

American Museum Novitates

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY
CENTRAL PARK WEST AT 79TH STREET, NEW YORK 24, N.Y.

NUMBER 2134

APRIL 12, 1963

Pseudoscorpions from the Black Hills of South Dakota

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During field studies (supported by National Science Foundation Grant G-5283) on pseudoscorpions of the Rocky Mountain region, I had the opportunity to make a brief survey of the pseudoscorpions of the Black Hills region of South Dakota. In the present paper are reported the results of this survey, along with the results of a study of a few other available collections from the Black Hills. Unless otherwise indicated, all records are based on my own collections, which were made between July 9 and 16, 1959. The records for six species, one of them new to the literature, are the first records of pseudoscorpions from South Dakota. The holotype and some paratypes of the new species, along with representatives of other species, are deposited in the American Museum of Natural History.

FAMILY CHTHONIIDAE HANSEN

Mundochthonius rossi Hoff

Mundochthonius rossi HOFF, 1949, Bull. Illinois Nat. Hist. Surv., vol. 24, p. 437.
HOFF AND BOLSTERLI, 1956, Trans. Amer. Micros. Soc., vol. 75, p. 158.

Although surfaces of palpal segments of type specimens were reported as smooth, it is now evident that there are scale-like markings on the dorsal surface of the chelal hand. These appear as small spinules in profile

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and are found chiefly between tactile setae *ib* and *isb* and the base of the fixed finger. On the average, males from the Black Hills are a little larger and have slightly stouter palpal segments than do the four type males described from Illinois. The following measurements are given as ranges based on three males from the Black Hills. Body length, 1.15–1.38 mm.; palpal femur 0.36–0.40 mm. long, 0.092–0.103 mm. wide, length 3.89–3.92 times the width; chela 0.56–0.63 mm. long, 0.129–0.143 mm. wide, length 4.34–4.40 times the width; length of movable chelal finger, 0.37–0.415 mm. The majority of specimens in the 14 collections are nymphs, there being only one female and three males among the 19 specimens. The species occurs in the litter and debris of both broad-leaved and coniferous trees and has been reported from Illinois, Iowa, North Dakota, and Wisconsin. In the Black Hills, specimens were taken at elevations of 4800 to 5500 feet.

RECORDS: *Pennington County*: From aspen and bur-oak litter, from a yellow-pine log, and from a squirrel midden of pine cone scales, 6 miles northwest of Keystone; in debris at base of yellow pines and in birch litter, 2 miles north of Keystone; in aspen litter and in birch debris, 10 miles north of Custer; from debris at base of yellow pine and from mixed aspen and birch litter, 8 miles northeast of Hill City; from yellow-pine stump, 6 miles east of Hill City; and from aspen litter and mixed spruce and yellow-pine litter, nearly 8 miles south of Hill City.

Lechytia pacifica (Banks)

Roncus pacificus BANKS, 1893, Canadian Ent., vol. 25, p. 66.

Lechytia pacifica, BANKS, 1895, Jour. New York Ent. Soc., vol. 3, p. 13. HOFF, 1956, Amer. Mus. Novitates, no. 1772, p. 11; 1961, Bull. Amer. Mus. Nat. Hist., vol. 122, p. 425.

Palpal segments of the single male are a little larger than those of males described from Colorado, but agree closely with males taken in New Mexico. The species is western in distribution, being reported from California, Colorado, New Mexico, Utah, and Washington.

RECORD: *Custer County*: A male and a tritonymph from woody debris at base of trunk of yellow pine, 7 miles east of Custer, elevation 5300 feet.

FAMILY NEOBISIIDAE CHAMBERLIN

Microbisium confusum Hoff

Microbisium confusum HOFF, 1946, Bull. Chicago Acad. Sci., vol. 7, p. 496; 1949, Bull. Illinois Nat. Hist. Surv., vol. 24, p. 446; 1961, Bull. Amer. Mus. Nat. Hist., vol. 122, p. 432.

Out of 44 specimens taken in 15 collections during July, 1959, only two are adult. Specimens from the Black Hills are very similar to those described from Colorado and were taken at elevations between 4400 and 5400 feet. The species occurs over a broad geographic area that extends from Colorado on the west to New York and North Carolina on the east.

