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## NEW PHALANGODIDAE (PHALANGIDA) FROM THE UNITED STATES

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The Phalangodidae is a family of phalangids which are rather small in size, about two to three millimeters in length, and which have relatively short legs. They are poorly known due to their secretive habits. Usually they are found in damp places around decaying logs, in sphagnum or in rich leaf mold. Many of them live in caves, a favorite habitat, and many cave-adapted forms without eyes and with long legs and paler coloration have developed. Careful work is needed for their collection, the sifting of leaf mold being the most satisfactory. When shaken upon a white background, the phalangodids are easily recognized by their slow movements and reddish coloration. In general, the phalangodids are confined to the southern portions of the United States, but some occur as far north as Maryland, southern Indiana and Ohio.

Ten species are already known from the United States. In the present study fifteen new species have been encountered, making a total of twenty-five species. All but one are members of the subfamily

Phalangodinae. *Phalangodes spinifera* Packard from southern Florida belongs to the small tropical subfamily Stygnommatinae and is made the genotype of the new genus *Rula*. Its true affinities were determined after a study of the type at the Museum of Comparative Zoölogy.

The writers have followed Roewer's system of classification in which the number of tarsal segments, the position of the eye tubercle and the presence or absence of median armament are considered of generic significance.

While this paper is based on a comparatively large collection of specimens, undoubtedly it represents only a small portion of the forms that remain to be discovered in the United States. Much credit is due Drs. W. B. Jones and A. F. Archer of the Alabama Museum of Natural History for an unusually fine series of specimens from a large number of caves. All holotypes are deposited in the collection of The American Museum of Natural History.

### SUBORDER LANIATORES THORELL

#### PHALANGODIDAE Simon

#### Phalangodinae Roewer

#### KEY TO GENERA AND SPECIES OF PHALANGODINAE

- 1.—(a) First tarsus with three segments . . . 2.  
(b) First tarsus with more than three segments . . . . . 7.
- 2.—(a) Eye tubercle on the anterior margin of the cephalothorax . . . . . 3.  
(b) Eye tubercle not on the anterior margin of the cephalothorax . . . . . 4.
- 3.—(a) Third and fourth tarsi with four segments . . . *Zuma acuta*, new species.  
(b) Third and fourth tarsi with five segments . . . . . *Sitalcina* Banks, 5.

- 4.—(a) Third tarsus having five articulations  
    . . . *Wespus arkansasensis*, new species.  
(b) Third tarsus having four articulations  
    . . . *Undulus formosus*, new species.
- 5.—(a) Eye tubercle in the form of a pointed cone, slanting anteriorly . . . . .  
    . . . . . *S. californicus* (Banks).  
(b) Eye tubercle in a different form . . . . . 6.
- 6.—(a) Eye tubercle in the form of a rounded cone, without teeth . . . . .  
    . . . . . *S. lobatus*, new species.  
(b) Eye tubercle in the form of a rounded cone, bearing dorsal teeth . . . . .  
    . . . . . *S. cockerelli*, new species.
- 7.—(a) First tarsus with five segments . . . . .  
    . . . *Tolus appalachius*, new species.  
(b) First tarsus with four segments . . . . . 8.

- 8.—(a) Eye tubercle with a median spine... *Citrinus marquesas*, new species.
- (b) Eye tubercle without a median spine..... 9.
- 9.—(a) Second dorsal area with a distinct elevation... *Bishopella* Roewer, 10.
- (b) Second dorsal area without elevation..... 12.
- 10.—(a) Dorsum very tuberculate.....
- ..... *B. jonesi*, new species.
- (b) Dorsum smooth, only slightly tuberculate..... 11.
- 11.—(a) Dorsum very dark, a definite pattern present... *B. marianna*, new species.
- (b) Dorsum light... *B. laciniosa* (Crosby and Bishop).
- 12.—(a) Eye tubercle on the anterior margin of the cephalothorax.....
- ..... *Texella mulaiki*, new species.
- (b) Eye tubercle not on the anterior margin of the cephalothorax... 13.
- 13.—(a) Third and fourth tarsi with four segments... *Phalangodes* Tellkamp, 14.
- (b) Third and fourth tarsi with five or six segments..... 18.
- 14.—(a) Ventral portion of the tarsus of the palpus with two spine-bearing tubercles on either side..... 15.
- (b) Ventral portion of the tarsus of the palpus with three spine-bearing tubercles on either side..... 16.
- 15.—(a) Femur of palpus unbedecked dorsally, legs long and thin.....
- ..... *P. armata* Tellkamp.
- (b) Femur of palpus toothed dorsally, legs short..... *P. californica* Banks.
- 16.—(a) Second joint of chelicera of male with two spines... *P. brunnea* Banks.
- (b) Second joint of chelicera of male without such spines..... 17.
- 17.—(a) Eye tubercle pointing anteriorly... *P. acanthina* Crosby and Bishop.
- (b) Eye tubercle rounded.....
- ..... *P. archeri*, new species.
- 18.—(a) Fourth tarsus five-segmented.....
- ..... *Erebomaster* Cope, 19.
- (b) Fourth tarsus six-segmented.....
- ..... *Crosbyella* Roewer, 21.
- 19.—(a) Apical median portion of femur of palpus with two spines.....
- ..... *E. caecum* (Packard).
- (b) Apical median portion of femur of palpus with one spine..... 20.
- 20.—(a) Color of body reddish yellow, second leg long and thin.....
- ..... *E. flavescens flavescens* Cope.
- (b) Body dark reddish yellow, with dark fleck, second leg short and thick... *E. flavescens weyerensis* (Packard).
- 21.—(a) Second tarsus seven-segmented; without eyes... *C. distincta*, new species.
- (b) Second tarsus six-segmented; with eyes..... 22.
- 22.—(a) Dorsum heavily tuberculate.....
- ..... *C. tuberculata*, new species.
- (b) Dorsum only slightly tuberculate... 23.

- 23.—(a) Dorsum without darker brown mottlings.....
- ..... *C. spinturnix* (Crosby and Bishop).
- (b) Dorsum with dark brown mottlings... 24.
- 24.—(a) Dorsum of femur of pedipalps distinctly tuberculate.....
- ..... *C. roeweri*, new species.
- (b) Dorsum of femur of pedipalps not tuberculate.....
- ..... *C. montana*, new species.

**Bishopella jonesi**, new species

Figures 1, 2 and 3

MALE.—Total body length, 2.2 mm. Cephalothorax, 0.9 mm. Width of body at widest portion, 1.8 mm.

	I	II
Trochanter	0.3 mm.	0.4 mm.
Femur	1.3	1.7
Patella	0.6	0.7
Tibia	0.9	1.4
Metatarsus	1.3	1.8
Tarsus	0.6	1.2
Total	5.0 mm.	7.2 mm.
	III	IV
Trochanter	0.4 mm.	0.4 mm.
Femur	1.4	1.5
Patella	0.4	0.6
Tibia	1.3	1.8
Metatarsus	1.4	2.1
Tarsus	1.1	1.3
Total	6.0 mm.	7.7 mm.

Dorsal scute (Fig. 1) with five distinct areas, the boundaries of which are parallel to one another. First area without a median line, second area with the median elevation characteristic of the genus. Eye tubercle (Fig. 2) clearly removed from the anterior margin of the carapace, in the form of an elevated cone, strongly tuberculate. Dorsum covered with distinct tubercles, larger on the free tergites, forming a small projecting transverse line across the posterior margin. Venter and coxae strongly tuberculate. Lateral rows of teeth present on the anterior and posterior margins of coxae III and a few on the anterior margin of coxae IV and on the posterior margin of coxae I. Those on coxae I and IV are more nearly tubercles than teeth.

Legs: clothed with scattered hairs, a few small tubercles on the femora. Tarsal segments: 4-7-5-6. End group of segments of first tarsus, 2; of second, 3. The astragalus is much greater in length than the calcaneus of the metatarsi of the legs.

Palpus: trochanter, 0.3 mm. long; femur, 1.1; patella, 0.5; tibia, 1.0; and tarsus, 0.6. Total length, 3.5 mm. Palpus as illustrated in Fig. 3, and in addition on the prolateral side at

the apical median portion of the femur, two spine-bearing tubercles, and two spine-bearing tubercles on the patella.

Chelicerae normal.

Dorsum reddish brown with the abdominal areas and free tergites having a dark overcast. This darker marking extends laterally on either side of the cephalothorax to the eye tubercle. Venter, coxae and trochanters concolorous, appendages with darker reddish brown mottlings, which make the legs and palpi appear almost gray.

TYPE LOCALITY.—Male holotype from McFarlen Cave, near Garth, Jackson County, Alabama, February 29, 1940 (W. B. Jones and A. F. Archer).

This species differs from *Bishopella laciniosa* (Crosby and Bishop) in its darker coloration and very tuberculate appearance.

### *Bishopella laciniosa* (Crosby and Bishop)

*Phalangodes laciniosa* CROSBY AND BISHOP, 1924, Jour. Elisha Mitchell Sci. Soc., XL, p. 9, Pl. I, figs. 3 and 4.

*Bishopella laciniosa* ROEWER, 1926, Abh. Naturw. Ver. Bremen, XXVI, p. 289, Figs. 12A and B.

