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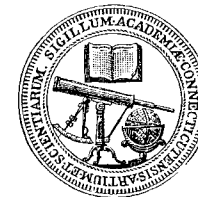
VOLUME 27]

JULY 1925

[PAGES 51-248

Arachnida from Panama

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NEW HAVEN, CONNECTICUT
PUBLISHED BY THE
CONNECTICUT ACADEMY OF ARTS AND SCIENCES
AND TO BE OBTAINED ALSO FROM THE
YALE UNIVERSITY PRESS

Boris Striffler

ARACHNIDA FROM PANAMA

INTRODUCTION

The study of the Arachnid fauna of the West Indies and of the shores of the Caribbean Sea has a peculiar interest in view of the geological past of the Antilles and because of the methods of distribution in this group of Invertebrates. The dispersion of individuals is accomplished by different means in different Orders of the Class and often by different means in different Families of the same Order. Dispersion by flight is possible only in spiders, by means of gossamer threads, and in mites parasitic on birds or insects. In the latter case the distribution of the species is evidently limited by the habits of the hosts; in the former by numerous factors as yet little known, such as the season of the year, air currents, humidity, temperature, climate and food. To a not inconsiderable extent, perhaps, also by the longevity of the species. We know something of the dispersion of spiders in the temperate zone where only those species which emerge from the egg in autumn produce gossamer threads. For this reason closely related genera sometimes show a decided difference. Thus in the United States *Argiope* winters in the state of eggs while *Epeira* develops earlier and takes part in gossamer flight. Definite information on ballooning exists only in the case of eight genera, and of these only one, *Atypus*, belongs to the Sub-Class Mygalomorphæ. Of ballooning in the tropics we know nothing. We do not even know whether it occurs there at all. Nor do we know the distance to which spiderlings may be carried by the wind, nor the height from the ground to which they may ascend in rising currents of air, both factors of the greatest importance in the distribution of spiders of an archipelago.

Floating objects and human trade may be considered as an important factor in the dispersion of Arachnida, applicable probably to all Orders, but only to such species as frequent human habitations or hide in crevices or under the bark of wood, in fruit, among living plants and other objects of export. We know about two dozen species of spiders and a few scorpions which are cosmopolitan in their distribution and which may have

been introduced in some places through the agency of man or oceanic currents. But trade involves usually great distances and considerable change of climatic conditions. Arachnida do not depend upon a certain species of insect for their food, but in new surroundings and new climate they may not find any food at a time of the year when they are particularly in need of it, or they may not be able to stand the cold or the lack of it, or they may encounter unaccustomed enemies, or conditions unfavorable for nest making or some other factor adverse to their existence. In many cases too, the lack of an individual of the opposite sex at the time of mating may prevent the establishment of a species in a new country even when the other conditions are favorable. While it is easy to see how all these factors work against the importation of southern species into northern countries, it is more difficult to understand why northern species are also restricted in their distribution. Yet we know that many species occur only in the North. What stands in the way of their gradual distribution southward?

Probably the most common method of dispersion in Arachnida is that of walking a sufficient distance away from the place of their birth to prevent cannibalism and to assure a sufficient supply of food. But this method is good only on land. Although we know nothing of the methods of dispersion in cave-dwelling Arachnida, it seems likely that it is the only possible method in these species.

A fascinating picture unrolls itself before the mind of the investigator who could compass at once in all its phases the arachnid fauna of the West Indies and the shores of the Caribbean. He could trace the geographical distribution backward to the centers of dispersion; he could identify the species which have sprung from the original stock after its geographical isolation; he could put his finger on the environmental factors which were responsible for the appearance of the new characters; he could comprehend the adaptive modification of instinct; he could envisage the evolutionary tendencies and bring the problem of evolution itself nearer our understanding. The hope some day to be able to contribute materially to our advance in this direction has ever been present during the many years of my studies. Unfortunately it soon became apparent that even our knowledge of the species inhabiting those regions is quite inadequate. No comprehensive

lists, no data of localities or of time of capture exist, and the descriptions of new species even by the most distinguished arachnologists are often too inadequate for identification, let alone for the study of local variations. Nor have been any biological observations made in the field, none at least of a comparative nature. It is therefore absolutely indispensable to begin at the beginning by a patient study of collections, compilation of lists and careful description of new and of inadequately described species. Naturally, this kind of work need not and cannot follow a prearranged system. It depends upon collections available, and may require additional investigations in its course.

The present paper, dealing mostly with spiders from Panama, is chiefly based on the study of a collection made in the spring of 1924 by a student in the Zoological Department of Yale University, Mr. J. M. Valentine, who went there for other purposes, but who was enabled to remain longer and to collect arachnida through a grant of \$100.00, made at my request, from the Elizabeth Thompson Science Fund. It gives me great pleasure to express my gratitude for this help to the Trustees of the Fund, as the collection has proved to be rich in new species. A few smaller collections have also been examined during the preparation of this paper. These were made at different times by Dr. B. H. Buxton, formerly Professor of Pathology in the Cornell Medical School, Mr. W. J. Baerg, Entomologist in the Agricultural Experiment Station of the University of Arkansas, and by Miss Elizabeth Deichmann. The latter collection was placed at my disposal by Dr. C. R. Shoemaker of the U. S. National Museum. To all these I express my best thanks for their courtesy and interest shown in my work.

While the smaller collections were all made in the Canal Zone and in the vicinity of Panama City, the localities in which Mr. Valentine was collecting require special attention. The localities visited by him are all east of the Canal Zone and either on the Pacific coast or on the Pacific slope of the mountain range. Mr. L. Griscom, with whom Mr. Valentine was traveling, describes the route and the collecting ground in an article published in No. 4, Vol. XXIV of *Natural History* for July-August 1924 on pages 509-519. *Remedios* and *Sona* are almost on sea-level with mangrove swamps in their vicinity. *San Lorenzo* is a river the swampy shores of which are covered with tropical forest. *Cerro*

Iglesia is in a tropical forest about 700 to 1,000 feet above sea level. *Bocas del Monte* represents an arid zone about 3,500 feet above sea level. *Cerro Flores* (sometimes referred to as Cerro Santiago on maps) is a mountain on the slope of which in a sub-tropical forest collecting was done at an elevation of from 3,700 feet to about 5,000 feet.