RECORDS: *Custer County*: From bur-oak litter, 9 miles south of Keystone; in moss on rock, 7 miles east of Custer. *Lawrence County*: From aspen litter, 3 miles east of Deadwood. *Pennington County*: From mixed bur-oak and elm litter, 13 miles southwest of Rapid City; from aspen litter, 14 miles southwest of Rapid City; from bur-oak litter, yellow-pine litter, yellow-pine stump, debris at base of a yellow pine, and birch litter, 2 miles north of Keystone; in aspen litter, bur-oak litter, and squirrel midden of pine cones, 6 miles northwest of Keystone; and from aspen litter and birch debris, 10 miles north of Custer.

FAMILY CHERNETIDAE MENGE

GENUS *HESPEROCHERNES* CHAMBERLIN

Hesperochnes CHAMBERLIN, 1924, Pan-Pacific Ent., vol. 1, p. 89. HOFF, 1956, Amer. Mus. Novitates, no. 1800, p. 31.

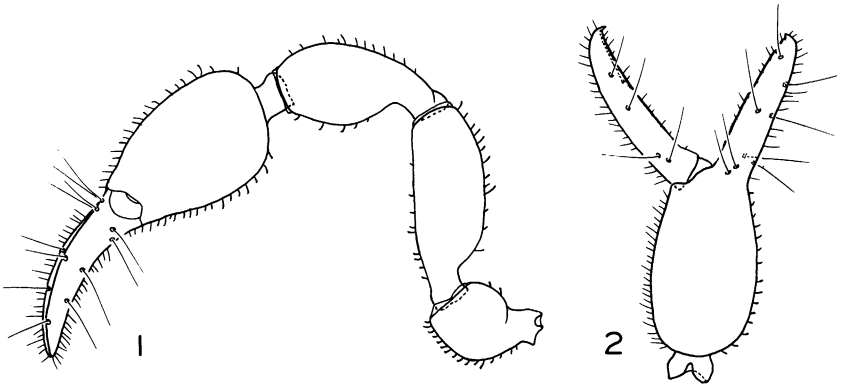
Reginachernes HOFF, 1949, Bull. Illinois Nat. Hist. Surv., vol. 24, p. 465.

***Hesperochnes amoenus*, new species**

Figures 1, 2

DIAGNOSIS: The new species is clearly separated from many species of *Hesperochnes* by the acuminate nature of seta *b* of the cheliceral hand, by the size, ratios, and shape of palpal segments, and by the unusually long tubule of the seminal receptacle. In general size and ratios of palpal segments, the new species resembles *H. sanborni* (Hagen), a species for which the nature of cheliceral seta *b* is unreported, from the northeastern part of the United States, but the two species differ in the shape of the palpal femur and tibia and in the stoutness of the cheliceral galea. Of the species known to have seta *b* of the cheliceral hand acuminate, *H. amoenus* appears related to *H. ewingi* and *H. lymphatus*, species originally described from Illinois and assigned to the genus *Reginachernes*, and to *H. canadensis* from Alberta, Canada, and Colorado. The new species can be differentiated from *H. ewingi* by the larger palpal segments and the more slender palpal femur and chela; from *H. lymphatus* by the more slender palpal femur and chela, especially in the male, and the relatively longer chelal finger; and from *H. canadensis* by the slightly smaller palpal segments in the female and the distinctly smaller palpal segments and much more slender chela in the male.

FEMALE: The description is based on 10 specimens, the holotype and nine paratypes. Measurements given for the holotype frequently are followed in parentheses by the range based on all 10 females. Appearance of body and appendages typical for species of the genus; abdomen and legs of a moderately deep golden color, carapace usually somewhat darker; palpi deep reddish gold in color; body 2.95 (2.65–3.05, with one specimen only 2.30 because of a strongly contracted abdomen) mm. in length.



FIGS. 1, 2. *Hesperochernes amoenus*, new species, female holotype. 1. Dorsal view of palpus. 2. Lateral view of chela.

