REVISION OF THE AMERICAN BUGS OF THE REDUVIID SUBFAMILY PLOIARIINAE.

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INTRODUCTION.

Begun in an effort to get additional light on certain problems not solved by then-existing literature, this study has gradually grown to the proportions indicated by the title. That we have been able to go so far is due in large part to generous loans of material for which we record our great appreciation. The initial basis of the work was the very good collection of Ploiariinae in the United States National Museum, but we have been favored with loans of large numbers of specimens by the Academy of Natural Sciences of Philadelphia, through E. T. Cresson, jr.; the Carnegie Museum of Pittsburgh, through Dr. W. J. Holland; Cornell University, through Dr. J. C. Bradley; and the Museum National d'Histoire Naturelle de Paris, through Dr. E. L. Bouvier. Smaller, but none the less appreciated, lots of material have been received from the Universitetets Zoologiske Museum, Copenhagen, through William Lundbeck; the Riksmuseets Entomologiska Afdelning, Stockholm, through Dr. B. Y. Sjöstedt; the American Museum of Natural History, New York, through Dr. F. E. Lutz; the British Museum of Natural History, London, through C. J. Gahan; and the Bishop Museum, Honolulu, through O. H. Swezey. Dr. Walther Horn, of the Deutsches Entomologisches Institut, generously sent us, with other specimens, the type of *Phasmatocoris spectrum* Breddin. Individuals who have kindly loaned us valuable material are Dr. E. Bergroth, who sent us the types of all his American species; Nathan Banks, H. G. Barber, J. R. de la Torre Bueno, William T. Davis (including the type of *Ghilianella productilis* Barber), W. Downes, Dr. Carl J. Drake, J. S. Hine, Dr. H. S. Parshley, and Dr. Miles S. Pennington. Assistance in reporting on the characters of specimens in their care has been given by Nathan Banks, of the Museum of Comparative Zoology, Cambridge; W. E. China, of the British Museum; and C. W. Johnson, of the Boston Society of Natural History. The

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collections of the Boston Society, Museum of Comparative Zoology, and Field Museum of Natural History have been examined also by one of the authors during the progress of the work.

THE GROUP TREATED.

(Subfamily Ploiariinae; Family Reduviidae.)

Insects of the subfamily Ploiariinae, in common with all other Reduviidae, have a longitudinal groove between the fore coxae which is invariably microscopically transversely striate, and in which the tip of the beak generally lies when at rest. This groove is called by some writers a "stridulatory groove" but whether it is really so we are unable to say. However, it is highly characteristic, as it is not present in any other family of Heteroptera known to us except the Phymatidae.

Absence of ocelli, and presence of anteriorly opening coxal cavities, and of usually very elongate fore coxae are the principal distinguishing characters of the Ploiariinae but neither is sufficient in itself for their recognition. The Saicinae also lack ocelli but the fore coxae are less elongate than in most Ploiariinae, the beak is armed with upwardly directed spines and the lower surface of the head is provided with two or more strong bristles. These spines and bristles are absent in the Ploiariinae. The Bactrodinae look considerably like Ploiariinae but differ structurally from them in characters more important even than do the Saicinae. The Bactrodinae have less elongate coxae than most Ploiariinae, possess ocelli, and the head is inserted not on the front or at most on the anterior margin of the prothorax but on the dorsum of that sclerite distinctly posterior to the front margin.

Expressing the most characteristic differences between these subfamilies in key form we have:

1. Anterior coxal cavities opening straight downward; ocelli none; underside of head with downwardly projecting, and beak with upwardly projecting, bristles or spines ..... **Saicinae.**
   Anterior coxal cavities opening forward and downward; head and beak without such armature 2
2. Ocelli absent; head scarcely pedicillate, lower anterior border of prothorax scarcely produced beyond upper margin, on which the head is inserted. **Ploiariinae.**
   Ocelli present; head pedicillate; lower anterior border of prothorax produced distinctly beyond the upper margin, behind which the head is inserted. **Bactrodinae.**

The antennae in Ploiariinae are very long and slender, 4-segmented, sometimes with a pseudo-suture near apex of fourth segment which is often pointed and more or less angulate or curved; the beak is elongate, curved downward and backward, usually

swollen at base, and acute at tip, and distinctly 3-segmented. The thorax is variously formed and the wings may be either large, reduced, or absent. The basal abdominal tergite is situated on the posterior part of thorax and the basal sternite is absent, a fact that should be borne in mind in counting the abdominal segments. The male hypopygium opens more or less dorsally, and the apical tergite sometimes entirely covers the orifice.

The fore wings of the Ploiariinae (as also those of some other Reduviidae) constitute an exception to a commonly accepted criterion to the Heteroptera in that they are of uniform texture throughout. The venation has not been homologized with that of other insects and the names applied by us to the cells and veins are arbitrary terms, which however, are clearly defined in the explanation of plate 1.

The fore legs of Ploiariinae are adapted for capture of prey by closure hinge-wise of the fore tibia and tarsus against the lower surface of the fore femur. The opposing surfaces of the front femora and tibia are nearly always armed with spines or setulae, the arrangement of which is characteristic, as a rule, in each genus, minor variations in them indicating subgeneric or specific groups. The fore tibia has a rather conspicuous transverse slit (figs. 13, 18, 136, and 145) on the anterior surface near apex which is surrounded by dense pilosity. The fore tarsi present a range of differentiation not found in any group of similarly related forms known to us. In the case of this strictly predaceous subfamily, it is natural to suppose that evolution has been in the direction of efficiency in the most important raptorial organs, the front legs. In our opinion, the fore tarsus in its most generalized form consists of distinctly separated segments the terminal one with two equal claws. We assume the course of evolution to be from that condition through forms with poorly defined, heavily chitinized segments with one large and one small claw to a highly specialized stage in which the fore tarsus is thorn-like, the joints entirely fused, and wholly without differentiated claw. The mid and hind tarsi are invariably 3-segmented and being used in the normal manner, not for grasping prey, are not specialized.

IS TRIBAL DIVISION OF THE PLOIARIINAE ADVISABLE?

Attempts have been made to define tribes of Ploiariinae, two of the principal efforts along this line being by Stal[1] and by Distant.[2] Put in the form of indented dichotomous keys these schemes are herewith appended.

[1] Enum. Hemip., vol. 4, 1874, pp. 92–94.
[2] Fauna Brit. India, Rhynchota, vol. 2, 1904, pp. 201–216.

TRIBES OF PLOIARIINAE ACCORDING TO STAL.

A[1]. Front femora armed for their whole length beneath with long, slender spines, all or most of them setiform; hind femora surpassing apex of abdomen; front tibia and tarsus together usually subequal in length to front femur, rarely distinctly shorter; body usually winged.

B[1]. Front tarsi short, segmented, flexible or sub-flexible, two-clawed, scarcely or not at all longer than hind tarsi; front tibia a little shorter than femur; hemelytra of species known to me marked with fuscous; scutellum and post-scutellum armed apically with spines.

PLOIARIARIA.
Ploiaria (=Empicoris).
Malacopus.
Stenolemus.

B[2]. Front tarsi long, scarcely or not at all shorter than tibia, one segmented or composed of three connate segments, subcurved, subcompressed, as seen from the side usually distinctly tapering toward apex, provided with two unequal contiguous or subcontiguous claws, or with one claw; front tibia much shorter than femur, sometimes only about half as long; first joint of antenna long; hemelytra scarcely or only very pale fuscous marked.

LEISTARCHARIA.
Orthunga.
Tinna.
Cerascopus.
Luteva.

A[2]. Front femur unarmed beneath toward the base or in front of middle; half or less than half its length, apically, armed with unequal spines; front tibia and tarsus together shorter than femur; body much elongated; head with the small eyes scarcely or only slightly wider than apex of thorax.

C[1]. Postocular part of head perceptibly tapering posteriorly, quite slender behind; hind femur distinctly, sometimes far, surpassing apex of abdomen; legs very long.

EMESARIA.
Gardena.
Ghilianella.
Emesa.
Ischnobaena.

C[2]. Postocular part of head scarcely or only slightly narrowed posteriorly, abruptly rotund coarctate at base; hind femur attaining or slightly surpassing apex of abdomen; head armed between the antennae with an usually very distinct tubercle or more often with a spine; tylus usually projecting as a spine.

METAPTERARIA.
Barce.
Metapterus.
Ischnonyctes.
Bargylia.

In criticism of the foregoing arrangement we would point out that:

1. The spines of the front femur of numerous species included under Stal's first major division are not setiform, but on the contrary, strongly chitinized.

2. Failure of the character of relative length of joints of front leg is admitted in the key.
3. "Usually winged" is an expression not applicable to *Cerascopus.*
4. Reference to color markings of hemelytra is entirely out of place in a key to tribes and especially when both sections are the same in this respect.
5. *Ploiaria* in the sense of *Ploiariola* (=*Empicoris*) is the inexplicable but frequent error of using the name of this monobasic genus for a species not the genotype nor congeneric with it.
6. There are no one-segmented tarsi in the genera named by Stal in his *Leistarcharia.*
7. *Orthunga* and *Tinna* are *Saicinae* not *Ploiariinae.*
8. *Cerascopus=Ploiaria* and we include *Luteva* as congeneric.
9. Head with eyes scarcely wider than apex of thorax is a character not in contrast with that of certain forms in the first division of key, species of *Ploiaria* for instance.
10. The attempt to define the tribes *Emesaria* and *Metapteraria* is futile; all gradations in posterior narrowing of head can be found in the species of the single genus *Ghilianella.* Most of the species of this genus have a spine or tubercle between antennae which would put the genus in the Metapteraria; and there is confessedly nothing to depend upon in length of hind femur.
11. *Barce=Metapterus.* Stal's character for separating them is of no more than specific importance.

TRIBES OF PLOIARIINAE ACCORDING TO DISTANT.

A.[1] Anterior femora spined beneath for their whole length.

B.[2] Anterior tarsi short, not longer, or a little longer than the posterior tarsi; hemelytra present or absent, when present, so far as known, ornamented with fuscous; scutellum and postscutellum frequently spined at apices.

STENOLAEMARIA.
Stenolaemus.
Ploiariola.
Myiophanes.
Eugubinus.

B.[2] Anterior tarsi long, not, or a very little shorter than the tibiae; hemelytra either not or sometimes very strongly marked with fuscous.

LEISTARCHARIA.
Bagauda.
Luteva.
Ploearia.

A.[2] Anterior femora spined beneath only from about or near middle.

C.[1] Head much narrowed at base; posterior femora either almost reaching or passing abdominal apex.

EMESARIA.
Ghilianella.
Gomesius.
Ischnobaena.
Gardena.

C.[2] Head not prominently narrowed posteriorly; posterior femora nearly reaching or passing abdominal apex; head between antenniferous tubercles distinctly spinous or tuberculous.

METAPTERARIA.
Ischnonyctes.

The criticisms of Stal's definitions of the tribes mostly apply to Distant's efforts also; and the lack of contrast in the characters assigned to the last two tribes is even more apparent. The truth is that the exact nature of important characters has been overlooked and an attempt made to define tribes upon criteria not acceptable even for the differentiation of genera. In our view attempting to recognize tribes of Ploiariinae is no more likely at the present moment to elucidate the relationships of the genera, than one would be led to suppose from the futile attempts of the past.

CHARACTERS USED FOR THE RECOGNITION OF GENERA.

In arriving at decisions as to what groups constitute valid genera and subgenera we have used as our criteria characters that appear to us to be of phylogenetic value, and in our arrangement have indicated what are in our opinion evolutionary steps insofar as the available material has permitted.

We have used the wing venation to a greater extent than has previously been attempted in this group, and this character has proved very useful in the alignment of related forms. As noted above the structure of the fore legs and their armatures, and especially the segmentation and form of the fore tarsi, have been used to an even greater extent than in preceding works upon this subfamily, but these characters have invariably been correlated with venational and other structural characters in the final analysis before assigning any particular species to a genus or subgenus.

In our work on this and other groups we have endeavored to utilize as generic indices characters which appear to us to indicate a common origin for the included species, and slight departures from the general rule such as we find in *Ploiaria* and *Ghilianella*, we have not considered as sufficient grounds for elevating the divergent forms to full generic status. Had we failed to find the intermediate subgenus *Ploeodonyx*, linking *Ghilianella* s.s. and *Lissonyx* we would very probably have considered the latter as a valid genus but with an intermediate form present it is undesirable to give to these closely related segregates the same rank as we accord to such distinctly separated genera as *Gardena* and *Emesaya*.

In the case of the last two genera there is a striking similarity in wing venation accompanying a great dissimilarity in the structure of the fore legs, the tarsi of *Gardena* being of the generalized simple type, while those of *Emesaya* are heavily chitinized and subfused.

In this case the evidence of the venation of the wings, in our opinion, outweighs that of the fore tarsal structure as an index to relationship, and we consider the genera as much more closely related to each other than either is to *Stenolemus* or *Emesa*. That such a relationship should be expressed by the use of tribal designation may be urged, but it should not be forgotten that characters of generic value are distributed in many intermeshing combinations and that as a consequence, definition of tribes of phyletic significance becomes impracticable.

The characters used as generic criteria in this synopsis of the Ploiariinae may have in allied subfamilies and families either more or less significance, but in our work we have steadfastly adhered to the idea that when classifying these insects we were dealing with a group, which though related to others, is subject to modification through influences that may or may not have affected these related groups. Any group of organisms must be classified on the basis of the characters it possesses, and the value these or other characters have in other groups, has nothng to do with the case. Classified on the basis of venation practically all of the vast family of Anthomyiidae would fall into a single genus, on leg structure the Jassoidea could be but little divided, nor could Coccidae on the characters of the beak, and so on. A synopsis of a group should be based on characters inspection proves to be of value for that group. There has been no greater retarding factor in systematic entomology than that of grafting supplementary work here and there upon the old, of using the characters and methods that have been used instead of seeking something of greater significance. Each new piece of synoptic work should penetrate as much further into the heart of things as possible, judiciously noting and using, but neither copying nor worshipping previous contributions to the study.

Under each genus will be found a discussion of the characters and a systematic alignment of the included species, the groups being in all cases distinguished by means of characters that we consider are of more than specific value, but not of sufficient importance in most cases to justify the use of a distinctive appellation for the groups concerned.

METHOD OF DESCRIPTION.

The keynote of descriptions throughout this paper is avoidance of repetition. In other words characters common to the whole subfamily are not mentioned in definitions of genera, and it has been our intention to hold to the minimum, repetition in specific descrptions of characters noted in descriptions of genera, in the keys to the species, or in descriptions of very similar forms. As a result, in some cases, specific descriptions may appear brief and inadequate. Nevertheless

we believe the method adopted to be the best, not only because it saves space and therefore cost of printing, but what is more important it avoids burying in a mass of verbiage, the really essential points of characterization. Some entomologists insist upon the so-called full descriptions and while their motive is laudable, a little consideration of actual entomological practice indicates that the results are not those hoped for. It seems the almost certain fate, for instance, when revising a group, to find that no matter how "full" previous descriptions may be, they contain no mention of the particular detail about which information is sought. And this defect is inherent in the very nature of taxonomic practice. In every revision worthy of the name intensive search is made for new characters that will aid in classification of the group and the more success attained in finding them the more will previous descriptions fail to satisfy. Viewed from this standpoint, it is obvious that an isolated description, however lengthy, might fail to mention any character essential to recognition of the species. The moral is that the best method of describing new forms is in revisions where keys are given, and other comparisons made with related forms. A few words of description or comparison in such a connection is likely to be worth more than pages of description not formulated as a result of revisional work.

