

Scorpions of Brazil

by

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(With plates 2 to 13).

MATERIAL STUDIED

Some 6 years ago the Bello Horizonte Branch of the Instituto OSWALDO CRUZ undertook the study of scorpionism in its varied aspects. The material was made up mostly of scorpions sent from Ouro Preto, Santa Barbara and Itabira do Malto Dentro or caught in Bello Horizonte. In this space of time the Institute received several thousands of live and dead scorpions and of caudal vesicles. This material comprises the species *Tityus bahiensis* and *Tityus serrulatus*. With the object of determining the scorpions of the Brazilian fauna and of throwing light on some points referring to the biology of scorpions and to their poison, the Institute distributed widely, towards the end of 1920, circulars requesting the remittance of scorpions and any information that might prove useful. These circulars were sent to the priests of each parish, to the president of each municipality and to our consular and di-

plomatic agents abroad. The appeal was not made in vain for in a short time this Branch had an abundant material for study. I was entrusted with the systematic part, restricted for the time being to Brazilian species.

Besides our own I had the chance of examining the collections of the Instituto OSWALDO CRUZ and the National Museum in Rio de Janeiro, the Institute of Butantan and the Museu Paulista in São Paulo to the directors of which I must acknowledge my indebtedness for the courteous welcome tendered.

To Dr. ADOLPHO LUTZ, in whose laboratory I carried out my researches and who favoured me with all the direction I felt necessary I must express my sincerest friendship and gratitude.

METHODS EMPLOYED.

The study of scorpions does not require special methods of preparation. It is advisable to preserve them in alco-

hol at 70% or in a mixture of equal parts of absolute alcohol, water and glycerin. Under these conditions it is possible to examine any one of the joints without the loss of a single segment, which does not happen when they are kept dry.

Dissection is only necessary for determination of sex in those cases in which sexual dimorphism is not particularly marked. I learned the method with LUTZ; the scorpion is fixed with pins to a basin with a dark ground; the tissue uniting the tergites to the abdominal sternites is cut along its whole length with a pair of scissors; cephalothoracic scutum and first abdominal tergite are separated and the plate formed by the abdominal tergites is turned back so as to disclose the contents of the abdomen which consist chiefly of liver, a more or less abundant fatty tissue, between the meshes of which are found the different parts of the digestive tube, pulmonary sacks, heart etc. This mass must be carefully dissociated with a probe. When the specimen examined is a female, in an advanced stage of ovular maturity or when it contains embryos the sex is self-evident. The examination of the male genital organs is very difficult which tends to increase the number of cases in which this research remains fruitless. Older writers even asserted that they had never found genital organs in scorpions.

DEFINITION AND EXTERNAL MORPHOLOGY OF SCORPIONS.

The structure of the abdomen allows of the division of the class Arachnida in two subclasses *Arthrogastra* and *Hologastra*, the former with distinct abdominal segments, the latter with fused abdominal segments. The *Arthrogastra* include five orders: *Scorpionida*, *Solijugida*, *Phalangida*, *Chernetida* and *Pseudoscorpionida*.

The scorpionida include the scor-

pions and are defined as: *Arthrogastra* with short and didactyle mandibles and very developed maxillary palpi ending in forceps; mesosome with 7 articulations, a metasome in the shape of a tail with 6 segments, the last one adapted as a poison-bearing organ and ending in a sting; 4 pairs of pulmotracheæ; pectinate organs on the ventral side of the second mesosomic segment.

The body of scorpions is divided in trunk and tail. The trunk comprises the cephalothorax (prosoma) and the praeabdomen (mesosoma), united on their whole breadth.

The cephalothorax is wide, flattened, not jointed covered on the dorsal surface by a quadrangular and undivided carapace known as the cephalothoracic scutum, shield or tergite. On the middle line, at the junction of anterior and middle thirds there are two median eyes. At the sides near the anterior border of the cephalothorax are seen ocelli numbering two to five. The surface of the cephalothoracic tergite may be smooth and polished or else wrinkled so as to form distinct keels, granules and depressions. It is customary to distinguish median, lateral, fore and hind keels. The part of the fore anterior median keel located between the two median eyes forms the superciliary (orbital) ridge, presenting for examination a fore and a hind end, an adherent and a free border, the latter being smooth or grooved.

The praeabdomen is covered dorsally by the abdominal tergites, and, on the ventral surface, only on the last five segments by the abdominal sternites. Each tergite is united to the next by a soft membrane, inter-segmental membrane; the same applies to each sternite. The tergites and sternites are bound together by lateral membranes. The tergites are usually granular but they may have a smooth surface, either brilliant or dull; they have a median keel, more marked in the apical direction; some species

have also on either side a *lateral keel*. The last tergite has usually 5 keels, one median and limited to the basal part and two lateral symmetric ones starting from the hind border and not attaining the fore border. The surface of the sternites is usually dull with the posterior margin brilliant. A structure characterised by an appearance of numerous little punctures looking like pin-pricks is common (*nadelstichig* of German authors). The last and less frequently the preceding sternite have longitudinal keels. The first sternite has a flat surface, but sometimes it displays a median triangular elevated area, having an apical base and limited by two lateral grooves.

The four first sternites possess a pair of stigmata, linear or circular shape, surrounded by a salient border or *peritreme*.

Pectinate organs. The pectinate organs or pectines are two narrow, articulated shafts showing on the posterior border a row of contiguous teeth arranged like those of a comb. Each of them is articulated on a transverse blade—the *support of the pectines*—situated immediately in front of the first sternite. Each pecten has a varying number of teeth from 2 to 50. Between the bases of the teeth can be seen rounded wedges—the *fulcra*—which may be absent in some species. The teeth are hung on the sclerites of the *median lamella* made up of one or two rows. The first median piece, near to the trunk of the comb is termed the *median basal lamella* or *basal piece* of the comb. Laterally from the *middle lamellæ* are the *marginal lamellæ*, three in number.

In front of the support of the pectines can be seen the *genital operculum*, made up of two small plates in contact along the middle line. After the genital operculum comes the *sternum*, made up of two chitinous plates. It has a variable form; triangular or pentagonal in some families, it is, on the other hand, almost

linear in a transverse sense and hard to see in another family.

The tail or post-abdomen is composed of five *caudal segments* and the *poison-vesicle*. The dorsal surface is more or less excavated into a *dorsal groove*, the borders of which make up the *dorsal keels*. The lateral and inferior surfaces of the caudal segments are convex. They are seldom smooth and are usually provided with *granulations* and *keels*. Besides the afore-mentioned dorsal keels, there are two inferior submedian keels (sometimes fused along a greater or smaller extension so as to form an *inferior median keel*), two symmetric lateral keels, termed the *dorsal lateral* and *ventral lateral keels*, between which is frequently to be seen, chiefly between the 1st. and 2nd. segments and more seldom between a more or less distinct *accessory keel* (*Nebenkiel*). The 5th. caudal segment differs very much from the 4 former ones as to the structure of its keels; as a rule the ventral median inferior keel is found to be present, whilst the dorsal lateral keel is absent. The vesicle is ovoid or pear-shaped, convex on the ventral surface and flat or excavated on the dorsal one. The vesicle ends in an *aculeus* or *sting*, generally curved. Near the base of the aculeus there is another smaller thorn-like projection, transversally flattened, the *subaculear spur* or *tooth*. The vesicle is smooth or provided with granulations disposed in rows or irregularly. There are not infrequently hairs to be seen.

Appendages. These comprise *prehensile* and *locomotory* appendages represented the former by the *chela*, *cheliceræ* or *mandibles* and the *maxillary palpi* and the latter by the 4 pairs of legs.

The mandibles are small three-jointed organs, directed forwards, almost hidden by the anterior border of the cephalothorax. They end in a didactyle forceps, the finger of which is horizontally movable. The superior border of

the two fingers has a special dentition.

The *maxillary palpi* are long and end in powerful forceps. They are made up of the five following joints: *coxa*, with a surface destined for mastication on the median line (maxillary or arm humerus of lobe); the *trochanter*, a short joint; the *femur*, humerus or arm, a big joint with a round or quadrangular section, in which case the arestae form granular or denticulate keels; on the anterior surface there is a denticulate keel; the *tibia* brachium or fore-arm, generally of truncated form with keels, of which the one located on the anterior surface is particularly important; the «hand» or manus, divided into *carpus* and *fingers* or digits. The carpus is of variable shape, being elongate, pear-shaped or globular. An imaginary horizontal plane passing along the edge of the fingers divides the carpus in a volar and a dorsal half. A keel in the shape of an overturned letter S runs along the dorsal surface in its whole extension and divides it in a *medial* and a *lateral surface*, and continues on the fixed finger; it is termed the *finger-keel*. The keels situated at the intersection of the imaginary surface with the carpus are known, when present, as the *lateral* and *medial marginal keels*. Other keels may also exist on the carpus. Of the two fingers the upper one is fixed whereas the lower one, articulated at its base is movable in a vertical plane. The fingers are usually curved and display on their narrow edges a special granular structure. These granulations are arranged in a continuous row along the whole edge or else in oblique but nearly parallel rows. In the latter case the *principal row* can be isolated, flanked laterally and medially only by one bigger granule or else accompanied along their whole extension by lateral and medial *accessory series*. At the base of the movable finger there is frequently a strong and salient tubercle known as the *finger-lobe* or *digital lobe* and corresponding to which

there is a depression at the base of the fixed finger. At other times there is not exactly a lobe but the two fingers are separated at the base by a space with the shape of a ~.

The locomotory appendages are 4 pairs of legs, each of which can be disjointed in *coxa*, *trochanter*, *femur*, *tibia* and *three-jointed tarsus* composed of protarsus, mesotarsus and metatarsus, the latter provided with two claws. The coxae of the first and second pairs of legs have triangular *maxillary appendages* or lobes directed towards the mouth; the maxillary appendages of the second pair are bigger and partially enveloped by the ones of the first. The four maxillary appendages are in touch with each other along the middle-line behind the mouth. The 3rd. pair is elongate and the 4th. still more so; the legs of each of these two pairs are separated from those of the other side by the sternum, which has already been described; the ones of the 4th. envelop the genital plates and the combs as well.

The tarsal joints sometimes display interesting formations: *tarsal spur*, *basal spur*, *pedal spur*, *claw-lobe* and *terminal lateral lobes*.

The tarsal spur is fairly strong, and usually easily seen with the unaided eye. It is located at the lower end of the protarsus of the last pairs of legs.

The basal spur is a similar formation found sometimes on the lateral sometimes on the medial side of the base of the metatarsus.

The pedal spur is seen at the base of the claws. The claw-lobe is narrow, located at the bifurcation of the two claws. Lateral terminal lobes are two rounded lobes hidden at the bottom of the bifurcation of the claws.

The formation of *bristles* or *hairs* is also common on metatarsus.

SEXUAL DIMORPHISM.

Sexual dimorphism is marked among scorpions. The *secondary sexual characters* consist in variations in colour and size of all the segments of the body, except perhaps the *sternum*, the *mandibles* and the *locomotory appendages*.

Scorpions have no external organ that characterises their sex. This is determined either by dissection of the viscera, when there is plenty of material, or by the secondary sexual characters of which not a single one is common to all species, though some are common to whole families but wanting in individual genera and species. Closely allied species differ profoundly as to sexual dimorphism; thus in the homogeneous group made up of *Tityus bahiensis*, *T. dorsomaculatus*, *T. trivittatus*, *T. costatus*, *T. stigmurus* and *T. serrulatus* the three first alone have a strong finger-lobe in the male. Sometimes two closely related species have very similar females and different males, which might suggest the existence of one species only with dimorphism of the male, as for instance in the case of *T. costatus* and *T. dorsomaculatus*.

It is therefore very advisable from the systematic point of view to be well acquainted with the sexual dimorphism of each species or at any rate of each group of species. With a little practice it is possible to determine the sex, even of a new species, by the mere observation of all the secondary characters. In some cases in which sexual dimorphism is not marked it is impossible to determine the sex without dissecting the specimen.

I will now make a careful study of the secondary sexual characters. The research work and conclusions only refer to the species found in Brazil.

Colour: As a rule male and female do not differ much as regards this character, but it is not rare to find varying

colour in the two sexes, for instance the male of *Isometrus maculatus* is darker and has less clear spots on the body than the female; the female of *Rhopalurus rochai* is lighter than the male; the female of *Rhopalurus acromelas* has lighter extremities than the male.

Size: The male is usually smaller than the female (for ex.: *R. rochai*, *R. pusillus*), at other times the reverse is the case, as in *Isometrus maculatus* and *Tityus metuendus*. Male and female may finally be of the same size: *T. bahiensis*, *T. stigmurus*, *T. dorsomaculatus* etc.

It is more usual to find a difference of size in the various segments of the body. As a rule the tail is bigger in the male, the body in the female; in other words there is a reduction in the ratio *body-tail* in the male. It is usual to estimate this difference by the number of times the length of the tail is comprised in the length of the cephalothorax. This dimorphism is very clear in *R. barythenar*.

The maxillary palpi may be of different length in the two sexes but in the case of these appendages the joint that varies most is the hand. The carpus is almost always thicker in the male, and, when present, this character is of the most distinctive. Examples are: *T. bahiensis*, *T. dorsomaculatus*, *R. borellii* and *R. laticauda*.

In some *Rhopalurus* species the tail is wider at the end in the male. POCO-CK considers the excess of this variation to be a distinctive character by which the genera *Rhopalurus* and *Centruroides* are distinguished. It may be casually mentioned however, that this division although exact for Central American scorpions cannot be applied to those of Brazil.

Pectinate Organs. In the pectines the chief difference between the sexes lies in the greater number of teeth in the male, as in *R. borellii*, and the vesicular dilata-

tion of the median basal lamella of the female, as in *T. cambridgei*, *T. metuendus*, *T. magnimanus*.

Structural Differences. On the maxillary palpi, tail, pectines hairs are longer and more plentiful in the male. Exs.: *R. rochai*, *R. laticauda*, *R. borellii*, *R. acromelas*, *R. barythenar*, *R. stenochirus*.

Of great value for differentiation is the presence of the finger lobe at the base of the movable finger and of corresponding groove on the fixed finger. In the genus *Tityus* this is only found in the male as in *T. bahiensis*, *T. trivittatus*, *T. dorsomaculatus*, *T. metuendus* and *T. magnimanus*. In *Rhopalurus* the lobe is not an exclusive apanage of the male; it may exist in both sexes but more accentuated in the male, as in *R. rochai*, or only in the male and reduced to vestiges, or only in the female as in *R. laticauda* and *R. borellii*.

An interesting sexual character is the presence of a navicular depression on the dorsal surface of the vesicle of the male of *B. bonariensis*, which also displays a strong spur on the medial surface of the hand.

The keels of the hand, finally, are more accentuated in the females of some species, such as *T. bahiensis*, *T. costatus*, *T. dorsomaculatus*.

KRAEPELIN divides the secondary sexual characters in three groups, viz. a) male secondary characters or formations peculiar to the male (spur on the medial surface of the hand, navicular depression on the dorsal surface of the vesicle) or the exaggeration of a formation also found in the female

(greater length of the tail, greater number of teeth on pectines, stronger finger-lobe, more marked separation of the fingers of the hand, bigger and more numerous hairs); b) female sexual characters, such as the vesicular dilatation of the median basal piece and the accentuations of the keels of the carpus; c) indifferent secondary sexual characters, appearing at times in the male, at others in the female and due to differences in an organ found in both sexes, owing to an exaggeration or diminution of the organ in either one of the sexes.

COMPARATIVE STUDY OF THE VARIOUS CLASSIFICATIONS OF SCORPIONS.

Arachnids were described by zoologists at the end of the 18th. and beginning of the 19th. centuries, in the great class of insects. They were the *Wingless Insects*. It is to LAMARCK that we owe the division of this class by the separation of the Arachnids from the Insects, a separation still valid to-day.

Classifications proposed for the scorpions are already numerous. It is no intention of ours to study critically the different classifications, but only to give a list of them, indicating as much as possible the points they have in common.

C. L. KOCH studies the Arachnids in 1837, outlining a classification for the Scorpionidæ which make up his fourth order. He considers four families, adopting as a criterion for distinguishing them the number of eyes present.

His classification is the following:

Order

Skorpionen. Scorpions.

Fam. I

Scorpionides: Scorpions with six eyes.

1rst. Genus. *Scorpius* EHRB. Comprising 15 species.

Fam. II.

Buthides: Scorpions with eight eyes.

- 1rst. Genus. *Buthus* LEACH with 12 species.
- 2nd. Genus. *Opisthophthalmus* with 5 species.
- 3rd. Genus. *Brotheas* with 5 species.
- 4th. Genus. *Telegonus* with 1 species.
- 5th. Genus. *Ischnurus* with 4 species.

Fam. III.

Centrurides: Scorpions with 10 eyes.

- 1rst. Genus. *Centrurus* EHRB. with 1 species.
- 2nd. Genus. *Vaejovis* with 7 species amongst which *V. debilis*.

Fam. IV.

Androctonides: Scorpions with twelve eyes.

- 1rst. Genus. *Androctonus* with 27 species.
- 2nd. Genus. *Tityus* with 27 species amongst which *Tityus bahiensis*.
- 3rd. Genus. *Lychas* with 4 species amongst which *L. maculatus*, *L. americanus*, *L. paraensis*.

PETERS' classification (Mon Ak. Wissensch. Berlin, 1861, pp. 509-513) is very different. It is the following:

- Group I: Telegonini.
Telegonus, Cercophonius, Bothriurus.
- Group II: Scorpionini
A. *Vaejovis*
B. a) *Brotheas, Euscorpilus, Scorpiops, Urodaeus.*
- Group III: Centrurini
Centrurus (Tityus, Isometrus,) Uroplectes.
- Group IV: Androctonini
Frionurus, Buthus.

THORELL in 1876 proposed a more complete classification published in the *Annals and Magazine of Natural History*, s. 4, v. 17, p. 3.

Fam. I. Androctonoidæ

- Subfam. I. Androctonini = Androctonini PETERS.
- Subfam. II. Centrurini = Centrurini PETERS with some additional genera.

Fam. II. Telegonoidæ = Telegonini PETERS.

Fam. III. Vaejovidæ

Vaejovis, Hadrurus.

Fam. IV. Pandinoidæ = Scorpionini PETERS minus *Vaejovis*.

- Subfam. I. Iurini
Iurus, Uroctonus.

Subfam. II. Pandinini

- A. *Diplocentrus*, *Heterometrus*, *Pandinus*, *Palamæus*, *Miæphonus*, *Opisthophthalmus*, *Opisthacanthus*, *Hormurus*, *Ischnurus*, *Hemiscorpius*.
 B. *Urodæus*, *Broteas*, *Scorpiops*, *Ioctonus*, *Chactas* *Euscorpius*.

In his classification of 1879, SIMON (Les Arachnides de France, VII, p. 92) subdivides the family Pandinoidæ in 3 others.

- Fam. I. Buthidæ = Androctonoidæ THORELL.
 Fam. II. Telegonoidæ = Telegonini PETERS.
 Fam. III. Vejovidæ = Vaejovidæ THORELL.
 Fam. IV. Heterometridæ = Pandinoidæ THORELL pro parte *Scorpio*, *Heterometrus*, *Opisthophthalmus*, *Nebo*, *Iurus*.
 Fam. V. Ischnuridæ = Pandinoidæ THORELL pro parte *Ischnurus*, *Euscorpius*, *Belisarius*.
 Fam. VI. Broteidæ = Pandinoidæ THORELL pro parte *Broteas*.

The classification of KARSCH 1879 (Mitt. Muench. ent. Ver., v. 3, pp. 17-22) is copied upon THORELL with small alterations.

In 1885 appeared the classification of RAY LANKESTER published in the Trans. of the Zool. Soc., II, pp. 379-380, and to which we will refer upon mentioning the elements of systematics. It is the following:

- Fam. Scorpionidæ.
 Subfam. I. Scorpionini.
 Genus I: *Scorpio*, including subgenera *Euscorpius*, *Buthus*, (*Heterometrus*) and *Broteas*.
 Genus II: *Telegonus*.
 Subfam. II. Androctonini.
 Genus: *Androctonus* with subgenera *Prionurus* and *Centrurus*.

POCOCK's classification in the Ann. of Nat. Hist., s. VI, vol. 12 stands for an undoubted progress in the systematics of scorpions. POCOCK makes use of the tarsal spur for the separation of families.

Fam. I. Scorpionidæ

- Subfam. I: Scorpionini = Heterometridæ SIM. without *Nebo* and *Iurus* = *Scorpio*, *Heterometrus*, *Miæphonus*, *Scelopetrus*, *Opisthophthalmus*, *Palamnæus*.
 Subfam. II: Ischnurini = Ischnuridæ SIM. without *Euscorpius* and *Belisarius* = *Ischnurus*, *Opisthacanthus*, *Opisthocentrus*, *Choloctonus*, *Chiromachus*, *Hormurus*, *Iomachus*.
 Subfam. III: Diplocentrini = Diplocentrini KARSCH and in addition *Nebo* = *Diplocentrus*, *Oiclus*, *Nebo* (*Oicus*).
 Subfam. IV: Hemiscorpionini (new subf.) *Hemiscorpius*
 Subfam. V: Urodacini (new subf.) *Urodacus* (*Iodacus*), *Ioctonus*.

Fam. II. Iuridæ

- Subfam. I: Iurini = Iurini with Vaejovidae THORELL: *Scorpiops*, *Iurus*, *Uroctonus*, *Androctonus*, *Vaejovis*, *Hadrurus*, *Caraboctonus*, *Hadruroides*.
 Subfam. II: Chaerilini = Iurini KARSCH in part, *Chaerilus*.
 Subfam. III: Chactini
 a. *Euscorpius*
 b. *Chactas*, *Hadrurochactas*, *Heterochactas*, *Teuthrastes*, *Broteas* and *Broteochactas*.

Fam. III. Bothriuridae = Telogonoidae SIM.

Bothriurus, Brachisosternus, Mecocentrus, Cercophonius, Timogenes, Thestylus, Urophonius, Phoniocercus.

Fam. IV. Buthidae SIM.

Prionurus, Buthus, Parabuthus, Grosphus, Archisometrus, Isometroides, Uroplectes, (Lepreus and Tityus lepreus), Tityobuthus, Pseudobuthus, Isometrus, Centrurus, Tityus, Heteroconus, Ananteres, Charmus. Heterocharmus and Stenochirus.

The classification of LAURIE, 1866, "Ann. Mag. Nat. Hist., s. 6, v. 13, p. 128-132", represents another attempt at systematics of scorpions based on their external morphology. When studying the elements of systematics we will return to the subject.

Fam. I. Scorpionidae

- Subfam. I. Scorpionini = Scorpionini POCOCK *Scorpio* (*Heterometrus*), (*Miaephonus*), (*Æcopetrus*), *Opisthophthalmus*, *Palamnaeus*.
- Subfam. I. Ischnurini = Ischnurini POCOCK without *Hormurus* and *Iodacus*. *Ischnurus*, (*Opisthacanthus*), *Opisthocentrus*, (*Cheloctonus*), (*Chiromachus*).
- Subfam. III. Hormurini, new subf. *Hormurus*, (*Iodacus*)
- Subfam. IV. Diplocentrini POCOCK *Diplocentrus*, (*Oiclus*), *Nebo*, (*Cyphocentrus*)
- Subfam. V. Hemiscorpionini POCOCK *Hemiscorpius*.
- Subfam. VI. Urodacini POCOCK *Urodacus*, (*Iodacus*), (*Ioctonns*)

Fam. II. Iuridae = Subfam. Iurini POCOCK and Vejovini in addition.

- Subfam. II. Vejovidae = Vaejovidae THOR. an in addition *Scorpiops*, *Anuroctonus* and *Hadruroides*. *Vejovis*, *Scorpiops*, *Anuroctonus*, *Hadrurus* (*Hadruroides*)

Fam. III. Chactidae = Chactini POCOCK

- Subfam. I. Euscorpioni *Euscorpius*
- Subfam. II. Chactini = Chactini POCOCK minus *Euscorpius* (*Chactas*), *Hodrurochactas*, (*Heterochactas*), (*Teuthrastes*), *Broteochactas*, *Broteas*.

Fam. IV. Bothriuridae SIM

Bothriurus, (Brachistosternus), (Mecocentrus), Cercophonius, (Timogenes), Thestylus, (Urophonius), (Phoniocercus), (Centromachus).