RECORDS.—*Alabama*: McFarlen Cave near Garth, Jackson County, February 29, 1940; Honeycomb Cave, Guntherville Dam, Marshall County, January 11, 1939; Cave Stand Cave, Jackson County, June 9, 1940; Shelta Cavern, Madison County, September 28, 1940; Saltpetre Cave, Clear Creek, Jackson County, June 9, 1940; McKinney Cave, Colbert County, September 26, 1940; Bat Cave, Morgan County, June 16, 1939; Cave Spring Cave, Morgan County, December 2, 1939; Dickey Cave, near Maud, Colbert County, September 25, 1940; Gilleymore Cave, near Allsboro, Colbert County, September 25, 1940; Lady Cave, Calhoun County, May 5, 1940; Wolf Den Cave, Colbert County, September 25, 1940; Georgetown Cave, Colbert County, September 26, 1940; Weaver Cave, Calhoun County, June 5, 1940; Devilstair Steps Cave, Jackson County, June 11, 1940; Gist Cave, near Allsboro, Colbert County, May 13, 1940. (All above collections by W. B. Jones and A. F. Archer.) Clear Creek, Jackson County, June, 1940; Mussee Creek, Houston County, October 21, 1940; Blowing Cave, McFarlen's Hollow, Jackson

County, June 12, 1940; Cheaha State Park, June, 1940. (Above collections by A. F. Archer.) Lime Point Cave, Marshall County, January 15, 1939; Black Warrior National Forest, Lawrence County, 1939; Terrel Cave No. 1, June 11, 1938; McGlendon Cave, Greasy Cove, St. Clair County, September 27, 1939; Ingram Cave, near Algood, Blount County, March 2, 1940; Griffith Cave, Marshall County, December 29, 1938. (Above collections by Dr. W. B. Jones.) Monte Sano, Madison County, July, 1939 (George Briar). *Georgia*: outside Grier's Cave, 10 miles north of Cuthbert, Randolph County, October 22, 1941 (A. F. Archer). *Tennessee*: Montvale Springs, May 18, 1929, and Elkmont, September 10, 1928 (W. M. Barrows).

### *Bishopella marianna*, new species

Figures 4, 5 and 6

MALE.—Total body length, 2.4 mm. Cephalothorax, 0.8 mm. Width of body at widest portion, 1.7 mm.

	I	II
Trochanter	0.2 mm.	0.2 mm.
Femur	1.0	1.3
Patella	0.4	0.5
Tibia	0.7	1.2
Metatarsus	1.0	1.3
Tarsus	0.6	1.0
Total	3.9 mm.	5.5 mm.
	III	IV
Trochanter	0.3 mm.	0.3 mm.
Femur	1.0	1.4
Patella	0.4	0.5
Tibia	1.0	1.3
Metatarsus	1.4	1.7
Tarsus	0.7	0.9
Total	4.8 mm.	6.1 mm.

Dorsum (Fig. 6) granulate with very small tubercles irregularly scattered on the dorsum, arranged in more or less definite rows at the posterior margin of the areas and the free tergites. Tubercles very faint on the first three areas. Second area with the characteristic elevation. Eye tubercle (Fig. 4) clearly removed from the anterior margin of the cephalothorax, in the form of an elevated cone, without a median spine. A row of very small hairs across each of the free tergites. Venter and coxae finely tuberculate, free sternites with

hairs arranged in transverse rows. Coxae with lateral teeth on the anterior and posterior margins of III and IV, and the posterior margin of II.

Legs: clothed with scattered hairs, tarsal articulations: 4-7-5-6. End groups of segments of first leg, 2; of second, 3. The astragalus is greater in length than the calcaneus of the legs.

Palpus: trochanter, 0.3 mm.; femur, 0.9; patella, 0.7; tibia, 0.7; and tarsus, 0.4. Total length, 3.0 mm. Palpus armed as in Fig. 5, and in addition on the prolateral side at the apical median portion of the femur, two spine-bearing tubercles. Two spine-bearing tubercles also present on the prolateral side of the patella.

Chelicerae normal, clothed with hairs.

Dorsum reddish brown, the free tergites and fourth and fifth areas darker. Cephalothorax and eye tubercle lighter, reddish brown. The lighter area projecting on either side of the elevation of the second area to the fourth area. The lateral margin of the first three abdominal areas and the region of the elevation darker, outlining the projecting light area. Venter and coxae reddish brown. Legs yellowish brown with a darker brown overcast. Tarsi of third and fourth legs white. Palpi and chelicerae yellowish, with a few darker brown mottlings.

TYPE LOCALITY.—Male holotype and male paratype from Marianna, Jackson County, Florida, December 29, 1939 (A. F. Archer).

This species differs from *laciniosa* in the darker pattern of the posterior part of the dorsum.

#### CITRANUS, NEW GENUS

Dorsal scutes, excluding free tergites, with five distinct areas, arranged parallel to one another, first area without a median line. Eye tubercle low, tipped by a median spine, distinctly removed from the anterior margin. First four areas with median paired tubercles. Fifth area and free tergites with a median spine. Tarsal articulations: 4—more than 6-5-5. End group of segments of first leg, 2; of second, 3.

GENOTYPE.—*Citranus marquesas*, new species.

This genus is related to *Neoscotolemon* Roewer but differs in having the first four areas with median paired tubercles, and the free tergites with a median spine.

#### *Citranus marquesas*, new species

Figures 7, 8 and 9

MALE.—Total length of body, 3.1 mm. Cephalothorax, 1.0 mm. Width of body at widest portion, 2.2 mm.

	I	II
Trochanter	0.3 mm.	0.4 mm.
Femur	0.9	1.4
Patella	0.4	0.6
Tibia	0.7	1.4
Metatarsus	1.0	1.5
Tarsus	0.6	1.8
Total	3.9 mm.	7.1 mm.
	III	IV
Trochanter	0.4 mm.	0.4 mm.
Femur	1.2	1.4
Patella	0.4	0.6
Tibia	0.7	1.4
Metatarsus	1.4	1.9
Tarsus	0.8	1.1
Total	4.9 mm.	6.8 mm.

First four dorsal areas (Fig. 7) with a median pair of tubercles; the tubercles of the first and second areas very small, those of the third and fourth larger, appearing like small spines. In addition, there is a median row of small tubercles across each of the four areas and numerous other small tubercles scattered irregularly. The fifth area and the free tergites with a median spine and also with a transverse row of smaller spines. The whole dorsum is very tuberculate. Eye tubercle low (Fig. 8), eye situated at the base. The median spine is curved anteriorly and is tuberculate. Free sternites with a lateral row of small tubercles; coxae granulate, with lateral teeth present on the anterior and posterior margins of the third coxae.

Legs: clothed with scattered hairs, a row of tubercles present on the ventral margin of the femur. Tarsal segments: 4-7-5-5. End group of segments of first leg, 2; of second, 3. Metatarsi of legs not divided into an astragalus and calcaneus.

Palpus: trochanter, 0.4 mm. long; femur, 0.9; patella, 0.5; tibia, 0.6; and tarsus, 0.7. Total length, 3.1 mm. As in Fig. 9, and in addition on the prolateral margin at the apical median portion of the femur, a spine-bearing tubercle, and a single spine-bearing tubercle similarly situated on the patella.

Chelicerae with the first joint slightly elevated.

Dorsum reddish brown, venter and coxae concolorous, appendages yellowish, lighter than the dorsum.

FEMALE.—Total length of body, 3.2 mm. Cephalothorax, 0.9 mm. Width of body at widest portion, 2.2 mm.

Similar in appearance to male, except the median spine and tubercles are reduced. The first joint of the chelicerae is not elevated.

TYPE LOCALITY.—Male holotype and female paratype from Marquesas Key, Florida, June 23, 1938 (George Van Hyning); female paratype from Barracuda

Key, Florida, June 13, 1938 (George Van Hying).

**Crosbyella distincta**, new species

Figures 13, 14 and 15

MALE.—Total length of body, 2.0 mm. Cephalothorax, 0.6 mm. Width of body at widest portion, 1.6 mm.

	I	II
Trochanter	0.3 mm.	0.3 mm.
Femur	2.0	2.8
Patella	0.4	0.6
Tibia	1.4	2.5
Metatarsus	1.1	2.8
Tarsus	1.4	2.1
Total	6.6 mm.	11.1 mm.
	III	IV
Trochanter	0.3 mm.	0.4 mm.
Femur	2.3	2.4
Patella	0.5	0.6
Tibia	1.7	2.2
Metatarsus	2.5	3.1
Tarsus	1.8	1.9
Total	9.1 mm.	10.6 mm.

Dorsal scute (Fig. 14) with five distinct areas, boundaries parallel to one another. First area without a median line. Dorsal areas and free tergites without median spines or tubercles. Dorsum finely tuberculate, with more or less regular rows of very minute tubercles on the posterior boundaries of the first four areas and across the fifth area and free tergite. Eye tubercle (Fig. 13) in the form of a rounded cone, clearly removed from the anterior margin of the carapace, without eyes. Venter and coxae granulate, a few very small spinose hairs on the coxae, more numerous on the first coxae. Lateral rows of teeth present on the anterior and posterior margins of coxae III and a few on the posterior margin of coxae II and on the anterior margin of coxae IV.

