
ADDITIONAL NOTES ON PSEUDOSCORPIONS FROM ILLINOIS¹

C. CLAYTON HOFF
Quincy College, Quincy, Illinois

During the past year, the writer has continued his studies of the pseudoscorpions of Illinois (*vid.* Hoff, 1944, 1945a). In the present paper, new records and notes, both descriptive and ecological, are given for five species. Unless otherwise indicated, records are based on collections of the Illinois State Natural History Survey.

Suborder
HETEROSPHYRONIDA
Chamberlin

Family Dithidae Chamberlin

Verrucaditha spinosa (Banks, 1893)
Chamberlin, 1929
(Figs. 1-3)

RECORDS: *Verrucaditha spinosa* is not an abundant species in Illinois. The writer has found only six males, two females, and one tritonymph in seven collections. Four of these collections are from Adams County, one collection being made by Rev. Edbert Long, O. F. M., the others by the writer. The three remaining records are based on Illinois State Natural History Survey collections and include one collection from each of the following counties: Jackson Co., Jersey

Co., and Madison Co. The species appears to have a wide range, extending from the Mississippi River Valley eastward to the coast, but individuals are nowhere abundant.

Verrucaditha spinosa occurs almost without exception in the debris and decaying wood of old stumps and logs, although one of the Survey collections was labeled "ground cover" and one of the Adams County collections was made from fallen needles under a red cedar tree. As a means of recognition of this species and separation from other Illinois pseudoscorpions, the following combination of characteristics is helpful: about 100 heavy spines on the carapace, anterior margin of carapace bilobed, the pair of tactile setae of the dorsum of the chelal hand removed from the proximal margin of the hand by about one-fourth of the hand length, and spines on coxae I and II.

MALE²: (Based on a study of five Illinois males cleared in beechwood creosote and mounted in Canada balsam.) Body length 1-1.25 mm.; carapace with five or six well-developed marginal setae on each lobe of the anterior margin; poste-

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²While the present publication was being prepared, the writer received from Dr. J. C. Chamberlin a manuscript copy of a paper written by Dr. Chamberlin and scheduled to appear soon in the University of Utah Series. In this paper, Dr. Chamberlin gives an excellent description of *V. spinosa*. In order to indicate the limits of variation in our Illinois specimens, the present writer gives here a short description of *V. spinosa* even though it duplicates to some degree the description being published by Dr. Chamberlin.

rior carapacial margin with 8-10 setae; total setae on carapace 95-110, usually about 100; length of carapace between 0.4 and 0.45 mm., usually closer to the latter; greatest width of carapace about 0.36 mm. Tergites except the first with a double row of setae; formula³ for tergal chaetotaxy of first six tergites as follows: 10-11:3-4/11-13:3-5/10-13:2-6/11-13:5-8/11-15:6-9/11-14.

Chelicera stout; length 0.22-0.25 mm., base 0.125-0.135 mm. wide; external or dorsal surface often bearing many minute spinules, ventral surface smooth; movable finger subequal to the width of the base; base with either five or six setae, the right and left chelicerae of the same individual often exhibiting this variation; serrula exterior with 15 ligulate plates.

Palp with granulate surface; setae numerous; trochanter usually between 0.145 and 0.16 mm. long, width 0.095-0.105 mm., length 1.5 to 1.65 times the width; femur 0.4-0.46 mm. long, 0.09-0.105 mm. wide, length 4.4 to 4.7 times the width; tibia 0.195-0.215 mm. long, width as in the femur, length 2.05 to 2.15 times the width; chela including pedicle 0.6-0.7 mm. long, 0.11-0.13 mm. wide; length usually 5.1 to 5.2 times the width but in one individual 5.5 times; depth of chela subequal to the width; length of hand with pedicle 0.23-0.27 mm.; length of movable finger 0.36-0.42 mm. Fixed finger with 10 to 12 well-spaced and acute teeth along the distal half of the finger and usually 18 to 20 (in one individual only 14) subcontiguous and contiguous teeth placed more proximal; movable finger with 28 to 30 flatly rounded and

more or less contiguous teeth. Tac-tile setae as indicated in figure 2.

