

B I O L O G I A  
CENTRALI-AMERICANA.

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A R A C H N I D A  
SCORPIONES, PEDIPALPI, AND SOLIFUGÆ.

BY  
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# BIOLOGIA CENTRALI-AMERICANA.

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## ZOOLOGIA.

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### Class ARACHNIDA.

### Order SCORPIONES.

#### *Key to the Families of Central-American Scorpions.*

- a.* Legs furnished with a single pedal spur on the anterior side of the arthrodistal membrane connecting the tarsus and protarsus. Sternum pentagonal; the two halves of the genital operculum united in the female . . . . . SCORPIONIDÆ.
- a*<sup>1</sup>. No subaculear tooth on caudal vesicle . . . . . Subfam. ISCHNURINÆ.
- b*<sup>1</sup>. A distinct subaculear tooth on the caudal vesicle . . . . . Subfam. DIPLOCENTRINÆ.
- b.* Legs with a pair of pedal spurs between the tarsus and protarsus; the two halves of the genital operculum separated in both sexes.
- a*<sup>2</sup>. Sternum with parallel or subparallel sides, pentagonal; the pedal spurs simple, unbranched; immovable finger of mandible without an inferior tooth . . . . . VÆJOVIDÆ.
- b*<sup>2</sup>. Sternum triangular, with anteriorly converging sides; anterior pedal spur bifid; immovable finger of mandible with one inferior tooth . . . . . BUTHIDÆ.

### Fam. SCORPIONIDÆ.

#### Subfam. ISCHNURINÆ.

#### OPISTHACANTHUS.

*Opisthacanthus*, Peters, MB. Ak. Wiss. Berlin, 1861, p. 511; Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 11 (1876); Pocock, Journ. Linn. Soc., Zool. xxiv. p. 397 (1893); Ann. & Mag. Nat. Hist. (6) xvii. p. 312 (1896); Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 118 (1894) (part.); Das Tierr., Scorpiones et Pedipalpi, p. 146 (1899).

*Opisthocentrus*, Pocock, Ann. & Mag. Nat. Hist. (6) xii. p. 316 (1893).

*Carapace* deeply excised anteriorly, longitudinally sulcate throughout; ocular tubercle subcentral; three lateral eyes on each side. *Tail* thin, compressed, rather short. *Chelæ* robust, the brachium armed at the base in front with a large tooth-like prominence; upperside of the hand divided by a strong crest into two areas, the external of which is nearly vertical and meets the internal horizontal area at an obtuse or a right angle, the vertical area separated by a strong keel from the underhand, which is completely

inferior and constitutes the external area of the lower surface of the hand; movable finger furnished with two rows of fine teeth extending from the base to the apex. *Tarsi* furnished beneath with two rows of spines. *Pectines* short, the shaft broad at the base owing to the width of the intermediate lamella.

Type *O. lepturus*, Pal. de Beauv. (*Scorpio*).

*Distribution.* Northern parts of the Neotropical Region. Tropical Africa. Madagascar.

The African and Madagascar species referred to this genus differ in certain structural points from the one known Neotropical form, and have been separated as a distinct genus named *Opisthocentrus*, which will probably have to be maintained.

### 1. *Opisthacanthus lepturus*. (Tab. I. figg. 1, 1 *a-g*, ♂ ♀.)

*Scorpio lepturus*, Pal. de Beauv. Ins. Afr. et Amér. p. 191, Apt. t. 5. fig. 4 (1805)<sup>1</sup>.

*Scorpio elatus*, Gervais, Arch. Mus. iv. p. 235, t. 12. figs. 46-49 (1844)<sup>2</sup>; Ins. Apt. iii. p. 69 (1844)<sup>3</sup>.

*Opisthacanthus elatus*, Peters, MB. Ak. Wiss. Berlin, 1861, p. 511<sup>4</sup>; Pocock, Journ. Linn. Soc., Zool. xxiv. p. 398 (1893)<sup>5</sup>; Ann. & Mag. Nat. Hist. (6) xii. p. 330, t. 14. figg. 2, 2 *a* (1893)<sup>6</sup>; Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 120 (1894)<sup>7</sup>; Das Tierr., Scorpiones et Pedipalpi, p. 148 (1899)<sup>8</sup>; Borelli, Boll. Mus. Torino, xiv. no. 338, p. 3 (1899)<sup>9</sup>.

*Dacurus galbineus*, Peters, MB. Ak. Wiss. Berl. 1861, p. 511<sup>10</sup>.

*Opisthacanthus kinbergi*, Thorell, Atti Soc. Ital. Sci. Nat. xix. p. 246 (1877)<sup>11</sup>.

♀. *Colour* a tolerably uniform deep brown, the abdomen often pale brown; legs deep brown, with yellow tarsi, ventral surface yellowish-brown. *Carapace* granular, a little longer than caudal segments 1+2+½ of 3. *Terga* also granular and rugose, the last not carinate, but furnished posteriorly with two small tubercles. *Sterna* smooth, the last subsulcate. *Tail* about two and a half times as long as the carapace; the segments mesially excavated above, with rounded smooth edges, subcarinate beneath, but granular only posteriorly, fifth segment denticulate beneath, vesicle smooth, with long hairs beneath the aculeus. *Chelæ*: humerus finely granular above, with tubercular keels; brachium with strong denticulated crest at the proximal end of its anterior surface; hand coarsely granular above, rugose beneath, denticulated in front; the underhand about as long as the movable finger and as the carapace, width of hand about two-thirds the length of the underhand, fingers in contact throughout, not lobate. *Legs* finely granular, the femora coarsely granular below; tarsi armed below with 2 anterior and 4-5 posterior spines. *Pectines* small, furnished with 4-7 teeth.

♂. Tail a little more than three times the length of the carapace. Base of the fingers lobate and sinuate. *Pectines* large and furnished with 9-14 teeth.

*Measurements in mm.*—♀. Total length 78, carapace 12, tail 33. ♂. Total length 69, carapace 10, tail 31.

*Hab.* PANAMA, Rio Cianate, Punta de Sabana, Rio Lara, Laguna de Pita and Tintin in Darien (*Festa*<sup>9</sup>), San José in the Pearl Is.<sup>11</sup>.—COLOMBIA.

Recorded from the Isthmus of Panama by Dr. Borelli, who has kindly submitted specimens to me for examination. The species possibly occurs in Haiti.

### Subfam. *DIPLOCENTRINÆ*.

#### DIPLOCENTRUS.

*Diplocentrus*, Peters, MB. Ak. Wiss. Berlin, 1861, p. 512<sup>1</sup>; Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 12 (1876)<sup>2</sup>; Pocock, Journ. Linn. Soc., Zool. xxiv. p. 393 (1893)<sup>3</sup>; Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 12 (1894)<sup>4</sup>; Das Tierr., Scorpiones et Pedipalpi, p. 99 (1899)<sup>5</sup>.

*Carapace* with its anterior border deeply excised in the middle, with rounded frontal lobes; three lateral eyes on each side; ocular tubercle in advance of its middle, not sulcate. *Mandible* with penultimate tooth of movable finger some distance behind the terminal fang. *Chelæ* robust, the fingers armed with a close-set median series of teeth, with a lateral series on each side consisting of more scattered denticles, some of which are enlarged. *Tarsi* armed beneath with two rows of spines. *Tail* with its fifth segment furnished beneath posteriorly with a semicircular area bounded by a row of granules, a distinct tubercular tooth beneath the aculeus.

Type *D. whitei*, Gervais.

*Distribution.* Texas, Mexico, West Indies, and Brazil.

1. **Diplocentrus whitei.** (Tab. I. figg. 2, 2 *a-f*, ♀; 3, 3 *a-d*, ♂.)

*Scorpio whitei*, Gervais, Ins. Apt. iii. p. 63 (1844)<sup>1</sup>.

*Diplocentrus whitei*, Karsch, Mittheil. Münch. ent. Ver. iii. p. 98 (1879)<sup>2</sup>; Pocock, Journ. Linn. Soc., Zool. xxiv. p. 396 (1893)<sup>3</sup>; Ann. & Mag. Nat. Hist. (7) i. p. 391 (1898)<sup>4</sup>; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 101 (1899)<sup>5</sup>.

[Nec *D. whitei*, Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 13 (1894).]

*Diplocentrus mexicanus*, Peters, MB. Ak. Wiss. Berlin, 1861, p. 512<sup>6</sup>; Karsch, Mittheil. Münch. ent. Ver. iii. p. 99<sup>7</sup>; Zeitschr. Naturw. (3) v. p. 407 (1880)<sup>8</sup>.

*Diplocentrus antillensis*, Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 16 (1894)<sup>9</sup> (nec *D. antillanus*, Pocock).