Most of our knowledge of the spider fauna of Panama was based upon the work of the two Cambridges forming part of their two splendid volumes on Arachnida Araneidea in the *Biologia Centrali Americana*. Whatever has been added since is of a desultory and chance character. It is perhaps too early to form a definite opinion on the arachnid fauna of Panama, but the indication is unmistakable that this fauna has more relationship to the Central American than to the South American fauna. I reserve a more detailed account of this relationship for future time, when I shall bring my study of the fauna of other Central American countries and of the West Indian Islands nearer completion. For the present this paper, the first of a series which is in preparation, must remain a strictly taxonomic one.

TERMINOLOGY AND MEASUREMENTS

The terminology employed in this paper is practically the same as in my paper which is to be published in the *Annals of the Entomological Society of America* except for a little improvement in the notation of spines on legs. To understand it I must recall to the mind of the reader that I use the terms *dorsal* and *ventral* in their morphological sense as determined by the plane of symmetry. *Right* and *left* are reserved for the body only. For all appendages the terms *pro* and *retro* are used to designate the two surfaces forming right angles with the dorsal and ventral surfaces. The *prolateral* surface is always the one which is nearest the anterior end or head of the animal. In a front leg the prolateral surface is therefore the inner or right side in the left leg and the inner or left side in the right leg. In the hind leg it is the outside or left side of the left leg and the outside or right side of the right leg. The *retrolateral* surface is always the one farthest from the head and nearest the posterior end of the spider. It is therefore the outside of the front legs and inside of the hind legs. The term *promargin* is applied to the inner margin of the chelicerae of Theraphosid spiders and to the upper or outer margin of the chelicerae of true spiders, while the term *retromargin* is applied to the outer margin of the chelicerae of Theraphosid spiders and to the lower or inner margin of the chelicerae of true spiders. The planes are determined by imaginary straight lines connecting the articulation points of the apical and basal end of the same segment. In the tibia there is a single middorsal articulation with the patella. It is necessary therefore to draw the imaginary line from the femoro-patellar to the tibio-metatarsal articulation. Extensive study has persuaded the writer that, with rare exceptions, no more than two rows of spines may be present on any of the four planes. A pair of spines is always represented by the figure 2, whether the spines are in a symmetrical position on the right and left of the median line or one spine in advance of the other. A single spine situated in the middorsal, midventral or midlateral line is similarly represented by the figure 1. Thus dorsal 2-2-2 means three pairs of spines, dorsal 1-1-2 means that the two apical spines form a pair. If the absence of a spine or of a pair of spines is quite certain from a comparison with the spines of another pair

of legs such absence is represented by the cipher 0 (I have in mind of course actual absence, not loss due to injury). Thus dorsal 1-0-1 means that there are only two spines in the middorsal line, separated by considerable space in which on a leg of another pair there is a spine. If only one spine of a pair has been lost, or if a single spine is situated not in a median line, then such a spine is represented by the numeral 1 with addition of a letter p, r, d or v. These letters indicate the plane nearer to which the single spine is situated. Thus dorsal 2-1r-2 means that the single spine is in line with the preceding and following which are closest to the retro-side of the leg. Similarly prolateral 1d-1v-1d-1v means that the four spines are not in one line but that the first and third are nearer the dorsal surface than the second and fourth. Though this system seems to be somewhat complicated at the first glance, it is not only more exact than either of the two systems generally in use, but once learned is no more difficult than the others. Mention should be made of cases in which either the legs are too thin or the spines too numerous to allow of a careful definition of the planes. In such cases no notation may be quite safe. The case of so-called vorticella of spines, as for example at the end of metatarsi in many jumping spiders, is only an additional proof of the inadequacy of the old systems of notation. Whenever there are six spines at the end of the metatarsus a pair of these is always ventral, a pair prolateral and a pair retrolateral. If there are only five spines the new notation shows at once which of the spines is wanting. It will be also found that in some cases there is a bristle in place of a spine which is present in the identical place on another leg. In all such cases the word *bristle* is added to the numeral.

All measurements are in millimeters and their fractions and, with the exception of very large specimens, are made with the aid of a micrometer eyepiece under a binocular microscope. It is essential that the entire segment should be in focus as otherwise wrong figures will result. For appendages the measurements are made from articulation point to articulation point. In the case of the eyes care must be taken to measure the *diameter of the cornea*, not of the better visible pupil which is often much smaller. All our measurements represent the diameter of the cornea or, in case of oval eyes, the *longer axis*. The measurement of the length or width of the eyegroup or of the quadrangle of median

eyes invariably includes the eyes, but not the curvature of the eyerow. Similarly, the length, width and height of the carapace, unless otherwise specified, does not include the curvature, but represents an airline. The ratios of eyes are naturally nothing but ratios. They have been purposely left without any change whatsoever, without any attempt to refer the figures to some definite organ. These ratios represent simply the number of divisions of the scale of the ocular micrometer. It is difficult to choose an organ sufficiently permanent in its relative size to be used as a unit for comparison, and the retention of the original figures, which are interchangeable, reveals relationships which are otherwise lost.

ORDER SCORPIONES

Of this Order only a few specimens from Panama came to my observation. One male and one female of *Opisthacanthus elatus* Gervais from Culebra are the only representatives of the Family Scorpionidae. The Family Buthidae is represented by one male *Tityus cambridgei* Pocock from Culebra, one male *Centrurus gracilis* Latreille from Bocas del Toro, and five females and two immature specimens of *Centrurus margaritatus* Gervais (locality not given).

ORDER PEDIPALPI

Of this Order only two species from Panama came to my notice. Five specimens of *Tarantula palmata* Herbst (locality not given) and one specimen of *Tarantula fuscimana* C. Koch from Bocas del Toro and six specimens from the Wilcox camp on the San Lorenzo River.