Legs of first pair almost smooth, distal three podomeres very setaceous; pars basalis subcylindrical, 0.24-0.265 mm. long, length a little more than four times the depth; pars tibialis with both margins slightly convex to almost straight, length 0.17-0.18 mm., 3 to 3.4 times the depth; tibia subcylindrical, 0.135-0.155 mm. long, 3.2 to 3.6 times the depth; tarsus a little curved in some individuals, 0.24-0.28 mm. long, depth 0.34-0.35 mm., length between 7 and 8 times the depth. Each coxa of the first and second legs with a cteniform row of four or five ligulate and terminally incised spines. Fourth leg with tibia, pars tibialis, and metatarsus very granular; setae abundant especially on the distal podomeres; pars basalis with almost straight to weakly convex flexor margin, extensor margin markedly convex, length 0.17-0.195 mm., 1.3 to 1.4 times the depth; pars tibialis with both margins a little convex, the extensor margin flatly so, length 0.21-0.24 mm., about 1.8 times the depth; tibia with flexor margin evenly convex, extensor margin distally straight, length 0.27-0.3 mm., 3.85 to 4.05 times the greatest depth just distal to the center; metatarsus subcylindrical, 0.125-0.14 mm. long, about 2.8 times the depth; telotarsus 0.27-0.32 mm. long, 8 to 8.5 times the depth.

FEMALE: (Description based on two females.) Much like the male except slightly larger and more tergal setae; body length 1.1-1.3 mm.; chaetotaxy of tergites 1 through 6 as follows: 11-17:6-8/13-17:6-11/13-17:8-13/13-20:10/14-18:10-15/14-18.

³In this formula, the minimum and maximum number of setae observed for any entire row are separated by a short line; the rows (if more than one row occurs) of a single tergite are separated by a diagonal line with the anterior row preceding the line and the posterior row following; the setae of each tergite are separated from those of the preceding and succeeding tergites by colons.

Chelicera 0.25 mm. long, finger length 0.135-0.14 mm. Palp with podomeres slightly larger than in the male, length : width ratios virtually identical in the two sexes; length of trochanter 0.16-0.175 mm., femur about 0.5 mm., tibia 0.215-0.24 mm., chela 0.7-0.75 mm., hand 0.275-0.295 mm., finger about 0.45 mm. Legs (measurements based on one female) much as in the opposite sex except podomeres slightly larger. First leg with pars basalis 0.31 mm. long, 4.4 times the depth; pars tibialis 0.205 mm. long; tibia 0.165 mm. long; tarsus about 0.29 mm. long, 7.6 times the depth. Fourth leg with podomeres of the following lengths: pars basalis 0.215 mm., pars tibialis 0.265 mm., entire femur 0.46 mm., tibia 0.34 mm. (4.25 times the depth), metatarsus 0.155 mm., telotarsus 0.34 mm.

TRITONYMPH: (Based on a single individual.) In general somewhat like the adult; setae fewer; appendages stouter. Chelicera with serrula exterior of 14 plates; movable finger (fig. 3) with two simple galea-like processes inserted close together between the base of the galeal seta and the finger tip, these processes having a marked significance since a galea is not present in the adult. Three to four coxal spines on each coxa of the first and second legs. Palp with femur 0.35 mm. long, 0.08 mm. wide; tibia about 0.17 mm. long, 0.09 mm. wide; chela including pedicle about 0.55 mm. long, 0.11 mm. wide; hand with pedicle 0.2 mm. long; movable finger 0.33 mm. long. Movable finger with tactile setae *t*, *st*, and *sb* related much as in the adult and with the first two distal to the midpoint of the finger; *b* wanting; finger with about 25 rounded and poorly developed marginal teeth. Fixed finger with tactile setae more or less as in

the adult except *it* and *est* closer together; dorsum of hand with one tactile seta (*isb* or *ib*), the other of the pair wanting; about 15 rounded basal teeth and 13 acute distal teeth.