Fam. V. Buthidae = Buthidae SIM. plus Chaerilus

- Subfam. I. Chærilinae *Chærilus*.
- Subfam. II. Buthini = Buthidae SIM. (*Prionurus*), *Buthus*, *Parabuthus*, (*Grosphus*), *Butholus*, (*Archisometrus*), (*Isometroides*), *Uroplectes*, (*Tityobuthus*), (*Pseudobuthus*), *Isometrus* *Tityus*, *Centrurus*, (*Heteroconus*), (*Ananteris*), (*Charmus*), *Heterocharmus*, (*Stenochirus*).

The genera enclosed in parentheses were not examined according to the author's criterium of the basis of classification, and the position is in some cases doubtful.

The author believes that the families Bothriuridae and Chactidae ought to be united.

Finally KRAEPELIN, in 1899, in his classic work on scorpions adopted a classification which is accepted by all workers in this field. It is adopted here with small modifications introduced after its publication. We will quote it in general lines and comparing it with the classifications of POCOCK and LAURIE.

Fam. I. Bothriuridæ = Bothriuridae SIMM.

Genera: *Brachistosternus* POCOCK, *Thestylus* SIMM., *Urophonius* POCOCK, *Bothriurus* PETERS, *Phonicocercus* POCOCK, *Cercophonius* PETERS, *Centromachus* LOENNB., *Timogenes* (doubtful) SIMM.

Fam. II. Scorpionidæ = Scorpionidae POCOCK

Subfam. I. Diplocentrinae

Genera: *Nebo* SIM., *Oeclus* SIM., *Diplocentrus* PETERS.

Subfam. II. Urodacinae

Genus: *Urodacus* PETERS.

Subfam. III. Scorpioninae

Genera: *Heterometrus* KRAEPELIN, *Pandinus* THORELL, *Scorpio* KARSCH, *Opisthophthalmus* C. L. KOCH.

Subfam. IV. Hemiscorpioninae

Genus: *Hemiscorpius* PETERS.

Subfam. V. Ischnuridae

Genera: *Hadogenes* KRAEPELIN, *Opisthacanthus* PETERS, *Cheloctonus* POCOCK, *Ischnurus* C. L. KOCH, *Hormurus* THORELL, *Iomachus* POCOCK.

Fam. III. Buthinæ = Buthidae POCOCK

Subfam. I. Buthidae

Genera: *Babycurus* KARSCH, *Microbuthus* KRAEPELIN, *Butheolus* SIM., *Buthus* LEACH, *Archisometrus* KRAEPELIN, *Charmus* KARSCH, *Stenochirus* KARSCH, *Isometroides* KEYS, *Parabuthus* POCOCK, *Grosphus* SIM., *Anateris* THOR., *Odonrus* KARSCH, *Archisometrus* KRAEPELIN, *Nanobuthus* POCOCK, *Uroplectes* PETERS.

Subfam. II. Centrurinae

Genera: *Isometrus* HEMPRICH & EHRENBERG, *Centrurus* H. & EHRB., *Tityus* C. L. KOCH, *Zabius* THORELL.

Fam. IV. Vejovidae = Iuridae POCOCK

Genera: *Iurus* THORELL, *Scorpiops* PETERS, *Uroctonus* THORELL, *Anuroctonus* POCOCK, *Vejovis* KOCH, *Hadrurus* THORELL, *Hudruroides* POCOCK, *Caraboctonus* POCOCK,

Fam. V. Chaerilidae = Chaerilinae POCOCK

Genus: *Chaerilus* SIM.

Fam. VI. Chactinae = Chactini POCOCK

Subfam. I. Megacorminae

Genus: *Megacormus* POCOCK.

Subfam. II. Euscorpiinae

Genera: *Euscorpius* THORELL, *Belisarius* SIM.

Subfam. III. Chactinae

Genera: *Cnactas* GERVAIS, *Broteas* C. L. KOCH, *Broteochactas* POCOCK, *Teuthraustes* SIM,

ELEMENTS OF SYSTEMATICS.

The elements taken into consideration in the systematic classification of scorpions are only those relating to the external morphology. Attempts made to apply the internal structure of scorpions to their classification have received no support from the majority of authors. RAY LANKESTER, a pioneer in the field, tried to group the scorpions according to the variations of two orders of internal organs: the *abdominal nervous ganglia* and the *lung-books*. He worked with little material and established the classification to which we have referred. LAURIE took up the studies of LANKESTER once more and made use of the *embryonic development* as well as of the *lung-books*. He examined scorpions belonging to a great number of genera establishing the classification quoted higher up. LAURIE'S conclusions are valuable from a great many points of view but it is evident that a classification requiring the dissection and minute study of the internal organs and besides this an embryological study is almost impossible to put into practice. The great interest of this kind of research lies in showing up to what point the differences in appearance are affected by the internal organisation, and if classifications based upon the latter content themselves with separating the families and discriminating the genera, those based upon the former must set themselves the task of describing species and varieties.

Passing on to describe each individual morphologic character made use of in classifying, we will enumerate them in the order of their importance.:

Sternum. The shape is applied to the distinction of families. Flat almost linear transversally and sometimes indistinct in the Bothriuridae, it is triangular or pentagonal, longer than broad

and quite distinct in the Buthidae, Chactidae and Scorpionidae.

Eyes. They are two in number on each side in the Chactidae and three in other families.

Tarsal, basal and pedal spurs are made use of in classification. In the matatarsus is to be noted the presence number and arrangement of bristles.

Stigmata. The round or linear shape of the stigmata helps us to distinguish the genera *Broteas* and *Broteochactas*.

To distinguish species one from another a careful examination is needed, taking into consideration the designs of the chitinous parts, and, on the body, the number of longitudinal keels, the shape of the cephalo-thoracic tergite, the presence of a groove on the free border of the orbital ridge, (ocular tubercle), the keels of the cephalo-thorax, the granulations, depressions etc. of the abdominal tergites and cephalo-thorax. As for the sternites, their shining or granular appearance or punctures on them resembling pin-pricks, the median triangular elevation of the first or the keels of the last one should be considered. In the pectines shape, number of teeth, presence of fulcra, number of median lamellae and dilatation of the median basal piece should be taken into account.

In the tail besides the length as compared to that of the cephalothoracic tergite, shape and size of the different segments, width in the apical direction, greater or lesser depth of the dorsal groove granular or denticular formation of the dorsal keel, the number of keels of the second segment, the evidence of the accessory keel, fusion of the ventral submedian keels, smoothness or granular surface of the spaces limited by the keels are all of importance. On the vesicle, it is necessary to observe the presence and dimensions of the subaculear spur.

The maxillary palpi furnish a great

number of important characters. On the tibia must be considered the crest located on the anterior surface. Shape and width of the hand, as compared to the tibia, comparative length of the movable finger, presence of a finger-lobe and corresponding groove, number of rows of granules etc. are all of great value. Presence of bristles and hairs on ear are also worth noting.

Colouring must not be despised and when considered attention must be paid to tint of background, designs spots, reticulation etc. not only on the body and tail but on the legs and maxillary palpi as well. It is important to know whether certain joints are of one colour or spotted.

Finally the total length of the scorpion is also made use of in the determination of species.

Variations of many of the above-mentioned characters which are due to sex, age or the time lapsed since the change of integument must also be remembered.

LIST OF SCORPIONS OCCURRING IN BRAZIL.

In Brazil 38 species of scorpions representing 10 genera and 4 families have already been found with certainty. We will give a complete list of families, genera and species with references to literature, synonyms and localities in which they occur.

BUTHIDAE SIMON, 1879.

Syn.: *Androctonidae* THORELL, 1876
Ann. Nat. Hist., s. 4, v. 17,
p. 6.

Androctonoidae KARSCH, 1879,
Mtt. Muench. ent. Ver., v. 3.

(*) *Buthidae* SIMON, 1879,
Arach. de France, v. 7, p.
92.

Buthidae POCOCK, 1893, Ann. Nat.
Hist., s. 6, vol. 12, p. 311.

(*) *Androctonoidae* KRAEPE-
LIN, 1894, Mtt. Mus. Hamb.,
v. 11, p. 15.

Buthini LAURIE, 1896, Ann.
Nat. Hist., s. 6, v. 18, p.
131.

Buthidae KRAEPELIN, 1899,
Das Tierr., Lfg. 8, p. 6.

Buthidae MAURANO, 1915, The-
sis of Fac. of Med., Rio de Ja-
neiro, p. 89.

BUTHINAE KRAEPELIN, 1899.

Syn.: *Androctonini* PETERS, 1861,
Mon. Ak. Berlin, p. 501-513.

(*) *Androctonini* KRAEPELIN,
1891, Mtt. Mus. Hamb., v.
8, p. 7.

Buthinae KRAEPELIN, 1899, Das
Tierr. Lfg. 8, p. 6.

ANANTERIS THORELL, 1891.

Syn.: *Ananteris* THORELL, 1891,
Ent. Tidskr., v. 12, p. 65.

Ananteris KRAEPELIN, 1895,
Mt. Mus. Hamb. v. 12, p. 5.

Ananteris KRAEPELIN, 1899,
Das Tierr. Lfg. 8, p. 51.

Ananteris MAURANO, 1915, op.
cit. p. 89.

1. ANANTERIS BALZANI THORELL, 1891.

Syn.: *Ananteris balzani* THORELL,
1891, Ent. Tidskr. v. 12, p.
65.

(*) *Ananteris balzani*, KRAE-
PELIN, 1895, Mt. Mus.
Hamb. v. 12, p. 6.

Ananteris balzani, KRAEPE-
LIN, 1899, Das Tierr. Lfg.
8, p. 51.

Loc.: Matto Grosso.

CENTRURINAE KRAEPELIN, 1899.

Syn.: (*) *Isometrini Centrurini*
KRAEPELIN, 1891 Mt. Mus.
Hamb. v. 8, p. 7.

Centrurinae KRAEPELIN, 1899,
Das Tierr. Lfg. 8, p. 64.

ISOMETRUS HEMPR. & EHRB., 1828.

Syn.: (*) *Isometrus* HEMPRICH and
EHRBG., 1828, Symb. Phys.
Scorp.

Atreus (partim) GERVAIS, 1844,
Walk. Ins. Apt., v. 3, p. 52.

(*) *Lychas* C. L. KOCH, 1845,
Arachn. v. 12.

Isometrus (partim) THORELL,
1876, Ann. Nat. Hist. s. 4,
v. 17, p. 8.

Isometrus (partim) KARSCH,
1879, Mt. Muench. ent. Ver.
v. 3, p. 18.

Isometrus KRAEPELIN, 1899,
Das Tierr. Lfg. 8, p. 64.

Isometrus KRAEPELIN, 1912,
Mt. Mus. Hamb. v. 30, p.
134.

2. ISOMETRUS MACULATUS

(DE GEER, 1778),

Syn.: (*) *Scorpio maculatus* DE
GEER, 1778, Mem. Ins. Apt.
v. 7, p. 346, t. 41, f. 9.

Scorpio americanus POHL and
KOEHLER, 1832, Reise im
Innern Bras., p. 6.

Atreus filum GERVAIS, 1844,
Walk. Ins. Apt. v. 3, p. 52.

(*) *Lychas maculatus* C. L.
KOCH, 1845, Arach. v. 12,
p. 1, f. 960.

(*) *Scorpio gabonensis* LUCAS,
1858, Arach. ent., v. 2, p.
430, t. 12, f. 8.

Isometrus maculatus THORELL,
1876, Ann. Nat. Hist. s. 4,
v. 17, p. 8.

Isometrus maculatus C. L.
KOCH, 1884, Arach. Austr.
pt. II, p. 6.

Isometrus europæus LOENN-
BERG, 1897, Ann. Nat. Hist,
s. 7, v. 1, p. 86.

Isometrus maculatus KRAEPE-
LIN, 1899, Das Tierr. Lfg.
8, p. 66.

Isometrus europæus POCOCK,
1902, Biol. Centr. Americ.
p. 11.

Isometrus maculatus KRAEPE-
LIN, 1912, Mt. Mus. Hamb.
v. 30, p. 134.

Loc.: It appears to have originated in
India, whence it emigrated to all parts of
the world. In Brazil it has been found not
only on the coast but also in the interior.

TITYUS C. L. KOCH, 1836.

Syn.: (*) *Tityus* C. L. KOCH, 1836,
(partim), Arach., v. 3, p.
33.

Isometrus (partim) *Androcottus*
KARSCH, 1879, Mt. Muench.
ent. Ver. (v. 3, p. 88, 11).

Isometrus POCOCK, 1890, Proc.
Zool. London, p. 119.

Phassus KRAEPELIN, 1891, Mt.
Mus. Hamb. v. 8, p. 107.

(*) *Tityus* POCOCK, 1893, Journ.
Linn. Soc. Zool. v. 24, p. 376.

Tityus KRAEPELIN, 1899, Das
Tierr. Lfg. 8, p. 69.

Tityus KRAEPELIN, 1910, Mt.
Mus. Hamb. v. 28, p. 60.

Tityus POCOCK, 1902, Biol.
Centr. Americ. p. 39.

3. TITYUS MICROCYSTIS LUTZ & MELLO, 1922.

Syn.: *Tityus microcystis* LUTZ &
MELLO, 1922, Folha Med.,
v. 3, n. 4, p. 25.

Loc.: Marianna. State of Minas Geraes.

4. TITYUS MAGNIMANUS POCOCK, 1897.

Syn.: *Tityus magnimanus* POCOCK,
1897, Ann. Nat. Hist. s. 6,
v. 19, p. 514.

Tityus magnimanus KRAEPE-
LIN, 1899, Das Tierr. Lfg. 8,
p. 78.

5. TITYUS CAMBRIDGEI POCOCK, 1897.

Syn.: *Tityus cambridgei* POCOCK, 1897, Ann. Nat. Hist. s. 6, v. 19, p. 360.

Tityus cambridgei KRAEPELIN, 1899, Das Tierr., Lfg. 8, p. 78.

Tityus cambridgei BORELLI, 1899, Boll. Mus. Torino, v. 14, n. 338, p. 1.

Tityus cambridgei POCOCK, 1902, Biol. Centr. Americ. p. 340.

Loc.: Panamá, Costa Rica, Pará.

6. TITYUS METUENDUS POCOCK, 1897.

Syn.: *Tityus metuendus* POCOCK, 1897, Ann. Nat. Hist. s. 6, v. 19, p. 361.

Tityus metuendus KRAEPELIN, 1899, Das Tierr., Lfg. 8, p. 80.

Loc.: Iquitos, Parintins, Belem (Stat of Pará), Tapajós River.

7. TITYUS DUCKEI BORELLI, 1910.

Syn.: *Tityus duckei* BORELLI, 1910, Boll. Mus. Torino, v. 25, n. 629, p. 1.

Loc.: State of Pará.

8. TITYUS PARAENSIS KRAEPELIN, 1896.

Syn.: (*) *Tityus paraensis* KRAEPELIN, 1896, Mt. Mus. Hamb. v. 13, p. 129.

Tityus paraensis KRAEPELIN, 1899, Das Tierr. Lfg. 8, p. 84.

Loc.: State of Pará.

9. TITYUS MATTOGROSSENSIS BORELLI, 1901.

Syn.: *Tityus mattogrossensis* BORELLI, 1901, Boll. Mus. Torino, v. 16, n. 403.

Loc.: Coxipó (State of Matto Grosso).

10. TITYUS PARAGUAYENSIS KRAEPELIN, 1895.

Syn.: (*) *Tityus paraguayensis* KRAEPELIN, 1895, Mt. Mus. Hamb. v. 12, p. 19.

Tityus paraguayensis KRAEPELIN, 1899, Das Tierr. Lfg. 8, p. 86.

Tityus paraguayensis BORELLI, 1901, Boll. Mus. Torino, v. 16, n. 403, p. 6.

Tityus paraguayensis PENTHER, 1913, Ann. k. k. Nat. Hist. Hfm. p. 239.

Loc.: Paraguay (S. Sofia), State of Matto Grosso (Cuyabá, Corumbá).

11. TITYUS PUSILLUS POCOCK, 1893.

Syn.: *Tityus pusillus* POCOCK, 1893, Ann. Nat. Hist. s. 6, v. 12, p. 315.

Tityus pusillus KRAEPELIN, 1899, Das Tierr. Lfg. 8, p. 86.

Loc.: Iguarassú (State of Pernambuco).

12. TITYUS SILVESTRIS POCOCK, 1897.

Syn.: *Tityus silvestris* POCOCK, 1897, Ann. Nat. Hist. s. 6, v. 19, p. 363.

Tityus silvestris KRAEPELIN, 1899, Das Tierr., Lfg. 8, p. 86.

Loc.: Santarém (State of Pará).

13. TITYUS INTERMEDIUS LUTZ & MELLO, 1922.

Syn.: *Tityus intermedius* LUTZ & MELLO, 1922, Folha Med. v. 3, n. 4, p. 26.

Loc.: Cuyabá.

14. TITYUS STIGMURUS (THORELL, 1877).

Syn.: *Isometrus stigmurus* THORELL, 1877, Atti Soc. Ital., v. 19, p. 32.

Phassus stigmurus KRAEPELIN, 1891, Mt. Mus. Hamb., v. 8, p. 116.

? *Isometrus cylindricus* KARSCH, 1879, Mt. Muench. ent. Ver. v. 3, p. 114.

Tityus stigmurus KRAEPELIN, 1899, Das Tierr., Lfg. 8, p. 82.

Loc.: States of Pernambuco, Bahia, S. Paulo, Minas Geraes (?).

15. TITYUS BAHIENSIS (PERTY, 1830).

Syn.: *Scorpio bahiensis* PERTY, 1830, Delect. Anim. artic., p. 200, t. 39, f. 11.

(*) *Tityus bahiensis* C. L. KOCH, 1836, Arachn. v. 3, p. 33, f. 191.

(*) *Phassus bahiensis* KRAEPELIN, 1891, Mt. Mus. Hamb. v. 8, p. 117.

Tityus bahiensis KRAEPELIN, 1899, Das Tierr., Lfg. 8, p. 83.

Tityus bahiensis MAURANO, 1915, op. cit. p. 101.

Loc.: States of Bahia, Minas Geraes, Rio de Janeiro, Espirito Santo, São Paulo, Santa Catharina, Matto Grosso, Paraguay (Puerto Bertoni).

16. TITYUS COSTATUS (KARSCH, 1879).

Syn.: *Isometrus costatus* KARSCH 1879, Mt. Muench. ent. Ver. v. 3, p. 115.

Isometrus sonticus KARSCH, 1879, Mt. Muench. ent. Ver. v. 3, p. 115.

Tityus costatus KRAEPELIN, 1899, Das Tierr., Lfg. 8, p. 83.

Loc.: States of Rio de Janeiro, S. Paulo, Espirito Santo, Minas Geraes (?).

17. TITYUS TRIVITTATUS KRAEPELIN, 1898.

Syn.: *Tityus trivittatus* KRAEPELIN,

1898, Mt. Mus. Hamb., v. 15, p. 43.

Tityus trivittatus KRAEPELIN, 1899, Das Tierr., Lfg. 8, p. 83.

Tityus trivittatus BORELLI, 1901, Boll. Mus. Tor. v. 16, n. 403, p. 5.

Tityus trivittatus PENTHER 1913, op. cit. p. 240.

Loc.: Paraguay, Corrientes, Urucum (State of Matto Grosso), State of Rio Grande do Sul.

18. TITYUS DORSOMACULATUS LUTZ & MELLO, 1922.

Syn.: *Tityus dorsomaculatus* LUTZ & MELLO, Folha Med. vol. 3, n. 5, p. 25.

Loc.: States of Piauhy (Amarantes), and Minas Geraes (Palma).

19. TITYUS SERRULATUS LUTZ & MELLO, 1922.

Syn.: *Tityus serrulatus* LUTZ & MELLO, 1922, Folha Med. vol. 3, n. 4, p. 25.

Loc.: States of Minas Geraes and S. Paulo.

RHOPALURUS THORELL, 1876.

Syn.: *Rhopalurus* THORELL, 1876, Ann. Nat. Hist., s. 4, v. 17, p. 9.

Rhopalurus THORELL, 1877, Atti Soc. Ital. Sci. nat. v. 19, p. 83.

Rhopalurus KARSCH, 1879, Mt. Muench. ent. Ver. v. 3, p. 18.

Heteroctenus POCOCK, 1893, Journ. Linn. Soc. Zool., v. 24, p. 385.

Centrurus (partim) KRAEPELIN, 1899, Das Tierr., Lfg. 8, p. 87.

Rhopalurus POCOCK, 1902, Biol. Centr. Americ., p. 36.

Centrurus (partim) MAURANO, op. cit. p. 91.

20. RHOPALURUS AGAMEMNON (C. L. KOCH, 1859).
 Syn.: (*) *Androctonus agamemnon* C. L. KOCH, 1859, Arach. v. 3, p. 103, f. 506.
 (*) *Heteroctenus agamemnon* POCOCK 1893 Journ. Linn. Soc. Z., v. 24, p. 385.
Centrurus agamemnon KRAEPELIN, 1899, Das Tierr., Lfg. 8, p. 94.
Rhopalurus agamemnon POCOCK, 1902, Biol. Centr. Americ. p. 37.
 1910, Boll. Mus. Tor. v. 25, n. 629, p. 2.
 Loc.: Ceará, Rio Grande do Norte, Pernambuco.
26. RHOPALURUS ACROMELAS LUTZ & MELLO, 1922.
 Syn.: *Rhopalurus acromelas* LUTZ & MELLO, 1922, Folha Med., vol. 3, n. 4, p. 25.
 Loc.: Therezina (in the State of Piauhy), Patú (in the State of Rio Grande do Norte).
27. RHOPALURUS BORELLII POCOCK, 1902.
 Syn.: *Rhopalurus borellii* POCOCK, 1902, Ann. Nat. Hist. s. 7, v. 10, p. 377.
Rhopalurus borellii POCOCK, 1902, Biol. Centr. Americ. p. 37.
 (*) (?) *Heteroctenus agamemnon* POCOCK, 1893, J. Lin. Soc. Z. v. 24, p. 393.
 Loc.: States of Ceará and Piauhy.
28. RHOPALURUS LATICAUDA THORELL, 1876.
 Syn.: *Rhopalurus laticauda* THORELL, 1876, Ann. Nat. Hist., s. 4, v. 17, p. 9.
Rhopalurus laticauda THORELL, 1877, Atti. Soc. Ital. Sci. Nat. v. 19, p. 143.
Rhopalurus laticauda, var. *Sachsii* KARSCHE, 1879, op. cit. p. 118.
 (*) *Centrurus laticauda* KRAEPELIN, 1891, Mt. Mus. Hamb. v. 8, p. 137.
Centrurus laticauda KRAEPELIN, 1899, Das Tierr., Lfg. 8, p. 95.
Rhopalurus laticauda POCOCK, 1902, Biol. Centr. Amer. p. 37.
 Loc.: State of Piauhy and in America Central.
21. RHOPALURUS DEBILIS (C. L. KOCH, 1841).
 Syn.: (*) *Vaejovis debilis* C. L. KOCH, 1841, Arach. v. 8, p. 21, f. 605.
Vaejovis debilis KRAEPELIN, 1899, Das Tierr., Lfg. 8, p. 96.
Rhopalurus debilis BORELLI, 1910, Boll. Mus. Tor., v. 25, n. 629.
 Loc.: State of Ceará.
22. RHOPALURUS STENOCHIRUS (PENTHER, 1913).
 Syn.: *Rhopalurus stenochirus* (PENTHER, 1913, op. cit. p. 240).
 Loc.: Barra, Joazeiro.
23. RHOPALURUS MELLEIPALPUS LUTZ & MELLO, 1922.
 Loc.: Assaré State of (Ceará).
24. RHOPALURUS BARYTHENAR (PENTHER), 1913.
 Syn.: *Rhopalurus barythenar* PENTHER, 1913 op. cit. p. 342
 Loc.: Joazeiro (State of Bahia), Lençoes do Rio Verde (State of Minas Geraes).
25. RHOPALURUS ROCHAI BORELLI, 1910.
 Syn.: *Rhopalurus rochai* BORELLI,

SCORPIONIDAE POCOCK, 1893.

Syn.: (*) *Scorpionini* PETERS, 1861, Monb. Akad. Berlin, p. 510.

Pandinoidea THORELL, 1876, Ann. Nat. Hist. s. 4, v. 17, p. 11.

(*) *Heterometridae-Ischnuridae* SIM. 1871, Arach. France, s. 7, p. 100, 115.

