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The Spider Genus *Mysmena* in the Americas (Araneae, Theridiidae)

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Several families of apneumone spiders have been described which superficially resemble the Theridiidae. Hickman (1931) established the family Symphytognathidae for a new genus lacking lungs, having only six eyes, and lacking palpi in the female. Fage (1937) and Gertsch (1941) have added genera to this family. Another family, the Tetricellidae, established by Hickman (1945), has an anterior pair of tracheal spiracles in place of the book lungs, and eight eyes. More recently, Marples (1955) established the Tamasesiidae, another apneumone family, having a peculiar tracheal system and eight eyes. Tamasesiidae has the type genus *Tamasesia* which is probably a synonym of *Mysmena*. The spiders belonging to all these families are minute in size; some have a tarsal comb, others not. The question is raised here whether the peculiarities in the respiratory system express phylogeny or are adaptations to small size, adaptations which evolved several times.

First I should call attention to the observation of Crosby and Bishop (1931, p. 360) that the position of the spiracle is sometimes of only specific value, at other times of generic value. Although Petrunkevitch (1933, p. 331) disagrees with this, there is evidence from the theridiids that this is so. *Dipoena provalis* Levi, a typical *Dipoena*, has the spiracle more anterior than any of its close relatives. There seems to be considerable variation in lungs and position of spiracles in *Mysmena*. A new small spider from California, described elsewhere and placed in a new theridiid genus, has only six eyes, and the leaves of the lung books are curiously

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modified, although the structure of the colulus, chelicerae, and genitalia suggests a close relationship to *Ctenium*.

Gertsch (1941, p. 1) has pointed out that the number of eyes in the symphytognathids is variable and that some females still have palpi, although these are reduced in size. One of the characters of many symphytognathids and textricellids, which has rarely been pointed out, is that the first pairs of legs of males may have strong spines on metatarsus or tibia, or may be modified, while the first pairs of legs in the female are normal. Another, slightly larger, genus, *Lucarachne*, described by Bryant (1940) as an argiopid in the subfamily Metinae, but recently placed by Kraus (1955) with the theridiosomatids, has similarly modified legs in the male, although it probably has lungs. Other characteristics which these groups have in common are that the carapace of the male, and sometimes also that of the female, is high and that the palpus of the male is relatively simple, lacking radix, median apophysis, and conductor, though the cymbium is frequently modified.

The genus *Mysmena*, which is revised in the present paper and which has always been considered a theridiid, has a number of characters in common with these other groups of small spiders. Among these characters are the modified first pairs of legs in males, the high carapace, and the structure of the palpi. The palpus of *Mysmena* is turned, so that the bulb faces dorsad, a characteristic also found in *Anapisona* and *Symphytognatha*. The anterior median eyes touch the laterals, a characteristic uncommon in theridiids but found in *Lucarachne*. The anterior edge of the labium of some larger species of *Mysmena* is swollen (rebordered) as is that of argiopids. This character is also found in *Lucarachne*. The genital furrow and the epigynum of *Mysmena* is located in an anterior position; the seminal receptacles are underneath the fourth coxae, and lungs are presumably reduced or absent. In *Anapisona* and *Risdonius*, which have been placed in the Symphytognathidae, the seminal receptacles are only slightly farther anterior, and lungs are believed to be absent.

A slight resemblance between *Mysmena* and *Theridiosoma* is only accidental. *Theridiosoma*, as do other argiopids, builds an orb web and has a paracymbium at the base of the cymbium. The structure of the palpus of *Theridiosoma* is very different from that of *Mysmena*.

This revision of *Mysmena* is based on the collection in the American Museum of Natural History made available by Dr. W. J. Gertsch. During the course of study of this difficult genus, Dr. Gertsch has made many suggestions and lent rare minute spiders. For his generous and continued help, I am deeply grateful. I am indebted to Drs. M. Vachon and E. Dresco of the Museum d'Histoire Naturelle in Paris for sending me in-

formation on the type of *Mysmena leucoplagiata*. I want also to thank Dr. H. Dietrich of Cornell University for the loan of additional specimens and my wife for editorial assistance.

All types are deposited in the American Museum of Natural History.

