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Atemnid and Cheliferid Pseudoscorpions, Chiefly from Florida

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The present paper, the second of a series on the pseudoscorpions of Florida, is concerned with pseudoscorpions of the monosphyronid families Atemnidae and Cheliferidae. While no atemnoid species in addition to the previously known *Paratemnus elongatus* (Banks) is reported from Florida, several additions are made to the cheliferid fauna. Besides discussions of and new locality records for the only two previously known Florida cheliferid species, *Tyrannochelifer floridanus* (Banks) and *Ocalachelifer cribratus* Chamberlin, two already described species are reported for the first time from Florida, and two previously undiagnosed genera and four new species are described. Because of relationship to the Florida fauna, a new species from Cuba and Haiti is included in this report.

Sources of collections studied are explained in the first paper (Hoff, 1963) of the series. Holotypes, unless indicated otherwise, are deposited in the American Museum of Natural History. The study was aided by National Science Foundation Grant GB-43.

FAMILY ATEMNIDAE CHAMBERLIN

Atemnidae CHAMBERLIN, 1931a, p. 243. BEIER, 1932a, p. 548; 1932b, p. 20. HOFF, 1958, p. 45 (key).

The many genera of the family are chiefly Asiatic and African in dis-

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tribution, but representatives occur in the Western Hemisphere, especially in South America. A single genus, represented by one species, is known from continental United States.

GENUS *PARATEMNUS* BEIER

Paratemnus BEIER, 1932a, p. 562; 1932b, p. 33.

Most of the species of this large genus occur in Asia and Africa, but a few species have been reported from South and Central America, Mexico, and the Antilles. Only one species is known to occur in the United States.

Paratemnus elongatus (Banks)

Atemnus elongatus BANKS, 1895, p. 10; 1904, p. 141.

Atemnus floridanus TULLGREN, 1900, p. 153, fig. 1.

Lustrochernes? floridanus: BEIER, 1932b, p. 95.

Paratemnus elongatus: HOFF, 1946a, p. 110, figs. 1, 2.

This is one of the common Florida pseudoscorpions. As Hoff's (1946a) species description was based largely on the lectotype, intraspecific variation has remained unknown until the present study of about 95 mounted individuals from various parts of Florida. An unusually wide range in size of palpal and pedal segments no doubt results in part from a few males and females of unusually large size. It is impossible, however, to segregate these large individuals into a separate species. Certainly there is only one atemnid species in Florida, as present evidence supports Banks's (1904) contention that *Atemnus floridanus* described by Tullgren (1900) is conspecific with *Paratemnus elongatus*.

Both Banks (1895) and Hoff (1946a) reported eyes and eye spots wanting, but Tullgren (1900) reported the presence of two eye spots. It is now known that most specimens have fairly well-developed eye spots, but in some individuals eye spots are very weakly developed or even lacking. The chelicera has four setae on the hand; the galea of the female usually has six conspicuous, simple, terminal and subterminal rami, but the galeal rami of the male are very short, often spinelike, and may be reduced in number; serrula exterior in both sexes is usually composed of 21–23 plates, but one specimen was found to have 24 plates on one chelicera and 26 plates on the other. While the typical cheliceral flagellum has four setae, Tullgren (1900, fig. 1) shows only three, one stout and dentate and two slender and simple. In the text, however, he mentions one specimen with four flagellar setae. Tullgren's figure, which has caused some confusion, may be based on an anomalous, damaged, or poorly oriented specimen. The median cribriform plate of the female

consists of a number of small, discrete, cribrate areas united in a common matrix.

The following measurements are expressed as ranges based on 10 females from Highlands County: Body 3.8–4.5 mm. long; carapace 0.98–1.10 mm. long. Movable finger of chelicera 0.28–0.31 mm. long. Palpus with trochanter 0.47–0.57 mm. long, 0.255–0.300 mm. wide, length 1.74–1.95 times width; femur 0.76–0.86 mm. long, 0.35–0.41 mm. wide, length 2.05–2.25 times width; tibia 0.75–0.86 mm. long, 0.37–0.44 mm. wide, length 1.88–2.05 times width; chela without pedicel 1.29–1.55 mm. long, 0.50–0.59 mm. wide, length 2.58–2.73 times width; hand without pedicel 0.74–0.90 mm. long, 0.44–0.51 mm. deep, length 1.62–1.83 times depth; movable chelal finger 0.59–0.72 mm. long. Fourth leg with entire femur 0.93–1.09 mm. long, 0.330–0.405 mm. deep, length 2.64–2.85 times depth; tibia 0.62–0.73 mm. long, 0.199–0.242 mm. deep, length 2.95–3.22 times depth; tarsus 0.42–0.48 mm. long, 0.133–0.158 mm. deep, length 2.81–3.16 times depth; tactile seta of tarsus removed 0.048–0.053 mm. from proximal margin of tarsus.

Except for the cheliceral galea and the genitalia, the male is very similar to the female. The following ranges are based on measurements of 10 males from Highlands County: Body 3.2–3.8 mm. long; carapace 0.88–1.12 mm. long. Movable finger of chelicera 0.27–0.31 mm. long. Palpus with trochanter 0.47–0.57 (with only one over 0.52) mm. long, 0.245–0.315 mm. wide, length 1.74–1.94 times width; femur 0.70–0.90 (with only one over 0.83) mm. long, 0.32–0.43 mm. wide, length 2.09–2.40 times width; tibia 0.71–0.91 (with only one above 0.79) mm. long, 0.36–0.46 mm. wide, length 1.87–2.05 times width; chela without pedicel 1.26–1.58 (only one over 1.45) mm. long, 0.46–0.60 mm. wide, length 2.55–2.75 times width; chelal hand without pedicel 0.72–0.92 (only one over 0.81) mm. long, 0.425–0.515 mm. deep, length 1.55–1.79 times depth; movable chelal finger 0.60–0.72 mm. long. Fourth leg with entire femur 0.88–1.11 mm. long, 0.30–0.41 (with only one above 0.36) mm. deep, length 2.68–2.95 times depth; tibia 0.58–0.74 mm. long, 0.190–0.245 mm. deep, length 2.88–3.21 times depth; tarsus 0.41–0.46 mm. long, 0.129–0.163 mm. deep, length 2.83–3.22 times depth; tactile seta of tarsus removed by 0.040–0.052 mm. from proximal margin of tarsus.

ECOLOGY: Ecological data are available for 45 collections, including Banks's type collection and two collections reported by Tullgren (1900). From a study of the data, it is clear that *Paratemnus elongatus* is associated with the bark of dead and living needle-leaved and broad-leaved trees. There are no records from palms or palmettos. The species was not found in tree litter, except for one deutonymph from oak litter. The 30 collec-

tions taken by Hoff in Highlands and Glades counties in April, 1956, were from a variety of living and dead trees, including slash pine (*Pinus elliottii*), sand pine (*P. clausa*), hickory, deciduous and live oaks, maple, gum, and cypress (*Taxodium distichum*). Some of the other collections studied were taken from such additional trees as eucalyptus, casuarina, poisonwood (*Metopium toxiferum*), pecan (*Carya pecan*), *Ficus*, and white mangrove (*Laguncularia racemosa*).

Based on experience in Highlands County, it seems probable that *Paratemnus elongatus* shows a definite preference for slash pines and live oaks. The more frequent occurrence on trees of these two kinds may result from the nature of the outer bark, which either forms loose plates or has ridges separated by deep furrows and offers suitable crevices for shelter and protection. Pseudoscorpions occur with much less frequency in the bark of the sand pine than in that of the slash pine, probably because the bark of the sand pine is relatively tight and smooth and offers little shelter for small arthropods. Pseudoscorpions are almost impossible to find in the bark of such trees as cypress, apparently because of a lack of sub-cortical spaces.

PREVIOUS RECORDS: The only published records for *Paratemnus elongatus* are for Florida and were published by Banks (1895, 1904) and by Tullgren (1900). Relative to the original species description, Banks (1895) reported the species from five localities: "Beaten from dead hickory wood in April, near St. Lucie Riv., Indian River, Florida, by Mr. Hubbard; also at Sand Point, and Enterprise, Florida, Punta Gorda, Fla., (Mrs. Slosson)." The first record no doubt refers to the type collection that Hoff (1946a) reports as being labeled "Indian River, Fla.; beaten from hickory." In 1904 Banks reported Lake Worth and Biscayne Bay as additional localities. Tullgren (1900) reported one collection from Lake County and one from Orange County.

A Punta Gorda collection in the Museum of Comparative Zoölogy bears the label "*Atemnus elongatus*" and was examined by the present writer who found that some, but not all, of the included specimens were *Paratemnus elongatus*. This collection is probably the one on which Banks based his 1895 record. The present writer also examined a collection in the Museum of Comparative Zoölogy from Royal Palm Park and again found that some, but not all, of the specimens identified by Banks as *Atemnus elongatus* were correctly identified. As Banks apparently did not publish the Royal Palm Park record, it is included among new records given below.

NEW FLORIDA RECORDS: *Brevard County*: Sebastian, in the Museum of

Comparative Zoölogy. *Collier County*: Royal Palm Hammock, collected by Stowell Rounds. *Dade County*: Seventeen collections from several sources, with one or more collections from Homestead, Miami, Royal Palm Park, Coral Gables, Matheson Hammock, Long Pine Key Hammock, Paradise Key, Everglades National Park, Ross and Castello Hammock, and Mahogany Hammock. *Glades County*: Two collections by Hoff, near Harrisburg. *Hendry County*: Two collections from Clewiston, in the Division of Plant Industry, Florida. *Highlands County*: Twenty-nine collections (of these, 26 by Hoff) from Highlands Hammock State Park, Parker Islands (hammock), and vicinity of Sebring, Lake Placid, and the Archbold Biological Station. *Hillsborough County*: Ruskin, collected by C. W. Hale, in the Division of Plant Industry, Florida. *Jackson County*: Florida Caverns State Park, by H. V. Weems, in the Division of Plant Industry, Florida. *Liberty County*: Torreya State Park, two collections by H. A. Denmark, in the Division of Plant Industry, Florida. *Monroe County*: Key West, in the United States National Museum. *Palm Beach County*: Belle Glade, by H. L. Speer, in the Division of Plant Industry, Florida. *Pinnelas County*: Dunedin, W. S. Blatchley collection, in the Museum of Comparative Zoölogy. *Putnam County*: Three collections, one without definite locality data, in the Division of Plant Industry, Florida, and one from Crescent City and one from Flora Home, in the Museum of Comparative Zoölogy. *Volusia County*: Edgewater, C. A. Frost collection, in the Museum of Comparative Zoölogy.

NEW ALABAMA RECORD: A single collection of immature individuals from Bon Secour, Baldwin County, by B. A. Maina, in the Illinois Natural History Survey. This is the first record of *Paratemnus elongatus* from an area outside Florida.

FAMILY CHELIFERIDAE HAGEN

Cheliferidae: CHAMBERLIN, 1931a, p. 244; 1931b, p. 289. BEIER, 1932b, p. 191 (for early synonymy). HOFF, 1956, p. 1; 1958, p. 46 (key).

Two subfamilies, the Cheliferinae and the Withiinae, occur in the United States, and both are represented in Florida.

SUBFAMILY CHELIFERINAE SIMON

Cheliferinae: CHAMBERLIN, 1931b, p. 293. BEIER, 1932b, p. 226 (for early synonymy). HOFF, 1956, p. 2; 1958, p. 48 (key).

Two tribes, the Cheliferini and the Dactylocheliferini, are known from Florida.

TRIBE CHELIFERINI CHAMBERLIN

Cheliferini CHAMBERLIN, 1932, p. 19. BEIER, 1932b, p. 227. HOFF, 1956, p. 2; 1958, p. 48 (key).

Twelve genera of Cheliferini are now known from North America north of Mexico. Species belonging to five of these genera are reported from Florida.

GENUS *CHELIFER* GEOFFROY

Chelifer: CHAMBERLIN, 1932, p. 19. BEIER, 1932b, p. 235 (for early synonymy). HOFF, 1956, p. 3; 1958, p. 49 (key).

Chelifer cancroides (Linnaeus)

Chelifer cancroides: BEIER, 1932b, p. 236, figs. 244–246 (for early synonymy). HOFF, 1958, p. 32.

The species is almost cosmopolitan as a result of being closely associated with man. Specimens are commonly found in chicken houses, stables, dwellings, warehouses, and elsewhere. In view of the numerous records (Hoff, 1958) from the United States and Canada, it is strange that the species previously has not been reported from Florida.

FLORIDA RECORD: *Dade County*: One male from stable floor, Miami International Airport, by J. L. Weaver, April 27, 1960, in the Division of Plant Industry, Florida.

GENUS *PARACHELIFER* CHAMBERLIN

Parachelifer CHAMBERLIN, 1932, p. 19. BEIER, 1932b, p. 237. CHAMBERLIN, 1934, p. 128; 1952, p. 299. HOFF, 1958, p. 49 (key).

