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THE NEARCTIC ATYPIDAE

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The curious spiders now comprising the Atypidae were set apart many years ago by various authors as representing a group which, though obviously closely related to the other mygalomorph species, was worthy of separation from them in some way, either as a genus, a subfamily, or a family. The genus *Atypus* dates from 1804, when Latreille used the name for the first time in a generic sense. *Aranea subterranea* Roemer, now placed as a synonym of *Atypus piceus* (Sulzer), was designated as the genotype by this same author in 1810. Ausserer in his 'Beiträge zur Kenntniss der Arachniden-Familie der Territelariae' recognized a subfamily Atypinae, which name had been used provisionally by Thorell in 1869–1870, and included three generic categories, *Calommata* Lucas, its synonym *Pelecodon* Doleschal, and *Atypus* Latreille. This author placed two of the American species in *Atypus* but erected the new genus *Madognatha* for *Sphodros abbotii* Walckenaer, assigning it to the subfamily Theraphosinae. The family name, Atypidae, was proposed by P. Bertkau in 1878 and was based on the characters presented in the German species of *Atypus*. A little later Thorell (1889–1890) divided his Territelariae into five families and for some reason substituted the name Calommatoidae for the Atypidae of Bertkau. In the 'Historie Naturelle des Araginées' Simon restored the name Atypidae and considerably enlarged the limits of the family by including twenty-four species representing six genera, and placed them in three subfamilies, the Brachybothrinae, Hexurinae, and Atypinae. Later, however, the family name was restricted to the genera *Atypus* and *Calommata* by Simon and the other genera previously included were relegated to the Avicullariidae in which they were regarded as subfamilies.

Atypidae

Atypinae Thorell, 1869–1870, 'On European Spiders,' pp. 164–165.

Atypinae Ausserer, 1871–1875, Verh. Zool.-Bot. Gesell., Wien, XXI, pp. 13–18.

Atypinae Thorell, 1870–1873, 'Remarks on Synonyms of European Spiders,' p. 604.

Atypidae Bertkau, 1878, Archiv für Naturgeschichte, XLIV (1), pp. 356 and 362.

Calommatoidae THORELL, 1889–1890, Studi sui Ragna Malesi e Papuani, IV, p. 394 (footnote 2); 1891–1892, idem, p. 467 (Atypoidae sive Calommatoidae).

Atypidae Simon, 1892–1895, 'Histoire Naturelle des Araignées,' I, pp. 191–199 (Brachybothriinae, Hexurinae, and Atypinae).

Atypidae Simon, 1897–1903, 'Histoire Naturelle des Araignées,' II, p. 972.

Atypidae SMITH, 1908, Ann. Amer. Ent. Soc., I, pp. 209–211.

Atypidae PETRUNKEVITCH, 1923, Ann. New York Acad. Sci., XXIX, p. 169; 1911, Bull. Amer. Mus. Nat. Hist., XXIX, pp. 94–95 (includes *Aliatypus* Smith); 1928, Trans. Connecticut Acad. Arts and Sci., XXIX, p. 31 (includes *Atypus*, *Calommata*, and *Microhexura*); 1933, idem, XXXI, pp. 328, 345, 357, 361 and 370.

The family name Atypidae is now used in the restricted sense of Ausserer, Bertkau and Simon. The validity of such a disposition has been further substantiated by Dr. Alexander Petrunkevitch in his recent paper dealing with the internal anatomy of spiders where he has shown that *Atypus piceus* has but six cardiac ostia. The combination of characters present in the members of this small family may be tabulated as follows in what is presumably the relative importance of each.

1.—The heart has three pairs of ostia (Branch Sexostiatae).
2.—The maxillary lobes (endites) are strongly developed.
3.—Six spinnerets are present, the last pair primitively triarticulate, but quadriarticulate in *Atypus abboti* (Walckenaer) and *Atypus muralis* Bertkau.
4.—The anal tubercle is situated well above the posterior spinnerets as in the Brachybothrinae and the Liphistiidae.
5.—The labium is completely fused with the sternum in *Atypus*, but there is a well-marked transverse suture in *Calommata*.
6.—The chelicera lacks a rastellum.
7.—The usual groove on the lower margin of the chelicera is indistinct or obsolete.
8.—The sternum has four pairs of sigilla.
9.—A conductor of the embolus is present in the male palpus.

The presence of only three pairs of cardiac ostia, a condition shared by at least two more families of mygalomorph spiders, the Migidae and the Barychelidae, is the most important single character upon which family status for the atypids is now based. It is presumed that spiders of the subfamily Brachybothrinae of the Ctenizidae are quadriostiate, though no definite data on this point are available for any of the species. In other respects there is a nearly complete parallelism between the Atypidae and the members of this subfamily, a fact which for a time certainly warranted the use of the family name in the broad sense of Simon. Smith's objections to the restriction of the family to two genera were pertinent, but at that time the fundamental data on the cardiac ostia were not known. The atypids also parallel true spiders in many ways, particularly in the development of maxillary lobes and a conductor of the embolus in the male palpus. The following chart, based on the

characters enumerated above, illustrates the parallelism in the groups of spiders mentioned.

	Atypidae	Brachybothrinae	Dipneumonomorphae
Heart	Sexostiate	Octostiate	Sexostiate
Maxillary lobes	Strongly	Slightly	Well developed
Spinnerets	Six	Six and four	Six, four and two
Anal tubercle	Remote from	Remote from	Near spinnerets
Labium	Fused in Atypus	Discrete	Discrete or fused
Rastellum	Absent	Present	.....
Sternum	Eight sigilla	Six sigilla	.....
Conductor	Present	Present	Present

The Atypidae seem clearly to be a recent offshoot of the main branch of three-clawed mygalomorph spiders. The specialization in *Atypus* is presumably more recent than in *Calommata*. This latter genus is essentially tropical in distribution in Asia and Africa. With the exception of *Atypus javanus* Thorell, from Java, the species of *Atypus* are found in the temperate zones of both the Old and the New World. Species of this genus advance farther north in Europe than representatives of any of the other four-lunged spiders. *Atypus affinis* Eichwald is found in England and, according to Nielsen, has its northern limit of distribution in Denmark, which would place it well above the 55th parallel north. The distribution of the American species is imperfectly known, but the records of *Atypus milberti* (Walckenaer) from Massachusetts, Wisconsin and New York indicate that the limits of occurrence of this species are well above the 40th parallel north. The three American atypids are confined to the eastern United States. On the west coast, however, other mygalomorph spiders (*Brachybothrium* of the Ctenizidae and *Hexura* of the Dipluridae) are found in Oregon, Washington, and Montana, and the limits of distribution of these forms will certainly be found to be well above the 50th parallel north, in British Columbia and possibly in Alberta.

