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VOLUME 106 : ARTICLE 4    NEW YORK : 1955





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Volume 106, article 4, pages 221–254, text figures 1–48,  
plates 3–6, table 1

*Issued June 6, 1955*

*Price: 75 cents a copy*



## INTRODUCTION

THE SPIDER TRIBE Mastophoreae of the family Argiopidae comprises a rather small group of spiders which are notable for their curiously formed and sculptured bodies, for the precocious development and small size of the males, and especially for the unique method they employ to ensnare flying insects. The ancestors of the group, undoubtedly stemming from stock using the conventional orbweb, seemingly gained access to all the principal land areas and attained wide distribution in tropical and subtropical areas of the world. No species are known from temperate Eurasia or North Africa. The six known genera still show only modest divergence from one another in important morphological features and close correspondence in habits and peculiarities. Representative genera now occur principally in three centers, two in tropical and southern Africa, two in Oriental Asia from India and Malaya southward through the East Indies into New Guinea and Australia, and two in the Americas. The American genus *Mastophora* has an exceptionally wide distribution, pressing far northward into the temperate zone to New Hampshire and Minnesota and extending southward through tropical America into southern Chile. The second American genus, *Agatostichus*, has a wide but discontinuous distribution; one species occurs in the state of Bahia, Brazil, the other in the lower Rio Grande Valley of Texas, and each is known from a single adult female.

The present paper is largely concerned with the North and Central American representatives of the Mastophoreae. A brief comparative résumé brings up to date our knowledge of the biology and natural history of these extraordinary spiders. This is followed by a systematic section based on a study of all material available to me from museums in the United States and from personal collections of individuals. A very substantial percentage of the total accumulation of material is to be found in the American Museum of Natural History, where the types of the six new species are deposited.

My especial interest in this group dates from 1946 when Mr. Charles E. Hutchinson of Glendale, California, brought to my attention his pioneer work on the biology of *Mastophora cornigera* Hentz. His careful study of 1903 was completely unknown to

me, to other American arachnologists, and to spider students all over the world. Even Dr. Nathan Banks, who identified Hutchinson's species and made mention of its capturing technique in a paper on California spiders, had completely forgotten the matter when I discussed it with him. A generation literally had forgotten Hutchinson's work, and it received no notice in the Zoological Record. Therefore, it is particularly gratifying for me to acknowledge this classic work by Mr. Charles E. Hutchinson and the much useful information he gave to me in recent correspondence.

I also take this opportunity to express my gratitude for loans and gifts of material from the following individuals and institutions: Dr. Edwin Chapin, formerly of the United States National Museum, Washington, D. C.; the late Miss E. B. Bryant and Dr. Philip J. Darlington, Jr., of the Museum of Comparative Zoölogy, Cambridge, Massachusetts; Dr. Henry Dietrich of Cornell University, Ithaca, New York; Dr. B. J. Kaston of the Connecticut State Teachers College, New Britain, Connecticut; Dr. M. H. Muma of the Florida State Experiment Station, Lake Alfred, Florida; Dr. H. K. Wallace of the University of Florida, Gainesville, Florida; Dr. H. E. Frizzell of Rolla, Missouri; Dr. Allan F. Archer of Union University, Jackson, Tennessee; and Mr. Walker Van Riper of the Denver Museum, Denver, Colorado.

The illustrations used in this paper represent the work of several individuals to whom I proffer my sincere thanks. The project was begun several years ago by the late Mrs. Alma Froederstrom who prepared dorsal and frontal views of the species then available in the American Museum collection. At about the same time the figures of *Agatostichus leucabulba* and various epigynal drawings were prepared by Mr. Wilton Ivie. Miss Alice Gray painted the several illustrations of the egg sacs from specimens in the American Museum collection. The three photographs of *Mastophora bisaccata* were generously furnished to me by Mr. M. W. Tyler of Umatilla, Florida. Finally, it remained for Miss Marjorie Statham to complete the project with the addition of numerous new drawings and the mounting of the whole series for reproduction.

## BIOLOGICAL MISCELLANEA

THE MASTOPHORIDS substitute an extraordinary snaring technique for the conventional aerial orbweb trap of their relatives. Hanging from a horizontal trapeze line, they pull out a short thread from their spinnerets, weight the end with a globule of viscid silk, and then hurl it at insects that fly within reach. The picture of a mastophorid (pl. 3) with its fishing line held in casting position is a most dramatic one. Even more amazing is the series of exacting actions necessary to the fashioning of this ingenious tool. The fishing line is drawn out, and we watch the spider press out viscid droplets from the spinnerets and sweep them forward with the combs on the hind legs until there is built up a shining bola. Meticulous care is evident in every step from the stringing of the trapeze lines to the snipping of the line below the bola and the assumption of the casting stance. At intervals the line and globule are rolled up, eaten, and then replaced by a fresh line.

Nothing was known about the casting technique of the mastophorids until 1903 when Charles E. Hutchinson of Glendale, California, published an article entitled "A bolas-throwing spider" in the *Scientific American*. Inasmuch as this vivid description of the habits of the "bolas spider" is largely unavailable to spider students, a substantial portion of the article is reproduced below:

"At night-fall the spider (*Mastophora cornigera* Hentz) crawls out to one of the outermost branchlets and there engages in a most wonderful operation.

"The branchlet selected is always one that retains a clear space of at least two or three inches below it when depressed by the spider's weight. A few short threads are first placed irregularly about the extreme tip of the branchlet and along its under side for a distance of several inches, while additional threads are carried out to adjacent branches to lend stability to the part.

"The spider now hangs back downward by its legs to the lower threads stretched along the under side of the branchlet. Attaching a new thread to one of the others near one end, it crawls along the horizontally inclined threads below the branchlet, drawing out the new thread the while from its

spinning organ to the length of about two inches. The thread naturally falls below the others, the spider taking care that it shall remain free from entanglement.

"The spider with its newly drawn thread still attached now exudes a very small quantity of viscid matter upon the thread at its juncture with the spinnerets. No other part of this thread bears any viscid matter nor is any subsequently added.

"Pressing the tips of its hind legs firmly upon the thread it pushes each leg backward, alternately, allowing the thread to slip between the short, stiff hairs which clothe them. With each extension a small quantity of viscid matter is pushed outward and away from the abdomen as far as the leg will reach. At the end of about twenty seconds, during which time each leg is extended eight or ten times, there results a globule averaging about 3-32 inch in diameter.

"This finished, the spider undertakes to release itself by severing the line between its body and the globule. Obviously to release the ball suddenly, fastened as it is to a nearly horizontal line, would be to allow an oscillation which might readily result in some sort of entanglement and the consequent destruction of the pendulum. To guard against such an occurrence the spider first lengthens the line by playing it out hand over hand, as it were, precisely as a human might perform a like operation, save that legs were used in the place of arms, the foot being well fitted to grasp and hold a thread.

"The ball having been carefully lowered until its supporting line hangs vertically, or nearly so, the thread running to the spider is severed by a dexterous movement of the clawed foot, the free end losing itself in the globule. As soon as the thread is cut the spider turns about and approaching the pendulum thread seizes it from above with its legs. In this act the performer hangs by two or more of the legs of one side to the horizontally inclined thread to which the pendulum thread is attached.

"Reaching well down with one of its long, arm-like fore legs it grasps the pendulum thread between the claws with which the leg is tipped, about half an inch above the ball. By a few well directed movements of



the other limbs the upper part of the thread is quickly passed under one of the short palps or mouth appendages from which the thread continues to its point of attachment to the main line, the upper portion more often remaining slack. The two fore legs extend horizontally to their full length like the shafts of a wagon save that one is above the other.

"If the writer's description is clear the reader now perceives the spider holding in its hand, as it were, a line to the lower end of which is attached a globule; the whole forming a most singular and ingenious contrivance designed for a useful purpose. In this position the spider may remain by the half-hour scarcely moving except to lower its weighted leg for a brief interval from time to time, presumably to rest it. Should the spider remain in this attitude for thirty or forty minutes the verdant observer may be astonished to see the ball carefully transferred to the spider's mouth and disappear forthwith. I have tried to find a reason for this action and think one may be found in the impaired viscosity of the globule due to exposure, as this, transferred to a piece of glass, seems to show deterioration at the end of an hour. Should the ball be swallowed a new one is made, usually within a few minutes, and hung out as was the other.

"If now the observer is to be rewarded he will see, by the light of the moon, a large moth approaching, flying slowly along as though searching for something. As the marked victim draws near the spider gathers itself for a supreme effort. The ball-supporting leg points straight down. The body swings about, if necessary, to assume a favorable position with reference to the moth. As the insect comes within the carefully measured limit the spider draws back the bolas supporting leg and with a pendulum-like movement swings it rapidly forward in the direction of the moth. The ball is directed with almost unerring aim and finds lodgment on some portion of the victim. In nearly every instance it strikes a wing, a part to which it is probably particularly directed. Its violent contact with that rapidly moving member insures a wide and firm attachment.

"The moth finding itself fast flutters violently in an attempt to free itself, but the assailant drops quickly down from its trapeze

and sinks its fangs into a vital part. In its descent it follows along the bolas line, but is supported by a new thread which it spins as it goes—an admirable provision against a fall. By reason of the poison injected the moth is soon paralyzed, after which it is carefully enswathed in bands of silk."

The capturing device of *Mastophora* so ably described by Hutchinson seemingly represents the heritage of the whole tribe Mastophoreae. This basic habit was carried by ancient forbears into the present centers, and the instinctive pattern has been little modified by the long isolation. At present, representatives of three of the six genera are known to hurl the bolas, and the remaining genera no doubt will be found to conform to the conventional practice.

Nearly 20 years after Hutchinson's work on *Mastophora cornigera*, Heber A. Longman (1922, pp. 91–98) of Brisbane described the similar angling methods used by the Australian *Dicrostichus magnificus*. The technique is the same, but the name "angler spider" very appropriately designates these spiders of a distinct genus. Longman knew nothing of earlier work on the group. His article makes exciting reading rarely found in scientific papers. Quotations from Longman's work and additional notes on the angler spiders, some of which were provided quite recently by Mrs. W. Rowan Lowry of New South Wales, may be found in McKeown's "Spider wonders of Australia" (1936, pp. 93–109) and in the enlarged reprint of the same book now entitled "Australian spiders" (McKeown, 1952, pp. 96–106). An excellent figure depicting the hairy imperial spider (*Dicrostichus furcatus*) with its fishing line and attached sticky globule may be found in both books, in the first having the deserved place of honor as the frontispiece.

Although the work of Conrad Akerman (1923, pp. 83–88, pl. 6) of Pietermaritzburg, South Africa, came one year after that of Longman, he had made some observations on *Cladomelea* as early as 1915, but seemingly was unable to interpret the meaning of the strange things he observed. *Cladomelea akermani* spins the trapeze lines and attaches the same perpendicular line with a heavy viscid globule at its end as do the other mastophorids. An excellent photograph showing her holding the device may be found as part

of plate 6 in Akerman's article. However, the weighted line is held by the short third leg and whirled rapidly with a rotary motion in a horizontal plane, as is a whirligig. After about 15 minutes of whirling in such strenuous fashion, *Cladomelea* pauses to rest and renew the line. As usual the old line and globule are rolled up and eaten. The whirligig innovation of *Cladomelea* is undoubtedly a derivation from the conventional practice. Perhaps other deviations in the capturing technique exist among the genera with unrecorded habits.

A quite full description of the biology and habitus of the mastophorids can be found in my popular article entitled "Spiders that lasso their prey," published in *Natural History* (Gertsch, 1947, April, pp. 152-158, 189). Several excellent illustrations show the egg sacs, the spiderlings, and the adults of *cornigera*. In addition, a discussion of the still unanswered problems in biology and a certain amount of speculation about number of molts of the males and the origin of the bolas habit are included. Excellent motion pictures of *Mastophora cornigera*, from the Los Angeles area, have been prepared by the Moody Bible Institute as a part of their film called "Prior claim." As time goes on, the extraordinary activities of the bolas spiders will be seen by an increasingly larger number of people.

The habits of *Mastophora bisaccata* are now known to correspond very closely to those of *cornigera*. This is attested by study of photographs, made available to me through the generosity of Mr. M. W. Tyler, of Umatilla, Florida, showing a fine female of *bisaccata* lowering her casting line (pl. 4) and in the conventional resting stance (pl. 3) while awaiting the appearance of prey. A third photograph (pl. 5) shows the female with her completed egg sac. Mr. Tyler noted some variability in the casting technique of this female, so I am including here a paragraph from his letter: "Her use of the bolas was interesting and rather variable. Most of the time the line was lowered close to its natural point of equilibrium and at others it was held very short, too much so to be effective. Twice the line held two drops, one 5 or 6 mm. above the other; and once the line was coated over half the length but no drop was formed. Any of these conditions

seemed satisfactory to her. Only once did I see her discard the old line for a new one and that only after the line had been in use for over an hour."

Nothing seems to have been published about the bolas habits of the South American mastophorids. However, as early as 1931 Mello-Leitão attributed the same curious capturing device (well known then in *Dicrostichus* and *Cladomelea*) to the entire Mastophoreae. During his visit to the United States in 1948, just a few months before his death in December of that year, Mello-Leitão told me that the activity had been observed in *Mastophora carpogastera*.

The life span of the species of *Mastophora*, at least in the north, seems to be only one year. The adult females, which are seemingly available only during the summer or later months of the year, produce egg sacs in the fall and then die. In the south and in southern California egg sacs may be produced very late, but only rarely do the females live for a few weeks into the new year beyond the normal yearly span. The males live a shorter period, probably several months less than the females.

In my popular article of 1947 the precocious development of the males of *Mastophora cornigera* was first brought to general attention. An estimate based on data from study of the contents of various egg sacs was made on the number of molts necessary to attain full maturity in that sex. The number of true molts was thought to be only two, and, if true, this number is the smallest recorded for any known spider. The first molt in the mastophorids presumably produces the penultimate stadium with enlarged palpi. The second molt produces fully developed males with seemingly functional palpi, comparable in appearance to adult males in more typical spiders. From an egg sac of *cornigera*, sent to me from California by Mr. C. E. Hutchinson, there emerged 147 spiderlings, of which 72 were immature females and 75 mature males. The ratio of males and females in this batch suggests an essential equality in the sex ratio for this species. The emergence of these fully developed males, along with juvenile females presumably also in the second stadium, occurred on September 1. Fall and early winter emergence seems not to be uncommon in California *cornigera*, and



we can presume that it occurs in egg sacs produced early in the season. Spring emergence may be the more normal occurrence. In all the instances so far noted the males have been fully developed when they left the sacs.

In colder parts of the country emergence of the spiderlings is seemingly most often delayed until spring. According to Emerton (1884, p. 325) the young of his *bisaccata* from Pine Swamp, near New Haven, Connecticut, came out of the sac in June, but he failed to note the stage they represented. In this connection, there should be mentioned the egg sacs of *bisaccata* from Billerica, Massachusetts, in the Museum of Comparative Zoölogy, which were kept in a warm room and from which a number of spiderlings emerged on February 20, 1923 (Kaston, 1948, p. 232). Some of the young had the palpi enlarged and were obviously males in the penultimate stage. However, this sac had been cut open, so the data do not pertain to normal field emergence. There is a vial in the Cornell collection containing a penultimate male and a juvenile female of *hutchinsoni* with data indicating they were taken on *Crataegus* at Ithaca, New York, on July 6, 1922. This record suggests that emergence is practiced in the penultimate stage in this species, at least on some occasions. More exact information is needed on emergence of the eastern species.

The male of *Mastophora bisaccata* was described and illustrated by McCook as early as 1893, and three additional North American species are now known from that sex. The males of the other mastophorid genera are still largely unknown. In his "Classification of spiders," W. S. Bristowe (1938, Proc. Zool. Soc. London, vol. 108, p. 289) mentions "the unique development of the male palpal organs to a state not very different from that found in the adult creature when it first emerges from the egg-sac" in the Australian *Dicrostichus magnificus*. Additional biological information on males of this species is included in McKeown's "Australian spiders" (1952, pp. 104-106, with 2 figs.) and is to be credited to studies made by Mrs. W. Rowan Lowry. The details on the molts, the precocious development of the males, and the emergence of the spiderlings seem to be the same as in the

American *Mastophora*. The illustration of the male fails to show a row of strong bristles on the first legs, but its absence is probably due to the license of the illustrator.