MYSMENA SIMON

Mysmena SIMON, 1894, Histoire naturelle des araignées, vol. 1, p. 588. Type species: *Theridion leucoplagiatum* Simon.

Microdipoena BANKS, 1895, Jour. New York Ent. Soc., vol. 3, p. 84. Type species: *Microdipoena guttata* Banks.

Calodipoena GERTSCH AND DAVIS, 1936, Amer. Mus. Novitates. no. 881, p. 8. Type species: *Calodipoena incredula* Gertsch and Davis. New synonymy.

Tamasesia MARPLES, 1955, Jour. Linnean Soc., London, vol. 42, p. 476. Type species: *Tamasesia rotunda* Marples. New synonymy.

Minute (0.5–2.0 mm.) spiders probably belonging to the family Theridiidae. Carapace slightly longer than wide, highest behind eyes. Anterior eye row straight to procurved if viewed from in front, posterior row straight or recurved if seen from above. Anterior and posterior lateral eyes touching; anterior median eyes touching anterior laterals (except in female of *M. cymbia*). Carapace of males modified, usually much higher than that of female, with anterior median eyes often a greater distance apart and sometimes at an angle facing towards the ground. Chelicerae with three to four (microscopic) teeth on the anterior margin of the furrow, one or two on the posterior. Labium of larger species swollen distally (rebordered). Sternum truncate between fourth coxae, which are separated by about their length. First legs longest, second leg second in length or subequal to fourth, third shortest. First and sometimes second femora of females with a distinct sclerotized spot on ventral side near distal end. Tarsal comb, typical of family, is lacking. Males often with first legs modified or with spines on metatarsus or tibia. Abdomen spherical or with a hump (*M. incredula*). Spiracles located near base of spinnerets in *M. cymbia* and *M. guianensis*, in others between base of spinnerets and genital furrow. The respiratory organs of two species, *M. incredula* and *M. guttata*, were examined by means of sodium hydroxide preparations. *Mysmena incredula* lacks lungs. From the spiracles extend bunches of trachea (fig. 19). In place of lungs are strands of trachea going anterior and to the sides. These trachea open through spiracles at each end of the genital groove. *Mysmena guttata* also has trachea extending from the spiracles between spinnerets and genital groove, but these are bunched for a shorter distance and seem connected at their base. In addition *M. guttata* has some structures between the seminal receptacles and the body wall which may be remains of book lungs but do not seem to be trachea.

A large colulus present (fig. 28). Sometimes colulus transparent and difficult to see.

Epigynum very close to pedicel, seminal receptacles located almost under fourth coxae. Epigynum sometimes just a swollen area or with a scape resembling that of argiopid spiders. Palpus twisted, bulb facing mesal or dorsal. The small size of the palpus makes study of it very difficult; however, it seems to consist only of a tegulum (T in figs. 11, 32, 43) and embolus (E). The other sclerites seem to have been lost. Cymbium (Y) often modified, usually transparent. Paracymbial hook lacking. Haematodocha attaches to a large area in cymbium.

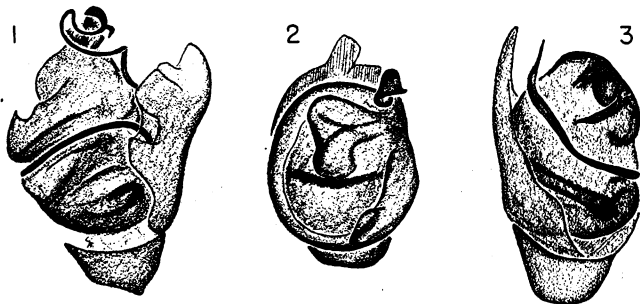
The small size, large colulus, lack of tarsal comb, anterior median eyes touching anterior laterals, as well as the spines on the first leg of males, the sclerotized spots on the first and second femora of females, and the twisted palpus readily distinguish this genus from other theridiid genera.

The habits of *Mysmena* are not well known. It is assumed that *Mysmena guttata* lives in dry litter, and Archer (1946) reports that it makes sheet webs like those of the linyphiids. In addition to the American representatives described here, species of *Mysmena* are known from southern France, North Africa, Ceylon, and the Philippines. Marples (1955) recently described two species from Samoa and placed them in a new genus (*Tamasesia*) which seems to be a synonym of *Mysmena*.

