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A NEW SPECIES OF ATYPUS (ARANEAE: ATYPIDAE) FROM PENNSYLVANIA¹

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The genus *Atypus*, first described by Latreille in 1804, designates those subterranean spiders which possess three pairs of spinnerets, eight eyes, an anal tubercle remote from the spinnerets, paraxial chelicerae, three pairs of cardiac ostia, a sternum with eight sigilla, and a labium fused to the sternum. These are purse-web spiders, so called because the webs in which they live are long tubes resembling once-fashionable purses. The biology and distribution of the genus is imperfectly known. Bonnet (1955) lists the following seven Old-World species: *Atypus piceus* (Sulzer, 1776) from Northwestern and Central Europe and Russia; *Atypus affinis* Eichwald, 1830 from Northwestern, Central and Southern Europe and Russia; *Atypus karschi* Donitz, 1887 from Japan and Formosa; *Atypus javanus* Thorell, 1890 from Java; *Atypus muralis* Bertkau, 1890 from Central and Southern Europe and Russia; *Atypus dorsualis* Thorell, 1890 from Burma; and *Atypus sutherlandi* Chennoppaiya, 1935 from India. In addition, Schenkel (1953) describes *Atypus sinensis*, from Shansi, China (mainland).

Four Nearctic species are recognized by some authors: *Atypus bicolor* Lucas, 1836; *Atypus abboti* (Walckenaer, 1837); *Atypus milberti* (Walckenaer, 1837) and *Atypus niger* (Hentz, 1842). However, Gertsch (1936) revised the Nearctic *Atypidae* and includes three species in the genus *Atypus*: *A. abboti*, *A. bicolor*, and *A. milberti*; he considers *A. niger* a synonym for the latter. Gertsch records the distribution of the Nearctic species as follows: *A. abboti*, Georgia and Florida; *A. bicolor*, District of Columbia, Florida and Maryland; and *A. milberti*, Massachusetts to Wisconsin and south to North Carolina. The occurrence of *A. niger* in Ontario, Canada is noted by Gray (1956). Exline and Petrunkevitch (1939) list four species, maintaining the distinction between

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A. milberti and *A. niger*. Kaston (1948), like Gertsch, considers the two species to be conspecific. *A. niger* and *A. milberti* are considered synonymous in this paper. Vogel (1962) also notes that: *A. abboti* has been collected in Tamoulipas, Mexico; *A. bicolor* from Louisiana; *A. milberti* in Connecticut and Illinois; and *A. niger* in Michigan.

During the summer of 1970, specimens of *Atypus* from Delaware County, Pennsylvania were collected because of an unusual complaint - a home owner reported an invasion of his swimming pool by spiders. An attempt to identify these materials revealed that they did not fit any of the existing species descriptions. Therefore, the description of a new species is presented in this paper. The description is based on 22 adult males and 20 adult females. Morphological terminology and descriptive technique follow Gertsch (1936). Descriptions of color are based on the alcoholic material, the spiders in life being slightly darker.

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ATYPUS SNETSINGERI NEW SPECIES

Type-Data

Male holotype and 21 paratypes from 221 North Lansdowne Avenue, Lansdowne (62.5 metres above sea level), Delaware County, Pennsylvania, June 25, 1969, R. Snetsinger. Female allotype, 19 paratypes, and 30 immature forms from the same locality, September 12, 1970, P. A. Sarno. Male holotype and one paratype, female allotype and one paratype on deposit in the American Museum of Natural History, New York, New York; two male and two female paratypes in the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts; one male and one female paratype in the Illinois Natural History Survey, Natural Resources Building, Urbana, Illinois; 17 male and 15 female paratypes and 30 immatures in the Frost Entomological Museum, The Pennsylvania State University, University Park, Pennsylvania.

Diagnosis

Male. Other Nearctic males without: smooth carapace and chelicerae, roughened sternum, 15 teeth on each chelicera, fang minus tooth, unswollen palpal tibia, short

conductor, straight embolus. Specifically, *A. abboti* without: brown abdomen, transverse cervical groove, leg formula 4123, five teeth on proclaws, three teeth on retroclaws. *A. bicolor* without: brown legs, oval sigilla, four-segmented posterior spinnerets. *A. milberti* without: long chelicerae and tarsi, four-segmented posterior spinnerets.

Female. Other Nearctic females without: five teeth on tarsal retroclaws and medians, three teeth on proclaws, five teeth on palpal claws, 14 teeth on each chelicera. Specifically, *A. abboti* without: sternum broader than long, transverse cervical groove. *A. bicolor* without: oval sigilla, four-segmented posterior spinnerets. *A. milberti* without: four-segmented posterior spinnerets.

Description

Male. (Figures 1 - 6). A rather large, stout spider with dark reddish-brown carapace, chelicerae, and legs, and a brown abdomen. Measurements of the cephalothorax and abdomen are given in Table 1.

Cephalothorax

Carapace darkest at the margins and anterior portion of the cervical groove; smooth except for a very small, curved spine on the front face of the ocular tubercle and a few, minute posterior spines. Carapace truncated in front, width greatest just behind this point. Sides weakly rounded, almost straight, with the carapace narrowed slightly from between the first coxae to between the third and fourth. Posterior margin of carapace broadly rounded and emarginated above the pedicel. Pars cephalica with sparse hairs, the dorsal aspect a subequilateral triangle with slightly rounded and irregular sides (Figure 1). The lateral aspect of the pars cephalica strongly elevated and convex, rounded from the front of the ocular tubercle to where it tapers off to the pars thoracica, just in front of the cervical groove. Pars thoracica unevenly flattened; the cervical groove a deep transverse depression two-thirds the length of the carapace back from the anterior margin. The depression almost triangularly shaped with rounded sides, the apex posterior in the direction of the posterior margin of the carapace. Two posterior radial furrows from the apex of the depression to just before the posterior margin of the carapace, a furrow on each side of the emargination above the pedicel (Figure 1).