The genus *Microhexura* Crosby and Bishop (1925, Ent. News., XXXVI, p. 145) is included in the Atypidae by Dr. Petrunkevitch in his 'Systema Aranearum,' but this genus seems to belong elsewhere.

It is a pleasure to acknowledge the coöperation of Dr. W. M. Barrows of Ohio State University, Mr. Wilton Ivie of the University of Utah, and Mr. H. K. Wallace of the University of Florida, to whom I am indebted for the loan of material and various data on this interesting group of spiders. The excellent drawings were done by Mr. V. Pierre Noel.

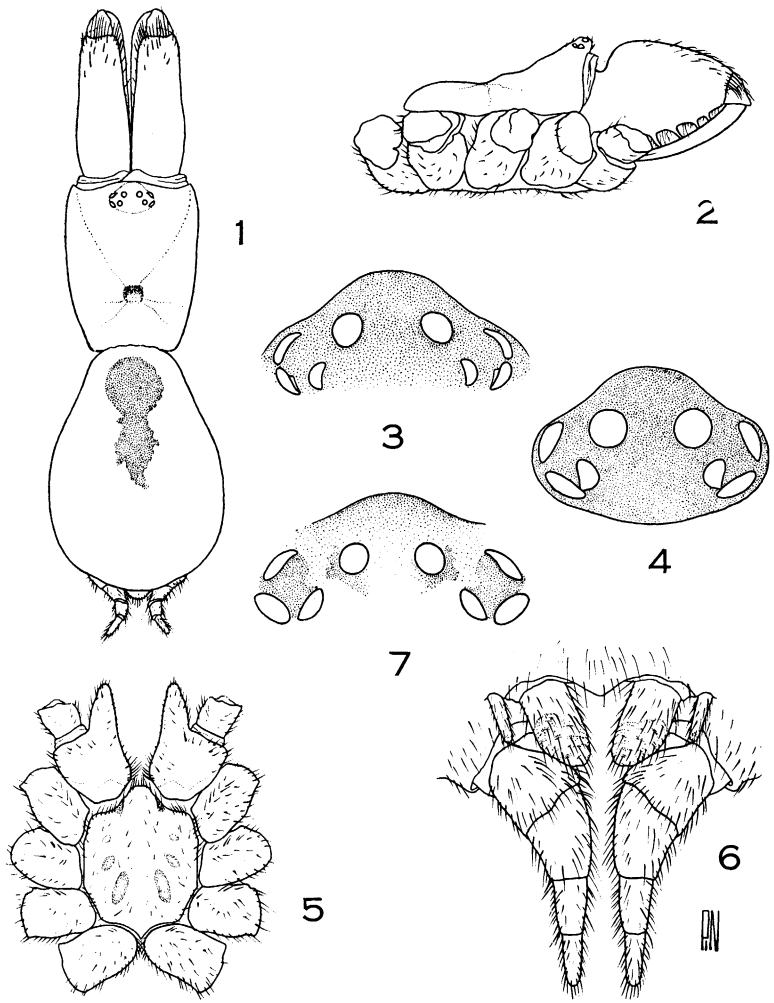


Fig. 1. *Atypus abboti* (Walckenaer), dorsal view of male, legs omitted.
Fig. 2. Idem, lateral view of carapace of male.
Fig. 3. Idem, eyes of female.
Fig. 4. Idem, eyes of male.
Fig. 5. Idem, underside of carapace of male.
Fig. 6. Idem, spinnerets of male.
Fig. 7. *Atypus bicolor* Lucas, eyes of female.

ATYPUS LATREILLE

Atypus LATREILLE, 1804, Nouv. Dict. Hist. Nat., XXIV, p. 133; 1810, 'Considérations Générals des Animaux, Des Crustacés, Des Arachnides et Des Insectes,' p. 120 (*Aranea subterranea* Roemer, designated as "Type").—AUSSERER, 1871, Verh. Zool.-Bot. Gesell, Wien, pp. 131–134.—SIMON, 1892–1895, 'Histoire Naturelle des Araignées,' I, p. 198; 1897–1903, idem, II, p. 972 (Atypidae).—PETRUNKEVITCH, 1911, Bull. Amer. Mus. Nat. Hist., XXIX, pp. 94–95.—COMSTOCK, 1913, 'The Spider Book,' pp. 253–256.—SIMON, 1914, 'Les Arachnides de France,' VI (part 1), pp. 22–23.

Oletera WALCKENAER, 1805, 'Tableau des Aranéides,' p. 7; 1837, 'Histoire Naturelle des Insectes Apteres,' I, p. 243–245 (*bicolor*).

Sphodros WALCKENAER, 1837, 'Hist. Nat. des Ins. Apt.,' I, pp. 246–251 (*abboti* and *milberti*).

Madognatha AUSSERER, 1871, Verh. Zool.-Bot. Gesell., Wien, pp. 143–144 (*abboti*).

GENOTYPE.—*Atypus piceus* (Sulzer).

The American species of this genus agree very well in important structural details with the better known European members. The females of all the species, which are predominantly brown in color, are robust spiders with short legs, most of them less than twenty millimeters in total length when adult. The largest Nearctic species, which is quite possibly the largest member of the genus, is *Atypus bicolor* Lucas, the adult female of which sometimes attains thirty millimeters. The males are similar to the females in general appearance, the body proper being proportionately quite as robust, but they have longer legs, the tarsi of which are flexible and marked by numerous false sutures. The disparity of size between the sexes is not particularly marked in *milberti*, but is more so in *abboti* and *bicolor*, some of the difference in the smaller male being due to the less distended abdomen. In two of the American species the males are brightly colored. The male of *Atypus abboti* has the abdomen a brilliant iridescent blue above. The bright red legs of *Atypus bicolor*, contrasted with the deep black carapace and abdomen, make this species especially striking.

All the American species have the marginal teeth on the chelicerae subequal in size as in *Atypus affinis* and *muralis*, but in the genotype, *Atypus piceus*, the teeth are unequal in size and somewhat irregular in arrangement. In the structure of the carapace and sternum *Atypus milberti* closely approaches the three European species. The four pairs of sigilla on the sternum are usually well defined, oval in shape, the caudal pair larger (see Figs. 9 and 14). In *Atypus abboti* and *bicolor* the sternum is longer than board and in the latter species the sigilla are characteristic in form (Fig. 13).