Statements of length in this paper refer to greatest length from front of head to tip of abdomen or of hemelytra as the case may be.

PRINCIPAL WORKS CITED.

Because of the frequency with which certain writings on the Ploiariinae are cited, it seems desirable to adopt much abbreviated references to them. The shortened forms used and bibliographic references in full for the papers in point are given in the following lists:

BANKS. EMESIDAE. 1909.

BANKS, NATHAN. Notes on our species of Emesidae. Pysche, vol. 16, No. 3, June, 1909, pp. 43–48, 2 figs.

Keys to genera and species of the United States; 6 species described as new.

BERGROTH. PLOEARIINEN. 1906.

BERGROTH, E. Zur Kenntnis der Ploeariinen. Verhandlungen der kaiserlich-königlichen zoologisch-botanischen Gesellschaft in Wien, vol. 56, 1906, pp. 305–321.

Original descriptions of 6 American species, and redescription of one of Dohrn's species.

CHAMPION. BIOLOGIA, 2. 1898.

CHAMPION, G. C. [Emesinae.] Biologia Centrali-Americana. Insecta. Rhynchota. Hemiptera-Heteroptera. vol. 2, pp. 162–175, pl. 10, figs. 7–24, October, 1898.

Key to the genera, two of which and 9 species are described as new.

DOHRN. EMESINA. 1860.

DOHRN, ANTON. Beiträge zur einer monographischen Bearbeitung der Familie der Emesina. Linnaea Entomologica, vol. 14, 1860, pp. 206–252, with Nachtrag, pp. 253–255, pl. 1.

Key to the genera, of which 3 that occur in the Americas, and 15 species are described as new.

DOHRN. NACHTRÄGE. 1863.

DOHRN, ANTON. Same title (Zweites Stück) and journal, vol. 15, 1863, pp. 42–63, with Nachträge, pp. 64–76.

Redescriptions of a number of genera and species both of Dohrn and other authors. In the Nachträge, two genera and 4 species from the Americas are described as new.

KEY TO THE GENERA.

We have placed in the following key only those genera of which we have examined authentic material, including a few of extralimital distribution inserted for comparative purposes. Notes on other American genera follow the key.

1. Fore tarsi distinctly segmented, sometimes heavily chitinized and the segments subfused, but the dividing sutures always visible under a high-power lens; claws of fore tarsus consisting of an equal sized pair except in some species of **Ploiaria** and in **Deliastes**_____ 2

   Fore tarsi without distinguishable segmentation under the highest power lens (even when cleared), consisting of but one heavily chitinized segment, with an unequal pair of claws, a single claw, or without distinct claws_____ 13

2. Fore femur without distinguishable ventral spines or bristles, only fine hairs present; third antennal segment as long as second and about three times as long as fourth; mesonotum without, metanotum with a spine; venation as in figure 1_____[3] **Emesopsis** Uhler (p. 13).

   Fore femur with distinct spines or bristles on ventral surface which are readily distinguishable from any fine hairs which may be present except in some species of the genus *Empicoris;* third antennal segment not nearly as long as second and frequently shorter than fourth_____ 3

3. Ventral spines on fore femur commencing at or very close to base; fore tibia very distinctly over half as long as fore femur_____ 4

   Ventral spines of fore femur commencing at or very close to middle; fore tibia not over half as long as fore femur_____ 12

4. Forewing with a closed subtriangular cell at basal extremity of the large discal cell, which does not touch margin of wing at any part (fig. 14); adults always winged; prothorax always with a deep constriction and distinctly bilobate, often pedunculate_____ 5

   Forewing lacking a closed subtriangular cell at basal extremity of the large discal cell (fig. 11); adults sometimes apterous; prothorax neither pedunculate nor lobate, never more than slightly constricted_____ 8

5. A longitudinal vein which connects with either the small subtriangular cell or the base of discal cell fuses with the vein joining apex of former at some distance from base of wing so that the disk of wing has 3 closed cells

[3] The Oriental species of this genus which we have seen have very weak spines on the ventral surface of fore femora and the antennae similar to those of *Empicoris* in general structure.

(figs. 45, 46, 47); mesonotum and metanotum sometimes with tubercles but without long spines at apices; fore tarsi 3-segmented.

Emesa Fabricius (**Westermannia** Dohrn) (p. 38).

When there is a vein connecting with the small discal cell it is usually short and its end is either free or it does not fuse with the other longitudinal vein, i. e., disk of wing with but 2 closed cells (figs. 33, 65, 66) ---------- 6

6. Mesonotum and metanotum without long spines; fore tarsi 3-segmented.

Myiophanes Reuter (Extralimital).

Mesonotum and metanotum each with a long spine or thorn---------- 7

7. Fore tarsi 3-segmented; no short vein emanating from costal margin of basal discal cell of forewing (fig. 65)--------**Polauchenia**, new genus (p. 47).

Fore tarsi 2-segmented; a short vein emitted from costal margin of basal discal cell (figs. 21, 23, 26, 29)----------**Stenolemus** Signoret (p. 25).

8. Fore tarsi 2-segmented, the segments nearly fused and subequal in length; claws unequal----------**Deliastes** Dohrn (p. 34).

Fore tarsi either 3-segmented or the segments not as above and claws equal ---------- 9

9. Pronotum not extending over mesonotum even in the winged forms; fore tarsus long, heavily chitinised, glossy and bare above, the 3 segments fused so closely that the oblique sutures are visible only under a very high-power lens; venation of forewings as in figures 73, 84, 89; adults often apterous---------**Ploriaria** Scopoli. (incl. **Luteva** Dohrn) (p. 48).

Pronotum extending over mesonotum to base of wings; adults always winged; fore tarsus short, not heavily chitinized nor glossy and bare above, the segmentation distinct---------- 10

10. Prothorax slightly constricted near anterior margin; mesonotum, metanotum, and basal abdominal tergite each with a long erect spine; fore tarsi 2-segmented.

Empicoris Wolff (=**Ploiariodes** Buchanan-White) (p. 13).

Prothorax slightly constricted at or near middle; mesonotum without a spine; fore tarsi 3-segmented---------- 11

11. Basal segment of beak shorter than second; fore tibia with a complete series of short ventral denticles; venation of forewing as in figure 43.

Lutevopsis Champion (p. 37).

Basal segment of beak longer than second; fore tibia with short decumbent pale setulae on ventral surface; venation of forewing as in figure 38.

Panamia Kirkaldy (p. 36).

12. Fore tibia almost half as long as fore femur; basal ventral spine of fore femur not longer than the longest of the others; fore tarsus with the segments well defined, not heavily chitinized, hairy above; venation of forewing as in figure 94; mesonotum highly glossy---**Gardena** Dohrn (p. 66).

Fore tibia not nearly half as long as fore femur; basal ventral spine of fore femur very distinctly longer than the longest of the others; fore tarsus with the segments poorly defined, heavily chitinized, bare above; venation of forewing as in figure 137; mesothorax sericeous.

Emesaya n.n. (for **Emesa** Authors not Fabricius) (p. 74).

13. Fore tarsus with two longitudinal series of angularly deflected spines which under a high power appear like elongate knife-like teeth on its ventral surface (fig. 166); head with a more or less pronounced spine or tubercle between bases of antennae, labrum closely adherent to base of rostrum, not projecting spine-like (fig. 165); adults never winged.

Ghilianella Spinola (p. 90).

Fore tarsus with two series of decumbent setulose hairs on its ventral surface (fig. 141); adults sometimes winged---------- 14

14. Head normally with two stout tubercles or spines, one between bases of antennae and the other (labrum) above base of proboscis (fig. 139); pronotum in winged form overlapping mesonotum to base of wings.
Metapterus Costa (**Barce** Stal) (p. 83).
Head with neither of the above mentioned tubercles or spines (fig. 140); pronotum in winged forms not overlapping mesonotum except at anterior extremity_____**Ischnonyctes** Stal (Extralimital[4]).

NOTES ON AMERICAN GENERA NOT INCLUDED IN THE FOREGOING KEY.

Emesella DOHRN, Emesina. 1860, p. 239. [Monobasic, *E. nebulosa*, new species, genotype, Bolivia, pp. 239–240.] From the original description it is impossible to determine the relationships of this group. If *Emesella immitis* (Bergroth, Ploeariinen, 1906, pp. 312–314, Venezuela) really is congeneric, we should say from inspection of imperfect specimens of this species, that Emesella probably would place in our classification as a subgenus of *Ghilianella* near *Lissonyx*. Signoret adds a species to this genus, namely *E. dohrni* Revision des Hemipteres du Chili, Ann. Soc. Ent. France, ser. 4, vol. 3, 1863, pp. 587–588 [Chili].

Malacopus STAL, C. Bidrag till Rio Janeiro-Traktens Hemipter-Fauna, 1862, pp. 80–81. [Monobasic, *M. cellularis*, new species genotype, Brazil.]

Palacus DOHRN, Nachträge, 1863, pp. 74–75 [Monobasic *P. cubensis*, new species genotype, Cuba, p. 75.] See remarks under *Deliastes* p. 34. The species described by Guerin-Meneville as *Ploiaria pallida* is put in *Palacus* by Lethierry and Severin, Cat. Gen. Hemip., vol. 3, 1896, p. 74. The original description of the species occurs in Sagra, Ramon de la, Historia Fisica, Politica y Natural de la Isla de Cuba, vol. 7, Crustaceos, Aragnides e Insectos, 1856 [Cuba]. This name is preoccupied by *Ploiaria pallida* Montrouzier, P., Essai sur la Faune de l'Isle de Woodlark ou Moiou, Ann. Sci. Phys. Nat. Lyon, ser. 2, vol. 7, pt. 1, 1855, p. 110.

SYSTEMATIC ARRANGEMENT OF THE AMERICAN GENERA

In connection with this arrangement we would first point out that in this as in most groups of existing insects there is little to which the much overworked word "primitive" can legitimately be applied. Rather we have in the modern insect world the products of specialization along a multitude of intercrossing lines, any one of which may be highly specialized in some, and but little specialized in other respects. The selection of the least specialized form and the tracing of the probable course of evolution in a group, is, therefore, a subject upon which opinion may vary greatly, according to the choice of characters of primary, secondary, and lesser degrees of importance.

Adhering to the idea that development of predatory efficiency is the course of evolution of the Ploiariinae we believe little objection can be made to placing *Emesopsis* at the base of the American series of genera. While the venation of this genus is more complex and

[4] There is a damaged specimen of *Ischnonyctes* in the National Collection, labelled N. O., La., R. H. Browne. We assume this is an accidentally introduced individual, and that it was collected in New Orleans.

therefore less specialized according to a prevalent view of the subject, there can be little doubt that this specialization is secondary, for there is no probability that an insect participating in the long course of evolution of so specialized a group as the Ploariinae could carry along the whole route a primitive type of venation.

Theoretical considerations are involved also in the question as to whether the possession of 2-segmented fore-tarsi (a nymphal character) is a forward- or a backward-looking specialization. Despite the fact that it would appear to be a step toward greater predatory effectiveness we have been obliged to give greater weight to certain other characters when the whole organization of a genus having 3-segmented fore tarsi seemed to be more perfectly fitted for predation.

We have endeavored to strike a fair balance among the characters entitled to consideration in settling upon a systematic arrangement, and believe we have been in a better position for so doing than our predecessors because of the much larger amount of material examined.

Fore tarsi segmented.
- Fore femora without spines or bristles; fore tarsi 2-segmented; forewing reticulate toward base, with about 5–6 discal cells. **Emesopsis** (p. 13).
- Fore femora with spines or bristles; forewing (when present) with fewer discal cells.
  - Fore femora spined for almost their whole length; fore tibiae relatively long.
    - Fore tarsi 2-segmented.
      - Fore tarsi not heavily chitinized, basal segment the shorter, claws equal; apices of meso- and meta-thoraces, each usually bearing a spine.
        - Forewing with one discal cell; prothorax scarcely constricted. **Empicoris** (p. 13).
        - Forewing with two discal cells; prothorax deeply constricted or pedicillate **Stenolemus** (p. 25).
      - Fore tarsi heavily chitinized, segments subfused, subequal, claws unequaled; meso- and meta-thoraces without spines; forewing with 3 discal cells **Deliastes** (p. 34).
    - Fore tarsi 3-segmented.
      - Fore tarsi usually flexible, hairy, at least above, claws equal.
        - Meso- and meta-notum each with a spine; fore wing with 2 discal cells **Polauchenia** (p. 47).
        - Meso- and meta-nota unspined.
          - Fore wing with 3 discal cells **Emesa** (p. 38).
          - Fore wing with 1 discal cell **Panamia** (p. 36). **Lutevopsis** (p. 37).
      - Fore tarsi inflexible, polished, sutures inconspicuous, claws usually unequal; fore-wing when present with 1 discal cell. **Ploiaria** (p. 48).
  - Fore femora spined on distal half; fore tibiae relatively shorter; fore wing with 1 discal cell **Gardena** (p. 66). **Emesaya** (p. 74).

Fore tarsi not segmented (even in nymphs); fore wing (when present) with 2 discal cells ..... Metapterus (p. 83).
Ghilianella (p. 90).

SYSTEMATIC ACCOUNT OF THE GENERA AND SPECIES.

Genus EMESOPSIS Uhler.

Emesopsis UHLER, P. R. A list of the Hemiptera-Heteroptera collected in the Island of St. Vincent by Mr. Herbert H. Smith; with descriptions of New Genera and Species. Proc. Zool. Soc. London, 1893, p. 718 [Monobasic, genotype *E. nubilus*, new species, St. Vincent: Cuba].

In addition to the characters in the key the following may be mentioned for this genus: Head and prothorax similar to those of Empicoris, the prothorax however, without lateral carinae. The mesonotum is produced into a backwardly directed subtriangular process which is rounded above, the metanotum has a long erect slender spine at apex, and the basal abdominal tergite has a much shorter spine. Fore tarsi as in *Stenolemus*: Basal segment of beak about twice as long as second, the latter subglobose; the third joint slender, nearly as long as first. The reticulate venation of corium is very characteristic (see fig. 1).

EMESOPSIS NUBILUS Uhler.

Emesopsis nubilus UHLER, P. R. Proc. Zool. Soc. London, 1893, pp. 718–9 [St. Vincent: Cuba].

A testaceous yellow species without distinct markings, the fore wings with indistinct yellowish brown mottling; eyes ruby red. Posterior lobe of head convex, distance from posterior margin of eye to back of head about twice as great as from anterior margin of eye to front of head and greater than width of eye; hairs of antennae much shorter than those of mid and hind legs. Fore coxae a little over half as long as fore tibiae, the latter over four-fifths as long as femur. Abdomen elongate ovate, the lateral outline smooth, spiracles slightly elevated; spical margin of male hypopygium produced into a subtriangular plate, the apex of which is thorn-like; claspers long, slender, curved at apices; apex of abdomen of female without processes, similar to that of females of *Empicoris*. Venation of fore wing as in figure 1.

Length 4–5 mm.