Eyes on an elevated, black tubercle, anterior medians the largest. Viewed from above, the second row of eyes very slightly recurved, almost in a straight line, the medians separate from each other by five diameters and subcontiguous with the laterals. Lateral eyes separate at their bases. Median ocular quadrangle broader than long, narrowed in front (Figure 2). Viewed from the front, the first row of eyes weakly procurved. Anterior medians separate from the laterals by one-half their diameter and from each other by one diameter. The laterals plus the posterior medians forming a cluster of three eyes, the anterior laterals the largest.

Labium and sternum fused with no indication of a suture. Both dark reddish-brown; profusely hirsute at the anterior margin of the labium and posterior margin of the sternum, otherwise sparsely covered. Surface of the sternum roughened, notably along the margins. Labium roughened, with the appearance of protruding at the anterior portion. Sternum with eight well-defined sigilla; a small oval pair at the base of the labium; a second small, round pair in between the first and second coxae on each side; a third larger, oval pair between the second coxae on each side; a fourth, the largest pair, at the posterior end of the sternum between the second and third coxae and directly anterior to the fourth. Posterior sigilla separate from each other by about one diameter. Coxae subequal, reddish-brown, with fine brown hairs. Maxillae concolorous with

sternum, fine brown hairs evenly over the surfaces. Endites, strongly developed, with rows of short clavate hairs on their prolateral margins (Figure 3).

Chelicerae same color as carapace. Dorsal surfaces smooth with fine light brown hairs mainly over the lateral margins and distal ends. Distal ends with longer, stouter curved hairs approaching spines. Viewed from above, the chelicerae three times as long as broad, curving downwards distally. Viewed from the side, twice as long as broad, rounded above, flat on the prolateral sides, convex on the retrolateral sides, abruptly narrowed near the bases. Ventral margins with long, light brown hairs on both sides of the teeth, thickest on the retrolateral sides. Claws dark brown to black, almost as long as chelicerae, gently curved, wider at the bases and narrowed to points. Each claw without a tooth near the base. Cheliceral furrows indistinct. The ventral margins of each chelicera with a row of 15 teeth; eight strong longer teeth, subequal in size; four thinner, much shorter teeth alternate with the longer ones; three reduced but strong teeth smaller to the distal end (Figure 4). Two very small tooth buds near the base of each chelicera; four larger buds in a row at the distal end on the prolateral side.

Legs and Palps

Legs concolorous with carapace, the tarsi slightly lighter. Relatively slender, the femurs the stoutest segments with each segment thereafter increasingly slender. Measurements of the lengths of legs and palps are given in Table 2. Widths of first leg: femur - 0.9 mm, patella - 0.7 mm, tibia - 0.8 mm, metatarsus - 0.4 mm, tarsus - 0.3 mm. Other legs essentially similar in stoutness. Legs with an uneven cover of fine brown hairs, sparsest on the femurs and increased in abundance to the tarsi. A few weak spines dorsal on the metatarsi, mostly at the distal ends. Not less than six ventral spines on the tibiae. With 12 strong ventrals along the lengths of the metatarsi, and in addition, five or six shorter distal spines. Tarsi essentially without spines except for a few very weak ones on the ventral surfaces of the third and fourth legs. Tarsi flexible, with numerous transverse false sutures the distal two-thirds of the joints except very near the claws. Three claws present on each tarsus; the median claw small and curved, the lateral claws much larger than the median, slightly dissimilar. All claws dark brown. Proclaws each with five teeth in a row, four long and one short nearest the basal end; retroclaws each with three teeth, two long and one short near the basal end. Palps concolorous with legs. Palpal femurs with long hairs on the ventral surfaces. Hairs on patellae and tibiae much as on femurs. Dorsal and lateral surfaces of tarsi same as femurs, with tarsi formed into palpal organs. Palpal organs spherical and brown. Conductors leading to and under emboli whitish, grooved and sclerotized. Emboli short and straight, whitish, wider at bases and tapered to thin points. Tibiae on palps not conspicuously swollen (Figure 5).

Abdomen

Abdomen essentially oval, brown to brownish-gray, mottled with lighter tan spots. Dorsum with a very dark brown marking from the pedicel back to a round, tan sclerotized plate, then another brown marking not as dark as the first. Extent of markings one-half the length of the abdomen. Surface with small, fine tan hairs (Figure 1). Venter brown and mottled, like the dorsum, but with longer hairs. The four lung covers light tan (Figure 3). Anal tubercle some distance from the spinnerets. Spinnerets six in number, tan, with tan hairs (Figure 6). Anterior laterals small (0.5 mm long), slender and one-segmented; median pair one-segmented (0.9 mm long and 0.6 mm wide), tan with white distal ends; posterior spinnerets long (2.1 mm) and four-segmented, the lengths of the segments from base to apex, 0.7 mm, 0.6 mm, 0.6 mm, 0.3 mm.