ORDER OPILIONES

Our ignorance of this Order is truly appalling. Only four species have been so far recorded from Panama, all belonging to the Sub-Order Laniatores. Of these *Flirtca picta* (Perty) is known also from Brazil, and *Euerginus subserialis* (Cambridge) from Costa Rica and Guatemala, while *Cosmetus flavopictus* Simon and *Hernandarioides plana* Cambridge from Panama only. To these must now be added the following species as occurring in Panama:

FAMILY COSMETIDÆ

Eucynorta quadripustulata Simon—Several specimens from Colon. (The type was from Colombia without locality.)

Eucynortula lata (Banks)—Three specimens from Panama without locality. Occurs also in Costa Rica and in Nicaragua (a specimen in the collection of the Dept. of Entomology, Washington, D. C.).

Pocilema limbatum Kollar—one specimen from Cerro Flores. (Originally described from Brazil.)

FAMILY PHALANGODIDÆ

Metapachylus gracilis Cambridge, one specimen from Cerro Flores. (Previously known from Mexico.)

Stygnomma rufum sp. nov., one specimen from Cerro Flores.

(I have also three specimens of this species in my collection from Limon, Costa Rica. I have also one male and one immature specimen of another species of the same genus, *Stygnomma armatum* sp. nov., from Siquierres, Costa Rica. Since our knowledge of the genus has been hitherto limited to a single species, *Stygnomma fuhrmanni* Roewer, represented by two males from the plateau of Camelia in Colombia, I give here a description of both new species.)

Metapachylus gracilis Cambridge.

Total length 4.5 mm. Legs, I—4.85 mm., II—8.00 mm., III—6.63 mm., IV—9.18 mm., Palp—2.55 mm.

Dorsal scutum divided into five areas. Carapace much narrower than scutum, with parallel sides and squarely truncated front with each angle produced into a spine. Lateral margin of scutum with tubercles. First area with scattered setigerous tubercles, second with two transverse rows, third, fourth and fifth areas with a single row of setigerous tubercles. Eyetubercle high, with a long, curved horn directed forward and carrying a short seta at the end. Chelicerae small. Pedipalpi powerful, their trochanter with one setigerous tubercle below, femur with two near base below and one prolateral near apex, patella with a single one prolateral, tibia and terminal joint with two pairs each below. At the end of the terminal joint a powerful, smooth claw. Both fingers of chelicerae toothed, the movable finger from middle on, the immobile one from its base on. These teeth are rounded at the end. Setigerous tubercles are present on all legs on every segment except first to third metatarsi and all four tarsi. The third trochanter is globular. Subdivision of the tarsi as follows: first tarsus—3 joints, second tarsus—4 + 3 or seven in all, third tarsus—3 + 2 or five in all, fourth tarsus—6 joints; all joints free. Pseudonychium on third and fourth tarsus wanting. Claws all smooth. Scopulae on legs wanting. Spiracles not visible. Color in alcohol brown. Palpi and trochanters of all legs yellow. Dorsal scutum with a black submarginal line. Carapace mottled with black, areas with indistinct black sprinkling which assumes the aspect of a black, transverse line on the free abdominal tergites. Habitat: Cerro Flores, Panama.

Although Roewer has placed the genus *Metapachylus* in the

Sub-Family Pachylinae of the Family Gonyleptidae he adds in a footnote on page 449 of his great work "Die Weberknechte der Erde": "Cambridge's Diagnose u. Figur nach scheint das Tier zu den Phalangodidae zu gehören, wenn nicht in der Diagnose das Psd des 3. u. 4. Ta besonders hervorgehoben wäre. Bei der Unsicherheit der Angaben in Cambridge's Diagnose muss dieses Tier bis zur Nachprüfung der Type als unsichere Art u. Gattung bezeichnet werden." I have had no opportunity to examine the type, but the specimen in my collection agrees in every detail with the figures of the type made by Cambridge. It seems to me that Roewer has misunderstood Cambridge's statement "tarsal claws of iii and iv, with an inter-basal process" and interpreted it as meaning that there is a pseudonychium on these joints. In my specimen there is also a small process, but it has the appearance of a little cone in no way comparable to a pseudonychium of other Opilionids. I do not hesitate to place the species in Roewer's Sub-Family Erecanininae of the Family Phalangodidae.

Stygnomma rufum sp. nov.

Total length without chelicerae 5.0 mm. Legs, including trochanters, I—12.3 mm., II—16.5 mm., III—12.0 mm., IV—15.5 mm., Pedipalpi, including coxa, 10.0 mm.

Dorsal scutum with 5 areas, none of which has a longitudinal sulcus. Eyes far apart, each on a separate small tubercle. Between and slightly behind the eyes a tubercle with a central larger cone-shaped spine and an irregular circle of smaller tubercles. Transverse rows of setigerous tubercles on every area and on all free abdominal tergites. Spiracles well visible. Entire ventral surface including coxae covered with setigerous tubercles. First joint of chelicerae 3.0 mm. long, with 3 pointed tubercles above and a right and left lateral row below together with several irregularly distributed tubercles. Chelæ much heavier than first joint, moveable finger considerably shorter than hand which is covered only with small setæ. Pedipalpi powerful and long; their coxa curved and armed dorsally with a row of teeth of which the distal one is strongly curved forward, ventrally with a retrorow of 4 setigerous tubercles and a prorow of several small tubercles. Trochanter of pedipalp short, with a peduncle and 2 dorsal teeth and 3 ventral setigerous tubercles. Femur curved, gradually increasing in width toward apical end, with a ventral

row of setigerous teeth. Patella with peduncle which is $\frac{1}{3}$ the full length of the segment, with 2 setigerous teeth below. Tibia with 2 pairs of heavy setigerous tubercles below. Terminal joint with 2 pairs of similar tubercles and a heavy, smooth terminal claw. All trochanters and femora of legs with setigerous tubercles, also fourth patella and tibia. Trochanters of third pair heaviest, globular, three times as heavy as femur; those of fourth pair subglobular, smaller. Trochanters of first and second pair with straight ventral and convex dorsal surface, elongate. Number of tarsal joints, I—5 + 2 or seven in all, II—7 + 3 or ten in all, III—3 + 3 or six in all and IV—4 + 3 or seven in all. First and second pair of tarsi with a single claw, third and fourth with a pair of claws. Scopulae wanting. Claws smooth. Color in alcohol rufous throughout except fingers of chelicerae, which are darker. Habitat: Cerro Flores, Panama and Limon, Costa Rica.