Scorpionidae POCOCK, 1893, Ann. Nat. Hist. s. 6, v. 12, p. 306.

Scorpionidae LAURIE, 1896, Ann. Nat. Hist. s. 6, v. 18, p. 128.

Scorpionidae KRAEPELIN, 1899, Das Tierr., Lfg. 8, p. 96.

DIPLOCENTRINAE KRAEPELIN, 1899.

Syn.: *Diplocentrinae* POCOCK, 1893, Ann. Nat. Hist. s. 6, v. 12, p. 307.

(*) *Diplocentrinae* KRAEPELIN, 1899, Mt. Mus. Hamb. v. 11, p. 18.

Diplocentrinae KRAEPELIN, 1899, Das Tierr. Lfg. 8, p. 97.

DIPLOCENTRUS PETERS, 1861.

Syn.: (*) *Diplocentrus* PETERS, Monb. Akad. Berlin, p. 172.

Diplocentrus KRAEPELIN, 1899, Das Tierr., Lfg. 8, p. 99.

29. DIPLOCENTRUS GUNDLACHI KARSCH, 1880.

Syn.: *Diplocentrus gundlachi* KARSCH, 1880, Z. Naturwiss. v. 53, p. 407.

Diplocentrus politus POCOCK, 1898, Ann. Nat. Hist. s. 7, v. 1, p. 390.

Diplocentrus gundlachi KRAEPELIN, 1899, Das Tierr. Lfg. 8, p. 101.

CHACTIDAE LAURIE, 1896.

Syn.: *Chactini* POCOCK, 1893, Ann. Nat. Hist. s. 6, v. 12, p. 310.

(*) *Chactini* KRAEPELIN, 1894, Mt. Mus. Hamb. v. 11, p. 149.

Chactidae LAURIE, 1896, Ann. Nat. Hist. s. 6, v. 18, p. 130.

Chactidae KRAEPELIN, 1899, Das Tierr., Lfg. 8, p. 160.

CHACTINAE KRAEPELIN, 1899.

Syn.: *Chactini* LAURIE, 1896, Ann. Nat. Hist. s. 6, v. 18, p. 130.

Chactinae KRAEPELIN, 1899, Das Tierr. Lfg. 8, p. 165.

Chactinae KRAEPELIN, 1911, Mt. Mus. Hamb., v. 29, p. 45.

BROTEAS C. L. KOCH, 1838.

Syn.: (*) *Scorpio* (partim) DE GEER, 1778, Mem. Hist. Ins. v. 7, p. 337.

(*) *Brotheas* (corr. Broteas) C. L. KOCH, 1838, Arachn. 4, p. 109.

Chactas (partim) GERVAIS, Walk. Ins. Apt. 4, 3, p. 64.

Broteas KRAEPELIN, 1899, Das Tierr. Lfg. 8, p. 170.

Broteas KRAEPELIN, 1911, Mt. Mus. Hamb. v. 29, p. 54.

30. BROTEAS PARAENSIS SIM. 1880.

Syn.: *Broteas paraensis*, E. SIM. 1880, Ann. Soc. Ent. France, s. 5, v. 10, p. 381.

Broteas paraensis POCOCK, 1898, Ann. Nat. Hist. s. 7, v. 2, p. 99.

Broteas paraensis KRAEPELIN, 1899, Das Tierr. Lfg. 8, p. 172.

Broteas paraensis KRAEPELIN, 1911, Mt. Mus. Hamb. n. 29, p. 55.

Loc.: State of Pará.

31. BROTEAS GERVAISI POCOCK, 1893.

Syn.: *Broteas gervaisi* POCOCK, 1893, Ann. Nat. Hist. s. 6, c. 19, p. 78.

Broteas gervaisi POCOCK, 1897, Ann. Nat. Hist., s. 6, v. 12, p. 366.

Broteas gervaisi POCOCK, 1898, Ann. Nat. Hist. s. 7, v. 2, p. 99.

Broteas gervaisi KRAEPELIN, 1899, Das Tierr. Lfg. 8, p. 171.

Broteas gervaisi KRAEPELIN, 1911, Mt. Mus. Hamb., v. 29, p. 55.

Loc.: North of Brazil at the borders of Guyana: Guarupa and Parentins.

BROTEOCHATAS POCOCK, 1893.

Syn.: *Chactas* (partim) KARSCH, 1897, Mt. Muench. Ent. Ver. v. 3, p. 133.

Broteochactas Hadrurochactas POCOCK, 1893, Ann. Nat. Hist., s. 6, v. (12, p. 77-78.)

Broteochactas KRAEPELIN, 1899, Das Tierr. Lfg. 8, p. 173.

Broteochactas KRAEPELIN, 1911, Mt. Mus. Hamb., n. 29, p. 54.

32. BROTEOCHACTAS DELICATUS (KARSCH, 1879).

Syn.: *Chactas delicatus* C. *Opacus* KARSCH, 1879, Mt. Muench. Ent. Ver. v. 3, p. (134).

(*) *Broteochactas delicatus* KRAEPELIN, 1894, Mt. Mus. Hamb. v. 11, p. 177.

Broteochactas delicatus KRAEPELIN, Das Tierr. Lfg. 8, p. 174.

Broteochactas delicatus KRAEPELIN, 1911, Mt. Mus. Hamb. n. 29, p. 54.

Loc.: Madeira River.

33. BROTEOCHACTAS PARVULUS POCOCK, 1897.

Syn.: *Broteochactas parvulus* POCOCK, 1897, Ann. Nat. Hist. s. 6, v. 19, p. 364.

Broteochactas parvulus KRAEPELIN, 1899, Das Tierr. Lfg. 8, p. 174.

Broteochactas parvulus KRAEPELIN, 1911, Mt. Mus. Hamb. n. 29, p. 53.

Loc.: Santarem (State of Pará).

BOTHRIURIDAE SIMON, 1880.

Syn.: (*) *Telegonini* PETERS, 1861, Monb. Ak. Berlin, p. 507.

Telegonoidae THORELL, 1877, Ann. Nat. Hist. s. 4, v. 17, p. 9.

(*) *Acanthochiroidae* KARSCH, 1880, Zeit. Naturwiss. v. 53, p. 408.

Bothriuridae SIMON, 1880, Ann. Soc. Ent. France, s. 5, v. 10, p. 392.

Bothriuridae POCOCK, 1893, Ann. Nat. Hist. s. 6, v. 12, p. 310.

(*) *Bothriuridae* KRAEPELIN, 1894, Mt. Mus. Hamb. n. 11, p. 211.

Bothriuridae LAURIE, 1896, Ann. Nat. Hist. s. 6, v. 18, p. 130.

Bothriuridae KRAEPELIN, 1899, Das Tierr., Lfg. 8, p. 190.

BOTHRIURUS PETERS, 1861

Syn.: *Bothriurus* PETERS, 1861, Monb. Ak. Berlin, p. 519.

Bothriurus THORELL, 1877, Atti Soc. Ital. s. 19, p. 68.

Bothriurus POCOCK, 1893, Ann. Nat. Hist., s. 6, v. 12, p. 95-97.

(*) *Bothriurus* KRAEPELIN, 1894, Mt. Mus. Hamb., v. 11, p. 122.

Bothriurus KRAEPELIN, 1899,

Das Tierr., Lfg. 8, p. 195.
Bothriurus KRAEPELIN, 1910,
 Mt. Mus. Hamb. v. 28, p.
 88.

34. *BOTHRIURUS BONARIENSIS* (C. L.
 KOCH, 1842).

Syn.: (*) *Broteas bonariensis* C. L.
 KOCH, 1842, Arach. v. 10
 p. 12, f. 752.

Buthus vittatus THORELL, 1877,
 Atti Soc. Ital., v. 19, p. 168.

Bothriurus bonariensis POCOCK,
 1893, Ann. Nat. Hist. s. 6,
 v. 12, (p. 94).

Bothriurus bonariensis KRAE-
 PELIN, 1910, MT. Mus.
 Hamb. n. 28, p. 91.

Loc.: The Argentine, Uruguay, Paraguay,
 Cuyabá, in the State of Matto Grosso, States of
 Rio G. Sul and Minas Geraes and the whole
 coast line to Pernambuco.

35. *BOTHRIURUS BONARIENSIS* var.
 ASPER, POCOCK, 1893.

Syn.: *Bothriurus asper* POCOCK,
 1893, Ann. Nat. Hist. s. 6,
 v. 12, p. 96.

Bothriurus bonariensis var. *as-*
per KRAEPELIN, 1910, Mt.
 Mus. Hamb. v. 28, p. 92.

Loc.: Iguarassu'.

36. *BOTHRIURUS SIGNATUS* POCOCK,
 1893.

Syn.: *Bothriurus signatus* POCOCK,
 1893, Ann. Nat. Hist. s. 6,
 v. 12, p. 96.

Bothriurus chilensis KRAEPE-
 LIN, 1899, Das Tierr., Lfg.
 8, p. 197.

Bothriurus signatus POCOCK,
 1900, Ann. Nat. Hist. s. 7,
 v. 5, p. 478.

Bothriurus signatus KRAE-
 PELIN, 1910, Mitt. Mus.
 Hamb., n. 28, p. 92.

Loc.: Therezopolis (State of Rio de Ja-
 neiro).

THESTYLUS SIMON, 1880.

Syn.: *Thestylus*, SIMON, 1880, Ann.
 Soc. Ent. France, s. 5, v.
 10, p. 393.

(*) *Thestylus* KRAEPELIN,
 1894, Mitt. Mus. Hamb., v.
 11, p. 28.

Thestylus KRAEPELIN, 1899,
 Das Tierr., Lfg. 8, p. 192.

37. *THESTYLUS GLASIOUI* (BERT-
 KAU, V. 1880).

Syn.: (*) *Cercophonius glasioui*
 BERTKAU, 1880, 1880,
 Mém. Acad. Belgique, v. 43,
 p. 10.

Thestylus glasioui E. SIMON,
 1880, Ann. Soc. Ent. France,
 s. 5, v. 10, p. 393.

Thestylus glasioui KRAEPELIN,
 1894, Mitt. Mus. Hamb. v. 11,
 p. 219.

Thestylus glasioui KRAEPELIN,
 1899, Das Tierr., Lfg., 8, p
 193.

Loc.: States of Minas Geraes, S. Paulo,
 Rio de Janeiro, Espirito Santo.

UROPHONIUS POCOCK, 1893.

Syn.: *Urophonius* POCOCK, 1893,
 Ann. Nat. Hist. s. 6, v. 12,
 n. 101.

(*) *Urophonius* KRAEPELIN,
 1894, Mt. Mus. Hamb. v. 11,
 p. 220.

Urophonius KRAEPELIN, 1899,
 Das Tierr. Lfg. 8, p. 193.

38. *UROPHONIUS BRACHYCENTRUS*

(THORELL, 1877).

Syn.: *Cercophonius brachycentrus*
 THORELL, 1877, Atti Soc.
 Ital. v. 19, p. 180.

Urophonius brachycentrus
KRAEPELIN, 1894, Mt. Mus.
Hamb. v. 11, p. 221.

Urophonius Iheringii POCOCK,
1893, Ann. Nat. Hist. s. 6,
v. 12, p. 101.

Urophonius brachycentrus

KRAEPELIN, 1899, Das
Tierr., Lfg. 8, p. 194.

Loc.: The Argentine, Rio Grande do Sul

Note: Literature indications preceded by an asterisk
were not consulted.

KEY for the Determination of FAMILIES OCCURRING IN BRAZIL

- 1) *Sternum* longer than broad, always conspicuous, generally triangular.....2
- 1) *Sternum* flat, almost linear (in a transverse direction), sometimes indistinct..... I BOTHRIURIDAE
- 2) 3 to 5 lateral eyes.....3
- 2) Only 2 lateral eyes..... II CHACTIDAE
- 3) *Sternum* pentagonal, with lateral borders parallel. Only one medial basal spur..... III SCORPIONIDAE
- 3) *Sternum* triangular, narrowing towards fore-end. One basal spur on each side. Sometimes a secondary lateral spur..... IV BUTHIDAE

FAM. BUTHIDAE SIMON, 1899.

Sternum triangular, narrowing forwards, always quite distinct. One basal spur on each side and sometimes a secondary lateral spur.

Tarsal spurs occur frequently on the 3rd and 4th pairs of legs. *Terminal tarsal lobes absent. Medial pectinal shafts* are never flattened. 3 to 5 lateral eyes. Hand rounded, smooth or keeled. *Fingers* compressed. Frequently a sub-aculear tooth.

It is subdivided into two subfamilies:

- 1) Tarsal spur on 3rd and 4th pairs of legs. One tooth only on the lower border of fixed mandibular finger..... BUTHINAE
- 2) Tarsal spurs absent on hind legs. One tooth present on the lower border of fixed mandibular finger..... CENTRURINAE

BUTHINAE KRAEPELIN, 1899.

The principle characters have already been mentioned in the fore-going key. In Brazil this family is only represented by one genus:

AMANTERIS THORELL, 1891.

The chief character of this genus resides in its pectines which are unprovided with fulcra. The following is the original description:

«Cephalothorax antice truncatus, costis carens, dorso librato, non antice proclive; oculi dorsuales plus duplo longius, a margine postico cephalothoracis quam ab antice margine remoti.

Abdominis scuta dorsualia costa longitudinali singula praedita; cauda mediocris, postice angustata, segmentis anterioribus undique carinatis, segmento 5o saltem inferius carinato, vesica dente subaculeo praedita. Sternum parvum, subtrapezoide. apicem late subtruncatum versus sensim angustatum.

Pectines lamellis fulcientibus (sive fulcris dentium) carentes modo ex duobus ordinibus lamellarum (dorsualium et intermediarum) et ex dentibus sat multis compositi. Mandibularum digitus immobilis in margine inferiore dente singulo armatus. Dentes laterales digitorum palporum intus seriem simplicem, extus seriem simplicem (vel duplicem) formantes».

This genus only includes one species.

AMANTERIS BALZANI THORELL, 1891.

Original description of the species:

«*Opacus cephalothorace et scutis dorsualibus crasse et dense granulosis nigricantibus et maculis striisque sub-impressis laevioribus sub-testaceis variatis, scutis illis plerisque magno sub-testaceo utrinque notatis: cauda fusco-testacea, segmentis posterius inaequaliter nigris vel nigro-maculatis, carinis superioribus segmentorum anteriorum nigris et sat subtiliter dentatis; palpis pedibusque superius nigro et testaceo-variatis, palpis gracilibus, brachio et manu vix costatis, digitis ipsa manu parva saltem duple longioribus.* ♀ ad lon. circa 30 mm.

Cephalothorax, segmentis duobus primis caudae conjunctis paullo brevior, **lateribus** rectis anteriora versus non parum angustatus est, antice truncatus (non emarginatus), angulis anticis valde oblique truncatis crasse et dense granulosis est, sulcis ordinariis et maculis striisque sub-impressis (clarioribus) quibus variatis est, laevibus, vel subtilius granulosis. Sulcus ordinarius medius latus et profundus est, per tuberculum oculorum continuatus a ante id non parum dilatatus sed parum profundus, arcibus supraciliaribus nitidis et serie densa granulorum minorum praeditis. In medio, praesertim antice, transversim parum convexus est cephalothorax, versus latera fortius convexo-declivis; dorsum ejus a latere visum rectum est, tuberculo ocu-

lorum non multo eminenti, ante hoc tuberculum libratum (non proclive).

Spatio inter oculos dorsuales, qui fere triple longius a margine cephalothoracis postico quam ab antico margine distant, oculi diametro paullo majus est; oculi tres utrinque lateris in seriem rectam dispositi sunt, posticus eorum reliquis duobus paullo minor.

Scuta abdominis dorsualia II--VI pone limbum anticum costa singula paullo crenulata munita sunt et crasse denseque granulosa, vitta transversa lata sub-impressa laeviore vel laevi utrinque praedita, quae saltem in posterioribus horum scutorum (ultimo excepto) formam litterae habet, angulus intus directo.

Scutum VII vestigia costae mediae ostendit et praeterea utrinque costas duas paene parallelas dense crenulatas, anteriora versus et paullo foras directas, quarum interior versus apicem anticum costae exterioris, foras et anteriora versus continuata; inter has costas sat dense et crasse paulloque inaequaliter granulatum est.

Scuta ventralia laevia sunt, ultimo excepto, quod costas duas breves humiles et sub-crenulatas postice habet ut et vestigia duarum aliarum magis versus latera scuti sitarum, praeterea granulis minoribus conspersum. Spiracula parva, angusta, dentibus mediis pectinum multo, fere duplo, breviora.

Cauda mediocris; desuper visa latera anteriora, saltem ad segm. V paene parallela habet, dein vero sensim angustata set. Segmenta I--IV undique carinata sunt, supra sat late excavata et hic secundum medium granulis parvis sparsa, quae aream fere V formam occupant; etiam in lateribus et subter inter carinas granulis parvis plus minus densis (in segm. 4^o, praesertim densis) conspersa sunt haec segmenta. Carinae eorum superiores altae sunt, dense et sat subtiliter denticulatae, dente ultimo carinarum dorsualium reliquis paullo majore; carinae inferiores humiliores, granulosae vel cre-

nulatae. Segm. I et II 10 carinas perfectas habent, segm. duo insequentia carinas 8 perfectas et, antice, 2 abbreviatas (laterales medias). Segm. V circa triplo longius est quam latius, lateribus levissime rotundatis fere a medio ad apicem sensim paullo angustatum, marginibus superioribus rotundatis; 5 carinas habet, quarum duae superiores, subtiliter crenulatae excepto ad basin obsoletae sunt, tres inferiores vero distinctissimae etsi tenues et subtiliter crenulatae. Supra versus basin granulis paucis parvis sparsum est segm. V in lateribus minus dense, subter dense et sat subtiliter granulosum (non punctis magnis impressis sparsum). Segm. VI priore multo angustius et non parum brevius est; vesica plus duplo est longior quam latior, segm. 5^o duplo angustior, in parte posteriore apicem versus sensim angustata, subter granulis humilibus sparsa, quae secundum medium in duas series vel fascias inaequales disposita sunt. Subaculeo dente forti triangulo munita est vesica; aculeus (in nostro exemplo apice abruptus) medioeris longitudinis esse videtur.

Sternum potius trapezoide quam subtriangulum dicendum, apicem truncatum versus sensim non ita multum angustatum. Parvum est, plus dimidio paene duplo angustius quam lobi maxillares pedum 2i paris conjunctim, basi vix vel non duplo latius quam apice, paullo latius basi quam longius, non vel parum longius quam latius apice. Laminae genitales convexae, parum longiores quam latiores, forma trianguli aequilateris fere apice foras directo, angulis anteriore et posteriore rotundatis. Pectines eo insignes sunt, quod fulcris dentium (lamellis fulcientibus) plane carent; modo duas series lamellarum ostendunt, seriem dorsualium et seriem intermediarium. Lamellae dorsuales tres sunt, ut in reliquis formis affinibus, lamellae intermediae 8, quarum 1a brevior et latior est quam 2a haec sat magna et duplo longior quam latior, reliquae ea non parum minores,

pleraeque oblongae et gradatim magnitudine paullo decrescentes, omnes tamen majores (et non tantum pauciores) quam ut fulcra credi possint. Dentes pectinum 16 sunt, primus (basalis) plane eadem forma atque insequentes, modo paullo brevior; dentes 13 primi laminae intermediae affixi sunt, 3 ultimi laminae dorsuali tertiae (ultimae). Lamina illa media, quae pectines gerit, semicirculata fere est, postice rotundata, antice truncata et, in medio, paullo incisa.

Mandibulae laeves et nitidae, digitis brevibus. Digitus mobilis apice bifidus (furcatus) est, in margine superiore dentibus tribus brevibus praeditus, quorum duo posteriores minuti et brevissimi sunt; in margine inferiore duobus dentibus longioribus est armatus. Digitus immobilis in margine superiore duos dentes habet, anteriorem sub-conicum, alterum magnum et apice late bifidum, in margine inferiore vero dentem sub-conicum singulum.

Palpi debiles, cephalothorace modo circa $3 \frac{1}{3}$ longiore. Humerus supra costas duas parallelas subtiliter granulosas habet, inter eas paucis granulis sparsus; postice superius aliam ejusmodi costam ostendit; antice superius serie sub-obliqua denticulorum parvorum inaequalium praeditus est, infra vero costa tenui subtilissime granulosa marginatus. Brachium, quod humero circa dimidio est latius, antice ad longitudinem modice et satis aequaliter convexo-arcuatum est et denticulis nonnullis sparsum, quorum circa 5 superiores, ut 3 inferiores, seriem longitudinalem formant; supra costis caret, hic magis versus basin, antice, serie granulorum praeditum, praeterea laeve. Ipsa manus parva est, humerum latitudine circiter aequans, circa dimidio longior quam latior, ad longitudinem extus parum, intus fortiter (quasi gibboso) convexa; laevis est, costis et granulis carens. Digili longi, ipsa manu circa duplo longiore (digitus mobilis manu postica duplo et dimidio longior est), leviter et aequa-

liter incurvi, teretes, vix evidenter costati.

Utraque series dentium lateralium aciei digitorum ab apice digiti modo ad medium ejus pertinet, et ex sex dentibus constat; series exterior tamen etiam sex paribus dentium constare dici potest, quam singuli dentes hujus seriei cum dente postico ordinum denticulorum mediorum par dentium transverse positum formare videatur. Denticuli medii ordinem basalem longissimum rectum et dein, inter series dentium lateralium ordines breves sub-obliquos formant.

Pedes forma in *Isometris* ordinaria sunt, femoribus superius sat dense et crasse granulosis, tibiis ibidem costis tribus granulosis praeditis et in margine inferiore serie setarum aculeiformium munitis; metatarsi quoque versus basin plus minus granuloso-costati sunt, calcare apicali instructi. Procursus apicalis tarsorum brevis et gracilis est, apicem setam gracilem gerens, subunguiculis apex tarsi muticus est vel modo denticulo minutissimo instructus.

Color. Cephalothorax nigricans, maculis et striis multis obscure testaceis variatus, quae sub-impressae sunt et ad maximam partem laeves, partibus nigricantibus vero granulosis. Abdomen supra nigricans quoque, inaequaliter testaceo-marginatum et maculis vittisque sub-testaceis variatum, scutis dorsualibus omnibus utrinque vitta transversa lata laeviore sub-testacea signatis, quae saltem in posterioribus scutis (ultimo excepto) formis est. Subter abdomen cum *sterno*, *maxillis*, *coxis*, *laminis genitalibus* et *pectinibus* sub-testaceum est. *Cauda* fusco-testacea et nigro-variata dicenda, segm. 5^o ad maximam partem nigro, segm. 6^o toto fusco-testaceo. Segmentua I—IV fasciam mediam anteriora versus sensim dilatata, antice abbreviatam et inaequalem supra ostendunt, carinis superioribus nigris quoque; in utroque latere, postice inaequaliter nigra vel nigro-maculata sunt, et segm. saltem IV etiam sub-

ter, postice, est nigrum; segm. Vm basi sive antice late et inaequaliter fusco-testaceum est, praeterea paene totus nigrum.

Mandibulae, testaceae, nigro-variatae. Palpi supra nigri et valde inaequaliter testaceo-variati dicendi, subter, ut pedes ibidem, paene toti testacei; brachium basi supra plagam magnam testaceam, quae linea longitudinali sub-flexuosa nigra in duas est divisa; manus testacea inaequaliter nigro-lineata et reticulata est apiceque nigra; digiti obscure testacei basi satis anguste nigri et apice nigricantes sunt.

Pedes testaceo et nigro-variati, vasi apiceque magis testacei, femoribus tibiisque ad maximam partem nigris, illis maculis paucis testaceis notatis, his vitta transversa testacea versus apicem. Trochanteres fasciam nigram antice ostendunt; metatarsi et tarsorum art 1s basi plus minus nigri sunt.

Lg. corp. 30 millim. Lg. et lat. cphth. paullo plus 3 1/2, lat. front. paene 2. Lg. caud. 17 3/4; segm. I lg. 2, lat. paullo plus 2, alt. 2; II lg. 2 1/4 lat. 2; IV lg. 3, lat. 2; V lg. paullo plus 5 1/2, lat. ad basin paene 2, ad apicem 1 1/2; VI lg. 4 1/2 (acul. 1 1/2), lat. et alt. paullo plus 1. Palpi 12 1/2 mm. longi; humerus long. 3 1/4, lat. 1; brach. lg. paullo plus 3 1/2, lat. paullo plus 1 1/3; lg. manu cum dig. 4 1/2, lg. manu paullo plus 1 1/2 lat. ej. max. circa 1; lg. dig. mob. 3 1/2 mm.

