrangle broader than long (48/32), narrowed in front (48/25). Chelicera with three large teeth on promargin and row of about nine denticles on retromargin.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	7.50	6.30	5.00	6.75	2.40
Patella	1.50	1.50	1.25	1.35	0.60
Tibia	7.80	5.70	3.70	5.20	1.05
Metatarsus	8.60	6.30	4.00	5.65	—
Tarsus	2.60	2.10	1.60	1.70	1.90
Total	28.00	21.90	15.55	20.65	5.95

Leg formula 1423. First leg 8 times, first femur 2.1 times as long as carapace. Third metatarsus longer than carapace.

Epigynum (Figs. 212–214) with rather narrow, elevated median septum flanked by shallow lateral foveae, with posterior margin straight and bearing distinct atrio-bursal orifices below lip.

TYPE DATA.—Female holotype from Cueva del Llano de Conejo, Xilitla, Querétaro, Mexico, 3 April 1969 (T. R. Evans), in American Museum of Natural History.

DISTRIBUTION.—Caves of San Luis Potosí.

RECORDS.—**San Luis Potosí:** Cueva de los Antiguos, 1.2 km W La Silleta, 2 April 1980 (Peter Keys), 1 female. Sótano de Guadalupe, 10 km W Aquismón, 21 March 1980 (R. Sprouse), 1 female. Gruta de los Muertos, Xilitla Plateau, 28 March 1980 (Dale Pate), 2 immatures. Sótano de La Silleta, La Silleta, 30 March 1980 (Peter Sprouse), 1 female, 2 immatures.

Nesticus arganoi Brignoli

Nesticus arganoi Brignoli, 1972: 148, Figs. 40–42.

DIAGNOSIS.—Small eyeless troglobite of *nahuanus* group readily recognized by genitalic features: epigynum (Figs. 246–248) with pale median septum developed to prominent posterior projection; male palpus (Figs. 244–245) with broadly rounded spatuliform paracymbium and two cymbial spurs, with the front one bifid.

ETYMOLOGY.—Named for Dr. Roberto Argano of the Institute of Zoology, Rome University, Italy.

DESCRIPTION

Female from Cueva Macinga.—Total length 3.00 mm. Carapace 1.20 mm long, 1.07 mm wide. Abdomen 1.80 mm long, 1.50 mm wide.

Carapace and abdomen of female as shown in Figure 203. Cephalothorax and abdomen white; appendages pale yellow; setae dusky; chelicerae dusky brown; epigynum dark brown.

Structure typical; pars cephalica of medium height with strongly sloping clypeus. Eyes completely missing, with faint internal suggestions in one female of their original position. Chelicera with three large, slender teeth on promargin and series of six smaller ones on retromargin.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	3.35	2.50	1.90	2.85	0.85
Patella	0.65	0.50	0.47	0.60	0.22
Tibia	3.50	2.75	1.35	2.35	0.35
Metatarsus	3.35	2.25	1.55	2.10	—
Tarsus	1.25	1.10	0.80	1.00	0.85
Total	12.10	8.60	6.07	8.90	2.27

Leg formula 1423. First leg 10 times, first femur about 3 times as long as carapace. Legs long, thin, with typical setae, weak spines and trichobothria.

Epigynum (Figs. 246–248) with pale median septum laterally enlarged at middle and ending in prominent, elevated, downwardly directed spur at posterior end.

Male from Cueva Macinga.—Total length 2.25 mm. Carapace 1.10 mm long, 0.96 mm wide. Abdomen 1.10 mm long, 0.70 mm wide.

Coloration and structure essentially like those of female. Eyes completely obsolete.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	2.70	2.15	1.45	2.35	0.67
Patella	1.00	0.90	0.75	0.90	0.20
Tibia	2.85	1.90	1.20	2.15	0.30
Metatarsus	2.80	2.00	1.35	2.00	—
Tarsus	1.20	1.00	0.75	0.80	0.55
Total	10.55	7.95	5.50	8.20	1.72

Leg formula 1423. First leg about 10 times, first femur 2.5 times as long as carapace.

Male palpus (Figs. 244–245) with following features: paracymbium large, curved, broadly spatuliform at apex with curved process on ventral edge toward base; two tegular spurs, anterior one bifid; conductor a heavy curved lamina with fine spine at apex; median apophysis a thin curved hook; embolus quite stout and of medium length.

TYPE DATA.—Female holotype from Cueva Macinga (=Cueva de Ojo de Agua de Tlilapan No. 2 and Cueva de Agua de Tlilapan), Orizaba, Veracruz, Mexico, 7 November 1969 (R. Argano), in Institute of Zoology, Rome University, Rome, Italy.

DISTRIBUTION.—Known only from above cave system.

RECORD.—**Veracruz:** Cueva Macinga, 5 March 1973 (J. Reddell, M. McKenzie, S. Murphy, M. Butterwick), male, 2 females.

Nesticus caverna, new species

DIAGNOSIS.—Eyeless troglomite similar to *N. arganoi* of Cueva Macinga in Veracruz, readily separated by distinctive epigynum (Fig. 209) with septum broadly rounded behind.

ETYMOLOGY.—Specific name from Latin *caverna*, cavern, used in apposition.

DESCRIPTION

Female holotype.—Total length about 3 mm. Carapace 1.20 mm long, 0.95 mm wide.

Cephalothorax and appendages pale yellow; chelicerae light brown; abdomen white at base.

Structure like that of *N. arganoi*; cephalothorax evenly convex, with faint traces of cephalic grooves; pars cephalica broadly rounded in front, with slightly sloping clypeus. Eyes completely absent. Chelicera with 3 thin teeth on promargin and patch of about 10 denticles opposite them on retromargin. Abdomen mostly missing but retaining attached base and epigynum.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	3.10	2.00	1.70	2.60	0.62
Patella	0.55	0.50	0.50	0.50	0.19
Tibia	—	2.00	1.45	—	0.32
Metatarsus	—	1.85	1.50	—	—
Tarsus	—	1.00	0.50	—	0.75
Total	—	7.35	5.65	—	1.88

Legs similar in length to those of *N. arganoi*, first femur about 2.6 times as long as carapace; third tibia longer than carapace.

Epigynum (Figs. 209–211) with pale, median septum bluntly rounded behind; atrio-bursal orifices in well-separated lateral grooves.

TYPE DATA.—Female holotype from Horizontal Cave (=Cueva de las Ranas), one-fourth mile upstream from 2nd River Cave, Zoquitlán, Puebla, Mexico, January 1978 (J. Hooper, P. Strickland), in the American Museum of Natural History.

Nesticus reddelli, new species

DIAGNOSIS.—Small yellow species not closely allied to others of Mexico, recognized by the following features: six well-developed eyes close together, but anterior median eyes missing; posterior eye row straight to faintly recurved; fourth leg longer than second; epigynum (Fig. 206) broader than long, with median septum ending in bluntly rounded, nasute projection.

ETYMOLOGY.—Named for James Reddell of the Texas Memorial Museum.

DESCRIPTION

Female.—Total length 1.75 mm. Carapace 0.80 mm long, 0.70 mm wide. Abdomen 1.00 mm long, 0.87 mm wide.

Carapace and abdomen as shown in Figure 204. Cephalothorax and appendages bright yellow; eye tubercle black; abdomen white with some duskiness on sides; epigynum reddish brown.

Structure essentially typical; carapace broad in front; clypeus sloping, equal in height to three diameters of

anterior lateral eye. Eyes (Fig. 205) fairly large, each triad on inconspicuous tubercle. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 9:0:9:8$$

Front eyes separated by full diameter. Posterior eye row essentially straight, with faint recurvature; posterior median eyes separated by full diameter, about half as far from lateral eyes. Chelicera with typical dentition: promargin with three large teeth and retromargin with row of denticles.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	1.18	0.94	0.80	1.18	0.34
Patella	0.35	0.30	0.24	0.30	0.13
Tibia	1.10	0.80	0.56	1.02	0.20
Metatarsus	0.93	0.72	0.58	0.85	—
Tarsus	<u>0.57</u>	<u>0.51</u>	<u>0.40</u>	<u>0.50</u>	<u>0.40</u>
Total	4.13	3.27	2.58	3.85	1.07

Leg formula 1423, fourth leg considerably longer than second. First leg 5.1 times, first femur 1.4 times as long as carapace. Third metatarsus shorter than carapace.

Epigynum (Figs. 206–208) with distinctive broad, nasute posterior lobe and pattern of receptacles as shown.

TYPE DATA.—Female holotype, female and penultimate male from Cueva de Apoala, Oaxaca, Mexico, 2 January 1972 (J. Reddell, S. Murphy, D. McKenzie, M. McKenzie), in the American Museum of Natural History.

Genus *Eidmannella* Roewer

Eidmannella Roewer, 1935: 195; Neave, 1939: II, 200; Roewer, 1942: 195; Bonnet, 1956: 1649; Levi and Levi, 1962: 20.

Eidmanella: Millidge and Locket, 1955: 167; Yaginuma, 1969: 6; Wild, 1955: 393.

Gondwanonesticus Dumitresco, 1973: 295.

DIAGNOSIS.—American genus related to *Nesticus* of small, 2 to 5 mm long, white to dusky spiders with legs mostly of short to medium length, distinguished by following genitalic characters: paracymbium of male palpus consisting of small short curved process with two small spurs at apex, outside one typically bifid; bulb lacking median apophysis; tegulum bearing single small, truncated, rounded or pointed process; epigynum relatively small, subtriangular plate with rounded or pointed septal element in front and narrow transverse piece behind; atrio-bursal orifices underneath lip of genital groove, leading to small bulbal or elongate receptacles and larger suboval receptacle on each side. Other somatic differences as follow; eyes of posterior row only slightly procurved and usually quite straight; claws of tarsi with fewer teeth than typical *Nesticus*; principal bristles on promargin of chelicera fewer, numbering about five instead of seven or more.

TYPES OF GENERA.—Of *Eidmannella*, *attae* Roewer (= *pallida* Emerton); of *Gondwanonesticus*, *dragani* Dumitresco (= *pallida* Emerton).

DISCUSSION.—Roewer placed his *Eidmannella* in the group Pholcommiae of the family Theridiidae, failing, as have some other authors, to perceive its proper placement in the family Nesticidae. The lack of a median

apophysis in the male palpus and other special features of the genitalia of both sexes make it appropriate to maintain full generic status, since these features carry *Eidmannella* beyond a mere species group of *Nesticus*.

There are several taxa in the American fauna. The identity of *Eidmannella attae* Roewer, based on one of a few collections from South America, seems fully established. Millidge and Locket (1955:165, Figs. 4 and 5), who published the first European record of *E. pallida* from England after comparison with material provided by me from the United States, listed *E. attae* as a synonym of *E. pallida*. This synonymy, they noted, was agreeable to the late Dr. C. F. Roewer, to whom I had also made American material available for study. Levi and Levi (1962) later listed *E. attae* as a synonym of *E. pallida* after studying types from the Senckenberg Museum. *Eidmannella attae* came from disused fungus-growing chambers of a leaf-cutting ant, *Atta sexdens*, in Mendes, Brazil. Also synonymous is *Gondwanonesticus*, used as a subgenus by Dumitresco, and based on *Nesticus* (*Gondwanonesticus*) *dragani*, a small species from caves in Cuba and in Majorca, part of the Spanish Balearic Islands off Barcelona. The male type of *N. (G.) dragani* from a small cave in Majorca shows slight differences from the Cuban male, but more than likely they are the same species, here regarded as *E. pallida*. It seems likely that *E. dragani*, like *E. pallida* in England, also was carried to Majorca by trade.

NATURAL HISTORY.—Petrunkevitch made contributions on the habits of typical *Eidmannella* when he was misled by the familial placement of material; his notes are worth repeating here. In *The Spiders of Porto Rico* (Petrunkevitch, 1930:167, 215) he described *E. pallida* under two names, placing them in the families Theridiidae and Linyphiidae. In his earlier paper entitled "The Value of Instinct as a Character in Spiders" (Petrunkevitch, 1926:430) he characterized his *Bathypantes ovigerus* perhaps in enough detail to demand dating of the name *ovigerus* from 1926. Of more interest were his notes on the habits of this species (now *E. pallida*): the female habit of dragging the egg sac attached to the spinnerets was compared to the similar behavior exhibited by vagrant wolf spiders. The egg sac of *B. ovigerus* was described as "globular and rather large in proportion to the size of the spider, being fully 2 mm in diameter, with thin white walls and a few eggs well visible through the silk." Of the habits he said the following: "The spider makes no web of any kind, but walks dragging the cocoon behind her and if disturbed runs for shelter. Deprived of the cocoon the spider shows signs of uneasiness and on discovering the cocoon grasps it with her chelicerae, bends the almost globular abdomen until the spinnerets reach the cocoon from below, releases her hold on it with the chelicerae and starts off dragging the cocoon behind her. For two days she behaved this way. On the third day I was surprised to find her sitting on the bottom of the jar while the cocoon was hanging close by, suspended by a few threads on a small web made of loose thread and much of the type common in small Linyphiids. The explanation of the change of behavior was furnished the same day when minute spiderlings emerged from the cocoon. Toward the end, then, of her maternal duties the original instinct common to all

Key to the Species of *Eidmannella*

1. Males2
Females4
2. Paracymbium of male palpus armed at tip with several trivial lobes and spurs; tegular process short pointed rod; known only from Cueva del Pachón, Tamaulipas, Mexico*pachona*, new species
Paracymbium of male palpus armed at tip with two well separated spurs3
3. Outer process at tip or paracymbium single black spur; caves of Edwards Plateau region of central Texas*rostrata*, new species
Outer process at tip of paracymbium bifid; caves and surface stations of North, Central and South America*pallida* (Emerton)
4. Anterior septal piece of epigynum smoothly rounded or moderately angled in lateral view (Figs. 264, 276); cave and surface stations of North, Central and South America.*pallida* Emerton
Anterior septal piece more conspicuous, with trivial sharp angle, prominent beak, or conspicuous lobe in lateral view5
5. Anterior septal piece with trivial conical angle in lateral view (Fig. 297); small, eyed species from Cueva del Pachón, Tamaulipas, Mexico*pachona*, new species
Anterior septal piece with conspicuous beak or lobe6
6. Anterior septal piece with conspicuous beak7
Anterior septal piece with rounded or bulbous lobe8
7. Anterior septal piece produced into long rounded beak (Figs. 286-287); blind troglobite from Ladder Cave, Val Verde County, Texas*delicata*, new species
Anterior septal piece produced into shorter angled beak (Figs. 282-283); mostly eyeless troglobites from caves in Edwards Plateau region of central Texas*rostrata*, new species
8. Anterior septal piece forming rounded angle (Fig. 289); blind troglobite from Tooth Cave, Travis County, Texas*reclusa*, new species
Anterior septal piece forming bulbous projection9
9. Anterior septal piece half as broad as length of epigynum; blind troglobite from Davenport Cave, Medina County, Texas*nasuta*, new species
Anterior septal piece broader and larger (Fig. 295); blind troglobite from Wiggley Cave, Culberson County, Texas*bullata*, new species

Linyphiids asserted itself, showing that the species still retains some of the family habits and that the new habit did not develop to the point characteristic for Lycosids, where the spiderlings are carried by the author on her back until they have molted and are large enough to shift for themselves."

The typical *Eidmannella*, like other known nesticids, lives a sedentary life in a small web under stones or ground debris in epigeal situations or on the floor and walls of caves. The egg sacs are stationed nearby in the web or closely guarded by the females who often hold or carry them attached to the spinnerets and hind legs. It seems certain that Petrunkevitch was describing females separated at the moment from their trivial webs, which he failed to detect. Such sedentary spiders rarely leave their webs and, when separated from them for any reason, respond by guarding the egg sac or even by carrying it in the fashion described. This habit was probably fully operative in the nesticids long before the derivative

wolf spiders developed the behavior of carrying their egg sacs attached to their spinnerets.

Eidmannella pallida Emerton

- Nesticus pallidus* Emerton, 1875: 297, pl. 1, Figs. 22-27; Packard, 1875: 275; Packard, 1888: 57; McCook, 1890: 154, 189; Marx, 1890: 521; Simon, 1894: 739; Comstock, 1903: 33; Banks, 1910: 32; Petrunkevitch, 1911: 383; Comstock, 1913: 424; Barrows, 1918: 306; Crosby and Bishop, 1928: 1056; Ives, 1935: 297; Wolf, 1936: 577; Chamberlin and Ivie, 1938: 134; Comstock, 1940: 430; Roewer, 1942: 512; Bonnet, 1958: 3099; Levi and Levi, 1962: 20; Reddell, 1963: 154 (part); Yaginuma, 1969: 8; Gertsch, 1971: 98.
- Nesticus cavicola* Banks, 1898a: 186; Banks, 1910: 32; Petrunkevitch, 1911: 382; Comstock, 1913: 425; Bonnet, 1958: 3094. (New Synonymy).
- Pocobletus mexicanus* Banks, 1898b: 243, pl. 14, Fig. 18; F. Pickard-Cambridge, 1903: 426; Petrunkevitch, 1911: 267; Bonnet, 1958: 3729. (New synonymy).

Nesticus suggerens Chamberlin, 1924: 15, pl. 4, Figs. 29–31; Jones, 1936: 39; Bonnet, 1958: 3100; Gertsch, 1977: 123. (New Synonymy).

Bathyphantes ovigerus Petrunkevitch, 1926: 430; Bonnet, 1955: 858

(considered nomen nudum of *Gentromerus ovigerus*).

Theonoe striatipes Petrunkevitch, 1930: 167, Figs. 4, 5; Bonnet, 1959: 4423. (New Synonymy).

Centromerus ovigerus Petrunkevitch, 1930: 215, Figs. 63–64; Bonnet, 1956: 993 (emended to *oviger*). (New Synonymy).

Eidmannella attae Roewer, 1935: 196, pl. 10, Figs. 3a–3g.

Eidmannella pallida: Millidge and Lockett, 1955: 167; Yaginuma, 1969: 6; Lockett, Millidge, and Merrett, 1974: 60, Figs. 35 a–c.

Nesticus mexicanus: Reddell, 1965: 174.

Eidmannella pallida: Gertsch, 1979: 162, 245, 246.

Nesticus (*Gondwanonesticus*) *dragani* Dumitresco, 1973: 295, Figs. 1–4; Gertsch, 1977: 123. (New Synonymy).

DIAGNOSIS.—Small epigeal and cavernicole species of North, Central and South America with following genitalic features: conductor of male palpus forming apical coil and produced forward into pointed lamina; tegular process a small truncated spur, less often rounded or pointed. Epigynum of medium size, sometimes half as wide as sternum, but most much narrower; anterior projection of inverted T-shaped median septum variously developed, rounded or produced to blunt or sharp process; transverse bar of septum continuous to side margins in some caves but mostly shorter, with small median projection above, straight or very broadly rounded behind as seen in ventral view.

ETYMOLOGY.—Specific name from Latin *pallidus*, pale, pallid, having reference to pale cave representatives.

DISCUSSION.—J. H. Emerton (1875) based his *N. pallidus* on specimens of both sexes from Fountain Cave, Virginia, where they lived among stalactites in total darkness. The study of this nesticid group has always presented identification difficulties; in fact, seven specific names have been proposed to represent populations in various parts of its range. The taxon *E. pallida* is used here to comprehend what I consider to be a single extremely variable and common species widespread over much of North America and also known to range into South America. The species has been introduced by trade into England, the Spanish Island of Majorca and into the Hawaiian Islands. A few years ago, as part of my study of the present revision of the American Nesticidae, I concluded that the mixing of two sibling species was probably responsible for the problems involved in understanding these often-exasperating spiders; the names I chose were *pallida* and, for a similar species, *suggerens*. Small, dusky, short-legged, big-eyed types of the *suggerens* phenotype live on the surface and penetrate underground habitats and superficial parts of available caves. Specimens of the *pallida* phenotype, usually cavernicoles, often seem radically different because of their pale coloration, longer legs, and their eyes reduced to near or complete obsolescence. The genitalia of the *pallida*

phenotype are larger, have long emboli varying from thin rods to some thickened and flattened to broad bands. The epigyna are rather uniform over the whole range and feature little or small modification of the anterior septal element. The pattern of the internal receptacles shows little variation. The taxon seems to be in a state of flux with geographical and ecological variables (which could be described as “polytypic”) not yet fully committed to separation into discrete species entities. A restudy of the abundant material from all over the range has, in spite of various extremes of habitus, convinced me that there is full intergradation in color features and in such somatic differences as size, length, eye relations, and, most importantly, in male and female genitalia. To me it now seems reasonable to use a single taxon to comprehend this complex of populations.