♀. *Colour* of trunk dark brown or greenish-brown; legs yellow-brown; hands and vesicle reddish. Upper side of trunk smooth and polished, with only a few granules upon the edge of the frontal lobes and upon the posterior border of the tergite laterally, the last tergite more granular at the sides, the granules forming two weak crests. *Carapace* a little longer than the first and second caudal segments, considerably longer than the fifth. *Sterna* smooth; the last with four abbreviated, posteriorly converging, weakly granular keels. *Tail* about three and a half times the length of the carapace; the intercarinal spaces smooth; superior and inferior lateral keels weak and weakly tubercular, becoming progressively weaker from the first to the fourth; median lateral keel extending over the posterior half of the segment of the second, complete on the first, represented by a few granules and punctures on the third; the four inferior keels strong and tubercular on segments 1-3, the median becoming progressively weaker on segments 1-3 and obsolete on the fourth, where they are represented by rows of punctures; fifth segment with strong and denticulated inferior keels, upper keels weakly tubercular; vesicle smooth and punctured, granular only quite at the base beneath; the subaculear tooth pointed or rounded and lobate. *Chelæ* mostly smooth and polished; crests on the humerus denticulated, the anterior strong and complete; upperside and upper crest of brachium smooth, its anterior surface finely granular; hand smooth and polished, weakly crested above, its inner edge denticulated, its inner surface with two weak denticulate crests, its width equal to the length of the underhand; movable finger considerably longer than carapace. *Legs* almost smooth externally; distal end of tarsus expanded and overlapping the base of the claws; tarsus of fourth armed beneath with 7 spines in front, 8 behind, the third with 5 and 7. *Pectinal teeth* 10-15.

♂. Smaller than female. *Carapace* finely shagreened in parts, terga also finely shagreened and furnished with a few coarse granules, especially along the posterior edge. *Tail* with inferior lateral keels on segments 1-3 parallel. *Chelæ* with upperside of humerus flat and anterior crest strong; brachium with reticulation of ridges; hand coarsely reticulated above, more finely below, furnished above with two crests, the external strong and running almost to base of immovable finger; area at base of immovable finger smooth, punctured, not depressed and granular; fingers curved as in female. *Legs* of third and fourth pairs with some coarse granules. *Pectinal teeth* 14.

*Measurements in mm.*—♀. Total length 65, carapace 9, tail 32. ♂. Total length 53, carapace 7, tail 31.

*Hab.* NORTH AMERICA, Texas.—MEXICO.

No exact locality in Mexico has ever been assigned to specimens of this species.

The above-given description and the figures on Tab. I. have been taken from an adult male and female, captured with many others at San Diego, Texas, by Mr. William Taylor. The only other example in the British Museum is the type of the species, which is dried and too imperfect to be available for description. It is ticketed "Mexico."

*D. mexicanus*, Peters, is cited as a synonym of *D. whitei* on Kraepelin's authority.

## 2. *Diplocentrus keyserlingi*. (Tab. I. figg. 4, 4 *a-c*, ♂.)

*Diplocentrus keyserlingii*, Karsch, SB. Ges. nat. Fr. Berlin, 1880, p. 57<sup>1</sup>; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 102 (1899)<sup>2</sup>.

*Diplocentrus rectimanus*, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 390 (1898)<sup>3</sup>.

♂. Colour as in *D. whitei*. The whole of the upperside of the *trunk* finely and closely granular, with coarse granules or tubercles on the frontal lobes of the carapace. *Tail* as in the preceding species, but the sides of the first to the fourth segments convexly rounded when viewed from above, and the inferior lateral crests strongly converging posteriorly. *Chelæ* with upperside of femur lightly convex and with weaker anterior crest; hand coarsely sculptured above, with network of ridges and two strong parallel keels, running from but not reaching the base of the immovable finger; area at base of this finger hollowed and granular; fingers much straighter than in *D. whitei*. Tarsi of fourth *leg* armed beneath with 6 spines behind and 6 in front. *Pectinal teeth* 9-10.

*Measurements in mm.*—Total length 55, carapace 6, tail 30.

*Hab.* MEXICO, Jalapa, Oaxaca.

The above-given description and the figures on Tab. I. have been taken from the type of *D. rectimanus*, which, according to Kraepelin, is synonymous with *D. keyserlingi*, Karsch. Only the male is known.

## Fam. VÆJOVIDÆ.

### *Synopsis of the Genera.*

- a.* Caudal segments 1-4 either keelless or furnished with a pair of parallel inferior keels.
- a*<sup>1</sup>. A large spike-like tooth present upon the lower border of the movable finger of the mandible . . . . . HADRURUS, Thorell.
- b*<sup>1</sup>. Lower border of movable finger of mandible either toothless or armed with a few small subequal teeth.
- a*<sup>2</sup>. Intermediate lamellæ of the pectines broken up into numerous subequal subsimilar sclerites, of which about eight in the distal half of the organ are spherical and like the fulcra, which are large and round; no teeth on inferior edge of movable finger of mandible; stigmata long and slit-like . . . . . VÆJOVIS, C. Koch.
- b*<sup>2</sup>. Intermediate lamellæ of the pectines not broken up into subequal subspherical sclerites, or when broken up in this manner only about six in number, and then the movable finger of the mandible is furnished with a row of five teeth below, and the stigmata are short and suboval; fulcra of pectines not large, triangular.

- a*<sup>3</sup>. Three lateral eyes on each side; lower surface of tail keeled; tarsi furnished beneath with a median row of short spicules.
- a*<sup>4</sup>. Intermediate lamellæ of the pectines not broken up into subequal sclerites; stigmata long, slit-like . . . . . ANUROCTONUS, Pocock.
- b*<sup>4</sup>. Intermediate lamellæ of the pectines distally broken up into about six subsimilar sclerites; stigmata short, sub-oval . . . . . UROCTONUS, Thorell.
- b*<sup>3</sup>. Two lateral eyes on each side; lower surface of caudal segments 1-4 keelless (in the Central-American species); tarsi without median row of spicules; stigmata oval . . . . . BROTEOCHACTAS, Pocock.
- b*. Caudal segments furnished with a single inferior median keel; two lateral eyes; two rows of small teeth on the fingers of the chelæ.
- a*<sup>5</sup>. Pectines with distinct fulcra; stigmata elongate, slit-like . . . . . PLESIOCHACTAS, Pocock.
- b*<sup>5</sup>. Pectines without distinct fulcra; stigmata short, crescentic . . . . . MEGACORMUS, Karsch.

HADRURUS.

*Hadrurus*, Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 11 (1876); Atti Soc. Ital. Sci. Nat. xix. p. 189 (1877) (part.); Karsch, Mittheil. Münch. ent. Ver. iii. p. 21 (1879) (part.); Pocock, Ann. & Mag. Nat. Hist. (6) xii. p. 92 (1893); op. cit. p. 329 (sensu stricto); Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 206 (1894); Das Tierr., Scorpiones et Pedipalpi, p. 188 (1899).

Movable finger of *mandible* armed beneath with a strong and long tooth. *Tarsi* furnished below with a median row of spicules and paired lateral setæ; a large inferior claw present. *Pectines* long, with numerous spherical fulcra and the intermediate lamellæ represented, except basally, by a row of spherical sclerites. *Sternum* short and wide, deeply impressed mesially. *Stigmata* elongate. Fingers of *chelæ* furnished with 7-8 median rows of teeth, flanked on each side with isolated larger teeth. *Carapace* with convex anterior border; ocular tubercle in the middle. *Tail* long and strong.

Type *H. hirsutus*, Wood.

*Distribution*. South-western area of the United States and Mexico.

*Synopsis of the Species.*

- a*. Frontal area of carapace closely and finely granular; the tubercle very finely granular; the terga also very finely and closely granular, with some coarser granules interspersed upon the posterior elevated area; sterna finely and closely granular laterally, the last with four granular keels and additional granules in the middle of its area; median and lateral keels of fourth and fifth segments coarsely granular, superior lateral portions of fourth and fifth segments thickly and coarsely granular; hand and brachium finely and closely granular; upperside of hand with some coarse granules near the inner edge and many on the edge; coxæ of legs shagreened; movable finger longer than carapace . . . . . *hirsutus*, Wood.
- b*. Frontal area of carapace somewhat sparsely studded with large rounded granules, the intervening areas perfectly smooth, as is the ocular tubercle; terga mostly smooth in front and mesially; last sternum smooth in the

middle, with a single granular keel on each side; tail much smoother, median lateral crests on third and fourth segments scarcely granular; brachium and hand smooth and polished, except for the granules on the crests and a few coarse granules on the distal end of the upper surface of the brachium; hand with only a few rounded granules on the inner edge and on the keel above the underhand; coxæ of legs almost entirely smooth; movable finger shorter than carapace . . . . . *aztecus*, sp. n.