Family Chthoniidae Hansen

Apochthonius moestus (Banks, 1891)
Chamberlin, 1929
(Figs. 4-7)

RECORDS: Besides the records previously given (Hoff, 1944) for this species from Illinois, *A. moestus* is now reported in the following 21 collections: Adams Co. (7 collections by the writer), Union Co. (3), Pope Co. (2), Madison Co. (1), Champagne Co. (1), Bond Co. (2), LaSalle Co. (3), Jersey Co. (1), and Hardin Co. (1). In addition, Dr. Chamberlin's collections include a series of individuals taken by Dr. Jane Claire Dirks at White Heath, Piatt Co., Illinois, during 1938.

In the writer's previous publication (1944), a statement was made regarding the use for species recognition of the two tactile setae of the dorsal surface of the chelal hand, there being known at that time only two species of pseudoscorpions from the State with this characteristic. Other species with this characteristic have now been found in Illinois. *A. moestus*, however, is easily recognized by its size (greater than 1.3 mm., except in very few individuals), the contiguous teeth of the chelal fingers, and the presence of three spines on each of the first coxae.

While there is some information (Hoff, 1944, 1945b) relative to the characteristics of the adults of this species from Illinois, no record or description has been given for the immature stages. Fortunately, the present series of collections includes numerous nymphs of several stages

TABLE SHOWING IMPORTANT CHARACTERISTICS OF THREE NYMPHAL STAGES AND THE ADULT OF *APOCHTHONIUS MOESTUS*

	Protonymph	Deutonymph	Tritonymph	Adult (both sexes)
Body length.....	0.67 mm.	0.72-0.9 mm.	1.1-1.3 mm.	1.3-1.8 mm. ²
Carapace length...	0.25 mm.	0.28-0.32 mm.	0.32-0.4 mm.	0.32-0.42 mm. ²
Serrula exterior, number of plates	11	12	14	16-17
Coxa I, number of spines.....	0	1	2	3 ²
Palpal femur length	0.17 mm.	0.20-0.24 mm.	0.30-0.35 mm.	0.32-0.5 mm.
width.....	0.055 mm.	0.06-0.07 mm.	0.075-0.09 mm.	0.08-0.11 mm. ²
1/w ratio.....	3.1	3.2-3.6	3.8-4.0	3.5-4.5
Palpal tibia length.	0.11 mm.	0.125-0.14 mm.	0.17-0.21 mm.	0.20-0.24 mm. ²
width.....	0.072 mm.	0.075-0.085 mm.	0.095-0.12 mm.	0.105-0.145 mm.
1/w ratio.....	1.55	1.6-1.7	1.8	1.6-1.9
Chela length.....	0.29 mm.	0.35-0.38 mm.	0.5-0.56 mm.	0.55-0.75 mm.
width.....	0.083 mm.	0.088-0.1 mm.	0.11-0.135 mm.	0.12-0.17 mm.
1/w ratio.....	3.5	3.8-4.1	4.1-4.5	4.0-4.7
Finger length.....	0.2 mm.	0.24-0.255 mm.	0.33-0.38 mm.	0.37-0.46 mm. ²
Movable finger tac- tile setae.....	1	2	3	4
marginal teeth...	30 (<i>circ.</i>)	40 (<i>circ.</i>)	45 (<i>circ.</i>)	50-60
Fixed finger tactile setae ¹	3	7	8	9
marginal teeth...	30 (<i>circ.</i>)	45 (<i>circ.</i>)	50 (<i>circ.</i>)	50-70

¹ Includes the tactile setae of the dorsum of the hand and the double seta (*xs*) when these occur.

² A few individuals may fall outside of these ranges.

EXPLANATION OF FIGURES

Drawings are outlined with the camera lucida from specimens cleared in beechwood creosote and mounted in Canada balsam.

