

A REVISION OF THE
SPIDER GENUS *GNAPHOSA*
(ARANEAE, GNAPHOSIDAE)
IN AMERICA

NORMAN I. PLATNICK AND MOHAMMAD U. SHADAB

BULLETIN
OF THE
AMERICAN MUSEUM OF NATURAL HISTORY
VOLUME 155 : ARTICLE 1 NEW YORK : 1975

A REVISION OF THE SPIDER GENUS *GNAPHOSA*
(ARANEAE, GNAPHOSIDAE) IN AMERICA

NORMAN I. PLATNICK

*Assistant Curator, Department of Entomology
The American Museum of Natural History*

MOHAMMAD U. SHADAB

*Scientific Assistant, Department of Entomology
The American Museum of Natural History*

BULLETIN
OF THE
AMERICAN MUSEUM OF NATURAL HISTORY
VOLUME 155 : ARTICLE 1 NEW YORK : 1975

BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY
Volume 155, article 1, pages 1-66, figures 1-150, maps 1-15

Issued February 26, 1975

Price. \$2.35 a copy

ISSN 0003-0090

ABSTRACT

The 26 New World species of *Gnaphosa* are diagnosed, described, and assigned to species groups. The genus *Cylphosa* Chamberlin is considered a junior synonym of *Gnaphosa*; the genera *Callilepis* Westring and *Laronia* Simon are removed from the Gnaphosinae. Nine new species are described: *snohomish* from Washington; *maritima*, *saxosa*, *dentata*, and *salsa* from the southwestern United States; and *sonora*, *chihuahua*, *potosi*, and *chiapas* from Mexico. Seven specific names are newly synonymized: *mulaiki* Cham-

berlin and *septentrionalis* Fox, both with *clara* (Keyserling); *subparvula* Fox with *mima* Chamberlin; *gosoga* Chamberlin with *californica* Banks; *distincta* Banks and *texana* Chamberlin, both with *fontinalis* Keyserling; and *peon* Chamberlin with *sericata* (L. Koch). The males of *utahana* Banks, *altudona* Chamberlin, and *sandersi* Gertsch and Davis, and the female of *orites* Chamberlin are described for the first time. The European species *microps* Holm is newly recorded from America.

INTRODUCTION

The present paper is the first in a proposed series on the Nearctic fauna of the spider family Gnaphosidae. Among the least well-known of American spiders, their systematics is currently chaotic, due largely to the work of Chamberlin (1922), who established numerous genera and species with brief descriptions and no illustrations. Most of these genera represent what are, to modern workers, merely species groups, and the number of valid genera in North America appears to be considerably less than Chamberlin's work would indicate. Most of the species described by Chamberlin can be identified only by referring to their type specimens, and, partly as a result of his narrow conceptions of geographic and individual variation, synonymies abound. Further, Chamberlin applied older names to species without examining their types, with the result that many names, including those of some of the most common species, may now have to be changed.

In the past, gnaphosids were identified by the widely separated anterior spinnerets (fig. 5) and the obliquely depressed endites (fig. 4). Neither of these characters appears completely reliable; some *Orodassus*, for example, have rather closely spaced spinnerets, and some *Callilepis* have greatly reduced depressions on the endites. As Lehtinen (1967) pointed out, if the family is to be maintained it will have to be radically re-limited. Numerous genera now placed in the Gnaphosidae appear to be closer to the Prodidomidae, Platoridae, and Liocraninae Clubionidae than to *Gnaphosa*. A worldwide study of

these groups is required to solve this problem, but it appears likely that Gnaphosidae will prove to be a valid (although polythetically defined) taxon and that most of the Nearctic forms previously placed in the family will remain there.

Three valid North American genera (*Gnaphosa*, *Callilepis*, and *Laronia*) have been placed in the subfamily Gnaphosinae. Species of all three genera have unusual structures on the chelical retromargin which are quite unlike the simple teeth found in most gnaphosids. Species of *Gnaphosa* have a distinctive serrated keel (fig. 3), whereas those of *Callilepis* and *Laronia* possess one or more rounded, translucent laminae. Several other genera with serrated keels have been described from the Old World; some of these will probably prove to be synonyms of *Gnaphosa*, but at least a few, like *Pterotricha*, are valid. The lumping of *Callilepis* and *Laronia* (which are closely related to each other) with these genera simply because their chelical retromargin is "modified" in some way is extremely artificial. Although it is remotely possible that *Callilepis* and *Laronia* constitute a sister group of the Gnaphosinae, genitalic characters indicate that an independent origin is far more likely.

The species treated here were formerly placed in *Gnaphosa* and *Cylphosa*. Chamberlin (1933) erected *Cylphosa* for the species *gosoga* (= *californica*) and its relatives on the basis of their long emboli; he gave no characters for distinguishing the females from those of *Gnaphosa*, and Kaston (1948) concluded that there are none. A total of



FIG. 1. *Gnaphosa muscorum* (L. Koch), female from Massachusetts. Photograph by H. W. Levi.

four species groups are involved in this question; their probable phylogeny based on genitalic characters is shown in figure 2. The *lucifuga* group, which includes the type species of *Gnaphosa*, is characterized by short emboli that arise ventrally from the tegulum (fig. 7). In the *lugubris* group the embolus ranges from short to long but arises on the prolateral side of the tegulum (fig. 8). The emboli of the *fontinalis* group, which includes the type species of *Cylphosa*, are long and originate on the retrolateral side of the tegulum (fig. 127). Finally, in the *sericata* group the embolus is extremely long and coils completely around the tegulum (fig. 143). There are also characters of the female genitalia, discussed below, which support each of these groupings. Given the groupings and phylogeny shown in figure 2, three different classifications are possible. If *Cylphosa* is accepted in its most restricted sense (i.e., the *fontinalis* group) each of the four species groups must receive generic status, and a monotypic genus must be erected for *sericata*. Alternatively,

Cylphosa could be interpreted more broadly, as, in fact, Chamberlin (1936a) did, to include both the *fontinalis* and *sericata* groups; this would leave one large and one small genus. Finally, all four species groups, which are almost certainly monophyletic, could be regarded as members of a single genus and *Cylphosa* considered a synonym of *Gnaphosa*. Admittedly, the choice between these classifications is to some degree a matter of personal preference; we have chosen the latter alternative because we believe it best expresses the relationships of the species involved (for example, the palpus of *muscorum*, a member of the *lugubris* group, is similar to those of the *fontinalis* group species; this relationship could be obscured if either of the first two alternatives were chosen) and because it allows a simple and clear-cut diagnosis of the group and thus produces a more usable classification. Kaston (1948) and Ubick and Roth (1973) have also taken this approach to the problem.

Like most gnaphosids, *Gnaphosa* are primarily

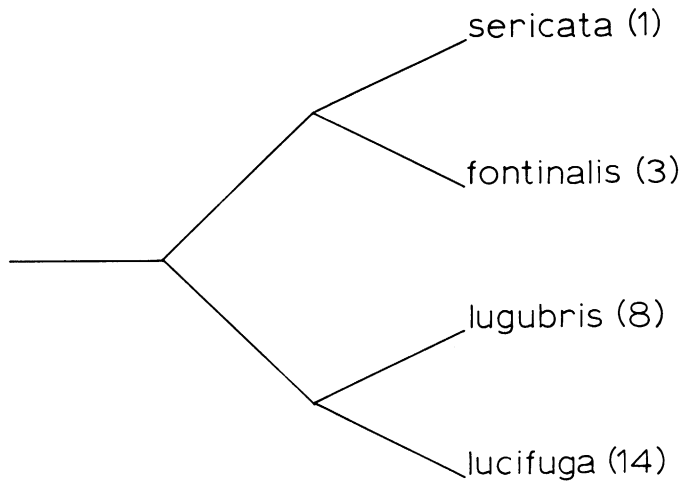


FIG. 2. Probable phylogeny of species groups of American *Gnaphosa*. Numbers in parentheses refer to the number of New World species in each group.

nocturnal hunters, and remain during the day in retreats under stones and logs. Females are often found with their characteristically flattened egg sacs, which can contain up to 250 eggs. Males are most easily collected by pitfall traps. Species of *Gnaphosa* occupy an astounding variety of habitats, and there seems to be a correlation between the species groups and their ecology. Members of the *lugubris* group are primarily montane and arctic tundra spiders, abundant at elevations up to 13,100 feet and as far north as northern Alaska and Canada. Many of these species seem to be cold-adapted; the southern limits of their distribution are at high elevations (see maps 8-11) and are presumably set by temperature requirements. Several species of this group are frequently found on the same mountain top; for example, at least four species (*muscorum*, *mima*, *brumalis*, and *orites*) are found on Mt. Washington in the White Mountains of New Hampshire. Schmoller (1970) showed that, at least to some extent, alpine *Gnaphosa* in Colorado avoid direct competition by having different mating seasons, and thus different instar life spans, during their unusual biennial life cycle. Members of the *lucifuga* group, on the other hand, are found at lower elevations, particularly in saline areas and on beaches. Some have been taken in the intertidal zone and may be restricted to that habitat.

Gnaphosa, like most North American gnaphosid genera, is Holarctic in distribution. Two of the four American species groups (the *lucifuga* and *lugubris* groups) also occur in Europe. The European and American forms of the *lugubris* group are very closely related; two species (*muscorum* and *orites*) were previously known to be Holarctic, and one more (*microps*) is shown below to be so distributed. In addition, some of the other American species of this group have their closest relatives in Europe. Undoubtedly, some of these species also occur in Siberia, from which a few *Gnaphosa*, described usually from a single female, are known. Until more material, particularly of males, is available, no conclusions can be reached, although Holm (1970, 1973) has made some significant contributions toward identifying these species. The problem poses a continued threat to the stability of nomenclature in the *lugubris* group.

In the New World, species of *Gnaphosa* are found only as far south as Guatemala; Roewer's (1954) listing of *Gnaphosa scutata* Mello-Leitão from Brazil is an erroneous citation of a species described in *Zelotes*. Examination of the distribution patterns (maps 1-15) reveals an interesting overlap, both of species and species groups, in the southern Rocky Mountains, particularly in Colorado; it seems likely that this was the prime

center of speciation of *Gnaphosa* in America. Patterns of speciation involving forms originating in alpine environments and subsequently colonizing arctic areas have been postulated for other groups of animals (Hoffmann and Taber, 1968). If this is the case in *Gnaphosa*, species of the *lugubris* group represent direct descendants of the ancestral population and have spread northward from the Rocky Mountains in that manner. The other species groups would represent lines that progressively became adapted to lower elevations and warmer climates. Decreasing interspecific competition for the relatively limited food supply of alpine areas seems to provide sufficient selection pressure to account for the repeated occurrence of this shift to lower elevations. Evidence that the shift occurred in this and not the opposite direction may be provided by the existence of montane species, like *antipola*, which are not found in arctic regions, and by the fact that in the *lucifuga* group those species, such as *clara*, that still occur at intermediate elevations, have widespread distributions (as in map 1), whereas those, such as *synthetica*, that are very restricted to elevations at or near sea level, have very limited distributions (as in map 5) and seem to be of more recent origin. Other interpretations of the distributional data are, of course, possible, and this conception should be regarded as highly speculative.

Intraspecific variation in *Gnaphosa* is pronounced, and is much greater than in, for example, clubionids or thomisids. This is especially true of females, which exhibit tremendous variation in size. It is not uncommon to find single specimens more than twice the length of other conspecifics. There is also some limited variation in the degree of sclerotization of the epigynum which can result in some initially disconcerting differences in appearance; for this reason it is recommended that reference be made to the internal genitalia and to both the illustrations (which show typical forms) and the scanning electron micrographs of epigyna when identifying females. It requires only a little experience to relate the two types of figures. Of special interest is the variation shown by *Gnaphosa fontinalis*, described below, which appears to be one of the few known cases of genitalic polymorphism in spiders.

For the species descriptions, an attempt was made to measure the total length, carapace length and width, and femur II length on 10 specimens of each sex. All means and standard deviations refer to this size sample. As leg spination characters seem quite stable and conservative in this genus, a complete description of the typical spination pattern is given for each species group and discrepancies from that pattern noted in the individual descriptions. The number of spines on the proximal, median, and distal thirds of a given surface (D, P, V, or R for dorsal, prolateral, ventral, or retrolateral) of a segment are given; thus tibia III V 2-2-2 means the segment bears three pairs of ventral spines. Exact measurements, based on a single specimen and accurate to ± 0.01 mm., are given of eye sizes and relationships; from these figures, the eye pattern can be easily reconstructed on graph paper. Five standard abbreviations (AME, ALE, PME, PLE, and MOQ) refer respectively to the anterior median, anterior lateral, posterior median, and posterior lateral eyes, and to the median ocular quadrangle. Eye interdistances are denoted by dashes; thus, AME-AME refers to the distance between the anterior median eyes. Eye sizes refer to the diameters of the lenses, not the encircling pigment; sizes of the triangular posterior median eyes are measured horizontally.

Scanning electron micrographs of the embolar region of the male palpus and of the external epigynum are provided for each species of which sufficient material was available. It was found useful to remove the palpal bulb from the cymbium as certain features of the embolus and accessory terminal sclerites are often obscured by the cymbium or the setae it bears (cf. figs. 91 and 92, whole palp and removed bulb of the same species); similarly, best results were obtained when the setae around the epigynum were removed before coating by scraping with a paint brush on which the hairs were clipped off close to the stem. Prior to mounting, all specimens were placed briefly in an ultrasonic vibrator to remove accumulated dirt and debris, and then air-dried on paper toweling. Although micrographs of the internal female genitalia can be obtained (fig. 94), no method has yet been discovered for removing all the excess tissue which, although transparent under the light microscope, obscures

in micrographs the structures it covers. A brief immersion in concentrated sodium hydroxide solution, however, does loosen this tissue and makes it easier to remove by hand. New techniques utilizing uncoated material allow greater penetration of the electron beam and may eventually solve this problem, in addition to allowing subsurface ducts to be traced.

The 2500 adult specimens used in the present study were obtained from the large holdings of the American Museum (AMNH) and from Drs. D. Barr, Royal Ontario Museum; J. A. Beatty; J. E. Carico; R. E. Crabill, National Museum of Natural History, Smithsonian Institution (USNM, types on extended loan to AMNH); C. D. Dondale, Canadian National Collections (CNC); W. J. Gertsch; Å. Holm, Uppsala Universitet (UUS); B. J. Kaston; T. Kronstedt, Naturhistoriska Riksmuseet (NRS); H. W. Levi, Museum of Comparative Zoology, Harvard University (MCZ);

M. H. Muma; W. B. Peck; R. J. Sauer, Michigan State University; R. X. Schick, formerly of the California Academy of Sciences (CAS); H. K. Wallace; H. V. Weems, Florida State Collection of Arthropods; and F. Wanless, British Museum (Natural History), London (BMNH), whom the senior author also thanks for the hospitality extended him during a recent visit to that institution. We especially thank Dr. Dondale for sorting out a crucial collection of arctic *Gnaphosa* without which many problems in the *lugubris* group could not have been solved, Dr. Holm for providing representatives and information on Palaearctic species, and Mr. R. J. Koestler of the American Museum of Natural History for his painstaking and patient assistance with the scanning electron microscope, a Cambridge Scientific Instruments Model S-4 purchased through a grant from the National Science Foundation.

GNAPHOSA LATREILLE

Gnaphosa Latreille, 1804, p. 134 (type species *Aranea lucifuga* Walckenaer, designated by Thorell, 1870, p. 149). Roewer, 1954, p. 360. Bonnet, 1957, p. 2000.

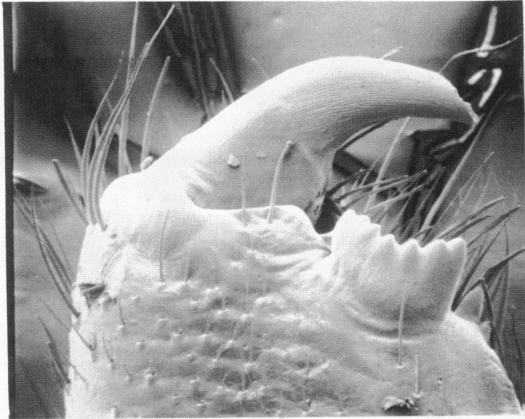
Cylphosa Chamberlin, 1933, p. 2 (type species by original designation *Gnaphosa gosoga* Chamberlin [= *californica* Banks]; first synonymized, informally, by Kaston, 1948, pp. 344, 861).

Diagnosis. *Gnaphosa* may be distinguished from all other Nearctic gnaphosids by the presence of a serrated keel on the cheliceral retromargin (fig. 3) and by the rounded endites (fig. 4).

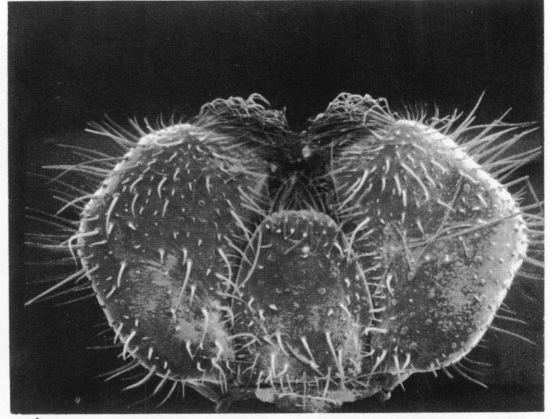
Description. Total length 3-12 mm. Carapace oval in dorsal view, widest at coxae II, flattened, with ocular area narrowed, light orange to dark brown, with dark border and erect dark macrosetae. Cephalic area only slightly elevated; thoracic groove longitudinal. From front, anterior eye row slightly recurved to procurved, posterior row straight to slightly recurved. PME roughly triangular, others circular. Lateral eyes usually larger than medians. Eyes of anterior row separated by their diameter or less; PME separated by their radius or more, by their horizontal diameter or more from PLE. MOQ wider in back than in front, roughly square. Clypeal height

equal to or greater than AME diameter. Chelicerae brown, with serrated keel on retromargin (fig. 3) and two promarginal teeth. Endites rounded, with oblique depression (fig. 4). Labium longer than wide, rounded at tip. Sternum light orange to light brown, longer than wide. Leg formula 4123. Legs with numerous spines and long setae. Tarsi with two dentate claws. Claw tufts and metatarsal preening comb lacking. Trochanters not notched. Abdomen dark orange to brown, longer than wide, with dark, shiny anterior scutum in males. Six spinnerets, anteriors widely separated (fig. 5) with five long spigots (fig. 6). Palp with one or two retrolateral tibial apophyses, broad tegulum, short to long embolus, curved terminal apophysis, and sometimes a conductor. Epigynal structure varying in different species groups.

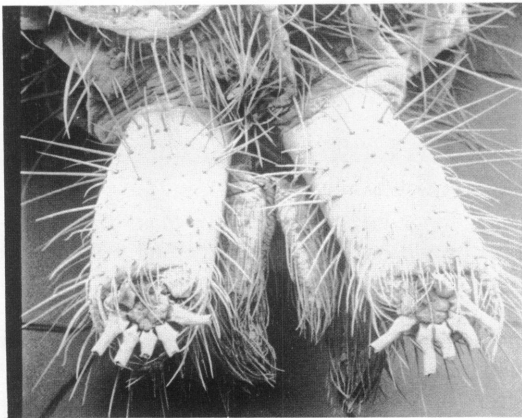
Uncertain Names. The following species, referred to *Gnaphosa* by their original or subsequent authors, are considered *nomina dubia*: *Herpyllus bicolor* Hentz (1847), type destroyed; *Drassus diversus* Blackwall (1871), type lost; *Gnaphosa humilis* Banks (1892), type lost; *Gnaphosa abnormis* Banks (1898), type destroyed; and *Gnaphosa decepta* Banks (1898), type destroyed.



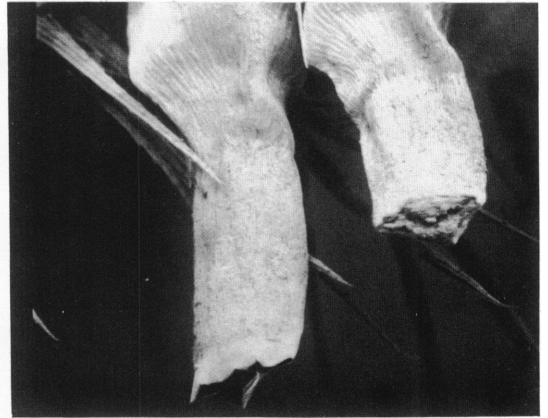
3



4



5



6

FIGS. 3-6. *Gnaphosa muscorum* (L. Koch), scanning electron micrographs. 3. Chelicera, posterior view, 140X. 4. Labium and endites, ventral view, 45X. 5. Spinnerets, ventral view, 90X. 6. Spigots of the anterior spinnerets, ventral view, 1080X.

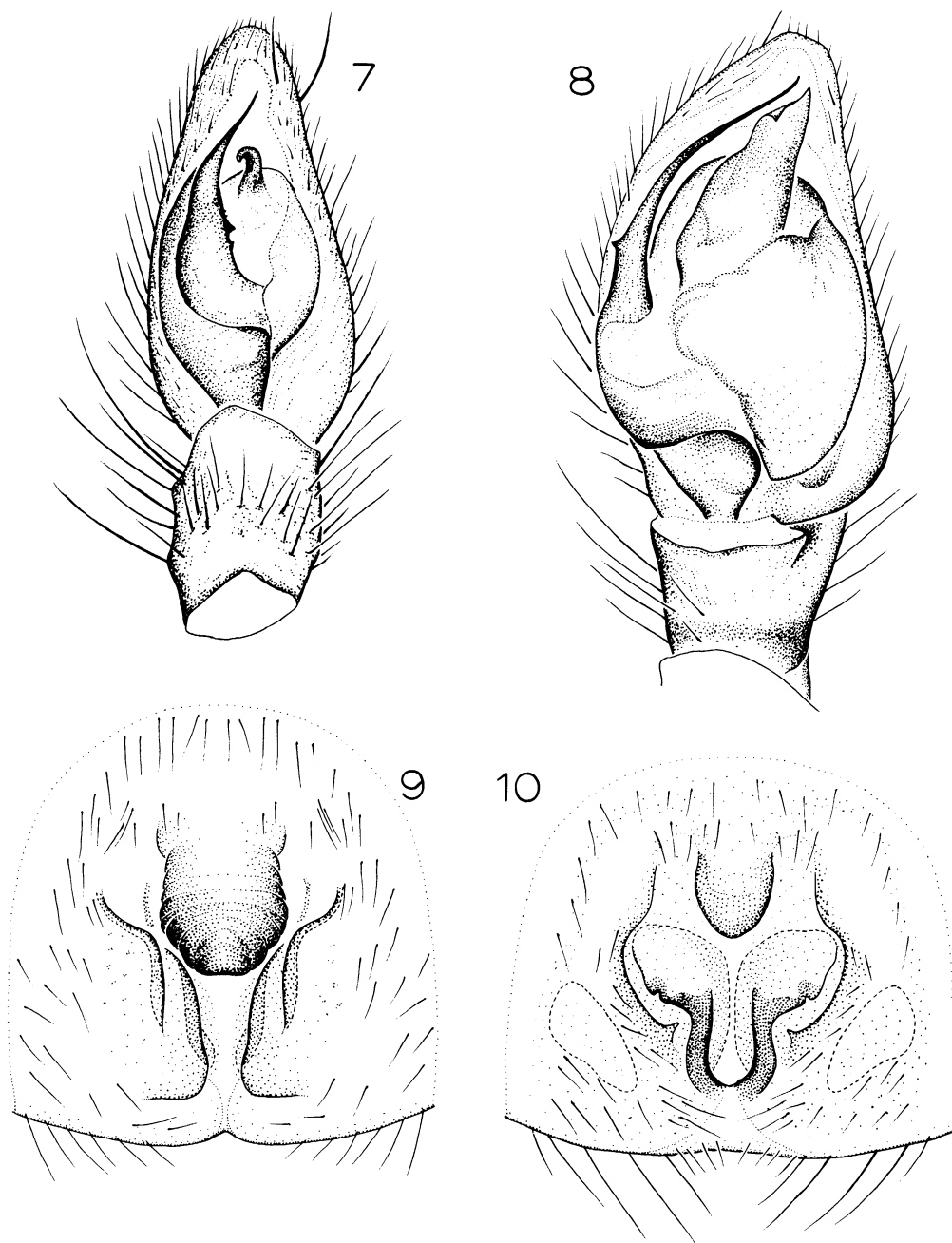
KEY TO SPECIES GROUPS OF *GNAPHOSA* IN AMERICA

1. Embolus coiling around bulb three times (figs. 143, 144, 147, 148); externally visible epigynal ducts coiled (fig. 145) *sericata* group
- Embolus coiling around bulb no more than once; epigynal ducts, if externally visible, not coiled 2
2. Embolus originating on retrolateral side of bulb (figs. 127, 135, 139); internal female genitalia with anterolateral flaplike enlargements (figs. 130, 138, 142) *fontinalis* group
- Embolus originating on prolateral side of

- bulb; internal female genitalia without anterolateral flaplike enlargements 3
3. Palp with one retrolateral tibial apophysis; embolus restricted to prolateral side of bulb (as in fig. 8); epigynum with large atrium (as in fig. 81), sometimes filled by septum (as in fig. 113) *lugubris* group
- Palp with two retrolateral tibial apophyses or embolus occupying ventral surface of bulb (as in fig. 7); epigynum without atrium, with inner and outer lateral margins (as in fig. 13) or with curved anterior opening (as in fig. 61) *lucifuga* group

THE *LUCIFUGA* GROUP

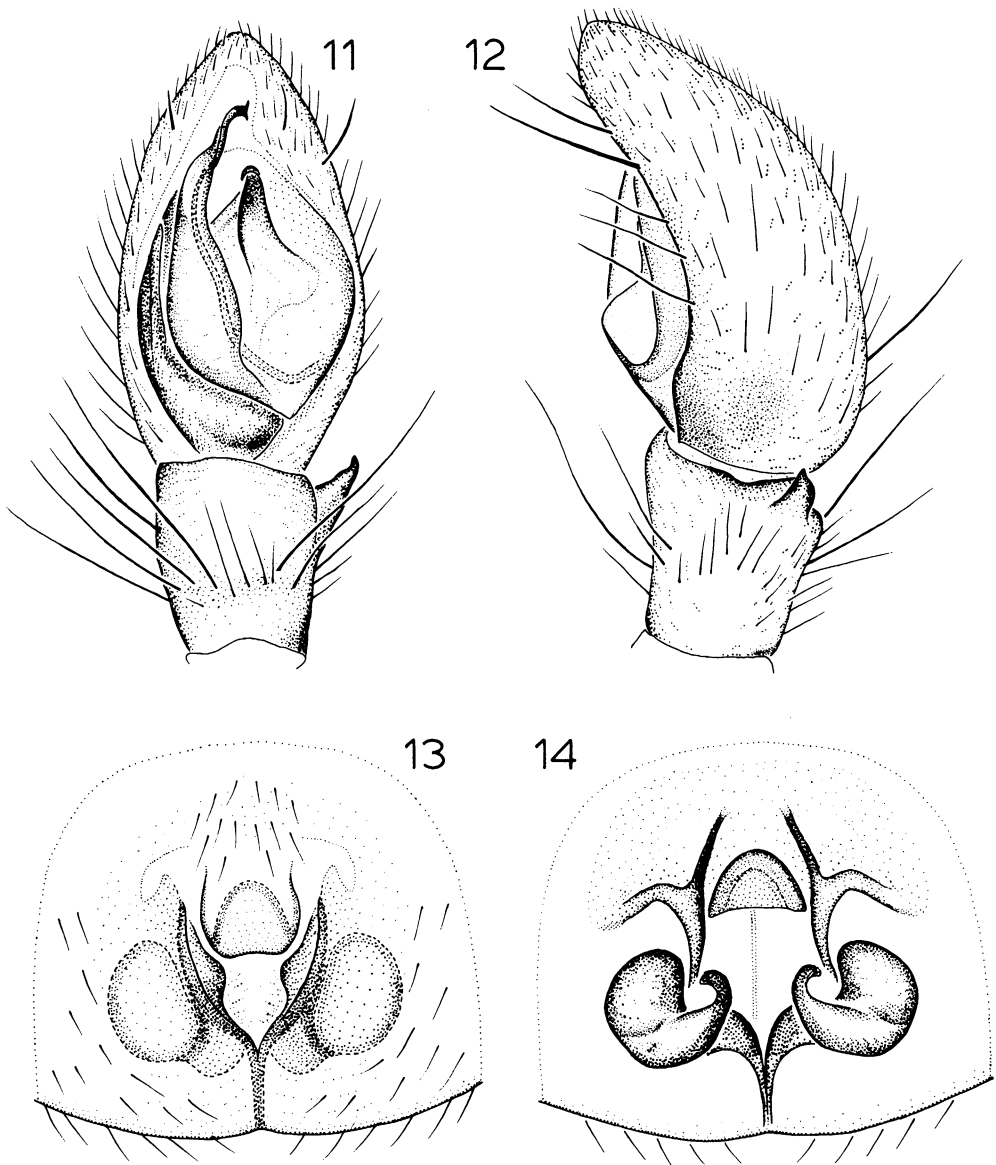
Diagnosis. Species belonging to the *lucifuga*



FIGS. 7-10. 7, 9. *Gnaphosa lucifuga* (Walckenaer). 7. Palp, ventral view. 9. Epigynum, ventral view. 8, 10. *Gnaphosa lugubris* (C. L. Koch). 8. Palp, ventral view. 10. Epigynum, ventral view.

group can usually be distinguished from other *Gnaphosa* by the male embolus, which typically occupies the entire prolateral half of the ventral

surface of the bulb (as in fig. 7) and by the female epigynum, which characteristically has a projecting anterior hood, inner and outer lateral



FIGS. 11-14. *Gnaphosa clara* (Keyserling). 11. Palp, ventral view. 12. Palp, retrolateral view. 13. Epigynum, ventral view. 14. Vulva, dorsal view.

margins, and a midpiece (as in fig. 9). However, three closely related species (*altudona*, *potosi*, and *chihuahua*), tentatively placed in this group because of somatic similarities and their distribution, differ from the others in having two retrolateral tibial apophyses on the male palp (as in fig. 68) and only one pair of lateral margins and a hood reduced to a curved opening on the epigynum (as in fig. 61). In species of the *lucifuga*

group the legs usually bear extremely long setae (often three or four times as long as the leg segment is wide) and the ventral spination of tibiae and metatarsi I and II is generally reduced. In contrast to the other species groups, these *Gnaphosa* are usually light in color.

Description. As for the genus, except for the following: Carapace, abdomen, and legs light orange to light brown. Endites sometimes slightly

angular at sides. Legs usually bearing extremely long setae. Typical leg spination (only surfaces bearing spines listed): femora: I, II D 1-1-0, P 0-0-1; III D 1-1-0, P 0-1-1, R 0-1-1; IV D 1-1-0, P 0-1-1, R 0-0-1; patella III R 0-1-0; tibiae: III, IV P 1-0-1, V 2-2-2, R 1-1-1; metatarsi: II V 1-0-0; III P 0-1-2, V 2-0-2, R 0-1-2; IV P 0-1-2, V 2-1-2, R 1-1-2. Genitalia as described above.

KEY TO SPECIES OF THE
LUCIFUGA GROUP
IN AMERICA

1. Two retrolateral tibial apophyses (figs. 60, 68); epigynum with hood reduced to anterior curved opening (figs. 61, 69, 77) . . . 2
One retrolateral tibial apophysis (as in fig. 12); epigynum with projecting hood (as in fig. 13) . . . 4
2. Retrolateral tibial apophyses widely separated (fig. 68); epigynum constricted behind anterior opening (fig. 69) . . . *potosi*
Retrolateral tibial apophyses approximate (fig. 60); epigynum not constricted behind anterior opening (figs. 61, 77) . . . 3
3. Palp with acutely curved conductor (fig. 59); epigynal margin surrounding anterior opening (fig. 61) . . . *altudona*
Male unknown; epigynal margin not surrounding anterior opening (fig. 77) . . . *chiapas*
4. Males . . . 5
Females . . . 12
5. Embolus distally and proximally expanded at tip (figs. 11, 15) . . . *clara*
Embolus not expanded at tip . . . 6
6. Embolus bearing several tubercles (figs. 17, 19) . . . *hirsutipes*
Embolus bearing only one tubercle (as in fig. 35) . . . 7
7. Embolar tubercle on prolateral side of embolus (figs. 35, 43) . . . 8
Embolar tubercle on retrolateral side of embolus (figs. 23, 31, 47, 55) . . . 9
8. Embolar tubercle relatively small (figs. 39, 43) . . . *dentata*
Embolar tubercle relatively large (figs. 41, 43) . . . *synthetica*
9. Embolar tubercle closer to base than to tip of embolus (figs. 31, 47) . . . 10
Embolar tubercle closer to tip than to base of embolus (figs. 23, 55) . . . 11
10. Embolar tubercle directed prolaterally (figs. 29, 31) . . . *saxosa*
Embolar tubercle directed retrolaterally (figs. 47, 51) . . . *salsa*
11. Retrolateral tibial apophysis large, erect (fig. 24) . . . *maritima*
Retrolateral tibial apophysis small, recumbent (fig. 56) . . . *utahana*
12. Epigynal hood relatively short (figs. 45, 57) . . . 13
Epigynal hood relatively long (as in fig. 13) . . . 14
13. Outer lateral margins of epigynum rounded (fig. 45) . . . *synthetica*
Outer lateral margins of epigynum angular (fig. 57) . . . *utahana*
14. Epigynal midpiece long, narrow (figs. 71, 73) . . . 15
Epigynal midpiece short (as in figs. 13, 33) . . . 16
15. Epigynal midpiece relatively wide (fig. 71) . . . *sonora*
Epigynal midpiece relatively narrow (fig. 73) . . . *tenebrosa*
16. Epigynal midpiece relatively wide (figs. 37, 75) . . . 17
Epigynal midpiece relatively narrow (as in fig. 13) . . . 18
17. Epigynal hood relatively large (fig. 37) . . . *dentata*
Epigynal hood relatively small (fig. 75) . . . *chihuahua*
18. Inner lateral margins of epigynum widely separated (figs. 33, 49) . . . 19
Inner lateral margins of epigynum approximate (figs. 13, 21, 25) . . . 20
19. Epigynal hood originating far anterior of outer lateral margins (fig. 33) . . . *saxosa*
Epigynal hood originating only slightly anterior of outer lateral margins (fig. 49) . . . *salsa*
20. Outer lateral margins of epigynum angular anteriorly (fig. 25) . . . *maritima*
Outer lateral margins of epigynum sinuous anteriorly (figs. 13, 21) . . . 21
21. Inner lateral margins of epigynum evenly curved (fig. 21) . . . *hirsutipes*
Inner lateral margins of epigynum sinuous (fig. 13) . . . *clara*

Gnaphosa lucifuga (Walckenaer)

Figures 7, 9

Aranea lucifuga Walckenaer, 1802, p. 221.

Gnaphosa lucifuga: Thorell, 1868, p. 379. Roewer, 1954, p. 364. Bonnet, 1957, p. 2011.

Illustrations of the palpus (fig. 7) and epigynum (fig. 9) of this European species, the type species of *Gnaphosa*, are provided for purposes of

comparison with the Nearctic members of the genus and species group. The specimens illustrated are from Basel, Switzerland (AMNH).

Gnaphosa clara (Keyserling)

Figures 11-16; Map 1

Pythonissa clara Keyserling, 1887, p. 429, pl. 6, fig. 6 (male holotype from Bridger Basin, Utah, in MCZ, examined).

Callilepis clara: Banks, 1910, p. 9. Chamberlin, 1922, p. 158. Bonnet, 1956, p. 931.

Gnaphosa mulaiki Chamberlin, 1936b, p. 6, fig. 24 (female holotype from Green Island Bird Sanctuary, Cameron County, Texas, in AMNH, examined). Roewer, 1954, p. 370. Bonnet, 1957, p. 2016. NEW SYNONYMY.

Gnaphosa septentrionalis Fox, 1938, p. 228, pl. 1, figs. 2, 8 (male holotype supposedly from Schumaline Island, Alaska [probably mislabeled], in USNM, examined). Roewer, 1954, p. 371. Bonnet, 1957, p. 2020. NEW SYNONYMY.

Pterotricha clara: Roewer, 1954, p. 378.

Gnaphosa clara: Ubick and Roth, 1973, p. 3.