While Chamberlin (1952) gave an extensive description of the genus, some recently observed variations should be recognized. For example, seta *sb* of the cheliceral hand is described by Chamberlin as denticulate, but I have found in some species individuals in which the seta is acuminate and other individuals in which the seta appears acuminate because of position. Again, there is much more variation than indicated by Chamberlin in the position of some tactile setae of the chelal fingers. While tactile seta *it* of the fixed chelal finger is usually about midway between *et* and *est*, as described by Chamberlin, the seta may be as much as 1.5 times farther from *et* than from *est* or as much as 1.6 times farther from *est* than from *et*. On the movable finger, tactile seta *st* may be as much as 1.6 times farther from *t* than from *sb* or as much as 1.2 times farther from *sb* than from *t*. Since Chamberlin (1952) published his generic description,

Beier (1953) has described a species in which the outer claw of the tarsus of the first leg of the male has two, instead of one, accessory teeth. Some difficulty in identifying nymphs to genus results from the fact that the claws of the pedal tarsi are simple (at least in tritonymphs of three species I have never observed an accessory tooth), although the subterminal setae are dentate.

The genus contains 15 species (including two new species described below) and three species of uncertain status. Species are known from North and Central America and from the northern part of South America. Five species have been reported from the United States. Two species, both new to the literature, occur in Florida.

In connection with studies of American Cheliferidae, published records for *Chelifer muricatus*, a species described by Say in 1821 and long considered *incertae sedis*, are very troublesome. Say's species description is entirely inadequate and, because he gives "North America" as the locality, the species cannot be associated with any nominal species on the basis of geographic distribution. Chamberlin's (1932) assignment of *C. muricatus* to *Parachelifer* is questionable and apparently was done without substantial evidence, although Chamberlin may have seen specimens of a species of *Parachelifer* identified by Banks as *Chelifer muricatus*. As it is impossible to associate Say's description with specimens, his *C. muricatus* is a *nomen dubium* and should be dropped from the literature. In 1869 Hagen suggested the possibility that Say's *C. muricatus* was based on two confused species, one of which was *C. cancroides*. This surmise may be correct, especially as Say (1821) stated that his *C. muricatus* resembles Leach's *C. hermanni*, a species now considered (Beier, 1932b) a synonym of *C. cancroides*. Banks (1895) reported *C. muricatus* from several areas in the United States east of the Mississippi River, and Hoff (1958) listed published locality records without attempting a verification of species identification.

As far as Florida is concerned, Say (1821) reported a variety of *Chelifer muricatus* from "the river St. John, in East Florida." To what species Say's variety belonged cannot be determined, but he may have had specimens of the new species of *Parachelifer* described below. Among Banks's (1895) records for *C. muricatus* are collections from four localities in Florida. Later Banks (1904) repeated these records, but at no time did he mention Say's variety. I examined some Florida specimens (in the Museum of Comparative Zoölogy) identified by Banks as *C. muricatus* and found pseudoscorpions belonging to three genera, including one genus of the family Chernetidae. One collection, apparently never reported in the literature, consists of several specimens of the new species described below.

Parachelifer superbus, new species

Figures 2, 4, 5

(?) *Chelifer muricatus* (*nomen dubium*) SAY, 1821, p. 63.(?) *Chelifer muricatus* (*pro parte*) BANKS (*non* SAY, 1821), 1895, p. 3; 1904, p. 140.

DIAGNOSIS: With typical *Parachelifer* facies; carapace of male with a small keel near each posterolateral corner; galea similar in the two sexes; palpus with setiferous tubercles confined to inner surface of femur; palpal femur 1.05–1.24 mm. long, 4.66–5.39 times width; chela without pedicel 1.52–1.76 mm. long, 3.48–4.20 times width; movable chelal finger usually a little longer than hand without pedicel; tarsus of first leg of male gradually increasing in depth from proximal to distal end, inner claw gently curved, outer claw with one accessory tooth; tarsus of fourth leg 0.43–0.52 mm. long, 4.34–5.20 times depth. The species is known only from Florida and Alabama.

The new species is separated from many species of the genus by differences in size and length/width ratios of palpal segments, but separation from some species depends largely upon other characteristics. *Parachelifer superbus* differs from the Guatemalan *P. pugifer* Beier, 1953, by having well-developed, seta-bearing tubercles on the inner surface of the palpal femur and a relatively long galea. The new species can be separated from *P. longipalpus* Hoff, 1945, from central United States by the presence of larger setiferous granules on the inner margin of the palpal femur and a slightly larger and stouter tarsus of the first leg of the male, with the inner claw gently curved.

Parachelifer superbus appears closely related to *P. persimilis* (Banks, 1909), a species reported from Rocky Mountain and adjacent states, and, because descriptions of *P. persimilis* include little more than size and ratios of palpal segments, separation of the two species is difficult without additional information. A re-examination of specimens of *P. persimilis* previously reported from New Mexico and Colorado (Hoff, 1956, 1961) provides data that facilitate a separation of the two species. For example, setiferous tubercles, which are well developed at least along the basal half of the inner margin of the palpal femur of *P. superbus*, are weakly developed to virtually absent in *P. persimilis*. The keels of the carapace and tergites in males of *P. superbus* are smaller and less spinelike and have less sharply pointed tips than those of *P. persimilis*. In the male of *P. superbus*, at least tergites 1 and 2 are not medially divided, but in the male of *P. persimilis* tergite 1 is in some cases, and tergite 2 is in every case, at least weakly divided. The tarsus of the first leg of the male in *P. superbus* has the inner claw gently curved, and the length of the terminal spine is less

than 1.5 times the width of the base of the spine, while in *P. persimilis* the first pedal tarsus has the inner claw distinctly bent near the midpoint and the length of the terminal spine is at least nearly twice the width of the base of the spine.

MALE: Description based on holotype and nine paratypes, with measurements and ratios for the holotype followed in parentheses by ranges based on all 10 males. Body and legs moderately deep golden in color, palpi usually of a luxuriant reddish golden color (chela before mounting often darker than other palpal segments); body 2.7 (2.6–3.1) mm. long. Carapace strongly and evenly granulate; setiferous tubercles numerous; truncate anterior margin with four setae; posterior margin with eight to 11 setae; tip of well-developed posterolateral keel extending posteriorly beyond carapacial margin; carapace 0.93 (0.86–0.98) mm. long, 0.86 (0.84–0.95) mm. wide, length 1.08 (1.00–1.09) times width. Abdomen with tergites divided, except tergites 1 and 2 not divided, tergite 3 usually at least weakly or incompletely divided, and tergite 4 in almost all cases divided; surface sculpture of tergites like that of carapace, except a tendency toward sculpture becoming scalelike or tessellate; tergal setae irregular; tergites 1 and 2 usually with marginal row of nine to 12 setae, but in some cases weakly biseriolate; each scutum of tergite 5 with one to three discal setae and marginal row of five to seven setae; each scutum of tergite 7 with usually two or three discal setae and marginal row of five to seven setae; keels of anterior seven or eight tergites with well-developed posterior projections, keels poorly expressed on more posterior tergites.

Chelicera with galea well developed, stalk or base stout, with six (possibly only five in one specimen) short, curved, clawlike rami confined to the distal one-half or two-fifths; seta *sb* of hand usually denticulate, but in some cases acuminate; serrula exterior with 17–19, possibly 20 in one specimen, plates; movable finger 0.180–0.215 mm. long.

Palpus with surface of segments, except chela, strongly granulate; chelal hand with weakly developed granules usually restricted to flexor or inner surface, rest of hand virtually smooth; setiferous tubercles generally confined to basal two-thirds of inner surface of femur, tubercles very weak to obsolete on inner surface of tibia; setae stout and denticulate, except acuminate on chelal fingers; inner surface of femur with especially heavy setae; femur 1.14 (1.05–1.22) mm. long, 0.223 (0.210–0.243) mm. wide, length 5.12 (4.86–5.39) times width; tibia 0.98 (0.90–1.05) mm. long, holotype with one tibia 0.262 and other tibia 0.266 (0.247–0.292) mm. wide, length 3.74 and 3.69 (3.43–3.76) times width; chela without pedicel 1.60 (1.52–1.76) mm. long, 0.42 (0.375–0.480) mm. wide, length 3.82

(3.48–4.13) times width; chelal hand without pedicel 0.80 (0.76–0.85) mm. long, 0.38 (0.34–0.43) mm. deep, length 2.10 (1.90–2.29) times depth; movable finger 0.82 (0.77–0.93) mm. long, length usually about equal to length of hand without pedicel; tactile setae of chelal fingers essentially as described for genus, distance between *st* and *t* of movable finger as great as 1.5 times distance between *st* and *sb*, distance between *it* and *est* of fixed finger as great as 1.5 times distance between *it* and *et*; marginal teeth of chelal fingers without unique features, teeth of basal part of row of movable finger less strongly developed than corresponding teeth of fixed finger; fixed finger with 43 (42–51), movable finger with 46 (46–56), teeth; each male with two to five more teeth on movable than on fixed finger.

First and fourth legs with moderately to strongly developed granulate sculpture on flexor and extensor surfaces of trochanter and femoral parts, sculpture usually becoming scalelike on anterior and posterior surfaces; surfaces of tibia and tarsus with less strongly developed scalelike markings; small setiferous tubercles irregularly distributed on extensor surface of femur, tibia, and tarsus of first leg and on femur of fourth leg; setae of extensor surface of segments chiefly stout and denticulate; acuminate setae on flexor surface of some segments. Tarsus of first leg somewhat gradually increasing in depth from proximal to distal, deepest at distal end (spine included in measurement) or a little proximal to spine; terminal spine not much longer than width of base of spine; basal half of outer claw fairly stout and strongly sclerotic, distal half of claw slender, with one acute accessory tooth; inner tarsal claw simple, stout, gently and evenly curved, but less strongly curved than claws of other legs; tarsus 0.38 (0.370–0.415) mm. long, 0.131 (0.112–0.143) mm. deep, length 2.91 (2.66–3.57) times depth. Fourth leg with entire femur 0.86 (0.81–0.94) mm. long, 0.299 (0.282–0.342) mm. deep, length 2.88 (2.58–2.92) times depth; tibia 0.625 (0.58–0.68) mm. long, 0.154 (0.151–0.178) mm. deep, length 4.07 (3.54–4.07) times depth; tarsus 0.455 (0.43–0.52) mm. long, 0.099 (0.092–0.108) mm. deep, length 4.59 (4.34–5.20) times depth; tarsus with tactile seta removed from proximal margin by 0.345 (0.325–0.385) mm. or 0.73–0.77 of the length of tarsus. Genitalia without unique features.

FEMALE: Description based on 10 paratypes, with measurements and ratios given as ranges. Female very similar to male in color, sculpture, chaetotaxy, and other characteristics. Body 3.05–3.95 mm. long. Carapace 0.97–1.08 mm. long, 0.81–1.00 mm. wide, length 1.08–1.24 times width. Abdomen with tergites 2 to 10 divided; tergites 1 and 11 at least weakly divided except one female with tergite 11 undivided and another

with tergites 1 and 2 undivided, the latter certainly an anomaly; in one female, one scutum of tergite 1 small, weakly sclerotic, and with only two setae, other scutum as usual in female; chaetotaxy of tergites 1 and 2 irregular, in some specimens uniseriate, with five to eight marginal setae on each scutum, in other specimens biseriate and with one to three discal setae and three to eight marginal setae on each scutum; tergite 3 invariably biseriate, each scutum with one to three discal setae and four to seven marginal setae; each scutum of tergites of central part of abdomen with three or four discal setae and a marginal row of three to eight setae. Chelicera with galea like that of male; serrula exterior with 18–19 (20 or 21 in one female) plates; movable finger 0.205–0.223 mm. long. Palpi very similar in the two sexes; femur 1.12–1.24 mm. long, 0.221–0.260 mm. wide, length 4.66–5.37 times width; tibia 0.95–1.04 mm. long, 0.259–0.305 mm. wide, length 3.42–3.70 times width; chela without pedicel 1.58–1.76 mm. long, 0.385–0.490 mm. wide, length 3.52–4.20 times width; chelal hand without pedicel 0.77–0.89 mm. long, 0.350–0.453 mm. deep, length 1.90–2.31 times depth; movable finger 0.82–0.95 mm. long; chelal fingers with tactile setae arranged like those in male; movable finger with seta *st* separated from *t* by 0.8–1.5 times distance between *st* and *sb*; seta *it* of fixed finger as much as 1.5 times farther from *et* as from *est*; fixed finger with 35–49 marginal teeth; movable finger with 37–57 (only one specimen with more than 50) marginal teeth, in most females teeth of basal part of row of movable finger almost as well developed as teeth of basal part of row of fixed finger; except for one individual, each female with two to five more teeth on movable than on fixed finger. Claws of first pedal tarsus similar to claws of other legs, but with accessory tooth longer and more strongly developed, with result that claw appears bifid or deeply cleft. Fourth leg with entire femur 0.85–0.92 mm. long, 0.287–0.330 mm. deep, length 2.78–3.02 times depth; tibia 0.605–0.690 mm. long, 0.147–0.175 mm. deep, length 3.80–4.35 times depth; tarsus 0.45–0.52 mm. long, 0.096–0.110 mm. deep, length 4.36–4.80 times depth; tactile seta of tarsus removed from proximal margin by 0.330–0.385 mm. or 0.73–0.81 (with only one above 0.78) of length of tarsus. Genitalia as usual in species of the genus; face of anterior operculum in some cases asetaceous, in no specimen with more than one or two small setae.

