

examples examined by this author, moreover, have the legs and chelæ yellowish-red, and the crests on the fifth sternum scarcely granular. They attained a length of 80 mm.

The following scorpion has been recorded by Gervais from Mexico, but the identification must be regarded as doubtful. The recognition of the differences between the various species allied to such forms as *T. cambridgei*, *T. festæ*, and *T. androcottoides*, especially in the case of the female sex, requires considerable powers of discrimination and analysis, and a large number of specimens from various localities for comparison and study. Hence the Mexican example determined by Gervais as *T. obscurus* may be referable to either of the three just mentioned, and may or may not belong to the genuine *T. obscurus*, which was from Cayenne.

Tityus obscurus.

Scorpio (Atreus) obscurus, Gervais, Arch. Mus. iv. p. 249 (1844)¹; Ins. Apt. iii. p. 55 (1844)²; and in Castelnau's Expéd. dans l'Amér. du Sud, Myriap. et Scorp. p. 42, t. 1. figg. 3, 3 a, b (1859)³.

Hab. MEXICO (*Parzudacki*).—COLOMBIA; GUIANA.

This species was based on a female from Cayenne. Gervais also records it from Colombia.

Except for the statement that *T. obscurus* possesses twenty-two pectinal teeth, there is nothing in the description that serves to differentiate this species from the females of almost all the many allied forms. That Gervais himself certainly confused more than one form under the name *S. obscurus* is attested by his determination of a Colombian specimen with only fifteen pectinal teeth, now in the British Museum, as that species.

Order PEDIPALPI.

The Central-American genera of this Order fall into two Suborders, which may be diagnosed as follows:—

- a. Carapace longer than broad; chelæ forming a pair of stout pincers, their basal segments fused in the middle line; legs of first pair with only the terminal segment subdivided, basal segments of second and third pairs meeting or almost meeting in the middle line; abdomen elongate, its last three segments narrowed to form a caudal support for a long many-jointed postanal flagellum UROTRICHA.
- b. Carapace wider than long; chelæ not pincer-like, being without digitiform prolongations; legs of first pair with their three distal segments forming a long many-jointed lash, those of the second and third pairs widely separated basally by the sternal area; no postanal flagellum, and the last three abdominal segments not narrowed to form a caudal prolongation AMBLYPYGI.

Suborder UROTTRICHA.

Fam. THELYPHONIDÆ.

Same characters as for the suborder.

Distribution. Oriental Region from Japan in the north and India in the west to the Western Pacific Islands in the south-east; Sonoran and Neotropical Regions in America.

MASTIGOPROCTUS.

Thelyphonus of authors up to 1894.

Mastigoproctus, Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 130 (1894); Kraepelin, Abh. Ver. Hamb. xv. p. 36 (1897); Das Tierr., Scorpiones et Pedipalpi, p. 223 (1899).

Carapace with a crest running forwards on each side in front of the lateral eye-clusters; median eyes separated by a low ridge and looking obliquely upwards and outwards. Maxillary processes of *chelæ* without tooth on inner edge. Secondary sexual characters slightly developed; *chelæ* in male longer than in female, with the spines on the trochanter modified and the tibial apophysis thinner. Female with the segments of the tarsus of the first leg unmodified and like those of the male. Sternum of first abdominal segment with a pair of shallow depressions; of second also with a pair of depressions and bearing a transverse crescentic crest immediately behind the generative orifice. In the male the sternum of the first abdominal segment inflated laterally, the pits prolonged into a couple of oblique furrows; no median sulcus; second abdominal sternum without any median spine or crest.

Type *M. giganteus*, Luc.

Distribution. From Florida, Texas, and Arizona, southwards into the West Indies (Haiti, Martinique), and through Central America into South America as far south as the Argentine Republic.

Synopsis of the Central-American Species.

- a. Upper and outer sides of all the segments of the chela smooth, polished, and sparsely punctured; tibia of second and third legs without apical spur beneath *liochirus*, Poc.
- b. Upper and outer sides of all the segments of the chela densely rugose with granules and close-set punctures; an inferior apical tibial spine upon the second, third, and fourth legs *giganteus*, Luc.
- a¹. Outer side of femur and of proximal half of tibia of chela rugose, spines on the trochanter subequal in male *giganteus* (typical form).
- b¹. Outer side of femur and proximal half of tibia of chela denticulate.
 - a². Spines on trochanter of chela in male much reduced. *giganteus*, subsp. *mexicanus*, Butl.
 - b². Anterior spine on trochanter in male very large . . . *giganteus*, subsp. *scabrosus*, n.

1. *Mastigoproctus giganteus*. (Tab. X. figg. 1-4, ♀ ♂.)

Thelyphonus giganteus, Lucas, Mag. Zool. v. Cl. viii. t. 8 (1835)¹; C. L. Koch, Die Arachn. x. p. 21, fig. 768 (1842)²; Wood, Journ. Ac. Philad. (2) v. p. 373 (1863)³; Butler, Ann. & Mag. Nat. Hist. (4) x. p. 205 (1872)⁴; Marx, Proc. Ent. Soc. Wash. i. p. 42 (1886)⁵.

Mastigoproctus giganteus, Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 130 (1894)⁶; Kraepelin, Abh. Ver. Hamb. xv. p. 37 (1897)⁷; Das Tierr., Scorpiones et Pedipalpi, p. 224 (1899)⁸.