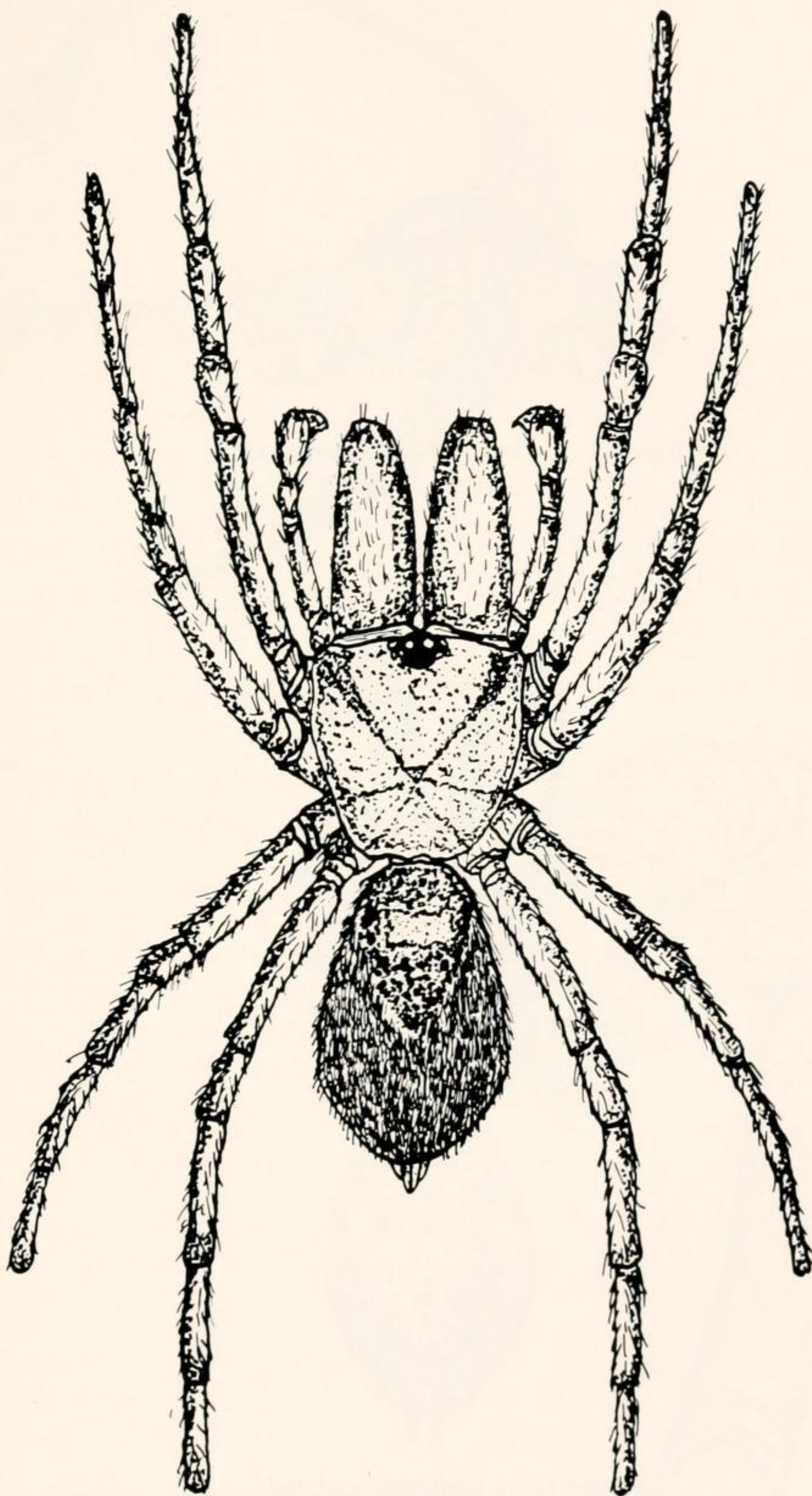


Figure 1. Male - dorsal view
1 mm = .5 cm

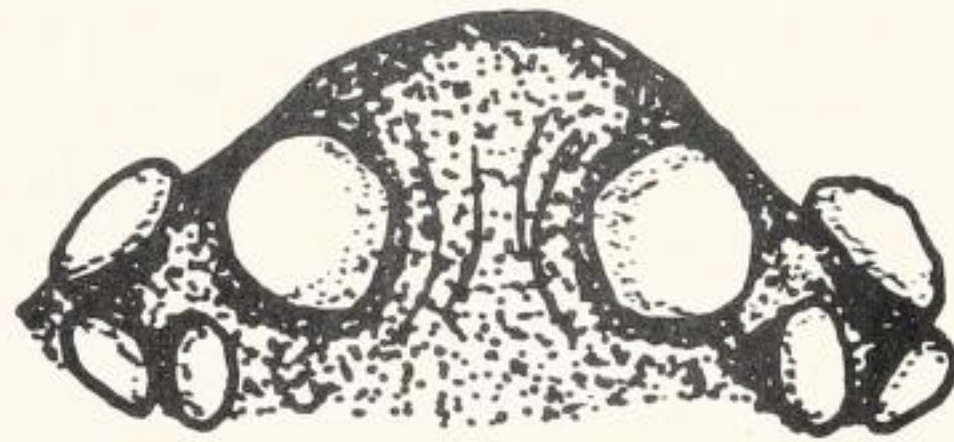


Figure 2. Eyes of male - dorsal view
1 mm = 2 cm



Figure 3. Underparts of male
1 mm = .5 cm

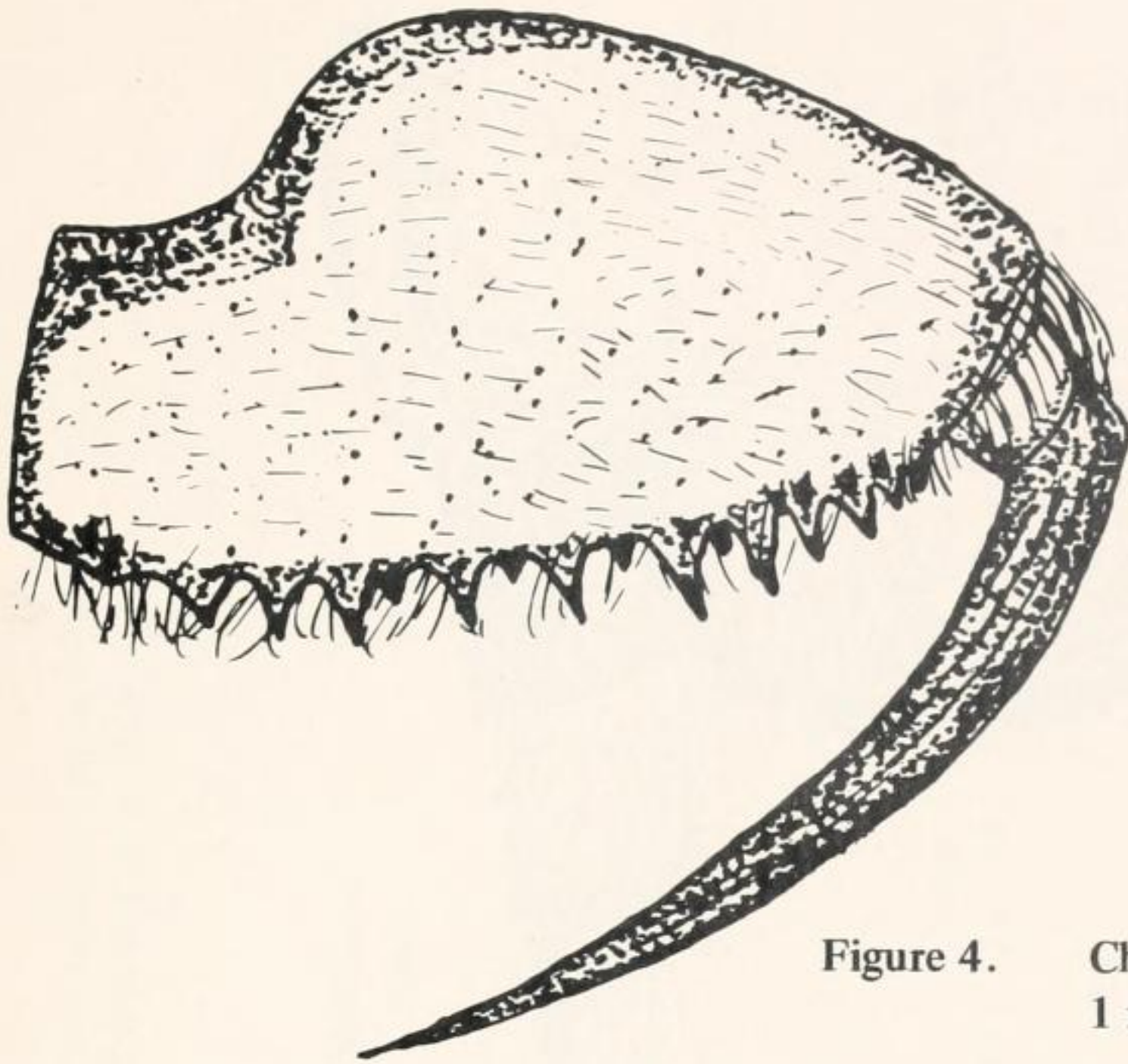