REMARKS: Two females from Alabama agree in detail with the 10 paratypes from Florida, except that in one Alabama female the carapace (0.95 mm. long, 0.78 mm. wide) is a little smaller and in the other Alabama female the palpal tibia (length/width ratio 3.84) and the fourth pedal femur (length/depth ratio 3.10) are slightly more slender than in type females.

ECOLOGY: In Highlands County, the species occupies a definite microhabitat, as all nine collections were taken from bark, usually beneath well-loosened or started bark, of dead slash pines (*Pinus elliottii*). Although I collected pseudoscorpions from the bark of large numbers of dead trees of many species, including sand pine (*Pinus clausa*), in Highlands County, I found *Parachelifer superbus* only in association with dead slash pines. Ecological data are given for only one other Florida collection. This collection, which is from Columbia County, consists of a single male taken from the bark of a dead tree. Unfortunately the tree is not identified. A female from Alabama (reported below) was taken from a cavity in an oak tree. At present I do not know if the association with oak is accidental or if the microhabitat varies from one locality to another.

TYPE LOCALITY AND FLORIDA RECORDS: *Columbia County:* One paratype male, under bark of dead tree, by H. V. Weems, Jr., February 13, 1960, in the Division of Plant Industry, Florida. *Dade County:* Three paratype males and four paratype females from Royal Palm Park, Blatchley collection, in the Museum of Comparative Zoölogy (from a collection containing pseudoscorpions of two genera and identified by Banks as *Chelifer muricatus* Say). *Highlands County:* Nine collections, containing the holotype male, five paratype males, four paratype females, one mounted tritonymph (tentative identification), and three females and two nymphs in alcohol, all taken by Hoff within 2 miles of the Archbold Biological Station during April, 1956. *Liberty County:* One paratype female, Torreya State Park, W. J. Gertsch and R. Forster, April 4, 1956, in the American Museum of Natural History. *Volusia County:* Two females, one designated a paratype, from Enterprise (collection containing pseudoscorpions of two genera and labeled *Chelifer cancroides* by Banks; collection having an old label reading "Sand Pt. 17.2.75. H." and possibly being the Sand Point, Florida, collection reported as *Chelifer muricatus* Say by Banks in 1895 and 1904), in the Museum of Comparative Zoölogy.

ALABAMA RECORDS: *Coosa County:* One female, Hatchet Creek, A. F. Archer, June, 1940, in the American Museum of Natural History. *Madison County:* One female from cavity of oak tree, Huntsville, Willis Snow, 1955.

***Parachelifer archboldi*, new species**

Figures 1, 3, 6

DIAGNOSIS: Typically *Parachelifer* in general appearance; male without keels on posterolateral corners of carapace, keels of tergites not strongly developed; galea similar in male and female; palpus with conspicuous seta-bearing tubercles along inner surface of femur and with a few re-

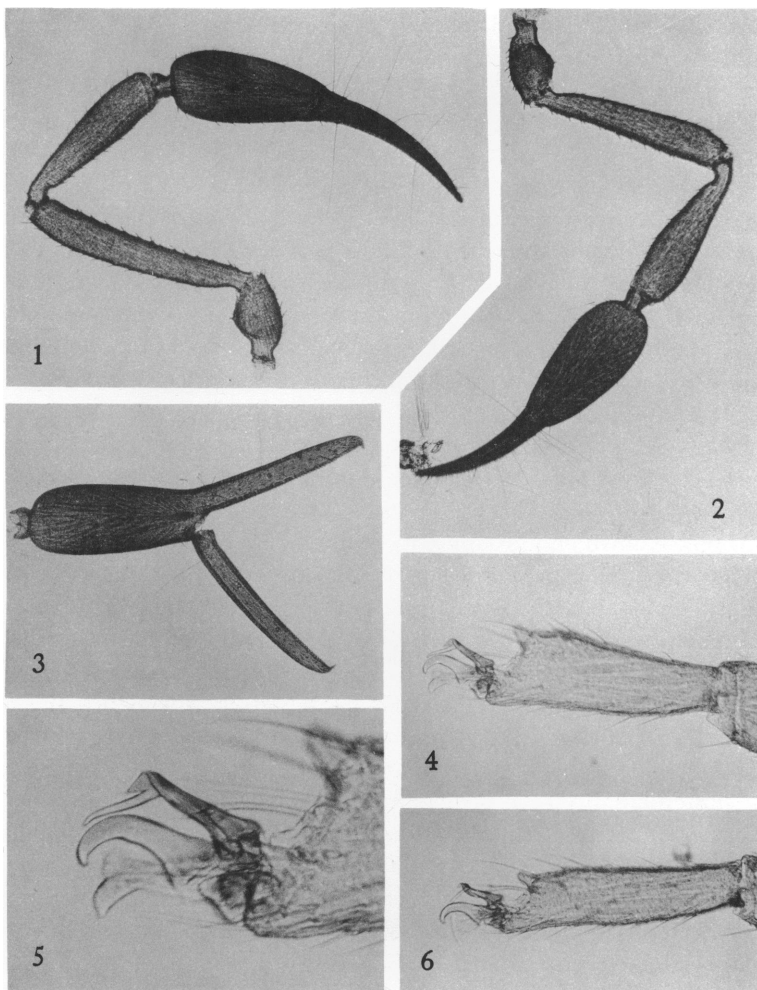


FIG. 1. *Parachelifer archboldi*, new species, male holotype, dorsal view of palpus.

FIG. 2. *Parachelifer superbus*, new species, male holotype, dorsal view of palpus.

FIG. 3. *Parachelifer archboldi*, new species, male holotype, lateral view of chela.

FIGS. 4, 5. *Parachelifer superbus*, new species, male holotype. 4. Tarsus of first leg. 5. Tarsal claws of first leg.

FIG. 6. *Parachelifer archboldi*, new species, male holotype, tarsus of first leg.

duced tubercles along the proximal part of inner surface of tibia; palpal femur 1.21–1.29 mm. long, 5.37–5.85 times width; chela without pedicel 1.74–1.95 mm. long, 4.28–4.83 times width; movable chelal finger dis-

tinctly longer than hand without pedicel; male with tarsus of first leg relatively slender and subcylindrical in general shape, inner claw gently curved and much like claws of other pedal tarsi, outer claw with one accessory tooth; tarsus of fourth leg 0.52–0.58 mm. long, 5.35–5.75 times depth.

In general, *P. archboldi* differs from other species of *Parachelifer* by having more slender palpal segments. From *P. superbus*, the only other species of the genus known from Florida, *P. archboldi* can be separated by the more slender palpal chela and fourth pedal tarsus. In addition, the male of *P. archboldi* lacks keels on the posterolateral corners of the carapace, and the tarsus of the first leg is longer, more slender, and more subcylindrical in shape than is the tarsus of the first leg of the male of *P. superbus*.

Parachelifer archboldi is known only from Florida. I have named the species in honor of Mr. Richard Archbold, Director of the Archbold Biological Station.

MALE: Known only from holotype. Body and legs of a fairly deep, rich, golden color; palpi of luxuriant golden color, with chela a little more deeply pigmented than other palpal segments; body 2.8 mm. long. Carapace with both transverse furrows deeply impressed; surface strongly granulate; setiferous tubercles numerous and strongly developed, becoming smaller and less numerous on posterior half of dorsal surface; setae clavate and multidenticulate; truncate anterior margin with four relatively long setae; posterior margin with only six setae; carapace without posterolateral keels; 0.96 mm. long, 0.89 mm. wide. Anterior three tergites not divided; surface strongly granulate, with sculpture tending to be scalelike or tessellate; tergal chaetotaxy irregular, but in general each of tergites 1–3 with four discal setae and 10 marginal setae; tergites of central part of abdomen with usually three discal and five or six marginal setae on each scutum; lateral keels of tergites 1–7 with short and blunt posteriorly directed projections, keels of tergites 8 and 9 without posterior projections.

Chelicera with outer surface of hand strongly marked by netlike pattern; seta *b* denticulate, seta *sb* either acuminate or with one or two minute subterminal spinules; galea with six short, curved, somewhat clawlike rami along distal two-fifths of fairly-stout stalk; 17–18 plates in serrula exterior; movable finger 0.210 mm. long.

Palpus with trochanter, femur, and tibia strongly granulate; surfaces of chelal hand almost completely marked by weakly developed granules appearing to form tessellated or scalelike pattern when observed in surface view; investing setae usually stout and denticulate, setae of trochanter and

flexor surface of femur clavate, setae of fingers acuminate; setiferous tubercles well developed on dorsal protuberance of trochanter and on flexor (inner) and dorsal surfaces of femur; weakly developed tubercles on basal half of extensor (outer) surface, but absent from ventral surface of femur; setiferous tubercles absent from tibia except for a few obsolete tubercles on basal part of inner surface; palpal femur 1.26 mm. long, 0.215 mm. wide, length 5.85 times width; tibia 1.02 mm. long, 0.253 mm. wide, length 4.04 times width; chela without pedicel 1.83 mm. long, 0.40 mm. wide, length 4.57 times width; hand without pedicel 0.85 mm. long, 0.37 mm. deep, length 2.30 times depth; movable finger 1.00 mm. long; tactile setae of chelal fingers without unique features; movable finger with seta *st* more than 1.4 times farther from *t* than from *sb*; fixed finger with *it* about midway between *et* and *est* or a little closer to *et* than to *est* and with *ist* no more than one areolar diameter proximal to *est*; teeth along nearly entire margin of each finger, those of proximal half of row of movable finger flattened and with cusps weakly developed or absent, corresponding teeth of fixed finger subtriangular in shape and with well-developed cusps; fixed finger with 50, movable finger with 55, teeth.

Legs similar to those of *P. superbus* in chaetotaxy, surface sculpture, and distribution and size of setiferous tubercles. Tarsus of first leg relatively slender, subcylindrical in lateral view; terminal spine subconical, little longer than wide; basal two-thirds of outer claw heavy, sclerotic, and strongly pigmented, distal one-third weakly pigmented and forming a slender spine with greatly curved tip; accessory tooth of outer claw small, acute, and apparently formed as extension of basal part of claw; inner claw much like those of other legs, but stouter and without accessory tooth; tarsus 0.44 mm. long, length 3.82 times depth. Fourth leg with entire femur about 0.95 mm. long, length about 2.9 times depth; tibia 0.71 mm. long, length 4.58 times depth; tarsus 0.54 mm. long, 5.75 times depth; tactile seta removed from proximal margin of tarsus by 0.41 mm. or 0.76 of length of tarsus. Genitalia without unique features.

FEMALE: Description based on six paratypes, with measurements and ratios given as ranges. Female like male in general appearance, chaetotaxy, and color, except some specimens less deeply pigmented; body 3.30–3.65 mm. long. Carapace essentially like that of male; anterior margin with four setae, posterior margin with nine or 10 setae; carapace 0.98–1.07 mm. long, 0.80–1.03 mm. wide, length 1.02–1.26 times width. Abdomen with tergites 1–11 divided, but often tergite 1 and in some cases tergite 2 incompletely divided; setae of same type as those of male; each scutum of tergite 1 with five to seven marginal setae, in some cases one seta discal in position; setae of tergite 2 irregular, some specimens with

six to eight marginal setae and other specimens with two or three discal and four to six marginal setae on each scutum; tergite 3 with one to three discal setae and three to seven marginal setae on each scutum; scuta of tergites of central part of abdomen usually with three discal and four to seven marginal setae. Chelicera, including galea, much like that of male; seta *sb* less stout than seta *b* and with few terminal and subterminal denticulations or spinules, in some cases at least appearing acuminate; serrula exterior with 17–19 plates; movable finger 0.203–0.231 mm. long.

Palpus like that of male in sculpture and chaetotaxy, except in some cases setiferous tubercles of extensor surface of femur less well developed; femur 1.21–1.29 mm. long, 0.211–0.237 mm. wide, length 5.37–5.74 times width; tibia 0.98–1.07 mm. long, 0.243–0.278 mm. wide, length 3.86–4.03 times width; chela without pedicel 1.74–1.95 mm. long, 0.360–0.455 mm. wide, length 4.28–4.83 times width; hand without pedicel 0.80–0.93 mm. long, 0.33–0.41 mm. deep, length 2.20–2.43 times depth; movable finger 0.95–1.03 mm. long, in every case 0.10–0.15 mm. longer than hand without pedicel; tactile setae of chelal finger arranged much like those of male, *st* of movable finger varying from about midway between *t* and *sb* to nearly 1.6 times farther from *t* than from *sb*, *it* of fixed finger usually about midway between *et* and *est* but in some cases as much as 1.5 or 1.6 times farther from *est* than from *et*; marginal teeth of basal part of row of movable finger variable, not so strongly reduced as those of holotype, some having cusps; fixed finger with 45–48, movable finger with 49–53, teeth; each female with four to seven more teeth on movable than on fixed finger.