Exemplum singulum feminum, ovis repletum, examinavi, in Brasilia (Matto Grosso) captum et a Cel. Prof. L. BALZAN dono mihi datum.

I have not examined specimens of this species.

CENTRURINAE KRAEPELIN, 1899.

The chief characters of this sub-family are indicated in the key for the division of the fam. *Buthidae*. The subfam. is represented in Brazil by three genera.

Key for determining the genera of *Centrurinae*

- 1) Granulations of the edge of the fingers of the hand disposed in oblique sub-parallel series.....2
- 1) Granulations of the volar surface of the fingers of the hand disposed in series, forming almost a straight line..... ISOMETRUS
- 2) Chief oblique rows of granulations on edge of fingers accompanied, on outside and inside, along their whole length, by secondary series..... RHOPALURUS
- 3) Chief oblique rows of granulations on edges of fingers not accompanied by secondary rows..... TITYUS

ISOMETRUS HEMPRICH AND EHRENBURG, 1828.

Granulations on volar surface of fingers form a few (5 or 6) rows arranged almost in a straight line, one behind the other, and only clearly separated on the anterior half of the finger and flanked, at posterior end, by a bigger granulation, both on inner and outer side. *Abdomen* with one keel. *Sub-aculear spur* large.

The species of this genus are found in India. One species, however, which is cosmopolitan, is common in Brazil.

ISOMETRUS MACULATUS (DE GEER, 1778).

The following is DE GEER's description:

«Scorpion tâcheté: *Scorpion tâcheté de brun a 8 yeux et à 18 dents aux peignes, à bras très longs et à serres allongées avec les doigts filiformes, à queue très longue et à aiguillon avec une pointe à la base.*

C'est à Surinam et en Pennsylvanie qu'on trouve les scorpions de cette espèce, qui sont aisés à distinguer par les mouchetures brunes dont toutes leurs parties sont marquées sur un fond brun griseâtre. Le corps de la femelle est long de neuf lignes et la queue de dix, mais le mâle, qui a le corps plus court d'une ligne, a, au contraire, une queue très longue ou d'un pouce et demi; les deux bras sont aussi d'une longueur excessive, au

lieu que ceux de la femelle n'ont qu'une étendue ordinaire. Ils ont huit yeux noirs, et les lames du peigne sont garnies de 18 dents, quoique M. LINNÉ ne leur donne que 14.

Leur couleur, comme j'ai dit, est d'un brun griseâtre; les bras, les pattes et la queue sont marqués de tâches et de points d'un brun obscur; le corps, sans excepter le corcelet, a quelques rangs de tâches, de points et de petites lignes du même brun, qui le rend tout tâcheté; mais sur le mâle, qui a le corps plus brun, ces mouchetures sont moins marquées.

Les serres qui terminent les bras sont longues et effilées, et leurs doigts, qui sont noirs, sont aussi fort longs, déliés et filiformes, à peu près comme ceux de l'espèce précédente. L'aiguillon qui termine la queue, est entièrement semblable à celui du Scorpion de l'Europe, que je viens de nommer, ayant comme lui, en dessous à la base une appendice de forme de pointe avancée garnie d'une petite épine de chaque côté. Au reste, les articles des bras et de la queue sont angulaires, parce qu'ils ont des arêtes longitudinales élevées comme dans toutes les espèces de ces Insectes».

This species has been found often in different points of Brazilian territory. According to information obtained, it is plentiful in the Federal District, where it enters the dwellings.

I examined together with Dr. ADOLPHO LUTZ various specimens of this species, noticing the fact that one-coloured specimens were found in nearly 50% of those examined. This difference of colouring had already been mentioned by GERVAIS, in *Walk. Ins. Apt.*, v. 3 p., 52, who uses the following words: *les uns étant marbrés et les autres uniformes.*

TITYUS C. L. KOCH, 1836.

Granulations on the edge of the fin-

gers of hand arranged in sub-parallel rows so that the inner ends of one row advance up to the middle of the next one. These rows are not accompanied by other *secondary lateral* rows. *Hands* usually strongly crested. *Body* with one keel. *Sub-aculear spur* usually present.

In Brazil 17 species of this genus have already been found. The area in which they occur seems to extend over the whole country.

Key for the determination of species

- 1 { Vesicle, aculeus and sub-aculear tooth of normal size.....2
- 1 { Vesicle, aculeus and sub-aculear tooth reduced..... *T. microcystis*
- 2 { Small species, not attaining 6 cm. of length.....11
- 2 { Bigger species, of 6 cm. length and more.....3
- 3 { Keel on the middle of the anterior surface of the tibia of the maxillary palpi with teeth of unequal size. In the female, median basal piece of combs with a vesicular dilatation.....4
- 3 { Same keel with 1 bigger tooth and the remainder of equal size. In female, median basal piece without vesicular dilatation 6
- 4 { Submedian ventral keels completely separate on segments II-IV..5
- 4 { Submedian ventral keels completely separate on segment II, united on the following except on the first third of segment III, and on half or two thirds of segment IV..... *T. magnimanus*
- 5 { Tail relatively slender not broadening caudally in the male. Width of hand not greater than that of tibia. Movable finger long, without distinct lobe in both sexes..... *T. cambridgei*
- 5 { Tail thick, widening out caudally. Hand wider than tibia. Movable digit with lobe more marked in the male..... *T. metuendus*
- 6 { Dorsal keels on segments II-IV of tail with bigger apical spur (or spurs).....7
- 6 { Dorsal keels on segments III-IV of tail without bigger apical spur.....8
- 7 { Dorsal keels on segment III with a bigger apical spur. Body usually with a dark stripe in the middle and lateral stripe reduced to spots..... *T. stigmurus*
- 7 { Dorsal keels on segment III with 2 and on IV with 3-5 bigger apical spurs. Body usually with apical belts either entire or reduced to spots..... *T. serrulatus*

- 8 { Segment V of tail uniformly dark or reddish yellow. Hand uniformly coloured. Carpus usually thicker than tibia and with a finger-lobe..... 9
- 8 { Tail variegated, chiefly below. Hand generally variegated. Carpus slightly thicker than tibia. Movable digit without a lobe in both sexes..... *T. costatus*
- 9 { Accessory keel of segment II complete. Trunk uniformly coloured or with irregular stripes. Dark patch on apical 2/3 of tibia. Femur with a spot dark or variegated with black. Carpus much thicker than tibia. Legs generally variegated..... 10
- 9 { Accessory keel of segment II merely apical. Trunk with three longitudinal and nearly parallel dark stripes. Tail, legs and maxillary palpi uniform. Carpus very much thicker than tibia *T. trivittatus*
- 10 { Tail robust, three last segments higher; body generally uniform. Small black spot, sometimes missing, on basal third of femur and a bigger apical one on the 2/3 of the tibia of the maxillary palpi..... *T. bahiensis*
- 10 { Tail slenderer, three last segments not very high. Body with irregular stripes. Femur with 2 variegated spots one apical and the other on light intermediary area, sometimes variegated. Tibia of maxillary palpi with basal 2/3 (or totally) variegated.. *T. dorsomaculatus*
- 11 { Dorsal keels of the segments II-III of tail with a bigger apical spur 12
- 11 { Dorsal keels of segments II-III of tail without a bigger apical spur 14
- 12 { Body of a uniform yellow testaceous colour..... *T. duckei*
- 12 { Body ocre yellow with dark spots..... 13
- 13 { Tail muddy yellow on dorsal surface, almost completely black on ventral. 22 teeth on pecten. 16 rows of granulations on digits..... *T. paraensis*
- 13 { 3 firsts segments almost altogether yellow slightly spotted with black, 2 last segments black on anterior and brownish yellow on posterior half. 17 pectinate teeth. 15 rows of granulations on digits..... *T. mattogrossensis*
- 14 { More than 16 pectinate teeth. More than 14 rows of granulations on digits. Coxae of legs and maxillary palpy uniformly yellow..... 15
- 14 { At most 15 teeth on pecten and 14 rows of granulations on digits. Coxae of legs and maxillary palpi completely black or with black patches..... 16
- 15 { Length up to 32 mm. Tail uniformly yellow. 16-18 pectinate teeth. 14-16 rows of granulations on digits..... *T. pusillus*
- 15 { Length up to 42 mm. Last segment of tail infuscated. 21 pectinate teeth. 16 rows of granulations on digit..... *T. intermedius*

- 16) Coxa of maxillary palpi with a black spot only on apex. Dto. on coxae of 2nd. pair of legs. 5th. segment of tail raised in the middle *T. paraguayensis*
- Coxa of maxillary palpi and of three first pairs of legs completely black, 4th and 5th segments of tail less raised in the middle *T. silvestris*

This table has been organised together with Dr. ADOLPHO LUTZ, making use of the general plan of that of KRAEPELIN.

TITYUS MICROCYSTIS LUTZ-MELLO
1922.

Original description of the species translated: Colour generally ochraceous, body and tail slightly brownish, dull. Extremities lighter with small longitudinal striations on femora and tibiae of legs and maxillary palpi. Cephalothorax relatively dark, without any marked design. Vesicle of a more reddish tone. Digits reddish-brown.

Tail rather slender; length in relation to length of body is as the ratio of 3/2. Length of the joints of the tail increases in apical direction, the 5th being twice as long as the first.

Vesicle small, with a short sting, not very curved and sub-aculear spur reduced to the shape of a flat tubercle.

Body finely granular above. Cephalothorax with granular dorsal keels. Last abdominal tergite with the 4 usual keels. The two last abdominal sternites with a median and three lateral keels, the latter converging caudally on the last segment.

Segments I and II of tail with 10 keels; accessory keel distinct on segments I and II, reduced to its basal part on segments III and IV. Four first segments with a dorsal groove and granular keels, the fifth with the dorsal keels almost obsolete. These keels are toothed on segments III and IV, with a bigger apical tooth. Vesicle with 8 longitudinal keels, dorsal surface slightly depressed.

Femur and tibia of maxillary palpi with granular keels. On anterior surface of tibia there is a keel of equal granulations beginning with a salient tooth. Carpus with distinct keels, but little salient, keels somewhat wider than the tibia and with some faint longitudinal striations.

Movable digit twice as long as carpus, with 14 rows of granulations. Pectinate teeth 22. Median basal piece not dilated. Total length 46 mm., length of body 18, of tail 28.

Description is made from a dried specimen, coll. Museu Paulista and proceeding from Marianna (State of Minas Geraes).

TITYUS MAGNIMANUS POCOCK, 1897.

Original description of POCOCK:

♂. Colour a reddish brown, the fourth and fifth caudal segments, the vesicle and digits blackish.

Tail barely six times the length of the carapace, which equals the length of its third segment, nearly parallel-sided, the third and fourth segments being only slightly wider than the first the inferior keels complete on the second segment, but represented by a single median one on the posterior third of the third and the posterior two thirds of the fourth; the intercarinal spaces almost smooth, scarcely perceptibly granular; the posterior granule of the upper crests of segments 2 to 4 enlarged. Vesicle a little wider than brachium, but narrower than hand. Chelae not elongate, width of brachium almost half its length, its length just exceeding that of the carapace; hand large, its width near-

ly equal to the length of the hand-back and not much less than the length of the first caudal segment; hand-back about half the length of the movable digit; the digits separated basally, sinuate and lobate.

Coxae and abdominal sterna only very feebly granular.

Pectinale teeth 19 (male and female).

♀. Young, 45 millim. in length, resembles the male in other than sexual characteres. Tail a little narrowed posteriorly; vesicle a little narrower than the hand and brachium, which are subequal; movable digit a little more than twice the length of the hand-back.

Measurements in millimetres.— ♂ Total length 68; length of carapace 7.3, of tail 43, width of its first segment 3.5, of fourth 3.8, of vesicle 3, of brachium 3, of hand 4.5; length of brachium 8, of hand-back 4.8, of movable digit 9.5.

Loc. Brazil. Two specimens, presented by E. E. AUSTEN.

I have not examined scorpions of this species.

TITYUS CAMBRIDGEI POCOCK, 1897.

Original description by POCOCK: ♀ —«*Colour* of upperside a uniform black or reddish black throughout, paler below; pectines testaceous; a triangular smooth testaceous area on the middle of the hinder border of the third sternite.

Sculpturing, granulation, &c. as in the Bogotá form *forcipula*, GERVAIS (= *americanus*, THORELL, KRAEPELIN, &c.), but not so coarse.

Tail parallel-sided, segments 2 and 4 of equal width, the fourth twice as long as wide; the inferior crests on segments 2—4 not confluent, the median lateral crest of the second only visible on the posterior fourth of the segment, or, at most, represented in front by minute granules; tail about 5 1/2 times the length of the carapace; width of the fourth seg-

ment equal to half its length, width of the fifth a little less than half its length.

Hand as wide as the brachium, the latter only a little longer than the carapace and less than three times as long as broad; hand-back two thirds the length of the carapace and half the length of the movable digit, which has 15 rows of teeth.

Pectinal teeth 22; base of shaft lobate.

♂. Tail feebly incrassate posteriorly as in the female, about 6 1/2 times the length of the carapace; the finger and hand as long as its first two segments and half the third, and nearly 2 1/2 times the length of the carapace; fifth caudal segment nearly three times as long as wide.

Chelae long and slender. Carapace about 3/4 the length of the brachium, which is at least four times as long as broad; hand long and slender, externally concave, its width equal to that of the brachium and about one third the length of the hand-back, which is a little less than the length of the carapace and more than half the length of the movable digit; digits in contact only feebly lobate basally.

Pectinale teeth 21—22.

Measurements in millimetres.— ♀. Total length 72; length of carapace 7.8, of tail 43, length of its fourth segment 7.5, width 3.8; width of vesicle 2.8, of brachium and hand 2.8; length of brachium 8.5, of hand-back 5, of movable digit 10.2.

♂. Total length 80; length of carapace 7.6, of tail 52, width of vesicle 3, of brachium and hand 2.5; length of brachium 11, of hand-back 7, of movable digit 12.

Loc. Pará (type, two males and a female).

TITYUS METUENDUS POCOCK, 1897.

♀.—Very like that of *T. cambridgei*,

but the tail thicker, the width of the fourth segment considerably more than half its length; the granulations of the tail also much less distinct.

Hand distinctly wider than the brachium and much less strongly crested than in *cambridgei*.

Pectinal teeth 19.

♂.—Strikingly different from male of *Cambridgei* and approaching that of *forcipula* in the nature of its sexual characters. Tail incrassate to the middle of the fifth segment; width of the fourth and fifth considerably more than half their length, the whole tail about 6 1/2 times the length of the carapace; the finger and hand as long as the first two segments and one third of the third, and only a little more than twice the length of the carapace; vesicle granular below and about equal to the brachium in width.

Chela moderately elongate; brachium not four times as long as wide; hand much expanded, much wider than brachium, its width about two thirds the length of the hand-back; the movable digit strongly lobate at the base, the immovable sinuate, leaving a narrow space between them when closed.

Pectinal teeth 20—21.

Measurements in millimetres.—♀ Total length 77; length of carapace 8, of tail 46, width of its first and fourth segments 5, length of fourth 8; width of vesicle 3, of brachium 3.3, of hand 4; length of brachium 9, of hand-back 5.1, of movable digit 10.8.

♂. Total length 97; length of carapace 9.5, of tail 61, width of its first segment 5, length 7.7, width of fourth 6.3, length 11; width of vesicle 3.8, of brachium 3.6, of hand 5.8; length of brachium 11.5, of hand-back 8, of movable digit 13.

Loc. of type (♂). Above Iquitos on the Marañon or Amazons.

Such is the description of this species according to POCKOCK.

The Branch Institute of Bello Horizonte possesses two specimens (♀) collected by Lieut. MENDES DE MOBAES at Belem, Pará. I also examined 2 ♀ specimens of the collection of the Museu Paulista and proceeding from the Tapajós River.

TITYUS STIGMURUS THORELL, 1877.

The following is the description of this species according to THORELL: «Fusco, vel luteo-fusco, abdomine vitta media e maculis nigris, carina pallida germinatis, formata segmento caudae 5^o apice subter inaequaliter nigro, digitis fuscis; cephalothorace et abdomine subtiliter granulosis, cauda carinis evidentibus denticulatis granulosisve munitis, dente apicali carinarum dorsualium segmentorum saltem 3ii et 4ii reliquis dentibus paullo majore, vesica oblonga, sub-aculeo dente forti compresso supra bidenticulato armato; manibus supra granuloso-costatis, brachio paullo latioribus, digito mobili manu postica poene duplo longiore ordinibus denticulorum secundum medium aciei circa 15; dentibus pectinum circa 21—23. Long. circiter 65 mm.

Cephalothorax subtilissime granulosis, tantum ad marginem anticum late et leviter emarginatum crassius granulosis, costis posticis tamen evidentibus, spatio 1/3 latitudinis cephalothoracis posticae non aequanti disjunctis, leviter sinuosis, subparallelis; sulcus transversus ordinarius inter eas igitur brevis, sulcus ab eo procurrens sat fortis, ramo parum profundo utrinque. Tuberculum oculorum dorsualium sulco lato et forti divisum, arcubus supraciliaribus crenulatis; area ante hoc tuberculum leviter excavata vix vel parum longior est quam latior, subtilius granulosa, in lateribus serie granulorum crassiorum levissime incurva limitata.

Segmenta abdominalia 1.m 6.m subtilissime granulosa, 3.m 6.m saltem transversim in medio poene lineam laevissime

impressam et paulo procurvam, ut et ad ipsum marginem posticum paullo crassius granulosa, costa longitudinali media postica crenulata; segm. 7.m costis ordinarius 5 granulosis instructum, media ad centrum segmenti pertinent, lateribus fortiter foras curvatis, interiore earum apice antico birami; interstitia subtiliter granulosa et granulis majoribus rotundatis nitidis sparsa.

Venter ad maximam partem opacus, omnium subtilissime coriaceus, segm. 4^o prope medium ad marginem posticum, costis duabus brevissimis nitidioribus instructo; segm. 5.m subtilissime coriaceum costas 4 tenues crenuatas habet.

Cauda brevior, apice angustata; segm. 1.m 4.m carinis omnibus ordinariis expressis (segm. 1.m 2.m carina laterali media quoque) instructa, dorsualibus denticulata, dente apicali saltem in segmentis 3^o et 4^o dentibus ceteris evidenter majore, reliquis carinis granulosis vel crenulatis; supra late et sat profunde sulcato-excavata, inter carinas 4 superiores granulis parvis sparsa. inter carinas 4 inferiores minus evidenter granulosa (in segm. 1^o et 2^o hic poene loevia). Segm. 5.m desuper visum versus apice sat fortiter angustatum est (versus basin poene dimidio latior quam apice sulco evidenti, in apice sub-dilatato, secundum medium instructum, granulis parvis supra sparsum, marginibus superioribus non acutis sed leviter rotundatis, carinis superioribus serie minus aequali granulorum parvorum indicatis; a latere visum supra et subter aequaliter et leviter arcuatum est, in lateribus inaequaliter et sat crasse granulorum; carinis tribus inferioribus evidentibus, serie granulorum munitis, granulis interstitiis inter eas versus basin segmenti utrinque seriem quousque inaequalem formantibus. Vesica oblonga elliptica fere, angulis basalibus supra tamen fortibus, sub-rectis; granulis parvis rarioribus sparsa, subaculeo longo et forti dente magus, compresso, triangulo, qui in margine su-

periore utrinque dente minuto instructus est, armata.

Palpi sat graciles, supra granulis minutis sat dene sparsi, costis omnibus fortibus, in humero denticulatis, in brachio granulatis crenulatisve; latus *humeri* anticum carinatum serie paullo inaequali denticulorum parvorum serrulatum est; latus anticum *brachii* versus basin dentem paullo fortiorem habet.

Manus sat angustae, intus sat fortiter, extus parum arcuatae, costa postica subtilissime crenulata, costisque supra et intus 5 evidentissimis, granulosis praeter costam abbreviatam basalem supra, magis extus; subter, extus costam loevem, et subter, intus costam abbreviatam granulorum minus distinctam ostendunt. *Digiti* longi, graciles, ordinibus denticulorum secundam aciem circa 15.

Pedes granulosi, lineis elevatis evidentissimis crenulatis granulosisve in femoribus, tibiis et tarsorum art. 1^o; femora in margines superiore et praesertim in inferiore, tibiae in margine inferiore saltem serrulatae.

Pectines breviores, dentibus 21—22.

Color:—Fusca vel luteo-fusca est hac species, truncus subter clariore, cephalothorace in medio margine postica macula nigra plus minus distincta notato et ad marginem infuscato, tuberculo oculorum dorsualium nigro abdomen vitta media a macula singula (carina pallida germinata) in singulis segmentis formata ornatum, quae maculae brevissimae sunt, sed anteriorae versus, quamquam multo magis dilutae, continuatae. Segmentum caudae 5.m apice subter late et valde inaequaliter nigrum, nigriore utrinque in dentes binos atos inaequales et in medio in lineam producto; palpi flavi, digiti illorum fusco.

Mesurae: Long. comp. 65; cepth. 7. Caudae 38.

Exempla dua in spiritu vini asservata ex Pernambuco obtinuit Museum Homiense; tria specimina siccata ex Mus. Gothob.; unumque in alcool ex Mus. Wy-

byeosi, quorum patria vera ignorata est. Omnia sex exempla verosimiliter femina.»

The Branch Institute at Bello Horizonte has two specimens of this species from unknown localities. I examined one specimen of this species in the Museu Paulista. The three specimens showed very clearly the median black stripe on the back of the abdomen as well as two lateral stripes reduced to spots.

The specimen of the Museu Paulista is from Bahia. PENTHER makes reference to the existence of this species in Soledade (Bahia).

NEIVA offered us some specimens taken in São Paulo. They were preserved in alcohol which appears to have dissolved the black pigment of the middle stripe so that they were practically uniform in colour.

TITYUS SERRULATUS LUTZ-MELLO,
1922.

Original description (translated from the portuguese text).

«Body, above dark chestnut-brown, without longitudinal bands; on the dorsal plates, sometimes, dark apical belts with a triangular dilatation in the middle. Cephalothorax lighter, with a dark triangle seated on anterior border of same and ending at posterior angle of the orbital ridge. Last segment of abdomen lighter, of the same tint as the tail.

Tail ochre-coloured; the median keel on the ventral side of segments II—IV, the ventral median and the apex of V black. Vesicle of the colour of the tail, aculeus with the base reddish and the dark. Maxillary palpi uniformly light ocre coloured, fingers reddish-brown.

Cephalothorax delicately granular; supraciliary ridge toothed and with a median groove. Dorsal plates almost entirely granular; the last with the usual punctate crest. Abdominal plates opaque, with microscopical granulations, only

the apical margins of I—III smooth. The last dorsal plate rough with the usual longitudinal keels.

Tail slender, not broadening caudally, the segments lengthening gradually backwards. Caudal keels toothed. Dorsal keels toothed on segments II—IV, with a saw-shaped disposition of larger posterior teeth on segments III—IV.

Dorsal keels on last segment obsolete, the dorsal median groove narrow. Lateral accessory keel of segment II distinct on its whole length. Caudal surfaces with small rounded granules. The inferior surface of segment V wholly rough. Vesicle flattened dorsally and with a *dull* surface. Sub-aculear tooth flattened transversally, pointed, with 2 dorsal granules. Hand as wide as the tibia of maxillary palpi, distinctly crested, the 2nd crest uninterrupted in the middle. Fingers almost twice as long as the posterior hand, without lobe, with 14 rows of granules. Pectinate teeth 22.

Measurements in millimetres.—Total length 60, cephalothorax 6, tail 32, movable digit 9, width of hand 3, of tibia 3.

Loc.: Bello Horizonte (State of Minas Geraes). Collection of the Branch Institute in that city.

This scorpion is very common in Bello Horizonte, where it invades the dwellings and causes occasional accidents. We received a great number of specimens of this species from Itauna, Minas Geraes. The Instituto OSWALDO CRUZ also possesses numerous specimens proceeding from Pirapora. The Museu Paulista has also a great quantity of sample obtained in São Paulo and Minas Geraes.

Sexual dimorphism is not very marked in this species».

TITYUS COSTATUS (KARSCH, 1879).

Original description of the species according to KARSCH.