Thelyphonus excubitor, Girard, in Marcy's Rep. Red River, p. 265, t. 17. figg. 1-3 (1853) (♂)⁹.

Thelyphonus rufus, Butler, Ann. & Mag. Nat. Hist. (4) x. p. 205 (1872) (♀)¹⁰.

Thelyphonus mexicanus, Butler, loc. cit. p. 201, t. 13. fig. 1¹¹.

♀. Colour uniformly blackish or reddish-brown, the ventral surface and the extremities of the appendages paler reddish-brown. Carapace coarsely granular, especially posteriorly; the cephalic region coarsely rugose. Chelæ with coxæ rugose, pitted, granular laterally; trochanter denticulate in front, armed below with 2 spines and above with 6—3 inner, 2 anterior, and 1 (the largest) on the angle, the external of the two anterior spines small, often nearly obsolete; femur armed above with 1 shorter and below with 1 longer spine, coarsely granular above, below, and externally, the granules on the outer surface often denticuliform; tibia granular above and below and coarsely pitted externally, the apophysis with the anterior edge denticulated throughout its length, the posterior edge with two denticles at the distal end; hand coarsely pitted and granular, its inner edge and that of the immovable finger denticulate, armed below with two spines; the opposable edges of the two fingers bluntly denticulated. Femur of first leg sparsely granular, of the remaining pairs coarsely and closely granular, smoother on the inner side, denticulate distally beneath; a single apical spine on the underside of the tibiæ of the second, third, and fourth pairs. Sterna mostly smooth, very finely punctulate and marked with scattered larger punctures, the first, second, and third granular at the side, the first also thickly and finely granular in front.

♂. Smaller than the female; the two inferior spines on the trochanter of the chela reduced in size; those on the upperside 5 in number—2 on the inner side, 1 on the angle, and 2 on the anterior side, the latter close together and remote from the angular spine, which is not produced forwards in advance of them; femur and tibia of chela not externally denticulated; tibial apophysis thinner than in female, not or scarcely denticulated posteriorly at the distal end; immovable finger of chela more strongly convex than in female; the mouth with a distinct apical prominence below the terminal claw.

Measurements in mm.—♀. Total length (not including flagellum) 74, carapace 25, chela (excluding coxa) 32; length of hand 6.5, width 6; femur of first leg 16, tibia 21. ♂. Total length 56, carapace 21, chela 34; length of hand 8.5, width 6; femur of first leg 14, tibia 18.

Hab. NORTH AMERICA, San Diego in Texas, Florida.—MEXICO (*Mus. Paris*¹), Mazatlan, Sinaloa, Cordova (*Höge*), Guadalajara, Jalisco (*Schumann*), Guanajuato (*Dugès*), Xautipa, Amula, and Omilteme in Guerrero (*H. H. Smith*), Atoyac, Playa Vicente, Oaxaca (*Mus. Brit.*).

Of female and young examples identified comprehensively as *M. giganteus* I have seen about fifteen examples from Mexico, and the British Museum also has others from San Diego, Texas (*Taylor*).

Three forms of the male of this species are distinguishable:—

- a. The form described above, in which the five spines on the upper edge of the trochanter of the chela are subequally developed, the anterior two being separated from each other and not markedly produced anteriorly; the upperside of the trochanter is pitted, but only obsoletely granular, and the outer side of the femur is not denticulated, merely rugose. (Tab. X. fig. 2.) *giganteus*, Luc. (typical form).

This is the form that Girard characterizes from the Red River under the name *Thelyphonus excubitor*, and it is probably the typical *M. giganteus*. The British Museum has examples of it ticketed "Mexico" (*Keyserling coll.*), and others from Atoyac in Vera Cruz.

- b. A larger form than the preceding, with the upperside of the trochanter of the chela coarsely granular, and the femur of the chela studded externally with sharp denticuliform granules or tubercles; the two anterior spines on the upper edge of the trochanter are united basally, the external (which is the smaller) rising from the internal, which is much stronger than the rest of the spines on this segment. (Tab. X. fig. 4.) Subsp. *scabrosus*, n.

The British Museum has two males of this subspecies—one, the type, from Oaxaca; the other labelled "Playa Vicente, Mexico."

- c. A small form with the two anterior spines on the upperside of the trochanter of the chela almost obsolete, the two internal small, the angular alone being prominent but small; the external surface of the femur and of the base of the tibia of the chela are coarsely denticulated. (Tab. X. fig. 3.) Subsp. *mexicanus*, Butl.

The British Museum has two males of this subspecies—the type, which is merely ticketed "Mexico," and another from "Ciudad" (*Rogers*). In the bottle with the last there is a small female which has the chela externally more scabrous and subdenticulate than the female I refer to *M. mexicanus*.

2. Mastigoproctus liochirus. (Tab. X. fig. 5.)

Mastigoproctus liochirus, Pocock, Ann. & Mag. Nat. Hist. (7) v. p. 299 (1900)¹.