1. **Hadrurus hirsutus.** (Tab. II. figg. 2, 2 a, ♂.)

*Buthus hirsutus*, Wood, Proc. Ac. Philad. 1863, p. 108<sup>1</sup>; Journ. Ac. Philad. (2) v. p. 367, t. 40. figg. 1, 1 a-c (1863)<sup>2</sup>.

*Hadrurus hirsutus*, Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 11 (1876)<sup>3</sup>; Atti Soc. Ital. Sci. Nat. xix. p. 189 (1877)<sup>4</sup>; Bull. Soc. Ent. Ital. xxv. p. 373 (1895)<sup>5</sup>; Karsch, Mittheil. Münch. ent. Ver. iii. p. 136 (1879)<sup>6</sup>; Marx, Proc. Ent. Soc. Wash. i. p. 91 (1888)<sup>7</sup>; Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 205 (1894)<sup>8</sup>; Das Tierr., Scorpiones et Pedipalpi, p. 188 (1899)<sup>9</sup>.

*Buthus emarginaticeps*, Wood, Proc. Ac. Philad. 1863, p. 109<sup>10</sup>; Journ. Ac. Philad. (2) v. p. 367, t. 40. fig. 4 (1863)<sup>11</sup> (teste Marx, Proc. Ent. Soc. Wash. i. p. 91).

*Hab.* NORTH AMERICA, San Bernardino in California<sup>2</sup>, La Paz in Lower California<sup>11</sup>, Arizona.—? GUATEMALA.

This species, recorded from Guatemala by Thorell, was originally discovered in California. The Berlin Museum has an example from La Paz, and the British Museum one from San Bernardino. Kraepelin also states that it occurs in Arizona. The specimen Thorell records from Guatemala was received from Dr. Gustav Eisen, of San Francisco, California. Hence it is permissible to doubt the authenticity of the locality, especially in view of the fact that two other well-known Californian species, namely *Uroctonus mordax* and *Anuroctonus phæodactylus*, were received from the same source and labelled "Guatemala."

Judging from the three specimens in the British Museum that I refer to this species, namely, the one from San Bernardino mentioned above and two smaller examples for which no locality is known, *H. hirsutus* may be easily distinguished from *H. aztecus* by the features pointed out in the synoptical table. These specimens agree tolerably closely with the examples which Thorell described with much minuteness in 1877. Wood's description is not all that can be desired, and Kraepelin's is too generalized to be satisfactory; but in some respects it does not fit the Californian specimen known to me, *e. g.* in the smoothness of the first four tail-segments and of the sterna. In these two characteristics, however, it agrees more closely with the two smaller unlocalized specimens in the British Museum, which, judging by the size of the San Bernardino example (97 mm.) and those seen by Wood (which reached 108 mm.), are not adult. They measure 75 mm.: Kraepelin gives 70 mm. as the maximum of the species, over-

looking Wood's statement on this point. Hence it seems likely that the smoothness of the organ referred to may be a sign of immaturity or characteristic of the female.

The pectinal teeth in *H. hirsutus* vary from 25 to 40, the usual number being about 32-35.

The characters of *H. hirsutus* given in the synoptical table are taken from the adult example from San Bernardino, which, from the size of the pectines, I regard as a male. For a similar reason the type of *H. aztecus* is assigned to that sex.

The San Bernardino example gives the following measurements:—Total length 97 mm., carapace 11.5, tail 63; width of vesicle 6, of brachium 4, of hand 5; length of finger 12.5. The pectines surpass the end of the coxa of the fourth leg when lying at rest, and bear 34-35 teeth. A smaller specimen, with the pectines falling short of the end of the coxa of the fourth leg and bearing 32 teeth, measures as follows:—Total length 75 mm., carapace 9.5, tail 64; width of brachium 3.2, of hand 4.2; length of movable finger 10.

It is noticeable that the hand in the San Bernardino example is much narrower than in the type of *H. aztecus*.

## 2. *Hadrurus aztecus*, sp. n. (Tab. II. figg. 1, 1 a-f, ♂.)

♀. *Colour*: upperside of trunk a rich reddish-brown, part of carapace and tail much paler; chelæ and legs clear ochre-yellow. *Carapace* as long as fifth caudal segment and as the first caudal segment, and more than half the second; the frontal area sparsely but coarsely granular; posterior and lateral portions much more thickly granular. *Terga* granular posteriorly and laterally, the anterior nearly smooth in the middle, the last granular throughout, with median crest. *Sterna* coriaceous, the last smooth and keelless on the middle, granular laterally, with a series of granules forming a single crest on each side. *Tail* nearly five times as long as the carapace, the fifth segment very slightly more than twice as long as wide, the first as long as wide; a few granules on the upperside of the segments; the lower side of segments 1-3 smooth, with smooth keels, those on the third only weakly granular posteriorly, on the fourth more strongly granular; superior and superior lateral keels granular; a median lateral keel, anteriorly abbreviated on segments 2-4, present on segments 1-4; fifth segment with superior crests strongly granular; the three inferior crests strong and denticulate, the intervening area coarsely but not closely granular; vesicle large, as wide as high, its width equal to that of the fifth segment and to half the length of the carapace, sparsely granular below and bristly, narrower than hand. *Chelæ* bristly; humerus with granular crests, and a few granules in front, elsewhere smooth; brachium with granular crests and a few granules above distally, elsewhere smooth or nearly so and polished; hand wide, polished and smooth except for a granular crest on its inner edge and one above the underhand, its width equal to the length of the underhand, more than half the length of the carapace, and far exceeding the width of the brachium; movable finger almost as long as carapace, about twice the length of the underhand, not lobate, and furnished with eight rows of teeth. *Legs* smooth, except the femora, which are finely granular externally and denticulate below; protarsus furnished externally with a comb of fine spicules. *Pectinal teeth* 35-37.

*Measurements in mm.*—Total length 103; carapace 13; tail 63, width of first segment 7, of fifth 6; height of vesicle 5.5, width 6; length of brachium 10.5, width 4; width of hand 7; length of underhand 6.5, of movable finger 12.5.

*Hab.* MEXICO, Jalapa (*Mus. Brit.*).



## VÆJOVIS.

*Væjovis*, C. L. Koch, Die Arachn. iii. p. 51 (1836).

*Vejovis*, Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 10 (1876); Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 198 (1894); Das Tierr., Scorpiones et Pedipalpi, p. 183 (1899).

*Carapace* with its anterior border not excised; three lateral eyes on each side; ocular tubercle in front of its middle. *Mandible* without teeth on the lower border of the movable finger. *Chelæ* with fingers furnished with a median row of teeth flanked by a few larger lateral teeth. *Sternum* wider than long, longer than in *Hadrurus*. *Pectines* with intermediate lamellæ broken up, at least in the distal half of the organ, into subsimilar subequal and spherical sclerites simulating the fulcra, which are also large and spherical. *Tarsi* furnished beneath with a median row of spicules and lateral bristles. *Stigmata* long and slit-like.

Type *V. mexicanus*, Koch.

*Distribution.* Southern States of North America; Central America.

*Synopsis of the Species known to me.*

- a. Inferior median keels on segments 1-4 or 2-4 well developed and granular.
- a<sup>1</sup>. Inferior and lateral intercarinal spaces of tail coarsely and thickly granular; tail short and thick, segment 3 much wider than long . . . . . *granulatus*, Pocock.
- b<sup>1</sup>. Inferior and lateral intercarinal spaces of tail smooth or at most weakly granular; third segment not wider than long.
- a<sup>2</sup>. Ventral surface of trunk and pectines marbled with black; small, up to 25 mm. long; pectinal teeth 11-12 . . . . . *pusillus*, Pocock.
- b<sup>2</sup>. Ventral surface of trunk and pectines not marbled with black; length of adult from 30-45 mm.; pectinal teeth 13-23 . . . . . *mexicanus*, C. Koch.
- b. Inferior median keels on segments 1-4 quite smooth or absent.
- a<sup>3</sup>. Inferior median keels on segments 2-4 present as upstanding ridges.
- a<sup>4</sup>. Trunk banded black and yellow; hand and vesicle smooth . . . . . *subcristatus*, Pocock.
- b<sup>4</sup>. Trunk uniformly brown; hand and vesicle granular in part . . . . . *cristimanus*, Pocock.
- b<sup>3</sup>. Inferior median keels on segments 2-4 obsolete.
- a<sup>5</sup>. Hand granular internally; movable finger longer than carapace, which equals the brachium or humerus in length . . . . . *nitidulus*, C. Koch.
- b<sup>5</sup>. Hand entirely smooth; carapace much longer than humerus, brachium, or movable finger.
- a<sup>6</sup>. Terga ornamented behind with six pale spots separating seven black lines; ♂ with upper surface of humerus coarsely granular; sides and lower surface of fourth and fifth caudal segments finely granular . . . . . *variegatus*, Pocock.
- b<sup>6</sup>. Terga ornamented posteriorly with three pale spots separating four dark lines; ♂ with upper surface of humerus not coarsely granular; lateral surface of fourth and fifth and lower surface of fourth caudal segments smooth . . . . . *punctatus*, Karsch.