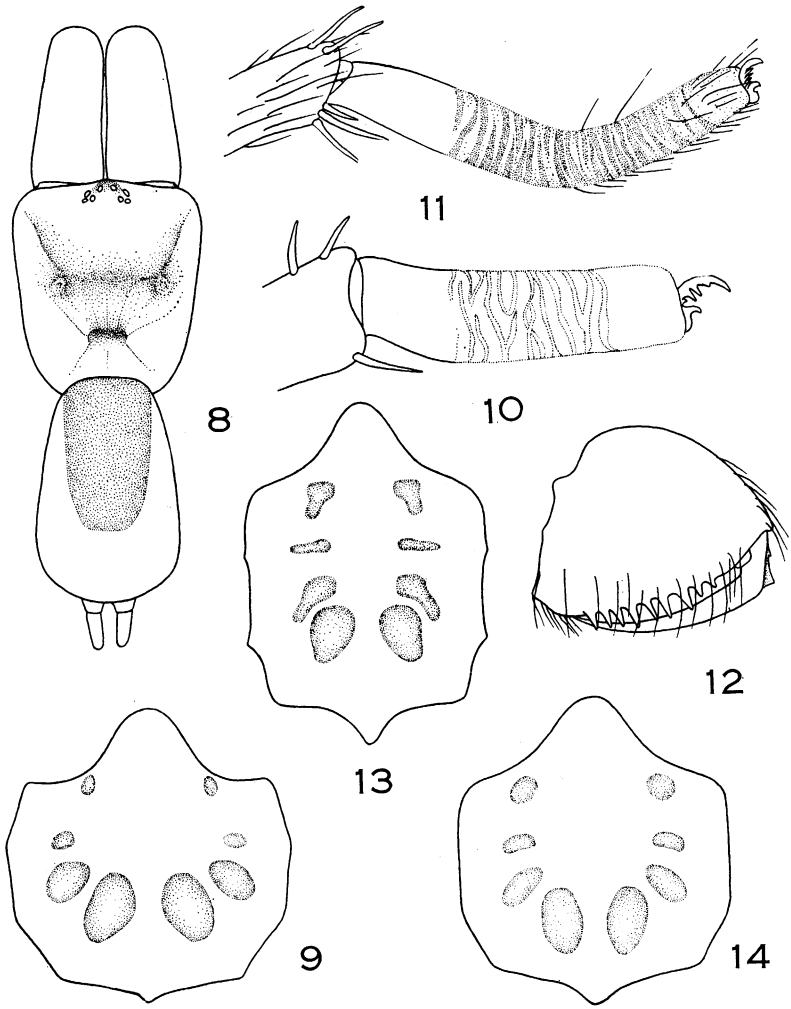


Fig. 8. *Atypus milberti* (Walckenaer), dorsal view of male, legs omitted.
Fig. 9. Idem, sternum of female.
Fig. 10. Idem, first right tarsus of male, hairs omitted.
Fig. 11. *Atypus abboti* (Walckenaer), first right tarsus of male, hairs omitted.
Fig. 12. Idem, left chelicera of female, prolateral view.
Fig. 13. *Atypus bicolor* Lucas, sternum of female.
Fig. 14. *Atypus piceus* (Sulzer), sternum of female.

The atypids have six spinnerets of which only the posterior pair has more than a single segment. *Atypus abboti* from the southeastern United States and *Atypus muralis* of Germany have the posterior spinnerets four-jointed, a character of considerable interest and of great convenience in the separation of the females. The other known species have these spinnerets triarticulate. Simon's statement in 1914 ('Les Arachnides de France,' VI, p. 23, note) that "*A. muralis* Bertkau, espèce d'Allemagne, dont je ne connais que la femelle, diffère des deux autres par ses filières supérieures quadriarticulees par suite de la division de l'article apical" is correct. The posterior spinnerets were primitively three-jointed in all the species, a condition found in the adults of both sexes of *Atypus bicolor* Lucas, *A. milberti* (Walckenaer), *A. piceus* (Sulzer), and *A. affinis* Eichwald. This is also true for the young of *Atypus abboti* (Walckenaer) and probably *A. muralis* Bertkau. However, in the adults of *Atypus abboti* and *muralis*, and probably some time before the last molt, the caudal segment becomes divided into two, the quadriarticulate spinneret resulting. Juveniles of *Atypus abboti* in one of the early stadia, when their total length is about 2.75 mm., have triarticulate posterior spinnerets. A young example in a later stadium (6.00 mm. long) has these spinnerets four-jointed as in the adult.

A short diagnosis and several illustrations (Figs. 15, 16 and 17) of a juvenile example of *Atypus abboti* are given for comparison with the adult.

Total length, including the chelicerae, 2.75 mm.

	Carapace	Front	Sternum	Labium	Maxilla	Abdomen
Length	0.90	..	0.66	0.24	0.45	1.05 mm.
Width	0.77	0.68	0.66	0.10	0.33	0.90 mm.

Carapace bright yellow to orange, very narrowly margined in brown and marked with faint brown streaks from the indistinct median groove on the pars thoracica, the first pair defining the head portion. Carapace smooth and shining, without hairs or spines, subquadrangular in outline, truncated and broad in front, narrowed in the caudal third, rounded caudally and emarginated above the pedicel. Eyes on a black field. General form of whole spider as given in figure 15. Sternum clothed with fine black hairs, three pairs of sigilla very faintly indicated around the margins (see Fig. 16). Chelicera concolorous with the carapace, with a few black hairs distally, the margin with eight subequal teeth. Coxae and legs with a dull greenish tinge, sparsely clothed with black hairs, the legs moderately stout. Spinnerets as in figure 17, the last pair triarticulate.

The nest and the habits of one American species, *Atypus abboti*, have been studied in detail by the Reverend Henry C. McCook (1888, Proc. Acad. Nat. Sci., Philadelphia, pp. 203–222). Mr. H. K. Wallace

of the University of Florida has communicated to me a few additional notes on the habits and habitat of the species in Alachua County, Florida. He writes: "The purse-webs which *Atypus abboti* builds, and in which the spiders live, extend eight to ten inches from the ground up the sides of sweet gums, oaks, magnolias, etc., in low hammock situations. The bottoms of the webs extend several inches undergound into soil that is usually black, damp and rich in organic material. Males and females build similar tubes, often on the same tree. The female keeps the young with her for a time in the web. However, the presence of miniature tube-webs on trees indicates the early departure of the young from the home nest. The males mature in June and seem to be less numerous than the females, for only twelve males have been collected to date in Alachua County. These were taken from tube-webs comparable in size and texture to those of the female."

The habits of the two northern species of *Atypus* have not been fully investigated, though it is known that both of them build purse-webs. The female of *Atypus bicolor* from Florida was taken from a web which, in keeping with the large size of the spider, was fully two feet long and placed upright against a tree. *Atypus milberti* is presumed to have this same habit. The only female of *milberti* that I have seen was not associated with its web. The males of *bicolor* and *milberti* are usually found wandering in the open. Eight males of this latter species were taken by Dr. W. M. Barrows at Cantwell Cliffs, Rockbridge, Ohio, where he found them "wandering around in the woods in broad daylight." The three American species are seemingly very local and relatively rare.