The egg sacs of the mastophorids are variable in form and texture. In *Mastophora* they are globose or subspherical cups which are drawn out into a thick stem or stalk of variable length. An inner padding of whitish floss encloses the egg mass, and this is covered by an extraordinarily tough outer envelope which is often gray, blackish, or brown in color and overlain with pale whitish or bluish silk. The sacs (8-12 mm. in diameter with stems from 8-36 mm. long) are about the same size as the female spiders and resemble plant buds, nuts, or small dried fruits of various plants. In typical species (*cornigera* Hentz, see pl. 6, fig. 2; and *extraordinaria* Holmberg) the sac is smooth around the equator at the juncture of the two sheets which go to make up the sac. In others (*bisaccata* Emerton, pl. 6, fig. 4; and *archeri*, new species) the equator is fringed by a series of small blunt points or more conspicuous scallops. In *phrynosoma*, new species, the sac is margined by four or five conspicuous wings or fins, as shown in plate 6, figure 5.

One, two, or several egg sacs often exhibiting considerable difference in size are produced by a single female. Three to five sacs, produced at intervals of about 10 days, are credited to *cornigera* by Hutchinson. These are fastened in various ways to leaves, twigs, or branches by irregular silken lines. Ordinarily the basal cup is suspended by the stem (pl. 6, fig. 5), which is attached to the substratum by numerous lines, and the whole guyed by additional lines. In *Mastophora hutchinsoni*, new species (pl. 6, fig. 3), the cup is securely lashed to a twig with the stem free. Multiple egg sacs are often aligned parallel to a branch, and the cluster is securely guyed by numerous lines (pl. 6, figs. 1, 4). There seems to be considerable variability in the fashioning of the egg sacs by females of the same species. In *Mastophora bisaccata* the sacs may be smooth around the equator (pl. 5; pl. 6, fig. 1), set with small points, or provided with quite conspicuous scallops (pl. 6, fig. 4), and they are suspended in various ways.

The egg sacs of at least two of the South

American species are known. Those of *Mastophora extraordinaria*, described and illustrated by Juan Brèthes (1909, p. 167, fig. 2), are quite similar in appearance and size to those of *cornigera*. One of the sacs which he examined (five are shown in his illustration) contained about 530 perfectly round, yellowish eggs of about 1.1 mm. in diameter. An excellent photograph of the egg sacs and nest of *M. carpogastra* can be found in Vellard's 1926 paper, under the name of *Glyptocranium fragoides*. The two egg sacs are perfectly spherical, about the same size as the female spider, and they are suspended by thin, short stems.

Conrad Akerman (1923, pp. 83-88, pl. 6) has described in excellent fashion the general characteristics and the spinning of the egg sacs of the South African *Cladomelea akermani*. The sacs, which are usually found on long grass in the veld and not on shrubs, are set in a row along the grass stems, and their appearance suggests the fruit of some shrub. The spherical or slightly pear-shaped sacs, varying in number from one to six for a female, are provided with short, thin stems.

The egg sacs of the Australian *Dicrostichus magnificus* must be counted among the most remarkable examples of spinning produced by a spider. Each fusiform sac, 3 or 4 inches long and nearly an inch in diameter, is fabricated by the half-inch female after nearly 10 hours of continuous spinning. Clusters of five, six, or even seven of these pale yellowish bags, which have a resemblance to the cocoons of silk moths and are called by "the descriptive but not very poetical name of cow's teats" by Queensland children, are not uncommon. Each sac contains about 600 eggs, so the average female may produce as many as 3600 eggs. A fine account of the spinning of such a sac was given by Longman (1921, pp. 91-97, pls. 6, 7) along with photographs of the sacs. All of this was republished in "Spider wonders of Australia" (McKeown, 1936, pp. 93-101) and in "Australian spiders" (McKeown, 1952, pp. 97-100).

The species of *Mastophora* seem not to show much preference in their choice of hunting or nesting sites. In the eastern United States they are found on shrubs or trees rarely under 5 feet above the ground, and occasionally up to a height of 10 or even

20 feet. Banks mentions one southern species as being common on corn, but the total number of specimens in collections indicates that all the eastern species must be regarded as being quite uncommon. In California, where these spiders are said to occur in vineyards and on a variety of different shrubs and trees, Hutchinson found his *cornigera* "less rarely on low-branching cypress trees." Specimens of all ages may occasionally turn up in the sweeping or beating of vegetation. Most often, however, the egg sacs are noticed, and then the spider is found near by.

The resemblance of the mastophorids to common objects has been mentioned in many reports on this group, and the inference has been drawn that they derive some protection from it. Their lumpy bodies, prolonged inactivity, and close correspondence to the forms and colors in their microhabitats contribute to make more plausible such characterizations. In North Carolina, George Atkinson (1887, p. 28) was at first deceived by our *Mastophora bisaccata* (his *multilineata*) which, when clinging with retracted legs to the under side of leaves, was almost an exact copy in color and shape of one of the snails frequenting this habitat. Several species have been likened to bird dung, and the appellation "bird dropping spider" is suitable to any of the species from the United States. When *Mastophora extraordinaria* first came to the attention of Juan Brèthes (1909, p. 168), so great was its resemblance to bird excrement that, had it dropped to the ground at that moment, he said that he would not have bothered to try to secure it. When alive, the abdomen of the Brazilian *Mastophora carpogastra* was said by Mello-Leitão (1925, p. 461) to resemble a raspberry. The Chilean *Mastophora gasteracanthoides* received the common name of cat's head spider (*araña cabeza de gato*) because of resemblance of the abdomen (in rear aspect) to the head of a cat (Porter, 1917, p. 131; 1918, p. 143). The same spider, dubbed *araña podadora* because of its presumed venomous properties, according to Escomel (1918), lives in the vineyards around Arequipa and resembles a new bud of the grape vine. Its reputation of biting field workers and causing dangerous hematoxic poisoning probably should be awarded to some other spider or arthropod.



## SYSTEMATIC SECTION

### TRIBE MASTOPHOREAE

Glyptocraniae SIMON, 1895, Histoire naturelle des araignées, vol. 1, pp. 881–887.

Mastophoreae MELLO-LEITÃO, 1931, An. Acad. Brasileira Cien., vol. 3, pp. 65–74.

This group, or tribe, comprises six genera of araneine spiders. The broad carapace is surmounted by an outgrowth of conspicuous spines, lobes, or processes which are variously arranged according to the genera. The legs, completely devoid of true spines, are of unequal length, the first pair being very much longer than the last. However, in the males and juvenile females, the first legs are armed on the prolateral side with a regular series of strong bristles approaching true spine size which runs from the patella to the tarsus. The obese, voluminous abdomen is quite coriaceous, often strengthened by enlarged muscle scars and sclerotized lines and reticulations, and variously provided with humps, lobes, and cones, and sometimes ornamented with modified hairs and hair tufts.

The six known genera and the 42 named forms, which include those described in this paper, are distributed geographically as follows: *Cladomelea* Simon, 1895, in Africa (three species); *Acantharanea* Strand, 1929, in Africa (six species); *Ordgarius* Keyserling, 1886, in Oriental Asia and the East Indies (five species), New Guinea (one species), and Queensland (one species); *Dicrostichus* Simon, 1895, in Australia (three species and one variety); *Agatostichus* Simon, 1895, in South America (one species) and North America (one species); and *Mastophora* Holmberg, 1876, in South America (10 species) and North America (10 species).

In the first volume of the "Histoire naturelle des araignées" can be found a very adequate account of this spider tribe and the five genera known to Eugene Simon. In his 1931 contribution Mello-Leitão substituted the name Mastophoreae for Simon's Glyptocraniae and presented a modified key to the six world genera. This included the homonym *Acantharachne* Tullgren, proposed in 1911, for which *Acantharanea* Strand must now be used.

Compared with the exotic genera the two

known from the Americas are said to have the carapace more strongly truncated behind, it being essentially subvertical in lateral view, and to have the lateral eyes on less prominently elevated tubercles. The American genera can be separated by the following key:

#### KEY TO THE AMERICAN GENERA OF THE MASTOPHOREAE

1. Median ocular tubercle armed with an erect spine or horn; pars cephalica with two greatly enlarged spines or bulbous processes on the midline . . . . . Genus *Agatostichus*  
Median ocular tubercle without an erect spine or horn; pars cephalica without enlarged processes on the midline . . . . . Genus *Mastophora*

#### GENUS MASTOPHORA HOLMBERG

*Mastophora* HOLMBERG, 1876, An. Agr. Republic Argentina, vol. 4, p. 112. Genotype: *Mastophora extraordinaria* Holmberg. BRÈTHES, 1909, An. Mus. Nac. Buenos Aires, ser. 3, vol. 10, p. 164. LUTZ, 1915, Ann. New York Acad. Sci., vol. 26, p. 94. PORTER, 1917, Bol. Mus. Nac. Chile, vol. 10, pp. 129–133, fig. 77; 1918, Rev. Chilena Hist. Nat., vol. 22, pp. 139–143, figs. 16, 17. MELLO-LEITÃO, 1925, Bol. Mus. Nac. Rio de Janeiro, vol. 1, p. 458; 1931, An. Acad. Brasileira Cien., vol. 3, pp. 65–74; 1933, Arch. Esc. Sup. Agr. Med. Veterinaria, Rio de Janeiro, vol. 10, pp. 37–39; 1936, An. Acad. Brasileira Cien., vol. 8, p. 134. CANALS, 1931, An. Mus. Argentino Cien. Nat., vol. 37, pp. 20–27.

*Heterocephala* HOLMBERG, 1876, An. Agr. Republic Argentina, vol. 4, p. 143. Genotype: *Heterocephala conifera* Holmberg.

*Glyptocranium* SIMON, 1895, Histoire naturelle des araignées, vol. 1, p. 885. Genotype: *Glyptocranium cornigerum* Hentz.

The genus *Mastophora* was created in 1876 by Eduardo Holmberg for the South American *Mastophora extraordinaria*, a specific name that characterizes the morphology and habitus of the whole group. His quite adequate description was published in an obscure journal (Anales de Agricultura de la Republica Argentina) which did not receive notice in the Zoological Record or other indexes and which is still largely unavailable even in the most complete libraries. Eugene Simon's genus *Glyptocranium*, with the closely allied *cornigera* Hentz as genotype, was published in

1895 and was largely used by arachnologists until recent years. In 1909 Juan Brèthes called attention to the priority of *Mastophora*, republished some of the descriptions of Holmberg, and gave interesting new information on the egg sac. Unfortunately, Brèthes' paper likewise did not come to the notice of most spider students with the result that for about 20 years more, until the appearance of Mello-Leitão's revision of 1931, the name *Glyptocranium* remained in general use.

Araneine spiders in which the adult females are of average size (10–15 mm. long), but the males are very small (1.50–2.25 mm.).

Carapace as wide as long, broadly rounded or truncated behind, narrowed in front to two-thirds of the greatest width, in side view high and subtriangular. Pars cephalica coriaceous, set with numerous warts, and armed at crest of posterior declivity with a pair of apically bifurcated horns. Lateral eyes of each side on a common tubercle and the four median eyes on a single rounded tubercle. Clypeus vertical. Both margins of chelicerae toothed, the lower margin with one or two blunt teeth. Sternum subtriangular, the posterior coxae subcontiguous or moderately separated. Labium broader than long, half as high as the maxillae.

Legs slender, very unequal in length, without spines; the first pair much longer than the others, the tibiae long and cylindrical, the metatarsi thin and gently curved. Median claws large and strongly curved. Hind legs with a dorsal series of serrated bristles at apex of metatarsus and on tarsus.

Abdomen short, subglobose or moderately elevated, broader than long, strongly overhanging the carapace in front; broadly rounded and relatively smooth or variously surmounted with coriaceous folds, wrinkles, conical or rounded shoulder humps, or other decorations. Abdomen coriaceous, more or less strongly marked with sclerotized muscle scars and reticulations, thinly set with short setae, covered with long hairs, or sometimes essentially smooth.

Structure of epigynum essentially typical for the Araneinae in that external orifices and fertilization canals are present. Epigynum very small for the size of the spider

(probably because of the small size of the male) and not easily visible in ventral view. External epigynum little differentiated, presenting at most a weakly developed median septum between the orifices, and a transverse hood or ridge. Openings to the single pair of well-developed seminal receptacles located on the caudal face of the genital groove.

Male palpi very similar in the known species, with a thin, spine-like embolus, and a conspicuous, curved, median apophysis which presents differences of length and proportion among the species.

In his contribution of 1931 Mello-Leitão presented a key to the then known species of the genus *Mastophora*. These included two from the United States, two from Baja California, and nine from South America. The four from the North American continent find their position in his key on the basis of quite inadequate descriptions. None of the North American species is known to occur in South America, but some can be expected to be common to both areas when more adequate collecting is done. Two of the principal species groups occur on both continents. The first of these is *Mastophora extraordinaria* of Argentina which has as a near relative *M. cornigera* (the genotype of *Glyptocranium*) and the four allied species from the United States. The second species group includes *Mastophora gasteracanthoides* of Peru, Chile, etc., which has as near relatives *M. lenca* of Honduras, probably *M. corpulenta* of Baja California, as well as such additional South American species as *M. satan* and *M. holmbergi* of Argentina.

It should be noted that *Mastophora corpulenta* Banks was reported by error from Brazil in Roewer's "Katalog der Araneae" (1942, vol. 1, p. 901). No doubt this was a clerical error occasioned by improper association of *Glyptocranium fragoides* Vellard, 1926, with *corpulenta*. Vellard's species should be properly listed as a synonym of *Mastophora carpogastra* Mello-Leitão, 1925.

The present paper has aimed to cover the Mastophoreae for continental North America and the adjacent islands. Unfortunately very sparse material has been available from some of the interesting tropical areas of this distribution. One species was available from

Cuba, and one from Honduras, but the remaining species came from the United States and temperate Mexico. The following records of *Mastophora* are from the area under consideration, but they are unknown to me and of uncertain identity:

*Mastophora conifera* HOLMBERG, recorded from Cuba by Franganillo (1936, Los arácnidos de Cuba hasta 1936, Havana, p. 67, fig. 28; 4). This is obviously different from the species from Argentina and may represent another distinct Cuban species.

*Mastophora gasteracanthoides* Nicolet, reported from Jamaica by Porter (1917, Bol. Mus. Nac. Chile, vol. 10, p. 133). This is an error, probably occasioned by Simon's mention of a new species of *Glyptocranium* from the island of Jamaica (1895, Histoire naturelle des araignées, vol. 1, p. 884).

The following key to the North American females does not include *Mastophora fasciata* Reimoser, which is not described in sufficient detail to be incorporated in the key. The males are readily separated by reference to the figures of the palpi.

#### KEY TO THE FEMALES OF THE NORTH AMERICAN SPECIES OF *Mastophora*

1. Sides of carapace coarsely granulated, thickly set with numerous large red or yellow tubercles; legs uniform reddish brown . . . 2  
Sides of carapace finely granulated, with few or no large tubercles; legs pale yellowish or yellowish brown, usually faintly ringed with dusky . . . 3
2. Abdominal humps small, directed upward; Cape region of Baja California . . . . .  
Abdominal humps proportionately larger, directed caudad; Honduras. *lenca*, new species
3. Abdomen smooth above, rounded, without dorsal humps . . . . . 4  
Abdomen with distinct dorsal humps . . . 6
4. Abdomen suboval, cordate or subtriangular, the side angles broadly rounded . . . . 5  
Abdomen very broadly triangular, the side angles produced into prominent shoulder lobes . . . . . *phrynosoma*, new species
5. Space between horns on carapace with small tubercles; Cape region of Baja California . . . . .  
Space between horns on carapace without tubercles; eastern United States . . . . .  
Space between horns on carapace without tubercles; eastern United States . . . . . *bisaccata* Emerton
6. First femora with granules on prolateral surface . . . . . *vaquera*, new species

- First femora smooth . . . . . 7
7. Abdominal humps broad, moderately elevated, close together; orifices of epigynum (fig. 13) close together . . . *hutchinsoni*, new species  
Abdominal humps small, well separated; orifices of epigynum widely separated . . 8
  8. Occipital horns broad behind (equalling the width of the posterior eye row), the inner branches larger; epigynum as shown in figures 3 and 37 . . . . . *cornigera* Hentz  
Occipital horns clearly narrower than the width of posterior eye row, the branches subequal; epigynum as shown in figures 6 and 36 . . . . .  
Occipital horns clearly narrower than the width of posterior eye row, the branches subequal; epigynum as shown in figures 6 and 36 . . . . . *archeri*, new species

#### *Mastophora cornigera* Hentz

Plate 6, figure 2; text figures 1-5, 37, 41, 42

*Epeira cornigera* HENTZ, 1850, Jour. Boston Soc. Nat. Hist., vol. 6, p. 20, pl. 3, fig. 8; 1875, Spiders of the United States, p. 123, pl. 14, fig. 8.