Figure 4. Chelicera of male - prolateral view
1 mm = 1.5 cm



Figure 5. Left male palpus - frontal view
1 mm = 2.5 cm

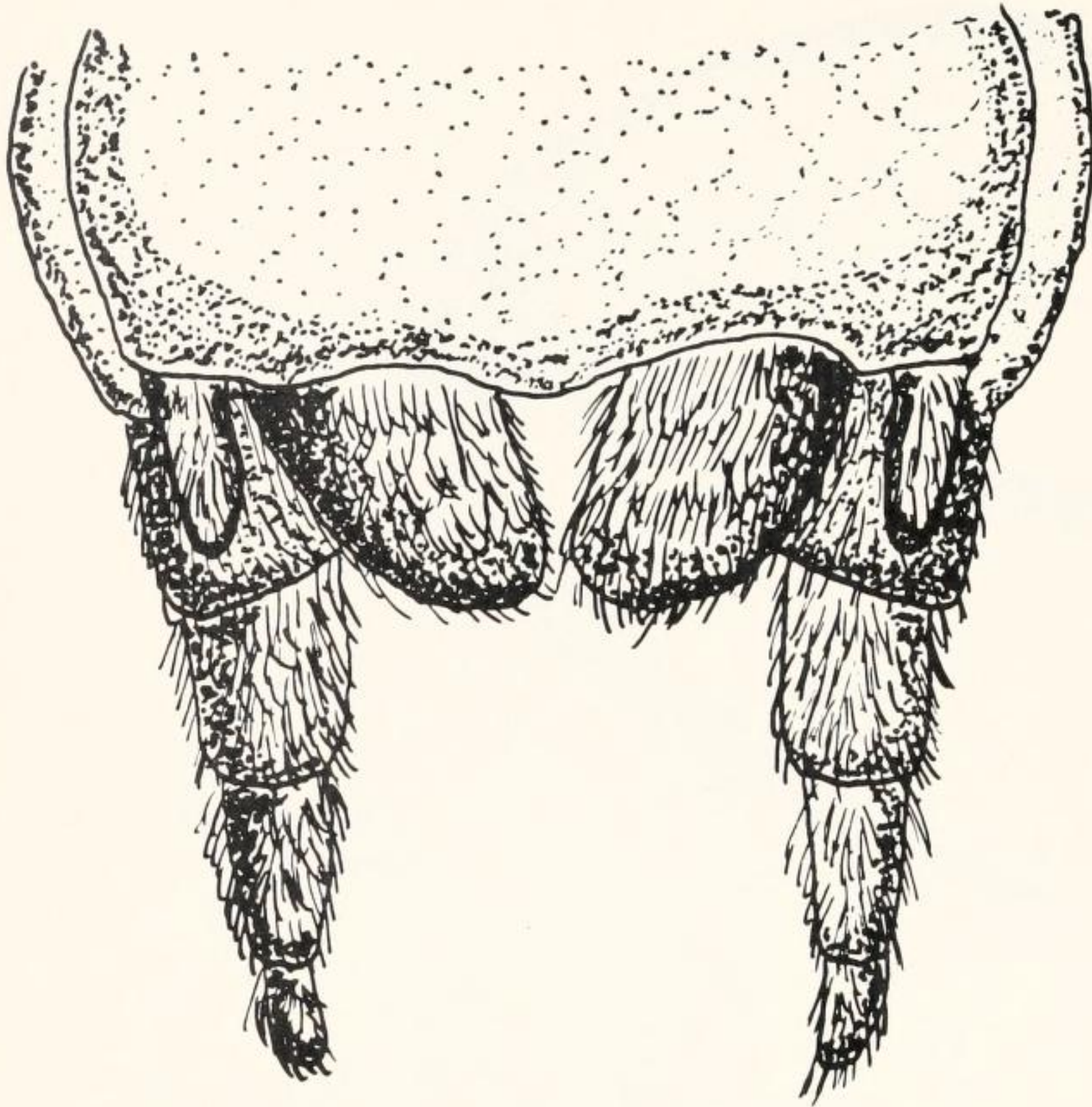


Figure 6. Spinnerets - male
1 mm = 2.5 cm

TABLE 1. Measurements of the Cephalothorax and Abdomen of ATYPUS SNETSINGERI, n. sp. Male