The effect of the cave habitat is striking and demonstrates that *E. pallida* is a very plastic species quickly and easily modified by cave life. Reduction of size and sporadic loss of eyes are features of this group that usually occur with minimal changes in the basic features of the *pallida* genitalia. In caves of the Edwards Plateau and adjacent karst regions of Central Texas, there are numerous essentially eyeless populations. Some of these white spiders have eyes so greatly reduced in size as to be barely visible, in a late stage of evanescence, or completely missing without external vestiges. Some of these populations are restricted to specific caves and are seemingly isolated from invasion by surface representatives of the parent species *E. pallida*. Small differences in the male and female genitalia, suggesting prolonged isolation from epigeal relatives, convince me they are incipient or even now full species deserving specific designation. Excluded from such designation are isolated, essentially eyeless examples (often from series including eyed partners) lacking significant genitalic modifications.

The most derivative member of the *pallida* complex is a small species with normal eyes, *Eidmannella pachona*, from Cueva del Pachón in Tamaulipas, Mexico, which presents radical differences in the male palpus.

DESCRIPTION

Female (phenotype of *pallida*) from Glade Cave, Virginia.—Total length 4 mm. Carapace 1.65 mm long, 1.3 mm wide. Abdomen 2.5 mm long, 2 mm wide.

Cephalothorax and appendages yellow; carapace faintly dusky in cephalic and radial sutures and eye region; sternum faintly dusky; abdomen uniformly gray without darker pattern. Coloration of epigeal specimens (Fig. 272) usually much darker, often with blackish chevrons on dorsum of abdomen leaving central, dentate pale stripe; subadult and some mature specimens with black seam on margin of carapace and black rings on femora and tibiae of legs.

Form of carapace and abdomen as shown in Figure 272. Clypeus 0.2 mm high, equal to not fully three diameters of anterior lateral eye (30/11). Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 11:5:11:12$$

Anterior eye row slightly procurved, essentially straight; anterior median eyes separated by more than diameter (9/5), full diameter from lateral eyes. Posterior eye row straight; median eyes separated by more than diameter (15/11), one third as far from lateral eyes. Median ocular quadrangle broader than long (38/28), narrowed in front (38/21).

TABLE 9.—Comparison of first legs of females from epigean stations in Alabama, Florida, Illinois and New Jersey (measurements in millimeters).

Limb Segment	Princeton NEW JERSEY	Kickapoo State Park ILLINOIS	Tuscaloosa ALABAMA	Southeast of Wetumpka ALABAMA	Homestead FLORIDA
Femur	2.25	2.15	2.20	2.50	2.15
Patella	0.70	0.65	0.70	0.65	0.65
Tibia	2.20	2.00	2.10	2.35	2.15
Metatarsus	2.19	1.75	1.90	2.20	2.05
Tarsus	1.15	1.00	0.85	1.05	1.00
Total	8.40	7.55	7.75	8.75	8.00
Carapace length	1.5	1.4	1.65	1.75	1.5
Carapace/leg length	5.6	5.4	4.7	5	5.3
Carapace/femur	1.5	1.5	1.3	1.4	1.5

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	2.62	2.00	1.70	2.40	0.70
Patella	0.70	0.62	0.55	0.60	0.27
Tibia	2.35	1.75	1.25	2.00	0.50
Metatarsus	2.30	1.75	1.30	2.00	—
Tarsus	1.25	1.10	0.85	1.15	0.80
Total	9.22	7.22	5.65	8.15	2.27

Leg formula 1423. First leg 5.6 times, first femur 1.6 times as long as carapace.

First legs of epigean specimens vary from 4.7 to 5.6 times as long as the carapace, average 5.2 times, and can be described as medium-length. First legs of cave specimens are appreciably longer, varying from 4.8 to 7.5 times as long as carapace, and averaging 6.2 times, this average slightly decreased by the short-legged female from Mayfield's Cave, Indiana.

Epigynum of female from west of Miami, Florida (Figs. 260–264).—Sclerotized portion of epigynum broadly subtriangular, much wider than long, half or more of the width of sternum, widest in eastern specimens; anterior, inflated portion of median septum moderately enlarged, in side view drawn to blunt process; posterior transverse bar gently rounded behind, with stem portion short.

Male from Glade Cave, Virginia.—Total length 2.8 mm. Carapace 1.45 mm long, 1.3 mm wide. Abdomen 1.5 mm long, 1.1 mm wide.

Coloration and structure like those of female except as noted. Clypeus 0.6 mm high, equal to two diameters of anterior lateral eye. Ratio of eyes:

$$\text{AME:PLE:PME} = 13:8:13:13$$

Both eye rows essentially straight, close together. Anterior median eyes separated by diameter, as far from lateral eyes. Oval posterior median eyes separated by less than long diameter (11/13), nearer lateral eyes (8/13). Median ocular quadrangle broader than long (33/23), narrowed in front in same ratio.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	2.95	2.00	1.70	2.20	0.85
Patella	0.60	0.60	0.50	0.60	0.20
Tibia	2.35	1.75	1.25	1.85	0.20
Metatarsus	2.30	1.75	1.35	1.90	—
Tarsus	1.20	1.05	0.75	1.00	0.70
Total	9.40	7.15	5.50	7.55	1.95

Leg formula 1423. First leg 6.5 times, first femur twice as long as carapace.

Palpus of male from Glade Cave, Virginia.—With following features (Figs. 249–251, 254–255): embolus of medium size, only moderately enlarged before coil lying in conductor; conductor broad, drawn out to wide lamina and ending in sharp point; tegular process truncated and with small anterior projection. Male palpus from Grotto

TABLE 10.—Comparison of first legs of females from caves in Alabama, Florida, Indiana, Iowa and Oklahoma (measurements in millimeters).

Limb Segment	Mayfield's Cave INDIANA	Demperwolf Sinks IOWA	Shelta Caverns ALABAMA	Caverns State Park FLORIDA	Wild Woman Cave OKLAHOMA
Femur	2.00	2.50	2.80	3.15	2.75
Patella	0.60	0.65	0.70	0.70	0.70
Tibia	1.85	2.60	2.70	3.15	2.70
Metatarsus	2.20	2.20	2.65	3.10	2.60
Tarsus	1.10	1.10	1.20	1.25	1.15
Total	7.15	9.05	10.05	11.35	9.90
Carapace length	1.5	1.5	1.5	1.5	1.65
Carapace/leg length	4.8	6	6.7	7.5	6
Carapace/femur	1.3	1.66	1.85	2.1	1.6

Cave, Florida: embolus (Figs. 249–250) heavy, thickened before apical coil; outer spur of paracymbium (Fig. 251). Aberrant palpus of male from Benton County, Arkansas (Fig. 259): embolus of medium size; tegular process drawn to thin spur; outer side of paracymbium with single spur. Tip of embolus and conductor of male from Mississippi County, Arkansas (Fig. 269) showing short, suberect conductor and short spinules on embolus.

Female (phenotype of *cavicola*) from Virtue Mine, Portal, Arizona.—Total length 3.25 mm. Carapace 1.65 mm long, 1.3 mm wide. Abdomen 1.7 mm long, 1.35 mm wide.

Coloration and structure essentially like typical *pallida* except as noted below. Clypeus 0.25 mm high, equal to three diameters of anterior lateral eye. Eyes small, well separated; ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 10:6:10:10$$

Anterior eye row essentially straight; anterior median eyes separated by full diameter, as far from lateral eyes. Posterior eye row moderately procurved; median eyes suboval, separated by nearly two diameters, half as far from lateral eyes.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	2.35	1.85	1.60	2.30	0.65
Patella	0.60	0.60	0.50	0.60	0.20
Tibia	2.35	1.70	1.70	1.85	0.35
Metatarsus	2.15	1.65	1.25	1.75	—
Tarsus	0.85	0.75	0.70	1.00	0.70
Total	8.30	6.55	5.30	7.50	1.90

Leg formula 1423. First leg 5 times, first femur 1.4 times as long as carapace.

Epigynum smaller and narrower than that of typical *pallida*; posterior transverse bar variable, gently rounded behind or with straight margin.

Male from Virtue Mine, Portal, Arizona.—Total length 2.7 mm. Carapace 1.4 mm long, 1.3 mm wide. Abdomen 1.5 mm long, 1 mm wide.

Coloration and structure like those of female. Eyes closer together; posterior median eyes separated by one and one-half diameters.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	2.15	1.75	1.50	2.10	0.60
Patella	0.65	0.55	0.50	0.60	0.18
Tibia	2.15	1.60	1.20	1.75	0.15
Metatarsus	2.05	1.60	1.30	1.85	—
Tarsus	0.95	0.75	0.70	0.85	0.55
Total	7.95	6.25	4.20	7.15	1.40

Leg formula 1423. First leg 5.6 times, first femur 1.6 times as long as carapace.

Male palpus (Figs. 270–271) differing in minor details from that of typical *pallida*; conductor shorter, with slight enlargement behind pointed tip; tegular process apically rounded, slightly flared on sides.

Female (phenotype of *suggerens*) from southwest of Marathon, Florida.—Total length, 2.2 mm. Carapace 1.05 mm long, 0.88 mm wide. Abdomen 1.2 mm long, 0.95 mm wide.

Cephalothorax and appendages yellowish to light brown. Carapace with more or less distinct narrow dusky seam on side margins and dusky streaks outlining pars cephalica and radiating to side margins; eye tubercles black. Sternum uniform dusky brown. Abdomen uniformly gray with faint traces of chevrons behind. Coloration of specimens showing wide range from pale yellow to dark brown or blackish.

Form of carapace and abdomen like that of *pallida* (Fig. 272). Clypeus 0.16 mm high, equal to three diameters of anterior lateral eye. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 7:4:9:10$$

Anterior eye row essentially straight; anterior median eyes separated by nearly their diameter, half as far from lateral eyes. Posterior eye row gently procurved; median eyes separated by less than diameter (10/6), nearer lateral eyes (10/4). Median ocular quadrangle broader than long (20/17), narrowed in front (20/15).

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	1.40	1.10	0.85	1.35	0.40
Patella	0.43	0.35	0.33	0.40	0.16
Tibia	1.25	0.85	0.60	1.05	0.23
Metatarsus	1.22	0.90	0.80	1.08	—
Tarsus	0.70	0.50	0.35	0.53	0.50
Total	5.00	3.70	2.93	4.41	1.29

Leg formula 1423. First leg 4.7 times, first femur 1.3 times as long as carapace.

Epigynum of female from San Antonio, Texas (Figs. 274–278).—Sclerotized portion of epigynum broadly subtriangular; septum and internal features; rarely more than third of the width of sternum; anterior portion of septum only moderately inflated; posterior transverse bar broadly subtriangular, nearly straight in ventral view but produced to rounded or subtruncated projection. Epigynum of female from St. Thomas, Virgin Islands (Figs. 279–280).

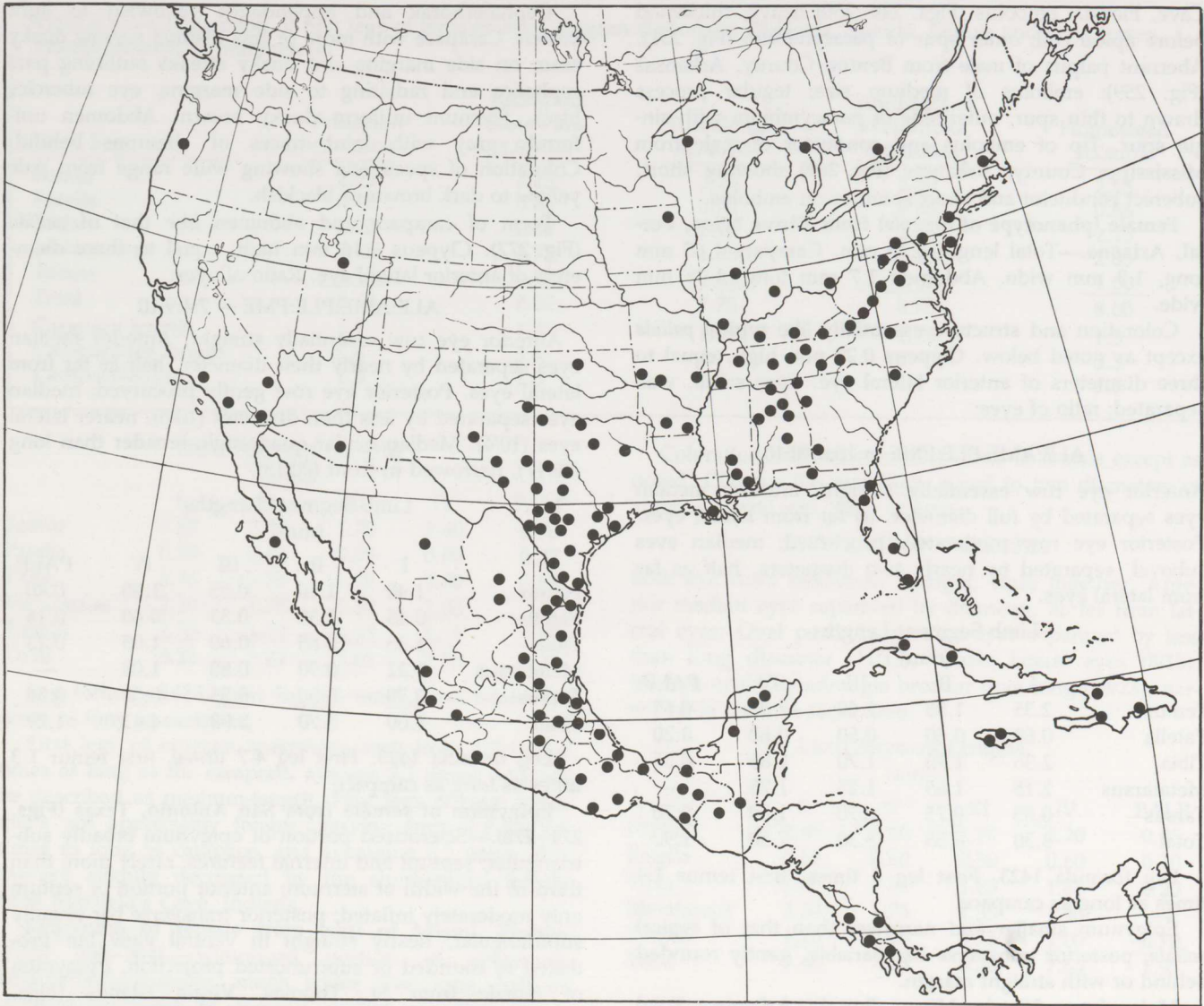
Male from southeast of Marathon Florida.—Total length 2.2 mm. Carapace 1.13 mm long, 0.85 mm wide. Abdomen 1.2 mm long, 0.85 mm wide.

Coloration and structure like those of female. Both eye rows essentially straight; eye ratio about the same, but eyes closer together.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	1.55	1.22	0.95	1.45	0.45
Patella	0.45	0.40	0.36	0.42	0.14
Tibia	1.50	1.00	0.77	1.25	0.15
Metatarsus	1.42	1.00	0.83	1.25	—
Tarsus	0.72	0.60	0.46	0.64	0.45
Total	5.64	4.22	3.37	5.01	1.20

Leg formula 1423. First leg 5 times, first femur 1.35 times as long as carapace.

Palpus of male from San Antonio, Texas.—With following features (Figs. 265–268): whole palpus small (bulb about 0.4 mm long); tegular process truncated with short anteriorly directed spur; conductor forming oval curve ending as sharp point and round lobe; paracymbium usually with bifid spur on retrolateral side; embolus of



Map 8.—Distribution of *Eidmannella pallida* (Emerton).

medium thickness, slightly flatter and moderately wider approaching terminal coil.

TYPE DATA.—Male and female cotypes of *Nesticus pallidus* Emerton from Fountain Cave, next to Grand Caverns (=Weyer's Cave), August County, Virginia (A. S. Packard), in Museum of Comparative Zoology (seen). Male type of *Nesticus cavicola* Banks from a cave in Wood Canyon, Chiricahua Mountains, Arizona, June 1897 (H. E. Hubbard), in Museum of Comparative Zoology (seen). Female cotype of *Pocobletus mexicanus* Banks from Agua Caliente, Baja California Sur, in Museum of Comparative Zoology (seen); other cotype from Tepic, Nayarit, in the California Academy of Sciences (not seen). Male holotype of *Nesticus suggerens* Chamberlin from Shrewsburg, Louisiana, in the Museum of Comparative Zoology (seen). Female type of *Theones striatipes* Petrunkevitch from station on road from Lares to Yauco, Puerto Rico, in collection of Yale University (not seen). Female type of *Centromerus ovigerus* Petrunkevitch from field near Aguas Buenas, Puerto Rico, in collection of Yale University (not seen). Male and female cotypes of *Eidmannella attae* Roewer from Mendes, Brazil, in

Deutschen Kolonial- und Uebersee-Museum, Bremen, Germany (not seen). Male type of *Nesticus* (*Gondwanonesticus*) *dragani* Dumitresco, from a small cave in Genoa, Majorca, in the Institut de Spéologie "Emile Racovitza," Bucarest, Roumania (not seen).

DISTRIBUTION.—Widespread in North America, Central America, and the West Indies (see Map 8); now known from several stations in South America; introduced by trade into the Hawaiian Islands, England, and Majorca. The many hundreds of epigeal and cavernicole collections of *E. pallida* make impractical the full listing of all exact locality information, collection dates and sexual and immature representation, and credits for the collectors. In general the species is relatively uncommon in the northern states. It becomes progressively more numerous as one moves southward, notably in the southeastern states and Texas. The bias of cave collections is important to note because caves in these areas have been studied by many speleologists. As far as possible all epigeal and cave records are mentioned according to county. Almost all of the Mexican records come from

cave collecting; most records from the West Indies are from surface stations.

