

THE ERIGONINE SPIDERS OF NORTH AMERICA. PART 4.
THE GENUS *DISEMBOLUS* CHAMBERLIN AND IVIE
(ARANEAE: LINYPHIIDAE)

A. F. Millidge

Little Farthing, Upper Westhill Road,
Lyme Regis, Dorset DT7 3ER, England

ABSTRACT

The erigonine genus *Disembolus* Chamberlin and Ivie, which appears to be endemic to North America, has been revised. *Cochlembolus sacerdotalis* Crosby and Bishop, *Soudinus corneliae* Chamberlin and Ivie, *Tapinocyba alpha* Chamberlin, *Tapinocyba kesimba* Chamberlin and *Tapinocyba (?) phana* Chamberlin have been transferred to *Disembolus*, while *Disembolus apache* Chamberlin and (in the absence of the type) *Disembolus zygethus* Chamberlin have been excluded from the genus. The somatic characters of the *Disembolus* species are very similar to those of the genera *Spirembolus* Chamberlin and *Scotinotylus* Simon, and *Disembolus* can be adequately defined and differentiated only on the structure of the male palpal organs and of the female epigyna. Synapomorphic genitalic characters for the genus have been identified. The genus now contains 22 species, including the following 16 new taxa: *Disembolus amoenus*, *D. anguineus*, *D. beta*, *D. concinnus*, *D. convolutus*, *D. galeatus*, *D. hyalinus*, *D. implexus*, *D. implicatus*, *D. lacteus*, *D. lacunatus*, *D. procerus*, *D. sinuosus*, *D. solanus*, *D. torquatus* and *D. vicinus*. Descriptions, diagnoses and distribution maps are given for all the species.

INTRODUCTION

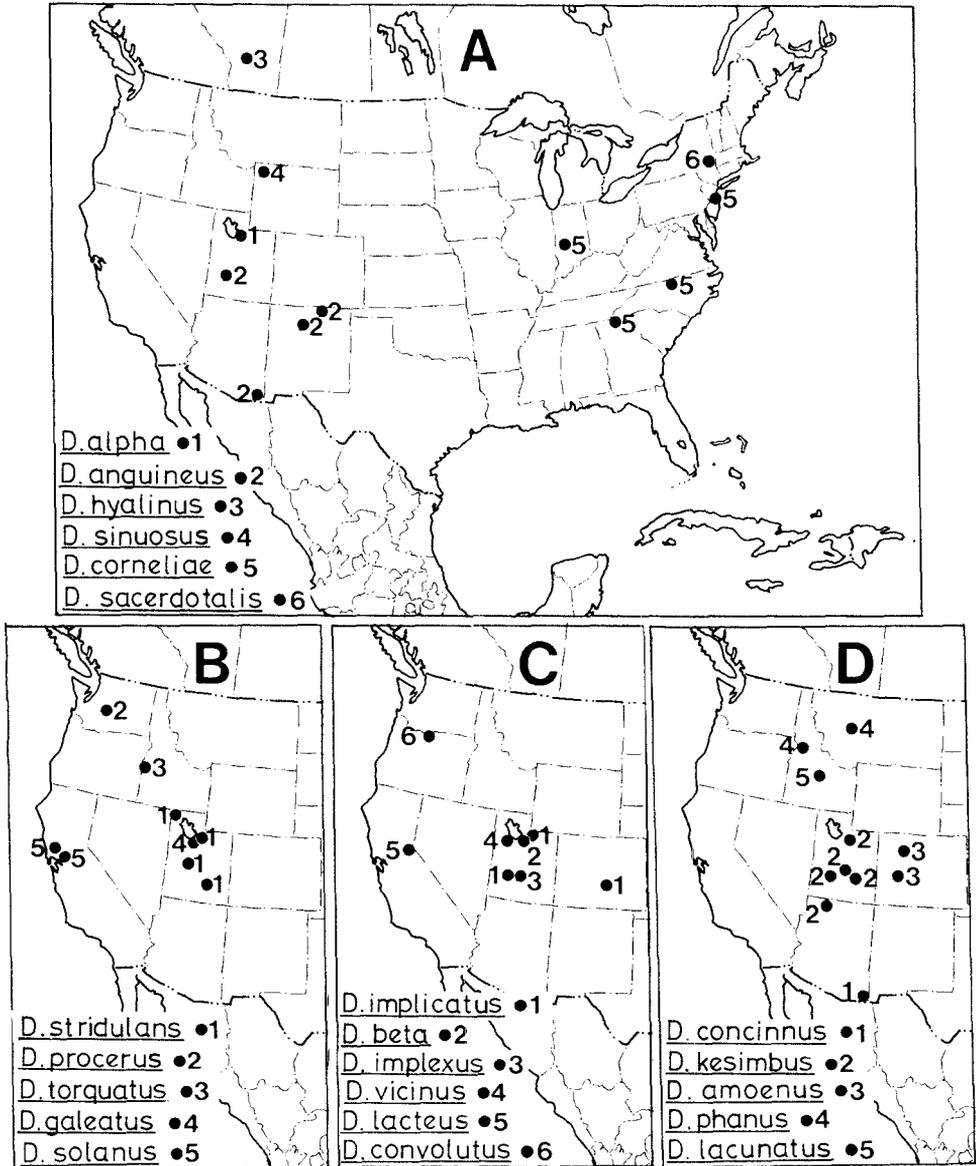
The genus *Disembolus* was erected by Chamberlin and Ivie (1933) for the single species *D. stridulans* Chamberlin and Ivie, and was redescribed some years later (Chamberlin and Ivie 1945). Several species were added to the genus by Chamberlin (1948). Examination of material supplied by the American Museum of Natural History (AMNH), the Museum of Comparative Zoology, Harvard University (MCZ) and the Canadian National Collection, Ottawa (CNC), has disclosed a number of additional species, and has made possible a more detailed description of the genus.

Genus *Disembolus* Chamberlin and Ivie

Disembolus Chamberlin and Ivie 1933:20; 1945:225 (type species: *Disembolus stridulans* Chamberlin and Ivie 1933, by original designation).

The members of this genus are small spiders, none of which exceeds 2 mm in total length. The female carapace is moderately raised behind the eyes (e.g. Fig. 69). The male

carapace usually bears a lobe anteriorly, with holes and sulci behind the lateral eyes (Figs. 57-61); in most species the lobe does not carry the eyes. In *D. stridulans*, *D. procerus*, new species, and *D. kesimbus* (Chamberlin) the holes and sulci are absent, and the posterior median eyes are carried on the summit of the lobe (Figs. 12, 55). The posterior median eyes of the female are in every case more widely spaced from one another than from the laterals. All the species have files on the lateral margins of the chelicerae in both



Map 1.—Distribution of *Disembolus* species in North America:

- A. *D. alpha*, *D. anguineus*, *D. hyalinus*, *D. sinuosus*, *D. corneliae* and *D. sacerdotalis*
 B. *D. stridulans*, *D. procerus*, *D. torquatus*, *D. galeatus* and *D. solanus*
 C. *D. implicatus*, *D. beta*, *D. implexus*, *D. vicinus*, *D. lacteus* and *D. convolutus*
 D. *D. concinnus*, *D. kesimbus*, *D. amoenus*, *D. phanus* and *D. lacunatus*

sexes. The abdomen is without scuta and is more or less unicolorous; only a few species have stridulatory files on the epigastric plates. The legs are relatively short and stout, with a value for tibia I 1/d (female) of 5-7. In all species the tibial spines are 2221 in the female, but are usually reduced in number in the male. Metatarsi I-III have a dorsal trichobothrium, which is absent on metatarsus IV; the value of TmI (female) is 0.35-0.55. The male palpal tibia is produced dorsally into a short apophysis which sometimes has a pointed hook distally (e.g. Fig. 49); the tibia always bears one stout spine dorsally (less developed in *D. sinuosus*, new species), and usually two trichobothria, but occasionally only one. The female palpal tibia always has two trichobothria dorsally.

The characters enumerated above are reminiscent of those given for the genera *Spirembolus* (Millidge 1980) and *Scotinotylus* (Millidge, 1981), and do not serve to differentiate *Disembolus* from related genera. The genus can be properly defined only on the structure of the genitalia.

The paracymbium of the male palp is U-shaped with the distal arm shorter and pointed (e.g. Fig. 15). The tegulum in most instances is truncated anteriorly (e.g. Fig. 26), but in the type species it has a pronounced anterior projection (Fig. 9). The embolic division (ED) of the palpal organ has an elongated central section lying between the tailpiece and the embolus proper (Figs. 1, 2, 3). The embolus has basically a spiral form, but distally it becomes convoluted to a greater or lesser degree; the terminal part of the embolus is always retroverted, with the tip in many instances lying more or less within a coil of the embolus (e.g. Figs. 2, 3). In *D. stridulans* and *D. procerus* the embolus has a very tangled appearance (Figs. 3, 9, 13, 15), but in other species the convolutions are developed to a lesser degree (e.g. Figs. 2, 33). The central section of the ED is equipped with what seems to be a reinforcing member (R, Figs. 1, 2, 3), located just posterior to the beginning of the embolus proper, and which sometimes gives the false impression of being the basal part of the embolus. The tailpiece of the ED is screw-like, with the distal part often somewhat lengthened (e.g. Fig. 1); this distal part is not particularly long in *D. stridulans*, while *D. kesimbis* (Chamberlin), which has a generally less highly developed ED, has a relatively short tailpiece (Fig. 17). The suprategular apophysis (SA) comprises (i) a weakly sclerotized part which is tusk or spade shaped and runs ventrad from the end of the suprategulum (TK, Figs. 4, 5, 6, 7, 8, 16, 32); (ii) a fairly robust membranous part of variable form which runs anteriorad from the end of the suprategulum on the mesal side of the tusk-shaped part (M, Figs. 4, 5, 6, 7, 8); and (iii) an auxillary membrane, thin and transparent, which extends between parts (i) and (ii) (AM, Figs. 4, 5, 6, 7, 8). The stalk (S, Fig. 5), which carries the seminal duct to the ED, is more or less continuous with the membranous part (ii).

The ED of *Disembolus* is of the same general pattern as in *Spirembolus* and *Scotinotylus*, but it differs from these in two significant respects: firstly, the embolus is distally more complex in form, and has the tip retroverted, and secondly, the central section of the ED is elongated. The SA is most similar to that of *Scotinotylus*, but differs in the shape of the membranous part and particularly in the presence of the auxillary membrane. The forms of the ED and of the SA can be regarded as derived palpal characters common to all members of the genus; these synapomorphies support the hypothesis that the genus as constituted here is a monophyletic group.

The epigyna of the *Disembolus* species have posteriorly a somewhat convex, translucent plate, roughly trapezoidal or ellipsoidal in shape (e.g. Figs. 74, 84), which often has a glassy, lens-like appearance; through this plate the outlines of the internal ducts, etc. are faintly visible. The spermathecae can usually be seen through the epigynal integument. In several of the species there is a darker colored ridge or mantle anterior to the

Table 1.—Partial key to *Disemboldus* species: females. A decision on species identity should be made only after reference to the species descriptions and diagnoses.