Legs similar to those of male in sculpture, chaetotaxy, and distribution of setiferous tubercles; claws of tarsus of first leg with accessory tooth distinctly longer and more slender than those of other legs, so that claws often appear bifid. Fourth leg with entire femur 0.88–0.97 mm. long, 0.280–0.335 mm. deep, length 2.89–3.14 times depth; tibia 0.68–0.73 mm. long, 0.141–0.163 mm. deep, length 4.28–4.83 times depth; tarsus 0.52–0.58 mm. long, 0.096–0.104 mm. deep, length 5.35–5.53 times depth; tactile seta removed from proximal margin of tarsus by 0.39–0.45 mm. or 0.74–0.78 of length of tarsus. Genitalia without unique features; one to three, usually two, setae on face of anterior operculum.

ECOLOGY: Pseudoscorpions of the four available collections were taken from beneath bark flakes of living live-oak trees (*Quercus virginiana*). When the large number of other trees, especially of slash pine, that I examined without finding *P. archboldi* is considered, there is clearly an association between the pseudoscorpion and live oaks. At least in south-central Florida, the microhabitat of *P. archboldi* is in strong contrast to that

of *P. superbus*, a species reported from the bark of dead slash pines.

TYPE LOCALITY AND FLORIDA RECORDS: *Glades County*: One paratype female, near Harrisburg, by Hoff, April 28, 1956. *Highlands County*: Three collections, including the holotype male, five paratype females, and two mounted tritonymphs, from Parker Islands (hammock), about 8 miles southeast of Lake Placid and 5 miles northeast of Archbold Biological Station, by Hoff, April, 1956.

GENUS *OCALACHELIFER* CHAMBERLIN

Ocalachelifer CHAMBERLIN, 1949, p. 17. HOFF, 1958, p. 49 (key).

Chamberlin's generic diagnosis is complete and accurate, although it is based entirely on the male. I have several females that are obviously conspecific with males described by Chamberlin, being very similar to males except for genitalia, first pedal tarsus, and pleural membranes. Although he had no information on the nature of the cribriform plates of the female, Chamberlin assigned *Ocalachelifer* to the tribe Cheliferini, where it undoubtedly belongs. The female is unusual because of the numerous and strongly developed clavate setae on the very wide pleural membranes—characteristic of all six females studied. Setae are absent from the pleural membranes of the male. Cribriform plates, both median and lateral, are lightly pigmented and weakly sclerotic. The median plates are especially flimsy and light in color and frequently appear partly fragmented and broken. From present material, it is difficult to determine the basic nature of the median plates, but they probably are in the form of two narrow, longitudinally oriented, parallel bands. In some specimens the median plates appear broken into a series of irregularly dispersed pieces, and in other specimens it is virtually impossible to find more than small remnants. The apparent fragmentation of the plates in some specimens possibly results from treatment with caustic during preparation of specimens for study, but perhaps some intact specimens have a number of small, irregular plates, instead of the two plates common in the Cheliferini. Certainly, however, there is not a single, compact median plate, which precludes assignment of *Ocalachelifer* to the Dactylocheliferini.

The genus *Ocalachelifer* appears closely related to *Levichelififer* Hoff (1946b). This relationship was not recognized by Chamberlin, as the cribrate areas on the coxal sacs of *Levichelififer* were not reported until later (Hoff, 1956). In spite of close relationship, the two genera can be separated without difficulty. In the males of *Ocalachelifer* tergal keels are absent or obsolete, whereas they are strongly developed in *Levichelififer*. In *Ocalachelifer* spirally coiled structures of the coxal sacs are strongly de-

veloped, conspicuous, and numerous, while in *Levichelifer* the structures are very weakly developed, few in number, and not always readily observed. No sclerotic rod has been found in the anteriorly invaginated end of the statumen convolutum of *Ocalachelifer*, but a reduced or vestigial rod is sometimes seen in *Levichelifer*. In both sexes, palpal segments, especially the chela, of *Ocalachelifer* are more slender than are those of *Levichelifer*. Distinctive differences occur in the median cribriform plates of the female, as the plates of *Levichelifer* are compact, well pigmented, circular in outline, and easily observed. The genus *Ocalachelifer* is monotypic and previously has been known only from Florida.

Ocalachelifer cribratus Chamberlin

Ocalachelifer cribratus CHAMBERLIN, 1949, p. 19.

Chamberlin described the species from two males taken from the Ocala National Forest (in either Marion County or Lake County), Florida. Present material includes several females that are considered conspecific with males described by Chamberlin, but males and females have not been taken in the same collection.

Except for small, clearly intraspecific differences, the single available male agrees closely with types described by Chamberlin. Body 2.1 mm. long; carapace 0.70 mm. long, posterior width equal to length. Tergites 1–3 not divided, tergite 4 partly divided; each of tergites 1–5 with a total of nine to 11 setae; chaetotaxy of tergites 6–10 not strongly biseriate, each scutum frequently with five marginal setae and one laterally placed discal seta. Chelicera with 17 (possibly 18) plates in the serrula exterior; seta *sb* appearing subacuminate. Palpal segments slightly smaller than those of type specimens; femur 0.82 mm. long, length 5.19 times width; tibia 0.72 mm. long, 4.02 times width; chela without pedicel 1.21 mm. long, 5.15 times width; chelal hand without pedicel 0.54 mm. in length, equal to 2.61 times depth; movable finger 0.68 mm. long; fixed finger with tactile seta *it* relatively closer to *et* and farther from *est* than in holotype; fixed finger with 49, movable finger with 48, marginal teeth. First leg with tarsus 0.287 mm. long, length 4.05 times depth; smaller claw with well-defined tooth on inner surface basal to midpoint of claw, larger claw lacking an accessory tooth. Fourth leg with entire femur 0.57 mm. long, length 2.97 times depth; tibia 0.445 mm. long, 4.41 times depth; tarsus 0.338 mm. long, 4.76 times depth; tactile seta of tarsus 0.279 mm. or 0.825 of length of tarsus from proximal margin of tarsus.

Females very similar to males, but palpal and pedal segments on the average a little larger; measurements given as ranges based on five females from Highlands County. Body 2.15–2.60 mm. long; carapace

0.75–0.84 mm. long, 0.70–0.76 mm. wide across posterior margin, length 1.04–1.14 times width; posterior margin with six to nine setae. Tergites divided, but tergite 1 may be incompletely divided; the two scuta of each tergite crowded together and interscutal space very narrow; setae of tergites 1–3 commonly, but not in every case, uniseriate; with four to seven setae on each tergal half; setae of tergites 4–9 biseriate, usually each tergal half with two or three discal and three to five marginal setae. Sternites divided or as many as sternites 4, 5, and 6 undivided; setae uniseriate except at very posterior end of abdomen; each sternite usually with a total of eight to 10 setae. Setae of pleural membranes fairly numerous and strongly clavate. Chelicera with 17–18 plates in serrula exterior; setae *b* and *sb* in some cases appearing almost acuminate; galea with three to five short, weakly developed, terminal and subterminal rami; rami of galea of female more strongly developed than those of male. Palpus with femur 0.88–0.97 mm. long, 0.162–0.188 mm. wide (exclusive of setiferous granules), length 4.78–5.43 times width; tibia 0.78–0.83 mm. long, 0.187–0.207 mm. wide, length 3.95–4.17 times width; chela without pedicel 1.34–1.45 mm. long, 0.251–0.285 mm. wide, length 4.95–5.34 times width; hand without pedicel 0.57–0.63 mm. in length, 0.230–0.253 mm. in depth, length 2.48–2.73 times depth; movable finger 0.76–0.83 mm. long; position of tactile seta *st* of movable finger somewhat variable, in one specimen a little closer to *sb* than to *t*; relative distance between tactile setae *it* and *et* of fixed finger also somewhat variable; nodi ramosi essentially as described for holotype; fixed finger with 58–61, movable finger with 60–64, marginal teeth. Fourth leg with entire femur 0.64–0.67 mm. long, 0.186–0.216 mm. deep, length 3.08–3.50 times depth; tibia 0.475–0.525 mm. long, 0.106–0.116 mm. deep, length 4.47–4.72 times depth; tarsus 0.370–0.395 mm. in length, 0.074–0.080 mm. in depth, length 4.75–5.07 times depth; tactile seta of tarsus at or slightly proximal to level of apical setae, situated 0.295–0.318 mm. or 0.77–0.82 of length of tarsus from proximal tarsal margin. Cribriform plates as described for genus; three to six setae on face of anterior operculum and four to eight setae along lip of operculum on each side of median line; posterior operculum with a row of eight or nine setae.

Female from Alabama very similar to females from Florida except palpal and pedal segments a little larger. Body 2.50 mm. long; carapace 0.86 mm. long, 0.83 mm. wide. Palpus with femur 1.01 mm. long, length 5.00 times width; tibia 0.90 mm. long, about four times longer than wide; chela without pedicel 1.53 mm. long, 4.94 times width; chelal hand without pedicel 0.69 mm. long, 2.45 times depth; movable finger 0.86 mm. long. Fourth leg with entire femur 0.75 mm. long, length 3.41 times depth;

tibia 0.56 mm. long, 4.75 times depth; tarsus 0.41 mm. in length, 4.88 times depth; tactile seta of tarsus 0.340 mm. or 0.83 of length of tarsus from proximal margin. Posterior operculum of genitalia with a row of 10 setae.

ECOLOGY: The species is associated with tree litter and woody debris. Of the five collections from Highlands County, two are from oak (*Quercus laevis*) litter and two from hickory (*Carya floridana*) litter. The fifth collection consists of one individual taken from the outside of an empty Berlese funnel. The Marion County collection was taken from debris beneath a sand pine (*Pinus clausa*). No ecological data accompany the female from Alabama.

NEW FLORIDA RECORDS: *Highlands County:* Five females in five collections, from immediate vicinity of Archbold Biological Station buildings and on hill east of buildings. *Marion County:* One male, Juniper Springs, by H. A. Denmark, June 16, 1959, in the Division of Plant Industry, Florida.

ALABAMA RECORD: *Baldwin County:* One female, by A. F. Archer, October 29, 1949, in the American Museum of Natural History.

FLORICHELIFER, NEW GENUS

DIAGNOSIS: Carapace with transverse furrows moderately to strongly impressed, two well-developed eyes; all tergites divided, except first tergite in some cases incompletely divided; male with tergal keels; setae of carapace and tergites subclavate to clavate; chelicerar hand with tactile setae *b* and *sb* acuminate; palpal segments without unusual processes; movable chelal finger with tactile seta *st* a little closer to *sb* than to *t* or midway between *sb* and *t*; claws and subterminal setae of posterior pedal tarsi not toothed; tactile seta of fourth pedal tarsus situated immediately proximal to the apical setae. Male with well-developed coxal sacs, each having a small atrium but lacking a cribrate area; fourth coxa with small lateral spur; statumen convolutum with a median rod; first pedal tarsus without an apical spine, anterior claw simple, posterior claw with a small accessory tooth. Female with greater diameter of median cribriform plates much less than diameter of anterior tracheal trunks. The genus is monotypic.

The new genus is related to *Kashimachelifer* Morikawa (1957) from Japan and *Ancistrochelifer* Beier (1951) from the Indochinese Peninsula, the relationship being based on the simple and untoothed claws and subterminal setae of the posterior pedal tarsi and the presence of an atrium in the coxal sac of the male. Males of *Florichelifer* are easily separated from males of the two related genera by the lateral spur of the

fourth coxa. In addition, tergal keels are present in males of *Florichelifer*, but absent in *Kashimachelifer*, and setae *b* and *sb* of the cheliceral hand are acuminate in *Florichelifer*, but toothed or terminally divided in *Ancistrochelifer*. The new genus is also probably related to the very inadequately described *Metachelifer* Redikortzev (1938) from the Indochinese Peninsula. Until information is available about more of the important generic characteristics of *Metachelifer*, *Florichelifer* can be separated from *Metachelifer* by the stouter palpal segments, the absence of a tubercle near the base of the inner margin of the palpal tibia, the division of the anterior four tergites, and the more strongly developed biseriate tergal chaetotaxy of the posterior half of the abdomen.

TYPE SPECIES: *Florichelifer aureus*, new genus and new species.