Verrucaditha spinosa. Fig. 1. Dorsal view of palp, male; tactile setae of movable finger omitted; scale equals 0.25 mm.—Fig. 2. Lateral view of chela, male; scale as in Fig. 1.—Fig. 3. Movable finger of chelicera, tritonymph, scale equals 0.05 mm.

Apochthonius moestus. Fig. 4. Lateral view of chela, protonymph.—Fig. 5. Lateral view of chela, deutonymph.—Fig. 6. Lateral view of chela, tritonymph.—Fig. 7. Lateral view of chela, female adult. Figures 4 through 7 drawn to the scale in fig. 1.

Chthonius tetrachelatus. Fig. 8. Lateral view of chela, male; scale equals 0.25 mm.

Larca granulata. Fig. 9. Dorsal view of palp male; tactile setae of movable finger omitted; scale equals 0.5 mm.—Fig. 10. Lateral view of chela, male; scale as in fig. 9.

b, basal seta of movable finger

eb, external basal seta of fixed finger

esb, external subbasal seta of fixed finger

est, external subterminal seta of fixed finger

et, external terminal seta of fixed finger

ist, internal subterminal seta of fixed finger

it, internal terminal seta of fixed finger

sb, subbasal seta of movable finger

st, subterminal seta of movable finger

t, terminal seta of movable finger

xs, double seta of fixed finger

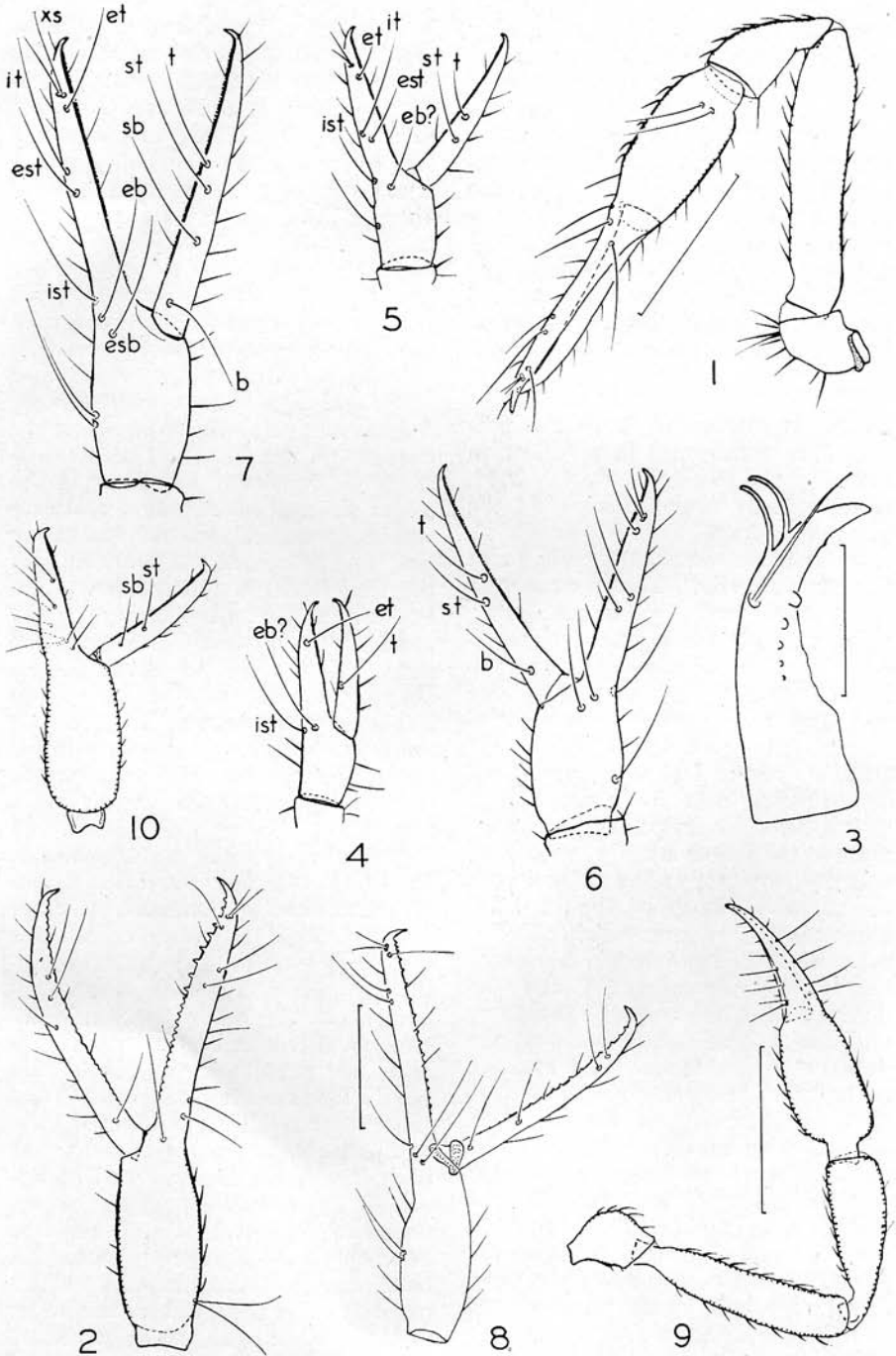


PLATE I.

taken in collections made from May through September. These nymphs demonstrate interesting progressive changes which occur from one instar to the next. These changes include a gradual increase in the number of coxal spines on each of the first coxae and an increase in the number of tactile setae on the chelal fingers. The brief descriptions given here in addition to the accompanying table serve to indicate these and other interesting changes.

NYPHS: A single individual of the earliest nymphal stage, the protonymph, was found in a collection taken by the writer on July 2, 1944, from an area near Quincy. In the same collection was a female *A. moestus* and several later nymphs of the same species. The protonymph is characterized by having very stout and little sclerotized appendages, by a lack of coxal spines on the first coxae, and by the presence of very few tactile setae on the chelal fingers. The positions of the tactile setae are of particular interest. The single tactile seta (very probably *t*, as indicated by its position approximate to the finger margin) is located a little proximal to the midpoint of the movable finger; on the fixed finger, *et* is located just within the distal one-third