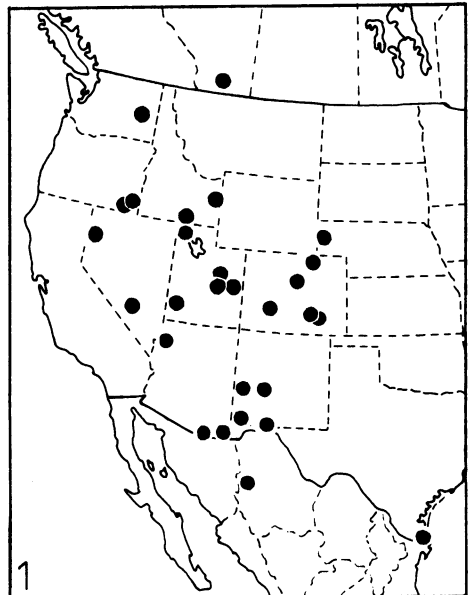
Diagnosis. *Gnaphosa clara* is closest to *hirsutipes* but may be distinguished by the distally and proximally expanded tip of the embolus (figs. 11, 15) and the sinuous inner lateral margin of the epigynum (fig. 13).

Male. Total length 4.15 ± 0.49 mm. Carapace 2.05 ± 0.23 mm. long, 1.62 ± 0.25 mm. wide. Femur II 1.32 ± 0.17 mm. long (23 specimens examined). Eye sizes and interdistances (mm.): AME 0.06, ALE 0.11, PME 0.08, PLE 0.08; AME-AME 0.06, AME-ALE 0.02, PME-PME 0.05, PME-PLE 0.09, ALE-PLE 0.11. MOQ length 0.23 mm., front width 0.18 mm., back width 0.22 mm. Embolus with distally and proximally expanded tip which rests against cymbium (figs. 11, 15). Retrolateral tibial apophysis short, narrowed at tip (fig. 12). Leg spination: femora: II P 0-1-1; IV R 0-1-1; tibiae: I V 0-0-2; II V 0-1-2; IV P 0-1-2, V 2-0-2, R 1-1-2; metatarsi: I V 1-0-0; II V 2-0-0; III P 1-0-1, V 2-2-2, R 1-1-1.

Female. Total length 5.61 ± 1.45 mm. Carapace 2.20 ± 0.32 mm. long, 1.62 ± 0.24 mm. wide. Femur II 1.18 ± 0.16 mm. long (36 specimens examined). Eye sizes and interdistances (mm.): AME 0.06, ALE 0.11, PME 0.09, PLE 0.09; AME-AME 0.08, AME-ALE 0.03, PME-PME 0.06, PME-PLE 0.13, ALE-PLE 0.11. MOQ

length 0.25 mm., front width 0.21 mm., back width 0.23 mm. Epigynum with long, narrow hood, excavated outer and sinuous inner lateral margins, and small midpiece (figs. 13, 16). Spermathecae with short median lobes (fig. 14). Leg spination: femur IV P 0-0-1; patella III R 0-0-0; tibiae: II V 0-0-1; III R 1-0-1; metatarsus I V 1-0-0.

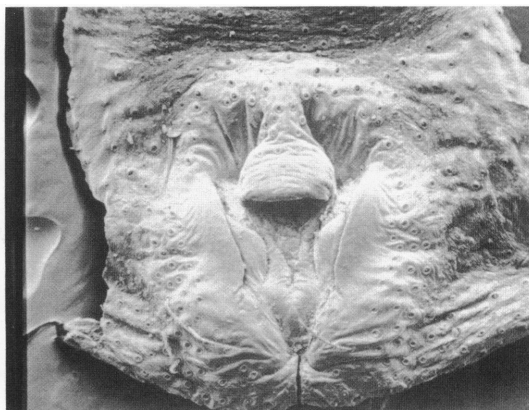
Records. **Canada:** *Alberta:* Chin. **United States:** *Arizona:* Cochise Co.: Swisshelm Mountain. Mohave Co.: Kaibab. Santa Cruz Co.: Ruby. *Colorado:* Denver Co.: Denver. Gunnison Co.: Crested Butte. Otero Co. Pueblo Co.: Boone. Weld Co.: Stoneham. *Idaho:* Bonneville Co.: Idaho Falls. Cassia Co.: Burley. *Nebraska:* Scotts Bluff Co.: Mitchell. *Nevada:* Nye Co.: Mercury. Washoe Co.: Nixon. *New Mexico:* Catron Co.: San Francisco Mountains. Dona Ana Co.: Organ Mountains. Grant Co.: Hurley. Socorro Co.: Socorro. *Oregon:* Harney Co.: Hot Springs. Malheur Co.: Harper. *Texas:* Cameron Co.: Green Island Bird Sanctuary. *Utah:* Beaver Co.: Wah Wah Mountains. Box Elder Co.: Grouse Creek. Carbon Co.: Mud Springs. Emery Co.: Green River. Grand Co.: Moab. *Washington:* Grant Co.:



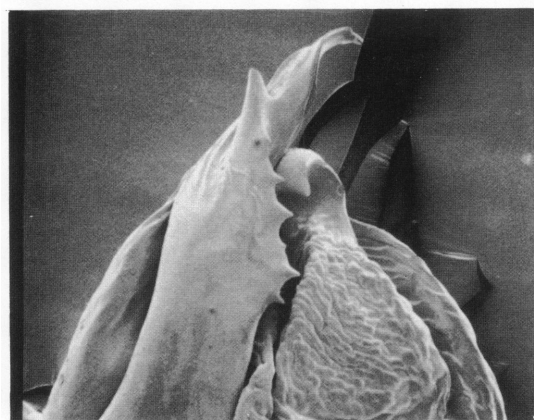
MAP 1. Western North America, showing distribution of *Gnaphosa clara* (Keyserling).



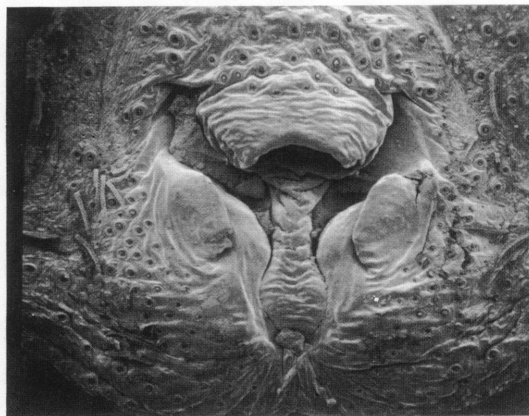
15



16



17



18

FIGS. 15-18. Scanning electron micrographs, ventral views. 15, 16. *Gnaphosa clara* (Keyserling). 15. Embolar region of palp, 470X. 16. Epigynum, 120X. 17, 18. *G. hirsutipes* Banks. 17. Embolar region of palp, 275X. 18. Epigynum, 100X.

Coulee City. **Mexico:** *Chihuahua*: 20 mi. W Matáchic.

Distribution. Washington and Alberta south to Chihuahua and Texas (map 1). The holotype of *septrionalis*, supposedly from Alaska, is from the notoriously mislabeled Marx collection, and it is extremely doubtful that the species actually extends that far north.

Natural History. Mature males have been collected from May through August, mature females from March through September. Specimens have been taken at elevations between 7100 and 9000 feet, under stones, in meadows, and in pitfall traps at the edge of fields.

Synonymy. Repeated simultaneous collec-

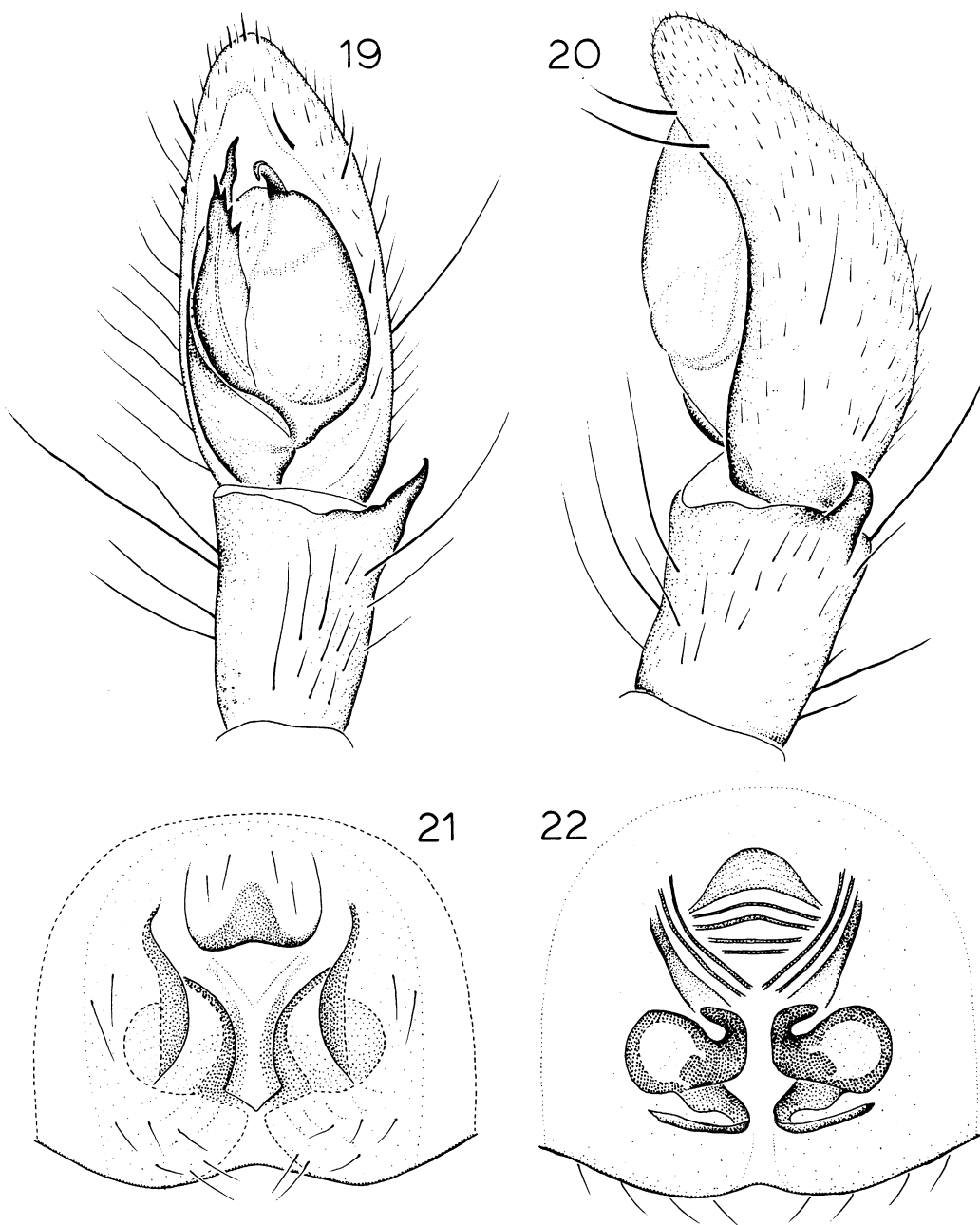
tions of both sexes indicate that *mulaiki* is simply the female of *clara*. Fox's redescription of the male is understandable in view of Chamberlin's failure to recognize the type of *clara* as a *Gnaphosa*.

Gnaphosa hirsutipes Banks

Figures 17-22; Map 2

Gnaphosa hirsutipes Banks, 1901, p. 573, pl. 33, fig. 4 (two female syntypes from Albuquerque, Bernalillo County, New Mexico, in MCZ, examined). Fox, 1938, p. 228, pl. 1, fig. 9. Roewer, 1954, p. 370. Bonnet, 1957, p. 2009.

Diagnosis. *Gnaphosa hirsutipes* is closest to



FIGS. 19-22. *Gnaphosa hirsutipes* Banks. 19. Palp, ventral view. 20. Palp, retrolateral view. 21. Epigynum, ventral view. 22. Vulva, dorsal view.

clara but may be distinguished by the numerous tubercles on the embolus (figs. 17, 19) and the evenly curved inner lateral margins of the epigynum (figs. 18, 21).

Male. Total length 7.31-10.54 mm. Carapace 3.31-5.57 mm. long, 2.59-4.21 mm. wide. Femur II 2.20-3.47 mm. long (four specimens examined). Eye sizes and interdistances (mm.):

AME 0.10, ALE 0.11, PME 0.12, PLE 0.11; AME-AME 0.11, AME-ALE 0.05, PME-PME 0.06, PME-PLE 0.21, ALE-PLE 0.17. MOQ length 0.33 mm., front width 0.32 mm., back width 0.30 mm. Embolus with numerous tubercles (figs. 17, 19). Retrolateral tibial apophysis slightly recurved (fig. 20). Leg spination: femora: II P 0-1-1; IV R 0-1-1; patella III R 0-0-0; tibia IV V 2-1-2.

Female. Total length 7.95 ± 1.61 mm. Carapace 3.28 ± 0.64 mm. long, 2.53 ± 0.56 mm. wide. Femur II 1.96 ± 0.43 mm. long (21 specimens examined). Eye sizes and interdistances (mm.): AME 0.11, ALE 0.13, PME 0.13, PLE 0.12; AME-AME 0.15, AME-ALE 0.06, PME-PME 0.09, PME-PLE 0.23, ALE-PLE 0.24. MOQ length 0.42 mm., front width 0.37 mm., back width 0.35 mm. Epigynum with evenly curved, closely spaced inner lateral margins (figs. 18, 21). Spermathecae with squared median lobes (fig. 22). Leg spination: femur II P 0-1-1; patella III R 0-0-0; tibia IV R 2-1-1; metatarsus III R 1-1-2.

Records. United States: *Arizona:* Cochise Co.: Apache; Douglas. *Colorado:* Weld Co.: Stoneham. *New Mexico:* Bernalillo Co.: Albuquerque. Lincoln Co.: Carrizozo. *Mexico:* *Chihuahua:* Cuevas; Santa Bárbara. *Distrito Federal:* Lago de Texcoco. *Durango:* Otinapa. *México:* Tenancingo.

Distribution. Colorado south to central Mexico (map 2).

Natural History. Mature males have been taken in September and October, mature females from February through October. Specimens have been collected at elevations between 6700 and 8200 feet, in grassland, on limestone hills, and under cow dung.

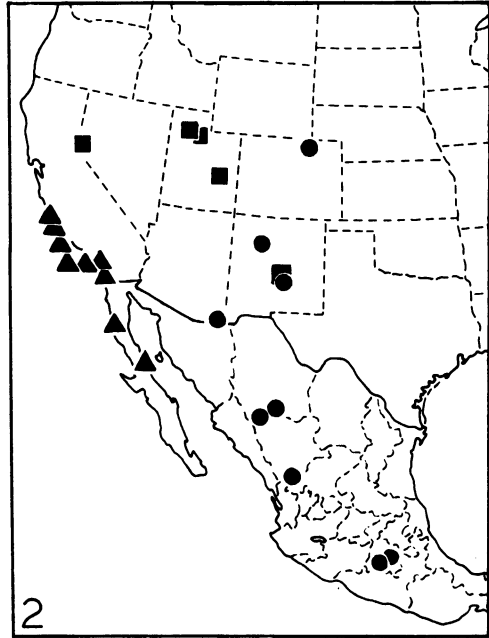
Gnaphosa maritima, new species

Figures 23-28; Map 2

Types. Male holotype and female paratype from beach northwest of San Simeon, latitude $35^{\circ} 40' N$, longitude $121^{\circ} 13' W$, San Luis Obispo County, California (September 16, 1964; Jean and Wilton Ivie), deposited in AMNH.

Etymology. The specific name is from the Latin *maritimus* (marine) and refers to one habitat of this species on salt water beaches.

Diagnosis. *Gnaphosa maritima* is closest to *saxosa* but may be distinguished by the shorter

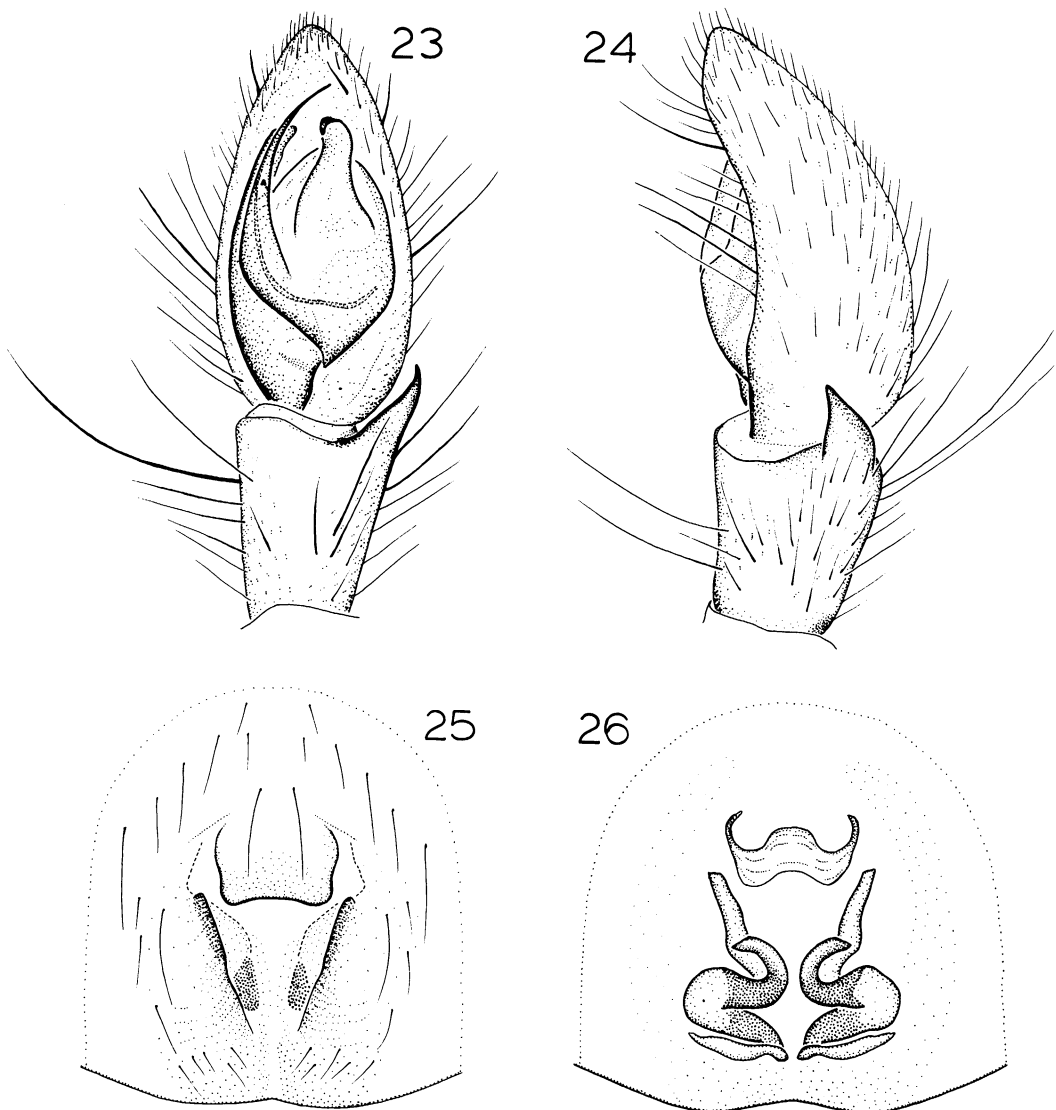


MAP 2. Southwestern North America, showing distributions of *Gnaphosa hirsutipes* Banks (circles), *G. maritima*, new species (triangles), and *G. utahana* Banks (squares).

embolus (fig. 23) and wider epigynal hood (fig. 25).

Male. Total length 7.71 ± 1.07 mm. Carapace 3.60 ± 0.51 mm. long, 2.82 ± 0.43 mm. wide. Femur II 2.40 ± 0.31 mm. long (45 specimens examined). Eye sizes and interdistances (mm.): AME 0.12, ALE 0.13, PME 0.14, PLE 0.12; AME-AME 0.16, AME-ALE 0.04, PME-PME 0.08, PME-PLE 0.22, ALE-PLE 0.23. MOQ length 0.42 mm., front width 0.39 mm., back width 0.37 mm. Embolus short, with tubercle on retrolateral side (figs. 23, 27). Retrolateral tibial apophysis broad (fig. 24). Leg spination: patella III R 0-0-0; tibiae: II V 0-0-1; III R 0-1-1; metatarsus IV R 0-1-2.

Female. Total length 8.06 ± 0.85 mm. Carapace 3.54 ± 0.41 mm. long, 2.82 ± 0.26 mm. wide. Femur II 2.18 ± 0.24 mm. long (34 specimens examined). Eye sizes and interdistances (mm.): AME 0.12, ALE 0.15, PME 0.15, PLE 0.22; AME-AME 0.13, AME-ALE 0.05, PME-PME 0.08, PME-PLE 0.22, ALE-PLE 0.24. MOQ length 0.41 mm., front width 0.37 mm., back width 0.37 mm. Epigynum with wide hood;



FIGS. 23-26. *Gnaphosa maritima*, new species. 23. Palp, ventral view. 24. Palp, retrolateral view. 25. Epigynum, ventral view. 26. Vulva, dorsal view.

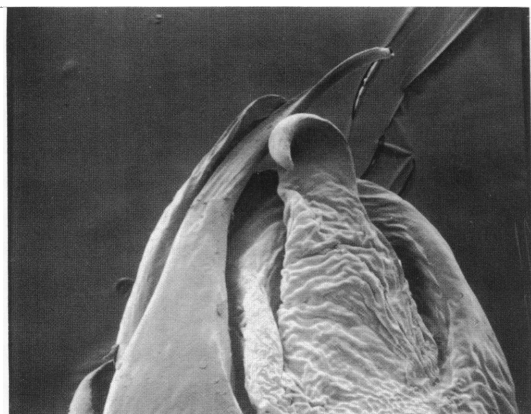
outer lateral margins closer posteriorly than anteriorly (figs. 25, 28). Spermathecae with thin median lobes (fig. 26). Leg spination: femur IV P 0-0-1; patella III R 0-0-0; tibiae: II V 0-0-1; III R 0-1-0; metatarsus IV R 1-2-1.

Records. **United States:** *California:* Los Angeles Co.: Santa Catalina Island. Orange Co.: Laguna Lake. San Diego Co.: San Diego. San Luis Obispo Co.: Cambria; beach NW San Simeon.

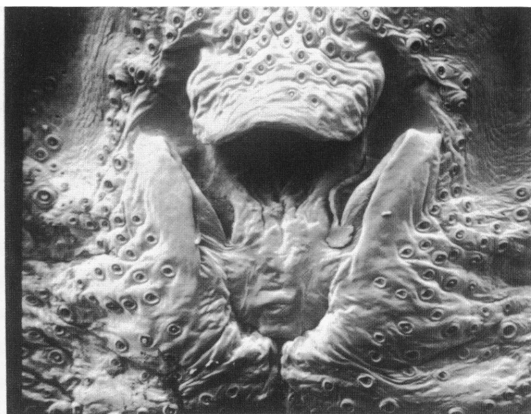
Santa Barbara Co.: Santa Barbara Beach; Santa Cruz Island. Ventura Co.: San Nicolas Island. **Mexico:** *Baja California Norte:* 24 mi. SE Bahía de los Ángeles; 10 mi. N El Rosario.

Distribution. California and Baja California (map 2).

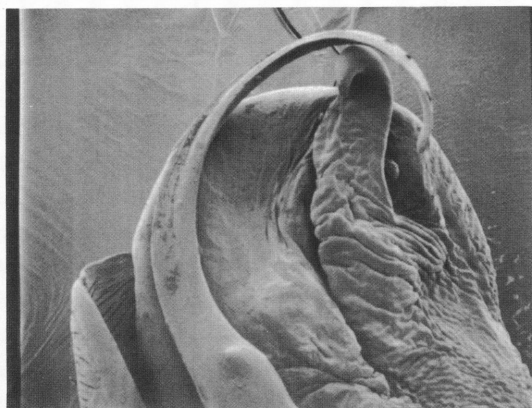
Natural History. Mature males have been taken in January, March, June, and September; mature females from January through Septem-



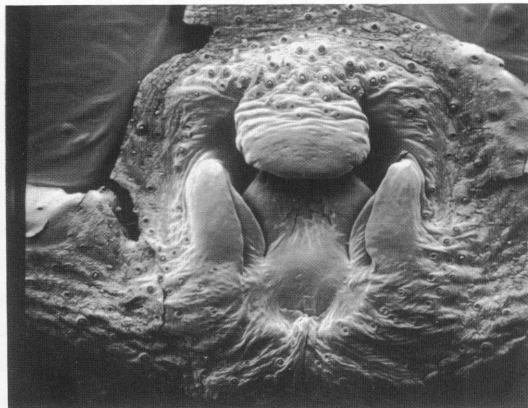
27



28



29



30

FIGS. 27-30. Scanning electron micrographs, ventral views. 27, 28. *Gnaphosa maritima*, new species. 27. Embolar region of palp, 230X. 28. Epigynum, 145X. 29, 30. *G. saxosa*, new species. 29. Embolar region of palp, 220X. 30. Epigynum, 130X.

ber. Specimens have been collected from gravel in the intertidal zone on salt water beaches.

***Gnaphosa saxosa*, new species**

Figures 29-34; Map 3

Types. Male holotype and female paratype from Boone, Pueblo County, Colorado (May 22, 1963; collector unknown), deposited in AMNH.

Etymology. The specific name is from the Latin *saxosus* (rocky) and refers to one habitat of this species under rocks.

Diagnosis. *Gnaphosa saxosa* is closest to *maritima* but may be distinguished by the longer em-

bolus (fig. 31) and narrower epigynal hood (fig. 33).

Male. Total length 5.87 ± 0.42 mm. Carapace 2.97 ± 0.35 mm. long, 2.37 ± 0.25 mm. wide. Femur II 1.94 ± 0.20 mm. long (10 specimens examined). Eye sizes and interdistances (mm.): AME 0.09, ALE 0.12, PME 0.12, PLE 0.12; AME-AME 0.09, AME-ALE 0.03, PME-PME 0.05, PME-PLE 0.18, ALE-PLE 0.18. MOQ length 0.33 mm., front width 0.27 mm., back width 0.30 mm. Embolus long, with prolaterally directed tubercle near base (figs. 29, 31). Retro-lateral tibial apophysis sharply pointed (fig. 32). Leg spination: femora: I, II P 0-1-1; III P 0-1-0;

IV R 0-1-1; tibia IV R 1-1-2; metatarsus III R 1-1-2.

Female. Total length 6.24 ± 1.33 mm. Carapace 2.60 ± 0.53 mm. long. 2.02 ± 0.41 mm. wide. Femur II 1.47 ± 0.34 mm. long (13 specimens examined). Eye sizes and interdistances (mm.): AME 0.09, ALE 0.13, PME 0.12, PLE 0.10; AME-AME 0.09, AME-ALE 0.03, PME-PME 0.05, PME-PLE 0.19, ALE-PLE 0.15. MOQ length 0.29 mm., front width 0.27 mm., back width 0.30 mm. Epigynum with narrowed hood and wide midpiece (figs. 30, 33). Spermathecae with median lobes expanded anteriorly (fig. 34). Leg spination: patella III R 0-0-0; tibia IV V 2-1-2, R 1-1-2; metatarsus IV P 1-1-2, R 1-2-2.

Records. United States: Arizona: Pima Co.: Tucson. Colorado: Pueblo Co.: Boone. Nebraska: Saline Co.: Crete. New Mexico: Bernalillo Co.: Albuquerque. San Miguel Co. Valencia Co.: Grants. Utah: Salt Lake Co.: Salt Lake City. Wyoming: Sweetwater Co.: Rock Springs.

Distribution. Utah and Nebraska south to Arizona and New Mexico (map 3).

Natural History. Mature males have been taken in June and July, mature females from April through September. Specimens have been collected under rocks.

***Gnaphosa dentata*, new species**

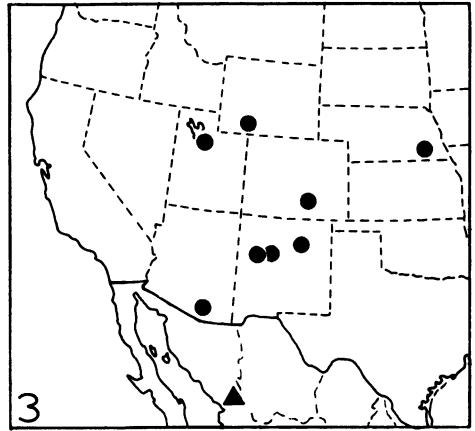
Figures 35-40; Map 4

Types. Male holotype and female paratype from Portal, Cochise County, Arizona (August 8, 1965; Willis J. Gertsch), deposited in AMNH.

Etymology. The specific name is from the Latin *dentatus* (toothed) and refers to the embolar tubercle.

Diagnosis. *Gnaphosa dentata* is closest to *synthetica* but may be distinguished by the smaller embolar tubercle (figs. 35, 39) and the wider epigynal midpiece (figs. 37, 40).

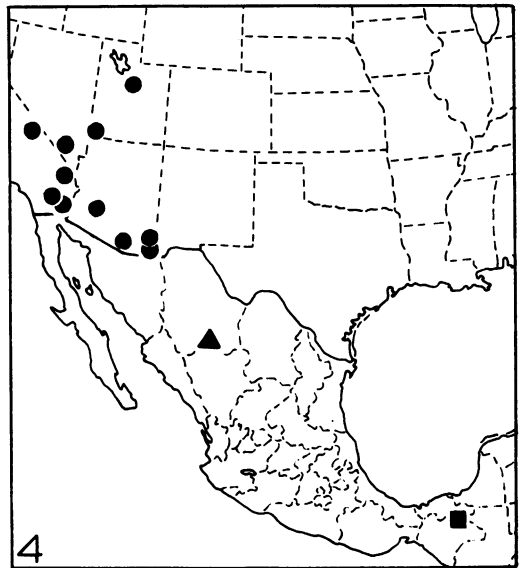
Male. Total length 3.68 ± 0.67 mm. Carapace 1.68 ± 0.26 mm. long, 1.25 ± 0.18 mm. wide. Femur II 1.07 ± 0.19 mm. long (28 specimens examined). Eye sizes and interdistances (mm.): AME 0.08, ALE 0.08, PME 0.11, PLE 0.10; AME-AME 0.10, AME-ALE 0.03, PME-PME 0.04, PME-PLE 0.13, ALE-PLE 0.16. MOQ length 0.30 mm., front width 0.25 mm., back width 0.26 mm. Embolus with small tubercle on prolateral side (figs. 35, 39). Retrolateral tibial



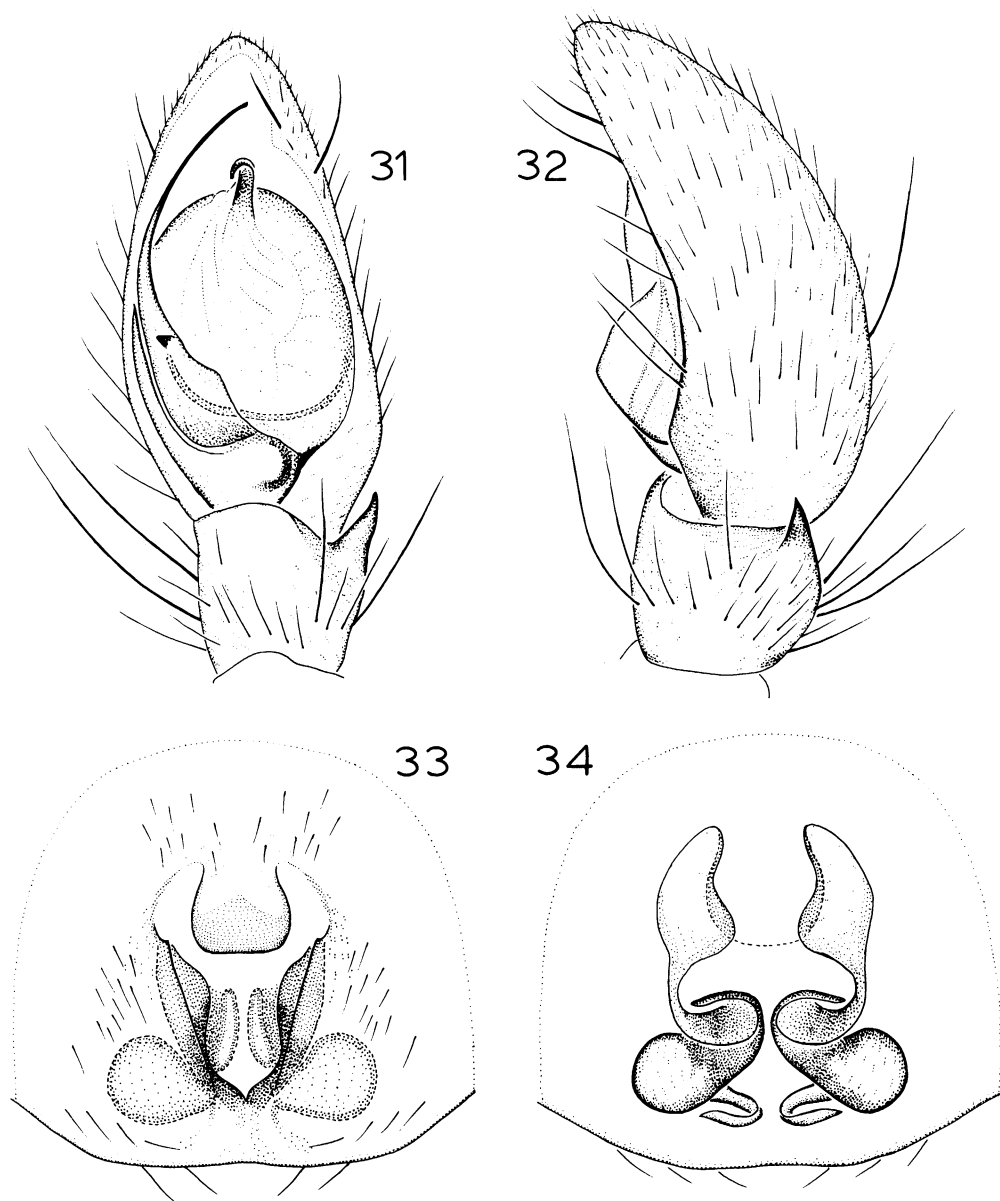
MAP 3. Southwestern North America, showing distributions of *Gnaphosa saxosa*, new species (circles) and *G. sonora*, new species (triangle).

apophysis short (fig. 36). Leg spination: femur II P 0-1-1; tibiae: I, II V 0-0-2; III P 1-1-1; IV R 2-1-1; metatarsi: I V 1-0-0; II V 2-0-0; III V 2-1-2, R 1-0-1; IV P 1-0-2, R 2-0-2.

Female. Total length 4.83 ± 1.10 mm. Carapace 1.94 ± 0.22 mm. long, 1.40 ± 0.16 mm. wide. Femur II 1.10 ± 0.10 mm. long (22 specimens ex-



MAP 4. Southern North America, showing distributions of *Gnaphosa dentata*, new species (circles), *G. chihuahuana*, new species (triangle), and *G. chiapas*, new species (square).