L E N G T H (mm)		Carapace		Sternum		Labium		Maxilla+Endite		Abdomen	
		\bar{X}	Range	\bar{X}	Range	\bar{X}	Range	\bar{X}	Range	\bar{X}	Range
W I D T H (mm)	Holotype	4.1		2.6		0.6		2.1		6.1	
	Type-Series	4.02	3.2 - 4.6	2.57	2.0 - 3.8	0.60	0.4 - 0.7	2.13	1.9 - 2.5	4.94	3.6 - 6.2
	Holotype	3.9		2.8		0.8		1.8		3.4	
	Type-Series	3.70	3.0 - 4.2	2.79	2.1 - 3.2	0.75	0.6 - 0.9	1.64	1.1 - 2.0	3.20	2.5 - 4.0

TABLE 2. Measurements of the Lengths of Legs and Palps of *ATYPUS* *SNETSINGERI*, n. sp. Male

Leg No.	Femur (mm)	Patella (mm)	Tibia (mm)	Metatarsus (mm)	Tarsus (mm)	Total (mm)
1						
	Holotype	4.1	1.2	3.0	2.0	12.3
	Type-Series	\bar{X} 3.94 Range 3.2-4.6	\bar{X} 1.44 Range 1.2-1.9	\bar{X} 2.10 Range 1.1-2.8	\bar{X} 1.92 Range 1.7-2.0	\bar{X} 12.17 Range 10.0-13.8
2						
	Holotype	3.5	1.6	2.3	2.0	11.5
	Type-Series	\bar{X} 3.50 Range 2.9-4.4	\bar{X} 1.38 Range 1.1-1.8	\bar{X} 2.37 Range 2.0-2.8	\bar{X} 1.90 Range 1.7-2.0	\bar{X} 11.16 Range 9.4-12.7
3						
	Holotype	3.0	1.5	2.1	2.0	10.5
	Type-Series	\bar{X} 3.03 Range 2.1-3.7	\bar{X} 1.18 Range 0.9-1.5	\bar{X} 2.34 Range 1.2-3.1	\bar{X} 1.90 Range 1.5-2.2	\bar{X} 10.33 Range 8.2-12.0
4						
	Holotype	3.6	1.4	3.6	2.4	13.5
	Type-Series	\bar{X} 3.54 Range 2.9-4.3	\bar{X} 1.28 Range 0.8-1.8	\bar{X} 3.18 Range 2.7-3.7	\bar{X} 2.22 Range 1.9-2.7	\bar{X} 12.69 Range 10.7-14.5
Palp						
	Holotype	2.0	0.1	—	1.2	5.3
	Type-Series	\bar{X} 1.74 Range 1.0-2.4	\bar{X} 0.83 Range 0.6-0.9	\bar{X} — Range 0.7-1.2	\bar{X} 1.03 Range 0.9-1.2	\bar{X} 4.64 Range 4.0-5.6

Female. (Figures 7 - 9). Lighter in color, larger, and more robust than the male. Measurements of the cephalothorax and abdomen are given in Table 3.

Cephalothorax

Carapace light brown, smooth, with a few small spines on the front and back of the ocular tubercle and a row of four to five weak spines on the pars cephalica from the ocular tubercle back. Carapace broadly truncated in front, sides straighter than in the male, narrowed to between the third coxae, and broadly emarginated above the pedicel (Figure 7). Pars cephalica slightly less elevated than in the male, dorsal and lateral aspects essentially alike. Pars thoracica irregularly flattened with radial furrows less evident than in the male. Cervical groove transverse, position as in the male but not as deep.

Eyes on an elevated tubercle, first row procurved as seen from the front, the anterior medians separate from each other by more than their diameter and separate from the anterior laterals by three-fourths of one diameter. As seen from above, the first row of eyes very slightly recurved, almost in a straight line so that a line along the upper margins of the laterals passes slightly below the upper margins of the medians. Second row of eyes recurved, the medians separate from each other by four times their length and contiguous with the laterals. Median ocular quadrangle broader than long and narrowed in front. Lateral eyes slightly separate at their bases (Figure 8).

Labium and sternum darker than carapace, both smooth, with an even cover of short brown hairs except on the sigilla. Sigilla the same in shape and position as the male, the anterior pair not as well defined. Coxae lighter in color than the carapace, subequal, with short brown hairs. Maxillae as broad as the lengths of their coxal portions, with a cover of short brown hairs; endites well developed, with short spinules, especially on their porolateral margins. Rows of clavate hairs here not as dense as in the male.

Chelicerae shorter than in the male, twice as long as broad as viewed from above. Slightly darker than the carapace, smooth, with several short and a few long dorsal spines the first two-thirds from the proximal ends. The distal thirds with many stout hairs and with long curved spines at the distal ends. Chelicerae more strongly rounded above than in the male, sides as in the male, all surfaces smooth. Cheliceral furrows indistinct. Ventral surface of each chelicera with 14 strong teeth; seven long teeth, subequal, four shorter teeth alternate with the long, and three short teeth at the distal end. One larger and two small tooth buds near the base of each chelicera, a small tooth bud after the fifth tooth from the distal end. A bank of long, thin hairs on the ventral margin on each side of the row of teeth, thicker on the retrolateral side. Claws almost as long as chelicerae, each with a weakly-developed tooth outside near the base (Figure 9).