Legs: clothed with a few scattered hairs, legs long and slender. Tarsal segments: 4-7-5-6. End group of segments of first leg, 2; of second, 3. Astragalus of the metatarsi greater in length than the calcaneus.

Palpus: trochanter, 0.2 mm. long; femur, 0.9; patella, 0.6; tibia, 0.7; and tarsus, 0.4. Total length, 2.8 mm. Armed as in Fig. 15, and in addition on the prolateral side at the apical median portion of the femur, two spine-bearing tubercles and two on the patella.

Chelicerae normal, second segment with a few small tubercles and hairs.

Dorsum, venter and coxae pale reddish brown, legs and palpi yellowish, lighter.

TYPE LOCALITY.—Male holotype and female paratypes from Wagler's Cave,

Harrison, Arkansas, April 13, 1935 (J. M. Valentine and J. C. Beakley).

This species differs from other *Crosbyella* in having seven instead of six segments in the second tarsus. It also lacks eyes and has longer legs than other species of *Crosbyella*.

**Crosbyella montana**, new species

Figures 25, 26 and 27

FEMALE.—Total length of body, 1.9 mm. Cephalothorax, 0.6 mm. Width of body at widest portion, 1.4 mm.

	I	II
Trochanter	0.2 mm.	0.2 mm.
Femur	0.7	1.0
Patella	0.4	0.4
Tibia	0.4	0.8
Metatarsus	0.7	0.9
Tarsus	0.5	0.9
Total	2.9 mm.	4.2 mm.
	III	IV
Trochanter	0.2 mm.	0.3 mm.
Femur	0.7	0.9
Patella	0.4	0.4
Tibia	0.7	0.9
Metatarsus	0.8	1.2
Tarsus	0.5	0.7
Total	3.3 mm.	4.4 mm.

Dorsum (Fig. 25) granulate, eye tubercle (Fig. 27) rounded, oval, granulate, clearly removed from the anterior margin of the cephalothorax. First area without a median line. Venter and coxae granulate. Lateral teeth present on the anterior and posterior margins of coxae III and IV and a few on the posterior margin of coxae II.

Legs: clothed with scattered hairs. Tarsal segments: 4-6-5-6. End group of segments of first leg, 2; of second, 3. Astragalus of metatarsi greater than the calcaneus.

Palpus: trochanter, 0.2 mm. long; femur, 0.6; patella, 0.4; tibia, 0.5; and tarsus, 0.4. Total length, 2.1 mm. Palpi robust, armed as in Fig. 26, and in addition, on the prolateral margin of the femur, a median spine-bearing tubercle and a smaller one at the apical median portion. The patella armed on the prolateral side with two large spine-bearing tubercles.

Chelicerae normal.

Dorsum reddish brown with mottlings of darker brown. The fifth area and free tergites with a transverse strip of darker brown, and from the median portion of the fifth area, a rectangle outlined in darker brown projects anteriorly to the second area. Inside this rectangle are three of the dark brown stripes. The cephalothorax, eye tubercle and lateral

margins of the abdomen are mottled with darker brown. Venter and coxae yellowish brown, without mottlings. Chelicerae and palpi yellowish brown, with mottlings of darker brown. Legs heavily mottled with darker brown, except for the tarsi which are almost white.

**TYPE LOCALITY.**—Female holotype from Shades Mountain, 43 miles west of Acton, Jefferson County, Alabama, March 4, 1940 (A. F. Archer).

This species differs from other *Crosbyella* in having the dorsal portion of the femur of the palpus not tuberculate, and in having dark mottlings on the dorsum.

***Crosbyella roeweri*, new species**

Figures 10, 11 and 12

**MALE.**—Total length of body, 2.2 mm. Cephalothorax, 0.6 mm. Width of body at widest portion, 1.5 mm.

	I	II
Trochanter	0.2 mm.	0.2 mm.
Femur	1.0	1.2
Patella	0.4	0.4
Tibia	0.6	1.1
Metatarsus	0.9	1.2
Tarsus	0.5	1.0
Total	3.6 mm.	5.1 mm.
	III	IV
Trochanter	0.3 mm.	0.4 mm.
Femur	0.9	1.4
Patella	0.3	0.4
Tibia	0.9	1.2
Metatarsus	1.2	1.2
Tarsus	0.7	0.9
Total	4.3 mm.	5.5 mm.

Dorsum (Fig. 12) finely granulate without median tubercles or spines. Eye tubercle (Fig. 10) in the form of a rounded elevation, clearly removed from the anterior margin of the cephalothorax, faintly tuberculate. Venter and coxae finely granulate. Well-developed rows of teeth on the anterior and posterior margins of coxae III and a few on the distal portion of the posterior margin of II and the anterior margin of IV.

Legs: clothed only with a few scattered hairs. Tarsal segments: 4-6-5-6. End group of segments of first leg, 2; of second, 3. As-tragus of metatarsi greater in length than the calcanes.

Palpus: trochanter, 0.3 mm. long; femur, 0.8; patella, 0.4; tibia, 0.5; and tarsus, 0.4. Total length, 2.4 mm. As in Fig. 11, and in addition on the prolateral margin at the apical median portion of the femur, two spine-bearing tubercles; also two on the patella similarly located.

Chelicerae normal.

Dorsum and eye tubercle yellowish brown with darker brown mottlings. There is a row of darker brown across each of the free tergites and the fifth area. These darker brown mottlings are present on the lateral margin of the abdomen and swing around on the fourth and fifth areas, extending forward in the median portion to the second area. This makes a marking which resembles an inverted V (see Fig. 12). Venter and coxae yellowish brown, appendages concolorous with the dorsum except for the third and fourth tarsi which are very light.

**FEMALE.**—Total length of body, 2.2 mm. Cephalothorax, 0.6 mm. Width of body at widest portion, 1.5 mm.

Identical in appearance with the male.

**TYPE LOCALITY.**—Male holotype and female allotype from Tom Danforth Cave, Benton County, Arkansas, October 29, 1938 (Albert Miller).

This species differs from *Crosbyella spinturnix* (Crosby and Bishop) in having a distinctly different dorsal color pattern and in having larger tubercles on the dorsal surface of the femur of the palpus, the darker brown mottling on the dorsum, and in lacking the proximal small tubercle of the tibia of the palpus.

***Crosbyella spinturnix* (Crosby and Bishop)**

Figures 16, 17 and 18

*Phalangodes spinturnix* CROSBY and BISHOP, 1924, Jour. Elisha Mitchell Sci. Soc., XL, p. 10, Pl. I, figs. 5 and 6.

*Crosbyella spinturnix* ROEWER, 1926, Abh. Naturw. Ver. Bremen, XXVII, p. 290, Figs. 13A and B.

**NEW RECORDS.**—Alberta City, Tuscaloosa County, Alabama, March 8, 1940 (A. F. Archer), Kigmulga Cave, 6 miles N. E. of Childersburg, Talladega County, Alabama, February 27, 1940 (W. B. Jones and A. F. Archer), Tishomingo State Park, Mississippi, September 5, 1941 (C. J. and M. L. Goodnight), Corkscrew Cave, Washington County, Arkansas, November 12, 1938 (J. M. Valentine and J. C. Beakley), and in ravine above Chipola River, Bristol, Florida, December 29, 1939 (A. Parker).

***Crosbyella tuberculata*, new species**

Figures 19, 20 and 21

**MALE.**—Total length of body, 1.6 mm. Cephalothorax, 0.5 mm. Width of body at widest portion, 1.4 mm.

	I	II
Trochanter	0.2 mm.	0.2 mm.
Femur	0.8	1.1
Patella	0.4	0.3
Tibia	0.5	0.8
Metatarsus	0.6	0.9
Tarsus	0.3	0.8
Total	2.8 mm.	4.1 mm.
	III	IV
Trochanter	0.3 mm.	0.3 mm.
Femur	0.8	1.2
Patella	0.3	0.4
Tibia	0.6	0.9
Metatarsus	0.9	1.2
Tarsus	0.6	0.6
Total	3.5 mm.	4.6 mm.

Dorsum (Fig. 21) including free tergites thickly covered with large granulations. Eye tubercle (Fig. 20) clearly removed from the anterior margin of the cephalothorax, in the form of a rounded cone. First area without a median line. Venter and coxae granulate. Lateral rows of teeth present on the anterior and posterior margins of coxae III and on the anterior margin of coxae IV; a few small teeth present on the posterior margin of coxae II.

Legs: clothed only with scattered hairs. Tarsal segments: 4-6-5-6. End group of segments of first leg, 2; of second, 3. Astragalus of metatarsi greater in length than the calcaneus.

Palpus: trochanter, 0.3 mm. long; femur, 0.8; patella, 0.4; tibia, 0.5; and tarsus, 0.4. Total length, 2.4 mm. As in Fig. 19, and in addition on the pro-lateral margin at the apical median portion of the femur, one spine-bearing tubercle, and two similarly situated on the patella. (In a few specimens examined, there is another smaller tubercle at the distal portion of the femur.)

Chelicerae normal, clothed with hairs.

Dorsum yellowish red with darker brown overcast on the abdominal segments. Mottlings of darker brown on the cephalothorax. Venter and coxae similar in appearance to the dorsum. Appendages yellow with brown mottlings which are so numerous on the legs as to give a brown overcast. Tarsi of legs white.