RECORDS.—CANADA: Ontario: Tobermory, tip of Bruce Peninsula, Manitoulin Island, female from cave. Latta, 15 mi. N Belleville, female from cave. **UNITED STATES:** **Alabama:** Blount County: Bangor Cave; Bryant Cave. Calhoun County: Weaver Cave; Lady Cave; Miller's Cave. Elmore County: 5 mi. SW Wetumpka. Jefferson County: West Birmingham. Limestone County: Carruth Cave. Madison County: Shelta Cave; Mathew's Cave; Byrd Spring Cave. Marshall County: Limrock Cave. Morgan County: Talucah Cave. Tuscaloosa County: Tuscaloosa. **Arizona:** Cochise County: Virtue Mine, Portal; Outlaw Cave; Buckelew Cave; Two-Hole Cave; Southwestern Research Station, 5 mi. W Portal, cave in Wood Canyon, Chiricahua Mountains. Arkansas: Benton, Chicot, Conroy, Hampstead and Mississippi counties: no specific localities. Madison County: Dinney's Cave. Washington County: Large Lelap Cave. **California:** Los Angeles County: Glendale. Orange County: Irvine Park, Santa Ana. Riverside County: Riverside. San Diego County: Anza-Borrego State Park, Coyote Canyon. Ventura County: 15 mi. S Oxnard. **Florida:** Alachua County: Grants Cave; Dudley Cave; Bat Cave; Gainesville. Dade County: 20 mi. W Miami; S Florida City; Homestead; 2 mi. SW Marathon. Highlands County: Lake Placid. Jackson County: Well Cave No. 1, Judge Cave; Miller's Cave; cave near Gerard's; Gerard's Cave; Florida Caverns; Old Indian Cave; Mill Pond Cave. St. John's County: Fort Marion, St. Augustine. **Georgia:** Floyd County: Cave Springs Cave. Randolph County: Grier's Cave. **Hawaii:** Kauai: Koloa Caves No. 1, No. 3, No. 4; Knudsen Cave No. 2. **Illinois:** Hardin County: Cave-in-Rock Cave; Cave Spring; Layoff Cave. Vermilion County: Kickapoo State Park. **Indiana:** Monroe County: Mayfield's Cave. Owen County: Porter Cave. **Iowa:** Dubuque County: Demperwolf Sinks. **Kansas:** 2 mi. SW Redfield. **Kentucky:** Adair County: Todd Cave. Logan County: Robertson Cave. **Louisiana:** East Baton Rouge Parish: Baton Rouge. **Maryland:** Alleghany County: Round Top Fissure; Fort Hill Fissure. Washington County: Howell's Cave; Crystal Grottoes; Mt. Etna Cave; Bowman's Cave; Dam No. 4 Cave; Sechrompf Cave. **Massachusetts:** Norfolk County: Cohasset. **Mississippi:** Clarke County: S. DeSota. Forest County: Hattiesburg. Harrison County: 42 mi. E New Orleans on Hy 90. **New Jersey:** Essex County: Livingston. Hunterdon County: Lambertville. Mercer County: Princeton. Middlesex County: Jamesburg. Somerset County: New Brunswick. **New Mexico:** Eddy County: Beetle Cave; Lake Cave; New Cave; Carlsbad Caverns; Ladder Cave; Jurnigen No. 1 Cave; Musk Ox Cave; Ringtail Cave; Watertank Cave; Endless Cave; near White's City. **North Carolina:** Durham County: Chapel Hill. Swain County: Bryson City. **Ohio:** Vinton County: Wildcat Cave; Columbus. **Oklahoma:** Murray County: Wild Woman Cave. Payne County: Stillwater. **Oregon:** Benton County: Corvallis. **Pennsylvania:** Berks County: Merkle Cave. Bucks County: Neshaminy Creek, near Jamison. Mifflin County: Lower Johnson Cave. **South Carolina:** Chesterfield County: Cheraw. Oconee County: Stumphouse Cave. **Tennessee:** Cannon County: Tenpenny Cave. Davidson County: Mill Creek Cave. Grundy County: Wildman's Cave. Knox County: Knoxville. Marion County: Nickajack Cave. Roan

County: Berry Cave. Rutherford County: Broyles Cave. Shelby County: Memphis. Wilson County: Cedars of Lebanon State Park. **Texas:** Some of the following records previously reported by Reddell (1965:74-75) as *Nesticus* sp., *pallida* and *mexicana*. Bell County: Hill's Cave. Bexar County: San Antonio; Government Canyon Bat Cave. Brooks County: Falfurrias. Burnet County: Snelling Cave; Nolan's Cave. Cameron County: Southmost Palm Grove, SE Brownsville; 4 mi. E Santa Maria. Childress County: Windmill Crack Cave. Clay County: Charlie. Collingsworth County: Turtle Cave. Comal County: Heidrich's Cave. Crockett County: Water Cave; 09 Well; Dudley Cave. Dallas County: White Rock Lake; Dallas. Hardeman County: Campsey Cave. Hidalgo County: Edinburg. Howard County: Cramer's Scenic Mountain Cave. King County: River Styx Cave. Kinney County: Webb Cave; 10 mi. N Brackettville. Llano County: Enchanted Rock Cave; 20 mi. N Fredericksburg. Matagorda County: Palacios. Menard County: Powell's Cave; Neel's Cave. Nueces County: Corpus Christi. Reagan County: Big Lake State Park Cave. Real County: Bonner Fallout Shelter Cave. San Saba County: Fern Cave; Schleicher County: Cave Y. Starr County: 5 mi. E Rio Grande City. Stonewall County: Aspermont Bat Cave. Sutton County: Mayfield Cave. Taylor County: Abilene. Travis County: Jack's Joint; Austin Caverns; Broken Straw Cave; Cave X; Goat Cave; Airman's Cave; Cotterell Cave; Midnight Cave; Lunsford Cave. Uvalde County: Story Cave; Rambie's Cave. Val Verde County: H. T. Mier's Cave; Four-Mile Cave (Sally Cave); Oriente Milestone Molasses Bat Cave; Langtry Lead Cave; Fern Cave; Emerald Sink. Ward County: Rattlesnake Cave. Washington County: Devil's Den. Williamson County: Inner Space Caverns; Coffin Cave; Three-Mile Cave; McNeil Quarry Cave; Steam Cave; Elm Water Cave; Bat Well Cave; Williams Cave; Ballroom Cave No. 2. **Utah:** Utah County: Timpanogos Cave National Monument. **Virginia:** Alleghany County: Walking Cave. Augusta County: Glade Cave; Grand Caverns, Fountain Cave. Giles County: New River Cave. Lee County: Glen Olinger Cave; Smith's Milk Cave; Gallohan Cave No. 1; Cattle Cave. Page County: Ruffner's Cave; Luray Caverns. Rockbridge County: Tolley's Cave. Rockingham County: Massanutten Caverns; Steam Hole Cave. Scott County: Harris Pit Cave; Ellington Cave. Tazewell County: Burke's Garden Cave. Washington County: Hall Bottom Cave No. 1; Perkins Cave. **West Virginia:** Grant County: Smokehole Caverns. Greenbrier County: McLaughlin-Unus Cave. Mercer County: Jackson's Park. Pocahontas County: Sharp's Cave. **Wisconsin:** Vilas County: Lac du Flambeau. **MEXICO:** Some of following records previously reported by Gertsch (1971:98) and Reddell and Mitchell (1971:146) under *Nesticus pallidus*; and by Gertsch (1977:123) under *Eidmannella suggerens*. **Campeche:** Ciudad del Carmen; Cenote de Cantemo; Grutas de Xtacumbilunam. **Chiapas:** Finca Santa Marta, near Huehuetán; Ocosingo; Puerto Madero; near Río San Gregorio; Finca Cuahtemoc, near Cadahuetán; 5 mi. W San Cristóbal; Tuxtla Gutiérrez; Cueva de Zapaluta; Cueva Cerro Hueco; Sótano de las Golondrinas; Hoyo de Don Nicho; Cueva Cerro Hueco; Cueva del Tío Ticho; Cueva del Tempisque; Sumidero del Camino; **Chihuahua:** Cueva del Diablo. **Coahuila:** 15 mi. N Saltillo; Sumidero de Alicantre; Cueva del Granjeno. **Colima:** 5 mi. SW Colima. **Distrito Federal:** Desierto de los Leones; Cueva del Cerro de la Estrella. **Guerrero:**

Gruta de Cacahuamilpa; Huajojutla. **Hidalgo:** Chapulhuacán; E side of Jacala. **Jalisco:** Ajijic; La Venta. **Michoacán:** Cueva de la Calera; 5 mi. E Cojumatlan. **Morelos:** Cuernavaca; Tepoztlán. **Nayarit:** Tepic; La Mesa de Nayarit. **Oaxaca:** Papaluapán; Tolosa; Monte Albán; Cueva del Guano; Cueva de Puente de Fierro. **Puebla:** Tlacotepec; Tehuacán; Sumidero de Atepolihuit de San Andres; Sima de la Cruz Verde; Sima Zoquiapan; Cueva Murciélago de Xocoyolo; Grutas de Jonotla; Sima de Esteban; Cueva de Xocoyolo; Cueva de Tasalolpan; Sumidero de Cohuatichan; Cueva Vampiros de la Mona; Cueva Xochitl; Sima Octimaxal Sur No. 1 and No. 2; Grutas de Ateno. **Querétaro:** Sótano del Tigre; Sótano Encantado; Cueva de la Milpa; Sótano de Conchas; Sótano de Nogal; Sótano de Tilaco. **San Luis Potosí.** Cueva Chica; Cueva de los Sabinos; Sótano de Yerbaniz; Sótano de Pichijumo; Sótano del Tigre; Sótano del Valle de los Fantasma; Sótano de la Tinaja; Sótano del Arroyo; Cueva de la Puente; Ventana Jabalí; Cueva de El Jobo; Cueva de la Curva; Cueva de los Grillos; Cueva de Otates; Cueva de la Laguna; Sótano de San Francisco; Sótano de las Golondrinas; Sótano de las Piedras; Valles; Tamazunchale; 12 mi. E Ciudad del Maíz; 10 mi. W Cadereata. **Sinaloa:** E Concordia. **Tabasco:** Cueva del Azufre. **Tamaulipas:** Cueva de la Capilla; Bee Cave; Cueva de la Mina; Sótano de las Pinas; Cueva de la Virgen; Sótano de Jineo; Sótano de Tres Manantiales; Sótano de Vazquez; Cueva X; Entrada del Viento Baja; Sistema Purificación; Sótano de las Calenturas; Rancho del Cielo. **Veracruz:** Veracruz; near Jalapa; Tierra Blanca; Cueva del Ojo de Agua Grande; Cueva de Sala de Agua Grande; Cueva de la Cascada; Sótano de Oztouatliltalao; Cueva de la Sala Seca; Cueva del Infiernillo; Cueva de Corral de Piedra; Peñuela; Ciudad Mendoza; Puente Actopan. **Yucatán:** Chichén Itzá; San Bulhá Cave; Cenote Luchil; Cenote de Silhunchén; Cenote G; Cenote Tekom; Cenote de Sambulá; Pyramid, Izamal; Cenote de Acanceh; Grutas de Tzab-Nah; Actún Chacaljas; Actún Chen; Actún Nohcacab; Cenote de Hochtún; Cenote Aká Chen; Kaua; Ruinas de Kantunil; 2 mi. S Tecoh. **CENTRAL AMERICA:** **GUATEMALA:** La Cueva Comán, near Lake Atitlan. **COSTA RICA:** San José; Cerro Muerte, San Juan Province; Cartago; Portarenas, 5 mi. S El Volcán Hy. **WEST INDIES:** **CUBA:** Soledad; Havana; University Hill, Havana; San Antonio de los Baños; Maisi; Valle del Río de Rancho Mundito; Astón a Emilio; Cueva del Jaguey; Cueva la Majana. **JAMAICA:** Kinloos; *Hanover Parish:* Cousins Cove Cave. *Manchester Parish:* Christiana. *St. Andrew Parish:* NE slope of Long Mt.; Richard's Reservoir; Hope Gardens. *St. Catherine Parish:* 2 mi. W Red Hills Road. *St. Thomas Parish:* Roselle Falls. *Trelawny Parish:* Glastonbury. **DOMINICAN REPUBLIC:** La Romana; Puerto Plata; Mt. Diego de Ocampo. **HAITI:** Enneny; Kenskoff; Cap Haitien. **VIRGIN ISLANDS** (not mapped): St. Croix; St. Thomas. **BRITISH VIRGIN ISLANDS:** Tortola; Virgin Gorda. **BRITISH WEST INDIES** (not mapped): Nevia; St. Kitts. **PUERTO RICO** (not mapped): (Other data on Puerto Rican cave biology in Peck, 1974.) Maricao National Forest; Castañer; San Sebastián; Mayagüez; 5 mi. N Mayagüez; El Yunque; Experimental Station, Lajas; Aguas Buenas Cave; Aguas Buenas; Cueva de Corozal; Cueva de Cerro San José; Empalme Cave; Bayaney; Tunnel Cave, Quebradillas; Cueva de los Alfaros, Isabela; Obispo Isla (Isleta Marina);

Cayo Don Luis. **BERMUDA** (not mapped): 2 records without specific data. **SOUTH AMERICA** (not mapped): **TRINIDAD:** Cuerpe, Santa Margarita Circ. Road. **ARGENTINA:** Tucuman. **BRAZIL:** Mendes. **EUROPE** (not mapped): **ENGLAND:** Cumberland, near Stonethwaite, Borrowdale; Kew Gardens, Surrey. **MAJORCA:** Grotte de Geneva.

Eidmannella rostrata, new species

Nesticus sp., Reddell, 1965: 174 (part).

DIAGNOSIS.—Depigmented troglobite with reduced eyes related to *E. pallida*, found in caves of and adjacent to the Edwards Plateau region of Central Texas, with following genitalic features: anterior septum of epigynum (Fig. 283) produced into small beak; male palpus (Fig. 281) with single outer spur on paracymbium and apically rounded tegular process.

ETYMOLOGY.—Specific name from Latin *rostratus*, with a beak.

DISCUSSION.—The phenotype of these essentially eyeless spiders is as follows: Small white or yellow spider with long legs; eyes rarely present, usually very small, widely separated, evanescent or obsolete; epigynum with small or prominent beak as seen from below or from the side, shorter in some specimens and sometimes thickened to trivial bulb shape; male palpus compact with thick embolus widened approaching coil of conductor, with single black outer spur on paracymbium and rounded tegular apophysis on the bulb. The single spur on the conductor appears occasionally in *pallida* itself and represents one of the derivative features of cave-adapted males. Some of the specimens of this wide-ranging taxon show some intergradation to the *suggerens* phenotype and still retain small eyes and relatively short legs; they are assigned arbitrarily to the *rostrata* series. The specimens from nearly 40 caves from 10 or more counties show modest variation suggesting that many of these are in separate enclaves and already forming distinctive phenotypes of their own.

DESCRIPTION

Female holotype from Schneider Ranch Cave, Kendall County.—Total length 2.7 mm. Carapace 1.35 mm long, 1.15 mm wide. Abdomen 1.65 mm long, 1.1 mm wide.

Whole spider white to pale yellow without darker pattern.

Eyes evanescent, pearly white, without darker pigment; anterior median eyes missing, others widely separated. Clypeus 0.25 mm high, equal to five diameters of anterior lateral eye. Ratio of eyes;

$$\text{ALE:AME:PLE:PME} = 6:0:6:6$$

Posterior eye row moderately procurved; median eyes separated by three diameters, one diameter from lateral eyes.

	Limb Segment Lengths (mm)				
	I	II	III	IV	PALP
Femur	2.75	2.15	1.75	2.50	0.50
Patella	0.65	0.50	0.50	0.60	0.20
Tibia	2.70	1.85	1.30	2.15	0.33
Metatarsus	2.50	1.80	1.50	2.15	—
Tarsus	1.15	0.85	0.80	0.90	0.70
Total	9.75	7.15	5.85	8.30	1.73

Leg formula 1423. First leg 7.2 times, first femur twice as long as carapace.

Epigynum (Figs. 282–283) narrower than that of typical *pallida*; anterior septum produced into prominent beak; posterior transverse bar straight behind but usually swollen at middle to small angle.

Male from Schneider Ranch Cave, Kendall County.—Total length 2.5 mm. Carapace 1.25 mm long, 1.2 mm wide. Abdomen 1.25 mm long, 1 mm wide.

Coloration and structure like those of female.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	2.50	1.80	1.55	2.25	0.65
Patella	0.65	0.60	0.50	0.55	0.20
Tibia	2.70	2.00	1.25	2.20	0.20
Metatarsus	2.75	1.90	1.70	2.40	—
Tarsus	1.00	0.70	0.65	0.75	0.70
Total	9.60	7.00	5.75	8.15	1.75

Leg formula 1423. First leg 7.7 times, first femur twice as long as carapace.

Male palpus (Fig. 281) compact, with thick embolus broadened in middle portion before apical coil; conductor produced apically to thin, forwardly directed spur; tegular apophysis rounded at apex; outer process of paracymbium single black spur.

TYPE DATA.—Female holotype from Schneider Ranch Cave; Kendall County, Texas, 27 February 1972 (J. Reddell), in American Museum of Natural History.

DISTRIBUTION.—Caves in and adjacent to Edwards Plateau of Central Texas. (See Map 9.)

RECORDS.—**Texas:** *Bandera County:* Garrison Hilltop Cave; Haby Water Cave; Fossil Cave; Fog Fissure. *Bexar County:* Madla's Cave; Robber Baron's Cave; Fair Hole. *Burnet County:* Longhorn Caverns. *Comal County:* Klar's Cave; Hitzfelder Cave; Bad Weather Pit; Strosser's Sink. *Hays County:* Halifax Bat Cave. *Kendall County:* Cascade Sinkhole; Cave Without-a-Name (Century Caverns); Cole (Kohl) Ranch Cave No. 1; Cascade Caverns; Schneider Ranch Cave; 474 Cave; Pfeiffer Crawlway Cave; Pfeiffer Dirt Sink; Prassell Ranch Cave; Cricket Cave. *Medina County:* Koch Cave; Surprise Cave. *Real County:* Skeleton Cave; Orell Crevice Cave; Orell Bat Cave. *Terrell County:* Goode Cave. *Uvalde County:* Whitecotton Bat Cave; Indian Creek Cave; Tampke Ranch Cave; Maybe Stream Cave. *Val Verde County:* Cave Hollow Cave.

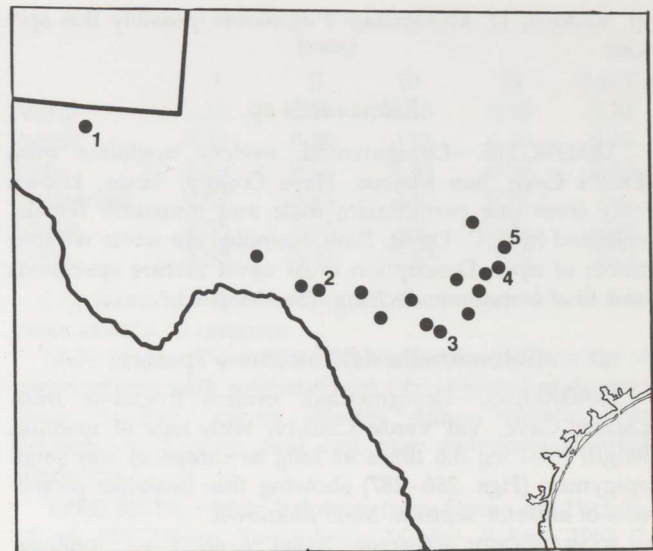
Eidmannella reclusa, new species

Nesticus sp. Mitchell and Reddell, 1971: 52, Fig. 28.

DIAGNOSIS.—Depigmented, eyeless troglobite with long legs (first leg 9 times as long as carapace) and small epigynum (Fig. 289) showing rounded enlargement of anterior septum. Male unknown.

ETYMOLOGY.—Specific name from Latin *recludere*, to close off, a recluse.

DISCUSSION.—Tooth Cave is famous for its distinctive fauna of troglobites and cavernicoles of other classifications. Surface and cave *Eidmannella* surrounding this cave in Travis County have their eyes well developed, shorter legs, but the epigyna are of quite similar type, without prominent development of the anterior septum



Map 9.—Distribution of Texas troglobitic *Eidmannella*: *rostrata*, n. sp. (unnumbered dots, ten counties); *bullata*, n. sp. (1, Wiggley Cave, Culberson County); *delicata*, n. sp. (2, Ladder Cave, Val Verde County); *nasuta* (3, Davenport Cave, Medina County); Unnamed species (4, Ezell's Cave, Hays County); *reclusa*, n. sp. (5, Tooth Cave, Travis County).

most suggestive of the *suggerens* phenotype. *Eidmannella reclusa* is obviously a troglobite and considered here to be in a restrictive enclave not susceptible to successful invasion of surface forms.

DESCRIPTION

Female holotype.—Total length 3.5 mm. Carapace 1.4 mm long, 1.25 mm wide. Abdomen 2.5 mm long, 2 mm wide.

Cephalothorax and appendages white to pale yellow. Abdomen gray. Carapace smooth, without trace of eyes.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	2.50	2.80	2.20	3.00	0.60
Patella	0.70	0.65	0.55	0.70	0.25
Tibia	3.40	2.40	1.50	2.50	0.60
Metatarsus	3.35	2.40	1.75	2.60	—
Tarsus	1.20	1.00	0.80	1.15	0.75
Total	12.15	9.25	6.80	9.95	2.05

Leg formula 1423. First leg 9 times, first femur 2.5 times as long as carapace.

Epigynum (Figs. 288–290) with broadly rounded anterior septum and internal structure of tubules differing from those of typical *suggerens* phenotype.

TYPE DATA.—Female holotype from Tooth Cave, 15 mi. NW Austin, Travis County, near Balcones Fault Zone, 9 June 1967 (R. Mitchell), in American Museum of Natural History.

DISTRIBUTION.—So far known only from Tooth Cave, but perhaps also in other nearby caves of Travis County as noted below. (See Map 9.)

RECORDS.—**Texas:** *Travis County:* Tooth Cave, 3 females and 4 immature, 2 March–19 August, various collectors; Schultze Cave, 2 mi. E Volente, 21 August 1963 (W. Russell), 3 penultimate males possibly this species; Kretschmar Cave, 15 mi. NW Austin, 2 March 1963

(J. Reddell, D. McKenzie), 1 immature possibly this species.

Eidmannella sp.

DIAGNOSIS.—Depigmented, eyeless troglobite from Ezell's Cave, San Marcos, Hays County, Texas, known only from one penultimate male and immature female, collected by J. C. Davis. Both examples are white without traces of eyes. Description must await mature specimens and final taxonomic decision. (See Map 9.)

Eidmannella delicata, new species

DIAGNOSIS.—Depigmented, eyeless troglobite from Ladder Cave, Val Verde County, with legs of medium length (first leg 6.6 times as long as carapace) and small epigynum (Figs. 286–287) showing thin beak-like projection of anterior septum. Male unknown.