The following species from this region have been described in *Mysmena*, but do not belong to it:

Mysmena quadrimaculata Banks (1896, Trans. Amer. Ent. Soc., vol. 23, p. 66) belongs to a new genus, described elsewhere.

Mysmena bulbifera Banks (1896, *ibid.*, vol. 23, p. 66) is *Mimognatha foxi* (McCook).



FIGS. 1-2. *Mysmena leucoplagiata* (Simon). Left palpus. 1. Mesal view. 2. Dorsal view.

FIG. 3. *M. guianensis*, new species, palpus, ectal view.

Mysmena leucoplagiata (Simon)

Figures 1, 2

Theridion leucoplagiatum SIMON, 1879, Bull. Soc. Zool. France, vol. 4, p. 258.*Dipoena leucoplagiata*, SIMON, 1881, Arachnides de France, vol. 5, p. 117, pl. 26, fig. 2.*Mysmena leucoplagiata*, SIMON, 1894, Histoire naturelle des araignées, vol. 1, p. 588, fig. 590 (male).

One male and one juvenile female determined by Simon were found in the Cornell University collection. The color and general appearance are very much as in *M. guttata*. The carapace of the male, however, is higher than long. The female epigynum seems to have a scape as in *M. incredula*.

This species is found in France but is reported to be very rare.

Mysmena incredula (Gertsch and Davis), new combination

Figures 4-19, 48

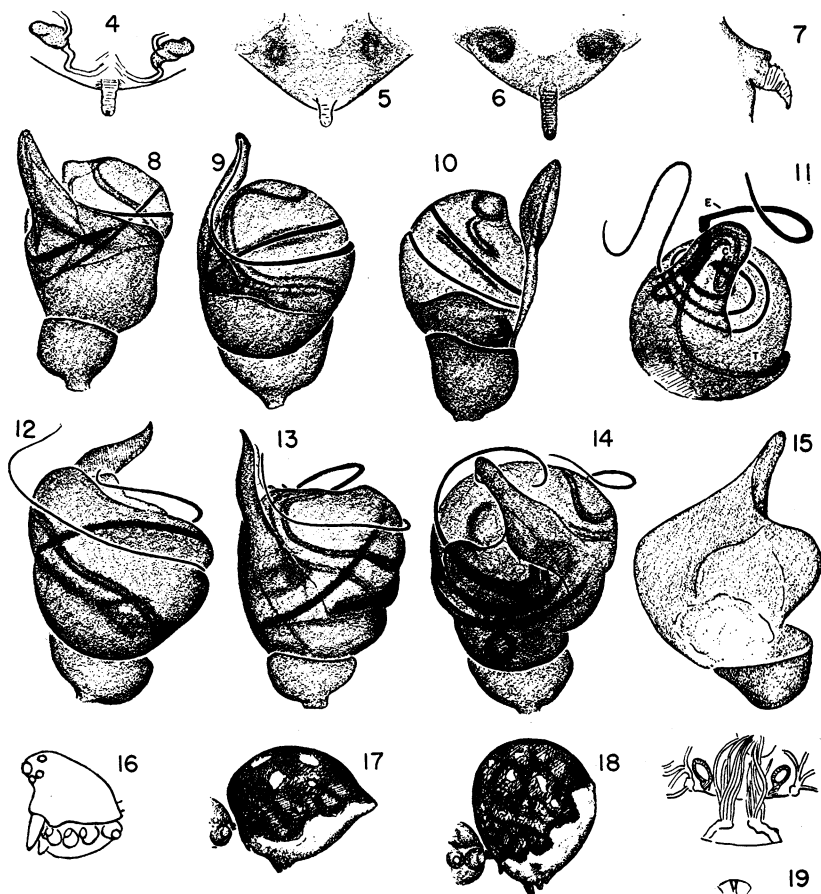
Calodipoena incredula GERTSCH AND DAVIS, 1936, Amer. Mus. Novitates, no. 881, p. 8, figs. 32, 33 (male). ROEWER, 1942, Katalog der Araneae, vol. 1, p. 417.

