

THE NEARCTIC HAHNIIDAE (ARACHNIDA: ARANEAE)¹

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ABSTRACT. The taxonomy of the North American and Mexican members of the family Hahniidae is revised; two genera and five species are placed in synonymy, eight new species are described and illustrated, and 20 species are redescribed, illustrated, and their distributions updated. Observations on the biology of some of these small, ecribellate, entelegyne spiders are included.

INTRODUCTION

The family Hahniidae includes small entelegyne, ecribellate spiders of the suborder Labidognatha. They can be recognized by the transverse arrangement of three pairs of spinnerets and by the location of a single broad spiracle much in advance of the spinneret bases (Figs. 1, 4, 10, 11). Their eight eyes are arranged in two slightly procurved rows (Figs. 3, 9, 12). The tarsus of each leg bears three serrate claws without claw tufts. The ovate abdomen of the hahniids is brown and in many specimens has several light dorsal chevrons set off by gray markings. The legs may be either unicolored or banded (Plate 2, Fig. 2).

Hahniidae have a world-wide distribution, and are represented in the Nearctic by three genera and 28 known species, in

the Neotropic by seven genera and 14 known species, in the Palearctic by five genera and 21 known species, in the Orient by four genera and nine known species, in the Australian zone by ten genera and 33 known species, and in the Ethiopian zone by three genera and ten known species. Three of the Nearctic species are widely distributed. The remainder have a more restricted range.

The Hahniidae of America north of Mexico were treated by Gertsch (1934), who, as did other authors, later described additional species of the family. In the last several years many new collections have become available, making a more thorough revision of the group possible.

ACKNOWLEDGMENTS

We would like to thank the following for loans of specimens: J. W. Berry, D. E. Bixler, W. J. Gertsch, J. A. L. Cooke, and N. I. Platnick of the American Museum of Natural History (Cornell University, University of Utah, and U. S. National Museum collections housed at the A.M.N.H. were also loaned); W. A. Drew of the Oklahoma State University Entomology Museum; H. Dybas of the Field Museum of Natural History; R. L. Fisher of Michigan State University; D. W. Fronk of Colorado State University; M. Grasshoff of the Natur-Museum and Forschungs-Institute, Frankfurt, Germany; A. Holm of the Institute of Zoology, Uppsala, Sweden; E. Komarek of Tall Timbers Research Station; H. W. Levi

¹A portion of this study was submitted to the Department of Zoology and the Graduate School of Southern Illinois University-Carbondale as a thesis in partial fulfillment of the requirements for the degree of Master of Arts.

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of the Museum of Comparative Zoology; J. E. Martin of the Entomological Research Institute of the Canada Department of Agriculture; W. B. Peck (Exline-Peck collection); V. D. Roth; R. X. Schick of the California Academy of Science; E. Schlinger of the University of California at Berkeley; W. A. Shear; A. la Touche; H. K. Wallace of the University of Florida, and M. R. Wümlli of the Naturhistorisches Museum, Basel, Switzerland (specimen 2006 a). The Southern Illinois University-Carbondale research collection was also used in this study.

Richard E. Blackwelder, George Garoian, and Donald Ugent critically reviewed the manuscript and made valuable suggestions. Technical advice and assistance in preparing maps and illustrations were provided by John Richardson. This study was revised and enlarged while the senior author was a graduate student at Harvard University. Herbert W. Levi provided much help in preparing this work for publication, Linda Roth assisted with mapping, and Diane Randolph did the final typing. National Science Foundation grant GB-36161 partially subsidized the preparation and publication of this study.

POSITION OF THE FAMILY

Since Bertkau (1878) erected the family Hahniidae using *Hahnia* C. L. Koch as the type genus it has been treated as both a family (Petrunkevitch, 1933; Gerhardt and Kaestner, 1938; Kaston, 1948) and as a subfamily of the Agelenidae (Emerton, 1890; Simon, 1892; Bristowe, 1938; Gertsch, 1949; Bonnet, 1959; Kaestner, 1968). Gerhardt and Kaestner and Kaston place the family Hahniidae in the superfamily Lycosoidea. The members of this superfamily have tracheae which extend into the cephalothorax. Agelenidae, Pisauridae, Lycosidae, and Oxyopidae have three pairs of cardiac ostia while the other members of this superfamily, Argyronetidae, Senoculidae, and Hahniidae, have two pairs of cardiac ostia (Petrunkevitch, 1933).

Lehtinen (1967) proposes quite a different classification which reclassifies the agelenid tribe Cryphoeceae of the subfamily Ageleninae (Simon, 1897) and part of the agelenid subfamily Cybaeinae (Petrunkevitch, 1928) as the subfamilies Cryphoecinae and Cybaeolinae, respectively, of the family Hahniidae. Lehtinen groups the Hahniidae with the Miturgidae, Amaurobiidae, Lioeranidae, Agelenidae, and Dictynidae in the superfamily Amaurobioidea which is part of the Amaurobioides-group of the suborder Araneomorpha. Although the Cryphoecinae and Cybaeolinae resemble the Hahniidae more closely than do other Agelenidae, the more widely accepted definition of the family Hahniidae clearly excludes these two agelenid groups. We have followed this definition here.

The classification proposed by Forster (1970) supports in principle that of Lehtinen (1967), but follows the more widely accepted definition of the Hahniidae. This family, along with the Dictynidae, Desidae, Cybaeidae, Argyronetidae, and Anyphaenidae, is placed in the araneomorph superfamily Dictynoidea. Dictynoidea includes families, members of which have strongly branched or divided median tracheae. Amaurobioidea, on the other hand, includes spider families with slender, unbranched tracheae.

The Hahniidae appear to be most closely related to the family Agelenidae, particularly of the subfamily Agelenidae group Cryphoeceae and the subfamily Cybaeinae. Both groupings contain small spiders found west of the Rocky Mountains in moist environments.

Two South American genera of the subfamily Ageleninae, *Lizarba* and *Mevianes*, resemble the genus *Hahnia* of the Hahniidae in general appearance and in certain features of the male and female genitalia, but differ from *Hahnia* in having a colulus, spinnerets which are not in a transverse row, and a spiracle near the base of the spinnerets.



Plate 1. Web of *Neoantistea agilis* (Keyserling) from Massachusetts. (From Ektachrome by H. W. Levi.)

NATURAL HISTORY OF THE HAHNIIDAE

Individuals of *Neoantistea* spin small sheet webs which are rarely more than two inches across and lack retreats. Webs are

found in moist areas over small depressions in the soil or in moss (Plate 1), but are hard to see unless covered with dew. We have observed *N. agilis* on both the upper and lower surfaces of its web. When dis-



Plate 2. (Top) *Neoantistea agilis* (Keyserling) female from Massachusetts. (From Ektachrome by H. W. Levi.) (Bottom) Egg case produced by an *N. agilis* from Indiana (the space between vertical lines represents 1 mm).

turbed these spiders run quickly to the edge of the web and often take refuge in crevices of the soil, moss, or debris. So far as we know, no spiders of the genera *Antistea* or *Hahnia* have been seen on or taken from webs, although collecting data for many specimens do not mention habitat. Specimens of these two genera have been found under stones and wood, in leaves and litter, and in pitfall traps, as were many *Neoantistea*. Berry (1970) found *Hahnia* primarily in forest leaf litter. It

may be that *Antistea* and *Hahnia* build small webs that have escaped notice. On the other hand, they may hunt small insects which are likely to be abundant where they have been found, and may not need webs.

The remains of prey have not been observed in the webs of *N. agilis* or *N. riparia*. Adult and subadult *N. agilis* are able to eat *Tribolium* larvae up to 7 mm in length. Upon hatching, *N. agilis* are less than one mm long and probably feed on Collembola and other small insects.

The egg sacs of Hahniidae are circular mounds covered by white silk (Plate 2). In the laboratory an *N. agilis* produced an egg sac which had a diameter of 4 mm and a height of 2 mm. After sixteen days, seven spiderlings, ranging in length from 0.84 to 0.96 mm, emerged from this sac. No unhatched eggs remained.

Collecting data for *H. cinerea*, *N. agilis*, *N. riparia*, and *N. magna* suggest that most reproduction occurs from late March to late May and again from mid-August to late September. Two peaks in adult and juvenile population are indicated, a smaller one during the latter two-thirds of April and a larger one from mid-August to mid-September. Most *N. agilis* immatures are taken during May and August while most *N. magna* immatures appear during April and July, indicating the reproductive isolation of these two sympatric species. The immature populations of *N. agilis* and *N. magna* are greatest during August and July, respectively.

Collecting records support the findings of Berry (1970) that *Neoantistea agilis*, *Hahnia cinerea*, and *H. flaviceps* are forest species, while *N. riparia* is found primarily in field environments. Although Berry found *N. magna* primarily in field environments, collecting records show that this species is common in the leaf litter of hardwood forests. *Antistea brunnea* and *H. glacialis* appear to be boreal species. *Neoantistea gosinta* is found at elevations of 8,000 to 12,000 feet in forests of ponder-

osa pine, aspen, douglas fir, and lodgepole pine, as well as in meadows.

Petrunkevitch (1933) and Levi (1967) report a positive correlation between a more extensive tracheal system and a less developed circulatory system (as determined by the number of cardiac ostia). Petrunkevitch (1933) found spiders with a single broad tracheal spiracle in front of the spinnerets to have a highly developed tracheal system and hypothesized that this forward movement of the spiracle was associated with an increased reliance upon tracheal rather than lung respiration. Levi (1967) notes that to avoid excess water loss some small spiders have a heavily sclerotized exoskeleton or remain in moist habitats, and that they often have a spherical abdomen, even when other members of their genus are characterized by an elongate abdomen.

If an anteriorly placed spiracle is a valid criterion for judging tracheal system development, it may be that the *Neoantistea* are more advanced than either *Antistea* or *Hahnia*. *Neoantistea* webs constructed close to the ground or on vegetation help condense water as well as capture prey. This increased moisture may keep these spiders active during the hotter, dryer parts of the day.

METHODS

About 3,000 specimens were examined. When appropriate, epigyna were removed and cleared in clove oil. Measurements were made with an ocular micrometer installed in a binocular microscope. Specimens were placed in a Syracuse dish of ethanol with a layer of fine, white sand. This allowed measurement of each structure in as nearly a horizontal plane as possible. Total lengths and, in larger specimens, dimensions of cephalothorax and abdomen were measured under 30–60× magnification, while other measurements were made under 75–90× magnification. Micrometer units were converted to metric

units and these rounded to the nearest 0.01 mm.

DESCRIPTIONS

The generic descriptions give a more comprehensive account of coloration and morphology, while species descriptions include features not common to all members of the genus and those helpful in identification of species. Only 15 of the 53 measurements taken proved useful in species identification. Some of these are included in the description of each species and others can be found in Opell (1974). Unless otherwise indicated, measurements are of both males and females.

DISTRIBUTION

Maps and distribution records are based solely on specimens examined by the authors. Opell (1974) gives a complete list of most localities for all species except *Neoantistea inaffecta*, *N. oklahomensis*, *N. spica*, *N. unifistula*, and *Hahnia nobilis*.

HAHNIIDAE

Hahniidae Bertkau, 1878, Arch. Natur., 44: 351–410. Type genus by monotypy: *Hahnia* C. L. Koch.

Description. Hahniidae have diaxial chelicerae, two book lungs, a single, broad, median spiracle located in advance of the spinneret bases (Figs. 1, 4, 10, 11), tracheae which extend into the cephalothorax, two pairs of cardiac ostia, three pairs of spinnerets arranged in a transverse row (Figs. 1, 4, 10, 11), no cribellum or calamistrum, eight eyes arranged in two slightly procurved rows (Figs. 3, 9, 12), three serrate tarsal claws without claw tufts on each leg, a low, cone-shaped anal tubercle, and endocephalic poison glands.

The median pair of spinnerets of hahniida corresponds to the posterior median spinnerets of other spiders, the intermediate pair to the anterior median spinnerets of other spiders, and the lateral pair to the posterior lateral spinnerets of

other spiders (Marples, 1967). The median spinnerets are unsegmented, but both the intermediate and lateral pairs have two segments. The distal segment of the intermediate spinnerets is less than one-fourth the length of the proximal segment. In *Antistea* and *Neoantistea* the distal segment of the lateral spinnerets is as long as or longer than the proximal segment (Figs. 1, 4), while in *Hahnia* the distal segment is about one-half as long as the proximal segment (Figs. 10, 11).

In *Antistea* the spiracle is situated midway between the epigastric furrow and the base of the median spinnerets (Fig. 4), in *Hahnia* it is nearer the spinnerets (Figs. 10, 11), and in *Neoantistea* it is nearer the epigastric furrow (Fig. 1).

Petrunkevitch (1933) found that in *Neoantistea agilis* the spiracle led to a shallow atrium with two stout trunks that continued through the petiole into the cephalothorax, giving off tubules to supply the abdomen. In the cephalothorax the two trunks split into hundreds of tubules branching off to every appendage. Forster (1970) reported a somewhat different arrangement in a *N. agilis* specimen from Massachusetts. The broad spiracle led to two short lateral trunks which opened into a common atrium from which two median and two lateral lobes arose. The two median lobes were joined by a duct and from the distal portion of each of these four lobes a bundle of tracheae extended through the petiole and a few passed posteriorly into the abdomen.

In females the two epigynal openings are slits or narrow ovals found in the anterior (Fig. 20), median (Fig. 38), or posterior (Fig. 84) region of the epigynum. From each opening, flattened bursae, which may be either long (Fig. 55) or short (Fig. 21), generally lead to various-sized bulbs. In some species bulbs are absent and the bursae connect directly to ducts (Figs. 67, 107). Ducts connecting bulbs and spermathecae may be either short and simple (Figs. 65, 84) or long and convoluted (Figs.

6, 15). A thin fertilization duct leads from each spermatheca dorsally into the abdomen.

A KEY TO THE GENERA OF HAHNIIDAE

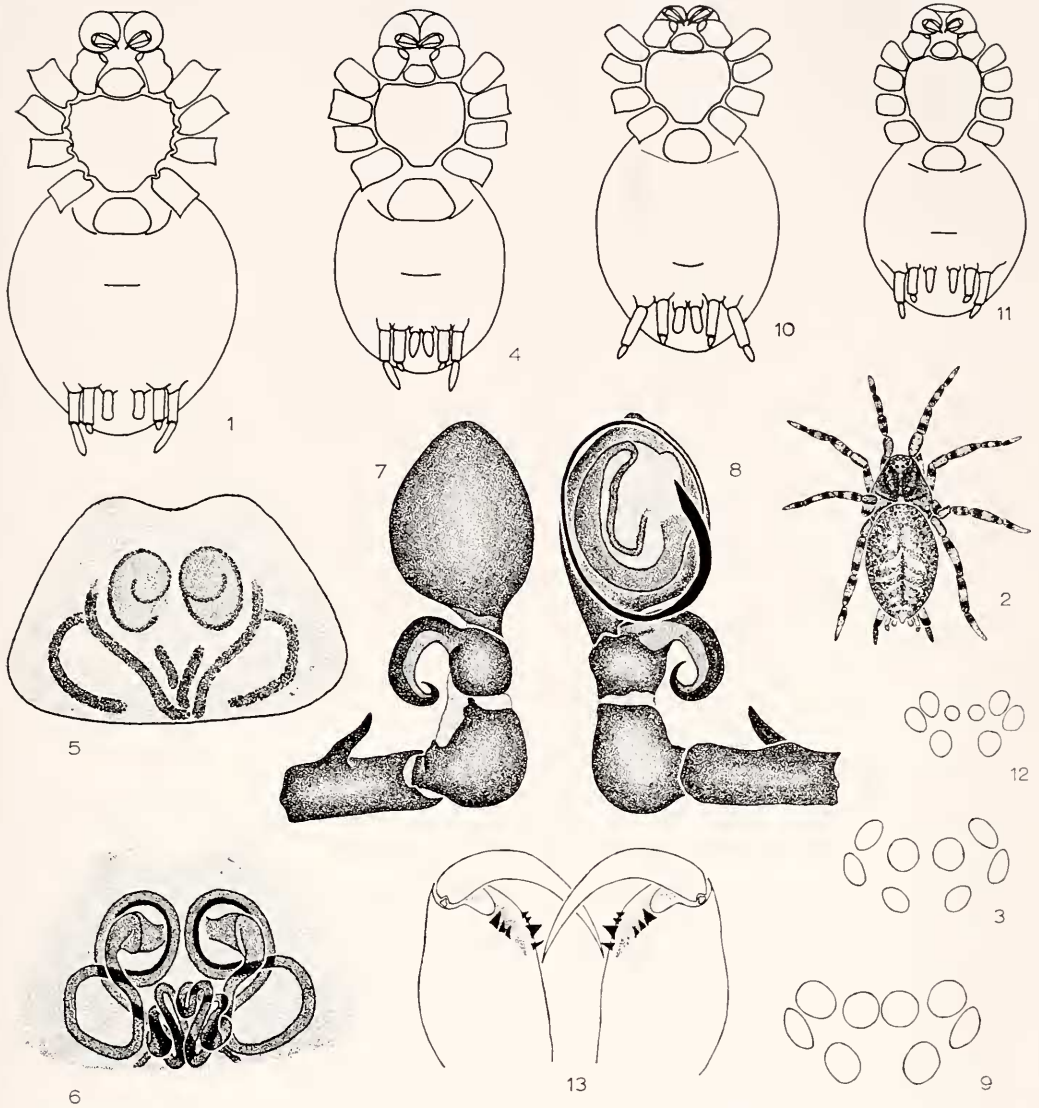
- 1 Spiracle equidistant from epigastric furrow and base of spinnerets or nearer to epigastric furrow (Figs. 1, 4). Anterior median eyes (AME) nearly as large as to larger than anterior lateral eyes (ALE) (Figs. 3, 9) with a stridulatory organ consisting of a file dorso-lateral to the petiole and a series of picks on posterior carapace. 2
- Spiracle nearer to base of spinnerets than to epigastric furrow (Figs. 10, 11). AME considerably smaller than ALE (Fig. 12) without a stridulatory organ as above. *Hahnia*
- 2(1) Spiracle equidistant between epigastric furrow and base of spinnerets (Fig. 4). Median spinnerets separated by one-half their diameter or less at their bases. Proximal segment of lateral spinnerets longer than distal segment *Antistea*
- Spiracle twice as far from base of spinnerets as from epigastric furrow (Fig. 1). Median spinnerets at least one diameter apart at bases. Proximal and distal segments of lateral spinnerets nearly equal in length. *Neoantistea*

Antistea

Antistea Simon, 1898, Histoire Naturelle des Araignées, 2(2): 275. Type species by monotypy: *Agelena elegans* Blackwall, 1841, Trans. Linn. Soc. London, 18: 619, from England. The genus name is feminine.