-
1. Posterior plate of epigynum distinctly notched anteriorly
 - a. epigynum as Fig. 72, with 2 small clear markings within plate
D. kesimbus
 - b. epigynum as Fig. 73
D. torquatus
 2. Epigynum with dark colored knob or ridge on anterior margin
 - a. epigynum as Fig. 75; spermathecae close together
D. anguineus
 - b. epigynum as Fig. 74; spermathecae further apart
D. convolutus
 3. Epigynum with dark colored ridge or mantle just anterior to the posterior plate (e.g. Fig. 79) (note: the epigynum must be examined vertically - when viewed somewhat from behind, the mantle is much less clear)
 - a. mantle roughly triangular in shape
 - i. mantle small (Figs. 76, 78)
D. amoenus, *D. sinuosus* (for separation, see species descriptions)
 - ii. mantle larger (Fig. 79)
D. concinnus
 - b. mantle roughly trapezoidal in shape (Figs. 81, 82)
D. corneliae
 4. Epigynum as Fig. 80, with posterior plate notably convex and glassy in appearance, and with dark colored bar anterior to plate
D. hyalinus
 5. Epigynum not of the form given in 1-4 (Figs. 83-91)
 - a. clear banana-shaped markings within the plate (Fig. 83); a tiny spider (total length 1.0-1.2 mm)
D. alpha
 - b. markings within plate faint or absent
 - i. plate milky white in color (Fig. 87)
D. lacteus
 - ii. spermathecae rather closely spaced (Fig. 88)
D. vicinus
 - iii. spermathecae rather widely spaced (Figs. 89-91)
D. procerus, *D. galeatus*, *D. solanus* (for separation, see species descriptions)
 - iv. spermathecae moderately spaced (Figs. 84, 85, 86)
D. implicatus, *D. phanus* (for separation, see species descriptions)
-

plate (e.g. Fig. 81). The openings of the spermathecal ducts seem to lie towards the posterior margin of the plate (e.g. Fig. 99), but there is some uncertainty as these are very difficult to see. The ducts arise on the dorsal side of the spermathecae, and follow a fairly simple curved pathway to the external openings. Since the ducts are transparent and practically unpigmented, it must be accepted that the figures given for the internal genitalia (Figs. 92-108) may not be accurate in every detail. The epigyna can be recognized in most cases by the presence of the translucent plate posteriorly. This feature, coupled with the simple arrangement of the spermathecal ducts and the position of the genital openings, probably represent a synapomorphic character for the genus.

It is difficult to visualize how a *Disemboldus* male can transfer sperm efficiently into the spermathecal duct of the female. The tip of the embolus is retroverted, often penetrating backwards well into the embolic coil; this tip does not uncoil or straighten when the palp is expanded. To make the situation even more difficult, the female has an apparently smooth and glossy epigynal plate which has no grooves or holds to guide the

Table 2.—Partial key to *Disembolus* species: males. A decision on species identity should be made only after reference to the species descriptions and diagnoses.

-
1. Carapace with no lobe, but with a tiny hole behind the lateral eyes (Fig. 56); a tiny spider (total length 1.0-1.2 mm)

D. alpha
 2. Carapace elevated anteriorly into a lobe which has no holes or sulci behind the lateral eyes (Figs. 12, 14, 55)

D. stridulans, *D. procerus*, *D. kesimbus* (for separation, see species descriptions)
 3. Carapace with a lobe which has a hole and sulcus on each side (e.g. Fig. 60)
 - a. palpal tibial apophysis, viewed laterally, with a forward-directed point distally (e.g. Figs. 16, 49)
 - i. tibial apophysis as Figs. 49, 50

D. phanus, *D. lacunatus* (for separation, see species descriptions)
 - ii. tibial apophysis as Figs. 39, 41, 47

D. implicatus, *D. implexus*, *D. convolutus* (for separation, see species descriptions)
 - iii. tibial apophysis as Fig. 18; SA with upward curving point distally (Figs. 18, 19)

D. torquatus
 - iv. tibial apophysis long, with small hook distally (Fig. 31); a relatively large species (total length 1.9-2.0 mm)

D. sacerdotalis
 - b. palpal tibial apophysis, viewed laterally, not pointed distally (e.g. Figs. 24, 32)
 - i. tibial apophysis fairly short and turned over at distal end (Figs. 24, 26)

D. beta, *D. sinuosus* (for separation, see species descriptions)
 - ii. tibial apophysis longer and not turned over at distal end (Fig. 32)

D. anguineus
-

embolus to the very inconspicuous genital pores. Does the male perhaps never achieve insertion of the embolus, but instead eject the sperm on to the surface of the epigynum around the genital pores? It would be interesting to examine, with live specimens of these tiny spiders, how the engagement of the palp with the epigynum takes place.

Species transferred into *Disembolus*.—On the basis of the genital structures, the following species have been transferred into *Disembolus*:

Cochlembolus sacerdotalis Crosby and Bishop 1933

Soudinus corneliae Chamberlin and Ivie 1944

Tapinocyba alpha Chamberlin 1948

Tapinocyba kesimba Chamberlin 1948

Tapinocyba (?) phana Chamberlin 1948

The figure given by Chamberlin (1948) for the epigynum of *Oedothorax cascadeus* indicates that this species may possibly be a *Disembolus*; the single specimen described cannot however be found, and hence its identity must remain uncertain. A similar situation exists for *Tapinocyba (?) pontis* Chamberlin 1948.

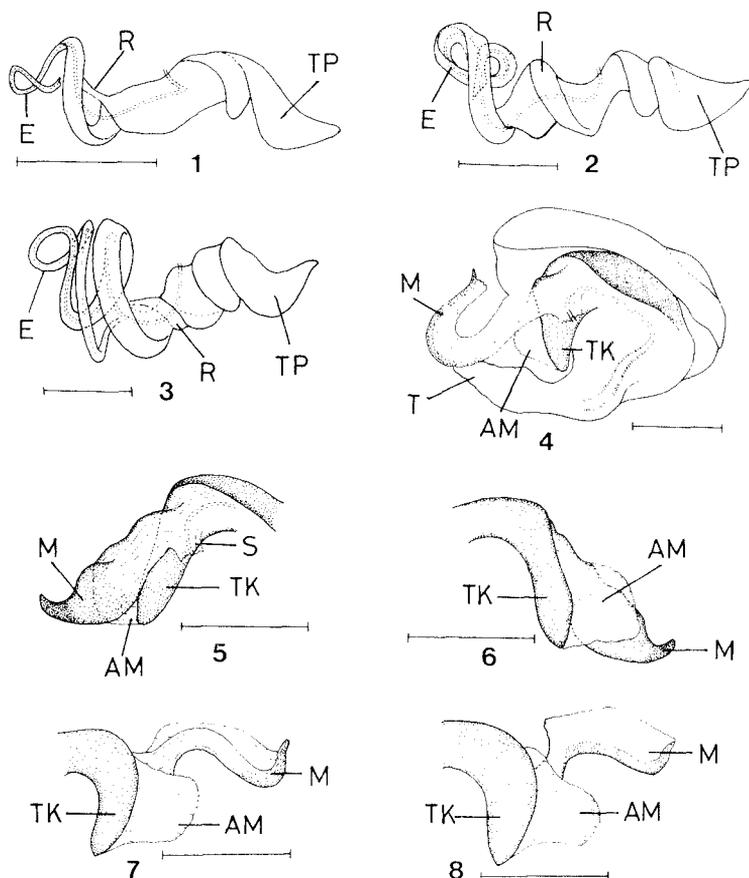
Misplaced species.—*Disembolus apache* Chamberlin 1948 has been transferred to *Scotinotylus* (Millidge 1981). The female of *Disembolus zygethus* Chamberlin 1948 has not been located, and no opinion can be given on this species. The putative female of *Disembolus stridulans* (Chamberlin and Ivie 1945) is *Scotinotylus sanctus* (Crosby) (Millidge 1981).

Distribution and Natural History.—The genus *Disembolus* appears to be endemic to North America. The species are distributed throughout the United States, but the majority have been found only in the western half. There is only one record for Canada

and none for Mexico. No valid conclusions on distribution can be drawn, however, since none of the species is represented by more than a few specimens.

Little is known on the natural history of the *Disembolus* species. A few have been recorded from under stones or in vegetable detritus, some at relatively high altitudes. Like most erigonines, they presumably live almost exclusively at or below ground level. The sparsity of material in the collections may indicate that most of the species have a limited distribution or live in specialized or unusual habitats. It should be remembered, however, that some tiny erigonines may give the impression of extreme rarity when hand collecting is employed, but are taken in large numbers when pitfall trapping is carried out in the same area.

Species.—The genus as now defined contains 22 known species. More than half of these are described on one sex only, and it is possible that the male and female of a single species are described under separate names in a few instances. The considerable number of species represented in the comparatively few vials of material received from all sources



Figs. 1-8.—1, *D. torquatus*, embolic division; 2, *D. anguineus*, embolic division; 3, *D. stridulans*, embolic division; 4, *D. stridulans*, male palp, meso-ventral, embolic division removed; 5, *D. torquatus*, suprategular apophysis, mesal; 6, *D. torquatus*, suprategular apophysis, ectal; 7, *D. anguineus*, suprategular apophysis, ectal; 8, *D. anguineus*, suprategular apophysis, dorso-ectal. Abbreviations: AM, suprategular apophysis, auxillary membrane; E, embolus; M, suprategular apophysis, membranous part; R, reinforcing member; S, stalk; T, tegulum; TK, suprategular apophysis, tusk-like part; TP, tailpiece (Scale lines 0.1 mm)

makes it probable that several more species remain to be discovered. The species described in this paper are as follows:

- Disembolus stridulans* Chamberlin and Ivie
- D. procerus*, new species
- D. galeatus*, new species
- D. solanus*, new species
- D. kesimbus* (Chamberlin and Ivie)
- D. torquatus*, new species
- D. alpha* (Chamberlin)
- D. beta*, new species
- D. sinuosus*, new species
- D. sacerdotalis* (Bishop and Crosby)
- D. angineus*, new species
- D. implicatus*, new species
- D. implexus*, new species
- D. convolutus*, new species
- D. phanus* (Chamberlin)
- D. lacunatus*, new species
- D. lacteus*, new species
- D. vicinus*, new species
- D. amoenus*, new species
- D. concinnus*, new species
- D. corneliae* (Chamberlin and Ivie)
- D. hyalinus*, new species

Keys to the species.—Partial keys to the *Disembolus* species are presented in Tables 1 and 2. Apart from some differences in size, the females are all very similar to one another, and their determination relies almost entirely on the form of the epigynum. The males show somewhat greater differences, not only in the palps but also in the form of the carapace lobes. The keys, particularly for the females, should not be used uncritically, and with both sexes a final diagnosis should be made only after reference to the species descriptions and diagnoses. In doubtful cases, bearing in mind the likelihood that new species will be discovered, comparisons with the type or paratypes will be desirable.

Descriptions of species.—The descriptions follow the order given in the list of species above. Figures of the male palps are of the right hand palp.