Atypus niger Hentz is considered here to be a synonym of *Atypus milberti* (Walckenaer). A strict comparison of specimens of *niger* with the description of *milberti* brings to light numerous discrepancies which, however, can scarcely be taken at their face value and are attributed to the faulty observation of Walckenaer.

KEY TO THE NEARCTIC SPECIES

1.—Posterior spinnerets four-jointed. Sternum and carapace longer than broad. Abdomen of male iridescent purple..... *Atypus abboti* (Walckenaer).
Posterior spinnerets three-jointed..... 2.

2.—Male: Legs carmine red, the carapace and abdomen black. Conductor of bulb of palpus curved, not broadened apically. Female: Carapace distinctly longer than broad. Eyes of the first row subequidistant. Sternum longer than broad, the sigilla irregularly subrectangular (Fig. 13).
Atypus bicolor Lucas.
ale: Legs black or dark reddish brown, concolorous with the carapace.

Conductor of bulb broadened distally. Female: Carapace as broad as or broader than long. Median eyes of the first row nearer the laterals. Sternum broader than long, the sigilla oval (Fig. 9).

Atypus milberti (Walckenaer).

Atypus abboti (Walckenaer)

Figures 1 to 6, 11, 12 and 15 to 23

Purse Web Spider ABBOT, 1792, Mss. drawings of Georgia Insects, XIV, Pl. VIII, No. 36, Zool. Libr. British Mus. Nat. Hist.

Sphodros Abbotii WALCKENAER, 1837, Hist. Nat. des Ins. Apt., I, p. 247.

Madognatha Abbotii AUSSERER, 1871, Verh. Zool.-Bot. Gesell., Wien, XXI, p. 143.—MARX, 1890, Proc. U. S. Nat. Mus., XII, p. 501 (not *milberti* Walckenaer, male).

Atypus abbotii MCCOOK, 1888, Proc. Acad. Nat. Sci., Philadelphia, pp. 203–220, with text figures; 1893, 'American Spiders,' II, p. 138, III, Pl. XXIX, fig. 9.

Atypus abboti SIMON, 1890, Actes Soc. Linn., Bordeaux, (4) XLIV, p. 308 (part); 1892, Hist. Nat. des Araignées, I, p. 198.—COMSTOCK, 1913, 'The Spider Book,' p. 253, Fig. 227.—PETRUNKEVITCH, 1911, Bull. Amer. Mus. Nat. Hist., XXIX, p. 94.

MALE ALLOTYPE.—Total length, including the chelicerae, 9.75 mm.

A medium-sized spider with black legs and carapace and an iridescent purple abdomen.

	CARAPACE	FRONT	STERNUM	LABIUM[1]	MAXILLA	ABDOMEN
Length	3.45	..	2.35	0.50	1.70	3.70 mm.
Width	2.85	2.50	2.00	0.75	1.20	2.70 mm.

Carapace very dark brown to black, uniformly pitted and roughened, the pars cephalica and the margins of the pars thoracica darker, armed only with a few small spines on the front face of the ocular tubercle. Carapace longer than broad, subtruncated in front, the width at this point being about eight-ninths of the greatest width of the carapace, very weakly rounded on the sides, essentially straight and narrowed to seven-ninths the greatest width between the fourth coxae (28/20), the caudal margin broadly rounded and emarginated above the pedicle. Pars thoracica irregularly flattened, the cervical groove a deep, suborbicular depression which is placed back four-sevenths of the total length (34/20) and occupies one-sixth of the width at that point. Pars cephalica very strongly elevated, convex, forming a subequilateral triangle as seen from above, as viewed from the side steeply declining behind the ocular tubercle and leveled off just in front of the cervical groove. Lateral and dorsal outlines of the carapace essentially as in figures 1 and 2.

Eyes on an elevated tubercle which is one-third as broad as the head in front. First row of eyes slightly broader than the second; as seen from in front procurved to the extent that a line along the upper margins of the laterals touches the lower margins of the medians, as seen from above recurved, a line along the caudal margin of the medians cutting the centers of the laterals. Ratio of the eyes: ALE:AME: PLE:PME = 17:14:14:11. Anterior median eyes separated by more than their

[1] The measurements of the labium are more or less arbitrary because of the fusion of the labium with the sternum.

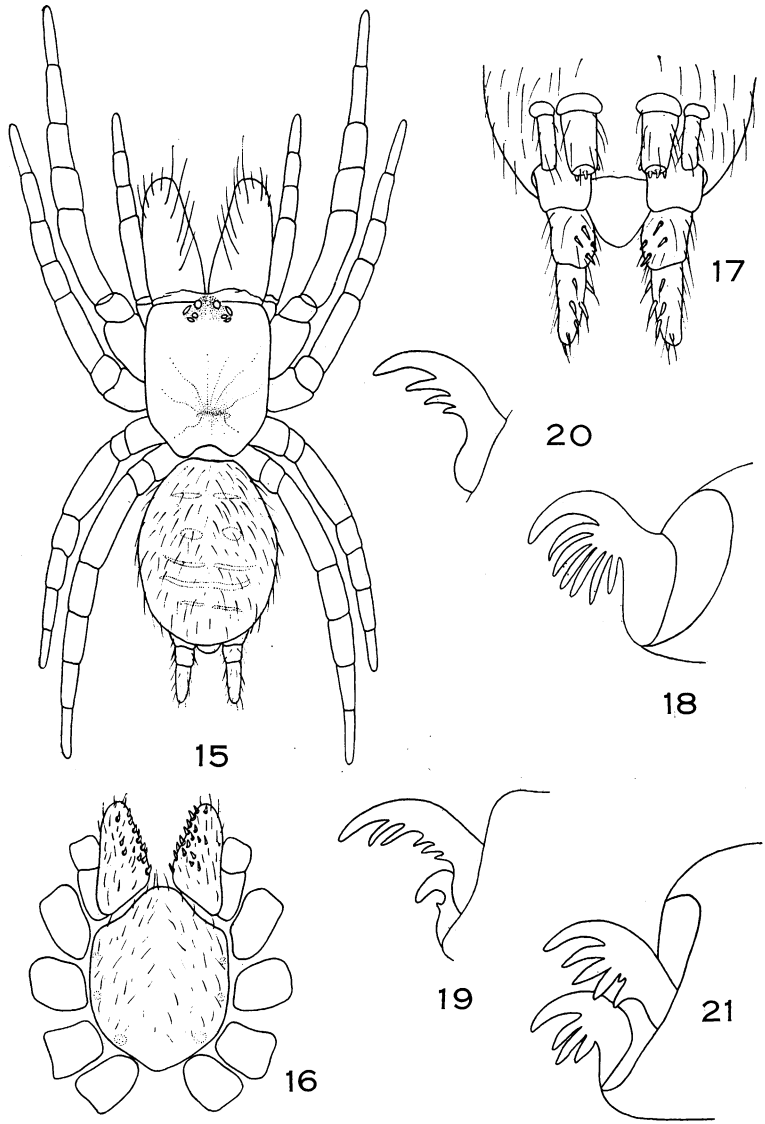


Fig. 15. *Atypus abboti* (Walckenaer), dorsal view of juvenile.