Diagnosis. *Antistea* differs from *Neoantistea* and *Hahnia* by having the spiracle situated midway between the epigastric furrow and the base of the median spinnerets (Fig. 4), by having the proximal segment of the lateral spinnerets longer than the distal segment, and by having AME and PME nearly equal in diameter (Fig. 9). A stridulatory file is formed by two patches of appressed setae lying dorsal and lateral to the petiole. A series of short, stout setae on the carapace's posterior surface forms a pick.

Discussion. This genus contains only the European species, *Antistea elegans* Blackwall, and the North American species, *Antistea brunnea* (Emerton). The nearly equal



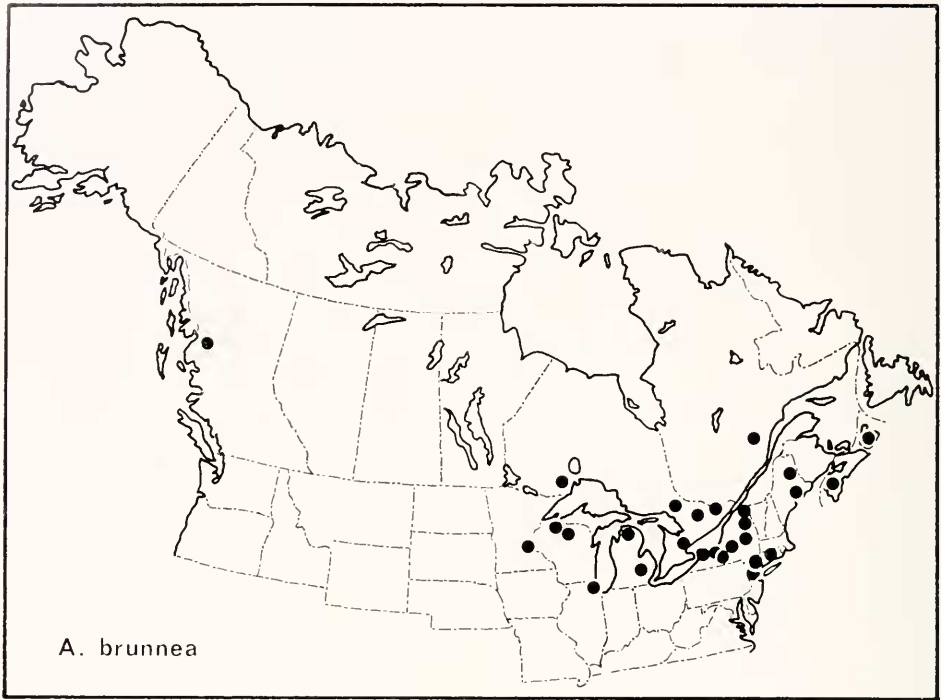
Figures 1-3. *Neoantistea agilis* (Keyserling). 1. Ventral view of female. 2. Dorsal view of female. 3. Dorsal view of ocular area.

Figures 4-9. *Antistea brunnea* (Emerton). 4. Ventral view of female. 5. Ventral view of epigynum. 6. Dorsal view of cleared epigynum. 7. Dorsal view of left male palpus. 8. Ventral view of left male palpus. 9. Dorsal view of ocular area.

Figure 10. Ventral view of *Hahnia sanjuanensis* Exline female.

Figures 11-12. *Hahnia cinerea* Emerton. 11. Ventral view of female. 12. Dorsal view of ocular area.

Figure 13. Ventral view of chelicerae of *Neoantistea magna* (Keyserling) female.

Map 1. Distribution of *Antistea brunnea* (Emerton).

size of the AME and PME, the anterior position of the spiracle, and the stridulatory organ indicate that *Antistea* may be more closely related to *Neoantistea* than to *Hahnia*. Although Lehtinen (1967) suggests that *Hahnia flaviceps* Emerton is closely related to the genus *Antistea*, the characteristics of this species identify it as a member of the genus *Hahnia*, a genus showing much more diversity than the *Antistea*.

Antistea brunnea (Emerton)

Figures 4-9; Map 1

Hahnia brunnea Emerton, 1909, Trans. Connecticut Acad. Arts Sci., 14: 223-224, pl. 8, fig. 5, ♀. Female holotype from Clarendon Hills maple swamp, Hanover, Grafton Co., New Hampshire, in Museum of Comparative Zoology, examined.

Antistea brunnea.—Gertsch, 1934, Amer. Mus. Novitates, No. 712: 15, figs. 31-33, ♂, ♀.

Description. Carapace brown with darker

cervical grooves, thoracic groove, and radial furrows. Dorsum of abdomen dark brown or gray with six light chevrons, each divided by a median gray line. Legs, palps, and spinnerets brown. Total length 2.20 to 5.10 mm. Carapace about 1.12 mm long, 1.00 wide. Eye ratio AME:ALE:PME:PLE = 1:1.2:1:1. Sternum length and width about 0.65 mm. Labium 0.14 mm long, 0.22 mm wide. Each chelicera with two to four retromarginal teeth, three being the usual number. Abdomen 1.43 to 2.02 mm long. Distance from spiracle to spinnerets 0.94 times the distance from spiracle to epigastric furrow. Proximal segment of the lateral spinnerets 1.45 times as long as distal segment.

Diagnosis. Male palpus with a tibial apophysis which is retrolateral, distal, broad, tapered to a point, and makes one complete dorsal spiral (Figs. 7, 8). Patella globose with no spur. Femur with a bent,

median, retrolateral apophysis which is about as long as femur is wide and is directed distally to form a 50° angle with the femur. Cymbium oval, broader than long. Epigynal openings of female are in the center of a spiral formed by the duets and connect by short bursae to the median, ventral surfaces of the laterally-compressed bulbs which are about the same size as the spermathecae (Figs. 5, 6). The duets make two loops, one lateral and one anterior, and at the posterior, median area of the epigynum are more convoluted and asymmetrical.

Discussion. *Antistea brunnea* is similar to the European species *Antistea elegans*, but details of the genitalia separate these species. The patellar spur of *A. brunnea* is flattened and forms a spiral (Fig. 7) while that of *A. elegans* is flattened, recurved, and twisted. The patellar spur of *A. elegans* bends more deeply. Differences in female genitalia (small variations in duet coils) are less striking.

Distribution. Nova Scotia south to northern New Jersey and northern Illinois, west to central Minnesota and western central British Columbia (Map 1).

Neoantistea Gertsch

Neoantistea Gertsch, 1934, Amer. Mus. Novitates, No. 712: 2, 18-19. Type species, by original designation, *Hahnia agilis* Keyserling, 1887, Verh. Zool. Bot. Ges. Wien, 37: 465-467. The genus name is feminine.

Diagnosis. Characteristic features of the genus *Neoantistea* include a spiracle twice as far from the base of the median spinnerets as from the epigastric furrow (Fig. 1), proximal and distal segments of the lateral spinnerets nearly equal in length, and AME nearly as large as or larger than PME (Fig. 3). A stridulatory file is formed by two patches of appressed setae lying dorsal and lateral to the petiole. The piek is formed by a series of short, stout setae on the earpace's posterior surface.

Discussion. Eighteen species of *Neoantistea* occur in the Nearctic. Although

Gertsch (1934) described this genus as being "strictly Nearctic," the collection of *N. lyrica* from Costa Rica establishes a Neotropical distribution for the genus. Species level identification of *Neoantistea* specimens, especially the males, is sometimes difficult. You must clear the epigynum to accurately use the key to the females. The number of retromarginal teeth on each chelicera is a character several places in the keys and in the species descriptions. Do not rely on this character alone, since the number of teeth may not always be constant for a given species, and the viewing angle may hide the separation between adjacent teeth.

Coloration. Carapace reddish brown and shiny; margin, cervical grooves, thoracic groove, and radial furrows usually darker (Plate 2, Fig. 2). Chelicerae, endites and labium brown. Sternum reddish brown, margin sometimes dusted with gray. Legs usually banded; femur, tibia, and metatarsus each with proximal and distal gray rings; tarsus with only proximal gray ring; patella with gray lateral margins. Legs of *N. hidalgoensis*, *N. lyrica*, *N. pueblensis* and *N. unifistula* without bands. Dorsum and lateral surfaces of abdomen tan, mottled with gray. Anterior one-third to one-half of dorsum with two reddish muscle attachments, often within a light oval. Posterior portion of dorsum with two to six (five or six in most) light, anteriorly-directed chevrons; the anterior ones bisected by a median gray line. Lateral surfaces of abdomen with gray dots often arranged in oblique rows. Venter of abdomen tan with no prominent markings. Anterior and median spinnerets tan, lateral spinnerets tan with distal gray ring on proximal segment and gray dorsum on the distal segment.

Structure. Total body length ranges from 2.30 to 4.76 mm of which the abdomen comprises about two-thirds. Carapace slightly longer than wide, cephalic region about two-thirds as wide and twice as high as thoracic region. Posterior eye row more

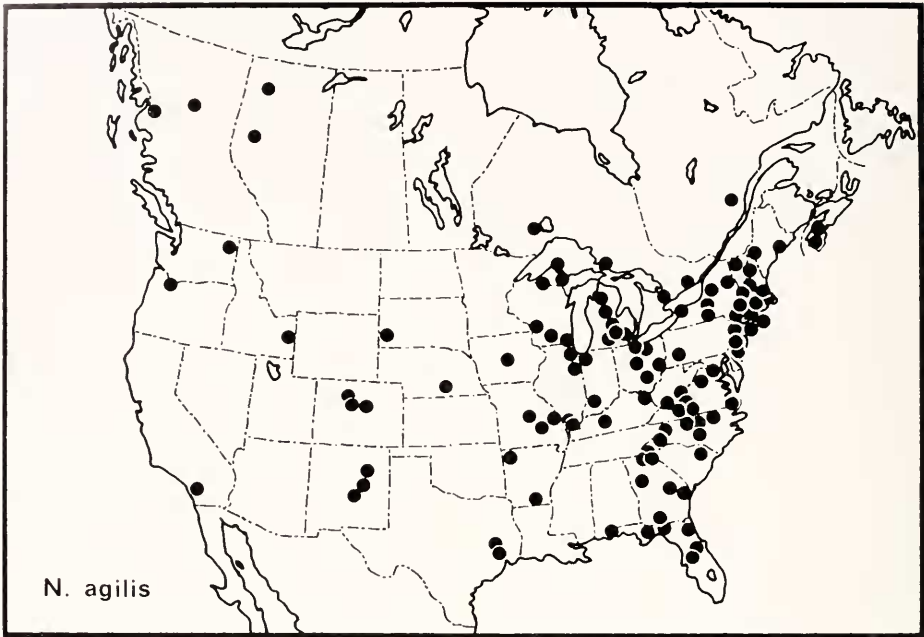
strongly procurved than anterior eye row. Median ocular quadrangle narrows anteriorly. AME of most species about 1.5 times the diameter of the PME (Fig. 3). In *N. hidalgoensis*, *N. jacalana*, *N. inaffecta*, *N. pueblensis*, *N. spica*, and *N. unifistula* the PME is as large as or slightly larger than AME. Each chelicera with one to four retromarginal teeth (Fig. 13). Endites equal in length and width (Fig. 1). Labium and sternum each slightly wider than long. Leg length commonly IV, I, II, III. Distance from spiracle to spinnerets 1.8–3.3 times the distance from spiracle to epigastric furrow. Proximal segments of lateral spinnerets 0.9 to 1.4 times longer than distal segments.

Male palpus with femur and tarsus about equal in length (Figs. 18, 19), each nearly equal to the combined lengths of patella and tibia. Tibial apophysis located distally and retrolaterally and, when curved, directed proximally. Patellar spur (present in all but *N. lyricea*) located proximally and retrolaterally and, when curved, directed distally. Cymbium oval, slightly longer than wide. Seminal canal encircles distal and lateral two-thirds of bulbal apparatus, decreasing in width and forming a prominent, oblique loop at the proximal, retrolateral area of the cymbium before joining the embolic region at the proximal prolateral region of the tarsus. The embolus originates near the base of the cymbium and curves around the periphery of the bulbal apparatus, making nearly a full turn. In *N. inaffecta* the embolus appears to lie in a groove at the base of the tibial apophysis (Figs. 68, 69). The epigyna of all species except *N. unifistula* (Figs. 76, 77) have openings which are anterior to the spermathecae (Fig. 64). Bulbs, found in the epigyna of all species but *N. inaffecta* (Fig. 67), are located anterior to the spermathecae and vary in size, being smaller than the spermathecae (Fig. 73), equal in size to the spermathecae (Fig. 65), or larger than the spermathecae (Fig. 77).

KEY TO MALE *NEOANTISTEA*

- (Males of *N. jacalana*, *N. hidalgoensis*, *N. spica*, and *N. unifistula* are not known)
- 1 Patellar spur present (Fig. 18). 2
 - Patellar spur absent (Figs. 50, 51). *lyricea*
 - 2(1) Basal two-thirds of tibial apophysis nearly perpendicular to long axis of tibia (Figs. 18, 36, 42, 58, 68, 74). 3
 - Tibial apophysis curved strongly proximally (Figs. 24, 26, 30, 40, 46, 56, 62). 8
 - 3(2) Patellar spur broad at base, conical or hooked at tip, about one-fourth as long as tibial apophysis (Figs. 36, 68, 74). 4
 - Patellar spur slender and talonlike, about one-half to two-thirds as long as tibial apophysis (Figs. 18, 42, 58). 6
 - 4(3) Tibial apophysis about as long as tibia is wide (Figs. 68, 74). 5
 - Tibial apophysis about twice as long as tibia is wide (Figs. 36, 37). *pueblensis*
 - 5(4) Embolus encircles cymbium in the usual manner (Figs. 74, 75); one retromarginal tooth on each chelicera; Canada and the U. S. *magna*
 - Embolus lies in a groove at the base of the tibial apophysis (Figs. 68, 69); four retromarginal teeth on each chelicera; southwestern Mexico. *inaffecta*
 - 6(3) Patellar spur gradually curved to form an angle of about 45° with the long axis of the patella (Figs. 18, 19). *agilis*
 - Patellar spur abruptly bent so that the distal one-third is nearly parallel to the long axis of the patella (Figs. 42, 58). 7
 - 7(6) From Oklahoma; three retromarginal teeth on each chelicera (Figs. 42, 43). *oklahomensis*
 - From Florida; one retromarginal tooth on each chelicera (Figs. 58, 59). *alachua*
 - 8(2) Tibial apophysis broad and dorsoventrally flattened (Figs. 46, 47). *riparia*
 - Tibial apophysis round or oval in cross section (Figs. 24, 26, 30, 40, 56, 62). 9
 - 9(8) Patellar spur broad and jagged (Figs. 62, 63). *procteri*
 - Patellar spur pointed (Figs. 24, 26, 30, 40, 56). 10
 - 10(9) Length of patellar spur about equal to the width of its base (Figs. 24, 40, 56). 12
 - Length of patellar spur at least two times the width of its base (Figs. 26, 30). 11
 - 11(10) Length of patellar spur two times as great as the width of its base (Figs. 26, 27); three retromarginal teeth on each chelicera; all legs similar. *coconino*
 - Length of patellar spur four times as great as the width of its base (Figs. 30 31); two retromarginal teeth on each chelicera;