Carapace with two well-developed transverse furrows, one furrow nearly median in position, the second furrow less deeply impressed and closer to the posterior carapacial margin than to the median furrow; setae not especially conspicuous, weakly clavate; entire surface of carapace uniformly granulate, except granules more strongly developed on the anterior than on the posterior portion; 10 (10–13) setae along the posterior margin; eyespots variable, ranging from obsolete to weakly developed; length of carapace, 0.92 (0.74–0.92) mm., greatest width posterior to the median furrow and equal to 0.74 (0.69–0.80) mm., length 1.24 (1.06–1.24) times the width. Abdomen with tergites and tergal halves well separated, wide intertergal spaces occupied by strongly and roughly papillose membrane; surface of tergites granulate; setae typically uniseriate, moderately clavate, a little longer and more conspicuous than carapacial setae; each of the first tergal halves with five to seven, rarely four, setae; each half tergite of second and third segments with five to eight setae; each tergal half of the central part of the abdomen with seven to 13 setae. Sternites much less strongly sclerotic; surface sculpture variable, central and posterior

sternites often with scale-like markings; intersternal membranes rugose; setae acuminate, typically uniseriate; fourth sternite very weakly sclerotic, not strongly divided, with five to 12 setae; sternal halves of central part of abdomen with 10–15 setae. Pleural membranes strongly papillose; anterior stigmatic plate with three, occasionally two or four, setae; posterior stigmatic plate with one seta.

Chelicera of a rich golden color; movable finger and hand stout, fixed finger relatively slender; exterior surface of hand marked by a net-like pattern; seta *b* acuminate, seta *sb* denticulate; length of chelicera, 0.255 (0.235–0.287) mm., width of hand, 0.139 (0.123–0.139) mm., length 1.83 (1.74–2.15) times the width. Fixed finger with usually three denticles on the concave surface of the apical tooth and two strongly developed teeth followed proximally by two much weaker teeth along the distal part of the inner finger margin. Movable finger with a well-developed subapical tooth and occasionally a minute denticle on the inner finger margin at or distal to the level of the insertion of the galeal seta; galeal seta not reaching beyond the end of the galea; galea with five or six simple rami confined chiefly to the distal half; serrula exterior with 17–18 (17–19) plates; movable finger, exclusive of the galea, 0.215 (0.187–0.223) mm. in length.

Palpus with surface of segments densely granulate, except that granules are poorly developed on the ventral aspect of segments and on the chela; investing setae moderately clavate on the flexor surface of trochanter and femur to terminally and subterminally paucidentate on the extensor surface of the tibia and hand. In dorsal view, segments of paratypes are very similar in shape to those of the holotype, as shown in figure 1, except for some variation in the shape of the chelal hand. In some specimens the chelal hand as seen in dorsal view is well rounded, in other specimens the hand is more triangular in shape as a result of the narrowing of the hand near the base of the fingers, and in some specimens the outer or extensor margin may be less convex. The holotype is more or less intermediate between the extremes of variation observed in the shape of the chelal hand. There is less variation in the shape of the hand in lateral view, the hand usually appearing similar to that of the holotype, as shown in figure 2. However, some specimens have a more elongate hand or a hand with a less convex ventral margin. Trochanter 0.415 (0.395–0.43) mm. long, 0.255 (0.235–0.255) mm. wide, length 1.63 (1.62–1.72) times the width; femur 0.65 (0.59–0.65) mm. long, 0.253 (0.235–0.253) mm. wide, length 2.56 (2.46–2.67) times the width; tibia 0.625 (0.55–0.625) mm. in length, 0.280 (0.250–0.280) mm. in width, length 2.24 (2.15–2.36) times the width; chela without pedicel 1.15 (1.07–1.18) mm. long, 0.400 (0.360–0.405) mm. wide, length 2.88 (2.84–3.07) times the width; chelal hand

without pedicel 0.57 (0.52–0.57) mm. long, 0.36 (0.32–0.36) mm. deep, length 1.58 (1.51–1.70) times the depth; chelal finger 0.61 (0.555–0.67) mm. long. Tactile setae of chelal fingers without special features; with chaetotaxy in the paratypes very similar to that of the holotype. However, some variation occurs. On the movable finger, the chief variation is in the position of tactile seta *st*, which varies from a point midway between *t* and *sb* to a position twice as far from *sb* as from *t*. On the fixed finger, some specimens have *ist* virtually on the same level as *est*, while in other specimens *ist* is considerably distal to *est*. Marginal teeth of chelal fingers extend along nearly the entire finger margin; fixed finger with 40 (35–41) marginal teeth, five to eight external accessory teeth, and three or four internal accessory teeth; movable finger with 46 (33–46, with only one specimen under 40) marginal teeth, five to eight external accessory teeth, and two or three internal accessory teeth. The somewhat reduced venedens of the fixed finger with a vestigial venom duct; nodus ramosus of movable finger somewhat variable in position, ranging from about the level of tactile seta *t* to a position about one-half of the distance between *t* and *st*.