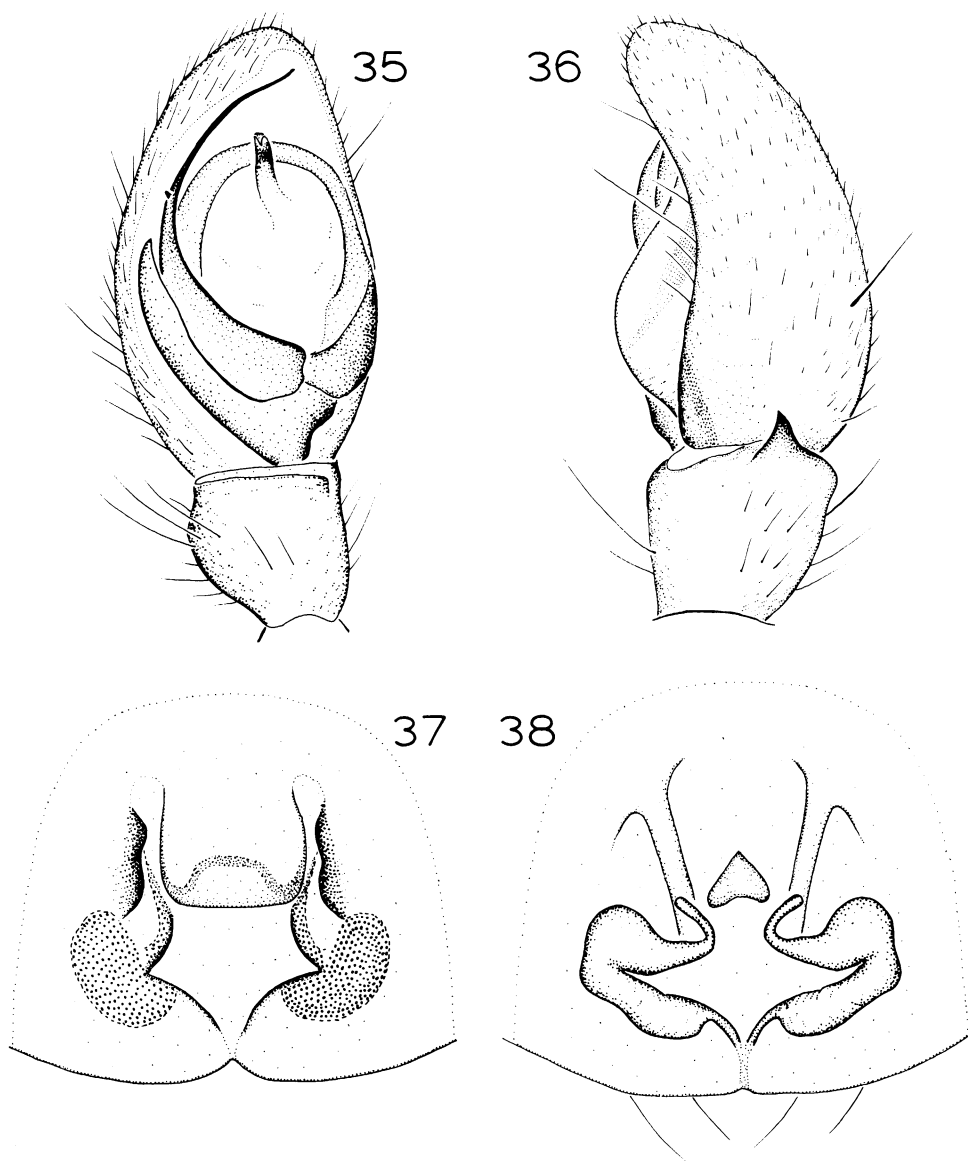


FIGS. 31-34. *Gnaphosa saxosa*, new species. 31. Palp, ventral view. 32. Palp, retrolateral view. 33. Epigynum, ventral view. 34. Vulva, dorsal view.

amed). Eye sizes and interdistances (mm.): AME 0.06, ALE 0.10, PME 0.07, PLE 0.06; AME-AME 0.06, AME-ALE 0.03, PME-PME 0.05, PME-PLE 0.08, ALE-PLE 0.09. MOQ length 0.21 mm., front width 0.18 mm., back width 0.20 mm. Epigynum with wide midpiece (figs. 37, 40). Spermathecae with long median

lobes (fig. 38). Leg spination: femur IV P 0-0-0; patella III R 0-0-0; tibiae: III R 0-1-1; IV P 0-0-0; metatarsi: I V 1-0-0; III V 2-1-2; IV P 0-1-1.

Records. United States: *Arizona:* Cochise Co.: Portal. Graham Co.: Solomonville. Maricopa Co.: Cave Creek. *Pima Co.:* Tucson; Tucson Mountains. *California:* Imperial Co.: Salton Sea. Inyo



FIGS. 35-38. *Gnaphosa dentata*, new species. 35. Palp, ventral view. 36. Palp, retro-lateral view. 37. Epigynum, ventral view. 38. Vulva, dorsal view.

Co.: Saline Valley. Riverside Co.: Coachella Valley; Palm Springs. San Bernardino Co.: Kelso; Yucca Valley. *Nevada*: Nye Co.: Mercury. *Utah*: Utah Co.: Utah Lake. Washington Co.

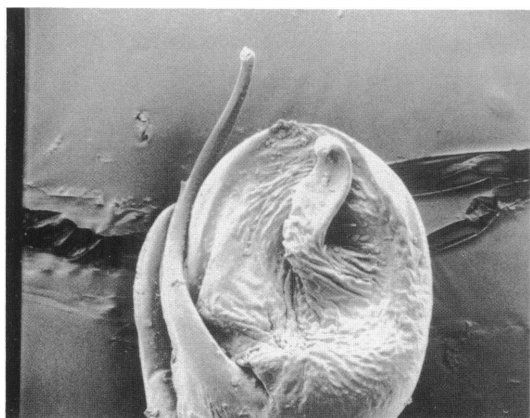
Distribution. Southwestern United States (map 4).

Natural History. Mature males have been taken from March through August, mature females from January through October. Specimens

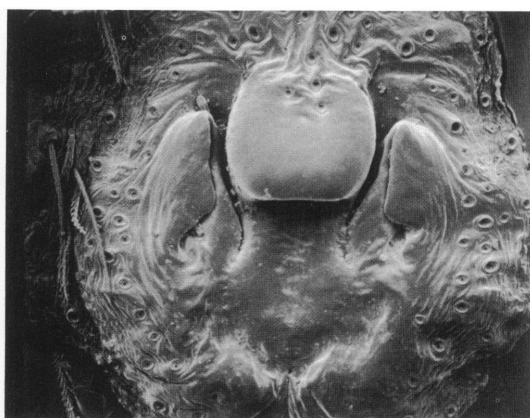
have been collected under stones and at an elevation of 2600 feet.

Gnaphosa synthetica Chamberlin
Figures 41, 43-46; Map 5

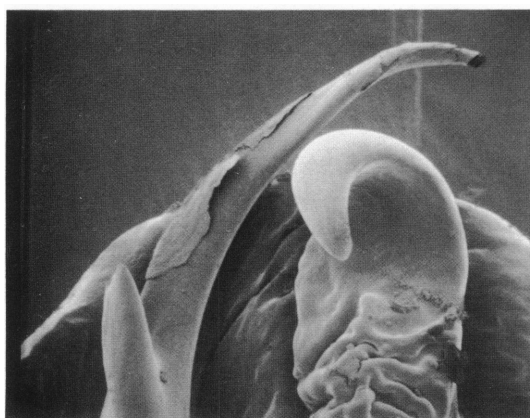
Gnaphosa synthetica Chamberlin, 1924, p. 620, figs. 58-60 (female holotype and male allotype from San Luis Island, Baja California



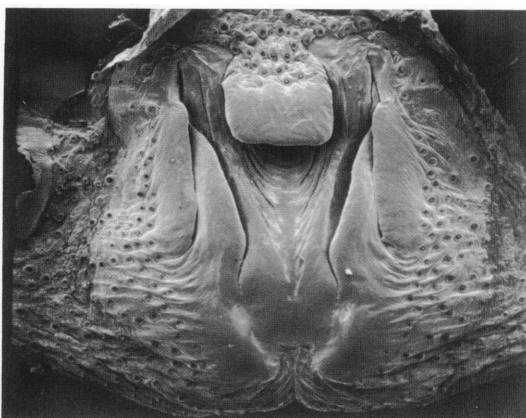
39



40



41



42

FIGS. 39-41. Scanning electron micrographs, ventral views. 39, 40. *Gnaphosa dentata*, new species. 39. Embolar region of palp, 120X. 40. Epigynum, 105X. 41. *G. synthetica* Chamberlin, embolar region of palp, 530X. 42. *G. sonora*, new species, epigynum, 110X.

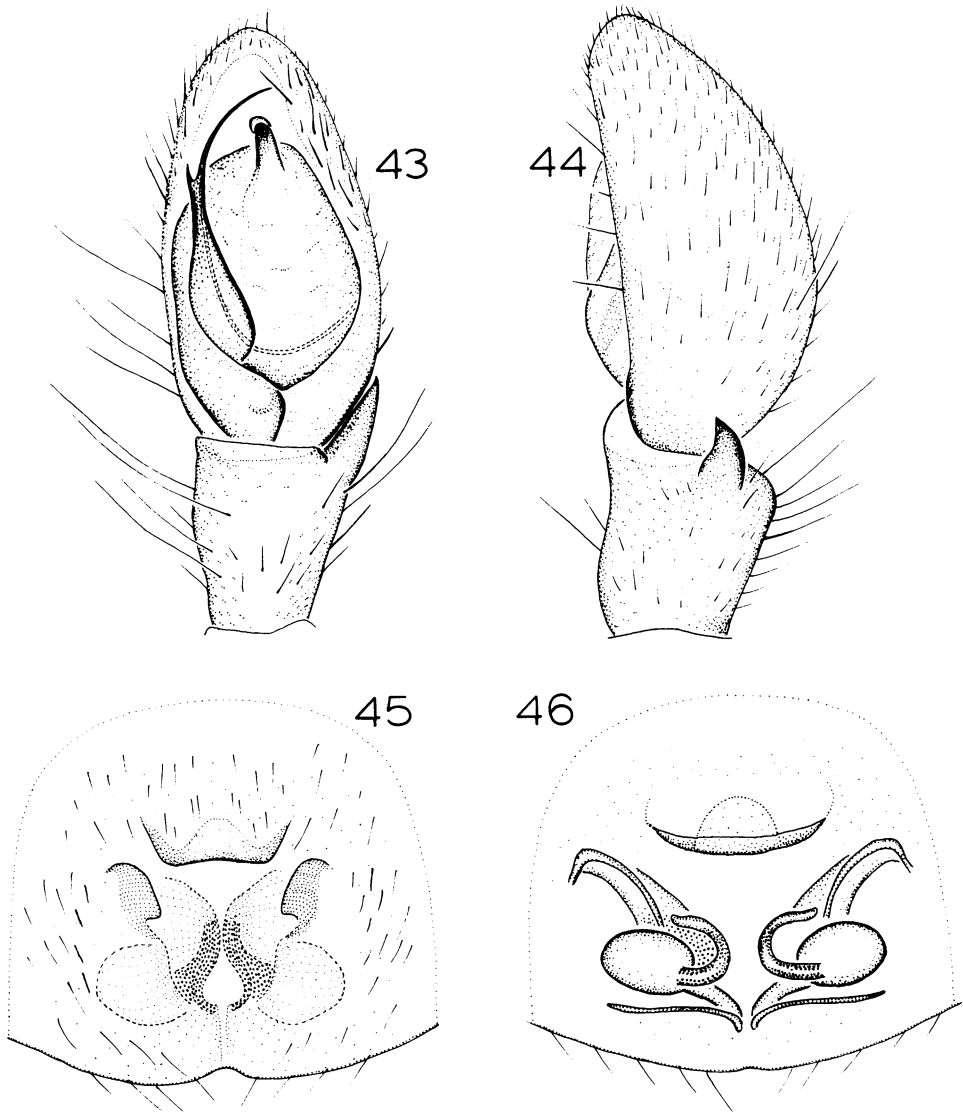
Norte, Mexico, in CAS, examined). Bonnet, 1957, p. 2021.

Diagnosis. *Gnaphosa synthetica* is closest to *dentata* but may be distinguished by the larger embolar tubercle (figs. 41, 43) and the narrower epigynal midpiece (fig. 45).

Male. Total length 6.08 ± 1.24 mm. Carapace 2.83 ± 0.51 mm. long, 2.26 ± 0.39 mm. wide. Femur II 1.90 ± 0.37 mm. long (12 specimens examined). Eye sizes and interdistances (mm.): AME 0.08, ALE 0.11, PME 0.10, PLE 0.10; AME-AME 0.09, AME-ALE 0.03, PME-PME 0.06, PME-PLE 0.15, ALE-PLE 0.09. MOQ length 0.23 mm., front width 0.25 mm., back width 0.26 mm. Embolus with large tubercle on

prolateral side (figs. 41, 43). Retrolateral tibial apophysis beaklike (fig. 44). Leg spination: metatarsi: II V 0-0-0; IV P 0-1-1.

Female. Total length 5.18-8.44 mm. Carapace 2.52-3.94 mm. long, 1.91-3.13 mm. wide. Femur II 1.40-2.34 mm. long (three specimens examined). Eye sizes and interdistances (mm.): AME 0.07, ALE 0.10, PME 0.09, PLE 0.09; AME-AME 0.09, AME-ALE 0.03, PME-PME 0.08, PME-PLE 0.15, ALE-PLE 0.13. MOQ length 0.24 mm., front width 0.23 mm., back width 0.26 mm. Epigynum with wide hood and short outer lateral margins (fig. 45). Spermathecae with angular median lobes (fig. 46). Leg spination: patella III R 0-0-0; tibia



FIGS. 43-46. *Gnaphosa synthetica* Chamberlin. 43. Palp, ventral view. 44. Palp, retro-lateral view. 45. Epigynum, ventral view. 46. Vulva, dorsal view.

III R 0-1-1; metatarsi: III V 2-1-2; IV P 0-1-1.

Records. United States: *Arizona:* Maricopa Co.: Tempe. *California:* Imperial Co.: Salton Sea. Inyo Co.: Owen's Lake. *Utah:* Washington Co.: St. George. **Mexico:** *Baja California Norte:* Isla San Luis. *Sonora:* Isla Tiburón.

Distribution. Southwestern United States and the Gulf of California (map 5).

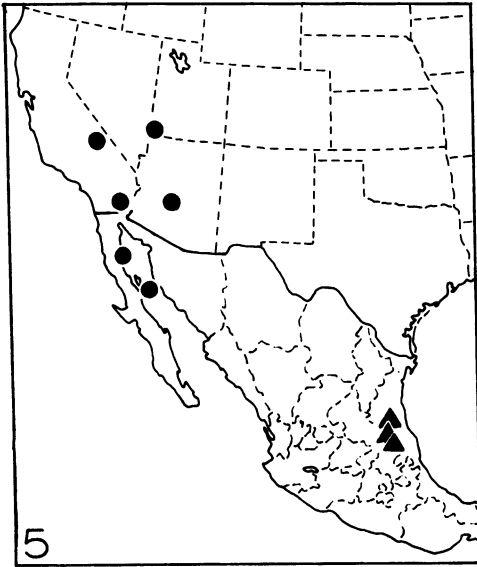
Natural History. Mature males have been

taken in March, April, July, and December; mature females in March and April. Specimens have been collected under driftwood on a beach at high tide.

***Gnaphosa salsa*, new species**

Figures 47-52; Map 6

Types. Male holotype and female paratype from Salton Sea, Imperial County, California



MAP 5. Southern North America, showing distributions of *Gnaphosa synthetica* Chamberlin (circles) and *G. potosi*, new species (triangles).

(March 12, 1941; A. and W. Ivie), deposited in AMNH.

Etymology. The specific name is from the Latin *salsus* (salty) and refers to the frequent occurrence of this species in saline areas.

Diagnosis. *Gnaphosa salsa* is closest to *utahana* but may be distinguished by the more basally located embolar tubercle (figs. 47, 51) and the narrower epigynal hood (figs. 49, 52).

Male. Total length 4.67-5.83 mm. Carapace 2.23-2.60 mm. long, 1.63-1.98 mm. wide. Femur II 1.26-1.66 mm. long (eight specimens examined). Eye sizes and interdistances (mm.): AME 0.08, ALE 0.11, PME 0.12, PLE 0.10; AME-AME 0.09, AME-ALE 0.03, PME-PME 0.04, PME-PLE 0.14, ALE-PLE 0.13. MOQ length 0.29 mm., front width 0.25 mm., back width 0.29 mm. Embolar tubercle basally situated on retrolateral side of embolus (figs. 47, 51). Retrolateral tibial apophysis sharply pointed (fig. 48). Leg spination: femur II P 0-1-1; tibiae: II V 0-0-1; III, IV V 2-1-2; metatarsi: I, II V 2-0-1; III V 2-1-2.

Female. Total length 6.13±0.75 mm. Carapace 2.74±0.25 mm. long, 2.06±0.20 mm. wide. Femur II 1.59±0.16 mm. long (20 specimens ex-

amined). Eye sizes and interdistances (mm.): AME 0.08, ALE 0.11, PME 0.12, PLE 0.10; AME-AME 0.10, AME-ALE 0.04, PME-PME 0.06, PME-PLE 0.15, ALE-PLE 0.15. MOQ length 0.31 mm., front width 0.27 mm., back width 0.30 mm. Epigynum with long outer lateral margins (figs. 49, 52). Spermathecae with long, rounded median lobes (fig. 50). Leg spination: femur IV P 0-0-1; tibia III R 1-0-1; metatarsi: I, II V 2-0-0; III V 2-1-2.

Records. **United States:** Arizona: Mohave Co.: Littlefield; Virgin Narrows. Yuma Co.: Mitty Lake; Yuma. **California:** Imperial Co.: Salton Sea. Inyo Co.: Mesquite Springs, Death Valley National Monument. San Bernardino Co.: Hellen-dale. **Utah:** Washington Co.: Beaver Dam; Torry's Ranch. **Mexico:** Baja California Norte: Laguna. Sonora: Sonoyta.

Distribution. Southwestern United States and northwestern Mexico (map 6).

Natural History. Mature males have been taken from January through April, mature females from February through June. Specimens have been collected along a river at an elevation of 1500 feet.

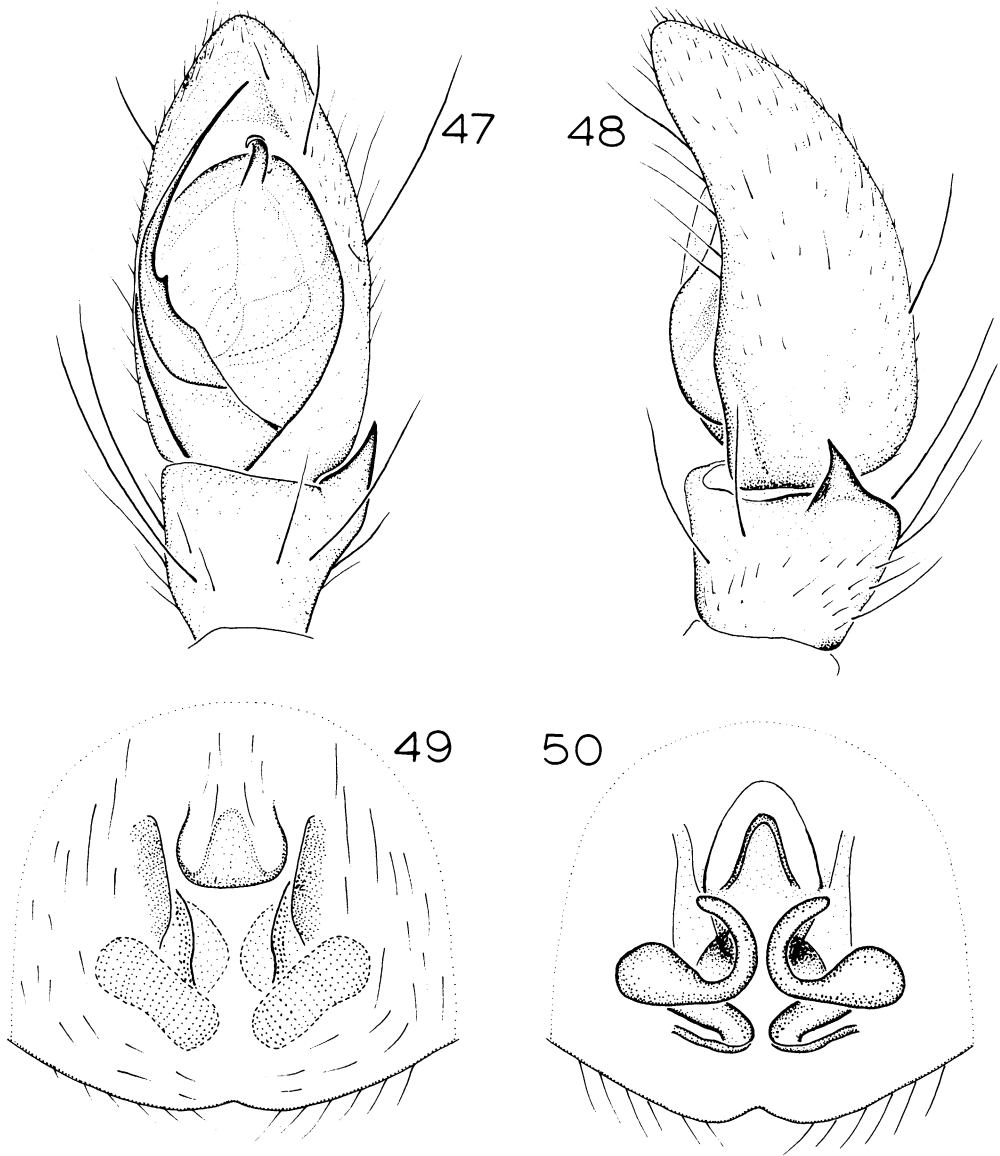
Gnaphosa utahana Banks

Figures 53-58; Map 2

Gnaphosa utahana Banks, 1904b, p. 110, pl. 6, fig. 26 (two female syntypes from Silver Lake, Utah, in MCZ, examined). Roewer, 1954, p. 371. Bonnet, 1957, p. 2022.

Diagnosis. *Gnaphosa utahana* is closest to *salsa* but may be distinguished by the more apically situated embolar tubercle (figs. 53, 55) and the wider epigynal hood (figs. 54, 57).

Male. Total length 5.69±0.67 mm. Carapace 2.61±0.24 mm. long, 2.11±0.20 mm. wide. Femur II 1.69±0.19 mm. long (33 specimens examined). Eye sizes and interdistances (mm.): AME 0.06, ALE 0.12, PME 0.11, PLE 0.11; AME-AME 0.12, AME-ALE 0.05, PME-PME 0.06, PME-PLE 0.17, ALE-PLE 0.15. MOQ length 0.24 mm., front width 0.24 mm., back width 0.29 mm. Embolar tubercle apically situated on retrolateral side of embolus (figs. 53, 55). Retrolateral tibial apophysis reduced (fig. 56). Leg spination: femora: II P 0-1-1; IV R 0-1-1; patella III R



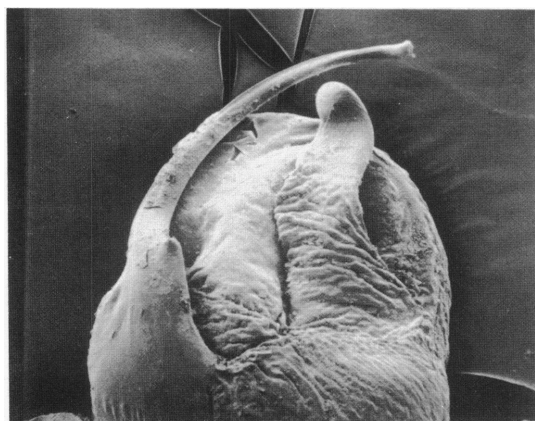
FIGS. 47-50. *Gnaphosa salsa*, new species. 47. Palp, ventral view. 48. Palp, retrolateral view. 49. Epigynum, ventral view. 50. Vulva, dorsal view.

0-0-0; tibia IV R 2-1-1; metatarsus IV P 1-0-1, V 2-2-2.

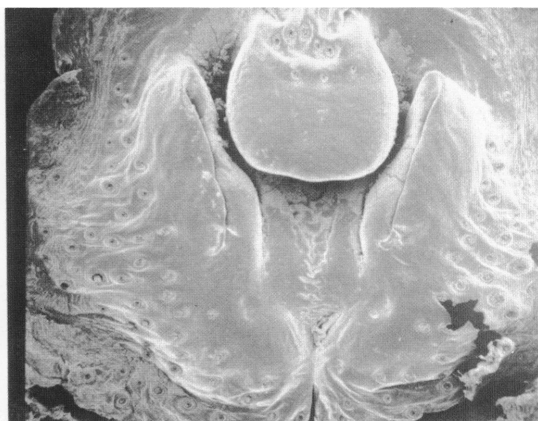
Female. Total length 8.36 ± 0.92 mm. Carapace 3.53 ± 0.32 mm. long, 2.85 ± 0.23 mm. wide. Femur II 1.93 ± 0.11 mm. long (77 specimens examined). Eye sizes and interdistances (mm.): AME 0.07, ALE 0.13, PME 0.12, PLE 0.12; AME-AME 0.14, AME-ALE 0.07, PME-PME

0.09, PME-PLE 0.24, ALE-PLE 0.25. MOQ length 0.36 mm., front width 0.29 mm., back width 0.32 mm. Epigynum with short outer lateral margins and wide hood (figs. 54, 57). Spermathecae with long, angular median lobes (fig. 58). Leg spination: femur II P 0-1-1; patella III R 0-0-0; tibia III R 1-0-1.

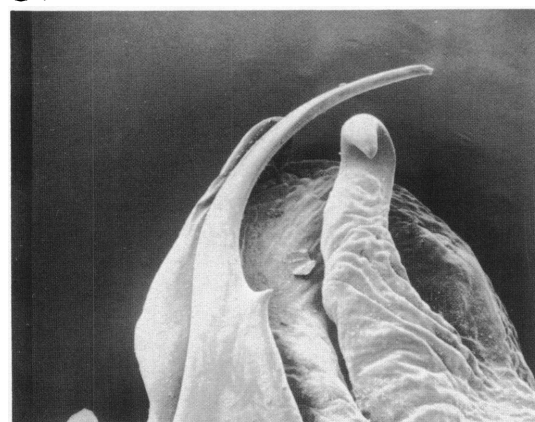
Records. United States: Nevada: Washoe Co.:



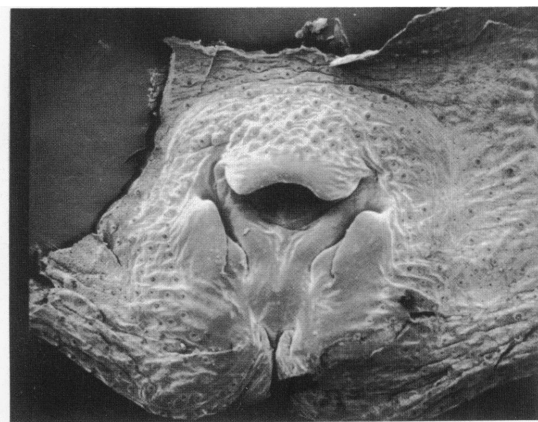
51



52



53



54

FIGS. 51-54. Scanning electron micrographs, ventral views. 51, 52. *Gnaphosa salsa*, new species. 51. Embolar region of palp, 240X. 52. Epigynum, 180X. 53, 54. *G. utahana* Banks. 53. Embolar region of palp, 240X. 54. Epigynum, 95X.

Reno. *New Mexico*: Lincoln Co. *Utah*: Davis Co.: shore Great Salt Lake, NW Farmington. Grand Co.: San Rafael River. Tooele Co.: Egg Island, Hat Island, Great Salt Lake. Weber Co.: Great Salt Lake, near Plain City.

Distribution. New Mexico, Utah, and Nevada (map 2).

Natural History. Mature males have been taken in April, June, July, and October; mature females in April, May, July, and October. Habitat data is lacking.

***Gnaphosa sonora*, new species**

Figures 42, 71, 72; Map 3

Type. Female holotype from Agua Caliente,

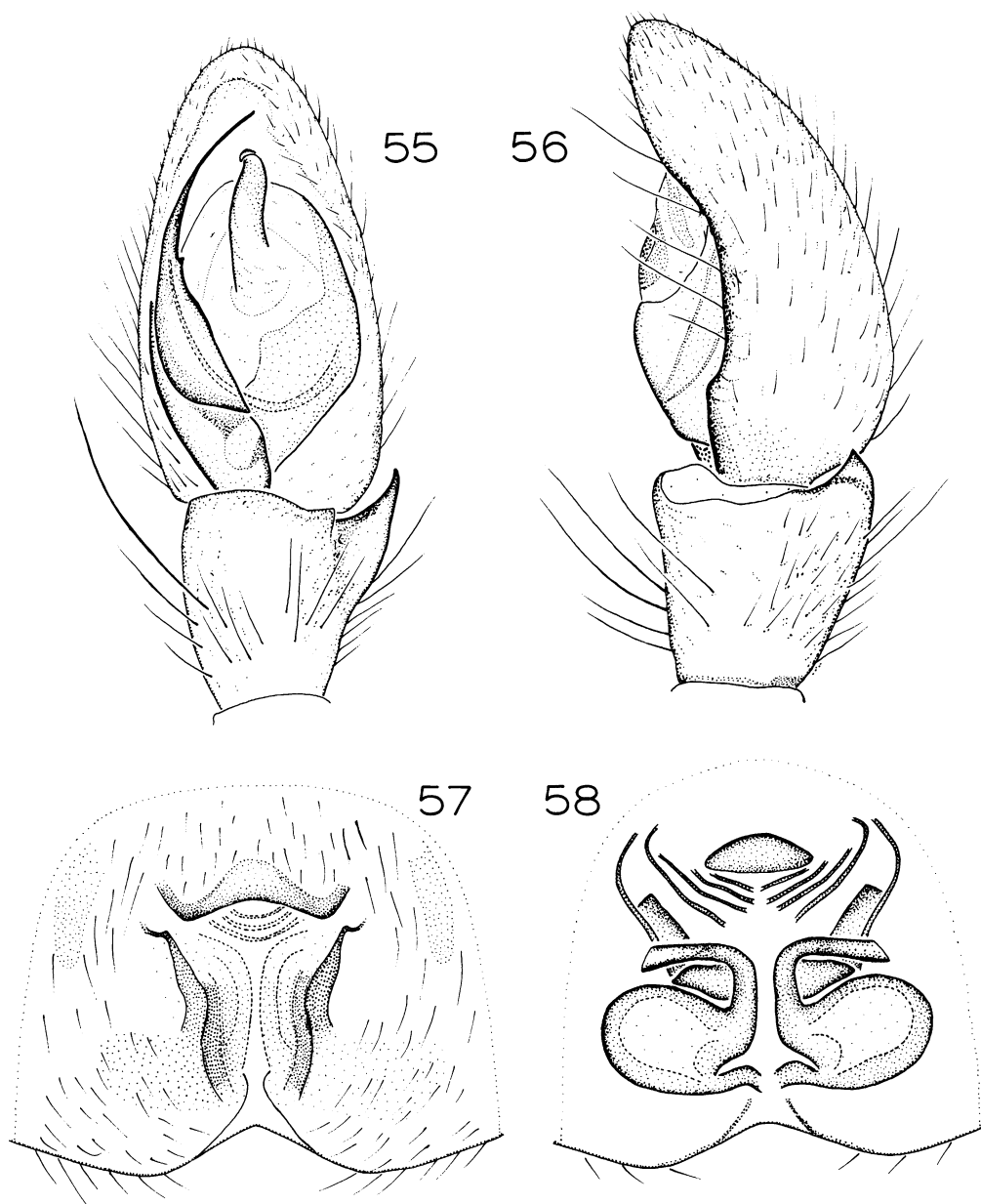
latitude 26° 50' N, longitude 108° 36' W, Sonora, Mexico (January 18, 1972; V. Roth), deposited in AMNH.

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

Diagnosis. *Gnaphosa sonora* is closest to *tenebrosa* but may be distinguished by the uniformly wide epigynal midpiece (figs. 42, 71).

Male. Unknown.

Female. Total length 7.48 ± 0.90 mm. Carapace 2.83 ± 0.22 mm. long, 2.16 ± 0.16 mm. wide. Femur II 1.75 ± 0.11 mm. long (10 specimens examined). Eye sizes and interdistances (mm.): AME 0.09, ALE 0.13, PME 0.12, PLE 0.11; AME-AME 0.11, AME-ALE 0.03, PME-PME

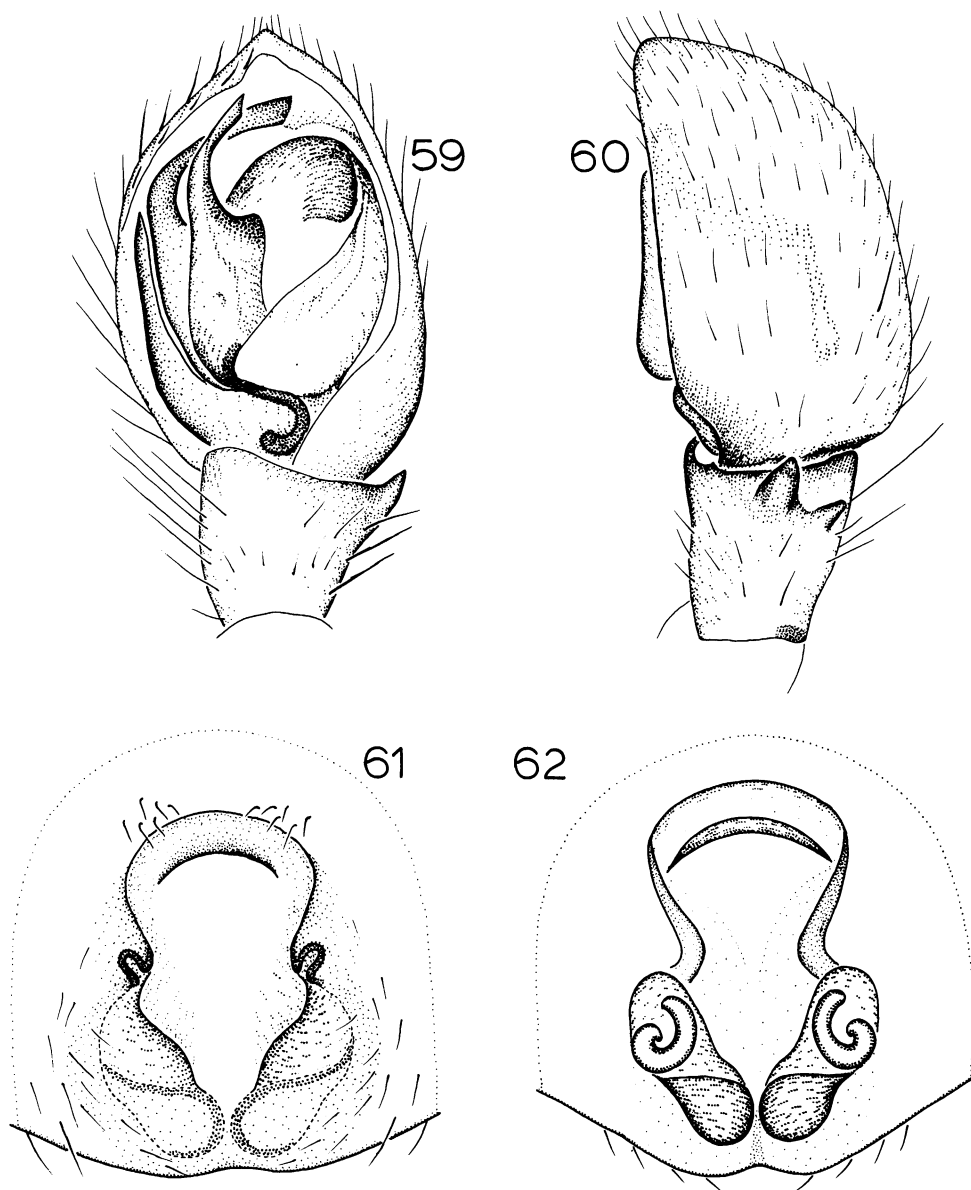


FIGS. 55-58. *Gnaphosa utahana* Banks. 55. Palp, ventral view. 56. Palp, retrolateral view. 57. Epigynum, ventral view. 58. Vulva, dorsal view.

0.09, PME-PLE 0.18, ALE-PLE 0.13. MOQ length 0.31 mm., front width 0.30 mm., back width 0.31 mm. Epigynum with long, uniformly wide midpiece (figs. 42, 71). Spermathecae with sharply tipped median lobes (fig. 72). Leg spina-

tion: femur IV P 0-0-1; tibiae: I V 0-0-1; II V 0-0-2; III R 1-0-1; metatarsi: I, II V 2-0-1; III V 2-1-2.

Records and Distribution. Known only from the type locality.



FIGS. 59-62. *Gnaphosa altudona* Chamberlin. 59. Palp, ventral view. 60. Palp, retro-lateral view. 61. Epigynum, ventral view. 62. Vulva, dorsal view.

Natural History. Mature females have been taken in January. Habitat data is lacking.

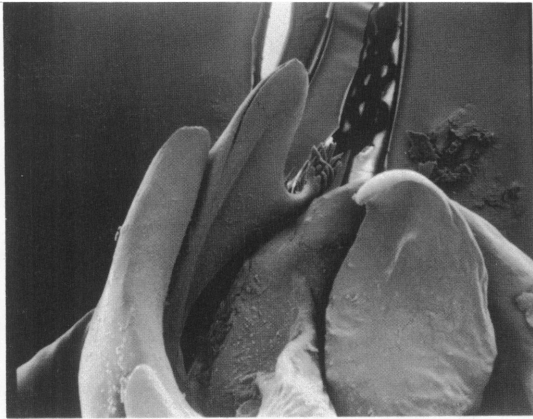
Gnaphosa tenebrosa Fox
Figures 73, 74

Gnaphosa tenebrosa Fox, 1938, p. 229, pl. 2, fig. 6 (female holotype supposedly from Labrador,

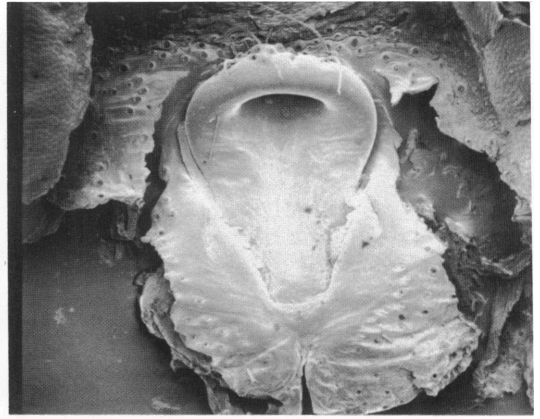
Canada [probably mislabeled], in USNM, examined). Roewer, 1954, p. 371. Bonnet, 1957, p. 2021.

