ON SOME FALSE SCORPIONS OF THE SUPERFAMILY CHEIRIDIOIDEA

(Arachnida, Chelonethida)

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The following report is designed to consider the material available to me pertaining to the superfamily in question in the same synoptic way as has previously been done for the suborders Heterosphyronida and Diplosphyronida and for the families of the Monosphyronida as a whole to which the present group pertains. The terminology employed is that previously elucidated and illustrated by the writer (Chamberlin, 1929, 1930 and 1931).

Superfamily CHEIRIDIOIDEA Chamberlin

Family PSEUDOCHEIRIDIIDÆ Chamberlin

Remarks. Includes only the type genus.

Genus PSEUDOCHEIRIDIUM With

1906. ***Pseudocheiridium.*** With, pp. 199-201.

Remarks. The three species at present pertaining to this genus may be separated by means of the following key (based upon the literature only). The species *träghårdi* of Tullgren may possibly represent a distinct genus.

1. Femur 3.0 times longer than broad; hand subequal to, or slightly shorter than the fingers; from South Africa..... .....*träghårdi* Tullgren (1907, p. 225)
   Femur 2.6 times longer than broad; hand distinctly much longer than fingers (1.4 to 1.5 times); from Asiatic region..... 2
2. Median transverse groove of carapace recurved; posterior process or heel of trochanter rounded; hand 1.6 times longer than broad; from the Nicobars.....*thorelli* With (1906, p. 200)
   Median transverse groove of carapace straight; heel of trochanter triangular and pointed; hand 1.9 times longer than broad; from Burma.....*clavigerum* Thorell (1889, p. 591)

Family CHEIRIDIIDÆ Chamberlin

Genus CHEIRIDIUM Menge

CHEIRIDIUM MUSEORUM (Leach)

Material examined. One ♂ (JC-609.01001) labeled simply "trouve sur un Polycaon. Chilien ? (15502)." Collections of the Paris Museum.

Genus CRYPTOCHEIRIDIUM Chamberlin

Remarks. The two species referred to this genus by Chamberlin (1931) may be separated by means of the following key (based on the literature).

1. Coxæ of legs IV laterally indented; first six tergites with marginal teeth; from South Africa..... *subtropicum* (Tullgren) (1907, p. 218)
   Coxæ of legs IV not laterally indented; first five tergites with marginal teeth; from Formosa..... *formosanum* (Ellingsen) (1912, p. 123)

Genus APOCHEIRIDIUM Chamberlin

Remarks. This group now includes some six species which may be separated by means of the following key. The addition of a species from the Philippine Islands adds greatly to the already large geographical territory ranged by members of this genus.

1. Chela not more than five times as long as width of tibia, generally considerably less; tibia at most not more than 3.2 or 3.3 times as long as broad..... 2
   Chela about 5.5 times as long as width of tibia; tibia 3.6 times as long as greatest breadth (♂, 1.35 mm. long; from Utah and Idaho) ..... *mormon* Chamberlin
2. Chela about 3.6 to 3.7 times as long as tibial breadth; palps smoothly granulate, with no larger tubercles except for 2-3 on the femoral angle; tibia 2.5 times as long as broad; from the Philippine Islands..... *eruditum* sp. nov.
   Chela at least 4.5 times as long as tibial breadth; palps with at least a few larger granules aside from those occurring on the femoral angle; tibia 2.7 or more times as long as broad..... 3
3. Tibia 3.1-3.2 times as long as broad; trochanter about 1.7 times as long as broad; palps with larger granules either relatively small and inconspicuous or else moderately prominent but sparse 4
   Tibia 2.7-3.0 times as long as broad; trochanter 1.4-1.5 times as long as broad; palps everywhere thickly beset by large tooth-like granules..... 5
4. Femur 3.8-3.9 times as long as broad; chela 4.5-4.6 times as long as tibial breadth; from South Africa..... *chamberlini* Godfrey
   Femur 4.3-4.4 times as long as broad; chela 4.8-4.9 times as long as tibial breadth; from southern California..... *inexpectum* sp. nov.
5. Femur 3.7-3.8 times as long as broad; tibia three times as long as broad; chela 3.1-3.2 times as long as broad; length 1.4-1.6 mm.; from California..... *ferumoides* Chamberlin
   Femur 4.1 times as long as broad; tibia 2.7 times as long as broad; chela 3.5 times as long as broad; length about 1.0-1.1 mm.; from France..... *ferum* (Simon)

APOCHEIRIDIUM FERUMOIDES Chamberlin

Remarks. In addition to material previously recorded I have at hand a collection of 125 specimens of this species taken at Atherton, California (JC-391.03 and 713.01). Some cast skins (JC-401.02001-4) taken from moulting nests under the bark of a decaying log of white oak (*Quercus lobata*) near Lakeport, California, apparently also represent this species.