***Florichelifer aureus*, new genus and new species**

Figures 7–10

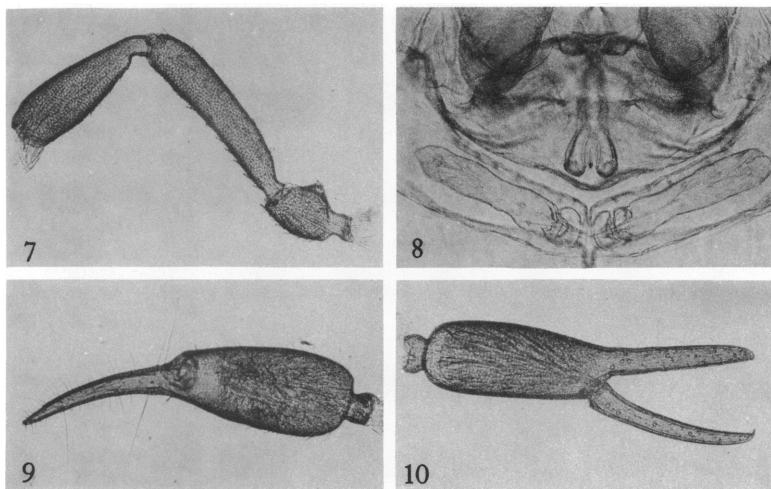
DIAGNOSIS: Palpal femur of female 0.91–0.93 mm. long, of male 0.83 mm. long, length 4.45–4.80 times width; chela of female 1.25–1.29 mm. long, of male 1.15–1.18 mm. long, length 3.66–4.01 times width; movable chelal finger 0.58–0.64 mm. long.

MALE: Description based on holotype and one paratype; measurements for holotype followed in parentheses by corresponding measurements for paratype. Body 2.18 (2.20) mm. long. Carapace uniformly granulate, with numerous, but not especially large, setiferous tubercles; small keel at each posterolateral corner; anterior margin with four setae, posterior margin with 11 setae; length 0.82 (0.76) mm., width across posterior end 0.78 (0.78) mm. Tergites with well-developed surface sculpture often appearing scalelike; halves of tergites 1–5 usually with a laterally placed discal seta in addition to five or six marginal setae; halves of tergites 6–9 usually with three discal and five or six marginal setae. Sternites with surface sculpture varying from weakly netlike anteriorly to more strongly developed and scalelike posteriorly; sternites 4–6 undivided or incompletely divided and with eight to 14 marginal setae; other sternites divided, usually each half with one laterally placed discal seta and five or six marginal setae; anterior stigmatic plate asetaceous, posterior plate with one seta.

Chelicera with outer surface of hand coarsely marked by netlike lines; fixed finger with three marginal teeth and three denticles on inner or concave margin of apical tooth; movable finger with apical tooth bicuspidate, subapical lobe submarginal in position and situated on outer aspect of finger near base of galea, one or two small marginal denticles

proximal to subapical lobe; galea terminally curved and slender, either appearing acute or ending in two minute rami and having a minute lateral ramus near distal one-third; lateral ramus of one chelicera of holotype enlarged and extending beyond end of main stalk of galea; serrula exterior with 17–18 plates; movable finger about 0.150 mm. long.

Palpus with surfaces of segments strongly and uniformly granulate, except for smooth chelal fingers; setiferous tubercles smaller than in many species of Cheliferini and conspicuous only on trochanter and on inner



FIGS. 7–10. *Florichelifer aureus*, new species, male holotype. 7. Dorsal view of palpus, chela missing. 8. Genitalia, by transmitted light. 9. Ventral view of chela, movable finger missing. 10. Lateral view of chela, most setae broken from specimen.

surface of femur; investing setae varying from strongly clavate on trochanter and inner surface of femur to stout and paucidenticulate on chelal hand and acuminate on fingers; femur 0.83 (0.83) mm. long, length 4.52 (4.80) times width; tibia 0.73 (0.70) mm. long, 3.16 (3.26) times width; chela without pedicel 1.18 (1.15) mm. long, 3.87 (3.90) times width; chelal hand without pedicel 0.59 (0.58) mm. long, length 2.12 (2.27) times depth; movable finger 0.59 (0.58) mm. long. Chaetotaxy and dentition of chelal fingers without unique features; fixed finger with tactile seta *ist* no more than two areolar diameters proximal to *est* and with *it* at least twice as far from *est* as from *et*; movable finger with tactile seta *st* midway between *t* and *sb*; fixed finger with 40–42 marginal teeth, virtually all with well-developed cusps; movable finger with about 44

teeth, those of proximal half or third of row with no more than weakly developed or obsolete cusps; fixed finger with nodus ramosus at least three times farther from tactile seta *it* than from *est*; movable finger with nodus ramosus distinctly closer to *st* than to *t* or midway between the two.

Legs with surface sculpture varying from strongly granulate and in some cases scalelike on proximal segments to much less strongly developed and scalelike on tarsus; setae varying from stout and multidenticulate, even subclavate, on extensor surface of pars tibialis to acuminate on flexor or inner surface of tarsus; extensor margin of pars tibialis of each leg with a few setiferous tubercles. First leg with tarsus subfusiform; posterior claw much smaller than relatively unmodified anterior claw, strongly attenuated in distal fourth, terminally acute and bearing small, subterminal, and hyaline accessory tooth; tarsus 0.287 (0.283) mm. long, length 3.99 (4.10) times depth. Fourth leg with entire femur 0.65 (0.655) mm. long, 2.47 (2.70) times depth; tibia 0.45 (0.45) mm. long, 3.52 (3.86) times depth; tarsus 0.355 (0.350) mm. long, 4.13 (4.55) times depth; tarsus with tactile seta 0.266 (0.263) or 0.75 of length of tarsus from proximal margin of tarsus.

FEMALE: Description based on four paratypes, with measurements given as ranges. Female much like male in general appearance, but body and palpal and pedal segments larger; shape and ratios of palpal and pedal segments very similar in the two sexes. Body 2.8–3.2 mm. long. Carapace with 10–12 setae along posterior margin; 0.88–0.93 mm. long, width 0.77–0.88 mm., length 1.00–1.17 times width. Tergites 1–3 usually with six or seven marginal setae and often with laterally placed discal seta on each half; setae of tergite 4 variable; each half of tergites 5–9 with three discal and five to seven marginal setae. Chelicera like that of male, except galea with five or six short, curved rami confined to distal two-fifths of basally stout stalk; rami more strongly developed than those of male; movable finger 0.165–0.170 mm. long.

Palpus with femur 0.91–0.93 mm. long, width exclusive of setiferous tubercles 0.196–0.205 mm., length 4.45–4.75 times width; tibia 0.76–0.80 mm. in length, 0.243–0.260 mm. in width, length 3.02–3.13 times width; chela without pedicel 1.25–1.29 mm. long, 0.322–0.350 mm. wide, length 3.66–4.01 times width; chelal hand without pedicel 0.64–0.67 mm. long, depth based on only three specimens 0.285–0.310 mm., length 2.10–2.33 times depth; movable finger 0.62–0.64 mm. long. Fixed finger with 39–42 marginal teeth, nearly all with well-developed cusps; movable finger with 42–43 teeth, those of proximal half of row with cusps obsolete or wanting; tactile setae like those of male, except movable finger with *st* a little closer to *sb* than to *t*; nodus ramosus of fixed finger ranging from one and

one-half to three times farther from tactile seta *it* than from *est*; nodus of movable finger ranging from about midway between tactile setae *t* and *st* to as much as three times farther from *st* than from *t*. Legs similar in sculpture and chaetotaxy to those of male. Fourth leg with entire femur 0.75–0.79 mm. long, depth 0.275–0.291 mm., length 2.61–2.76 times depth; tibia 0.49–0.52 mm. long, 0.135–0.147 mm. deep, length 3.40–3.70 times depth; tarsus 0.366–0.394 mm. long, 0.091–0.096 mm. deep, length 4.02–4.18 times depth; tactile seta 0.290–0.304 mm. or 0.76–0.80 of length of tarsus from proximal margin of tarsus. Female genitalia with one or two setae on face and nine to 14 setae in irregular row near posterior margin of anterior operculum; posterior operculum with eight to 11 setae.

TRITONYMPH: A single, provisionally identified tritonymph much like female, but smaller and less sclerotic. Body 1.85 mm. long; carapace 0.62 mm. long. Palpus with femur 0.63 mm. long, length 4.41 times width; tibia 0.52 mm. long, 3.17 times width; chela without pedicel 0.93 mm. long, 4.29 times width; chelal hand without pedicel 0.48 mm. in length, 2.40 times depth; movable finger 0.45 mm. long. Fixed finger with 35 marginal teeth, all except proximal six teeth with cusps; movable finger with 38 teeth, those of proximal two-thirds or three-fourths of row without cusps; tactile setae much like those of female except *ist* absent from fixed finger and either *b* or *sb* absent from movable finger.

ECOLOGY: Four of the five Highlands County collections were taken from beneath bark flakes of boles of living slash pines (*Pinus elliottii*), and the fifth collection was from debris beneath the started bark of a slash-pine log. Ecological data do not accompany specimens from Volusia and Dade counties. Population densities appear very low, as a single specimen occurs in each of the seven available collections.

TYPE LOCALITY AND FLORIDA RECORDS: *Dade County*: A male paratype from Royal Palm Park, Blatchley collection, in the Museum of Comparative Zoölogy (identified by Banks as *Chelifer muricatus* Say). *Highlands County*: The male holotype and four female paratypes in five collections taken within 1 mile of the Archbold Biological Station buildings. *Volusia County*: One tritonymph from Enterprise (identified by Banks as *Chelifer cancroides*), in the Museum of Comparative Zoölogy.

GENUS *TYRANNOCHELIFER* CHAMBERLIN

Tyrannochelifer CHAMBERLIN, 1932, p. 20. BEIER, 1932b, p. 251.

When Chamberlin created the genus *Tyrannochelifer*, with the Brazilian *Chelifer imperator* With, 1908, as the type species, he apparently relied exclusively upon With's description. As a result, certain taxonomically

important features remain unknown, and a definitive generic diagnosis cannot be provided. Males of species of *Tyrannochelifer* can be recognized by the following combination of traits: tergal keels well developed; palpal segments moderately slender to very slender; chela gaping, usually strongly gaping; teeth of much of proximal two-thirds of marginal row of each chelal finger reduced in number, widely spaced, and in some cases virtually wanting; coxal sac probably in all cases with an atrium; fourth leg with tarsal claws toothed, subterminal setae acuminate, and tactile seta short and inserted near level of apical setae. The palpus of the female differs from that of the male by having smaller and less slender palpal segments and by having contiguous teeth along virtually the entire margin of each finger of the no more than weakly gaping chela. The genus appears related to the Cuban genus *Cubachelifer* Hoff (1946c), but in *Cubachelifer*, which is known only from males of the type species, the palpal segments are not strongly slender, the chelal fingers gape very little, contiguous teeth occur along the entire margin of each chelal finger, and the claws of the second (but not of the third and fourth) pedal tarsi have accessory teeth. Besides the type species, *Tyrannochelifer* contains *Chelifer macropalpus* Tullgren, 1907, from Haiti and *C. floridanus* Banks, 1891, from Florida. With information now available, it is evident that the genus belongs in the tribe Cheliferini and not in the Dactylocheliferini, where the genus was formerly placed by both Chamberlin and Beier. It is significant that females of *T. floridanus* have paired median cribriform plates, as this character, which no doubt also occurs in females of the type species, relates the genus to the Cheliferini.

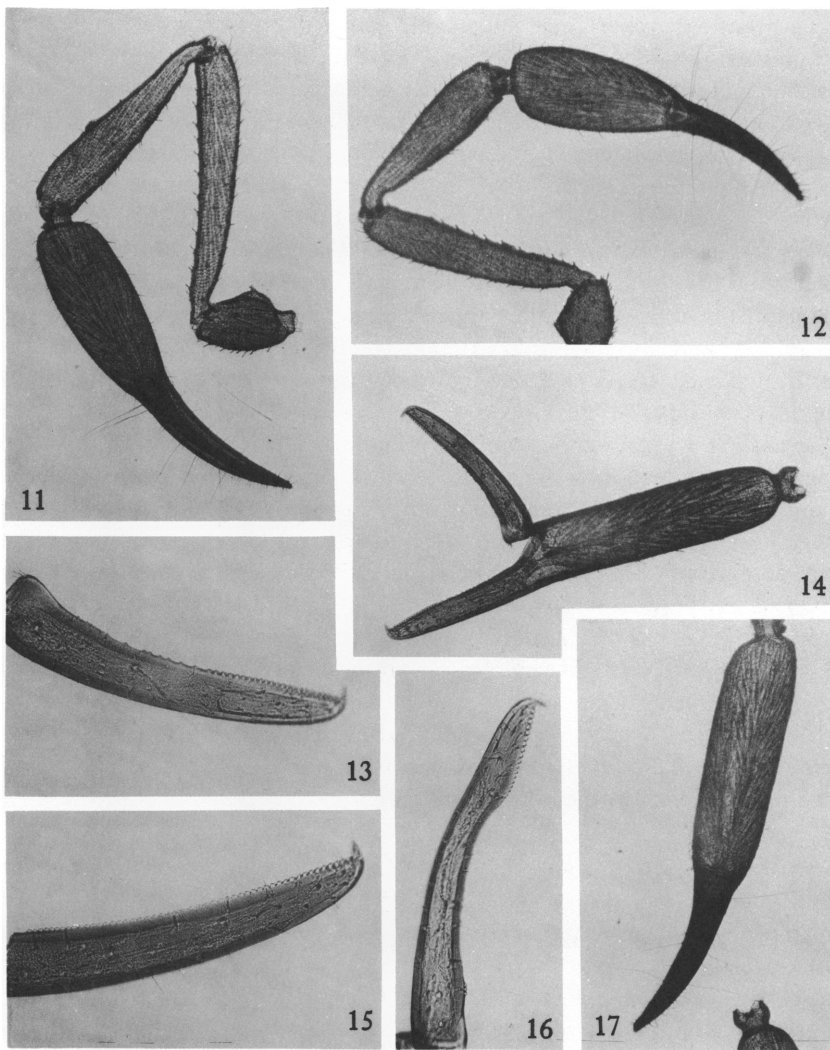
Tyrannochelifer floridanus (Banks)

Figures 11, 12, 15, 16

Chelifer floridanus BANKS, 1891, p. 162; 1904, p. 140. CHAMBERLIN, 1931a, fig. 39j.