Diagnosis. *Gnaphosa tenebrosa* is closest to *sonora* but may be distinguished by the posteriorly narrowed epigynal midpiece (fig. 73).

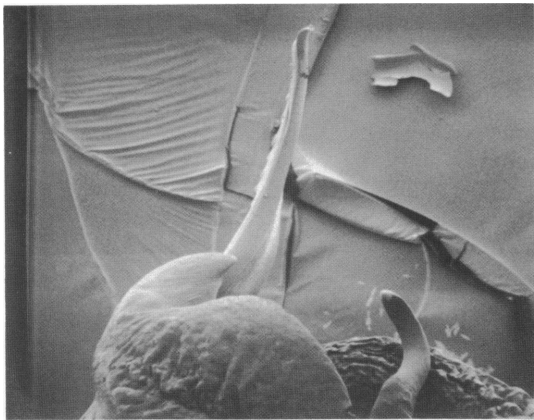
Male. Unknown.



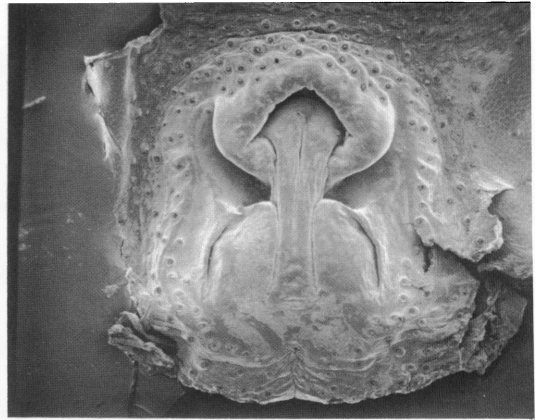
63



64



65



66

FIGS. 63-66. Scanning electron micrographs, ventral views. 63, 64. *Gnaphosa altudona* Chamberlin. 63. Embolar region of palp, 475X. 64. Epigynum, 120X. 65. *G. orites* Chamberlin, embolar region of palp, 220X. 66. *G. potosi*, new species, epigynum, 130X.

Female. Total length 6.26 mm. Carapace 2.41 mm. long, 1.87 mm. wide. Femur II 1.46 mm. long (holotype). Eye sizes and interdistances (mm.): AME 0.07, ALE 0.11, PME 0.11, PLE 0.11; AME-AME 0.09, AME-ALE 0.04, PME-PME 0.08, PME-PLE 0.12, ALE-PLE 0.10. MOQ length 0.24 mm., front width 0.23 mm., back width 0.29 mm. Epigynum with long, posteriorly narrowed midpiece (fig. 73). Spermathecae with median lobes expanded anteriorly (fig. 74). Leg spination: tibiae: II V 0-0-1; III R 1-0-1; metatarsi: I V 0-1-0; II V 0-2-0; III P, R 1-1-2.

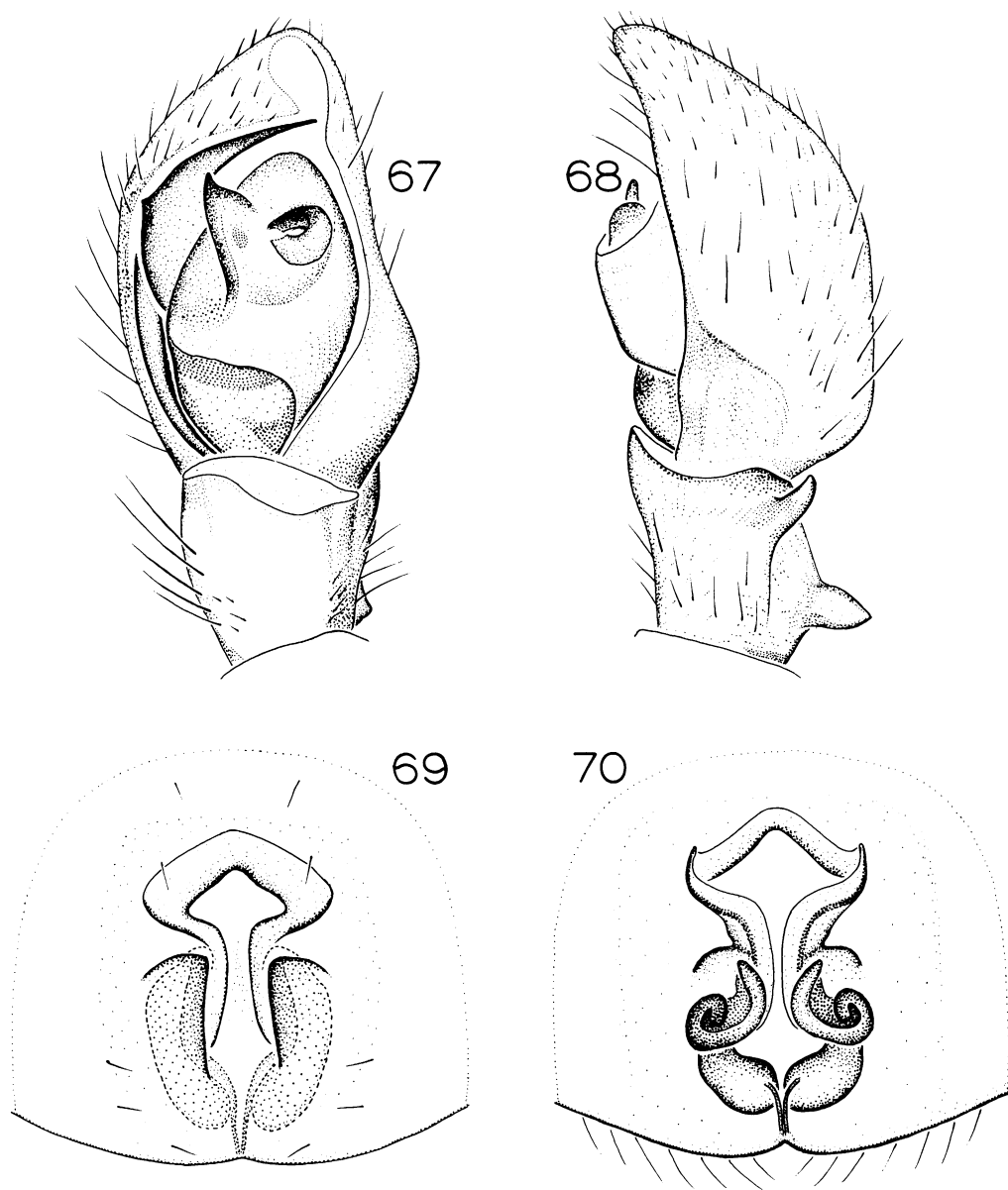
Records and Distribution. Known only from the type specimen from the notoriously mislabeled Marx collection. The only locality label presently with the specimen reads "Labrador" or

"Labrados"; Fox interpreted this as Labrador, Canada, which is almost certainly incorrect. Judging from its close relationship with *sonora*, this species is probably from somewhere in Mexico (perhaps from Labrados in Sinaloa, although it is more likely that the specimen is totally mislabeled).

Natural History. Nothing is known of the habits of this species.

***Gnaphosa chihuahua*, new species**
Figures 75, 76; Map 4

Type. Female holotype from 22 miles N of Parral, Chihuahua, Mexico (July 17, 1956; V. Roth and W. J. Gertsch), deposited in AMNH.



FIGS. 67-70. *Gnaphosa potosi*, new species. 67. Palp, ventral view. 68. Palp, retrolateral view. 69. Epigynum, ventral view. 70. Vulva, dorsal view.

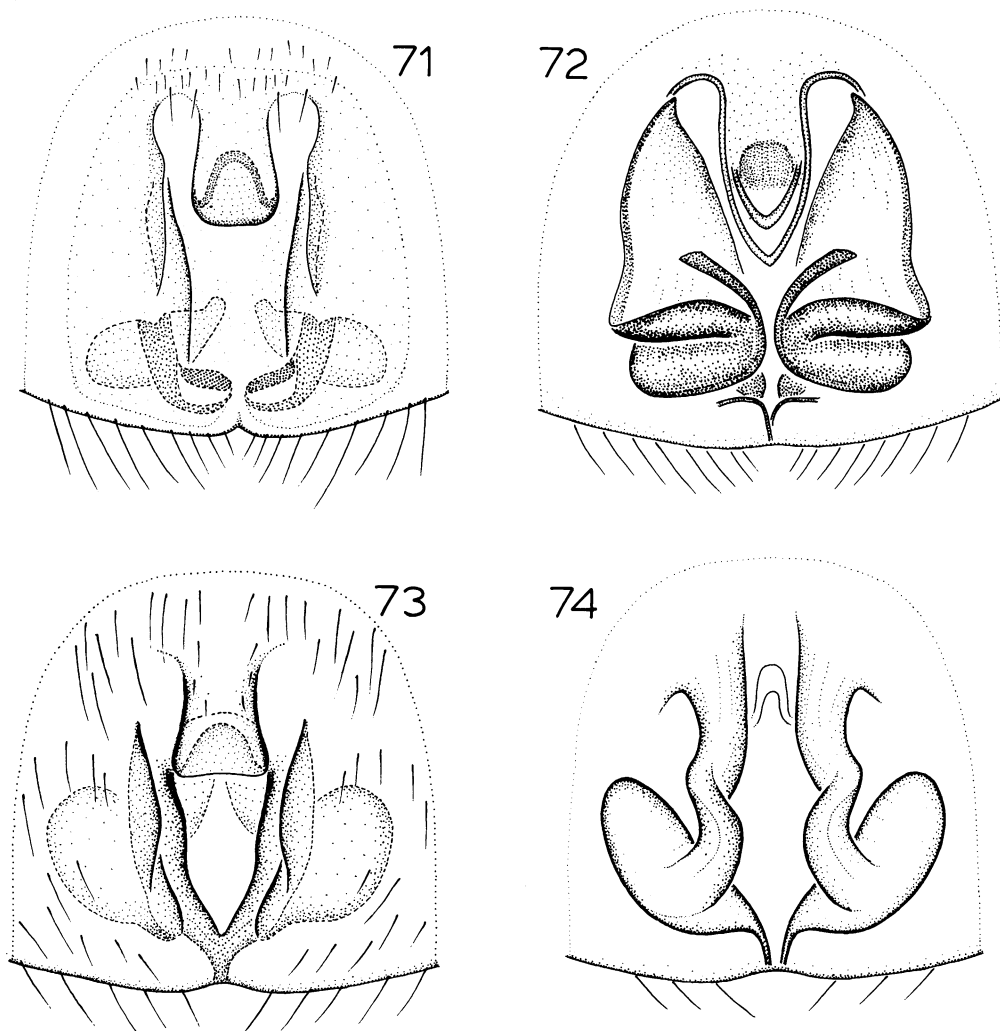
Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. *Gnaphosa chihuahua* is a distinctive species easily recognizable by its short, wide epigynal midpiece (fig. 75).

Male. Unknown.

Female. Total length 6.77, 6.98 mm. Carapace

2.65, 2.66 mm. long, 1.80, 1.91 mm. wide. Femur II 1.51, 1.58 mm. long (two specimens examined). Eye sizes and interdistances (mm.): AME 0.09, ALE 0.13, PME 0.11, PLE 0.10; AME-AME 0.10, AME-ALE 0.03, PME-PME 0.06, PME-PLE 0.19, ALE-PLE 0.22. MOQ length 0.31 mm., front width 0.28 mm., back



FIGS. 71-74. 71, 72. *Gnaphosa sonora*, new species. 71. Epigynum, ventral view. 72. Vulva, dorsal view. 73, 74. *G. tenebrosa* Fox. 73. Epigynum, ventral view. 74. Vulva, dorsal view.

width 0.27 mm. Epigynum with short, wide mid-piece (fig. 75). Spermathecae with basally enlarged median lobes (fig. 76). Leg spination: femur IV P 0-0-1; tibiae: I, II V 0-0-2; III D 1-0-0, P 1-1-1; IV R 2-1-1; metatarsi: I, II V 2-0-2; III P 0-2-2, V 2-1-2, R 0-2-2; IV P, R 0-2-2.

Records. **Mexico:** *Chihuahua*: 22 mi. N Parral; Salaires.

Distribution. Chihuahua, Mexico (map 4).

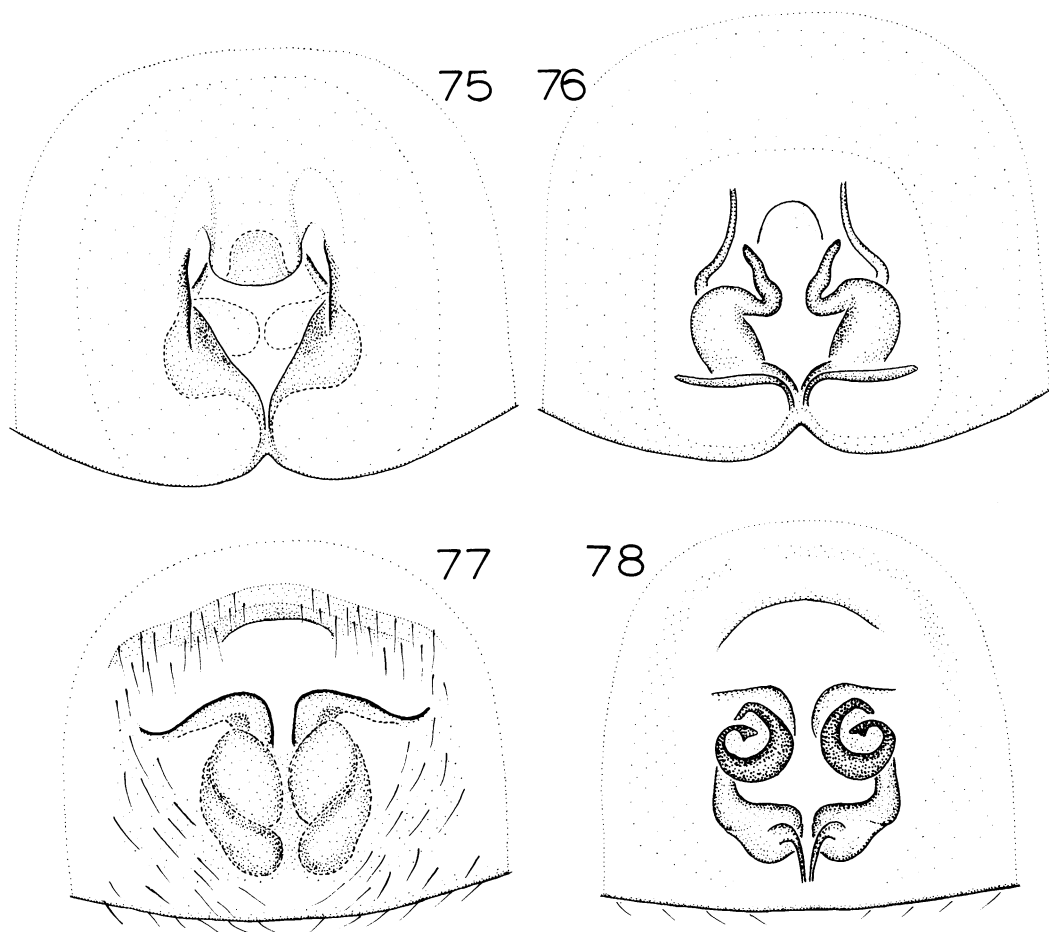
Natural History. Mature females have been taken in July.

Gnaphosa altudona Chamberlin

Figures 59-64; Map 6

Gnaphosa altudona Chamberlin, 1922, p. 157 (female holotype from Altudo, Brewster County, Texas, in MCZ, examined). Roewer, 1954, p. 369. Bonnet, 1957, p. 2003.

Diagnosis. *Gnaphosa altudona* is closest to *potosi* but may be distinguished by the approximate retrolateral tibial apophyses (fig. 60) and the wider anterior epigynal opening (figs. 61, 64).

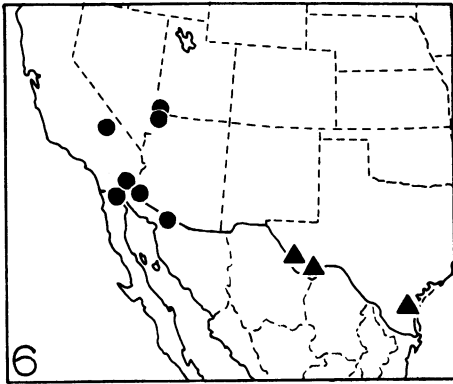


FIGS. 75-78. 75, 76. *Gnaphosa chihuahua*, new species. 75. Epigynum, ventral view. 76. Vulva, dorsal view. 77, 78. *G. chiapas*, new species. 77. Epigynum, ventral view. 78. Vulva, dorsal view.

Male. Total length 3.56 ± 0.44 mm. Carapace 1.73 ± 0.13 mm. long, 1.30 ± 0.07 mm. wide. Femur II 0.95 ± 0.07 mm. long (13 specimens examined). Eye sizes and interdistances (mm.): AME 0.05, ALE 0.06, PME 0.05, PLE 0.06; AME-AME 0.04, AME-ALE 0.02, PME-PME 0.03, PME-PLE 0.07, ALE-PLE 0.07. MOQ length 0.15 mm., front width 0.13 mm., back width 0.14 mm. Palp with acutely curved conductor (figs. 59, 63). Two retrolateral tibial apophyses, approximate (fig. 60). Leg spination: femora: II P 0-1-1; IV R 0-1-1; tibiae: I, II V 1-2-2; III P 1-1-1, R 0-1-1; metatarsi: I, II V 2-0-2; III V 2-0-2, R 1-1-2; IV D 0-1-0, R 1-2-2.

Female. Total length 3.02-5.08 mm. Carapace 1.46-1.97 mm. long, 1.04-1.30 mm. wide. Femur II 0.91-1.01 mm. long (four specimens examined). Eye sizes and interdistances (mm.): AME 0.04, ALE 0.08, PME 0.05, PLE 0.07; AME-AME 0.05, AME-ALE 0.02, PME-PME 0.05, PME-PLE 0.09, ALE-PLE 0.07. MOQ length 0.16 mm., front width 0.13 mm., back width 0.14 mm. Epigynum with wide anterior opening (figs. 61, 64). Spermathecae with short median lobes (fig. 62). Leg spination: femora II, IV P 0-0-0; tibiae III, IV P 1-1-1, R 0-1-1; metatarsi: I, II V 2-0-2; IV P 0-2-2, R 1-2-2.

Records. United States: Texas: Brewster Co.: Altudo; Basin, Chisos Mountains. Presidio Co.:



MAP 6. Southern North America, showing distributions of *Gnaphosa salsa*, new species (circles) and *G. altudona* Chamberlin (triangles).

Sierre Vieja, 11 mi. W Valentine. San Patricio Co.: Sinton.

Distribution. Texas (map 6).

Natural History. Mature males have been taken from April through September, mature females from May through September. Habitat data is lacking.

Gnaphosa potosi, new species

Figures 66-70; Map 5

Types. Male holotype from Mante, latitude 22° 45' N, longitude 98° 58' W, Tamaulipas, Mexico (April 17, 1963; W. J. Gertsch and W. Ivie) and female paratype from 20 miles S of Valles, San Luis Potosí, Mexico (April 14, 1946; A. M. and L. I. Davis), deposited in AMNH.

Etymology. The specific name is a noun in apposition taken from the region where the paratype was collected.

Diagnosis. *Gnaphosa potosi* is closest to *altudona* but may be distinguished by the widely separated retrolateral tibial apophyses (fig. 68) and the narrower anterior epigynal opening (figs. 66, 69).

Male. Total length 3.75 mm. Carapace 1.78 mm. long, 1.33 mm. wide. Femur II 0.97 mm. long (holotype). Eye sizes and interdistances (mm.): AME 0.05, ALE 0.09, PME 0.06, PLE 0.06; AME-AME 0.04, AME-ALE 0.01, PME-PME 0.04, PME-PLE 0.09, ALE-PLE 0.06. MOQ length 0.16 mm., front width 0.14 mm., back width 0.16 mm. Palp with broad embolus and reduced terminal apophysis (fig. 67). Two retro-

lateral tibial apophyses, widely separated (fig. 68). Leg spination: femora: II P 0-1-1; IV R 0-1-1; tibiae: I V 1-2-2; II P 0-0-1, V 1-2-2; III P 1-1-1; metatarsi: I, II V 2-0-2; III P 0-2-2; IV P 0-2-2, R 1-2-2.

Female. Total length 3.35-4.86 mm. Carapace 1.51-1.91 mm. long, 1.01-1.33 mm. wide. Femur II 0.83-0.94 mm. long (six specimens examined). Eye sizes and interdistances (mm.): AME 0.04, ALE 0.08, PME 0.05, PLE 0.06; AME-AME 0.07, AME-ALE 0.02, PME-PME 0.04, PME-PLE 0.13, ALE-PLE 0.11. MOQ length 0.16 mm., front width 0.14 mm., back width 0.14 mm. Epigynum with narrow anterior opening (figs. 66, 69). Spermathecae with long median lobes (fig. 70). Leg spination: femur IV P 0-0-1; tibia III R 0-1-1; metatarsi: I, II V 2-0-2; III V 2-1-2, R 0-2-2; IV P 0-2-2, R 1-2-2.

Records. Mexico: *San Luis Potosí*: Tamaunchale; 20 mi. S Valles. *Tamaulipas*: Mante.

Distribution. San Luis Potosí and Tamaulipas, Mexico (map 5).

Natural History. Mature males have been taken in April, mature females from April to July. Habitat data is lacking.

Gnaphosa chiapas, new species

Figures 77, 78; Map 4

Type. Female holotype from El Real, Chiapas, Mexico (July 3, 1950; C. and M. Goodnight and L. J. Stannard), deposited in AMNH.

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

Diagnosis. *Gnaphosa chiapas* is related to *altudona* and *potosi* but may be distinguished by the horizontally deflected lateral margins of the epigynum (fig. 77).

Male. Unknown.

Female. Total length 3.60 mm. Carapace 1.68 mm. long, 1.23 mm. wide. Femur II 0.90 mm. long (holotype). Eye sizes and interdistances (mm.): AME 0.05, ALE 0.08, PME 0.05, PLE 0.08; AME-AME 0.05, AME-ALE 0.01, PME-PME 0.05, PME-PLE 0.10, ALE-PLE 0.08. MOQ length 0.20 mm., front width 0.14 mm., back width 0.15 mm. Epigynum with horizontally deflected lateral margins (fig. 77). Spermathecae with median lobes produced anteriorly (fig. 78). Leg spination: femora: II D 1-0-0; III R 0-0-1; IV D 0-1-2, P 0-0-1; tibiae: III D 1-0-0, P 1-1-1, R

0-1-1; IV D 1-0-0; metatarsi: I V 2-0-2; II V 1-0-2; III D 0-1-0; IV P, R 1-2-2.

Records and Distribution. Known only from the type locality.

Natural History. Habitat data is lacking.

THE *LUGUBRIS* GROUP

Diagnosis. Species belonging to the *lugubris* group may be distinguished from other *Gnaphosa* by the emboli arising on the prolateral side of the palpal bulb (as in fig. 8) and the epigyna consisting of an anterior projecting hood, a single pair of lateral margins surrounding an atrium, and often a raised septum (as in fig. 10). These species are larger and darker than those of the *lucifuga* group; the legs have fewer setae but more numerous spines.

Description. As for the genus, except for the following: Carapace, abdomen, and legs light brown to dark chestnut brown. Endites rounded. Legs without extremely long setae. Typical leg spination (only surfaces bearing spines listed): femora: I, II D 1-1-0, P 0-0-1; III, IV D 1-1-0, P 0-1-1, R 0-1-1; patella III R 0-1-0; tibiae: I, II V 0-0-1; III, IV D 1-0-0, P 2-1-1, V 2-2-2, R 2-1-1; metatarsi: I, II V 0-2-0; III P 1-2-2, V 2-1-2, R 1-2-2; IV P 1-2-2, V 2-2-2, R 1-2-2. Genitalia as described above.

KEY TO SPECIES OF THE *LUGUBRIS* GROUP IN AMERICA

1. Males 2
Females 9
2. Embolus originating from proximal half of bulb (figs. 79, 119) 3
Embolus originating from distal half of bulb (as in figs. 87, 111) 4
3. Embolus with denticles (figs. 117, 119)
..... *antipola*
Embolus without denticles (figs. 79, 83)
..... *muscorum*
4. Retrolateral tibial apophysis relatively long (figs. 96, 104, 108) 5
Retrolateral tibial apophysis relatively short (figs. 88, 112, 124) 7
5. Embolus with short prolateral cusp, without conductor (figs. 95, 99) *brumalis*
Embolus without prolateral cusp, with conductor (figs. 103, 107) 6
6. Embolus relatively wide at base (figs. 101, 103) *microps*
Embolus relatively narrow at base (figs. 65,

- 107) *orites*
7. Palp with elongate conductor (figs. 87, 91, 92) *mima*
Palp without conductor 8
8. Embolus thin at base, passing behind terminal apophysis, without denticles (fig. 111) *parvula*
Embolus thick at base, not passing behind terminal apophysis, with denticles (fig. 123) *snohomish*
9. Epigynum with triangular median septum (figs. 97, 105, 113) 10
Epigynum with rounded median septum (figs. 121, 125) or without septum (figs. 81, 89, 109) 12
10. Septum almost filling atrium (figs. 113, 116) *parvula*
Septum not filling atrium 11
11. Epigynal atrium widest posteriorly, epigynal septum relatively wide (figs. 97, 100)
..... *brumalis*
Epigynal atrium widest anteriorly, epigynal septum relatively narrow (figs. 102, 105) *microps*
12. Epigynum with large septum filling atrium (figs. 121, 125) 13
Epigynum without septum (figs. 81, 89, 109) 14
13. Epigynal hood relatively large (fig. 121)
..... *antipola*
Epigynal hood relatively small (fig. 125)
..... *snohomish*
14. Epigynal atrium with distinct anterolateral corners (figs. 89, 93) *mima*
Epigynal atrium without distinct anterolateral corners (figs. 81, 109) 15
15. Epigynal ducts widely separated (fig. 109) *orites*
Epigynal ducts approximate (fig. 81)
..... *muscorum*

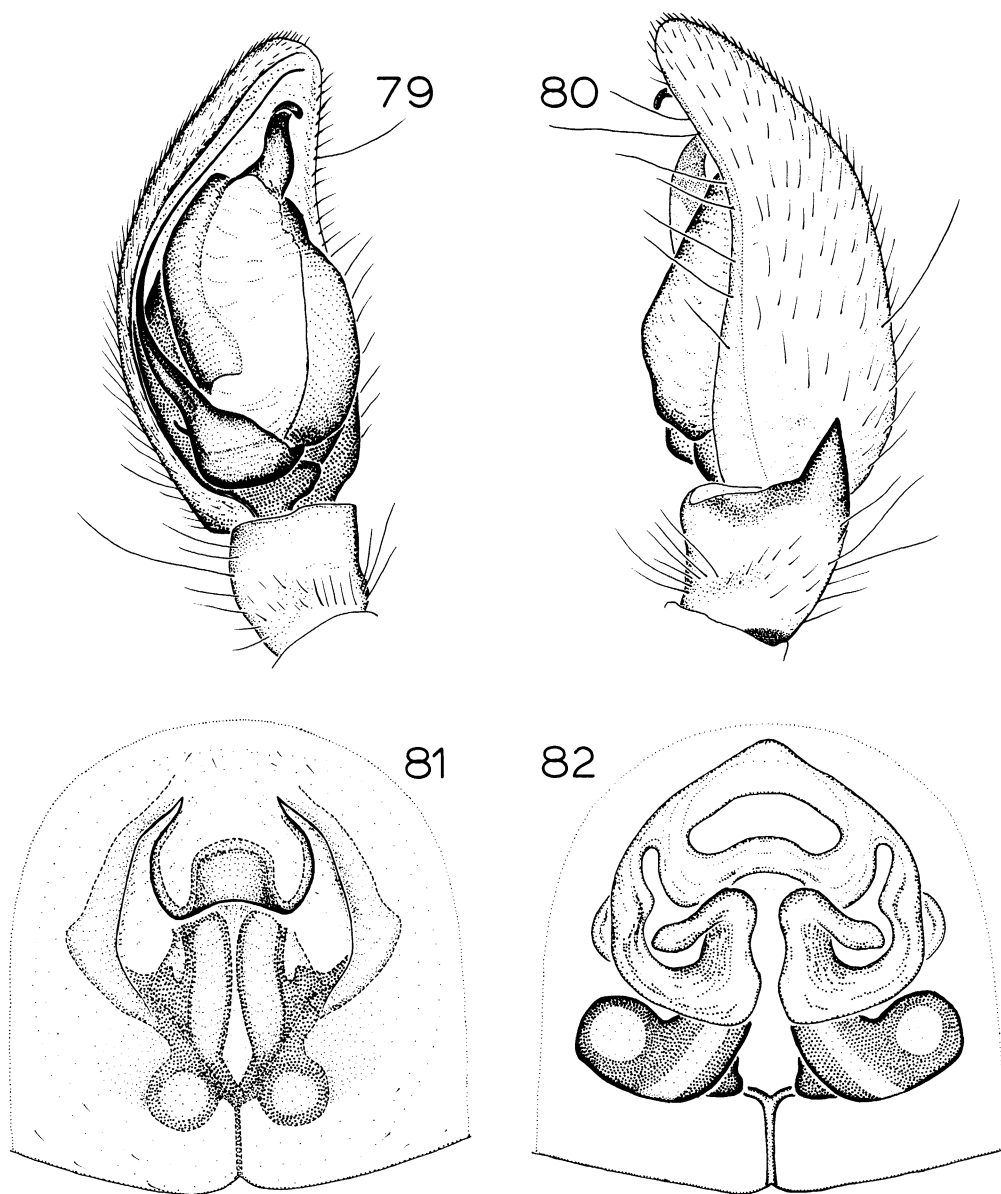
Gnaphosa lugubris (C. L. Koch)

Figures 8, 10

Pythonissa lugubris C. L. Koch, 1839, p. 60, pl. 195, fig. 473.

Gnaphosa lugubris: Pavesi, 1873, p. 132. Roewer, 1954, p. 365. Bonnet, 1957, p. 2014.

Illustrations of the palpus (fig. 8) and epigynum (fig. 10) of this European species, the first member of the species group to be described, are provided for purposes of comparison with the Nearctic members of the group. The specimens illustrated are from Wallisellen, Switzerland (AMNH).



FIGS. 79-82. *Gnaphosa muscorum* (L. Koch). 79. Palp, ventral view. 80. Palp, retrolateral view. 81. Epigynum, ventral view. 82. Vulva, dorsal view.

Gnaphosa muscorum (L. Koch)

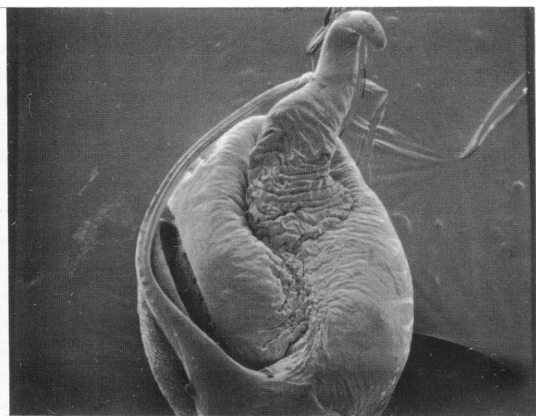
Figures 1, 3-6, 79-84; Map 7

Pythonissa muscorum L. Koch, 1866, p. 14, pl. 1, figs. 9, 10 (female holotype from Engadin, Switzerland, in BMNH, examined).

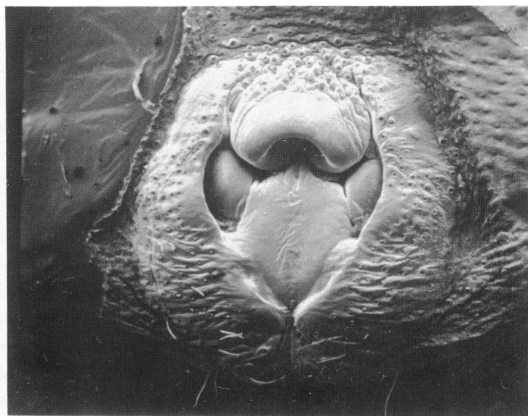
Gnaphosa muscorum: Thorell, 1871, p. 190.

Roewer, 1954, p. 366. Bonnet, 1957, p. 2016.
Gnaphosa conspersa Thorell, 1877, p. 489 [female holotype from Massachusetts, in NRS, examined; preoccupied by *Gnaphosa conspersa* O. P.-Cambridge (1872)].

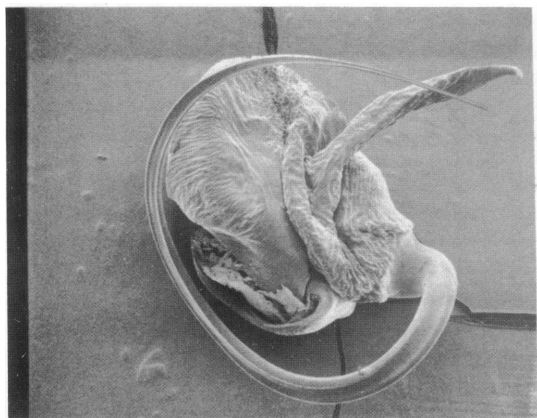
Gnaphosa gigantea Keyserling, 1887, p. 424, pl. 6, fig. 3 (female holotype from Sullivan



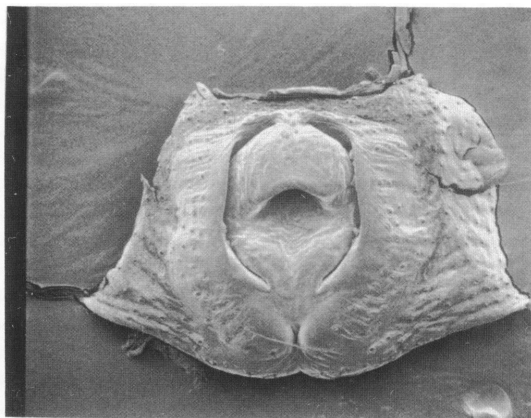
83



84



85



86

FIGS. 83-86. Scanning electron micrographs, ventral views. 83, 84. *Gnaphosa muscorum* (L. Koch). 83. Embolar region of palp, 65X. 84. Epigynum, 65X. 85, 86. *G. californica* Banks. 85. Embolar region of palp, 55X. 86. Epigynum, 55X.

County, New York, in MCZ, examined). Roewer, 1954, p. 370. Bonnet, 1957, p. 2008. First synonymized with *conspersa* by Marx, 1890, p. 508; with *muscorum* by Gertsch, 1935, p. 28.

Diagnosis. *Gnaphosa muscorum* is a distinctive species easily recognizable by the long embolus (figs. 79, 83) and the wide epigynal hood and closely spaced epigynal ducts (figs. 81, 84).