ETYMOLOGY.—Specific name from Latin *delicatus*, dainty, nice.

DISCUSSION.—This small troglobite parallels *reclusa* in living in an enclave surrounded by epigeal and cavernicole relatives with normal to medium-sized eyes and epigynum showing little difference from those of the *suggerens* phenotype.

DESCRIPTION

Female holotype.—Total length 2.7 mm. Carapace 1.15 mm long, 1 mm wide. Abdomen 2 mm long, 1.5 mm wide.

Cephalothorax and appendages uniformly pale yellowish. Abdomen grayish. Carapace smooth, without trace of eyes.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	2.00	1.70	1.30	1.85	0.60
Patella	0.50	0.45	0.30	0.50	0.20
Tibia	2.15	1.50	0.90	1.70	0.30
Metatarsus	2.00	1.50	1.15	1.60	—
Tarsus	0.95	0.75	0.65	0.70	0.60
Total	7.60	5.90	4.30	6.35	1.70

Leg formula 1423. First leg 6.6 times, first femur 1.7 times as long as carapace.

Epigynum (Figs. 286–287) presenting thin but prominent beak-like projection from front of anterior septum; internal tubules like those of *suggerens* phenotype.

TYPE DATA.—Female holotype from Ladder Cave, Val Verde County, 2 April 1965 (J. Reddell), in American Museum of Natural History.

DISTRIBUTION.—Known only from Ladder Cave. (See Map 9.)

RECORD.—Texas: Val Verde County: Ladder Cave, 2 mi. E Diablo Cave, Calyx Hole Entrance, 11 August 1963 (J. Reddell, D. McKenzie), 5 females, 2 penultimate males.

Eidmannella nasuta, new species

DIAGNOSIS.—Depigmented, eyeless troglobite from Davenport Cave, Medina County, with long legs (first leg 10.3 times as long as carapace) and epigynum (Fig. 292) with prominent bulbous projection. Male unknown.

ETYMOLOGY.—Specific name from Latin *nasuta*, with a big nose.

DESCRIPTION

Female holotype.—Total length 3 mm. Carapace 1.25 mm long, 1.15 mm wide. Abdomen 2 mm long, 1.5 mm wide.

Cephalothorax and appendages unmarked yellow. Abdomen grayish. Carapace smooth, without trace of eyes except pair of faint subintegumental spots on each side.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	3.75	2.80	2.15	3.10	0.60
Patella	0.65	0.65	0.55	0.65	0.22
Tibia	3.70	2.60	1.50	2.75	0.36
Metatarsus	3.60	2.60	1.75	2.70	—
Tarsus	1.20	1.10	0.95	1.10	0.80
Total	12.90	9.75	6.90	10.30	1.98

Leg formula 1423. First leg 10.3 times, first femur 3 times as long as carapace.

Epigynum (Figs. 291–293) with anterior portion of septum swollen to large spherical process; transverse piece rounded behind, narrowed to sides.

TYPE DATA.—Female holotype from Davenport Cave, 12 mi. SW Bandera, Medina County, in Edwards Plateau region, 10 July 1966 (J. and J. Reddell), in American Museum of Natural History.

DISTRIBUTION.—Known only from above specimen from Davenport Cave. (See Map 9.)

Eidmannella bullata, new species

DIAGNOSIS.—Depigmented, essentially eyeless troglobite from Wiggley Cave, Culberson County, with legs of medium length (first leg 6.8 times as long as carapace) and epigynum (Fig. 295) with bulbous projection of anterior septum. Male unknown.

ETYMOLOGY.—Specific name from Latin *bullatus*, inflated, in reference to the projection on the epigynum.

DESCRIPTION

Female holotype.—Total length 2.5 mm. Carapace 1 mm long, 0.8 mm wide. Abdomen 1.75 mm long, 1 mm wide.

Cephalothorax and appendages yellow. Abdomen grayish.

Anterior median eyes obsolete, others evanescent, present as insignificant, widely separated pale spots.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	2.00	1.45	1.15	1.80	0.40
Patella	0.50	0.35	0.30	0.45	0.15
Tibia	1.85	1.40	—	1.60	0.30
Metatarsus	1.70	1.35	—	—	—
Tarsus	0.80	0.70	—	—	0.55
Total	6.85	5.20	—	—	1.40

Leg formula 1423. First leg 6.8 times, first femur twice as long as carapace.

Epigynum (Figs. 294–295) with anterior septum enlarged to bulbal projection; posterior transverse bar moderately rounded behind.

TYPE DATA.—Female holotype from Wiggley Cave, 4 mi S State Line, Culberson County, Texas, 27 June 1967 (J. Reddell, J. Fish, A. R. Smith), in American Museum of Natural History.

DISTRIBUTION.—So far known only from Wiggley Cave. (See Map 9.)

Eidmannella pachona, new species

DIAGNOSIS.—Small derivative taxon of *pallida* group known only from Cueva del Pachón, with distinctive genitalia; epigynum (Fig. 297) with small projecting lobe from anterior septum and male palpus (Figs. 284–285) with spike-like tegular process and forwardly directed conductor of the thin coiled embolus.

ETYMOLOGY.—Specific name from Spanish *pachona*, female pointerdog, in reference to the type-locality.

DESCRIPTION

Female.—Total length 2.3 mm. Carapace 0.8 mm long, 0.7 mm wide.

Cephalothorax and appendages bright yellow; eyes ringed with black. Abdomen grayish.

Clypeus 0.15 mm high, equal to 2.5 diameters of anterior lateral eye. Eyes of average size. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 6:2:6:6$$

Anterior eye row slightly recurved; median eyes separated by their diameter, as far from lateral eyes. Posterior eye row slightly recurved; median eyes separated by narrow diameter, about a third as far from lateral eyes. Median ocular quadrangle broader than long (20/11), narrowed in front in same ratio.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	0.93	0.75	0.55	0.90	0.30
Patella	0.30	0.27	0.23	0.32	0.10
Tibia	0.70	0.62	0.43	0.80	0.16
Metatarsus	—	0.55	0.54	0.70	—
Tarsus	—	0.40	0.40	0.44	0.32
Total	—	2.59	2.15	3.16	0.98

Leg formula probably 1423. First leg 1.15 times as long as carapace.

Epigynum (Figs. 296–297) small, with anterior portion of septum produced to trivial rounded lobe; posterior transverse bar straight behind.

Male holotype.—Total length 1.45 mm. Carapace 0.75 mm long, 0.7 mm wide.

Coloration like that of female but eyes larger and more heavily ringed with black.

Clypeus 0.12 mm high, equal to one and one-third diameters of anterior lateral eye. Ratio of eyes:

$$\text{ALE:AME:PLE:PME} = 9:5:9:9$$

Posterior eye row essentially straight; median eyes separated by their radius, about half as far from lateral eyes.

Limb Segment Lengths
(mm)

	I	II	III	IV	PALP
Femur	1.10	0.75	0.60	0.95	0.33
Patella	0.32	0.30	0.25	0.30	0.10
Tibia	1.10	0.77	0.55	0.88	0.10
Metatarsus	0.83	0.74	0.60	0.92	—
Tarsus	0.55	0.45	0.40	0.47	0.30
Total	3.90	3.01	2.40	3.52	0.83

Leg formula 1423. First leg 5.2 times, first femur 1.46 times as long as carapace.

Male palpus (Figs. 284–285) distinct as follows: tip of paracymbium with several trivial lobes instead of discrete spurs; tegular process slender spike; embolus thin throughout, making oval coil over anteriorly directed conductor.

TYPE DATA.—Male holotype from Cueva del Pachón, 13 mi. SW Mante, Tamaulipas, Mexico, 8 June 1967 (J. Reddell), in American Museum of Natural History.

DISTRIBUTION.—Known only from Cueva del Pachón.

RECORDS.—MEXICO: Tamaulipas: Cueva del Pachón. 13 mi. SW Mante. 25 November 1967 (J. Reddell, S. Fowler), female.

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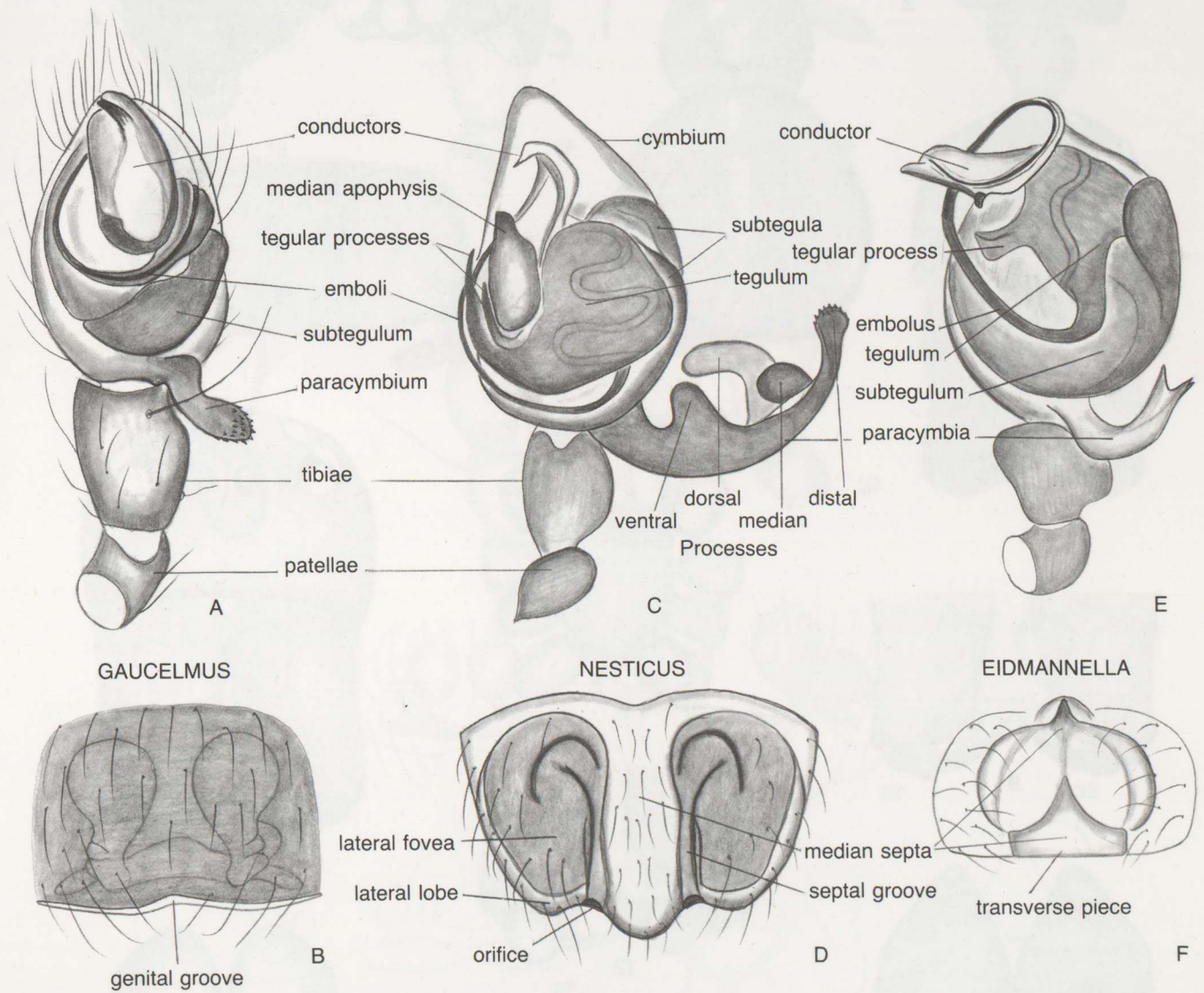
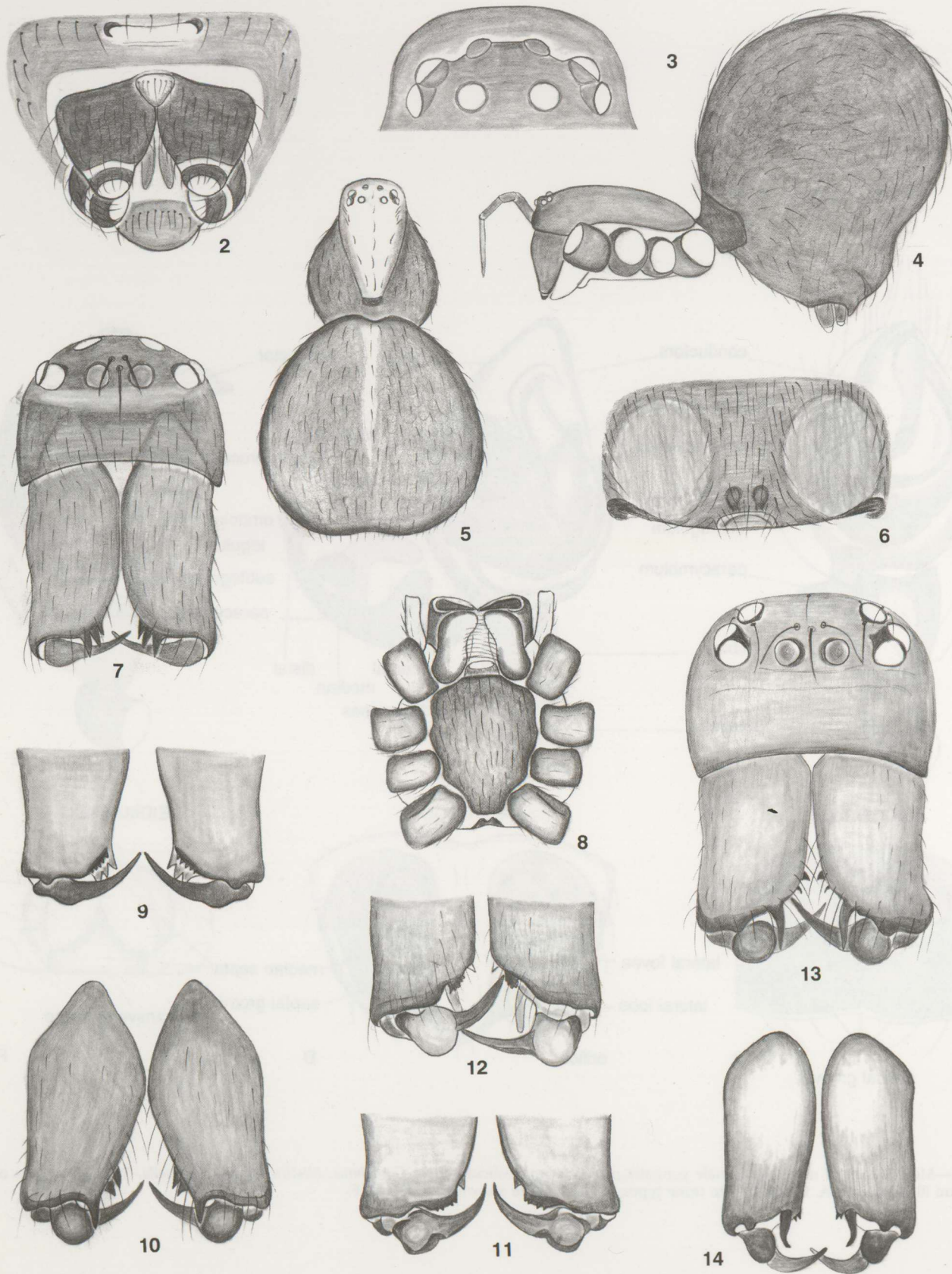
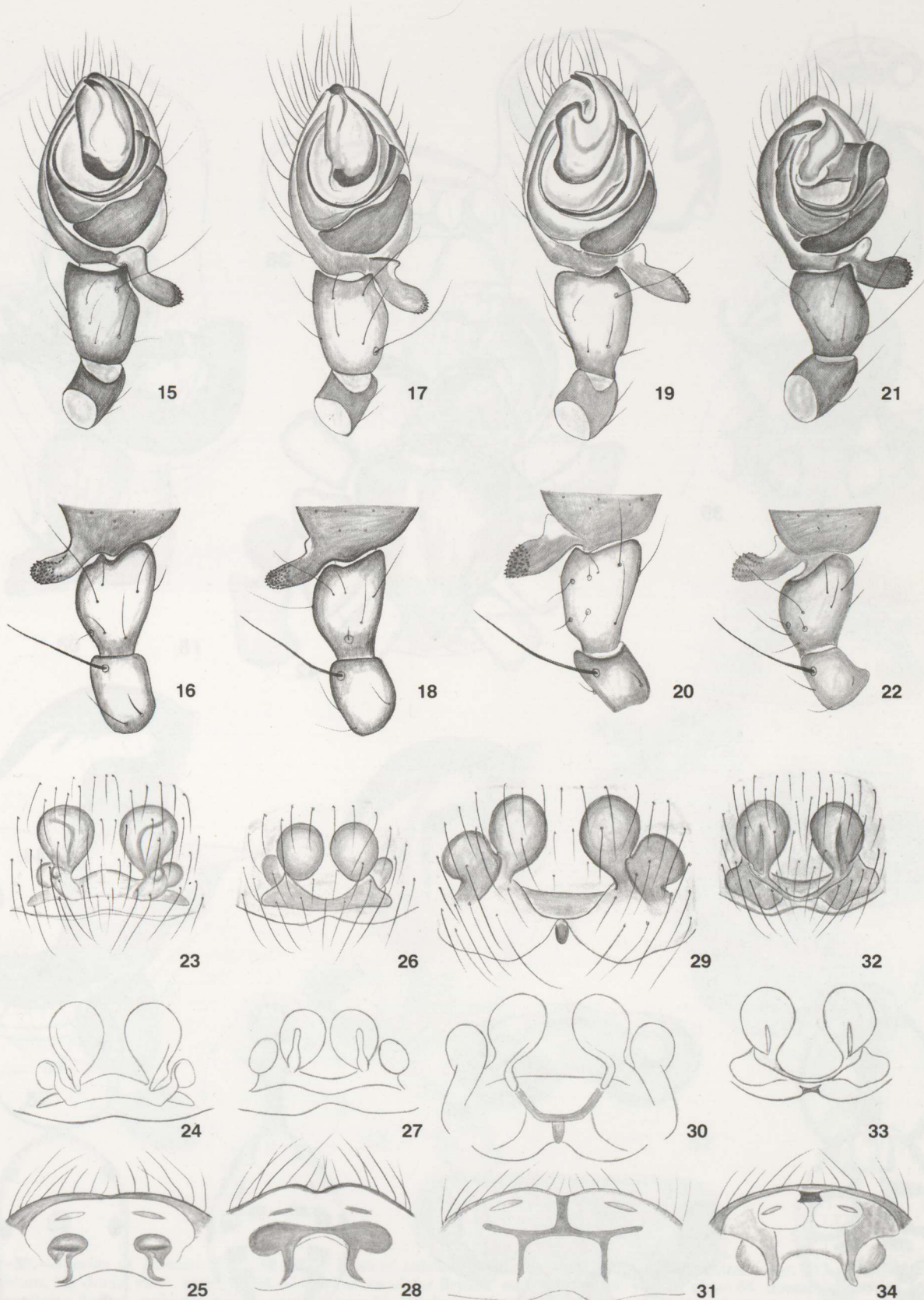


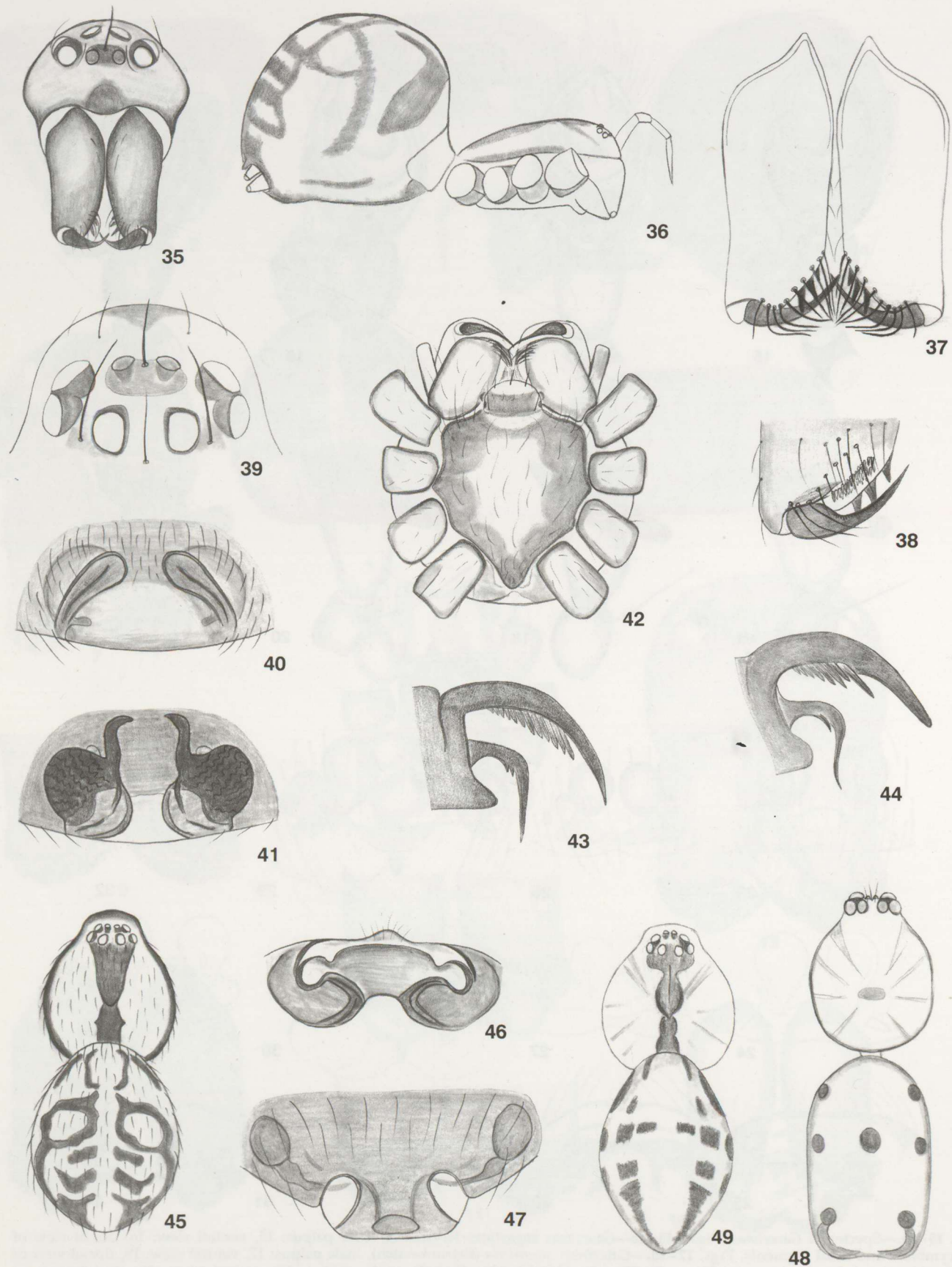
Fig. 1.—Morphology of male and female genitalia of American nesticid genera *Gaucelmus*, *Nesticus* and *Eidmannella*. The three types of palpi are illustrated in A, C and E. The three types of epigyna are shown in B, D and F.