Disembolus stridulans Chamberlin and Ivie
Figures 3, 4, 9, 10, 11, 12, 13; Map 1B

Disembolus stridulans Chamberlin and Ivie 1933:21; 1945:226 (male, *not* female); Roewer 1942:664; Bonnet 1956:1516

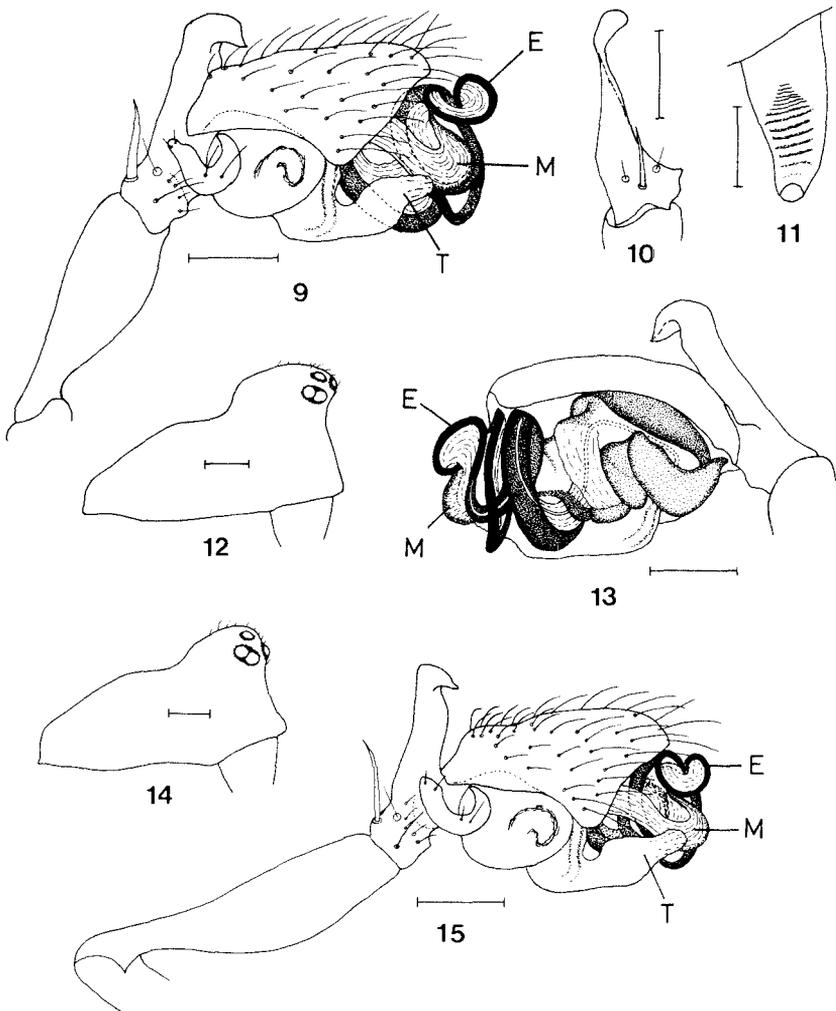
Type.—Male holotype from Raft River Mts., south fork of Raft River, 8 mi. south of Lynn, Utah, September 6, 1932 (W. Ivie); in AMNH. Paratypes examined.

Description.—Only the male is known. Total length: male 1.35-1.40 mm. Carapace: length: male 0.65 mm. Brown to orange-brown, with blackish markings and margins. The carapace is raised anteriorly into a lobe which projects over the clypeus (Fig. 12); there are no holes or sulci. Chelicerae: with clear stridulatory file (Fig. 11). Abdomen: grey to black; epigastric plates smooth. Sternum: practically black. Legs: brown to yellow-brown.

Tibial spines: male 2221, weak. TmI: male 0.38-0.40. Male palp: Figs. 3, 4, 9, 10, 13; the tibia bears a very stout spine.

Diagnosis.—The male of *D. stridulans* is diagnosed by the form of the carapace lobe (Fig. 12), which has no holes or sulci; this character groups this species with *D. procerus* and *D. kesimbus*. *D. stridulans* is at once distinguished from *D. kesimbus* by the much more complicated embolus (Fig. 13 cf. Fig. 17), and by the form of the palpal tibia (Figs. 9, 10 cf. Figs. 16, 20). *D. stridulans* and *D. procerus* have closely similar palpal organs, but in *D. stridulans* the palpal patella is shorter (Fig. 9 cf. Fig. 15); the carapace lobes are also differently shaped, with the lobe in *D. stridulans* projecting well over the clypeus (Fig. 12 cf. Fig. 14).

Distribution.—I have seen specimens from Utah only (Map 1B). The females reported by Chamberlin and Ivie (1945) are *Scotinotylus sanctus* (Crosby). It has not been possible to locate the males reportedly taken in California (Chamberlin and Ivie 1945); it must be



Figs. 9-15.—9, *D. stridulans*, male palp, ectal; 10, *D. stridulans*, male palpal tibia, dorsal; 11, *D. stridulans*, right male chelicera, lateral; 12, *D. stridulans*, male carapace, lateral; 13, *D. stridulans*, male palp, mesal; 14, *D. procerus*, male carapace, lateral; 15, *D. procerus*, male palp, ectal. Abbreviations: E, embolus; M, suprategular apophysis, membranous part; T, tegulum (Scale lines 0.1 mm)

regarded as uncertain that these males are *D. stridulans*, and the records are not included on the map.

Natural History.—The male has been taken in September and October; nothing was recorded on habitat.

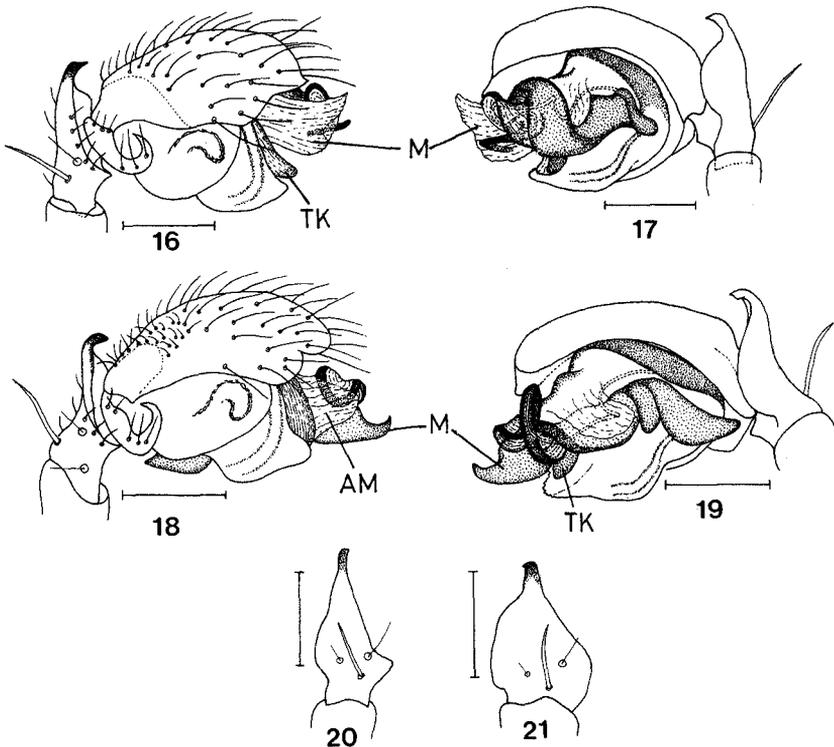
Disembolus procerus, new species

Figures 14, 15, 91, 92; Map 1B

Type.—Male holotype from Tieton River, 10 miles east of Rimrock, Washington, September 13, 1965 (J. and W. Ivie); deposited in AMNH.

Description.—The male and female were taken together. Total length: female 1.45-1.55 mm, male 1.55 mm. Carapace: length: female/male 0.60-0.65 mm. Orange-brown to brown, with dusky markings and margins. The male carapace is raised anteriorly into a lobe (Fig. 14), which has no holes or sulci. Abdomen: grey to black; epigastric plates smooth. Sternum: brown, heavily suffused with black. Legs: brown to pale orange-brown. Tibial spines: female/male 22/21, but rather weak in male. TmI: female/male 0.40-0.42. Male palp: Fig. 15; very similar to that of *D. stridulans*. Epigynum: Fig. 91. Internal genitalia: Fig. 92.

Diagnosis.—The male is very similar to *D. stridulans*, and its diagnosis is dealt with under that species. The female of *D. procerus* is diagnosed by the epigynum (Fig. 91); the



Figs. 16-21.—Male palps. 16, *D. kesimbus*, ectal; 17, *D. kesimbus*, mesal; 18, *D. torquatus*, ectal; 19, *D. torquatus*, mesal; 20, *D. kesimbus*, tibia, dorsal; 21, *D. torquatus*, tibia, dorsal. Abbreviations: AM, suprategular apophysis, auxillary membrane; M, suprategular apophysis, membranous part; TK, suprategular apophysis, tusk-like part. (Scale lines 0.1 mm)

small, rather widely spaced spermathecae separate it from most other species except *D. galeatus* (Fig. 90) and *D. solanus* (Fig. 89): see *D. galeatus* and *D. solanus* diagnoses.

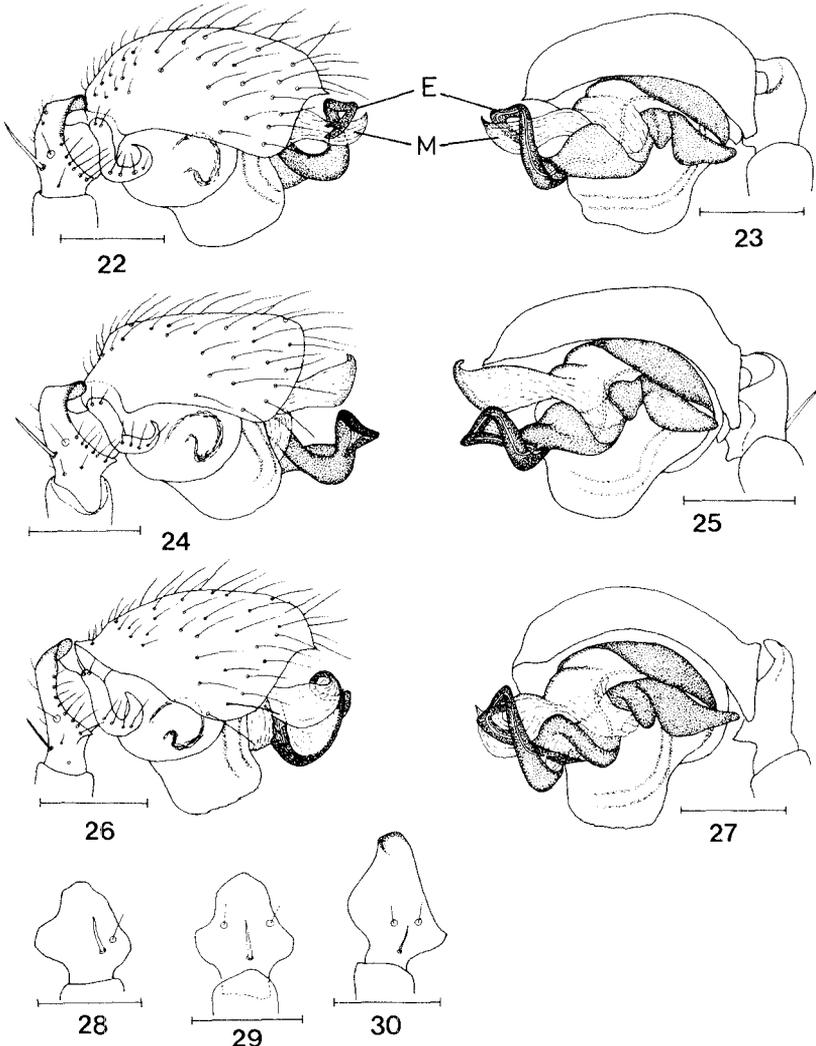
Distribution.—Known only from the type locality, Washington (Map 1B).