- first two pair of legs with double row of tubercles on venter of robust femur and tibia. *gosiuta*
- 12(10) Tibial apophysis abruptly bent so that it is nearly parallel to the long axis of the tibia (Figs. 40, 41). *mulaiki*
- Tibial apophysis gradually curved to form a 45° angle with the long axis of the tibia (Figs. 24, 56). 13
- 13(12) Patellar spur conical (Figs. 24, 25); one retromarginal tooth on each chelicera; first two pair of legs with double row of tubercles on venter of robust femur and tarsus; southeastern Arizona and southern Colorado. *crandalli*
- Patellar spur curved (Figs. 56, 57); two retromarginal teeth on each chelicera; all legs similar; California. *santana*
- KEY TO THE FEMALE *NEOANTISTEA*
- (Females of *N. coconino* and *N. procteri* are not known)
- 1 Epigyneal openings in anterior one-half of epigynum; bursae separate (Figs. 22, 23, 34, 35). 2
- Single epigyneal opening in posterior one-fourth of epigynum; bursae fused to form a common canal (Figs. 76, 77). *unifistula*
- 2(1) Epigyneal openings anterior to or at the same level as the anterior-most loops of the ducts visible in uncleaned epigynum (Figs. 20, 54, 64, 66, 70). 3
- Epigyneal openings posterior to the anterior-most loops of the ducts visible in uncleaned epigynum (Figs. 32, 38, 48). 11
- 3(2) Epigyneal openings in a common depression from which protrudes a pointed, flattened scape (Figs. 70, 71). *spica*
- Epigyneal openings separate (Figs. 54, 72), or if adjacent without scape (Figs. 64, 66). 4
- 4(3) Without bulbs, spermathecae large and bulbous, about three-fourths as long as the epigynum; ducts short and uncoiled (Figs. 66, 67). *inaffecta*
- With bulbs, spermathecae length never more than one-half that of epigyneal length; ducts form at least a simple loop (Figs. 23, 45, 73). 5
- 5(4) Bulbs about equal in size with spermathecae (Figs. 44, 45, 64, 65). 6
- Bulbs much smaller than spermathecae (Figs. 23, 73). 7
- 6(5) Spermathecae oval; epigyneal openings at same level as bulbs (Figs. 64, 65); southern Mexico. *hidalgoensis*
- Spermathecae appear as slightly enlarged ducts; epigyneal openings anterior to bulbs (Figs. 44, 45); Oklahoma. *oklahomensis*
- 7(5) Ducts one-half as wide as a spermathecae (Figs. 72, 73). *magna*
- Ducts one-fifth as wide as a spermathecae or less (Figs. 15, 23, 29, 55). 8
- 8(7) Spermathecae comma-shaped; ducts form two median loops between spermathecae (Figs. 23, 29). 9
- Spermathecae round or oval; ducts irregularly looped and coiled (Figs. 15, 21, 55). 10
- 9(8) Ducts about one-fifth as wide as spermathecae; bulbs located anterior and lateral to spermathecae; anterior portion of ducts simple (Figs. 22, 23). *crandalli*
- Ducts about one-eighth as wide as spermathecae; bulbs located anterior to spermathecae; anterior portion of each duct makes two abrupt loops before connecting to the spermathecae (Figs. 28, 29). *gosiuta*
- 10(8) Bulbs about two-fifths as wide as spermathecae, located anterior and lateral to spermathecae (Figs. 54, 55). *santana*
- Bulbs about one-fifth as wide as spermathecae, located anterior to spermathecae (Figs. 14-17, 20, 21). *agilis*
- 11(2) Bulbs smaller than spermathecae (Figs. 39, 49, 61). 12
- Bulbs nearly equal in size to, or larger than spermathecae (Figs. 33, 35, 53). 14
- 12(11) Each epigyneal opening in a medially-directed "C" formed by one of the ducts (Figs. 38, 60); bulbs three-fifths as wide as the spermathecae (Figs. 39, 61). 13
- Epigyneal openings in an anteriorly-directed "U" formed by both ducts (Fig. 48); bulbs one-third as wide as the spermathecae (Fig. 49). *riparia*
- 13(12) Ducts long, highly convoluted and asymmetrical (Figs. 38, 39); three retromarginal teeth on each chelicera; Arizona, Texas, Mexico. *mulaiki*
- Ducts short, simple, looped, and symmetrical (Figs. 60, 61); one retromarginal tooth on each chelicera; northern Florida. *alachua*
- 14(11) Bulbs about three times as large as spermathecae; ducts form a lyre-shaped pattern (Figs. 52, 53). *lyrica*
- Bulbs about the same size as spermathecae 15
- 15(14) Bulbs cylindrical, separated by a distance equal to the width of each; epigyneal openings separated by a distance two times as great as the length of each (Figs. 32, 33). *jacalana*

Map 2. Distribution of *Neoantistea agilis* (Keyserling).

- Bulbs oval, contiguous or nearly so; epigynal openings separated by a distance one-half as great as the length of each (Figs. 34, 35). *pueblensis*

Neoantistea agilis (Keyserling)
Figures 1–3, 14–21; Map 2

Hahnia agilis Keyserling, 1887, Verh. Zool. Bot. Ges. Wien, 37: 465–467, pl. 4, figs. 29–29a, 29b, ♂, ♀. Male and female syntypes (U.S.N.M. No. 1602, epigynum of female missing) from Fort Stevenson, South Dakota, female syntype (U.S.N.M. No. 1603) from Washington, D.C., all collected by Marx. In United States National Museum collection, housed in American Museum of Natural History, examined.

Hahnia bimaculata Emerton, 1890, Trans. Conn. Acad. Arts, Sci., 8: 196, pl. 7, figs. 8, 8c–f; 8a–b, ♀, ♂. Male and two immature syntypes from Salem, Massachusetts. Female syntype from base of Mt. Washington, New Hampshire, in Museum of Comparative Zoology, examined.

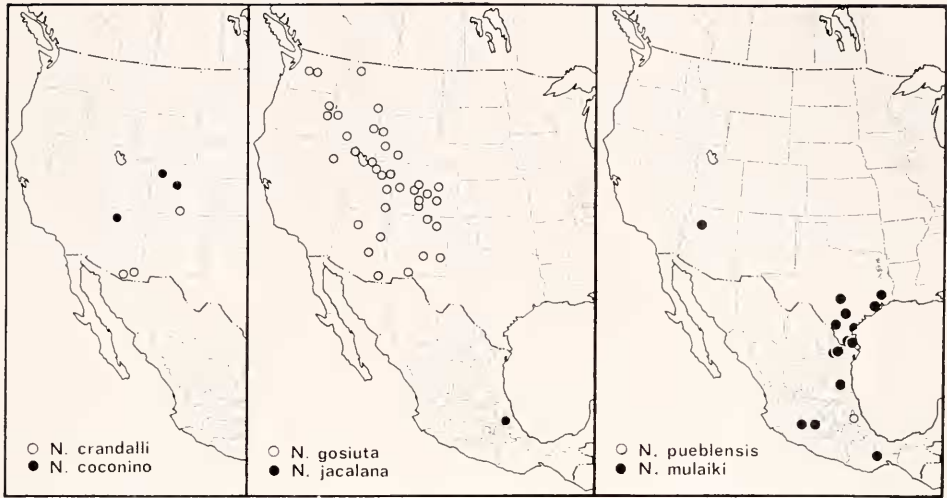
Neoantistea agilis, – Gertsch, 1934, Amer. Mus. Novitates, No. 712: 19–23, figs. 29, 41.

Neoantistea gertschi Muma, 1945, Proc. Biol. Soc. Washington, 58: 101–102, figs. 18, 19, ♀. Female holotype from Berwyn, Maryland, in

American Museum of Natural History, examined. NEW SYNONYMY.

Description. Total length 2.50 to 3.21 mm, females generally larger than males. Legs banded, dorsum of abdomen with five light chevrons (Fig. 2). Carapace 1.35 mm long, 1.16 mm wide. Eye ratio AME: ALE:PME:PLE = 1:1:0.8:0.8 (Fig. 3). Length and width of sternum about 0.80 mm. Labium 0.18 mm long, 0.25 mm wide. Most specimens have three retromarginal teeth on each chelicera; although one male had four and one female two. Abdomen 1.67 to 2.11 mm long. Distance from spiracle to spinnerets 2.1 times the distance from spiracle to epigastric furrow in male, 2.3 times in female. Proximal segment of lateral spinneret 1.1 times as long as distal segment in male, 1.0 times in female.

Diagnosis. Males may be distinguished from all other species except *N. alachua* and *N. oklahomensis* by a tibial apophysis with the basal two-thirds nearly perpendicular to the long axis of the tibia and



Map 3. Distribution of *Neoantistea crandalli* Gertsch, *Neoantistea coconino* Chamberlin and Ivie, *Neoantistea gosiuta* Gertsch, *Neoantistea jacalana* Gertsch, *Neoantistea pueblensis* n. sp., and *Neoantistea mulaiki* Gertsch.

by a narrow, curved patellar spur about one-half as long as the tibial apophysis (Figs. 18, 19). The patellar spur of *N. agilis* gradually curves to form a 45° angle with the long axis of the patella while the patellar spur of *N. alachua* (Figs. 58, 59) and *N. oklahomensis* (Figs. 42, 43) are more abruptly bent and nearly parallel with the long axis of the patella. Most *N. agilis* males have three retromarginal teeth on each chelicera while *N. alachua* has only one. Females of *N. agilis* (Figs. 14, 15) are similar to those of *N. crandalli* (Figs. 22, 23) and *N. gosiuta* (Figs. 28, 29), but differ from both by having oval rather than comma-shaped spermathecae and ducts which are much more highly convoluted and less symmetrical.

Variation. Of *N. gertschi*, Muma (1945) states, "This species is almost identical in structure and coloration with *N. agilis* (Keyserling). It may be separated from the latter by differences in the details of the epigynum." While uncleared epigyna of "*N. gertschi*" are distinguishable from those of most *N. agilis*, cleared epigyna of the two show little difference (Figs. 14,

15, 20, 21). Others (Emerton, 1890; Gertsch, 1934; and Kaston, 1948) have recognized considerable variability in the arrangement of the highly convoluted portion of the ducts of *N. agilis*, and *N. gertschi* seems to fall within this range of variability. *Neoantistea gertschi* variety females have been collected only east of the Appalachian mountains and are more common in the southern states, indicating speciation. *Neoantistea gertschi* variety females were often found with large collections of *N. agilis* from Pennsylvania, along with females whose epigynal features were intermediate between these two (Fig. 17). The same collections contained only males of the *N. agilis* variety. Of the total 240 females of *N. agilis* and *N. gertschi* variety examined, 45 (19%) were *N. gertschi* variety. *N. gertschi* variety females comprised two of 20 (10%) from New York, one of six (17%) from Connecticut, 20 of 57 (35%) from Pennsylvania, four of 13 (31%) from New Jersey, and five of six (83%) from Georgia and Florida.

Distribution. Throughout the United States and Canada (Map 2).

Neoantistea crandalli Gertsch
 Figures 22–25; Map 3

Neoantistea crandalli Gertsch, 1946, J. New York Ent. Soc., 54(3): 35–36, pl. 1, figs. 7, 8, ♂, ♀. Male holotype and paratype from Patagonia, Arizona, in American Museum of Natural History, two male paratypes examined.

Description. Total length 4.00 to 5.10 mm. Legs banded, dorsum of abdomen with five faint chevrons. Carapace 1.70 to 3.40 mm long, 1.60 to 2.30 mm wide. Eye ratio AME:ALE:PME:PLE = 1:1:0.8:0.8. Length and width of sternum about 1.20 mm. Labium 0.26 mm long, 0.40 mm wide. Each chelicera of male with one large retromarginal tooth, female with three. Abdomen 2.36 to 3.13 mm long. Distance from spiracle to spinnerets 2.3 times the distance from spiracle to epigastric furrow in male, 3.3 times in female. Proximal segment of lateral spinnerets 0.9 times as long as distal segment in male, 1.0 times in female.

Diagnosis. *Neoantistea crandalli* males (Figs. 24, 25) resemble those of *N. santana* (Figs. 56, 57) in their gradually curved tibial apophysis which forms a 45° angle with the long axis of the tibia and patellar spur which has a length about equal to the width of its base. *Neoantistea crandalli* has a conical rather than hooked patellar spur and two rows of tubercles on the venter of the femur and tarsus of the first two pair of legs. All legs of *N. santana* are similar. Females of *N. crandalli* (Figs. 22, 23) resemble those of *N. agilis* (Figs. 14, 15) and *N. gosiuta* (Figs. 28, 29). They differ from *N. agilis* by having comma-shaped rather than oval-shaped spermathecae and less convoluted ducts. They differ from

N. gosiuta by having bulbs located anterior and lateral to the spermathecae rather than anterior to the spermathecae, by having ducts which are one-fifth rather than one-eighth as wide as each spermathecae, and by lacking a double loop in the anterior portion of each duct.

Distribution. South central Colorado and southeastern Arizona (Map 3).

Neoantistea coconino Chamberlin
 and Ivie

Figures 26, 27; Map 3

Neoantistea coconino Chamberlin and Ivie, 1942, Bull. Univ. Utah, 32(13): 28–29, pl. 6, figs. 59, 60. Male holotype from Kaibab Forest, Coconino Co., Arizona, in American Museum of Natural History, examined.

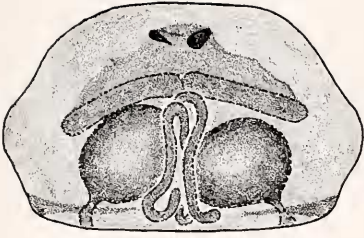
Description. Total length of male (female not known) 3.80 mm. Legs banded, dorsum of abdomen with six light, narrow chevrons. Carapace 1.66 mm long, 1.60 mm wide. Eye ratio AME:ALE:PME:PLE = 1:1.1:0.9:1. Sternum 1.00 mm long, 1.11 mm wide. Labium 0.27 mm long, 0.32 mm wide. Each chelicera with three subequal retromarginal teeth. Distance from spiracle to spinnerets 2.2 times the distance from spiracle to epigastric furrow. Proximal segment of lateral spinnerets 1.2 times as long as distal segment.

Diagnosis. Males of *N. coconino* (Figs. 26, 27) are similar to those of *N. gosiuta* (Figs. 30, 31), both having a tibial apophysis which is gradually curved to form a 45° angle with the long axis of the tibia and a narrow, hooked patellar spur. The first two pair of legs of *N. gosiuta* are robust and bear two rows of tubercles on

Figures 14–21. *Neoantistea agilis* (Keyserling). 14. Ventral view of epigynum. 15. Dorsal view of cleared epigynum. 16–17. Ventral view of epigynum. 18. Dorsal view of left male palpus. 19. Ventral view of left male palpus. 20. Ventral view of epigynum (holotype of *Neoantistea gertschi* Muma). 21. Dorsal view of cleared epigynum shown in Figure 20.

Figures 22–25. *Neoantistea crandalli* Gertsch. 22. Ventral view of epigynum. 23. Dorsal view of cleared epigynum. 24. Dorsal view of right palpus of male paratype. 25. Ventral view of right palpus of male paratype.

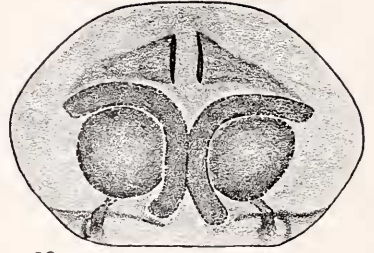
Figures 26–27. *Neoantistea coconino* Chamberlin and Ivie. 26. Dorsal view of left palpus of male holotype. 27. Ventral view of left palpus of male holotype.



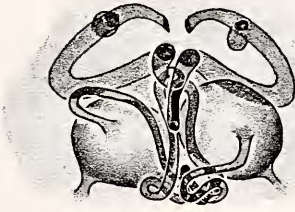
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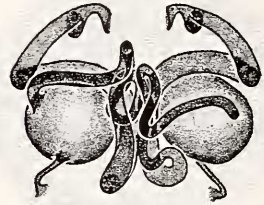
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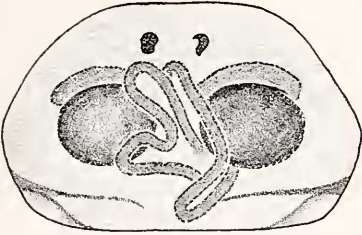
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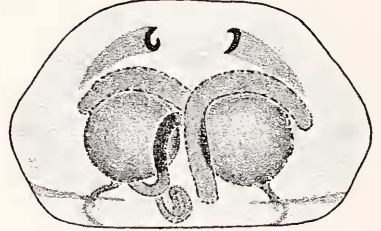
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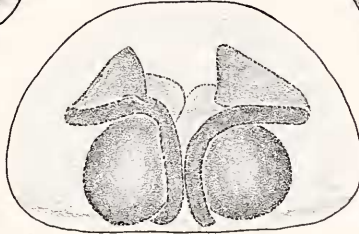
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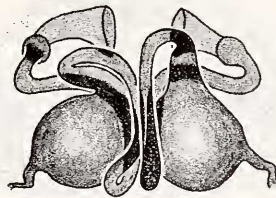
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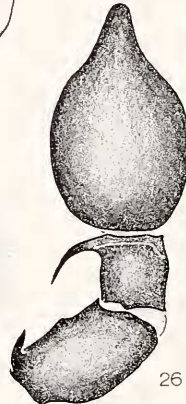
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venter of the femur and tarsus, while in *N. coconino* the first two pair of legs are similar to the other legs.

Distribution. Northern Arizona and northwestern Colorado (Map 3).

Neoantistea gosiuta Gertsch

Figures 28–31; Map 3

Hahnia radula.—Chamberlin and Ivie, 1933, Bull. Univ. Utah, 23(2): 48. Not *Hahnia radula* Emerton.

Neoantistea gosiuta Gertsch, 1934, Amer. Mus. Novitates, No. 712: 19, 24, figs. 30, 42, ♂, ♀. Male holotype from east of Yost, Utah (University of Utah collection), female paratypes from South Fork of Raft River, eight miles S. of Lynn, Utah, all in American Museum of Natural History, two female paratypes, examined.

Description. Total length 2.62 to 4.10 mm, females generally larger than males. Legs with very faint bands, dorsum of abdomen with six light chevrons. Carapace 1.24 mm long, 1.10 mm wide. Eye ratio AME:ALE:PME:PLE = male 1:0.9:0.8:0.8, female, 1:1:0.8:0.8. Length and width of sternum about 0.80 mm. Labium 0.18 mm long, 0.25 mm wide. Males with two subequal retromarginal teeth on each chelicera, females with two or three. Abdomen 1.64 to 2.77 mm long. Distance from spiracle to spinnerets 2.3 times the distance from spiracle to epigastric furrow in male, 2.1 times in female. Proximal segment of lateral spinnerets 1.0 times as long as distal segment in male, 0.9 times in female.

Diagnosis. Males of *N. gosiuta* (Figs. 30, 31) are similar to those of *N. coconino* (Figs. 26, 27), as both have a tibial apophysis which is gradually curved to form a 45° angle with the long axis of the tibia and a patellar spur which is narrow and hooked. *Neoantistea gosiuta* males are distinguished from those of *N. coconino* by the presence of two rows of tubercles on the venter of robust femur and tarsus of the first two pair of legs. Female *N. gosiuta* (Figs. 28, 29) are similar to those of *N. agilis* (Figs. 14, 15) and *N. crandalli* (Figs. 22, 23). *Neoantistea gosiuta* females

differ from *N. agilis* females by having comma-shaped rather than oval spermathecae and by having less convoluted ducts and from *N. crandalli* females by having bulbs located anterior to rather than anterior and lateral to the spermathecae, by having ducts which are one-eighth as wide as a spermathecae rather than one-fifth as wide, and by having two loops in the anterior region of each duct.