Localities.—Mount Gay Estate, and Balthazar, Grenada, West Indies, H. H. Smith; Cayamas, Cuba, May 31, June 5, E. A. Schwarz; Cuba, Uhler Collection (U.S.N.M.).

Genus EMPICORIS Wolff.

Empicoris WOLFF, J. F. Icones Cimicum Descriptionibus illustratae, Fasc. 5, 1811, p. IV [Monobasic, *Gerris vagabundus* Linnaeus genotype].

Ploiariodes WHITE, F. BUCHANAN. Descriptions of new species of Heteropterous Hemiptera collected in the Hawaiian Islands by the Rev. T. Blackburn.—

No. 3, Ann. and Mag. Nat. Hist., ser. 5, vol. 7, 1881, pp. 58–59. [Monobasic, *P. whitei* Blackburn ms., genotype, Mauna Loa.]

Ploiariola REUTER, P. M. Revisio synonymica Heteropterorum palearcticorum quae descripserunt Auctores vetustiores (Linnaeus 1758–Latreille 1806). II. Acta Soc. Sci. Fennicae, vol. 15, 1888, p. 711 [New name for *Ploiaria* of Latreille not of Scopoli, the genotype of which, *Cimex vagabundus* Linnaeus automatically assumed the same relation to the new name.]

Emendations: *Ploeariodes; Ploeariola.*

We are not in ignorance of what has been said[5] in favor of regarding *Ploiariodes and Ploiariola* as distinct genera, but we find the chief character advanced for their separation, namely the lateral carina of pronotum, showing practically all phases from distinct to obsolete.[6] Even were this character unequivocal we should regard it of no more than subgeneric value in view of the agreement throughout the species in general coloration and habitus as well as in the venation of the forewings and the structure of the fore legs. All species known to us have the legs and antennae as well as the beak with blackish spots or annuli, and the wings are invariably dark spotted. The head and thorax have silvery hairs, usually arranged in distinct lines, some of these being almost invariably evident on pleura and pectus. The pronotum is more or less distinctly vittate, at least behind the constriction but there are some differences in this respect which are used in defining a few of the species; the carina on side of pronotum is nearly always pale. The abdomen usually is dark, with the spiracles and spots on connexivum pale, the venter finely pubescent, with more or less of the median line, and sometimes spots about bases of certain longer hairs, bare.

The radial vein runs to beyond the middle of the fore wing, ending in the costa, the apical portion of it being what we have called the "stigma" which offers some good distinguishing characters for the species both in its shape and color. The pronotum is divided into two parts by a broad constriction, the anterior part being about half as long as the posterior, but there are no species known to us in which the pronotum is at all pedicillate. All species have the mesonotum and metanotum, and usually the basal abdominal tergite with a slender thorn on the middle of the hind margin; the presence or absence of a process on middle of hind margin of the pronotum is a specific character. The spines or bristles on fore femora are sometimes difficult to see even with a high power lens.

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[5] Especially Bergroth, E. Ploeariodes B. White und Ploeariola Reut. (Hemiptera-Heteroptera, Reduviidae.) Rev. Russe d'Ent., vol. 9, No. 3, Nov. 1909, p. 324.

[6] We have examined several species from the Oceanic region in addition to those treated herein.

KEY TO THE SPECIES.

1. Pronotum with the lateral carinae distinguishable only at anterior and posterior extremities, obsolete in middle; eighth sternite in male with a large rounded central incision in posterior margin (fig. 2); stigma with a reddish line along inner or posterior margin from cross-vein to apex.

rubromaculatus (Blackburn) (p. 16).

Pronotum with the lateral carinae complete, pale colored on their entire length; eighth sternite in male produced in middle of hind margin; stigma without a red line along inner margin apically 2

2. Pronotum with two dorsal linear yellowish carinae similar to the lateral carinae, extending the entire length of dorsum; dark markings of forewings peppered with minute hyaline dots; lateral carinae of pronotum not capitate at anterior extremity ..... **barberi** (McAtee and Malloch) (p. 19).

Pronotum without sharp dorsal carinae, with two slight rounded longitudinal elevations; dark markings of forewings solid; lateral carinae more or less distinctly produced or capitate at anterior extremities 3

3. Hind wings conspicuously spotted with black apically, or fuscous with white reticulations 4

Hind wings not spotted apically or very faintly so at extreme tip (cf. *orthoneuron*) 5

4. Pronotum with a conspicuous tubercle on middle of hind margin; anterior extremity of lateral carina of pronotum with a small capitate process which projects nearly at right angles to pronotum; fore wings not perceptibly honeycombed as in next species; vein closing posterior half of apex of discal cell much more conspicuously bent than its fellow (fig. 11).

errabundus (Say) (p. 24).

Pronotum without a median tubercle on hind margin; lateral carina of pronotum with at most a slight process at anterior extremity which is not capitate nor at right angles to pronotum; fore wings microscopically honeycombed with fine black lines which are most noticeable basad of apex of discal cell and in the dark spots of membrane (best seen in transmitted light); veins closing discal cell almost symmetrically formed.

reticulatus, new species (p. 20).

5. Both veins closing discal cell of hemelytra at apex nearly straight (fig. 4); posterior lobe of pronotum not narrowed in front, a little broader than long, without a median process on middle of hind margin, the lateral carina with a small process at anterior extremity; wing without microscopic honeycombing; hind wings may be faintly spotted apically.

orthoneuron, new species (p. 18).

At least the vein closing posterior half of apex of discal cell conspicuously bent or angulated; posterior lobe of pronotum as long as or longer than broad, narrowed anteriorly, the sides not straight; wings without microscopic honeycombing 6

6. The large fuscous spots on forewings irrorated with minute clear dots; one or two of the spines at base of ventral series on fore femur about as long as the femoral diameter and quite stout; fore coxa stouter than usual, not longer than distance from coxal cavity to upper margin of pronotum; tubercle on hind margin of pronotum small, the lateral carina with a small process at anterior extremity which projects at nearly right angles to the pronotum ..... **parshleyi** (Bergroth) (p. 22).

The large fuscous spots on forewings not irrorated; fore femoral spines not nearly as long as the femoral diameter; fore coxa longer than distance from coxal cavity to upper margin of pronotum anteriorly 7

7. Pronotum with a distinguishable tubercle on middle of hind margin---- 8
Pronotum without a distinguishable tubercle on middle of hind margin- 10
8. Tubercle on middle of hind margin of pronotum very small, the linear white vittae distinct in front of constriction, almost straight, disk almost bare; bases of fore wings spotted with fuscous.
subparallelus, new species (p. 21).
Tubercle on middle of hind margin of pronotum large---------- 9
9. Pronotum with two conspicuously curved linear pilose white vittae which are distinct in front of constriction; bases of fore wings white.
nudus, new species (p. 22).
Pronotum with two moderately broad whitish vittae which do not extend in front of constriction nor to hind margin, the disk with rather conspicuous white decumbent hairs; eighth sternite in male with a very slender apical process (fig. 8)----------**armatus** (Champion) (p. 20).
10. Stigma linear, entirely black, forming a conspicuous costal streak centered on vein closing costal half of discal cell, the latter much longer than that closing the other half (fig. 6); cross-veins in middle of hind wing forming a straight line (fig. 7)----------**winnemana**, new species (p. 19).
Stigma widened beyond vein closing costal half of discal cell, the latter not longer than that closing other half (fig. 3); cross-veins in middle of hind wing forming an angulate line---------- 11
11. Stigma with two or three blackish spots beyond the cross-vein; male hypopygial claspers knobbed, the knob concave at tip (fig. 9).
culiciformis (DeGeer) (p. 23).
Stigma without dark spots beyond the cross-vein; claspers not knobbed.
vagabundus (Linnaeus) (p. 17).

SYSTEMATIC ARRANGEMENT OF THE SPECIES.

Lateral carinae of pronotum incomplete; armature of fore femora consisting of uniform bristly hairs, none as long as femoral diameter; pronotum without tubercle on hind margin----------**rubromaculatus.**
Lateral carinae of pronotum complete.
Armature of fore femora consisting chiefly of bristly hairs, often with spine-like bases.
Pronotum without a tubercle on hind margin----------**vagabundus.**
orthoneuron.
barberi.
winnemana.
reticulatus.
Prontum with a tubercle on hind margin---------- **armatus.**
subparallelus.
nudus.
Armature of fore femora more definitely spinous, usually a few spines at base of series are longer than the others.
Pronotum without a tubercle on hind margin. **parshleyi.**
culiciformis.
Pronotum with a tubercle on hind margin.
errabundus.

EMPICORIS RUBROMACULATUS (Blackburn).

Ploiariodes rubromaculata BLACKBURN, T. Notes on the Hemiptera of the Hawaiian Islands, Proc. Linn. Soc. New South Wales, ser. 2, vol. 3, 1889, p. 349 [Mauna Loa, Hawaii].

Ploiariodes curyale KIRKALDY, G. W. A Catalogue of the Hemiptera of Fiji, Proc. Linn. Soc. N. S. W., vol. 33, 1908, p. 372 [Riwa, Fiji].

Ploiariodes californica BANKS, N. Emesidae, 1909, p. 46 [Stanford University, Calif.].

Ploiariola froggatti HORVATH, G. Miscellanea hemipterologica XV, Ann. Mus. Nac. Hung., vol. 12, 1914, pp. 643–644, fig. 5 [Sydney, New South Wales].

This species is readily distinguished by the characters cited in the key. In some cases the anterior rudiment of the lateral carina is dark in color and therefore inconspicuous. The fore femur is about as long as the pronotum and the apical antennal segment is not over one-third as long as the third segment. This species has no round bare spots at bases of the longer hairs on venter as in *errabundus* and some others. For the male genitalia, see figure 2.

Length: 5–5.5 mm.

Specimens examined.—Kilauea, Hawaii, 4,000 feet. (Bishop Mus., det. Kirkaldy); Haleakala, Maui, Hawaii, 5,000 feet, R. C. Perkins (British Mus.); Mount View, Calif., G. W. Ehrhorn; Alameda County, Calif., December (U.S.N.M.); Salinas, Calif., June 20, 1908, Riverside, Calif., June 10, 1908, E. D. Ball (Ball); Stanford University, Calif., September (Holotype of *Ploiariodes californica* Banks, Mus. Comp. Zool.); Palo Alto, Calif., Sept., 1908, Bradley (Van Duzee); Berkeley, Calif., Oct. 31, J. C. Bradley (Cornell Univ.); Calcedonia, Miss., June 24, 25, 1921, C. J. Drake; Gainesville, Fla., J. R. Watson (Drake); Chain Bridge, Va., Sept. 11, 1921, J. R. Malloch. (Biol. Survey); Rio Piedras, Porto Rico, July 23, 1916, E. G. Smyth (U.S.N.M.); Tallabao near Ponce, Porto Rico, July 23, 1914 (Am. Mus.); Rio de Janeiro, Brazil (Carnegie Mus.).

A male collected at Funchal, Madeira, December 30, by F. Jones (U.S.N.M.) differs only in having no red streak along inner margin of the stigma. Since this marking varies in extent and intensity in the other specimens studied we are not inclined to consider this form as a distinct species.

EMPICORIS VAGABUNDUS (Linnaeus).

Cimex vagabundus LINNAEUS, C. Systema Naturae per Regna tria Naturae, secundum Ordines, Genera, Species cum characteribus, differentiis, synonymis, locis., ed. 10, 1758, p. 450 (Engelmann Reprint 1894) [Europe].

We have examined several European specimens of this species which agree in all particulars with those from North America. The armature of fore femora, the lack of pronotal tubercle, and the shape and color of the stigma are characteristic; the apical antennal segment is not more than one-third as long as preapical. Apex of forewing as in figure 3.

Length; 6–7 mm.

KEY TO THE VARIETIES.

A. Antennae and fore femora with very short hairs, those on the former very little longer than the segmental diameter; general color usually somewhat fuscous ---------- **vagabundus.**

AA. Antennae and fore femora with very long hairs, those on the former about four times as long as the diameter of segments; general color usually whitish ---------- **pilosus.**

EMPICORIS VAGABUNDUS, var. VAGABUNDUS (Linnaeus).

Original citation same as for the species.

Ploiariola canadensis PARSHLEY, H. M. On some Hemiptera from Western Canada. Occasional papers of the Museum of Zoology, University of Michigan, No. 71, Aug. 29, 1919, pp. 25–27 [Victoria, B. C.].

American specimens examined are from Victoria, B. C., August 18, 25, 1919, W. Downes, including type of *P. canadensis* Parshley (Downes, Parshley.); Washington, D. C., from the breeding cage of the Division of Entomology, June 10, 1898, F. H. Chittenden (Cornell Univ.). The scutellar spine is not developed in Parshley's type and in certain other specimens, but this is a malformation.

EMPICORIS VAGABUNDUS, var. PILOSUS (Fieber).

Plocaria pilosa FIEBER, F. X. Die europäischen Hemiptera. Halbflügler (Rhynchota Heteroptera), 1861, pp. 149–150 [France].

Ploiariodes hirtipes BANKS, N. A new species of Emesidae from Vermont. Psyche, vol. 19, No. 3, June 1912, p. 97 [Brattleboro, Vt.].

This variety is represented in North American material by specimens which agree exactly with a European example.

Full data for the specimens examined are: Wisconsin; Pennsylvania no other data (U.S.N.M.); Nantucket, Mass., Aug. 21, 1911 (Parshley); Victoria, B. C., Aug. 16, 18, 1919, W. Downes (Downes); Brattleboro, Vt., July 15, 1908, C. W. Johnson, type of *P. hirtipes* Banks (Bost. Soc. Nat. Hist.).

This form has been recorded also from Gogebic County, Mich. (Hussey, R. F., Pysche, 28, No. 1, Feb. 1921, p. 10).

EMPICORIS ORTHONEURON, new species.

Male.—Similar to *errabundus* in color, except that the type shows no distinct spotting at the apices of the hind wings, but these wings in this specimen are in poor condition and it is not possible to be absolutely sure of this character. The venation of apex of the discal cell is as in *reticulatus*, but the minute honeycomb of lines is absent (fig. 4), the stigma is narrower, fuscous, and there is a more conspicuous blackish mark on middle of veins closing discal cell and the base of the vein that emanates from them. The form of the apical sternite is shown in figure 5.

Length, 4 mm.

Holotype.—Monterey, Calif., July 12. E. A. Schwarz (U.S.N.M.).

A female from Santa Cruz, Calif., August (Coll. Parshley) also is in poor condition, the wings being stuck to abdomen, but apparently the hind pair are faintly spotted apically.

Type.—Cat. No. 27090 U.S.N.M.

EMPICORIS BARBERI (McAtee and Malloch).

Ploiariodes barberi McATEE, W. L., and MALLOCH, J. R. American Museum Novitates, No. 75, May 11, 1923, pp. 7–8 [Porto Rico].

Male.—Head with white pruinosity in front of eyes and a white line from base of each antenna, which connects with another that runs diagonally from lower hind margin of eye to upper occiput; faint lines of pruinosity on lower sides of pronotum in front and on pleura, and posterior and lateral margins, and lateral and dorsal carinae of pronotum white. Abdominal spiracles white; venter mottled, each sternite with a large round bare spot on each side on hind margin. Antennae and legs with narrow annulations, a subapical one on each femur and on first segment of antenna broader. Dark areas on fore wings profusely areolate with minute pale dots; apices of hind wings fuscous with white reticulations.