Stygnomma armatum sp. nov. (Figure 1).

Male. Total length of body 6.0 mm. Legs, I—12.92 mm., II—18.36 mm., III—12.58 mm., IV—15.90 mm. Palpi 11.22 mm. number of tarsal joints, I—7 (= 5 + 2), II—13 (= 10 + 3), III—6 (= 3 + 3), IV—7 (= 4 + 3). Chelicerae very large.

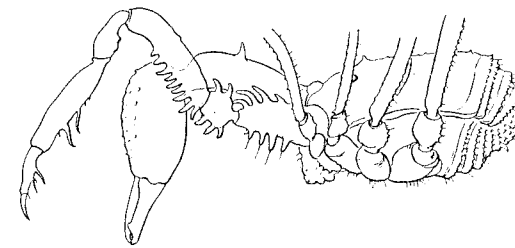


FIGURE 1. *Stygnomma armatum* sp. nov., male.

long and heavy, with a single dorsal tubercle on first segment. Length of first segment—3.57 mm., of hand with finger—5.185 mm. Pedipalpi armed in same way as in *S. rufum*, except that the spines are longer and stronger curved forward. Color in alcohol a mottled grey except first joint of chelicerae, and pedipalpi, which are white. Legs dark below, but with white ends in all segments except metatarsi and tarsi. Cephalic line of scutum, separating head, black. Habitat: Siquerres, Costa Rica.

ORDER ARANEÆ

In the following list of spiders recorded as occurring in Panama an asterisk denotes that the species has not been previously reported from that country, while all new species are in black face type.

SUB-ORDER MYGALOMORPHÆ

FAMILY THERAPHOSIDÆ

Avicularia glauca Simon.

Eurypelma emilia (White).

Eurypelma panamense Simon.

**Eurypelma sabulosum* F. Cambridge, 1 female from Culebra. Original record from Guatemala.

**Eurypelma vagans* Ausserer, 1 female from Culebra. 4 very young specimens probably belonging to this species without definite locality.

**Hapalopus pentatoris* (Simon), 3 immature specimens without definite locality. Known from Guatemala, Costa Rica and Mexico.

**Ischnocolus* sp.?, 2 immature specimens from Culebra, 1 immature specimen from Cerro Flores, found under a log in the forest. All specimens much alike and with the characters of the genus as defined by Simon. All tarsi clearly divided by a longitudinal band of bristles. On anterior tarsi this band is quite narrow, on the fourth tarsi almost as wide as the tarsus itself.

Neischnocolus panamanus gen. et sp. nov., 1 female from Cerro Iglesia.

Psalmopoeus pulcher sp. nov., 1 male collected by Dr. W. J. Baerg in the Canal Zone.

Psalmopoeus rufus sp. nov., 1 female—definite locality not given.

Scricopelma communis F. Cambridge, 1 male, 1 female, Canal Zone.

Scricopelma rubronitens Ausserer, 2 females from Culebra, 2 females from Bocas del Toro.

Xenesthis immanis (Ausserer), occurs also in Colombia.

FAMILY BARYCHELIDÆ

Merothele zebra gen. et sp. nov., 1 female from Cerro Flores.

FAMILY DIPLURIDÆ

Accola spinosa sp. nov., 1 female from Wilcox camp on San Lorenzo River.

**Ecagrus guatemalensis* F. Cambridge, 1 immature specimen from the Wilcox camp on San Lorenzo River, found under wood, in forest. Previously known from Guatemala.

**Ischnothele guianensis* (Walckenaer), 1 male and 4 females from Santiago found in funnel-shaped webs along stream. Previously recorded from Guiana, Brazil, Costa Rica and Bahamas.

FAMILY CTENIZIDÆ

Actinopus robustus (Cambridge).

Ancylotrypa panamana sp. nov., 1 female from the Wilcox camp on San Lorenzo River. First record of an American representative of this genus.

SUB-ORDER ARACHNOMORPHÆ

FAMILY ULOBORIDÆ

**Uloborus americanus* Walckenaer, 1 female from the Wilcox camp on San Lorenzo River. Reported from Guatemala, Costa Rica, West Indies (including Bahamas) and U. S. A.

Uloborus geniculatus (Oliver), 1 female from Cerro Flores. A cosmopolitan species.

Uloborus sp., 1 immature male from Remedios.

FAMILY ACANTHOCTENIDÆ

Acanthoctenus maculatus sp. nov., 1 immature specimen from Santiago, 1 very young specimen from the Wilcox camp on San Lorenzo River, and 1 immature specimen from Ancon Hill, C. Z.

FAMILY ZOROPSIDÆ

Zorocrates fuscus Simon, known also from Guatemala and Mexico.

FAMILY DICTYNIDÆ

**Dictyna nivea* (Cambridge), 1 female from Sona. Previously known from Guatemala and Mexico.

FAMILY FILISTATIDÆ

Filistata hibernalis Hentz.

specimen from Remedios. Occurs also in Costa Rica and Guatemala.

Sillus placens (Cambridge).

Sphécotyplus niger (Perty), occurs also in Brazil and Venezuela.

Syrisca hirsuta sp. nov., 1 male from Cerro Iglesia, 1 female from Panama City.

Syrisca pulchra sp. nov., 1 female from Remedios.

Tendis roseus F. Cambridge.

Trachelas bispinosus F. Cambridge, 1 female from Cerro Flores, occurs also in Costa Rica.

**Trachelas* sp.? (possibly *bispinosus*), 2 immature females from Cerro Flores.

FAMILY CTENIDÆ

Celatycheus paradoxus F. Cambridge.