Distribution. New Mexico and Arizona northwest to Washington and northwestern Montana (Map 3).

Neoantistea jacalana Gertsch

Figures 32, 33; Map 3

Neoantistea jacalana Gertsch, 1946, J. New York Ent. Soc., 54(3): 32–33, pl. 1, fig. 2. Female holotype and female paratype from Hidalgo, Mexico, 20 mi. S. of Jacalana, in American Museum of Natural History, examined.

Description. Total length of female (males not known) 3.13 to 3.60 mm. Legs banded, dorsum of abdomen with five or six faint chevrons. Carapace 1.35 mm long, 1.13 mm wide. Eye ratio AME:ALE:PME:PLE = 1:1.1:1:1. Length and width of sternum about 0.80 mm. Labium 0.18 mm long, 0.26 mm wide. Each chelicera with three subequal retromarginal teeth. Abdomen 2.18 mm long. Distance from spiracle to spinnerets 2.0 times the distance from spiracle to epigastric furrow. Proximal segment of lateral spinnerets 1.3 times as long as distal segment.

Diagnosis. Females of *N. jacalana* (Figs. 32, 33) are similar to those of *N. pueblensis* (Figs. 34, 35) and *N. riparia* (Figs. 48, 49), but are distinguished from *N. riparia* by the presence of bulbs which are nearly as large as the spermathecae and from *N. pueblensis* by the presence of elongate, separate bulbs rather than oval, contiguous bulbs and by epigyneal openings which are separated by twice rather than one-half the length of each.

Distribution. Eastern central Mexico (Map 3).

Neoantistea pueblensis n. sp.

Figures 34–37; Map 3

Types. Female holotype, male and five female paratypes from 4.4 miles S.W. of Huachinango, Mexico at an elevation of 1700 m, collected in malt traps placed in a moist ravine of an oak forest from 25–28 July 1969 by S. and J. Peck. In the American Museum of Natural History. This species is named for the Mexican state in which the types were collected.

Description. Total length 2.30 to 3.05 mm, females larger than male. Legs not banded, dorsum of abdomen with five light chevrons, lateral surfaces of abdomen of one male and one female with four dark diagonal stripes. Carapace 1.22 mm long, 0.96 mm wide. Eye ratio AME:ALE:PME:PLE = male, 1:1.3:1.3:1.3, female, 1:1.5:1.3:1.5. Sternum 0.64 mm long, 0.72 mm wide. Labium 0.15 mm long, 0.23 mm wide. Each chelicera with four retromarginal teeth (one large and three small). Abdomen 1.28 to 1.93 mm long. Distance from spiracle to spinnerets 1.7 times the distance from spiracle to epigastric furrow in male, 1.9 times in female. Proximal segment of lateral spinnerets 1.2 times as long as distal segment in male, 1.1 times in female.

Diagnosis. Males of *N. pueblensis* (Figs. 36, 37) are distinguished by having a tibial apophysis which is nearly perpendicular to the long axis of the tibia for the basal two-thirds of its length and is two times as long as the tibia is wide. Females of *N. pueblensis* (Figs. 34, 35) are similar to those of *N. jacalana* (Figs. 32, 33) and *N. riparia* (Figs. 48, 49), but are distinguished from the former by having oval, contiguous bulbs rather than elongate, separate bulbs and epigyneal openings separated by a distance equal to one-half rather than twice the length of an opening and from the latter by having bulbs which are equal in size with the spermathecae rather than being only one-fifth their size.

Distribution. Eastern central Mexico (Map 3).

Neoantistea mulaiki Gertsch

Figures 38–41; Map 3

Neoantistea mulaiki Gertsch, 1946, J. New York Ent. Soc., 54(3): 34–35, pl. 1, figs. 5, 6, ♂, ♀. Male holotype and female paratypes from Monterrey, Mexico, in American Museum of Natural History, examined.

Description. Total length 4.00 to 4.76 mm, male larger than female. Legs banded, dorsum of abdomen with six light chevrons. Carapace of males 2.27 mm long, 1.93 mm wide, of female 1.43 mm long, 1.41 mm wide. Eye ratio AME:ALE:PME:PLE = 1:0.9:0.8:0.9. Length and width of sternum of male 1.30 mm, of female 0.94 mm. Labium of male 0.30 mm long, 0.42 mm wide, of female 0.20 mm long, 0.30 mm wide. Each chelicera of male with one retromarginal tooth, of female with three retromarginal teeth. Abdomen 2.71 mm long. Distance from spiracle to spinnerets 2.7 times the distance from spiracle to epigastric furrow. Proximal segment of lateral spinnerets 1.2 times as long as distal segment in male, 1.0 times in female.

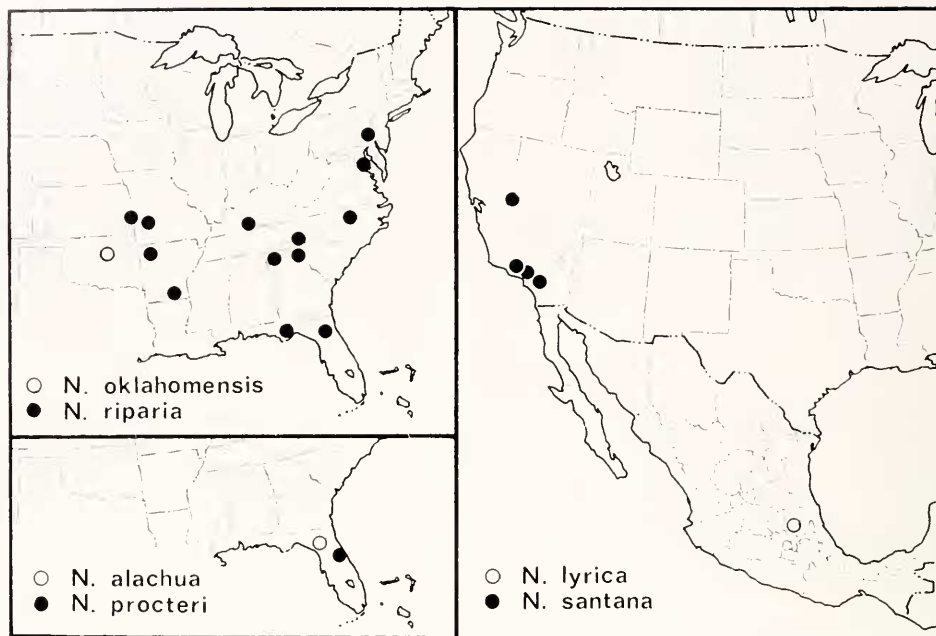
Diagnosis. Males possess an abruptly bent tibial apophysis nearly parallel to the long axis of the tibia and a hooked patellar spur about equal in length to the width of its base (Figs. 40, 41). Females of *N. mulaiki* (Figs. 38, 39) resemble those of *N. alachua* (Figs. 60, 61), which occurs in Florida, in having each epigyneal opening located in a C-shaped loop of a duct. *N. mulaiki* has ducts which are longer, more convoluted, and less symmetrical than those of *N. alachua*.

Distribution. Southeastern and south central Texas south to southeastern Mexico, west to northwestern Arizona (Map 3).

Neoantistea oklahomensis n. sp.

Figures 42–45; Map 4

Types. Female holotype, two male and one female paratypes from near Ripley, Oklahoma, collected 12 October 1973 by Saint, in Museum of Comparative Zoology. Two male and seven female paratypes from near Ripley, Oklahoma, in Oklahoma State



Map 4. Distribution of *Neoantistea oklahomensis* n. sp., *Neoantistea riparia* (Keyserling) *Neoantistea lyrica* n. sp., *Neoantistea santana* Chamberlin and Ivie, *Neoantisteaalachua* Gertsch, and *Neoantistea procteri* Gertsch.

University Entomology Museum. The name of this species is derived from the state where the type specimens were collected.

Description. Total length 2.40 to 3.00 mm. Legs banded, dorsum of abdomen with five light chevrons. Carapace 1.20 mm long, 1.00 mm wide. Eye ratio AME:ALE: PME:PLE = 1:1:0.8:0.8. Length and width

of sternum 0.78 mm. Labium 0.17 mm long, 0.24 mm wide. Each chelicera with three retromarginal teeth. Abdomen 1.60 mm long. Distance from spiracle to spinnerets 1.8 times the distance from spiracle to epigastric furrow in male, 2.0 times in female. Proximal segment of lateral spinnerets 1.0 times as long as distal segment.

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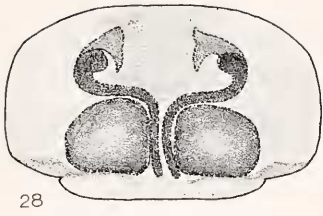
Figures 28–31. *Neoantistea gosiuta* Gertsch. 28. Ventral view of epigynum. 29. Dorsal view of cleared epigynum. 30. Dorsal view of left male palpus. 31. Ventral view of left male palpus.

Figures 32–33. *Neoantistea jacalana* Gertsch. 32. Ventral view of epigynum of holotype. 33. Dorsal view of cleared epigynum of holotype.

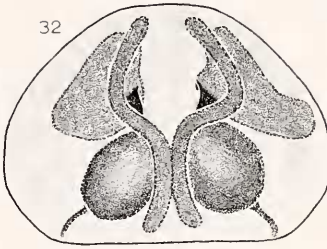
Figures 34–37. *Neoantistea pueblensis* n. sp. 34. Ventral view of epigynum of holotype. 35. Dorsal view of cleared epigynum of holotype. 36. Dorsal view of left palpus of male paratype. 37. Ventral view of left palpus of male paratype.

Figures 38–41. *Neoantistea mulaiki* Gertsch. 38. Ventral view of epigynum of paratype. 39. Dorsal view of cleared epigynum of paratype. 40. Dorsal view of right palpus of male holotype. 41. Ventral view of right palpus of male holotype.

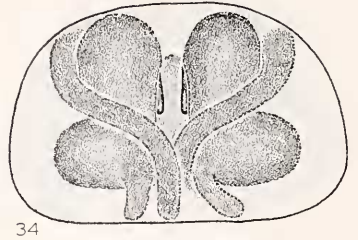
Figures 42–45. *Neoantistea oklahomensis* n. sp. 42. Dorsal view of left palpus of male paratype. 43. Ventral view of left palpus of male paratype. 44. Ventral view of epigynum of holotype. 45. Dorsal view of cleared epigynum of holotype.



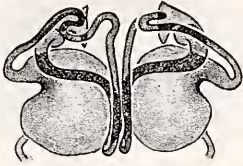
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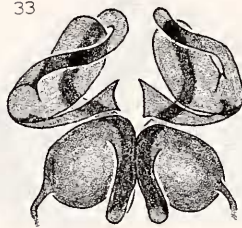
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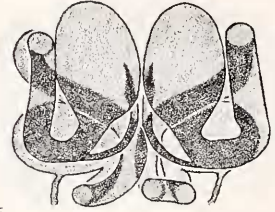
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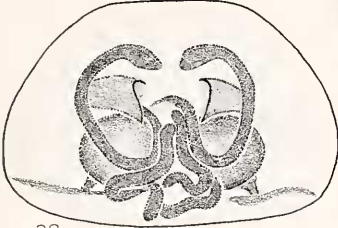
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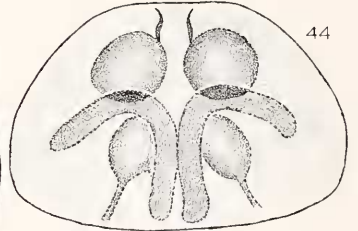
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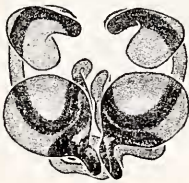
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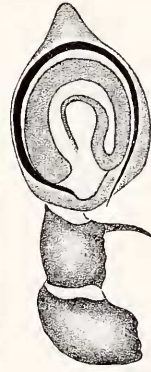
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Diagnosis. A nearly straight tibial apophysis and a long, narrow patellar spur one-half as long as the tibial apophysis and curved nearly parallel to the long axis of the patella distinguishes *N. oklahomensis* males (Figs. 42, 43) from those of all other species except *N. alachua* (Figs. 58, 59). *Neoantistea oklahomensis* has been found only in Oklahoma and has three retromarginal teeth on each chelicera while *N. alachua* has been found only in Florida and has one retromarginal tooth on each chelicera. Females of *N. oklahomensis* (Figs. 44, 45) differ from those of other species by having epigyneal openings located at the anterior margin of the epigynum, spermathecae which appear as slightly enlarged ducts, and bulbs which in an uncleared epigynum appear as large as the spermathecae.

Distribution. Known only from Oklahoma (Map 4).

Neoantistea riparia (Keyserling)

Figures 46–49; Map 4

Hahnia riparia Keyserling, 1887, Verh. Zool. Bot. Ges. Wien, 37: 463–464, pl. 6, fig. 27, ♂. Male syntype from Springdale, Utah, erroneous locality (U.S.N.M. No. 1605), collected by Marx, in United States National Museum Collection, housed in American Museum of Natural History, examined.

Neoantistea barrowsi Gertsch, 1934, Amer. Mus. Novitates, No. 712: 19, 29–31, figs. 36, 37, ♂, ♀. Male holotype from Franklington, North Carolina, in American Museum of Natural History, examined. NEW SYNONYMY.

Note. The Keyserling species *Hahnia riparia* and *Hahnia magna* were incorrectly considered synonyms by earlier workers. This discovery makes proper the synonymy of *Neoantistea riparia* and *Neoantistea barrowsi* and the use of *Neoantistea magna* for specimens previously identified as *N. riparia*, *N. riparia radula*, and *N. radula*.

Description. Total length 3.66 to 4.57 mm. Legs banded, dorsum of abdomen with six light chevrons. Carapace 1.56 to 1.85 mm long, 1.28 to 1.65 mm wide. Eye ratio AME:ALE:PME:PLE = male, 1:0.9:

0.6:0.8, female, 1:1:0.8:0.9. Length of sternum 0.92 mm, width 1.02 mm. Labium 0.22 mm long, 0.32 mm wide. Male with one retromarginal tooth on each chelicera, female with three subequal retromarginal teeth. Abdomen 1.80 to 3.39 mm long. Distance from spiracle to spinnerets 2.4 times the distance from spiracle to epigastric furrow in male, 2.6 times in female. Proximal segment of lateral spinnerets 1.0 times as long as distal segment in male, 1.1 times in female.

Diagnosis. Males of *N. riparia* are distinguished from those of all other species by a broad, flattened tibial apophysis and a conical patellar spur with a long seta extending from the tip (Figs. 46, 47). Females of *N. riparia* (Figs. 48, 49) are similar to those of *N. jacalana* (Figs. 32, 33) and *N. pueblensis* (Figs. 34, 35), but can be distinguished from both by bulbs about one-fifth as large, rather than equal to the spermathecae.

Distribution. Eastern Pennsylvania south to northern Florida, west to southeastern Kansas and southeastern Arkansas (Map 4).

Neoantistea lyrica n. sp.

Figures 50–53; Map 4

Types. Female holotype and male and three female paratypes from Cerro Muerte (elevation 10,000 m), Costa Rica, collected 2 August 1966 by S. Peck, in Museum of Comparative Zoology. The name refers to the lyre pattern of the epigynum ducts (Fig. 52).

Description. Total length 3.02 to 3.46 mm. Legs not banded, dorsum of abdomen heavily splotted with dark gray and with four light chevrons in the posterior half. Carapace 1.44 mm long, 1.14 mm wide. Eye ratio AME:ALE:PME:PLE = male, 1:1.2:1:1.2, female, 1:1.3:1.3:1.5. Length and width of sternum 0.80 mm. Labium 0.19 mm long, 0.25 mm wide. Each chelicera with three subequal retromarginal teeth. Abdomen 1.68 to 2.10 mm long. Distance from spiracle to spinnerets 1.8 times the distance from spiracle to epigastric furrow.

Proximal segment of lateral spinnerets 1.1 times as long as distal segment.

Diagnosis. Males of *N. lyrica* are distinguished from those of all other species by the absence of a patellar spur (Figs. 50, 51). The distinctive lyrelike arrangement of the ducts of the epigynum (Fig. 52) and the presence of bulbs which are three times as large as the spermathecae (Fig. 53) separate females of *N. lyrica* from those of all other species.

Distribution. Southern central Mexico (Map 4).

Neoantistea santana Chamberlin and Ivie

Figures 54–57; Map 4

Neoantistea santana Chamberlin and Ivie, 1942, Bull. Univ. Utah, 32(13): 29, pl. 6, figs. 61–62, 63, ♂, ♀. Male holotype from Laguna Beach, Orange Co., California, in American Museum of Natural History, male and female paratypes examined.

Neoantistea jollensis Schenkel, 1950, Verhandl. Naturf. Gesell., Basel, 61: 90, fig. 34, ♀. Female holotype from Country Club Heights, LaJolla, San Diego Co., California, in Naturhistorisches Museum, Basel, Switzerland, examined. NEW SYNONYMY.

Description. Total length 4.36 to 4.62 mm. Legs banded, dorsum of abdomen with five or six light chevrons. Carapace 1.52 mm long, 1.42 mm wide. Eye ratio AME:ALE:PME:PLE = 1:1:0.9:0.9. Sternum 0.96 mm long, 1.15 mm wide. Labium 0.27 mm long, 0.36 mm wide. Each chelicera of male with two retromarginal teeth, of female with three retromarginal teeth. Abdomen of male 2.54 mm long, of female 3.18 mm long. Distance from spiracle to spinnerets 1.8 times the distance from spiracle to epigastric furrow in male, 1.3 times in female. Proximal segment of lateral spinnerets 1.4 times as long as distal segment in male, 1.3 times in female.

Diagnosis. Males of *N. santana* have a tibial apophysis curved to form a 45° angle with the long axis of the tibia and a patellar spur which is about as long as its base is broad (Figs. 56, 57), making them similar

to those of *N. crandalli* (Figs. 24, 25). In males of *N. crandalli* the first two pairs of legs are robust and have two rows of tubercles on the ventral surfaces of the femur and tarsus, while in *N. santana* the first two pairs of legs are similar to the others. Females of *N. santana* (Figs. 54, 55) are distinguished by their asymmetrical, highly coiled ducts and laterally located bulbs which are two-fifths as wide as the spermathecae.