Natural History.—Both sexes were taken in September; nothing was recorded on habitat.

Disembolus galeatus, new species

Figures 90, 93; Map 1B

Type.—Female holotype from Lasa Falls, Little Cottonwood Canyon, Wasatch Mts., Salt Lake Co., Utah, April 19, 1961 (H. Levi); deposited in MCZ.

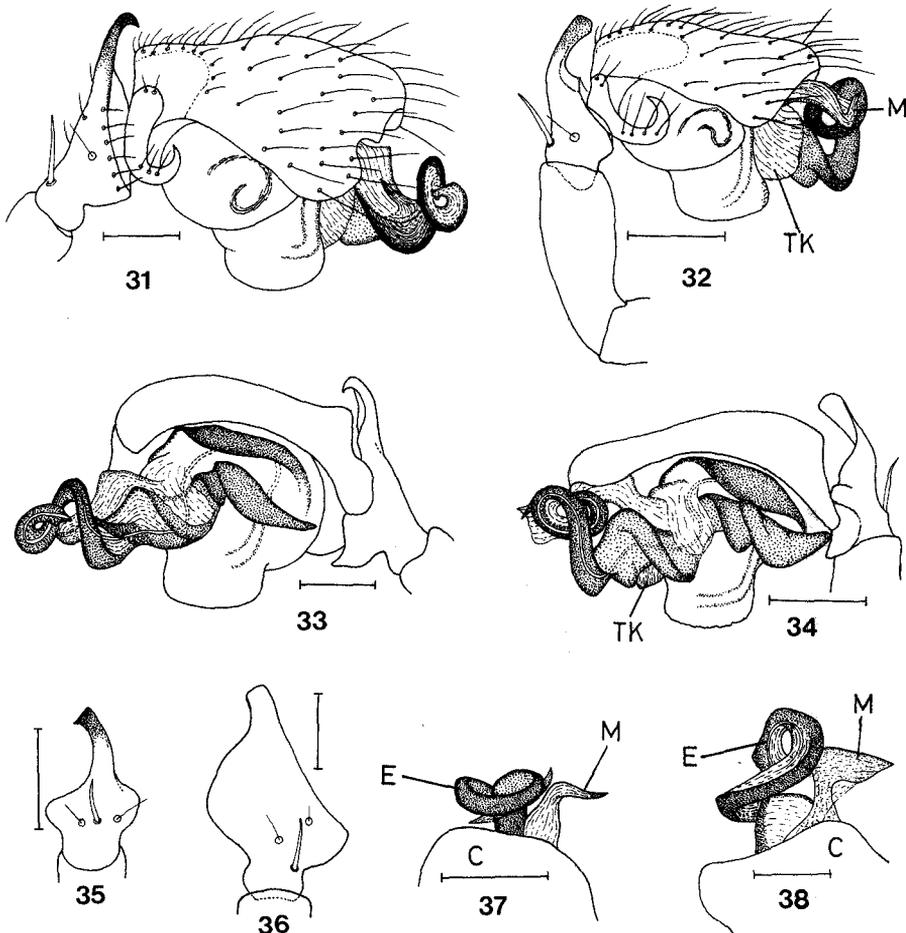


Figs. 22-30.—Male palps. 22, *D. alpha*, ectal; 23, *D. alpha*, mesal; 24, *D. beta*, ectal; 25, *D. beta*, mesal; 26, *D. sinuosus*, ectal; 27, *D. sinuosus*, mesal; 28, *D. alpha*, tibia, dorsal; 29, *D. beta*, tibia, dorsal; 30, *D. sinuosus*, tibia, dorsal. Abbreviations: E, embolus; M, suprategular apophysis, membranous part. (Scale lines 0.1 mm)

Description.—Only the female is known. Total length: female 1.65 mm. Carapace: length: female 0.65 mm. Brown, with dusky markings and margins. Abdomen: black, epigastric plates smooth. Sternum: brown, suffused with black. Legs: brown, with the joints somewhat darker. Tibial spines: female 2221. TmI: female 0.43–0.47. Epigynum: Fig. 90; the outline of the posterior plate is helmet-shaped. Internal genitalia: Fig. 93.

The similarity of the internal genitalia to those of *D. procerus* (Fig. 92), coupled with the location of capture, make it likely that this female may prove to be the unknown female of *D. stridulans*. Until the two sexes are captured together, however, this cannot be regarded as certain.

Diagnosis.—The female is diagnosed by the epigynum (Fig. 90), which has widely separated spermathecae and a plate which is helmet shaped (though the outline may not always be very clear). More specimens are required to establish whether the difference from *D. procerus* epigynum (Fig. 91) is as clear as shown in the figures. A better knowledge of the geographical distribution of *D. galeatus* and *D. procerus* may prove to be valuable for deciding the identity of doubtful females.



Figs. 31-38.—Male palps. 31, *D. sacerdotalis*, ectal; 32, *D. anguineus*, ectal; 33, *D. sacerdotalis*, mesal; 34, *D. anguineus*, mesal; 35, *D. anguineus*, tibia, dorsal; 36, *D. sacerdotalis*, tibia, dorsal; 37, *D. anguineus*, tip of palp, dorsal view; 38, *D. sacerdotalis*, tip of palp, dorsal view. Abbreviations: C, cymbium; E, embolus; M, supratergular apophysis, membrane part; TK, supratergular apophysis, tusk-like part. (Scale lines 0.1 mm)

Distribution.—Known only from the type locality, Utah (Map 1B).

Natural History.—The female was taken in April, at 2000 m. altitude, in douglas fir and cottonwood.

Disembolus solanus, new species

Figures 89, 107; Map 1B

Type.—Female holotype from Mix Canyon, Solano Co., California, March 12, 1960 (Parker and Menke); deposited in AMNH.

Description.—Only the female is known. Total length: female 1.45 mm. Carapace: length: female 0.60 mm. Orange-brown. Abdomen: black; epigastric plates smooth. Sternum: yellow-brown. Legs: orange-brown. Tibial spines: female 2221. TmI: female 0.35. Epigynum: Fig. 89; the posterior plate is whitish in color. Internal genitalia: Fig. 107.

Diagnosis.—The female is diagnosed by the epigynum (Fig. 89), the posterior plate of which has a shape rather different from that of the other species, and is whitish in color. More specimens are required to establish the extent of variation shown by the epigynum.

Distribution.—This species is known from two localities in California (Map 1B).

Natural History.—The females were taken in February and March; nothing was recorded on habitat.

Disembolus kesimbus (Chamberlin), new combination

Figures 16, 17, 20, 55, 72, 94; Map 1D

Tapinocyba kesimba Chamberlin 1948:552 (*kesimba* is assumed to be an adjective)

Type.—The types were taken in Kaibab Forest (V. T. Ranch), Arizona, September 4, 1931 (R. V. Chamberlin). No holotype seems to have been designated, but a vial containing male and female "types" is present in AMNH; a male has been selected and labelled as "lectotype."

Description.—Total length: female/male 1.35-1.40 mm. Carapace: length: female/male 0.60 mm. Brown to orange-brown, with dusky markings. The male carapace is raised anteriorly, and the lobe has no holes or sulci (Fig. 55). Abdomen: grey; the epigastric plates have weak, closely spaced striae in the female, and clear, moderately spaced striae in the male. Sternum: brown, suffused with grey. Legs: orange-brown. Tibial spines: female 2221, male 0021. TmI: female 0.37-0.40, male 0.35. Male palp: Figs. 16, 17, 20; the embolic division is less typical than in the other *Disembolus* species. Epigynum: Fig. 72; the plate is notched anteriorly: the small markings posterior to the notch are always present but variable in shape. Internal genitalia: Fig. 94.

Diagnosis.—The male of *D. kesimbus* is diagnosed by the form of the carapace lobe (Fig. 55), which has no holes or sulci, and by the form of the palps (see *D. stridulans* diagnosis). The female of *D. kesimbus* is diagnosed by the epigynum (Fig. 72), which is easily recognized by the deep notch on the anterior margin of the plate, and by the two small curved markings posterior to the notch: these markings, though somewhat variable in shape, are always present.

Distribution.—This species is known from several localities in Utah and one in Arizona (Map 1D).

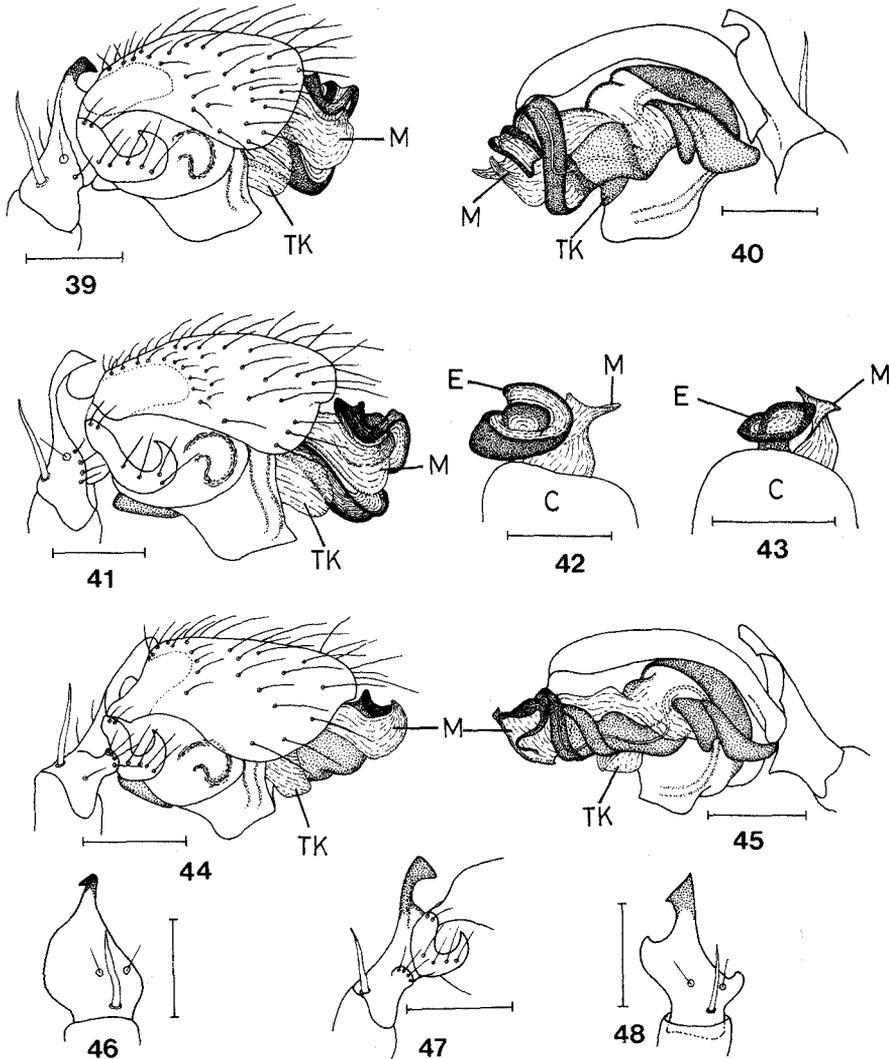
Natural History.—Both sexes have been taken in September and October; nothing was recorded on habitat.

Disembolus torquatus, new species

Figures 1, 5, 6, 18, 19, 21, 57, 73, 95; Map 1B

Type.—Male holotype from north-east of Fruitland, Idaho, November 24, 1940; deposited in AMNH.