It is probable that the specimen from Mulegé, Lower California, previously noted (Chamberlin, 1924, p. 35) under this species, more likely pertains to *A. inexpectum* sp. nov. (q. v.).

APOCHEIRIDIUM CHAMBERLINI Godfrey

1924. *Apocheiridium* unnamed sp. nov. Chamberlin, pp. 35 and 37.
1927. *Apocheiridium chamberlini* Godfrey, p. 17.

Remarks. This South African species was given its name by Godfrey in a passing reference to the description by Chamberlin (t. c.). It is easily separable from the other members of the genus by the characters noted in the key.

Apocheiridium eruditum sp. nov.

Holotype, ♀ (JC-545.01001). Collected by Dr. C. F. Baker "among papers" at Los Baños, Luzon, Philippine Islands. Stanford University collections.

Diagnosis. Palps relatively stout, in general appearance quite similar to those of *A. ferumoides* but somewhat more robust; chela turbinate but more greatly swollen interiorly than exteriorly; the posterior femoral angle scarcely as pronounced as in *ferumoides;* femur 3.5-3.6 times as long as broad and 1.15 times as long as tibia; tibia 2.6 times as long as broad and nearly 1.4 times as long as hand; chela 2.9 times as long as broad; fingers perhaps slightly longer but very close to the same length as the hand; femur with a gentle but distinct concavity distally and proximally on its anterior contour; palps evenly granulate and almost totally (except for two or three on the femoral angle) without the larger tooth-like granules so characteristic of *ferumoides, ferum* and *mormon.* Small species, the ♀ measuring 0.95 mm.

Remarks. This small species seems most nearly related to *chamberlini* of South Africa, but differs in the distinctly more robust palps. This is the smallest representative of the genus thus far known and indeed is one of the smallest of all false scorpions.

Apocheiridium inexpectum sp. nov.

Holotype, ♂ (JC-548.01001); allotype ♀ (JC-548.01002); paratopotypes 60 ♂, ♀ and ⊙ (JC-548.01003-62) all taken

from under the bark of *Eucalyptus globulus* (Blue Gum) at Beaumont, Riverside County, California. Collected by the author, November 11, 1925. Paratypes, 58 ♂, ♀ and ⊙ (JC-546.01001-58) taken under the bark flakes of sycamore trees near the Citrus Experiment Station (Box Springs Grade) Riverside, California. Collected by the author, November 26, 1925.

Additional material. Some cast skins (JC-534.01001-7) taken by the author from moulting nests under mesquite bark between Palm Springs and Indio, California, April 5, 1925, probably pertain to this species as does a single immature specimen presumably collected at Mulegé, Lower California, and previously recorded under *A. ferumoides* (Chamberlin, 1924, p. 35).

Diagnosis. A markedly smaller species than either *ferumoides* or *mormon,* the only other western American representatives of the genus thus far known. It reaches a length of 0.9-1.1 mm. as compared with the 1.4-1.6 mm. for the latter two species. Palps distinctly more slender than in *ferumoides,* but plainly stouter than in *mormon;* trochanter 1.7 times as long as broad; femur 3.8-3.9 times as long as broad; tibia 3.2 times as long as broad; chela 3.5 times as long as broad; hand and fingers nearly equal in length; chela 4.8-4.9 times as long as breadth of tibia; tibia 2.7-2.8 times as long as breadth of trochanter. The chela, unlike the case with either *mormon* or *ferumoides,* is markedly more swollen interiorly than exteriorly, a characteristic in which it agrees with *chamberlini* and *eruditum;* the palps are granulate, with fairly numerous but relatively inconspicuous larger granules, in which feature again it differs from *ferum, ferumoides,* and *mormon.* The general appearance is thoroughly typical of the genus.