Pronotum without median tubercle on hind margin; submedian dorsal carinae as sharp as the lateral ones, but little curved; mesonotal and metanotal thorns absent in type, the one at base of abdomen distinct. Apical abdominal sternite not deeply excavated at tip. Fore femur with very weak ventral spinules. Stigma normal, cross-vein closing apex of discal cell on its anterior half straight, the other one curved.

Length (without wings): 3 mm.

Holotype.—Tallabao, near Ponce, Porto Rico, July 23, 1914, H. G. Barber (American Museum).

Named in honor of the collector. This is one of the most distinct species known to us. The submedian dorsal pronotal carinae are not sharp in any other species, and the only other which has the dark areas of the forewings with minute hyaline dots is *P. parshleyi* Bergroth.

EMPICORIS WINNEMANA, new species.

Male.—This species differs from all the others in having the legs and antennae almost entirely brownish fuscous, with but faint annuli except at extreme apices of segments, the fore and mid femora alone showing distinguishable annuli. The pronotum is almost uniformly brownish and the thoracic spines are stramineous. The wings are as in *errabundus*, but the linear stigma is entirely black as far before as beyond the cross-vein.

Antenna with short pubescence, apical segment over one-third as long as the subapical. Lateral carina of pronotum not sharp. Apical abdominal sternite subtriangular, hypopygial claspers slender, tapered at apices. Fore femur over twice as long as coxa, rather densely short haired ventrally, the spines minute. Stigma and veins closing discal cell as in figure 6. Cross-veins in middle of hind wing forming a straight line (fig. 7).

Female.—Similar to male, the abdomen broader.

Length, 4.5 mm.

Holotype.—Plummer Island, Md., October 10, 1921, taken at light in the cabin of the Washington Biologists' Field Club, H. L. Viereck (U.S.N.M.), Allotype, Vienna, Va., October 17, 1890, (Cornell Univ.).

Type.—Male, Cat. No. 26703, U.S.N.M.

EMPICORIS RETICULATUS, new species.

Male and female.—Similar to *errabundus* in color, the spots at apices of hind wings very distinct. Differs as indicated in key, the reticulation or honeycombing of forewings visible only under a very high power. The apical abdominal sternite of male is similar to that of *orthoneuron* and quite different from that of *errabundus* (figs. 5 and 12). As in *errabundus* and *orthoneuron* the cross-veins in middle of hind-wings are angulated and the apices of forewings are notched where the vein joins the margin. Apical antennal segment nearly half as long as preapical. Base of abdomen with a much shorter dorsal thorn than in *errabundus*.

Length, 5–6 mm.

Holotype.—Male, Cordoba, Mexico, December 25, 1907, F. Knab, Allotype, found on imported orchids from Port Barrios, Guatemala; Paratype male, Natchez, Miss., June 2, 1909, E. A. Schwarz (U.S.N.M.); female, Plummer Island, Md., August, 1903, A. Busck (Cornell Univ.); Plummer Island, Md., Sept. 9, Falls Church, Va., Oct. 13, N. Banks; Malden, Mass., Oct., 1883, F. H. Sprague (Mus. Comp. Zool.).

Type, allotype, and paratype.—Cat. No. 26704, U.S.N.M.

EMPICORIS ARMATUS (Champion).

Ploiariodes armata CHAMPION, G. C. Biologia, vol. 2, 1898, p. 165 [Guatemala; Panama].

Plocariola mansueta BERGROTH, E. The American Species of Ploeariola Reut. (Hem. Reduviidae). Notulae Entomologicae, vol. 2, 1922, pp. 51, 80–81 [Sanford, Fla., Mandeville, Jamaica].

Head with white decumbent hairs which form three curved longitudinal lines on each side, one from lower posterior angle of eye, one from just above middle of eye and a third from upper posterior angle of eye, the latter curved inward at middle. Pronotum with two

whitish submedian vittae which do not reach anterior or posterior margins, the space betwen them yellowish, laterad of these and across their posterior extremities dark brown, hind margin of pronotum narrowly pale yellowish in middle, broadly so on each posterior lateral angle, dorsum with rather dense decumbent white hairs; mesonotal spine dark brown, pale at tip; mentanotal spine whitish; basal abdominal spine dark brown. Abdomen brown, venter unspotted, spiracles and a connexival streak in front of them on each segment, whitish. Wing spots not irrorate; stigma from cross-vein to near tip filled with two contiguous or subcontiguous brown or fuscous spots.

Lateral pronotal carina complete, without anterior process; median process on hind margin of pronotum stout, conspicuous. Fore coxa slender, almost as long as pronotum and half as long as femur. Vein closing posterior half of discal cell much curved. Apical antennal segment fully one-third as long as preapical. Male genitalia as in figure 8.

Length, 4–5.5 mm.

Localities.—Sanford, Fla., April 26, 1908, Mandeville, Jamaica, April 1906, E. P. Van Duzee (Type material *Ploeariola mansueta* Bergroth, Coll. Van Duzee); Aibonito, Porto Rico, July 14–17, 1914 (Am. Mus.); Paraiso, Canal Zone, February 10, 1911 E. A. Schwarz; Cacao Trece Aguas, Guatemala, April 21, E. A. Schwarz and H. S. Barber; Vega Alta, Porto Rico, February 26, 1917, R. J. Cotton, Paradise Key, Fla., Feb. 28, 1918, E. A. Schwarz (U.S.N.M.); Sebastian, Fla., February 11, 1919, A. Wetmore (Biol. Survey); Gainesville, Fla., June 9, 1918, C. J. Drake (Drake.).

We had this species identified as *armatus* Champion prior to the appearance of Doctor Bergroth's paper and to settle whether we were in error we requested W. E. China to supply data from an examination of the type. The information kindly furnished by that gentleman confirms our identification and synonymy.

EMPICORIS SUBPARALLELUS, new species.

Male.—Similar to *nudus* in color and structure, differing as stated in key. The black spots on antennae are much smaller than in *nudus*, and especially apically, the last two segments in *nudus* being almost entirely fuscous whereas in *subparallelus* they are largely white, the apical segment having a small black spot at base and a larger one near apex.

Length, 4.5 mm.

Type.—Cayamas, Cuba, March 2, E. A. Schwarz (U.S.N.M.).

A female specimen from Brownville, Texas, May 7, H. S. Barber, (U.S.N.M.), lacking the head and most of the legs appears to belong

to this species; the pronotal tubercle is better developed than in the type.

Type.—Male, Cat. No. 26705, U.S.N.M.

EMPICORIS NUDUS, new species.

Female.—Head marked as in *armatus;* the white lines are not composed of moderately long decumbent hairs but of microscopic pile or pruinescence, and the two lines on dorsum are regularly arcuate, the anterior and posterior extremities being incurved. The dorsum of pronotum is chocolate brown on disk between the white lines, the latter are very slender, converge from anterior margin to constriction, and then arcuately diverge, ending a short distance from hind margin of pronotum; laterad of the white lines the posterior half of pronotum is paler brown; there is a slender white Y-shaped mark extending from constriction over humerus on each side, a white line along the hind margin, and the lateral carinae are white. In other respects as *armatus.*

Pronotum almost nude, processes and spines as in *armatus.* Fore coxa stouter than in that species, distinctly shorter than pronotum, and half as long as femur; stigmatal spot farther from apex. Apical antennal segment fully half as long as preapical.

Length, 4.5 mm.

Holotype.—Paradise Key, Fla., March 6, 1919, E. A. Schwarz and H. S. Barber (U.S.N.M.).

EMPICORIS PARSHLEYI (Bergroth).

Ploeariola parshleyi BERGROTH, E. Am. Ploeariola. Notulae Entomologicae, vol. 2, 1922, pp. 50–51 and 79 [Falls Church, Va.].

Color decidedly more brownish than in *errabundus.* Dorsum of pronotum behind suture pale yellowish brown, but little darker than the lateral carinae; thoracic spines pale. Venter of abdomen pale brown, unspotted. Most of the fuscous spots on wings and especially those in discal cell with minute clear dots in them; apices of hind wings not spotted. Legs and antennae ringed and spotted with fuscous.

Pronotum with lateral carina, which has a small process at anterior extremity, and with a poorly developed but distinguishable median process on hind margin. Fore legs short and stout, the femur not longer than the pronotum, the coxa about half as long as the femur and not longer than distance from coxal cavity to upper anterior margin of pronotum. Stigma normal, rather broadly rounded at apex; discal cell produced at apex, both veins closing cell curved. Apical antennal segment fully half as long as preapical.

Length, 5–6 mm.

Localities.—Falls Church, Va., August 1, N. Banks (Holotype, Coll. Bergroth); same locality, August 22 (Amer. Mus. Nat. Hist.) same locality, August 6, 25, N. Banks (Mus. Comp. Zool.); Plummer Island, Md., June 27, 1911, August 10, 1915, H. S. Barber (U.S. N.M.); Contoocook, N. H., July 16, 1920, E. W. Hall (Drake); Beverly, Mass., July 15, 1906 (Bost. Soc. Nat. Hist.).

EMPICORIS CULICIFORMIS (De Geer).

Cimex culiciformis De Geer, Charles. Mem. Hist. Insects, 3, 1773, pp. 323–8, pl. 17, figs. 1–8 [France].

Ploiaria alata Scopoli, J. A. Deliciae Florae et Faunae Insubricae, etc., pt. 3, 1788, pp. 52–53, pl. 25, figs. 6–10 [Austria].

Gerris erraticus Fallen, C. F. Monographia Cimicum Sueciae, 1818, pp. 117–118.

Ploiaria maculata Haldeman, S. S. Descriptions of several new species and one new genus of insects. Proc. Acad. Nat. Sci. Phila., vol. 3 (1846–7) 1848, p. 151 [Pennsylvania]. A longer description is given in a later article by Haldeman entitled "On four new species of Hemiptera of the genera Ploiaria, Chermes, and Aleurodes," etc. (Amer. Journ. Sci., ser. 2, vol. 9, 1850, p. 108).

Ploiariodes errabunda Banks, N. Emesidae, 1909, p. 46 [Va., Md.].

We have before us several European specimens of this species including one male. A number of North American specimens, comprising males also, agree in every particular with those from Europe so that we have been compelled to accept the American species as *culiciformis.* In color it agrees very closely with *errabundus* but it is distinguished structurally as indicated in the key, and also by the lateral carina of the pronotum lacking the anterior process. The apical sternite in male is more broadly rounded at apex than in *errabundus* and the hypopygial claspers are knobbed at apices as shown in figure 9. No other species so far as we know has this last structural peculiarity. The wings are as in *errabundus* but the hind pair are not spotted apically (fig. 10). Apical antennal segment about half as long as preapical. One or two of the basal ventral spines on fore femur quite prominent.

Length, 4–4.5 mm.

Localities.—Boston, Mass., Oct. 26, 1921, H. Biddle (Bost. Soc. Nat. Hist.); Pennsylvania, June, Uhler Coll. labeled as type of *Ploiaria maculata* Haldeman (U. S. N. M.); Plummer Island, Md., May 22, 1912, at light, E. A. Schwarz (U. S. N. M.); Kenilworth, D. C., July 26, 1912, O. Heidemann (Cornell Univ.); Eastern Branch, D. C., May 14, 1901, at light, A. Busck (Van Duzee); Maywood, Va., Oct. 16, 1915, W. L. McAtee (McAtee); Vienna, Va., Aug. 17, 1913, H. G. Barber (Barber); Falls Church, Va., May 27, July 20, 25, Aug. 2, 29, N. Banks (M. C. Z.); Falls Church, Va., July 20, N. Banks (Cornell Univ.); Falls Church, Va., Aug. 6, and no date (Van Duzee); Falls Church, Va., Aug. 7, N. Banks (Parshley); Falls Church, Va.,

Sept. 29, N. Banks (McAtee); Falls Church, Va., Aug. 22, N. Banks (U. S. N. M.); Berkeley, W. Va., Aug. 20, 1891 (Cornell Univ.); The Dalles, Ore., May 19 (Cornell Univ.).

With reference to the supposed type of *Ploiaria maculata* Haldeman listed above it is to be said that in Haldeman's first article the data for his specimen are given as "Pennsylvania, July," and in the second "Pennsylvania, June and July." Uhler tells us:[7] "Prof. Haldeman generously gave me the type of his description," but this specimen is the type of the second, not the original description. The latter. Haldeman informs us, was mutilated and now probably is lost.

This species, next to *errabundus*, is the commonest of the genus in America.

EMPICORIS ERRABUNDUS (Say).

Ploiaria errabunda SAY, THOMAS. Descriptions of new species of Heteropterous Hemiptera of North America, 1831; Reprint Trans. N. Y. State Agr. Soc. 1857, p. 804; Complete Writings, vol. 1, 1859, p. 359 [North America].

Ploiariodes tuberculata BANKS, N. Emesidae, 1909, p. 46 [Sea Cliff, N. Y., Falls Church, Va.].

In addition to the characters mentioned in the key, this species has the venter with dense appressed white pile except on numerous small round areas at bases of the longer hairs which give it under a a moderate magnification the appearance of being spotted. The fore coxa is nearly as long as the pronotum, the cross-veins in the hind wing form an angulated line, both the veins closing the discal cell are curved so that the apex of the cell is drawn out into a rather long point, the stigma is spotted beyond the cross-vein (fig. 11), and the eighth sternite in the male has an obtusely pointed terminal process (fig. 12). The apical antennal segment is one-third as long as preapical. Fore tibia and tarsus as in figure 13.

Length: 4–4.5 mm.

Our most common and widely distributed species, represented in the material examined by the following collections: Paris, Me., July 4, 1916, C. A. Frost (Parshley); Monmouth, Me., July 27, 1912, C. A. Frost; Fall River, Mass., May 22, 1911, N. S. Easton (Bost. Soc. Nat. Hist.); Amherst, Mass., June 5, 1914; Cold Spring Harbor, New York, July 29, O. B. Meiner (Parshley); Sea Cliff, N. Y., Aug., N. Banks (M. C. Z.); White Plains, N. Y., Aug. 21, 1909 (Bueno); Penn Mar, Pa., July 15 (Cornell Univ.); Bedford Co., Pa., Aug. 8, O. Heidemann (Cornell Univ.); Bedford Co., Pa., Aug. (E. P. Van Duzee); Cropley, Md., April 27, 1910, laid eggs soon after capture, H. S. Barber (U.S.N.M.); Forest Glen, Md., July 14, 1915, at light, O. Heidemann (Cornell Univ.); Plummer Island, Md., May 7, 1916, R. C. Shannon (U.S.N.M.); Plummer

[7] Proc. Boston Soc. Nat. Hist., vol. 19, p. 431, Nov. 1878.

Island, Md., May 21, 1910, Aug. 16, 1914, W. L. McAtee (Biol. Survey); Falls Church, Va., Aug. 7, Sept. 24 (type of *P. tuberculata* Banks), N. Banks (Mus. Comp. Zool.); Herndon, Va., Aug. 1911, H. G. Barber (Barber, Bueno, U.S,N.M.); Mount Vernon, Va., Aug. 20, 1916, W. L. McAtee (McAtee); Berkeley Springs, W. Va., Sept. 20, 1886 (Cornell Univ.); Thomasville, Ga., Mrs. A. P. Taylor (U.S.N.M.); Michigan (U.S.N.M.); Ridgeway, Ont., Aug. 7, 1886; E. P. Van Duzee (Iowa Agr. Coll.); Kansas (E. P. Van Duzee); Onaga, Kansas, F. F. Crevecoeur (U.S.N.M.); Texas, Uhler Coll. (U.S.N.M.); Dallas, Tex., June 7, 1907, F. C. Pratt (U.S.N.M.); Kerrville, Tex., June 19, 1907, F. C. Pratt (U.S.N.M.); Mexico (Cornell Univ.).