Description.—The male and female were taken together. Total length: female 1.45-1.60 mm, male 1.25-1.55 mm. Carapace: length: female/male 0.60-0.65 mm. Brown



Figs. 39-48.—Male palps. 39, *D. implicatus*, ectal; 40, *D. implicatus*, mesal; 41, *D. implexus*, ectal; 42, *D. implicatus*, tip of palp, dorsal view; 43, *D. convolutus*, tip of palp, dorsal view; 44, *D. convolutus*, ectal; 45, *D. convolutus*, mesal; 46, *D. implicatus*, tibia, dorsal; 47, *D. convolutus*, tibia, ectal; 48, *D. convolutus*, tibia, dorsal. Abbreviations: C, cymbium; E, embolus; M, suprategular apophysis, membranous part; TK, suprategular apophysis, tusk-like part. (Scale lines 0.1 mm)

to orange-brown with blackish markings and margins. The male carapace has a large lobe which has well marked sulci and holes (Fig. 57). Abdomen: grey to black; epigastric plates smooth. Sternum: brown, suffused with black, particularly on margins. Legs: brown to orange-brown. Tibial spines: female 2221, male spineless. TmI: female 0.38-0.42, male 0.36-0.40. Male palp: Figs. 1, 5, 6, 18, 19, 21. Epigynum: Fig. 73; the plate has a notch anteriorly. Internal genitalia: Fig. 95.

Diagnosis.—The male of *D. torquatus* is diagnosed by the carapace lobe, which has large holes and sulci (Fig. 57), coupled with the form of the tibial apophysis and of the SA, which has a curved hook distally (Fig. 18). Confirmation is given by the palpal organs (Fig. 19). The female is diagnosed by the epigynum, which differs from other species in the presence of a broad notch on the anterior margin of the plate (Fig. 73).

Distribution.—Known only from the type locality, Idaho (Map 1B).

Natural History.—Both sexes were taken in September; nothing was recorded on habitat.

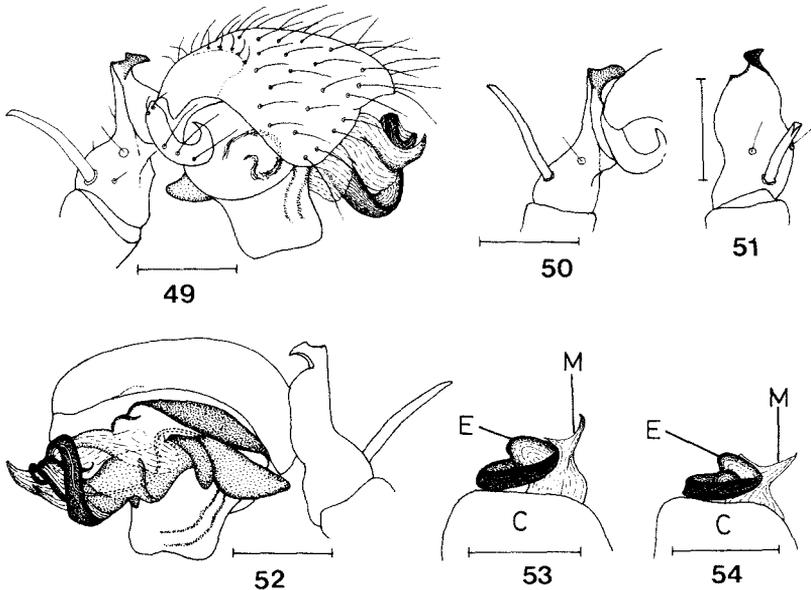
Disembolus alpha (Chamberlin), new combination

Figures 22, 23, 28, 56, 83, 96; Map 1A

Tapinocyba alpha Chamberlin 1948:550

Type.—Male and female types from Dry Creek Canyon, Salt Lake City, Utah, October 22, 1932; in AMNH, examined. A holotype has not been designated. A male lectotype has been selected and deposited in AMNH.

Description.—Total length: female 1.1 mm, male 1.05-1.2 mm. Carapace: length: female 0.50 mm, male 0.50-0.54 mm. Yellow-brown, with dusky markings and margins.



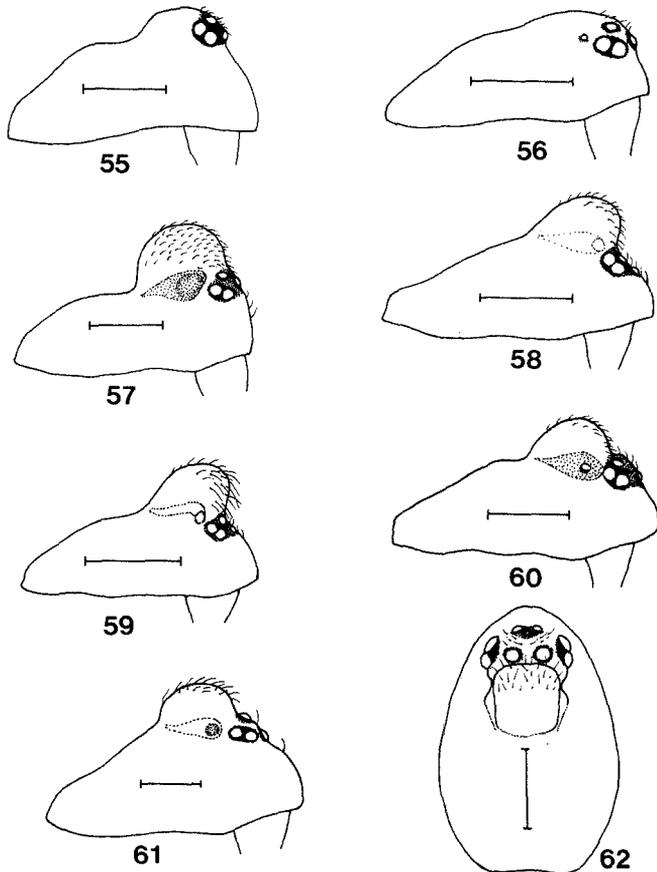
Figs. 49-54.—Male palps. 49, *D. phanus*, ectal; 50, *D. lacunatus*, tibia, ectal; 51, *D. phanus*, tibia, dorsal; 52, *D. phanus*, mesal; 53, *D. phanus*, tip of palp, dorsal view; 54, *D. lacunatus*, tip of palp, dorsal view. Abbreviations: C, cymbium; E, embolus; M, supratergular apophysis, membranous part. (Scale lines 0.1 mm)

The male carapace has no lobe, but there is a tiny hole behind the lateral eyes (Fig. 56). Abdomen: grey, suffused with whitish yellow; epigastric plates smooth. Sternum: yellow, suffused with grey. Legs: pale yellow. Tibial spines missing on all specimens. TmI: female 0.40, male 0.38-0.40. Male palp: Figs. 22, 23, 28; the embolus is less convoluted than in many of the *Disembolus* species. Epigynum: Fig. 83. Internal genitalia: Fig. 96.

Diagnosis.—The male of *D. alpha* is diagnosed at once by the absence of a lobe on the carapace, and the presence of a small hole behind the lateral eyes (Fig. 56). Confirmation is given by the form of the palpal tibia (Fig. 22), by the relatively simple form of the embolus (Fig. 23) and by the small size of the spider. The palpal tibia and ED are similar to those of *D. beta* (Fig. 24, 25) and *D. sinuosus* (Fig. 26, 27), but these two species are at once distinguished from *D. alpha* by the presence of a carapace lobe (Figs. 58, 59). The female of *D. alpha* is diagnosed by the epigynum, which has two clear banana-shaped markings within the plate (Fig. 83), coupled with the small size of the spider.

Distribution.—Known only from the type locality, Utah (Map 1A).

Natural History.—Both sexes were taken in October; nothing was recorded on habitat.



Figs. 55-62.—Male carapaces. 55, *D. kesimbus*, lateral; 56, *D. alpha*, lateral; 57, *D. torquatus*, lateral; 58, *D. sinuosus*, lateral; 59, *D. beta*, lateral; 60, *D. anguineus*, lateral; 61, *D. sacerdotalis*, lateral (after Crosby and Bishop, 1933); 62, *D. anguineus*, dorsal. (Scale lines 0.2 mm)

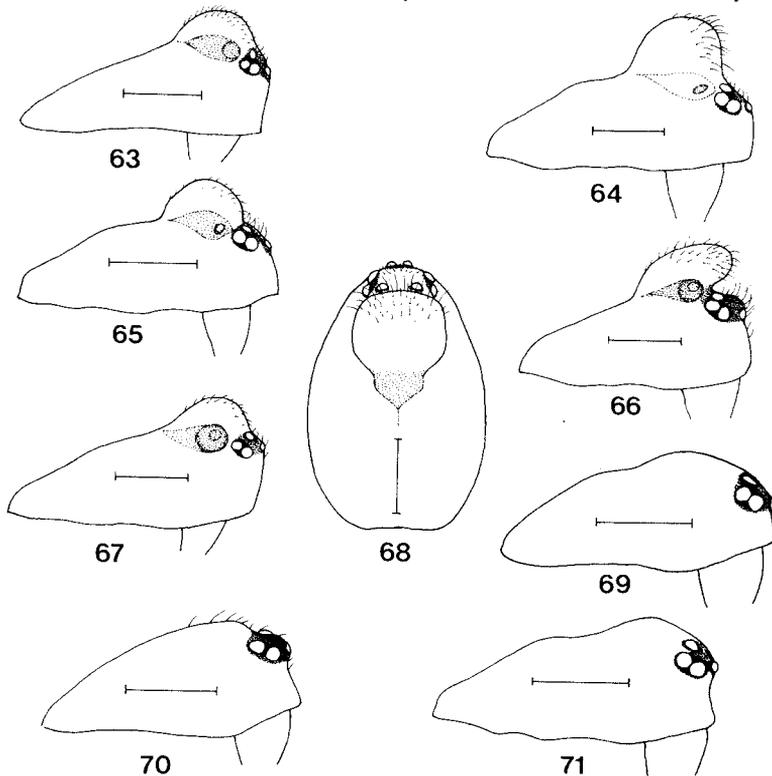
Disemboldus beta, new species
 Figures 24, 25, 29, 59; Map 1C

Type.—Male holotype from Dry Canyon, Salt Lake City, Utah, October 22, 1932 (W. Ivie); deposited in AMNH.

Description.—Only the male is known. Total length: male 1.1-1.15 mm. Carapace: length: male 0.50 mm. Pale orange-brown, with faint dusky markings and margins. The male carapace is raised into a lobe with holes and sulci (Fig. 59), and the clypeus projects. Abdomen: yellowish-grey; epigastric plates smooth. Sternum: yellow-brown with grey margins. Legs: yellow-brown. Tibial spines absent. TmI: male 0.40. Male palp: Figs. 24, 25, 29; the embolus is less convoluted than in many of the *Disemboldus* species.

Diagnosis.—The male of *D. beta* is diagnosed by the presence of a carapace lobe with holes and sulci (Fig. 59), coupled with the shape of the tibial apophysis (Fig. 24); these characters group it with *D. sinuosus*. *D. beta* is separated from *D. sinuosus* by its smaller size (ca. 1.1 mm cf. 1.4 mm), by the somewhat shorter tibial apophysis (Fig. 29, cf. Fig. 30) and by the smaller size of the embolic coil (Fig. 25 cf. Fig. 27). *D. beta* has the palpal organs and tibia very similar to those of *D. alpha*, but differs from this species in the presence of the carapace lobe (Fig. 59 cf. Fig. 56).