Distribution. Central and southern California (Map 4).

Neoantistea alachua Gertsch

Figures 58–61; Map 4

Neoantistea alachua Gertsch, 1946, J. New York Ent. Soc., 54: 33–34, figs. 3, 4, ♂, ♀. Male holotype from 5 mi. W. of Gainesville, Alachua Co., Florida, in American Museum of Natural History, examined.

Description. Total length of male 2.78 mm, of female 3.46 mm. Legs banded, dorsum of abdomen with four light chevrons. Carapace 1.09 mm long in male, 1.43 mm long in female. Width of carapace 1.09 mm in male, 1.17 mm in female. Eye ratio AME:ALE:PME:PLE = 1:0.9:0.7:0.9. Sternum 0.74 mm long, 0.80 mm wide. Labium 0.17 mm long, 0.23 mm wide. Each chelicera with one retromarginal tooth. Abdomen of male 1.71 mm long, of female 2.31 mm. Distance from spiracle to spinnerets 2.5 times the distance from spiracle to epigastric furrow in male, 2.6 times in female. Proximal segment of lateral spinnerets 1.1 times as long as distal segment.

Diagnosis. The presence of a nearly straight tibial apophysis and a narrow patellar spur which is half as long as the tibial apophysis and is curved to be nearly parallel with the long axis of the patella (Figs. 58, 59) distinguish males of *N. alachua* from all other species except *N. oklahomensis* (Figs. 42, 43). *Neoantistea alachua* has been collected only from Florida and has one retromarginal tooth on each chelicera while *N. oklahomensis* has been collected only from Oklahoma and

has three retromarginal teeth on each chelicera. Females of *N. alachua* (Figs. 60, 61) have the epigynal openings situated in a "C" formed by each duct, much as in *N. mulaiki* (Figs. 38, 39). *Neoantistea alachua* has short, symmetrical ducts while *N. mulaiki* has much longer, asymmetrically arranged ducts.

Distribution. Known only from Alachua Co. in north central Florida (Map 4).

Neoantistea procteri Gertsch

Figures 62, 63; Map 4

Neoantistea procteri Gertsch, 1946, J. New York Ent. Soc., 54(3): 31-32, pl. 1, fig. 1, ♂. Male holotype from St. John's River near Geneva, Florida, in American Museum of Natural History, examined.

Description. Total length of male (females not known) 3.12 mm. Legs banded, dorsum of abdomen with five light chevrons. Carapace 1.62 mm long, 1.41 mm wide. Eye ratio AME:ALE:PME:PLE = 1:0.7:0.7:0.7. Sternum 0.79 mm long, 0.92 mm wide. Labium 0.20 mm long, 0.29 mm wide. Left chelicera with one retromarginal tooth, right with three subcontiguous retromarginal teeth. Abdomen 1.79 mm long. Distance from spiracle to spinnerets 2.1 times the distance from spiracle to epigastric furrow. Proximal segment of lateral spinnerets 1.4 times as long as distal segment.

Diagnosis. Males of *N. procteri* are distinguished from those of all other species

by the presence of a broad, jagged patellar spur (Figs. 62, 63).

Distribution. Known only from the type locality in eastern central Florida (Map 4).

Neoantistea hidalgoensis n. sp.

Figures 64, 65; Map 5

Type. Female holotype from 6.4 mi. S. of Tenango de Doria (elevation 3000 m), Hidalgo, Mexico, collected 24-28 July 1969 from carrion trap in pine-oak forest by S. and J. Peck, in American Museum of Natural History. The name of this species is derived from that of the Mexican state from which the type was collected.

Note. Both the metatarsus and tarsus were missing from legs I-III and leg IV had no tarsus. The leg length is apparently IV, I, II, III.

Description. Total length of female (males not known) 2.71 mm. Legs not banded, dorsum of abdomen with two light chevrons just forward of the anal tubercle, remainder of dorsum with several light blotches on a field of gray. Carapace 1.14 mm long, 0.92 mm wide. Eye ratio AME:ALE:PME:PLE = 1:2:1.7:2. Sternum 0.67 mm long, 0.76 mm wide. Labium 0.17 mm long, 0.24 mm wide. Each chelicera with four retromarginal teeth, one large and three small. Abdomen 1.75 mm long. Distance from spiracle to spinnerets 1.8 times the distance from spiracle to epigastric furrow. Proximal segment of the posterior

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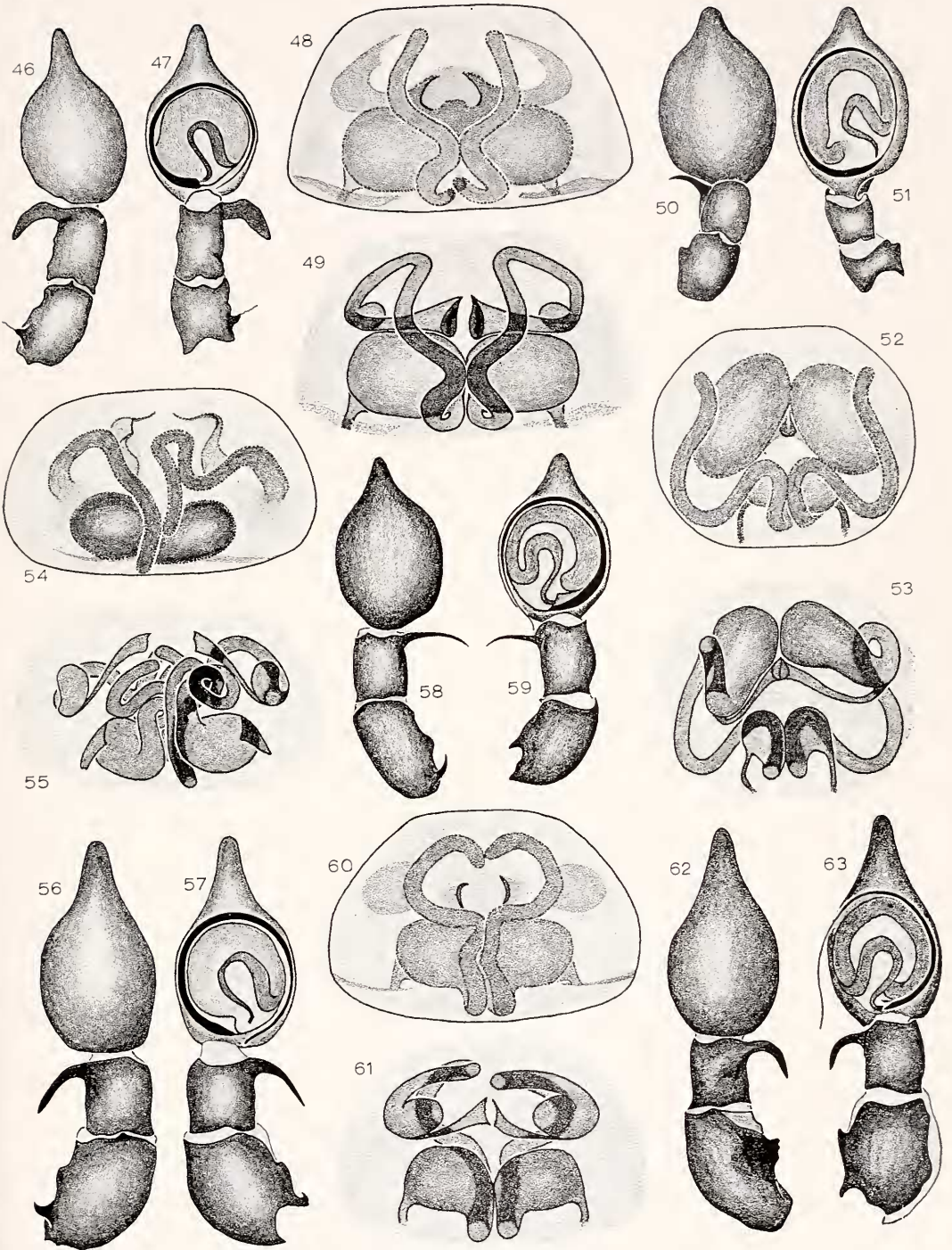
Figures 46-49. *Neoantistea riparia* (Keyserling). 46. Dorsal view of left male palpus. 47. Ventral view of left male palpus. 48. Ventral view of epigynum. 49. Dorsal view of cleared epigynum.

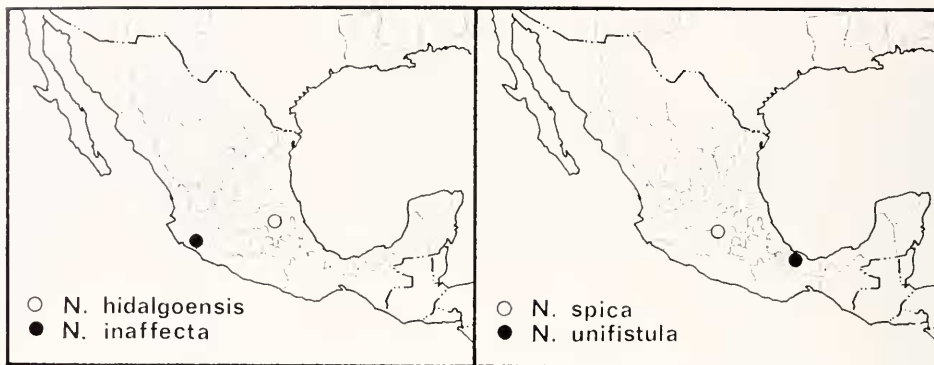
Figures 50-53. *Neoantistea lyrica* n. sp. 50. Dorsal view of left palpus of male paratype. 51. Ventral view of left palpus of male paratype. 52. Ventral view of epigynum of holotype. 53. Dorsal view of cleared epigynum of holotype.

Figures 54-57. *Neoantistea santana* Chamberlin and Ivie. 54. Ventral view of epigynum of paratype. 55. Dorsal view of cleared epigynum of paratype. 56. Dorsal view of left palpus of male holotype. 57. Ventral view of left palpus of male holotype.

Figures 58-61. *Neoantistea alachua* Gertsch. 58. Dorsal view of right palpus of male holotype. 59. Ventral view of right palpus of male holotype. 60. Ventral view of epigynum of paratype. 61. Dorsal view of cleared epigynum of paratype.

Figures 62-63. *Neoantistea procteri* Gertsch. 62. Dorsal view of right palpus of male holotype. 63. Ventral view of right palpus of male holotype.





Map 5. Distribution of *Neoantistea hidalgoensis* n. sp., *Neoantistea inaffecta* n. sp., *Neoantistea spica* n. sp., and *Neoantistea unifistula* n. sp.

spinnerets 1.2 times as long as the distal segment.

Diagnosis. Females of *N. hidalgoensis* are distinguished from those of all other species by the arrangement of the ducts to form two posteriorly-directed "C"s in which the spermathecae lie (Fig. 64), by the equal-sized bulbs and spermathecae (Fig. 65), by the absence of bands on the legs, and by the presence of only two chevrons on the dorsum of the abdomen.

Distribution. Known only from the type locality in south central Mexico (Map 5).

Neoantistea inaffecta n. sp.

Figures 66–69; Map 5

Types. Female holotype and male paratype from Nevado de Colima, Colima, Mexico, collected 20 January 1943 by F. Bonet, in American Museum of Natural History. The name refers to the simple nature of the epigynum.

Description. Total length of male 2.2 mm, of female 2.4 mm. Legs banded, dorsum of abdomen with five or six light chevrons. Carapace of male 1.1 mm long, 0.8 mm wide; of female 0.9 mm long, 0.8 mm wide. Eye ratio AME:ALE:PME:PLE = male, 1:1.6:1.2:1.6, female, 1:1.3:1:1.1. Sternum 0.54 mm long, 0.60 mm wide. Labium 0.12 mm long, 0.20 mm wide. Each chelicera of male with four retromarginal teeth, of female with three retromarginal

teeth. Abdomen of male 1.3 mm long, of female 1.6 mm long. Distance from spiracle to spinnerets 1.8 times the distance from spiracle to epigastric furrow in male, 1.7 times in female. Proximal segment of lateral spinnerets 1.1 times as long as distal segment.

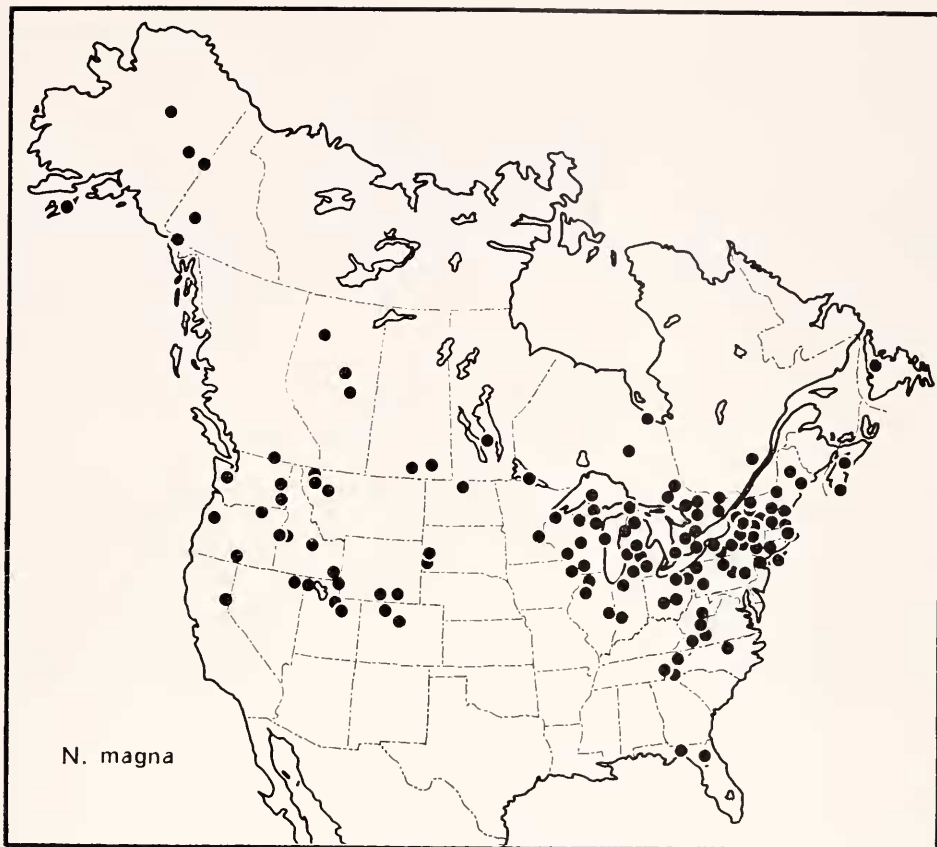
Diagnosis. Males of *N. inaffecta* (Figs. 68, 69) can be distinguished from those of all other species except *N. magna* (Figs. 74, 75) by the presence of a straight tibial apophysis and a broad patellar spur which is hooked at its tip. Males of *N. inaffecta* have four retromarginal teeth rather than only one, have the embolus held in a groove at the base of the tibial apophysis rather than encircling the cymbium in the usual manner, and are known only from southwestern Mexico rather than from the U. S. and Canada. Females of *N. inaffecta* are distinguished by the absence of bulbs in the epigynum, by short, nearly straight ducts, and by spermathecae which are about three-fourths as long as the epigynum (Figs. 66, 67).

Distribution. Known only from the type locality in southwestern Mexico (Map 5).

Neoantistea spica n. sp.

Figures 70, 71; Map 5

Type. Female holotype from Desiertos de los Leones, Distrito Federal, Mexico, collected 12 June 1946 by J. C. and D. L.



Map 6. Distribution of *Neoantistea magna* (Keyserling).

Pallister, in the American Museum of Natural History. The name refers to the projection of a scape from the depression containing the epigyneal openings.

Description. Total length of female (males are not known) 3.00 mm. Legs banded, dorsum of abdomen with four very thin, light chevrons. Carapace 1.3 mm long, 1.2 mm wide. Eye ratio AME:ALE:PME:PLE = 1:1.2:1.2:1.2. Length and width of sternum 0.82 mm. Labium 0.19 mm long, 0.25 mm wide. Each chelicera with three subequal retromarginal teeth. Abdomen 1.9 mm long. Distance from spiracle to spinnerets 2.1 times the distance from spiracle to epigastric furrow. Proximal segment of lateral spinnerets 1.1 times as long as distal segment.

Diagnosis. The projection of a thin, pointed scape from a shallow depression in which the epigyneal openings are located (Fig. 70) distinguishes females of *N. spica* from those of other species. Separated bulbs which are larger than the oval spermathecae to which they connect by short ducts (Fig. 71) further distinguish females.

Distribution. Known only from the type locality in southeastern Mexico (Map 5).

Neoantistea magna (Keyserling)

Figures 13, 72–75; Map 6

Hahnina magna Keyserling, 1887, Verh. Zool. Bot. Ges. Wien, 37: 464, pl. 6, fig. 28, ♀. Two female syntypes from Fort Bridger, Wyoming, collected by Marx, in United States National Museum collection housed in the American Museum of Natural History, examined.

Hahnia radula Emerton, 1890, Trans Connecticut Acad. Arts Sci., 8: 196, pl. 7, figs. 10, 10a, ♂.

Male holotype from Jaffrey, New Hampshire, in Museum of Comparative Zoology, examined.

Autistea riparia.—Simon, 1898, Histoire Naturelle des Araignées, 2: 274. (misidentification)

Neoantistea riparia.—Gertsch, 1934, Amer. Mus. Novitates, No. 712: 25, figs. 13–17, 38–40, ♂, ♀. (misidentification)

Neoantistea riparia race *radula*.—Gertsch, 1934, Amer. Mus. Novitates, No. 712: 28, fig. 18.