After a careful examination of all the American species available, and consideration of Say's original description, we have no doubt that this is the species Say had before him and not that here identified as *culiciformis* De Geer which has gone under the name *errabunda*. The present species has the small knob on the anterior end of lateral carina of prothorax, which Say specifically mentions ("the lateral carinate line of the thorax has a prominence like an obtuse spine before"), while the other never has it so far as we have been able to find. The fact that no mention was made by Say of the median process on middle of hind margin of pronotum may have been due either to his considering it of generic value or to oversight, the latter being not at all improbable as the tubercle is not conspicuous except when viewed from the side.

Genus STENOLEMUS Signoret.

Stenolemus SIGNORET, V. Description d'un nouveau Genre de la Tribu des Longicoxes, Amyot et Serville. Ann. Soc. Ent. France, ser. 3, vol. 6, 1858, pp. 251–2, pl. 6, figs. 1–3 [Monobasic, *S. spiniventris*, new species, genotype.]

Phantasmatophanes KIRKALDY, G. W. A catalogue of the Hemiptera of Fiji, Proc. Linn. Soc. New South Wales, vol. 33, 1908, pp. 369–370, fig. 2 [Monobasic, *P. muiri*, new species, genotype.]

Emendation. *Stenolaemus*.

In species of this genus the labrum is closely adherent to base of rostrum and there is no spine between bases of antennae; the apices of the latter are more or less enlarged, ending in an acute process which may be more or less curved or angled. The prothorax is very variable in structure, but is always carried backward over mesonotum to the bases of wings, and is very noticeably constricted near middle, or pedicillate; there are great differences in the length of the pedicel connecting the anterior and posterior lobes. Some species have merely a constriction while others have a long pedicel. This difference is however not coordinated with any other outstanding structural character except in the case of *arizonensis* which has

the venation of forewing different from that of the other species; we consider this species entitled to subgeneric rank. The mesonotum and metanotum each have a long spine on middle of hind margin. The male hypopygium is of the form shown in figure 16. Fore femur spinose from base, fore tarsus not heavily chitinized, short and straight, with two distinct segments, hairy above and below; claws equal.

With the exception of *S. arizonensis* members of this genus are whitish to stramineous with brown to black markings of variable extent; their usual pale coloration and the abundance of long hairs on most parts of the body give them a habitus quite distinct among American genera. While the extent to which dark markings prevail is variable, the pattern is nearly the same throughout all of the subgenus *Stenolemus*. The principal features of these markings are the following: Bands differing in number, width and intensity, and sometimes in character of pubescence, and even of the supporting integument, on antennae and legs; two longitudinal vittae on top of anterior lobe of head; a band on each side of head from neck toward eyes dividing so as to leave the tubercles and a spot behind each eye pale; on prothorax a stripe nearly percurrent on lower surface, embracing most of pedicel, and sending a tongue posteriorly along side of posterior lobe, and anteriorly a band above front coxa, and a broad vitta each side of the median line on dorsum, these latter vittae interrupted by one or two pale stripes on outer side near base; mesothorax and metathorax largely dark, with pale edgings, and abdomen the same, more or less marked with pale. In most cases we have figured the forewings in order to give a clearer idea of their markings.

KEY TO THE SUBGENERA AND SPECIES.

1. A distinct vein emitted from costal margin of basal discal cell of forewing (figs. 21, 23, 26, 29) (Subgenus **Stenolemus**)_____ 2

   No vein emitted from costal margin of basal discal cell of forewing (fig. 14); basal stout spine on posteroventral surface of fore femur directed downward, not angling towards base of femur; prothorax hardly pedunculate, anterior lobe gradually narrowed posteriorly, posterior lobe without tubercles on posterior margin; dorsum of head without post-sutural tubercles. Subgenus **Stenolemoides**, new subgenus, type species, **Luteva arizonensis** Banks_____(p. 28).

2. Basal spine of fore femur directed straight downward, not angling towards base of femur; prothorax deeply constricted but not pedunculate, anterior lobe quadrate, posterior lobe with four distinct tubercles near hind margin; subapical antennal segment longer than apical; fore tibia stout (fig. 17), barely longer than fore coxa and hardly as long as head and interior lobe of prothorax combined; mesothoracic and metathoracic spines short and stout, tapered apically_____**pristinus**, new species (p. 29).

   Basal spine of fore femur angling towards base of femur_____ 3

3. Prothorax not distinctly pedunculate, anterior lobe tapered posteriorly, tubercles on posterior lobe nearly obsolete; subapical antennal segment less than half as long as apical; fore tibia slender (fig. 20) about twice as long as fore coxa and as long as head and thorax combined; mesothoracic and metathoracic spines long and slender_____**pallidipennis**, new species (p. 30).

Prothorax pedunculate, the peduncle sharply differentiated from the anterior and posterior swollen lobes and about as long as or longer than the former; posterior lobe with four tubercles near hind margin_____ 4

4. Abdomen without submedian spines on venter in addition to the pedicillate spiracles; posterior discal cell bisected longitudinally by a distinct vein: basal and apical bands on hind femur brownish, the middle one deep black and very conspicuous_____**schwarzi** Bergroth (p. 30).

Abdomen with a pair of submedian spines on hind margin of sternites 3 to 5 or at least on 3 and 4 in addition to the pedicillate spiracles_____ 5

5. Submedian spines on venter distinguishable only on sternites 3 and 4, posterior discal cell not bisected by a longitudinal vein (fig. 24); all hind femoral dark bands broad and fuscous in color, not conspicuously dark pilose_____**variatus**, new species (p. 31).

Submedian spines on abdomen present on sternites 3 to 5, inclusive_____ 6

6. The small cross-vein behind basal discal cell in line with the posterior extremity of the vein closing that cell (fig. 25); submedian spines near hind margin of pronotum not acute, mere convexities on surface; posterior discal cell without longitudinal vein; dark bands on hind femora except the apical one very narrow_____**interstitialis**, new species (p. 31).

The small cross-vein behind basal discal cell distinctly proximad of the posterior extremity of the vein closing that cell (fig. 28); submedian spines near posterior margin of pronotum acute_____ 7

7. Posterior discal cell of forewing bisected longitudinally by a distinct vein; mesothoracic and metathoracic spines not thickened near apices_____ 8

Posterior discal cell of forewing not bisected by a distinct vein; mesothoracic and metathoracic spines more or less swollen near apices (figs. 31, 32); tubercles on hind lobe of head prominent, acute_____ 9

8. Dark bands on hind femora broad, separated by about their own width, brown in color, the short hairs uniformly brown on all bands; bands on hind tibiae pale, third one from base especially so; sixth tergite without a pair of submedian spines at apex; wing venation as in figure 26; basal discal cell with two or three narrow whitish lines through the dark interior_____**hirtipes**, new species (p. 32).

Dark bands on hind femora narrow, separated by much more than their own width, the basal bands black and black haired, the apical one golden haired; bands on hind tibiae all black; sixth tergite with a pair of submedian spines at apex; basal discal cell with numerous reticulating pale lines in dark part_____**mexicanus**, new species (p. 32).

9. Portion of vein along inner margin of basal discal cell longer than the portion along same margin of posterior discal cell, and much arcuated basally (fig. 29); mesothoracic and metathoracic spines as in figure 31.

spiniger, new species (p. 33).

Portion of vein along inner margin of basal discal cell shorter than that along same margin of posterior discal cell, and but little arcuate basally; mesothoracic and metathoracic spines as in figure 32.

perplexus, new species (p. 33).

NOTES ON PREVIOUSLY DESCRIBED SPECIES NOT INCLUDED IN THE FOREGOING KEY.

spiniventris (*Stenolemus*) SIGNORET, V. Ann. Soc. Ent. France, ser. 3, vol. 6, 1858, p. 253 [Mexico].

Apparently runs to that section of our key embracing the new species, *spiniger* and *perplexus*, but the meso- and meta-notal spines if properly figured, differ from those of either of these species or in fact from any we have seen. The mesonotal spine is represented as erect and acute and the metanotal, swollen at tip and curved so as to extend forward past the mesonotal spine.

SYSTEMATIC ARRANGEMENT OF THE SPECIES.

No cross vein emitted from costal margin of basal discal cell; basal spine of fore femur directed downward; posterior lobe of head and of pronotum without tubercles. (Subgenus *Stenolemoides*)_____**arizonensis.**

A cross vein emitted from costal margin of basal discal cell; posterior lobe of head and of pronotum with tubercles (Subgenus *Stenolemus*).

Prothorax deeply constricted but not pedunculate.

Basal spine of fore femur directed downward_____**pristinus.**

Basal spine of fore femur directed basad_____**pallidipennis.**

Prothorax pedunculate; basal spine of fore femur directed basad.

Abdomen without submedian ventral spines_____**schwarzi.**

Abdomen with submedian ventral spines.

variatus.
interstitialis.
hirtipes.
mexicanus.
spiniger.
perplexus.

STENOLEMOIDES, new subgenus.

Differs from subgenus *Stenolemus* in the venation of fore and hind wings as shown in figures 14 and 15, the basal discal cell in former having no vein emitted from its costal margin. The basal spine of posteroventral series on fore femur is directed downward and not sloped towards base of femur as in most species of *Stenolemus*. *Type species.—Luteva arizonensis* Banks, N. (Emesidae 1909, p. 45).

STENOLEMUS (STENOLEMOIDES) ARIZONENSIS (Banks).

Luteva arizonensis BANKS, N., Emesidae, 1909, p. 45 [Palmerlee, Arizona].

A pale brownish yellow species, without distinct markings on forewings. Basal two antennal segments with a few whitish annuli. Anterior third or more of posterior lobe of pronotum whitish, posterior margin subfuscous. Anterior femora and tibiae faintly whitish annulate, mid and hind femora each with six whitish annuli. Most of the veins of fore wings paler than the membrane.

Head about as wide as long on dorsum, eyes large, the posterior lobe slightly bulbous above and neither tuberculate nor sulcate. An-

terior lobe of prothorax about 1.5 as long as wide, much tapered posteriorly, barely half as wide at posterior as at anterior margin, dorsum arched, posterior lobe slightly widened posteriorly, a little longer than anterior lobe, with a broad shallow median depression, posterior width less than greatest length, no tubercles near posterior margin. Legs less elongate and hairy than usual in the genus; fore tibia and tarsus as in figure 18. Hypopygium as in figure 16.

Length, 8-9 mm.

Data for specimens examined: Arizona, C. U. Lot 34 (Uhler Coll.); Oracle, Ariz., July 23; Yerington, Nev., July 13, J. P. Baumberger; Los Angeles, Calif., August (U.S.N.M.). The holotype also was examined (M. C. Z.).

Subgenus STENOLEMUS Signoret.

STENOLEMUS PRISTINUS, new species.

Female.—Head, anterior lobe of prothorax, and abdomen conspicuously marked and clouded with brownish fuscous and the fore wings almost entirely of that color, with the veins, some reticulating lines, and a few minute dots, whitish. The antennal, and femoral, and tibial annuli of mid and hind legs are very pale brown and, with the exception of the preapical one on each femur, inconspicuous; front coxa with 2, and front femora and tibiae with 4 rather conspicuous brown bands.

Head broader than long, eyes large, covering much more than half the entire length of side of head, transverse suture on dorsum not very deep, posterior lobe with two small but sharp processes on dorsum anteriorly; antennae much stouter than usual, with long hairs, third segment fully as long as fourth. Anterior lobe of prothorax subquadrate, not tapered, separated from posterior lobe by a deep constriction, posterior lobe widened from anterior to posterior margin, with four distinct but not very large tubercles near posterior margin; mesothoracic and metathoracic spines comparatively short and stout. Spines on fore legs much shorter than in any of the other species, the basal one not bent towards base of femur (fig. 17). Abdomen elongate ovate, third, fourth, and fifth tergites each with an angular projection near posterior lateral angles; venter without submedian spines, spiracles elevated. Posterior discal cell of fore wing with a longitudinal vein bisecting it, vein emitted by basal discal cell not as close to base as in next species, the cell acute at base.

Length, 7.5 mm.

Holotype.—Key West, Fla., April 9, E. A. Schwarz (U.S.N.M.).

The fore tibia in this species has about three series of minute subdecumbent black setulae on venter, while in *pallidipennis* it has two

series, one anteroventral and the other posteroventral, which consist of much longer suberect spines of unequal lengths alternating. All the other species of the genus in this paper have the anteroventral series complete (*arizonensis*), or that series complete and the postero-ventral series present on at least the apical half of tibia.

Type.—Female, Cat. No. 26707, U.S.N.M.

STENOLEMUS PALLIDIPENNIS, new species.

Male.—Much paler than the other species of the genus, the general color stramineous, the femoral annuli very indistinct, and the wing markings pale fuscous.

Head as broad as long, arched above, the posterior lobe slightly tumid on each side of median line anteriorly; basal antennal segment and base of second segment above very long haired, third segment not one-third as long as fourth. Profile of head and thorax as in figure 19. Anterior lobe of prothorax not longer than its greatest width, anterior lateral angles tumid, narrowed posteriorly, and separated from posterior lobe by a deep constriction, posterior lobe gradually widened from anterior to posterior margin, about 1.5 times as long as anterior lobe and as long as wide, the four tubercles before hind margin barely evident; mesothoracic and metathoracic spines slender, curved, the pointed apices directed forward. Venter lacking submedian processes, the spiracles slightly elevated and situated very close to lateral margins; hypopygium not large, almost covered on dorsum by the broadly rounded posterior projection of the apical tergite, claspers small, slender, curved. Venter and all femora and tibiae with very long fine hairs; fore femur with the postero-ventral spines longer and more widely spaced than usual, four or five of them conspicuously longer than the others, the basal one directed somewhat toward the base of femur (fig. 20). Venation as in figures 21 and 22.

Length, 8.5 mm.

Holotype.—Santa Rita Mountains, Ariz., June 12, 1898, E. A. Schwarz (U. S. N. M.).

Type.—Cat. No. 26708 U. S. N. M.

STENOLEMUS SCHWARZI Bergroth.

Stenolaemus schwarzi BERGROTH, E. New and little known heteropterous Hemiptera in the United States National Museum, Proc., U. S. Nat. Mus., vol. 51, pp. 229–230, Oct. 28, 1916 [Tampico, Mex.].

This species, in common with most of those treated in this paper, has the forewing concave behind the apex (fig. 23), the degree of concavity varying with the species, the least occurring in *pallidipennis*.

The antennae and legs in *schwarzi* appear slightly thicker at the dark annuli and are also furnished with more dense blackish pubescence on these parts; thoracic spines piceous. Wings with the fuscous markings as seen with the naked eye consisting of two or three bands irrorated with whitish.