FEMALE: Carapace yellow-white, anterior half dusky to black, sides dusky. Sternum yellowish white, usually with two pairs of dusky marks. Legs yellowish, with dusky rings on ends of segments, or all dusky. Abdomen black, with light spots, except for the posterior portion which is white (figs. 17, 18). Posterior eye row slightly recurved. Eyes subequal in size. Anterior median eyes two-thirds to one and one-half of their diameter apart. Posterior eyes one-half to one diameter apart. Height of clypeus equal to about one diameter of anterior median eyes. Abdomen with a minute tubercle or a large hump. Epigynum (figs. 5, 6) with an indistinct scape of varying length. Total length, 0.8-1.1 mm. A specimen from Texas measured: total length, 1.00 mm.; carapace, 0.36 mm. long, 0.31 mm. wide; first femur, 0.32 mm.; patella and tibia, 0.34 mm.; metatarsus, 0.16 mm.; tarsus, 0.18 mm.; second patella and tibia, 0.30 mm.; third, 0.23 mm.; fourth, 0.29 mm.

MALE: Coloration like that of female. Posterior eye row straight. Sometimes anterior median eyes slightly larger than others. Anterior medians separated by one and one-half diameters. Posterior eyes separated by one-half to one diameter. Height of clypeus two and one-half to four diameters of anterior medians. First metatarsus with a median prolateral spine. Palpus (figs. 8-15) more or less spherical. Total length, 0.5-0.9 mm. A male from Texas measured: total length, 0.6 mm.; cara-

pace, 0.29 mm. long, 0.29 mm. wide, 0.25 mm. high; first femur, 0.29 mm.; patella and tibia, 0.32 mm.; metatarsus, 0.15 mm.; tarsus, 0.19 mm.; second patella and tibia, 0.29 mm.; third, 0.18 mm.; fourth, 0.23 mm.

On first examination this was thought to be a series of species. When it was noted that hardly two males, even when collected from near-by sites, had identical palpi, it was assumed to be one highly variable species.



FIGS. 4-19. *Mysmena incredula* (Gertsch and Davis). 4. Female genitalia, dorsal view. 5-7. Epigynum. 5-6. Ventral view. 7. Lateral view. 8-11. Palpus, Texas. 8. Submesal view. 9. Subventral view. 10. Subdorsal view. 11. Expanded, subventral view, diagrammatic. *Abbreviations:* C, conductor; E, embolus; T, tegulum. 12-15. Palpus, Colima. 12. Submesal view. 13. Subventral view. 14. Subectal view. 15. Cymbium from inside. 16. Male prosoma. 17-18. Female abdomen. 17. Colima. 18. Texas. 19. Female abdomen, showing trachea.

Most of the variation is not geographic. The abdomen of some specimens is long and stretched out, with a large hump (fig. 17); in Texas specimens, the abdomen is usually higher than long, with only a minute tubercle (fig. 18). The size of the eyes differed greatly. The scape of the epigynum may be so short as to be hardly visible, or it may extend halfway between the genital furrow and the base of the spinnerets, and in one specimen it reached the spinnerets. The carapace height differs in different males. The palpus of the male (figs. 12-14) from Morelos had the embolus consisting of two threads, while in all other males there was only one thread, although this varied greatly in thickness. It is assumed that the other one had broken off, as the base could still be seen in some specimens.

This species has been collected in soil and by sweeping.

TYPE LOCALITY: Male holotype, juvenile female allotype, and paratype from Cameron County, Texas, May, 1936 (L. I. Davis), in the American Museum of Natural History.

RECORDS: *Florida*: Collier County. *Texas*: Cameron County (several records); Hidalgo County. *Colima*: Arméria; Manzanillo; Potrero Grande; Cuyutlán. *Veracruz*: Atoyac. *Guerrero*: Río Blanco, Colotlipa; 62 miles north of Acapulco. *Chiapas*: Ocosingo Valley; Palenque Ruins. *Canal Zone*: Barro Colorado Island. *Cuba*: near Havana. *Jamaica*: Hardware Gap, 4000 feet. *Trinidad*: St. Augustine.