Male. Total length 8.12 ± 0.79 mm. Carapace 4.05 ± 0.36 mm. long, 3.14 ± 0.28 mm. wide. Femur II 2.40 ± 0.23 mm. long (184 specimens examined). Eye sizes and interdistances (mm.): AME 0.11, ALE 0.13, PME 0.13, PLE 0.13; AME-AME 0.14, AME-ALE 0.05, PME-PME

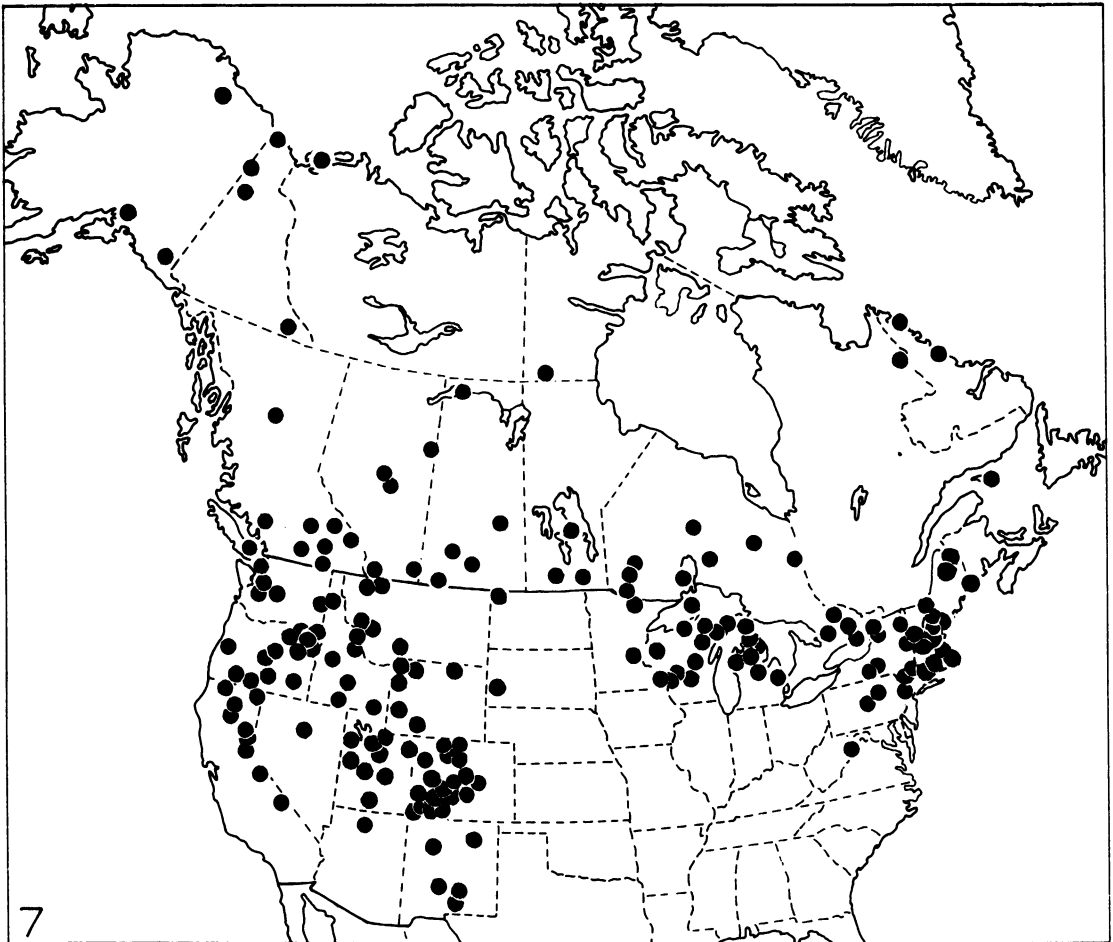
0.11, PME-PLE 0.25, ALE-PLE 0.24. MOQ length 0.38 mm., front width 0.36 mm., back width 0.37 mm. Embolus long, with erectile spur basally (figs. 79, 83). Retrolateral tibial apophysis triangular (fig. 80). Leg spination: femur II P 0-1-1; tibiae: II V 0-0-2; III R 1-1-1; IV D 0-0-0; metatarsus III V 2-2-2.

Female. Total length 10.05 ± 1.45 mm. Carapace 4.58 ± 0.60 mm. long, 3.39 ± 0.41 mm. wide. Femur II 2.44 ± 0.32 mm. long (565 specimens examined). Eye sizes and interdistances (mm.): AME 0.09, ALE 0.15, PME 0.13, PLE 0.13; AME-AME 0.15, AME-ALE 0.06, PME-PME 0.11, PME-PLE 0.27, ALE-PLE 0.24. MOQ length 0.38 mm., front width 0.33 mm., back

width 0.36 mm. Epigynum with wide hood and long, closely spaced median ducts (figs. 81, 84). Spermathecae with wide median lobes (fig. 82). Leg spination: patella III P 0-1-0; tibiae: III R 1-1-1; IV D 0-0-0; metatarsi: III P 2-2-2, V 2-2-2, R 1-2-2; IV V 2-3-2.

Records. Canada: Alberta: Edmonton; Fawcett; Lake Waterton; McMurray; Medicine Hat. *British Columbia:* Anarchist Mountain; Blue Pool; Cascade; Fountain Valley; Hedley; Lillooet; Nanoose Bay; Nelson; Oliver; Radium; Revelstoke; Salmon Arm; Seton Creek; Summit Lake; Takla Landing; Trail; Wellington; Yalacum River; Yoho National Park. *Keewatin:* Nueltin Lake. *Labrador:* Hebron; Nain. *Mackenzie:* Tuktoyaktuk. *Manitoba:* Cedar Lake; Glenlea; Roblayton; Spruce Woods Provincial Park; Winnipeg. *Nova Scotia:* Isle Haute. *Ontario:* Attawapiskat Lake; Belleville; Black Sturgeon Lake; Brockville; Cloyne; Dryden; Emo; Gunther; Lac Seul; Lake Abitibi; Lake Opeongo; Low Bush; Madoc; Maynooth; Muskoka Falls; Nakina; Nipigon; Odessa; Ottawa; Saint Ola; Smoky Falls; Smooth Rock Falls. *Quebec:* Anticosti Island; Fort Chimo; Indian House Lake; Lake Ouareau; Lanoraie. *Saskatchewan:* Carswell Lake; Claydon; Lake Athabasca; Nipawin; Rattleford; Saskatoon; Strasbourg; Val Marie. *Yukon:* Canal Road; Firth River; Ogilvie Mountains; Rampart House; Rancheria; Swede Dome; Swim Lake. *United States: Alaska:* Matanuska Glacier; McCarthy; Umiat. *Arizona:* Coconino Co.: Flagstaff; Grand Canyon; Jacob Lake; San Francisco Mountains. *California:* El Dorado Co.: Echo Lake; Lake Tahoe. Inyo Co.: Bishop Creek. Modoc Co.: Canby; Cedar Pass. Mono Co.: Basin. Nevada Co.: Truckee. Plumas Co.: Chester; Lake Almanor. Shasta Co.: Dana; Dickson Flat; Lessen Park. Siskiyou Co.: Bartle. Tehama Co.: Deer Creek. *Colorado:* Archuleta Co.: Pagosa Springs; Piedra. Boulder Co.: Allenspark; Eldora; Nederland; Ward. Chaffee Co.: Cottonwood Lake. Clear Creek Co.: Mt. Evans; Summit Lake. Conejos Co.: Trujillo Meadows Camp. El Paso Co.: Cascade; Pike's Peak. Fremont Co.: Hayden Creek. Garfield Co.: Douglass Pass. Gilpen Co.: Cold Spring Camp. Grand Co.: St. Louis Creek Camp; Winter Park. Gunnison Co.: Almont; Elk Mountains; Gothic; Sawatch Mountains. Hinsdale Co.: Weminuche Creek. Jackson Co.: Gould. La Plata Co.: Columbine Lake; Durango. Larimer

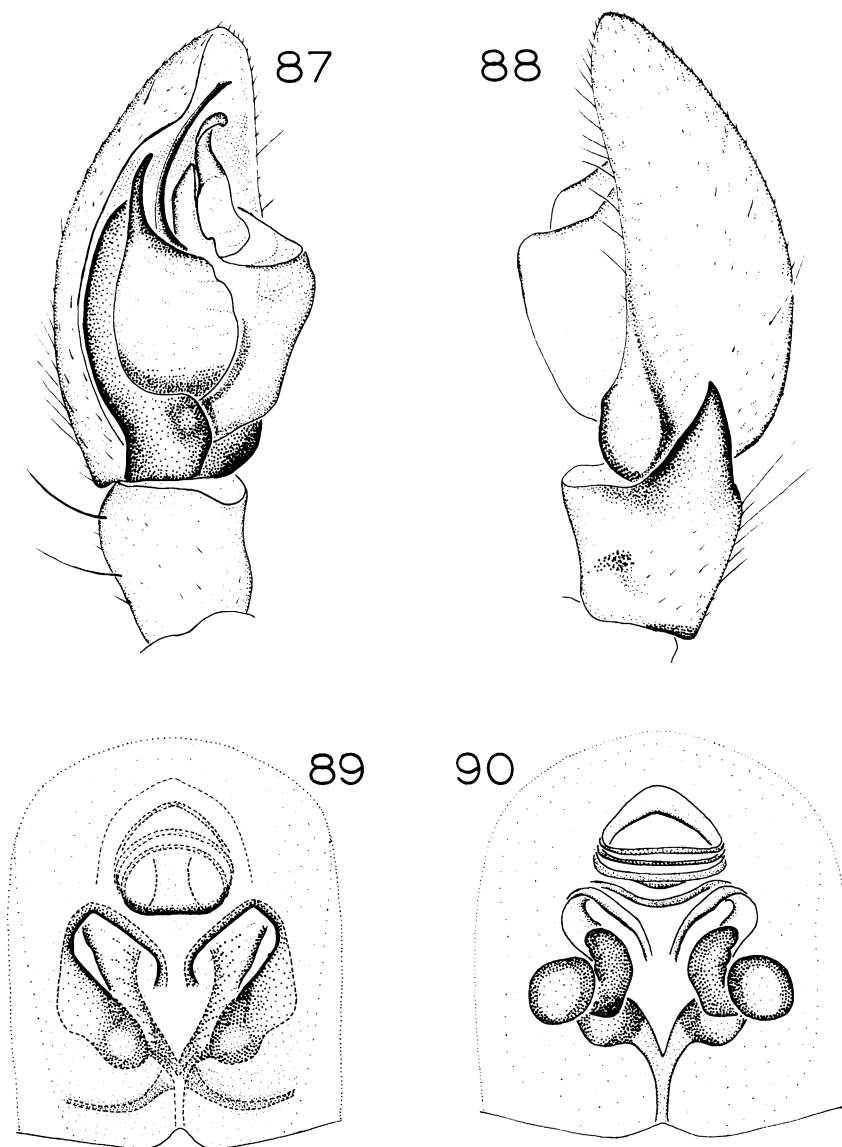
Co.: Estes Park; Fort Collins; Long's Peak. Montezuma Co.: Mesa Verde National Park. Montrose Co.: Iron Springs Camp. Pitkin Co.: Aspen; Piney Creek. Rio Grande Co.: Beaver Creek. Saguache Co.: Cochetopa Creek. San Juan Co.: San Juan Mountains. Teller Co.: Glen Cove. *Connecticut:* Fairfield Co.: Norwalk. Hartford Co.: Simsbury; Southburg; Windsor. New Haven Co.: New Haven. Tolland Co.: Andover. Windham Co.: Woodstock. *Idaho:* Blaine Co.: Hyndman Creek. Franklin Co.: Wasatch Mountains. Kootenai Co.: Coeur d'Alene. Lemhi Co.: Salmon. Twin Falls Co.: Rock Creek Canyon; Twin Falls. Valley Co.: McCall. *Maine:* Aroostook Co.: Caribou. Hancock Co.: Mt. Desert Island; Otis. Penobscot Co.: Dexter. Piscataquis Co.: Mount Katahdin. Washington Co.: Cherryfield; East Machias. York Co.: Ogunquit. *Massachusetts:* Essex Co.: Lynnfield; Salem. Middlesex Co.: Pepperell. Norfolk Co.: Blue Hills; Westwood. Plymouth Co.: Wareham. Worcester Co.: Harvard. *Michigan:* Alger Co.: Sands. Charlevoix Co.: Beaver Island; Thumb Lake. Cheboygan Co.: Douglas Lake. Clare Co.: Crawford Co.: Emmet Co.: Silver Creek. Gogebic Co.: Watersmeet. Gratiot Co.: Kalkaska Co. Keweenaw Co.: Isle Royale. Lapeer Co. Mackinac Co.: Atlanta. Roscommon Co. Schoolcraft Co. *Minnesota:* Hennepin Co.: Minneapolis. Koochiching Co.: Craigville. Winona Co.: Elba. *Montana:* Flathead Co.: Bigfork. Glacier Co.: Glacier National Park. Missoula Co.: Seeley Lake. Park Co.: Eagle Creek; Yellowstone National Park. Powell Co.: Goldcreek. Ravalli Co.: Girdle Creek; Hamilton; Willow Creek. *Nevada:* Lander Co.: Kingston Camp. *New Hampshire:* Belknap Co.: Lake Winnepesaukee. Carroll Co.: West Ossipee. Cheshire Co.: Jaffrey; Surry. Coos Co.: Mt. Washington. Hillsborough Co.: Temple Mountains. *New Jersey:* Morris Co.: Boonton. *New Mexico:* Bernalillo Co.: Sandia Mountains. Lincoln Co.: Ruidosa. Otero Co.: Camp Mary White; Pine Camp. San Miguel Co.: Cowles; Pecos. Socorro Co.: Bear Trap Camp. *New York:* Bronx Co.: Bronx. Dutchess Co.: Poughkeepsie. Essex Co.: Keene Valley. Jefferson Co.: Clayton. Orange Co.: Cornwall. Rockland Co.: Greenwood Lake; Suffern. Steuben Co.: Wallace. Sullivan Co.: South Fallsburg. Tompkins Co.: Freeville. Ulster Co.: Phoenicia; West Shokan. Warren Co.: Lake George. *North Dakota:* Divide Co. *Oregon:* Baker Co.: Mill Creek; Spring Creek.



MAP 7. Northern North America, showing distribution of *Gnaphosa muscorum* (L. Koch).

Crook Co.: Prineville. Deschutes Co.: Three Sisters Primitive Area. Grant Co.: Blue Mountains; Long Creek; Lunch Creek. Harney Co.: Fish Lake; Steens Mountain; Tencent Lake. Jackson Co.: Ashland Peak. Klamath Co.: Gearhardt Mountain; Klamath Agency. Lake Co.: Summer Lake. Lane Co.: Frog Camp; Willamette Pass. Umatilla Co.: Fly Creek Valley; Ukiah. Union Co.: North Powder. Wallowa Co.: Enterprise. Wheeler Co.: Mitchell. *Pennsylvania*: Centre Co.: Beech Creek. Lycoming Co.: Cedar Run. *South Dakota*: Custer Co.: Blue Bell; Custer State Park. Pennington Co.: Horsethief Lake; Keystone; Rapid City; Sheridan Lake; Spring Creek Camp. *Utah*: Emery Co.: Castle Dale. Garfield Co.: Blue Spruce Camp; Hatch. Millard Co.: Fillmore. Salt Lake Co.: Emigration Canyon; Salt Lake City;

Wasatch Mountains. Sevier Co.: Fish Lake; Richfield. Summit Co.: Mill Creek. Uintah Co.: Leidy Peak. Utah Co.: Provo. Tooele Co. *Vermont*: Rutland Co.: West Bridgewater. Windham Co.: South Newfane; Westminster West. Windsor Co.: Ascutney. *Washington*: King Co.: Seattle. Kittitas Co.: Cle Elum. Pierce Co.: Longmire. San Juan Co.: Friday Harbor. Spokane Co.: Deer Park; Newman Lake. Whitman Co.: Wawawa. *West Virginia*: Pendleton Co.: Spruce Knob. *Wisconsin*: Adams Co.: Roche Cri Roadside Park. Barron Co.: Haugen. Door Co.: Peninsula State Park. Florence Co.: Tipler. Jackson Co.: Cattle Mound Roadside Park. La Crosse Co.: La Crosse. Waupaca Co.: Clintonville. *Wyoming*: Lincoln Co.: Cottonwood. Park Co.: Wapiti. Sheridan Co.: Ranger Creek Camp. Sweetwater



FIGS. 87-90. *Gnaphosa mima* Chamberlin. 87. Palp, ventral view. 88. Palp, retrolateral view. 89. Epigynum, ventral view. 90. Vulva, dorsal view.

Co.: Rock Spring. Teton Co.: Moran. Yellowstone National Park Co.: Absaroka Range.

Distribution. Alaska to Labrador, south to New Mexico and West Virginia (map 7). Also in Europe.

Natural History. Mature males have been taken from May through September, mature females from April through November. Specimens have been collected at elevations between 3200 (Yukon) and 12,800 feet (Colorado), on dead pitch pine, under rocks in pine forests and on

beaches, under logs in spruce forests, in pitfall traps in sandy dry soil and tall grasses, and from pitcher plants.

Gnaphosa mima Chamberlin

Figures 87-93; Map 8

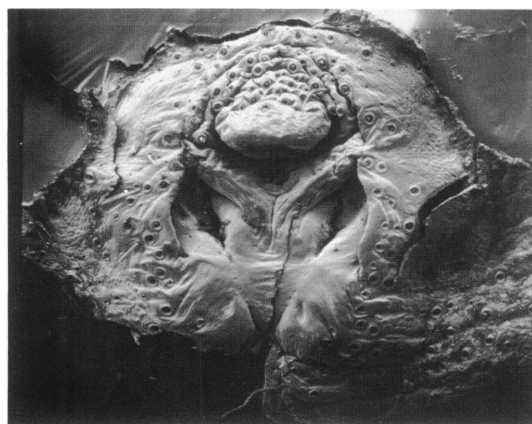
Gnaphosa mima Chamberlin, 1933, p. 2, figs. 3, 4 (male holotype from Seba Beach, Alberta, Canada, in AMNH, examined). Roewer, 1954, p. 370. Bonnet, 1957, p. 2015.



91



92



93



94

FIGS. 91-94. Scanning electron micrographs. 91-93. *Gnaphosa mima* Chamberlin. 91. Distal portion of palp, ventral view, 200X. 92. Embolar region of palp, ventral view, 235X. 93. Epigynum, ventral view, 130X. 94. *G. brumalis* Thorell, vulva, dorsal view, 100X.

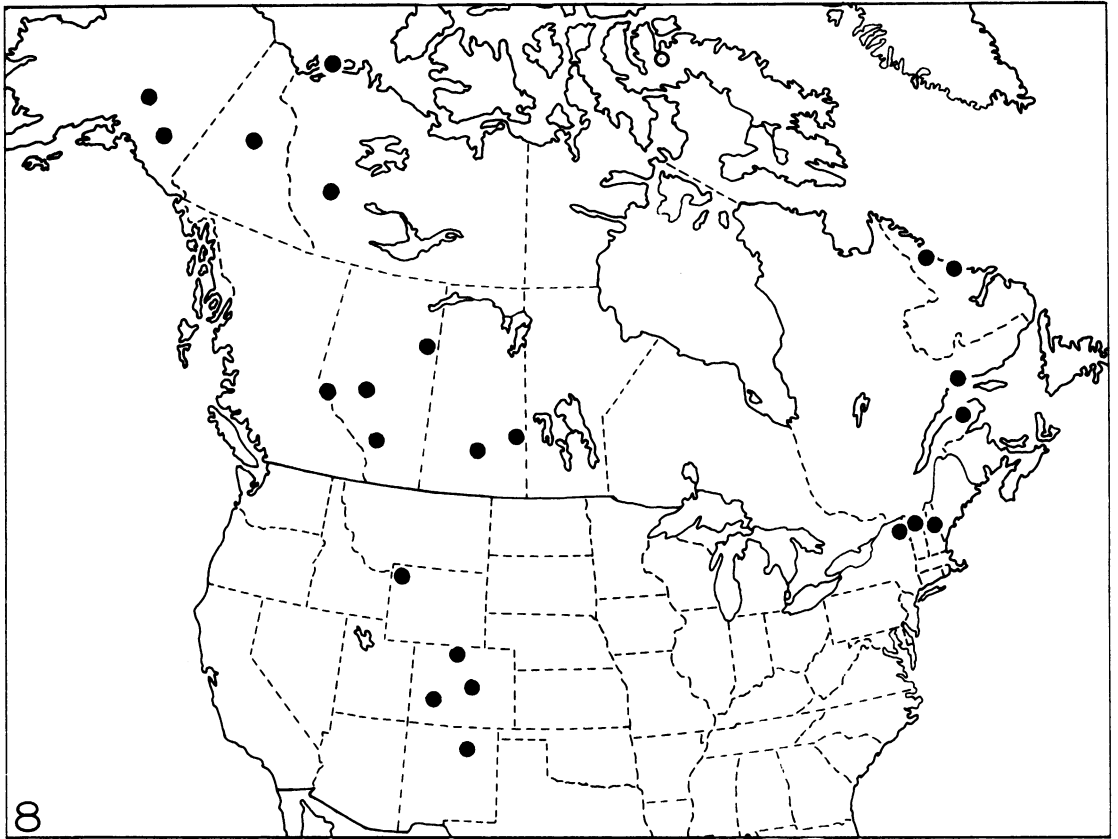
Gnaphosa subparvula Fox, 1938, p. 230, pl. 2, fig. 5 (female holotype from Labrador, Canada, may be in USNM; three female paratypes from same locality, in USNM, examined). Roewer, 1954, p. 371. Bonnet, 1957, p. 2021. NEW SYNONYMY.

Diagnosis. *Gnaphosa mima* is closest to *brumalis* but may be distinguished by the presence of an elongate conductor parallel to the embolus (figs. 87, 91, 92) and the distinct anterolateral corners of the epigynum (figs. 89, 93).

Male. Total length 6.47 ± 0.21 mm. Carapace 3.25 ± 0.15 mm. long, 2.49 ± 0.11 mm. wide. Femur II 1.94 ± 0.09 mm. long (74 specimens examined). Eye sizes and interdistances (mm.): AME 0.06, ALE 0.10, PME 0.10, PLE 0.10;

AME-AME 0.10, AME-ALE 0.04, PME-PME 0.09, PME-PL 0.14, ALE-PL 0.22. MOQ length 0.30 mm., front width 0.23 mm., back width 0.28 mm. Palp with elongate conductor parallel to embolus (figs. 87, 91, 92). Retro-lateral tibial apophysis broadened at base (fig. 88). Leg spination: femur II P 0-1-1; patellae: III P 0-1-0; IV R 0-1-0; tibiae: I P 1-0-1, V 2-2-2; II P 1-0-1, V 1-2-2; metatarsi: II P 0-1-0; III D 0-1-1; IV D 1-1-0, R 1-1-2.

Female. Total length 7.54 ± 0.56 mm. Carapace 3.31 ± 0.31 mm. long, 2.38 ± 0.20 mm. wide. Femur II 2.38 ± 0.20 mm. long (24 specimens examined). Eye sizes and interdistances (mm.): AME 0.06, ALE 0.14, PME 0.11, PLE 0.11; AME-AME 0.06, AME-ALE 0.05, PME-PME



MAP 8. Northern North America, showing distribution of *Gnaphosa mima* Chamberlin.

0.05, PME-PLE 0.19, ALE-PLE 0.21. MOQ length 0.30 mm., front width 0.24 mm., back width 0.28 mm. Epigynum with distinct antero-lateral corners (figs. 89, 93). Spermathecae with widely separated median lobes (fig. 90). Leg spination: femur IV R 0-0-1; patella IV R 0-1-0; tibiae: I V 0-1-1; III R 1-1-1; metatarsi: III D 0-1-0, P 1-1-2, R 2-2-2; IV D 0-1-0, R 2-1-2.

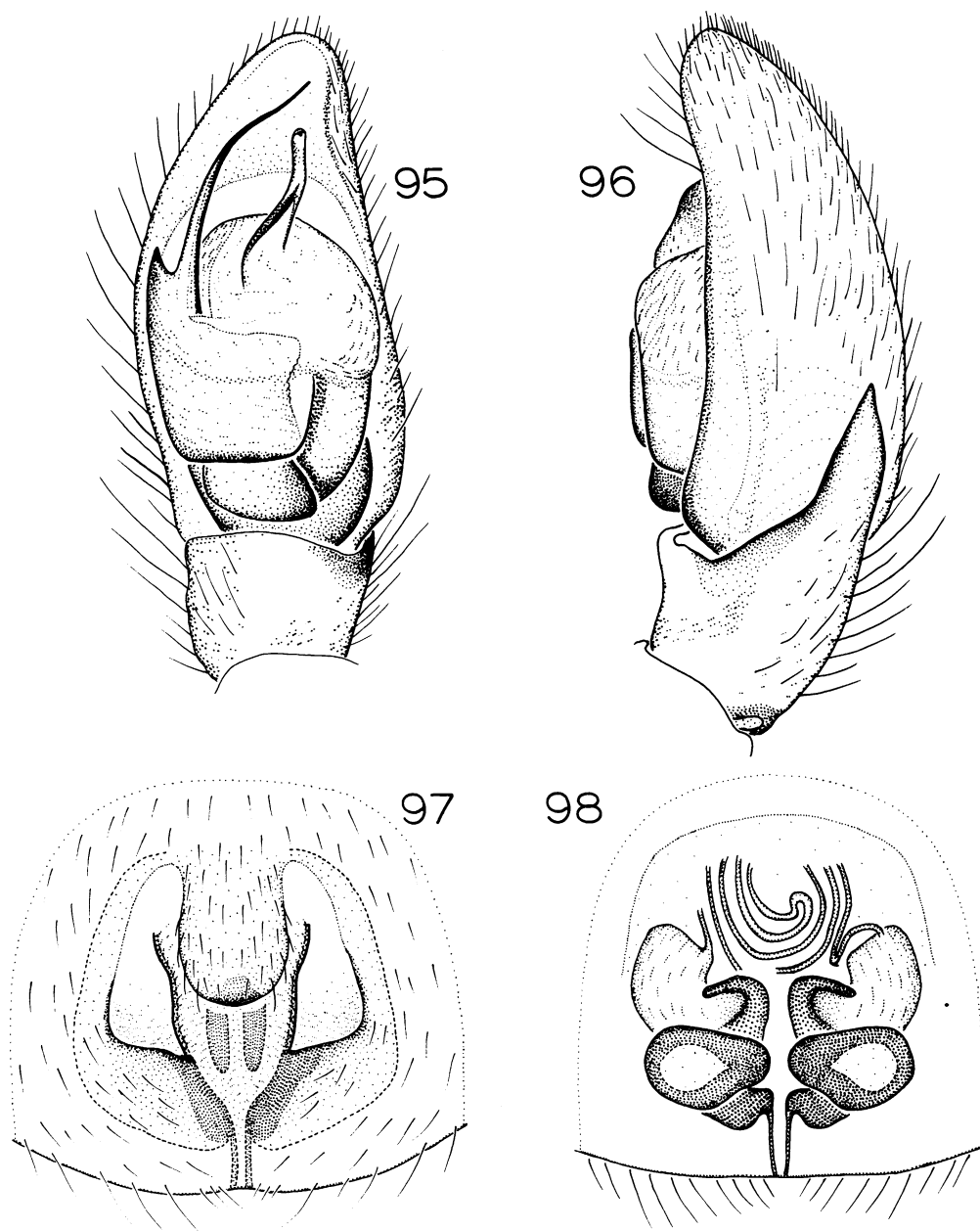
Records. **Canada:** *Alberta:* Canmore; Jasper Park; McMurray; Morley; Seba Beach. *Franklin:* Tununuk Point. *Labrador:* Hopedale; Nain. *Mackenzie:* Tuktoyaktuk; Wrigley. *Quebec:* Mont Albert; Seven Islands. *Saskatchewan:* Lady Lake; Simpson. *Yukon:* Ogilvie Mountains. **United States:** *Alaska:* Paxson Lake; Toklat River. *Colorado:* Clear Creek Co.: Berthoud Pass; Mt. Evans. El Paso Co.: Pike's Peak. Gilpin Co.: Cold Spring Camp. Gunnison Co.: Crested Butte; Sawatch Mountains. Larimer Co.: Estes Park;

Rocky Mountain National Park. Summit Co.: Dillon. *New Hampshire:* Coos Co.: Mt. Washington. *New Mexico:* San Miguel Co.: Pecos Baldy Lake. *New York:* Essex Co.: Mt. McIntyre. *Vermont:* Chittenden Co.: Mt. Mansfield. *Wyoming:* Yellowstone National Park Co.: Yellowstone Lake.

Distribution. Alaska to Labrador, south to New Mexico and New England (map 8).

Natural History. Mature males and females have been taken from June through August. Specimens have been collected at elevations between 3000 (Alaska) and 11,800 feet (Colorado), under stones, running on moss, and in pitfall traps in a *Carex* marsh, *Salix* shrubs, and dwarf clover.

Synonymy. Repeated simultaneous collections of both sexes indicate that *subparvula* is simply the female of *mima*.

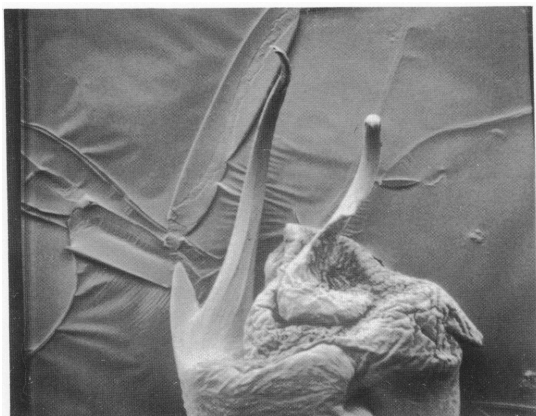


FIGS. 95-98. *Gnaphosa brumalis* Thorell. 95. Palp, ventral view. 96. Palp, retrolateral view. 97. Epigynum, ventral view. 98. Vulva, dorsal view.

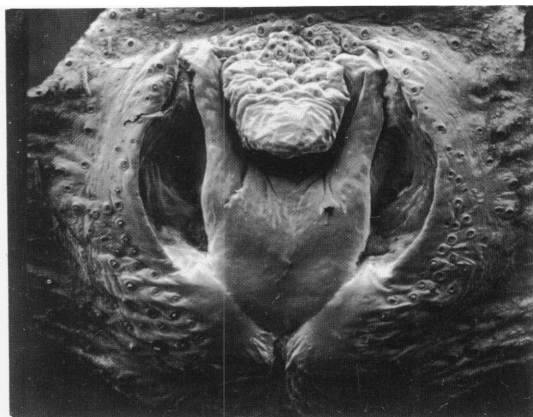
Gnaphosa brumalis Thorell
Figures 94-100; Map 9

Gnaphosa brumalis Thorell, 1875, p. 497 (fe-

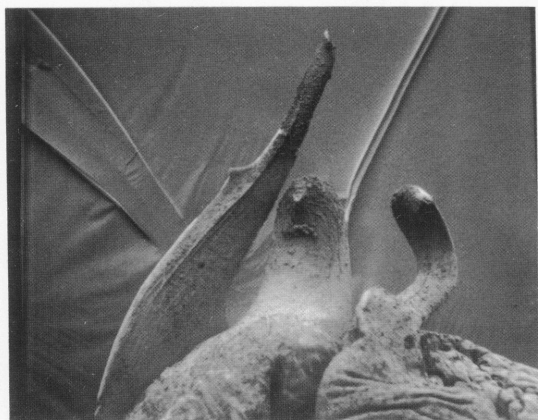
male holotype from Labrador, Canada, de-
pository unknown; presumed destroyed).
Roewer, 1954, p. 370. Bonnet, 1957,
p. 2006.



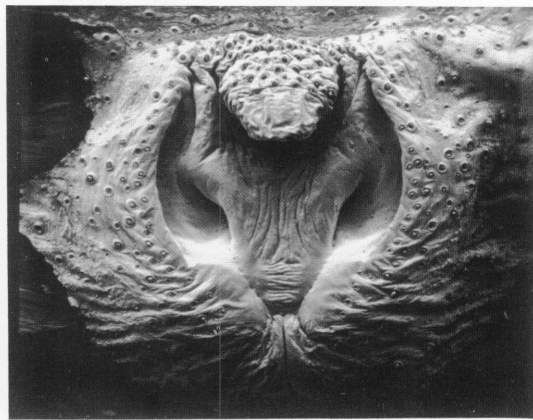
99



100



101



102

FIGS. 99-102. Scanning electron micrographs, ventral views. 99, 100. *Gnaphosa brumalis* Thorell. 99. Embolar region of palp, 130X. 100. Epigynum, 120X. 101, 102. *G. microps* Holm. 101. Embolar region of palp, 255X. 102. Epigynum, 130X.

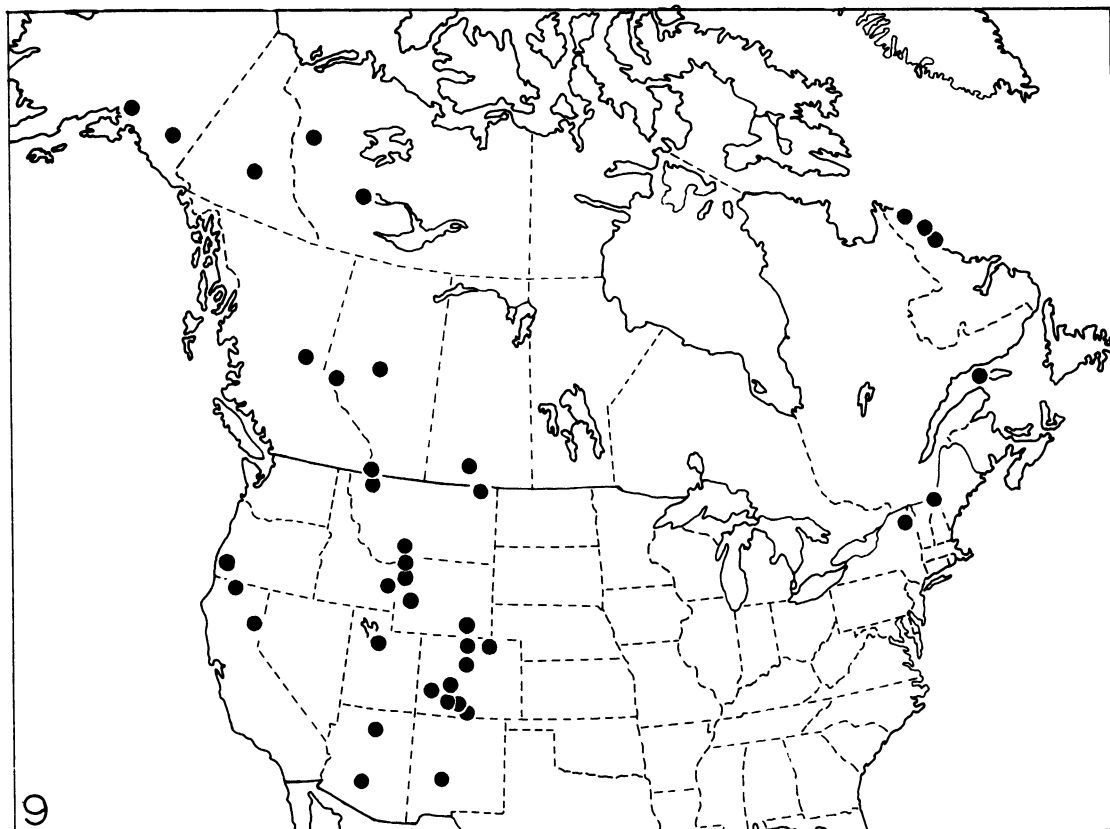
Gnaphosa scudderi Thorell, 1877, p. 491 (female holotype from Garden of the Gods, Colorado, depository unknown; presumed destroyed; first synonymized by Emerton, 1890, p. 175).

Diagnosis. *Gnaphosa brumalis* is closest to *mima* but may be distinguished by the small prolateral cusp at the base of the embolus (figs. 95, 99) and the wide epigynal septum (figs. 97, 100).

Male. Total length 7.21 ± 0.41 mm. Carapace 3.33 ± 0.29 mm. long, 2.62 ± 0.24 mm. wide. Femur II 2.23 ± 0.25 mm. long (29 specimens examined). Eye sizes and interdistances (mm.): AME 0.07, ALE 0.11, PME 0.09, PLE 0.11; AME-AME 0.08, AME-ALE 0.04, PME-PME 0.07, PME-PLE 0.16, ALE-PLE 0.21. MOQ

length 0.31 mm., front width 0.23 mm., back width 0.25 mm. Embolus with small prolateral cusp at base (figs. 95, 99). Retrolateral tibial apophysis elongate (fig. 96). Leg spination: femora: I P 0-1-1, R 0-1-0; II P 0-1-1; patella III P 0-1-0; tibiae: I P 1-0-1, V 2-2-2; II P 2-0-2, V 2-2-2; metatarsi: II P 0-1-0; III D 1-0-0, R 1-1-2; IV D 1-1-0, R 1-1-2.

Female. Total length 8.72 ± 0.93 mm. Carapace 3.75 ± 0.27 mm. long, 2.79 ± 0.19 mm. wide. Femur II 2.27 ± 0.15 mm. long (130 specimens examined). Eye sizes and interdistances (mm.): AME 0.09, ALE 0.13, PME 0.11, PLE 0.12; AME-AME 0.13, AME-ALE 0.04, PME-PME 0.10, PME-PLE 0.22, ALE-PLE 0.23. MOQ



MAP 9. Northern North America, showing distribution of *Gnaphosa brumalis* Thorell.