«Long. trunci 25, caudae 48 mm. Cephalothorax antice leviter emarginatus, segmenta 1m 1/2 2m conjunctim vel seg-

men 5 caudae longitudine aequans, crassius et densius granulatus; segmenta abdominalia antice subtiliter postice crassius granulosa, costa longitudinali ordinaria media et costis plus minus evidentibus transversis curvatis binis lateralibus granulosis; segmenta abdominalia subter non vel subtilissimo modo granulosa; segmentum 5m costis longitudinalibus 4; segmenta caudae posteriora versus sensim longiora, supra subtilissime, supra et lateralibus subtiliter granulosa; segmentum I et II carinis crassius granulosis 10, segmenta III et IV carinis 8, segmentum V carinis, dorsualibus subtiliter tantum granulosis; carinae dorsuales dentem apicalem majorem non praebent; vesica subter fere laevis, non granulosa, costa media in tuberculum sub-aculeo gracili curvato compressum et supra bidenticulatum transienti. Manus palporum brachio vix latior, costa interiora et exteriora granulosa, supra costis 2 magis interiora versus in digitum immobilem transientibus (costa exteriora medio parum interrupta) et costis 2 magis extus, interiore antice paullo, exteriora forfiter abbreviata, usque ad medium tantum manus partinens; digitis gracilibus, digito mobili manu postica duplo longiore. Color fuscus vel luteofuscus, manibus, digitis et cauda posteriora versus infuscatis. Denti pectini 16

Exempla 4 siccata, verosimiliter omnia Mus. Berol. ex Rio de Janeiro possidet.

We have four specimens of this species collected by Prof. BRUNO LOBO, at Montserrat on the Itatiaya Mountain, 2 male and 2 female. They are spotted all over, body, tail, chiefly below, legs maxillary palpi including the hands. I only found 16 pectinate teeth and not 22 as stated by KRAEPELIN.

TITYUS BAHIENSIS (PERTY, 1830).

Original description according to PERTY:—«Oculis octo; brunneo-fuscus,

palpi pedibusque badio-flavis; pectinibus 20 dentatis. Lg. exempli unici 27.»

Habitat prope Bahiam.

Subgeneri *Butho* celeberr. Leachii adscribendus. Cephalothorax antice paene recta truncatus, vix emarginatus; totus fuscus, asperulus, convexus, lineis elevatis transversis interruptis, oculis atris, lucidis, duobus majoribus mediis, antice ad marginem extremum utrinque tribus minoribus. Abdomen fuscum, asperulum, linea media elevata longitudinali, lineolis elevatis transversis interruptis, et pluribus longitudinalibus in segmento ultimo. Cauda crassa articulis inflatis, in tergo excavatis, subter et ad latera sex-carinatis, carinis lateralibus crenulatis; segmento ultimo processu parvo infra aculeum; aculeo curvo, ferrugineo. Subter cum pedibus ochraceo-testaceus. Pectines pallidiores, viginti dentati.

Localities. This species was described from a specimen obtained in Bahia, where it is not mentioned to occur by the majority of authors, including MAURANO. The Branch Institute of Bello Horizonte received a specimen from Boa Nova in the State of Bahia. NEIVA collected a female specimen of *Tityus bahiensis* in the North-east of Brazil. But the species appears to be really more common in the States of Minas Geraes and São Paulo. In some districts in Minas, such as Ouro Preto, Santa Barbara, Itabira do Matto Dentro, it is extremely abundant, and from these places the Institute has obtained several tens of thousands of specimens. From other places in Minas, samples of the species have been obtained: Pirapora, Lafayette, Oliveira, Morada Nova etc. In Bello Horizonte it is rare. It is plentiful in São Paulo in the suburbs of the Capital. The Institute has also received specimens from the State of Santa Catharina.

PENTHER has collected specimens of this species in Matto Grosso and in Rio de Janeiro. BORELLI found it at Puerio Bertoni (in Paraguay) and in

Santa Catharina and Cuyabá. Specimens from Puerto Bertoni and Santa Catharina are dark reddish, whereas those from Cuyabá are of a lighter hue.

Sexual dimorphism is marked in this species. The male has a hand thicker than the tibia and a strong finger-lobe on the movable digit and a corresponding groove in the fixed one. The female has more accentuated crests on the hand.

Another point worthy of mention is the colouring of this species. Some specimens are reddish-brown almost dark such as those from Itabira and others are of a dirty yellow colour. POCOCK described under the name of *T. rufojuscus* a species which KRAEPELIN considers to be the same as *T. bahiensis* and whose chief character resided in its colouring, uniformly «brownish-black».

The legs are uniform in colour in some specimens; in others they are spotted with brown. The tail may also have darker spots. Spots occurring constantly in this species are, one on the apical 2/3 of the tibia of maxillary palpi and another on the middle of femur.

It is against the venom of this species that scorpion antivenins were prepared at this Institute in Belio Horizonte and at the Institute of Butantan in São Paulo.

This serum proves of use in accidents caused by *T. serrulatus*; it might be admitted logically that it should be of use against other *Tityus* species chiefly those of the group *stigmurus*, i. e.: *bahiensis*, *costatus*, *stigmurus*, *trivittatus*, *serrulatus* and *dorsomaculatus*.

TITYUS DORSOMACULATUS LUTZ-MELLO, 1922.

Original description of the species (translated from the portuguese).—♂. Cephalothorax with a dark dorsal triangle, the base of which is constituted by the anterior edge, the apex lying just behind the median eyes. On its posterior part and on the back of the abdomen there

run two longitudinal bands of a light reddish-brown colour and saw-toothed edges; on the cephalothorax, at the sides of the median dark spot, there is a dark spot obliquely elongated and on an ochraceous ground. The median longitudinal stripe is made up of triangle with a posterior base, including small median linear spots of a light ochre colour. This linear spot is wanting on the last segment where the dark triangle occupies only the basal half. Externally from the submedian stripes, there is, on either side, a dark stripe made up of spots of irregular shape. The tail is of light chestnut colour on its upper half, segment III, below segment IV and V, all over pass from a blackish brown to a deep black colour. Vesicle reddish brown. The legs are spotted with dark dots, below the colour is generally uniform, but metatarsi are generally darker on basal 2/3. Coxae of maxillary palpi, above, with a transversal black spot; femur is variegated with black and light colours in the middle and dark at the end. Tibia with light base ending obliquely; the rest dark with light spots. Hand ochraceous, with some indistinct spots. Fingers blackened at base, reddish at the end and ochraceous at the tips of their extremities. Body, above, generally dull. Orbital ridge saw-edged, with a distinct median groove. Anterior end of cephalothorax with bigger granules. Caudal segment 11 has 10 crests. Dorsal keels on segments I—IV weakly granular, obsolete on V. Intercarinal surfaces generally smooth. Vesicle smooth. Sub-aculear tooth strong, pointed, with two dorsal granules. Tibia with granular keels, the one of the anterior surface with stronger basal tooth. Hand pear-shaped, dilated, with marked keels, very much thicker than tibia. Movable digit with lobe (to which corresponds a groove on fixed digit), and 13 rows of granules. Pectinal teeth 19.

♀.—Body generally more granular. Caudal keels more toothed. Hand slen-

derer, with distinct keels and movable digit without lobe.

Measurements in millimetres. ♂ Total length 53, of cephalothorax 5.5, of tail 30; width of hand 5, of tibia 3. Length of movable digit 8.

♀.—Total length 52, of cephalothorax 5.5, of tail 30; width of hand 3, of tibia 2.8, length of movable digit 9.

Type specimen: from the collection of the Branch Institute of Bello Horizonte, probably from Minas Geraes.

This Institute obtained also a male specimen from Amarante, State of Piauhy and a female specimen from Palma, State of Minas Geraes. We must therefore admit that this specimen has a considerable geographical range.

TITYUS TRIVITTATUS KRAEPELIN.

1897.

Original description according to KRAEPELIN: «Zur Stigmurus-Gruppe gehörig und speziell dem *T. stigmurus* nächstverwandt, aber nur 50 mm. lang. *Truncus* mit 3 starken, gleichmässig ausgebildeten, schwarzen Binden, die aber nicht zusammenfliessen, wie bei *T. costatus*, sondern durch breite helle Zwischenstreifen voneinander getrennt sind. Andererseits finden sich auch Exemplare, deren Cephalothorax und Abdomen bis auf das letzte Segment fast einfarbig schwarz beraucht ist (wohl als Varietät zu trennen). Das V Caudal-Segment ist einfarbig gelbrot. Die lateralen Nebenkiele im II Segment sind nur am Ende durch einige Körnchen angedeutet; die Körnelung der Kaudalflächen ist feiner als bei *T. stigmurus* und die Dorsalkiele der Cauda endigen ohne stärkeren Dorn. Finger beim ♂ mit Lobus und Innbuchung der Gegenseite. Kammzähne 20—22. Von *T. costatus* durch die fehlende schwarze Sprenkelung der Caudalunterseite leicht zu unterscheiden.

Paraguay (San Salvador am Paraguay-Fluss).

The Branch Institute in Bello Horizonte has one specimen collected by Dr. HONORIO HERMETTO at Tapiá, Rio Grande do Sul.

ALFREDO BORELLI refers to 3 female specimens collected one at Corrientes and two at Urucum, near Corumbá, State of Matto-Grosso. The specimens of BORELLI have a dark spot on the femur and another on the tibia of maxillary palpi; these are not found on the specimen of HONORIO HERMETTO.

TITYUS PARAENSIS KRAEPELIN, 1896.

Original description of species:—«*Truncus* gelb, schwarz gefleckt (medianer schwarzer Fleck auf dem Vorderrande jedes Segm., Hinterrand abwechselnd mit gelben und schwarzen Fleckchen; ausserdem die bogenförmige Körnchen-Querreihe schwarz).

Cd. oberseits lehmgelb, unterseits fast ganz schwarz, Dorsalflächen mit schwarzer V-förmiger Zeichnung, Blase dunkelbraun.

Bauchplatten gelb, nur etwas beraucht, IV am Rande, V fast ganz schwarz. beraucht (mit runden gelben Fleckchen), Handkiele und Finger schwarz. Bauchplatten matt, die letzten fein gekörnt. Caudalkiele sehr stark, fast dornig, die dorsalen im III—IV Segm. mit stärkerem Enddorn. Caudalflächen sämtlich dicht und fein gekörnt, im IV und V Segm. fast grobkörnig. Nebenkiel im II Segm. ziemlich ausgeprägt. Blase schwächig. Dorn unter dem Stachel gross, spitz, mit 2 dorsalen Körnchen. Hand äusserst schmal, schlank, doppelt so lang wie breit. II Fingerkiel in der Mitte der Handfläche verschwindend. Finger sehr lang, über doppelt so lang wie die Hinterhand, ohne Lobus, mit 16 Schrägreihen. Kz. 22. Basale Mittellamelle der Kämme nicht (♀?) blasig erweitert.—L. bis 48 mm. Pará.»

I have not examined any specimen of this species.

TITYUS DUCKEI BORELLI, 1910.

«Tronco giallo testaceo, interamente giallo-chiaro nella parte inferiore: i due primi segmenti della coda giallo-chiaro, il terzo giallo-bruno, i due ultimi bruno rossicci; vescicola brunno-rossiccia ad eccezione della parte anteriore dell'aculeo e dell'estremità della sporgenza sotto l'aculeo giallo-brunno.

Cefalotorace coperto di piccolissime granuli appena distinti colla lente, carene ed arcate sopraciliari leggermente dentellate. Segmenti dorsali finamente granulati colle carene mediane leggermente dentellate e marcate soltanto nella metà posteriore dei segmenti, ultimo segmento colle solite carene marcate e leggermente denticolate. Segmenti ventrali opachi, non granulati, l'ultimo con quattro carene poco marcate e debolmente granulose di cui le mediane dal margine posteriore si estendono per i due terzi della sua lunghezza, mentre le due esterne, più corte, non raggiungono nè anteriormente nè posteriormente i margini del segmento.

Coda de lunghezza superiore a 6 volte quella del cefalotorace, con carene distinte e finamente dentellate; le carene superiori, appena più alte nella parte posteriore del segmento, sono denticolate coll'ultimo dente più grosso degli altri nel secondo e nel terzo segmento, mentre nel quarto esse sono più sensibilmente granulose. Nel secondo segmento le carene medio-laterali non sono più distinte che nella metà posteriore. Quinto segmento con 5 carene poco marcate, indicate da piccoli granuli i quali sono più grossi alle estremità del segmento. Spazii intercarinali sparsamente e finamente granulati, nel quarto e nel quinto segmento i granuli sono alquanto più numerosi principalmente sulle superficie laterali e inferiori che sono anche alquanto rugose. Superficie superiore del quinto segmento fortemente convessa nel mezzo e segnata da un leggero solco

mediano longitudinale, superficie laterali ed inferiori debolmente convessa. Vescicola oviforme, poco più stretta del quinto segmento, opaca sulla superficie superiore sparsamente punteggiata e granulosa sulle superficie laterale ed inferiore con una carena medio-inferiore, dentellata, la quale dalla sua base si prolunga sino all'estremità della sporgenza sotto l'aculeo e 2 serie laterali di piccoli granuli brillanti, separati dal margine superiore della vescicola da una leggera depressione.

Aculeo fortemente ricurvo, sotto al quale notasi una forte sporgenza appiattita senso trasversale, di forma triangolare coll'apice arrotondato, il margine inferiore dentellato ed il margine superiore bisinuoso fornito di 2 piccoli granuli nel mezzo.

Femori e tibie dei palpi mascellari finamente granulati colle carene marcate e leggermente denticolate; sulla faccia anteriore dei femori notasi una carena mediana denticolate sulla faccia anteriore della tibia una carena mediana sporgente e seghettata col primo dente prossimale più grosso e spiniforme.

Mani convessi internamente, non globbose, poco più larghe delle tibie con tutte le carene superiori marcate, non interrote e finamente dentellate, le 2 carene inferiori leggermente denticolati.

Ditto mobile sinuosa alla base, di lunghezza poco superiore ad una volta e mezza quella della mano posteriore, con 13 serie de granuli.

Zampe granulose esternamente, colle carene granulose.

Denti ai pettini: 16—17.

Dimensioni in millimetri: Lunghezza del tronco 12.5, del cefalotorace 4, della coda 25. Lunghezza del 1° segmento 3, sua larghezza 1.85. Lunghezza del 4° segmento 5, sua larghezza meno di 1.8. Lunghezza del 5° segmento 5.5, sua larghezza anteriore meno di 1.8, mediana 2, sua altezza mediana 2. Lunghezza della vescicola 3.8, di cui 1.5 per l'aculeo.

Larghezza della tibia dei palpi mascellari 1.3, della mano 1.75. Lunghezza della mano posteriore 3, del dito mobile circa 5.

Località: Pará (Brasil), un solo esemplare ♂, raccolto da Dr. A. DUCKE.»

I examined no specimens of this species.

TITYUS PUSILLUS POCOCK 1893.

♀. Nearly related to the preceding (*T. Quelchii*) (POCOCK), but more distinctly spotted with black; the maxillary lobes, however, are not fuscous, and the fifth caudal segment and the vesicle of the tail are of the same tint as the rest of the tail and not conspicuously infuscate as in *T. Quelchii* and *T. columbianus*.

Trunk carinate and granular above as in the preceding species; the lower surface perhaps rather more coarsely and closely granular.

Tail a trifle more than five times the length of the carapace, slender, nearly parallel-sided, the fifth segment being only very slightly wider than the second; the vesicle a little more globular than in *T. Quelchii*, with proportionately larger tooth, but with much less distinctly defined granules; the fifth caudal segment also less distinctly granular, and the terminal tooth of the superior caudal keels is only a little larger than the rest upon the third and fourth segments.

Palpi and legs as in *T. Quelchii*, but with 14–15 rows of teeth along the middle series of the digit: «palpi finely and closely granular throughout, all the normal keels well developed and granular; hand strongly carinate, rounded, a little narrower than the brachium; the movable digit long and slender, twice the length of the hand-back. *Legs* carinate and granular, the soles of the feet furnished with long closely set hairs.»

Pectines with 16–17 teeth, the basal intermediate lamella slightly produced.

Measurements in millimetres.—Total length 32, length of carapace 4, of tail 20; width of fifth caudal segment 1.6, of vesicle 1.3.

♂. A little smaller and slenderer than female, with tail slightly longer, being a little more than five and a half times the length of the carapace. Pectines much larger, with 17–18 teeth.

Two specimens in alcohol, collected by Mr. G. S. RAMAGE at Iguarassú.

I have not examined any specimens of the above species.

TITYUS PARAGUAYENSIS KRAEPELIN, 1895.

Description of KRAEPELIN's (Das Tierr., 1899): Truncus, Cd., Beine und Mxpalp. auf gelbem bis gelbrotem Grunde dichtschwarz (auf den Extremitäten fast schachbrettartig) gefleckt. Cd. in den 2 Endsgm. nebst Blase rotbraun. Flächen der Bauchplatten ebenfalls schwarzfleckig. Coxen des Mxpalp. und des 2. Beines am Vorderrande mit schwarzem Fleck. Bauchplatten grob gekörnt, Längskiele im 4. Segm. fast verschwindend, im 5. perlschnurartig. Dorsalkiel der Cd. am Ende nicht in einen stärkeren Dorn auslaufend, nicht steil konkav gegen den Hinterrand des Segm. abfallend. 4. und 5. Cdsegm. beim ♂ auffallend hoch gewölbt, ihre Dorsalkiele obsolet und von der Mitte des Segm. fast geradlinig nach beiden Seiten abfallend.

Caudalflächen alle ziemlich dicht feinkörnig, gegen das Ende gröber, untere Medialflächen im 5. Segm. ziemlich gleich mässig körnig (medianer Körnchenstreif wenig hervortretend). Hand beim ♀ nicht dicker als die Tibia des Mxpalp., beim ♂ aufgeblasen, wie bei *T. clathratus*, mit 3 durchgehenden Kielen. Finger mit 14 Schrägreihen, beim ♀ gerade ohne Lobus, fast doppelt so lang wie die Hinterhand, beim ♂ in der Mitte etwas winklig geknickt, aber nur mit schwacher Lobenvorwölbung. Kz. 12–15. Basale Mitellamelle der Kämme beim

nicht blasig erweitert.—L. bis 35 mm. ◊

Paraguay».

ALFREDO BORELLI refers to the existence of this species at Urucum and Cuyabá, collected by FRANCISCO SILVESTRI.

I have not examined specimens of this species.

TITYUS SILVESTRIS POCOCK, 1897.

Original Description of POCOCK.—

«The dorsal and sternal surfaces of the trunk densely spotted black and yellow; there is, however, a conspicuous bright yellow T.—shaped mark on the fore part of the carapace, a similar mark being much less conspicuous in *paraguayensis* and not noticeable in *Quelchii*, which is of a much more uniform tint and less distinctly mottled.

In *silvestris*, moreover, not only are the maxillary lobes infuscate throughout their length, but the dark pigment, in addition, spreads on to the coxae of the second, third and sometimes also of the fourth leg, whereas in the specimens of the other two species that I have seen the maxillary lobes are infuscate only at the tip, there being, however, in *paraguayensis* also a single spot upon the coxae of the second leg.

In structural features *Quelchii* has better developed granulation and stronger keels, the sculpturing of *paraguayensis* being finer than in *silvestris*, as is particularly noticeable on the superior caudal crests. And, lastly, in *silvestris* the vesicle is higher than in the other species, the tooth beneath the aculeus being very high, with a blunt and obliquely truncate apex.

Pectinal teeth 14—16 (in a young specimen 12—13). The single male example has 15. Rows of teeth on digit 14 (not including small apical rows); 15—16 along the other row.

The sexual characters are the same as in *paraguayensis*, but the fourth and

fifth segments are much less strongly elevated.

♀. Total length of body and tail 34 millim., of tail 19.5; width of first segment 2, of fifth 1.5; width of brachium and hand 1.8.

♂. Total length 30.5, of tail 19, width of first and fifth segments 2; width of brachium 1.5, of hand 2.

Loc. Santarem. Several specimens collected in the forest by Mr. F. O. P. CAMBRIDGE».

I have not examined specimens belonging to this species.

TITYUS MATTOGROSSENSIS BORELLI, 1901.

Colore giallo-chiaro macchiato di nero como nel *T. paraguayensis*. I tre primi segmenti della coda quasi completamente gialli, leggermente screziati di nero, i due ultimi neri nella metà anteriore, bruno-rossicci nella metà posteriore; vescicola bruna-oscuro, quasi nera, ad eccezione della metà anteriore del aculeo, bruno-rossiccia, e dei margini della sporgenza sotto l'aculeo, gialli. Inferiormente giallo-chiaro, le estremità dei lobi mascellari del primo e del secondo paio, nere; segmenti ventrali gialli marmeggiati di nero, principalmente vicino al margine posteriore. Mano e dito giallo leggermente annerite.

Cefalotorace e segmenti dorsali fittamente granulosi, segmenti ventrali coperti di piccoli granuli brillanti, il penultimo con due carene poco distinte vicino al margine posteriore, l'ultimo con quattro carene leggermente dentellate, di cui le mediane dal margine posteriore si estendono per due terzi della lunghezza del segmento, mentre le due esterne non raggiungono nè anteriormente nè posteriormente i margini del segmento.

Coda con segmenti a lati pressoché paralleli, con carene ben marcate e leggermente dentellate, le carene mediane superiori finamente seghetate, principalmente nel secondo e nel terzo segmento,

nei quali l'ultimo granulo spiniforme è sensibilmente più grosso degli altri. Nel secondo segmento le carene medio-laterali sono ben marcate per metà della lunghezza del segmento, e indicati da pochi granuli nella metà anteriore. Quinto segmento con 5 carene, le supero-laterali sono indicati per tutta la lunghezza del segmento da piccoli granuli rotondi. Spazi intercarinali finamente granulosi nella parte anteriore della superficie superiore dei segmenti, con granulazione più fitta e più marcate sulle superficie laterali e superficie superiori, principalmente nei due ultimi segmenti. Vescicola oviforme, sensibilmente più stretta del quinto segmento, opaca sulla superficie superiore, sparsamente granulosa e debolmente rugosa sulle superficie laterali ed inferiore: con una cresta mediana inferiore, la quale della base della vescicola si prolunga sino la estremità della sporgenza sotto l'aculeo, e con due serie di granuli perliformi separati da solchi quasi liscii sulle superficie laterali. Aculeo molto ricurvo, sotto al quale si trova una sporgenza appiattita in senso trasversale di forma triangolare, coll'apice arrotondato.

Palpi mascellari fittamente granulosi. Mani debolmente granulose con tutte le carene superiori non interrote e ben marcate, colle carene inferiori seghettate. Dito mobile leggermente ricurvo, di lunghezza doppia della mano posteriore, con 15 serie di granuli, fiancheggiate internamente ed esternamente da 15 granuli più grossi.

Lamella basale intermedia dei pettini leggermente sporgente, di forma trapezoide; numero dei denti ai pettini 17—17.

Dimensioni in millimetri.—Lunghezza del tronco 14.5, del cefalotorace 4, della coda 21.5, larghezza del II e del V della coda 2.3, lunghezza del V segmento 5, larghezza della vescicola 1.5, larghezza della tibia dei palpi mascellari circa 1.9, della mano circa 1.8. Lunghezza della mano posteriore 2.5, del dito mobile 5.

Un solo esemplare ♀.

Località:—Coxipó, perto di Cuyabá.

I have not examined any specimens of this species.

TITYUS INTERMEDIUS LUTZ-MELLO,
1922.

Original description (translated from portuguese text):—«Cephalothorax of a dark ochre colour, with a darker triangular area on the anterior border of carapace and with its apex located behind the orbital ridge. Last segment takes the colour of tail. Tail an ochraceous yellow, little darker on ventral side.

Last two segments and keels of a dark brown; tone of segment V deeper than that of segment IV. Legs yellow with dark spots. Tibia of maxillary palpi of a dark brown. Hand ochre-yellow, of the colour of segment II. Fingers of a reddish chestnut colour.

Pectinate teeth whitish. Cephalothorax furrowed above, with bigger granulations and smaller hollows. Keels granular. Orbital ridge granular, divided by a median groove. Dorso-abdominal plates rather granular the last one with the 4 usual crests also granular. Tail slender, not widened posteriorly, with segments augmenting from I to V, which is more than twice the size of I. Crests of caudal segments granular and dorsal crests of II—IV without a larger apical tooth, those of V almost obsolete. Secondary crests of II conspicuous only at the hind-end of the segment.