Mysmena guianensis, new species

Figure 3

MALE: Carapace yellow-white, eye region and clypeus dusky. Sternum yellow-white. Legs dusky. Abdomen black, with a lighter venter and posterior; lighter area separated by a white ring from darker portion. Posterior eye row recurved. Eyes subequal in size. Anterior medians four diameters apart. Posterior medians two-thirds of a diameter apart, one and one-quarter diameters from laterals. Height of clypeus equal to four diameters of anterior median eyes. First leg with a strong spine at middle of metatarsus. Palpus, which differentiates this species from others, illustrated by figure 3. Measurements: total length, 0.5 mm.; carapace, 0.26 mm. long, 0.26 mm. wide, 0.19 mm. high; first femur, 0.23 mm.; patella and tibia, 0.26 mm.; metatarsus, 0.14 mm.; tarsus, 0.15 mm.; second patella and tibia, 0.23 mm.; third, 0.18 mm.; fourth, 0.20 mm.

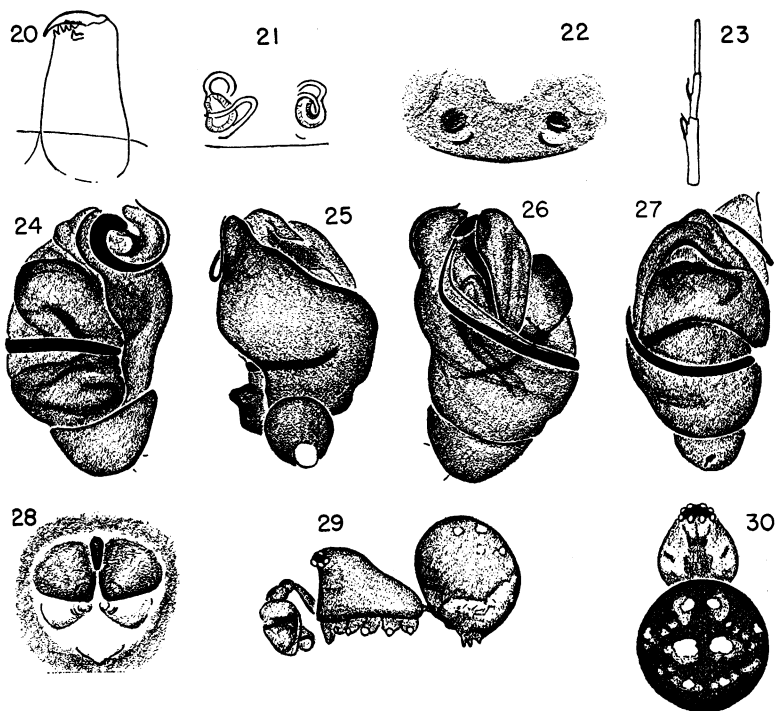
TYPE LOCALITY: Male holotype from Kartabo, British Guiana, 1924, collected by sifting litter.

Mysmena guttata (Banks)

Figures 20-30, 48

Microdipoena guttata BANKS, 1895, Jour. New York Ent. Soc., vol. 3, p. 85; 1903, Proc. Ent. Soc., Washington, vol. 5, p. 106; 1910, Bull. U. S. Natl. Mus., no. 72, p. 22. PETRUNKEVITCH, 1911, Bull. Amer. Mus. Nat. Hist., vol. 29, p. 184.

Mysmena guttata, CROSBY, 1925, Canadian Ent., vol. 57, p. 50. BISHOP AND CROSBY, 1926, Jour. Elisha Mitchell Sci. Soc., vol. 41, p. 177, pl. 22, fig. 22 (male). CROSBY AND BISHOP, 1928, Mem. Cornell Univ. Agr. Exp. Sta., no. 101, p. 1040. COMSTOCK, 1940, The spider book, rev. ed., p. 381. ROEWER, 1942, Katalog der Araneae, vol. 1, p. 394. CHAMBERLIN AND IVIE, 1944, Bull. Univ. Utah, biol. ser., vol. 8, no. 5, p. 45. ARCHER, 1946, Paper Alabama Mus. Nat. Hist., no. 22, p. 17. KASTON, 1948, Bull. Connecticut Geol. Nat. Hist. Surv., no. 70, p. 93.