Distribution.—Known only from two localities in Utah (Map 1C); the holotype male appears to have been taken in the same locality and on the same date as *D. alpha*.



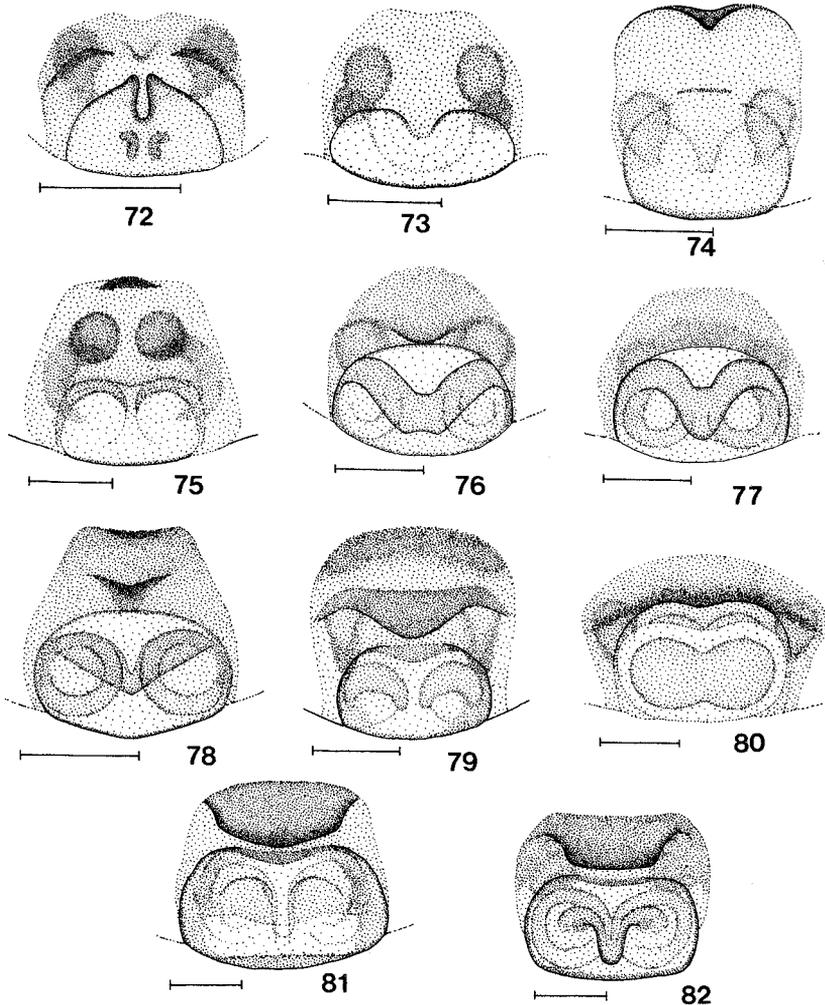
Figs. 63-71.—Carapaces. 63, *D. implicatus*, male, lateral; 64, *D. implexus*, male, lateral; 65, *D. convolutus*, male, lateral; 66, *D. phanus*, male, lateral; 67, *D. lacunatus*, male, lateral; 68, *D. implexus*, male, dorsal; 69, *D. implicatus*, female, lateral; 70, *D. phanus*, female, lateral; 71, *D. vicinus*, female, lateral. (Scale lines 0.2 mm)

Natural History.—The males were taken in October; nothing was recorded on habitat.

Disembolus sinuosus, new species
Figures 26, 27, 30, 58, 78, 97; Map 1A

Type.—Male holotype from the summit of Mt. Washburn, Wyoming, August 13, 1940 (W. Ivie); deposited in AMNH.

Description.—The male and female were taken together. Total length: female/male 1.40 mm. Carapace: length: female/male 0.60 mm. Dark brown, with blackish markings and margins. The male carapace is raised into a lobe, with holes and sulci (Fig. 58), and the clypeus projects. Abdomen: black; epigastric plates smooth. Sternum: brown, heavily suffused with black. Legs: brown to orange-brown. Tibial spines: female 2221, male,



Figs. 72-82.—Epigyna. 72, *D. kesimbus*, ventral; 73, *D. torquatus*, ventral; 74, *D. convolutus*, ventral; 75, *D. anguineus*, ventral; 76, *D. amoenus*, ventral; 77, *D. amoenus*, postero-ventral; 78, *D. sinuosus*, ventral; 79, *D. concinnus*, ventral; 80, *D. hyalinus*, ventral; 81, 82, *D. corneliae*, ventral. (Scale lines 0.1 mm)

spines missing (or absent). TmI: female 0.40-0.44, male 0.47. Male palp: Figs. 26, 27, 30. Epigynum: Fig. 78. Internal genitalia: Fig. 97.

Diagnosis.—*D. sinuosus* male is diagnosed by the presence of the carapace lobe with holes and sulci (Fig. 58), coupled with the form of the tibial apophysis (Fig. 26); these characters group it with *D. beta*, and its diagnosis is dealt with under that species. The female of *D. sinuosus* is diagnosed by the epigynum, which has a small dark colored wedge-shaped marking just anterior to the plate (Fig. 78), and clear markings across and within the plate.

Distribution.—Known only from the type locality, Wyoming (Map 1A).

Natural History.—Both sexes were taken at ca. 3000 m in August; nothing was recorded on habitat.

Disembolus sacerdotalis (Crosby and Bishop), new combination
Figures 31, 33, 36, 38, 61; Map 1A

Cochlembolus sacerdotalis Crosby and Bishop 1933:167

Type.—Male holotype from Karner, Albany Co., New York, March 24, 1923; in AMNH, examined.

Description.—This species is known only from the holotype. This specimen is in bad condition, with all the legs missing and the carapace damaged; fortunately the palps are present. The following brief and incomplete description is therefore based for the most part on the data given by Crosby and Bishop (1933). Total length: male 1.90 mm. Carapace: length: male 0.90 mm. Yellow-brown. Carapace steeply rising to a small lobe anteriorly, with small holes and sulci (Fig. 61); the clypeus is strongly convex. Abdomen: dark grey; epigastric plates smooth. Sternum: dull yellow, with dusky markings. Legs: dusky orange-yellow. Male palp: Figs. 31, 33, 36, 38.

Diagnosis.—The male is diagnosed by the form of the carapace, which has a lobe with holes and sulci (Fig. 61), and by the tibial apophysis which is relatively long and hooked distally (Fig. 31). Confirmation is given by the form of the ED (Fig. 33) and of the SA (Fig. 38). This species is relatively large (total length ca. 2 mm).

Distribution.—Known only from the type locality, New York (Map 1A).

Natural History.—The male was taken in March, by sifting leaf mold.

Disembolus anguineus, new species
Figures 2, 7, 8, 32, 34, 35, 37, 60, 62, 75, 101; Map 1A

Type.—Male holotype from Chiricahua Mts., Cochise Co., Arizona, December 17, 1954 (K. W. Haller); deposited in AMNH.

Description.—The male and female were taken together. Total length: female 1.65 mm, male 1.45-1.55 mm. Carapace: length: female 0.65-0.75 mm, male 0.65-0.70 mm. Orange-brown, with dusky markings and margins. The male carapace is raised into a lobe (Figs. 60, 62), with holes and sulci. Abdomen: yellowish grey; epigastric plates smooth. Sternum: orange, heavily suffused with black. Legs: orange-brown. Tibial spines: female 2221, male, spines missing (or absent). TmI: female 0.40-0.45, male 0.45-0.50. Male palp: Figs. 2, 7, 8, 32, 34, 35, 37. Epigynum: Fig. 75. Internal genitalia: Fig. 101.

Diagnosis.—The male of *D. anguineus* is diagnosed by the form of the carapace, which has a lobe with holes and sulci, and a fairly strongly projecting clypeus (Figs. 60, 62),

coupled with the form of the tibial apophysis (Fig. 32). Confirmation is afforded by the form of the ED (Fig. 34) and of the SA (Fig. 37). The female of *D. anguineus* is diagnosed by the epigynum, which has a small dark-colored knob on the anterior margin, with the spermathecae close together (Fig. 75); this epigynum is unlikely to be confused with that of any other *Disembolus* species.

Distribution.—This species is known from Utah, Arizona and New Mexico (Map 1A).

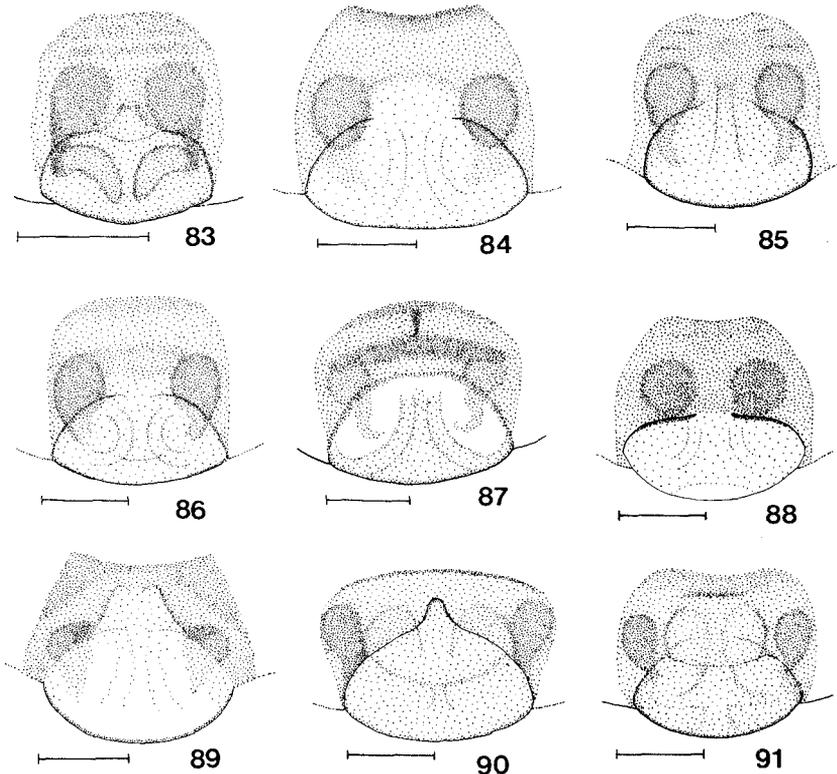
Natural History.—Both sexes have been taken in October, December and March; it seems probable that the chief period of maturity is in autumn and winter. In New Mexico it was taken in March in pitfall traps (at Los Alamos), and also at ca. 2500 m in October.

Disembolus implicatus, new species

Figures 39, 40, 42, 46, 63, 69, 84, 85, 98; Map 1C

Type.—Male holotype from Cobble Rest, Upper Provo River, Utah, July 30, 1936 (W. Ivie); deposited in AMNH.