1. *Væjovis mexicanus*. (Tab. II. figg. 3, 3 a-c, ♂.)

*Væjovis mexicanus*, C. Koch, Die Arachn. iii. p. 51, fig. 206 (1836)<sup>1</sup>; Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 400 (1898)<sup>2</sup>.

*Vejovis mexicanus*, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 185 (1899)<sup>3</sup> (in part. and synonym. excluded).

♀. *Colour*: upper side of trunk, upper and under sides of tail, and chelæ a tolerably uniform deep brown, without definite pattern of pale markings; legs and underside of the trunk paler yellowish-brown. *Carapace* somewhat coarsely granular, with symmetrically arranged smooth or almost smooth paler brown patches, especially on its lateral slopes; about as long as first and second caudal segments, shorter than the fifth. *Terga* without definite keels, more coarsely granular posteriorly than anteriorly; seventh with four strongly granular keels. *Sterna* smooth, with a few coarse punctures; the last finely granular at the sides and with one granular keel on each side. *Tail* about four and a half times as long as carapace, almost parallel-sided; the intercarinal space at most sparsely and finely granular; all the normal keels well developed and granular except the inferior medians of the first, which are weakly granular; median lateral keel strong on first, short on second and third segments; fifth segment with keel reaching the middle of its lateral surface; superior keels of segments 1-4, and superior lateral keels of segments 2-3, and in a lesser degree of 1, ending in a spine; second segment a trifle wider than long, third as long as wide, fourth considerably longer than wide, fifth twice as long as wide; vesicle almost smooth, subgranular laterally and at base. *Chelæ*: humerus and brachium at most finely granular above, upper side of brachium almost smooth; their surfaces bordered with granular keels; hand large, its width nearly as great as the length of the underhand, subcristate above and internally and distinctly granular internally; fingers in contact, movable about as long as the carapace and almost twice as long as width of hand; six teeth along the inner series. *Legs* with femora and patellæ, especially of third and fourth pairs, finely granular. *Pectinal teeth* 15-17.

♂. Smaller than female, *trunk* a little more coarsely granular and with *tail* slightly longer, being about five times as long as the carapace; third caudal segment as wide as long. *Hand* more strongly crested than in female, its width almost equal to the length of the underhand, and more than half the length of the movable finger. *Pectinal teeth* 18-20.

*Measurements in mm.*—♀. Total length 45, carapace 5.5, tail 25.5. ♂. Total length 34, carapace 4, tail 21.

*Hab.* MEXICO, neighbourhood of the city and Lake Chalco (*Mus. Brit.*<sup>2</sup>), Coyoacan, eight miles from Mexico city (*Howard Crosbie, in Mus. Brit.*).

Koch and Kraepelin give no exact locality for this species.

Subsp. *dugesii*, nov.

♀. Resembling the typical form, but with only 13 pectinal teeth and distinctly variegated on the trunk, limbs, and tail, the terga being ornamented with four black bands separating five pale bands; tail patched with black above, laterally, and below, the pigment on the lower side taking the form of spots round the base of the setæ; lower side of last abdominal sternum with six small spots, the other sterna very indistinctly spotted; similar spots upon the larger setal pores on the chelæ; hands lined with black, and black at base of fingers.

Total length 37 millim.

*Hab.* MEXICO, Guanajuato, in the mountains (*A. Dugès*).

Subsp. *smithi*, nov.

♂. Resembling the male of the typical form in most characters, but with 22-23 pectinal teeth, variegated in colour much as in *V. mexicanus*, subsp. *dugesii*, but not so definitely spotted on the setiferous pores, and with the tail shorter; the carapace as long as caudal segments 1+2, and almost as long as 5, the hand narrower, its width less than half the length of the movable finger.

*Measurements in mm.*—Total length 30, carapace 4, tail 18.

*Hab.* MEXICO, Cuernavaca 5200 feet (*H. H. Smith*).

BIOL. CENTR.-AMER., Arachn. Scorp., May 1902.

2. *Væjovis granulatus*. (Tab. II. figg. 4, 4 a, b, ♀.)

*Væjovis granulatus*, Pocock, Ann. & Mag. Nat. Hist. (7) i. pp. 398, 399 (1898)<sup>1</sup>.

*Væjovis granulatus*, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 186 (1899)<sup>2</sup>.

♀. Allied to *V. mexicanus* (typical form), but distinguishable by the following features:—*Colour* variegated black and yellow, terga with four black longitudinal bands; sterna spotted with black; maxillary processes of first and second legs infusate; lower side of tail and vesicle spotted with black, sides of segments largely black on the posterior half; chelæ yellowish-brown with black mottling, hand black at base of fingers; legs mostly black, with yellow lines and spots. *Trunk* granular above, as in *V. mexicanus*. *Tail* shorter and thicker than in that species, about four times as long as the carapace, which is as long as its fifth segment; third segment much wider than long, fourth almost as wide as long, fifth about two-thirds as wide as long; dorsal, lateral, and inferior intercarinal spaces thickly and rather coarsely granular; vesicle granular throughout below. *Chelæ* as in *V. mexicanus*, but the hand thicker and fingers shorter, the width of the hand about two-thirds the length of the movable finger. *Pectinal teeth* 15.

*Measurements in mm.*—Total length 33, carapace 4, tail 17.

*Hab.* MEXICO (Patrick Geddes<sup>1</sup>, in *Mus. Brit.*).

3. *Væjovis pusillus*. (Tab. II. figg. 5, 5 a-c, ♂.)

*Væjovis pusillus*, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 399 (1898)<sup>1</sup>.

*Væjovis pusillus*, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 185 (1899)<sup>2</sup>.

Belonging to the same category of species as *V. mexicanus* and *V. granulatus*, and approaching the latter in colour, the upperside of the trunk being densely marbled with black and reddish-brown; the tergites with a median, triangular, reddish patch, a >-shaped mark of the same colour, a submarginal yellow stripe, and a clear yellowish-red spot on each side of the middle line, the intervening black areas forming four black bands on the upperside of the trunk; tail coloured much as in *V. granulatus*, with a broad black stripe on each side of the middle line of the upperside of the segments, the two stripes sometimes meeting mesially; ventral surface of trunk, including the coxæ and pectines, thickly clouded with black; legs marbled from trochanter to tarsus; chelæ also marbled, hands lined with black, fingers indistinctly mottled. *Trunk* granular above, much as in *V. mexicanus*. *Tail* thin and short, about four times as long as carapace, which is longer than the first and second segments and as long as the fifth; third segment about as wide as long, fifth about twice as long as wide; lateral and inferior intercarinal spaces very finely and closely granular or coriaceous, also furnished with a few larger granules; vesicle granular below. *Chelæ* with crests much weaker and less coarsely granular than in *V. mexicanus*; the hand smooth, neither crested nor granular, narrower than in *V. mexicanus*, only a little wider than the brachium, its width barely half the length of the movable finger. *Pectinal teeth* 11-12.

*Measurements in mm.*—Total length 25, tail 13, carapace 3.

*Hab.* MEXICO, Omilteme in Guerrero 7000 to 9000 feet, under rotten logs (*H.H. Smith*).

4. *Væjovis subcristatus*. (Tab. II. figg. 6, 6 a, b, ♂.)

*Væjovis subcristatus*, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 396 (1898)<sup>1</sup>.

*Væjovis subcristatus*, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 186 (1899)<sup>2</sup>.

♂. *Colour* reddish-yellow; ocular tubercle black; tergites with a >-shaped black patch and a weakly-defined submarginal black patch; tail lined with black beneath. *Carapace* somewhat coarsely granular. *Terga* also furnished with coarse granules. *Sterna* smooth, the last with a smooth crest on each side. *Tail* long, at least five times as long as the carapace, which is shorter than the fifth and the first and second segments; the inferior and infero-lateral keels of segments 1-4 visible as distinct, smooth, punctured ridges, the laterals at most very slightly crenulate on segments 3 and 4; median lateral keel of first segment forming a weakly-crenulated ridge; lower surface of fifth sparsely granular; lateral intercarinal spaces of segments 1-4 practically smooth; vesicle smooth, punctured. *Chelæ*: upper surface of

brachium smooth, the posterior crest large but smooth; hand wide, its width about two-thirds the length of the movable finger, which is about as long as the fourth caudal segment; the two fingers sinuate, and not meeting at base when closed. *Pectinal teeth* 18.