Intercarinal space dull. Vesicle narrower than the 5th segment and pear-shaped. Aculeus strongly curved. Subaculear tooth pointed, with 2 dorsal granulations. Vesicle smooth without hairs. Hand the width of the tibia, with 4 distinct dorsal crests, the 2 median crests being projected up to the fixed digit and the 3rd interrupted in the middle. Digits slightly arched; length of movable digit twice that of hand-back. Tibia with distinct crests; on anterior surface a crest with a stronger basal tooth. Finger wi-

thout lobe, with 16 rows of granules. Pectinal teeth 21.

Dimensions in millimetres:—Total length 42.5, of cephalothorax 5, of tail 25, movable digit 8, width of hand and tibia 2.

Sexual differences inconspicuous.

Loc.—Cuyabá, collection of Branch Institute at Bello Horizonte, collected by father CARLOS VALLETE».

RHOPALURUS THORELL, 1876.

Definition of genus. One tooth on inferior margin of fixed mandibular digit.

Rows of digital granules flanked on both sides by oblique secondary rows, running along the whole length of the principal row. Sub-aculear tooth may be found or not. First abdominal sternite with a distinct median triangular elevated area limited on each side by a depression which harbours the pectines.

Species type of the genus is *R. borellii*. This genus is represented in Brazil by 9 species. The area in which it occurs is made up chiefly of the north-western region of the country.

Key for the identification of Brazilian species (Organized jointly with ADOLPHO LUTZ)

- 1 { 2nd and 3rd caudal segments with 8 keels..... *R. agamemnon*
- 1 { 2nd and often, 3rd caudal segments with 10 keels..... 2
- 2 { Sub-aculear spur thorn-shaped..... 7
- 2 { Sub-aculear spur reduced to the shape of a rhombic or pointed granule..... 3
- 3 { Width of carpus at most equal to that of tibia..... 4
- 3 { Carpus thicker than tibia in both sexes..... 6
- 4 { Pectinal teeth 23–25. Maxillary palpi uniformly yellow. Caudal segments II-IV usually of same width..... 5
- 4 { Pectinal teeth 15-16. Hand spotted with black on external surface. Tail dilated distally..... *R. debilis*
- 5 { Cephalothorax uniformly coloured. Tail uniformly mud-yellow, only ventro-lateral and median keels blackened. Tail relatively shorter; its length is at most equal to 4 times that of cephalothorax..... *R. stenochirus*
- 5 { Cephalothorax with a triangular dark area involving the eyes. Lateral eyes black. Tail variegated: 1st segment olive, 2nd and 3rd ochraceous and the 2 last reddish-brown. Length of tail relatively greater, more than 5 times that of cephalothorax *R. melleipalpus*
- 6 { Tail, in ♂, from 4.5 to 5 times the length of the cephalothorax, in ♀, from 4.2 to 4.7. The ratio of length of body to that of tail is 2/3 in ♂, and 3/4 in ♀. Colour generally mud-yellow, hand and ventral surface of last caudal segments more reddish *R. barythenar*
- 6 { Tail bigger, in ♂ about 6 times, in ♀ 5.5 times the length of cephalothorax. The ratio of the length of the trunk to that of the tail is 1/2 in ♂ and 2/3 in ♀. Colour of trunk is ochre-yellow *R. rochai*

- 7 } Hand slenderer than tibia of maxillary palpi in both sexes.
 Tail widens slightly in apical direction. Hand in ♂ is of the
 dark colour of the 2 last caudal segments. In the female it is
 a little lighter..... *R. acromelas*
- 8 } Tail widens considerably backwards. Hand lighter than 2 last
 caudal segments..... 8
- 8 } Pectines strongly widened at base. The triangular elevation of
 first abdominal sternite ends in a rounded point, exactly at the
 anterior border of first sternite. ♀ with a small lobe at the
 base of movable digit..... *R. borellii*
- 8 } Pectines little widened at base. The triangular elevation of the
 first abdominal sternite ends at an acute angle. ♀ without
 lobe at base of movable digit..... *R. laticauda*

RHOPALURUS AGAMEMNON

(C. L. KOCH, 1841).

I did not obtain the description of this species. I have not examined any specimen.

RHOPALURUS DEBILIS (C. L. KOCH, 1841).

«Cefalotorace giallo orlato di nero lateralmente, ornato di una grande macchia triangolare di colore bruno nerastro che dal margine anteriore si estende alquanto oltre la gobba oculare mediana é interrotta dietro gli occhi laterali da due piccoli macchie ovali di colore giallo ed é più chiara lungo il solco mediano. Segmenti superiori dell'abdome di un giallo grigiastro ad olivastro orlati lateralmente di bruno-nero colla carena mediana bruno, ultimo segment più chiaro. Coda di un giallo più oscuro del cefalotorace leggermente screziata di bruno fra le carene medio-inferiori dei segmenti II—IV; quinto segmento giallo sporco colle carene latero-superiori orlate di bruno, fortemente lavato di bruno nella superficie inferiore. Palpi mascellare giallo chiari colle tibie leggermente lavate di bruno nella faccia superiore, dita di un giallo poco più oscuro.

Segmenti inferiori dell'abdome giallo-chiari leggermente grigiastri, zampe giallo-chiare.

Cefalotorace alquanto schiacciato, irregolarmente coperto di piccoli granuli brillanti, più grossi lungo il margine posteriore e nella macchia bruna, perli-formi lungo il margine anteriore; segnato per tutta la sua lunghezza da un solco mediano ben marcato anche nella gobba oculare mediana; creste sopracciliari lisce, le sole carene mediane posteriore appena indicate vicino al margine posteriore. Segmenti superiori dell'abdome sparsamente e irregolarmente granulosi, con granuli più grossi e brillanti nella metà posteriore dei segmenti. Segmenti inferiori dell'abdome lucenti; nel primo segmento i lati sono debolmente depressi e coperti di una finissima granulazione nel tratto anteriore alle stimme, la sua parte mediana é alquanto prominente, in forma di triangolo di cui i lati si prolungano regolarmente e terminano con un angolo acuto a poca distanza dal peso trasverso dei pettini e di cui la superficie é finissimamente punteggiata e fornita di alcuni grossi punti e fossette disposte in serie oblique lungo i lati. Secondo, terzo e quarto segmenti lucidi con alcuni grossi punti disposti in serie trasversali e due depressione internamente alle stimme, nella metà posteriore del quarto segmento sono anche a notare 2 leggere ripiegature lisce. Quinto segmento fittamente granuloso fornito di 4 carene finamente den-

tellate di cui le mediane dal margine posteriore conraggiungono il margine anteriore del segmento mentre le laterali, più corte, non raggiungono nè il margine anteriore nè il posteriore.

Coda di lunghezza uguale a circa 4 volte e mezzo quella dei cefalotorace, con segmenti allargantisi debolmente e gradatamente dal primo al quinto; quarto segmento circa un quarto più lungo che largo, quarto e quinto segmento circa di un quinto più larghi che il primo. Primo e secondo segmento con 10 carene; le carene mediolaterale ben marcate nel primo segmento sono distinte nel secondo e rappresentate da 2 granuli nella parte posteriore del terzo.

Carene medio-superiori dei 4 primi segmenti marcate e leggermente denticolate coll'ultimo dente poco più grosso dei precedenti, le altre più deboli e leggermente dentellate; quinto segmento con carene latero-superiori appena indicate da pochi granuli nel terzo posteriore, carene latero-inferiori più marcate e granulose, carena medio-inferiore indicata da alcuni granuli disposti in serie longitudinale nella metà posteriore del segmento. Superficie intercarinali superiori granulose, largamente manon profondamente incavate nei 3 primi segmenti, infossate nella metà anteriore del quarto, nel terzo anteriore e nella metà posteriore del quinto segmento; superficie laterali ed inferiore leggermente rugose e granulose e fornite di alcuni profondamente impressi più numerosi lungo le carene laterali ed inferiori. Vescicola oviforme poco più lunga che larga, di larghezza poco inferiore alla larghezza posteriore del quinto segmento ed alla propria altezza, sparsamente granulosa con 2 serie laterali di piccoli granuli e alcuni piccoli tubercoli, di cui l'ultimo sotto l'aculeo, alquanto più grosso, disposti lungo una leggera e costa mediana inferiore; aculeo fortemente ricurvo.

Femori e tibie dei palpi mascellari finissimamente granulosi con tutte le ca-

rene marcate e debolmente granulose, faccia anteriore dei femori fornita di una carena mediana denticolata, faccia mediana e spiniforme. Mano di larghezza poco inferiore a quella della tibia e inferiore ai due terzi della propria lunghezza. Dita lunghe e sottili; dito mobile di lunghezza superiore al doppio della mano posteriore, fornito di 7 serie di granuli, poco distinte, disposte in linea retta e continua, indicate soltanto dai granuli basali più grossi degli altri; delle serie laterali l'esterna è poco distinta e si confonde colle serie mediane, mentre l'interna è ben distinta e consta di granuli grossi tuberculiformi. Pezzo trasverso dei pettini convesso posteriormente, lamelle basali intermedie poco allargate, dente ai pettini 15—16.

Loc.: Ceará. Un solo esemplare ♂ raccolto dal sr. F. DIAS DA ROCHA.

RHOPALURUS STENOCHIRUS (PENTHER. 1913).

Färbung lehmig gelb, Oberseite des Truncus etwas dunkler, mit einem Stich ins Olivenfarbige, wenigstens beim ♀, die Beine etwas heller; nur die unteren Kiele der Cauda und die Stachelspitze schwärzlich.

♀: Cephalothorax vorne bedeutend schmaler als rückwärts, am Vorderrande nur sehr seicht ausgerandet, auf der ganzen Fläche mit Ausnahme der seichten Medianfurche vor den Mittelaugen ziemlich zerstreut grobkörnig; Kiele körnig, jedoch nicht stark ausgeprägt; die Medianfurche durchzieht den Cephalothorax seiner ganzen Länge nach und ist nur vor dem Augenhügel flach.

Truncus: Terga des Abdomens grobgekörnt, zumal gegen den Hinterrand zu; die ersten sechs Rückenplatten mit nur einem schwach gekerbten Mittelkiel; im letzten Segment ist dieser Mittelkiel nur in der vorderen Hälfte der Dorsalplatte entwickelt, schwach sägezählig; ausserdem noch vier starke grobkörnige Kiele. — Erste Bauchplatte in der Mitte mit

deutlichem Dreieckswulst, der äusserst fein nadelstichig und mit ca. zwölf grösseren Grübchen, aus deren letzteren je ein kurzes Haar entspringt; an den Seiten der proximale Teil bis zum Stigma feinkörnig, sonst glatt. Zweite bis vierte Bauchplatte ebenfalls äussert fein nadelstichig, mit zerstreute trichobothrienartigen Haargrübchen im Mittelfelde. Fünfte Bauchplatte in der Mitte feinkörnig, gegen die Seiten zu gröber gekörnt, mit vier deutlichen gekerbten Kielen.

Caudal: Die einzelnen Caudalglieder nach rückwärts an Länge zu-, an Höhe und Breite nicht oder nur ganz unbedeutend abnehmend. Das erste und zweite Segment der ganzen Länge nach zehnkülig, das dritte und vierte achtkülig, ersteres in seiner ganzen Länge mit Andeutung eines Nebenküeles in Form einer Reihe grösserer Körnchen, das fünfte mit fünf Kielen. Untere Küele in allen Segmenten schwarz pigmentiert, in den beiden ersten gekerbt, in den beiden folgenden stumpf sägezählig, im letzten stumpf gezähnt; alle anderen Küele der ersten vier Caudalglieder mehr minder sägezählig mit meist etwas grösseren Zähnen gegen das distale Ende, erstrecken sich über die ganze Länge ihres Segmentes, nur die oberen des vierten Caudalgliedes enden nach zwei Dritteln beim Absturz des Segmentes; obere Küele des fünften Segmentes nur schwach hervortretend, zumal gegen das distale Ende. Caudalflächen zwischen den oberen Kielen im ersten Segment mässig vertieft, in jedem folgenden an Schärfe zunehmend, so das im fünften Gliede eine deutliche enge Rinne entsteht; diese Fläche in den ersten drei Segmenten grobkörnig, im vierten zerstreut grobkörnig, im fünften nur sehr zerstreut schwach körnig; die Caudalfläche zwischen den unteren Mediankielen in den beiden ersten Segmenten feinkörnig; alle anderen Caudalflächen grobkörnig. Am fünften Caudalgliede befindet sich an der Unterseite am proxi-

malen Ende je ein schwärzlich pigmentierter Ansatz zu einem Zwischenküel, zwischen dem Median- und dem Lateralküele, der aber bald in der groben Körnelung der Fläche verschwindet. Giftblase oberseits glatt, unterseits mit stumpfen, undeutlich in Reihen gestellten Körnchen; unter dem langen, stark gekrümmten, in seiner distalen Hälfte schwarz gefärbten Stachel ein niedriger, stumpfer Höcker.

Maxillarpalpus: Humerus vierkantig mit deutlichen gekörnten Kielen, die Flächen zerstreut feinkörnig; ausserdem in der Mittellinie der Vorderfläche etwa zehn unregelmässig gestellte grössere tuberkelförmige, stumpfe Körnchen. Tibia schlank, mit deutlichen Kielen und sehr feinkörnigen Flächen. Hand ebenso breit oder nur unbedeutend schmaler als die Tibia, oberseits schwach körnig-runzelig; unterseits zerstreut feinkörnig, mit schwach entwickelten Kielen. Finger doppelt so lang als die Hinterhand, mit schwachem Lobus, der ganzen Länge nach zusammenschliessend, mässig dicht, mit kurzen Haaren besetzt. An die ersten beiden undeutlichen proximalen Körnchenreihen, die über dem Lobus stehend ineinander übergehen, schliessen sich noch sieben Körnchenreihen an, von denen das letzte an der Spitze nicht vollständig, sondern verkürzt erscheint. Jede vollständige Körnchenreihe wird aussen sowohl wie innen von je drei, ganz ausnahmsweise vier Körnchen, von denen das basale bedeutend stärker ist als die übrigen, flankiert.

Beine: Humerus und Tibia aller Beinpaare mit deutlichen krenelierten Leisten; Innenflächen glatt, Aussenflächen beim Humerus ziemlich dicht grobkörnig, bei den Tibien matt. Erstes Tarsalglied kantig, matt. Englied mit deutlichem Gehstachel und grossem Krallenlappen. Tarsalglieder mit ziemlich zahlreichen, aber kurzen in Längsreihen stehenden Haaren besetzt, besonders gegen das distale Ende reichlich.

Kammgrundstück mit halbkreisförmigen Hinterrande, mit seichter Grube in seiner Mitte. Mittellamellen 10—11, von denen die zweite die weitaus grösste ist. Anzahl der Kammzähne 23—24.

♂. Das Männchen unterscheidet sich von ♀ hauptsächlich durch die grössere Anzahl der Kammzähne; beweglicher Finger fast ganz ohne merkbareren Lobus, klafft ganz wenig an der Basis. Am Kammgrundstücke fehlt auch die beim ♀ vorhandene seichte Grube in der Mitte.

Loc.: Barra, April 1903, 1 und 2 ♀
♂ (Brasilianische Exped., PENTHER leg.).

MASSE

	♀	♂
Kz.	23—24	24—23
Truncus	23.5	21
Cauda	30	22
Cepth.	7	5
Tibiabreite	2.5	2
Handbreite	2.5	1.5
Bew. Fing.	7.5	5.5
Cd. Segm. I (läng.)	5	3.5
Cd. Segm. I (läng.)	7	5.5
Cd. Segm. I (breit.)	4	3
Cd. Segm. V (breit.)	4	2.5

I examined a very characteristic specimen of the collection of the Museu Paulista, and obtained from Joazeiro (Bahia).

RHOPALURUS ROCHAI BORELLI, 1910.

♂. Tronco giallo-bruno superiormente, inferiormente giallo-sporco; coda ocracea colle carene medio e latero-inferiori oscurate di nero, nel quinto segmento la carena medio-inferiore fiancheggiata anteriormente a destra ed a sinistra da una serie de tre o quattro granuli di colore nero; estremità dell'aculeo bruno-oscuro. Palpi mascellari interamente gialli; zampe e lobi mascellari del primo e del secondo paio giallo-paglia.

Cefalotorace fortemente granuloso con alcuni granuli disposti in serie longitudinale, arcata sopraciliare granulosa. Segmenti dorsali fortemente granulosi, le carene mediane ben marcate e dentellate fiancheggiate vicino al margine posteriore dei segmenti II—IV da una serie longitudinale di 2 a 3 granuli più grossi, ultimo segmento fortemente granuloso colle solite 5 carene ben marcate e granulose. Segmenti ventrali lucenti, finissimamente punteggiati, la punteggiatura appena visibile colla lente, forniti di alcuni grossi punti o fossete.

Lati del primo segmento fortemente depressi, finamente granulosi anche dietro le stime, la parte mediana rialzata in forma di triangolo, cui i lati si avvicinano bruscamente e corrono quasi paralleli nella metà anteriore, raggiunge il margine anteriore del segmento col suo apice smuzzato, essa è lucente e sparsa di alcuni grossi punti o fossete. Ultimo segmento non lucente, fittamente e finamente granuloso fornito di 4 carene dentellate di cui le mediane del margine posteriore del segmento si prolungano per i due terzi della sua lunghezza mentre i laterali, più corte non raggiungono nè il margine anteriore nè il posteriore del segmento; nel tratto compreso fra le carene laterali ed il margine del segmento i granuli sono più grossi.

Coda robusta, di lunghezza uguale a 6 volte quella del cefalotorace, co i segmenti allargandosi debolmente dal primo al quinto; quarto segmento circa un terzo più lungo che largo, quarto e quinto segmento circa di un ottavo più larghi che il primo.

Carene ben marcate e granulose, le superiori quasi denticolate cogli ultimi granuli più grossi, nel quinto segmento le carene superiori laterali sono poco marcate da una serie de granuli perli-formi. Primo e secondo segmento con 10 carene ben marcate, nel terzo le carene medio-laterali sono poco distinte indicate da alcuni granuli più grossi degli

altre e disposti in serie longitudinale. Superficie intercarinali superiore sparsamente granulose sui lati, le laterali ed inferiori coperti di grossi granuli bralanti. Vescicola sparsamente granulosa, quasi sferica, di larghezza ed altezza pressoché uguali; aculeo lungo e fortemente ricurvo, spina sotto l'aculeo appena rappresentata da un piccolo tubercolo.

Femori e tibie dei palpi fittamente e finamente granulose colle carene ben marcate e granulose; sulla faccia anteriore dei femori notasi una serie media di piccoli tuberculi e su quella delle tibia una carena mediana sporgente e seghettata col primo dente prossimale più grosso e spiniforme. Mano convessa internamente, poco più larga della tibia, la sua larghezza appena superiore ai due terzi della lunghezza della mano posteriore, superficie superiori zigrinata con 2 carene interne poco marcate e leggermente granulose che dalla base si prolungano al dito immobile ed una carena laterale esterna, fra quest'ultima e la carena superiore mediana sono da notare alcuni granuli disposte irregolarmente in serie; sulla superficie inferiore, anch'essa finissimamente granulosa, notansi 2 carene laterali poco marcate, di cui l'esterna raggiunge la base del dito mobile, mentre l'interna prolungasi nel dito immobile.

Dita sinuose coperte di pelli gialli, fornite vicino alla base di un forte lobo sotto al quale s'incontra una profonda intaccatura cossiché nel chiudersi esse lasciano un largo spazio vuoto vicino alla base. Dito mobile di lunghezza uguale al quinto segmento della coda e circa una volta e due terzi quella della mano posteriore, fornito di 8 serie di granuli di cui le due ultimi si confondono.

Zampe granulose con carene ben marcate e granulose.

Labini fortemente allargati alla base, forniti di 25—27 denti.

♀: Colore del tronco più chiaro che nel ♂, di un giallo cuoio appena più oscuro della coda. Coda proporzionalmente più corta che nel ♂. Quarto segmento sensibilmente più lungo che largo, quarto e quinto segmenti appena più larghi che il primo.

Mano fortemente convessa internamente, colle carene più marcate che nel ♂. Lobi della dita più deboli, staccature sottostanti molto meno marcate, peli meno numerosi e più corti.

Denti ai pettini 23—24.

Misure in millimetri. ♂. Lunghezza del tronco 17.5, del cefalotorace 6, della coda 36; larghezza del primo segmento della coda 3.5, del quarto 4.1, lunghezza del quarto 6, del quinto 7. Larghezza della tibia 2.2, della mano 2.9; lunghezza della mano posteriore 4.2, del dito mobile circa 7.

♀.: Lunghezza del tronco 28.5, del cefalotorace 7.6, della coda 42; larghezza del primo segmento della coda 4.8, del quarto poco più di 5; lunghezza del quarto 6, del quinto 8.5. Larghezza della tibia 2.9, della mano 3.7; lunghezza della mano posteriore 4.7, del dito mobile 8.

Località: Ceará (Brasile); ♂ e ♀ raccolti dal signore FRANCISCO DIAS DA ROCHA.»

The Branch Institute at Bello Horizonte has various specimens, ♂ and ♀, of this species, obtained in Ceará (at Assaré) and Rio Grande do Norte (at Patú). The males have a dark chestnut coloured thorax. In the Museu Paulista I found one male specimen proceeding from Joazeiro (State of Bahia) of a uniform mud-colour. The area in which this species occurs comprises the whole north-western region of Brazil.

This species is closely allied to *R. barythenar*, from which it is separated by quite small differences as may be seen from the table given above.

RHOPALURUS BARYTHENAR (PENTHER, 1913).

Original description according to PENTHER: «Färbung lehmgelb, etwas rötlich, besonders die Hände und Tibia des Maxillarpalpus, Oberseite des Truncus dunkler, mit Stich ins Oliverfarbene; die Beine heller; nur die unteren Caudalkiele und die Stachelspitze schwärzlich, die Kiele des Femurs und Tibia des Maxillarpalpus kaum merklich beraucht. Im ganzen der Färbung des *C. stenochirus* äusserst ähnlich, nur etwas rötlich dunkler.

♀: Cephalothorax am Vorderrande mit seichter Ausrandung, vorne bedeutend schmaler als rückwärts, der ganzen Länge nach mit Medianfurche, die vor dem Augenhügel breit seicht erscheint. Die ganze Fläche zerstreut grobkörnig, mit schwach ausgeprägten grobkörnigen Kielen.

Truncus: Rücken und Bauchplatten des Abdomens wie bei *C. stenochirus*, mit dem nur geringen Unterschiede, dass die Kiele der Rückenplatten etwas deutlicher kerbt erscheinen.

Cauda: Ebenso wie bei *C. stenochirus*, mit dem Unterschiede, dass die Andeutung eines Nebenkieses im dritten Caudalsegment kaum mehr erkennbar und der Höcker unter dem Stachel sehr klein ist.

Maxillarpalpus: Humerus und Tibia wie bei *C. stenochirus*, nur das die Kiele schwach beraucht sind und jene der etwas gedrungenere Tibia etwas schwächer gekörnt erscheinen als die des Humerus, zumal der untere. Die Hand breiter als die Tibia an ihrer breitesten Stelle, blasig aufgetrieben, unterseits feinkörnig, oberseits körnig-runzelig, mit schwach entwickelten Kielen. Finger etwa doppelt so lang als die Hinterhand, gerade, mit deutlichem Lobus, nur am Grunde unbedeutend klaffend, ziemlich dicht mit kurzen Haaren besetzt. Körnchenreihen wie bei *C. stenochirus*, doch

bestehen die seitlichen Nebenreihen öfter aus vier Körnchen.

Beine wie bei *C. stenochirus*.

Kamm wie bei *C. stenochirus*.

Anzahl der Kammzähne 21—25

♂. Das Männchen unterscheidet sich vom ♀ abgesehen von der geringeren Grösse noch durch folgende Merkmale: Die Anzahl der Kammzähne ist grösser, der unbewegliche Finger ist S-förmig gebogen und klafft der ganzen Länge nach ziemlich stark. Ein weiteres, wenn auch geringes Unterscheidungsmerkmal der Geschlechter glaube ich darin erblicken zu dürfen, dass das halbrunde Basalstück des Kamms beim ♂ stets gleichmässig gewölbt ist während es beim ♀ etwas platter erscheint und in seiner Mitte eine, allerdings oft kaum merkbare, seichte grubenförmige Depression aufweist.