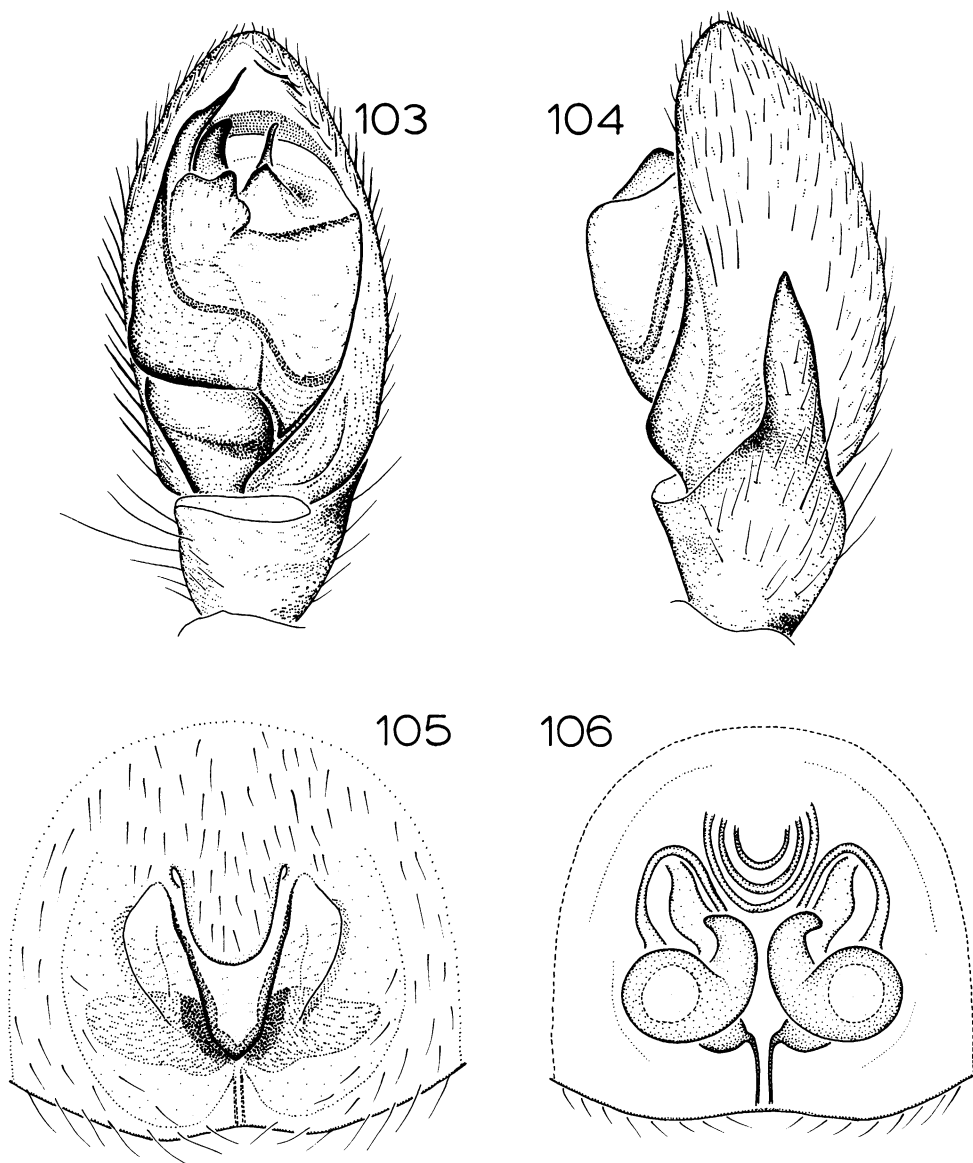
length 0.36 mm., front width 0.31 mm., back width 0.32 mm. Epigynal atrium widest posteriorly, with wide septum (figs. 97, 100). Spermathecae with closely spaced median lobes (figs. 94, 98). Leg spination: tibiae: I V 0-1-2; II V 0-2-2; IV P 1-1-1; metatarsi: III D 0-1-0; IV D 1-1-0, R 1-1-2.

Records. **Canada:** *Alberta:* Fawcett; Waterton Lakes National Park; Whistlers Mountain. *British Columbia:* Summit Lake. *Labrador:* Cabot Lake; Nain; Okak Islands; Ramah. *Mackenzie:* Norman Wells; Slave Lake. *Quebec:* Ellis Bay. *Saskatchewan:* Chaplin Lake; Val Marie. *Yukon:* Swim Lake. **United States:** *Alaska:* Blackburn; Copper River Valley; Palmer. *Arizona:* Coconino Co.: Bill Williams Mountain; Flagstaff; Kaibab Forest. Maricopa Co.: Mormon Lake. *California:* Sierra Co.: Gold Lake. Siskiyou Co.: Mt. Shasta. *Colorado:* Clear Creek Co.: Mt. Evans. Costilla Co. Gunnison Co.: Elk Mountains; Sawatch Mountains. Hinsdale Co.: San Juan Mountains. Larimer

Co.: Fort Collins; Long's Peak; Milner Pass; Rocky Mountain National Park; Trail Ridge Road. Montrose Co.: Black Canyon. Rio Grande Co.: Highway Springs Campground. Weld Co.: Fremont Buttes. *Idaho:* Bonneville Co.: Idaho Falls. *Montana:* Daniels Co.: Flaxville. Flathead Co.: Cobalt Lake; Little Chief Mountain; Mt. Henkel. Park Co.: Cooke City. *New Hampshire:* Coos Co.: Mt. Washington. *New Mexico:* Socorro Co.: Bear Trap Camp. *New York:* Essex Co.: Whiteface Mountain. *Oregon:* Douglas Co.: Bald Crater. *Utah:* Salt Lake Co.: Salt Lake City. *Wyoming:* Albany Co.: Laramie. Sublette Co.: Lower Green River Lake. Teton Co.: Brooks Mountain; Moran. Yellowstone National Park Co.: Mammoth Hot Springs.

Distribution. Alaska to Labrador, south to New Mexico and New England (map 9).

Natural History. Mature males have been taken from June through August, mature females from April through September. Specimens have



FIGS. 103-106. *Gnaphosa microps* Holm. 103. Palp, ventral view. 104. Palp, retrolateral view. 105. Epigynum, ventral view. 106. Vulva, dorsal view.

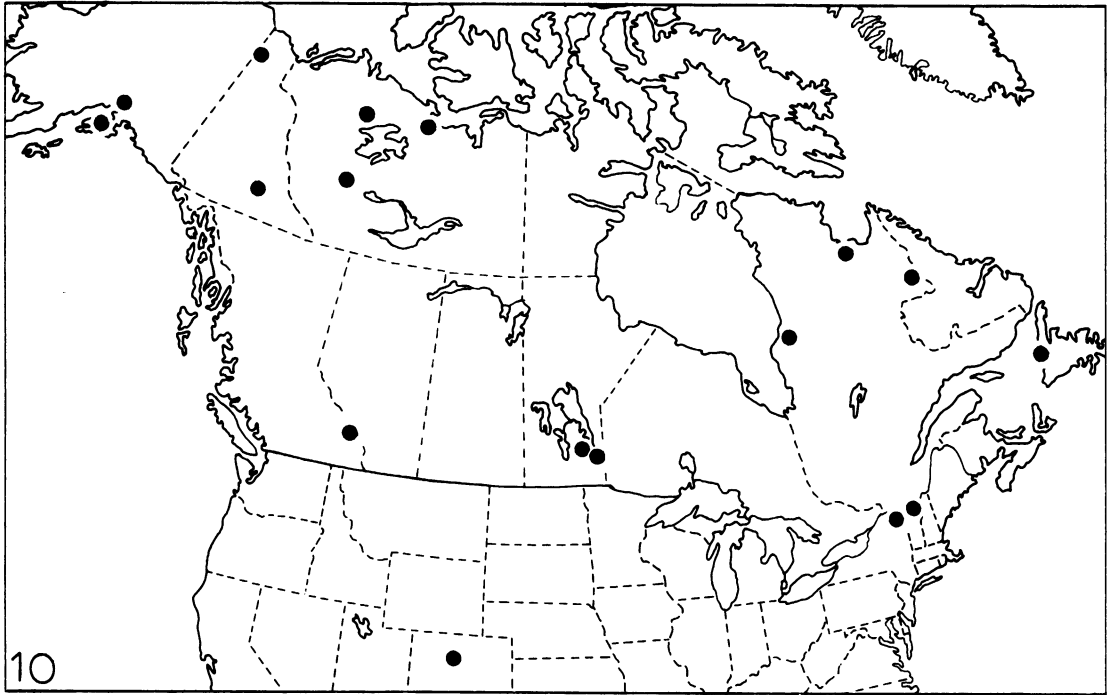
been collected at elevations between 3200 (Yukon) and 13,100 feet (Colorado), under stones, in pinyon, ponderosa, and lodgepole pine forests, on talus and tundra, in pitfall traps in gopher mounds, and under a dead eagle.

Gnaphosa microps Holm
Figures 101-106; Map 10

Gnaphosa microps Holm, 1939, p. 9, fig. 4 (fe-

male holotype from Abisko National Park, Lappland, Sweden, in UUS, examined). Roewer, 1954, p. 365. Bonnet, 1957, p. 2015. *Gnaphosa holmi* (misidentification): Tullgren, 1945, p. 89, fig. 179 (female only).

Diagnosis. *Gnaphosa microps* is closest to *orites* but may be distinguished by the broader embolus (figs. 101, 103) and the presence of an epigynal septum (figs. 102, 105).



MAP 10. Northern North America, showing distribution of *Gnaphosa microps* Holm.

Male. Total length 6.17 ± 0.52 mm. Carapace 2.65 ± 0.11 mm. long, 2.00 ± 0.12 mm. wide. Femur II 1.56 ± 0.06 mm. long (23 specimens examined). Eye sizes and interdistances (mm.): AME 0.05, ALE 0.09, PME 0.08, PLE 0.08; AME-AME 0.07, AME-ALE 0.03, PME-PME 0.05, PME-PLE 0.14, ALE-PLE 0.14. MOQ length 0.24 mm., front width 0.20 mm., back width 0.21 mm. Palp with broad embolus and short conductor (figs. 101, 103). Retrolateral tibial apophysis long, narrow (fig. 104). Leg spination: femur II P 0-1-1; patella IV R 0-1-0; tibiae: I V 0-0-2; II V 1-0-2; III, IV P 1-1-1; metatarsi: III D 0-1-0, P 1-1-1, V 2-0-2, R 1-1-1; IV V 2-1-2.

Female. Total length 6.24 ± 0.86 mm. Carapace 2.52 ± 0.31 mm. long, 1.88 ± 0.21 mm. wide. Femur II 1.41 ± 0.17 mm. long (19 specimens examined). Eye sizes and interdistances (mm.): AME 0.06, ALE 0.13, PME 0.09, PLE 0.10; AME-AME 0.07, AME-ALE 0.04, PME-PME 0.08, PME-PLE 0.15, ALE-PLE 0.17. MOQ length 0.28 mm., front width 0.20 mm., back width 0.26 mm. Epigynal atrium widest anteriorly, with narrow septum (figs. 102, 105). Sper-

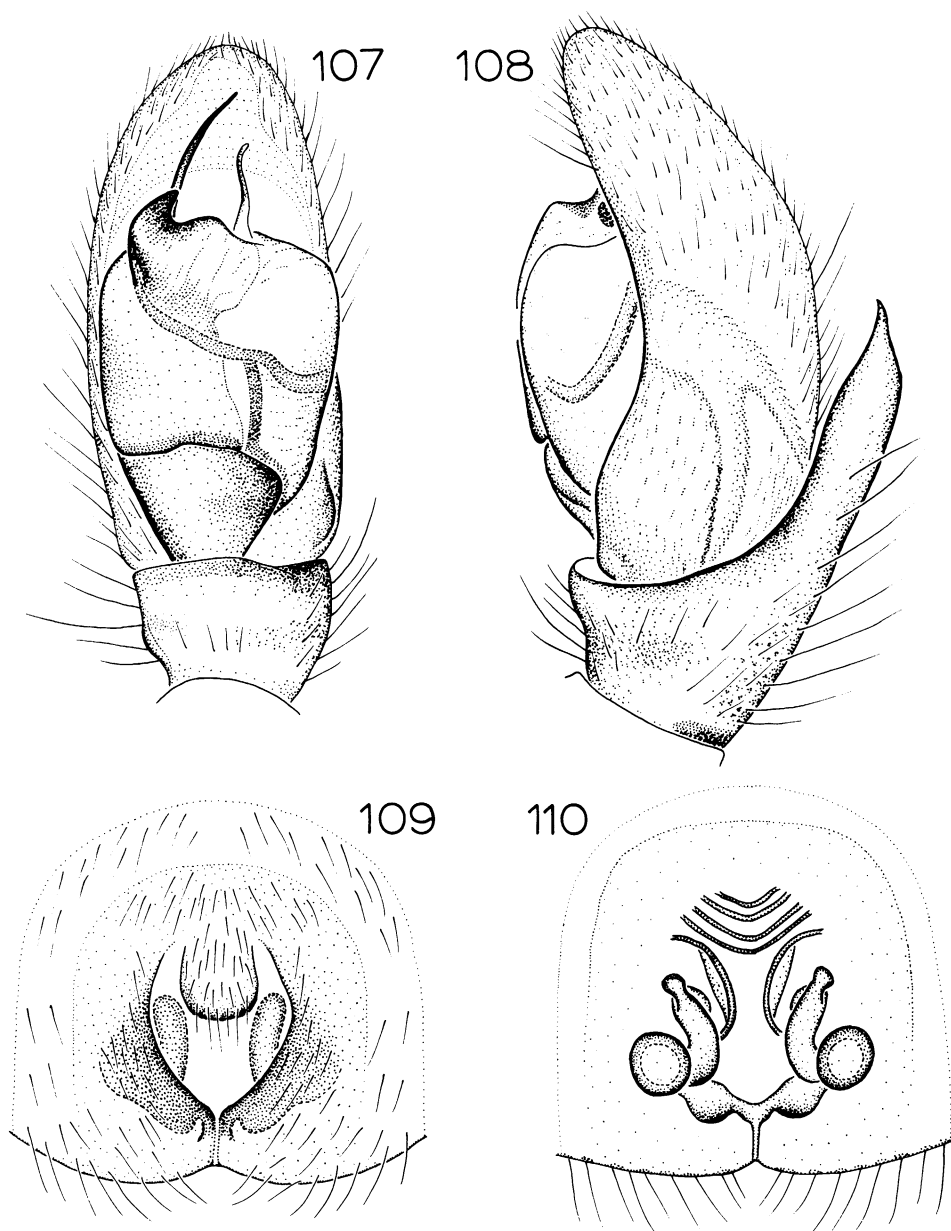
mathecae with wide median lobes (fig. 106). Leg spination: femur IV P 0-0-0, R 0-0-1; tibiae: III P 1-1-1, R 0-1-1; IV P 1-1-1; metatarsi: III D 0-1-0, P 1-1-2, V 2-0-2, R 1-1-2; IV V 2-1-2.

Records. Canada: *British Columbia*: Yoho National Park. *Mackenzie*: Coppermine; Lac Maunoir; Wrigley. *Manitoba*: Pine Falls; River-ton; Telford. *Newfoundland*: Bay of Islands. *Quebec*: Fort Chino; Great Whale River; Indian Horse Lake. *Yukon*: Canal Road; Old Crow Flats; Swim Lake. **United States**: *Alaska*: Matanuska Valley; Seward. *Colorado*: Clear Creek Co.: Mt. Evans. *New York*: Essex Co.: Mt. McIntyre; Whiteface Mountain. *Vermont*: Lamoille Co.: Mt. Mansfield.

Distribution. Alaska to Newfoundland, south to Colorado and New England (map 10). Also in Europe.

Natural History. Mature males have been taken from July through September, mature females from May through August. Specimens have been collected at elevations between 3200 (Yukon) and 11,500 feet (Colorado), and in pit-fall traps in *Salix* shrubs.

Discussion. Holm (1945, p. 64, fig. 21) de-



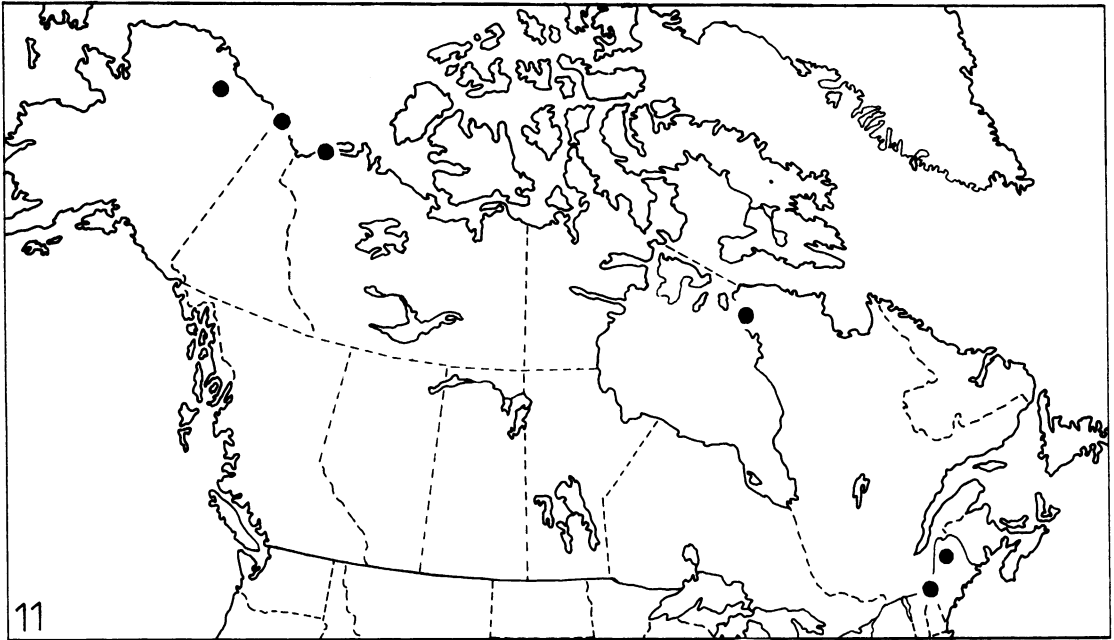
FIGS. 107-110. *Gnaphosa orites* Chamberlin. 107. Palp, ventral view. 108. Palp, retro-lateral view. 109. Epigynum, ventral view. 110. Vulva, dorsal view.

scribed the male of *microps* but later (1950, p. 136, fig. 8) wrongly associated a different male with the species. Holm (1973, p. 103) corrected this error and, in addition, synonymized *microps* with the Siberian species *bilineata* L. Koch (1879). Holm suppressed the older name, apparently under the 50-year rule. This synonymy re-

mains uncertain until males of the Siberian species become available for study.

Gnaphosa orites Chamberlin
Figures 65, 107-110; Map 11

Gnaphosa orites Chamberlin, 1922, p. 158 (male



MAP 11. Northern North America, showing distribution of *Gnaphosa orites* Chamberlin.

holotype from Mount Katahdin, Piscataquis County, Maine, in MCZ, examined). Roewer, 1954, p. 370. Bonnet, 1957, p. 2018.

Gnaphosa labradorensis Fox, 1938, p. 231, pl. 1, fig. 1 (male holotype from Labrador, Canada, in USNM, examined). Roewer, 1954, p. 370. Bonnet, 1957, p. 2010. First synonymized by Ubick and Roth, 1973, p. 4.

Gnaphosa humilis Holm, 1939, p. 7, fig. 3 (male holotype from Gällivare, Lappland, Sweden, in UUS, examined). Bonnet, 1957, p. 2010. Preoccupied by *Gnaphosa humilis* Banks (1892).

Gnaphosa holmi Lohmander, 1942, p. 47 (*nomen novum* for *Gnaphosa humilis* Holm). Palmgren, 1943, p. 88, fig. 93 (male only). Tullgren, 1945, p. 89, figs. 180, 181 (male only). Roewer, 1954, p. 363. First synonymized with *orites* by Holm, 1950, p. 129.

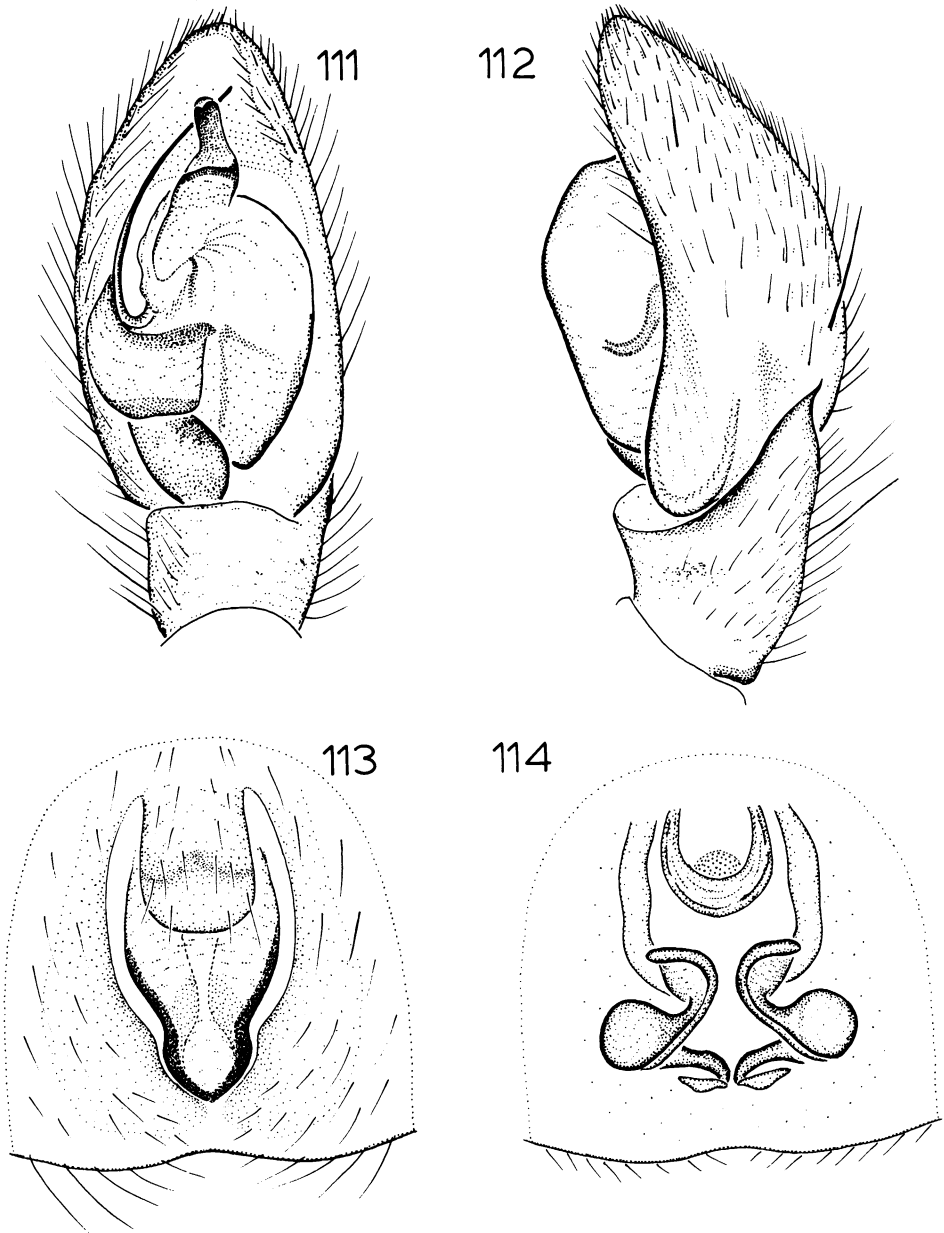
Diagnosis. *Gnaphosa orites* is closest to *microps* but may be distinguished by the narrower embolus (figs. 65, 107) and the lack of an epigynal septum (fig. 109).

Male. Total length 5.00 ± 0.31 mm. Carapace 2.26 ± 0.12 mm. long, 1.79 ± 0.15 mm. wide. Femur II 1.38 ± 0.08 mm. long (21 specimens examined). Eye sizes and interdistances (mm.):

AME 0.06, ALE 0.08, PME 0.09, PLE 0.08; AME-AME 0.07, AME-ALE 0.02, PME-PME 0.05, PME-PLE 0.08, ALE-PLE 0.10. MOQ length 0.23 mm., front width 0.19 mm., back width 0.22 mm. Palp with hooklike conductor and narrow embolus (figs. 65, 107). Retrolateral tibial apophysis long, greatly narrowed at tip (fig. 108). Leg spination: femur IV P 0-0-1, R 0-0-1; patella III P 0-1-0, R 0-0-0; tibiae: I V 0-0-0; II V 0-0-2; III P 1-1-1, R 0-1-1; IV D 0-0-0, P 1-1-1, V 2-1-2, R 1-1-1; metatarsus III R 1-1-2.

Female. Total length 8.93 mm. Carapace 3.14 mm. long, 2.17 mm. wide. Femur II 1.62 mm. long (one specimen examined, CNC). Eye sizes and interdistances (mm.): AME 0.07, ALE 0.11, PME 0.12, PLE 0.11; AME-AME 0.08, AME-ALE 0.04, PME-PME 0.07, PME-PLE 0.17, ALE-PLE 0.21. MOQ length 0.31 mm., front width 0.23 mm., back width 0.30 mm. Epigynum with short atrium, without septum (fig. 109). Spermathecae with widely separated median lobes (fig. 110). Leg spination: femur II P 0-1-1; patellae: III P 0-1-0; IV R 0-1-0; tibiae: I, II V 0-1-1; III P 1-1-1; metatarsi: III V 2-0-2; IV P 2-2-2, V 2-1-2.

Records. **Canada:** *Mackenzie:* Tuktoyaktuk. *Quebec:* Mangmoc Bay; Kogaluk River. *Yukon:*



FIGS. 111-114. *Gnaphosa parvula* Banks. 111. Palp, ventral view. 112. Palp, retro-lateral view. 113. Epigynum, ventral view. 114. Vulva, dorsal view.

Herschel Island. **United States:** *Alaska:* Umiat. *Maine:* Piscataquis Co.: Mount Katahdin. *New Hampshire:* Coos Co.: Mt. Washington.

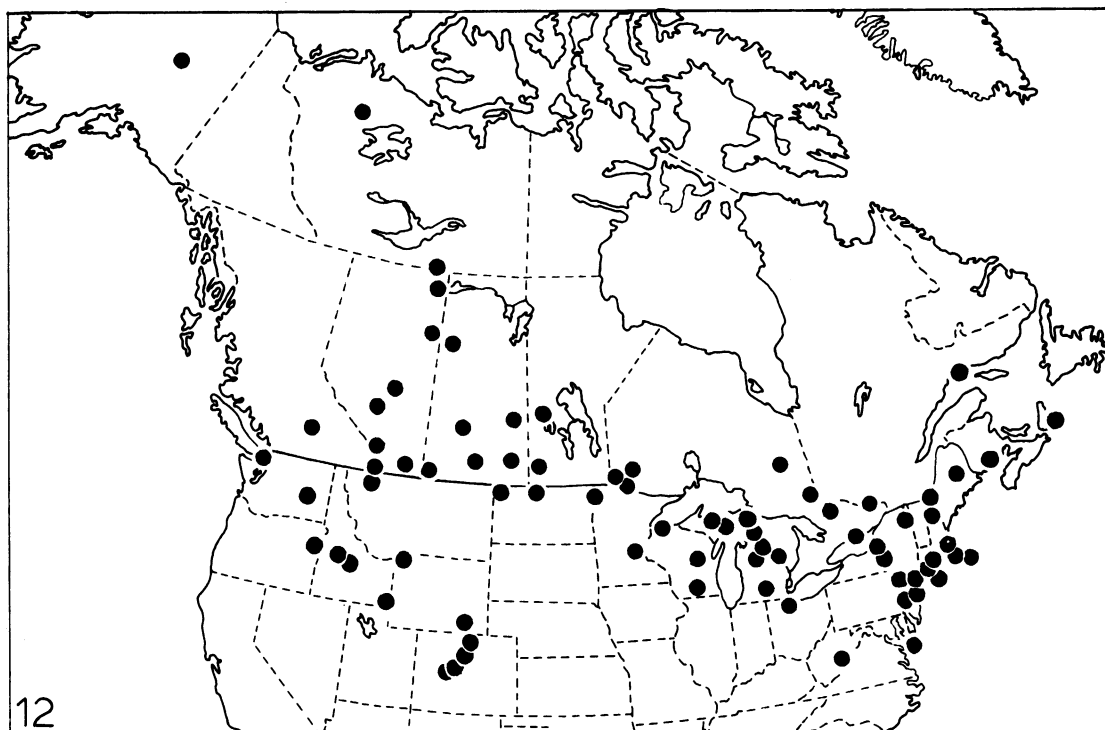
Distribution. Alaska to New England (map 11). Also in Europe.

Natural History. Mature males have been taken from June through September, a mature

female in June. Specimens have been collected in pitfall traps.

Gnaphosa parvula Banks
Figures 111-116; Map 12

Gnaphosa parvula Banks, 1896, p. 61 (male holotype from Franconia, Grafton County, New



MAP 12. Northern North America, showing distribution of *Gnaphosa parvula* Banks.

Hampshire, in MCZ, examined). Roewer, 1954, p. 370. Bonnet, 1957, p. 2018.

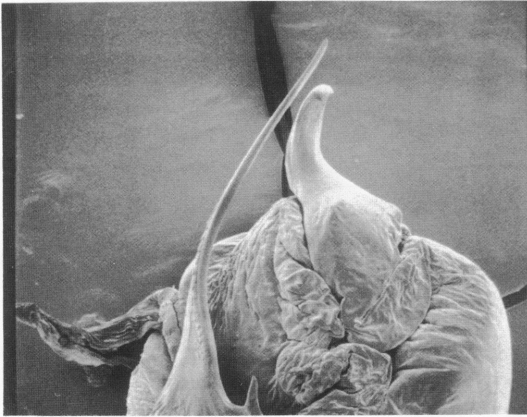
Diagnosis. *Gnaphosa parvula* is closest to *antipola* and *snohomish* but may be distinguished from them by the lack of denticles on the embolus (figs. 111, 115) and the narrow epigynal septum (figs. 113, 116). These three species belong to a sub-group which includes the closely related European species *nigerrima* L. Koch (1878).

Male. Total length 6.41 ± 0.39 mm. Carapace 2.99 ± 0.21 mm. long, 2.25 ± 0.18 mm. wide. Femur II 1.80 ± 0.08 mm. long (141 specimens examined). Eye sizes and interdistances (mm.): AME 0.06, ALE 0.10, PME 0.10, PLE 0.10; AME-AME 0.09, AME-ALE 0.03, PME-PME 0.05, PME-PLE 0.14, ALE-PLE 0.17. MOQ length 0.29 mm., front width 0.22 mm., back width 0.26 mm. Embolus with short basal tubercle but no denticles (figs. 111, 115). Retrolateral tibial apophysis narrowed, sinuous at tip (fig. 112). Leg spination: patella IV R 0-1-0; tibiae: I V 1-1-2; II V 1-2-2; metatarsi: III D 0-1-0, P 1-1-2, V 2-2-2; IV P 1-2-1, V 0-2-2, R 2-2-2.

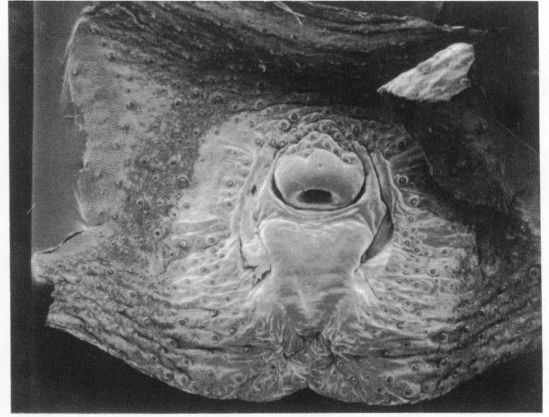
Female. Total length 8.01 ± 0.82 mm. Carapace

3.34 ± 0.27 mm. long, 2.41 ± 0.20 mm. wide. Femur II 1.88 ± 0.17 mm. long (132 specimens examined). Eye sizes and interdistances (mm.): AME 0.08, ALE 0.13, PME 0.14, PLE 0.11; AME-AME 0.12, AME-ALE 0.05, PME-PME 0.09, PME-PLE 0.19, ALE-PLE 0.21. MOQ length 0.32 mm., front width 0.27 mm., back width 0.36 mm. Epigynum with narrow septum filling atrium (figs. 113, 116). Spermathecae with long median lobes (fig. 114). Leg spination: femur II P 0-1-1; patella IV R 0-1-0; tibiae: I V 0-0-2; II V 0-1-2; III P 1-1-1; metatarsus III P 1-1-2.

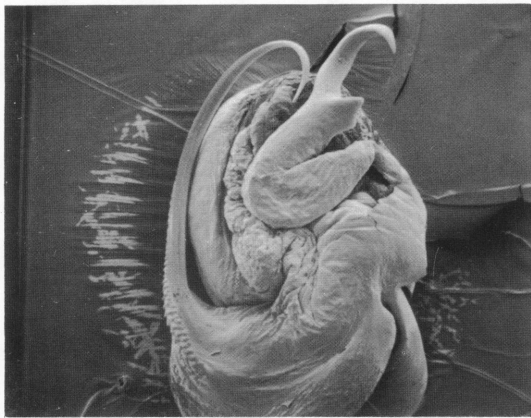
Records. Canada: *Alberta:* Calgary; Cardston; Edmonton; Foremost; Lower Peace River; McMurray; Rock Lake; Seba Beach. *British Columbia:* Kamloops. *Mackenzie:* Fort Smith; Lac Maunoir. *Manitoba:* Cedar Lake; Glenlea; Oak Lake; Pipestone; Seddon's Corner; Souris. *New Brunswick:* White Head, Bay of Fundy. *Nova Scotia:* Canard; Saint Ann Point. *Ontario:* Belleville; Chatterton; Dryden; Emo; Gregoire Mills; Lake of the Woods; Lake Opeongo; Mer Bleue; Odessa; Oxford Mills; Smooth Rock Falls; South Wye; Sturgeon Lake; Timagami. *Quebec:*



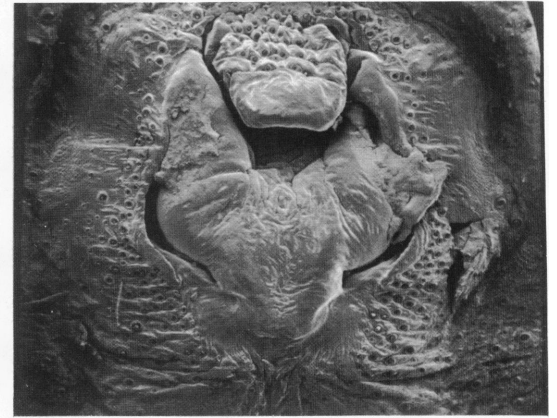
115



116



117

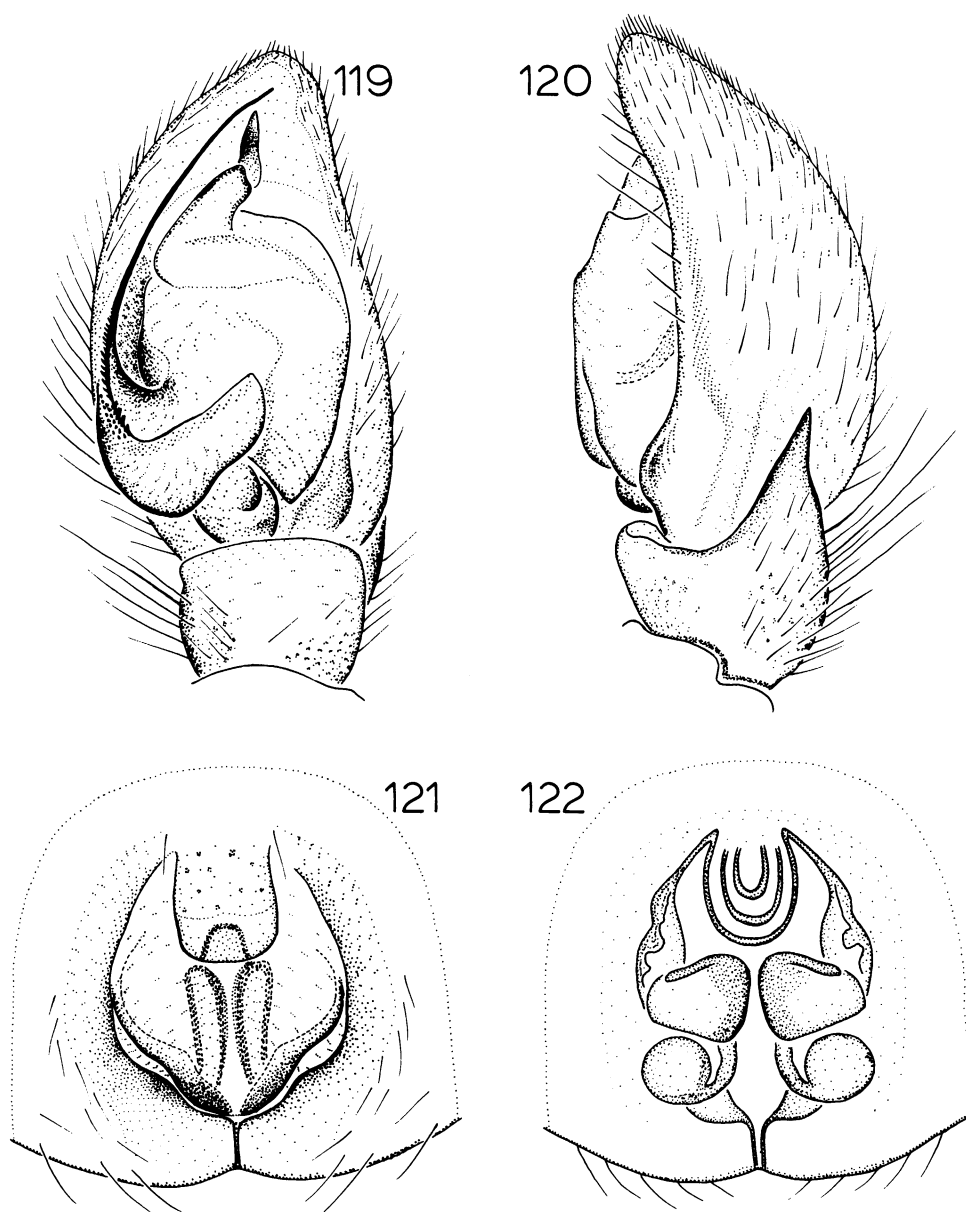


118

FIGS. 115-118. Scanning electron micrographs, ventral views. 115, 116. *Gnaphosa parvula* Banks. 115. Embolar region of palp, 125X. 116. Epigynum, 95X. 117, 118. *G. antipola* Chamberlin. 117. Embolar region of palp, 100X. 118. Epigynum, 100X.