♀. Resembling the male, but less granular, the anteoocular area of *carapace* being nearly smooth; *tail* shorter, about four and a half times as long as the *carapace*; *hand* narrower, its width about half the length of the movable digit, the two fingers in contact at base when closed. *Pectinal teeth* 16-17.

*Measurements in mm.*—♂. Total length 51.5, *carapace* 5.5, *tail* 31; width of *hand* 3. ♀. Total length 52, *carapace* 6, *tail* 29; width of *hand* 2.8.

*Hab.* MEXICO, San Andres (?Tuxtla) (coll. Keyserling, in *Mus. Brit.* 1), Jalapa (Höge).

At once distinguishable from *V. mexicanus* in having the four inferior caudal keels smooth, and also the hand in both sexes smooth and keelless.

5. *Væjovis cristimanus*. (Tab. III. figg. 1, 1 *a-d*, ♀.)

*Væjovis cristimanus*, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 397 (1898)<sup>1</sup>.

*Væjovis cristimanus*, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 186 (1899)<sup>2</sup>.

♀. *Colour* a uniform reddish-brown, not variegated; legs yellow. Closely allied to *V. subcristatus*, but, apart from the difference in colour, distinguishable by having the *chelæ* more strongly crested, the posterior surface of the brachium being weakly granular and its inferior crest distinctly crenulate; the hand is also distinctly crested, the crests on its inner surface being granular. *Terga* visibly tricostate. Upper surface of fifth segment of *tail* with its superior lateral keels granular; vesicle granular below and more coarsely punctured than in *V. subcristatus*. *Pectinal teeth* 18-19.

*Measurements in mm.*—Total length 63, *carapace* 7.3, *tail* 36.

*Hab.* MEXICO, Zacatecas (*Mus. Brit.* 1).

6. *Væjovis variegatus*. (Tab. III. figg. 2, 2 *a-h*, ♀.)

*Væjovis variegatus*, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 394 (1898)<sup>1</sup>.

*Væjovis spinigerus*, var. *variegata*, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 187 (1899)<sup>2</sup>.

♀. *Colour* reddish ochre-yellow or reddish-brown; *carapace* with black tubercle and irregularly-shaped but symmetrically-arranged black patches and stripes; tergites symmetrically marked, the median keel with a very narrow black stripe which sometimes expands in front and behind, on each side of this and separated from it by a narrow pale stripe there is a triangular black spot, the narrow anterior extremity of which extends forwards and often fuses with the anterior portion of the median stripe; the lateral portion of the *terga* with a narrow black edge and a yellow stripe separating it from a large black stripe extending from the anterior to the posterior border, and separated from the before-mentioned submedian triangular spot by a yellow stripe; this stripe is widened in front, but posteriorly it is narrower than the black patch to the right and left of it; *tail* clouded below and laterally with black and ornamented below with four black stripes; vesicle and upper surface of *tail* clear reddish-brown; *chelæ* reddish-brown, coarsely granular, its frontal area nearly smooth, as long as the first and second caudal segments, slightly shorter than the fifth. *Terga* coarsely granular, nearly smooth anteriorly. *Sterna* smooth, the last not keeled, and scarcely granular laterally. *Tail* more than four times as long as the *carapace*; third segment much wider than long, fourth almost as wide as long, fifth nearly twice as long as wide; the anterior segments granular above and laterally, smooth and symmetrically punctured below; fourth and fifth also smooth above and laterally; fourth smooth below and punctured, fifth thickly granular below, with three granular keels; superior and supero-lateral keels strongly developed, coarsely granular, dentate posteriorly, except the supero-lateral of the fourth; the inferior median keels obsolete on segments 1-4, the inferior laterals represented by a low, indistinct, smooth ridge; vesicle smooth, punctured below; median lateral

keel of fifth absent. *Chelæ*: humerus rather coarsely granular above and in front and finely granular below, with well-developed superior and anterior crests; brachium smooth above, the posterior crest of its upperside smooth, upper and lower anterior crests well developed and granular, with a few large granules above and below, smooth on its upper and posterior surfaces; hand entirely smooth, without crests, punctured, underhand about three-fourths the length of the movable digit. *Legs* with femora and patellæ finely granular externally. *Pectines* with 16-17 teeth.

- ♂. Smaller and much more coarsely granular than the female; third segment of *tail* as long as wide, fourth and fifth granular laterally, weakly and sparsely granular above, fourth also granular below, especially in its posterior half. Upperside of *humerus* coarsely granular; posterior crest of upperside of *brachium* crenulate; hand smooth, but grooved and subcostate above. *Pectinal teeth* 17-18.

*Measurements in mm.*—♀. Total length 45, carapace 5.5, tail 25. ♂. Total length 36, carapace 4.5, tail 23.

*Hab.* MEXICO, Amula in Guerrero (*H. II. Smith*<sup>1</sup>).

### 7. *Væjovis punctatus*.

*Væjovis punctatus*, Karsch, Mittheil. Münch. ent. Ver. iii. p. 135 (1879)<sup>1</sup>.

*Væjovis nigropictus*, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 395 (1898)<sup>2</sup>.

*Væjovis spinigerus*, var. *punctata*, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 187 (1899)<sup>3</sup>.

- ♀. Nearly allied to the foregoing, but differing in the arrangements of the colour-bands on the tergites, the posterior half of the median keel being yellow, leaving a central pale spot, and on each side of this there is a black stripe which in front of the spot meets its fellow of the opposite side; lateral portion of the terga occupied by a large black patch, which extends to the lateral margin and is only indistinctly divided by a submarginal slightly paler band; between this patch and the submedian black band there is a broad yellow stripe, which posteriorly is twice as broad as the black spot that borders it on its admedian side; tail pale, except for the black lines on its four lower and median lateral keels; legs very feebly infuscate externally. Structurally resembling *V. variegatus*, but with the lateral surface of the *tail* scarcely granular, lower side of fifth segment more coarsely and less thickly granular, and scarcely a trace of coarser granulation on the upperside of the *humerus*. *Pectinal teeth* 16-18.

- ♂. Differing more from the male of *V. variegatus* than do the females; colour the same as in the female; *tail* with the upper and lateral surfaces of the first, second, and third segments smooth; fourth segment smooth above, below, and at the sides; fifth segment smooth laterally. Upperside of *humerus* without coarse granulation. *Pectinal teeth* 19-21.

*Measurements in mm.*—♀. Total length 42, carapace 5, tail 22. ♂. Total length 37, carapace 4.5, tail 22.

*Hab.* MEXICO (*Mus. Berol.*<sup>1</sup>), Jalisco (*Schumann*<sup>2</sup>), Guanajuato, in the mountains (*A. Dugès*).

The type of *V. punctatus*, Karsch, is unknown to me. Hence I accept the decision of Dr. Kraepelin, who presumably has examined this type, that it is conspecific with the specimen upon which *V. nigropictus* was based.

### 8. *Væjovis nitidulus*. (Tab. III. figg. 3, 3 a-c, ♂.)

*Væjovis nitidulus*, C. L. Koch, Die Arachn. x. p. 4, fig. 758 (1843)<sup>1</sup>.

*Væjovis nitidulus*, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 186 (1899)<sup>2</sup>.

*Væjovis nigrescens*, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 396 (1898)<sup>3</sup>.

*Colour* of trunk, chelæ, legs, and tail a tolerably uniform brown, the fourth and fifth segments infuscate beneath.

*Carapace* a little shorter than caudal segment 1+2 or 5; rather coarsely granular, except on the frontal area. *Terga* finely shagreened in front, coarsely but sparsely granular posteriorly. *Tail* thick and longish, about four and a half times as long as the carapace; third segment as broad as long, fifth about twice as long as broad; superior and superior lateral keels granular, posteriorly dentate, except the

superior lateral of the fourth, which is almost smooth; the inferior median keels absent on segments 1-4 as in *V. variegatus*; inferior laterals at most finely crenulate; superior and superior lateral surfaces of tail finely and sparsely granular; fifth segment with keels finely granular, its lateral and inferior surfaces finely and closely granular; vesicle punctured, scarcely granular. *Chelæ* long, finely granular; the crests granular, including the posterior crest on the upperside of the brachium; hand coarsely granular internally, smooth above and weakly crested; movable fingers long, longer than the carapace; brachium or humerus about as long as the carapace.