Description.—The male and female were taken together. Total length: female 1.45-1.55 mm, male 1.40 mm. Carapace: length: female/male 0.60-0.65 mm. Brown, with dusky markings and margins. The female carapace is well elevated behind the eyes (Fig. 69). The male carapace bears a lobe which has prominent holes and sulci behind the lateral eyes (Fig. 63). Abdomen: grey to black; epigastric plates smooth or with very weak striae. Sternum: brown, suffused with black. Legs: brown to orange-brown. Tibial



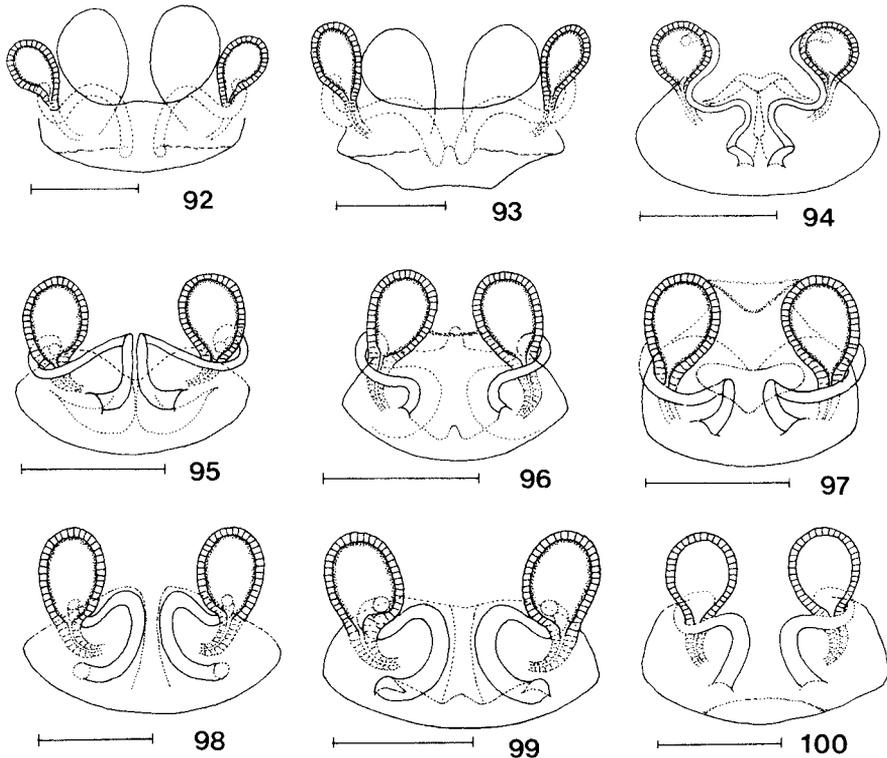
Figs. 83-91.—Epigyna, ventral. 83, *D. alpha*; 84, 85, *D. implicatus*; 86, *D. phanus*; 87, *D. lacteus*; 88, *D. vicinus*; 89, *D. solanus*; 90, *D. galeatus*; 91, *D. procerus*. (Scale lines 0.1 mm)

spines: female 2221, male 0011. TmI: female 0.38-0.50, male 0.40-0.44. Male palp: Figs. 39, 40, 42, 46. Epigynum: Figs. 84, 85; two females taken in Colorado show small differences in the epigynum (Fig. 85), but in the absence of males are assumed to be *D. implicatus*. Internal genitalia: Fig. 98.

Diagnosis.—The male of *D. implicatus* is diagnosed by the presence of the carapace lobe with large holes and sulci (Fig. 63), coupled with the form of the tibial apophysis, which has a forward-directed point distally (Fig. 39). These characters group it with *D. implexus* and *D. convolutus*. *D. implicatus* is very similar to *D. implexus*, and is distinguished only by the form of the carapace lobe (Fig. 63 cf. Figs. 64, 68) and by very small differences in the SA. *D. implicatus* and *D. implexus* are readily distinguished from *D. convolutus* by the form of the ED, which in the latter species is more elongated and has the embolic coil smaller in diameter (Fig. 40 cf. Fig. 45), and by the form of the palpal tibia (Fig. 46 cf. Figs. 48); the carapace lobe of *D. convolutus* is fairly similar to that of *D. implexus* (Figs. 64, 65). The female of *D. implicatus* is diagnosed by the epigynum (Figs. 84, 85), which is one of the simplest of the genus. This epigynum is very similar to that of *D. phanus* (Fig. 86), and could easily be confused with it. These two species can be distinguished, however, by the more abrupt elevation of the carapace immediately behind the eyes in *D. phanus* (Fig. 70 cf. Fig. 69).

Distribution.—Known from two localities in Utah and from Colorado (Map 1C).

Natural History.—Males were taken in July, females in July, August and October; the chief maturity period is probably in summer. Nothing was recorded on habitat.



Figs. 92-100.—Internal genitalia, females, ventral. 92, *D. procerus*; 93, *D. galeatus*; 94, *D. kesimbus*; 95, *D. torquatus*; 96, *D. alpha*; 97, *D. sinuosus*; 98, *D. implicatus*; 99, *D. phanus*; 100, *D. vicinus*. (Scale lines 0.1 mm)

Disembolus implexus, new species

Figures 41, 64, 68; Map 1C

Type.—Male holotype from Fish Lake, Utah, September 4, 1929 (Chamberlin and Gertsch); deposited in AMNH.

Description.—Only the male is known. Total length: male 1.55 mm. Carapace: length: male 0.70 mm. Orange-brown, with lobe pale yellow; raised into large lobe, which bears long hairs anteriorly (Figs. 64, 68). Abdomen: grey-black; epigastric plates smooth. Sternum: yellow, suffused with black. Legs: yellow. Tibial spines: male 1121, very short and weak. TmI: male 0.45. Male palp: Fig. 41; almost identical with that of *D. implicatus*.

Diagnosis.—The male of *D. implexus* is very similar to *D. implicatus*, and its diagnosis is dealt with under that species.

Distribution.—Known only from the type locality, Utah (Map 1C).

Natural History.—The male was taken in September; nothing was recorded on habitat.

Disembolus convolutus, new species

Figures 43, 44, 45, 47, 48, 65, 74, 102; Map 1C

Type.—Male holotype from 2 miles east of Rufus, Oregon, November 25, 1940 (W. Ivie); deposited in AMNH.

Description.—The male and female were taken together. Total length: female 1.45-1.55 mm, male 1.25-1.35 mm. Carapace: length: female/male 0.60 mm. Orange-brown with dusky markings and margins. The male carapace has a lobe with holes and sulci (Fig. 65). Abdomen: grey to yellow-grey; epigastric plates smooth. Sternum: orange-brown, suffused with black. Legs: orange-brown. Tibial spines: female 2221, male 0011. TmI: female 0.53-0.56, male 0.50-0.55. Male palp: Figs. 43, 44, 45, 47, 48. Epigynum: Fig. 74. Internal genitalia: Fig. 102.

Diagnosis.—The male of *D. convolutus* is diagnosed by the presence of the carapace lobe with holes and sulci (Fig. 65), coupled with the form of the tibial apophysis (Fig. 47). These characters group it with *D. implicatus* and *D. implexus*, and its diagnosis is dealt with under *D. implicatus*. The female of *D. convolutus* is diagnosed by the epigynum, which is simple apart from the presence of a V-shaped ridge on the anterior margin (Fig. 74); this epigynum is unlikely to be confused with that of any other known species of the genus.

Distribution.—Known only from the type locality, Oregon (Map 1C).

Natural History.—Both sexes were taken in November; nothing was recorded on habitat.

Disembolus phanus (Chamberlin), new combination

Figures 49, 51, 52, 53, 66, 70, 86, 99; Map 1D

Tapinocyba (?) *phana* Chamberlin 1948:553. It is assumed that *phana* is an adjective.

Type.—Female holotype from 4 miles N.E. of McCall, Idaho, October 18, 1944 (W. Ivie); in AMNH, examined.

Description.—The male, which was taken with females, is described for the first time. Total length: female 1.45-1.65 mm, male 1.45-1.55 mm. Carapace: length: female/male

0.60-0.65 mm. Orange-brown, with blackish markings and margins. The female carapace is abruptly elevated behind the eyes (Fig. 70). The male carapace is raised into a large lobe, which projects forwards over the ocular area (Fig. 66); there are sulci and deep wide holes behind the lateral eyes. Abdomen: grey to black; epigastric plates smooth. Sternum: almost black. Legs: brown to orange-brown. Tibial spines: female 2221, male 0021. TmI: female 0.37-0.45, male 0.40-0.45. Male palp: Figs. 49, 51, 52, 53; the tibia bears one very stout spines. Epigynum: Fig. 86. Internal genitalia: Fig. 99.

Diagnosis.—*D. phanus* male is diagnosed by the presence of a large lobe with holes and sulci (Fig. 66), coupled with the form of the palpal tibia (Fig. 49), which has a forward-directed point distally and bears a very stout spine; these characters place *D. phanus* with its close relative *D. lacunatus*. These two species have almost identical palpal organs, but show small differences in the SA (Fig. 53 cf. Fig. 54), and there are also small differences in the palpal tibia (Fig. 49 cf. Fig. 50); the carapace lobes are on the contrary quite different in form (Fig. 66 cf. Fig. 67). The female of *D. phanus* is diagnosed by the epigynum (Fig. 86), which is very similar to that of *D. implicatus*; these two species are distinguished by the more abrupt post-ocular elevation of the carapace in *D. phanus* (Fig. 70 cf. Fig. 69).

Distribution.—This species is known from Idaho and Montana (Map 1D).

Natural History.—Both sexes were taken in October; nothing was recorded on habitat.

Disembolus lacunatus, new species

Figures 50, 54, 67; Map 1D

Type.—Male holotype from Big Wood River, 19 miles N. of Ketchum, Idaho, August 25, 1941 (Chamberlin and Piemeisel); deposited in AMNH.

Description.—Only the male is known. Total length: male 1.5 mm. Carapace: length: male 0.70 mm. Orange-brown; raised anteriorly into a lobe, with sulci and large holes (Fig. 67); the clypeus does not project. Abdomen: yellowish grey; epigastric plates smooth. Sternum: yellow, suffused with black. Legs: yellow. Tibial spines missing (or absent). TmI: male 0.52. Male palp: Figs. 50, 54; the tibia bears a very stout spine. The palpal organs are practically identical with those of *D. phanus*, except for a small difference in the tip of the membraneous part of the SA (Fig. 54).

Diagnosis.—*D. lacunatus* male is closely related to *D. phanus*, and is distinguished by the form of the carapace lobe (see *D. phanus* diagnosis).

Distribution.—Known only from the type locality, Idaho (Map 1D).

Natural History.—The male was taken in August; nothing was recorded on habitat.

Disembolus lacteus, new species

Figures 87, 103; Map 1C

Type.—Female holotype from Fallen Leaf Lake, California, August 24, 1953 (J. D. Lattin); deposited in AMNH.

Description.—Only the female is known. Total length: female 1.55 mm. Carapace: length: female 0.75 mm. Orange-brown with dusky markings and black margins. Abdomen: black; epigastric plates smooth. Sternum: brownish black. Legs: orange-brown. Tibial spines: female 2221. TmI: female 0.50. Epigynum: Fig. 87; the posterior plate is milky white in color, and there is a yoke-like marking across the epigynum

anterior to the plate. The spermathecae are rather widely separated. Internal genitalia: Fig. 103.

Diagnosis.—*D. lacteus* female is diagnosed by the epigynum (Fig. 87), the posterior plate of which is more or less devoid of markings and is milky white in color.

Distribution.—Known only from the type locality, California (Map 1C).

Natural History.—The female was taken in August; nothing was recorded on habitat.

Disembolus vicinus, new species

Figures 71, 88, 100; Map 1C

Type.—Female holotype from Grantsville, Tooele Co., Utah, April 24, 1961 (H. Levi); deposited in MCZ.