FIGS. 20-30. *Mysmena guttata* (Banks). 20. Left female chelicera from below. 21. Female genitalia, dorsal view. 22. Epigynum. 23. Left first leg of male, ventral view. 24-27. Left palp. 24. Mesal view. 25. Ventral view. 26. Ectal view. 27. Dorsal view. 28. Colulus and spinnerets of female. 29. Male. 30. Female.

FEMALE: Carapace light brown, with a narrow black band around margin, sometimes with dusky spots. Sternum light yellow-brown, sides darker. Legs light brown, distal segments darker. Abdomen brown, with white spots, posterior and ventral portions of abdomen lighter (fig. 29), area around spinnerets dusky. Posterior eye row straight. Eyes subequal in size. Anterior medians one diameter apart. Posterior eyes three-quarters to one diameter apart. Height of clypeus equals one and one-quarter diameters of anterior medians. Epigynum (fig. 22) with two dark spots almost underneath the coxae and an indistinct line between spots and genital furrow. Total length, 0.9–1.3 mm. Measurements of a specimen from New Jersey: total length 1.3 mm.; carapace, 0.47 mm. long, 0.39 mm. wide; first femur, 0.43 mm.; patella and tibia, 0.44 mm.; metatarsus, 0.23 mm.; tarsus, 0.26 mm.; second patella and tibia, 0.39 mm.; third, 0.27 mm.; fourth, 0.36 mm.

MALE: Coloration slightly lighter than that of female. Posterior eye row slightly recurved. Anterior median eyes one diameter apart, posterior eyes less than one diameter apart. Height of clypeus equals about four diameters of anterior median eyes. Palpus and distal segments of first leg illustrated by figures 23–27. Total length, 0.7–0.8 mm. A male from Florida measured: total length, 0.7 mm.; carapace, 0.36 mm. long, 0.36 mm. wide, 0.32 mm. high; first femur, 0.38 mm.; patella and tibia, 0.41 mm.; metatarsus, 0.21 mm.; tarsus, 0.25 mm.; second patella and tibia, 0.32 mm.; third, 0.26 mm.; fourth, 0.29 mm.

TYPE LOCALITY: Six syntypes found under dead leaves in dry woods, on Long Island, New York, in the Museum of Comparative Zoölogy.

RECORDS: *Massachusetts*: Barnstable County. *New Jersey*: Bergen County. *Virginia*: Alleghany County. *Tennessee*: Benton County. *North Carolina*: Buncombe County; Mecklenburg County. *Georgia*: Rabun County (Bishop and Crosby, 1926; Chamberlin and Ivie, 1944). *Florida*: Highlands County; Lake County; Martin County. *Alabama*: Calhoun County; Clarke County; Hale County; Jackson County. *Missouri*: Butler County.

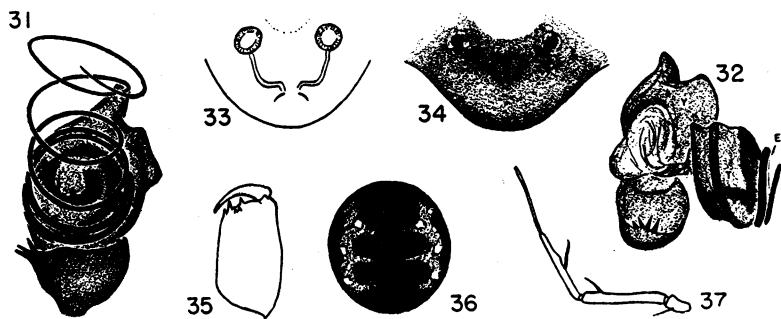
Mysmena ixlilla, new species

Figures 31–37

FEMALE: Carapace brown. Sternum dark brown, legs lighter brown. Abdomen dark gray, dorsum with a lighter pattern on which are white spots (fig. 36), lighter pattern quite variable. Posterior eye row straight. Eyes subequal in size. Anterior medians one diameter apart. Posterior medians two-thirds of a diameter apart, one diameter from laterals.