Colour: carapace and abdomen blackish, chelæ and legs reddish-brown. *Carapace* and *terga* less coarsely granular than in *M. giganteus*. *Chela* with coxa almost smooth; trochanter armed as in the female; spine on upper edge of femur minute, on the lower side small; tibial apophysis long, as in the male of *M. giganteus*, smooth along its posterior edge, but with 1 subapical denticle and 1 close to its base on the tibia, anterior edge of the apophysis denticulated; inner edge of hand denticulated from the base up to the tip of the immovable finger, 1 spine on the lower side of the hand close to the base of the movable finger, which has denticulated edges and no process beneath the terminal fang; the whole of the upper and outer sides of the segments of the chela smooth, polished, sparsely punctured and quite unlike the appendages in *M. giganteus*; hand as wide as long, its inner edge compressed as in the female of *M. giganteus*. *Sterna* smooth and polished, without granules. *Legs* without an apical tibial spine upon the second and third pairs.

Measurements in mm.—Total length 36, carapace 13, chela 28.5.

Hab. GUATEMALA (*Sarg*).

This species is based upon a single specimen, which, to judge by the length of the chela, is probably a subadult male. The genital operculum (sternum of first abdominal segment) is unmodified, but is furnished on its underside near the edge with a pair of horny black crests, such as are seen in subadult specimens. The second abdominal sternum is also unmodified.

Suborder AMBLYPYGI.

Fam. PHRYNIDÆ.

Tarantulinae, Simon, Ann. Soc. Ent. Fr. lxi. p. 46 (1892); Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 240 (1899) (part.).

Neophryninæ, Kraepelin, Abh. Ver. Hamb. xiii. p. 20 (1895) (part.).

Admetinæ, Pocock, Ann. & Mag. Nat. Hist. (6) xix. p. 358 (1897) (part.).

Sternal area of cephalothorax mostly membranous, the two mesosternal plates small and oval, the prosternal plate gradually narrowed from base to apex, not abruptly expanded at its basal extremity. Fourth leg with its tibia composed of three and its tarsus of four segments.

The sexes may be recognized without difficulty. Beneath the genital operculum in the male there is a pair of soft, muscular, weakly chitinized, indistinctly bisegmented, apically bifid organs which probably act as penes. When the operculum is raised these organs protrude from the aperture. In the female, on the contrary, there are no such organs beneath the operculum, but a pair of rounded membranous eminences affixed to the inner surface of the operculum, each bearing a pointed, inwardly directed, chitinous, claw-like sclerite. Furthermore, the males have the legs and chelæ a little, or considerably, longer than in the females.

This family is confined to the tropical and warmer temperate parts of America. It is divisible into two subfamilies:—

- a. Trochanter (second segment) of second appendage (chela or palpus) not furnished beneath with a subcylindrical chitinous process lying back against the coxa PHRYNINÆ.
- b. Trochanter of second appendage furnished beneath with a subcylindrical process lying back against the coxa. (See Tab. XII. fig. 1 a, ap.) HETEROPHRYNINÆ, NOV.

Subfam. PHRYNINÆ.

Characters as above.

Distribution. From Central America northwards into Lower California and Texas, eastwards over all the islands of the Greater and Lesser Antilles to the Bahamas, and southwards into the northern parts of South America as far down as the Amazons.

The three genera referable to this subfamily may be diagnosed as follows:—

- a. Anterior border of carapace armed with long spiniform processes; protarsal segment (hand) of the chela furnished with a single upper and lower long spine ACANTHOPHRYNUS, Kraep.
- b. Anterior border of carapace armed with small denticuliform processes or almost smooth; protarsal segment of chela furnished, at least above, with more than the one long spine.
 - a'. Tibia of the chela armed above with two longish spines between the two principal longest spines HEMIPHRYNUS, Poc.
 - b'. Tibia of chela armed above with only one long spine between the two principal longest spines PHRYNUS, Lam.

PHRYNUS.

Tarantula, Fabr. Ent. Syst. ii. p. 43 (1792) (part.); Karsch, Arch. f. Naturg. xlv. 1, p. 197 (1879) (part.); Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 275 (1894); Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 241 (1899).

Phrynus, Lamarek, Hist. Anim. sans Vert. p. 175 (1801) (part.); Latreille, Hist. Nat. Crust. et Ins. iii. p. 48 (1802); Pocock, Ann. & Mag. Nat. Hist. (7) ix. p. 161 (1902). (Type *palmatus*, Herbst.)

Admetus, C. Koch, Uebersicht Arachn. Syst. v. p. 81 (1850) (ad max. part.); Simon, Ann. Soc. Ent. Fr. lxi. p. 51 (1892); Pocock, Ann. & Mag. Nat. Hist. (6) xix. p. 358 (1897). (Type *palmatus*, Herbst.)

Neophrynus, Kraepelin, Abh. Ver. Hamburg, xiii. p. 23 (1895). (Type *palmatus*, Herbst.)

Anterior border of carapace at most weakly denticulate. Femur of chela armed above and below only with marginal spines; tibia armed above with 7-9 spines, two of which are noticeably longer than the rest, and are separated by one long spine, which is about three-quarters the length of the others; hand armed above with 2 or 3 spines, and below with 3 spines and 1 long spine and a proximal and distal spinule. Proximal tarsal segment of legs partially divided by a membranous subjoint into two segments.

Type *Phalangium palmatum*, Herbst (1797).

Distribution. Texas, Central America, West Indies, and South America north of the Amazons.

Synopsis of the Species.