Legs and Palps

Legs brown, stouter than in the male. Measurements of the lengths of legs and palps are given in Table 4. Widths of the first leg as follows: femur - 0.9 mm, patella - 1.0 mm, tibia - 0.9 mm, metatarsus - 0.7 mm, tarsus - 0.6 mm. Second and third legs proportionately stouter respectively, last leg essentially as the first. Legs with rows of short dark and long brown hairs mainly on the dorsal and ventral surfaces of the femurs and more evenly over the rest of the legs. Hairs increased in length to the tibiae, then decreased in length to the tarsi. First metatarsus with not less than 10 short dorsal spines, and three longer ventrals, a pair at the distal end; first tarsus with not less than six small dorsals. Second tibia with three small dorsals; second metatarsus with not less than 14 small dorsals and not less than seven longer ventrals, three at the distal end; second metatarsus with not

less than 14 small dorsals and not less than seven longer ventrals, three at the distal end; second tarsus with not less than six small ventrals. Third tibia with a few small prolaterals; metatarsus with not less than 12 prolaterals these almost dorsal, and not less than six longer ventrals; third tarsus with a few small dorsals and ventrals. Fourth tibia with a few short dorsals and not less than eight longer ventrals; fourth tarsus like the third. Each tarsus with three small claws, retroclaw with four larger teeth and a small basal tooth, proclaw with three teeth, median claw with five small teeth. Each palpal claw with five teeth.

Abdomen

The abdomen suboval, narrowed near the base, a tan sclerotized plate in the cardiac area (Figure 7). Abdomen darker than the carapace with pale, lighter spots. Venter and dorsum similar. Posterior spinnerets four-segmented as in the male.