Description.—Only the female is known. Total length: female 1.65 mm. Carapace: length: female 0.60 mm. Orange-brown, with dusky markings and margins. The female carapace is moderately raised behind the eyes (Fig. 71); this degree of elevation in the female indicates that the male carapace will probably have a fairly large lobe. Abdomen: black; epigastric plates smooth. Sternum: orange, heavily suffused with black. Legs: orange-brown. Tibial spines: female 2221. TmI: female 0.40-0.42. Epigynum: Fig. 88. Internal genitalia: Fig. 100.

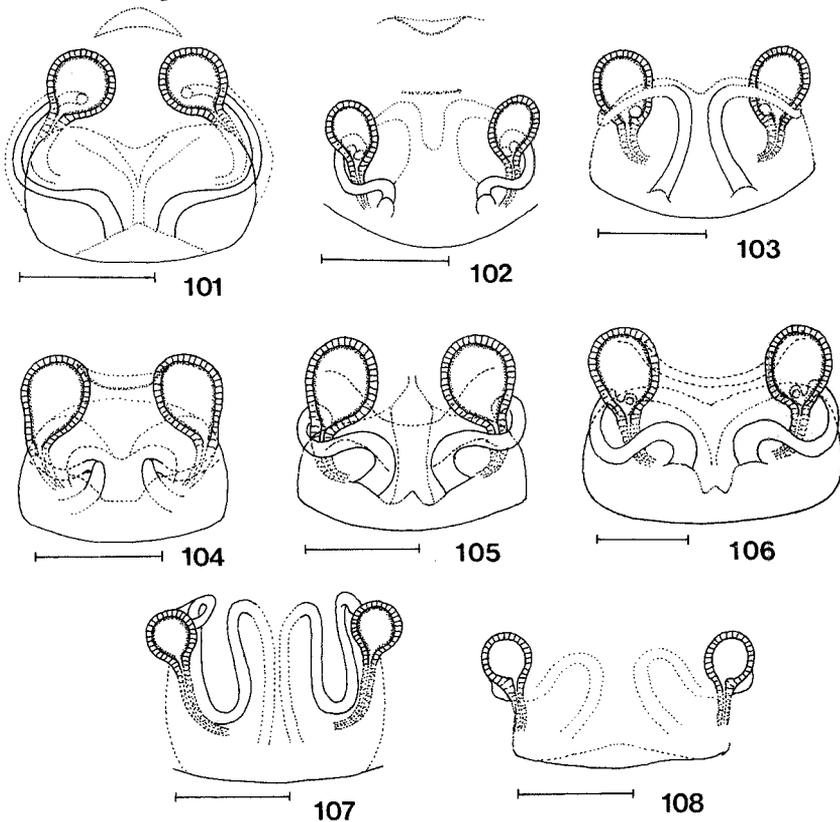


Fig. 101-108.—Internal genitalia, females, ventral. 101, *D. anguineus*; 102, *D. convolutus*; 103, *D. lacteus*; 104, *D. amoenus*; 105, *D. concinnus*; 106, *D. corneliae*; 107, *D. solanus*; 108, *D. hyalinus* (Scale lines 0.1 mm)

Diagnosis.—*D. vicinus* female is diagnosed by the epigynum (Fig. 88), which has the posterior plate more or less devoid of markings and the spermathecae close together.

Distribution.—Known only from the type locality, Utah (Map 1C).

Natural History.—The female was taken in April, in sage trash at 1300 m altitude.

Disembolus amoenus, new species

Figures 76, 77, 104; Map 1D

Type.—Female holotype from Cumberland Pass, 12,500 ft., Sawatch Range, Gunnison Co., Colorado, July 13, 1957 (H. and L. Levi); deposited in MCZ.

Description.—Only the female is known. Total length: female 1.35-1.70 mm. Carapace: length: female 0.60-0.65 mm. Orange-brown to deep brown, with dusky markings and margins. Abdomen: black; epigastric plates smooth but dark in color. Sternum: brown, suffused with black. Legs: orange-brown to brown. Tibial spines: female 2221. TmI: female 0.40-0.44. Epigynum: Figs. 76, 77; when viewed from behind (Fig. 77), the small ledge is invisible. Internal genitalia: Fig. 104.

Diagnosis.—*D. amoenus* female is diagnosed by the epigynum, which has a small and rather indistinct V-shaped marking just anterior to the plate (Fig. 76); when viewed somewhat from behind, however, the marking is not visible (Fig. 77). In the Key, *D. sinuosus* falls into the same group with *D. amoenus*, but the epigyna of these two species are sufficiently different in appearance (Fig. 76 cf. Fig. 78) to make confusion unlikely.

Distribution.—Known from two localities in Colorado (Map 1D).

Natural History.—The female has been taken in July and September; one habitat quoted is under stones and rocks, at 3800 m altitude (Cumberland Pass), where it was taken in company with *Scotinotylus majesticus* (Chamberlin and Ivie).

Disembolus concinnus, new species

Figures 79, 105; Map 1D

Type.—Female holotype from Southwestern Research Station, Arizona, September 25, 1956 (A. M. Nadler); deposited in AMNH.

Description.—The two females taken were accompanied by a sub-adult male almost at the final moult: the palpal organs and the tibial apophysis were visible through the integument. The data given for the male are based on this sub-adult specimen. Total length: female 1.70-1.80 mm, male 1.60 mm. Carapace: length: female 0.75-0.80 mm, male 0.65 mm. Brown, with dusky markings and margins. The sub-adult male has no lobe or sulci visible on the carapace, and it is probable therefore that the adult will have at most a shallow lobe. Abdomen: black; epigastric plates smooth. Sternum: yellow-brown, heavily suffused with black. Legs: yellow-brown. Tibial spines: female/male 2221. TmI: female 0.46-0.50, male 0.42. Male palp: the palpal organs, seen through the integument, are somewhat obscure, but seem to be similar to those of *D. implicatus*; the palpal tibia also resembles that of *D. implicatus*. Epigynum: Fig. 79; when viewed from behind, the mantle is scarcely visible, and the epigynum has a similar appearance to Fig. 77. Internal genitalia: Fig. 105.

Diagnosis.—*D. concinnus* female is diagnosed by the epigynum, which has a large, dark-colored, V-shaped mantle anterior to the plate (Fig. 79); viewed more from behind, the epigynum approaches in appearance that of *D. amoenus* (Fig. 77). There are clear

markings within the plate, rather similar to those of *D. alpha*; since there are only two females known, it is uncertain to what extent these markings vary in shape. *D. concinnus* is one of the larger species of the genus (total length ca. 1.8 mm).

Distribution.—Known only from the type locality, Arizona (Map 1D).

Natural History.—The females were adult at the end of September; the male was then ready for its final moult, and would probably have become adult in October. Nothing was recorded on habitat.

Disembolus corneliae (Chamberlin and Ivie), new combination

Figures 81, 82, 106; Map 1A

Soudinus corneliae Chamberlin and Ivie 1944:77

Type.—Female holotype from Demorest, Georgia, April 26, 1943 (W. Ivie); in AMNH, examined.

Description.—Only the female is known. Total length: female 1.95-2.0 mm. Carapace: length: female 0.75-0.80 mm. Orange-brown to brown, with dusky markings and black margins. Abdomen: grey to black; epigastric plates smooth. Sternum: brown, suffused with black. Legs: brown to orange-brown. Tibial spines: female 2221. TmI: female 0.50-0.55. Epigynum: Figs. 81, 82. The posterior plate is somewhat variable in appearance, depending probably on the transparency of the integument, and the size of the mantle also shows small variations; when viewed from behind, the mantle is much less visible. Internal genitalia: Fig. 106.

The material described as *D. corneliae* may prove to be the female of *D. sacerdotalis*; these two species have in common an unusually large size (for the genus), and both are found in the eastern part of the continent. Capture of the two sexes together, or at least in the same locality, would be necessary to confirm this suggestion.

Diagnosis.—*D. corneliae* female is diagnosed by the epigynum, which has a large, dark-colored mantle, trapezoidal in shape, anterior to the plate (Figs. 81, 82). There are clear markings within the plate, and although these show some variation they seem to be characteristic of the species. *D. corneliae* is one of the larger species of the genus (total length ca. 2 mm).

Distribution.—This species is known from New Jersey, Indiana, Georgia and S. Carolina (Map 1A).

Natural History.—The female has been taken in April and in "summer." Nothing was recorded on habitat.

Disembolus hyalinus, new species

Figures 80, 108; Map 1A

Type.—Female holotype from Lake Agnes, Alberta, August 4, 1927; deposited in AMNH. This specimen, in the S. C. Bishop Collection, consists of an abdomen only.

Description.—Although only the abdomen is present, I have little hesitation in recording this as a new species, since the epigynum indicates fairly conclusively that we are dealing with an undescribed species of *Disembolus*. The description is necessarily incomplete. Total length: probably ca. 2 mm, based on the abdomen length. Abdomen: length: 1.3 mm; grey-black, epigastric plates smooth. Epigynum: Fig. 80. Internal genitalia: Fig. 108.

Diagnosis.—*D. hyalinus* is diagnosed by the epigynum (Fig. 80). There is a dark line anterior to the plate, but no ledge or mantle; the plate is very glassy, and the markings visible are different from those of any other known species. *D. hyalinus* is probably one of the larger species of the genus.

Distribution.—Known only from the type locality, Alberta (Map 1A).

Natural History.—The female was taken in August; nothing was recorded on habitat.

ACKNOWLEDGEMENTS

I am indebted to the following colleagues for the loan of material: Dr. N. I. Platnick, American Museum of Natural History, New York; Prof. H. W. Levi, Museum of Comparative Zoology, Harvard University; Dr. C. D. Dondale, Agriculture Canada, Biosystematics Research Institute, Ottawa.

Drs. Platnick and Dondale gave some valuable help with the mapping, and Mr. F. R. Wanless and Mr. P. Hillyard (British Museum, Natural History) and Mr. G. H. Lockett (Stockbridge) provided me with some of the literature.

LITERATURE CITED

- Chamberlin, R. V. 1948. On some American spiders of the family Erigonidae. *Ann. Ent. Soc. America*, 41:483-562
- Chamberlin, R. V. and W. Ivie. 1933. Spiders of the Raft River Mountains of Utah. *Bull. Univ. Utah (Biol.)*, 23(4):1-53
- Chamberlin, R. V. and W. Ivie. 1944. Spiders of the Georgia region of North America. *Bull. Univ. Utah (Biol.)*, 35(9):1-267
- Chamberlin, R. V. and W. Ivie. 1945. Erigonid spiders of the genera *Spirembolus*, *Disembolus* and *Bactroceps*. *Trans. Connecticut Acad. Arts Sci.*, 36:215-235
- Crosby, C. R. and S. C. Bishop. 1933. American spiders: Erigoneae, males with cephalic pits. *Ann. Ent. Soc. America*, 26(1):105-182
- Millidge, A. F. 1980. The erigonine spiders of North America. Part 2. The genus *Spirembolus* Chamberlin (Araneae: Linyphiidae). *J. Arachnol.*, 8(2):109-158.
- Millidge, A. F. 1981. The erigonine spiders of North America. Part 3. The genus *Scotinotylus* Simon (Araneae: Linyphiidae). *J. Arachnol.*, 9:167-213

Manuscript received February 1980, revised May 1980.