The author gives the measurements of the specimens examined in a table, from which we have borrowed the following indications:

♀. Kz. 24, Truncus 33, Cauda 34, Total 67, Hinterhand 4, Handbreite 3.5, Bew. Finger 8.5, I Cdsgm. Länge 5.5, Breite 5, V Cdsgm. Länge 8, Breite 5.

Measurements are indicated in millimetres.

PENTHER describes this species based on 8 ♂ specimens and 13 ♀ collected in Joazeiro, 1 ♂ and 3 ♀ collected at the Barra.

The Branch Institute of Bello Horizonte possesses specimens from Boa-Nova, Bahia and Lençoes do Rio Verde (North of Minas). The specimen from Lençoes do Rio Verde is a female with numerous young of a whitish colour.

RHOPALURUS ACROMELAS
LUTZ-MELLO, 1922.

♂. Colour generally ochre-yellow, more or less blackened on tergites of the cephalothorax and abdomen and on the two last caudal segments. The last

abdominal tergites is lighter and the third caudal sternite partly infusate, and the sub-caudal crests generally reddish-brown or blackish. The ochraceous colour is darker on the tibiae of the maxillary palpi, becoming deeper in an apical direction. Hand blackened not only on carpus but also on fingers, the extreme tip of which is ochraceous. Vesicle light chestnut below, ochraceous above and on base of aculeus, the apex of the latter dark chestnut-coloured. Back of cephalothorax with an indication of a more blackish triangle with its base on anterior margin and apex behind eyes.

Cephalothorax with background and keels granular, abdomen mostly granular, the last tergite with the usual crests, the first sternite with a median triangular elevation.

Tail robust, widening in apical direction, five times longer than the cephalothorax. The keels are generally granular, the superior ones of segments I to IV denticulate, the size of the teeth increasing in apical direction. First two segments with 10 crests, the lateral crest usually appears also on the third segment, only a little weaker; in the fourth it is either missing or else reduced to traces. On the sternites I-IV the median keels are independent along their whole length. On segment V there are five distinct keels. Ventral surface and lateral surfaces generally granular, a fact which is better seen on the darker parts. Vesicle below with rows of dark granules. Aculeus strong, curved, sub-aculear spur small and pointed.

Femur of maxillary palpi with 4 granular keels; tibia with the keels slightly granular and separated by smooth surfaces. Hand somewhat narrower than tibia, the background smooth with distinct crests. Movable digit double the length of the hand-back, with a trace of a lobe and eight rows of granules

on the edge. The whole palpus with hairs.

Pectinal teeth 17.

♀. Colour of tibia, hand and aculeus lighter than in the ♂. Tibia and hand narrower, movable digit with traces of a lobe. Hairs of maxillary palpi less numerous. Fifth caudal sternite with indication of two sub-median crests. Tail slenderer.

Measurements in millimetres: ♂ Total length 55, cephalothorax 6.5, tail 32, carpus 4.5, movable digit 9, width of 4th caudal segment 5.5, of hand 2.9, of tibia 3.

♀ Total length 54, length of cephalothorax 6.5, of tail 30, of carpus 3.5, of movable digit 8, width of 4th caudal segment 4.5, of hand 2.5, of tibia 2.5.

Loc. of specimens: Therezina (Piauh). They belong to the collection of the Museu Paulista. There is one more from Patú (Rio Grande do Norte) at the Institute in Bello Horizonte.

RHOPALURUS MELLEIPALPUS LUTZ-MELLO, 1922.

*Body generally olive-brown, with a blackish triangle on cephalothorax, having the eyes as its centre. Anterior margin of cephalothorax more reddish, having, on either side, a black stripe made up by the lateral eyes. Extremities including maxillary palpi honey coloured, with ferruginous articular points. Abdominal tergites with black belts at base, interrupted at the middle. First caudal segment is olive-brown (the same colour as the last abdominal tergite), 2nd and 3rd light ochre-brown, 4th and 5th olive-brown, darker. Caudal crests of ventral surface blackish on segments II-IV. Abdominal sternites I-IV are light, and shine on apical 2/3. Last sternite is olive-brown.

Cephalothorax generally granular, with larger granules arranged in keels. The blackish triangle is finely granular near the eyes, the size of the granules

increasing peripherically. Abdominal tergites with a median keel almost toothed, distinct along its whole length, with exception of the last in which it is only basal. Laterally from the median crest there is an indication of a crest made up by some granules in a longitudinal row.

Surfaces of tergites irregularly granular. Last tergite with the usual keels; the intercarinal surfaces granular.

Tail strong, not widening in an apical direction, caudal segments increasing gradually. Caudal keels granular almost toothed, segments I—II with 10 crests. Lateral accessory keel well marked on segments I—II, weaker on the 3rd, almost obsolete on 4th. Dorsal crest of 5th almost obsolete. Dorsal groove granular, the granules becoming scarcer on the last segments. Intercarinal spaces generally granular. Vesicle small, pearshaped, flattened on dorsal surface. Aculeus slender, curved the sub-aculear tooth pointed, but very reduced. Vesicle with fine granules separated from one another, crests inconspicuous and hairs spread over the posterior surface. 1st abdominal sternite with a triangular median elevation. The lateral excavations being finely punctured. Sternites I—IV brilliant on apical 2/3.

Femur of maxillary palpi with granular keels; there is an irregular keel made up of bigger teeth on the anterior surface. Tibia with granular keels, and an irregular keel, begun by a bigger tooth on the anterior surface. Carpus flattened externally, convex medially, thinner than tibia, with distinct but not salient keels. Movable digit almost double the carpus, slightly lobate, with a corresponding groove on fixed digit and 7 chief rows of granules. Plentiful hairs on the whole maxillary palpus.

Pectines widened at base, the basal median lamella without a vesicle-shaped dilatation.

Measurements in millimetres. Length of cephalothorax 6, of trunk 17, of tail 31, of 1st caudal segment 4.5, of 5th 7.5, width of 1st caudals 4.2, of 4th 4.2, length of carpus 4, of movable digit 7.2, width of carpus 2, of tibia 2.2.

Loc. Assaré (Ceará). One specimen (♀ ?) of the collection of this Institute at Bello Horizonte.

RHOPALURUS LATICAUDA THORELL,
1876.

«Sub-testaceus, cauda a basi ad segmentum 5 dilatata, tum fortiter angustata, apice late infuscata; manibus subtiliter granulosis, plus minus evidenter costatis, brachio circiter dimidio lateribus; digito mobili manu postica paullo plus dimidio longiore, ordinibus denticulorum secundum mediam aciem circa 8; dentibus pectinum 19—23. Long. circa 44—50 millim.

Femina. Truncus sat latus, subdepressus. Cephalothorax antice late et levissime emarginatus, granulis sat crassis minus dense sparsus, praesertim late utrinque ad marginem anticum et ad angulos posticos, his granulos praeterea hic illic lineas breves inaequales in costis posticis parum distinctis et in lateribus formantibus; inter granula subtiliter et inaequaliter granuloso-rugosus; sulcus ordinarius transversus posticus et sulcus medius ab eo procurrentes fortes, hic per tuberculum oculorum dorsualium productus et ante id in excavationem sublanceolatam dilatatus; arcus supraciliares crenulati; oculi dorsuales spatio diametrum suam circiter aequanti disjuncti, oculi laterales 3 contingentes, fere aequales, in seriem recta dispositi.

Segmenta abdominalia dorsualia 1m—6m in limbo antico subtiliter sed inaequaliter granulosa, paullo crassius granulosa ad marginem posticum et transversim in medio utrinque, ubi praeterea lineam transversam tenuem nitidam ostendunt; costa angusta sub-crenulata secundum medium segmentorum estensa

est. Segmentum 7m costam mediam crassam granulosam ad medium segmenti pertinentem habet, et utrinque costas duas fortes foras curvatas crasse granulosas, interiorum apice antico inaequaliter biramem; interstitia granulis crassis aliisque minoribus inaequalibus dense sparsa. Venter nitidus laevis, segmento 5 excepto quod costas 4 subcrenulas habet, et inter eas sat subtiliter et dense granulosum est.

Cauda brevior, crassa, segmentis I—IV desuper visis in lateribus leviter rotundatis, sensim paulo latioribus, caudam fortiter angustata; segm. 1m—4m supra late, posteriora eorum profunde quoque, excavato-sulcata sunt, carinis praesertim superioribus, sat subtiliter denticulatis, mediis inferioribus in segmentis anticis potius crenulatis dicendis; Interstitiis inter carinas supra minus dense, in lateribus et subter fortius, in segmentis posterioribus immo crasse et dense granulosi; Segm. 5m supra late excavatum est, marginibus elevatis et crasse granulosi desuper visum versus apicem fortiter (lateribus leviter modo rotundatis) angustatum, a latere visum supra sat fortiter et aequaliter subter levius arcuatum; supra granulis paucioribus sparsum, in lateribus et subter dense et crasse granulosum, carinis inferioribus evidentibus, serie densissima granulorum crassorum munitis. Vesica parva, a latere visa hemispherica fere, angulis tamen basalibus, supra, fortiter eminentibus; sat dense et crasse granulosa, dente parvo conico sub aculeo longissimo et fortiter curvato armata.

Palpi ut in *Centrurus* formam et costarum dispositionem; humerus et brachium supra granulis minutis sparsa. Margines humeri costis fortiter granulosi muniti, costa posterior inferior tamen serrulata, dente primo (basali) magno; latus humeri anticum dentibus nonnullis sat fortibus sparsum est. Costa brachii superiores et posteriores fortiter granulosae; latus anticus ejus ab apice versus

basin sensim paulo incrassatum, in angulo versus basin dentes duos fortiores ostendit. Manus mediocres, intus fortiter rotundato-dilatatae, extus parum arcuatae, undique sat subtiliter granulosae, costa sublaevi in latere exteriori, costis in digito immobilem continuatis 4 supra, quae satis inaequaliter et subtiliter granulosae sunt; magis extus ed ad basin costae duae abbreviatae ejusmodi adsunt. Digiti sat graciles, leviter incurvi, lobo vel emarginatione carentes, spatium inter se clausi non reliquentes, ordinibus denticulorum secundum mediam aciem 8.

Pedes supra granulosi lineis elevatis granulis; femora et tibia in marginibus, praesertim inferioribus serrulata.

Dentes pectinis alterius 19, alterius 21, in exemplo a me descripto.

Color. Truncus supra sordide testaceus, tuberculo oculorum dorsualium nigricanti; cauda subter apicem versus infusca, segmento 5 nigro vel, supra, nigro-fusco, vesica nigro-fusca aculeo fusco, apice late nigricanti. Truncus subter, palpi ed pedes paulo clarius, testacei digitis palporum infuscati.

Mas differt, saltem in exemplo singulo a me viso, manibus latioribus, magis inflatis, supra, apice, et intus costis tribus parum distinctis munitis, digitis basi crassioribus et ita sinuatis, ut spatium longum lanciolum, a base poene ad apicem pertinentem inter se relinquant quum manus clausus est; praeterea et praesertim, differt forma caudae, quae postice latissima est; Segmentis IV et V in lateribus fortiter rotundatis, aequae fere latis ac longis, 5 versus apicem fortiter rotundato-angustato. Dentes pectinus 23.

Mensurae. ♀. Lg. corp. 49, cepth. 6, caudae 28; segm. I long. 3.6, lat. 3.6; segm. IV lg. 5, lat. 4.25. Palpi 21.6. Humeri 5.2. Brachii lg. 6, lat. 2.5. Manus lg. 4.7, lat. 3. Digit. mob. 6.2.

♂. Lg. corp. 44.5, Cepth. 5.6. Caudae 26.5. Segm. I lg. 3.5, lat. 3.5; Segm.

IV lg. 4.7, lat. 5. Manus lg. 3.5, lat. 3.5; digit. mobil. 6.

Patria: America meridionalis (Colombia). Exempla duo supra descripti, quae mas et femina ejusdem speciei haud dubie sunt, in spiritu vini condita possidet Mus. Gothob.; feminam siccata vidi quoque, in Mus. Holm. asservatam, cuja patria vera ignota est.

The above is THORELL's original description of this species.

The Branch Institute received one specimen, very much deteriorated, from the Municipal Chamber of Amarante, State of Piahy.

This species is very closely allied to *R. borellii*. The differences are very slight.

RHOPALURUS BORELLII POCOCK,
1902.

Original description: «♀. Colour. Upperside of trunk a nearly uniform yellowish brown, the frontal area of the carapace infusate; tail yellow with exception of the fourth and fifth segments, the latter deep blackish brown throughout, the former blackish posteriorly, more deeply and extensively so beneath and laterally than above; inferior median keels of third segment sometimes infusate; chelae with humerus and brachium clear yellow, hands strongly infusate, but not so dark as the fingers, which are black, with the extreme apex yellow; mandibles distally infusate; legs and sterna pale yellow.

Carapace coarsely granular, the granules subserially arranged laterally, as long as the first more 1/2 the second or as the fifth caudal segment.

Terga coarsely granular, without lateral crests.

Sterna for the most part smooth, but the depressed area on each side of the first finely and closely granular throughout as far back as the stigma, the median triangular area perfectly smooth

and sparsely punctured, last sternum granular throughout and with four granular crests.

Tail thick and strong, more than five times as long as the carapace; fourth segment as wide as long, fourth and fifth a little wider than first, the former about one fourth, the latter about one third longer than wide; upper side of tail weakly granular, sides and lower surface thickly and coarsely granular, the superior subdenticulate posteriorly, upperside of fourth and fifth segments excavated with upstanding keels; the median lateral keel strong on the second and quite distinct on the third segment, and just detectable on the fourth; vesicle weakly granular, wider than high, a little wider than the hand or the brachium; an acute subaculear tooth twice its basal diameter from the aculeus.

Chelae very finely granular above, with coarsely and evenly granular crests. Hand narrow, as wide as the brachium, its width two thirds the length of the underhand, which is less than half that of the movable finger; upper surface of hand shagreened, with feebly granular but conspicuous finger keels; movable finger longer than fifth caudal segment, weakly lobate, with 8 rows of teeth.

Legs weakly granular, with granular crests.

Pectines strongly expanded at base, with 19—20 teeth.

♂. *Tail* a little longer than in female, nearly six times as long as carapace, the latter as the first more 1/4 of the second and slightly shorter than the fifth segment, fourth segment about one fourth longer than wide.

Hand smooth, not crested, much wider than brachium, its width nearly equal to the length of the underhand, which exceeds half the length of the movable finger, the two fingers separated by a narrow-shaped space.

Pectinal teeth 24—25.

Measurements in millimetres. ♀. Total length 75, carapace 8.5, tail 44, width of first segment 5, of fourth 5.5, of brachium 2.5, of hand 2.8, length of underhand 4, of movable finger 10.

♂. Total length 77, carapace 8.5, tail 47, width of first segment 5.5, of fourth 6.5, of brachium 2.5, of hand 4.2, length of underhand 5, of movable finger 9.

Type specimen in the British Museum.

The Branch Institute has one specimen from Amarante, State of Piauhý. I examined, at the Museu Paulista, several specimens, male and female, of this species, also from Piauhý. NEIVA has in his collection two specimens also obtained in Piauhý (at Paranaguá and Thezina).

FAM. CHACTIDAE LAURIE, 1896.

Diagnosis of the family, according to KRAEPELIN: *Metatarsus* inside and outside with a spur on the membrane of the joint and without rounded lateral lobes terminally. Only two lateral eyes; the eyes are rarely all of them absent. *Forehead* straight or rounded. Movable digit of mandible without a spur on inferior border; rarely it has a little tooth. *Edge of finger of palpus* with one longitudinal row only of granules; besides on one or both sides isolated and seldom arranged in rows other granules. *Hand* rounded or flattened. *Stigmata* circular or linear. *Sternum* generally not longer than wide. *Pectines* few-jointed. *Pectinate teeth* few in number.

This family is represented in Brazil by 4 species belonging to 2 genera.

Key for identification of genera:

- 1 { Metatarsus below with 2 rows of bristles. Tail with keels below on segments I-IV. Stigmata linear in the shape of a crack..... *Broteas*
- 2 { Metatarsus, below, with bristles disposed in an irregular manner. Tail rounded below, on segments I-IV. Stigmata rounded or oval *Broteochactas*

BROTEAS C. L. KOCH, 1838.

Def. according to KRAEPELIN: *Cephalothorax* almost straight in front. *Orbital ridge* not surrounded in front by a depression but falling gradually to the anterior margin. *Maxillary appendages* of the second pair of legs united, distinctly wider than the basal extremity of

the sternum. Row of granules of the edge of finger flanked only on anterior part by a few larger granules *Hand* rounded dorsally. *Stigmata* ample, linear. Tail with 2 inferior submedian keels.

This genus is limited to the Neotropic Regions. In Brazil it is represented by two species.

Key for the determination of the Brazilian species of the genus *Broteas* (Partly according to KRAEPELIN).

- 1 { Pecten narrow; its shaft at base, narrower than half the length. Medio-lateral and infero-lateral keels missing on segments I-II. Caudal sternites I-IV smooth. Cephalotoracic and abdominal tergites smooth, punctured. Abdominal sternites polished. Pectinate teeth II..... *B. paraensis* ♀
- 2 { Pecten broad; its shaft, at base, wider than half the length. Medio-lateral and infero-lateral keels visible on segment .11 Caudal sternites granular. Cephalotoracic and abdominal tergites more or less granular..... *B. gervaisii* ♀ ♂

BROTEAS PARAENSIS SIMON, 1880.

Original description: «Tronc long. 28mm; larg. 9mm. Port. caud. 21mm. Patte-mâchoire: femur 5.1, tibia 6.3; main 8; doigts 5.

Noir, avec les pattes et la vésicule brun-rouge très foncé. Céphalothorax un peu plus long que large, légèrement atténué en avant, tronqué, avec le milieu du bord frontal déprimé et très légèrement, à peine distinctement, échancré, assez finement, régulièrement et densément ponctué, sans granulations ni tubercules, avec des espaces lisses imponctués latéralement au-dessus des yeux et dans le milieu près de la strie; partie antérieure plane, non canaliculée; partie postérieure coupée d'un profond canal longitudinal un peu élargi en fossette triangulaire près le bord postérieur. Yeux médians situés vers le premier tiers, leur intervalle à peine égal à leur diamètre, plan, ponctué, non canaliculé. Segments abdominaux lisses, brillants, très finement et moins densément ponctués; 7e segment marqué, près le bord postérieur, de 4 tubercules bas et obtus, disposés en une ligne transverse. Portion caudiforme beaucoup plus courte que le tronc, peu robuste, peu atténuée; 1r segment beaucoup plus large que long; 3e aussi large que long; 5e plus long que les deux premiers réunis; en dessus et latéralement, carènes granulifères très nettes sur les segments I—IV; intervalle des carènes lisse et finement ponctué; sur le 5e lisses, ponctués et parsemés de granulations très espacées; en dessous, segments I et II lisses, non carénés; segment III peu caréné; segment IV marqué de quatre fortes carènes également denticulées, dont les médianes plus resserrés; segment V tricaréné, avec les intervalles parsemés de tubercules coniques inégaux. Vésicule ovale, plus courte et plus étroite que le 5e segment, lisse et plane en-dessus, garnie en dessous de granulations obtuses disposées en lignes longitudinales.

Patte-mâchoire de même forme que chez le *B. herbstii*. En dessus, femur et tibia ponctués, ni granuleux ni tuberculeux; fémur limité en avant et en arrière, tibia seulement en avant, par des fortes carènes obtusement denticulées; main en dessus finement ponctué, réticulée, au au côté interne parsemée de granulations obtuses.

Pattes lisses, très ponctuées. Peignes à 11 dents.

Localité: Pará, coll. E. SIMON; reçu de M. de Mathan.

I have not examined any specimens of this species.

BROTEAS GERVAISII POCOCK, 1893.

Original description: «Carapace coarsely granular laterally, the area surrounding the tubercle and the antecular portion finely and closely punctured.

Tergites shining, smooth, but finely and closely punctured throughout, at most weakly and sparsely granular posteriorly; the last smooth, polished and punctured in front, coarsely granular behind.

Sternites smooth, polished, densely and very finely punctulate.

Tail rather more than three and a half times as long as the carapace, like that of *B. herbstii*, but with the inferior surface of the first segment smooth, polished, finely punctulate, with the median keels almost obsolete; the median lateral keel present on all the segments, but anteriorly abbreviated on the second to fourth and posteriorly on the fifth, the segments lower than in *B. herbstii* and less strongly excavated above, with the superior intercarinal space more granular.

Palpi and legs smoother than in *B. herbstii*, finely and closely punctured.

Pectines with 8 or 9 teeth.

Measurements in millimetres.—Total length 62, of carapace 9, of tail 37; width of first segment 5, length 3.5; width of fifth and of vesicle 3.5, length of fifth 8.8.

I examined several specimens of this species belonging to the collection of the Museu Paulista and obtain from Parintins, State of Amazonas.

BROTEOCHACTAS POCOCK, 1893.

Cephalothorax narrowed anteriorly. *Orbital ridge* not surrounded anteriorly by a depression, but diminishing gradually towards anterior border. *Maxillary appendages* of the second pair of legs, together wider than base of sternum.

Metatarsus below with irregular rows of fine bristles. Row of granules of finger accompanied mesially by some lateral granules. *Palm of hand* rounded in both sexes, wider than tibia of maxillary palpi. *Stigmata* rounded or oval. *Tail* rounded on ventral part of first four segments.

Sexual dimorphism is characterised by the big sensory area which, in the male, attains the base of the pectinate teeth.

Key for the determination of Brazilian species of the g. *Broteochactas*

- 1) Crest of lateral border of hand smooth or only finely granular.
- Length up to 50 millimetres..... *B. delicatus*
- 1) Crest of lateral border of hand coarsely granular. Length up to 27 mm..... *B. parvulus*

BROTEOCHACTAS DELICATUS
(KARSCH, 1879).

Original description: «*Cephalothorax* antice truncatus, supra laevis, lateribus tantum subtiliter granulosus, medio longitudinaliter sulcatus et sulco laterali postico obliquo in latera versus descendente.

Segmenta abdominalia laevia, nitida, caudae segmenta 1m et 2m subter laevia, segmenta 3m et 4m sparse et irregulariter, segmentum 5m crasse granulosum, carinis lateralibus subter evidentibus subdenticulatis; segmenta 1m—4m posteriora versus sensim longiora, supra non profunde canaliculata, carina dorsuali et laterali superiore bene expressa, granulosa, segmentum 5m supra lateribus rotundatis, subtiliter granulosus, in medio antice sulcatum, postice planum, posteriora versus sensim angustius; vesica sat parva, supra plana, subter granulosa, aculeo longiore, curvato. Palporum manus supra paullo convexa subtiliter et humile granulosa, base aequae lata ac longa, digiti breves spatium inter se clausi non relinquentes, digitus mobilis manum posticum longitudine aequat sed cephalothorace multo brevior; cephalothorax segmentum

5m. caudae longitudine aequans; manus postica a latere manus superior a costa non limitatur. Color brunneo-niger, pedibus rubro-brunneis, vix pallidioribus. Dentes pectinum 6—8.

Duo exempla siccata, e Brit. Guyana, in Mus. Berol.»

I have not examined any specimens of this species.

BROTEOCHACTAS PARVULUS
POCOCK, 1897.

♀.—*Colour* a tolerably uniform blackish brown, redder on chela and vesicle; legs fulvous, with femur and patella externally infuscate; lower surface fulvous; pectines testaceous.

Carapace with its anterior border very slightly emarginate; the interocular area and the dorsal portion of the area behind the median eyes smooth; lateral portions closely and finely granular, with a few larger granules intermixed.

Terga shining, nearly smooth, finely granular laterally and mesially, with a few larger granules intermixed, the last more coarsely granular, but without distinct crests.

Sterna entirely smooth and polished; a few large punctures here and there.

Tail a little more than three times as long as carapace, posteriorly narrowed; lower surfaces of segments I—III smooth, polished, keelless but furnished with long bristles; the superior and superior lateral keel distinct and weakly granular, terminating on the second segment in an angular tooth; fourth segment like the third, but sparsely granular below, upperside of these segments sparsely granular; upperside of fifth without granules except on the side margins; the sides granular, the lower surface coarsely but not closely granular, lateral keels granular; vesicle coarsely granular below, hairy, smooth at base of aculeus.

Chela with humerus granular above on its anterior and posterior keel; brachium smooth, not keeled, hairy; hand smooth, polished and punctured above except towards the inner edge and the base of the immovable digit, where there is coarse granulation, the inner edge with a distinct basal tooth; hand-back and lower surface quite smooth, immovable digit stout, punctured, rugose.