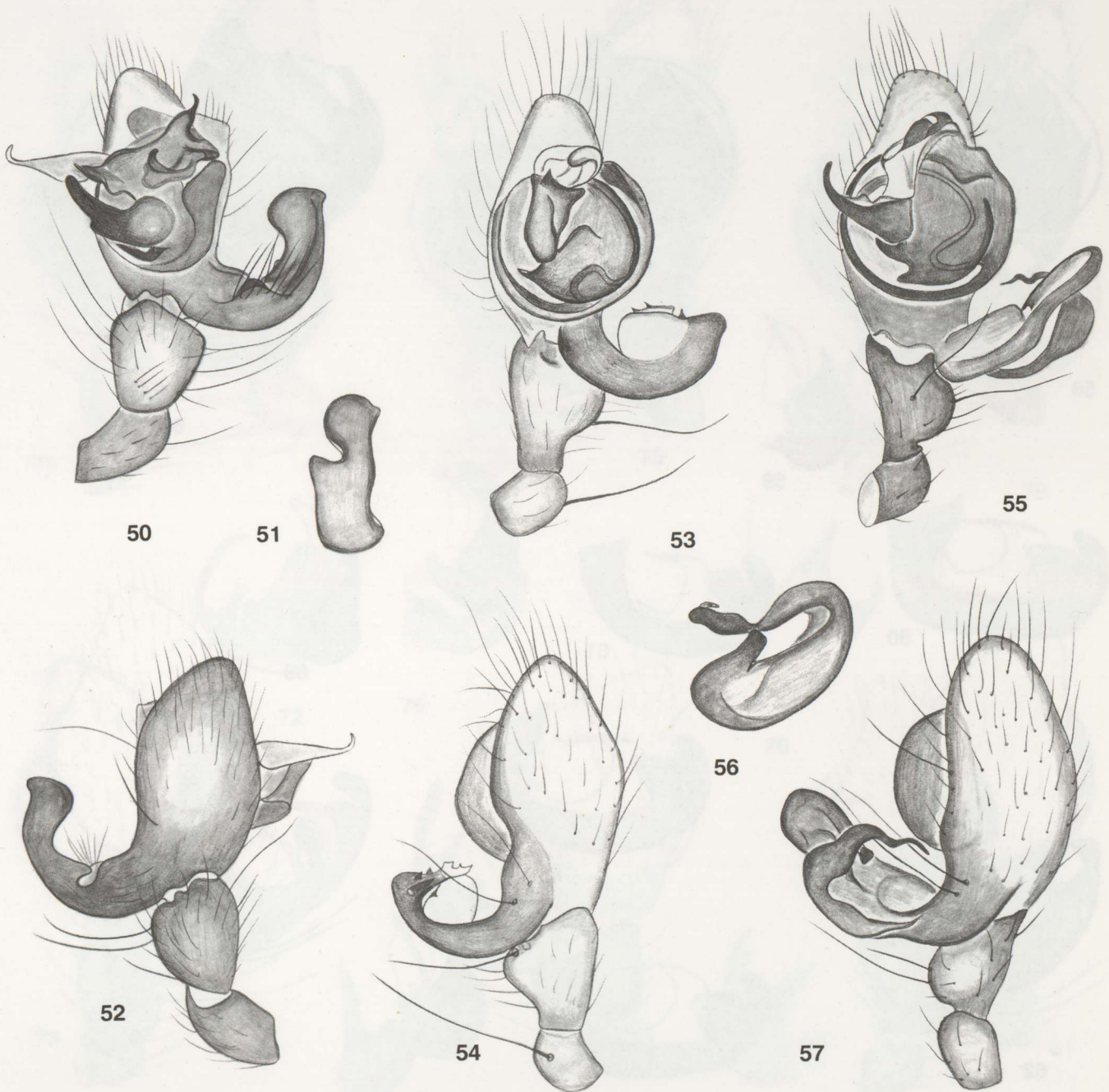
Figs. 2-14.—Species of *Gaucelmus*: Figs. 2-9.— *Gaucelmus augustinus* Keyserling, female: 2, spinnerets; 3, eyes, dorsal view; 4, carapace and abdomen, lateral view; 5, carapace and abdomen, dorsal view; 6, base of abdomen with positions of book lungs, epigynum and genital groove; 7, carapace and chelicerae, frontal view; 8, sternum and underside of carapace; 9, chelicerae, inner view. Figs. 10-11.—*Gaucelmus augustinus* Keyserling, male: 10, chelicerae, frontal view; 11, chelicerae, inner view; 13, carapace and chelicerae, frontal view. Figs. 12-13.—*Gaucelmus calidus* Gertsch; 12, chelicerae, inner view; 13, carapace and chelicerae, frontal view. Fig. 14.—*Gaucelmus cavernicola* (Petrunkevitch), chelicerae, frontal view.



Figs. 15-34.—Species of *Gaucelmus*: Figs. 15-16—*Gaucelmus augustinus* Keyserling, male palpus: 15, ventral view; 16, dorsal view of paracymbium and basal segments. Figs. 17-18.—*Gaucelmus cavernicola* (Petrunkevitch), male palpus: 17, ventral view; 18, dorsal view of paracymbium and basal segments. Figs. 19-20.—*Gaucelmus calidus* Gertsch, male palpus: 19, ventral view; 20, dorsal view of paracymbium and basal segments. Figs. 21-22.—*Gaucelmus tropicus*, n. sp., male palpus: 21, ventral view; 22, dorsal view of paracymbium and basal segments. Figs. 23-25.—*Gaucelmus augustinus* Keyserling, epigynum: 23, ventral view; 24, dorsal view; 25, posterior view. Figs. 26-28.—*Gaucelmus cavernicola* (Petrunkevitch) epigynum: 26, ventral view; 27, dorsal view; 28, posterior view. Figs. 29-31.—*Gaucelmus calidus* Gertsch, epigynum: 29, ventral view; 30, dorsal view; 31, posterior view. Figs. 32-34.—*Gaucelmus tropicus*, n. sp., epigynum: 32, ventral view; 33, dorsal view; 34, posterior view.



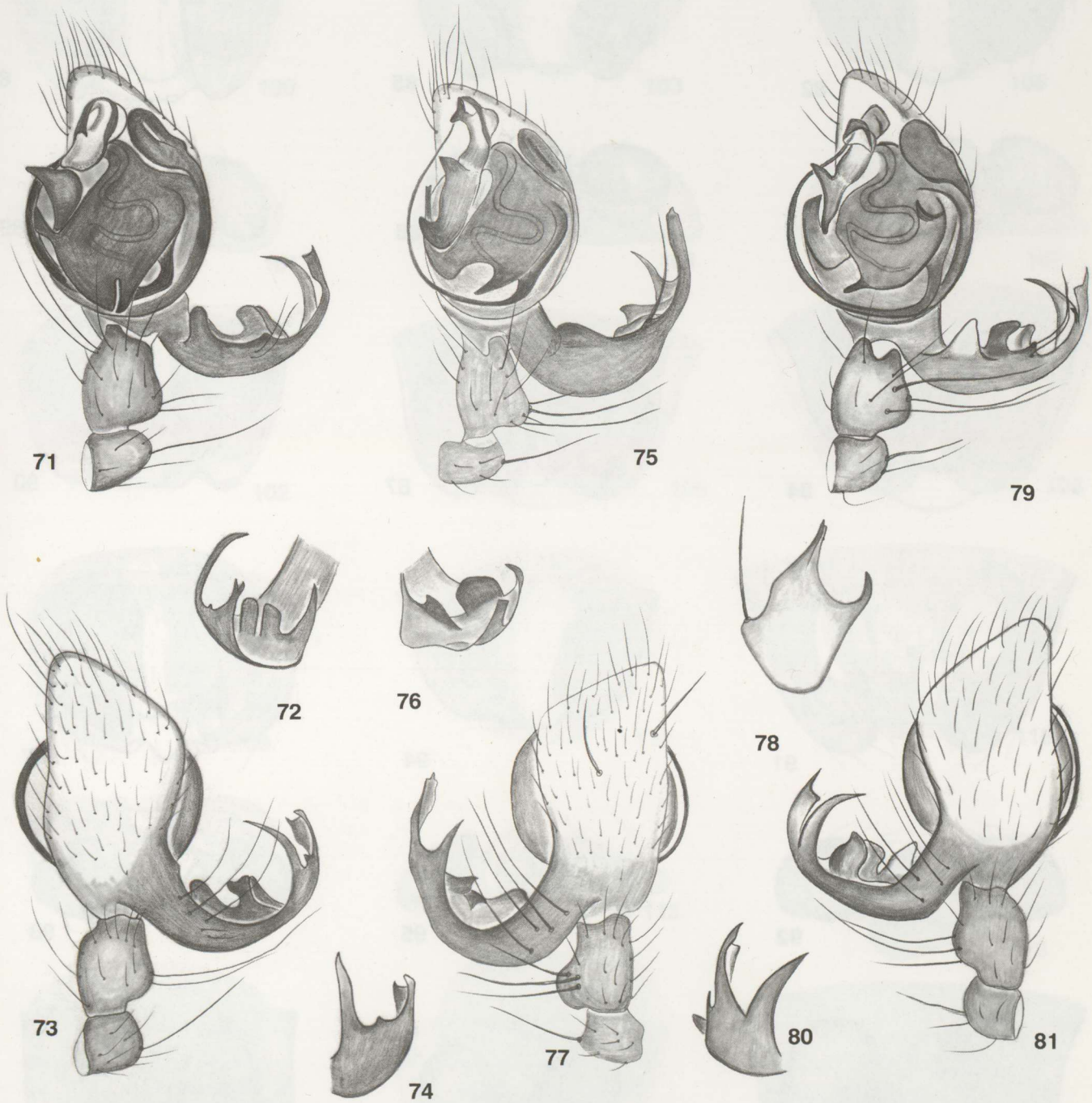
Figs. 35-49.—Species of *Nesticus*: Figs. 35-45. —*Nesticus cellulanus* (Clerck), female: 35, carapace and chelicerae, frontal view; 36, carapace and abdomen, lateral view; 37, chelicerae, frontal view; 38, chelicerae, inner view; 39, eyes, dorsal view; 40, epigynum, ventral view; 41, epigynum, dorsal view; 42, sternum and underside of carapace; 43, claws of first tarsus; 44, claws of fourth tarsus; 45, carapace and abdomen, dorsal view. Figs. 46-48.—*Nesticus maculatus* Bryant, female: 46, epigynum, posterior view; 47, epigynum ventral view; 48, carapace and abdomen, dorsal view. Fig. 49.—*Nesticus antillanus* Bryant, female, dorsal view.



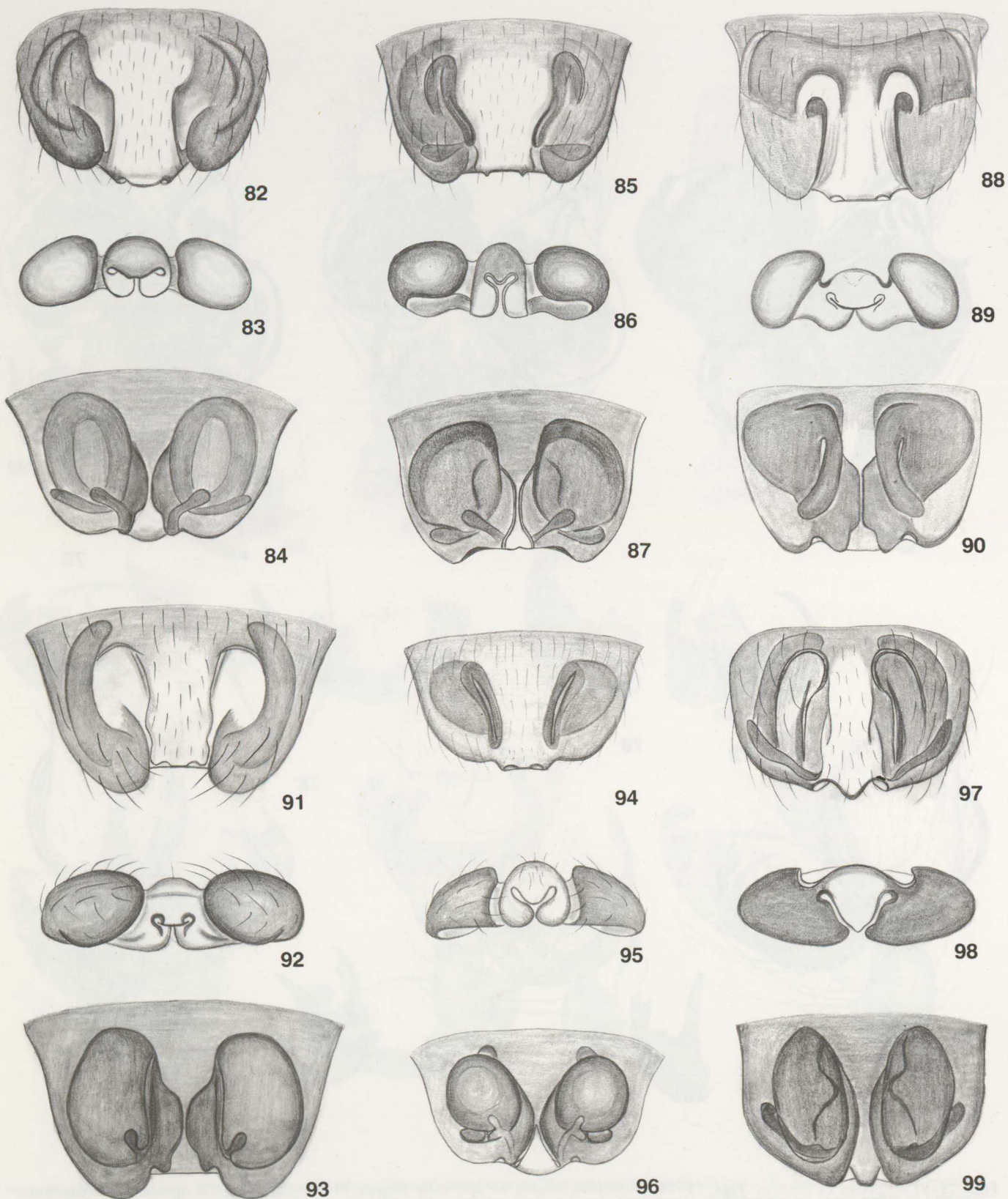
Figs. 50-57.—Species of *Nesticus*: Figs. 50-52.— *Nesticus cellulanus* (Clerck), male palpus: 50, ventral view; 51, prolateral view of paracymbium; 52, dorsal view. Figs. 53-54.— *Nesticus maculatus* Bryant, male palpus: 53, ventral view; 54, dorsal view. Figs. 55-57.— *Nesticus antillanus* Bryant, male palpus; 55, ventral view; 56, subdorsal view of paracymbium; 57, dorsal view.



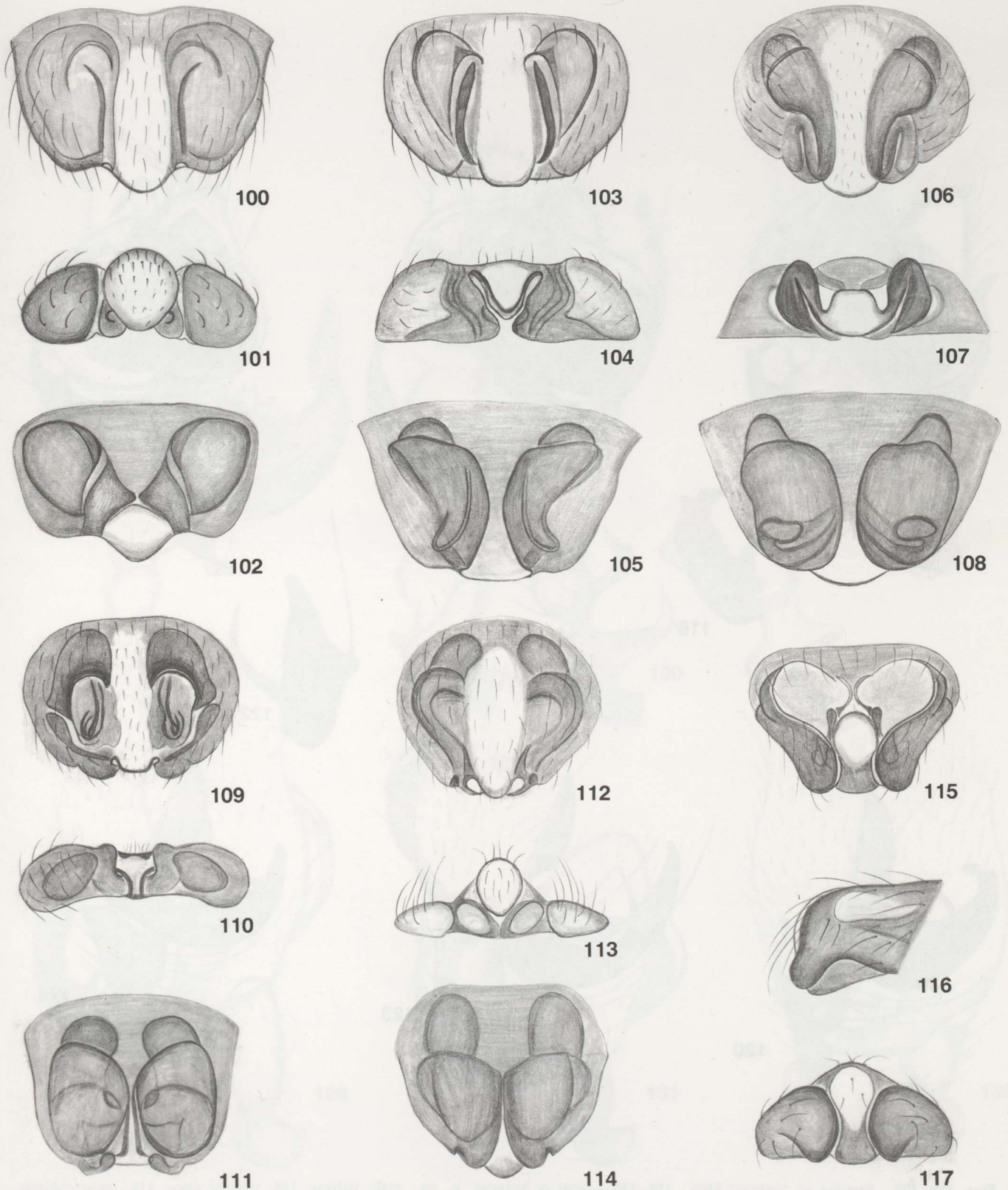
Figs. 58-70.—Species of *Nesticus*: Figs. 58-63.—*Nesticus tennesseensis* (Petrunkevitch), male palpus: 58, ventral view; 59, tegular process (Fish Hatchery Cave, Virginia), lateral view; 60, paracymbium (Indian Cave, Tennessee), dorsal view; 61, paracymbium (Indian Cave, Tennessee), dorsal view; 62, dorsal view; 63, paracymbium (Fish Hatchery Cave, Virginia), dorsal view. Figs. 64-65.—*Nesticus mimus*, n. sp., male palpus: 64, ventral view; 65, tegular process, lateral view. Figs. 66-67.—*Nesticus holsingeri*, n. sp., male palpus: 66, paracymbium, dorsal view; 67, tegular process, prolateral view. Figs. 68-70.—*Nesticus carolinensis* (Bishop), male palpus: 68, ventral view; 69, tegular process, prolateral view; 70, dorsal view.