Ctenus curvipes (Keyserling).

Ctenus rubripes Keyserling, occurs also in Ecuador.

**Ctenus sinuatifipes* F. Cambridge, 1 male from Cerro Flores, 1 male from Culebra. The latter is considerably larger, but exhibits the same structure. First described from Costa Rica.

Ctenus W-notatus sp. nov., 1 female from the Wilcox camp on San Lorenzo River.

**Ctenus* sp.?, several immature specimens of different age from Cerro Flores, Santiago and the Wilcox camp on San Lorenzo River. This is a small species with yellow median band on carapace.

**Ctenus* sp.?, several immature specimens from the Wilcox camp on San Lorenzo River. A larger species with a black median broad band on carapace and abdomen and with a black longitudinal band on chelicerae.

**Ctenus* sp.?, 1 immature specimen from Cerro Iglesia.

Cupiennius coccineus F. Cambridge, recorded also from Costa Rica.

Cupiennius foliatus F. Cambridge, occurs also in Costa Rica and Nicaragua.

Cupiennius sallei (Keyserling), occurs also in Costa Rica, Honduras, Mexico and Florida.

FAMILY AGELENIDÆ

Agelena panamana sp. nov., 1 female from Bocas del Monte, 1 female from the Wilcox camp on San Lorenzo River.

Tegenaria domestica (Clerck), cosmopolitan.

FAMILY PISAURIDÆ

Ancylometes bogotensis (Keyserling), occurs also in Colombia, Brazil, Bolivia and Costa Rica.

Ancylometes valentinei sp. nov., 1 male and 1 female and 1 immature female from the Wilcox camp on San Lorenzo River.

**Ancylometes* sp.?, 1 immature male and 1 immature female from the Wilcox camp on San Lorenzo River. This is a larger species than *A. valentinei*. Total length of the immature male 25 mm. Legs shorter and stouter, scopulae green iridescent. On 3d and 4th tarsi five or six pairs of short spines below.

Dyrines lineatipes sp. nov., 1 male from the Wilcox camp on San Lorenzo River.

Enna approximata (Cambridge).

Enna jullieni (Simon), occurs also in Venezuela.

Enna minor sp. nov., 1 female from Santiago.

**Hesyrus habilis* (Cambridge), 1 male from Remedios, known from Costa Rica and Guatemala.

Syntrechalea tenuis F. Cambridge.

Thaumasia uncatata F. Cambridge.

Trechalea magnifica sp. nov., 2 females and several immature specimens of various ages from the Wilcox camp on San Lorenzo River, Bocas del Monte, La Mesa and Santiago.

FAMILY LYCOSIDÆ

Arctosa cheluncata sp. nov., 2 males, 3 females and 1 immature female from Santiago, 1 female from Remedios, 1 immature female from La Mesa, and 1 male, 1 female and 1 immature female from the Wilcox camp on San Lorenzo River.

Arctosa panamana sp. nov., 1 female from Remedios.

**Arctosa trifida* F. Cambridge, 1 immature male and 1 immature female from Remedios, known from Costa Rica, Guatemala and Mexico.

Lycosa cerrofloresiana sp. nov., 1 male from Cerro Flores.

**Lycosa dilatata* F. Cambridge, 2 large females of the yellowish red variety from Culebra, 1 female of the typical variety from Bocas del Monte, 1 ditto from Cerro Flores, 1 female with black venter from Cerro Flores, 2 ditto from Bocas del Monte. First described from Mexico.

Lycosa fusca (Keyserling), known from Central America, Cuba and Porto Rico.

- Partona rosens* (F. Cambridge).
Peckhamia variegata (F. Cambridge).
Pensacola radians (Peckham).
Phiale bicuspidata (F. Cambridge), 1 female from the Wilcox camp on San Lorenzo River, occurs also in Costa Rica.
Phiale delecta (Peckham), 1 female from Remedios, occurs also in Costa Rica, Guatemala and Mexico.
Phiale elegans (F. Cambridge).
Phiale flavescens (Peckham).
Phiale geminata (F. Cambridge).
Phiale gratiosa C. Koch, occurs also in Brazil and Peru.
Phiale interrupta (F. Cambridge), occurs also in Costa Rica and Guatemala.
Phiale minica (C. Koch), occurs also in Brazil.
Phiale niveo-guttata (F. Cambridge).
Phiale panamense Chamberlin.
 **Phiale simplicicava* (F. Cambridge), 2 females from Panama City, 1 immature male from the Wilcox camp on San Lorenzo River, occurs in Mexico.
 **Phiale* sp.?, (possibly *simplicicava*), several young specimens from Cerro Iglesia, Cerro Flores and the Wilcox camp on San Lorenzo River.
Plexippus paykulli (Audouin), cosmopolitan.
Salticus albocinctus (Peckham), "Central America" without definite locality, Mexico, also Texas and Utah of U. S. A.
Sidusa recondita (Peckham), occurs also in Guatemala.
Simonella bicolor Peckham, occurs also in Venezuela.
Thiodina sylvana (Hentz); occurs also in Costa Rica, Guatemala, Mexico, Southern U. S. A., and Cuba.
 *? *Tutelina* sp.?, 1 young specimen from the Wilcox camp on San Lorenzo River.
Zygoballus desidiosus (Peckham), occurs also in Costa Rica.
Zygoballus maculatipes sp. nov., 1 female from Sona, 1 female from the Wilcox camp on San Lorenzo River.

Although the above list clearly indicates our comparative ignorance of the spider fauna of Panama, it is sufficiently extensive to permit a preliminary tabulation and to draw some interesting conclusions.