FEMALE.—Total length of body, 2.0 mm. Cephalothorax, 0.6 mm. Width of body at widest portion, 1.5 mm.

Identical in appearance with male.

TYPE LOCALITY.—Male holotype and female paratypes from Hatchet Creek, Coosa County, Alabama, June, 1940 (A. F. Archer). Female paratype from Acton, Jefferson County, Alabama, March 4, 1940 (A. F. Archer).

This species differs from other *Crosbyella*

in the tuberculate appearance of the dorsum.

### *Phalangodes acanthina* Crosby and Bishop

*Phalangodes acanthina* CROSBY AND BISHOP, 1924, Jour. Elisha Mitchell Sci. Soc., XL, p. 11, Pl. I, figs. 7 and 8.—ROEWER, 1926, Abh. Naturw. Ver. Bremen, XXVI, p. 285, Figs. 9A and B.

*Cladonychium corii* Hadži, 1935, Biologia Generalis, XI, pp. 49-72, Figs. 1-8.

NEW RECORD.—Shenandoah National Park, Virginia, June 18, 1941 (C. J. and M. L. Goodnight) and Washington, D. C.

A study of the excellent description of the animal described as *C. corii* by Jovan Hadži has convinced the writers that Hadži actually had specimens of *Phalangodes acanthina* which is common in the region from which his collection came, Newmarket, Virginia.

### *Phalangodes archeri*, new species

Figures 22, 23 and 24

MALE.—Total length of body, 1.6 mm. Cephalothorax, 0.7 mm. Width of body at widest portion, 1.4 mm.

	I	II
Trochanter	0.2 mm.	0.2 mm.
Femur	0.7	1.0
Patella	0.3	0.4
Tibia	0.5	0.9
Metatarsus	0.7	1.0
Tarsus	0.3	0.9
Total	2.7 mm.	4.4 mm.
	III	IV
Trochanter	0.2 mm.	0.3 mm.
Femur	0.7	0.8
Patella	0.3	0.4
Tibia	0.6	0.9
Metatarsus	0.9	1.2
Tarsus	0.4	0.5
Total	3.1 mm.	4.1 mm.

Dorsum (Fig. 22) finely granulate, almost smooth. Boundaries of five dorsal areas parallel to one another. First area without a median line. A row of very small tubercles present on the fifth area and on the free tergites. Eye tubercle low (Fig. 23), distinctly separated from the anterior margin of the cephalothorax. Venter and coxae finely granulate. Third coxae with lateral teeth on the anterior and posterior margins, and there are some teeth on the posterior margin of the fourth coxae.

Legs: clothed with a few scattered hairs.

Tarsal segments: 4-7-4-4. End group of segments of first leg, 2; of second, 3. Metatarsi not divided into astragalus and calcaneus.

Palpus: trochanter, 0.3 mm. long; femur, 0.5; patella, 0.3; tibia, 0.5; and tarsus, 0.4. Total length, 2.0 mm. Palpus armed as in Fig. 24, and in addition on the prolateral margin at the apical median portion of the femur there are two spine-bearing tubercles; one spine-bearing tubercle similarly situated on the patella.

Chelicerae normal with three to four long hairs on the second segment.

Dorsum yellowish brown with dark brown mottlings on the cephalothorax and the entire dorsum darker brown, in parts almost gray. There is a distinct light pattern forming an oval posterior to the eye; there are a few lighter markings along the margin. Venter yellowish, much lighter than the dorsum, but with the darker brown lines on the free sternites. Coxae light; palpi mottled with yellowish and darker markings. Legs darker, grayish brown, similar to dorsum, except for the tarsi which are pale. Chelicerae light with some mottlings.

FEMALE.—Length of body, 2.4 mm. Cephalothorax, 0.6 mm. Width of body at widest portion, 1.5 mm.

Similar in appearance to male.

TYPE LOCALITY.—Male holotype from McFarlen Cave, near Garth, Jackson County, Alabama, February 29, 1940; female paratype from Blowing Cave, near Garth, Jackson County, Alabama, February 29, 1940; male and female paratypes from Alladin Cave, Sharp's Cove, Madison County, Alabama, December 1, 1939. (All collections by W. B. Jones and A. F. Archer.)

The three spine-bearing tubercles on either side of the tarsus of the palpus show the relationships of this species to *Phalangodes brunnea* Banks and *Phalangodes acanthina* Crosby and Bishop; however, it lacks the projection on the second joint of the chelicerae as in *brunnea*, has an entirely different type of eye tubercle from *acanthina* and is generally darker in color than both.

#### SITALCINA BANKS

*Sitalces* (part) BANKS, 1893, Trans. American Ent. Soc., XX, p. 15.

*Metapachylus* BANKS, 1909, Proc. Acad. Nat. Sci. Philadelphia, LXI, p. 230.

*Sitalcina* BANKS, 1911, Pomona Jour. Ent., III, pp. 412-421.

*Paramitraceras* (part) ROEWER, 1912, Arch. Naturg., LXXV, p. 155.

*Pachylicus* ROEWER, 1923, Die Weberknechte der Erde, p. 118.

Dorsum with five distinct areas, boundaries parallel to one another, first area without a median line; all dorsal areas and free tergites without median spines or tubercles. Eye tubercle situated on the anterior margin of the cephalothorax. Tarsal segments: 3-5-5-5. End group of segments of first leg, 2; of second, 3.

GENOTYPE.—*Sitalcina californicus* (Banks).

This genus is related to *Scotolemon* Lucas but differs in having the eye tubercle situated on the anterior margin of the cephalothorax instead of away from it.

#### *Sitalcina californicus* (Banks)

Figures 28, 29 and 30

*Sitalces californicus* BANKS, 1893, Trans. Amer. Ent. Soc., XX, p. 151.—BANKS, 1901, Amer. Natural., XXXV, p. 672.—BANKS, 1904, Proc. California Acad. Arts and Sci., (3) III, p. 363, Pl. xxxviii, fig. 18.

*Sitalcina californicus* BANKS, 1911, Pomona Jour. Ent., III, pp. 412-421.

*Paramitraceras californicus* ROEWER, 1912, Arch. Naturg., LXXVIII, p. 155.

*Pachylicus californicus* ROEWER, 1923, Die Weberknechte der Erde, p. 118.

FEMALE.—Total length of body, 1.7 mm. Cephalothorax, 0.5 mm. Width of body at widest portion, 1.2 mm.

	I	II
Trochanter	0.1 mm.	0.1 mm.
Femur	0.7	0.7
Patella	0.3	0.3
Tibia	0.4	0.4
Metatarsus	0.4	0.3
Tarsus	0.3	0.5
Total	2.2 mm.	2.3 mm.
	III	IV
Trochanter	0.2 mm.	0.2 mm.
Femur	0.5	0.7
Patella	0.2	0.3
Tibia	0.5	0.6
Metatarsus	0.6	0.8
Tarsus	0.4	0.4
Total	2.4 mm.	3.0 mm.

Animal pyriform in shape, rounded caudad. Dorsal scute (Fig. 30) with five parallel areas, a transverse row of tubercles across the posterior margins of these five areas, and on the free tergites. Tubercles on the fifth area and free tergites make a slightly lobate appearance. Eye tubercle



(Fig. 29) on the anterior margin of the cephalothorax, slanting anteriorly, in the form of an acute pointed cone, granulate. In side view, a row of larger granulations is seen in the median portion. Venter and coxae slightly granulate.

Legs: clothed with minute scattered hairs. Tarsal segments: 3-5-5-5. End group of segments of first leg, 2; of second, 3. Metatarsi not divided into astragalus and calcaneus.

Palpus: trochanter, 0.2 mm. long; femur, 0.3; patella, 0.2; tibia, 0.2; and tarsus, 0.4. Total length, 1.3 mm. As in Fig. 28, and in addition on the pro-lateral margin at the apical median portion of the femur, one spine-bearing tubercle. Two situated similarly on the patella.

Chelicerae normal.

Color of entire animal dark reddish brown, except for the distal portion of the legs which are lighter.

TYPE LOCALITY.—Female holotype from southern California in the Museum of Comparative Zoology, Cambridge, Massachusetts.

#### *Sitalcina cockerelli*, new species

Figures 31, 32 and 33

FEMALE.—Total length of body, 2.6 mm. Cephalothorax, 0.8 mm. Width of body at widest portion, 1.8 mm.

	I	II
Trochanter	0.2 mm.	0.2 mm.
Femur	1.1	1.3
Patella	0.4	0.5
Tibia	0.6	1.1
Metatarsus	0.9	1.2
Tarsus	0.5	1.0
Total	3.7 mm.	5.3 mm.
	III	IV
Trochanter	0.3 mm.	0.3 mm.
Femur	1.0	1.3
Patella	0.4	0.5
Tibia	0.8	1.1
Metatarsus	1.1	1.3
Tarsus	0.7	0.8
Total	4.3 mm.	5.3 mm.

Dorsum (Fig. 33) finely granulate, without median spines or tubercles, having a transverse row of small tubercles across the posterior margin of the five dorsal areas and the free tergites. Those on the free tergites giving a scalloped appearance to the posterior margins. There

is a row of very small tubercles on the lateral margin of the dorsal scute. Eye tubercle (Fig. 32) in the form of a granular elevated mound with the eyes near the base, located directly on the anterior margin of the cephalothorax. Free sternites with a posterior margin of small tubercles. Coxae granulate, with a few tubercles on the lateral margin, but without definite lateral teeth. At the anterior lateral margin of the cephalothorax there are four very small spinules.