Legs without unusual characteristics; setae clavate on the extensor surface of the femur and tibia of each leg, becoming subclavate on the extensor surface of the tarsus; some of the more strongly clavate setae, especially on the pars tibialis, inserted on enlarged papilliform granules; setae of the flexor surface of the femoral parts varying from subclavate to acuminate; setae of the flexor surfaces of tibia and tarsus acuminate; scale-like surface sculpture variable, often fairly conspicuous on the femoral parts, less well developed on the tibia, and weakly developed to obscure on the tarsus. First leg with tibia 0.320 (0.283–0.322) mm. long, 0.108 (0.092–0.108) mm. deep, length 2.96 (2.78–3.26) times the depth; tarsus 0.330 (0.295–0.342) mm. in length, 0.074 (0.064–0.074) mm. in depth, length 4.47 (4.21–5.03) times the depth. Fourth leg with entire femur 0.590 (0.545–0.62) mm. long, 0.183 (0.158–0.192) mm. in depth, length 3.22 (3.06–3.61) times the depth; tibia 0.455 (0.42–0.48) mm. long, 0.118 (0.102–0.118) mm. deep, length 3.86 (3.73–4.32) times the depth; tarsus 0.365 (0.345–0.382) mm. long, 0.087 (0.078–0.088) mm. deep, length 4.20 (4.02–4.55) times the depth.

Genitalia with a cluster of 25 (18–27) setae on the anterior operculum and a uniseriate row of 10 (seven to 12) setae on the posterior operculum; spermathecae tubular, unusually long and slender, apparently without a terminal bulb; three females with eggs or young, with 13–15 in each clutch.

MALE: Description based on 10 paratypes, with measurements given as

ranges. Male very similar to female, except body and appendages on the average a little smaller. Body length, 2.2–2.35 mm. Carapace with eye-spots obscure to weak; 11–14 setae along the posterior carapacial margin; length of carapace, 0.74–0.81 mm., greatest width, 0.66–0.76 mm., length 1.07–1.23 times the width. Abdomen essentially like that of the female except for the genitalia; tergal halves of first, second, and third segments with five to eight setae; tergal halves of center of abdomen with seven to 10 setae; fourth sternite with a row of 10–14 setae; anterior stigmatic plate with three setae; posterior stigmatic plate with one seta, except that no seta occurs on one plate in one paratype. Chelicera as in the female; seta *b* acuminate, seta *sb* denticulate; serrula exterior with 17–18 plates; galea with five to six simple rami; length of chelicera, 0.223–0.247 mm., width of base, 0.127–0.135 mm., length 1.74–1.94 times the width; movable finger 0.183–0.203 mm. in length.

Palpus essentially like that of the female; trochanter 0.37–0.40 mm. long, 0.205–0.250 mm. wide, length 1.64–1.85 times the width; femur 0.54–0.62 mm. long, 0.21–0.24 mm. wide, length 2.50–2.76 times the width; tibia 0.515–0.59 mm. in length, 0.235–0.26 mm. in width, length 2.08–2.34 times the width; chela without pedicel 1.00–1.07 mm. long, 0.325–0.37 mm. wide, length 2.81–3.14 times the width; chelal hand without pedicel 0.46–0.535 mm. long, 0.29–0.335 mm. deep, length 1.44–1.71 times the depth; movable chelal finger 0.55–0.59 mm. long. Variation in shape of segments similar to that found in the female. Fixed finger with 37–40 marginal teeth, three to seven (usually six or seven) external accessory teeth, and two to five internal accessory teeth; movable finger with 38–43 marginal teeth, four to seven external accessory teeth, and two or three internal accessory teeth.

Legs of male very similar to those of the female. First leg with tibia 0.270–0.308 mm. long, 0.092–0.101 mm. deep, length 2.83–3.30 times the depth; tarsus 0.280–0.310 mm. long, 0.064–0.068 mm. deep, length 4.22–4.72 times the depth. Fourth leg with entire femur 0.515–0.565 mm. in length, 0.155–0.174 mm. in depth, length 3.01–3.50 times the depth; tibia 0.398–0.450 mm. long, 0.103–0.115 mm. deep, length 3.61–4.18 times the depth; tarsus 0.33–0.36 mm. in length, 0.076–0.084 mm. in depth, length 4.00–4.50 times the depth.