*Cyrtarachne bicurvata* BECKER, 1879, Ann. Soc. Ent. Belgique, vol. 22, p. 77, pl. 2, figs. 16-19.

*Cyrtarachne cornigera* KEYSERLING, 1879, Verhandl. Zool. Bot. Gesell. Wien, vol. 29, p. 30, pl. 4, fig. 4. MCCOOK, 1890, American spiders, vol. 2, pp. 98-99, fig. 80 (egg sac). (Part: not figs. 81-84; see *hutchinsoni*.)

*Ordgarius cornigerus* MARX, 1890, Proc. U. S. Natl. Mus., vol. 12, p. 541. KEYSERLING, 1892, Die Spinnen Amerikas, Epeiridae, p. 40, pl. 2, figs. 34-34c. MCCOOK, 1893, American spiders, vol. 3, p. 197, pl. 12, figs. 1a, 1b, 1d (not 1c: see *phrynosoma*). BANKS, 1900, Proc. Acad. Nat. Sci. Philadelphia, p. 535; 1904, Proc. California Acad. Sci., ser. 3, vol. 3, p. 350. HUTCHINSON, 1903, Sci. Amer., vol. 89, p. 172.

*Glyptocranium cornigerum* SIMON, 1895, Histoire naturelle des araignées, vol. 1, pp. 882, 884, 885. COMSTOCK, 1913, The spider book, p. 448, figs. 457-458; 1940, *op. cit.*, rev. ed., p. 462, figs. 457-458.

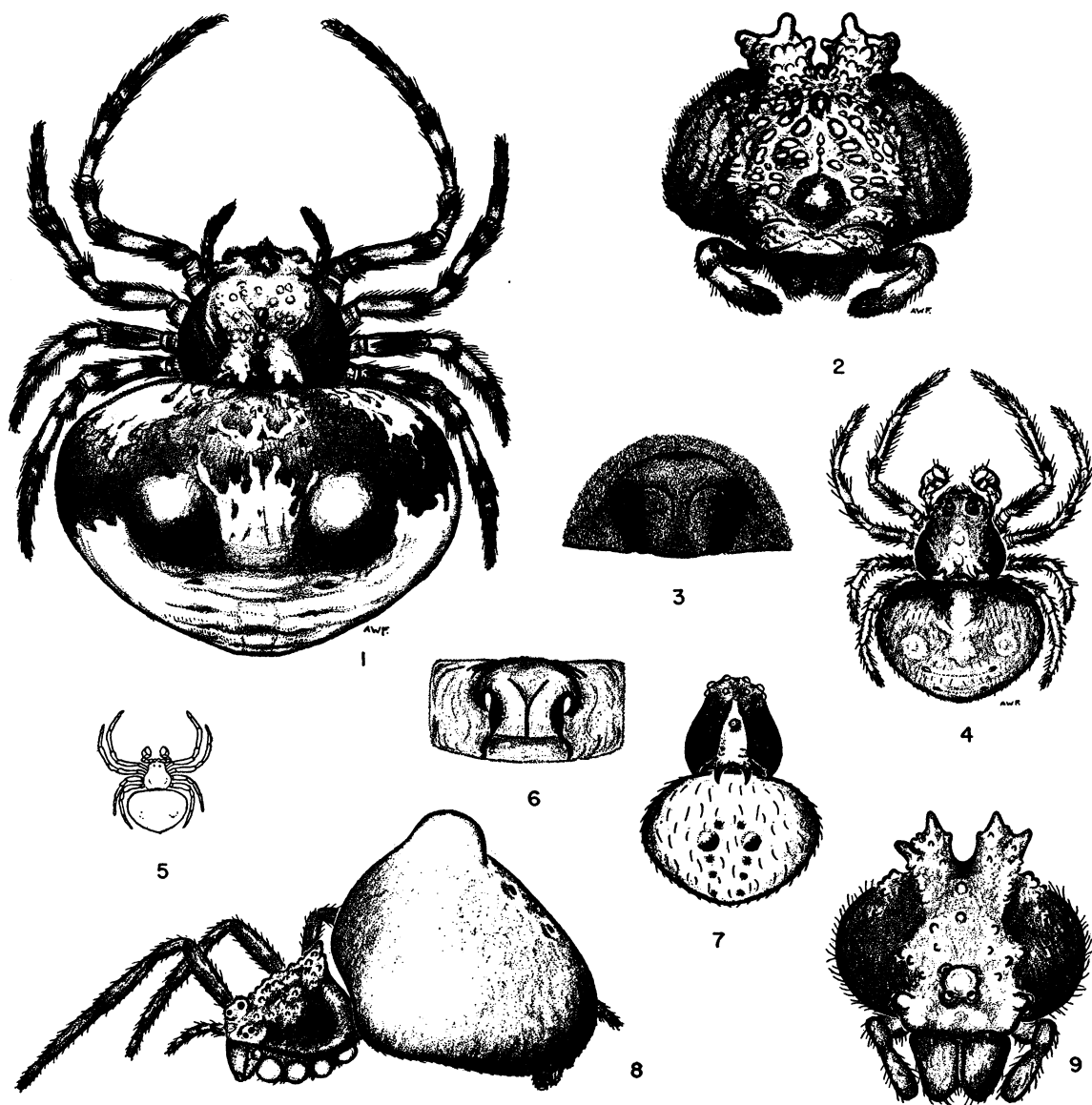
*Mastophora cornigera* MELLO-LEITÃO, 1931, An. Acad. Brasileira Cien., vol. 3, p. 70. ARCHER, 1941, Mus. Paper 14, Alabama Mus. Nat. Hist., p. 32. ROEWER, 1942, Katalog der Araneae, vol. 1, p. 902.

This interesting spider has been described and illustrated in good detail by Henry C. McCook in "American spiders and their spinning work" and by J. H. Comstock in "The spider book."

FEMALE: Seven adult females vary from 11.00 mm. to 15.00 mm. in total length and average 12.40 mm.

Female from Glendale, California: 11.00 mm. long; carapace, 4.00 mm. long, 5.15 mm.





FIGS. 1-5. *Mastophora cornigera* Hentz. 1. Dorsal view of female. 2. Frontal view of carapace of female. 3. Subcaudal view of epigynum. 4. Dorsal view of male. 5. Dorsal outline of male to show size comparison with female above.

FIGS. 6-9. *Mastophora archeri*, new species. 6. Subcaudal view of epigynum. 7. Dorsal view of male, appendages omitted. 8. Lateral view of female, appendages of left side omitted. 9. Frontal view of carapace of female.

wide, 3.00 mm. wide at posterior eye row; abdomen, 7.50 mm. long, 11.00 mm. wide, 5.50 mm. high at apex of dorsal hump.

The structure and color pattern are as illustrated in figures 1 and 2, in close agreement with those of *hutchinsoni*, new species. Carapace broader than long and very

granulose, the principal warts large and conspicuous. Occipital horns coarsely granulose, shallowly bifurcated, and separated by a rounded depression which may be largely closed in extreme specimens, on one of which figure 2 is based. Sides of pars cephalica granulose and the edge of posterior

declivity set with conspicuous warts to form a coarse crest. Eyes typical, as in *hutchinsoni*, but the eye tubercles are somewhat more elevated and granulose.

Legs typical, of average length, the thin metatarsi only gently curved.

	I	II	III	IV
	(mm.)	(mm.)	(mm.)	(mm.)
Femur	4.50	3.60	2.35	3.25
Patella	2.40	2.15	1.45	1.90
Tibia	4.00	2.60	1.50	2.35
Metatarsus	4.20	2.50	1.35	2.10
Tarsus	1.25	1.10	0.65	0.70
Total	16.35	11.95	7.30	10.30

Abdomen much broader than long, strongly elevated above the carapace and highest at the apex of the rather small, rounded, quite widely separated humps.

The epigynum is as illustrated in figures 3 and 37.

MALE: The male of *Mastophora cornigera* (fig. 4) has not heretofore been described.

Fifteen adult males from California average 1.74 mm. in total length, with the extremes from 1.50 mm. to 2.25 mm.

Male from Glendale, California: total length, 1.73 mm.; carapace, 0.75 mm. long, 0.80 mm. wide; abdomen, 1.00 mm. long, 1.35 mm. wide; sternum, 0.40 mm. long, 0.38 mm. wide.

Carapace golden yellow to orange, the sides dusky, the pars cephalica with a narrow white streak beginning behind the eyes and running back to the tips of the horns. Sternum, labium, and maxillae golden yellow. Legs bright yellow to dull orange, with dusky or reddish cast on patellae, tibiae, and metatarsi. Abdomen bright to dull yellow, dusky at base, the caudal face whitish.

Structure essentially typical, as illustrated in figure 4, the carapace about as broad as long, quite smooth, evenly convex, the pars cephalica with the median elevation only slightly elevated and with the bifurcated horns more or less strongly developed. Carapace with very few hairs and each of the median warts and occipital horns with a long seta. First eye row moderately procurved, the large median separated by nearly one and one-half diameters, one full

diameter from the half as large lateral eyes. Clypeus equal in height to one and one-half diameters of the anterior median eyes. Second eye row weakly procurved, the median separated by two full diameters, as far from the half as large lateral eyes. Lateral eyes on a small connate tubercle, the front eyes twice as large. Median eyes on a slightly elevated tubercle, the quadrangle broader than long (42/33), slightly narrower behind, the front eyes considerably larger. Sternum cordate, bluntly rounded behind where the coxae are separated by about their width.

Legs set with dark hairs and with a series of somewhat heavier setae on the prolateral face of the tibiae, metatarsi, and tarsi of the first two pairs of legs. First leg longest, somewhat more slender than the second.

	I	II	III	IV
	(mm.)	(mm.)	(mm.)	(mm.)
Femur	0.70	0.60	0.37	0.50
Patella	0.35	0.33	0.22	0.26
Tibia	0.55	0.37	0.22	0.33
Metatarsus	0.43	0.33	0.22	0.30
Tarsus	0.30	0.30	0.22	0.22
Total	2.33	1.93	1.25	1.61

Abdomen broader than long, moderately elevated, convex, emarginated in front, widely rounded on the sides and behind, sometimes seemingly smooth but usually with a pair of weakly developed, well-separated humps. Clothing of abdomen inconspicuous hairs.

The male palpus is as illustrated in figures 41 and 42.

TYPE LOCALITIES: Immature female type of *Epeira cornigera* Hentz from Alabama, undoubtedly destroyed; female type of *Cyrtarachne bicurvata* Becker from Donaldsonville, Louisiana, probably in the Zoological Museum in Brussels, Belgium.

DISTRIBUTION: Southern United States from Alabama and the lower Mississippi Valley westward into southern California and northern Mexico.

SPURIOUS RECORD: McCook recorded *Mastophora cornigera* from Fork Yukon, Alaska, which is far outside the seeming natural range of the species. Indeed no recent specimens are available even from northern California or the Pacific Northwest where

considerable spider collecting has been done. The Alaska record was based on Marx material, and there is scarcely any doubt that the locality information was false. Many of Marx's Alaskan records are based on specimens from Florida and other southern states and even on exotic material from Tropical America.

**OTHER LOCALITIES:** *Alabama:* Spring Hill (Archer, 1940). Mobile, November 12, 1939 (A. C. Cole), female; (N. Banks), female; 1932 (H. P. Loding), female. Tuscaloosa, February 18, 1950 (B. D. Valentine), female; September, 1950 (A. F. Archer), males, egg sac. *Louisiana:* Baton Rouge, March 23, 1902, two males; (N. Banks), female. New Orleans, female; September 26, 1936 (James N. Gowanloch), female; October 1, 1935 (J. E. Snyder), female, egg sac with eggs. *Mississippi:* Gulfport, July 11, 1916 (C. C. Greer), immature female. Ocean Springs, June 11, 1919, female egg sac. Mississippi Agricultural College, March 18, 1903 (G. W. Herrick), female. *Arkansas:* Imboden, 1935 (B. C. Marshall), female. *Texas:* San Diego, April 29, 1895, four males, juvenile female. Floresville, April 28, 1895, four males. Texas City (S. W. Bilsing), two females. Edinburg (S. Mulaik), male, females; December 10 (S. Mulaik), subadult female. East of Harlingen, January–March, 1936 (L. I. Davis), female. *Oklahoma:* Edmond, September 10, 1937 (R. H. Crandall), immature female. *Arizona:* Phoenix, March 7, 1936 (J. H. O'Dell), female; April, 1941 (M. Stegmeier), female. *California:* San Diego (N. Banks; Marx collection), females. Santa Ana (Roy K. Bishop), three males, nine juvenile females. Claremont (N. Banks), female. San Bernardino, female. Palo Alto, 1914 (H. Heath), female. Glendale, August 27 (Hutchinson), female, egg sac. Pasadena, November 5, 1942 (Mrs. H. Michener), female. Westwood Village, fall, 1942 (Kay Cowles), female. West Los Angeles, March–August, 1945 (David Verrity), two immature females. Los Angeles, October 10, 1942 (J. H. Branch), males; (Hutchinson), female. San Juan Capistrano, September 25, 1952 (R. E. Ryckman), female, seven egg sacs. *Baja California:* Santo Tomas, July 8, 1953 (W. J. and J. W. Gertsch), immature female. *Chihuahua:* Madera, July 5, 1947 (W. J.

Gertsch), juvenile female. *Oaxaca:* Huajuapán, September 27–October 1, 1946 (H. Wagner), immature female.

The egg sacs of *Mastophora cornigera* have been illustrated in several reports and they are very well shown in my popular article entitled "Spiders that lasso their prey," in *Natural History* (Gertsch, 1947, June, pp. 156–157, 7 figs.). The typical sac has a subspherical basal cup (about 10 mm. in diameter) and a heavy stem of about equal length. The relatively smooth cup does not bear equatorial points or flaps. A quite typical sac is shown in plate 6, figure 2, with the emergence hole of the spiderlings plainly evident. Because it lives in warmer areas, *M. cornigera* probably produces more sacs than do the northern species. Five or more are frequent, and they are usually hung in typical fashion from the point of attachment.

#### ***Mastophora hutchinsoni*, new species**

Plate 6, figure 3; text figures 10–14, 39, 47, 48

*Cyrtarachne cornigera* McCook, 1890, *American spiders*, vol. 2, pp. 98–99, figs. 81–84 (not fig. 80).

*Ordgarius cornigerus* McCook, 1894, *American spiders*, vol. 3, p. 197 (northeastern records only). BANKS, 1907, 31st Ann. Rept. Dept. Geol. Nat. Res. Indiana, p. 741.

*Glyptocranium cornigerum* EMERTON, 1913, *Trans. Connecticut Acad. Arts Sci.*, vol. 18, p. 219, pl. 2, figs. 10–10a. BARROWS, 1918, *Ohio Jour. Sci.*, vol. 18, p. 310.

*Mastophora cornigera* KASTON, 1941, in Friend, *Connecticut State Ent. 40th Rept.*, for 1940, pp. 379–380, fig. 5. CHAMBERLIN AND IVIE, 1947, *Bull. Univ. Utah, biol. ser.*, vol. 10, no. 3, pp. 11, 63.

*Mastophora hutchinsoni*, new species, has been confused with *cornigera* Hentz, which accounts for the already involved synonymic history given above. It presents the following differences: The average size is smaller. The proportionately narrower carapace is less heavily granulose, and the smoother sides of the posterior declivity are not conspicuously angled. The occipital horns are smaller, smoother, and more divergent, directed upward, the space between them wide and subtriangular. The legs are slightly longer and more slender. The abdomen is not so broad as in *cornigera*, and the dorsal humps are broad, low, and nearer together.

**FEMALE:** Five adult females vary from

9.00 mm. to 11.50 mm. in total length, the average being 10.25 mm.