- a. Subfrontal process not concealed from above by the anterior border of the carapace; lateral ocular cluster nearly twice as far from the median tubercle as from the lateral border; trochanter of chela with a strong spine in the middle of its anterior surface; first spine on upperside of hand isolated from the base of the median spine; first spine on upperside of femur of chela long and strong *barbadensis*, Poc.
- b. Subfrontal process concealed from above by the anterior border of the carapace; lateral ocular cluster at most a little further from the median tubercle than from the lateral border; no strong median spine in the middle of the anterior surface of the trochanter of the chela; first spine on upperside of hand represented by a small denticle situated upon the base of the long median spine; first spine on upperside of femur of chela small.
- a¹. Second spine on tibia of chela about as long as the fourth and longer than the sixth; no distinct yellow spot on inner side of lateral eyes.
- a². Area between eyes not red; femora not spotted, anterior border of carapace nearly straight; genital operculum enormous and sternum of third abdominal somite arcuate in male *operculatus*, sp. n.
- b². Area between eyes reddish; legs not spotted; femora and anterior border of carapace distinctly emarginate; genital operculum in male small; sternum of third abdominal somite straight *parvulus*, sp. n.
- b¹. Second spine on tibia of chela much shorter than the fourth, and shorter than the sixth; a distinct bright yellow spot on the inner side of each lateral eye-cluster *whitei*, Gerv.

1. *Phrynus barbadensis*. (Tab. X. figg. 6, 6 *a*, *b*, δ .)

Tarantula barbadensis, Pocock, Journ. Linn. Soc., Zool. xxiv. p. 529, t. 40. fig. 1 (1893)¹; Ann. & Mag. Nat. Hist. (6) xiv. p. 278 (1894)².

Tarantula palmata barbadensis, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 244 (1899)³.

Neophrynus palmatus, var. *barbadensis*, Kraepelin, Abh. Ver. Hamburg, xiii. p. 33 (1895)⁴.

Colour: carapace a uniform deep brown, passing into black, with four ill-defined marginal yellow spots; abdomen pale brownish-yellow or more frequently dark brownish-black variegated with yellow, a patch of this colour being particularly noticeable round the muscular pit, which is black. *Carapace* very finely granular, with some larger granules sparsely scattered; anterior border lightly emarginate, denticulate, not concealing the subfrontal process, which visibly projects downwards between the bases of the mandibles; the median tubercle about half its own longitudinal diameter from the edge; lateral eye-clusters wide apart, each cluster further from the median tubercle than from the anterior margin, nearly twice as far from the tubercle as from the lateral margin above the base of the anterior leg, and nearer to the latter point than to the anterior margin; median length of carapace about equal to length of tibia of chela and a little less than twice that of femur of first leg; width of carapace equal to length of tibia + protarsus + $\frac{1}{2}$ the tarsus (claw) of chela and about two-thirds the length of the femur of the first leg and equal to the femur of the second leg. These proportions are approximately true for both sexes. *Chelæ* short and robust, the trochanter armed in front with 5 strong spines; femur armed above and below with 5 strong spines and at least 2 smaller spines, the third inferior spine about as long as the fourth and always noticeably longer than the fifth, and the first on the upperside half the length of the second; tibia armed above with 8 spines, the distal of which is quite small; the second about two-thirds the length of the third and as long as the fourth or fifth; the longest of these spines less than the width of the tibia; the lower side of the segment armed with 5 spines—the first, third, and fifth short and subequal, much shorter than the second and fourth, which are long and also subequal; protarsus (hand) armed above and below with 3 spines, the first and third on the lower side small, sometimes spinuliform; the first on the upperside small but remote from the base of the median long spine, the third longer, about half the length of the second; femur of chela coarsely granular above and below; tibia finely shagreened, but sparsely and weakly granular, its lower side bordered externally by a strong granular ridge; outer side of hand smooth. *Legs* granular. *Abdominal terga* shagreened, beset with coarse granules, a row of which runs along the posterior border; genital operculum in male rather large, exceeding the length of the sternal area of the carapace; sternal area of third abdominal somite straight from side to side.

Measurements in mm.—Total length 19; width of carapace 11, median length 7; femur of chela (upperside) 5, tibia 7.5.

Hab. PANAMA, San José in the Pearl Is. (*vide Kraepelin*).—COLOMBIA; VENEZUELA; TRINIDAD; BARBADOS.

2. *Phrynus parvulus*, sp. n. (Tab. X. figg. 7, 7 *a*, *b*, δ .)

Resembling *P. barbadensis* in general form, but more conspicuously variegated, the carapace ornamented with pale reddish patches on each side of the middle line, and the area between the eyes red; terga yellow along the posterior border, and with a large crescentic yellow patch round the muscular impressions. *Carapace* with its coarser granules more numerous, its frontal area narrower, the anterior border more deeply emarginate, concealing the frontal process; ocular tubercle at least its own diameter from the anterior border; lateral ocular clusters closer together, each cluster standing about equally distant from the median tubercle and from the lateral emargination above the base of the first leg and further from the anterior border than from the median tubercle. *Chelæ* of much the same length and form as in *P. barbadensis*, but more granular, the inner surface being beset with fine close granulation, the trochanter armed with only 4 spines, all of which except the inferior are small; the third spine on the lower side of the femur small, much shorter than the fourth, and only as long as the fifth; the basal spine on the upperside of the hand subtubercular and rising from the base of the median spine, not independently of

it as in *P. barbadensis*; the spines on the lower side longer, the first or proximal arising close to the base of the median, which it almost touches, and from which it diverges at an acute angle. *Genital operculum* in male small, its length about equal to that of the circular sternal area of the cephalothorax and much less than that of the upperside of the femur of the chela. Sternal area of third abdominal somite straight from side to side.