Legs: clothed with scattered hairs. Tarsal segments: 3-5-5-5. End group of segments of the first leg, 2; of the second, 3. Metatarsi not divided into astragalus and calcaneus.

Palpus: trochanter, 0.3 mm. long; femur, 0.8; patella, 0.4; tibia, 0.5; and tarsus, 0.4. Total length, 2.4 mm. As in Fig. 31, and in addition on the pro-lateral margin of the patella, a larger spine-bearing tubercle in the median portion, and a small one at the distal portion.

Chelicerae normal.

Color of dorsum, venter and coxae reddish brown, golden. Appendages concolorous except for the tarsi of the legs which are very pale.

TYPE LOCALITY.—Female holotype from Myers Auto Camp, Redwood Highway, California (T. D. A. Cockerell).

This species differs from *S. californicus* (Banks) in having an entirely different type of eye tubercle and in the tuberculations on the dorsum.

#### *Sitalcina lobatus*, new species

Figures 37, 38 and 39

FEMALE.—Total length of body, 1.6 mm. Cephalothorax, 0.5 mm. Width of body at widest portion, 1.2 mm.

	I	II
Trochanter	0.1 mm.	0.2 mm.
Femur	0.4	0.5
Patella	0.3	0.4
Tibia	0.4	0.5
Metatarsus	0.4	0.4
Tarsus	0.4	0.5
Total	2.0 mm.	2.5 mm.
	III	IV
Trochanter	0.2 mm.	0.3 mm.
Femur	0.5	0.5
Patella	0.3	0.3
Tibia	0.5	0.6
Metatarsus	0.5	0.7
Tarsus	0.4	0.4
Total	2.4 mm.	2.8 mm.

First four dorsal areas of the dorsal scutes, the cephalothorax and the eye tubercle covered with numerous distinct tubercles (Fig. 39). On the posterior margins of the first four areas,

these tubercles are arranged in an indefinite row, but on the remaining portions of the areas and the cephalothorax they are irregularly scattered. Fifth area with only a few tubercles. The posterior margin of the fifth area and the free tergites with a row of larger tubercles, giving a scalloped appearance. In addition, on each of the free tergites there is a transverse row of smaller tubercles in the median portion. Eye tubercle (Fig. 38) in the form of a rounded cone, situated on the anterior margin of the cephalothorax. Free sternites granulate, the few small tubercles on the posterior lateral margin. Coxae slightly granulate, lateral teeth present on the posterior margins of the third coxae, and a few present on the anterior margin of the fourth coxae and the posterior margin of the second coxae.

Legs: clothed with a few scattered hairs. The legs, except the tarsi, covered with very fine striations, giving a shining appearance. Metatarsi not divided into an astragalus and calcaneus. Tarsal segments: 3-5-5-5. End group of segments of the first leg, 2; of the second, 3.

Palpus: trochanter, 0.2 mm. long; femur, 0.4; patella, 0.2; tibia, 0.2; and tarsus, 0.3. Total length, 1.4 mm. Armed as in Fig. 37, and in addition on the prolateral margin at the apical median portion of the femur, a spine-bearing tubercle. Two spine-bearing tubercles situated similarly on the patella.

Chelicerae normal.

Color of dorsum light reddish brown, giving a golden appearance. The tubercles are slightly darker. Venter and appendages somewhat lighter.

TYPE LOCALITY.—Female holotype from Oceanside, California.

This species differs from the preceding ones in having a different type of eye tubercle, the palpal spination and the dorsal tuberculation.

#### TEXELLA, NEW GENUS

Eye tubercle situated on the anterior margin of the cephalothorax, in the form of an elevated cone. Dorsum with five areas, the boundaries of areas parallel to one another. Dorsal scutes and free tergites without spines or tubercles. First area without a median line. Tarsal segments: 4—more than 6-5-6. End group of segments of first leg, 2; of second, 3.

GENOTYPE.—*Texella mulaiki*, new species.

This genus is related to *Sitalcina* Banks but differs in the number of tarsal segments.

#### *Texella mulaiki*, new species

Figures 34, 35 and 36

MALE.—Total length of body, 2.6 mm. Cephalothorax, 0.5 mm. Width of body at widest portion, 1.2 mm.

	I	II
Trochanter	0.2 mm.	0.3 mm.
Femur	2.3	2.6
Patella	0.4	0.4
Tibia	2.2	2.2
Metatarsus	2.6	2.7
Tarsus	1.8	1.9
Total	9.5 mm.	10.1 mm.

	III	IV
Trochanter	0.3 mm.	0.4 mm.
Femur	4.1	3.6
Patella	0.6	0.5
Tibia	4.1	2.6
Metatarsus	3.9	4.0
Tarsus	4.9	2.6
Total	17.9 mm.	13.7 mm.

Dorsum smooth (Fig. 34), the areas poorly defined. Eye tubercle (Fig. 36) directly on the anterior margin of the cephalothorax, in the form of an acute elevated cone, slanting slightly anteriorly, without eyes. Venter and coxae clothed with a few small scattered hairs. Coxae quite smooth, lacking even the lateral teeth.

Legs: clothed only with a few scattered hairs, covered with fine striations. Metatarsi not divided into astragalus and calcaneus. Tarsal segments: 4-7-5-6. End group of segments of first leg, 2; of second, 3.

Palpus: trochanter, 0.4 mm. long; femur, 0.8; patella, 0.5; tibia, 0.6; and tarsus, 0.6. Total length, 2.9 mm. Armed as in Fig. 35, and in addition on the prolateral margin, a median spine-bearing tubercle on the femur, two on the patella.

Chelicerae clothed only with a few scattered hairs, the proximal joint with a slight elevation.

Entire animal and appendages concolorous, light yellow.

TYPE LOCALITY.—Male holotype from Hays County, Texas, April 15, 1939 (D. and S. Mulaik).

#### TOLUS, NEW GENUS

Dorsum with five distinct areas, first area without a median line, boundaries of areas parallel to each other, eye tubercle present in the form of a small mound, clearly separated from the anterior margin of the cephalothorax. All five dorsal areas and free tergites unarmed. Tarsal segments: 5—more than 6-5-6. End group of segments of first leg, 2; of second, 3.

GENOTYPE.—*Tolus appalachius*, new species.

This genus shows its closest affinities to *Phalangodes* Tellkampf but differs in the number of segments in several tarsi.

**Tolus appalachius**, new species

Figures 40, 41 and 42

FEMALE.—Total length of body, 2.7 mm. Cephalothorax, 1.0 mm. Width of body at widest portion, 2.1 mm.

	I	II
Trochanter	0.4 mm.	0.4 mm.
Femur	2.9	4.6
Patella	0.7	1.1
Tibia	2.2	4.5
Metatarsus	2.9	5.0
Tarsus	2.1	5.1
Total	11.2 mm.	20.7 mm.

	III	IV
Trochanter	0.4 mm.	0.5 mm.
Femur	3.5	4.0
Patella	0.7	0.9
Tibia	2.8	3.4
Metatarsus	4.1	5.2
Tarsus	2.5	3.3
Total	14.0 mm.	17.3 mm.

Dorsum (Fig. 40) granulate, without spines or tubercles. Eye tubercle (Fig. 41) low, slightly granulate posteriorly, clearly removed from the anterior margin of the carapace. Without eyes. Venter and coxae granulate, coxae with scattered spine-like hairs, more numerous on the first and second coxae and fewer on the fourth. Lateral rows of teeth present on the anterior and posterior margins of coxae III.

Legs: trochanters and bases of femora with a few scattered spine-like hairs, remainder of legs clothed only with a few scattered hairs. Legs long and slender. Astragulus of the metatarsi greater in length than the calcaneus. Tarsal segments: 5-10-5-6. End group of segments of first leg, 2; of second, 3.

Palpus: trochanter, 0.4 mm. long; femur, 1.2; patella, 0.8; tibia, 1.0; and tarsus, 0.9. Total length, 4.3 mm. Armed as in Fig. 42, and in addition on the prolateral surface at the apical median portion of the femur, two spine-bearing tubercles; two spine-bearing tubercles similarly situated on the patella, and three on the tibia (ectolateral margin having only two as in the figure).

Chelicerae with longer spine-like hairs on the second joint.

Dorsum, venter and coxae light reddish brown, all appendages yellowish white, lighter than the dorsum.

TYPE LOCALITY.—Female holotype and female paratypes from Wonder Cave, Mount Eagle, Tennessee, April 18, 1935 (J. C. Valentine and J. M. Beakley). Female paratypes from Crystal Cave, Monteagle, Tennessee, April 18, 1935 (J. C. Valentine and J. M. Beakley).

**UNDULUS**, NEW GENUS

Dorsal scute with five distinct areas, the boundaries of which are parallel to one another. First area without a median line, dorsal scutes and free tergites unbedecked. Eye tubercle low, rounded, not situated on the anterior margin of the cephalothorax. Tarsal segments: 3-5-4-5. End group of segments of first leg, 2; of second, 3.

GENOTYPE.—*Undulus formosus*, new species.

This genus is related to *Scotolemon* Roewer but differs in the number of segments in the third tarsus.