The measurements of the holotype, from Somers, New York, are as follows: female: total length, 11.50 mm.; carapace, 3.75 mm. long, 3.75 mm. wide; abdomen, 8.35 mm. long, 11.65 mm. wide.

Carapace dusky yellowish brown, darkest on the sides and behind on the posterior declivity, the pars cephalica yellowish brown. Carapace rather thinly clothed with erect, short hairs, most noticeable on the sides. Sternum yellowish brown, dusky on the margins; labium and maxillae concolorous but apically whitish. Coxae and legs yellowish to pale yellowish brown, the first leg with two dusky rings on the femur, one on the patella, two on the tibia, and one on the metatarsus, the second leg similarly but less distinctly marked, the posterior legs annulate only in strongly marked specimens. Abdomen yellowish to whitish above, sooty black around the base, with dusky or brown patches across the front and enclosing the shoulder humps, with narrow lines and reticulations over most of the dorsum, and three pairs of oval, sclerotized depressions (in addition to many scattered minor ones), of which the first pair between the shoulder humps is dark brown and more conspicuous than the others. Venter of the abdomen mostly dusky between base and yellow brown spinnerets.

The structure and pattern are as illustrated in figures 10 and 14. Carapace as long as broad, wide behind, rounded on the sides, the pars cephalica at the posterior eye row more than half as wide as the carapace (2.25 mm./3.75 mm.). Pars cephalica typical for the genus, subtriangular as seen from the side, the occipital horns apically bifurcated as usual, quite widely separated by a deeply rounded depression between them, the greatest width of the horns about half of the width of the carapace (fig. 12). Pars cephalica with rather weakly developed warts and cones which are fewer in number than in *cornigera* and mostly restricted to the pars cephalica. Lateral eyes of each side on a single, low, rounded tubercle and the four median eyes on a single more expansive elevation. Clypeus vertical, equal in height to about two diameters of an anterior

median eye. First eye row moderately procurved (a line along the upper edges of the laterals cuts only the lower edges of the medians), the median separated by one and one-half diameters, twice as far from the smaller lateral eyes. Posterior eye row moderately recurved (a line along the front edges of the laterals cuts through the centers of the medians), the median eyes separated by two diameters, twice as far from the subequal lateral eyes. Median ocular quadrangle broader than long (63/53), slightly narrower in front (63/60), the front eyes larger.

Chelicera moderately robust, bluntly conical, the upper margin with three sharp teeth, the middle one much larger, the lower margin with a single blunt tooth. Sternum subtriangular, about as broad as long, broadly emarginated in front, with a rounded point opposite each coxa, the posterior coxae subcontiguous, separated by about one-third of the coxal width. Labium broader than long (0.70 mm./0.48 mm.) bluntly triangular at apex, extending to about the middle of the parallel maxillae.

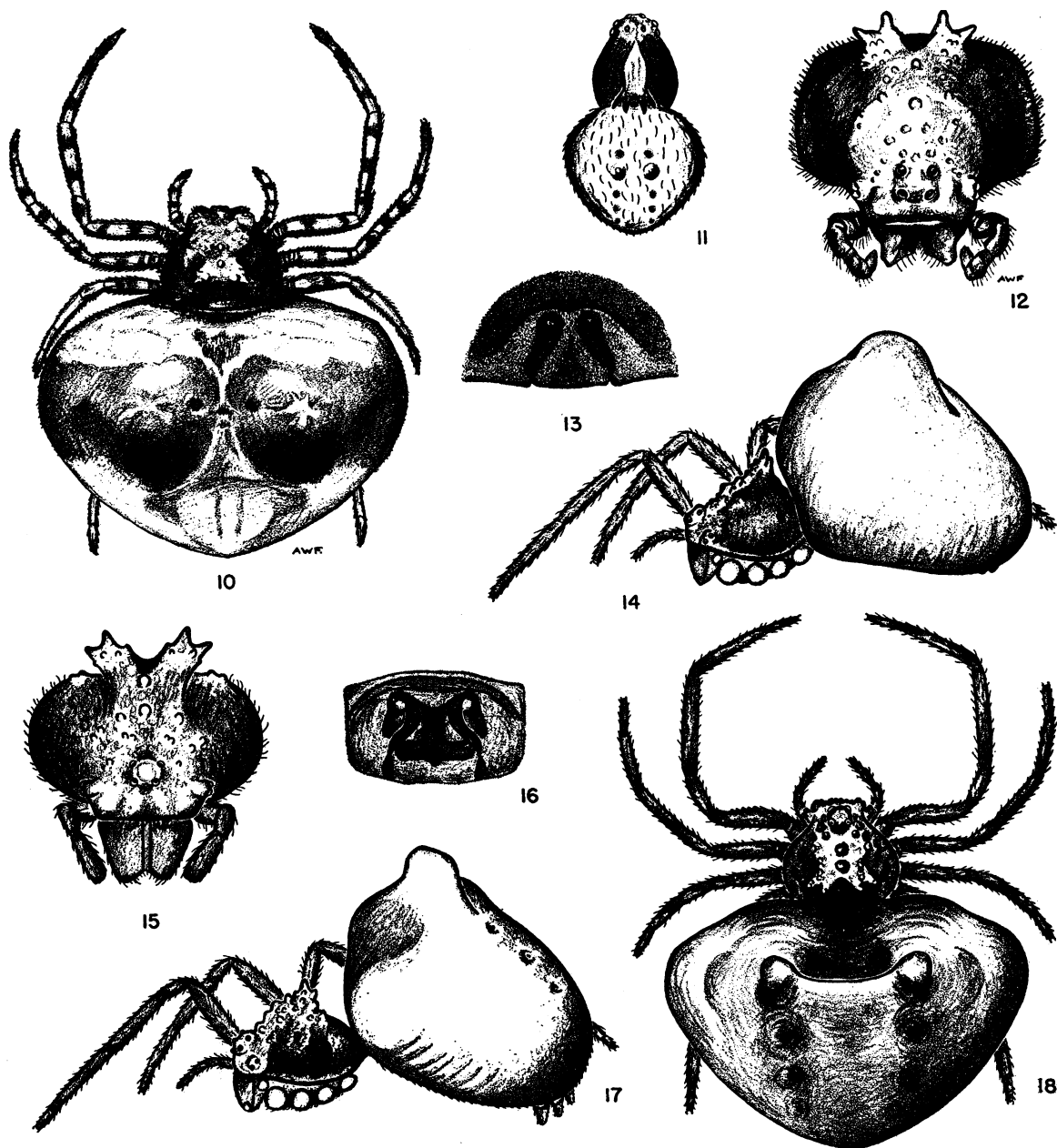
Legs clothed with fine whitish hairs and long setaceous hairs.

	I	II	III	IV
	(mm.)	(mm.)	(mm.)	(mm.)
Femur	3.50	2.90	1.90	2.90
Patella	1.90	1.75	1.00	1.50
Tibia	3.10	2.05	1.25	2.05
Metatarsus	3.25	2.05	1.15	1.70
Tarsus	1.15	0.80	0.65	0.65
Total	12.90	9.55	5.95	8.80

First leg much longer than the others, slender, the tibia long and cylindrical, the metatarsus much thinner and gently curved. Median claws large, strongly curved.

Abdomen broadly cordiform as seen from above, shallowly emarginated in front, broadly rounded on the sides, presenting two rounded, well-separated shoulder humps, which are usually well developed but which on occasion are reduced to inconspicuous cones. Abdomen from the side elevated to twice the height of the carapace at the apex of the horns, overlapping the carapace nearly to the horns, highest in the front at the shoulder humps, steeply declining behind,



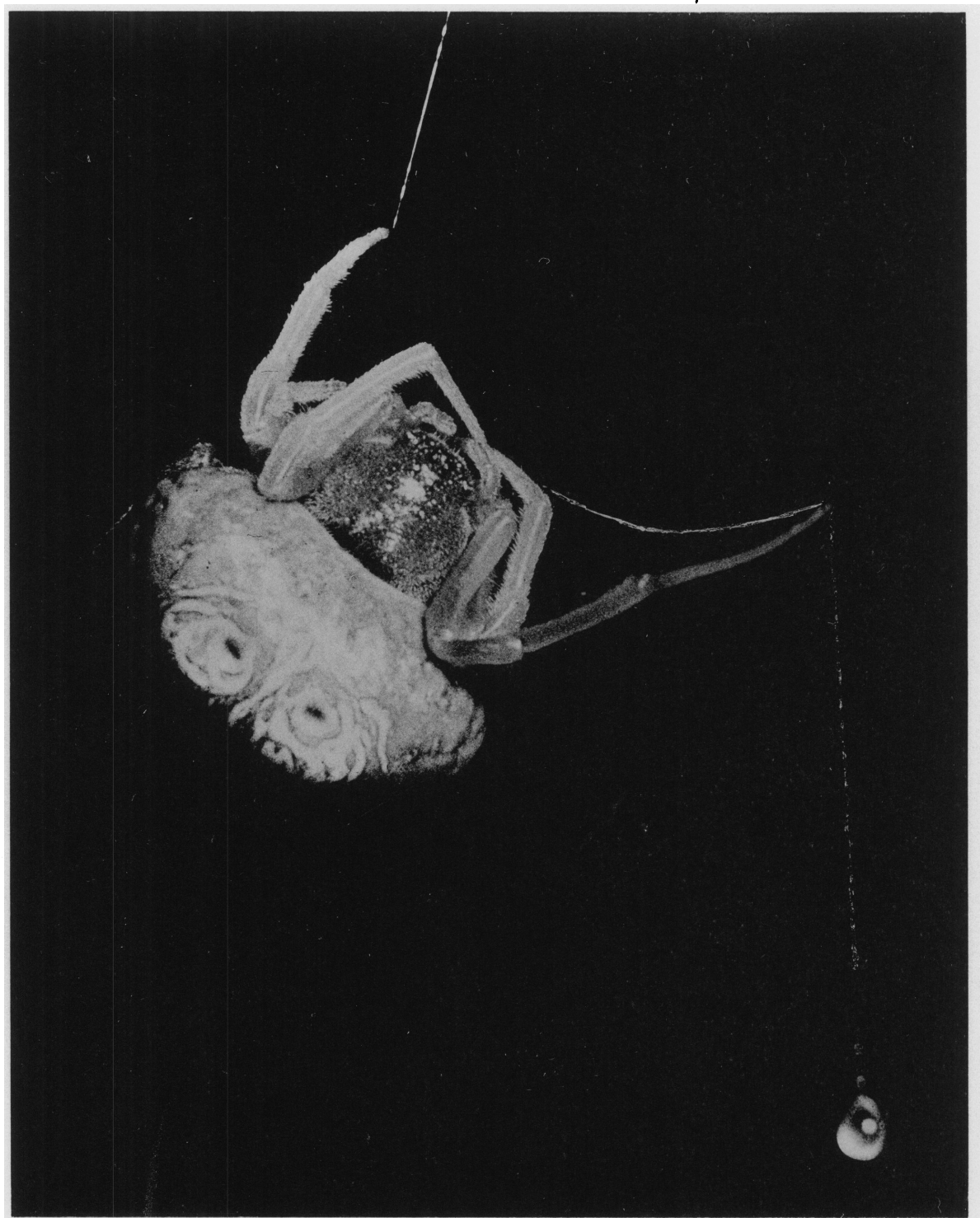


FIGS. 10-14. *Mastophora hutchinsoni*, new species. 10. Dorsal view of female. 11. Dorsal view of male, appendages omitted. 12. Frontal view of carapace of female. 13. Subcaudal view of epigynum. 14. Lateral view of female, appendages of left side omitted.

FIGS. 15-18. *Mastophora vaquera*, new species. 15. Frontal view of carapace of female. 16. Subcaudal view of epigynum. 17. Lateral view of female, appendages of left side omitted. 18. Dorsal view of female.

the caudal portion rounded. Clothing of the carapace inconspicuous whitish hairs, but for the most part the abdomen appears smooth, is shallowly or deeply wrinkled

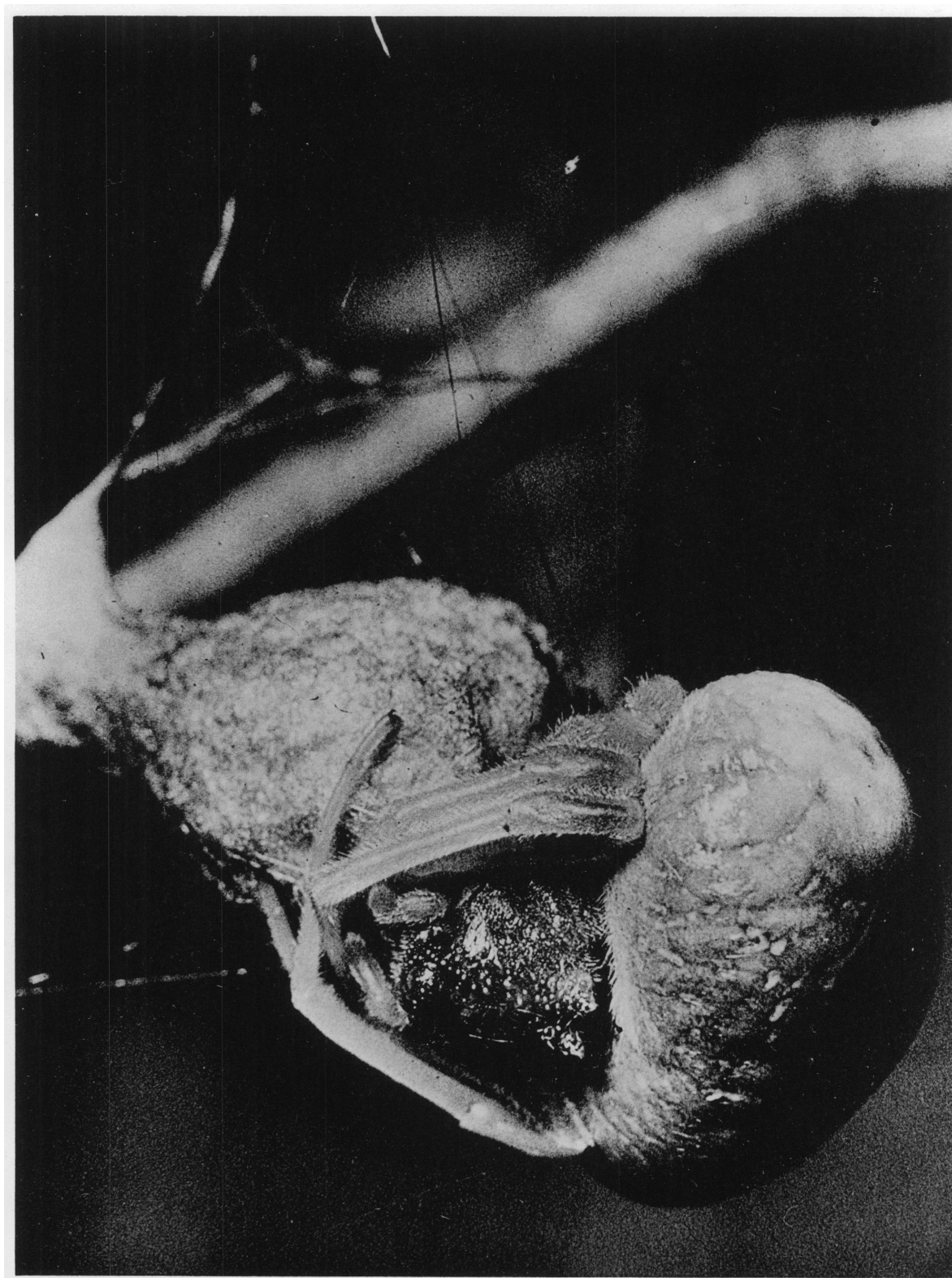
according to the age and condition of the specimen, and marked with a reticulation of sclerotized, yellowish lines, the venter with paired spots and a great many yellowish



*Mastophora bisaccata* Emerton. Dorsal view of female hanging from her trapeze line and holding the casting line in resting position