Family	Number of species recorded only from Panama	Number of species found only in Panama and Central Am.	Number of species found only in Panama and South Am.	Number of species cosmopolitan or neo-tropical	Total number of species found in Panama
Theraphosidae	8	2	1	1	12
Barychelidae	1	0	0	0	1
Dipluridae	0	1	0	1	2
Ctenizidae	2	0	0	0	2
Uloboridae	0	1	0	1	2
Acanthoctenidae	1	0	0	0	1
Zoropsidae	0	1	0	0	1
Dietyidae	0	1	0	0	1
Filistatidae	0	0	0	1	1
Sicariidae	0	1	0	3	4
Oonopidae	1	0	0	0	1
Caponiidae	1	0	0	0	1
Drassidae	0	0	0	0	0
Hersiliidae	6	1	0	0	1
Pholcidae	0	2	0	3	5
Theridiidae	8	7	1	11	27
Linyphiidae	3	1	1	0	5
Argiopidae	15	55	1	25	96
Mimetidae	4	2	0	0	6
Thomisidae	12	10	1	3	26
Selenopidae	0	2	0	0	2
Sparassidae	2	2	0	1	5
Clubionidae	14	10	1	0	25
Ctenidae	3	4	1	0	8
Agelenidae	1	0	0	1	2
Pisauridae	7	1	1	1	10
Lycosidae	5	7	0	0	12
Senoculidae	2	1	0	0	3
Oxyopidae	5	2	0	1	8
Attidae	47	40	6	6	99
Total	142	154	14	59	369

We see that out of the 369 species of spiders recorded as occurring in Panama 59 species are either Pan-American, or neo-tropical and widely distributed throughout the tropical belt of North, Central and South America, or else are cosmopolitan. Even if we were to regard these species as characteristic of the South American fauna—an assumption which were not quite warranted without a very extensive study of the distribution of each of the above species—and if we added to them the 14 species

recorded only from Panama and South America, we would have to place against these 73 species the 154 species, recorded only from Panama and other Central American countries, Mexico and the Southern United States, and the 142 species recorded only from Panama. It would require a great deal of new data to invalidate the unmistakable conclusion that *the spider Fauna of Panama is Central American in its character*. Moreover there is not a single family which would represent an exception from the general rule. Even the Sub-Order of Mygalomorphæ is Central American in character, though on the whole very poorly represented. Of the Family Uloboridae among the Cribellatae one species is Central American, the other cosmopolitan. The single species belonging to the Family Filistatidae has a very wide distribution from the Southern United States to Argentina. Two families, the Attidae and Argiopidae, together comprise more than half of the total number. Of the 99 species of Attidae 87 have not been recorded from South America, nor have been 70 species of the 96 Argiopidae. As stated before, the analysis of species common to Panama and the West Indies will have to be postponed until later.

Five new genera and 46 new species together with several species inadequately described by former investigators are described in detail in the following pages.

SUB-ORDER MYGALOMORPHÆ

FAMILY THERAPHOSIDÆ

Neischnocolus gen. nov.

Carapace low. Thoracic groove very slightly procurved. Eye-tubercle low, much wider than long. AME slightly smaller than ALE. PME smaller than AME and slightly smaller than PLE. Anterior row of eyes slightly procurved, posterior row recurved. Lateral eyes separated by less than radius. Lip wider than long, with few granules. Legs 4123, with spines. Stridulating organs wanting. Scopulae divided longitudinally by setæ only on 3d and 4th tarsi. First metatarsus barely longer than tarsus; fourth metatarsus much longer, as long as tibia. Scopula on fourth metatarsus wanting. A single apical spine on first metatarsi, three apical spines on second, third and fourth

metatarsi. Closely related to *Ischnocolus* from which it may be distinguished by the intact scopula on anterior four tarsi, by the comparative shortness of first metatarsi and the complete absence of a scopula on fourth metatarsi. Type *N. panamanus*.

Neischnocolus panamanus sp. nov. Female. Total length with chelicerae 25.0 mm. Carapace flat, 8.8 mm. long, 7.3 mm. wide, anteriorly truncated squarely, with eye-tubercle almost, but not quite reaching the margin. Thoracic groove very slightly procurved. Cephalothoracic sulci poorly developed, but visible. Eye-tubercle low, eye-area in the shape of a transverse rectangle. AME slightly smaller than ALE, same size as PLE. PME slightly smaller than PLE, contiguous with them and subcontiguous with AME. Laterals distinctly, but slightly separated from each other. AME separated from each other by their radius. AME separated from ALE less than from each other. Anterior row of eyes slightly procurved by centers, posterior row recurved by centers. Carapace clothed with woolly grey hair. Stridulating organs wanting. Promargin of *chelicerae* with a row of 9 black teeth. (There is one additional black granule between fourth and fifth tooth on left chelicera, and two additional granules on right chelicera, one between the third and the fourth, the other between the fourth and fifth tooth.) Between the margins near base a small row of minute granules and others irregularly scattered. Both margins with a scopula, but the one of the promargin is the denser one. Lip wider than long in ratio 16:11, wider behind than in front, semicircular at base, emarginate at end, with a few granules. Maxilla with a few granules at base near inner angle. Immediately behind the lip a pair of smooth sclerites in every respect similar to sigilla. Sternum longer than wide in ratio 42:40. Three pairs of sigilla, first and second minute, third twice their size, subrotund, widely separated from each other and separated by their diameter from the margin of the sternum. Coxæ subequal in size. A pad or brush on retrolateral surface of fourth leg wanting. Legs 4123. First leg 21 mm. long, second—18 mm., third—18 mm., fourth—24 mm. Third and fourth tarsal scopulae bisected by a row of setæ, the setæ on the fourth tarsus forming quite a wide band. First and second tarsal scopulae entire. First and second metatarsi barely longer than tarsi, third metatarsus distinctly longer.

fourth much longer than tarsus, as long as tibia. First metatarsus scopulate in distal $2/3$, second in distal $1/2$, third in distal $1/4$, fourth without scopula. Three ventral apical spines and one prolateral on tibia of palp.