Neoantistea radula.—Kaston, 1948, Bull. St. Geol. Nat. Hist. Surv. Connecticut, 70: 294, figs. 958–959.

Note. *Hahnia riparia* and *Hahnia magna* have been incorrectly considered synonyms. The name *Neoantistea riparia* has to be used for the species previously known as *Neoantistea barrowsi* and the name *Neoantistea magna* for *N. riparia*, *N. riparia radula*, and *N. radula*.

Discussion. Based upon the equal sizes of the AME and PME Gertsch (1934) recognized the eastern race *N. riparia radula* as distinct from the western *N. riparia* whose AME are larger than the PME. Using this distinction, Kaston (1948) recognized the eastern species *N. radula*. Levi and Field (1954) and Chickering (1963) find this distinction unwarranted and an examination of specimens shows the larger PME to appear sporadically in populations throughout the range of *N. riparia*. No other differences between *riparia* and *radula* were found so the species have been synonymized.

Description. Total length 3.73 mm. Legs banded, dorsum of abdomen with six light

chevrons. Carapace 1.54 mm long, 1.35 mm wide. Eye ratio AME:ALE:PME:PLE = male, 1:1:0.8:0.9, female, 1:1:0.8:0.8. Sternum 0.87 mm long, 1.00 mm wide. Labium 0.23 mm long, 0.34 mm wide. Each chelicera of male with one retromarginal tooth, of female with three retromarginal teeth. Abdomen 2.30 mm long. Distance from spiracle to spinnerets 2.2 times the distance from spiracle to epigastric furrow. Proximal segment of lateral spinnerets 1.0 times as long as distal segment.

Diagnosis. Males of *N. magna* have a straight tibial apophysis and a broad patellar spur which is hooked at its tip (Figs. 74, 75), making them similar to those of *N. inaffecta* (Figs. 68, 69). *Neoantistea magna* has one retromarginal tooth on each chelicera while *N. inaffecta* has four retromarginal teeth on each chelicera. *Neoantistea magna* has an embolus which encircles the cymbium in the usual manner while *N. inaffecta* has an embolus which passes through a groove at the base of the tibial apophysis. *Neoantistea magna* is found in the United States and Canada while *N. inaffecta* has been found only in southwestern Mexico. Females of *N. magna* are distinguished by ducts half as wide as each spermatheca and short and simply looped, and by bulbs one-fourth as wide as the spermathecae (Figs. 72, 73).

Distribution. Newfoundland south to northern Florida, west to Alaska and central California (Map 6).

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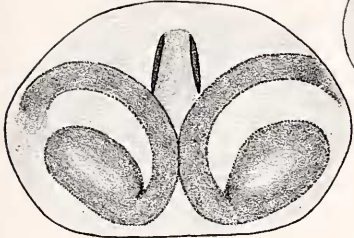
Figures 64–65. *Neoantistea hidalgoensis* n. sp. 64. Ventral view of epigynum of holotype. 65. Dorsal view of cleared epigynum of holotype.

Figures 66–69. *Neoantistea inaffecta* n. sp. 66. Ventral view of epigynum of holotype. 67. Dorsal view of cleared epigynum of holotype. 68. Dorsal view of left palpus of male paratype. 69. Ventral view of left palpus of male paratype.

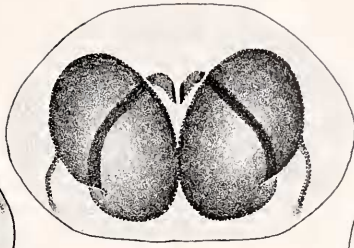
Figures 70–71. *Neoantistea spica* n. sp. 70. Ventral view of epigynum of holotype. 71. Dorsal view of cleared epigynum of holotype.

Figures 72–75. *Neoantistea magna* (Keyserling). 72. Ventral view of epigynum. 73. Dorsal view of cleared epigynum. 74. Dorsal view of left male palpus. 75. Ventral view of left male palpus.

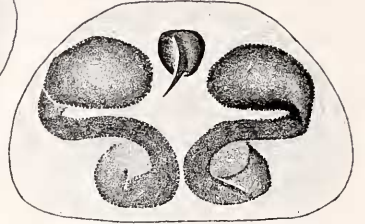
Figures 76–77. *Neoantistea unitistula* n. sp. 76. Ventral view of epigynum of holotype. 77. Dorsal view of cleared epigynum of holotype.



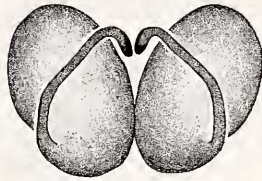
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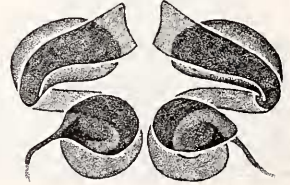
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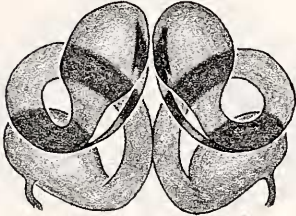
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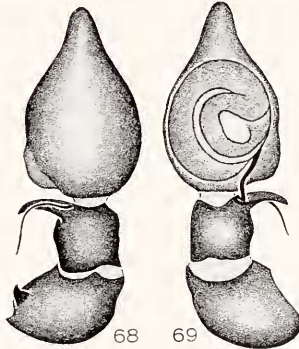
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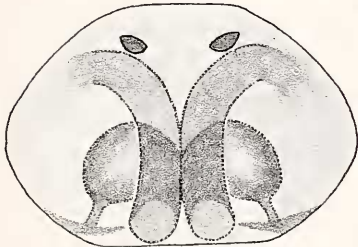


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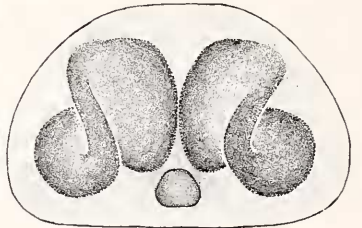


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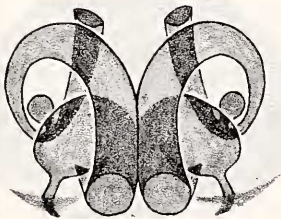
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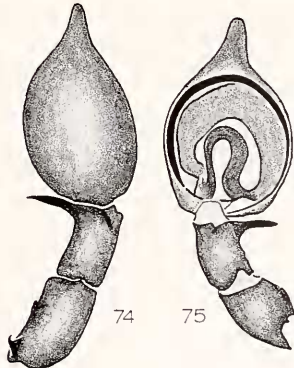
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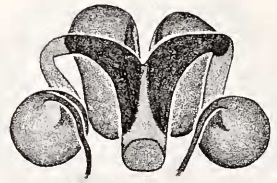


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Neoantistea unifistula n. sp.

Figures 76, 77; Map 5

Type. Female holotype from Sotano de Botella Chica, 2 mi. N.W. of Tequila, Veracruz, Mexico, collected 4 August 1967 by J. Reddell and J. Fish. Female paratype from Volcan San Martín (elevation 3500 feet), Veracruz, collected 14 July 1953 by C. J. Goodnight. Both in American Museum of Natural History. This species is named for the unique fused ducts in the epigynum.

Description. Total length of female (males are not known) 3.00 mm. Legs not banded, dorsum of abdomen with four light chevrons. Carapace 1.30 mm long, 1.00 mm wide. Eye ratio AME:ALE:PME:PLE = 1:2.4:2:2.2. Length and width of sternum 0.73 mm. Labium 0.15 mm long, 0.24 mm wide. Each chelicera with four retro-marginal teeth. Abdomen 1.8 mm long. Distance from spiracle to spinnerets 3.0 times the distance from spiracle to epigastric furrow. Proximal segment of lateral spinnerets 1.3 times as long as distal segment.

Diagnosis. Females of *N. unifistula* are distinguished from those of other species by a common epigyneal opening in the posterior one-fourth of the epigynum (Fig. 76) and by ducts (bursae) fused for about half of their length (Fig. 77).

Distribution. Known in the Nearctic only from the holotype from southeastern Mexico (Map 5).

Hahnia C. L. Koch

Hahnia C. L. Koch, 1841, *Die Arachniden*, 8: 61, figs. 637-638, ♀, ♂. Type species by monotypy: *Hahnia pusilla* C. L. Koch, *ibid.*, from Germany. The generic name is feminine.

Hahnistea Chamberlin and Ivie, 1942, *Bull. Univ. Utah*, 32(13): 27-28, fig. 58. Type species by original designation and monotypy: *Hahnistea longipes* Chamberlin and Ivie, *ibid.* NEW SYNONYMY.

Unzickeria Lehtinen, 1967, *Ann. Zoologici*, 4: 199-196. Type species by original designation: *Hahnia okefinokensis* Chamberlin and Ivie, 1934, in Certsch, *Amer. Mus. Novitates*, No. 712: 1-32, figs. 22, 23, ♂. NEW SYNONYMY.

Diagnosis. *Hahnia* is characterized by having the spiracular opening twice as far from the epigastric furrow as from the base of the median spinnerets (Figs. 10, 11) (in *H. flaviceps* the spiracle may be about midway between the epigastric furrow and bases of the median spinnerets), by having the distal segment of each lateral spinneret about two-thirds as long as the proximal segment (Figs. 10, 11), and by having the AME smaller than the PME (Fig. 12).

The nine species of Nearctic *Hahnia* appear to constitute three species groups. *Hahnia arizonica*, *H. cinerea*, and *H. ononidium* form a compact group whose male members have a palp with a recurved tibial apophysis, a brush of setae on the ventral margin of the cymbium, and a transparent cymbial conductor and whose female members have an epigynum with equal-sized bulbs and spermathecae, ducts of an intermediate length, and epigyneal openings in the posterior one-third of the epigynum. *Hahnia sanjuanensis*, *H. glacialis*, *H. flaviceps*, and *H. veracruzana* form a somewhat less compact group whose male members have a palp with a long, slightly curved tibial apophysis, no brush of setae or conductor and whose female members have an epigynum without bulbs, with long ducts, and with epigyneal openings in the anterior one-third of the epigynum. *Hahnia nobilis* and *H. okefinokensis* are closely similar species whose members are smaller than those of other species in this genus, whose male members have a short, slightly curved tibial apophysis and a palp without a brush of setae or conductor and whose female members have an indistinct epigynum without bulbs, with short or intermediate length ducts, and with epigyneal openings in the center of the epigynum. Although the genus *Hahnia* appears more diverse than either *Antistea* or *Neoantistea*, there seems at present no basis for placing any of the above species or species groups into another genus as Chamberlin and Ivie (1942) and Lehtinen (1967) propose.

Chamberlin and Ivie (1942) separated

Hahnistea from other hahniiid genera by their possession of longer legs, an eye ratio of AME:ALE:PME:PLE = 1:2:1.6:2, a slightly procurved anterior eye row and a straight posterior eye row, a spiracle which is "about midway" between the spiracle and genital furrow, and lateral spinnerets whose distal segments are about one-half as long as their proximal segments.

Hahnia sanjuanensis appears to fall within the limits of the genus *Hahnia* as it is defined here. Although its legs are longer than most *Hahnia* they are similar to those of *H. glacialis*. The spiracle of specimens examined was more posterior than Chamberlin and Ivie indicate and falls within the range described for *Hahnia*, as do the eye configuration and spinneret segment lengths.

Lehtinen (1967) placed *Hahnia okefinokensis*, *Bigois tatei* Gertsch, and *Hahnia ernesti*, -Petrunkevitch into a new genus, *Unzickeria*, which he characterized primarily by features of the genitalia. These species do not appear to form a very uniform genus. As Gertsch (1934) describes, *B. tatei* differs from both *H. ernesti* and *H. okefinokensis* by having AME one-fifth the diameter of the ALE, rather than half the diameter and by having the proximal segment of the intermediate (second) spinnerets longer than the corresponding segment of the lateral spinnerets.

Hahnia veracruzana and *H. ernesti* Simon are placed in the genus *Neohahnia* Mello-Leitão, 1917, by Lehtinen (1967). Although females of *H. veracruzana* are not known, the male genitalia of this species are closer to those of some species Lehtinen retains in the genus *Hahnia* than to *H. ernesti* Simon, and there seems no reason to remove *H. veracruzana* from the genus *Hahnia*.

Coloration. Carapace of most species brown with darker bands radiating from the cervical groove. A dark patch on the posterior cephalic region helps form a U-shaped marking which delineates the cephalic region. Chelicerae are reddish

brown. Endites and labium are brown. Sternum is tan, often with a gray margin. Leg segments brown, becoming lighter towards either end in some specimens. Palp segments are brown. Dorsum of abdomen tan, splotted with gray to form five to seven light, median chevrons in most species. The anterior two or three chevrons are commonly divided by a median gray line. Two small, light dots often lie forward of the anterior chevron. Oblique rows of small dots are found on the lateral surfaces of the abdomen. Venter of the abdomen in most species is tan. Spinneret segments are tan.

Structure. Total length ranges from 1.17 to 2.38 mm, of which the abdomen comprises about two-thirds. Cephalic region of carapace about two-thirds as wide as thoracic region. Maximum width of carapace equal to carapace length. Anterior and posterior eye rows about equally procurved. Median ocular quadrangle narrower anteriorly. AME 0.25 to 0.75 times as large as PME; PME 1.33 to 4.00 times further apart than are AME. Each chelicera about one-half as wide as long with one to five retromarginal teeth. Endites nearly equal in width and length. Labium slightly wider than long. Sternum width and length nearly equal. Leg length commonly IV, I, II, III (I, IV, II, III in *H. sanjuanensis*). Distance from spiracle to spinnerets 0.3 to 0.9 times the distance from spiracle to epigastric furrow. Proximal segment of each lateral spinneret 1.5 to 2.5 times as long as distal segment.

Male palpus with femur and tarsus nearly equal in length, each nearly equal to the combined lengths of patella and tibia. Tibial apophysis distal and retrolateral, either gradually curved distally (*H. flaviceps*, *H. glacialis*, *H. nobilis*, *H. okefinokensis*, *H. sanjuanensis*, *H. veracruzana*) or directed distally and strongly recurved (*H. arizonica*, *H. cinerea*, *H. ononidium*). Patellar spur proximal and retrolateral, basal two-thirds straight and distal portion bent or hooked. Cymbium oval, slightly longer

than wide. Seminal canal clearly visible only in *H. flaviceps*, *H. glacialis*, *H. nobilis*, *H. okefinokensis*, *H. sanjuanensis*, and *H. veracruzana*. A tuft of setae forms a brush on the proximal, prolateral margin of the cymbium in *H. arizonica*, *H. cinerea*, and *H. ononidum*. The embolus arises at the mid-retrolateral margin of the cymbium and completes or nearly completes a circle around the cymbium.

Openings may be located in the anterior region of the epigynum (*H. flaviceps*, *H. glacialis*, *H. sanjuanensis*), in the center of the epigynum (*H. nobilis*, *H. okefinokensis*), or at the posterior of the epigynum (*H. arizonica*, *H. cinerea*, *H. ononidum*). Bulbs may be large (*H. arizonica*, *H. cinerea*, *H. ononidum*), very small (*H. sanjuanensis*), or absent (*H. flaviceps*, *H. glacialis*, *H. nobilis*, *H. okefinokensis*). *Hahnia flaviceps* and *H. sanjuanensis* have highly coiled ducts while those of other species are more simply arranged. Spermathecae of all species but *H. sanjuanensis* are large.