Measurements in mm.—Total length 16, width of carapace 8.5, median length 6; length of genital operculum 2, width 3.

Hab. GUATEMALA, ruins of Tikal, Peten (*Sarg*).

I have seen, in all, seven specimens of this species in the Godman and Salvin collection. Three of these are adult males, one an adult ovigerous female, and the rest about half or three-parts grown. The smallest measures about 8 mm. in length.

3. *Phrynus operculatus*, sp. n. (Tab. X. figg. 8, 8 a-c, ♂.)

Closely allied to *P. parvulus*, but darker in colour, there being no red upon the interocular area on the carapace, and no yellow spots upon the femora of the legs. The anterior border of the carapace is almost straight, and the lateral ocular clusters are about equidistant from the anterior border, from the lateral border above the base of the first leg, and from the median tubercle. The third spine upon the inferior edge of the femur of the chela is subequal to the fourth, and longer than the fifth, and the first spine upon the lower side of the hand is isolated from the base of the median spine and pointing in the same direction. Apart from these distinguishing features, which are found in both sexes, the male of *P. operculatus* differs from that of *P. parvulus* in the great size of the genital operculum, the length of which far exceeds that of the circular sternal area of the cephalothorax, and is almost equal to the length of the femur of the chela. Correlated with the enlargement of this plate the sternal area of the second somite shows almost a semicircular curvature, and that of the third is also curved and encroaches upon the sternum of the fourth segment.

Total length 13 mm., width of carapace 9; length of genital operculum (♂) 4, width 5.5.

Hab. GUATEMALA (*Sarg*).

An adult male and female in the Godman and Salvin collection.

4. *Phrynus whitei*. (Tab. XI. figg. 1, 1 a-c.)

Phrynus whitei, Gervais, Journ. l'Inst. Soc. Phil. Paris, x. p. 72 (1842)¹; Ins. Apt. iii. p. 6 (1844)².

Tarantula whitei, Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 277, t. 7. figg. 4, 4 a (1894)³;

Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 243 (1899)⁴.

Neophrynus whitei, Kraepelin, Abh. Ver. Hamb. xiii. p. 28 (1895)⁵.

Colour: carapace blackish, with yellow rim, yellowish radiating spots, and a bright yellow-red patch on the inner side of each lateral ocular cluster; abdomen variegated, femora of legs spotted. Carapace with sparsely arranged coarse granules, the anterior border covering the subfrontal process, lightly emarginate, median ocular tubercle less than its own diameter from the anterior border; lateral ocular clusters about equidistant from the median tubercle, from the anterior border, and from the lateral border at the emargination above the base of the first leg. Chela with trochanter and femur spined as in *P. parvulus*; spines of tibia differing from those of the three foregoing species in that the second and sixth are much shorter than the fourth, and less than half the length of the third and fifth respectively, the eighth spine is even more reduced than in *P. parvulus*; hand as in *P. parvulus*. Genital operculum rather large, its length exceeding that of the sternal area of the cephalothorax; sternal area of third abdominal somite straight from side to side.

Total length 14 mm., width of carapace 8.5; length of genital operculum 2.5.

Hab. NORTH AMERICA, Texas and Lower California⁴.—MEXICO⁴; CENTRAL AMERICA as far south as Nicaragua⁴ (*fide Kraepelin*).

The only example of this species available for description is the type, which is erroneously ticketed "Burdwan, India," and formed part of Col. Hardwicke's collection.

HEMIPHRYNUS.

Hemiphrynus, Pocock, Ann. & Mag. Nat. Hist. (7) ix. p. 161 (1902).

Very closely allied to *Phrynus*, but differing in that the tibia of the chela is armed above on its inner edge with nine spines, of which the third from the proximal end and the fourth from the distal end are the longest. These two long spines are apparently homologous to the two longest spines on this segment in *Phrynus*, which are respectively the third from the proximal end and the fourth or third from the distal end; but whereas in *Phrynus* there is only one long spine between these two, in *Hemiphrynus* there are two.

Type *H. levifrons*, Poc.

Distribution. Central and South America; Bahamas.

In addition to the three species described below, this genus includes *Phrynus viridiceps*, Poc. [Journ. Linn. Soc., Zool. xxiv. p. 540 (1893), and Ann. & Mag. Nat. Hist. (6) xiv. p. 279 (1894)], from the Bahamas, and *P. macrops*, Poc. [Ann. & Mag. Nat. Hist. (6) xiv. p. 281, t. 7. fig. 3 (1894)], from S. America. Both appear to be valid species. The first will fall alongside *H. aztecus* under heading *a*, and the second alongside *H. raptator* under *a'* of the synoptical table that follows.

Synopsis of the Central-American Species.

- a.* Underside of tibia of chela evenly convex and coarsely granular right up to the base of the spines, without a trace of a longitudinal crest dividing the lower from the outer surface; spines on tibia short, the longest less than the width of the segment; first and third spines on lower side of hand minute &c. *aztecus*, Poc.
- b.* Underside of tibia of chela flat, horizontal, forming a right angle with the outer surface, from which it is separated by a strong longitudinal ridge; the lower side with at most a few coarse granules at least in its distal half; spines on tibia long, the longest considerably exceeding the width of the segment; first and third spines on lower side of hand longish.
- a'.* First spine on upperside of hand longer than the third, as in *H. aztecus*, and as in that species the trochanter is armed with only four spines, the one on the middle of the anterior surface being small, not longer than the superior spines *raptator*, sp. n.
- b'.* First spine on upperside of hand always shorter than the third; anterior side of trochanter armed with five spines, one being on the middle of the surface *levifrons*, Poc.