of the finger, two other tactile setae (possibly *ist* and *eb*) are located at the base of the finger; and one of the future setae of the dorsum of the chelal hand appears to be marked by a prominent seta without, however, the characteristic areole. The marginal teeth of the chelal fingers in this early instar vary from slender and acute teeth at the distal end of each row to rounded and flattened teeth at the proximal end of the row; the teeth are in general more slender and acute than in the adult.

The next stage available for study

is the deutonymph, several of these being found in six collections. The earliest date of collection of the deutonymph was June 15 and the latest September 30. This instar has a larger size and more slender appendages than the protonymph described above. This is shown clearly in the table. There is a single spine on each first coxa. The movable finger has two tactile setae, *t* just proximal to the midpoint of the finger and *st* about three areolar diameters distal to *t*; fixed finger with a double seta (*xs*) and five tactile setae on the finger; one seta (*ib* or *isb*?) on the dorsum of the hand; *et* about one-third of the finger length from the finger tip and about one areolar diameter proximal to *xs*, two setae (*est* and *it*) at about two-thirds of the finger length from the tip, and two others (*ist* and either *esb* or *eb*) near the base of the finger. The marginal teeth of the chelal fingers shaped much as in the earlier nymph but greater in number; the teeth do not extend entirely to the base in the movable finger but cover almost the entire finger margin in the fixed finger.

Two tritonymphs were available for study. One was found in a collection made on Sept. 30 and the other in a collection taken on May 23. The tritonymphs are larger than the deutonymphs and have more slender appendages. The coxal spines have increased to two and additional tactile setae are present on the chelal fingers. The movable finger has three setae: *t* just distal to the midpoint of the finger, *st* just proximal to the midpoint of the finger, *t* and *st* separated by about the width of the finger at the level of *t*, *b* basal in position and separated from the basal margin of the finger by a distance equal to the width of the finger at the level of *b*, *sb* wanting. Fixed finger with tactile setae much as in

the adult except only one seta (*isb* or *ib*?) occurs on the dorsum of the hand.