*Measurements in mm.*—Total length 58, carapace 7, tail 34, movable finger 8.8, of type of *V. nigrescens*.

*Hab.* MEXICO<sup>1</sup> (*Mus. Brit.*<sup>3</sup>), Guanajuato, in houses (*A. Dugès*).

Though resembling *V. variegatus* and *V. punctatus* in the absence of the inferior median keels of caudal segments 1-4, *V. nitidulus* differs from those two, and from all the other known species of the genus, in the length of its chelæ, which have the humerus or brachium as long as the carapace and the movable finger considerably longer.

The following species, based upon an unsexed specimen, is unknown to me:—

### *Væjovis intrepidus*.

*Vejovis intrepidus*, Thorell, *Atti Soc. Ital. Sci. Nat.* xix. p. 183 (1877)<sup>1</sup>.

*Hab.* MEXICO<sup>1</sup>.

Kraepelin [*Jahrb. Hamb. Wiss. Anst.* xi. p. 199 (1894) and *Das Tierr., Scorpiones et Pedipalpi*, p. 185 (1899)] cites this species, without even a mark of interrogation, as synonymous with *V. mexicanus*, Koch. In face of Thorell's description, I find it impossible to adopt this opinion. The measurements given show that *V. intrepidus* is about twice the size of the average *V. mexicanus*, the length being 84, the carapace 11.5, and the tail 52.5 mm. Moreover, the third caudal segment is one-third longer than wide (9:6) and the second as long as wide. Lastly, the inferior caudal keels, although well expressed, are described as subcrenulate, except the median keels on segments 1, 2, and 3, which are smooth, those on the third being subcrenulate only posteriorly. So far as these keels are concerned, as well as in colour and certain other characters, *V. intrepidus*, apart from its much greater size, most nearly approaches *V. cristimanus*, and it may conceivably be based upon a large male of that species, of which only the female is up to the present time known.

### ANUROCTONUS.

*Anuroctonus*, Pocock, *Ann. & Mag. Nat. Hist.* (6) xii. p. 328 (1893); Kraepelin, *Das Tierr., Scorpiones et Pedipalpi*, p. 183 (1899).

*Oncocentrus*, Thorell, *Bull. Soc. Ent. Ital.* xxv. p. 374 (1894).

*Carapace* with its anterior border shallowly excised, with rounded frontal lobes; three principal lateral eyes on each side; ocular tubercle in front of its middle. *Mandible* with movable finger either unarmed below or furnished with a few, only about three, minute teeth. *Chelæ* with fingers furnished with a single median row of teeth, flanked on each side by a few larger scattered teeth; the brachium supplied beneath

posteriorly with a row of about 9 setiferous pores. *Pectines* with the intermediate lamellæ normally separated. *Tarsi* furnished with a median row of spicules and lateral setæ; a distinct inferior median claw. *Stigmata* long and slit-like. Tail with the fourth segment keelless below. Dorsal half of the aculeus spherically swollen in the male.

Type and only known species *A. phæodactylus* (Wood).

*Distribution.* Southern States of North America; Guatemala (sec. Thorell).

1. **Anuroctonus phæodactylus.** (Tab. III. figg. 4, 4 *a-e*, ♀; Tab. IV. figg. 1, 1 *a-c*, ♂.)

*Centrurus phæodactylus*, Wood, Proc. Ac. Philad. 1863, p. 111<sup>1</sup>; Journ. Ac. Philad. (2) v. p. 372<sup>2</sup>.

*Uroctonus phæodactylus*, Karsch, Mittheil. Münch. ent. Ver. iii. p. 103 (1879)<sup>3</sup>; Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 196 (1894)<sup>4</sup>.

*Anuroctonus phæodactylus*, Pocock, Ann. & Mag. Nat. Hist. (6) xii. p. 328, t. 14. figg. 14, 14 *a-c* (1893)<sup>5</sup>; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 183, fig. 58 (1899)<sup>6</sup>.

*Oncocentrus phæodactylus*, Thorell, Bull. Soc. Ent. Ital. xxv. p. 375 (1894)<sup>7</sup>.

♂. *Colour* reddish or yellowish-brown, the tergite darker; chelæ and legs yellow, the fingers infuscate, a dark spot at distal end of brachium above; legs yellow, with a dark spot at the distal end of the femur and patella; caudal segments darker beneath posteriorly. *Carapace* smooth, granular on frontal lobes anteriorly and on the sides, a little longer than caudal segments 1+2+½ of 3 and as 3+4. Terga shagreened and granular. *Sterna* smooth, the last with four strong granular keels. *Tail* about three and a half times as long as the carapace, the superior and superior lateral keels weakly granular, the four inferior strong and tubercular on segments 1-3, weak on segment 4; fifth with 3 strong inferior keels; vesicle almost smooth, compressed, inflated, as high as wide. *Chelæ* large; humerus finely granular, with strong granular crests; brachium almost smooth, with strong anterior granular crest and a strong tooth on the anterior surface; hands smooth and punctured, a single weak keel above, its width about three-fourths the length of the movable finger, which is shorter than the carapace and as long as the underhand. *Pectinal teeth* 8-10.

♀. Like the male, but smoother, with smaller pectines and 5-6 teeth.

*Measurements in mm.*—♂. Total length 67, carapace 11, tail 37. ♀. Total length 74, carapace 11.5, tail 35.

*Hab.* NORTH AMERICA, California, Utah, Virginia, and Colorado.—GUATEMALA<sup>7</sup>.

The description given above and the figures on Tab. III. and IV. are taken from two specimens in the British Museum—the male from San Bernardino in California and the female from Denver in Colorado.

### UROCTONUS.

*Uroctonus*, Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 11 (1876); Atti Soc. Ital. Sci. Nat. xix. p. 196 (1877); Bull. Soc. Ent. Ital. xxv. p. 374 (1894); Karsch, Mittheil. Münch. ent. Ver. iii. p. 103 (1879); Pocock, Ann. & Mag. Nat. Hist. (6) xii. p. 328 (1893); Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 193 (1894); Das Tierr., Scorpiones et Pedipalpi, p. 182 (1899).

Allied to *Anuroctonus*, but with the movable finger of the mandible furnished below with 5 small but distinct teeth. Brachium of the *chelæ* supplied beneath with only a few (3 or 4) setiferous pores. Intermediate lamellæ of the *pectines* distally breaking up into about 6 subequal subspherical sclerites. *Stigmata* short and suboval. *Tail* with its fourth segment granularly keeled below. Last abdominal *sternum* scarcely visibly keeled. Basal half of *aculeus* not globularly swollen in male.

Type and only known species *U. mordax*, Thor.

*Distribution.* California; Guatemala (sec. Thorell).

1. *Uroctonus mordax*. (Tab. IV. figg. 2, 2 a-f, ♂.)

*Uroctonus mordax*, Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 11 (1876)<sup>1</sup>; Atti Soc. Ital. Sci. Nat. xix. p. 196 (1877)<sup>2</sup>; Bull. Soc. Ent. Ital. xxv. p. 374 (1894)<sup>3</sup>; Karsch, Mittheil. Münch. ent. Ver. iii. p. 103 (1879)<sup>4</sup>; Pocock, Ann. & Mag. Nat. Hist. (6) xii. p. 330, t. 14. fig. 15 (1893)<sup>5</sup>; Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 194 (1894)<sup>6</sup>; Das Tierr., Scorpiones et Pedipalpi, p. 182 (1899)<sup>7</sup>.

♂. *Colour* a uniform deep brown, legs yellower, hands with a reddish tint. *Carapace* a little longer than the first and second caudal segments and about as long as the fifth, finely granular. *Terga* finely punctulate, granular laterally and along the posterior border, the last granular throughout and furnished with four granular crests. *Sterna* smooth, finely punctured, the last scarcely crested. *Tail* about four times as long as carapace, slender, second segment a little longer than wide, fifth rather more than twice as long as wide; all the caudal keels present, but the median lateral absent on segments 2-4 and scarcely developed on the first; the inferior medians and laterals smooth or nearly so on segments 1 and 2, weakly granular on the third, strongly granular on the fourth; the intercarinal spaces almost smooth, finely granular; fifth segment finely granular, the inferior keels subdenticulate; vesicle smooth, pyriform, a little wider than high; aculeus very lightly curved. *Chelæ* finely granular, with strong granular crests; the brachium with three strong teeth in front; upperside of hand with a network of fine granules, with a strong external finger-keel separating the horizontal inner from the vertical outer portion of the upper surface; width of the hand a little less than the length of the underhand, which is about equal to that of the movable finger, the latter not lobate. *Legs* with granular femora. *Pectinal teeth* 10-12.