Head across eyes slightly broader than long, eye as wide as interocular space; posterior lobe with 2 moderate swellings on dorsum anteriorly. Anterior lobe of prothorax a little longer than the peduncle, posterior lobe rather abruptly widened, the posterior tubercles distinct. Basal and one other spine of the postero-ventral series on fore femur much longer than the others. Venation and markings of forewings as in figure 23. The male has the wings less extensively blackened, the disk being almost all white.

Length, 8–10 mm.

Redescribed from the type specimen, a female, No. 20149, U.S.N.M., Tampico, Mexico, Dec. 21, E. A. Schwarz, two males. Tegucigalpa, Honduras, July 25 and 26, 1917, and one female, La Ceiba, Honduras, September 27, 1916, F. J. Dyer (U.S.N.M.).

STENOLEMUS VARIATUS, new species.

Male.—Mesothoracic spine pale, metathoracic one darker. Wings more evenly infuscated than in *schwarzi*, basal discal cell almost solid black, center of posterior discal cell with an amoeboid yellowish splotch. Hind femoral and tibial bands broader than in other species and lacking short dark hairs, the long hairs on the bands dark brown, those on other parts of femora and tibiae pale brown.

Tubercles on posterior lobe of head barely perceptible. Anterior lobe of prothorax a little longer than pedicel; processes near hind margin of posterior lobe elongate, acute; mesothoracic and metathoracic spines slender, of about equal size, blunt at tips, with rather long hairs. Abdomen as stated in key. Fore coxa a little longer than pedicel of prothorax, fore femur slightly curved, with normal armature. Basal discal cell of fore wing as in figure 24, apical discal cell not subdivided longitudinally, acute at apex.

Length, 10 mm.

Holotype.—Near San Ignacio, Misiones, Argentina, 1910, E. R. Wagner. (Paris Museum.)

STENOLEMUS INTERSTITIALIS, new species.

Male.—General color as in *variatus* but the hind femoral and tibial bands are much narrower and paler.

Tubercles on posterior lobe of head small but rather acute. Anterior lobe of prothorax slightly shorter than pedicel; submedian tubercles on posterior lobe mere round swellings (the thorax is in

poor condition owing to faulty pining); metathoracic spine slightly more thickened preapically than mesothoracic, both attenuated apically and rather densely long haired but not so pronouncedly so as in *spiniger*, submedian ventral spines long, posteriorly curved. Basal discal cell as in figure 25; apical discal cell lacking longitudinal dividing vein. Dark bands on hind femora separated by about twice their own width, lacking short dark hairs.

Length, 10 mm.

Holotype.—French Guiana, 1899, R. Oberthur (Paris Museum).

STENOLEMUS HIRTIPES, new species.

Female.—Similar to *schwarzi* in color, rather paler, with the fore wings differently marked (fig. 26), and the antennal, femoral, and tibial annuli much paler.

In addition to the structural characters mentioned in the key the following are the principal characters possessed by this species: Head as broad as long, bituberculate on dorsum of posterior lobe anteriorly; basal antennal segment and base of second above very long haired, third segment about three-fifths as long as fourth. Anterior lobe of prothorax as long as peduncle, posterior lobe not abruptly widened, the tubercles large and rather sharp; mesothoracic and metathoracic spines erect and slender. Fore femur with only two of the postero-ventral spines conspicuously longer and stouter than the others; all legs, the prothorax, and venter densely and rather long haired. Fore tibia and tarsus as in figure 27.

Length, 9–10 mm.

Holotype.—Female, and two paratypes Mississippi, no other data, Coll. Ashmead (U.S.N.M.); one paratype, Miami, Fla., September 24, 1913, W. T. Davis (Davis); and another N. Landing, S. C., W. F. Fiske (U.S.N.M.).

Type.—Female, Cat. No. 26709, U.S.N.M.

STENOLEMUS MEXICANUS, new species.

Female.—Head, thorax, and wings more extensively blackened than in other species of this subgenus, the markings on the wings much broken by narrow white lines and irregular dots.

Pedicel of prothorax a little longer than anterior lobe, posterior lobe with the 4 tubercles distinct; mesothoracic spine slender, tapered to apex, metathoracic one stouter and not so much tapered apically, both with rather inconspicuous hairs. Basal discal cell of forewings as in figure 28; a distinct, undulated, longitudinal vein through middle of posterior discal cell, as in *schwarzi*. Basal 2 bands on hind femora very narrow, middle one (deeper black) broader than these two combined and distinctly broader than either of the apical two; hind tibial bands except basal one about three times as long as tibial

diameter; fore coxa a little longer than prothoracic pedicel; fore femur as thick as pedicel, the basal spine long, normal.

Length, 10 mm.

Holotype.—Frontera, Tabasco, Mexico, June, 1897, Townsend (Iowa State College).

STENOLEMUS SPINIGER, new species.

Male and female.—Similar to *hirtipes* in color, the wings marked as in figure 29, but rather variable in intensity and form of markings.

Besides the characters mentioned in the key, the peduncle of the prothorax is slightly longer than the anterior lobe (on dorsum) and distinctly tapered anteriorly (fig. 30), not equally thick the whole length as in *hirtipes;* the vein emitted by basal discal cell is longer and nearer base of cell than in that species, and there are three or four outstanding stout spines on the posteroventral surface of fore femur. Thoracic spines as in figure 31.

Length: 10–12 mm.

Holotype.—Male, Brownsville, Tex., May 21, 1904, H. S. Barber. Allotype, Brownsville, Tex., A. Jagow. Paratypes, one female. Escuintla, Guatemala, August, 1898, F. Knab; one female with label "Venedo" and no other data (U.S.N.M.); one female, Brownsville, Tex., Dorner (Ill. Nat. Hist. Survey); and a male, Motzorongo, V. C., Mexico, Feb. 11, 1892 (Iowa State College).

There is a small nymph from Brownsville, Tex., April 30, 1904, H. S. Barber (U.S.N.M.) which may belong to this species or to *hirtipes*, the presence of only two outstanding postero-ventral spines on fore femur apparently associating it with *hirtipes*, though we have seen no specimens of that species from Texas. The mesonotum and metanotum bear no spines; each abdominal tergite has a series of four long tubercles near posterior margin and numerous minute discal papillae, while each sternite has about eight small papillae along posterior margin.

Type, allotype, and paratypes.—Male, Cat. No. 26710, U.S.N.M.

STENOLEMUS PERPLEXUS, new species.

Male and female.—Very similar in coloration and structure to *spiniger*, the dark color more intense as a rule. The pedicel of prothorax is longer, being distinctly longer than anterior lobe; the upper margin of male hypopygium between the claspers has no pronounced notch in center in *perplexus* while in *spiniger* it has. The other distinctions are as stated in key. Thoracic spines as in figure 32.

Length, 11 mm.

Holotype.—Male, El Campamento Col. Perene, Peru, June 21, 1920 (Cornell Univ. Exped., Lot 569). Allotype, Jatahy, Prov. Goyas, Brazil, 1889, H. Donckier (Paris Museum).

Genus DELIASTES Dohrn.

Deliastes Dohrn, A. Nachträge, 1863, pp. 75–76 [Monobasic, *D. reticulatus*, new species, genotype, p. 76].

This genus differs from any known to us in having the fore tarsi heavily chitinized, bare above, and with but one oblique suture; the claws are unequal in size. The fore femur is spined from near base to apex, the basal spine longest; and the fore tibia has a series of setulae along the ventral surface which are stout at bases and are bent at right angles at middle, their apices directed toward apex of tibia. Second antennal segment slightly longer than first (13 : 12), third very short (0.75). Prothorax bilobate, in the winged forms the posterior lobe extending to bases of wings. Mesonotum and metanotum unspined; abdomen normal. Venation of fore wing as in figure 34; posterior discal cell with a nearly percurrent median longitudinal fold, simulating a vein.

The female of the genotype is wingless, and, like all apterous forms of Ploiariinae known to us, has the prothorax without a backwardly projecting flap overlying the dorsum of mesothorax. The abdomen is much broader than in male and with tergites 4–7 tuberculate posteriorly.

Through the kindness of Dr. M. S. Pennington, of Buenos Aires, we have received a specimen of *Deliastes brachmanni* Berg compared by him with the type. Study of this specimen in connection with the descriptions of Dohrn and Berg emboldens us to identify the genus which we had previously failed to do and to synonymize Berg's species with *reticulatus* Dohrn. There is a possibility of error here as Dohrn's description calls for reticulate venation of the hemelytra; however, because of the agreement of our specimens with the description in every other respect, we conclude that the "whitish veins" mentioned are only color markings, not true veins. Since Dohrn cites these "veins" as the principal distinction of *Deliastes* from *Palacus* it is probable that these are really only one genus. If this presumption is verified upon appeal to the types, the name *Palacus* will have the preference due to page priority.

KEY TO THE SPECIES.

1. Mid and hind femora dark brown or fuscous, each with two narrow stramineous annuli, one at one third of the length from apex and the other close to apex; mid and hind tibiae paler than femora, especially apically, a narrow band of fuscous marking off a pale band near base; antennae brown, with a narrow stramineous band near apex and another near base of first segment ..... **reticulatus** Dohrn.

   Mid and hind femora and tibiae, pale stramineous, each hind femur with a small dark brown mark above at apex, the tibiae with a similar mark at base, mid femora with 2 brown marks on posterior side of apical half, mid tibiae with a narrow dark brown annulus near base; antennae pale stramineous, narrowly dark brown at bases and apices of first and second segments ..... **stramineipes**, new species.

DELIASTES RETICULATUS Dohrn.

Deliastes reticulatus DOHRN, A. Nachträge, 1863, p. 76 [Cuba].
Deliastes brachmanni BERG, C. Addenda et Emendanda ad Hemiptera Argentina, 1884, pp. 114–115 [Mendoza, Argentina].

Male.—Brownish fuscous, spotted and mottled with whitish. Fore femur with two irregular whitish annuli, fore tibia with a broad band on basal half and a narrower one on apical half, whitish. Fore wings brownish fuscous, reticulated with fine whitish lines; hind wings whitish hyaline.

Head very little longer than wide, convex above, the transverse constriction deep; eyes large, as wide as the distance between them; antennae without long hairs. Anterior lobe of prothorax a little shorter than posterior one, slightly tapered posteriorly, with no distinct constriction between it and the posterior lobe, its extreme length about twice its greatest width; posterior lobe arcuate both longitudinally and transversely, tapering anteriorly, greatest length about 1.5 times its greatest width, not tuberculate posteriorly. Apical tergite forming a broad lobe which extends to apex of hypopygium and almost entirely covers it, the apex bluntly rounded; upper posterior border of hypopygium as in figure 35; claspers long, slender, recurved apically; seventh sternite slightly concave posteriorly, not half as long as preceding one.

Female.—Similar to male in color, the abdomen with venter largely yellowish, marked with brown, more conspicuously on sides, the dorsum darker and with dark brown marbling over entire surface.

The eyes are much smaller than in male, being a little narrower above than the interocular space. The prothorax has a noticeable annular swelling just before its posterior margin and the margin is not flared; the mesonotum is distinctly humped posteriorly, with a median straight, and 2 lateral curved carinae; metanotum also tricarinate. Abdominal tergites 4 to 7 each with a median pointed tubercle on middle of hind margin, the intermediate two largest, posterior angles of connexivum angulate, most conspicuously so on segments 4 to 6; tergites 8 and 9 as in figure 36.

Length, 10–11 mm.

Male specimen compared with type of *brachmanni*, La Rioja, Argentina, M. S. Pennington (Pennington); 3 males and 3 females, Argentina, Chaco de Santiago del Estero, near Icano, E. R. Wagner (Paris Museum); one male, South America (Cornell Univ.).

There are three nymphs from the Paris Museum collection (with the same data as the adults) which agree in general characters of head, thorax, and legs with the female, but the claws of the fore tarsi are poorly differentiated, and there are no processes on dorsum of abdomen.

DELIASTES STRAMINEIPES, new species.

Male.—Very similar to the male of the preceding species. Differs in color as stated in key and also in having the forewings more closely reticulated with whitish lines, and the process on upper margin of hypopygium as in figure 37.

Length, 11 mm.

Holotype.—Argentina. Chaco de Santiago de Estero, near Icano, E. R. Wagner (Paris Museum).

Genus PANAMIA Kirkaldy.

Panamia KIRKALDY, G. W. Notes on Central American Hemipterous Fauna, Can. Ent., vol. 39, p. 249, July, 1907 [Monobasic, genotype, *Lutevopsis ornata* Champion].

This genus may readily be separated from its allies by the peculiar venation of the fore wings (fig. 38) and also by the characters mentioned in the generic key.

PANAMIA ORNATA (Champion).

Lutevopsis ornata CHAMPION, Biologia, vol. 2, pp. 166–7, Oct. 1896 [Bugaba, Panama].

Panamia ornata KIRKALDY, G. W. Notes on Central American Hemipterous Fauna, Can. Ent., vol. 39, p. 249, July 1907.

A pale testaceous yellow species, the pronotum sometimes with one or two short oblique brown streaks on each side, and a faint median vitta and sometimes 2 lateral clouds on posterior lobe. Fore wings with some faint fuscous spots, the most distinct, being one in extreme base of discal cell, one or more at middle of same, and one near the cross vein at its apex.

Head including eyes nearly as broad as long, rounded above (fig. 39); proboscis slender; antennal hairs not very long. Anterior lobe of prothorax smooth, slightly shining, a little tapered posteriorly, with a punctiform depression in middle posteriorly, the constriction between it and the posterior lobe shallow, length about 1.5 as great as its width; posterior lobe granular, slightly sulcate centrally, with four very slight elevations near posterior margin, length about 1.5 as great as width, slightly tapered anteriorly; mesonotum with a rounded central elevation, metanotum with a longitudinal ridge a little more prominent apically; first abdominal segment with a short, erect, spine. Abdomen slender, a little enlarged terminally; segment preceding hypopygium in male deeply concave both above and below, extending as a rounded flap on each side for about half the length of the rather large hypopygium, the latter open above posteriorly, the claspers slender and upturned apically on each side of the very slender and acute hypopygial spine,

which exceeds them by about a third of its length (figs. 40, 41). Structure of hypopygium of female not very evident in the specimens at hand, the ventral valve somewhat inflated, capping over the end of the abdomen, the apical tergite with a rounded projection apically, and an emargination each side of it. Fore coxa about as long as prothorax and five-sixths as long as fore tibia; fore femur slender, about one fourth of its length longer than tibia, with about four minute stout postero-ventral thorns and short soft hairs; tibia lacking distinct armature; tarsus with two small slightly divergent claws. Venation of hind wing as in figure 42.

Length, 7–8 mm.

Localities.—Tabernilla, Canal Zone, Panama, April 27, 1907, A Busck. (U.S.N.M.); Chapada, Brazil, August, September, October (Carnegie Mus.).

Genus LUTEVOPSIS Champion.

Lutevopsis CHAMPION, G. C. Biologia, vol. 2, pp. 165–6, Oct. 1898. [Included species *L. longimanus* and *L. ornata*, both new; Mexico and Panama].

This genus was originally erected for the reception of two species which Champion in his remarks on the genus points out "differ greatly, but they may be retained in the same genus for the present." We consider that the shape of the head, structure of the fore legs and their armature, and the venation of the fore wings are sufficiently distinct to warrant their assignment to different genera. For the venation of the fore wing of *Lutevopsis* (s. s.) see figure 43. The armature of the fore femur consists of moderately long thorns and intervening shorter setulae and hairs, while the fore tibia has a complete series of minute stubby denticles along the entire ventral surface as in *Gardena* (fig. 95).