Genitalia without special features; anterior operculum with a cluster of 35–47 setae; posterior operculum with a transversely oriented group of 15–20 setae and with four to seven specialized setae along the very posterior lip of the aperture.

TRITONYMPH: Description based on five paratypes; measurements given as ranges; tritonymph can be recognized by the three tactile setae on the

movable chelal finger. Tritonymph much like the female in sculpture and chaetotaxy, but lighter in color, less sclerotic, and smaller. Body length, 1.88–2.30 mm. Carapace with 10–12 setae along the posterior margin; eyespots obsolete to very weakly developed; carapace 0.66–0.71 mm. in length. Abdomen with five or six setae on each tergal half of the first segment; five to eight, usually seven or eight, setae on each tergal half in the central part of abdomen; anterior stigmatic plate with two setae, posterior plate with one. Chelicera with seta *b* acuminate, *sb* denticulate; serrula exterior with 15–16 plates; galea with five, in some specimens four, rami confined to little more than the distal third; movable finger 0.157–0.175 mm. long.

Palpus showing considerable resemblance to that of the female; femur 0.43–0.47 mm. in length, 0.174–0.195 mm. in width, length 2.33–2.47 times the width; tibia 0.395–0.435 mm. long, 0.191–0.215 mm. wide, length 1.97–2.07 times the width; chela without pedicel 0.795–0.87 mm. in length, 0.261–0.288 mm. in width, length 2.96–3.05 times the width; chelal hand 0.41–0.44 mm. long, 0.246–0.277 mm. deep, length 1.59–1.68 times the depth; movable finger 0.41–0.455 mm. in length. Nodus ramosus of the movable chelal finger at the level of tactile seta *t* or basal to *t*, but very seldom more than one areolar diameter basal to *t*. Fixed chelal finger with 29–32 marginal teeth, and three to five external and one to three internal accessory teeth; movable finger with 34–37 marginal teeth and two to four external accessory teeth, internal accessory teeth may be absent or one, in some cases three, may be present. Fourth leg with entire femur 0.405–0.47 mm. in length, 0.126–0.143 mm. in depth, length 3.16–3.28 times the depth.

DEUTONYMPH: Description obtained from three paratypes; measurements given as ranges; deutonymph characterized by having only two tactile setae on the movable chelal finger. The deutonymph has the general characteristics of the tritonymph, but is distinctly smaller. Body 1.5–1.7 mm. in length. Carapace with seven to eight setae along the posterior margin. Each tergal half of central part of abdomen with five to 10 setae; anterior stigmatic plate with one or two setae, posterior plate with one. Chelicera with seta *b* acuminate, *sb* denticulate; serrula exterior with 13–14 plates; galea with four simple rami; movable finger 0.127–0.143 mm. in length. Palpal femur 0.295–0.325 mm. in length, 0.135–0.151 mm. in width, length 2.15–2.23 times the width; tibia 0.293–0.315 mm. long, 0.145–0.158 mm. wide, length 1.97–2.02 times the width; chela 0.59–0.63 mm. long, 0.192–0.207 mm. wide, length 3.04–3.07 times the width; length of hand, 0.295–0.31 mm., depth, 0.185–0.199 mm., length 1.56–1.62 times the depth; movable finger 0.30–0.325 mm. in

length. Fixed finger with 23–28 marginal teeth, usually no accessory teeth, but one specimen with one internal accessory tooth; movable finger with 28–31 marginal teeth, both external and internal accessory teeth absent. Fourth leg with entire femur 0.270–0.320 mm. in length, 0.094–0.108 mm. in depth, length 2.87–3.23 times the depth.

PROTONYPH: Only two protonymphs mounted and studied in detail; measurements of one of the protonymph paratypes follows in parentheses the measurements of the other; the protonymph can be recognized by the single tactile seta on the movable chelal finger. Body length, 1.35 (1.38) mm.; carapace, 0.45 (0.46) mm. in length, six setae along the posterior margin. Tergal halves of central part of abdomen with six setae; anterior stigmatic plate asetaceous, posterior plate with one seta. Base of chelicera with either *b* or *sb* wanting, the remaining seta acuminate; galea with three simple rami; serrula exterior with 10–11 plates. Palpal femur 0.220 (0.239) mm. long, 0.108 (0.111) mm. wide; tibia about 0.225 (0.240) mm. long, width, 0.123 (0.120) mm.; chela without pedicel 0.48 (0.505) mm. long, 0.159 (0.163) mm. wide; chelal hand about 0.260 (0.250) mm. long, 0.159 (0.159) mm. deep; movable finger 0.248 (0.255) mm. long. Fixed chelal finger with 21 (22) marginal teeth, without accessory teeth except for one possible rudimentary internal accessory tooth in one specimen; movable finger with 21 (24) marginal teeth, one specimen with two small external accessory teeth, other specimen without external accessory teeth; movable finger without internal accessory teeth.