Height of clypeus equal to two diameters of anterior median eyes. Openings of epigynum probably underneath lobe; dark spots almost below fourth coxae; sometimes with light spots in middle (fig. 34). Total length, 1.5–1.7 mm. Measurements of female allotype: total length, 1.5 mm.; carapace, 0.62 mm. long, 0.55 mm. wide; first femur, 0.78 mm.; patella and tibia, 0.79 mm.; metatarsus, 0.45 mm.; tarsus, 0.40 mm.; second patella and tibia, 0.68 mm.; third, 0.55 mm.; fourth, 0.65 mm.

MALE: Anterior median eyes at a slight angle, facing towards ground. Posterior medians one diameter apart, one-half of a diameter from laterals. Height of clypeus equal to two and one-half diameters of anterior median eyes. A strong distal prolateral spine on first tibia, and a strong median prolateral spine on first metatarsus. Palpus with a spiral embolus (fig. 31). Total length, 1.0–1.2 mm. Measurements of male holotype: total length, 1.2 mm.; carapace, 0.59 mm. long, 0.55 mm. wide; first femur, 0.73 mm.; patella and tibia, 0.80 mm.; metatarsus, 0.49 mm.;



FIGS. 31–37. *Mysmena ixhlita*, new species. 31–32. Palpus. 31. Dorsal view. 32. Dorsal view expanded. *Abbreviations:* E, embolus; T, tegulum; Y, cymbium. 33. Female genitalia, dorsal view. 34. Epigynum. 35. Left female chelicera from below. 36. Female abdomen, dorsal view. 37. Left first leg of male, prolateral view.

tarsus, 0.45 mm.; second patella and tibia, 0.73 mm.; third, 0.52 mm.; fourth, 0.70. mm.

The genitalia distinguish this species from related ones.

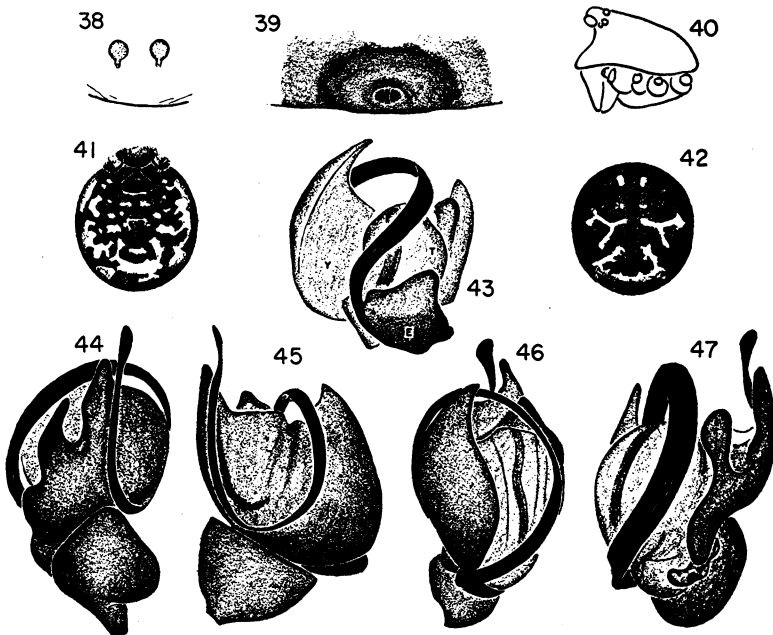
TYPE LOCALITY: Male holotype, female allotype, a male and female paratype from Ixlitla, San Luis Potosí, Mexico, December 2, 1939 (A. M. and L. I. Davis).

RECORD: *Guerrero*: Mexcala, July 2, 1941 (L. I. Davis), one male.