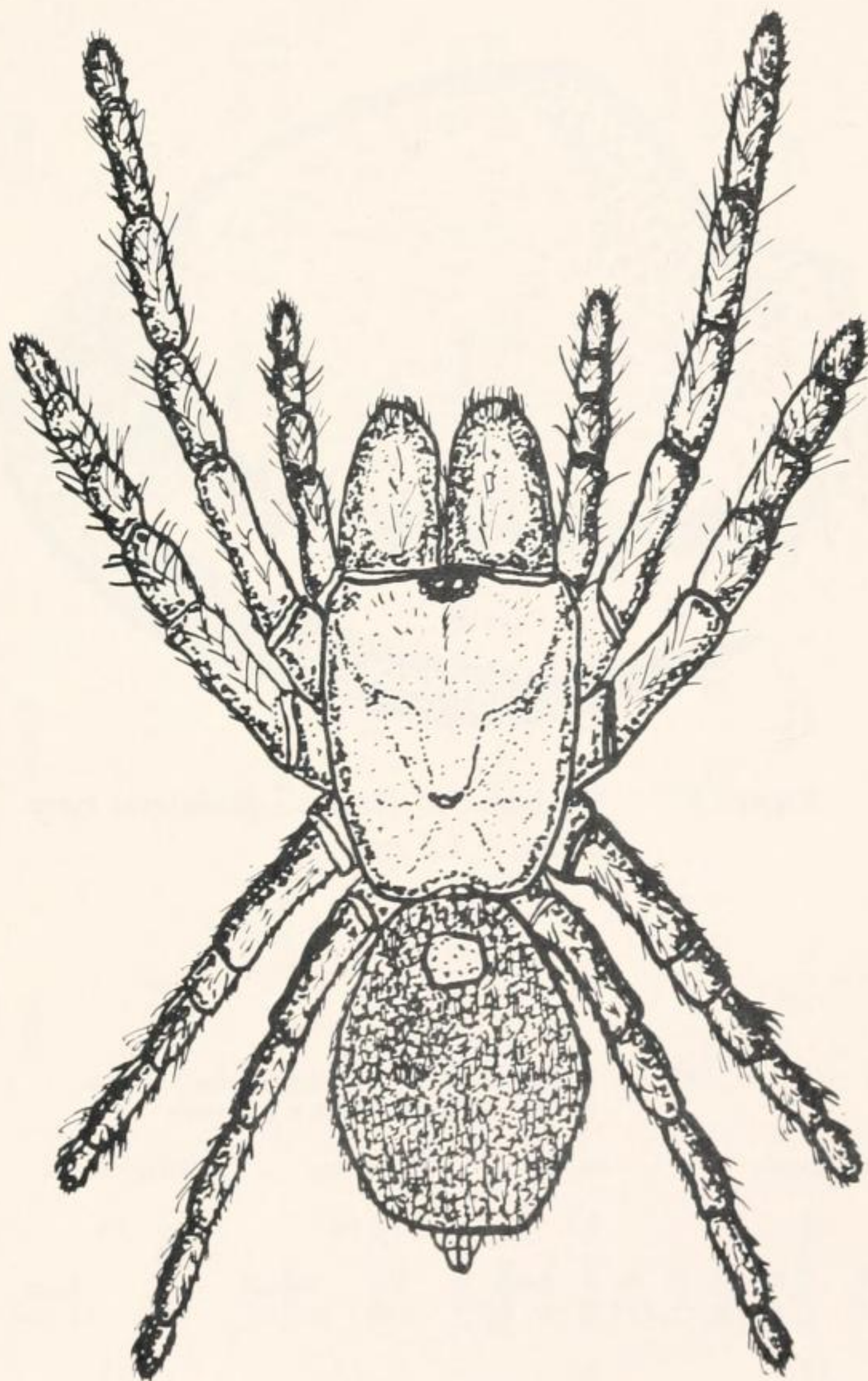


Figure 7. Female - dorsal view
1 mm = .5 cm

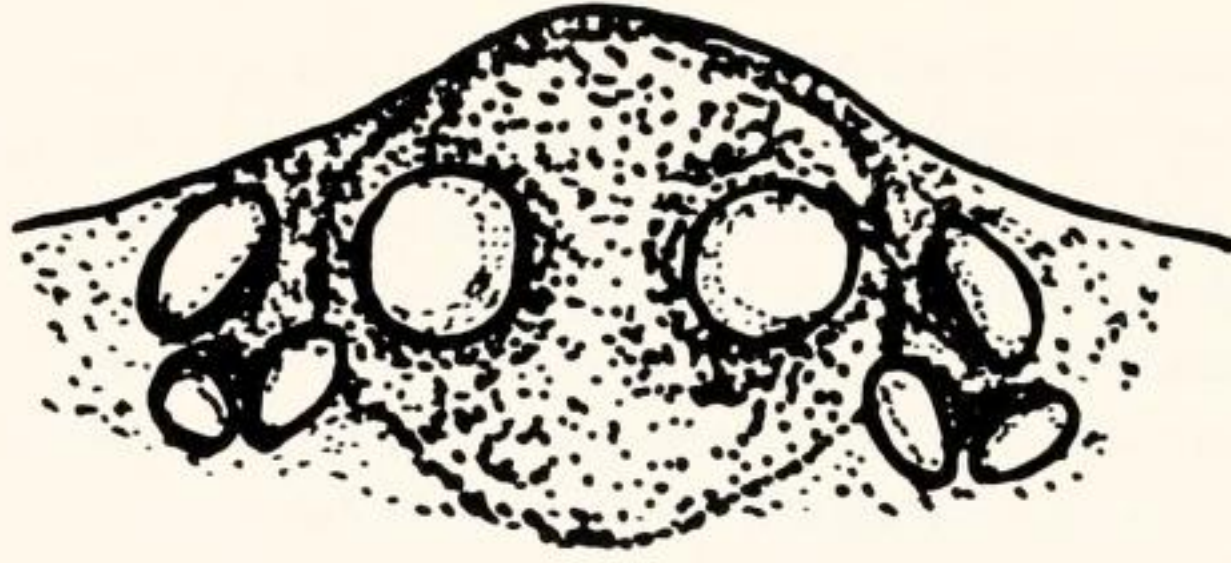


Figure 8. Eyes of female - dorsal view
1 mm = 2 cm

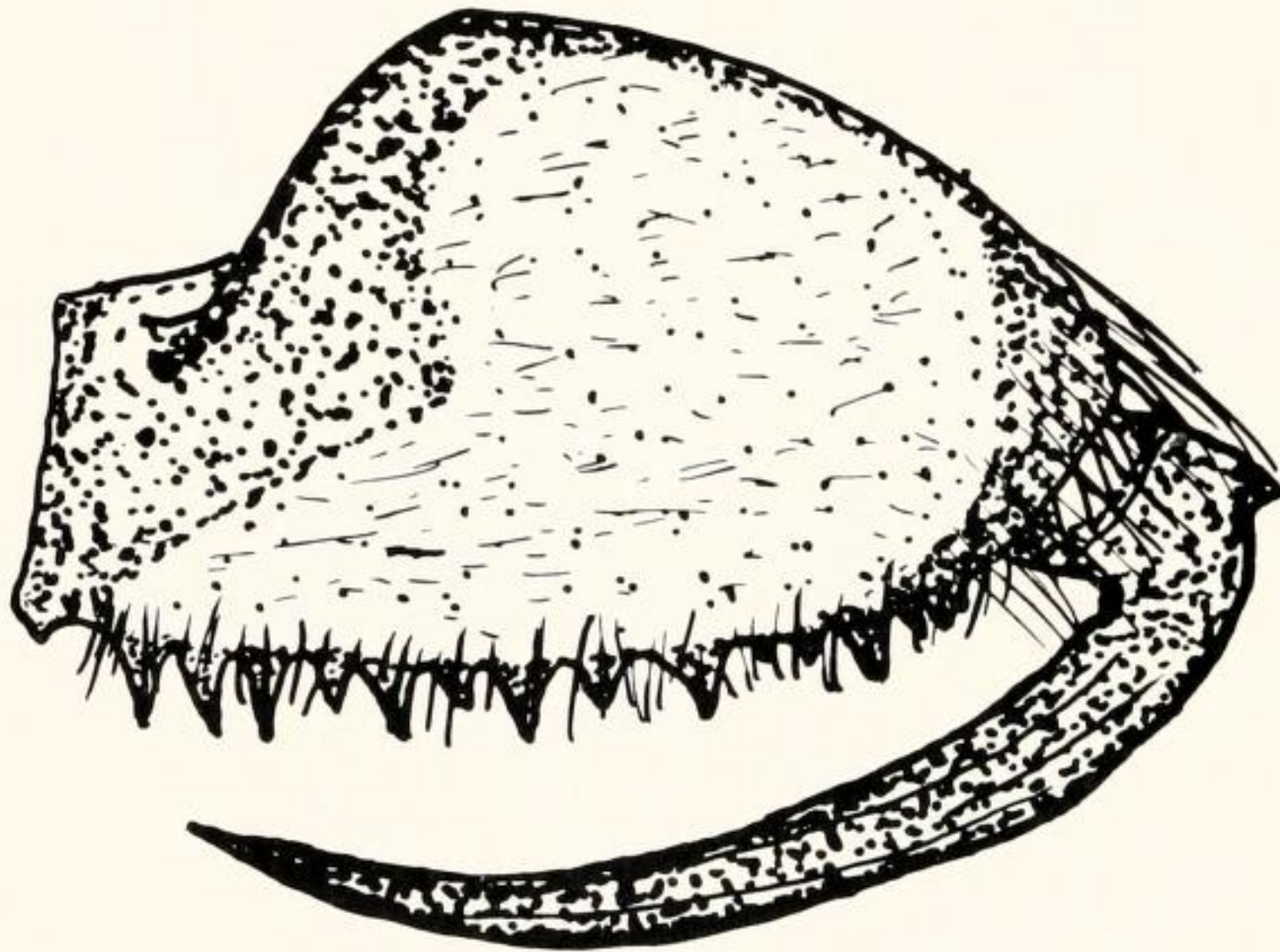


Figure 9. Chelicera of female - prolateral view
1 mm = 1.5 cm

TABLE 3. Measurements of the Cephalothorax and Abdomen of ATYPUS SNETSINGERI, n. sp. Female