Remarks. When originally collected this species was thought to be *ferumoides* and its specific distinctness was only recognized much later.

Family Sternophoridæ Chamberlin
Genus Sternophorus Chamberlin

Remarks. Of the four species here recorded, only *sini,* the genotype, has thus far been described. These four species, in spite of their large and discontinuous distribution, are so extremely close in superficial morphological structure that it is difficult to find characters that are sufficiently marked to permit their easy separation. The following key includes most of the important taxonomic criteria thus far ascertained.

The term "heel" of the trochanter requires some clarification. It is employed herein to mean the posterior protuberance of the trochanter which, in members of this genus, is often pronouncedly elongate and with a straight or nearly straight posterior contour. Its length is measured from the pedicel at the point where the swelling of the heel begins to the trochantero-femoral condyle.

1. Hand 2.8 times as long as tibial breadth; femur 3.0 times as long as broad; tibia 2.8 times as long as broad; fourth pedal tibia 3.5 times as long as broad; heel of trochanter nearly twice as long as breadth of chela; large species from the west coast of Mexico, the male measuring 3.7 mm. long..... .....*ferrisi* sp. nov.

   Hand 2.3 or less times as long as tibial breadth; femur 2.8 or less times as long as broad; tibia 2.3 or less times as long as broad; fourth pedal tibia 3.2 or less times as long as broad; heel of trochanter subequal to or less than breadth of chela in length; smaller species only rare individuals (occasional females of *sini*) attaining a length greater than 2.5 mm..... 2

2. Chela about three times as long as broad; femur 2.3 times as long as broad; tibia 2.5 times as long as heel of trochanter, which is much shorter than the breadth of the chela (about 0.7 as long); Australian species, the male measuring about 1.9 mm. long.....*hirsti* sp. nov.

   Chela plainly more than three times as long as broad, generally 3.4-3.6 times as great; femur 2.5-2.8 times as long as broad; tibia 2.0 or less times as long as the heel of the trochanter; heel of trochanter subequal in length to breadth of chela, never more than slightly greater or smaller; North American species 3

3. Heel of trochanter 1.1 or less times as long as breadth of femur; femur slightly but distinctly broader than tibia; chela about four times as long as broad (male); fourth pedal tibia 2.6 times as long as broad; median cribriform plates of female smoothly ovate and no larger or more conspicuous than the anterior spiracular guard sclerites; palpal femur strongly swollen basally, subequal in breadth to that of chela; small species (expanded male 1.7 mm., female barely 2.0 mm.), from southeastern United States.....*paludis* sp. nov.

   Heel of trochanter 1.3 times as long as breadth of femur; femur and tibia subequal in breadth; chela 3.5-3.6 times as long as broad; fourth pedal tibia 3.0 to 3.2 times as long as broad; median cribriform plates of female conspicuous, larger than guard sclerites of anterior spiracles and provided at either end of their major axis with a prominent sclerotic spur; palpal femur less swollen basally than in *paludis,* plainly

narrower than chela; larger species, expanded female specimens measuring 2.5-3.5 mm. long; from the region of the Gulf of California.....*sini* Chamberlin

STERNOPHORUS SINI Chamberlin

Material examined. Owing to an editorial oversight, the only locality recorded for this species in the original description (Chamberlin, 1923, p. 371) was the type locality. The following localities (all in Mexico) were actually represented by one or more specimens at the time. All collections were by the author. No additional material has since come to hand.

Sonora; San Carlos Bay (JC-687.02); San Pedro Bay (JC-177.02).

Islands of the Gulf of California: Angel de la Guardia, (Palm Canyon) (JC-167.02); Carmen Island, (Puerto Bellandra) (JC-130.03), Marquer Bay (JC-156.03); San Josef Island, (Lagoon at north end) (JC-174.04); Tiburon Island, (Monument Point, type locality) (JC-183.02), (Willards Point) (JC-344.03); Espiritu Santo Island, (San Gabriel Bay) (JC-361.03).

Lower California: Los Angeles Bay, (Palm Wells) (JC-119.03); Puerto Escondido (JC-129.02); Concepcion Bay, (Coyote Bay) (JC-181.02), (Point Guadalupe) (JC-366.02); Point Santa Antonita (JC-367.02); San Evaristo Bay (JC-369.03); Los Animas Bay (JC-714.01); Cuesta Blanca, (near Loreto) (JC-144.02); Agua Verde Bay (JC-182.03).