Mysmena cymbia, new species

Figures 38-47

FEMALE: Carapace, sternum black. Legs yellow to orange; patellae black, black bands on ends of femora, tibiae, and tarsi. Abdomen black, with a characteristic light pattern (figs. 41, 42). Posterior eye row straight. Diameter of lateral eyes one-half of that of anterior medians; posterior medians of intermediate size. Anterior medians one diameter apart, one-quarter of a diameter from laterals. Posterior eyes a little more than diameter of medians apart. Height of clypeus equals one and one-quarter diameters of anterior median eyes. Abdomen spherical. Epigynum (fig. 39) with a depression containing a septum located on top of a knob. Measurements: total length, 1.8 mm.; carapace, 0.71 mm. long, 0.68 mm. wide; first femur, 0.66 mm.; patella and tibia, 0.72 mm.; metatarsus, 0.39 mm.; tarsus, 0.38 mm.; second patella and tibia, 0.63 mm.; third, 0.51 mm.; fourth, 0.62 mm.



FIGS. 38-47. *Mysmena cymbia*, new species. 38. Female genitalia, dorsal view. 39. Epigynum. 40. Male prosoma. 41-42. Female abdomen. 41. Ventral view. 42. Dorsal view. 43-47. Palpus. 43. Expanded, subectal view. Abbreviations: E, embolus; T, tegulum; Y, cymbium. 44. Mesal view. 45. Ventral view. 46. Ectal view. 47. Dorsal view.

MALE: Coloration slightly lighter than that of female. Anterior median eyes one diameter apart, touching laterals. Posterior row separated by about one diameter. Height of clypeus equal to three diameters of anterior median eyes. Clypeus cutting under median eyes, but projecting below. First metatarsus with a prolateral spine. Cymbium of palpus modified to serve as embolus support (figs. 43-47). Measurements: total length, 1.5 mm.; carapace, 0.62 mm. long, 0.60 mm. wide, 0.18 mm. high; first femur, 0.62 mm.; patella and tibia, 0.72 mm.; metatarsus, 0.39 mm.; tarsus, 0.38 mm.; second patella and tibia, 0.62 mm.; third, 0.47 mm.; fourth, 0.60 mm.

The genitalia readily distinguished this species from others.

TYPE LOCALITY: Male holotype from Perrine, Dade County, Florida, November 25, 1952 (A. M. Nadler).

RECORD: *Florida*: Lake County, Leesburg, March 1-11, 1954 (M. Statham), one female.

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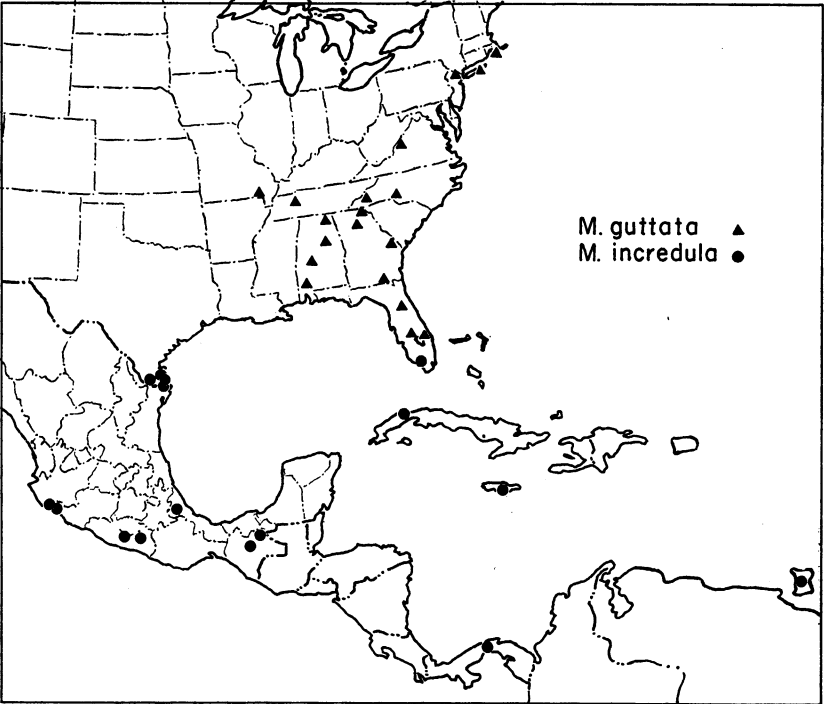


FIG. 48. Distribution of *Mysmena guttata* and *M. incredula*.