L E N G T H (mm)		Carapace		Sternum		Labium		Maxilla+Endite		Abdomen	
		\bar{X}	Range	\bar{X}	Range	\bar{X}	Range	\bar{X}	Range	\bar{X}	Range
W I D T H (mm)	Allotype	6.0		3.2		1.0		2.9		6.3	
	Type-Series	5.32	3.4 - 7.0	3.19	2.0 - 4.0	0.90	0.6 - 1.2	2.91	2.3 - 3.6	6.23	4.2 - 10.0
	Allotype	4.8		3.5		1.5		2.1		4.8	
	Type-Series	4.58	3.0 - 5.5	3.59	2.5 - 4.3	1.34	1.0 - 1.8	2.07	1.5 - 2.9	4.26	2.7 - 6.0

TABLE 4. Measurements of the Lengths of Legs and Palps of ATYPUS SNETSINGERI, n. sp. Female

Leg No.	Femur (mm)	Patella (mm)	Tibia (mm)	Metatarsus (mm)	Tarsus (mm)	Total (mm)	
1	Allotype	3.4	2.6	2.3	2.0	1.0	11.3
	\bar{X}	3.64	1.81	1.76	1.56	1.02	9.83
	Range	2.2 - 4.5	0.8 - 2.6	0.9 - 2.3	1.0 - 2.3	0.9 - 1.2	6.6 - 11.7
2	Allotype	3.0	1.8	1.3	1.5	1.0	8.7
	\bar{X}	2.99	1.80	1.21	1.39	0.99	8.37
	Range	2.2 - 4.1	0.9 - 2.4	0.7 - 2.0	0.8 - 2.0	0.7 - 1.2	5.3 - 11.2
3	Allotype	3.0	1.2	1.5	2.0	1.0	8.6
	\bar{X}	2.71	1.50	1.13	1.31	0.94	7.53
	Range	2.0 - 3.4	0.9 - 2.0	0.6 - 1.5	0.9 - 2.0	0.7 - 1.1	5.4 - 8.7
4	Allotype	3.2	2.0	2.1	2.0	1.0	10.3
	\bar{X}	3.19	1.55	1.70	1.82	1.07	9.42
	Range	2.5 - 4.1	1.0 - 2.0	1.0 - 2.1	1.0 - 2.6	0.9 - 1.2	6.8 - 12.4
Palp.	Allotype	2.0	1.0	0.8	---	1.1	4.9
	\bar{X}	1.98	0.99	0.94	---	0.99	4.9
	Range	1.2 - 2.4	0.7 - 1.2	0.7 - 1.4	---	0.7 - 1.2	3.4 - 5.9

HABITS

Males. Males were collected: from the swimming pool filter and from silk tubes attached to the lower stems and around the roots of a hedgerow; at the base of a small magnolia tree and rhododendron bush; and along a concrete house foundation. Lengths of the tubes range from 150 to 175 mm above the surface of the soil, and the burrows from 100 to 150 mm below. Widths range from 12.2 to 15.5 mm. Essentially unbranched, the tubes are attached at their tops to the plants and house foundation. Color of the silk is white, but the tube varies from gray to brown depending upon the type of soil particles attached to it by the spider as camouflage. The tubes are separated by approximately 50 mm. Males wander away from their tubes during late June and early July. Occasionally, dead males are found in tubes in early September.

Females. Tubes and burrows of females are similar in location and form to those of males but proportionately larger. Lengths range from 175 to 250 mm above the soil surface, and from 150 to 200 mm below. Widths range from 12.2 to 18.3 mm. The aerial portion, or tube, is occasionally divided into two or three branches. Females retreat when disturbed, but on continued prodding with a probe rear back (the two front legs extended outward and upward, the chelicerae apart and fangs extended) and strike at the probe. Taken from the original tubes, they build small horizontal tubes along the sides of the containers in which they are placed within 24 hours after capture. When placed on the surface of soil, they dig a tunnel and construct a tube and burrow within approximately six days. When put into a ready-made tunnel, they begin to line it with silk, extending guidelines the length of the tunnel on all sides and out over the soil surface. These lines are then attached to the stem of woody plants or sticks nearby. Construction of the tube and burrow alone is completed in three to four days, at the rate of 37.2 mm per day. Tubes and burrows of females reared in captivity are comparatively smaller than those in nature, the tube not exceeding 50 mm. Soil particles are added to the tubes only a small distance above the soil surface. When the original tube and burrow are removed with the spider and placed into a terrarium, the spider usually leaves the old tube and constructs a new one. Females feed approximately once every two days, striking at small insects through the tube and pulling them partially in. After feeding, the

tube is repaired. White, liquid fecal matter is ejected with much force from the top of the tube. The spider is found mainly near the upper portion of the burrow, just below the soil surface. At rest, the abdomen is directed toward the base of the burrow and the legs are bent with the femurs inward and upward over the body. Spiders usually remain in the lower tubes or upper portion of the burrow but leave when an insect is introduced down the tube from the top. After the insect is removed, the spider returns. When molting occurs, the exuviae are removed from the tube at the top and are often found entangled in the side.

Immatures. Tubes of immatures are similar to those of males and females but proportionately smaller, and are attached on a side along the entire length of the aerial portion. They may be in rows of seven or eight, separated by 18.3 mm or more. Abandoned tubes are frequently found. Lengths of tubes in use range from 50 to 100 mm above and the burrows from 50 to 75 mm below the surface of the soil. Widths range from 3.1 to 4.0 mm. Immatures do not live long in captivity. They construct a small horizontal tube which encloses them and remain inside.

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