Fig. 16. Idem, underside of carapace of juvenile.

Fig. 17. Idem, spinnerets of juvenile.

Fig. 18. Idem, claw of left palpus of female, retrolateral view.

Fig. 19. Idem, proclaw and unpaired claw of first right tarsus of male, prolateral view.

Fig. 20. Idem, retroclaw of first right tarsus of male, prolateral view.

Fig. 21. Idem, retroclaw and unpaired claw of first left tarsus of female, retrolateral view.

diameter (18/14), one diameter from the larger laterals. Second row of eyes recurved, the medians separated by nearly four times their length and contiguous with the laterals. Median ocular quadrangle broader than long (6/3), narrowed in front (6/4). Lateral eyes of each side slightly separated at their bases. Curvature and eye arrangement essentially as in figure 4.

Labium and sternum light brown, with a greenish tinge, clothed evenly with short erect black hairs. Shape of under parts as illustrated in figure 5. Labium fused with the sternum, the latter with eight sigilla, a very inconspicuous pair at the base of the labium, a small pair near the margins between the first coxae, another small pair between the second coxae and a large oval caudal pair between the second and third coxae which are separated by their length, about as far from the margins of the sternum. Coxae subequal, greenish, clothed evenly with erect black hairs. Maxilla as broad as the length of the coxal portion, the endite strongly developed, set with rows of short clavate hairs on the prolateral margin, the whole maxilla otherwise evenly clothed with erect black hairs. Chelicera twice as long as broad as viewed laterally, strongly rounded above, flat on the prolateral side, convex on the retrolateral side, abruptly narrowed near the base; as seen from above three times as long as broad, roughened above, clothed with short inconspicuous black hairs and set with long curved spines and stout hairs at the distal end. Chelicera black, the claw and the denticles brown. Claw with a tooth outside near the base, gently curved. Cheliceral furrow indistinct, the ventral margin armed with nine strong teeth, the two nearest the base of the claw reduced in size, the other subequal in size, the outer side with a very thin band of black hairs.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	2.80	1.25	1.70	2.50	1.70	9.95 mm.
II	2.45	1.20	1.40	2.15	1.80	9.00 mm.
III	2.30	1.15	1.35	2.30	2.00	9.10 mm.
IV	2.80	1.30	2.00	3.10	2.25	11.45 mm.
Palp	2.10	0.80	1.50	..	1.60	6.00 mm.

Leg formula, 4132. Legs black with a greenish tinge, the tarsi light brown, relatively slender, the comparative width and length of each joint of the first leg, measured from above, indicated by the following ratios, the first number representing the width: femur (6/28); patella (5.5/12); tibia (5.6/17); metatarsus (3/25); and tarsus (2.5/17). Other legs essentially similar in relative stoutness. Legs evenly clothed with rows of black hairs, without spines above, except for one or two weak ones which occur at the distal ends of the metatarsi. Ventral spines few, the first tibia with very weak distals and one or two medians, the metatarsus with two rows of five ventrals; one or two retrolaterals, all of which are very weak. Other legs essentially as the first. All tarsi long and flexible, the distal three-fourths of the joints marked with numerous transverse false sutures, the ventral face with short curved spines. Claws three, the median small, curved, and armed with a single weak tooth. Paired claws relatively small, slightly dissimilar, the proclaws usually with five, the retroclaws with three teeth in a single series (Figs. 19 and 20). Details of the palpus as illustrated in figures 22 and 23, the conductor a strongly curved, grooved, sclerotized appendage which supports the long embolus.

Abdomen longer than broad, oval, with a median black hastate marking at the

base of the dorsum which is flanked by round pale spots, otherwise iridescent blue to purple above, the venter brown, the clothing black hairs. Spinnerets six, black, the one-jointed anterior lateral pair very small and slender (0.45 mm. long), the robust one-jointed median pair (0.65 mm.) separated by the width at base and set with white spinning tubules at the distal end. Posterior spinnerets very long, four-jointed, the lengths of the joints from base to apex, 0.50 mm., 0.55 mm., 0.45 mm., and 0.55 mm., respectively. Inner (retrolateral) margin of the ventral surface of the posterior spinnerets set with white spinning tubules. Spinnerets as illustrated in figure 6, the terminal joint of the posterior pair somewhat foreshortened.

FEMALE NEOTYPE.—Total length, including the chelicerae, 13.00 mm.

	CARAPACE	FRONT	STERNUM	LABIUM	MAXILLA	ABDOMEN
Length	4.25	..	3.00	0.70	2.35	6.00 mm.
Width	3.50	3.48	3.00	1.25	2.00	5.00 mm.

Carapace light to dark yellowish brown, smooth and glabrous, the sutures infuscated, the eyes enclosing a black field. Carapace subquadrangular, broadly truncated and widest in front, nearly straight on the sides, slightly narrowed behind, the width at the third coxae, 3.00 mm., the caudal end broadly rounded and shallowly emarginated above the pedicel. Pars cephalica proportionately less elevated than in the male, broader in front, forming a triangle as seen from above. Pars thoracica flat as in the male, the cervical groove a deep depression placed back two-thirds of the total length of the carapace.

Eyes on a tubercle which is less elevated caudally than in the male and is two-sevenths as wide as the carapace at the first eye row. Eyes of the first row recurved from above, a line along the caudal edges of the medians cutting the centers of the laterals, procurved as seen from in front. Ratio of the eyes: ALE:AME:PLE:-PME = 25:15:17:13. Anterior median eyes separated by more than a diameter (15/22), about as far from the larger laterals (15/20). Second row of eyes recurved, the medians separated by four diameters (13/54), contiguous with, slightly, or well separated from the lateral eyes in various specimens. Median ocular quadrangle broader than long (77/34), narrowed in front (77/47), the eyes subequal. Lateral eyes of each side subcontiguous or slightly separated. Curvature and eye arrangement essentially as in figure 3.

Sternum and labium yellowish brown, the structure much as in the male (Fig. 5), clothed with short erect black hairs. Sternum as broad as long, with eight sigilla, the two anterior pairs occasionally absent or poorly defined. Maxilla clothed with black hairs, the endite well developed, set with numerous short clavate hairs (spinules). Chelicera powerful as in the male but proportionately shorter, three-fourths as broad as long as viewed from the side, the lower margin armed with nine teeth, as in the male, and with an additional very small tooth retrolaterad of the basal tooth.