♀. Differing from male in having the hand smooth and the strong finger-keel absent. *Pectines* with 8 teeth. *Measurements in mm.*—♂. Total length 42, carapace 6, tail 23.5; width of first segment 2.5, of fifth 1.8, length of latter 5.5; length of brachium 5, width 2; width of hand 4; length of underhand 5, of movable finger 5.8.

*Hab.* NORTH AMERICA, San Francisco, California.—GUATEMALA<sup>3</sup>.

The above-given description is based upon a male example from California in the British Museum, the only example available for the purpose. The characters of the female are taken from Kraepelin's monograph. According to this author the specimens of this species reach a length of 60 mm.

## BROTEOCHACTAS.

*Broteochactas*, Pocock, Ann. & Mag. Nat. Hist. (6) xii. pp. 77, 78 (1893); Journ. Linn. Soc., Zool. xxiv. p. 399 (1893); Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. pp. 175, 178 (1894); Das Tierr., Scorpiones et Pedipalpi, p. 172 (1899).

Anterior border of *carapace* lightly depressed mesially, but not excised. Two lateral *eyes* on each side. *Mandible* with fingers not toothed inferiorly. *Chelæ* with a single row of teeth along the middle line and flanked internally by a few larger lateral teeth. *Sternum* wider than long. *Pectines* with shaft segmented and small triangular fulcra. *Tarsi* furnished beneath with somewhat irregularly-arranged setæ, without median row of spicules. *Tail* smooth below anteriorly or with paired keels. *Stigmata* oval.

Type *B. gollmeri*, Karsch.

*Distribution.* S. America as far south as the Amazons; Panama.

1. *Broteochactas delicatus*. (Tab. IV. figg. 3, 3 a-f, ♀; 4, 4 a, b, ♂.)

*Chactas delicatus*, Karsch, Mittheil. Münch. ent. Ver. iii. p. 134 (1879) (♀)<sup>1</sup>.

*Broteochactas delicatus*, Pocock, Journ. Linn. Soc., Zool. xxiv. p. 401 (1893)<sup>2</sup>; Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 77 (1894)<sup>3</sup>; Das Tierr., Scorpiones et Pedipalpi, p. 174 (1899)<sup>4</sup>.



*Chaetas opacus*, Karsch, Mittheil. Münch. ent. Ver. iii. p. 134 (1879) (♂) <sup>5</sup>.

*Broteas panamensis*, Thorell, Bull. Soc. Ent. Ital. xxv. p. 382 (1893) <sup>6</sup>.

♀. Colour a deep reddish-brown, ventral side of trunk ochre-brown; vesicle clear reddish-brown; chelæ nearly black; legs clear reddish-brown. *Carapace* as long as the first and second, and one-fourth of the third, caudal segments, slightly longer than the fifth, smooth and polished on the frontal area, on the ocular tubercle, and behind on the middle, finely and closely granular at the sides. *Terga* smoothly polished, slightly shagreened at the sides, the last very distinctly granular and bitubercular laterally. *Sterna* smooth and polished, the last without keels; an ill-defined pale (sensory?) area in the middle of the posterior border of the third. *Tail* about three and a half times as long as the carapace, narrowed posteriorly; the first segment much wider than long, second a little wider, third as wide as long, fourth one-fourth longer than wide, fifth a little more than twice as long as wide and about twice as long as the second segment; superior and superior lateral keels developed and granular, and the rest of the keels obsolete on segments 1-4; upperside of these segments scarcely granular, the sides weakly granular; underside of first and second smooth and polished, of third weakly granular behind, of fourth coarsely granular; fifth segment coarsely granular below and at the sides; vesicle granular below, its width a little wider than its height and equal to the width of the fifth caudal segment. *Chelæ* with two granular crests above, weakly granular above and in front; brachium very weakly granular above and behind; hand thick, its width a little exceeding the length of the underhand and equal to the movable finger, covered above and to a less extent below with a fine network of granules, which spread on to the base of the fingers; the inner edge subdenticulate; fingers short, the immovable less than twice as long as wide, the movable a little shorter than the carapace. *Legs* smooth and polished; the femora at most very weakly granular. *Pectines* with 8 teeth.

♂. The same size and colour as the female. The *terga* shagreened. *Sterna* as in female, but with the sensory area on the third more conspicuous. *Tail* longer, about four and a half times as long as the carapace, which is scarcely as long as the fifth segment; vesicle inflated, the width equal to that of the first caudal segment. *Chelæ* hardly differing from those of the female. *Pectines* larger than in female, with 8 teeth.

*Measurements in mm.*—♀. Total length 50, carapace 7, tail 25; width of hand 5.5; length of underhand 5, of movable finger 5.5. ♂. Total length 51, carapace 6.2, tail 29.

*Hab.* PANAMA <sup>6</sup>.—COLOMBIA; VENEZUELA; GUIANA.

The type of *Broteas panamensis*, Thorell, has been kindly submitted to me for examination by Prof. Targioni-Tozzetti, of the Florence Museum. I was thus enabled to establish its specific identity with specimens in the British Museum from Guiana, from which the above-given description has been taken.

### PLESIOCHACTAS.

*Plesiochactas*, Pocock, Ann. & Mag. Nat. Hist. (7) v. p. 470 (1900).

*Carapace* not narrowed anteriorly, truncate, with squared antero-lateral angles; two lateral eyes on each side. Movable finger of *mandible* with a row of small teeth on the inferior border. Fingers of the *chelæ* armed with numerous minute teeth, forming two rows along the middle of their length and flanked on each side by about half a dozen larger-spaced teeth. *Sternum* of cephalothorax wider than long. *Pectines* with the shaft distinctly and normally segmented and distinct fulcra. Segments of the *tail* and last abdominal *sternum* furnished beneath with a single median inferior keel. *Tarsi* furnished beneath with two rows of slender bristles.

*Type.* Species represented by specimen described as *P. dugesi*, which probably equals *Megacormus granosus*, var. *dilutus*, Karsch.

*Distribution.* Mexico.

1. *Plesiochactas dilutus*. (Tab. IV. figg. 5, 5 a-f, ♀.)*Megacormus granosus*, var. *dilutus*, Karsch, Arch. f. Naturg. 1881, p. 18<sup>1</sup>.*Plesiochactas dugesi*, Pocock, Ann. & Mag. Nat. Hist. (7) v. p. 470 (1900)<sup>2</sup>.

♀. *Colour* deep reddish-brown, nearly black, the smooth areas of the carapace reddish; the terga with a small posterior median yellow spot, a much larger yellow spot on each side of this, the series forming two nearly complete and uninterrupted dorsal bands; also a large but not strongly defined yellow spot on the posterior angle; tail deep red-brown, mottled with black; sterna deep brown, paler mesially; chelæ deep reddish-brown, fingers blacker with yellow tips; legs yellow, broadly banded with black; sternum and coxæ yellow, the former and the maxillary processes of the first and second leg partially infuscate; coxa of chela blackish. *Carapace* coarsely and subserially granular; a median granular crest running backwards from the ocular tubercle and a series of coarse granules on each side from lateral eyes; the ocular tubercle with two rows of granules; carapace as long as caudal segments  $1+2+\frac{1}{2}$  of 3, or as  $3+4$  or 5, a little shorter than the movable finger. *Terga* finely granular in front, very coarsely granular in the posterior half, not distinctly keeled, except the last, which has four coarsely granular keels, with its median area finely and closely granular. *Sterna* finely and closely punctured; the last finely granular, with a single median and an abbreviated granular crest on each side, a few coarse granules on its posterior and lateral margins as well as on the lateral margin of the fourth sternum. *Tail* between three and four times as long as the carapace; its third segment as wide as long, fourth one-fourth longer than wide; fifth nearly or quite three times as long as wide; all the keels coarsely granular, the inferiors on segments 2-4 posteriorly denticulate; upper surface of 1-4 with a median closely granular area; the lateral and inferior surfaces much more coarsely but somewhat sparsely granular, the inferior surface of the first nearly smooth; fifth very weakly granular above, with squared, coarsely granular superior lateral edges; the lateral and inferior surfaces and the inferior crests granular, as on the other segments; median lateral keel strong on the first, present on the anterior fourth of the fifth, absent on the other segments; vesicle granular throughout, except on the normal smooth tracts, piriform, a little wider than high and about as wide as the fifth caudal segment or as the humerus; aculeus long and lightly curved. *Chelæ* with humerus and brachium coarsely but not closely granular, smooth or nearly so, all the keels coarsely granular, anterior side of brachium with at least two strong teeth; hand considerably wider than brachium, its width about two-thirds the length of the underhand; furnished with seven granular keels, its upper surface with two granular finger-keels and a keel between them, the area between the keels coarsely but not closely granular; fingers long and slender, not lobate. *Legs* with femur and patella granularly crested, femur of third and fourth granular on the external surface as well. *Pectines* with 8-9 teeth.