Gatineau National Park; Lanorale; Quyon; Seven Islands. *Saskatchewan*: Big River; Cypress Hills Provincial Park; Lady Lake; Laura; McLean; Montmartre; Moose Jaw; Pasqua; Saskatoon; Wapella. *United States*: *Alaska*: College. *Colorado*: Chaffey Co.: Cottonwood Lake. Clear Creek Co.: Mt. Evans. Gunnison Co.: Gunnison. Larimer Co.: Milner Pass. *Connecticut*: Fairfield Co.: Norwalk. Hartford Co.: New Britain. New Haven Co.: Meriden. *Idaho*: Bear Lake Co.: Montpelier. Custer Co.: Stanley. Valley Co.: Smiths Ferry. *Maine*: Penobscot Co.: East Lowell. *Massachusetts*: Barnstable Co.: Chatham; Woods Hole. Essex Co.: Ipswich. Hampden Co.: Springfield. Middlesex Co.: Holliston. Nantucket

Co.: Nantucket. Norfolk Co.: Cohasset. Plymouth Co.: Duxbury. *Michigan*: Cheboygan Co. Clare Co. Clinton Co.: Bath; Burke Lake. Delta Co. Emmet Co.: Round Lake. Huron Co. Ingham Co.: Bear Lake. Mackinac Co. Marquette Co.: Marquette. Midland Co. Ogemaw Co. Osceola Co. *Minnesota*: Hennepin Co.: Minneapolis. Marshall Co.: Warren. *Montana*: Flathead Co.: Bowman Lake. *New Hampshire*: Coos Co.: White Mountains. Grafton Co.: Franconia. *New Jersey*: Bergen Co.: Ramsey. Monmouth Co.: Manasquan. Union Co.: Roselle Park. *New York*: Essex Co.: Adirondack Lodge. Rockland Co.: Bear Mountain. Suffolk Co.: Orient; Plum Island; Southold. Tompkins Co.: Ithaca. Wayne Co.: Mud Pond.



FIGS. 119-122. *Gnaphosa antipola* Chamberlin. 119. Palp, ventral view. 120. Palp, retrolateral view. 121. Epigynum, ventral view. 122. Vulva, dorsal view.

North Dakota: Bottineau Co. Divide Co. *Ohio*: Ottawa Co.: Middle Bass Island. *Oregon*: Baker Co.: Trout Creek Meadows. *Pennsylvania*: Bucks Co.: Jamison. Pike Co.: Milford. *Virginia*: Accomack Co.: Chincoteague. *Washington*: Grant Co.: Soap Lake. San Juan Co.: Friday Harbor. *West Virginia*: Pocahontas Co.: Black Mountain.

Wisconsin: Bayfield Co.: Herbster; Port Wing. Dane Co.: Madison. Waupaca Co.: Clintonville. *Wyoming*: Albany Co.: Laramie. Yellowstone National Park Co.: Bridge Bay.

Distribution. Alaska to Nova Scotia, south to Colorado and West Virginia (map 12).

Natural History. Mature males have been

taken from June to November, mature females from June through August. Specimens have been collected at elevations between 4500 (West Virginia) and 13,000 feet (Colorado), in pitfall traps in meadows and *Sphagnum* bogs, under rocks and boards, on beaches, under tidal drift, and from moss in a spruce forest.

Gnaphosa antipola Chamberlin

Figures 117-122; Map 13

Gnaphosa antipola Chamberlin, 1933, p. 4, figs. 5-7 (male holotype and female allotype from west shore of Utah Lake, Utah County, Utah, in AMNH, examined). Roewer, 1954, p. 370. Bonnet, 1957, p. 2003.

Diagnosis. *Gnaphosa antipola* is closest to *snohomish* but may be distinguished by the longer embolus (figs. 117, 119) and the larger epigynal hood (figs. 118, 121).

Male. Total length 5.93-7.45 mm. Carapace 2.65-3.48 mm. long, 2.02-2.77 mm. wide. Femur II 1.51-2.16 mm. long (seven specimens examined). Eye sizes and interdistances (mm.): AME 0.05, ALE 0.11, PME 0.13, PLE 0.10; AME-AME 0.11, AME-ALE 0.05, PME-PME 0.04, PME-PLE 0.18, ALE-PLE 0.23. MOQ length 0.30 mm., front width 0.22 mm., back width 0.29 mm. Embolus long, with many denticles at base (figs. 117, 119). Retrolateral tibial apophysis gradually narrowed distally (fig. 120). Leg spination: femur II P 0-1-1; patella IV R 0-1-0; tibiae: I V 1-2-2; II P 0-0-1, V 1-2-2; metatarsus III V 2-0-2, R 1-1-2.

Female. Total length 7.91±1.11 mm. Carapace 3.53±0.34 mm. long, 2.64±0.27 mm. wide. Femur II 2.09±0.26 mm. long (37 specimens examined). Eye sizes and interdistances (mm.): AME 0.08, ALE 0.14, PME 0.12, PLE 0.11; AME-AME 0.11, AME-ALE 0.04, PME-PME 0.05, PME-PLE 0.15, ALE-PLE 0.15. MOQ length 0.30 mm., front width 0.26 mm., back width 0.28 mm. Epigynum with wide septum and large hood (figs. 118, 121). Spermathecae with transversely expanded median lobes (fig. 122). Leg spination: femur IV P 0-0-1, R 0-0-1; tibiae: III P 1-1-1, R 0-1-1; IV P 2-0-1; metatarsi: III D 0-1-0, P 1-1-2, R 1-0-2; IV V 2-1-2.

Records. **United States:** *California:* Lassen Co.: Susanville. Modoc Co.: Lake City. *Colorado:* Gunnison Co.: Elk Mountains; Gothic. Hillsdale

Co.: San Juan Mountains. *Montana:* Ravalli Co.: Girdle Creek. *Oregon:* Baker Co.: Fish Lake. Klamath Co.: Lake of the Woods. *Utah:* Davis Co.: Farmington. Grand Co.: Moab. Salt Lake Co.: Salt Lake City. Utah Co.: Utah Lake.

Distribution. Northwestern United States (map 13).

Natural History. Mature males have been taken in July and September, mature females from May through September. Specimens have been collected at elevations between 9500 and 11,500 feet, under stones, in pitfall traps in willows, and by sweeping sedges.

Gnaphosa snohomish, new species

Figures 123-126; Map 13

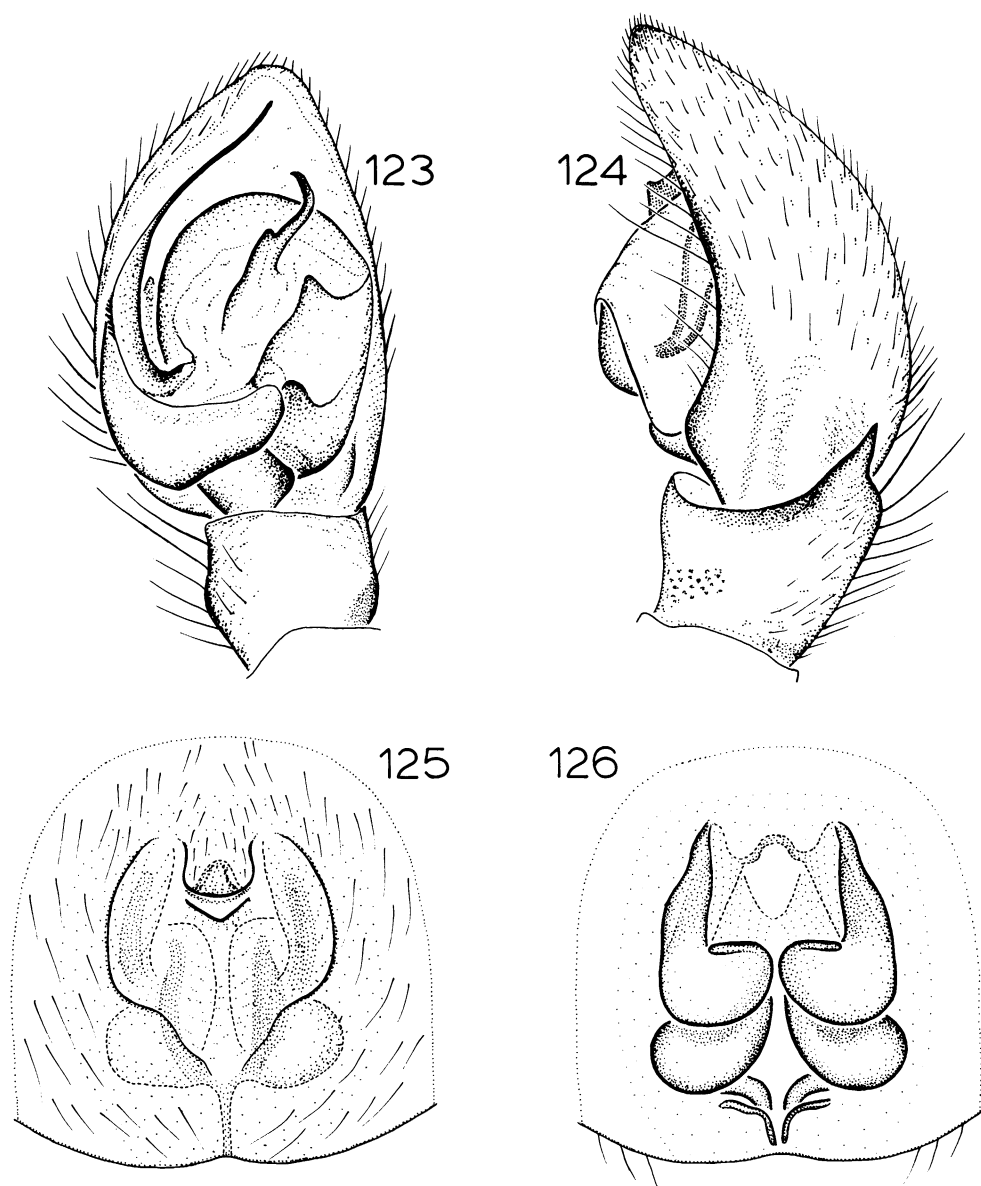
Types. Male holotype from Chase Lake, Snohomish County, Washington (April, 1957; B. Malkin) and female paratype from the same locality (May 16, 1954; B. Malkin and D. Boddy), deposited in AMNH.

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

Diagnosis. *Gnaphosa snohomish* is closest to *antipola* but may be distinguished by the shorter embolus (fig. 123) and the smaller epigynal hood (fig. 125).

Male. Total length 6.62 mm. Carapace 2.85 mm. long, 2.27 mm. wide. Femur II 1.73 mm. long (holotype). Eye sizes and interdistances (mm.): AME 0.06, ALE 0.10, PME 0.09, PLE 0.10; AME-AME 0.09, AME-ALE 0.03, PME-PME 0.05, PME-PLE 0.16, ALE-PLE 0.17. MOQ length 0.24 mm., front width 0.22 mm., back width 0.24 mm. Embolus short, with a few denticles at base (fig. 123). Retrolateral tibial apophysis short (fig. 124). Leg spination: femora: II P 0-1-1; IV R 0-0-1; tibiae: I, II V 1-1-2; III P 1-0-1, R 1-1-1; IV P 1-0-1; metatarsus III P 1-1-1, V 2-0-2, R 1-1-1.

Female. Total length 8.14 mm. Carapace 3.10 mm. long, 2.30 mm. wide. Femur II 1.69 mm. long (paratype). Eye sizes and interdistances (mm.): AME 0.07, ALE 0.11, PME 0.12, PLE 0.11; AME-AME 0.09, AME-ALE 0.03, PME-PME 0.08, PME-PLE 0.09, ALE-PLE 0.16. MOQ length 0.24 mm., front width 0.23 mm., back width 0.31 mm. Epigynum with wide septum and small hood (fig. 125). Spermathecae with anteriorly expanded median lobes (fig. 126). Leg



FIGS. 123-126. *Gnaphosa snohomish*, new species. 123. Palp, ventral view. 124. Palp, retrolateral view. 125. Epigynum, ventral view. 126. Vulva, dorsal view.

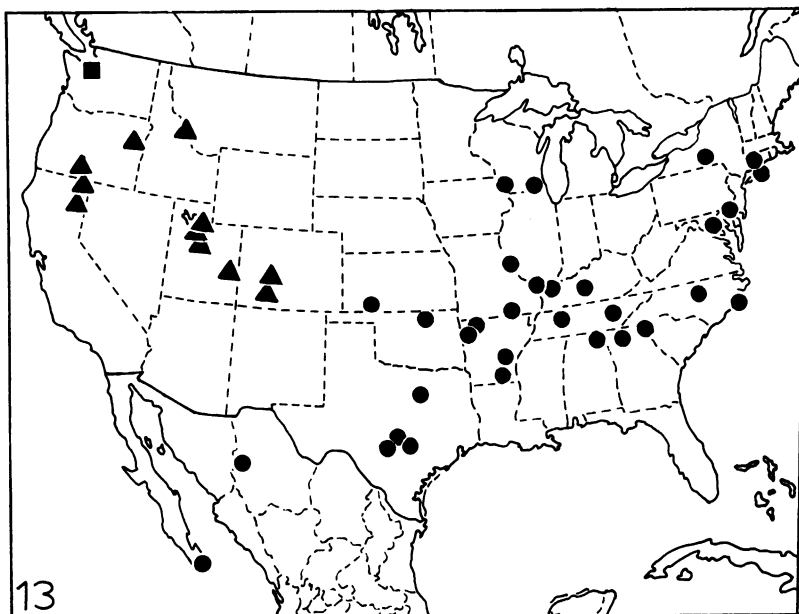
spination: femora: II P 0-0-0; IV P 0-0-0, R 0-0-1; tibiae: III D 0-0-0, P 1-1-1, V 2-1-2, R 0-1-1; IV D 0-0-0; metatarsi: III D 0-1-0, P 0-2-2, V 2-2-2, R 1-1-2; IV V 2-0-2.

Records and Distribution. Known only from the type locality.

Natural History. Nothing is known of the habits of this species.

THE *FONTINALIS* GROUP

Diagnosis. Species belonging to the *fontinalis* group can be distinguished from other *Gnaphosa* by the long but uncoiled emboli arising on the retrolateral side of the palpal bulb (as in fig. 127) and the flaplike anterolateral enlargements of the internal female genitalia (as in fig. 130).



MAP 13. Central North America, showing distributions of *Gnaphosa fontinalis* Keyserling (circles), *G. antipola* Chamberlin (triangles), and *G. snohomish*, new species (square).

Description. As for the genus, except for the following: Carapace and legs light orange to dark brown, abdomen light brown to dark brown. Endites rounded. Legs without extremely long setae. Typical leg spination (only surfaces bearing spines listed): femora: I, II D 1-1-0, P 0-0-1; III, IV D 1-1-0, P 0-1-1, R 0-1-1; patellae III, IV R 0-1-0; tibiae: I, II V 1-2-2; III, IV D 1-0-0, P 2-1-1, V 2-2-2, R 2-1-1; metatarsi: I V 2-0-2; II V 2-0-1; III D 0-1-0, P 1-1-2, V 2-1-2, R 1-1-2; IV P 1-2-2, V 2-1-2, R 1-2-2. Genitalia as described above.

KEY TO SPECIES OF THE FONTINALIS GROUP

1. Terminal apophysis relatively wide (figs. 127, 131, 132, 150); epigynal atrium relatively narrow (figs. 129, 133, 134) . . . *fontinalis*
Terminal apophysis relatively narrow (figs. 85, 135, 139); epigynal atrium relatively wide (figs. 86, 137, 141) 2
2. Base of embolus projecting far from bulb (figs. 135, 136); epigynal hood anteriorly broad (fig. 137) *californica*
Base of embolus not extending far from bulb

(figs. 139, 140); epigynal hood anteriorly narrow (fig. 141) *sandersi*

Gnaphosa fontinalis Keyserling Figures 127-134, 150; Map 13

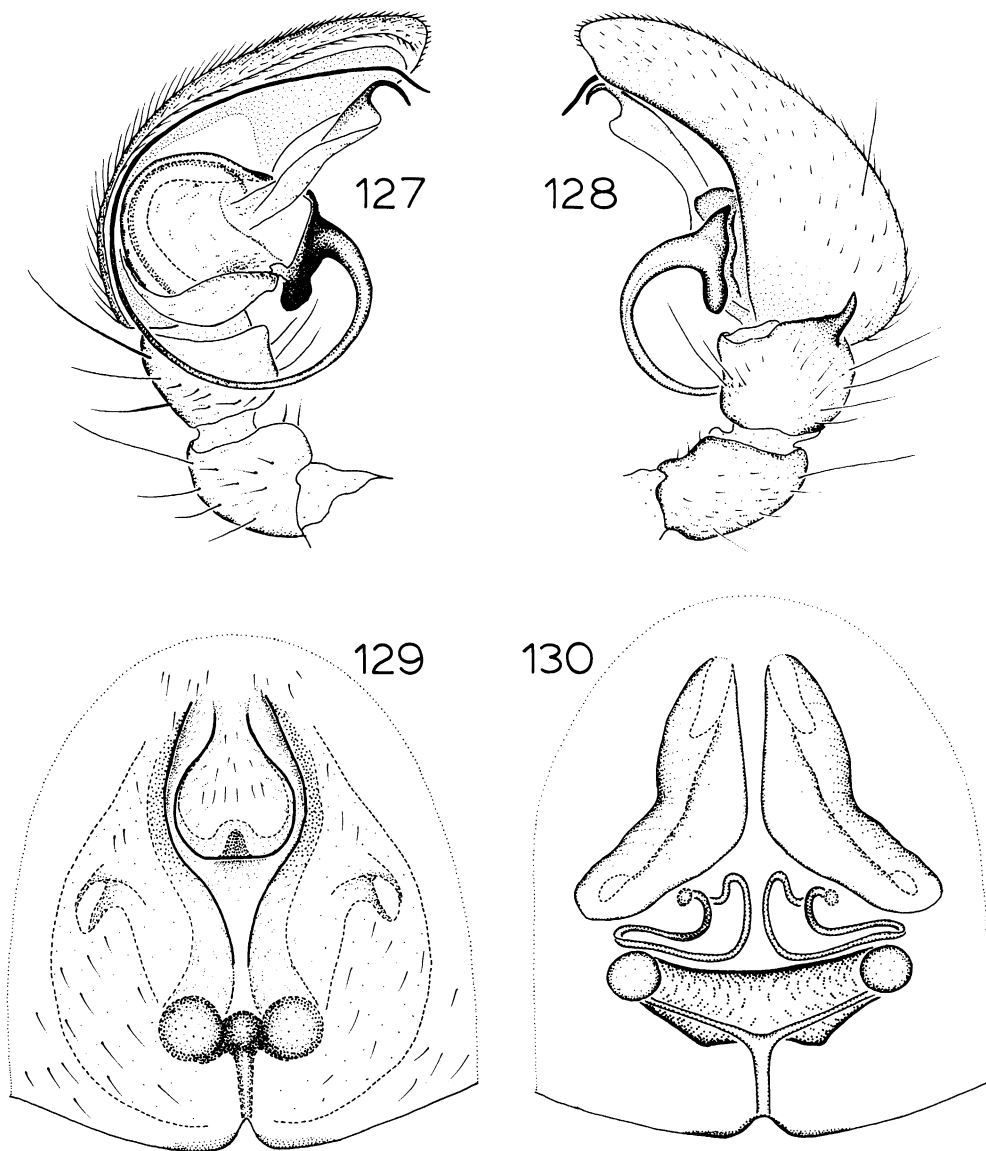
Gnaphosa fontinalis Keyserling, 1887, p. 426, pl. 6, fig. 4 (female holotype from Bee Spring, Edmonson County, Kentucky, in MCZ, examined). Roewer, 1954, p. 370. Bonnet, 1957, p. 2007.

Gnaphosa americana Banks, 1896, p. 61 (female holotype from Ithaca, Tompkins County, New York, in MCZ, examined; first synonymized by Chamberlin, 1922, p. 157).

Gnaphosa distincta Banks, 1898, p. 222, pl. 13, fig. 13 (three female syntypes from Sierra de San Lázaro, Baja California Sur, Mexico, in MCZ, examined). Roewer, 1954, p. 369. Bonnet, 1957, p. 2007. NEW SYNONYMY.

Gnaphosa texana Chamberlin, 1922, p. 157 (male holotype from Austin, Travis County, Texas, in MCZ, examined). Roewer, 1954, p. 371. Bonnet, 1957, p. 2022. NEW SYNONYMY.

Diagnosis. *Gnaphosa fontinalis* is closest to *californica* and *sandersi* but may be distinguished



FIGS. 127-130. *Gnaphosa fontinalis* Keyserling. 127. Palp, prolateral view. 128. Palp, retrolateral view. 129. Epigynum, ventral view. 130. Vulva, dorsal view.

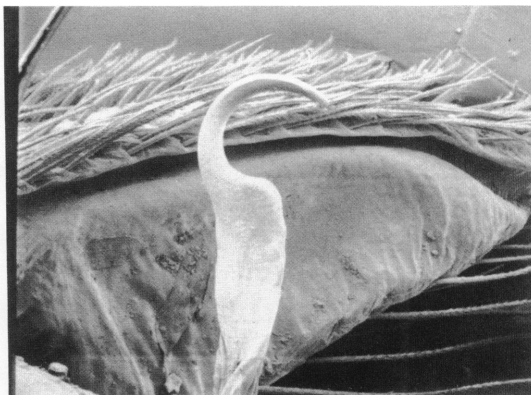
from them by the relatively wide terminal apophysis (fig. 127) and the narrow epigynal atrium (fig. 129).

Male. Total length 5.60 ± 0.52 mm. Carapace 2.74 ± 0.35 mm. long, 2.18 ± 0.31 mm. wide. Femur II 1.65 ± 0.25 mm. long (66 specimens examined). Eye sizes and interdistances (mm.):

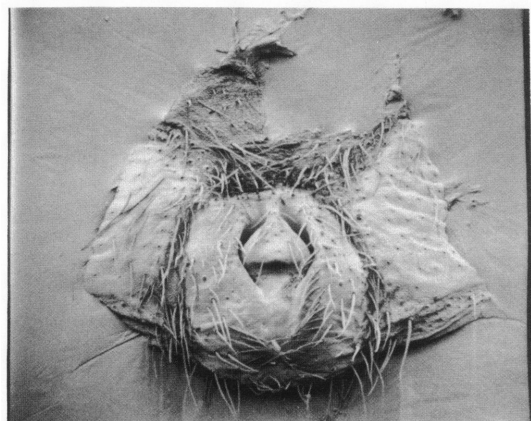
AME 0.07, ALE 0.13, PME 0.09, PLE 0.13; AME-AME 0.11, AME-ALE 0.05, PME-PME 0.09, PME-PLE 0.18, ALE-PLE 0.21. MOQ length 0.31 mm., front width 0.26 mm., back width 0.27 mm. Embolus projecting far from bulb; terminal apophysis relatively wide (figs. 127, 150). Retrolateral tibial apophysis thin,



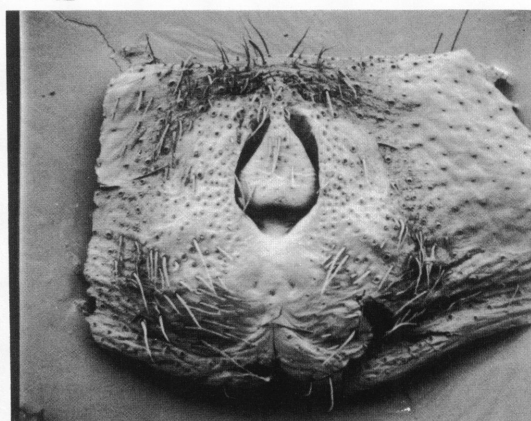
131



132



133



134

FIGS. 131-134. Scanning electron micrographs, ventral views, *Gnaphosa fontinalis* Keyserling. 131. Terminal apophysis, wide form, 120X. 132. Terminal apophysis, narrow form, 250X. 133. Epigynum, wide form, 65X. 134. Epigynum, narrow form, 65X.

hooklike (fig. 128). Leg spination: tibia II P 0-0-1; metatarsi: II P 0-1-0, V 2-0-2; III V 2-4-2; IV D 0-1-0, V 2-2-2.

Female. Total length 7.48 ± 0.97 mm. Carapace 3.43 ± 0.48 mm. long, 2.53 ± 0.37 mm. wide. Femur II 1.88 ± 0.25 mm. long (89 specimens examined). Eye sizes and interdistances (mm.): AME 0.10, ALE 0.16, PME 0.11, PLE 0.13; AME-AME 0.12, AME-ALE 0.07, PME-PME 0.12, PME-PLE 0.23, ALE-PLE 0.18. MOQ length 0.34 mm., front width 0.31 mm., back width 0.33 mm. Epigynal atrium narrow, filled by hood (fig. 129). Spermathecal ducts thin, uncoiled (fig. 130). Leg spination: femur IV P 0-0-1; patella III P 0-1-0; tibiae: I V 0-0-2; II V

0-1-2; III P, R 1-1-1; IV D 0-0-0, P 1-0-1; metatarsi: II P 0-0-1, V 2-2-2; III P 0-1-2, V 2-2-2, R 0-2-2; IV D 0-1-0, P 0-2-2, V 2-2-2.

Records. United States: *Alabama:* Jackson Co.: Clear Creek; Saltpetre Cave. *Marshall Co.:* Guntersville. *Arkansas:* Bradley Co.: Sumpter. Carroll Co.: Berryville. Franklin Co. Jefferson Co. Washington Co.: Cove Creek. *Connecticut:* Fairfield Co.: New Canaan; Norwalk. Hartford Co.: New Britain. New Haven Co.: Branford; Mount Carmel; Westville; Whitneyville. *Delaware:* New Castle Co.: Wilmington. *Georgia:* Pickens Co.: Jasper. *Illinois:* Jackson Co.: Murphysboro. Pope Co.: Eddyville. Union Co.: Pine Hills. *Kansas:* Meade Co.: Meade County State Park. *Ken-*

tucky: Edmonson Co.: Bee Spring. *Maryland*: Prince Georges Co.: Bowie. *Missouri*: Oregon Co.: Shawnee National Forest. Saint Charles Co.: Saint Charles. *New York*: Suffolk Co.: Wildwood State Park. Tompkins Co.: Ithaca. *North Carolina*: Carteret Co.: Beaufort. Durham Co.: Duke Forest. Wake Co.: Cary. *Oklahoma*: Osage Co.: Osage. *South Carolina*: Oconee Co.: Clemson. *Tennessee*: Benton Co. Roane Co.: Kingston. *Texas*: Dallas Co.: White Rock Lake. Kerr Co.: Kerrville; Raven Ranch. Llano Co. Travis Co.: Austin. *Wisconsin*: Grant Co.: Wyalusing State Park. Richland Co.: Gotham. Walworth Co.: Lake Geneva. *Mexico*: *Baja California Sur*: Sierra de San Lázaro. *Chihuahua*: Matáchic.

Distribution. New York to Wisconsin, south to Texas and northwestern Mexico (map 13).

Natural History. Mature males have been taken from April through July, mature females from April through October. Specimens have been collected in maple-basswood and pine-oak forests, on bean plants, and in pitfall traps in leaf litter.

Variation. Two varieties of both the male and female genitalia, which correspond in some degree with differences in size and color pattern, have been detected. The smaller variety, in which the terminal apophysis is relatively narrow (fig. 132), the epigynal hood relatively wide (fig. 133), and the carapace usually orange, is more abundant in the southeastern and northwestern parts of the species range. The larger variety, in which the terminal apophysis is relatively wide (fig. 131), the epigynal hood relatively narrow (fig. 134), and the carapace usually brown, is more abundant in the northeastern and southwestern parts of the range. Males can generally be separated by these genitalic differences but intermediate females occur. The genitalic differences are extremely minor when compared with those between *fontinalis* and its closest relatives, *californica* and *sandersi*, and it seems reasonable to assume that *fontinalis* is a polymorphic species. This interpretation is supported by the lack of any detected differences in the internal female genitalia within the species as it is here defined. The polymorphism may be due in part to character convergence: the smaller individuals with the orange carapace are more common in areas of sympatry with *sericata* (also small with an orange

carapace) than elsewhere; both species may be responding in similar ways to the same environmental factor or factors.

Synonymy. The type of *fontinalis* has a wide epigynal hood; the types of *americana* and *distincta* have narrow epigynal hoods; the type of *texana* has a wide terminal apophysis. For the reasons explained above, all are regarded as members of a single polymorphic species.

Gnaphosa californica Banks

Figures 85, 86, 135-138; Map 14

Gnaphosa californica Banks, 1904a, p. 335, pl. 38, fig. 10 (two female syntypes from Claremont, Los Angeles County, California, in MCZ, examined). Roewer, 1954, p. 370. Bonnet, 1957, p. 2006.

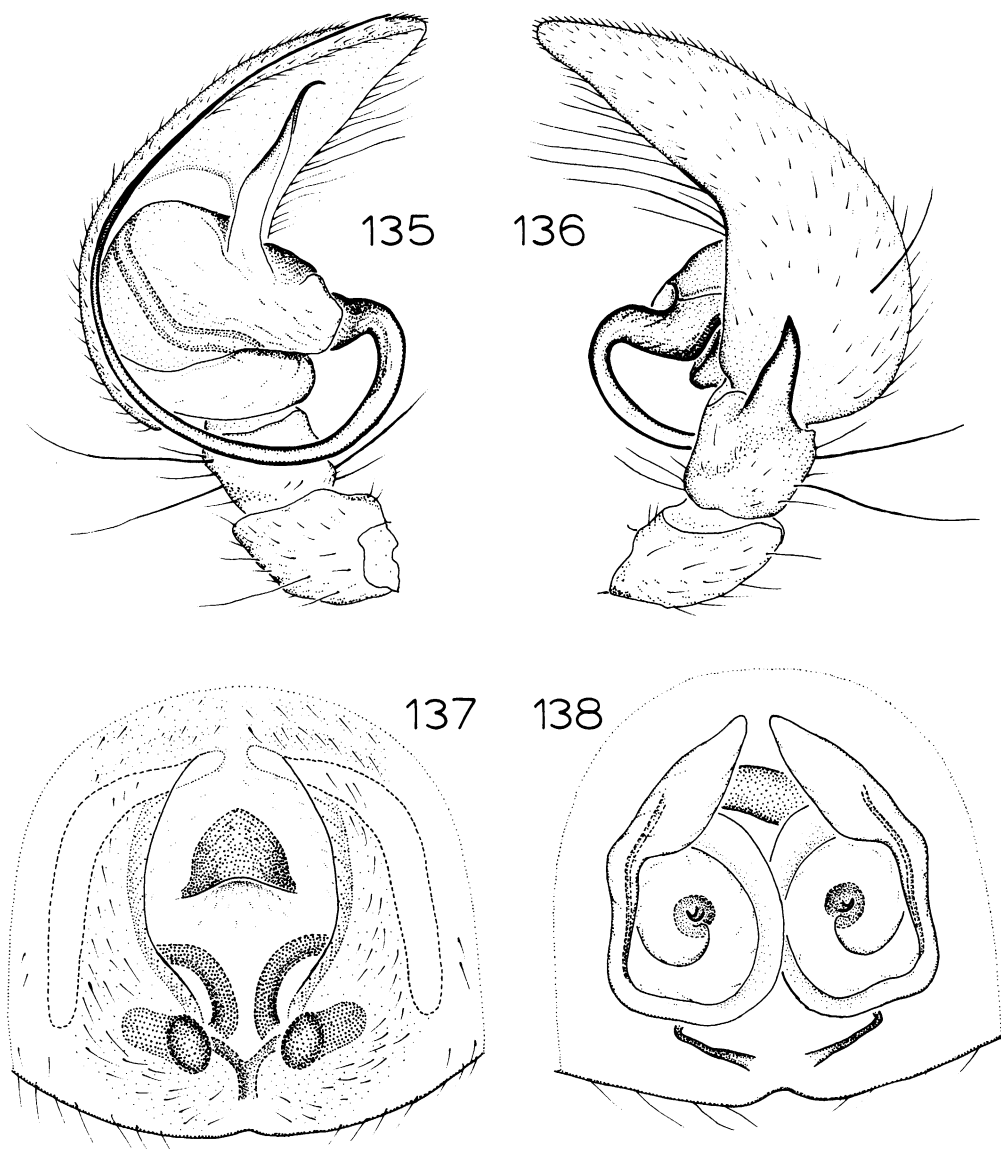
Gnaphosa gosoga Chamberlin, in Chamberlin and Gertsch, 1928, p. 178 (male holotype from Straight Wash, Emery County, Utah, in AMNH, examined). NEW SYNONYMY.

Cylphosa gosoga: Chamberlin, 1933, p. 2. Roewer, 1954, p. 360. Bonnet, 1956, p. 1333.

Diagnosis. *Gnaphosa californica* is closest to *sandersi* but may be distinguished by the base of the embolus protruding from the bulb (fig. 135) and the anteriorly broader epigynal hood (fig. 137).

Male. Total length 6.08 ± 0.73 mm. Carapace 2.89 ± 0.31 mm. long, 2.22 ± 0.23 mm. wide. Femur II 1.94 ± 0.20 mm. long (30 specimens examined). Eye sizes and interdistances (mm.): AME 0.06, ALE 0.13, PME 0.10, PLE 0.13; AME-AME 0.10, AME-ALE 0.05, PME-PME 0.08, PME-PLE 0.19, ALE-PLE 0.18. MOQ length 0.30 mm., front width 0.23 mm., back width 0.28 mm. Embolus protruding from bulb; terminal apophysis narrow at tip (figs. 85, 135). Retrolateral tibial apophysis long, narrow (fig. 136). Leg spination: femur II P 0-1-1; tibiae I, II P 1-0-1, V 2-2-2; metatarsi: I V 2-0-1; III R 1-2-2; IV D 1-1-0, V 2-2-2, R 2-1-2.

Female. Total length 6.67 ± 1.29 mm. Carapace 2.94 ± 0.30 mm. long, 2.10 ± 0.24 mm. wide. Femur II 1.71 ± 0.20 mm. long (65 specimens examined). Eye sizes and interdistances (mm.): AME 0.05, ALE 0.11, PME 0.11, PLE 0.11; AME-AME 0.13, AME-ALE 0.04, PME-PME 0.06, PME-PLE 0.19, ALE-PLE 0.18. MOQ length 0.28 mm., front width 0.23 mm., back

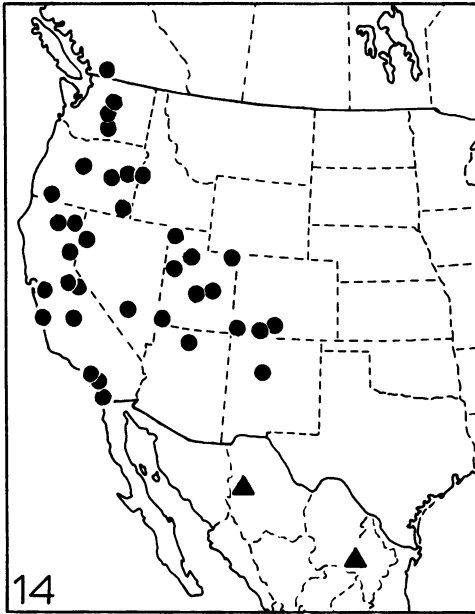


FIGS. 135-138. *Gnaphosa californica* Banks. 135. Palp, prolateral view. 136. Palp, retro-lateral view. 137. Epigynum, ventral view. 138. Vulva, dorsal view.

width 0.29 mm. Epigynum with anteriorly broad hood (figs. 86, 137). Spermathecae with one coil (fig. 138). Leg spination: patella IV R 0-0-0; tibiae: I, II V 0-1-1; III D 0-0-0, P 1-1-1, R 1-1-1; IV D 0-0-0, P 1-1-1; metatarsi: I, II V 2-0-1; III V 2-1-1, R 2-2-2; IV P 2-1-2.