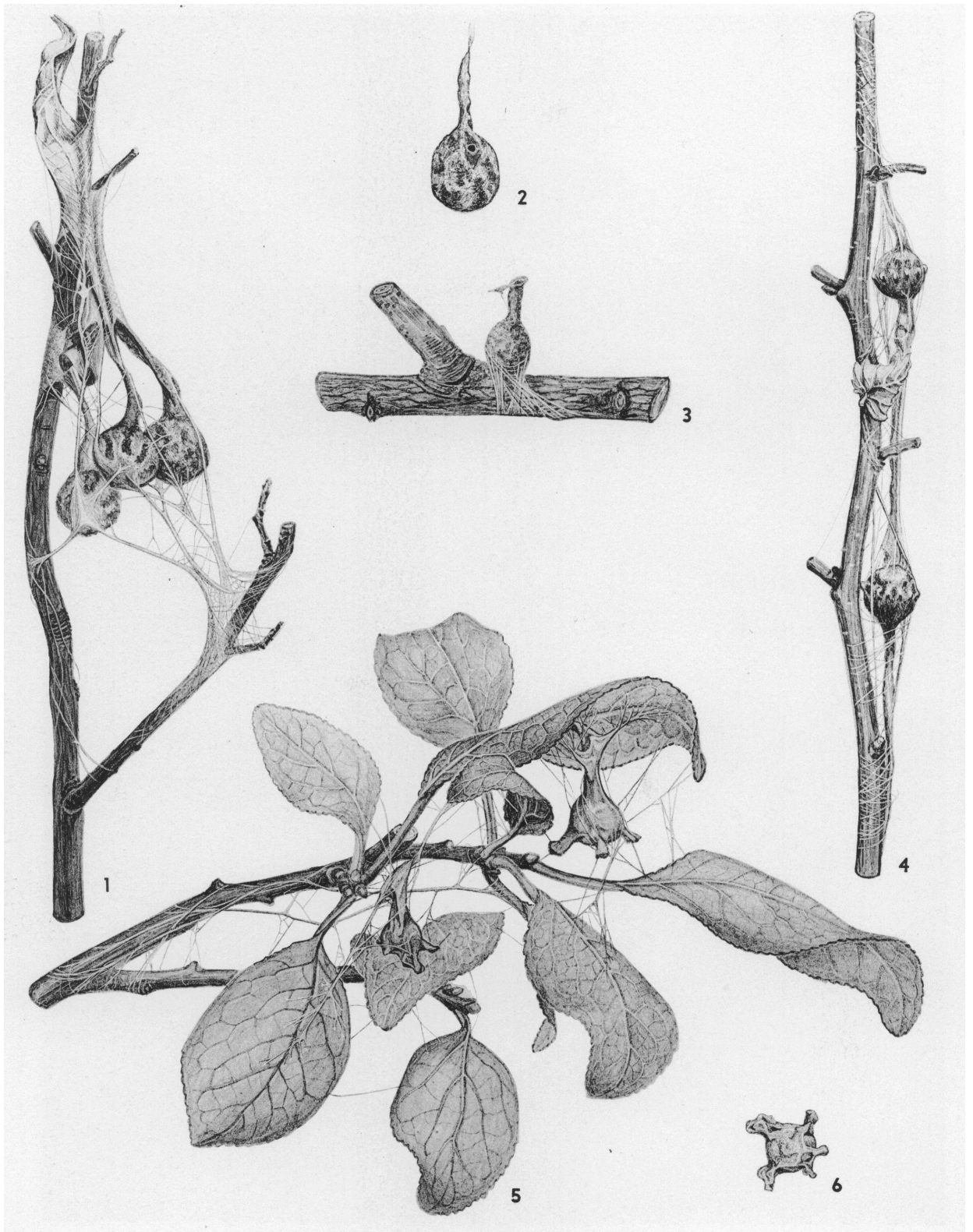


*Mastophora bisaccata* Emerton. Ventral view of female hanging from her trapeze line and lowering her casting line



*Mastophora bisaccata* Emerton. Female clinging to her recently completed egg sac





Egg sacs of *Mastophora*. 1. *M. bisaccata* Emerton. 2. *M. cornigera* Hentz, specimen from California, showing the emergence hole for spiderlings. 3. *M. hutchinsoni*, new species. 4. *M. bisaccata* Emerton. 5. *M. phrynosoma*, new species. 6. Ventral view of right-hand sac shown in 5

lines radiating from the base. Spinnerets typical, the apical segments short and subconical.

The epigynum is as illustrated in figures 13 and 39.

MALE: Total length, 1.35 mm.; carapace, 0.56 mm. long; abdomen 0.83 mm. long, 0.87 mm. wide.

Coloration uniform yellowish brown, without contrasting colors, the eyes darker. Abdomen with three pairs of rounded sclerotized depressions, and a pair of small shoulder humps close together between the front pairs of depressions.

The structure is as illustrated in figure 11.

The palpus is as illustrated in figures 47 and 48.

TYPE LOCALITY: Female holotype from Somers, New York, September 17, 1937 (W. C. Wood).

DISTRIBUTION: Eastern United States from New Hampshire west to Minnesota and south to Kansas, Alabama, and Georgia.

OTHER LOCALITIES: Almost all the specimens listed below have been designated as paratypes. *New Hampshire*: Ponemah, August, 1912 (E. B. Bryant), male allotype. *Massachusetts*: Sanborn, female. *Rhode Island*: Providence, female. *Connecticut*: Rocky Hill, October 23, 1940 (B. J. Kaston, 1948), female. Mount Carmel, October (B. J. Kaston, 1948), egg sacs. *New York*: Cold Spring Harbor, Long Island, July 25, 1906, juvenile. Ithaca, November 10, 1910, female; July 6, 1922, penultimate male, juvenile female, on *Crataegus*. *New Jersey*: Millburn, August 30, 1944, female, egg sac, from poplar branch 8 feet from ground. *Pennsylvania*: Bernville, September 4, 1937 (L. Hook), female. *Maryland*: Hagerstown, August, 1915 (W. E. Pennington), immature female. *Virginia*: Virginia, August, 1927 (W. T. Davis), immature female. Falls Church (N. Banks), six females and immatures. *Alabama*: Lagoon, September 29, 1949 (A. F. Archer), female. *District of Columbia*: Female paratype in the United States National Museum. Tacoma Park, October 13, 1897, female, two egg sacs. (Fox collection), female paratype. *Ohio*: Columbus, November 1, 1915 (Barrows, 1918), female. *Georgia*: Savannah (Marx collection, 202), female. *Indiana*: Greencastle, female. *Minne-*

*sota*: Minneapolis, November 1, 1931 (W. J. Gertsch), female. *Michigan*: E. S. George Reserve, Livingston County, July 22, 1951 (H. K. Wallace), immature female.

The egg sac of *Mastophora hutchinsoni* was first illustrated in 1890 by H. C. McCook in the second volume of "American spiders and their spinning work," under the name *cornigera*. An excellent figure was also given by B. J. Kaston in 1948, under the same name (Connecticut State Geol. Nat. Hist. Surv. Bull., no. 70, pl. 71, fig. 2039). The sac (pl. 6, fig. 3) is very similar to that of *cornigera* and differs principally in the mode of attachment. The cup, which has a diameter of about 8 mm. and a somewhat shorter stem, is lashed firmly to the limb with the stem free. Up to the present time no exceptions to this characteristic attachment have been noted for the species.

#### ***Mastophora archeri*, new species**

Text figures 6-9, 36, 45, 46

This species has probably been confused with *Mastophora cornigera* Hentz, to which it is very closely allied and from which it differs as follows: The somewhat narrower carapace is less heavily granulose and the sides of the posterior declivity are rounded, not sharply angled. The occipital horns are smaller, narrower, directed caudad and upward at a 40-degree angle, the space between them being a narrow triangle. The abdominal humps are small and rounded and are set somewhat closer together. From *M. hutchinsoni*, new species, *archeri* is easily separated by the shape of the abdominal humps and by the distinct epigynum. From *vaquera* it differs in the smooth front femora and the less prominent eye tubercles.

FEMALE: Two females are 10.00 mm. and 12.00 mm. in total length, the average being 11.00 mm. Female, total length, 10.00 mm.; carapace, 3.70 mm. long, 3.85 mm. wide; abdomen, 6.65 mm. long, 8.70 mm. wide, 7.00 mm. high at apex of dorsal hump.

The structure and color pattern are as illustrated in figures 8 and 9, in close agreement with those of *hutchinsoni* and *cornigera*. Carapace broader than long, coriaceous, the sides with scattered granules, the median crest thickly set with large warts, and the bifurcated horn rather narrow (as in *hutchin-*

*soni*) and narrowly separated by a rounded depression. Eye tubercles well developed as in *cornigera*. Eyes typical, the essentially straight posterior eye row with the median eyes separated by two full diameters, five diameters from the lateral eyes.

Legs with faint brown rings and clothed with inconspicuous light hairs.

	I	II	III	IV
	(mm.)	(mm.)	(mm.)	(mm.)
Femur	3.70	2.75	2.00	2.70
Patella	1.85	1.65	1.20	1.60
Tibia	3.30	2.20	1.25	2.10
Metatarsus	3.50	2.25	1.20	1.85
Tarsus	1.10	0.75	0.65	0.65
Total	13.45	9.60	6.30	8.90

Abdomen essentially as in *cornigera*, much broader than long, subtruncated in front, broadly rounded on the sides and behind, strongly elevated at the shoulders, presenting two small, but distinct, rounded tubercles which are separated by a little more than their diameter.

The epigynum is as illustrated in figures 6 and 36.

MALE: Total length, 1.70 mm.; carapace, 0.75 mm. long, 0.75 mm. wide; abdomen, 0.96 mm. long, 1.30 mm. wide, 0.80 mm. high at apex of hump.

The coloration and structure (fig. 7) are in close agreement with those of *cornigera*.

First leg: femur, 0.80 mm.; patella, 0.35 mm.; tibia, 0.50 mm.; metatarsus, 0.45 mm.; and tarsus, 0.30 mm. long.

Abdomen of moderate height, with a pair of conical humps close together at middle, each hump about as far from the other as from the side of abdomen.

The male palpus is as illustrated in figures 45 and 46, very similar to that of *hutchinsoni* but the median hook slightly longer and thinner.

Male in penultimate stage: total length, 1.50 mm.; carapace, 0.75 mm. long, 0.70 mm. wide; abdomen, 0.80 mm. long, 1.20 mm. wide.

Carapace bright orange-brown, dusky on the sides, the pars cephalica with a whitish stripe beginning behind the eyes and passing back to apices of the two middle horns.

Legs bright orange, but the femora and

tibiae of the front legs are reddish. Abdomen dull yellowish, whitish on the sides. Pars cephalica with two large whitish cones on midline and the occipital horns bifid, the lateral spur somewhat more slender.

First leg: femur, 0.64 mm.; patella, 0.31 mm.; tibia, 0.42 mm.; metatarsus, 0.40 mm.; and tarsus, 0.31 mm. long. First and second legs with a row of spiniform bristles on prolateral surface of tibiae and metatarsi. Abdomen quite smooth, shaped essentially as in the female, somewhat higher than the width as seen from the side, the coniform humps close together.

TYPE LOCALITY: Female holotype from Fruitland Park, Florida, October 15, 1953 (M. H. Muma), taken with egg sac on a citrus tree.

OTHER LOCALITIES: *Florida*: Putnam County: Crescent City, May (Marx collection, 203), female paratype. Alachua County: Gainesville, December, 1951 (A. H. Laessle), female paratype, from a front porch. Bevard County: Three miles south of Lake Istokpoga, February 28, 1951 (A. M. Nadler), penultimate male. Glades County: Fish Eating Creek, February 23, 1951 (A. M. Nadler), juvenile female. *Alabama*: Baldwin County: Lagoon, September 29, 1949 (A. F. Archer), male allotype swept from *Myrica* in hammock wood. *Kansas*: Douglas County: September 22, 1948 (R. H. Beamer), female paratype. *Missouri*: St. Louis County: July 17, 1940 (W. M. Gordon), male.

The egg sac of *Mastophora archeri* is known from a single example. It was taken at Fruitland Park, Florida, from a citrus tree by Martin H. Muma, who found the female holotype near it. The sac, which was preserved in liquid, is dark brown, quite smooth, and variegated with irregular bands of lighter silk. The cup is subspherical, about 10 mm. in diameter, and has a slender stem about 14 mm. long. Around the equator are 11 distinct projections, or scallops, of modest size, which are quite white in color. The sac is similar in appearance to that of *M. bisaccata* (shown in pl. 6, fig. 4) but has a somewhat shorter stem.

#### ***Mastophora vaquera*, new species**

Text figures 15-18

*Mastophora extraordinaria* FRANGANILLO, 1936,

Los arácnidos de Cuba hasta 1936, Havana, p. 67, fig. 28 (1, 2, 3) (not *extraordinaria* Holmberg).

The present species, which has little in common with the South American *Mastophora extraordinaria*, to which Franganillo assigned it, is readily distinguished from the other Nearctic species by the following characters: The lateral eyes are on conical tubercles much more prominent than in the other species. The abdomen in lateral view is subtriangular, about as high as broad, and has the small shoulder humps joined by a transverse ridge. The femur of the first leg has a series of conical granules, or warts, on the prolateral side.

FEMALE: Total length, 11.00 mm.; carapace, 4.15 mm. long, 3.75 mm. wide; abdomen, 7.85 mm. long, 10.50 mm. wide.

Carapace yellowish brown, somewhat dusky on the sides and behind the elevated crest, the horns of which are yellowish. Carapace with few hairs except on the sides and along the base of the crest. Sternum, labium, maxillae, and appendages yellowish brown, the legs and palpi faintly annulate with dusky. Abdomen yellowish brown, darker on the humps (between which is a pair of conspicuous black, depressed muscle scars), brighter yellow behind, and marked by numerous vertical lines in the caudal half and six small yellowish points. Venter of the abdomen striped on the sides, with a median yellow band enclosing two rows of small black points.

The structure and pattern are as illustrated in figures 17 and 18. Carapace clearly longer than broad, more rounded behind than in *cornigera*, the pars cephalica at the posterior eye row only slightly wider than half of the width of carapace (1.95 mm./3.75 mm.). Pars cephalica typical, subtriangular as seen from the side, the occipital horns bifurcated in subequal sharp spurs, widely separated by a subtriangular depression (fig. 15). Pars cephalica with numerous large warts and cones and with well-developed ones along the side margins of the posterior declivity. Lateral eyes of each side on a prominent connate elevation, the four median eyes on an elevated, rounded tubercle set with several small cones. Clypeus vertical, with numerous warts, equal in height to three full diameters of an anterior

median eye. First eye row strongly pro-curved, the large median eyes separated by somewhat more than their full diameter, nearly three times as far from the small lateral eyes. Posterior eye row slightly recurved, the median separated by two diameters, twice as far from the slightly smaller lateral eyes. Median ocular quadrangle broader than long (70/55), slightly narrower in front, and the front eyes larger.

Chelicera typical, conical, robust, the fang short, the upper margin with three sharp teeth, the middle one larger, the lower margin with a single sharp tooth. Sternum and mouth parts typical, as in *hutchinsoni*, new species.

Legs clothed evenly with inconspicuous pale hairs and fewer long setaceous hairs, several on the ventral margin of the first tibia coming from conical bases and approaching spine size.

	I	II	III	IV
	(mm.)	(mm.)	(mm.)	(mm.)
Femur	3.15	2.50	1.70	2.65
Patella	1.80	1.65	1.00	1.40
Tibia	3.10	2.15	1.50	2.05
Metatarsus	3.25	2.15	1.10	1.75
Tarsus	1.20	0.80	0.60	0.65
Total	12.50	9.25	5.90	8.50

Leg proportions essentially as in *hutchinsoni*, new species. First leg longest, slender, the femur curved near distal end and set with a series of cones and granules on the prolateral side, the tibia cylindrical, somewhat thicker apically, and the metatarsus thinner and gently curved.

Abdomen (see fig. 18) very broadly cordiform as seen from above, broadly rounded on the sides, surmounted by a conspicuous transverse elevation which bears two small, well-separated humps. Abdomen as viewed from the side subtriangular, the apex at the hump, almost as high as broad at base, about three times the height of the carapace, steeply declining in front and behind the shoulder humps. Carapace coriaceous, quite smooth, clothed with inconspicuous pale hairs, with the usual reticulation of yellowish lines on the sides, the dorsum with a pair of large black depressed spots and scattered spots in front, the venter



with a central yellow patch enclosing a series of small black points.

The epigynum is as illustrated in figure 16.