**Undulus formosus**, new species

Figures 49, 50 and 51

FEMALE.—Total length of body, 1.9 mm. Cephalothorax, 0.6 mm. Width of body at widest portion, 1.4 mm.

	I	II
Trochanter	0.2 mm.	0.2 mm.
Femur	0.6	0.9
Patella	0.3	0.4
Tibia	0.4	0.7
Metatarsus	0.6	0.7
Tarsus	0.4	0.8
Total	2.5 mm.	3.7 mm.

	III	IV
Trochanter	0.2 mm.	0.2 mm.
Femur	0.7	0.9
Patella	0.3	0.4
Tibia	0.6	0.8
Metatarsus	0.6	0.9
Tarsus	0.4	0.5
Total	2.8 mm.	3.7 mm.

Dorsum (Fig. 49) finely granulate, without spines or tubercles. First area without a median line. Eye tubercle (Fig. 51) clearly removed from the anterior margin of the cephalothorax, covered with small granulations. Venter and coxae finely granulate. Lateral teeth present on the anterior and posterior margins of coxae III and a few on the posterior margin of coxae II and on the anterior margin of coxae IV.

Legs: clothed only with a few scattered hairs. Astragulus of the metatarsi greater in length than the calcaneus. Tarsal segments: 3-5-4-5. End group of segments of first leg, 2; of second, 3.

Palpus: trochanter, 0.2 mm. long; femur, 0.5; patella, 0.4; tibia, 0.4; and tarsus, 0.3. Total length, 1.8 mm. Armed as in Fig. 50, and in addition on the prolateral side at the apical median portion, two spine-bearing tubercles on the femur and two spine-bearing tubercles on the patella.

Chelicerae normal.

Dorsum reddish brown with darker brown transverse markings across the free tergites;

the third, fourth and fifth areas are darker brown, the lateral margins of the first and second areas likewise darker brown. Cephalothorax and eye tubercle with mottlings of darker brown; venter and coxae reddish brown with fine pencillings of transverse darker lines on the posterior margins of the free sternites. All appendages reddish brown, with mottlings of darker brown, the darker brown mottlings almost completely covering the legs except for the tarsi which are white.

**TYPE LOCALITY.**—Female holotype and female paratype from Elk River Fish Hatchery, Limestone County, Alabama, April 16, 1940 (A. F. Archer).

#### WESPUS, NEW GENUS

Dorsum with five distinct areas; all dorsal areas and free tergites without median spines or tubercles. Eye tubercle clearly separated from the anterior margin of the carapace, in the form of a roughly tuberculate cone. First area without a median line. Boundaries of dorsal areas parallel to each other. Tarsal segments: 3-6-5-5. End group of segments of first leg, 2; of second, 3.

**GENOTYPE.**—*Wespus arkansasensis*, new species.

This genus differs from other Phallogodinae in the number of tarsal segments.

#### *Wespus arkansasensis*, new species

Figures 46, 47 and 48

**FEMALE.**—Total length of body, 2.2 mm. Cephalothorax, 0.7 mm. Width of body at widest portion, 1.6 mm.

	I	II
Trochanter	0.2 mm.	0.3 mm.
Femur	0.8	1.1
Patella	0.3	0.5
Tibia	0.5	0.8
Metatarsus	0.6	0.9
Tarsus	0.4	0.6
Total	2.8 mm.	4.2 mm.
	III	IV
Trochanter	0.3 mm.	0.3 mm.
Femur	0.8	1.1
Patella	0.4	0.4
Tibia	0.6	1.0
Metatarsus	0.7	1.1
Tarsus	0.4	0.5
Total	3.2 mm.	4.4 mm.

Dorsum (Fig. 48) granulate, eye tubercle (Fig. 47) in the form of a roughly tuberculate cone. Dorsum without tubercles or spines, free

tergites likewise unbedecked. Dorsal scutes and the first three free tergites form a hard rounded shield which projects slightly over the ventral area and the remaining free tergites. Venter and coxae granulate with lateral rows of teeth on the anterior and posterior margins of coxae III and IV, and a few on the posterior margin of coxae II.

**Legs:** granulate, clothed only with a few hairs. Astragulus of the metatarsi greater in length than the calcaneus. Tarsal segments: 3-6-5-5. End group of segments of first leg, 2; of second, 3.

**Palpus:** trochanter, 0.3 mm. long; femur, 0.5; patella, 0.4; tibia, 0.4; and tarsus, 0.3. Total length, 1.9 mm. Armed as in Fig. 46, and in addition on the prolateral margin at the apical median portion, two spine-bearing tubercles on the femur and two on the patella.

Chelicerae normal.

Color of dorsum reddish brown with darker brown mottlings on the cephalothorax and etched on the posterior lateral margin of the cephalothorax so as to bound a lighter square posterior to the eye tubercle. This darker brown marking extends into the abdomen where it forms a cast over most of the dorsal scute and on the free tergites. Venter, coxae concolorous with the dorsum. Appendages lighter than the dorsum with the leg tarsi almost white.

**MALE.**—Total length of body, 2.2 mm. Cephalothorax, 0.7 mm. Width of body at widest portion, 1.5 mm.

Identical in appearance with female.

**TYPE LOCALITY.**—Female holotype and male and female paratypes from Hot Springs, Arkansas, September 3, 1941. Collected by the writers while sifting near a decayed log.

#### ZUMA, NEW GENUS

Dorsum with five distinct areas, the boundaries of which are parallel to one another. First area without a median line, eye tubercle situated at the anterior margin of the cephalothorax in the form of an elevated cone. Tarsal segments: 3-5-4-4. End group of segments of first leg, 2; of second, 3. Dorsum without median spines or tubercles.

**GENOTYPE.**—*Zuma acuta*, new species.

This genus is related to *Sitalcina* Banks but differs in the number of tarsal segments on the third and fourth legs.

#### *Zuma acuta*, new species

Figures 52, 53 and 54

**MALE.**—Total length of body, 1.4 mm. Cephalothorax, 0.5 mm. Width of body at widest portion, 1.3 mm.

## Stygnommatinae Roewer

## RULA, NEW GENUS

*Phalangodes* (part) PACKARD, 1888, Mem. Nat. Acad. Sci., IV, p. 52.

*Scotolemon* (part) BANKS, 1901, Amer. Natural., XXXV, p. 671.—BANKS, 1908, Proc. Ent. Soc. Washington, IX, p. 38.

*Neoscotolemon* (part) ROEWER, 1912, Arch. Naturg., LXXVIII, p. 149.—ROEWER, 1923, Die Weberknechte der Erde, p. 112.

Eye tubercle absent. Cephalothorax with a median spine. Dorsum with five areas, boundaries parallel to one another, first area without a median line. All areas with median paired tubercles which are very much reduced in the first two areas. All free tergites with a median spine. Tarsal segments: 4—more than 6—5—5. End group of segments of first leg, 2; of second, 3. Secondary sexual characteristics of the male present as enlarged spines in certain free tergites and as heavier tubercles on the legs, and heavier palpi and chelicerae.

GENOTYPE.—*Rula spinifera* (Packard).

A study of the type revealed that Packard's *Phalangodes spinifera* was actually a member of the subfamily Stygnommatinae Roewer. It has been incorrectly placed in the subfamily Phalangodinae in Roewer's "Die Weberknechte der Erde." It was thought best to erect a new genus for *spinifera* and to maintain the genus *Neoscotolemon* in the Phalangodinae with *Neoscotolemon pictipes* (Banks) as the genotype. The number of segments of the fourth tarsus of *N. pictipes* is 5 and not 4 as was originally stated. The type of this animal was also checked.

*Rula spinifera* (Packard)

Figures 43, 44 and 45

*Phalangodes spinifera* PACKARD, 1888, Mem. Nat. Acad. Sci., IV, p. 52, Pl. XIII, figs. 2, 2a-c.

*Scotolemon spinifera* BANKS, 1901, Amer. Natural., XXXV, p. 672.

*Neoscotolemon spinifera* ROEWER, 1912, Arch. Naturg., LXXVIII, p. 150.—ROEWER, 1923, Die Weberknechte der Erde, p. 113.

MALE.—Total length of body, 3.3 mm. Cephalothorax, 1.2 mm. Width of body at widest portion, 2.4 mm.

	I	II
Trochanter	0.3 mm.	0.4 mm.
Femur	1.1	1.9
Patella	0.5	0.8
Tibia	0.9	1.8
Metatarsus	1.4	2.1
Tarsus	0.7	1.9
Total	4.9 mm.	8.9 mm.

	I	II
Trochanter	0.2 mm.	0.2 mm.
Femur	0.7	1.2
Patella	0.4	0.4
Tibia	0.6	1.0
Metatarsus	0.8	1.2
Tarsus	0.5	1.0
Total	3.2 mm.	5.0 mm.

	III	IV
Trochanter	0.2 mm.	0.3 mm.
Femur	0.9	1.1
Patella	0.4	0.4
Tibia	0.7	1.0
Metatarsus	1.0	1.3
Tarsus	0.5	0.8
Total	3.7 mm.	4.9 mm.