1. *Hemiphrynus aztecus*. (Tab. XI. figg. 2, 2 a, b, ♂.)

Tarantula azteca, Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 280, t. 7. fig. 2 (1894)¹.

Colour almost entirely blackish-brown, without distinct flavous spots or bands. *Carapace* finely and closely granular, and sparsely studded with coarser granulation; the anterior border very distinctly emarginate, and evenly and somewhat coarsely denticulate, concealing the subfrontal process; median ocular tubercle about its own length from the anterior border; lateral eye-clusters subequally distant from the median lateral, from the anterior border, and from the lateral emargination above the base of the first leg. *Mandibles* at most very weakly tuberculous at the distal end above. *Chelæ* robust, moderately long, the tibia rather longer than the median length of the carapace, the width of which is about as long as the tibia and the hand (protarsus); the trochanter armed with four spines, of which only the two inferior are long and strong, the other two being short and spinuliform; femur armed above with six spines and some spinules, the third the longest, but only about half the height of the segment, the fourth and sixth short; also armed below with six spines, of which the fourth and sixth are the shortest, the first a little longer than the second and third, but less than the height of the segment; this segment coarsely and closely granular above and below, finely granular in front, with only a few coarse granules intermixed; tibia somewhat coarsely granular above and below, the granules on the lower side passing right up to the base of the spines throughout the length of the segment, no trace of a longitudinal crest running along the outer side of the lower surface and separating it from the external surface; anterior surface finely granular, with a few coarser granules; nine spines on upper inner edge, the first, eighth, and ninth the smallest, second and seventh coming next in size and subequal, third the longest, fourth and sixth almost as long and subequal, fifth midway between the second and fourth; none of the spines long, the longest (third) a little less than the height of the inner surface of the tibia, and still less than the width from the upper inner to the under outer edge; hand almost smooth, a few granules below, its upper edge with three strong spines, the first or proximal longer than the third or distal, and about half the length of the median; the inferior surface armed with one long spine and two spinules. *Legs* with granular femora; femur of the first about one-third longer than the width of the carapace, which is a little less than that of the second, and equal to that of the fourth.

Measurements in mm.—Total length 23, median length of carapace 7·8, greatest width 12·8; height of femur of chela 3; length of tibia 9·5, thickness 3·5, length of longest spine 2·5.

Hab. MEXICO, Tuxtla (coll. *Keyserling*¹), Oaxaca¹.

Six specimens seen.

2. *Hemiphrynus raptator*, sp. n. (Tab. XI. figg. 3, 3 a-g, ♂.)

Colour of carapace and chelæ deep blackish-brown, the former often with four marginal reddish spots, and the same number of reddish stripes radiating from the central depression; abdomen blackish, with a large yellowish-red ring round the muscular impression, or when the yellowish patches increase in size describable rather as reddish-yellow with a median and a lateral dark band; femora of legs in the adult uniformly dark reddish-brown, at most indistinctly spotted. *Carapace* finely granular, and beset with scattered coarser granules as in *H. aztecus*; the anterior border much straighter than in that species, the frontal lobes being less produced, and the lateral eye-clusters in consequence nearer to the anterior border; the median tubercle about its own diameter from the anterior edge, which conceals the frontal process. *Mandible* furnished above at the distal end with a pair of setiferous tubercles. *Chelæ* shaped as in *H. aztecus*, but most of the spines relatively much longer, the longest spine on the upperside of the femur as long as the height of the segment, and the longest on the lower side much longer; tibia differing essentially from that of *H. aztecus* in that the underside is flat and horizontal, and separated from the upperside by a distinct ridge studded with coarse granules, and at least in the distal half of this segment there are no coarse granules lying close to the base of the spines; the longest spines—*i. e.*, the third and sixth—are much longer than the thickness of the segment, the fourth being equal to its thickness from the upper inner edge to the under outer edge; also the fifth spine is very noticeably shorter than the second, and not much longer than the seventh; hand (protarsus) as in *H. aztecus*, except that the long spines

are longer, exceeding the height of the segment. *Legs* longer than in *H. aztecus*, the femur of the fourth always considerably exceeding the width of the carapace; that of the first variable in length, generally from about twice to twice and a half the length of the width of the carapace.

Measurements in mm. of ♂ ad. (type from Teapa).—Total length 28; median length of carapace 9.8, its width 15; length of tibia of chela 13, thickness 3, length of its longest spine 3; height of femur 2.5, length of longest spine 3; length of femur of first leg 34, of fourth 22.5.

Hab. MEXICO, Teapa in Tabasco (*H. H. Smith*), Yucatan (*coll. Keyserling*); GUATEMALA, Cahabon in Vera Paz, and the ruins of Tikal, Peten (*Sarg*).