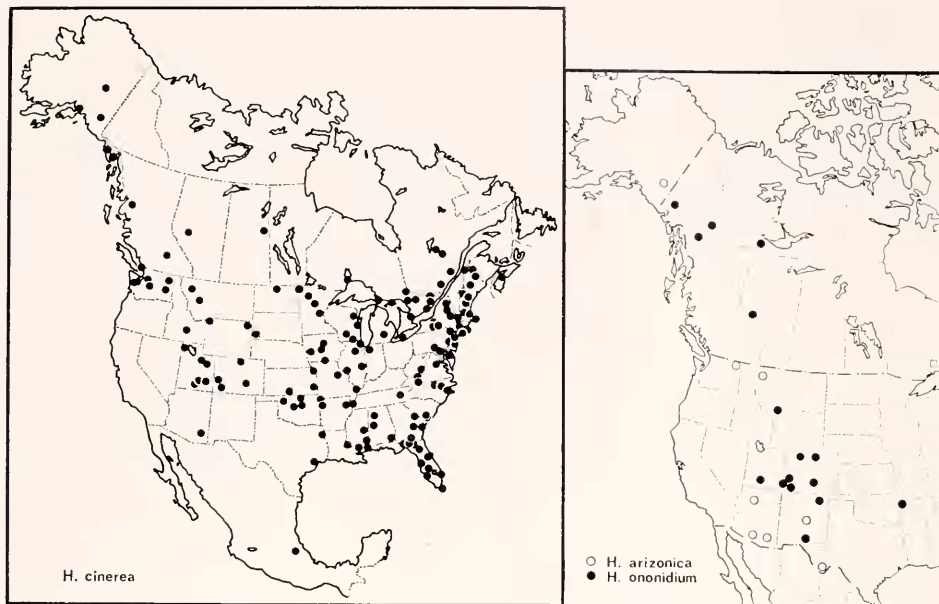
KEY TO THE MALE *HAHNIA*

- 1 Tibial apophysis recurved; brush on proximal, prolateral portion of cymbium (Figs. 80, 81, 86, 87). 2
- Tibial apophysis straight or only slightly curved; no brush on cymbium (Figs. 104, 105, 112, 113). 4
- 2(1) Dorsum of abdomen without chevrons or with only very faint markings (Fig. 93); patellar spur bent, but not hooked (Figs. 91, 92). *ononidum*
- Dorsum of abdomen with conspicuous chevrons (Figs. 82, 83, 88); patellar spur hooked (Figs. 80, 86). 3
- 3(2) Venter of abdomen with U-shaped white patch; proximal segment of lateral spinneret over twice as long as distal segment (Figs. 11, 80-83). *cinerea*
- Venter of abdomen with one median and two lateral light stripes; proximal segment of lateral spinneret less than twice as long as distal segment (Figs. 86-88). *arizonica*
- 4(1) Tibial apophysis twice as long as tibia (Figs. 97, 108, 112). 5
- Tibial apophysis as long as or shorter than tibia (Figs. 101, 104, 114). 7

- 5(4) Cymbium drawn out into a fingerlike distal extension; tibial apophysis nearly straight; patellar spur bifurcate at tip (Figs. 112, 113). *flaviceps*
- Cymbium rounded at distal end; patellar spur with single point (Figs. 97, 108). 6
- 6(5) Tip of tibial apophysis curved retrolaterally, basal one-third of tibial apophysis about one-sixth width of tibia; two to four retromarginal teeth on each chelicera (Figs. 108, 109). *glacialis*
- Tip of tibial apophysis bent prolaterally, basal one-third of tibial apophysis about one-half width of tibia; one retromarginal tooth on each chelicera (Figs. 97, 98). *sanjuanensis*
- 7(4) Tibial apophysis one and one-third times as long as tibia (Figs. 114, 115); AME minute. *veracruzana*
- Tibial apophysis one-third to two-thirds as long as tibia (Figs. 101, 104). 8
- 8(7) Dorsum of abdomen tan; tibial apophysis one-third as long as tibia (Figs. 104, 105); southern Georgia *okefinokensis*
- Dorsum of abdomen gray with four light chevrons and four light ovals; tibial apophysis two-thirds as long as tibia (Figs. 101, 102); southern Mexico *nobilis*

KEY TO THE FEMALE *HAHNIA*

- (Females of *H. veracruzana* are not known)
- 1 No bulbs present; short ducts lead from openings directly to spermathecae (Figs. 99, 100, 103); epigynum very indistinct, details visible only under high magnification after clearing. 2
- Bulbs present (Figs. 79, 85, 90) or absent (Figs. 96, 107, 111), if absent, long coiled ducts lead to spermathecae; epigynum distinct, some details visible under low magnification without clearing. 3
- 2(1) Ducts form a circle before entering spherical spermathecae medially (Figs. 99, 100); southern Mexico. *nobilis*
- Ducts pass laterally to enter elongate spermathecae anteriorly (Fig. 103); southern Georgia. *okefinokensis*
- 3(1) Openings in anterior third of epigynum (Figs. 95, 106, 110). 4
- Openings in posterior third of epigynum (Figs. 78, 84, 89). 6
- 4(3) Large distinct spermathecae about four times as wide as ducts; openings not encircled by ducts (Figs. 106, 107, 110, 111). 5
- Small indistinct spermathecae, appearing as knobs at the end of each duct, less than



Map 7. Distribution of *Hahnia cinerea* Emerton, *Hahnia arizonica* Chamberlin and Ivie, and *Hahnia ononidum* Simon.

- two times as wide as ducts; openings encircled by anterior loops of ducts (Figs. 94-96). *sanjuanensis*
- 5(4) Ducts highly coiled; spermathecae not contiguous (Figs. 110, 111). *flaviceps*
- Ducts not highly coiled; spermathecae contiguous along most of their median surfaces (Figs. 106, 107). *glacialis*
- 6(3) Bulbs ovate; ducts leaving their posterior median surfaces (Figs. 78, 79). --- *cinerea*
- Bulbs elongate or comma-shaped; ducts leaving their posterior lateral or lateral margins (Figs. 84, 85, 89, 90). 7
- 7(6) Abdomen with conspicuous light chevrons (Fig. 88); bulbs separated by a distance equal to two-thirds their width, long axes of bulbs directed anterior-posteriorly (Figs. 84, 85). *arizonica*
- Abdomen without conspicuous light chevrons (Fig. 93); bulbs nearly contiguous, their long axes directed laterally (Figs. 89, 90). *ononidum*

Hahnia cinerea Emerton
Figures 11, 12, 78-83; Map 7

Hahnia cinerea Emerton, 1890, Trans. Conn. Acad. Arts Sci., 8: 197, pl. 7, figs. 9a, b. Male and three female syntypes from Swampscott, Massachusetts, in Museum of Comparative Zoology, examined.

Hahnia cinerea seminola Gertsch, 1934, Amer. Mus. Novitates, No. 712: 3, 8. Male holotype and four paratypes from Gainesville, Florida, in American Museum of Natural History, examined. NEW SYNONYMY.

Description. Total length about 2.00 mm, female generally larger than male. Legs banded, dorsum of abdomen with five to six chevrons (Figs. 82, 83). Carapace about 0.80 mm long and 0.64 mm wide. Eye ratio AME:ALE:PME:PLE = 1:2:1.5:2. Length and width of sternum 0.50 mm. Labium 0.08 mm long, 0.14 mm wide. Three to five nearly equal-sized retromarginal teeth on each chelicera. Abdomen 1.08 to 1.45 mm long. Distance from spiracle to spinnerets 0.5 times the distance from spiracle to epigastric furrow in male, 0.6 times in female. Proximal segment of lateral spinneret 1.8 times as long as distal segment in male, 1.6 times in female.

Diagnosis. A brush on the proximal, prolateral portion of the cymbium (Fig. 81), a recurved tibial apophysis, and a transparent conductor on the distal, prolateral surface of the cymbium (Fig. 80) dis-

tinguish this species from all other North American *Hahnia* except *H. arizonica* and *H. ononidum* with which it is sympatric in western North America. Males of *H. cinerea* and *H. arizonica* have conspicuous chevrons on the dorsum of the abdomen (Figs. 82, 83, 88) and a hooked patellar spur (Fig. 80), while those of *H. ononidum* have only very faint color markings on the abdomen (Fig. 93) and a bent patellar spur (Fig. 91). *Hahnia cinerea* has a median white patch on the venter of the abdomen while *H. arizonica* has three light median stripes. In *H. cinerea* the proximal segment of the lateral spinnerets is about 1.8 times as long as the distal segment, while in *H. arizonica* it is about 2.4 times as long.

Females of *H. cinerea* have the epigynal opening located anterior to the rear margin of the spermathecae (Fig. 79), while in *H. arizonica* (Fig. 85) and *H. ononidum* (Fig. 90) the openings are at the level of the rear margins of the spermathecae. The bulbs of *H. cinerea* are oval and much less elongate than the other species, and the ducts leading from the openings connect to their median surfaces rather than the lateral surfaces as in the *H. arizonica* and *H. ononidum*. *Hahnia cinerea* also differs from *H. ononidum* by having conspicuous chevrons on the dorsum of the abdomen.

Variation. Specimens collected from the Florida Keys north to eastern central Florida show more contrast in light and dark markings on the carapace, sternum, legs, and abdomen and have less symmetri-

cal abdominal markings (Fig. 83) than specimens from elsewhere in North America (Fig. 82), as noted by Gertsch (1934). In specimens from Alachua Co., Columbia Co., Highlands Co., Monroe Co., Palm Beach Co., and Sarasota Co., all of which showed this color pattern, no clinal variation was apparent. Details of the epigynum and palp of these specimens are the same as other *H. cinerea* and other structural features fall within the range of those for specimens examined. At present it seems appropriate only to note this color difference and not to interpret it as defining the subspecies *H. cinerea seminola* as does Gertsch (1934).

Distribution. Nova Scotia south to the Florida Keys, southern Mexico, and Arizona, west to Arizona, Washington, and Alaska (Map 7).

Hahnia arizonica Chamberlin and Ivie

Figures 84–88; Map 7

Hahnia arizonica Chamberlin and Ivie, 1942, Bull. Univ. Utah, 32(13): 26, figs. 54, 55, ♂, ♀. Female holotype, seven male and 13 female paratypes from Oak Creek Canyon, 20 mi. S. of Flagstaff, Arizona, in American Museum of Natural History, 19 paratypes examined.

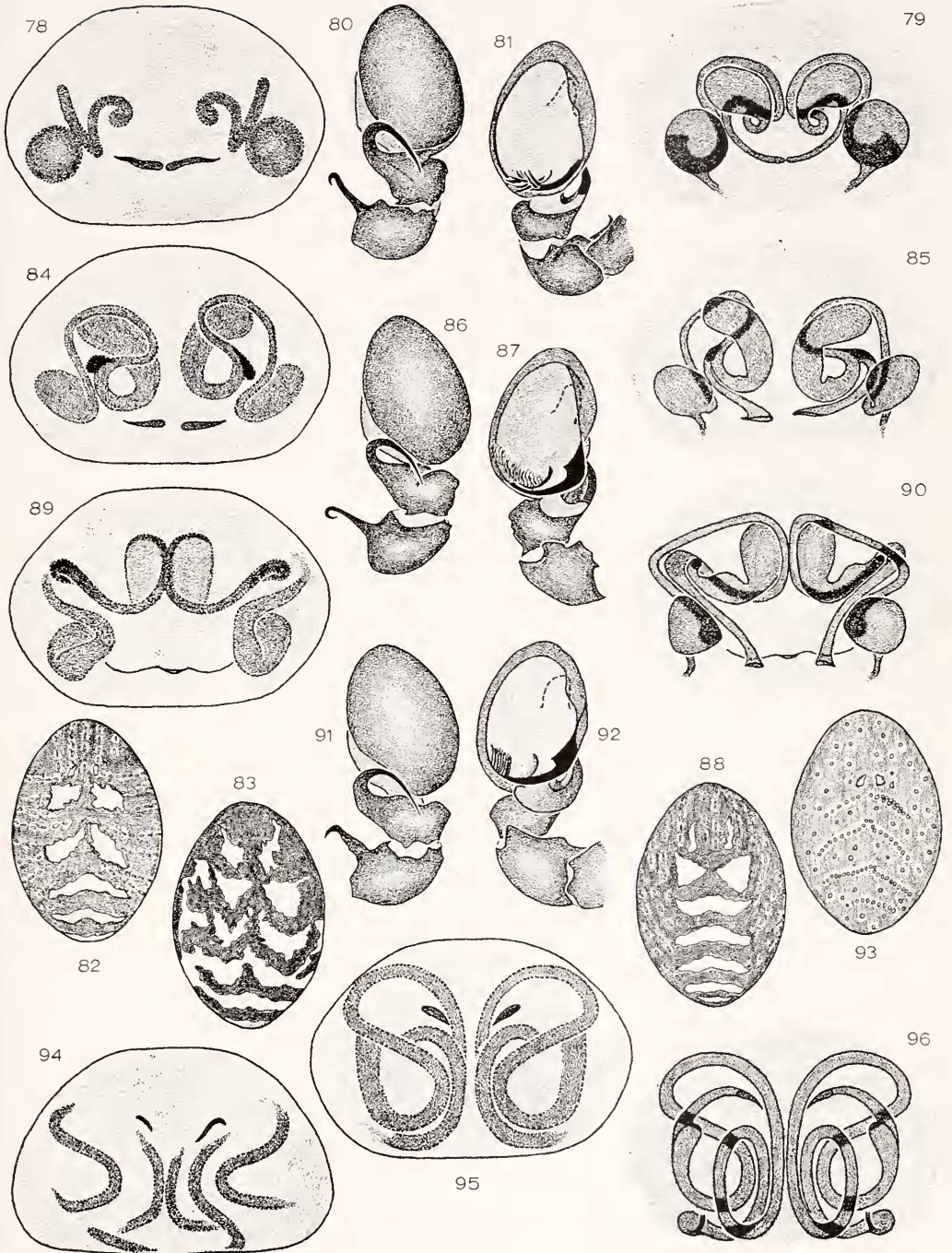
Description. Total length about 2.00 mm, females generally larger than males. Legs banded, dorsum of abdomen with six or seven light chevrons (Fig. 88). Carapace about 0.90 mm long and 0.72 mm wide. Eye ratio AME:ALE:PME:PLE = 1:2:2:3. Length and width of sternum 0.52 mm.

Figures 78–83. *Hahnia cinerea* Emerton. 78. Ventral view of epigynum. 79. Dorsal view of cleared epigynum. 80. Dorsal view of left male palpus. 81. Ventral view of left male palpus. 82. Dorsum of abdomen of male from New Jersey. 83. Dorsum of abdomen of male from Florida.

Figures 84–88. *Hahnia arizonica* Chamberlin and Ivie. 84. Ventral view of epigynum of paratype. 85. Dorsal view of cleared epigynum of paratype. 86. Dorsal view of left palpus of male paratype. 87. Ventral view of left palpus of male paratype. 88. Dorsum of abdomen of male from Arizona.

Figures 89–93. *Hahnia ononidum* Simon. 89. Ventral view of epigynum of paratype. 90. Dorsal view of cleared epigynum of paratype. 91. Dorsal view of left palpus of male paratype. 92. Ventral view of left palpus of male paratype. 93. Dorsum of abdomen of male from Wyoming.

Figures 94–96. *Hahnia sanjuanensis* Exline. 94. Ventral view of epigynum of holotype. 95. Ventral view of epigynum of female from California. 96. Dorsal view of cleared epigynum (95).



Labium 0.10 mm long and 0.17 mm wide. Four retromarginal teeth of nearly equal size on each chelicera. Abdomen 1.18 to 1.56 mm long. Distance from spiracle to spinnerets 0.4 times the distance from spiracle to epigastric furrow in male, 0.5 times in female. Proximal segment of lateral spinneret 2.4 times as long as distal segment in male and female.

Diagnosis. Males can be distinguished from those of *H. ononidum* by their conspicuous abdominal chevrons (Fig. 88) and by a hooked (Fig. 86) rather than a bent patellar spur. It is difficult to distinguish *H. arizonica* and *H. cinerea* males since both have similar color patterns and palps. The venter of *H. arizonica*'s abdomen is generally marked with three light median stripes, while *H. cinerea* has a median white patch. In *H. arizonica* the proximal segment of the lateral spinneret is about 2.4 times as long as the distal segment, while in *H. cinerea* it is about 1.8 times as long.

Females of *H. arizonica* have conspicuous chevrons on the abdomen which distinguish them from *H. ononidum*. *H. arizonica* females may be distinguished from both sympatric species, *H. cinerea* and *H. ononidum*, by having comma-shaped bulbs (Fig. 85) which are separated by at least two-thirds their width and have their long axes nearly parallel to, rather than perpendicular to, the median body plane.

Distribution. Southwestern Texas, west to Arizona, and north of Alaska (Map 7).

Hahnia ononidum Simon

Figures 89–93; Map 7

Hahnia ononidum Simon 1875, *Arachnides de France*, 2: 135–136. Male and female syntypes from the high Alps at Monétier-de-Briançon, France, in the Muséum National d'Histoire Naturelle, Paris, examined.

Hahnia inornata Chamberlin and Ivie, 1942, *Bull. Univ. Utah*, 32(13): 26–27, figs. 56, 57, ♂, ♀. Female holotype and three paratypes from Pine Springs, Henry Mtns., Utah, in American Museum of Natural History, examined. First synonymized by Lehtinen, 1967.

Description. Total length about 1.90 mm, females and males nearly equal in size. Legs only faintly banded, dorsum of abdomen without conspicuous chevrons (Fig. 93). Carapace about 0.80 mm long and 0.64 mm wide. Eye ratio AME:ALE:PME:PLE = 1:1.5:1.5:1.5. Length and width of sternum about 0.45 mm. Labium 0.08 mm long and 0.17 mm wide. Two to three retromarginal teeth on each chelicera. Abdomen 1.04 to 1.60 mm long. Distance from spiracle to spinnerets 0.4 times the distance from spiracle to epigastric furrow in male, 0.6 times in female. Proximal segment of lateral spinneret 3.0 times as long as distal segment in male, 2.0 times in female.

Diagnosis. Both males and females may be distinguished from their sibling species, *H. arizonica* and *H. cinerea*, by their very faint abdominal chevrons (Fig. 93).

The male palp has a patellar spur which is bent (Fig. 91), but not hooked as in the other two species. The female epigynum has elongate, comma-shaped bulbs with bursae connected to their lateral surfaces (Fig. 90) as does *H. arizonica*, but, unlike *H. arizonica*, the long axis of these bulbs is oriented perpendicular to the longitudinal axis of the body and the bulbs are not separated by more than one-fourth the width of each.

Discussion. Lehtinen (1967) treats *H. ononidum*, *H. cinerea*, and *H. inornata* as synonyms. Although *H. ononidum* and *H. inornata* are clearly synonyms, as indicated by similar color patterns and similar male and female genitalia, *H. cinerea* and *H. arizonica* appear to be closely related but distinct species.

Distribution. Southern New Mexico east to northwestern Arkansas, west to Utah, and north to southwestern Yukon (Map 7).

Hahnia sanjuanensis Exline

Figures 10, 94–98; Map 8

Hahnia sanjuanensis Exline, 1938, *Univ. Wash. Publ. Biol.*, 9(1): 32, fig. 45, ♀. Female holotype from Friday Harbor, Washington, in American Museum of Natural History, examined.



Map 8. Distribution of *Hahnia sanjuanensis* Exline, *Hahnia nobilis* n. sp. (*nobila*, not correct, on map), *Hahnia okefinokensis* Chamberlin and Ivie, *Hahnia glacialis* Soerensen, *Hahnia flaviceps* Emerton, and *Hahnia veracruzana* Gertsch and Davis.

Hahnistea longipes Chamberlin and Ivie, 1942, Bull. Univ. Utah, 32(13): 27-28, fig. 58, ♀. Female holotype from Potter Creek Cave (W 123°: N 40°), California, in American Museum of Natural History, examined. First synonymized by Lehtinen, 1967.

Description. Total length 1.70 to 2.38 mm. Male tan, female with six to seven faint chevrons on dorsum of abdomen. Carapace about 0.70 mm in width and length. Eye ratio AME:ALE:PME:PLE = 1:2.5:2.5:2.5. Sternum 0.44 mm long and 0.53 mm wide. Labium 0.09 mm long, 0.16 mm wide. One small retromarginal tooth on each chelicera. Abdomen 1.00 to 1.79 mm long. Distance from spiracle to spinnerets 0.3 times the distance from spiracle to epigastric furrow in male, 0.6 times in female. Proximal segment of lateral spinneret 1.9 times as long as distal segment in male, 1.7 times in female.