Genotype.—*Lutevopsis longimanus* Champion.

LUTEVOPSIS LONGIMANUS Champion.

Luteropsis longimanus CHAMPION, G. C. Biologia, vol. 2, p. 166, Oct., 1898 [Chilpancingo, Mexico].

Female.—Reddish testaceous, shining, without distinct markings, the venter of the abdomen darkest, and the wings unmarked. Head over 1.5 times as long as wide, much tapered anteriorly, convex above, anterior lobe with a deep short central longitudinal cavity at posterior margin, the posterior lobe not sulcate (fig. 44). Anterior lobe of prothorax fully twice as long as its greatest width, gradually tapered from anterior to posterior margin, subopaque, with a slight linear sulcus posteriorly, posterior lobe subquadrate, about two-thirds as long as anterior, slightly elevated on each lateral angle and in center posteriorly. Abdominal spiracles slightly raised, no protuberances on tergites, the apical sternite convex at apex; seventh

and eighth tergites polished, moderately convex apically, the former three times as long as latter. Fore legs rather slender, coxa about five sixths as long as tibia, the latter slightly curved. Venation of fore wing as in figure 43.

Length, 10 mm.

Locality, Istachatla, Fla., July 24, Heidemann Collection (U. S. N. M.).

We have had the opportunity of examining the type specimen of *Lutevopsis muscicapa* Bergroth through the kindness of its describer and find that it falls in the same genus as *longimanus* though the spines on fore femur do not extend as near to base, and the fore tibia is a little less than two-thirds as long as fore femur. It is a much darker species than the genotype, being brownish fuscous, with yellowish apical annulus on each hind femur (mid femora missing). Doctor Bergroth has expressed a doubt as to the region from which this species came. It is labelled "Borneo," but he suspects that it may really be South American.

SPECIES NOT SEEN.

L. chilensis Porter, Carlos. Revista Chilena de Historia Natural, vol. 25 (1921) 1922, pp. 505–506 [Chile]. Seems too small for this genus.

Genus EMESA Fabricius.

Emesa FABRICIUS, J. C. Systema Rhyngotorum secundum Ordines, Genera, Species, adiectis synonymis, locis, observationibus, descriptionibus. 1803, p. 263. [For a discussion of the genotype see below.]

Westermannia DOHRN, A., Emesina 1860, p. 251. [Includes three new species: *W. difficilis*, Colombia: *W. tenerrima*, Porto Rico; and *W. annulata*, Mexico, of which the last is here designated as the type species.]

Westermannias KIRKALDY, G. W. Biographical and Nomenclatorial Notes on the Hemiptera. The Entomologist, 1904, p. 280. New name for *Westermannia* Dohrn, 1860, preoccupied by Hübner's genus of the same name in the Lepidoptera, 1816.

F. L. de Laporte in his Essai d'une Classification Systematique de l'ordre des Hémiptères (Hémiptères Héteroptères Latreille), Guerin's Magasin de Zoologie, 1833 (p. 84), gives *Emesa mantis* Fabricius as sole example of this genus. It is customary to accept the first such mention of a single species in illustration of a genus as selection of a genotype. E. P. Van Duzee in his Catalogue of the Hemiptera of America North of Mexico, 1917 (p. 236), gives *E. precatorius* as the type by original designation, a view in which we are unable to concur. For a fuller discussion of the matter see Appendix 1.

Since the fate of the Fabrician genus *Emesa* and its component species underlies the nomenclature of the whole subfamily it may be well to give here a rather full discussion of the subject.

The genus *Emesa* originally included the following four species at the pages indicated in the Systema Rhyngotorum.

1. *filum*, Ent. Syst., vol. 4, 1794, p. 191. East India, p. 263.

2. *longipes*, Ent. Syst., vol. 4, 1794, p. 191. America, p. 263.

3. *mantis*, Ent. Syst., vol. 4, 1794, p. 190. Islands of America, p. 263.

4. *precatorius*, new species. Middle America, pp. 263–264.

The status of these species is discussed in the following paragraphs.

1. Unidentified by Dohrn (Emesina, 1860, p. 230) who shows that the references by Gray, Brullé, and Blanchard do not certainly apply to the insect Fabricius had. Distant's citation [8] adds nothing that would make definite the status of this species. Stal [9] queries *filum* showing that the type could not be found. We conclude that the species is entirely unidentifiable.

2. Stal [9] writes that *longipes* is a *Zelus*, thus removing it as a factor in taxonomy of the Ploiariinae.

3. The type of *mantis* recorded by Fabricius in his original description as being in the British Museum is still in that institution and in good condition. Through the kindness of W. E. China we are able to describe and illustrate it in this paper.

4. The *Emesa precatorius* of the Systema Rhyngotorum is not the *Gerris praecatorius* of the Entomologia Systematica (described from Guinea). The type is still is existence (Sehestedt Museum), and we have been furnished data concerning it by Dr. William Lundbeck. (See p. 82.)

Summarizing data as to the type species of *Emesa* Fabricius, it appears that *mantis* was at least acceptably selected by Laporte as the genotype. On the other hand it is only by a stretch of the imagination that *precatorius* can be considered the genotype. (See Appendix 1.)

The genus *Emesa* differs from *Stenolemus* in number of tarsal joints, in venation, and in having no long spines on either the mesonotum or metanotum, though the former has a central elevation and the latter an apical tubercle, sometimes pronounced. The genus *Myiophanes* Reuter is related to *Emesa* and we have figured the venation of the forewing (fig. 33) for comparative purposes.

KEY TO THE SUBGENERA.

1. Fore tibia with a series of erect antero-ventral spinules which are about half as long as diameter of tibia, and between each pair of these two or more shorter spinules; fore femur as in *Stenolemus*, without a distinct break in antero-ventral series of spines near base, but the postero-ventral series curved ventrad at base so that the last long spine is almost in middle of ventral surface; venation of forewing as in figures 45, 46, 47; prothorax elongate pedunculate, two small round warts on disk of posterior lobe.
Emesa Fabricius (p. 40).

[8] Fauna British India, Rhynchota, vol. 2, 1904, p. 216.

[9] Hemiptera Fabriciana, vol. 2, 1869, p. 123.

Fore tibia either with a complete postero-ventral series of spinules mostly as long as, or longer than, tibial diameter, or with microscopic ventral denticles; venation of forewing as in figure 54; prothorax not pedunculate, without small warts on disk of posterior lobe_____ 2

2. Fore femur with armature of postero-ventral surface consisting of short stout spines with black apices and between each pair and in line with them much shorter similar spines and longer fine bristles alternating, the antero-ventral series consisting of only short spines alternating with fine bristles, a rather wide break in the series near base, beyond which there are two short spines; fore tibia about two-thirds as long as femur, slightly ridged on ventral surface, the apex of the ridge with two series of minute denticles which are visible only under a high power lens; third antennal segment a little shorter than fourth_____**Myiagreutes** Bergroth (p. 42).

Fore femur with long fine bristles on postero-ventral surface, which are situated on short elevated bases and rather closely spaced, the antero-ventral surface with a similar series of shorter bristles which is interrupted near base, there being one or more bristles basad of the interruption_____ 3

3. Fore tibia with a slight ridge along ventral surface which is surmounted by two series of short black denticles_____**Phasmatocoris** Breddin (p. 44).

Fore tibia with a single complete series of minute blunt denticles on ventral surface_____**Rothbergia**, new subgenus (p. 44).

Subgenus EMESA Dohrn.

Bibliographical citation and type species same as for the genus.

KEY TO THE SPECIES.

1. Basal discal cell large, distinctly longer than wide, interpolated between supplementary discal cell and posterior discal cell (fig. 45); anterior lobe of pronotum without sharp tubercle on each side anteriorly.
annulatus (Dohrn) (p. 40).

Basal discal cell small or almost obsolete, when distinct much wider than long, supplementary discal cell abutting on base of posterior discal cell_____ 2

2. Basal discal cell subobsolete (fig. 46); anterior lobe of pronotum with a sharply pointed tubercle on each side anteriorly; posterior lobe without spines_____**mantis** (Fabricius) (p. 41).

Basal discal cell distinct (fig. 47); anterior lobe of pronotum with a small rounded tubercle on each side anteriorly; posterior lobe with a conical acute spine on each humeral angle_____**marmoratus**, new species (p. 41).

EMESA (EMESA) ANNULATUS (Dohrn).[10]

Westermannia annulata DOHRN, A. Emesina, 1860, p. 251 [Mexico].

We have not seen this species but have been favored by W. E. China with data and sketches drawn from the specimens in the British Museum identified as *annulata* by Champion. Our inform-

[10] Apparently the name *Emesa* as a genus of Heteroptera must be considered masculine in gender since of the originally included species the only one with a termination indicating gender, namely *precatorius*, is masculine.

ant points out that the specimens agree with Dohrn's Latin description of 1860 but not with the German one of 1863 (Nachträge, p. 49).

We reproduce Mr. China's sketches showing structural details of the species (figs. 45, 48, 49). The color of the forewing is brownish, with base, a band across basal discal cell, and the apex, much darker. The brown annulations on mid and hind femora and tibiae are as broad as, or broader than, the intervening pale spaces, whereas in the next two species they are narrower than the pale spaces.

Length, 28 mm.

Locality, Mexico.

EMESA (EMESA) MANTIS (Fabricius).

Gerris mantis FABRICIUS, J. C. Ent. Syst., vol. 4, 1794, p. 190 [no locality]. In the Systema Rhyngotorum, 1803, p. 263, a locality, Islands of America is given.

Westermannia mantis CHAMPION, G. C. Ent. Mo. Mag., ser. 2, vol. 9, 1898, p. 258.

We have not seen this species but have been supplied with data and drawings from the type by W. E. China. We have thus been able to definitely identify the species. The principal structural characters are represented in Figures 46, 50, 51, 52.

The color of the forewings is similar to that of *marmoratus*, the most conspicuous marking being the rather broad white veins at base of outer discal cell which form an angulated mark across the middle of the wing; the base of costa also is white. Structurally similar to *marmoratus* except as stated in key.

Length, 20 mm.

The type is from Jamaica; there is a second specimen, also in the British Museum from Jamaica, which, according to Mr. China, agrees with the type in all characters.

EMESA (EMESA) MARMORATUS, new species.

Female.—Dark brown, marked with yellowish white. Beak, antennae, and legs conspicuously annulated. Anterior lobe of prothorax mottled, the pedicel largely whitish above, with brown spots, black beneath; lateral carina of posterior lobe and a pair of small tubercles on disk whitish. Abdomen almost black, with a few yellowish white marks, the most conspicuous, being one on connexivum, and another on each sternite in front of spiracles, the spiracles whitish. Fore wings fuscous brown, mottled with darker, veins at base of discal cell and the anterior half of the one closing costal half of outer discal cell ivory white, the membrane near them hyaline.

Head longer than wide, hind lobe tapered posteriorly, with two slight dorsal humps. Anterior lobe of prothorax about two-thirds as

long as pedicel, tapered posteriorly, not sulcate on dorsum, posterior lobe a little shorter than pedicel, tapered anteriorly, about 1.5 as long as wide, with a slight but distinct carina on each side, a sharp tubercle near each posterior lateral angle, a pair of very small submedian tubercles behind middle, and a shallow median sulcus anteriorly. Connexivum with prominent angulate flaps on segments 6 and 7, eighth tergite longer than ninth, broadly rounded. Fore femur slender, the shorter spines distinctly shorter than the femoral diameter. Venation of fore and hind wings as in figures 47 and 53, respectively.

Male.—Anterior lobe of pronotum a little less than half as long as pedicel, the fore legs longer and more slender than in female, the abdomen more extended beyond apices of wings, with the apical tergite tapering to tip, where it is rounded, its basal width about three-fourths as great as its median length, the hypopygial claspers curved, moderately stout and hairy, hind margin of hypopygium with a central erect pale spike broad at base.

Length, 13–20 mm.

Holotype.—Female, Cayamas, Cuba, March 14, E. A. Schwarz. Allotype, male, Uhler Collection (U. S. Nat. Mus.); paratype, female, much broken, without data (Bueno).

Type and allotype.—Cat. No. 26711, U.S.N.M.

Subgenus MYIAGREUTES Bergroth.

Myiagreutes BERGROTH, E. New neotropical Ploeariinae, Psyche, vol. 18, 1911, pp. 15–16. [Monobasic, type species, *M. praecellens*, new species.]

KEY TO THE SPECIES.

1. Hind margin of pronotum with three long slender spines; more than four outstanding spines present on postero-ventral surface of fore femur, the distance between them distinctly less than the length of fore tarsus.
praecellens (Bergroth) (p. 42).

Hind margin of pronotum without long spines, only indistinct rounded elevations present; four outstanding spines present in the postero-ventral series on fore femur, the distance between them equal to or greater than the length of fore tarsus_____minor, new species (p. 43).

EMESA (MYIAGREUTES) PRAECELLENS (Gergroth).

Myiagreutes praecellens BERGROTH, E. New neotropical Ploeariinae, Psyche, vol. 18, pp. 16–17 [French Guiana].

Female.—Black, variegated with brown and with yellowish white markings. Base and apex of first antennal segment whitish; beak annulated. Thoracic thorns, more or less of sides, hind margin of prothorax and sometimes two vittae connected thereto, disk of mesonotum, four marks on anterior margin of posterior lobe of prothorax, and a spot above each of the fore and mid coxae yellowish

white. Abdomen with a spot on connexivum in front of each spiracle, and membrane surrounding the spiracles whitish. Legs castaneous, femora blackish apically, and with a broad whitish apical annulus, bases of tibiae each with a broad white annulus, the ground color immediately beyond almost black. Markings of fore wing as in figure 54. Coxal spots and bases of mid and hind tibiae sometimes touched with orange red.

Head about twice as long as wide, not tuberculate on dorsum, the median transverse constriction very deep. Anterior lobe of prothorax arcuate, tapered slightly posteriorly, about 1.75 as long as wide, faintly sulcate on dorsum and obliquely on sides, and with a pair of outwardly directed sharp thorns on anterior margin above; posterior lobe a little shorter than anterior, but little tapered anteriorly, as long as wide, with a broad shallow median sulcus, and three long slender thorns near posterior margin; mesonotum with a subtriangular elevation; metanotum with a short spine. Abdomen slightly sloped downward from apex of seventh tergite, the eighth in the form of a broadly rounded lobe which at center is not over half as long as ninth tergite. Fore legs as stated in key, femora tapered at base and apex. Venation as in figures 54 and 55.

The male has the pale color markings rather more accentuated; the apical tergite has a broad, triangularly pointed process; hypopygium wanting in the specimen examined.

Length, 15–20 mm.

In addition to the holotype female from French Guiana, kindly submitted by Doctor Bergroth, we have seen two other female specimens from French Guiana (Bas Carsevenne, F. Geay, 1898; R. Oberthur, 1899) belonging to the Paris Museum, one male and one female from Para, Brazil, June (Carnegie Museum), and one female from Trinidad Rio, Panama, June 4, 1912, A. Busck (U.S.N.M.).

EMESA (MYIAGREUTES) MINOR, new species.