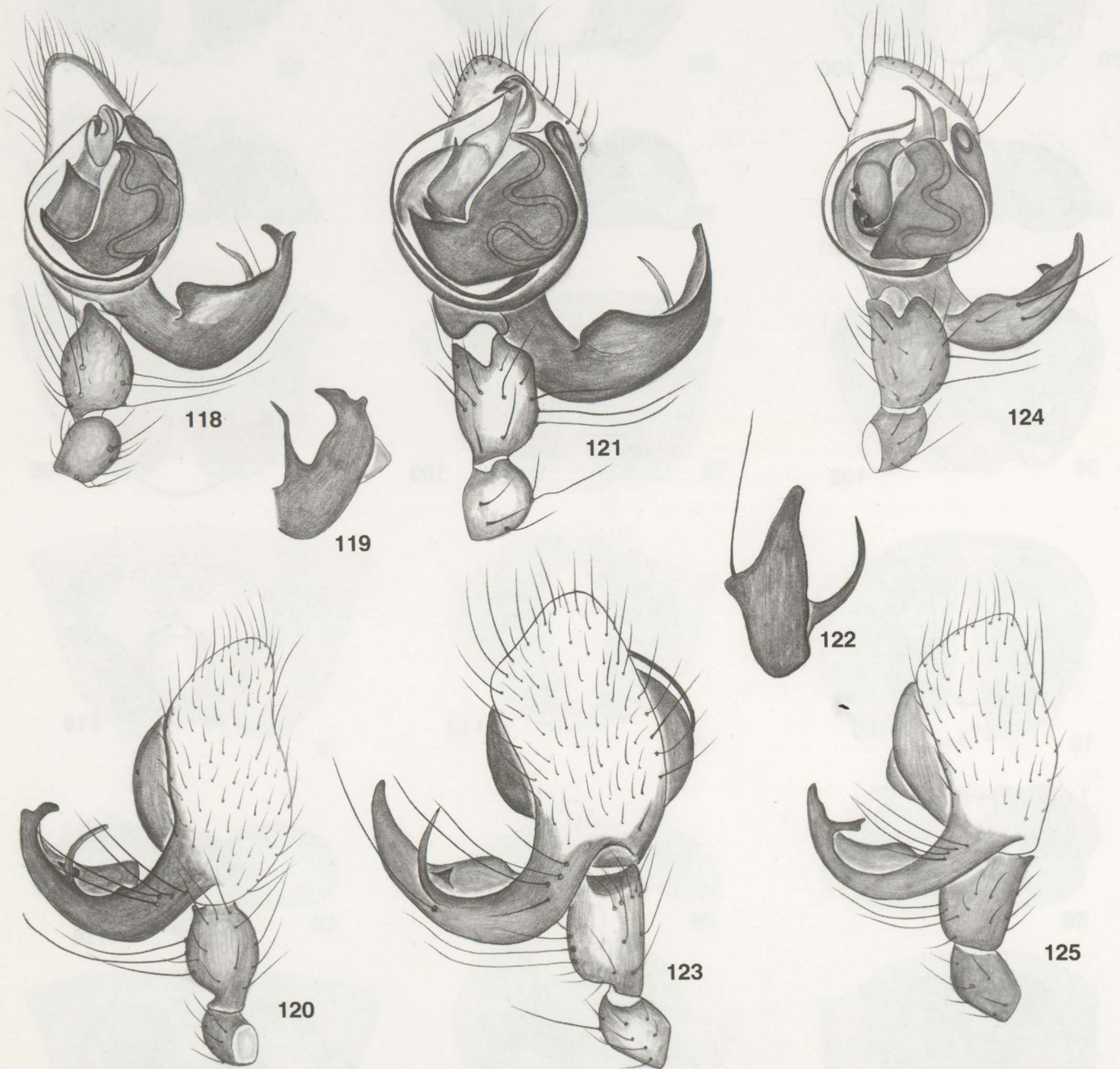
Figs. 71-81.—Species of *Nesticus*: Figs. 71-74. —*Nesticus stupkai*, n. sp., male palpus: 71, ventral view; 72, apex of paracymbium, subdorsal view; 73, dorsal view; 74, apex of paracymbium, sublateral view. Figs. 75-78.—*Nesticus reclusus*, n. sp., male palpus: 75, ventral view; 76, apex of paracymbium, subdorsal view; 77, dorsal view; 78, apex of paracymbium, sublateral view. Figs. 79-81.—*Nesticus sheari*, n. sp., male palpus: 79, ventral view; 80, apex of paracymbium, sublateral view; 81, dorsal view.



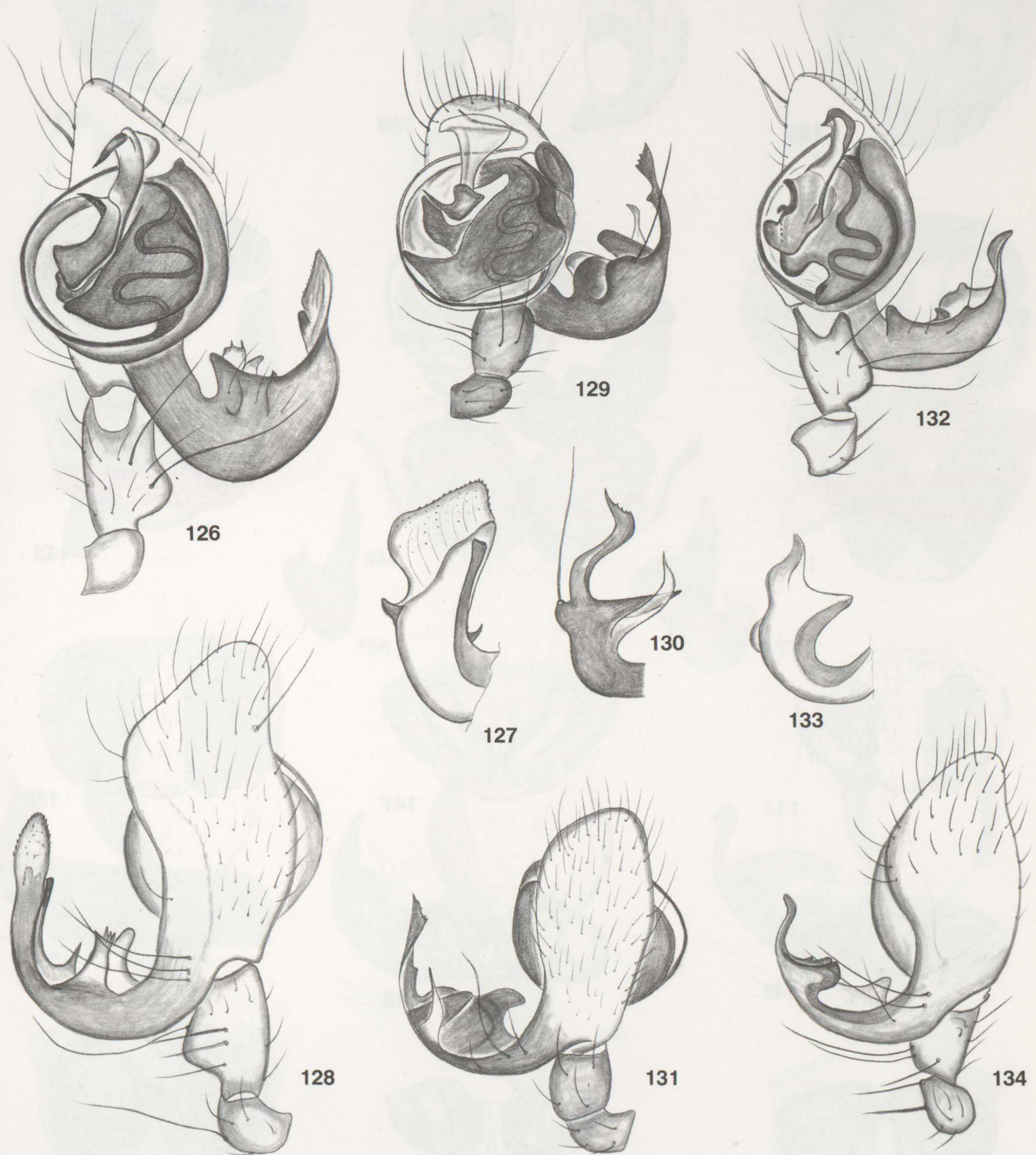
Figs. 82-99.—Species of *Nesticus*: Figs. 82-84.—*Nesticus tennesseensis* (Petrunkevitch), epigynum: 82, ventral view; 83, posterior view; 84, dorsal view. Figs. 85-87.—*Nesticus mimus*, n. sp., epigynum: 85, ventral view; 86, posterior view; 87, dorsal view. Figs. 88-90.—*Nesticus carolinensis* (Bishop), epigynum: 88, ventral view; 89, posterior view; 90, dorsal view. Figs. 91-93.—*Nesticus holsingeri*, n. sp., epigynum: 91, ventral view; 92, posterior view; 93, dorsal view. Figs. 94-96.—*Nesticus dilutus*, n. sp., epigynum: 94, ventral view; 95, posterior view; 96, dorsal view. Figs. 97-99.—*Nesticus furtivus*, n. sp., epigynum: 97, ventral view; 98, posterior view; 99, dorsal view.



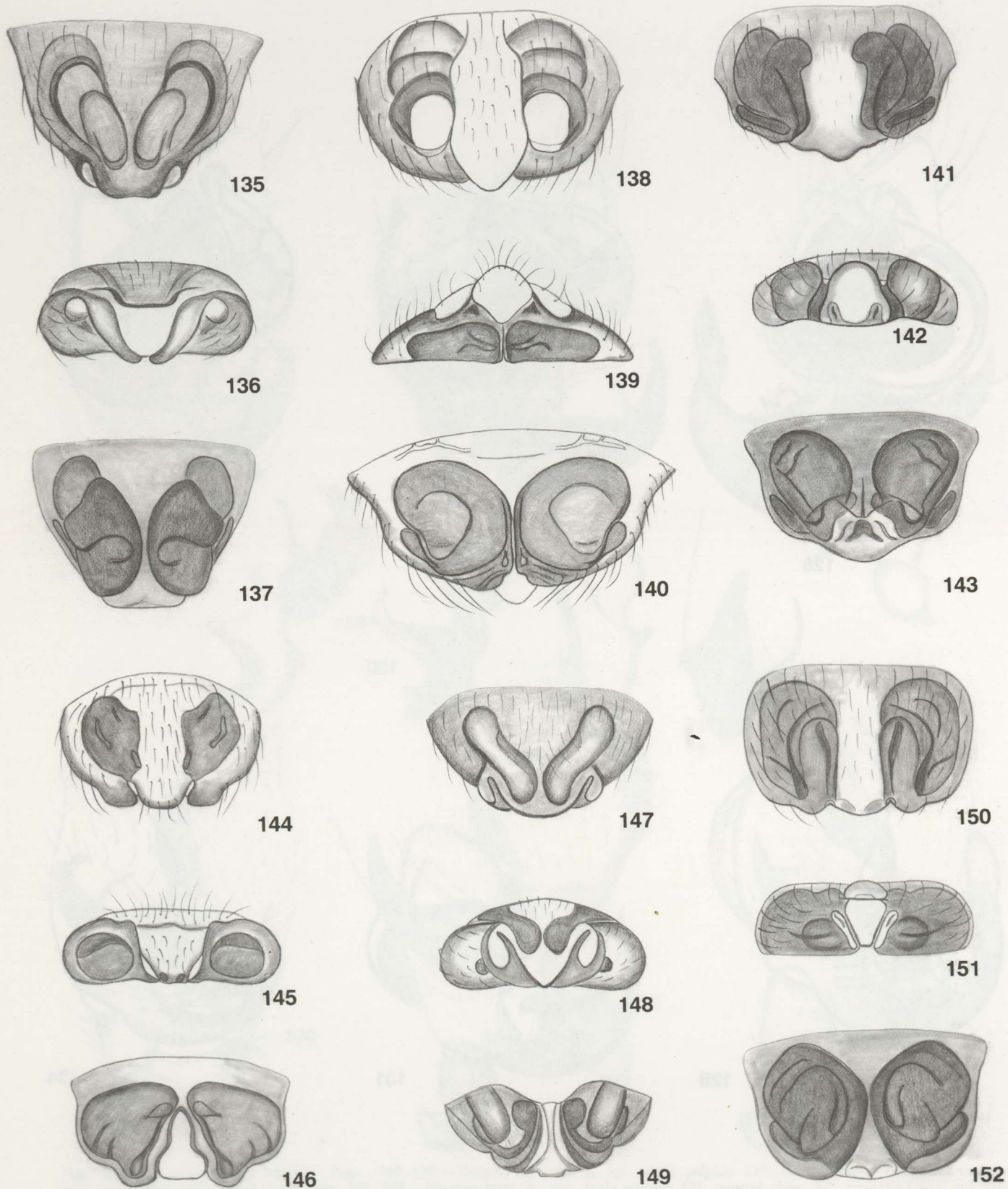
Figs. 100-117.—Species of *Nesticus*: Figs. 100-102.—*Nesticus paynei*, n. sp., epigynum: 100, ventral view; 101, posterior view; 102, dorsal view. Figs. 103-105.—*Nesticus barrowsi*, n. sp., epigynum: 103, ventral view; 104, posterior view; 105, dorsal view. Figs. 106-108.—*Nesticus stupkai*, n. sp., epigynum: 106, ventral view; 107, posterior view; 108, dorsal view. Figs. 109-111.—*Nesticus reclusus*, n. sp., epigynum: 109, ventral view; 110, posterior view; 111, dorsal view. Figs. 112-114.—*Nesticus secretus*, n. sp., epigynum: 112, ventral view; 113, posterior view; 114, dorsal view. Figs. 115-117.—*Nesticus archeri*, n. sp., epigynum: 115, ventral view; 116, posterior view; 117, dorsal view.



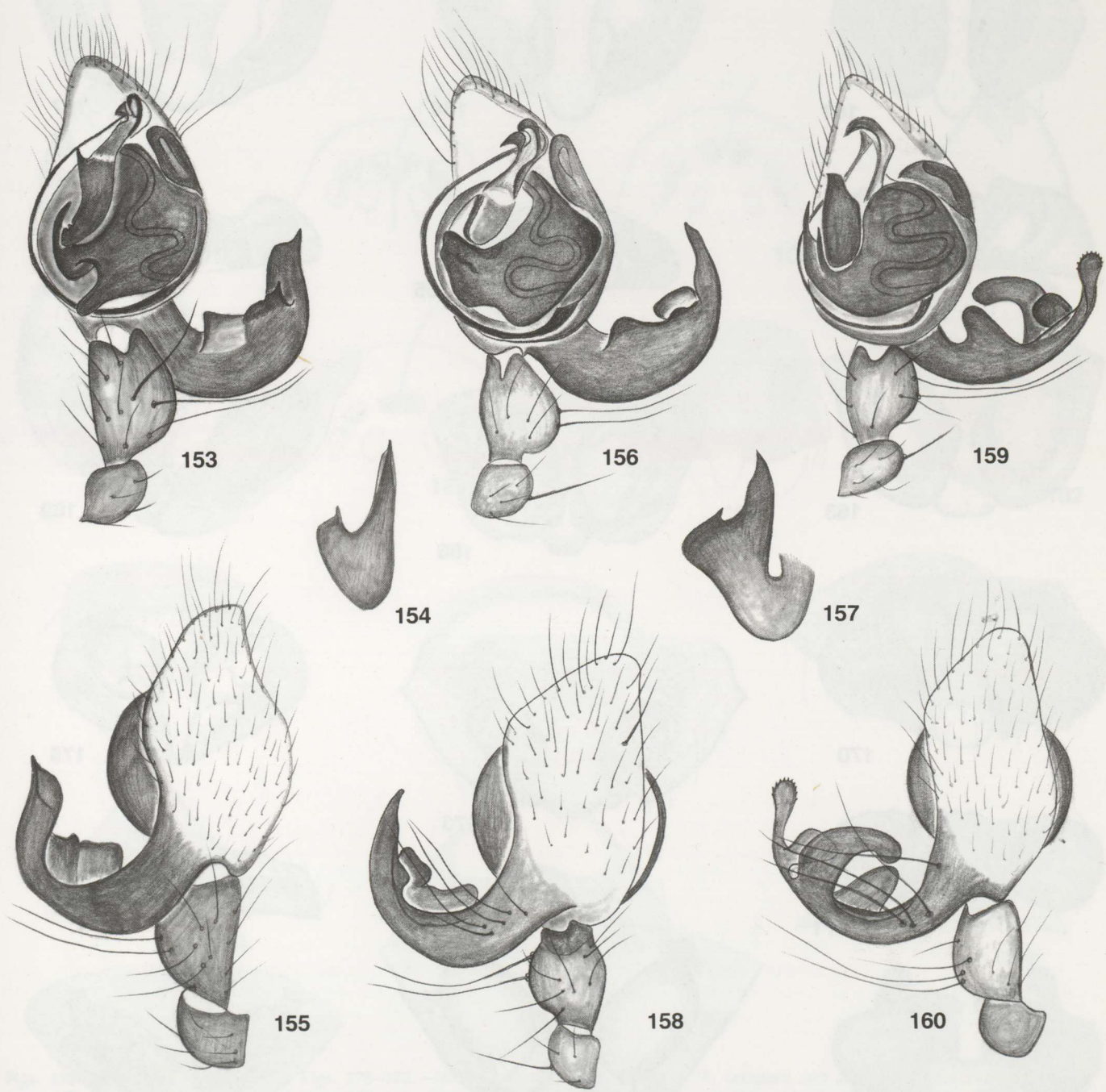
Figs. 118-125.—Species of *Nesticus*: Figs. 118-120.—*Nesticus barrowsi*, n. sp., male palpus: 118, ventral view; 119, paracymbium, sublateral view; 120, dorsal view. Figs. 121-123.—*Nesticus barri*, n. sp., male palpus: 121, ventral view; 122, paracymbium, sublateral view; 123, dorsal view. Figs. 124-125.—*Nesticus carteri* Emerton, male palpus: 124, ventral view; 125, dorsal view.