Dorsum (Fig. 53) finely granulate, the boundaries of the areas poorly defined, but the first four areas with the median portion slightly raised so as to give a rounded appearance in lateral view. Dorsum armed only with a few posterior pointing hairs, best seen from lateral view. Areas parallel to one another. Eye tubercle (Fig. 52) directly on the anterior margin of the carapace, in the form of an acute cone, the eyes situated near the base. Venter and coxae armed only with a few scattered hairs. Lateral teeth situated on the anterior and posterior margins of coxae III.

Legs: clothed only with a few hairs. Metatarsi not divided into astragalus and calcaneus. Tarsal segments: 3-5-4-4. End group of segments of first leg, 2; of second, 3.

Palpus: trochanter, 0.2 mm.; femur, 0.5; patella, 0.4; tibia, 0.5; and tarsus, 0.4. Total length, 2.0 mm. Armed as in Fig. 54, and in addition, on the prolateral margin at the apical median portion, one spine-bearing tubercle on the femur and one on the patella.

Chelicerae normal, clothed with hairs, and the first segment with a small elevation.

Entire animal including appendages light yellow, with a brown overcast present on the first four segments of the legs and on the dorsum. This brown overcast forms an intricate mottling on the cephalothorax and eye tubercle. The brown overcast on the male is less conspicuous than on the female, showing that there is considerable variation in the depth of color on different individuals.

FEMALE.—Total length of body, 2.0 mm. Cephalothorax, 0.5 mm. Width of body at widest portion, 1.4 mm.

Identical in appearance with male; palpi somewhat smaller; body more rounded.

TYPE LOCALITY.—Male holotype and female allotype from Redwood City, California.

	III	IV
Trochanter	0.4 mm.	0.6 mm.
Femur	1.3	2.0
Patella	0.5	0.7
Tibia	1.2	1.6
Metatarsus	1.5	2.4
Tarsus	1.0	1.3
Total	5.9 mm.	8.6 mm.

Eye tubercle (Fig. 45) missing, the eyes widely separated with a median, long, curved spine between them, the posterior portion of which has several tubercles. This spine curves slightly posterior and then recurves anteriorly. Dorsal scute (Fig. 43) with five areas, first without a median line. Paired tubercles of the first area very much reduced, being only slightly larger than the numerous tubercles scattered over the area. Second area with tubercles still reduced, but somewhat larger, and distinctly elevated over the other scattered tubercles of the area. Median tubercles of the third, fourth and fifth areas progressively larger. In addition, in these areas there is a median row of smaller tubercles which, however, are slightly larger than the numerous scattered tubercles, the row on the fifth area being almost spinose in character. Free tergites with a median spine which is larger on the first and second free tergites than on the remaining ones. In addition, there is a median row of spinose tubercles on each of the free tergites which on the lateral margin of the first one has enlarged into two larger spinose tubercles. Similarly on the second free tergite, two larger tubercles, which might almost be considered spines, are present. On the third free tergite, three large spines separated from the smaller median spine by two spinose tubercles are present. On the dorsal scute there is a row of tubercles. Each of the free sternites has a median row of low tubercles. Coxae and genital

operculum tuberculate. Third coxae with a well-developed row of lateral teeth on the anterior and posterior margins. Second and fourth coxae with only a few of these teeth.

Legs: clothed throughout with hairs, and in addition the trochanters and femora are tuberculate. On the femora there is a row of a few larger tubercles on the first and second legs, and there are slightly larger tubercles on the third and fourth legs, arranged in several rows. Tarsal segments: 4-8-5-5.

Palpus: trochanter, 0.5 mm. long; femur, 1.9; patella, 1.0; tibia, 1.4; and tarsus, 1.6. Total length, 6.4 mm. Palpus stout and curved, having an extremely large curved tarsus, armed ventrally as in Fig. 44, and in addition on the prolateral margin there are two spines on the trochanter, two hair-tipped spines on the median portion of the femur and a spine at the apical portion of the patella.

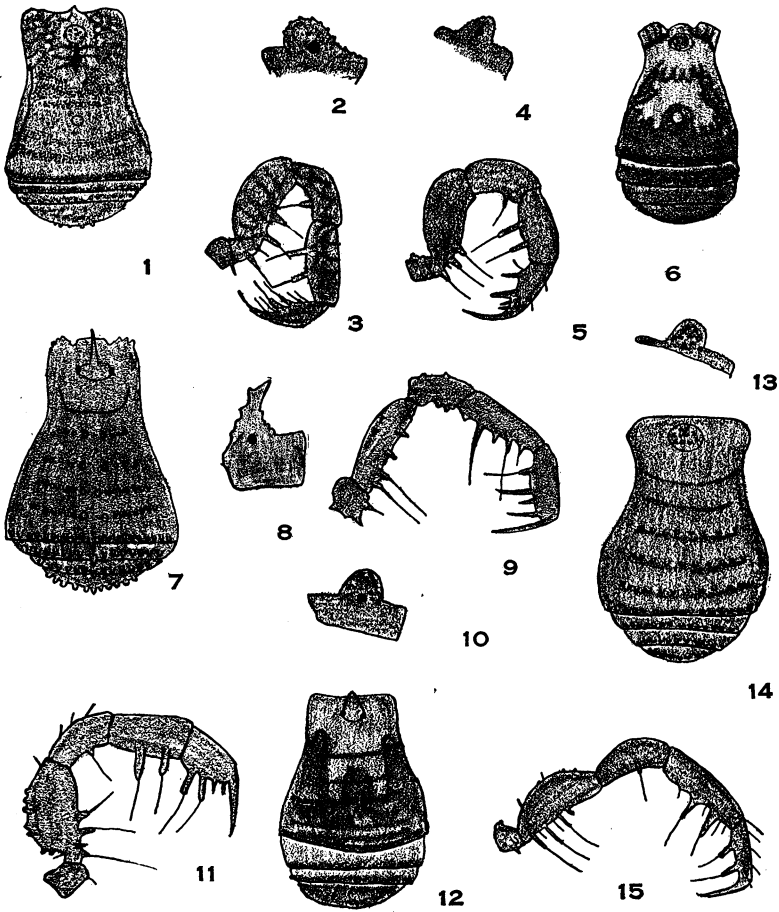
Chelicerae having the first joint curved and elevated above the cephalothorax.

FEMALE.—Total length of body, 2.8 mm. Cephalothorax, 0.7. Width of body at widest portion, 2.1 mm.

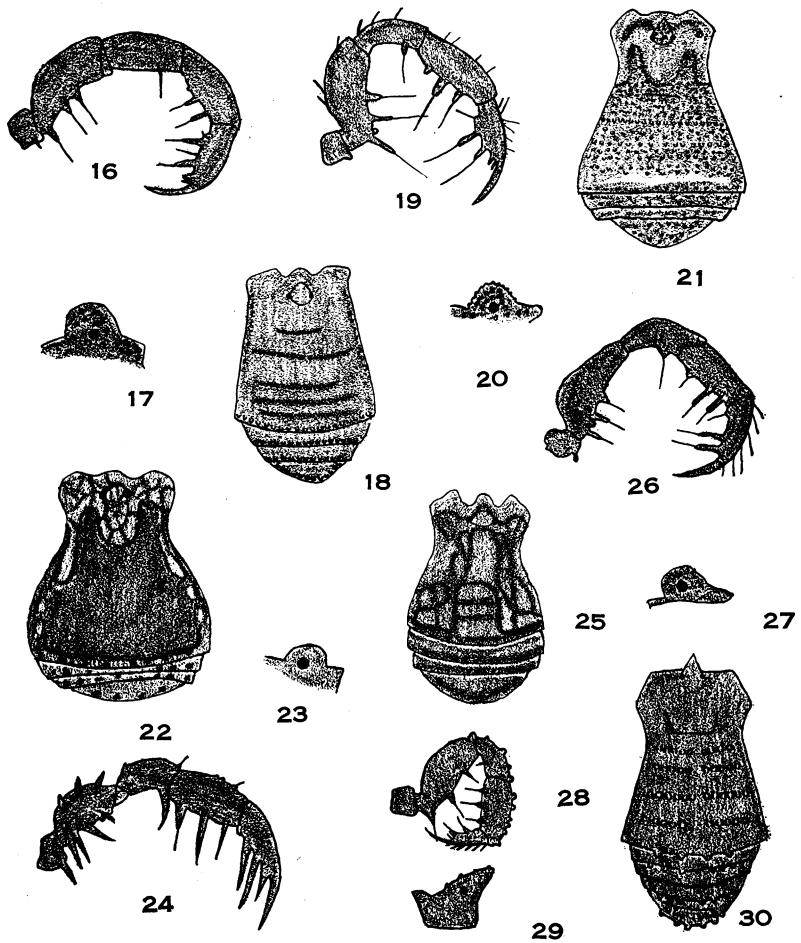
Similar in appearance to the male, except with less elevated first joint of the chelicerae, palpi slender and with median tubercles and spines reduced in size. Legs less tuberculate, and lateral spines of first three tergites not so prominent.

TYPE LOCALITY.—Male type from Florida; in the vial labeled "Type," the locality datum was only, "In a jar containing Florida Worms." The type is in the Museum of Comparative Zoölogy at Cambridge, Massachusetts.

NEW RECORDS.—Male from Royal Palm State Park, Dade County, Florida, December 29, 1940 (A. F. Archer); female from Homestead, Dade County, Florida, December 27, 1940 (A. F. Archer).