*Measurements in mm.*—Total length 42, carapace 6, tail 24; width of first segment 3, of fifth 2, of brachium 2.2, of hand 3; length of underhand 4.8, of movable finger 6.5.

*Hab.* MEXICO, Atoyac in Vera Cruz (*A. Dugès*<sup>2</sup>), Cordova<sup>1</sup>.

It appears to me to be highly probable that the type of *Plesiochactas dugesi*, from Atoyac, is conspecific with those from Cordova, which Karsch regarded as a variety of *Megacormus granosus* and named *dilutus*. These specimens measure 57-65 mm., have 8 and 9 pectinal teeth, smooth sterna, no median tergal keel, and no wart-like tubercles between the two inner keels on the last tergal plate. I have also seen a young specimen of this or a nearly allied species from Guatemala.

## MEGACORMUS.

*Megacormus*, Karsch, Arch. f. Naturg. xlvii. p. 17 (1881); Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 151 (1894); Das Tierr., Scorpiones et Pedipalpi, p. 161 (1899).

Related to *Plesiochactas*, and apparently a specialized offshoot of it. Distinguishable by having the carapace narrowed in front, by the reduction in size of the pectines (which is accompanied by the entire loss of BIOL. CENTR.-AMER., Arachn. Scorp., August 1902.

the fulcra), and by the difference in the stigmata, which have the form of narrow crescentic slits opening upon an elevated smooth oval area.

Type *M. granosus* (Gervais).

*Distribution.* Mexico.

1. **Megacormus granosus.** (Tab. V. figg. 1-1 h, ♂.)

*Scorpio (Chactas) granosus*, Gervais, Arch. Mus. iv. p. 233, t. 12. figg. 42-44 (1844)<sup>1</sup>; Ins. Apt. iii. p. 65 (1844)<sup>2</sup>.

*Chactas granosus*, Karsch, Mittheil. Münch. ent. Ver. iii. p. 111 (1879)<sup>3</sup>.

*Megacormus granosus*, Karsch, Arch. f. Naturg. xlvii. p. 17 (1881)<sup>4</sup>; Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 151 (1894)<sup>5</sup>; Das Tierr., Scorpiones et Pedipalpi, p. 162 (1900)<sup>6</sup>; Pocock, Ann. & Mag. Nat. Hist. (7) v. p. 470 (1900)<sup>7</sup>.

[Nec *Scorpio granosus*, Gervais, in Castelnau's Expéd. dans l'Amér. du Sud, Myriap. et Scorp. p. 42, t. 2. figg. 2, 2 a-c (1857).]

*Hab.* MEXICO<sup>1 2 3 6</sup>, Cordova<sup>4</sup>, Huatusco.

This species apparently differs from *M. segmentatus* in having the pectines without the transverse joints, the basal portion of the shaft exhibiting merely a longitudinal sulcus: but I have had no opportunity of comparing in detail a specimen of *M. granosus* with the type of *M. segmentatus*. The figure of the former on Tab. V. is taken from an example kindly lent me by Dr. Fritsch, the same example as that described by Kraepelin; and since only one example of each of the two kinds has been examined, it is possible that the difference in the structure of the pectines above referred to may prove to be merely sexual. Nevertheless it is possible that a detailed and comparative study of the two forms with the types, side by side, may reveal other differential features which under present circumstances it is not possible to point out.

2. **Megacormus segmentatus.**

*Megacormus segmentatus*, Pocock, Ann. & Mag. Nat. Hist. (7) v. p. 470 (1900)<sup>1</sup>.

*Colour* a tolerably uniform deep brown; terga with an indistinct marginal spot in the middle and on the posterior angle; ventral surface a little paler; legs indistinctly banded. Upperside of *trunk* coarsely and closely granular, a long median granular crest running backwards from the ocular tubercle; terga without crests, except the last, which has four coarsely granular crests, the median area of the plate coarsely granular. *Sterna*, especially the first, fourth, and fifth, granular; the second and third smooth and punctured anteriorly; the fifth coarsely granular throughout, with a short median keel and a few large granules forming a very short crest on each side. *Tail* about three and a half times as long as the carapace, which equals the first, second, and half the third or the third and fourth segments and slightly exceeds the fifth; third segment wider than long, fourth a little longer than wide, fifth a little more than twice as long as wide; all the keels coarsely granular; lateral and inferior surfaces coarsely granular, a few coarse granules on the upperside of the first, second, third, and fourth segments, a median lateral crest on the first and on the anterior half of the fifth; upperside of fourth deeply excavated, with elevated keels, also of the second and third, though to a less degree; upperside of fifth with sharp elevated lateral border, space between them very finely granular; vesicle smooth and punctured above, very finely granular below and laterally, almost as wide as the fifth segment and considerably wider than the humerus. *Chelæ*: upperside of humerus and brachium coarsely granular, all the crests coarsely granular; the brachium with five crests, one large

tooth on its anterior border; hand with six granular keels, the inner half of its upperside with two granular finger-keels and one keel between them, its outer surface with a median keel; width of hand about two-thirds the length of the underhand, which is almost equal to the movable finger; the latter a little shorter than the carapace, without lobe. *Legs* externally granular; coxæ thickly granular. *Pectinal teeth* 4; shaft of pecten distinctly segmented, divided by two transverse sulci into an apical, a median, and a basal sclerite, the latter divided by a longitudinal sulcus.

*Measurements in mm.*—Total length 32, carapace 4.5, tail 16; width of first segment 2, of fifth 1.5, of brachium 1.5, of hand 2.5; length of underhand 3.5, of movable finger 4.

*Hab.* MEXICO, Atoyac in Vera Cruz (*A. Dugès*<sup>1</sup>).

### Fam. BUTHIDÆ.

In all the known Central-American genera of this family the sternum of the cephalothorax is triangular, its sides anteriorly converging; there are two pedal spurs upon the arthrodial membrane connecting the protarsus with the tarsus, and the anterior of these is branched; the two halves of the genital operculum are separated in both sexes and there is a single tooth upon the lower side of the immovable fang of the mandible.

*Distribution.* Tropical and temperate countries of Eastern and Western Hemispheres to the south of 40°–45° of North latitude.

#### *Synopsis of the Central-American Genera.*

- a. Dentition of the fingers of the chela consisting of series of median rows of teeth flanked by numerous small supernumerary teeth.
  - a<sup>1</sup>. Tail not posteriorly expanded, longer in male than in female; sternum of first abdominal somite scarcely sulcate. . . . . CENTRUROIDES, Marx.
  - b<sup>1</sup>. Tail posteriorly expanded, much thicker but scarcely longer in male than in female; first abdominal sternum strongly sulcate. RHOPALURUS, Thor.
- b. Dentition of fingers of chelæ consisting of median rows of teeth.
  - a<sup>2</sup>. Rows of teeth on the fingers of the chelæ not overlapping . . . ISOMETRUS, Hempr. & Ehr.
  - b<sup>2</sup>. Rows of teeth on the fingers of the chelæ largely overlapping . . . TITYUS, C. Koch.

### CENTRUROIDES.

*Centrurus*, Hempr. & Ehrenb. Symb. Phys., Scorp. p. 12 (1828) (part.) (nomen nudum); Peters, Mon. Ak. Wiss. Berlin, 1861, p. 512 (part.); Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 9 (1876); Atti Soc. Ital. Sci. Nat. xix. p. 83 (1877); Karsch, Mittheil. Münch. ent. Ver. iii. p. 18 (1879); Pocock, Journ. Linn. Soc., Zool. xxiv. pp. 385, 391 (1893); Kraepelin, Jahrb. Hamb. Wiss. Anst. viii. p. 119 (1891); Das Tierr., Scorpiones et Pedipalpi, p. 87 (1899) (part.).

*Tityus*, C. Koch, Die Arachn. xi. pp. 1–48 (1845) (part.) [nec iii. p. 33 (1836)].

Nec *Centrurus*, C. Koch, Die Arachn. iv. p. 110 (1838); Gervais, Ins. Apt. iii. p. 49 (1844).

Nec *Centrurus*, Wood, Proc. Ac. Philad. 1863, p. 111; Journ. Ac. Philad. (2) v. p. 372 (1863).

*Centruroides*, Marx, Proc. U. S. Nat. Mus. 1889, p. 211.