Diagnosis. Males are similar to those of *H. flaviceps* and *H. glacialis*, all of which have a nearly straight tibial apophysis about twice as long as the tibia. *H. sanjuanensis* males may be separated from those of *H. flaviceps* by the presence of a rounded (Fig. 97) rather than a pointed (Fig. 112) cymbium tip and by the presence of a single-pointed rather than a double-pointed, patellar spur. The basal one-third of the tibial apophysis of *H. sanjuanensis* is about one-half as wide as the tibia (Fig. 97), while that of *H. glacialis* is about one-sixth as wide as the tibia (Fig. 108). Females are distinguished by oblique epigynal openings situated in the anterior one-third of the epigynum, separated by a distance equal to the width of each opening, and generally encircled by a loop of the duct (Figs. 94, 95). Bulbs and spermathecae are

much reduced and the ducts form several large loops (Fig. 96).

Discussion. The male described above is the first identified with this species and was collected from Spanish Fork Canyon, Utah Co., Utah, on 2 November 1951 by D. E. Beck. It is deposited in the American Museum of Natural History. Although not collected with a female, this specimen has the long, thin legs (the first longer than the rest) and reduced coloration characteristic of *H. sanjuanensis* females. Dimensions of the carapace, sternum, and labium as well as the position of the spiracle and relative length of the spinneret segments correspond to those of female specimens of *H. sanjuanensis*. Lehtinen (1967) recognized the synonymy of *Hahnna sanjuanensis* and *Hahnistea longipes*, but considered this species to be in the genus *Hahnistea*. As mentioned in the discussion of *Hahnna* the genus *Hahnistea* does not seem valid.

Distribution. Southeastern Arizona west to northern Baja California, north to north-central Utah and northwestern Washington (Map 8).

Hahnna nobilis n. sp.

Figures 99–102; Map 8

Types. Female holotype, three male and three female paratypes from five miles north of Encarnacion, Hidalgo, Mexico (W 99.12: N 20.55), collected 28 July 1966 by Jean and Wilton Ivie, in the American Museum of Natural History. The name of this species is derived from a Latin translation of the Mexican name of the state in which types were collected.

Description. Total length 1.5 mm. Legs and palps tan, dorsum of abdomen with four light chevrons in the posterior one-half and four light ovals in the anterior one-half. Cardiac muscle scars indistinct. Venter of male's abdomen tan, female with a wide, light, transverse stripe on venter of abdomen. Carapace 0.66 mm long and 0.48 mm wide. Eye ratio of male, AME:ALE: PME:PLE = 1:3.5:2.5:3.5, of female, 1:2.5: 2.5:2.5. Length and width of sternum 0.40

mm. Labium 0.08 mm long and 0.14 mm wide. Male with three and female with two retromarginal teeth on each chelicera. Abdomen 0.80 to 0.85 mm long. Distance from spiracle to spinnerets 0.4 times the distance from spiracle to epigastric furrow in male, 0.6 times in female. Proximal segment of lateral spinneret 1.8 times as long as distal segment in male, 1.6 times in female.

Diagnosis. Males of *H. nobilis* (Figs. 101, 102) are similar to those of *H. okefinokensis* (Figs. 104, 105) and *H. veracruzana* (Figs. 114, 115), all of which have a relatively short, straight tibial apophysis. In *H. nobilis* the tibial apophysis is two-thirds as long as the tibia, in *H. okefinokensis* one-third as long, and in *H. veracruzana* one and one-third times as long. *Hahnna nobilis* has light chevrons and ovals on the dorsum of its abdomen while *H. okefinokensis* does not. Females have a very small, simple epigynum (Figs. 99, 100) similar to that of *H. okefinokensis* (Fig. 103), but somewhat more distinct. In *H. nobilis* the ducts make a circle before connecting to the median surfaces of oval spermathecae; whereas, the short ducts of *H. okefinokensis* pass laterally to enter the anterior surfaces of elongate spermathecae.

Distribution. Known only from the type locality in southeastern Mexico (Map 8).

Hahnna okefinokensis Chamberlin and Ivie

Figures 103–105; Map 8

Hahnna okefinokensis Chamberlin and Ivie, 1934 in Gertsch, Amer. Mus. Novitates, No. 712: 8. Male holotype and two female paratypes from east side of Okefinokee Swamp, Georgia, collected 23 August 1933 by Wilton Ivie, in American Museum of Natural History, examined. *Unzickeria okefinokensis*, – Lehtinen, 1967, Ann. Zoologici, 4: 199–496.

Note. There appear to be more paratypes than mentioned by Chamberlin and Ivie in the original species description. The authors examined one male and three female paratypes from the American Museum of Natural History, all collected by W. Ivie

on the date and from the locality mentioned above. The male examined was damaged so that it could not be accurately measured.

Description. Total length 1.68 mm. Legs tan, male and two females with dorsum of abdomen tan, one female with four light chevrons and two light ovals on the dorsum of gray abdomen. Carapace 0.67 mm long, 0.54 mm wide. Eye ratio AME:ALE:PME:PLE = 1:4:4:4. Length and width of sternum 0.40 mm. Labium 0.08 mm long, 0.13 mm wide. Two retromarginal teeth on each chelicera of female. Distance from spiracle to spinnerets 0.3 times the distance from spiracle to epigastric furrow in female. Proximal segment of lateral spinneret 1.7 times as long as distal segment in female.

Diagnosis. Males are similar to those of *H. nobilis* and *H. veracruzana*, all of which have a palp with a slightly curved apophysis which is less than half as long as the palpal tarsus. In *H. okefinokensis* (Figs. 104, 105) the tibial apophysis is one-third as long as the tibia, in *H. nobilis* (Figs. 101, 102) two-thirds as long, and in *H. veracruzana* (Figs. 114, 115) one and one-third times as long as the tibia. Details of the epigynum (Fig. 103), like those of *H. nobilis* (Figs. 99, 100), are very indistinct. While very few details can be seen through the uncleared epigynum of *H. nobilis*, this is not possible in *H. okefinokensis*. In *H. okefinokensis* the ducts pass laterally to enter the anterior surfaces of elongate spermathecae, while in *H. nobilis* the ducts form a circle before entering the median margins of oval spermathecae.

Distribution. Known only from the type locality in southeastern Georgia (Map 8).

Hahnia glacialis Soerensen

Figures 106–109; Map 8

Hahnia glacialis Soerensen, 1898, Vid. Medd. Natur. Foren. Kjöbenh., 1898: 219. Type locality Greenland, type specimens in Copenhagen Museum, examined.

Hahnia monticola Bryant, 1941, Psyche, 48(4): 132–134, fig. 1, ♀. Female holotype and paratype from Mt. Washington, New Hampshire, in Museum of Comparative Zoology, examined. NEW SYNONYMY.

Description. Total length 2.35 mm. Legs tan, dorsum of abdomen with six light chevrons. Carapace 0.94 mm long, 0.70 mm wide. Eye ratio AME:ALE:PME:PLE = 1:1.5:1.5:1.5. Length and width of sternum 0.56 mm. Labium 0.10 mm long, 0.16 mm wide. Two to four very small retromarginal teeth on each chelicera. Abdomen 1.37 to 1.60 mm long. Distance from spiracle to spinnerets 0.4 times the distance from spiracle to epigastric furrow. Proximal segment of lateral spinnerets 1.3 times as long as distal segment in male, 2.2 times in female.

Diagnosis. *Hahnia glacialis* males (Figs. 108, 109) are distinguished from all others except *H. flaviceps* and *H. sanjuanensis* by a long, straight tibial apophysis which is nearly as long as the tarsus. *Hahnia glacialis* differs from *H. flaviceps* (Figs. 112, 113) by having a palp whose tarsus is rounded distally rather than drawn to a point, and by having a single-pointed rather than a forked patellar spur. The basal one-third of the tibial apophysis in *H. glacialis* is one-sixth as wide as the tibia, while in *H. sanjuanensis* (Figs. 97, 98) it is one-half as wide as the tibia. Females of *H. glacialis* are distinguished by the pattern of their epigynum (Figs. 106, 107). The epigyneal openings are located in the anterior one-fourth of the epigynum, just anterior to the spermathecae. The spermathecae are large, elongate, contiguous along their median surfaces, and clearly visible in an intact epigynum. Lateral to each spermathecae is a semicircular loop of the duct with its open side directed posteriorly and laterally.

Discussion. Several specimens from Greenland were examined. This species has a very distinctive epigynum and male palp, so that illustrations and descriptions clearly establish its identity. Lehtinen (1967) places both *H. glacialis* and *H. monticola* in the genus *Neoantistea*, but retains them as separate species. Specimens examined clearly show that *H. glacialis* and *H. monticola* are synonyms and that this species should be kept in the genus *Hahnia*

as the arrangement of the spiracle, spinnerets, and eyes is characteristic of *Hahnia* and not *Neoantistea*.

Distribution. This boreal species is found from Alaska and the Yukon south to Colorado and southeast to northern New York and New Hampshire (Map 8).

Hahnia flaviceps Emerton
Figures 110–113; Map 8

Hahnia flaviceps Emerton, 1913, Bull. Amer. Mus. Nat. Hist., 32: 257. Male and female syntypes from swamp near railroad at Farmingdale, New Jersey, in American Museum of Natural History, examined.

Description. Total length 1.68 to 2.36 mm, females larger than males. Legs tan or with faint bands, abdomen with five or six light chevrons. Carapace 0.80 mm long, 0.60 mm wide. Eye ratio AME:ALE:PME:PLE = 1:2:2:2. Clypeus longer than any other North American member of the family, easily visible anterior to AME. Length and width of sternum 0.45 mm. Labium 0.08 mm long, 0.13 mm wide. Each chelicera with three nearly equal retro-marginal teeth. Abdomen 0.84 to 1.31 mm long. Distance from spiracle to spinnerets 0.8 times the distance from spiracle to epigastric furrow in male, 0.9 times in female. Proximal segment of lateral spinnerets 1.5 times as long as distal segment.

Diagnosis. Males of *H. flaviceps* (Figs. 112, 113) are separated from all North

American *Hahnia* except *H. glacialis* and *H. sanjuanensis* by a long, straight tibial apophysis which is nearly as long as the tarsus. The tarsus of *H. flaviceps* is drawn to a point distally while those of *H. glacialis* (Figs. 108, 109) and *H. sanjuanensis* (Figs. 97, 98) are rounded distally. *Hahnia flaviceps* is the only North American species of the genus with a double-pointed patellar spur. Females of *H. flaviceps* have epigynal openings in the anterior one-third of the epigynum, medial to spirals of the ducts (Figs. 110, 111). Bursae connect directly to these ducts and there are no bulbs. Ducts are highly convoluted and lead to elongate spermathecae which do not show through an uncleared epigynum and are not contiguous along the midline of the epigynum.

Discussion. The long, highly-coiled ducts and absence of bulbs in the female epigynum, the extension of the tarsus of the male palp to a distal point, a long, sloping clypeus, and the location of the spiracle nearly midway between the base of median spinnerets and the epigastric furrow indicate that this species may not be closely related to any other North American *Hahnia*. However, *Hahnia* appears to be a more diverse genus than *Antistea* or *Neoantistea* and at present there appears no basis for treating it as other than a single genus.

Distribution. Indiana east to New Jersey

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Figures 97–98. *Hahnia sanjuanensis* Exline. 97. Dorsal view of left male palpus. 98. Ventral view of left male palpus.

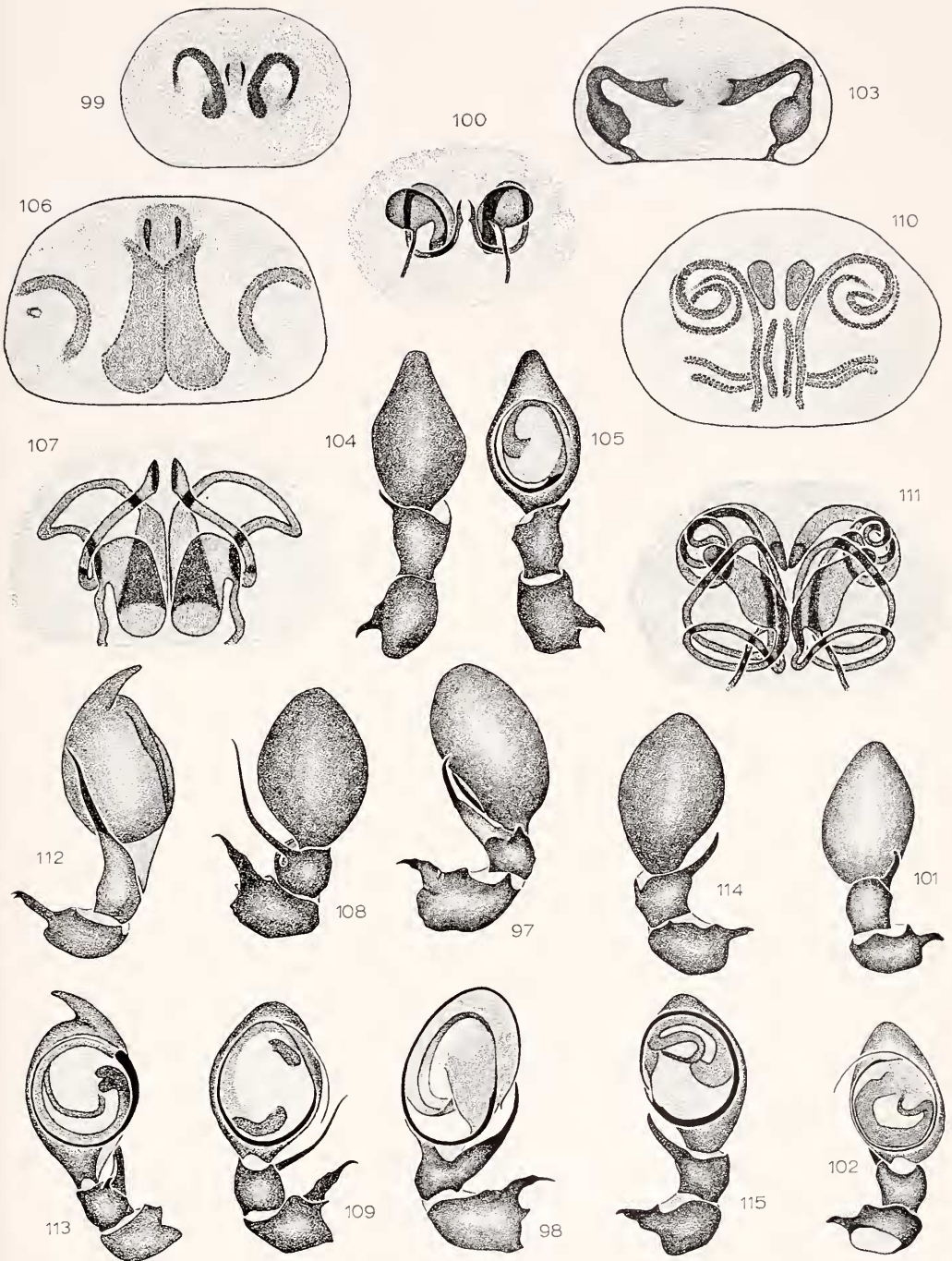
Figures 99–102. *Hahnia nobilis* n. sp. 99. Ventral view of epigynum of holotype. 100. Dorsal view of cleared epigynum of holotype. 101. Dorsal view of left palpus of male paratype. 102. Ventral view of left palpus of male paratype.

Figures 103–105. *Hahnia okefinokensis* Chamberlin and Ivie. 103. Dorsal view of cleared epigynum of paratype. 104. Dorsal view of left palpus of male paratype. 105. Ventral view of left palpus of male paratype.

Figures 106–109. *Hahnia glacialis* Soerensen. 106. Ventral view of epigynum. 107. Dorsal view of cleared epigynum. 108. Dorsal view of left male palpus. 109. Ventral view of left male palpus.

Figures 110–113. *Hahnia flaviceps* Emerton. 110. Ventral view of epigynum. 111. Dorsal view of cleared epigynum. 112. Dorsal view of left male palpus. 113. Ventral view of left male palpus.

Figures 114–115. *Hahnia veracruzana* Gertsch and Davis. 114. Dorsal view of right palpus of male holotype. 115. Ventral view of right palpus of male holotype.



and North Carolina, south to Mississippi and southeastern Texas (Map 8).

Hahnia veracruzana Gertsch and Davis
Figures 114–115; Map 8

Hahnia veracruzana Gertsch and Davis, 1940, Amer. Mus. Novitates, No. 1059: 14–15, fig. 20, ♂. Male holotype and male paratype from 15 mi. W. of Jalapa, Veracruz, Mexico, in American Museum of Natural History, examined.

Neohahnia veracruzana:—Lehtinen, 1967, Ann. Zoologici, 4: 199–496.

Description. Total length of male (females not known) 1.17 mm. Legs tan, dorsum of abdomen with five very faint chevrons. Carapace 0.54 mm long, 0.42 mm wide. Eye ratio AME:ALE:PME:PLE = 1:4:4:4, AME minute. Length and width of sternum 0.32 mm. Labium 0.03 mm long, 0.08 mm wide. Each chelicera with two very small, equal retromarginal teeth. Distance from spiracle to spinnerets 0.3 times the distance from spiracle to epigastric furrow. Proximal segment of lateral spinnerets of male 1.5 times as long as distal segment.

Diagnosis. Males are distinguished from all others of the genus except *H. nobilis* and *H. okefinokensis* by a slightly curved tibial apophysis which is less than half as long as the tarsus. *H. veracruzana* has a tibial apophysis which is one and one-third times as long as the tibia (Figs. 114, 115) while that of *H. nobilis* is two-thirds as long as the tibia (Figs. 101, 102) and that of *H. okefinokensis* is one-third as long as the tibia (Figs. 104, 105).

Distribution. Known only from the type locality in southeastern Mexico (Map 8).

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