TYPE LOCALITY: Female holotype from Torriente, Matanzas, Cuba, July 14, 1941 (J. M. Osorio).

***Mastophora bisaccata* Emerton**

Plates 3-5; plate 6, figures 1, 4;  
text figures 19-23, 35, 43, 44

*Cyrtarachne bisaccata* EMERTON, 1884, Trans. Connecticut Acad. Arts Sci., vol. 6, p. 325, pl. 34, figs. 11, 11a. McCook, 1889, American spiders, vol. 2, p. 95, figs. 78-79 (egg sacs).

*Cyrtarachne multilineata* ATKINSON, 1887, Jour. Elisha Mitchell Sci. Soc., vol. 5, p. 29.

*Ordgarius bisaccatus* MARX, 1890, Proc. U. S. Natl. Mus., vol. 12, p. 541. KEYSERLING, 1892, Die Spinnen Amerikas, Epeiridae, p. 42, pl. 2, figs. 35-35c. McCook, 1893, American spiders, vol. 3, p. 198, pl. 12, figs. 2-3. BANKS, 1895, Jour. New York Ent. Soc., vol. 3, p. 88. BRITCHER, 1903, Proc. Onondaga Acad. Sci., vol. 1, p. 126.

*Glyptocranium bisaccatum* SIMON, 1895, Histoire naturelle des araignées, vol. 1, p. 885. COMSTOCK, 1913, The spider book, p. 448, figs. 459-460; 1940, *op. cit.*, rev. ed., p. 462, figs. 459-460.

*Mastophora bisaccata* MELLO-LEITÃO, 1931, An. Acad. Brasileira Cien., vol. 3, p. 71. KASTON, 1948, Connecticut State Geol. Nat. Hist. Surv. Bull., no. 70, p. 232, pl. 35, figs. 737-740. ROEWER, 1942, Katalog der Araneae, vol. 1, p. 902. ARCHER, 1941, Mus. Paper 14, Alabama Mus. Nat. Hist., p. 31.

This pretty species has been well described by Henry C. McCook (1889) and by B. J. Kaston (1948).

FEMALE: Ten adult females vary from 9.50 mm. to 14.50 mm. in total length and average 12.37 mm. Specimens from the northern states are somewhat smaller.

Female from New Brunswick, New Jersey: 10.50 mm. long; carapace, 3.50 mm. long, 3.85 mm. wide; abdomen, 8.20 mm. long, 11.60 mm. wide, 8.00 mm. high; sternum, 2.00 mm. long, 1.75 mm. wide.

The structure and color pattern are as illustrated in figures 19 and 22, in close agreement with those of *phrynosoma*, new species. Carapace golden yellow to orange-brown, broader than long, granulose, the conical warts of moderate size. Occipital horns finely granulose, shallowly bifurcated, separated by a rounded depression by the width of the horn. Sides of carapace finely

granulate and the edge of posterior declivity rounded, without a crest of heavy granules. Eyes typical, the tubercles rounded, of moderate elevation.

Legs typical, rather long and thin, the metatarsi moderately curved.

	I	II	III	IV
	(mm.)	(mm.)	(mm.)	(mm.)
Femur	3.65	3.10	2.00	3.15
Patella	2.05	1.80	1.10	1.60
Tibia	3.35	2.20	1.35	2.20
Metatarsus	3.60	2.20	1.15	1.85
Tarsus	1.00	0.85	0.65	0.65
Total	13.65	10.15	6.25	9.45

Abdomen bright to dull white or yellow, lightly shaded with dusky, the paired spots and lateral reticular lines bright orange. Abdomen coriaceous, much broader than long, convex, shallowly emarginated in front, broadly rounded on the side and behind, evenly rounded above and without trace of humps. Clothing of abdomen inconspicuous, fine hairs.

The epigynum is as illustrated in figures 23 and 35.

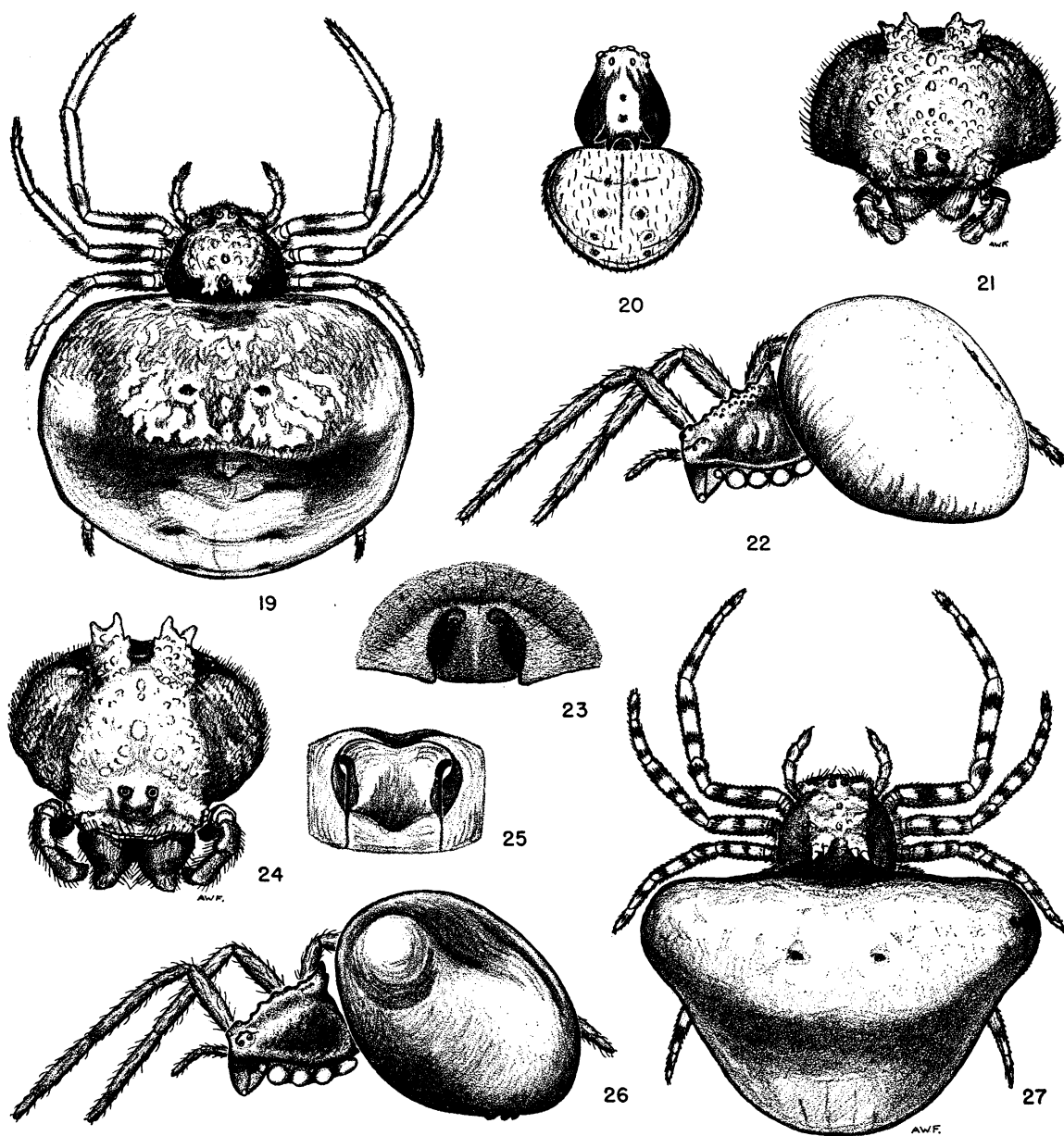
MALE: Total length, 1.85 mm; carapace, 0.86 mm. long, 0.82 mm. wide; abdomen, 0.95 mm. long, 1.17 mm. wide.

Coloration in fresh specimens presumably as in *cornigera*, but the carapace is now faded to dull yellowish on the midline and brownish on the sides. Abdomen rather bright yellowish above, duller below.

Structure essentially as in the male of *cornigera*, but the horns of the median crest are directed caudad and not so erect as in that species. Abdomen broader than long, truncated in front, broadly rounded on the sides and behind, and presenting very weakly developed humps. The front pairs of legs are missing.

The male palpus is as illustrated in figures 43 and 44.

The male of *Mastophora bisaccata* was described and figured by McCook in 1893. It has also been reported from near Sea Cliff, Long Island, New York (by Banks, in 1895), and from Onandaga County, New York (by Britcher, in 1904). The latter specimen, which is old, faded, and lacks the front pairs of legs, is the one described above.



FIGS. 19–23. *Mastophora bisaccata* Emerton. 19. Dorsal view of female. 20. Dorsal view of male, appendages omitted. 21. Frontal view of carapace of female. 22. Lateral view of female, appendages of left side omitted. 23. Subcaudal view of epigynum.

FIGS. 24–27. *Mastophora phrynosoma*, new species. 24. Frontal view of carapace of female. 25. Subcaudal view of epigynum. 26. Lateral view of female, appendages omitted. 27. Dorsal view of female.

TYPE LOCALITIES: Female type of *Cyrtarachne bisaccata* Emerton from New Haven, Connecticut, October 22, 1882 (J. H. Emerton), in the Museum of Comparative Zoölogy; two female cotypes of *Cyrtarachne*

*multilineata* Atkinson, presumably from Chapel Hill, North Carolina, probably lost.

DISTRIBUTION: Eastern United States from Maine and New York southward to Florida, westward to Arkansas.

OTHER LOCALITIES: *Maine*: Mount Desert Island, August (Marx collection, 204), female. *Massachusetts*: Billerica, December 26, 1922 (Rogers), female, egg sacs. *Connecticut*: Clintonville, April 8, 1935, egg sac. Prospect, August 16, 1935. Rainbow, August 9, 1939. South Meriden, October, 1945. Whitneyville, July 4, 1883 (J. H. Emerton). New Haven, October 22, 1882 (J. H. Emerton), female, two egg sacs. Kent, September, 1937, female, on bittersweet vine. (All in Kaston, 1948.) *New York*: Jamaica, Long Island, September 4–29, 1933 (R. Schmaltz), female. New York, on *Amelanchier*, female, egg sacs. Sea Cliff, Long Island (N. Banks, 1895), male. West Nyack, October 16, 1934 (Paul Richards), female, 20 feet high in elm tree; August 31, 1946 (E. L. Bell), female on mountain ash. Staten Island, September 9, 1928 (N. J. Burns), female. *New Jersey*: New Brunswick, July, 1930, female. Roselle Park, September 25, 1910, female. *Pennsylvania*: Altoona, August (Marx collection, 457), female. *Maryland*: Kensington, August 16, 1945 (E. A. Chapin), immature female. *District of Columbia*: July (Marx collection, 204), female; September (Fox collection), male. Near Washington, summer, 1925 (H. E. Ewing), female. *Virginia*: Falls Church (N. Banks), male, female. Monterey, July 30, 1943, immature. *North Carolina*: Canton (N. Banks), female. Raleigh, October 1, 1911 (C. S. Brimley), female. *South Carolina*: Batesburg (N. Banks), female. Clemson College (N. Banks), female. *Florida*: High Springs, October 18 1935 (Mrs. H. H. Simpson). Kissimmee (J. R. Gunn), female. Briston (Archer, 1940). Gainesville, August, 1942 (Mrs. Mary Mills), female. Sebastian, April, 1944 (G. Nelson), female. *Mississippi*: Gulfport, August 20, 1950 (Charles Segars), female. *Arkansas*: Berryville, July, 1942 (C. Wilton), male; 1941, egg sac. *Alabama*: Houston County, Chattahoochee River (Archer, 1940). *Tennessee*: Kingston, July 10, 1933 (W. J. Gertsch), immature female. *Ohio*: Camden, fall, 1939 (Henning), typical egg sac from apple twig.

The egg sac of *Mastophora bisaccata* was first illustrated by J. H. Emerton who found two examples on a beech tree at New Haven, Connecticut, in 1882. These

were dark brown, hard as the bark of a tree, and each was encircled by a series of irregular points. Quite a number of sacs of this type are now known, and most have long stems, even 30 or 40 mm. in length, and show more or less distinctly the scalloping around the equator of the cup. Such typical sacs are shown in plate 6, figure 4, and were borne on an elm twig which probably was set in a horizontal position. Quite different sacs are illustrated in plate 6, figure 1, depicting a cluster of three sacs on *Amelanchier*, which were produced by what seems to be a quite typical female *bisaccata*. These sacs are slightly larger, have quite spherical cups with long stems, and show no circle of scallops. These are nearly black in color and liberally covered with whitish hairs as shown in the plate. The egg sac shown in plate 5, from a photograph taken at Umatilla, Florida, by M. W. Tyler, shows still another pattern in this species. The rough sac has a very short stem and may not be a fully finished example. The females associated with the three types of egg sacs seem to belong quite definitely to *bisaccata*, but the possibility that more than a single species is represented must not be excluded. On the other hand, the differences may represent only the normal range in pattern for the species.

#### *Mastophora obesa* Banks

*Ordgarius obesus* BANKS, 1898, Proc. California Acad. Sci., ser. 3, vol. 1, p. 250, pl. 15, fig. 9.

*Glyptocranium obesum* PETRUNKEVITCH, 1911, Bull. Amer. Mus. Nat. Hist., vol. 29, p. 347.

*Mastophora obesa* MELLO-LEITÃO, 1931, An. Acad. Brasileira Cien., vol. 3, p. 72, figs. 1, 13. ROEWER, 1942, Katalog der Araneae, vol. 1, p. 901.

Banks's description is given below:

"Length of ♀ 15 mm.; breadth of abdomen 15 mm. Cephalothorax dull yellowish brown; legs paler, uniform; sternum brownish, a little yellowish in center; abdomen yellowish, with golden lines coming up on the sides, four indented dark spots, the anterior pair in a yellow region, base of abdomen mostly grayish and extending behind in the middle, more or less broken up with yellow. Cephalothorax elevated, pars cephalica spinulated, two prominent elevations behind, truncate at tip and terminated at each

corner by a more prominent spinule; M. E. on a slight elevation. Legs short; femora curved near tip. Abdomen not very high, extending over the basal part of the cephalothorax, plainly broader than long. The epigynum consists of a small transverse at the margin of the rima genitalis.

"Two specimens from La Chuparosa. Distinguished from *O. bisaccatus* Em., by the processes on the cephalothorax being truncate at tip, and by its much larger size."

TYPE LOCALITY: Female type and paratype from La Chuparosa, Baja California.

The type, which was deposited in the California Academy of Arts and Sciences, was destroyed in the San Francisco earthquake and fire of 1906. The female paratype is presumably deposited in the Museum of Comparative Zoölogy.

***Mastophora phrynosoma*, new species**

Plate 6, figure 5; text figures 24-27, 31

*Ordgarius cornigerus* McCook, 1893, American spiders, vol. 3, p. 197, pl. 12, fig. 1c only.

This species has been confused with *cornigera* Hentz and was figured by McCook in 1893. Its nearest relative, however, is *bisaccata*, from which it differs in the following respects: The median crest of the pars cephalica is higher, set with somewhat heavier conical tubercles, and the bifurcated horns are directed caudally instead of dorsally. The eye tubercles are more prominent, especially the lateral ones which are on angular cones. The abdomen is triangular, much broader than long, and the shoulders are prominent, rounded lobes.

FEMALE: Seven adult females vary from 8.50 mm. to 13.25 mm. in total length, the average being 10.27 mm.

Female holotype from Burlington, North Carolina, 13.25 mm. long; carapace, 4.60 mm. long, 4.60 mm. wide; abdomen, 9.20 mm. long, 15.50 mm. wide.

Carapace light yellowish brown, tinged with sooty on the sides, and faintly streaked with black on the posterior declivity. Sternum dull yellowish brown bordered with black; labium and maxillae concolorous at their bases, otherwise dirty white. Chelicerae sooty over buff; fang and border of fang groove brown. Coxae and trochanters of legs buff except for dirty white at the joints;

femora almost entirely sooty; patellae buff on the dorsal faces, sooty beneath; tibiae and metatarsi banded with sooty. Apex of abdomen, the sides, and the area beneath the shoulder humps a continuous zone of creamy white (yellowish in alcohol); just above the apex a roughly triangular patch (the base cephalad) of very pale buff on the mid-dorsum; shoulders gray or sooty and having fine dots; a wide zone between the shoulders and extending to the pedicel buff; the shoulders and the zone between flecked with light spots, each having one or more brown nuclei. Venter dark around the spinnerets and forward to the epigastric groove and on either side of the epigastric plates; parallel to the posterior corners of the epigastric plates a series of brown maculations; three pairs of black dots between the epigastric groove and the spinnerets, each pair progressively closer caudad.