	FEMUR	PATELLA	TIBIA	METATARSUS	TARSUS	TOTAL
I	3.20	1.60	1.20	1.43	1.00	8.43 mm.
II	2.50	1.60	0.96	1.23	0.85	7.14 mm.
III	2.20	1.40	0.85	1.20	0.80	6.45 mm.
IV	2.60	1.55	1.20	1.60	1.05	8.00 mm.
Palp	1.80	0.97	0.80	..	0.95	4.52 mm.

Leg formula, 1423. Legs dusky yellowish brown, stout, the comparative width and length of the joints of the first leg, measured from above, indicated by the following ratios, the first number representing the greatest width: femur (8/32); patella (7/16); tibia (7/12); metatarsus (5/15); and tarsus (3.7/10). Last leg slightly stouter than the first. Second and third legs proportionately very much stouter. Legs clothed with short black and longer dark hairs, some of them bristle-like, otherwise very sparsely spinose. First tibia with a distal ventral pair, five dorsals and a single prolateral, all small; first metatarsus with a small median dorsal spine. Second leg with a distal dorsal spine, the tibia with two distal dorsals and the metatarsus with a ventral pair and fifteen dorsals, and the tarsus with three dorsal spines, all very small. Metatarsus of the third leg with eleven prolaterals, fourteen retrolaterals and a ventral pair, some of the laterals nearly dorsal in position. Fourth leg spined essentially as the first. Claws very small, the single palpal claw with six teeth (Fig. 18), the unpaired claws of the tarsi usually with three teeth, the paired claws essentialy similar, with four or five teeth in a single series, the proclaws occasionally lacking one denticle (Fig. 21).

Abdomen suboval in outline, dark brown, with small round pale spots. Posterior spinnerets four-jointed, the proportions as in the male.

TYPE LOCALITY.—Georgia, females (Walckenaer, 1837).

DISTRIBUTION.—Georgia and Florida.

RECORDS.—Georgia: (Abbot, 1792); (Walckenaer, 1837); (McCook, 1888); (Simon, 1890). Florida: Fairyland, Georgiana, Brevard County, females (McCook, 1888); near Gainesville, Alachua County, May 25, 1933, male and three immature males (H. K. Wallace), April 1, 1933, females (H. K. Wallace), April 18, 1933, females, one designated as the neotype (H. K. Wallace), February 22, 1933 (H. K. Wallace), June 19, 1935, four males, one designated as the allotype (H. K. Wallace), June 12, 1935, four males, females (Ivie, Wallace and Gertsch); Sugar Foot, Alachua County, May 25, 1933, male, female (H. K. Wallace); Alachua County, October 31, 1933, young (H. K. Wallace); Quincy, Gadsden County, November 28, 1934, female (H. K. Wallace); Leon County, April 16, 1936, female (James Rogers and H. K. Wallace); Lake City (Comstock, 1913); Crescent City (Simon, 1890).

Atypus bicolor Lucas

Figures 7, 13, 24, 25, and 28, 29

Atypus bicolor LUCAS, 1836, Ann. Soc. Ent. France, V, p. 213, Pl. v, fig. 5; 1840, Hist. Nat. Crust. Arachn., p. 344.—SIMON, 1890, Actes Soc. Linn., Bordeaux, (4) XLIV, p. 309.—MARX, 1890, Proc. U. S. Nat. Mus., XII, p. 499.—BANKS, 1910, Bull. U. S. Nat. Mus., LXXII, p. 1.—PETRUNKEVITCH, 1911, Bull. Amer. Mus. Nat. Hist., XXIX, p. 94.—COMSTOCK, 1913, 'The Spider Book,' p. 256, Fig. 227.

Oletera bicolor WALCKENAER, 1837, Hist. Nat. des. Ins. Apt., I, p. 245.

MALE.—Total length, including the chelicerae, 14.50 mm.

A large species with black carapace, abdomen and palpi, but with strikingly colored carmine-red legs.

	Carapace	Front	Sternum	Labium	Maxilla	Abdomen
Length	5.40	..	3.30	0.65	2.80	5.00 mm.
Width	4.70	4.25	3.30	1.30	2.00	3.50 mm.

Carapace deep black, uniformly pitted and roughened as in *abboti*, without spines. Carapace longer than broad, subquadrangular in outline, broadest in front, the sides nearly straight, the width at the third coxae, 3.75 mm., the caudal margin rounded and shallowly emarginated above the pedicel. Structure of the pars cephalica as in *abboti*, the cervical groove a conspicuous deep depression one-fifth as wide as the carapace at that point, placed back seven-elevenths of the total length of the carapace.

Eyes on a tubercle similar to that of *milberti*, the caudal margin not strongly elevated, equal in width to one-fourth of the width of the carapace at the second eye row. First row of eyes procurved from in front, very weakly recurved from above, essentially straight. Ratio of the eyes: ALE:AME:PLE:PME = 22:17:14:12. Anterior median eyes separated by more than a diameter (17/25), nearly as far from the laterals (17/21). Second eye row recurved, the medians separated by five diameters (12/65), subcontiguous with the laterals. Median ocular quadrangle broader than long (90/33), narrowed in front (90/54). Eye arrangement and curvature as in the female (Fig. 7).

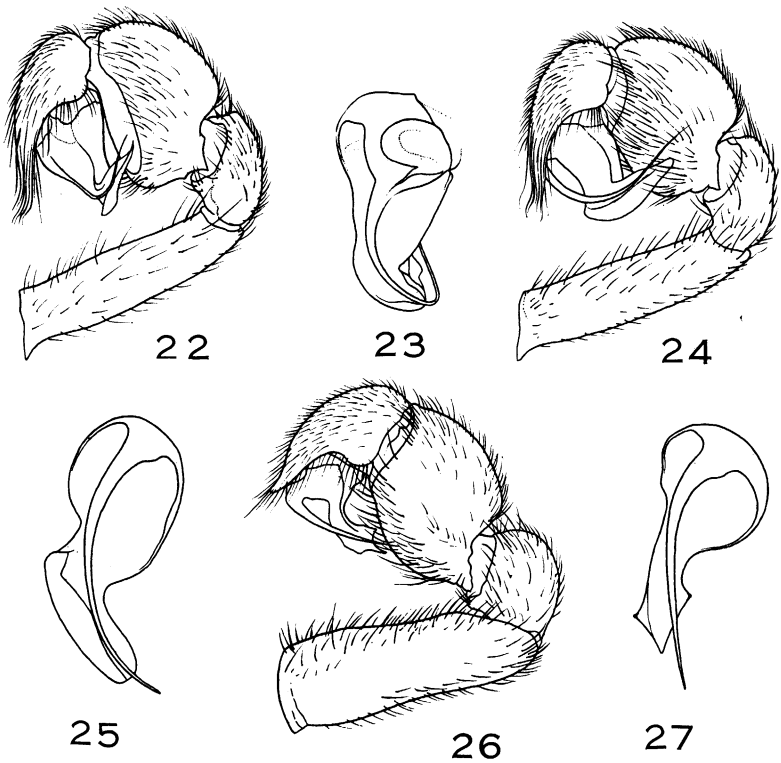
Structure of the under side of the carapace much as in *abboti*. Sigilla of the sternum more deeply impressed, characteristic in shape, the first pair at the base of the labium well indicated (Fig. 28). Coxae and trochanters of the legs and all the joints of the palpus dark brown to black. Clothing of the sternum and maxillae erect black hairs. Coxal portion of the maxilla as long as broad at the base, the endite well developed, with a promarginal band of pale hairs. Chelicera powerful, 4.30 mm. long as seen from above, 1.40 mm. broad at the base, roughened, especially so on the prolateral side, clothed apically with curved hairs and spines. Lower cheliceral margin with a single series of eleven teeth, nine of them very large, the basal two smaller. Claw very long, weakly curved, with a small tooth near the base just above the margin on the outer side.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	4.65	2.00	2.25	3.40	2.00	14.30 mm.
II	4.00	2.00	1.90	3.15	1.80	12.85 mm.
III	3.40	1.65	1.65	3.35	1.70	11.75 mm.
IV	4.25	2.00	2.35	4.40	2.20	15.20 mm.
Palp	3.00	1.20	1.75	..	2.00	7.95 mm.