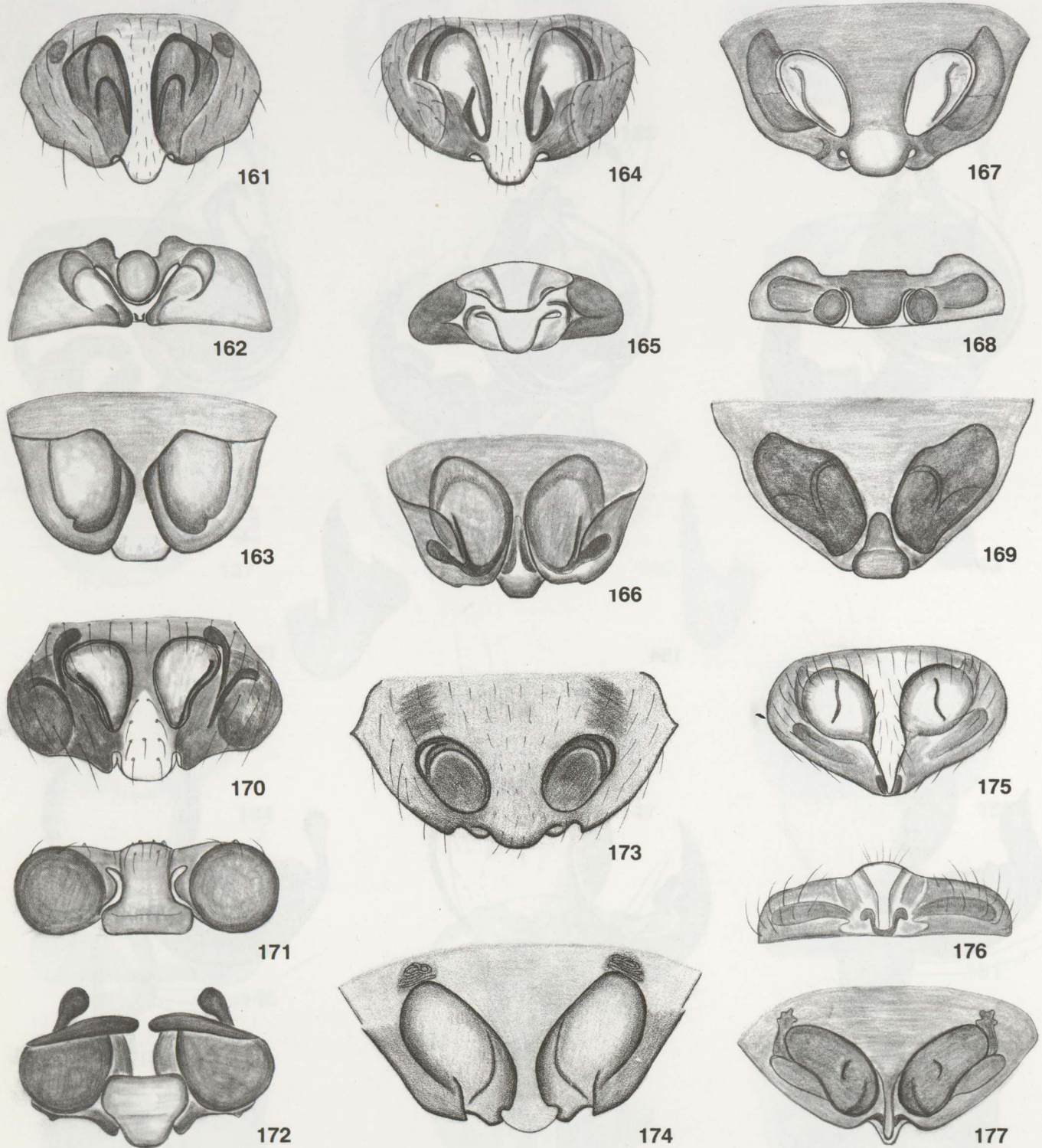
Figs. 126-134.—Species of *Nesticus*: Figs. 126-128.—*Nesticus brimleyi*, n. sp., male palpus: 126, ventral view; 127, paracymbium, retrolateral view; 128, dorsal view. Figs. 129-131.—*Nesticus archeri*, n. sp., male palpus. 129, ventral view; 130, paracymbium, retrolateral view; 131, dorsal view. Figs. 132-134.—*Nesticus cooperi*, n. sp., male palpus. 132, ventral view; 133, paracymbium retrolateral view; 134, dorsal view.



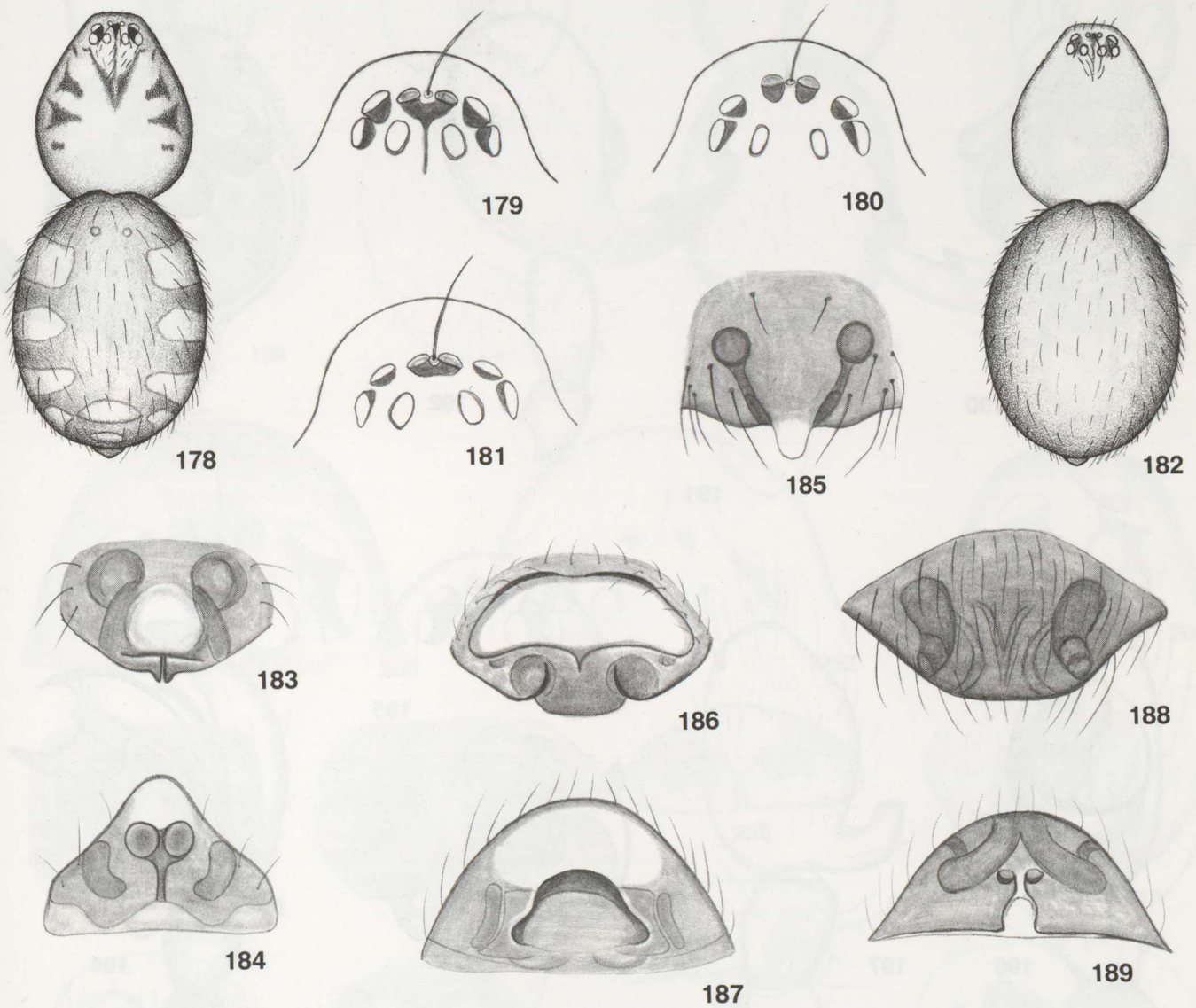
Figs. 135–152.—Species of *Nesticus*: Figs. 135–137.—*Nesticus sheari*, n. sp., epigynum: 135, ventral view; 136, posterior view; 137, dorsal view. Figs. 138–140.—*Nesticus brimleyi*, n. sp., epigynum: 138, ventral view; 139, posterior view; 140, dorsal view. Figs. 141–143.—*Nesticus silvanus*, n. sp., epigynum: 141, ventral view; 142, posterior view; 143, dorsal view. Figs. 144–146.—*Nesticus cooperi*, n. sp., epigynum: 144, ventral view; 145, posterior view; 146, dorsal view. Figs. 147–149.—*Nesticus bishopi*, n. sp., epigynum: 147, ventral view; 148, posterior view; 149, dorsal view. Figs. 150–152.—*Nesticus valentinei*, n. sp., epigynum: 150, ventral view; 151, posterior view; 152, dorsal view.



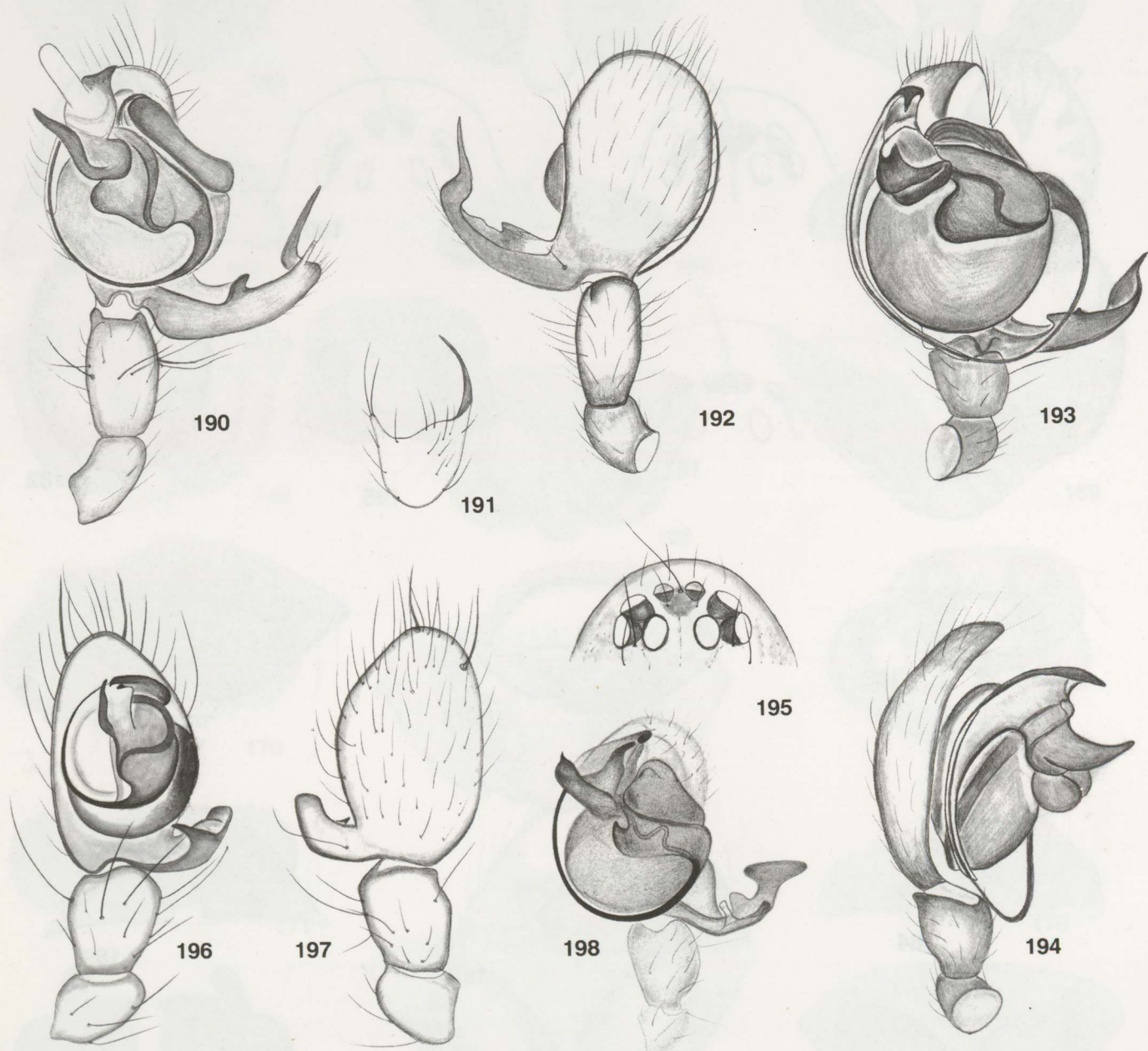
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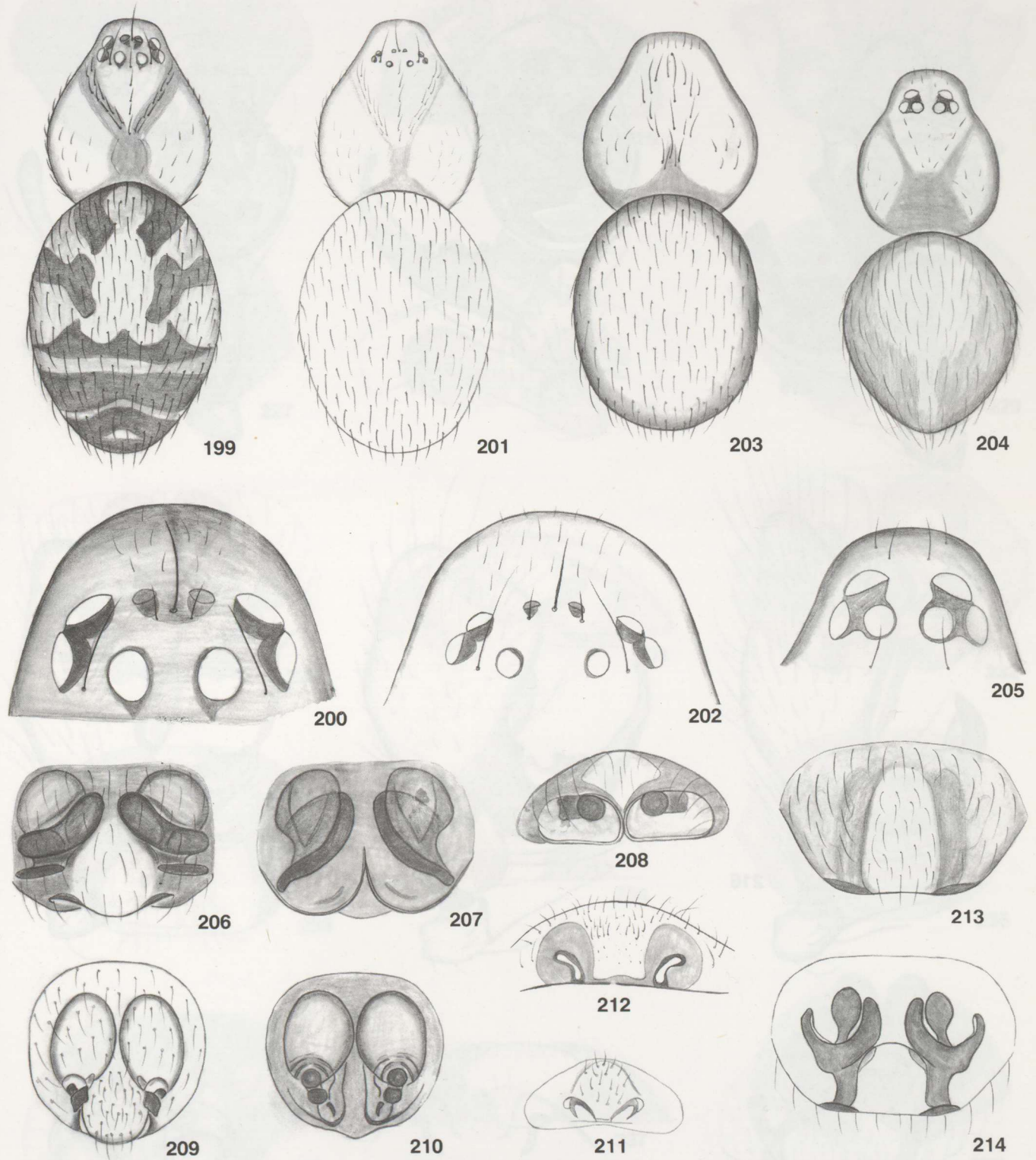
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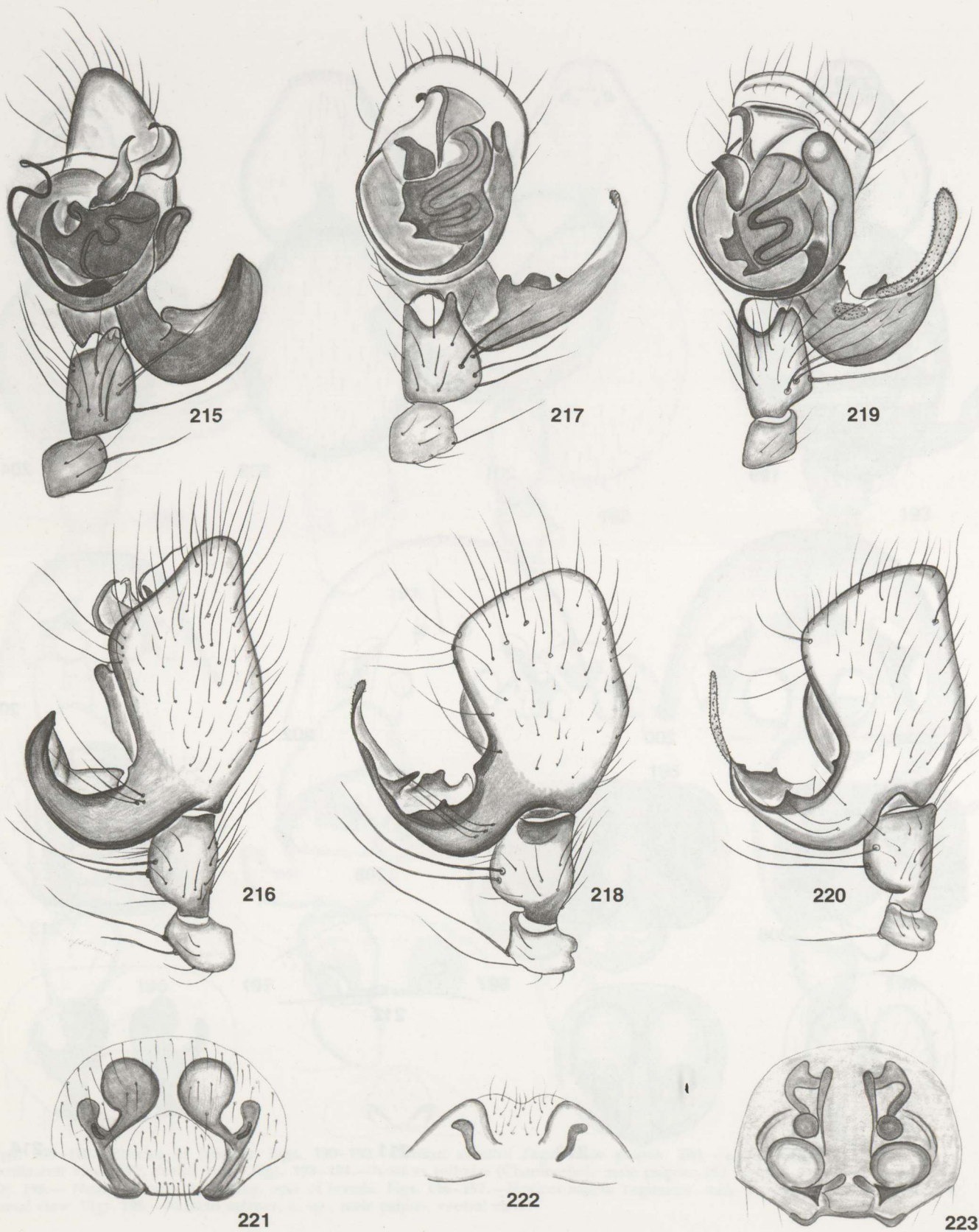
Figs. 178-189.—Species of *Nesticus*: Figs. 178-182.—*Nesticus silvestrii* Fage, female: 178, carapace and abdomen (Mendocino), dorsal view; 179, eyes (Mendocino), dorsal view; 180, eyes (Empire Cave), dorsal view; 181, eyes (Mercer's Cave), dorsal view; 182, carapace and abdomen (Mendocino), dorsal view. Figs. 183-184.—*Nesticus silvestrii* Fage, epigynum: 183, ventral view; 184, posterior view. Fig. 185.—*Nesticus mogera* Yaginuma, epigynum (Hawaii), ventral view. Figs. 186-187.—*Nesticus sodanus*, n. sp., epigynum: 186, ventral view; 187, posterior view. Figs. 188-189.—*Nesticus potterius* (Chamberlin), epigynum: 188, ventral view; 189, posterior view.