Tyrannochelifer floridanus: CHAMBERLIN, 1932, p. 20. BEIER, 1932b, p. 253.

In spite of Banks's very incomplete description of the type material collected in southern Florida, there can be no doubt about the identification of the present Florida specimens. The available males agree closely with Banks's description, which is obviously based only on the male, except that the length of the movable chelal finger is about equal to the length of the hand and not, as Banks stated, a little longer than the hand. This discrepancy probably results from Banks's examining specimens in alcohol and from not making exacting measurements. All records for the species apparently relate to the type collection, which consists of one specimen in the Museum of Comparative Zoölogy. It is probably from



FIGS. 11, 12. *Tyrannochelifer floridanus* (Banks). 11. Dorsal view of palpus, male. 12. Dorsal view of palpus, female.

FIGS. 13, 14. *Tyrannochelifer cubanus*, new species, male holotype. 13. Movable chelal finger. 14. Lateral view of chela.

FIGS. 15, 16. *Tyrannochelifer floridanus* (Banks). 15. Movable chelal finger, female. 16. Movable chelal finger, male.

FIG. 17. *Tyrannochelifer cubanus*, new species, male holotype, dorsal view of chela.

this specimen that Chamberlin (1931a, fig. 397) drew his figure of the chelal fingers.

The following description of the male is based on five specimens, with measurements given as over-all ranges. Body 2.5–2.8 mm. long. Carapace with two well-developed eyes; setiferous tubercles large and terminally acute; transverse furrows sharply and deeply impressed; each posterolateral corner with a well-developed keel; length 0.88–0.96 mm. Abdomen with tergites medially divided, except anterior two or three tergites undivided or incompletely divided; each tergal half of central part of abdomen with three discal setae and five to seven marginal setae; lateral keels strongly developed on tergites 1–8 or 1–9. Chelicera with 17 (18 in one specimen) plates in the serrula exterior; hand with setae *b* and *sb* acuminate; galea with one to three very small terminal and subterminal rami, rami in some cases spinelike or obsolete.

Palpus with surface of segments granulate, fingers smooth; strongly developed setiferous tubercles spaced along entire inner or flexor margin of femur, these less strongly developed along inner surface of tibia; basal two-thirds of inner margin of each finger distinctly concave; each finger with 16–22 cusp-bearing, contiguous teeth along distal one-third to one-fourth of finger, with usually three to eight contiguous teeth near proximal end of finger margin and five to 11 teeth scattered between proximal and distal groups; fixed finger of one specimen atypical, with 24 contiguous teeth in basal group and no teeth between basal and distal groups; fixed finger with tactile seta *it* usually about one and one-half times farther from *est* than from *et*; movable finger with *st* closer to *sb* than to *t* and in some cases even closer to *b* than to *t*; nodus ramosus of fixed finger variable, ranging from a little distal of *est* to a little proximal of *it*; nodus of movable finger ranging from midway between *st* and *t* to more than two times farther from *st* than from *t*. Palpal femur 1.14–1.29 mm. in length, 0.187–0.207 mm. in width exclusive of setiferous tubercles, length 5.95–6.36 times width; tibia 1.01–1.12 mm. long, 0.220–0.235 mm. wide, length 4.55–4.94 times width; chela without pedicel 1.52–1.68 mm. long, 0.342–0.362 mm. wide, length 4.44–4.64 times width; chelal hand without pedicel 0.78–0.85 mm. long, 0.302–0.345 mm. deep (based on only four specimens), length 2.41–2.58 times depth; finger 0.76–0.85 mm. long.

First leg with tarsus subfusiform in general shape; small, but well-developed apical spur; outer or posterior claw smaller than other claw and with a small accessory tooth; tarsus 0.335–0.358 mm. long, 0.084–0.092 mm. deep, length 3.80–4.17 times depth. Fourth leg with a few strongly developed and acute setiferous tubercles on extensor surface of pars tibialis; entire femur 0.72–0.76 mm. long, 0.243–0.275 mm. deep,

length 2.76–3.13 times depth; tibia 0.49–0.54 mm. long, 0.124–0.132 mm. deep, length 3.79–4.13 times depth; tarsus 0.39–0.42 mm. long, 0.084–0.096 mm. deep, length 4.34–4.65 times depth; tactile seta of tarsus at level of apical setae, 0.310–0.335 mm. or 0.79–0.80 of length of tarsus from proximal tarsal margin. Coxa of fourth leg with lateral spur; coxal sacs with a well-developed atrium, but without cribrate area; statumen convolutum deeply invaginated anteriorly, but lacking a sclerotic rod.

Female much like male in general appearance; description based on eight specimens. Body 2.7–3.2 mm. long. Carapace like that of male except setiferous tubercles usually less well developed; 0.88–1.01 mm. long. Abdominal tergites 1–3 in no case entire, in some incompletely divided, often completely divided; chaetotaxy like that of male. Chelicera with setae *b* and *sb* acuminate; 17–18 plates in serrula exterior; galea with five or six short, gently curved, terminal and subterminal rami. Palpal segments on average a little smaller and consistently much stouter than corresponding segments in male; surface sculpture much like that of male, except setiferous tubercles a little less strongly developed; chelal fingers in no case more than very weakly gaping; dentition complete, with contiguous teeth along nearly entire margin of each finger; fixed finger with 48–55 teeth, movable finger with 47–55 teeth; chelal fingers with tactile setae much like those of male, fixed finger of one chela of one female lacking tactile seta *et*; nodus ramosus of movable finger in some cases very little proximal to tactile seta *t*. Palpal femur 0.95–1.14 mm. long, 0.193–0.231 mm. wide, length 4.80–5.16 times width; tibia 0.83–1.00 mm. long, 0.218–0.276 mm. wide, length 3.63–3.87 times width; chela without pedicel 1.34–1.60 mm. long, 0.318–0.394 mm. wide, length 4.02–4.22 times width; chelal hand without pedicel 0.66–0.81 mm. long, 0.300–0.346 mm. deep (based on six specimens), length 2.20–2.43 times depth; movable finger 0.69–0.81 mm. long. Fourth leg with setiferous tubercles of pars tibialis weakly developed, much less conspicuous than those of male; entire femur 0.67–0.81 mm. long, 0.230–0.279 mm. deep, length 2.88–3.01 times depth; tibia 0.475–0.565 mm. long, 0.120–0.140 mm. deep, length 3.84–4.15 times depth; tarsus 0.380–0.406 mm. long, 0.085–0.097 mm. deep, length 4.15–4.58 times depth; tactile seta of tarsus 0.295–0.326 mm. or 0.772–0.809 of length of tarsus from proximal tarsal margin. Paired median cribriform plates well defined, each with a greater diameter less than diameter of anterior tracheal trunk.

TYPE LOCALITY: Originally given by Banks (1891) as southern Florida. Later Banks (1904), undoubtedly in reference to the type collection, gave

Biscayne Bay [Dade County] as the locality.

NEW RECORDS: *Monroe County*: One female, Everglades National Park, Cape Sable, by Richards and Stannard, December 26, 1951, in the Illinois Natural History Survey. *Pinellas County*: One collection with one male and two females and another (identified by Banks as *Chelifer muricatus* Say) with four males and five females, Dunedin, Blatchley collections, in the Museum of Comparative Zoölogy.

***Tyrannochelifer cubanus*, new species**

Figures 13, 14, 17

DIAGNOSIS: Males with palpal femur about 1.50 mm. long, about 7.5 times width exclusive of setiferous tubercles; tibia 1.25–1.40 mm. long; chela without pedicel 1.65–1.75 mm. long, about 5.8 times width; movable chelal finger distinctly shorter than chelal hand without pedicel. Males differ from males of *T. imperator* and *T. macropalpus* by having smaller palpal segments and a stouter palpal femur and from males of *T. floridanus* by having larger and more slender palpal segments. In general, hand in dorsal view appearing much more cylindrical than that of other species of *Tyrannochelifer*.

MALE: Description based on holotype and one paratype, with measurements for paratype following in parentheses corresponding measurements for holotype. Body 2.53 (3.08) mm. long. Carapace with two well-developed eyes; setae clavate; setiferous tubercles large, numerous, and terminally acute; transverse furrows moderately well developed; postero-lateral corners with strongly developed keel; 0.88 (0.95) mm. long. Holotype with tergites 1–3 entire, paratype with all tergites divided; setae clavate; tergal halves of central part of abdomen with three discal setae and five to seven marginal setae; tergites 1–8 or 1–9 with strongly developed lateral keels. Chelicera with setae *b* and *sb* acuminate; galea slender, terminally acute, and with two or three minute subterminal rami; apparently 17–18 plates in serrula exterior, but exact count difficult.

Palpus with segments slender; surface uniformly and strongly granulate, except for chelal fingers; well-developed setiferous tubercles on inner surface of femur, less strongly developed on tibia; setae of femur and tibia in no case strongly clavate, subclavate on inner surface, multidenticulate on extensor surface; setae of hand chiefly multidenticulate, setae of fingers acuminate; chela distinctly gaping in holotype, less strongly gaping in paratype; each finger with 18–23 contiguous teeth along about distal one-third of margin, with eight contiguous teeth near proximal

end of margin, and with four to 13 irregularly and in some cases very weakly developed teeth scattered between two groups of contiguous teeth; fixed finger with tactile seta *it* closer to *et* than to *est*; movable finger with tactile seta *st* closer to *sb* than to *t*; nodus ramosus of fixed finger at least twice as far from *est* as from *it*, nodus of movable finger a little closer to *st* than to *t* in holotype and only a little proximal to *t* in paratype. Palpal femur 1.46 (1.51) mm. long, 0.193 (0.203) mm. wide exclusive of setiferous tubercles, length 7.56 (7.44) times width; tibia 1.29 (1.36) mm. long, 0.219 (0.223, 0.219) mm. wide, length 5.89 (6.10, 6.21) times width; chela without pedicel 1.69 (1.74) mm. long, 0.287 (0.305) mm. wide, length 5.89 (5.70) times width; chelal hand without pedicel 0.97 (1.01) mm. long, 0.253 (0.275) mm. deep, length 3.84 (3.68) times depth; movable finger 0.74 (0.74) mm. long.

Legs without unique features; tarsi of second, third, and fourth legs with subterminal setae acuminate and with claws having an accessory tooth. Tarsus of first leg subfusiform; subapical spur well developed in both males, but smaller in paratype than in holotype; posterior tarsal claw smaller than anterior claw and with small accessory tooth; tarsus 0.302 (0.330) mm. long, 3.69 (3.67) times depth. Fourth leg with setiferous tubercles of extensor surface of pars tibialis not strongly developed; surface sculpture of all segments chiefly scalelike, more strongly granulate in profile view on pars tibialis than elsewhere; setae varying from multidenticulate on extensor surface of pars tibialis to acuminate on flexor surface of tarsus; coxa of fourth leg with lateral spur; entire femur 0.72 (0.80) mm. long, 3.18 (3.16) times depth; tibia 0.485 (0.55) mm. long, 3.95 (4.07) times depth; tarsus 0.350 (0.400) mm. long, 4.37 (4.26) times depth; tactile seta of tarsus at or a little proximal to level of apical setae, 0.271 (0.299) mm. or 0.774 (0.748) of length of tarsus from proximal tarsal margin. Genitalia with ramshorn organ; coxal sac with atrium, but without a cribrate area; anterior margin of statumen convolutum deeply invaginated, holotype with sclerotic rod vestigial or obsolete, paratype with rod a little more definite but not strongly sclerotic.

FEMALE: Unknown.

TYPE LOCALITY AND RECORDS: Holotype collected by M. W. Sanderson near Nuevitas, Camagüey Province, Cuba, June 8, 1959, in the Illinois Natural History Survey. Paratype male taken by W. M. Mann, Manneville, Haiti, December, 1912, in the Museum of Comparative Zoölogy.

TRIBE DACTYLOCHELIFERINI BEIER

Dactylocheliferini BEIER, 1932c, p. 63; 1932b, p. 241. HOFF, 1956, p. 28.

The tribe contains more than 20 genera. Of these, only three are re-

ported from North America north of Mexico, and only one is known to occur in Florida.

GENUS *DACTYLOCHELIFER* BEIER

Dactylochelifer BEIER, 1932c, p. 64; 1932b, p. 253. HOFF, 1956, p. 28.