ECOLOGY: The species is definitely associated with leaf litter beneath birch, aspen, and bur oak and with the debris and decomposing wood of yellow-pine stumps and logs. While two collections were made from accumulations of flakes of bark at the base of trunks of yellow-pine trees, no specimens were taken from yellow-pine leaf litter. Fourteen collections were made by Hoff at elevations between 4600 and 5400 feet; elevation of other two collections unknown.

TYPE LOCALITY AND RECORDS: The female holotype, four female paratypes, three male paratypes, and one tritonymph paratype in a collection from beneath rocks and logs, Horse Thief Lake, Pennington County, South Dakota, June 19, 1952; the American Museum of Natural History collection, collector unknown. The collection also contains five gravid females and three nymphs that were not mounted and are not designated types. In addition, the species occurs in 15 other collections, with representatives of each collection mounted and considered paratypes. *Custer County:* Custer State Park, June 18–25, 1950, the American Museum of Natural History collection, collector not given; 7 miles east of Custer; and 9 miles south of Keystone. *Pennington County:* Several collections taken

2 miles north of Keystone, 6 miles northwest of Keystone, 10 miles north of Custer, 6 miles east of Hill City, and 8 miles northeast of Hill City.

FAMILY CHELIFERIDAE HAGEN

Parachelifer persimilis (Banks)

Chelifer persimilis BANKS, 1909, Canadian Ent., vol. 41, p. 304.

Parachelifer persimilis, HOFF, 1956, Amer. Mus. Novitates, no. 1804, p. 4; 1961, Bull. Amer. Mus. Nat. Hist., vol. 122, p. 457.

This frequently occurring species is widely distributed in the Rocky Mountain states, where it is usually associated with yellow pines, being found chiefly under the bark of logs, stumps, and dead trees.

RECORDS: *Custer County*: One male, Custer State Park, June, 1950; the American Museum of Natural History collection, collector unknown. *Pennington County*: One female from between slabs of sandstone, 14 miles southwest of Rapid City, elevation about 4500 feet; one female and one tritonymph from beneath bark of yellow-pine log, 2 miles north of Keystone, 5200 feet elevation.

Parachelifer scabriculus (Simon)

Chelifer scabriculus SIMON, 1878, Ann. Soc. Ent. France, ser. 5, vol. 8, p. 154.

Parachelifer scabriculus, CHAMBERLIN, 1952, Bull. Amer. Mus. Nat. Hist., vol. 99, p. 300. HOFF, 1956, Amer. Mus. Novitates, no. 1804, p. 7.

The single available female appears conspecific with females described in the literature, but in the absence of additional specimens, especially of males, it is impossible to complete a definitive determination. The stouter palpal segments, as well as other differences, suggest that the female is not an abnormal or unusual specimen of *P. persimilis*. The following measurements were obtained from the Black Hills female. Body length, 3.5 mm.; carapace 1.12 mm. long. Palpus with femur 1.20 mm. long, length 4.21 times the width; tibia 1.00 mm. long, length 2.90 times the width; chela without pedicel 1.64 mm. in length, this being 3.38 times the width; hand without pedicel 0.86 mm. long, movable finger 0.84 mm. long. Fourth leg with entire femur 0.91 mm. in length, this being 3.03 times the depth; tibia 0.72 mm. long, tarsus 0.53 mm. long. The species, which is of much less frequent occurrence than *P. persimilis*, is found chiefly under the bark of both broad-leaved and needle-leaved trees and has been reported from Arizona, California, New Mexico, Oregon, and Utah.

RECORD: *Pennington County*: From a yellow pine infested with bark beetles, 23 miles north and 5 miles east of Tepee Ranger Station, elevation about 6500 feet; collected by Thomas H. Follingstad, July 12, 1960.