Chthonius (Ephippiochthonius)
tetrachelatus (Preyßler, 1790)
Stecker, 1875
(Fig. 8)

RECORDS: This species has been taken in eleven collections made by the writer from several places along the Mississippi River bluffs near Quincy, Adams Co., Illinois. A single individual was also available to the writer from a collection (Chicago Natural History Museum) made by Henry Dybas from near Moosehart, Kane Co., Illinois. Since this species is found over a wide area in Europe and has been reported frequently from eastern United States as far west as Indiana, it seems strange that it has not been taken from other Illinois areas.

Chthonius tetrachelatus is fairly abundant as to number of individuals whenever taken and most collections contain both nymphs and adults. With exception of the Kane Co. specimen for which no ecological data are available, the collections have been made from debris, leaf mold, and loam. In each instance, limestone outcrops are in the immediate vicinity. The habitat in Adams County is somewhat similar to the habitat in Europe where Kästner (1929) reports this species as living under fallen leaves and stones in the forest, the nests being made on the underside of the stones. Its particular habitat might explain why it has not been found in collections from other sections of Illinois.

Our individuals agree well with the descriptions given for this species in the literature except that the cheliceral finger seems to be somewhat shorter than indicated by some writers (Hadzi, 1933). With re-

spect to recognition of this species, the following combination of characteristics may prove useful: coxal spines present on second and third coxae; two tactile setae on the dorsum of the hand; palpi very slender; from the side, the dorsal margin of the chelal hand shows a marked depression between the tactile setae and the base of the fixed finger; the marginal teeth of the chela are acute and widely separated at least along the distal end of the row on each finger.

Suborder
DIPLOSPHYRONIDA
Chamberlin

Family Neobisiidae Chamberlin

Microbisium brunneum (Hagen,
1869) Chamberlin, 1930

RECORDS: In addition to records previously published (Hoff, 1944), the following new records are given: Adams Co. (11), Bond Co. (2), Boone Co. (1), Calhoun Co. (1), Carroll Co. (1), Champaign Co. (3), Coles Co. (1), Cook Co. (4), DuPage Co. (1), Fulton Co. (1), Jackson Co. (1), Jersey Co. (1), Jo Daviess Co. (1), Lake Co. (11), La Salle Co. (5), Lee Co. (1), Madison Co. (2), Mason Co. (3), Mercer Co. (1), Ogle Co. (1), Piatt Co. (1), Pope Co. (3), Putnam Co. (1), Schuyler Co. (1), Union Co. (2). While most of these records are based on collections of the State Natural History Survey, a few are records of specimens collected by the writer and specimens kindly supplied by Dr. Chamberlin.

Family Garypidae Hansen, 1894

Larca granulata (Banks, 1891)
Chamberlin, 1930
(Figs. 9-10)

RECORDS: Five collections from Starved Rock State Park, LaSalle Co. and one collection from near Fountain Bluff, Jackson Co.

This species is apparently restricted in habitat, being found in Starved Rock State Park only in association with debris on sandstone ledges and shelves. No ecological data are available for the Jackson Co. collection. In this connection, it is interesting to note that the type specimens were "Found in crevices of a cliff at Ithaca, N. Y." (Banks, 1891). With the exception of the publication of a drawing by Ross (1944), no records have been published of the occurrence of this spe-

cies outside of New York State. The drawing of the Illinois specimen as published by Ross (1944, fig. 56) was through an unfortunate clerical error incorrectly designated as an individual of the vastly different species *Chernes dentatus*.

Larca granulata can be recognized easily by the very stout abdomen in which the width is nearly equal to the length, by the triangular carapace, and by the characteristic shape of the palp.

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