Of the 23 species reported for the genus, only two occur in the United States, and none are known from Florida.

Dactylochelifer copiosus Hoff

Dactylochelifer copiosus HOFF, 1945, p. 53; 1949, p. 491.

As the species is widespread in the central part of the United States and, according to Hoff and Bolsterli (1956), occurs as far south as southern Tennessee and northeastern Mississippi, it is not surprising to find the species in east-central Georgia. The species is included here because the Georgia locality is no more than 100 miles north of the northern boundary of Florida and the species probably occurs in northern Florida.

NEW RECORD: One female, Columbus, Muscogee County, Georgia; L. W. Cunningham, August 20, 1948, in the Illinois Natural History Survey.

PUGNOCHELIFER, NEW GENUS

DIAGNOSIS: Carapace with two well-developed transverse furrows, eyes flatly convex; setae of carapace and tergites clavate; male without tergal keels. Chelicera with one galeal seta, hand with seta *sb* wanting. Palpal segments strongly and uniformly granulate except movable finger and distal half of fixed finger smooth; setae of basal segments clavate; in lateral view fixed chelal finger distally narrowed, resulting in a distinct break in regular contour of dorsal or outer finger margin; chelal fingers with marginal teeth more strongly retroconical, coarser, and less crowded than in most cheliferid pseudoscorpions; fixed finger with tactile *it* closer to *et* than to *est*; movable finger with tactile seta *st* closer to *sb* than to *t*. Legs with subterminal setae and tarsal claws edentate and simple; tarsus of fourth leg without tactile seta; coxa of fourth leg of male without lateral spine; tarsus of first leg of male modified, apical spine wanting, claws asymmetrical, strongly contorted, and edentate. Male genitalia with ramshorn organs; coxal sac filling little more than half of coxal cavity, each sac with strongly developed atrium; statumen convolutum with medial portion of anterior margin either incomplete or very weakly sclerotic. Female with median cribriform plate irregular in outline, not well defined, elongate, longitudinally oriented, and appearing to be

formed of a few small plates scattered at random in a common matrix. Genus known only from type species.

TYPE SPECIES: *Pugnochelifer amoenus*, new genus and new species.

REMARKS: The new genus can be separated from other genera, including the related *Dactylochelifer*, by the strongly retroconical chelal teeth, the shape of the fixed chelal finger in lateral view, and the absence of seta *sb* from the cheliceral hand.

***Pugnochelifer amoenus*, new genus and new species**

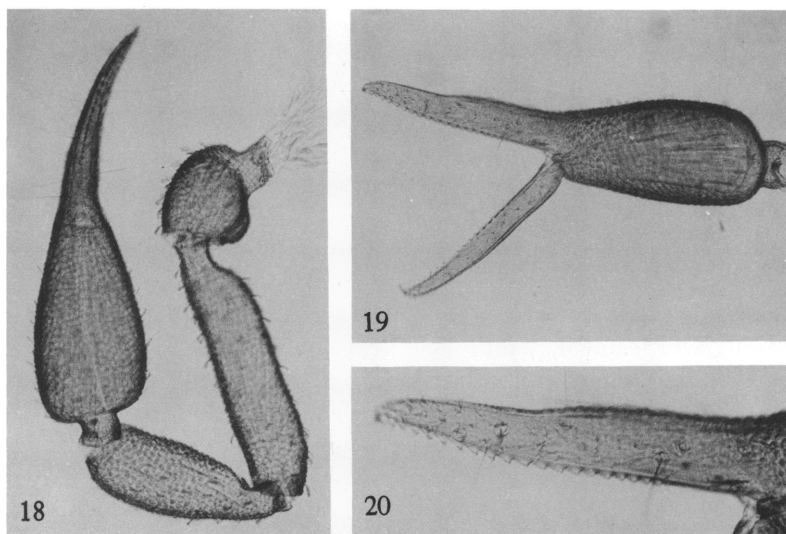
Figures 18–20

DIAGNOSIS: Body 1.8–1.9 mm. long; carapace wider than long. Palpus of male with femur 0.57 mm. long, 0.143 mm. wide; chela without pedicel 0.83 mm. long; movable finger 0.435 mm. long. Palpus of female with femur 0.54 mm. long, 0.158 mm. wide; chela without pedicel 0.88 mm. long; movable finger 0.46 mm. long.

MALE: Description based on holotype. Body and appendages strongly sclerotic, chiefly of deep golden color; body 1.81 mm. in length. Carapace strongly and uniformly granulate, of lustrous golden brown color; investing setae at least moderately clavate; 12 setae along posterior margin; length 0.64 mm.; greatest width, 0.78 mm., at posterior margin. Abdomen with tergites strongly sclerotic and well pigmented, divided, sculpture varying from granulate to subtessellate; tergal setae moderately to strongly clavate, each half of tergites 1–4 with six or seven marginal setae, each half of central tergites with one lateral seta and six to eight marginal setae; sternites less deeply pigmented, with netlike or scalelike surface sculpture; sternites divided except eleventh, setae acuminate; sternites 4–6 with nine to 12 setae in each half, setae uniseriate except somewhat irregular on sternite 4; each half of sternites 7–9 with five to seven setae; stigmatic plates asetaceous.

Chelicera with four setae on hand; outer surface of hand marked by coarse, strongly developed, netlike lines; galea with two or three very small rami near distal end; movable finger with apical tooth bicuspidate or tricuspidate, subapical lobe weakly developed; flagellar setae appearing to lack teeth or spinules; accurate count of plates in serrula exterior impossible, but probably between 13 and 15; movable finger about 0.127 mm. long.

Palpus very sclerotic; setae varying from strongly clavate on trochanter and femur to moderately clavate on chelal hand and basal half of dorsal surface of fixed finger, setae of distal half of fixed finger and those of movable finger acuminate; femur 0.57 mm. long, 3.98 times width; tibia about 0.43 mm. long, 2.72 times width; chela without pedicel 0.83 mm.



FIGS. 18-20. *Pugnochelifer amoenus*, new species, male holotype. 18. Dorsal view of palp. 19. Lateral view of chela. 20. Fixed chelal finger.

long, 0.235 mm. wide, length 3.53 times width; chelal hand without pedicel 0.395 mm. long, 0.211 mm. deep, length 1.87 times depth; movable finger 0.435 mm. long. Marginal teeth of chelal fingers distinctly retroconical in shape; fixed finger with 22 teeth, all cuspidate except very basal tooth; movable finger with 20 teeth, basal five reduced and lacking well-formed cusps. Fixed finger with tactile seta *ist* distal to *est*; tactile setae *ib* and *isb* about halfway between *est* and finger base, with *esb* about on level of *ib*. Movable finger with seta *st* midway between *t* and *b*, with *sb* two times farther from *st* than from *b*. Nodus ramosus of fixed finger immediately basal to *est*; nodus of movable finger more than two times farther from *t* than from *st*.

Legs with ventral surfaces of coxae smooth, otherwise segments strongly granulate, sculpture often appearing coarsely granulate in profile and scalelike in surface view; setae variable, setae of extensor surfaces usually at least moderately clavate, those of flexor surfaces chiefly paucidenticulate on more basal segments and acuminate on tarsi. First leg with segments relatively stout; tibia 0.191 mm. long, length 1.77 times depth; tarsus fusiform, 0.251 mm. long, 2.48 times depth; details of tarsus described in generic diagnosis. Fourth leg with entire femur 0.44 mm. long, 2.67 times depth; tibia 0.338 mm. long, 3.64 times depth; tarsus 0.283 mm. long, 3.93 times depth.

FEMALE: Description based on one paratype; essentially like male in color, surface sculpture, and chaetotaxy. Carapace partly broken, but body length estimated as about 1.9 mm.; carapace probably about 0.70 mm. long, 0.78 mm. wide. Abdomen with tergal chaetotaxy like that of male; sternites less strongly divided than those of male, sternite 4 with a total of 14 setae, sternite 5 with a total of 20 setae, each half of more posterior sternites with seven to nine setae. Galea of chelicera with five or six short terminal and subterminal rami; no spinules observed on flagellar setae; serrula exterior with 13–14 plates; movable finger 0.125–0.130 mm. long.

Palpus with femur 0.54 mm. long, length 3.42 times width; tibia 0.44 mm. long, 2.68 times width; chela without pedicel 0.88 mm. long, one palpus missing and width not obtained; chelal hand without pedicel 0.42 mm. long, 1.79 times depth; movable finger 0.46 mm. long. Fixed finger with 23 marginal teeth, all with cusps; movable finger with 22 teeth, with six basal teeth acuspidate. Fixed finger with tactile seta *ist* less than one areolar diameter proximal to *est*; movable finger with tactile seta *st* midway between *t* and *b*, with *sb* about 1.5 times farther from *st* than from *b*. Nodus ramosus not observed in fixed finger; nodus of movable finger about three times farther from *t* than from *st*. First leg more slender than that of male; tibia about 0.20 mm. long, length about 2.4 times depth; tarsus 0.239 mm. long, 3.52 times depth. Fourth leg with entire femur 0.43 mm. long, 2.67 times depth; tibia 0.33 mm. long, 3.34 times depth; tarsus 0.283 mm. long, 3.82 times depth. Genitalia simple; lateral cribriform plates well formed and compact, of only moderate size, inconspicuous; median cribriform plate described in generic diagnosis; anterior operculum with 12 acuminate setae; 15 setae in uniseriate row near posterior margin of posterior operculum.

DEUTONYMPH: A single deutonymph, designated a paratype, is the only nymph available for study. Body about 1.35 mm. long. Carapace 0.47 mm. long, 0.45 mm. wide; investing setae clavate, with six setae along posterior margin; surface sculpture suggesting that of adult. Abdomen with four clavate setae on each tergal half. Chelicera much like that of female; galea with four or five small rami; serrula exterior with 11 plates. Palpal femur 0.335 mm. long, about 3.4 times width; chela without pedicel 0.57 mm. long, 3.67 times width; hand without pedicel 0.26 mm. long, 1.82 times depth; finger 0.31 mm. long. Fixed finger with 17 marginal teeth, all with cusps; movable finger with 16 marginal teeth, basal four teeth lacking cusps. Fixed finger with six tactile setae; movable finger with one tactile seta near midpoint and a second seta near base of finger.

TYPE LOCALITY AND RECORDS: Holotype male and paratype deuto-

nymph from trunk bark of cypress (*Toxodium distichum*), Highlands Hammock State Park, Highlands County, Florida, by Hoff, April 27, 1956. Paratype female from Kisatchie National Forest, Grant Parish, Louisiana, June, 1941, by Jones and Archer, in the American Museum of Natural History.

CHELIFERINAE, GENUS AND SPECIES INDETERMINATE

A female (tribe Cheliferini) taken by H. V. Weems, Jr., from beneath bark of a dead turkey oak (*Quercus laevis*) in Putnam County, Florida, June 18, 1960, is especially peculiar, because some of the subterminal setae of the pedal tarsi are toothed and some are not. The specimen cannot be associated with any known Florida species and, unless the subterminal setae are anomalous, the female may represent an undescribed genus. The specimen is being retained for further study. Six nymphs, one in each of six collections from Highlands, Levy, and Marion counties, Florida, also remain unidentified.

SUBFAMILY WITHIINAE CHAMBERLIN

Withiinae CHAMBERLIN, 1931b, p. 290. BEIER, 1932b, p. 192. HOFF, 1958, p. 48 (key).

While pseudoscorpions of this subfamily are widely distributed in both hemispheres, New World genera are chiefly neotropical, and representatives of a single genus are known from continental United States (Hoff, 1958).

GENUS *WITHIUS* KEW

Withius: CHAMBERLIN, 1931b, p. 293. BEIER, 1932b, p. 196 (for early synonymy).

At the present time 14 species from Europe, Asia, northern and extreme western Africa, and continental United States are assigned to the genus. As some of the species are possibly synonyms, the genus may actually contain no more than 10 or 12 species. In addition to *W. subruber* discussed below, the following species are reported from the United States.

1. *Chelifer texanus* Banks, 1891. Beier (1932b) placed the species provisionally in *Parachelifer*, while Hoff (1947) examined the type specimens and found that the species belonged in *Withius*. The species is known from one male and one female collected, according to Banks (1891, 1908), in Brazos County, Texas.

2. *Chelanops lagunae* Moles, 1914. Chamberlin (1931b) tentatively assigned the species to *Withius*. The species is reported only from the vicinity

of Laguna Beach, California.

3. *Withius vagrans* Chamberlin, 1925; from Brownsville, Texas; described from a single male specimen.

Withius subruber (Simon)

Withius subruber: CHAMBERLIN, 1931b, p. 293. BEIER, 1932b, p. 198, fig. 202 (for early synonymy).