Legs smooth except for the femora of third and fourth, which are finely granular externally.

Pectinal teeth 6—7.

♂.—Like the female, but with the carapace, terga, the sides of the caudal segment, including also the lower surface of the third and fourth, and the lateral portions of the sterna finely shagreened with granules.

Pectines larger, 8—9 teeth, in which the sensory area extends up to the base; upper surface of hand not so smooth as in the female, but only very finely shagreened externally.

Measurements in millimetres.—♀. Total length 27; length of carapace 3.5, of tail 13, width of its first segment 2.

♂. Total length 24; length of carapace 3.5, of tail 13.8.

Loc. Santarem. Several specimens ta-

ken in the forest beneath rotten wood by Mr. Cambridge.

I have not examined specimens of the above species.

FAM. SCORPIONIDAE POCOCK, 1893.

Only one internal *basal spur*. No *tarsal spurs* on two last pairs of legs. *Sternum* generally pentagonal, longer than wide. *Lateral eyes* 3 in number. Hand often compressed, seldom rounded. *Sub-aculear tooth* rarely found.

DIPLOCENTRINAE KRAEPELIN, 1899.

Sub-aculear spur present. *Tail* with two submedian inferior keels. *Hand* smooth and rounded. *Rows of longitudinal granulations* on edge of movable digit flanked on inside and outside by lateral granulations. Metatarsus with two series of spines on ventral surface.

DIPLOCENTRUS PETERS, 1861.

Orbital ridge not sulcate. First tooth of immovable mandibular digit located much deeper than terminal spur. *Metatarsal lateral lobes* almost absent, or slightly rounded. *Hand-back* rounded and divided by *finger-keel* in two obtuse angles; finger-keels may be altogether missing. Extremity of *fifth caudal sternite* with a depressed surface, furnished with a crescent-shaped row of granules.

DIPLOCENTRUS GUNDLACHI KARSCH, 1880.

Description of species according to POCOCK: «Colour yellowish brown. Upperside of trunk smooth and polished; carapace granular laterally and with a few granules on the frontal lobes; tergites with a few scattered granules posteriorly and laterally; the last more coarsely granular. *Tail* robust with intercarinal spaces smooth, the normal keel coarsely granular; the median lateral and inferior-medians represented by a few granules of the fourth segment; median

keel on the fifth weak; sides of these with a few coarse granules; vesicle granular. *Chelae* robust; humerus with irregular coarse granulation above most distinctly keeled, smooth behind and below; brachium almost wholly smooth, a little granular in front above; marked with scattered punctures, its inner edge and lower surface towards the base of the immovable digit granular. *Legs* smooth.

Pectinal teeth 7.

Length 36 mm., of carapace 4.5, of tail 18.5.

I have not examined any specimens of this species.

BOTHRIURIDAE SIMON, 1880.

Sternum flat, linear in transverse direction, much wider than long, sometimes invisible. *Basal spur* lateral and median.

No *terminal lateral lobe*. Median pectinate lamellae often rounded, pearl string shaped.

This family is represented in Brazil by 4 species and one variety, belonging to 3 genera.

Key for the determination of the genera of Bothriuridae

- 1 { Edge of finger of hand with one row of granules only.....2
 1 { Edge of finger of hand with 2 rows of granules, at any rate in part *Urophonius*
- 2 { Protarsus below with 2 rows of 6-7 bristles..... *Bothriurus*
 2 { Protarsus, below, with 2-3 pairs of bristles only..... *Thestylus*

UROPHONIUS POCOCK, 1893.

Orbital ridge with a median groove. *Metatarsus* provided, below, with 6 to 7 pairs of thorn-like bristles in the shape of pectinal teeth, with a prominent row of bristles in the middle. *Pedal spur* small. *Medial lamellae* of pectines in a row like a string of pearls. *Edge of the finger* of hand with two rows of granules at any rate partially so. *Abdomen* generally smooth in female and granular in male.

Hand, in male, has, below, at base of immovable digit, a semilunar hollow above which rises a spine. *Vesicle* with an oval excavation on dorsal surface.

UROPHONIUS BRACHYCENTRUS (THORELL, 1877).

«Luteo-flavus, nigro-variatus, abdomine supra quatuor ordinibus macularum nigrarum ornato; cephalothorace et abdomine parum granulosus, illo caudae I et II brevior; cauda cephalothorace circiter 5plo longior, carinis superioribus in segmentis 4 anterioribus dis-

tinctis, in I et II granulosus, segmento V plus duplo longior quam latior, modo subter carinato, carinis granulosus; vesica longa, supra fovea magna oblonga notata, aculeo brevissimo; manibus latis et crassis, subter ad apicem crista denticulata munitis, digito mobili manu postica brevior; dentibus pectinum circa 18.—Long. circa 28 mm.

Cephalothorace antice truncatus, angulis sat late rotundatis, postice truncatus quoque vel levissime modo rotundatus; a latere visus in dorso paene rectus tuberculo oculorum dorsualium parum prominenti; supra omnium subtilissime coriaceus ad marginem anticam rugosus, utrinque in medio latere ed ad margine posticum subtilissime granulosus, sulco medio longitudinali exaratus profundo, per tuberculum oculorum ducto, ante ed pone id in foveam dilatato, arcubus supraciliaribus laevibus, sulcus ordinarius lateralis posticus obliquus profundus sed sat brevis est; in medio latere praeterea impresso sat magna levis (subtiliter granulosa) conspicitur. Oculi dorsualis spatium diametro suo evidenter majore inter

se remoti; laterales trini triangulum vel lineam fortissime incurvam ad ipsum marginem lateralem formant.

Segmenta abdominalia dorsualia omnia subtilissime coriacea, modo postice, utrinque subtiliter granulosa segm. 7m postice costas 4 brevissimas valde divaricantes granulosas ostendit.

Segmenta ventralia nitida, laevia vel subtilissime coriacea, ultimum granulis paucis inaequale.

Cauda, ut palpi et pedes, pili longis cospersa, segmentis I—IV desuper visi in lateribus leviter rotundatis, supra sat lato excavato-sulcatis, carinis dorsualibus et lateralibus superioribus distinctis, in segmento I—II subtiliter granulosis, in segm. III et IV laevibus vel modo paullo inaequalibus, carinis inferioribus saltem in segmentis duobus primis, quae subter granulis crassis inaequalia sunt, evidentibus et granulis crassis sparsis, in segm. III et IV non vel parum expressis. Segmentum 5m desuper visum primum latitudine paene aequalia est, tum, inter medium et apicem planum, in margine superiore modo serie pilorum munitum; in lateribus laeve, subter carinis tribus sat inaequaliter granulosis, lateralibus saltem antice abbreviatis, praeditum. Vesica magna, longa, laevis et nitida, supra in medio fovea magna opaca, ovata munita; aculeus brevissimus, debilis.

Palpi nitidi, vix granulosi nisi in marginibus lateris antici humeri, qui apicem versus paullo latior evadit et tuberculis paucis piliferis inaequalis est ut et in margine inferiore lateris antici brachii; margines humeri reliqui parum expressi; brachium intus versus basin incrassatum quidem sed non dentatum, latiore superiore sub-excavato costis evidenti laevi a latere postice rotundato et inaequali limitato, latere inferiore plano. Manus crassa et lata, extus parum, intus fortiter arcuata, laevis, paucis impressis piliferis sparsa hic illic in series ordinatis; subter ad basin digiti mobilis cristam brevem compressam obliquam in

margine denticulatam ostendit. Digiti breviores, acie vitta densa denticulorum minutissimorum vestita et praeterea in lateribus serie denticulorum paullo majorum utrinque circa 5 munita.

Laminae genitales paullo longiores quam latiores, subtriangulae.

Pect. dent. 18.

Color luteo-flavus vel testaceus, nigro-maculatus, truncus subter cum vesica et pedibus nigro-maculatis pallidior. Cephalothorax praesertim in medio circum oculos dorsuales et in lateribus maculis striis nigris variatus est. Abdomen series 4 longitudinales maculorum inaequalium habet, duas secundum medium, duas laterales. Maculae duae in medio uniuscujusque segmenti sub-incurvae sunt, minores quam laterales et inter se satis appropinquantes longius vero a maculis lateralibus remotae. Ipse margo laterali segmentorum saltem nonnullorum angustissime niger. Cauda subter et in lateribus maculis et striis nigris, vittas vel lineas inaequales longitudinales fere formantibus sat dense variata; supra ad apicem binas maculas vel strias nigricantes ostendunt segm. I—IV; segm. V supra, magis versus basin, maculam talem utrinque habet. Vesica supra immaculata, subter nigricanti-maculata; aculeus apice late niger. Palpi subter immaculati, supra aculeis at striis inaequalibus variati in manibus praesertim supra et in lateribus lineas vel vittas longitudinales formantibus; digiti immaculati. Femora apicem versus et tibia nigro-maculata.

Mensurae:—Lg. corp. 28, cepth. 3.3, caud. 17, Brach. lat. 12.2. Manus lat. 2. Digit. mob. lg. 2.

Patria: Argentina. Exemplum masculinum ?.

IHERING collected specimens of this species in Rio Grande do Sul.

I possess no specimens.

THESTYLUS SIMON, 1880.

Median lamellae of pectines in one row, not rounded. *Metatarsus* furnished,

below, with 6 or 7 pairs of bristles, disposed like pectinate teeth. No hairy patch between the bristles.

Pedal spur small. *Orbital ridge* without median groove. *Edge of finger* of hand with one row of granules only, flanked on each side by 6 granules.

THESTYLUS GLASSIOUI (BERTK., 1880).

(From KRAEPELIN, *Das Tierreich*, 1889).

Colour piceous or leathery often with symmetric yellow spots. Legs brick-brown, often with blackish reticulum. Vesicle reddish-brown. Cephalothorax and abdomen smooth and shining. Orbital ridge without a median groove. In the female the longitudinal keels of the abdominal tergites are substituted by shallow finely shagreened depressions. Ventral surface smooth, the last sternite without keels. Dorsal keels of tail almost rounded. On lower surface of first and second caudal segments a smooth almost heart-shaped area surrounded by a smooth keel that forms a shut curve on segment I and is open in front on segment II. Third and fourth caudal sternites quite smooth and shining. Segment V has frequently at proximal end a median granular keel and on distal end and lateral surfaces some coarse granules. Vesicle smooth or almost so. Femora

of maxillary palpi smooth and shining. Hand smooth, shining, keelless, rounded only just wider than the tibia.

Pectinal teeth 11—13 in female, 14 in male. Median lamellae 5—7. Length up to 40 mm. Male smaller.

I received specimens from Lafayette and Tartaria in the State of Minas Geraes as well as from Santa Catharina. This species occurs also in the states of São Paulo, Rio de Janeiro and Espirito Santo.

BOTHRIURUS PETERS, 1861.

Median lamellae of pectines with one row or only indistinctly with two rows on proximal end and usually pearl-string shaped. *Metatarsus* with 2 or 3 pairs of spurs on inferior surface, among which can be seen clearly or otherwise a hairy.

Pedal spur small. *Orbital ridge* usually without a median groove. *Granules* of edge of finger disposed in a straight line, flanked by 6 or 7 bigger granules. The male with a spine on inner surface of hand, trunk opaque or granular and one *navicular hollow* on dorsal surface of vesicle.

This genus is represented in Brazil by 2 species and one variety. In our key to the classification of these species we will abridge *B. flavidus* and var. *maculatus* on account of the great analogies they evince, the latter with *B. bonariensis* the former with *B. signatus*.

Key for the determination of Brazilian species of the gen. *Bothriurus*.

- 5th abdominal sternite and 1st caudal sternite smooth and rounded in both sexes. General colouring piceous-brown or black.....2
- 1} 5th abdominal sternite with 2-4 short keels, more or less distinct. 1st caudal sternite also with a suggestion of keels. Colouring of background usually yellow, at times with black patches.....4

- Pectinal teeth 12-20 in female, 19-22 in male. Posterior borders of abdominal sternites not more granular than the surfaces. Orbital ridge generally grooved in the middle. Colour almost uniformly dark.....3
- 2 } Pectinal teeth 10 in female. Posterior borders of abdominal sternites granular, whilst surfaces are smooth. Orbital ridge not grooved in the middle. Tail spotted black..... *B. bonariensis* var. *maculatus*
- 3 } Colouring uniformly dark, including tail and legs..... *B. bonariensis*
 { Trunk with light median stripes. Tail spotted, legs piceous-brown *B. bonariensis*, var. *asper*
- 4 } Trunk dark with pale median dorsal band. Tail dark or reddish-brown, and then with dark longitudinal bands below. Hand reddish. Inner surface of carpus carinated and with three bristles. Finger longer than carpus. Vesicle in male without a hollow on dorsal surface, 5th abdominal sternite in female with outer smooth or almost smooth..... *B. signatus*
- 4 } Trunk coloured mud yellow more or less spotted a dark colour. Tail with 2 or 3 isolated longitudinal bands. Carpus rounded on palmar surface. Only three distinct bristles. Digit shorter than carpus. Male with a depression on dorsal surface of vesicle. In the male the dorsal keel of tail is almost absolute only distinct on apical end. Intercarinal surface of 5th abdominal sternite finely granular..... *B. favidus*

BOTHRIURUS SIGNATUS POCOCK,
1893.

Original description: ♀. Colour brunneo-fuscous, with a pale median dorsal band; variegated with black patches, the lower surface of the trunk pale-coloured, the lower surface of the tail and of the last abdominal segment with an irregular transverse black band; the palpi reddish, concolorous or nigro-variegated.

Carapace smooth and highly-polished, only very feebly granular laterally its anterior border lightly emarginate, the ocular tubercle just in front of its middle.

Tergites polished, very finely and closely granular postero-laterally and mesially, the last furnished with four abbreviated tubercular keels.

Sternites smooth, the last with four smooth abbreviated keels.

Tail about five times the length of

the carapace, parallel-sided from the second segment, the third a trifle wider than long, the fourth a trifle longer than wide; the upper surface of the tail smooth, the superior and supero-lateral present on the anterior three segments, but smooth on the second and third; the lower surface of the first furnished with four smooth keels, the internal of which are furnished with a single large setiferous pore; the second segment similarly but less strongly keeled below, the third and fourth not keeled below; the upper edges of the fifth squared granular in front, but the lower surface of the fifth with a weak median posteriorly granular keel, the lateral obliquely curved series of granules not completely circumscribing the normal area, which is granular in the middle.

Vesicle thickly granular beneath, smooth and flat above, not quite as wide as the fifth segment.

Palpi very smooth and polished, scarcely granular, and not carinate; *manus* moderately robust, its width about two thirds the length of the movable digit, about twice the width of the brachium; the hand-back a little shorter than the movable digit.

Legs smooth and polished, the penultimate segment furnished with a few spines, the feet adorned below with a single row of stoutish curved stiff setae, those of the first pair not spined beneath, those of the second pair having a single pair of spines, while the third and fourth have three pairs of spines.

Pectines moderately long, furnished with 12—14 teeth.

Stigmata small and oval.

Measurements in millimetres.—Total length 45, of carapace 5, of tail 25; width of second segment of tail 3; width of brachium $1\frac{1}{2}$, of manus 3; length of hand-back 3.8, of movable digit 4.8.

♂. Distinguished by very marked sexual characters.

The upper side of the body and palpi are not smooth and highly polished, but finely and closely granular. The tail is a little more robust and is narrowed posteriorly; the vesicle is much narrower and smoother beneath than in the female, and its upper surface is marked by an oval depressed yellow spot. The lower surface of the last abdominal sternite and of the first and second segments of the tail is not keeled. In the palpi, the humerus is more granular, the manus is much wider, its width as compared with the brachium being as $1\frac{1}{2}$ is to $3\frac{4}{5}$; and there is a strong spicular tooth on the inner side of it at the base of the movable digit.

Pectines much larger, furnished with 13—16 very long teeth.

Loc. Theresopolis.

I have no specimens of this species.

BOTHRIURUS BONARIENSIS VAR. ASPER POCOCK, 1893.

Original description: Young male. Colour fuscous, with a distinct median fulvous dorsal band on the tergites; the legs palpi and lower surface of the tail irregularly variegated with flavous spots and bands.

Carapace finely and closely granular throughout, except on the summit of the ocular tubercle, which is smooth and polished; this tubercle obscurely sulcate above; the eyes large, the distance between them being about equal to a diameter. The whole of the exposed portion of the tergites thickly granular like the carapace, the last with two sets of larger granules on each side. The *sterna* finely and closely granular, the last without trace of keels.

Tail moderately robust, rather more than four times the length of the carapace, parallel-sided, the third segment about as long as wide; minutely and closely granular throughout; a few larger granules in the region of superior and supero-lateral keels on the anterior three segments, these keels being marked posteriorly by small tubercles; the supero-lateral keel absent on the fourth segment; the sides and lower of the segments without keels; the fifth segment mesially sulcate, widely excavated behind; the lower surface with an obsolete median keel, the posterior semioval area not very clearly defined, the two inwardly curved oblique series of granules not coalescing in the middle line as in *B. bonariensis*, the middle of this area tubercular. *Vesicle* flat above, scarcely granular, subserially granular below.

Palpi: humerus coarsely granular above and in front; brachium weakly granular above, its upper inner edge carinate; manus longer than wide, very finely and closely granular above and below.

Legs very finely granular externally, the penultimate segment armed with a single series of long white hairs, the first not spines beneath, the rest armed with from two to three pairs of spines.

Pectines large, furnished with 20 teeth; the genital operculum acutely produced behind.

Stigmata small, ovately elongate.

Measurements in millimetres.—Total length 24, length of carapace 3, of tail 14.

A single example from Iguarassú.

I have not examined any specimens of this species.

BOTHRIURUS BONARIENSIS (C. L. KOCH, 1842).

I did not obtain the original description of this species.

Its chief characters are to be found in the key for the determination of the species of the genus *Bothriurus*.

This species is plentiful in the south of the country, whence we received several specimens collected by Dr. HONORIO HERMETTO.

RÉSUMÉ.

The fauna of Brazil comprises 37 species and one variety of scorpions, belonging to 4 families and 10 genera. They are the following:

FAM. BUTHIDAE

1. Genus *Anateris* with the species *A. balzani*.
2. Genus *Isometrus* with the species *I maculatus*.
3. Genus *Tityus* with the species: *T. microcystis*, *T. magnimanus*, *T. metuendus*, *T. cambridgei*, *T. duckei*, *T. paraensis*, *T. mattogrossensis*, *T. paraguayensis*, *T. pusillus*, *T. silvestris*, *T. intermedius*, *T. stigmurus*, *T. bahiensis*, *T. costatus*, *T. trivittatus*, *T. dorsomaculatus*, *T. serrulatus*.

4. Genus *Rhopalurus* with the species: *R. agamemnon*, *R. debilis*, *R. stenochirus*, *R. melleipalpus*, *R. barythenar*, *R. rochai*, *R. acromelas*, *R. borellii*, *R. laticauda*.

FAM. SCORPIONIDAE.

5. Genus *Diplocentrus* with the species *D. gundlachi*.

FAM. CHACTIDAE.

6. Genus *Broteas* with the species *B. paraensis* and *B. gervaisii*.
7. Genus *Broteochactas* with the species *B. parvulus* and *B. delicatus*.

FAM. BOTHRIURIDAE

8. Genus *Bothriurus* with the species: *B. bonariensis*, *B. signatus* and the variety *B. bonariensis var asper*.
9. Genus *Thestylus* with the species *T. glasioui*.
10. Genus *Urophonius* with the species *U. brachycentrus*.

One may say in general terms that the fam. Bothriuridae is limited to the south of the country and the fam. Chactidae and Scorpionidae to the north (Amazon's Basin). The fam. Buthidae is distributed in the following way: the genus *Anateris* is limited to Matto Grosso, the genus *Isometrus* is cosmopolitan, the genus *Rhopalurus* is dominant in the North-western region of Brazil whilst the Genus *Tityus* is represented in the whole country, in the North by the groups *cambridgei* (Amazons Basin) and *pusillus* (Amazons Basin and State of Matto Grosso, in the centre and South by the group *stigmurus*. In the state of Minas Geraes the dominant species are *T. bahiensis* and *T. serrulatus* the former in Ouro Preto the latter in Bello Horizonte, Santa Barbara, Itabira.

Of the above mentioned species six were described by the author in collaboration with ADOLPHO LUTZ. These are the following: *T. serrulatus*, *T. dorsomaculatus*, *T. microcystis*, *T. intermedius*, *R. acromelas* and *R. melleipalpus*.

EXPLANATION OF PLATES 2—13.

Plate 2

- Fig. 1: Dorsal view of a scorpion (from KRAEPELIN).
 Fig. 2: Ventral view of a scorpion (from KRAEPELIN).
 Fig. 3: Pectinate organ (from KRAEPELIN).

Plate 2—A

- Fig. 4: Sternum of *Buthidae* (from KRAEPELIN).
 Fig. 5: Sternum of *Scorpionidae* (from KRAEPELIN).
 Fig. 6: Sternum of *Chaerilidae* (from KRAEPELIN).
 Fig. 7: Sternum of *Chactidae* (from KRAEPELIN).
 Fig. 8: Sternum of *Bothriuridae* (from KRAEPELIN).
 Fig. 9: Basal and tarsal spurs (from KRAEPELIN).
 Fig. 10: *Trichobothria* (from KRAEPELIN).
 Fig. 11: Section of movable finger of *Isometrus* (from KRAEPELIN).
 Fig. 12: Do. of *Tityus* (from KRAEPELIN).
 Fig. 13: Do. of *Rhopalurus* (from KRAEPELIN).
 Fig. 14: Manus and tibia of *T. metuendus* (from POCOCK).
 Fig. 15: Manus and tibia of *T. cambridgei* (from POCOCK).
 Fig. 16: Manus of *Tityus magnimanus* (from POCOCK).
 Fig. 17: Metatarsus of *Thestylus* (from KRAEPELIN).
 Fig. 18: Metatarsus of *Bothriurus* (from KRAEPELIN).

Plate 2—B

- Fig. 19: Tail of *T. stigmurus* THORELL.
 Fig. 20: Tail of *T. microcystis* LUTZ-MELLO.

- Fig. 21: Tail of *T. bahiensis* (PERTY).
 Fig. 22: Tail of *T. serrulatus* LUTZ-MELLO.

Plate 3

- Fig. 23: *Tityus intermedius* LUTZ-MELLO.
 Fig. 24: *Tityus costatus* KARSCH.

Plate 4

- Fig. 25: *Tityus metuendus* POC. ♀ 2/1.
 Fig. 26: *Rhopalurus barythenar* (PENTHER) ♀ 3/2.

Plate 5

- Fig. 27: *Rhopalurus barythenar* (PENTHER) ♂ 3/2.
 Fig. 28: *Tityus dorsomaculatus* LUTZ-MELLO ♀ 3/2.

Plate 6

- Fig. 29: *Tityus dorsomaculatus* LUTZ-MELLO ♂ 2/1.
 Fig. 30: *Isometrus maculatus* ♀ 3/2.

Plate 7

- Fig. 31; *Rhopalurus laticauda* THORELL ♂ 3/2.

Plate 8

- Fig. 32: *Tityus metuendus* POC. ♀ Ventral view 2/1.
 Fig. 33: *Tityus cambridgei* POC. ♀ 2/1.

Plate 9

- Fig. 34: *Rhopalurus barythenar* (PENTHER) ♂ 2/1.

Plate 10

- Fig. 35: *Rhopalurus rochai* (BORELLI) ♀ 2/1.
 Fig. 36: *Rhopalurus rochai* (BORELLI) ♂ 2/1

Plate 11

- Fig. 37: *Rhopalurus melleipalpus* LUTZ-MELLO ♀ (?), 1/1.
 Fig. 38: *Rhopalurus acromelas* LUTZ-MELLO ♂ 3/2.

Fig. 39: *Rhopalurus stenochirus* (PENTHER) ♀ 1/1 Coll. Museu Paulista.

Plate 12

Fig. 40: *Thestylus glasioui* (BERTK) 2/1.

Fig. 41: *Bothriurus bonariensis* ♂ 2/1 (KOCK).

Fig. 42: *Broteas gervaisi* (POC.) ♀ 1/1 (Coll. Museu Paulista).

Plate 13

Fig. 43: *Ananteris balzani* (THORELL) (Original photograph of THORELL'S.).