I have seen twenty-seven specimens of this species from the above-mentioned localities, including young and adults of both sexes, varying in length from 7 to about 30 mm. This series is particularly instructive, since it proves that the characters are, on the whole, so constant that there is never any doubt even in the youngest specimens as to which of the three Central-American *Hemiphryni* they belong. In all the crest on the lower side of the tibia of the chela is present, the first spine on the upperside of the hand is longer than the third, and the fifth on the upperside of the tibia is shorter than the second, and the spines are noticeably longer than in *H. aztecus*. The chief difference in the young lies in the fact that the chelæ are shorter and much smoother than in the adult.

The adults vary considerably in size. Two ovigerous females from the ruins of Tikal, Peten, give the following measurements:—*a*, large specimen; *b*, small ditto. Total length 30 (*a*), 23 (*b*); width of carapace 15 (*a*), 11 (*b*), its median length 10.5 (*a*), 8 (*b*); length of tibia of chela 12.5 (*a*), 8 (*b*); femur of first leg 33 (*a*), 20 (*b*), of fourth 21 (*a*), 13 (*b*).

3. *Hemiphrynus lævifrons*. (Tab. XI. figg. 4, 4 *a*.)

Tarantula lævifrons, Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 279, t. 7. figg. 1, 1 *a* (1894)¹.

Nearly allied to *H. raptator*, Poc. Colour the same as in that species. Anterior border of carapace less strongly denticulated; upperside of mandibles without a pair of tubercles at their distal end. Chelæ with practically the same spine-armature, except that there is a distinct spine, almost as long as the external of the three inferior spines, on the middle of the anterior surface of the trochanter, and of the three spines on the upperside of the hand, both the proximal and distal are long, but the latter is longer than the former, in the adult almost or quite twice as long. In the young the two are subequal and about one-third of the length of the median spine, but as age advances the proximal diminishes in relative length, while the distal at the same time increases, until ultimately the proximal is only about one-fourth the length of the median and scarcely more than half that of the distal, which itself exceeds half the median. In *H. raptator*, on the other hand, the distal spine is at all ages small, and never half the length of the proximal, which, in the adult, is about half the length of the median. Moreover, the granules on the chela are fewer in number and smaller than in *H. raptator*.

Measurements in mm.—Total length 24; width of carapace 14, median length 9; length of tibia of chela 10, thickness 3, length of its longest spine 4; length of femur of first 28, of fourth leg 17.

Hab. GUATEMALA (*Champion*); COSTA RICA (*Rogers*); PANAMA, Bugaba, Chiriqui (*Champion*).—WEST COAST OF AMERICA (? Colombia or Ecuador)¹.

The Godman and Salvin collection contains seven specimens of this species, the

largest being the one measured, and the smallest reaching a length of 14 mm., with the carapace 6.5 mm. in width, and the tibia of the chela 4 mm. long.

Apart from these examples, there are three in the British Museum, the type and two others, which are merely labelled "W. Coast of America." Hence the discovery of the exact distribution of this species is of much interest.

Kraepelin describes the following as the only species of this type represented in Mexico:—

Phrynus fuscimanus, C. L. Koch.

Syn. *Phrynus fuscimanus*, C. L. Koch, Die Arachn. xv. p. 67, fig. 1463 (1848).

Admetus fuscimanus, C. L. Koch, Uebersicht Archn. Syst. v. p. 81 (1850).

Phrynus mexicanus, Bilimek, Verh. zool.-bot. Ges. Wien, xvii. p. 231 (1867).

Neophrynus fuscimanus, Kraepelin, Abh. Ver. Hamb. xiii. p. 25 (1895).

Tarantula fuscimanus, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 243 (1899).

It is impossible even to guess how many species are here confused in the above-given synonymy. The description, covering three pages quarto in length, furnishes no clue as to whether the specimens described presented the characters distinctive of *H. aztecus*, or *H. lævifrons*, or *H. raptator*, or of all three; and no detailed diagnosis is furnished of the structural features of the type of either *Phrynus fuscimanus* or *P. mexicanus*, although both were available for the purpose. • Had this been done it would have been possible to hazard an opinion as to whether either or both of these names, or neither, is to be applied to one of the three species I have described in the foregoing pages.

The type of *Phrynus fuscimanus*, said to come from North America, was immature, to judge from the figure. The spines on the chelæ appear to be long. Hence the species may prove to be identical with either *H. raptator* or *H. lævifrons*, or to belong to an allied form. Bilimek's species, too, cannot be classified from the description. The specimens came from the Cave of Cacahuamilpa, in Mexico. The localities given by Kraepelin for the twenty-three specimens procured for his "Revision" are Yucatan, Cozumel Island, Guatemala, and Panama. Since *H. raptator* occurs in Yucatan, it is probable that specimens of that species furnished some of the material whereon the voluminous disquisition above referred to was based.

ACANTHOPHRYNUS.

Phrynopsis, Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 257 (1894); Kraepelin, Abh. Ver. Hamburg, xiii. p. 21 (1895) (nom. præocc.).

Acanthophrynus, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 241 (1899).

Distinguishable from *Phrynus* and *Hemiphrynus* by the following characters:—The anterior border of the carapace is armed with long spiniform teeth, which extend on to the lateral margin of the cephalic portion, gradually diminishing in size from before backwards. The anterior surface of the femur of the

chela is armed basally with two spines, one superior and one inferior, in addition to those that stand upon the upper and lower edges; tibia of chela armed above with two long spines separated by a spinule, or a spine which does not exceed one-fourth the length of either of them; between the distal of these and the extremity of the segment stand three spines, the median of which is longer than the others; hand armed above and below with a single long spine, the upper nearer the base of the hand than the corresponding long spine in *Phrynus* and *Hemiphrynus*. Proximal tarsal segment of the *legs* entire, without transverse membranous line.