Spines on legs: I—tibia, ventral 2 near end; metatarsus—ventral 1 near end. II—tibia—ventral 1 near end, 1 before middle, prolateral 1 a little beyond middle. Metatarsus—ventral 3 at end. III—Tibia—ventral 3 at end, prolateral 1 beyond middle. Metatarsus—ventral 3-2-3, prolateral 2, retrolateral 2. IV—tibia—ventral 3 at end, prolateral 2, retrolateral 1. Metatarsus—ventral numerous spines, prolateral 2, retrolateral 2. Long trichobothria in two rows on all tibiae, metatarsi and tarsi. Little club-shaped hairs on all tarsi between the common hairs. Legs clothed with short recumbent grey and long dark hair. Claws entirely concealed, curved, with a single row of five small teeth. Color in alcohol generally yellowish-brown, femora darker. Abdomen brown. One apparently mature female from Cerro Iglesia.

Sericopelma rubronitens Ausserer.

Large female from Culebra. Total length with chelicerae 45 mm. Carapace 19 mm. long, 17 mm. wide, flat, with deep transverse groove and deep radiating sulci. Anteriorly carapace truncated almost squarely. Eyegroup transversely rectangular. Anterior row procurved by centers, posterior row recurved. AME separated from each other by slightly more than their radius and by almost their diameter from ALE. Laterals equal in size, larger than AME, separated from each other by $1/2$ their long axis. PME smallest, about same distance from AME as from PLE, so that a straight line may be drawn touching these three eyes. Quadrangle much wider than long, trapeze-shaped. Tubercle not reaching edge of carapace, so that in front of the tubercle is a narrow true clypeus. Carapace clothed with light grey, woolly hair, with longer brown hairs interspersed. A fringe of long grey hair along anterior edge of carapace. A few long, stiff, brown hairs in front of and on eyetubercle. Stridulating organs wanting. Both margins of *chelicerae* with a red brown scopula. Promargin with eleven powerful black teeth, with numerous black granules to the outside of the proximal three teeth. Retromargin smooth. *Lip* wider than long in

ratio 35:30, convex, narrowed toward end which is slightly emarginate, and covered with numerous brown granules and long, stiff, incurved hairs. Base of lip semicircular. Immediately behind lip two crescentic brown, shiny spots or sclerites on the sternum, resembling the sigilla, but much larger. *Maxilla* with slightly but distinctly produced inner angle, with numerous granules at base. Scopula composed of long, fiery red hair. *Sternum* slightly longer than wide. Two pairs of sigilla, first pair opposite second coxae, second opposite third coxae, the two of both pairs wide apart, but separated from margin only by their length. Sternum clothed with woolly hair of white color and with stiff, erect, dark hair. Fourth coxae considerably larger than third and distinctly larger than first and second. *Abdomen* clothed with white woolly hair and long hair which is dark at base, but becomes grey toward end. This hair is considerably longer on the dorsum than on the venter. In front of the genital groove is an oval of white woolly hair surrounded by long, dark brown hair. *Legs* 41 $\frac{2}{3}$. First leg—53 mm., second—51 mm., third—51 mm., fourth—66 mm. Scopula on all tarsi heavy. On tarsi 1-3 it is entire, but on fourth tarsus it is bisected longitudinally by a narrow line of black bristles. First and second metatarsi with scopula almost to base, third and fourth without scopula. Several ventral spines on first and second tibia and one at base and three at end on second metatarsus. Several ventral spines on third and fourth tibia and on third metatarsus, while on fourth metatarsus the ventral spines are numerous. No spines on tarsi, nor anywhere else, except on palp, where there is one prolateral spine on femur near end and several ventral spines on tibia. Scopula of terminal joint entire. Femora of fourth pair with a velvety pad on retrolateral surface. Claws with three small teeth. Palpal claw smooth. Color in alcohol generally coffee-brown.

Psalmopoeus pulcher sp. nov. (Figure 2).

Male from the Canal Zone. Total length with chelicerae 38 mm. Carapace 15 mm. long, 15 mm. wide, very flat. Head flat. Thoracic groove small, transverse, straight. Eyetubercle low, wider than long in ratio 30:30. Eyecarrea rectangular, laterals extending to edge of tubercle. Anterior row very slightly procurved, posterior row slightly recurved. AME largest,

separated from each other by almost their diameter and from ALE by less than their radius. PME smallest, contiguous with PLE, but widely separated from each other. Quadrangle much wider behind than in front and much wider than long. Anterior declivity of tubercle extending to edge of carapace which is therefore slightly bulging out in middle. True clypeus wanting, but distance between AME and the anterior edge of the eyetubercle

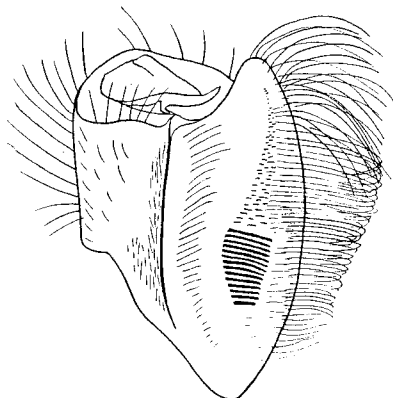


FIGURE 2, *Psalmopoeus pulcher* sp. nov., male. Left coxa of pedipalp with lyra.

is equal to the diameter of the AME. Several long thick, black hairs between the AME and in front of them. Elsewhere carapace is clothed with stiff dark and recumbent short, fine, grey hair, as are also the appendages and the dorsum of the abdomen. On the patellæ, tibiæ and metatarsi the black hair forms on the dorsal surface three indefinite longitudinal bands. Bushy lateral brushes on both sides of all patellæ, tibiæ, metatarsi and tarsi as well as of the third femora, while on first and second femora only a retrolateral brush is present, and on fourth femora only a prolateral one. Outer surface of *chelicera* with numerous parallel, transverse, shallow grooves and ridges and a few heavy, spinelike hairs below the scopula of the retromargin. Promargin with a row of 10 teeth of which the third and fifth from base are smaller than the rest. Both pro- and retromarginal scopulæ composed of fiery red hair. Lip black, with black hair, but chitin reddish beyond the granules. The *lip* is wider than long