Carapace (figs. 24, 26, 27) nearly as wide as long, broadly rounded on the sides, widest behind; pars cephalica bluntly angular at the fore corners; in profile, carapace ascending convexly from the depression behind the ocular quadrangle to the occipital crest; the crest surmounted by a pair of rather wide, bifurcated horns; a pair of sulci on either side of the carapace radiating anterolaterally from the crest; surface of carapace covered by scattered, blunt cones and warts from the region of the clypeus, and lateral eyes to the horns; sides and clypeus covered with a mat of hairs. Lateral eyes mounted on bluntly angular elevations, the anterior ones frontal, the laterals temporal, but close together. Median eyes on a quadrangular prominence, about equal in size; anterior median eyes separated from the posterior median eyes by the diameter of one eye; posterior median eyes slightly closer together than anterior eyes. Median and lateral eyes very widely separated. Clypeus nearly as wide as median ocular quadrangle, subconvex, slanting anteriorly, and forming convex enlargements directly below each lateral ocular prominence. Sternum subtriangular. Chelicerae two-thirds as wide as long, conical, curved inward towards each other below the middle. Labium and maxillae as in *Mastophora bisaccata* and *M. cornigera*. Legs of about the same proportions as in *M.*

*bisaccata*; their surfaces hirsute; the first pair of legs long in proportion to the other pairs.

	I	II	III	IV
	(mm.)	(mm.)	(mm.)	(mm.)
Femur	4.70	3.50	2.40	3.50
Patella	2.35	2.00	1.25	1.80
Tibia	4.50	2.70	1.60	2.50
Metatarsus	5.00	2.50	1.35	2.25
Tarsus	1.30	0.90	0.70	0.75
Total	17.85	11.60	7.30	10.80

Abdomen very bluntly triangular, wider than long, hirsute on the basal face, not prominent over the carapace; shoulders forming raised domes, flaring widely, and having an irregular tuberculated surface; area between the shoulders concave and having one pair of muscle scars in the middle and another pair on the apical face. Sides of the abdomen ornamented with horizontal and perpendicular striations, the horizontal ones being especially long on the blunt apical prominence.

The epigynum is as illustrated in figures 25 and 31. It is larger than in *cornigera* and has the entrances to the spermathecae obliquely oval, separated from each other by more than twice their diameter. The front border of the hood curves posteriorly. In *cornigera* the orifices are irregularly oval, slant towards each other, are twice their diameter apart, and are without the anterior curvature of the hood. In *cornigera* the orifices are subparallel, about one and one-third diameters apart, and the hood is high and smoothly arched.

TYPE LOCALITY: Female holotype from Burlington, North Carolina, September 17, 1934 (H. K. Wallace).

DISTRIBUTION: Eastern United States from New Hampshire and New York southward to Alabama.

OTHER LOCALITIES: All the specimens listed below have been designated as paratypes. *New Hampshire*: Hollis, September (Marx collection, 205), female. *New York*: New York City, on *Prunus*, female, egg sacs. *District of Columbia*: July (Marx collection, 201), female; October (Fox collection), female. *Maryland*: Annapolis, September 21, 1941 (M. H. Muma), female. College Park, October 4, 1936 (M. H. Muma), female, egg sacs. Shore opposite Plummer's

Island, October 23, 1913 (Schwarz), female. New Market, September 13, 1876 (H. Hopkins), female. Cabin John, November 11, 1943 (I. N. Hoffman), female, egg sac. *Virginia*: Falls Church (N. Banks), two females. *North Carolina*: Burlington, September 17, 1934 (H. K. Wallace), female holotype. *Alabama*: Monroe County, Randon's Creek, October 19, 1941 (A. F. Archer), female. Cullman County, Cullman, October 3, 1941 (A. F. Archer), female.

Allan Archer found females of this species in Alabama without formal webs. He writes: "They were taken from the upper surfaces of sassafras and hickory leaves, at least five and a half feet off the ground, on the slopes of hardwood ravines. They were clinging to the leaves like burrs and one was taken from its exposed position during a rain. In life the spiders closely resemble bird lime, whereas live *M. bisaccata* resembles a rather large crab spider."

The egg sacs of *Mastophora phrynosoma* are well illustrated in plate 6, figure 5, and they are the most characteristic in form in the whole genus. The basic cup is about 10 mm. in diameter at its widest point and suspended by a quite heavy stem equal in length to the height of the cup. Around the lower circumference of the cup are located three to five conspicuous wings. These are quite variable in form and size, and they may be reduced occasionally to conical points, as can be noted in the second egg sac shown in plate 6, figure 6. Several egg sacs are known for this species, and they all agree in the possession of the extensive lateral projections.

#### *Mastophora fasciata* Reimoser

*Mastophora fasciata* REIMOSER, 1939, Ann. Naturhist. Mus. Wien, vol. 50, p. 356, fig. 8. ROEWER, 1942, Katalog der Araneae, vol. 1, p. 902.

This species was based on a single female from the central tableland (Meseta Central) of Cartago Province in Costa Rica. The description of Reimoser, although lacking in verbal and pictorial detail, depicts a species seemingly quite distinct from any previously described from North America.

The following description has been translated from the German of Reimoser.



**FEMALE:** The cephalothorax (4.5 mm. long and 4.8 mm. wide) is thickly provided with warts. The crest of the pars cephalica is bifurcated, and each principal horn bears two rounded lobes. The pars cephalica is yellowish red, the pars thoracica is dark reddish brown. The legs and palpi are yellowish red. The light reddish brown sternum bears low radial elevations. The abdomen (9 mm. long and 12 mm. wide) presents on each side a wide, low, shoulder hump which extends far back. The upper side is dark reddish brown; on the caudal half a wide yellowish red transverse band is present. The epigynum has the form of a small, prominent elevation.

**TYPE LOCALITY:** Female holotype from Orosi, Cartago Province, Costa Rica, in the Reimoser collection.

***Mastophora corpulenta* Banks**

*Ordgarius corpulentus* BANKS, 1898, Proc. California Acad. Sci., ser. 3, vol. 1, p. 251, pl. 15, fig. 8.

*Glyptocranium corpulentum* PETRUNKEVITCH, 1911, Bull. Amer. Mus. Nat. Hist., vol. 29, p. 347.

*Mastophora corpulenta* MELLO-LEITÃO, 1931, An. Acad. Brasileira Cien., vol. 3, p. 72, fig. 8. ROEWER, 1942, Katalog der Araneae, vol. 1, p. 901.

Banks's description is given below:

"Length ♀ 13 mm.; abdomen, broad 10 mm., high 10 mm. Cephalothorax blackish in the front and elevated part, with the tubercles tipped with yellow, behind pale. Abdomen dark grayish, markings not distinct; venter yellowish; sternum and coxae reddish; femora and tibiae of legs reddish, darkest on anterior pairs, tarsi and metatarsi yellowish. Legs clothed with long white hair. Eyes as usual; cephalothorax gradually elevated, at the ridge divided into four lobes, the median pair smaller and barely higher than the lateral, terminated with two blunt tubercles; a number of scattered blunt tubercles in front, some as large as those on the ridge. Abdomen high, globose, with two widely separated, conical projections above.

"One specimen; San José del Cabo, Sept. This species is related to *O. cornigerus* Hentz, but is larger and has tubercles on the anterior sides as well as the pars cephalica, all tipped with yellow; the median elevation is barely

higher than the sides, and not furcate; the legs have no bands; and the projection above on abdomen is taller, but not of greater diameter."

**TYPE LOCALITY:** The female type, from San José del Cabo, Baja California, was destroyed in the San Francisco earthquake and fire of 1906.

***Mastophora lenca*, new species**

Text figures 28-30, 32, 33

This very curious species seems to be closely allied to *Mastophora holmbergi* Canals and *M. satan* Canals of Argentina. In these spiders the cephalothorax is matted quite thickly with gray or yellowish hairs, and the numerous, subspherical tubercles are conspicuous by their orange or red color. The abdomen is leathery, deeply grooved and wrinkled, and provided with more or less well-developed, flabby, shoulder humps. Canals' good descriptions and photographs (1931, An. Mus. Argentino Cien. Nat., vol. 37, pp. 17-27, text figs., pls. 1-4) characterize the Argentina species in excellent fashion. The first leg in this group is proportionately much longer than in *Mastophora extraordinaria* Holmberg, *M. cornigera* Hentz, and other more typical members of the genus.

In *Mastophora lenca*, new species, the first leg is about four times the length of the carapace; the first tibia is only slightly longer, and the first metatarsus is one-fifth longer, than the carapace. The proportionally greater length in *satan* and much greater length in *holmbergi* are indicated in table 1.

**FEMALE:** Total length, 11.50 mm.; carapace, 5.00 mm. long, 5.75 mm. wide; abdomen, 8.00 mm. long, 11.50 mm. wide.

Carapace dark reddish brown to black, with a purplish tinge, brighter red at middle, the numerous warts bright orange to red, the whole carapace with a mat of woolly white hairs, thickest on the sides. Sternum orange-red, somewhat brighter than the coxae, labium, and maxillae, all with a thin covering of inconspicuous hairs. Legs purplish red to brown, the basal segments darkest, clothed with fine white hairs, the first pairs with quite conspicuous fringes on the prolateral and retrolateral surfaces of the femora, patellae, and metatarsi. Abdo-

TABLE 1  
MEASUREMENTS (IN MILLIMETERS) OF THE FIRST LEGS OF SPECIES OF *Mastophora*,  
TOGETHER WITH THE LENGTH OF THE CARAPACE

	<i>M. holmbergi</i>	<i>M. satan</i>	<i>M. lenca</i>	<i>M. cornigera</i>
First leg				
Femur	6.00	6.00	5.00	4.50
Patella	3.25	3.10	2.75	2.40
Tibia	7.20	7.00	5.30	4.20
Metatarsus	9.50	6.00	6.00	4.20
Tarsus	2.00	2.00	1.35	1.25
Total	27.95	24.10	20.40	16.55
Carapace Length	4.75	5.00	5.00	4.00

men quite uniform bright yellow to orange, with a few small black spots along the grooves of the wrinkles and with a more conspicuous pair of black spots on the posterior declivity, the thin covering of procumbent amber hairs inconspicuous.

The structure and pattern are as illustrated in figures 28 and 33. Carapace broader than long, very broadly truncated behind along the lateral crest, slightly rounded below at pedicel, the square front equal at second eye row to nearly three-fifths of the greatest width (32/57). Pars cephalica quite evenly ascending from eyes to crest, where the pair of horns, of moderate prominence and asymmetrically bifurcated, are set with numerous warts, the area in front of eyes with a ring of seven warts, with a large one at center. Sides of carapace rough, with several warts, elevated at posterior declivity into a high crest nearly continuous with the median horns. Clypeus nearly vertical, grooved transversely below the median eyes, and as high as four diameters of an anterior median eye. First eye row strongly procurved, the median eyes separated by a little more than the diameter, four diameters of the median from the half as large lateral eyes. Second eye row moderately recurved, the median separated by scarcely two diameters, five diameters from the slightly smaller lateral eyes. Lateral eyes of each side on a robust, elevated tubercle, the front eye a little smaller. Four median eyes on an expansive elevated tubercle, highest at posterior edge, with two

large warts between the posterior eyes, the median quadrangle slightly broader than long and slightly narrower behind, the front eyes larger.

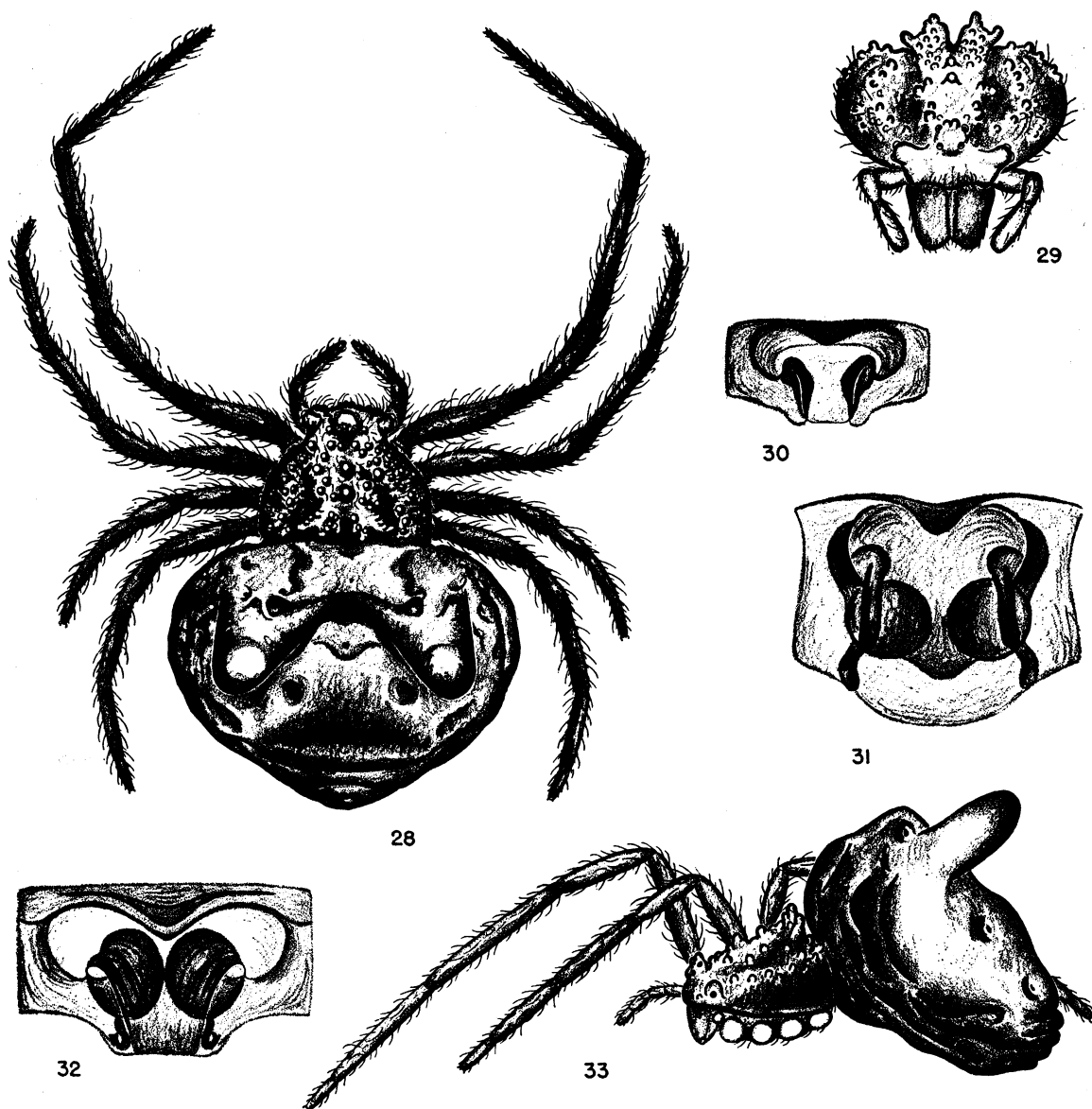
Chelicera typical, small but robust, the fang thick and short, the upper margin with the usual three teeth, the middle one much larger, and the lower margin with a blunt tooth.

Legs without true spines, all relatively smooth, the proportions typical.

	I	II	III	IV
	(mm.)	(mm.)	(mm.)	(mm.)
Femur	5.00	3.75	2.35	3.25
Patella	2.75	2.35	1.40	2.00
Tibia	5.30	3.00	1.65	2.60
Metatarsus	6.00	3.00	1.45	2.25
Tarsus	1.35	1.00	0.65	0.70
Total	20.40	13.10	7.50	10.80

First leg much longer than the others, the femur quite slender, curved at distal end, the cylindrical tibia long and uniform in thickness, the metatarsus much thinner, apically curved. All claws curved nearly to a right angle, the median claws large and more strongly curved.