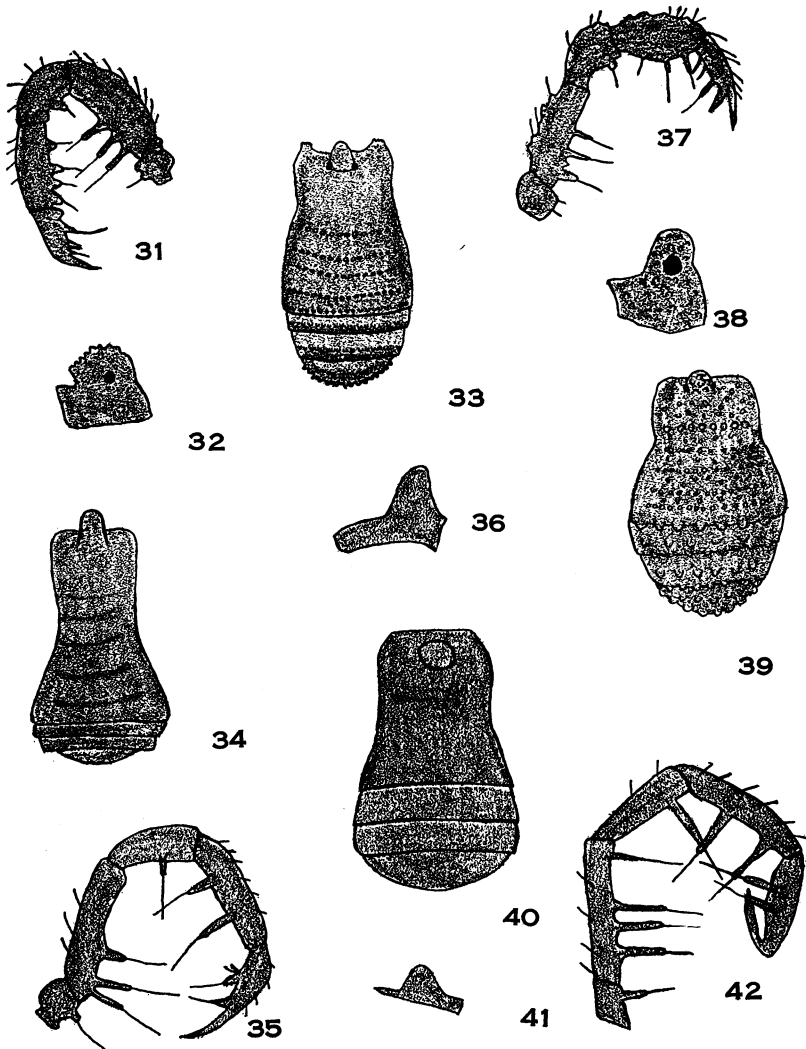


- Fig. 1. *Bishopella jonesi*, new species, dorsal view of male.  
 Fig. 2. Idem, lateral view of eye tubercle of male.  
 Fig. 3. Idem, retrolateral view of left palpus of male.  
 Fig. 4. *Bishopella marianna*, new species, lateral view of eye tubercle of male.  
 Fig. 5. Idem, retrolateral view of left palpus of male.  
 Fig. 6. Idem, dorsal view of male.  
 Fig. 7. *Citramus marquesas*, new species, dorsal view of male.  
 Fig. 8. Idem, lateral view of eye tubercle of male.  
 Fig. 9. Idem, retrolateral view of left palpus of male.  
 Fig. 10. *Crosbyella roeweri*, new species, lateral view of eye tubercle of male.  
 Fig. 11. Idem, retrolateral view of left palpus of male.  
 Fig. 12. Idem, dorsal view of male.  
 Fig. 13. *Crosbyella distincta*, new species, lateral view of eye tubercle of male.  
 Fig. 14. Idem, dorsal view of male.  
 Fig. 15. Idem, retrolateral view of left palpus of male.

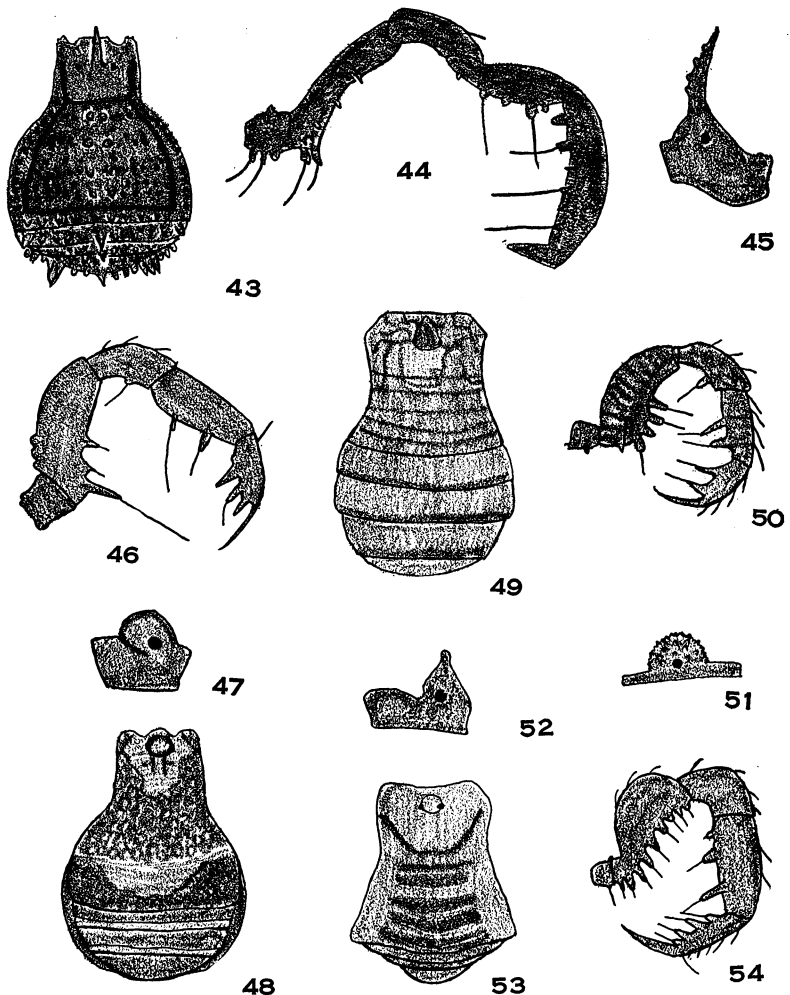


- Fig. 16. *Crosbyella spinturnix* (Crosby and Bishop), retrolateral view of left palpus of male.  
 Fig. 17. Idem, lateral view of eye tubercle of male.  
 Fig. 18. Idem, dorsal view of male.  
 Fig. 19. *Crosbyella tuberculata*, new species, retrolateral view of left palpus of male.  
 Fig. 20. Idem, lateral view of eye tubercle of male.  
 Fig. 21. Idem, dorsal view of male.  
 Fig. 22. *Phalangodes archeri*, new species, dorsal view of male.  
 Fig. 23. Idem, lateral view of eye tubercle of male.  
 Fig. 24. Idem, retrolateral view of left palpus of male.  
 Fig. 25. *Crosbyella montana*, new species, dorsal view of female.  
 Fig. 26. Idem, retrolateral view of left palpus of female.  
 Fig. 27. Idem, lateral view of eye tubercle of female.  
 Fig. 28. *Sitalcina californicus* (Banks), retrolateral view of left palpus of female.  
 Fig. 29. Idem, lateral view of eye tubercle of female.  
 Fig. 30. Idem, dorsal view of female.





- Fig. 31. *Sitalcina cockerelli*, new species, retrolateral view of right palpus of female.  
 Fig. 32. Idem, lateral view of eye tubercle of female.  
 Fig. 33. Idem, dorsal view of female.  
 Fig. 34. *Texella mulaiki*, new species, dorsal view of male.  
 Fig. 35. Idem, retrolateral view of left palpus of male.  
 Fig. 36. Idem, lateral view of eye tubercle of male.  
 Fig. 37. *Sitalcina lobatus*, new species, retrolateral view of left palpus of female.  
 Fig. 38. Idem, lateral view of eye tubercle.  
 Fig. 39. Idem, dorsal view of female.  
 Fig. 40. *Tolus appalachius*, new species, dorsal view of female.  
 Fig. 41. Idem, lateral view of eye tubercle of female.  
 Fig. 42. Idem, retrolateral view of left palpus of female.



- Fig. 43. *Rula spinifera* (Packard), dorsal view of male.  
 Fig. 44. Idem, retrolateral view of left palpus of male.  
 Fig. 45. Idem, lateral view of eye tubercle of male.  
 Fig. 46. *Wespus arkansasensis*, new species, retrolateral view of left palpus of female.  
 Fig. 47. Idem, lateral view of eye tubercle of female.  
 Fig. 48. Idem, dorsal view of female.  
 Fig. 49. *Undulus formosus*, new species, dorsal view of female.  
 Fig. 50. Idem, retrolateral view of left palpus of female.  
 Fig. 51. Idem, lateral view of eye tubercle of female.  
 Fig. 52. *Zuma acuta*, new species, lateral view of eye tubercle of male.  
 Fig. 53. Idem, dorsal view of male.  
 Fig. 54. Idem, retrolateral view of left palpus of male.