in ratio 29:25. As the end of the lip, so is the inner angle of the maxillæ covered with numerous granules. The lyra is on the prolateral surface of the coxa of the pedipalp and is composed of from 14 to 16 bacilli (14 on the right coxa, 16 on the left), increasing in length distally. Beyond the last long bacillus are numerous short bacilli forming irregular rows as shown in Figure 2, overlapping each other and partly concealed by hair. The scopula of the maxillæ is fiery red. *Sternum* a little longer than wide, thickly clothed with black hair. Two pairs of sigilla, one pair opposite third coxæ, the other opposite fourth coxæ. This second pair is much larger than the first, long and submarginal. *Legs* 1423. First leg—62 mm., second—58 mm., third—51 mm., 4th—62 mm. First and second metatarsi and tarsi much the heaviest. First metatarsus 1 1/2 times as long as first tarsus. Fourth metatarsus more than twice as long as fourth tarsus, as long as fourth tibia. First tibia with two hooks covered with hair. No spines on legs. Tarsal scopulæ entire on all legs. First and second metatarsi scopulate to base, third metatarsus in distal half, fourth metatarsus in distal third. Claws so concealed by unguis tufts that they are quite invisible. Terminal joint of palp with a bushy pad. Bulb long, fine, curved and pointed, of the general appearance as in *P. cambridgei* with which *P. pulcher* has much in common except as to proportions.

Psalmopoeus rufus sp. nov.

Female. Total with chelicerae 33 mm. Carapace flat, 13.5 mm. long, 12.5 mm. wide, anteriorly truncated square except for the slightly protruding eyetubercle which reaches the margin. Thoracic groove deep, transverse. Sulci well visible, but not deep. Eyearea in the shape of a transverse rectangle. Anterior row of eyes slightly procurved, posterior row slightly recurved. AME as large as ALE, separated from each other by a fraction more than their radius (in ratio 5:4.5) and from ALE by less than radius. PME contiguous with PLE, but widely separated from each other. Laterals slightly separated from each other. Quadrangle wider behind than in front, trapeze-shaped, much wider than long. PME smallest, PLE slightly smaller than ALE. Carapace clothed with white woolly hair with long white hair interspersed. Abdomen clothed above with short white,

short brown and very long white hair with darker base. Promargin of *chelicera* with 9 black teeth of which the second and fourth from base are smallest. Prolateral surface of chelicerae smooth, red. Retrolateral surface red, clothed with short hair which becomes heavier and longer on the dorsal surface especially toward the base of the fang. Lyra on the coxa of the pedipalp, submarginal, composed of 10 stiff flat bacilli with blunt end. It is poorly developed, though easily seen and is not accompanied by small spines as in preceding species. End of lip and inner angles of maxillae densely covered with granules. Lip wider than long in ratio 28:22, with almost parallel sides, curved at base, emarginated at end. An area of smooth chitin on sternum behind lip. Both the pro- and the retromarginal scopula of the chelicerae, the maxillary scopula and the hair fringing the lip are red, while the hair covering the rest of the lip and the maxillae is dark brown. *Sternum* longer than wide, clothed with short brown and long black hair. Four sigilla. First pair opposite second coxae, second pair opposite third coxae, much larger and long, separated from margin by almost their length. Their anterior ends separated from each other by twice the length of the sigilla. Palpi, first and second legs much heavier than third and fourth legs. Legs 1423. First leg—41 mm. long, second—38 mm., third—32 mm., fourth—41 mm. A velvety pad on retrolateral surface of fourth femur. All legs fringed with a lateral brush of hair on both sides of patella, tibia and metatarsus. A lateral brush on the retrolateral surface of first and second femora, and on both sides of third and fourth femora. Scopulae very dense. Those of fourth tarsi bisected by a narrow line of setae, those of all other tarsi entire. First and second metatarsi scopulate to base, third metatarsus in distal half, fourth metatarsus in distal fifth. First leg without spines. Its metatarsus short, though distinctly longer than tarsus. No spines on second leg. Two terminal spines below on third metatarsus, as well as on fourth metatarsus. The latter slightly longer than tibia. Two longitudinal broad lines bare of all hair on all patellae. Legs clothed with short grey recumbent and long curved hair which is dark at base but becomes grey toward end. Claws entirely concealed by ungual tufts, strongly curved, smooth. Palp with a

heavy scopula on terminal joint. Color in alcohol reddish-brown above, abdomen brown, third and fourth legs yellowish-brown. Below, abdomen and third and fourth legs same color as above, rest darker, especially first and second pair of coxae. Habitat: Panama (definite locality not given).

FAMILY BARYCHELIDAE

Merothele gen. nov.

Thoracic groove transverse. ALE larger than PLE. Laterals separated from each other by almost the length of PLE. PME almost round. Anterior row procurved, posterior recurved. Rastellum wanting. All tarsal scopulae bisected longitudinally by setae. Claws with teeth. Lip and maxillae spinulose. Basal joint of spinnerets longer than the middle and terminal together, dorsally subdivided into two sclerites. This genus belongs in the sub-family Leptopelmatae. Type *M. zebra*.

Merothele zebra sp. nov.

Female from Cerro Flores. Total length with chelicerae 17 mm. Carapace 6.0 mm. long, 4.8 mm. wide, widely truncated in front. Thoracic groove transverse. Eyetubercle low, somewhat protruding beyond edge of carapace. Eyegroup transversely rectangular. ALE largest, PME smallest. Anterior row procurved, posterior row recurved. AME separated from each other by their radius and from ALE by more than their radius. PME almost round, equidistant from AME and PLE, the distance being the same as that between AME. Laterals separated from each other by almost the length of the PLE. Quadrangle much narrower in front than behind, not quite twice as wide as long. Eyecore behind posterior row clothed with black bristles directed forward; in front of first row with dark brown bristles directed backward. *Chelicerae* without rastellum, but with heavy bristles curved downward. Promargin with a row of twelve black teeth, a few small tubercles at base between margins and a very scant promarginal scopula. Retromarginal scopula heavy, red. Lip very slightly wider than long, with spicules at tip. *Maxilla* with spicules at inner angle, with heavy red scopula. *Sternum* as long