The geographic range of this species is generally given as Europe and northern Africa (Beier, 1932b). With (1906) mentioned that the species may also occur in India, but the presence of specimens in rice warehouses and in rice on ships from India does not prove that the species actually occurs in India. Beier (1929) stated that the species perhaps occurs in India, but later (Beier, 1932b) did not include India in the geographic range. Chamberlin (1931b) stated that the species is nearly cosmopolitan as a result of being transported with food materials, but he gave no definite locality records. There is no question about the association of *W. subruber* with stored food products (Evans and Browning, 1954; Cloudsley-Thompson, 1956). When the ease of dispersal through human agencies is considered, it is remarkable that the species previously has not been reported from the United States, although (as discussed below) one or more North American species may be synonymous with *W. subruber*. In the present paper, the geographic range of the species is extended to North America and to extreme western Africa by records from Arizona, Florida, Cuba, and Senegal.

FEMALE: Description based on five females, including two from Florida and one each from Sardinia, Algeria, and Senegal. All females very similar; sizes and ratios expressed as total ranges based on all five specimens. Present females agree closely with Beier's (1932b) description of *W. subruber* and agree well with With's (1906) description except for smaller palpal and pedal segments.

Body 2.05–2.90 mm. long. Carapace with two well-developed transverse furrows and two corneate eyes; four stout, toothed, subspatulate setae along the almost truncate anterior margin; seven to 10 distally toothed and widely spatulate or narrowly fan-shaped setae along posterior margin; surface of carapace strongly and uniformly granulate, with most setae similar to those of posterior margin; carapace 0.72–0.78 mm. long, 0.55–0.57 mm. wide, length 1.3–1.4 times width. Abdomen with tergites divided, except division of tergites 1 and 11 in some cases incomplete; tergites nearly as strongly granulate as carapace and with setae much like those of carapace; each half of anterior three tergites with marginal row

of five to seven setae; each half tergite of central part of abdomen biseriate, with four to seven marginal setae and with three or four setae anterior to marginal row; sternites weakly sclerotic, with acuminate setae and inconspicuous, scalelike, surface sculpture. Chelicera with 17–18 plates (20 plates, according to With, 1906) in serrula exterior; galea with five or six short terminal and subterminal rami; seta *sb* of cheliceral hand long and heavy, with a few terminal and subterminal spinules; seta *b* shorter, more slender, tapering toward distal end, with few spinules, and in some cases appearing acuminate (probably spinules obscured by position of seta); movable finger 0.16–0.18 mm. long.

Palpus with trochanter, femur, and tibia strongly and almost uniformly granulate; chelal hand with basal and flexor surfaces granulate, but extensor surface smooth or with very weakly developed granules; fingers smooth; setae of palpal segments variable in stoutness, but never simple and acuminate except on chelal fingers. General shape of segments as pictured by Beier (1932b, fig. 202). Palpal femur 0.55–0.60 mm. long, 0.190–0.205 mm. wide, length 2.85–3.08 times width; tibia 0.55–0.60 mm. long, 0.220–0.235 mm. wide, length 2.37–2.58 times width; chela without pedicel 0.86–0.91 mm. in length, 0.281–0.318 mm. in width, 2.86–3.10 times longer than wide; hand without pedicel 0.460–0.505 mm. long, 0.275–0.298 mm. deep, length 1.64–1.82 times depth; movable finger 0.41–0.42 mm. long. Fixed finger with tactile seta *it* at least a little proximal to level of *est*; movable finger with *st* at least a little closer to *t* than to *sb*. Fixed finger with 29–32, and movable finger with 33–37, marginal teeth, except only 24 teeth on fixed and 27 on movable finger of female from Senegal.

Fourth leg, exclusive of leg of female from Senegal, with entire femur 0.535–0.555 mm. long, 3.00–3.14 times depth; tibia 0.430–0.465 mm. long, 4.31–4.79 times depth; tarsus 0.34–0.36 mm. in length, 5.00–5.26 times depth; tactile seta 0.56–0.61 (Senegal female included in range) of length of tarsus from proximal margin. Female from Senegal with segments of fourth leg smaller and stouter than corresponding segments in other four females; femur 0.515 mm. long, 2.67 times depth; tibia 0.407 mm. long, 3.77 times depth; tarsus 0.318 mm. in length, 4.60 times depth.

MALE: Description based on seven males from Florida, one from Arizona, and one from Cuba, with measurements and ratios expressed as ranges determined from all nine specimens. Male very similar to female, but exhibiting greater variation in size and ratios of palpal and pedal segments. North American males agree closely with Beier's (1932b) description, but are smaller than specimens described by With (1906). Body 2.2–2.6 mm. long, except one male with abdomen contracted and

only 1.85 mm. long. Carapace with eight to 12 broadly spatulate setae along posterior margin; 0.69–0.81 mm. long, 0.50–0.66 mm. wide, length 1.18–1.38 times width. Each scutum of first three tergites with four to seven, but usually with five or six, setae; each scutum of central part of abdomen with four to seven, usually five or six, marginal setae and usually with three setae anterior to row. Sternites 4–9 with medial areas of specialized microsetae; sternite 10 lacking well-defined area of microsetae, but a very few males with three to six microsetae possibly representing a rudimentary or vestigial field. Chelicera with 16–18 plates in serrula exterior; galea with three to five small terminal and subterminal spinules; movable finger 0.135–0.168 mm. long. Palpal segments variable in size and shape, with segments of some specimens similar to corresponding segments in females studied, but palpal segments of other males larger and more slender (increase in length and in length/width ratio not always directly correlated) than in females; in general shape palpal segments agree well with figures given by With (1906, pl. 3, fig. 7e) and by Beier (1932b, fig. 202), except for some specimens having decidedly slender femora and tibiae, with correlated differences in shape of segments; investing and tactile setae essentially like those of female; surfaces of palpal segments conspicuously granulate, except granules weak to absent on extensor surface of hand of most specimens; fixed finger with 26–32, movable finger with 31–35, marginal teeth. Palpal femur 0.55–0.69 mm. long, 0.175–0.220 mm. wide, length 2.84–3.28 times width (only Loggerhead Key specimen with a ratio less than 3.08); tibia 0.550–0.715 mm. long, 0.20–0.24 mm. wide, length 2.67–2.98 times width; chela without pedicel 0.85–0.99 mm. in length, 0.26–0.29 mm. in width, length 3.18–3.60 times width; hand without pedicel 0.45–0.55 mm. long, 0.24–0.28 mm. deep, length 1.80–2.10 times depth; movable finger 0.41–0.45 mm. long. Fourth leg without unique features; no unusual variation in actual lengths of segments, but marked variation in depth of segments and in length/depth ratios; Loggerhead Key and Cuba males with segments stouter than those of other males. Fourth leg with entire femur 0.51–0.60 mm. long, 0.173–0.205 mm. deep, length 2.51–3.12 times depth; tibia 0.41–0.49 mm. long, 0.096–0.111 mm. deep, length 3.93–4.71 times depth; tarsus 0.310–0.355 mm. long, 0.064–0.076 mm. deep, length 4.45–5.23 times depth; tactile seta removed from proximal margin of tarsus by 0.54–0.60 of length of tarsus. Exclusive of Loggerhead Key and Cuba specimens, length of femur 2.91–3.12, tibia 4.28–4.71, and tarsus 4.85–5.23, times depth.

Two males from Senegal in West Africa differ somewhat from the North American males and, because one or both of them may be atypical,

the measurements and ratios were not included in the ranges given above. One of the males is very light in color and weakly sclerotic; perhaps it has just molted. This male has palpal segments that fall at the lower limit or just below the lower limit of size and of length/width ratios of the nine North American males. Segments of the fourth leg are distinctly smaller than those of males described above, and the tibia (but not the femur and tarsus) is definitely more slender. The second Senegal specimen differs very strongly from the first by having palpal segments distinctly larger than those of North American males, but smaller than those described by With (1906). The palpal femur in this second Senegal male is 0.775 mm. long; the tibia, 0.80 mm. long; the chela without pedicel 1.07 mm., chelal hand without pedicel 0.62 mm., and the movable finger 0.46 mm., long. While the palpal segments are unusually large, the length/width ratios are not especially unique and fall almost within ranges given for the nine North American males, except that the femur is a little more slender (length 3.37 times width), and the tibia stands at the upper limit of the range. In contrast, the chela is relatively stout, having a length/width ratio of 3.22. Segments of the fourth leg have both lengths and ratios that fall within ranges given for North American males. At least for the present, identification of the two Senegal males with any species except *W. subruber* cannot be justified.

REMARKS: The occurrence of *W. subruber* in Florida and Arizona supports the possibility that one or more of the three species of *Withius* from the United States are actually based on specimens of *W. subruber*. Chamberlin (1923, 1931b) suggested that *Chelanops lagunae*, a species described by Moles in 1914, is a species of *Withius*, possibly *W. subruber*. Although Chamberlin gave figures for the palp (1931a, fig. 30*N*) and for a sternite of the male (1931a, fig. 45*H*) of *W. lagunae*, he neither described the species nor definitely declared it a synonym of *W. subruber*. While possibly the two species are synonyms, small differences occur between specimens of *W. subruber* and the inadequate, original, and only description of *W. lagunae*. For example, Moles (1914) stated that the fixed cheliceral finger has many small teeth, but specimens of *W. subruber* examined in the present study have only three teeth on the inner finger margin. Moles attached considerable taxonomic significance to the presence of indistinct eye spots, while corneate eyes are present in *W. subruber*. The eye spots may be incorrectly described, however, as eye spots are by no means indistinct in a figure (Moles, 1914, fig. 1) accompanying the original species description. Unfortunately, from the figure it is impossible to determine if the eyes are corneate. In the same figure, tergites are not medially divided and tergites 1-3 have a biseriate chaetotaxy that resembles the

chaetotaxy of the more central tergites. As the division of the tergites and the distribution of setae are easily observed, one is inclined to consider the figure correct. While Chamberlin may have had *W. subruber* from California, possibly his pseudoscorpions were not conspecific with specimens described by Moles as *W. lagunae*. On present evidence, it is impossible to prove that *W. lagunae* is a synonym of *W. subruber*.

The relationships of the two Texas species, *W. texanus* and *W. vagrans*, to each other and to *W. subruber* are difficult to determine. From the literature, however, it is clear that males of the two Texas species are separated from *W. subruber* by the presence of a field of microsetae on sternite 10 (Chamberlin, 1925; Hoff, 1947). The male of *W. subruber* lacks a defined area of microsetae on sternite 10, but a few males have (as a rudiment or vestige of a setal field) three to six small setae near the mid-line of the sternite. Studies of series of specimens of *W. texanus* and *W. vagrans* are essential to an understanding of the interspecies relationships of American species of *Withius*.

FLORIDA RECORDS: *Madison County*: Two females and six males from feed mill in warehouse, Greenville, collected by E. M. Collins, Jr., June 7, 1960, in the Division of Plant Industry, Florida. *Monroe County*: One male from Loggerhead Key, June, 1906, by the Marine Laboratory of the Carnegie Institution at Tortugas, in the Museum of Comparative Zoölogy.

OTHER RECORDS: *Arizona*: One male, Tucson, by O. Bryant. *Cuba*: A male from Soledad, Weber collection, in the Museum of Comparative Zoölogy. *Sardinia*: One female, Oristano, by Dr. Krausse. *Algeria*: One female from Palestro, by B. Malkin, October 26, 1948. *Senegal*: One female and two males, Dakar Peninsula, by Eldon H. Newcomb, July, 1945.

ECOLOGY OF FLORIDA CHELIFERIDAE

Except for three species, Florida cheliferid pseudoscorpions live in crevices and beneath scales and plates of bark of living and dead trees. Of the three species not found in the bark of trees, *Chelifer cancroides* and *Withius subruber* live in association with man. The single Florida collection of *Chelifer cancroides* is from a stable, a common habitat of this cosmopolitan species. *Withius subruber*, a species frequently found in European warehouses, was collected from a feed mill in a Florida warehouse. The third non-cortical species is *Ocalachelifer cribratus*, which was found in tree litter and woody debris, chiefly of oak and hickory. Of the five Florida species taken from the bark of trees, lack of data does not allow generalizations

relative to the habitat of *Tyrannochelifer floridanus* and *Pugnochelifer amoenus*, although limited information suggests association with trees. Two of the remaining three species, *Parachelifer superbus* and *Florichelifer aureus*, were found associated with slash pines (*Pinus ellottii*), with the former taken from loosened or well-started bark of dead trees and the latter found usually beneath bark flakes of trunks of living trees. In contrast to these two species is *Parachelifer archboldi*, which is associated with live oaks (*Quercus virginiana*). The bark of both slash pines and live oaks is well suited as a habitat for pseudoscorpions. The bark of slash pine is deeply furrowed and breaks away to form irregularly rectangular plates, thus providing hiding places, both for pseudoscorpions and for small arthropods that serve as food. In dead slash pines, the bark becomes loosened, and pseudoscorpions are frequently abundant between the bark and underlying wood. In live oaks, the bark has large numbers of deep furrows that provide protection. The presence of cheliferid pseudoscorpions is apparently associated with the occurrence of subcortical and intracortical spaces, which may explain the few occurrences of cheliferid pseudoscorpions from trees such as sand pines (*Pinus clausa*) and cypress (*Toxodium distichum*) that have relatively tight, smooth bark.

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