Leg formula, 4123. Legs in the living specimens described as carmine red, faded in the alcoholic material to bright orange. Legs rather slender and essentially like those of *abboti* in relative stoutness, the spination similar. Claws as in *abboti*. Palpus as illustrated (Figs. 24 and 25), much as in *abboti* but the conductor strongly geniculate and heavier.

Abdomen deep black, with an elongate, moderately sclerotized scutum on the dorsum. Spinnerets as in *milberti*, the posterior pair three-jointed (Fig. 29).

Female.—Total length, including the chelicerae, 22.50 mm.



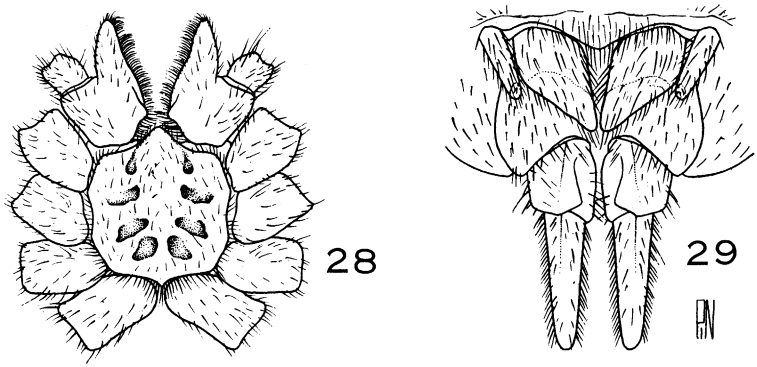


Fig. 22. *Atypus abboti* (Walckenaer), left male palpus, retrolateral view.
Fig. 23. Idem, conductor and embolus of left male palpus, terminal view.
Fig. 24. *Atypus bicolor* Lucas, left male palpus, retrolateral view.
Fig. 25. Idem, conductor and embolus of left male palpus, terminal view.
Fig. 26. *Atypus milberti* (Walckenaer), left male palpus, retrolateral view.
Fig. 27. Idem, conductor and embolus of left male palpus, terminal view.
Fig. 28. *Atypus bicolor* Lucas, under side of carapace of male.
Fig. 29. Idem, spinnerets of male.

	Carapace	Front	Sternum	Labium	Maxilla	Abdomen
Length	7.40	..	4.65	0.85	3.50	10.00 mm.
Width	6.50	6.20	5.30	2.00	2.70	7.00 mm.

Color and structure essentially as in *abboti*. Carapace longer than broad, subquadrangular, narrowed behind, the width at the third coxae, 4.80 mm. Cervical groove a deep transverse depression one-fifth as wide as the width of the carapace at that point (22/5), placed back five-sevenths of the total length. Eyes as in figure 7. Sternum essentially as in the male but much more narrowed behind, the sigilla in the same position and of the same shape (Fig. 13).

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	5.10	2.60	1.80	2.50	1.35	13.35 mm.
II	4.00	2.50	1.60	2.25	1.35	11.70 mm.
III	3.75	2.15	1.15	2.25	1.00	10.30 mm.
IV	4.00	2.70	1.60	2.65	1.35	12.30 mm.
Palp	3.00	1.50	1.30	..	1.20	7.00 mm.

Leg formula, 1423. Legs and tarsal claws as in *milberti*. Posterior spinnerets three-jointed, essentially as in the male (Fig. 29). Abdomen dark brown, with a round sclerotized plate at the base of the dorsum.

Type Locality.—North America (locality not given).

Distribution.—District of Columbia. Florida. Maryland.

Records.—District of Columbia: male and female; Plummer's Island, near Washington, male (Banks collection) (Comstock, 1913, p. 256). Florida: Gadsden County, July 7, 1934, female Allotype, collected by R. E. Bellamy. Maryland: Camp Roosevelt, June, 1935, two males (H. S. Barber).

Atypus milberti (Walckenaer)

Figures 8 to 10 and 26, 27

Sphodros milberti Walckenaer, 1837, Hist. Nat. des Ins. Apt., I, p. 249.

Atypus abboti Simon, 1890, Actes Soc. Linn., Bordeaux, (4) XLIV, p. 308 (Part).

Atypus milberti Banks, 1907, 31st Ann. Rpt. Dept. Geol. Nat. Res., Indiana, (1906), p. 736; 1910, Bull. U. S. Nat. Mus., LXXII, p. 1.—Petrunkevitch, 1911, Bull. Amer. Mus. Nat. Hist., XXIX; p. 95.

Atypus niger Hentz, 1842, Jour. Boston Soc. Nat. Hist., IV, p. 224, Pl. viii, fig. 1; 1875, 'Spiders U. S.,' p. 19, Pl. ii, fig. 1 (reprint).—Ausserer, 1871, Verh. Zool.-Bot. Gesell., Wien, XXI, p. 134.—Marx, 1890, Proc. U. S. Nat. Mus., XII, p. 449.—Petrunkevitch, 1911, Bull. Amer. Mus. Nat. Hist., XXIX, p. 95.—Emerton, 1913, Bull. Amer. Mus. Nat. Hist., XXXII, p. 259, Text Figures 1*a*-1*c*.

Male Neotype.—Total length, including the chelicerae, 10.50 mm. A uniformly black, robust species of medium size.