Abdomen broader than long as seen from above, truncated in front, broadly rounded on the sides and behind, wrinkled and grooved at base and presenting two large mammillated humps which are flattened and directed caudad over the steeply declining caudal end. Abdomen from the side as high



FIGS. 28-30. *Mastophora lenca*, new species. 28. Dorsal view of female. 29. Frontal view of carapace of female. 30. Subcaudal view of epigynum.

FIG. 31. *Mastophora phrynosoma*, new species. Internal view of epigynum.

FIGS. 32-33. *Mastophora lenca*, new species. 32. Internal view of epigynum. 33. Lateral view of female, appendages of left side omitted.

as wide, wrinkled on venter and at sides. The abdomen of the female paratype has less conspicuous humps as a result of shrinking, and there is a deep groove running between them to the front margin.

The epigynum is as illustrated in figures 30 and 32.

TYPE LOCALITY: Female holotype and paratype from Zamorano, Honduras, October 19, 1946 (T. D. A. Cockerell).

Two females and an egg sac of this curious spider were sent to me in 1947 by the late Prof. T. D. A. Cockerell, who wrote as follows: "On a coffee tree here was found a

most extraordinary spider, herewith crudely sketched. It is hard and, when the legs are drawn in, you would never suspect that the creature was a spider. But let it alone for a while, and out come the legs, the first pairs long and slender, the others shorter."

The charcoal gray egg sac resembles very closely in size and appearance the typical sac of *Mastophora cornigera* Hentz (pl. 6, fig. 2). The subspherical cup is about 12 mm. in diameter and has the silk on the upper surface drawn out into a slender, tough stem (10 mm. long) which is flared out apically to effect a wide attachment by means of numerous silk lines to the substratum. The sac, when cut open in February, was found to be filled with spiderlings in the first instar indistinguishable as to sex.

#### GENUS AGATOSTICHUS SIMON

*Agatostichus* SIMON, 1895, Histoire naturelle des araignées, vol. 1, p. 885 (genotype: *Agatostichus leucacantha* Simon, of Brazil); 1896, Ann. Soc. Ent. France, vol. 65, p. 473. MELLO-LEITÃO, 1931, An. Acad. Brasileira Cien., vol. 3, p. 67. ROEWER, 1945, Katalog der Araneae, vol. 1, p. 900.

Araneine spiders in which the females are of average size (6.65 mm.) and the males (still unknown) are presumed to be of very small size.

Carapace slightly broader than long, broadly rounded behind and narrowed and truncated in front. Pars cephalica strongly elevated behind into an outgrowth which is surmounted with white spines or bulbous processes, as follows: one on midline behind the eyes, one at middle of carapace, and one on each side at the crest of the posterior declivity. Lateral eyes of each side on a single tubercle and the four median eyes on an elevated tubercle which bears, between the median eyes, an erect and subacute spine or a rounded horn. Clypeus subvertical. Chelicerae toothed, the lower margin with a single robust tooth. Sternum subtriangular.

Legs slender and spineless, the first pair much longer than the others. Median claws prominent, strongly curved. Fourth legs with a dorsal patch of toothed spines at distal end of metatarsus.

Abdomen short, much broader than long, coriaceous, grooved and wrinkled, with a pair of small, conical humps on the dorsum,

which is clothed with whitish hairs, white hair tufts, and brown setae.

Epigynum very small, located on the caudal edge of the genital groove. The egg sacs are unknown.

The males of this genus are still unknown. The small size and caudal position of the female epigynum are features shared by *Mastophora* and make it likely that the male *Agatostichus* will prove to be a diminutive of the female.

#### *Agatostichus leucabulba*, new species

Text figures 34, 38, and 40

This is the second species of the genus to be described. The genotype, *Agatostichus leucacantha* Simon, was based on a single female from Baía, Brazil, and no additional specimens have since been mentioned in the literature. *Agatostichus leucabulba*, new species, from the Rio Grande Valley of Texas and adjacent Tamaulipas, differs in the following features: The median ocular tubercle bears a rounded horn instead of an erect spine. The pars cephalica bears subequal white bulbous processes instead of erect spines (of which the median spine behind is of much greater length). The small humps on the dorsum of the abdomen are set much nearer the base.

FEMALE: Total length, 6.65 mm.; carapace, 2.75 mm. long, 2.85 mm. wide; abdomen, 4.50 mm. long, 5.80 mm. wide.

Carapace reddish brown except for the yellowish side margins and an orange median patch enclosing the tubercles, which are tipped in milky white. Carapace rather thickly clothed with woolly white hairs. Sternum yellowish, the chelicerae brownish at base, the coxae, labium, and maxillae yellowish, all clothed with whitish hairs. Legs yellowish to light brown, with faint brown markings only on the first leg, as follows: with narrow submedian and distal dusky rings on the femur and tibia and the metatarsus with broad median ring running nearly to distal end. Abdomen mostly yellowish to whitish above, sooty black around the base, and with dusky flecks showing through the otherwise whitish integument.

The structure of the animal is as illustrated in figures 34 and 40. Carapace slightly

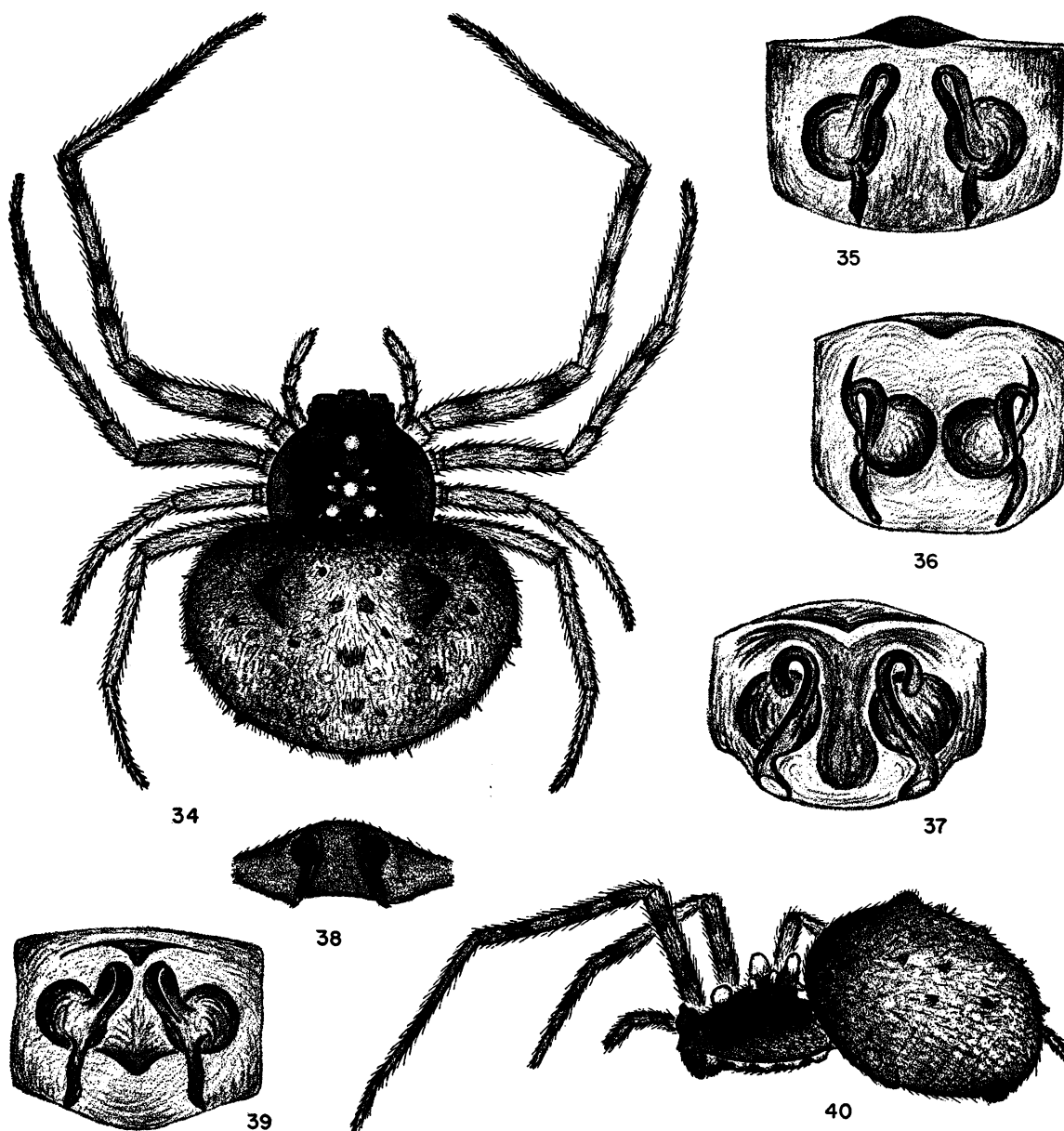


FIG. 34. *Agatostichus leucabulba*, new species. Dorsal view of female.

FIG. 35. *Mastophora bisaccata* Emerton. Internal view of epigynum.

FIG. 36. *Mastophora archeri*, new species. Internal view of epigynum.

FIG. 37. *Mastophora cornigera* Hentz. Internal view of epigynum.

FIG. 38. *Agatostichus leucabulba*, new species. Subcaudal view of epigynum.

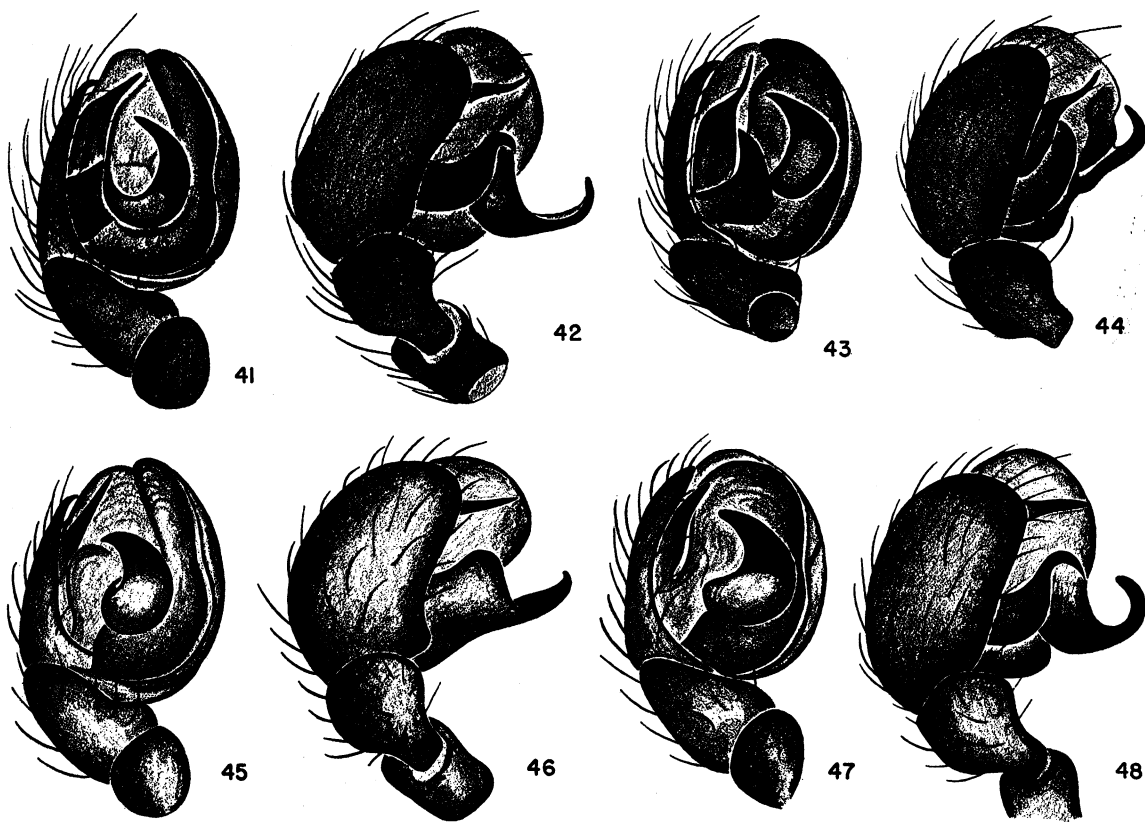
FIG. 39. *Mastophora hutchinsoni*, new species. Internal view of epigynum.

FIG. 40. *Agatostichus leucabulba*, new species. Lateral view of female, appendages of left side omitted.

broader than long, broadly rounded on the sides, widely truncated behind, produced at eye rows and more narrowly truncated across clypeus in front. Pars cephalica

strongly elevated behind into a bifurcated outgrowth which supports various white bulbous processes as follows; one large bulb just behind the median eyes and separated





FIGS. 41-42. *Mastophora cornigera* Hentz. 41. Ventral view of left palpus. 42. Lateral view of left palpus.

FIGS. 43-44. *Mastophora bisaccata* Emerton. 43. Ventral view of left palpus. 44. Lateral view of left palpus.

FIGS. 45-46. *Mastophora archeri*, new species. 45. Ventral view of left palpus. 46. Lateral view of left palpus.

FIGS. 47-48. *Mastophora hutchinsoni*, new species. 47. Ventral view of left palpus. 48. Lateral view of left palpus.

from the eyes by a transverse groove and from the remaining elements of the outgrowth by a broad, transverse groove; a large medially placed bulb behind is flanked by a pair of small bulbs on each side; the caudal edge of the eminence is bifid and presents a bulb of moderate size on each angle (or horn) and a smaller one below the steeply declining edge. The lower edge of the eminence with dark warts and the pars thoracica coarsely roughened and set with lesser warts and cones largely hidden by the mat of woolly hairs. Lateral eyes of each side on a low, connate tubercle, the median eyes on a large, elevated tubercle at the posterior edge of which (nearly between the posterior median eyes) is a small, rounded horn.

First eye row rather strongly recurved as seen from in front, the median separated by two full diameters, three diameters from the smaller lateral eyes. Clypeus rounded below the median eyes, separated by a shallow groove, which is much deeper, by the side eyes. Space between the anterior median eyes and the clypeal edge about equal to the length of the median quadrangle. Posterior eye row weakly recurved as seen from above, the median separated by two full diameters, about four diameters from the somewhat smaller lateral eyes. Median ocular quadrangle four-fifths as long as broad, as wide in front as behind, the eyes subequal in size. Chelicerae bluntly conical, the upper margin with three robust teeth, the lower

with a single nearly equal tooth near base of the brown fang, which is curved and of moderate stoutness. Sternum subtriangular, pointed behind between the posterior coxae, which are only slightly separated. Legs clothed with fine white hairs but lacking true spines.

	I	II	III	IV
	(mm.)	(mm.)	(mm.)	(mm.)
Femur	3.55	2.70	1.65	2.65
Patella	1.60	1.30	0.75	1.20
Tibia	3.30	2.05	1.15	1.95
Metatarsus	3.60	2.20	1.15	1.60
Tarsus	1.00	0.65	0.50	0.55
Total	13.05	8.90	5.20	7.95

First leg much longer than the others and quite slender, the tibia gently curved. Median claws prominent on all tarsi and spurious claws present.

Abdomen much broader than long, deeply emarginated in front partially to overhang the carapace, broadly rounded behind, and presenting above two small conical humps separated by the width of the carapace. Clothing of the abdomen whitish hairs, a series of about a dozen small tufts of long white hairs, scattered amber brown setae,

most numerous on the shoulders, among which are a few larger flattened setae which are drawn out to a fine point apically. Caudal end of abdomen and venter grooved and wrinkled. Spinnerets small, the front pair with flattened apical segment.

The epigynum is as illustrated in figure 38, small in size as in species of *Mastophora* and other genera.

TYPE LOCALITY: Female holotype from east of Harlingen, Texas, January–March, 1936 (L. I. Davis).

OTHER LOCALITY: *Tamaulipas*: Forty miles south of Linares, one juvenile female paratype (Coralyn Davis).

The juvenile specimen from Tamaulipas, which is only 1.90 mm. in total length, is assigned to this species with only moderate doubt. The points of difference presumably are due to age. The first legs have a series of fine bristles along the prolateral side of the tibiae and metatarsi as in juvenile *Mastophora*. The processes on the cephalic outgrowth occupy the same position as in the Texas female, but they are white spines of about subequal length and each is provided at the tip with a pale hair. The conical humps on the abdomen are more widely separated.

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