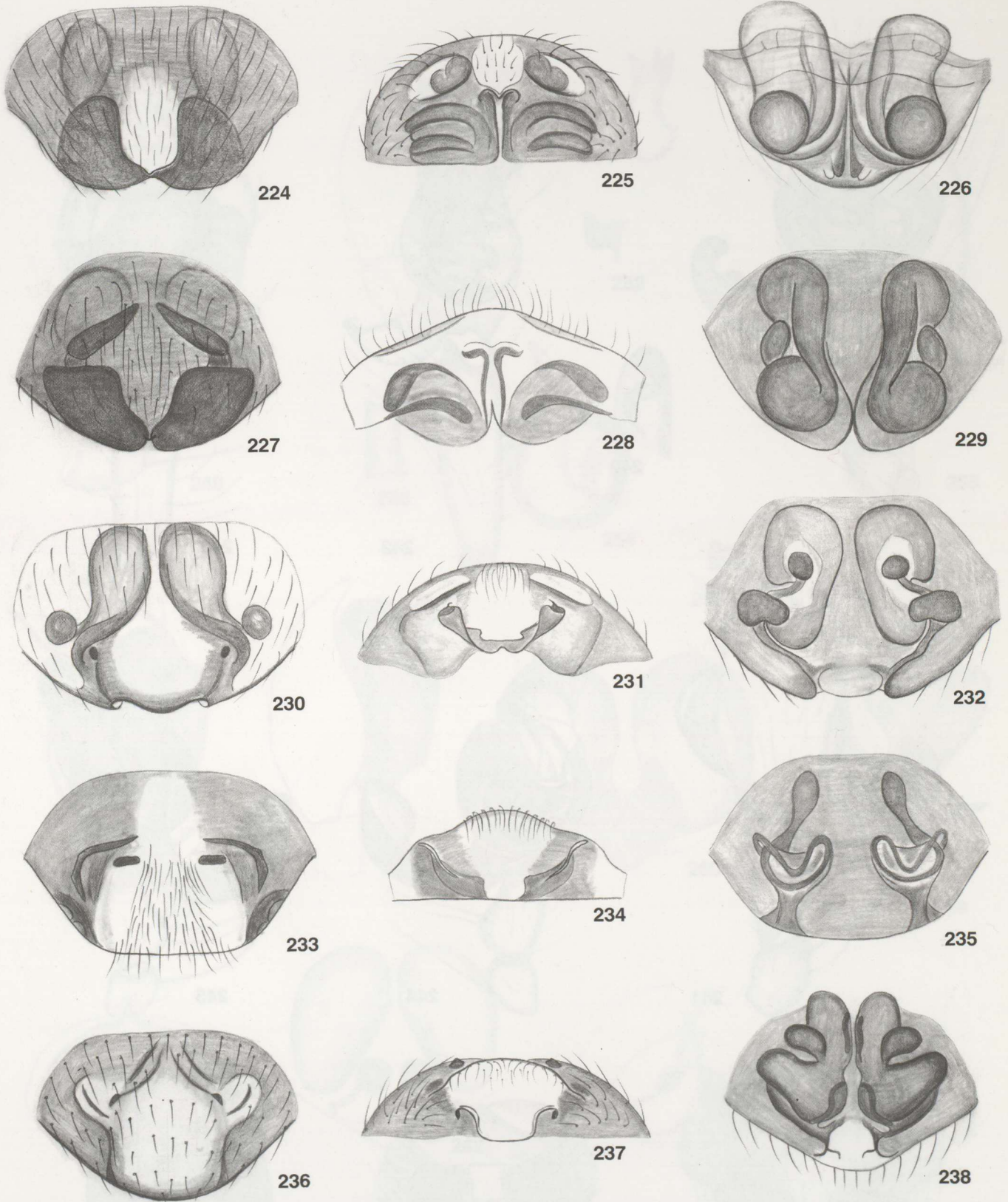
Figs. 190-198.—Species of *Nesticus*: Figs. 190-192.—*Nesticus silvestrii* Fage, male palpus: 190, ventral view; 191, paracymbium, retrolateral view; 192, dorsal view. Figs. 193-194.—*Nesticus potterius* (Chamberlin), male palpus: 193, ventral view; 194, dorsal view. Fig. 195.—*Nesticus mogera* Yaginuma, eyes of female. Figs. 196-197.—*Nesticus mogera* Yaginuma, male palpus: 196, ventral view; 197, dorsal view. Figs. 198.—*Nesticus sodanus*, n. sp., male palpus, ventral view.



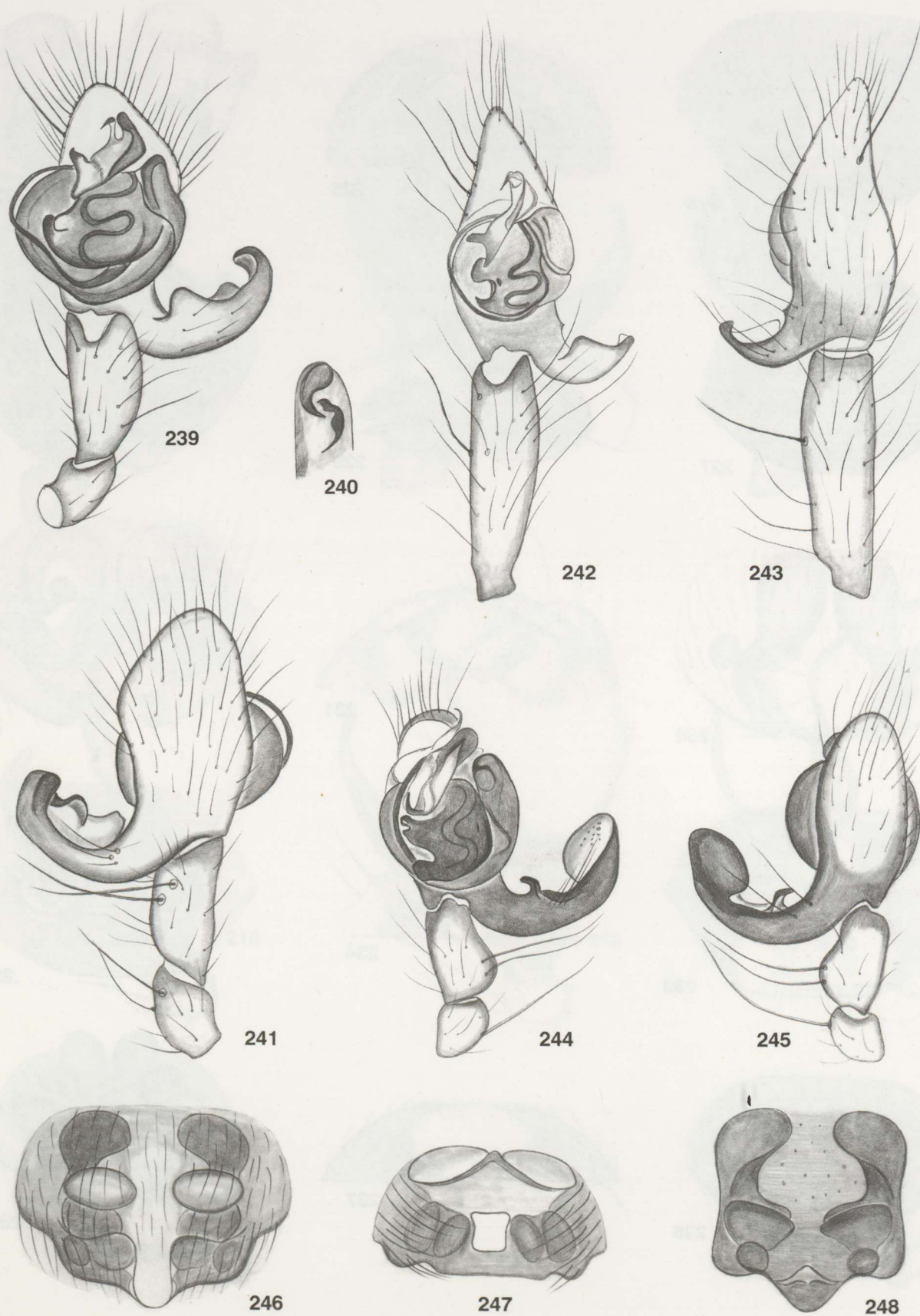
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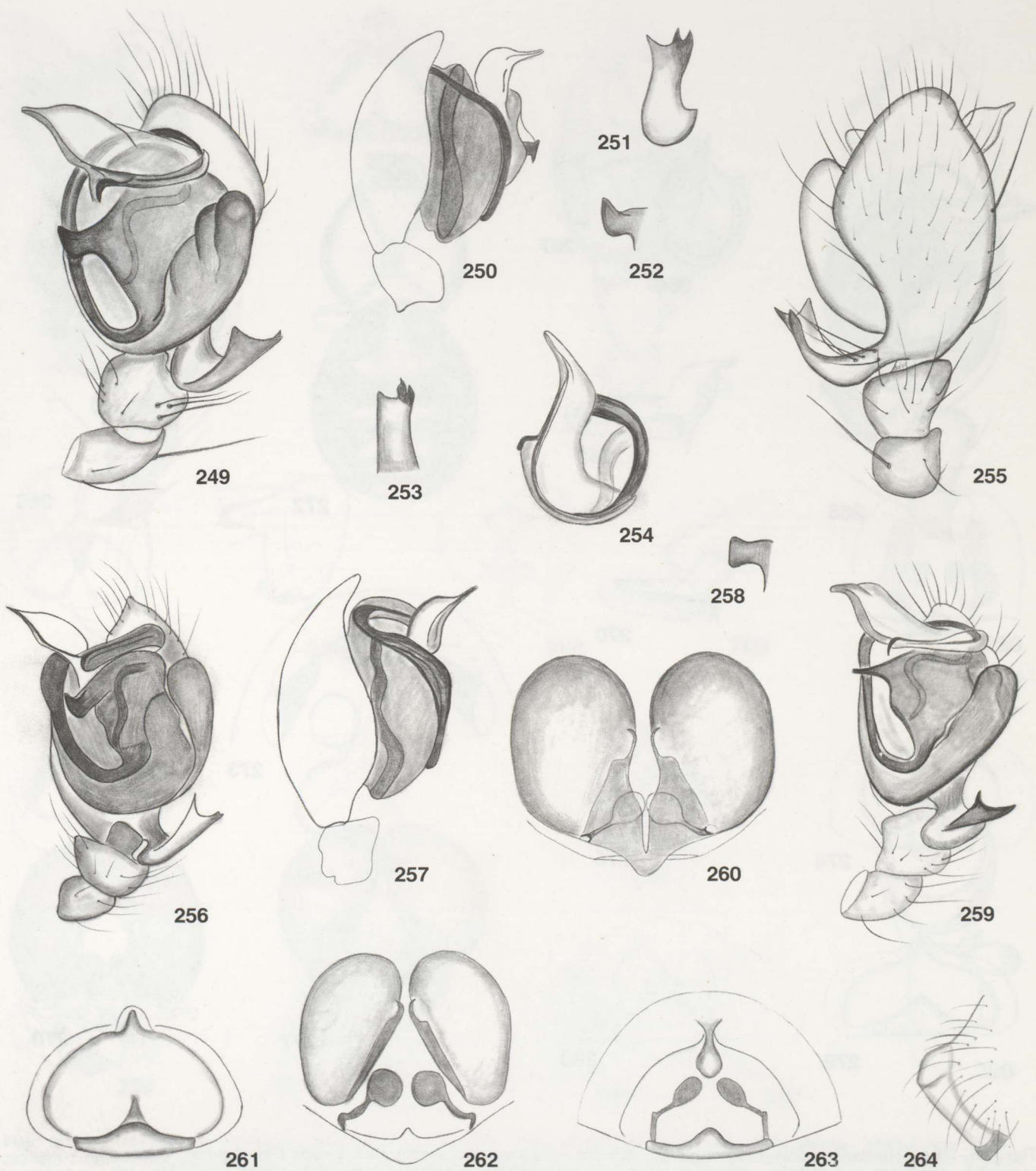
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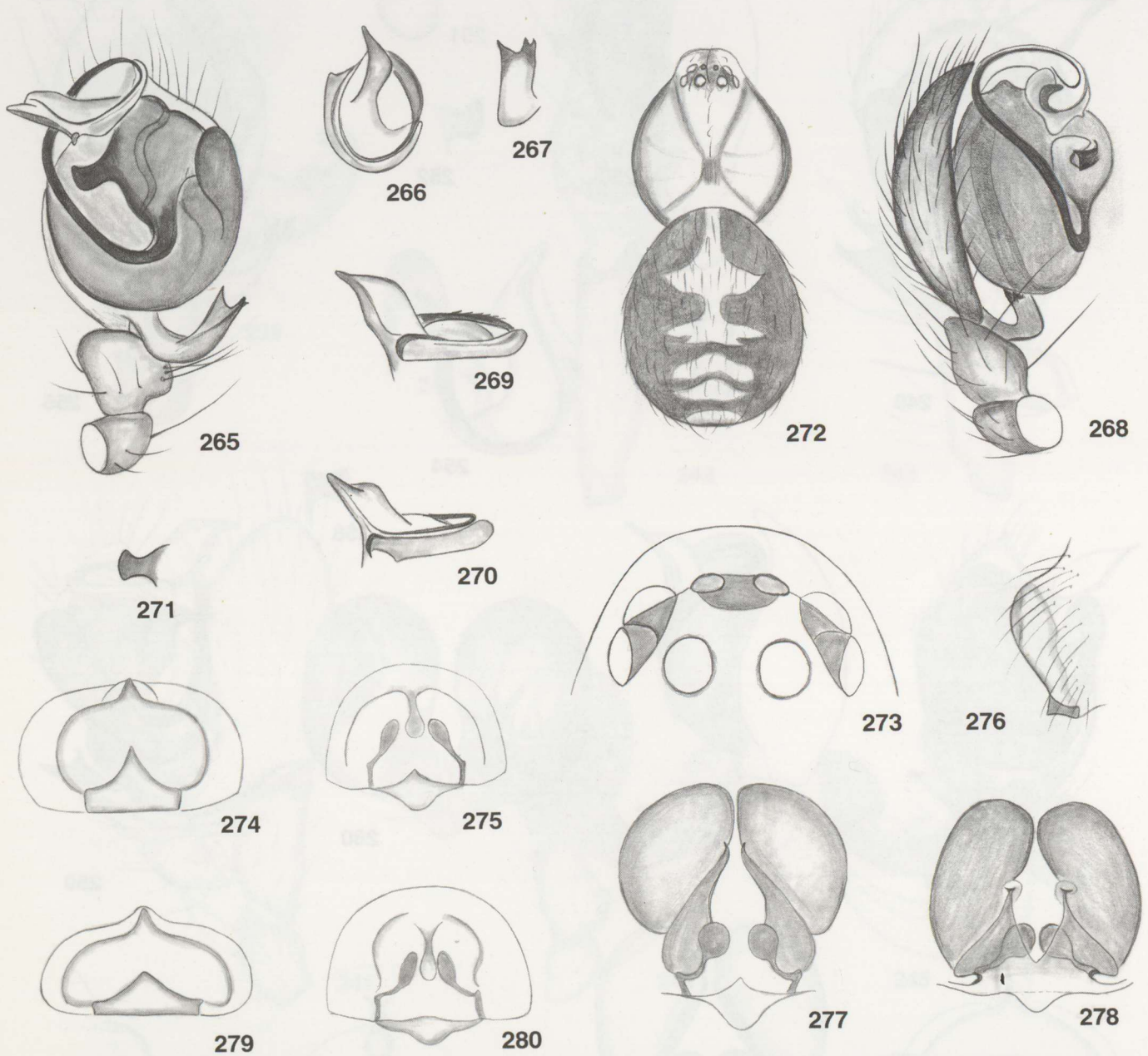
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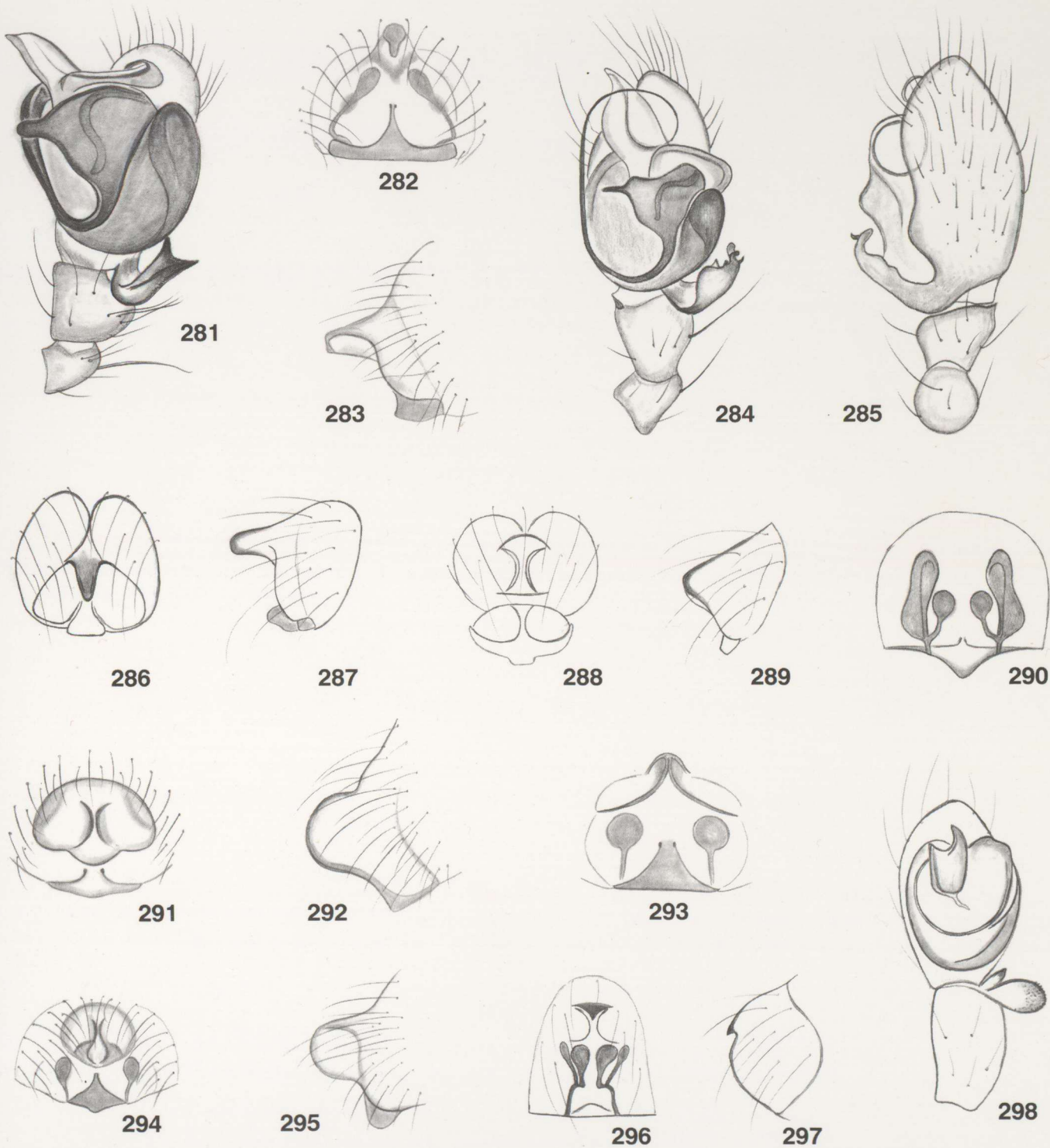
Figs. 239-248.—Species of *Nesticus*: Figs. 239-241.—*Nesticus vazquezae* Gertsch, male palpus: 239, ventral view; 240, paracymbium, subdorsal view; 241, dorsal view. Figs. 242-243.—*Nesticus campus*, n. sp., male palpus: 242, ventral view; 243, dorsal view. Figs. 244-245.—*Nesticus arganoi* Brignoli, male palpus: 244, ventral view; 245, dorsal view. Figs. 246-248.—*Nesticus arganoi* Brignoli, epigynum: 246, ventral view; 247, posterior view; 248, dorsal view.



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