	Carapace	Front	Sternum	Labium	Maxilla	Abdomen
Length	3.90	..	2.50	0.50	2.20	4.50 mm.
Width	4.05	3.60	2.75	0.90	1.70	3.00 mm.

Carapace very dark reddish-brown to black, the pars cephalica darker, pitted and roughened, without hairs or spines except for some small ones on the ocular tubercle. Carapace longer than broad, truncated in front and broadest there, gently rounded on the sides and narrowed behind, the width at the fourth coxae, 3.30 mm., broadly rounded behind and shallowly emarginated above the pedicel. Cervical groove a deep transverse depression two-ninths as wide as the width of the carapace at that point, situated back three-fourths of the total length. Structure of the carapace essentially as in *abboti* but proportionately much broader (Fig. 8).

Eyes on a prominent tubercle, not so strongly elevated caudally as in the male of *abboti*, which occupies about one-fourth of the width of the carapace at the first eye row (9/39). Ratio of the eyes: ALE:AME:PLE:PME = 16:11:13:11. First row of eyes as broad as the second, procurved from in front, recurved as viewed from above, the medians separated by two diameters (11/20), one diameter from the laterals. Second row of eyes recurved, the medians separated by four diameters (44/11), subcontiguous with the laterals. Median ocular quadrangle broader than long (63/25), narrowed in front (63/40). Lateral eyes of each side subcontiguous.

Under side of the carapace uniform dark reddish brown to black, sparsely clothed with short erect black hairs. Sternum broader than long, with four pairs of sigilla in the usual position, essentially as in figure 9, which represents the female, the large posterior sigilla, however, separated by nearly the long diameter. Coxal portion of the maxilla broader than long, the endite well developed, with a thin band of hairs on the prolateral side and a few short clavate spines. Chelicera twice as long as broad as seen from above, with eleven large subequal teeth on the margin. Claw of the chelicera with a poorly developed tooth on the outer side at the base.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	3.30	1.55	1.45	2.15	1.35	9.80 mm.
II	2.75	1.65	1.25	2.00	1.48	9.13 mm.
III	2.70	1.35	1.20	2.25	1.48	8.98 mm.
IV	3.00	1.40	1.70	3.10	1.75	10.95 mm.
Palp	2.15	0.90	1.50	..	1.35	5.90 mm.

Leg formula, 4123. Legs dark reddish brown to black, slender, but more robust than in *abboti*, the comparative width and length of the joints of the first leg, measured from above, indicated by the following ratios, the first number representing the greatest width: femur (9/33); patella (8/15); tibia (8/14); metatarsus (5/21); and the tarsus (3.5/13). Other legs essentially similar in relative stoutness. Legs clothed with rows of black hairs. Spines all weak, placed much as in *abboti*. Tarsi proportionately shorter and consequently less flexible than in that species, ringed with false sutures in the distal two-thirds of the joint (Fig. 10). Details of the palpus as illustrated in figures 26 and 27, the embolus a long, relatively weakly curved spine, the conductor broadened and triangular at the distal end.

Abdomen dark reddish brown to deep dull black, with a smooth brown sclerotized basal plate. Spinnerets six, the small lateral pairs and the robust median pair placed nearly in a transverse line, the long posterior pair three-jointed, the basal joint, 0.45 mm., the median, 0.55 mm., and the apical joint, 0.80 mm. long.

Female Allotype.—Total length, including the chelicerae, 17.00 mm.

	Carapace	Front	Sternum	Labium	Maxilla	Abdomen
Length	5.10	..	3.50	0.80	3.00	.....
Width	5.40	5.00	4.35	1.80	2.30	.....

Carapace, appendages and under side dark reddish brown, clothed with black hairs. Structure of the carapace essentially as in the male.

Eyes on a tubercle which is rounded and prominent in front but which is lower behind, merging evenly with the pars cephalica behind and practically on the same plane, the width equal to one-sixth the width of the head at the second eye row. Ratio of the eyes: ALE:AME:PLE:PME = 25:17:17:17. First row of eyes procurved from in front, weakly recurved as seen from above, a line through the centers of the laterals cutting the caudal fifth of the median eyes. Anterior median eyes separated by more than a diameter (25/17), much nearer the laterals (25/10). Second eye row recurved, the medians separated by over three times their long diameter (55/17), subcontiguous with the laterals. Median ocular quadrangle broader than long (80/39), narrower in front (80/54). Lateral eyes of each side subcontiguous.

Sigilla of the sternum placed as in the male, the prominent caudal pair nearer together as figured (Fig. 9). Cheliceral margin with twelve large subequal teeth. Tooth on fang near the outer distal end weakly developed.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	3.35	1.95	1.35	1.60	1.20	9.45 mm.
II	2.80	1.80	1.05	1.45	1.00	8.10 mm.
III	2.45	1.80	0.85	1.50	0.80	7.40 mm.
IV	3.00	1.85	1.25	1.80	1.25	9.15 mm.
Palp	2.20	1.30	1.10	..	1.15	5.75 mm.

Leg formula, 1423. Legs all very stout, spines essentially as in the female of *abboti*. Abdomen imperfect, the spinnerets completely broken off and lost, the posterior spinnerets presumably three-jointed as in the male.

Type Localities.—Male type of *Sphodros milberti* Walckenaer from Philadelphia, Pennsylvania (Walckenaer, 1837). Male type of *Atypus niger* Hentz from Northampton, Massachusetts (Hentz, 1842).

Distribution.—Northeastern United States, from Massachusetts to Wisconsin and south to Ohio, Pennsylvania and North Carolina.

Records.—Massachusetts: Northampton, male (Hentz, 1842). New York: Cornwall on the Hudson, May 30, 1913, male Neotype (Emerton, 1913), in the collection of The American Museum of Natural History. New Jersey: "Palisades opposite the northern part of New York City," "several young *Atypus* in their tubes" (N. Banks) (Emerton, 1913, p. 260). Wisconsin: no specific locality (Peckham) (Simon, 1890, p. 308, as *abboti*). Illinois: Princeton, Bureau County, May 13, 1933, male (T. H. Hubbell); Riverside, May 30, 1912, male. Indiana: Wyandotte, September 8; New Harmony (Dransfield) (Banks, 1906).

Ohio: Marietta (W. Holden) (J. H. Emerton, in Hentz, 1875, p. 19, footnote to the species); Cedar Point, August 15, 1913, female allotype from the stomach of a frog (Carl Drake), identified as *milberti* by Dr. Banks; Cantwell Cliffs, Rockbridge, June 18, 1926, eight males (Dr. W. M. Barrows); Put-In Bay, June 26, 1927, male (Dr. C. H. Kennedy). D. C.: Washington (Marx) (Simon, 1890, p. 308, as *abboti*). North Carolina: no specific locality (McCook), probably this species (Simon, 1890, as *abboti*).