Type *A. spinifrons*, Poc.

Distribution. California and Mexico.

1. *Acanthophrynus spinifrons*. (Tab. XI. figg. 5, 5 *a-e*, ♂.)

Phrynopis spinifrons, Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 286 (1894)¹.

Colour a tolerably uniform reddish-brown, a distinct yellow ring round the apex of the femora of the legs. *Carapace* studded with coarse granulation, which is more scattered on the cephalic area; median ocular tubercle at least twice its long diameter from the groove that marks the thickening of the anterior margin; subfrontal process lying far beneath the edge of the carapace and bluntly rounded. *Chelæ* longish, trochanter armed in front with five spines on its lower and distal edge, there being two close together near the acutely angular pivot that articulates with the femur; femur armed above and below as in *Hemiphrynus raptator*, the longest inferior spine equal to the height of the segment, and the longest superior spine a little less; very coarsely granular above, much less coarsely below; tibia coarsely granular, with distinct inferior crest, the longest spine on its upper edge much exceeding the thickness of the segment; the spine between the two long spines minute and spinuliform, subequal to or smaller than the proximal and distal spines, much smaller than the third spine from the proximal and the third from the distal end; hand with only a few granules above and below externally; two spinules on the area lying on the proximal side of the upper long spine; tibia of chela as long as the width of the carapace. Femur of first *leg* more than twice as long as width of carapace, of fourth leg one-fourth longer.

Measurements in mm.—Total length 33; width of carapace 16, median length (not including anterior spines) 11.5; length of tibia of chela 16, thickness 3, length of its longest spine 4.5; femur of first leg 37, of fourth 20.

Hab. MEXICO, Ciudad in Durango¹ (*Forrer*).

Subfam. HETEROPHRYNINÆ.

Characters as above (p. 49).

HETEROPHRYNUS.

Phrynus, C. Koch (nec Lamarck), Uebersicht Arachn. Syst. v. p. 80 (1850) (part.).

Admetus, C. Koch, loc. cit. p. 81 (1850) (part.).

Tarantula, Karsch (nec Fabr.), Arch. f. Naturg. xlv. 1, p. 107 (1879) (type *pumilio*, Koch); Simon, Ann. Soc. Ent. Fr. lxi. p. 51 (1892) (type *reniformis*, Pall., nec Linn.).

Heterophrynus, Pocock, Journ. Linn. Soc., Zool. xxiv. p. 527 (in note) (1894); Ann. & Mag. Nat. Hist. (6) xiv. p. 275 (1894) (type *chiracanthus*, Gerv.); Kraepelin, Abh. Ver. Hamb. xiii. p. 36 (1895).

Admetus, Kraepelin (nec Koch, Simon), Das Tierr., Scorpiones et Pedipalpi, p. 245 (1899).

Same characters as for the subfamily.

BIOL. CENTR.-AMER., Arachn. Pedip. & Solif., October 1902.

i

1. **Heterophrynus chiracanthus.** (Tab. XII. figg. 1, 1 a.)

Phrynus chiracanthus, Gervais, Journ. Inst. Soc. Phil. Paris, x. p. 72 (1842)¹; Ins. Apt. iii. p. 3 (1844)²; Butler, Ann. & Mag. Nat. Hist. (4) xii. p. 117 (1873)³.

Heterophrynus chiracanthus, Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 287 (1894)⁴.

Colour a tolerably uniform blackish-brown; legs redder. *Carapace* sparsely covered with coarse granules; the anterior border transverse, denticulated; the median ocular tubercle high, about its own diameter from the margin; the lateral eye-clusters not widely separated, only a little further from each other than either is from the lateral margin, and about equidistant from the anterior border and from the median tubercle. *Chelæ* very long and slender, coarsely granular, the tibia twice and a half times the width of the carapace; the trochanter armed with four long spines; femur with six spines above and five below, the distal in each case small, third on upper and first on lower the longest, and considerably exceeding the height of the segment; tibia armed with seven upper and six lower spines, the proximal small, spinuliform, the two distal small and subequal; hand granular above and below, smooth externally.

Measurements in mm.—Total length 30; median length of carapace 11, width 16.5; femur of chela 39; tibia 42; femur of first 61, of fourth leg 36.

Hab. CENTRAL AMERICA (*vide* Kraepelin).

The description given above and the figures 1, 1 a on Tab. XII. have been taken from the type specimen of the species which is in the British Museum.

Dr. Kraepelin describes all the species of this genus, some five or six in number, under the name *Admetus pumilio*, C. L. Koch, and amongst the localities cites Colombia, Venezuela, Guiana, and the Amazons. The type of *A. pumilio*, Koch, is a very young specimen, which, from the figure and description, cannot be assigned with certainty to any one of the species of the genus I recognize. Kraepelin does not describe the characters of the Central-American specimen he mentions. Hence it is impossible to do more than guess to which of the species it belongs. But since some of the Demerara scorpions, e. g., *Tityus androcottooides*, *T. cambridgei*, subsp. *championi*, and *Broteochactas delicatus*, extend into Panama, I have assumed provisionally that the *Heterophrynus* may also prove to be identical with the Demerara species described by Gervais as *Phrynus chiracanthus*.