Sternophorus paludis, sp. nov.

Holotype, ♂ (JC-725.01001), Alachua County, Florida. Collected March 30, 1925, by Prof. T. H. Hubbell. Allotype, ♀ (JC-43.02001), Okefinokee Swamp (Billy's Island), Georgia. Collected by Prof. C. R. Crosby. Cornell University collection.

Diagnosis. Very close to *sini* Chamberlin, but the palps are somewhat more robust. The points in which the palpal proportions differ have already been noted in the preceding key to the species. In addition it may be noted that in the male at least the anterior femoral margin shows a number of larger granules (not conspicuous) which do not occur in *sini.* The species, however, is most easily separated from *sini* by its small size and geographical range. The male genitalia is of the same type as occurs in *sini,* but differs in as yet unelucidated details. In the female the most important difference is found in the inconspicuous unspurred median cribriform

plates. The following palpal proportions are from the male (the allotype was treated *in toto* in caustic potash, and as a result the palpal form unfortunately became somewhat distorted). Trochanter 2.0 times as long as broad; femur 2.7 times as long as broad; tibia 2.4 times as long as broad; chela 4.0 times as long as broad; hand slightly longer than the fingers and subequal in length to the tibia. Length of fully expanded male 1.7 mm., female 2.0 mm.

Sternophorus ferrisi sp. nov.

Holotype ♂, (JC-275.01001), State of Michoacan, Mexico. Precise date and locality unknown. Collected under the bark of a tree by Prof. G. F. Ferris. I take pleasure in dedicating this splendid species to its discoverer.

Diagnosis. Although quite distinct from the other species of the genus, this form is nevertheless quite closely related to *sini*. The male genitalic structures differ, in details not yet entirely worked out, from *sini* and other species of the genus. The preceding key includes all the important discriminatory criteria yet ascertained. The large size and excessive elongation of the heel of the trochanter are perhaps the most distinctive features of this species. The following palpal proportions should be of supplementary value. Trochanter 2.1 times as long as broad; femur 3.0 times as long as broad; tibia 2.8 times as long as broad; chela 4.0 times as long as broad; hand distinctly longer than fingers and only slightly shorter than the tibia. The fully expanded male measures 3.7 mm. long.

Sternophorus hirsti sp. nov.

Holotype ♂, (JC-480.01001) collected by F. S. Hirst on the Barringun frontier between New South Wales and Queensland, Australia. I take pleasure in dedicating this fine species to its discoverer, Dr. F. S. Hirst.

Diagnosis. In spite of its great and apparently remarkable geographical discontinuity with other members of the genus, this species is yet very close to the American forms in most of its morphological details. All the important diagnostic criteria thus far ascertained are incorporated in the preceding key. Perhaps the most characteristic feature of the species lies in the unusual shortness of the heel of the trochanter as compared with that of the American species. The male genitalia seems to show some differences, but they are not especially marked. The following palpal proportions should be of supplementary value. Trochanter 1.8 times as long as broad; femur 2.3 times as long as broad; tibia 1.9-2.0 times as long as broad; chela 3.0 times as long as broad; fingers and hand subequal in length and somewhat shorter than the tibia. Small species, the fully expanded male measuring 1.9 mm. long.

List of Publications Cited in the Text

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An Important Work on the Pseudoscorpions

The entomologist generally finds his own field so engrossing that he rarely has time to give much thought to the spiders. However, the order Chelonethida, or pseudoscorpions, seems almost like a connecting link between the spiders and insects and they often attract the attention of the entomologist. One of our younger workers, Dr. Joseph C. Chamberlin, developed an interest in this order while a student at Stanford University and has now become our leading American authority on the group. Recently he has given us an elaborate monographic paper, from both the morphological and systematic sides. In the systematic portion he keys down to the genera and gives us numerous excellent cuts, most if not all of which were drawn by Dr. Chamberlin. With this work in hand one should be able to place any pseudoscorpion in its correct genus. A full bibliography and index completes the work. It is listed above as the "Chamberlin, Joseph C., 1931" entry.—E. P. Van Duzee.