Records. **Canada:** *British Columbia:* Keremeos.
United States: *Arizona:* Coconino Co.: Mor-

mon Lake. *California:* Contra Costa Co.: Clayton. Fresno Co.: Silver Creek. Kern Co.: Grapevine, Tehachapi Mountains. Lassen Co.: Westwood. Los Angeles Co.: Beverly Glen Canyon, Santa Monica Mountains; Castaic; Claremont; Pomona; Santa Monica; Tanbark Flats, San Gabriel Mountains. Mono Co.: Coleville; Montgomery Canyon. Monterey Co.: Hastings



MAP 14. Western North America, showing distributions of *Gnaphosa californica* Banks (circles) and *G. sandersi* Gertsch and Davis (triangles).

Reservation. San Diego Co.: San Diego. Santa Barbara Co.: Santa Cruz Island. Shasta Co.: Fall River Mills; Pittville. Sierra Co.: Peavine. Tuolumne Co.: Pinecrest; Yosemite National Park. Ventura Co.: Wheeler Springs. *Colorado*: Archuleta Co.: Piedra River. Montezuma Co.: Cortez; Mesa Verde. Rio Grande Co.: South Fork. *Idaho*: Washington Co.: Weiser. *Nevada*: Nye Co.: Mercury. Washoe Co.: Galena Creek. *New Mexico*: Bernalillo Co.: Sandia Mountains. *Oregon*: Baker Co.: Baker. Grant Co.: John Day. Jackson Co.: Pinehurst. Jefferson Co.: Spring Creek. Malheur Co.: Vale. *Utah*: Box Elder Co.: Grouse Creek, Raft River Mountains; Tremonton. Daggett Co.: Manila. Emery Co.: Straight Wash. Salt Lake Co.: Fort Douglas; Salt Lake City. Sevier Co.: Glenwood; Richfield. Tooele Co.: Grantsville; Hat Island, Great Salt Lake; Stockton; Tooele Canyon. Washington Co.: Pintura; St. George. *Washington*: Chelan Co.: Wenatchee. Kittitas Co.: Cle Elum; Ellensburg. Yakima Co.: Naches; White Swan.

Distribution. British Columbia south to southern California, west to New Mexico (map 14).

Natural History. Mature males have been taken from April through September, mature females from April through October. Specimens have been collected under rocks and at an elevation of 3500 feet.

Synonymy. Repeated simultaneous collections of both sexes indicate that *gosoga* is simply the male of *californica*.

Gnaphosa sandersi Gertsch and Davis

Figures 139-142; Map 14

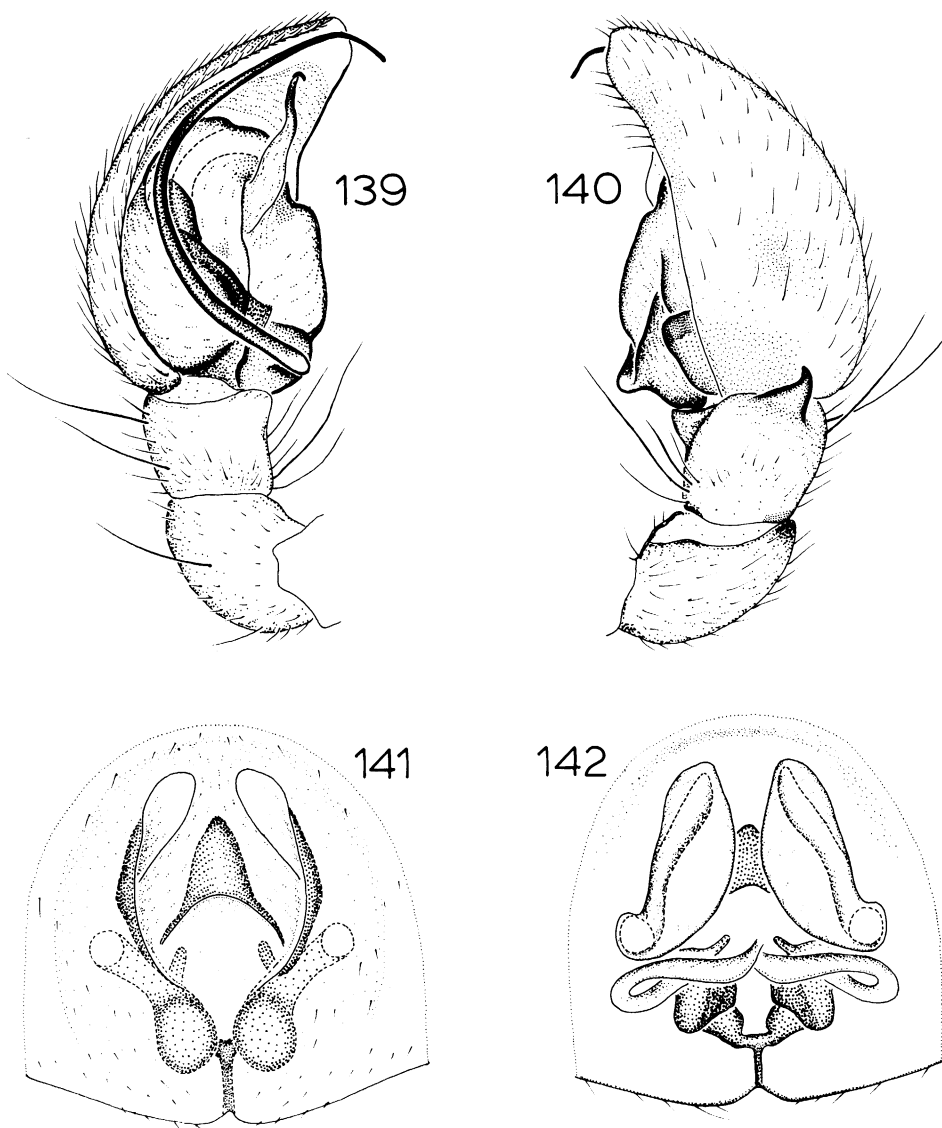
Gnaphosa sandersi Gertsch and Davis, 1940, p. 8, fig. 14 (female holotype from Saltillo, Coahuila, Mexico, in AMNH, examined). Roewer, 1954, p. 369.

Diagnosis. *Gnaphosa sandersi* is closest to *californica* but may be distinguished by the embolus not protruding from the bulb (fig. 139) and the anteriorly narrow epigynal hood (fig. 141).

Male. Total length 6.95 mm. Carapace 3.18 mm. long, 2.47 mm. wide. Femur II 1.76 mm. long (one specimen examined, AMNH). Eye sizes and interdistances (mm.): AME 0.10, ALE 0.13, PME 0.11, PLE 0.11; AME-AME 0.09, AME-ALE 0.03, PME-PME 0.07, PME-PLE 0.17, ALE-PLE 0.16. MOQ length 0.32 mm., front width 0.30 mm., back width 0.29 mm. Embolus not protruding from bulb; terminal apophysis narrow at tip (fig. 139). Retrolateral tibial apophysis short, sinuous (fig. 140). Leg spination: patella III P 0-1-0; tibiae: I P 1-0-1, V 1-2-1; II P 1-0-1; metatarsi: I, II V 2-0-1; III D 0-0-0, P 1-2-2; IV R 2-2-2.

Female. Total length 5.15, 6.55 mm. Carapace 2.38, 2.81 mm. long, 1.62, 2.05 mm. wide. Femur II 1.21, 1.55 mm. long (two specimens examined). Eye sizes and interdistances (mm.): AME 0.06, ALE 0.13, PME 0.09, PLE 0.09; AME-AME 0.09, AME-ALE 0.03, PME-PME 0.05, PME-PLE 0.13, ALE-PLE 0.13. MOQ length 0.25 mm., front width 0.22 mm., back width 0.24 mm. Epigynum with anteriorly narrow hood (fig. 141). Spermathecae with wide ducts (fig. 142). Leg spination: femur IV P, R 0-0-1; tibiae: I V 0-0-1; II V 0-0-2; III R 1-1-1; IV D 0-0-0, P 1-0-1; metatarsi: III P, R 0-1-2; IV P 0-2-2.

Records. *Mexico*: *Chihuahua*: Matáchic. *Coahuila*: Saltillo.



FIGS. 139-142. *Gnaphosa sandersi* Gertsch and Davis. 139. Palp, prolateral view. 140. Palp, retrolateral view. 141. Epigynum, ventral view. 142. Vulva, dorsal view.

Distribution. Northern Mexico (map 14).

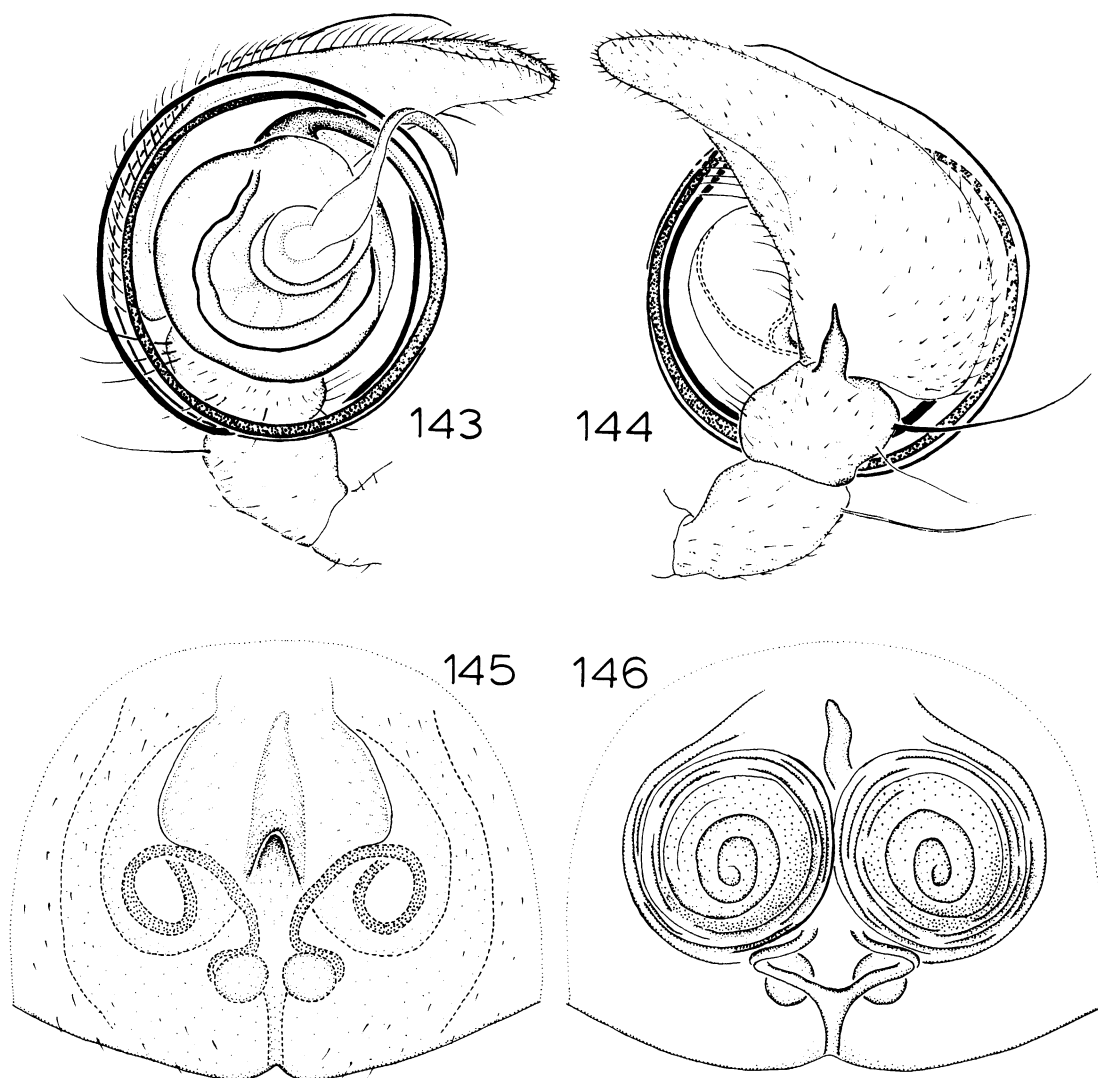
Natural History. Mature males and females have been taken in July. One specimen was collected at an elevation of 7200 feet.

THE *SERICATA* GROUP

Diagnosis. *Gnaphosa sericata*, the only member of this species group, can be distinguished

from other *Gnaphosa* by the triply coiled embolus (fig. 143) and spermathecae (fig. 146).

Description. As for the genus, except for the following: Carapace and legs light orange, abdomen dark gray. Endites rounded. Legs without extremely long setae. Typical leg spination (only surfaces bearing spines listed): femora: I, II D 1-1-0, P 0-0-1; III, IV D 1-1-0, P 0-1-1, R 0-1-1; patellae: III P, R 0-1-0; IV R 0-1-0; tibiae: I V



FIGS. 143-146. *Gnaphosa sericata* (L. Koch). 143. Palp, prolateral view. 144. Palp, retrolateral view. 145. Epigynum, ventral view. 146. Vulva, dorsal view.

1-1-2; II P 0-0-1, V 1-2-2; III, IV D 1-0-0, P 2-1-1, V 2-2-2, R 2-1-1; metatarsi: I V 2-0-2; II P 0-1-0, V 2-0-2; III D 0-1-0, P 1-1-2, V 2-2-2, R 1-1-2; IV P 1-2-2, V 2-1-2, R 1-2-2. Genitalia as described above.

Gnaphosa sericata (L. Koch)
Figures 143-149; Map 15

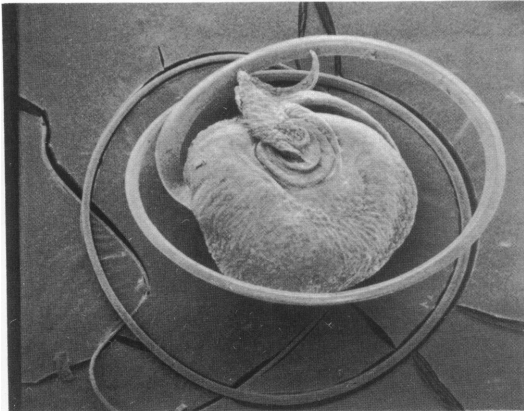
Pythonissa sericata L. Koch, 1866, p. 31, pl. 2, figs. 21, 22 (male holotype from Baltimore, Maryland, in BMNH, examined).

Gnaphosa sericata: Banks, 1895, p. 78.

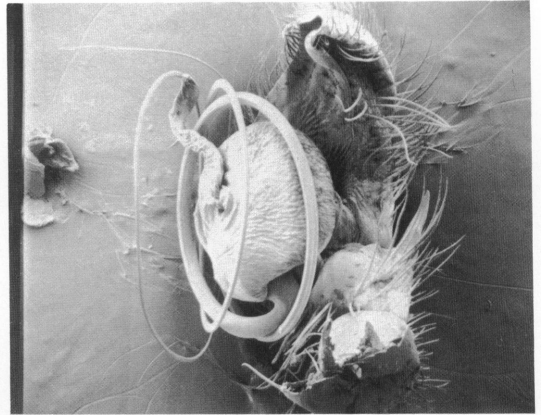
Gnaphosa spiralis F. O. P.-Cambridge, 1899, p. 55, pl. 4, fig. 18 (male holotype from Guatemala, in BMNH, examined). Bonnet, 1957, p. 2021. First synonymized by Bryant, 1940, p. 390.

Gnaphosa peon Chamberlin, 1925, p. 213 (female holotype from Veracruz, Mexico, in MCZ, examined). Roewer, 1954, p. 369. Bonnet, 1957, p. 2018. NEW SYNONYMY.

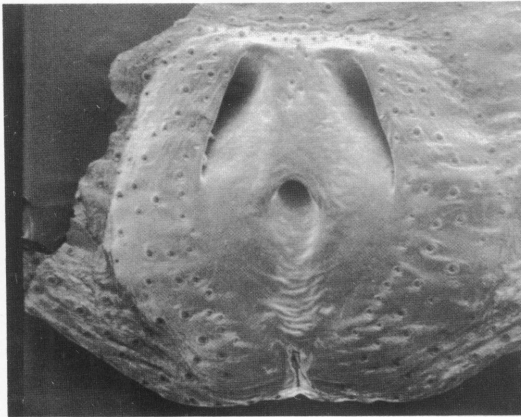
Gnaphosa simplex Franganillo, 1926, p. 69 (male holotype from Santa Clara, Cuba, may be in



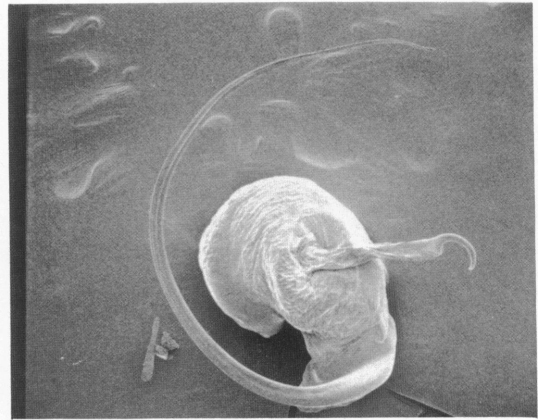
147



148



149



150

FIGS. 147-150. Scanning electron micrographs. 147-149. *Gnaphosa sericata* (L. Koch). 147, 148. Embolar region of palp. 147. Prolateral view, 170X. 148. Ventral view, 130X. 149. Epigynum, ventral view, 110X. 150. *G. fontinalis* Keyserling, embolar region of palp, ventral view, 70X.

Academia de Ciencias de Cuba, unavailable). Bonnet, 1957, p. 2020. First synonymized by Bryant, 1940, p. 390.

Cylphosa sericata: Chamberlin, 1936a, p. 14. Roewer, 1954, p. 360. Bonnet, 1956, p. 1333.

Diagnosis. *Gnaphosa sericata* may be distinguished from all other Nearctic *Gnaphosa* by the extremely long embolus, coiled three times around the bulb (figs. 143, 147, 148) and the coiled epigynal ducts and spermathecae (figs. 145, 146).

Male. Total length 4.34 ± 0.30 mm. Carapace 2.06 ± 0.20 mm. long, 1.64 ± 0.11 mm. wide. Femur II 1.28 ± 0.07 mm. long (293 specimens ex-

amined). Eye sizes and interdistances (mm.): AME 0.05, ALE 0.08, PME 0.05, PLE 0.06; AME-AME 0.05, AME-ALE 0.03, PME-PME 0.06, PME-PLE 0.13, ALE-PLE 0.09. MOQ length 0.17 mm., front width 0.16 mm., back width 0.17 mm. Embolus coiled around bulb three times (figs. 143, 147, 148). Retrolateral tibial apophysis narrow (fig. 144). Leg spination typical.

Female. Total length 5.26 ± 0.87 mm. Carapace 2.20 ± 0.25 mm. long, 1.58 ± 0.20 mm. wide. Femur II 1.19 ± 0.13 mm. long (188 specimens examined). Eye sizes and interdistances (mm.): AME 0.07, ALE 0.10, PME 0.06, PLE 0.10;

AME-AME 0.06, AME-ALE 0.04, PME-PME 0.09, PME-PLE 0.15, ALE-PLE 0.18. MOQ length 0.28 mm., front width 0.22 mm., back width 0.23 mm. Epigynum with narrow hood and coiled ducts (figs. 145, 149). Spermathecae highly coiled (fig. 146). Leg spination: femur IV P, R 0-0-1; patella IV R 0-0-0; tibiae: I V 0-0-0; II P 0-0-0, V 0-0-1; IV D 0-0-0, P 1-1-0; metatarsi: II P 0-0-0; III P 0-1-2, V 2-1-2; IV D 0-1-0, P 0-2-2.

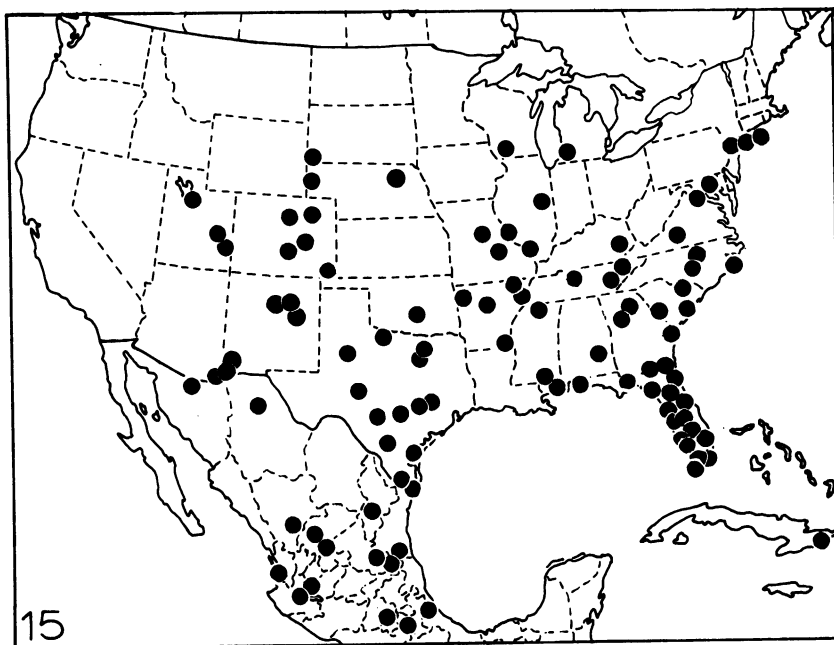
Records. United States: *Alabama:* Baldwin Co.: Bay Shore. Montgomery Co.: Montgomery. *Arizona:* Cochise Co.: Carr Canyon, Huachuca Mountains; Portal. *Arkansas:* Bradley Co. Chicot Co. Conway Co.: Morrilton. Franklin Co.: Ozark. Mississippi Co. Randolph Co. Washington Co.: Cove Creek Valley. *Colorado:* Baca Co. Boulder Co.: Boulder. El Paso Co.: Fountain Valley; Peyton Road. Fremont Co.: Canon City. Morgan Co.: Fort Morgan. *Florida:* Alachua Co. Charlotte Co.: Punta Gorda. Collier Co.: Naples. Dade Co.: Cape Sable; Miami Beach. De Soto Co.: Arcadia. Escambia Co.: Pensacola. Gadsden Co.: Lake Talquin. Hernando Co.: Brooksville. Highlands Co.: Lake Placid. Hillsborough Co.: Tampa. Lake Co.: Leesburg. Lee Co.: Fort Myers. Leon Co.: Tall Timbers Research Station. Levy Co.: Sea Horse Key. Liberty Co.: Torreya State Park. Marion Co.: Lake Weir. Monroe Co.: Key West; Marathon; Plantation Key; Sugarloaf Key. Orange Co.: Orlando. Palm Beach Co.: Delray Beach; Lake Worth. Pinellas Co.: Largo. Polk Co.: Lake Alfred; Winter Haven. Saint Johns Co.: Saint Augustine. Saint Lucie Co.: Fort Pierce. Volusia Co.: Edgewater. *Georgia:* Charlton Co.: Okefinokee Swamp. Chatham Co.: Savannah. Fulton Co.: Atlanta. Hall Co.: Gainesville. Lowndes Co.: Valdosta. *Illinois:* Champaign Co.: Urbana. Jackson Co.: Carbondale. Union Co.: Cobden. *Kentucky:* Breathitt Co. *Maryland:* Baltimore. *Michigan:* Kalamazoo Co.: Gull Lake. Van Buren Co.: Van Buren State Park. *Mississippi:* Forrest Co.: Hattiesburg. Jackson Co.: Horn Island. Marshall Co.: Holly Springs. *Missouri:* Boone Co.: Columbia. Phelps Co.: Rolla. Saint Louis. *Nebraska:* Holt Co. Scotts Bluff Co.: Mitchell. *New Jersey:* Bergen Co.: Ramsey. *New Mexico:* Grant Co.: Burrow Mountains; Silver City. Guadalupe Co.: Santa Rosa. Hidalgo Co.: Lordsburg. San Miguel Co.: Las Vegas. Santa Fe

Co.: Santa Fe. *New York:* Nassau Co.: Sea Cliff. Suffolk Co.: Cold Spring Harbor; Orient. *North Carolina:* Carteret Co.: Beaufort. Durham Co.: Durham. Lee Co.: Sanford. Orange Co.: Wake Co. *Oklahoma:* Cleveland Co.: Norman. *South Carolina:* Aiken Co.: Aiken. Charleston Co.: Charleston. Chesterfield Co.: Cheraw. *South Dakota:* Fall River Co.: Hot Springs. *Tennessee:* Davidson Co.: Nashville. Grainger Co.: Bean Station. Roane Co.: Kingston. *Texas:* Brazos Co. Comal Co. Denton Co. Frio Co.: Pearsall. Garza Co.: Post. Hidalgo Co.: Edinburg; Mission. Kerr Co.: Raven Ranch. San Patricio Co.: Sinton. Somervell Co.: Glen Rose. Tom Green Co.: Christoval. Travis Co.: Austin. Wilbarger Co.: Vernon. *Utah:* Carbon Co.: Price. Grand Co.: Moab. Salt Lake Co.: Salt Lake City. *Virginia:* Campbell Co.: Lynchburg. Fairfax Co.: Falls Church; Great Falls. *Wisconsin:* Iowa Co.: Arena. *Mexico:* *Chihuahua:* Primavera. *Distrito Federal:* Pedregal. *Durango:* Nombre de Dios. *Jalisco:* Guadalajara; Laguna de Sayula. *Nayarit:* Compostela; San Blas. *Nuevo León:* Galeana. *Puebla:* Tlacotepec. *San Luis Potosí:* Ciudad del Maíz; Valles. *Sonora:* 25 mi. S Nogales. *Tamaulipas:* 27 mi. NNW Fresnillo; Magiscatzin; Matamoros; San Pedro. *Veracruz:* Perote. *Zacatecas:* Guadalupe; Saín Alto; Zacatecas. **Guatemala.** *Cuba:* *Oriente:* Soledad.

Distribution. New York to Utah, south to Guatemala (unmapped record) and Cuba (map 15).

Natural History. Mature males have been taken from January through September, mature females year round. Specimens have been collected at elevations between 1000 and 6000 feet, in pitfall traps at pond edges and in sweet potato fields, in pastures, under dung, under rocks and boards, crossing sidewalks and sandy roads, on cotton plants, on beaches at the tide line, in a red mangrove swamp, and in a nest of the field mouse *Microtus ochrogaster*.

Variation. In specimens preserved in alcohol the origin of the embolus varies from angles of 270 to 80 degrees and the origin of the terminal apophysis varies from angles of 355 to 85 degrees. It was thought at first that several species might be involved. In the process of preparing specimens for scanning electron microscope study, the palpi of four specimens (selected to



MAP 15. Southern North America, showing distribution of *Gnaphosa seriata* (L. Koch).

show the range of variation) all returned to the same position (embolus origin 190° , terminal apophysis origin 350°) after being dried. It seems that partial inflation of the hematodocha occurs routinely when the spiders are preserved, and

that this accounts for the observed variation.

Synonymy. No genitalic differences were detected in the holotype of *peon* that would justify its specific status.

LITERATURE CITED

Banks, Nathan

- 1892. The spider fauna of the Upper Cayuga Lake Basin. *Proc. Acad. Nat. Sci. Philadelphia*, pp. 11-81, pls. 1-4.
- 1895. A list of spiders of Long Island. *Jour. New York Ent. Soc.*, vol. 3, pp. 76-93.
- 1896. New North American spiders and mites. *Trans. Amer. Ent. Soc.*, vol. 23, pp. 57-77.
- 1898. Arachnida from Baja California, and other parts of Mexico. *Proc. California Acad. Sci.*, ser. 3, vol. 1, pp. 205-308, pls. 13-17.
- 1901. Some Arachnida from New Mexico. *Proc. Acad. Nat. Sci. Philadelphia*, vol. 53, pp. 568-597, pl. 33.
- 1904a. Some Arachnida from California. *Proc. California Acad. Sci.*, ser. 3, vol. 3, pp. 331-376, pls. 38-41.

- 1904b. New genera and species of Nearctic spiders. *Jour. New York Ent. Soc.*, vol. 12, pp. 109-119, pls. 5, 6.

- 1910. Catalogue of Nearctic spiders. *Bull. U. S. Natl. Mus.*, vol. 72, pp. 1-80.

Blackwall, John

- 1871. Notice of spiders captured by Miss Hunter in Montreal. *Ann. Mag. Nat. Hist.*, ser. 4, vol. 8, pp. 429-436.

Bonnet, Pierre

- 1956. *Bibliographia araneorum*. Toulouse, vol. 2, pt. 2, pp. 919-1926.
- 1957. *Bibliographia araneorum*. Toulouse, vol. 2, pt. 3, pp. 1927-3026.

Bryant, Elizabeth B.

- 1940. Cuban spiders in the Museum of Comparative Zoology. *Bull. Mus. Comp. Zool.*, vol. 86, pp. 247-554, pls. 1-22, figs. 1-297.

Cambridge, Frederick Octavius Pickard-

1899. Arachnida-Araneida. In Godman, F. D., and O. Salvin, *Biologia Centrali-Americana*. London, vol. 2, pp. 41-88, pls. 3-6.

Cambridge, Octavius Pickard-

1872. General list of the spiders of Palestine and Syria. *Proc. Zool. Soc. London*, pp. 212-354, pls. 13-16.

Chamberlin, Ralph V.

1922. The North American spiders of the family Gnaphosidae. *Proc. Biol. Soc. Washington*, vol. 35, pp. 145-172.
1924. The spider fauna of the shores and islands of the Gulf of California. *Proc. California Acad. Sci.*, ser. 4, vol. 12, pp. 561-694, figs. 1-140.
1925. Diagnoses of new American Arachnida. *Bull. Mus. Comp. Zool.*, vol. 67, pp. 211-248.
1933. Four new spiders of the family Gnaphosidae. *Amer. Mus. Novitates*, no. 631, pp. 1-8, figs. 1-12.
- 1936a. Records of North American Gnaphosidae with descriptions of new species. *Ibid.*, no. 841, pp. 1-30, figs. 1-45.
- 1936b. Further records and descriptions of North American Gnaphosidae. *Ibid.*, no. 853, pp. 1-25, figs. 1-47.

Chamberlin, Ralph V., and Willis J. Gertsch

1928. Notes on spiders from southeastern Utah. *Proc. Biol. Soc. Washington*, vol. 41, pp. 175-188.

Emerton, James H.

1890. New England spiders of the families Drassidae, Agalenidae and Dysderidae. *Trans. Connecticut Acad. Arts Sci.*, vol. 8, pp. 166-206, pls. 3-8.

Fox, Irving

1938. Notes on North American spiders of the families Gnaphosidae, Anyphaenidae, and Clubionidae. *Iowa State College Jour. Sci.*, vol. 38, pp. 227-243, pls. 1, 2.

Franganillo Balboa, R. P. Pelegrín

1926. Arácnidos nuevos o poco conocidos de la Isla de Cuba. *Cuba Contemporanea*, vol. 41, pp. 64-83.

Gertsch, Willis J.

1935. Spiders from the southwestern United States. *Amer. Mus. Novitates*, no. 792, pp. 1-31, figs. 1-39.

Gertsch, Willis J., and L. Irby Davis

1940. Report on a collection of spiders from Mexico. III. *Amer. Mus. Novitates*, no. 1069, pp. 1-22, figs. 1-35.

Hentz, Nicholas M.

1847. Descriptions and figures of the Araneides of the United States. *Jour. Boston Soc. Nat. Hist.*, vol. 5, pp. 443-478, pls. 23, 24, 30, 31.

Hoffmann, R. S., and R. D. Taber

1968. Origin and history of holarctic tundra ecosystems. In Wright, H. E., Jr., and W. H. Osburn (eds.), *Arctic and alpine environments*. Bloomington, Indiana Univ. Press, pp. 143-170, figs. 1-7, tables 1, 2.

Holm, Åke

1939. Neue Spinnen aus Schweden. *Arkiv Zool.*, vol. 31, no. 8, pp. 1-38, figs. 1-17.
1945. Zur Kenntnis der Spinnenfauna des Torneträskgebietes. *Ibid.*, vol. 36, no. 15, pp. 1-80, figs. 1-26.
1950. Studien über die Spinnenfauna des Torneträskgebietes. *Zool. Bidr. Uppsala*, vol. 29, pp. 103-213, figs. 1-26.
1970. Notes on spiders collected by the "Vega" Expedition 1878-1880. *Ent. Scandinavica*, vol. 1, pp. 188-208, figs. 1-42.
1973. On the spiders collected during the Swedish Expedition to Novaya Zemlya and Yenisey in 1875 and 1876. *Zool. Scripta*, vol. 2, pp. 71-110, figs. 1-117.

Kaston, Benjamin J.

1948. Spiders of Connecticut. *Bull. Connecticut State Geol. Nat. Hist. Surv.*, no. 70, pp. 1-874, figs. 1-2144.

Keyserling, Graf Eugen

1887. Neue Spinnen aus Amerika. VII. *Verhandl. Zool. Bot. Gesell. Wien*, vol. 37, pp. 421-490, pl. 6.

Koch, Carl Ludwig

1839. *Die Arachniden*. Nürnberg, vol. 6, 155 pp., pls. 181-216, figs. 432-546.

Koch, Ludwig

1866. *Die Arachniden-Familie der Drassiden*. Nürnberg, pts. 1-6, 304 pp., 12 pls.
1878. Verzeichniss der bei Nürnberg bis jetzt beobachteten Arachniden. *Abhandl. Nat. Gesell. Nürnberg*, vol. 6, pp. 1-86, pl. 1.
1879. Arachniden aus Sibirien und Novaja Semlja. *Kgl. Svenska Vetensk. Akad. Handl.*, vol. 16, no. 5, pp. 3-136, pls. 1-7.

Latreille, Pierre A.

1804. *Tableau méthodique des Insectes. Arachnides*. *Dictionnaire (Nouv.) Hist. Nat.*, vol. 24, pp. 131-136.

Lehtinen, Pekka T.

1967. Classification of the cribellate spiders and some allied families. *Ann. Zool. Fennici*, vol. 4, pp. 199-468, figs. 1-524.

Lohmander, Hans

1942. Südschwedische Spinnen. I. Gnaphosidae. *Meddel. Göteborgs Mus. Zool.*, vol. 98, pp. 1-164, figs 1-26.

Marx, George

1890. Catalogue of the described Araneae of temperate North America. *Proc. U.S. Natl. Mus.*, vol. 12, pp. 497-594.

Palmgren, Pontus

1943. Die Spinnenfauna Finnlands. II. *Acta Zool. Fennica*, vol. 36, pp. 1-112, figs. 1-115, maps 1-27.

Pavesi, Pietro

1873. Catalogo sistematico dei Ragni. *Ann. Mus. Civ. Stor. Nat. Genova*, vol. 4, pp. 5-215.

Roewer, Carl F.

1954. Katalog der Araneae. *Bremen*, vol. 2, pt. 1, 923 pp.

Schmoller, Ronald

1970. Life histories of alpine tundra Arachnida in Colorado. *Amer. Midland Nat.*, vol. 83, pp. 119-133, figs. 1-7.

Thorell, Tamerlan

1868. Détermination d'Araignées. *In* Eisen, G., and A. Stuxberg, *Bidrag till kännedom om Gotska-Sandön*. Öfvers. Kgl. Vetensk. Akad. Förhandl. Stockholm, vol. 25. p. 379.
1870. On European spiders. *Nova Acta Regiae Soc. Sci. Upsaliensis*, ser. 3, vol. 7, pp. 109-242.
1871. Remarks on synonyms of European spiders. *Uppsala*, pt. 2, pp. 97-228.
1875. Notice of some spiders from Labrador. *Proc. Boston Soc. Nat. Hist.*, vol. 17, pp. 490-504.
1877. Descriptions of the Araneae collected in Colorado in 1875, by A. S. Packard, jun., M.D. *Bull. U. S. Geol. Surv.*, vol. 3, pp. 477-529.

Tullgren, Albert

1945. Svensk Spindelfauna. Stockholm, vol. 2, 141 pp., 21 pls., 275 figs.

Ubick, Darrell, and Vincent D. Roth

1973. Nearctic Gnaphosidae including species from adjacent Mexican States. *Amer. Arachnology*, no. 9, suppl. 2, pp. 1-12; suppl. 3, pp. 1-6 (index).

Walckenaer, Charles A.

1802. Faune parisienne. Insectes. [Araignées]. Paris, vol. 2, pp. 187-250.