Female.—Much paler than the preceding species, the general color being ochreous without the conspicuous cream colored markings which are so evident on the thorax and abdomen in *praecellens*. The legs are paler and while the apices of femora and bases of tibiae are paler than the other parts the immediately adjacent areas do not show the dark brown annuli so conspicuous in *praecellens*. The forewings are missing in the type and but one hind wing remains, which has the same venation as *praecellens*. Structural characters other than those mentioned in key much the same as in *praecellens*.

Length, 12 mm.

Holotype.—Female, Chaco Austral, near Icano, Argentina, 1910, E. R. Wagner (Paris Museum).

Subgenus PHASMATOCORIS Breddin.

Phasmatocoris BREDDIN, G. Neue Rhynchotenausbeute aus Süd-Amerika, Societas entomologica, vol. 18, No. 19, Jan. 1, 1904, p. 148. [Monobasic, type species *P. spectrum*, new species.]

This subgenus is very closely related to *Myiagreutes* having the same venation and structure of fore tibia. In the armature of the fore femur, however, it agrees with *Rothbergia*, new subgenus, next described, though there are about 3 bristles instead of one basad of the interruption of the antero-ventral series. Only one species is known.

EMESA (PHASMATOCORIS) SPECTRUM (Breddin).

Phasmatocoris spectrum BREDDIN, G. Neue Rhynchotenausbeute aus Süd-Amerika,, Societas entomologica, vol. 18, No. 19, Jan. 1, 1904, pp. 148–149 [Bolivia].

Male.—Reddish brown, including the fore-wings, the bases of the latter between the veins, and the extreme apices of mid and hind femora and tibiae are cream colored.

Fore coxa and tibia subequal in length, each about four-sevenths as long as fore femur. Eye not as wide as interocular space; posterior lobe of head rounded above. Pronotum with a short, round tubercle on each side of anterior margin; anterior lobe almost parallel-sided, as long as posterior lobe, separated from latter by a deep constriction; posterior lobe slightly concave in center of disk, with 3 short wart-like tubercles posteriorly. Hypopygium as in figure 56. Fore wing almost identical in appearance with that of *E. praecellens* (fig. 54).

Length, 20 mm.

Bolivia (Berlin Mus.). Redescribed from the holotype kindly sent to us for examination by Dr. Walther Horn. Another specimen from same collection which reached us in fragments is labeled Yungas de la Paz, Bolivia, 100 m., Breddin.

ROTHBERGIA, new subgenus.

Genotype.—Emesa testaceus, new species.

KEY TO THE SPECIES.

1. Ventral spines on fore femur ceasing about the length of tarsus from base of femur (slender hairs basad of this point); anterior lobe of prothorax longer than posterior lobe (27:22), slightly narrowed posteriorly when seen from above (fig. 57); basal discal cells of forewing as in figure 58.
rapax, new species (p. 45).

Ventral spines on fore femur extending to or almost to base of femur__ 2

2. Basal discal cells of forewings as in figure 59; prothorax similar to that of *rapax* (fig. 57), but the anterior lobe is not narrowed posteriorly.
testaceus, new species (p. 45).

Basal discal cells of forewings as in figure 60; prothorax shorter than in preceding species, the anterior lobe declivitous in front (fig. 61).
diffinis, new species (p. 46).

EMESA (ROTHBERGIA) TESTACEUS, new species.

Female.—Pale brownish testaceous, without distinguishable markings.

Head a little longer than wide, tylus forming a ridge in front of eyes, posterior lobe with a slight median hump just behind constriction; basal segment of beak over half as long as second; second antennal segment not two thirds as long as first, third nearly as long as fourth, third and fourth combined over three fourths as long as second. Anterior lobe of prothorax not narrowed posteriorly, arcuate, with a tubercle in front each side of the neck and a percurrent median longitudinal sulcus, about twice as wide as long, separated from posterior lobe by a deep constriction; fore coxal cavities slightly flaring, the prosternal sulcus almost vertical, pointed posteriorly; posterior lobe of prothorax about four fifths as long as anterior, subquadrate, without tubercles or distinct elevations; mesonotum and metanotum slightly elevated in center. Abdomen elongate, slightly ovate, tergites 1 to 7 broader than long, eighth very short, slightly rounded apically, about one fourth as long as seventh and over three times as broad as long, ninth longer than eighth, transverse at apex, disk depressed, margins and median line elevated. Fore femur stouter than usual, tapered apically, armature as stated in key; fore tibia well over half as long as femur (40:67) and equal to fore coxa; the three tarsal segments subequal in length, tarsal claws rather large, divergent. Venation of forewings much as in *Emesa praecellens*, basal cells as in figure 59.

Length, 11 mm.

Holotype.—Cacao, Trece Aguas, Guatemala, June, 1907, G. P. Goll (U.S.N.M.).

Type.—Female, Cat. No. 26712, U.S.N.M.

EMESA (ROTHBERGIA) RAPAX, new species.

Male.—Similar in color to *testaceus;* differs as stated in the key. Apical tergite with a rounded flap extending over hypopygium, the latter opening upward, claspers rather short, pointed apically and slightly incurved, the process from hind margin of hypopygium erect, broad at base, thin and rounded apically. There is but one bristle on anteroventral surface of fore femur basad of the break in the series and this is situated at more than the length of the tarsus from the base of femur, the fore tibia is a little longer than half the

entire length of femur (45:80) and a little shorter than fore coxae (50). Prothorax as in Figure 57; basal discal cells of forewing as in figure 58.

Length: 12 mm.

Holotype.—Tapia, Argentina, 2,000 feet, W. F. H. Rosenberg (U.S.N.M.).

Type.—Male, Cat. No. 26713, U.S.N.M.

EMESA (ROTHBERGIA) DIFFINIS, new species.

Female.—A darker species than either of the others, the posterior lobe of pronotum, fore wings, and fore femora being largely infuscated.

The most noticeable structural difference is in the fore-shortened and declivitous pronotum which is illustrated in figure 61. The transverse constriction on head in this species is very shallow as compared with that of the others. Length of fore tibia as compared with fore femur 26 as to 45, of fore coxa 25. Basal discal cells of forewing as in figure 60.

Length, 9 mm.

Holotype.—Bolivia, W. M. Mann (U.S.N.M.).

Type.—Female, Cat. No. 26714, U.S.N.M.

UNPLACED SPECIES.

difficilis (*Westermannia*) DOHRN, A. Emesina, 1860, p. 251 [Colombia].
tenerrima (*Westermannia*) DOHRN, A. Emesina, 1860, p. 251 [Porto Rico]

We are unable to place these species in our keys without fuller knowledge of the characters of their types.

We have been unable to enter into communication with the authorities who have the specimens in charge but W. E. China of the British Museum has supplied data dealing with the characters of the specimens that are identified as these species in that institution. Both have 3-segmented fore tarsi which would seem to ally them closely with *Emesa*, but the basal discal cell of forewings has a short vein emanating from it as in *Stenolemus* (fig. 62). The basal stout spine on ventral surface of fore femur is directed straight downward as in *Emesa* and the forewing is rounded at apex, not at all concave behind tip. In *tenerrima* the peduncle of prothorax is longer while in *difficilis* it is shorter than the anterior lobe. Mr. China also writes that the subapical antennal segment in *difficilis* is much longer than the apical. In the species of related genera examined by us this is never the case, the third being shorter than the fourth. There is, however, in some species a slightly indicated suture just before the apical swollen part of fourth segment which may be mistaken for a true joint, in which case the antenna would

be considered as 5-segmented. This is, however, not really the case, the pseudosuture being almost indistinguishable in cleared material and much less so in dry specimens.

Genus POLAUCHENIA, new genus.

Differs from *Emesa* in having only 2 discal cells in forewing (fig. 65) and in having the mesonotum and metanotum spined, and from *Stenolemus* in having the fore tarsi 3-segmented (fig. 64*a*), and in having no vein arising from the costal margin of the basal discal cell. The fore femur has the basal ventral spine directed downward and not sloped backward (fig. 64), the head has two pointed conical tubercles behind the transverse constriction and the posterior lateral angles of pronotum have divergent spines of moderate length.

Genotype.—Polauchenia protentor, new species.

KEY TO THE SPECIES.

1. Peduncle of prothorax but little longer than anterior lobe; posterior lobe of prothorax with two broader stramineous vittae; mid and hind tibiae each with two brown bands on basal half; preapical brown band on hind femur reduced to a small spot_____**biannulata**, new species (p. 48).
   Peduncle of prothorax about three times as long as anterior lobe (fig. 63); posterior lobe of prothorax with three narrower stramineous vittae on disk; mid and hind tibiae each with five brown bands on basal half; preapical brown band on hind femur broad____**protentor**, new species (p. 47).

POLAUCHENIA PROTENTOR, new species.

Female.—Dark brown, marked with pale yellow. Basal and second antennal segments each with four pale annuli; basal two segments of beak pale at apices; prothorax with markings as in figure 63. Spines of mesothorax and metathorax pale. Abdomen fuscous, spiracles, lateral posterior angles of segments, and some linear marks on venter yellowish. Legs whitish yellow, each femur with five brown annuli; fore tibiae with four brown annuli, mid and hind pairs each with five brown annuli on basal half. Wings brown, darker apically, veins yellow, the membrane along the cross-veins, most of clavus, and base of corium whitish.

Head, antennae, prothorax, and fore coxae as in Figure 63. Fore femur a little less than twice as long as fore coxae, with armature as in figure 64; spines of mesothorax and metathorax short and straight, pubescent. Abdomen broadened slightly beyond middle, the tergites angulate laterally but without well developed lateral appendages; venter without submedian spines, spiracles but little elevated, not pedicillate, seventh pair not exposed. Hind femora about as long as head and body together, the tibiae distinctly longer,

the hairs on legs of moderate length and not dense. Venation and shape of wing as in figure 65.

Length, 15 mm.

Holotype.—Tabernilla, Canal Zone, Panama, May 14, 1907, A. Busck (U.S.N.M.).

Type.—Female. Cat. No. 26715, U.S.N.M.

POLAUCHENIA BIANNULATA, new species.

Male.—Similar in color to *protentor*, the prothorax bivittate instead of trivittate on disk posteriorly, and the mesothoracic and metathoracic spines black instead of yellow. The apices of forewings are not uniformly dark brown as in *protentor*, but have an elongate yellow mark with dark spotting in center about one-third of the width of wing. The principal color difference lies in the biannulate hind tibia, *protentor* having 5 brown annuli.

A much stouter species than *protentor*, the length of head and thorax combined being barely over two-thirds that of the abdomen, whereas in *protentor* they almost or quite equal the abdomen. The forewings (fig. 66) exceed the tip of abdomen and their posterior apical margin is but slightly concave. The head is much broader and shorter than in *protentor*, the interocular space is much narrower than one eye, the mesothoracic thorn is short, the metathoracic one longer, tapered, and neither very hairy. Venter about as in *protentor;* hypopygial claspers small, slender, and slightly upcurved apically.

Length, 16 mm.

Holotype.—Mana River, French Guiana, May, 1917 (Carnegie Mus.).

Genus PLOIARIA Scopoli.

Ploiaria Scopoli, J. A. Deliciae Florae et Faunae Insubricae. Part 1, 1786, p. 60, pl. 24, fig. A (3 parts). [Monobasic *P. domestica*, new species, genotype, Austria.] Plate 23, Part 2, 1786, further (and better) illustrates the species and pp. 69–73 are devoted to an account of the habits and structure of the insect. Plate 25, figs. 1–5, Part 3, 1788, illustrate the egg and nymph, the latter with a strong submedian spine on front femur, a character the adult does not have.

Cerascopus Heineken, C. Descriptions of a new genus of Hemiptera, and of a species of Hegeter. The Zoological Journal, No. 17, Jan.–May, 1829 (1830), pp. 36–40, pl. 2, fig. 5. [Monobasic, *C. marginatus*, new species, genotype, Madeira.]

Emesodema Spinola, Maximilien. Essai sur les Insectes Hémiptères, Rhyngotes ou Hetéroptères, 1840, p. 87 [founded on *Ploiaria domestica* Scopoli, hence an absolute synonym of *Ploiaria.*]

Luteva Dohrn, A. Emesina, 1860, pp. 242–3 [included species, all new; *L. concolor*, Celebes; *L. gundlachi*, Cuba; and *L. macrophthalmus*, Brazil and Colombia, of which the first named was subsequently designated as type by Van Duzee, Cat. Hemip. Amer. North of Mexico, 1917, p. 235].

Ploiariopsis CHAMPION, G. C. Biologia Centrali-Americana. Insecta. Rhynchota. Hemiptera-Heteroptera, vol. 2, p. 173, Oct. 1898. [Included species, both new: *P. megalops*, Panama; and *P. praedator*, Guatemala, of which the former was subsequently designated as type by Van Duzee, Cat. Hemip. 1917, p. 235.]

Emendation: *Ploearia*.

This genus shows in the structure of the fore tarsi an approach to the form of those of *Barce*, but in the armature of the fore femora there is a stronger resemblance to *Emesa* and its allies. In the winged forms of this genus the pronotum does not extend over dorsum of mesonotum except at the extreme anterior margin. The venation of the forewing is characteristic and in the hind wing there is immediately beyond the cross-vein a distinct thickening of the membrane and a slightly denser appearance similar to that of the costa extending almost across the field of the wing which is not found in any other genus in the subfamily so far as we know. The latter character is shown in figure 83. That we have here a group of closely allied species well regarded as belonging to a single genus is evident from the intergradation observable in what have been considered diagnostic characters. This is true not only of the armature of the fore legs, but also of the spines on the posterior lobe of the head. As for the presence or absence of hairs on the antennae it may be said that in this and some other genera the degree of development of these is a sexual character. If minor differences in the armature of the fore-legs and other characters of like importance are seized upon as justifying the recognition of additional genera, there will be almost no end to the process in a subfamily so rich in structural differences as the Ploiariinae.

To illustrate what would happen in the present genus if *Ploiaria* and *Luteva* were recognized as genera and the process carried to its logical end, *Ploiaria* would consist only of *domestica* and its closest allies; the species with two-spined trochanters would form a different genus; *Luteva* could not include a species with like femoral armature but with spined trochanter like *setulifera* here described; *Cerascopus* would be resurrected, and various segregates of one or a few species could be made on equally valid grounds. Generic importance has been claimed for a character, absence or presence of wings, which is not even of specific value in this group. Recognizing an excessive number of genera makes it difficult to construct and to use the generic key. When the genera approach the one-species standard the generic key becomes as difficult to use as an unusually long specific key. Is it not better to divide the burden between them? This can be done only by the recognition so far as practicable of genera which comprehend more species than the mere variants of a single specific type. If one gets off the track in a complicated generic key, he may soon go far

into strange country; while with a simple key, after following an easy lead to the genus, even if he does find a key grouping a considerable number of related forms, he will at least be near his destination (that is, among forms truly related to that in hand). Winged and apterous specimens occur in the same species of *Ploiaria*, and it requires close observation at times to make certain whether apterous specimens are nymphs or adults. The full development of the genitalia and the three, instead of two, segmented tarsi, however, serve to identify adults in such cases.

KEY TO THE SPECIES.

1. Fore trochanters with one or more spines (sometimes merely bristles), usually set on raised bases (the body of trochanter itself often acutely produced), never with numerous setae; fore femur with 4 to 7 stout spines which are always set on more or less distinctly enlarged and elevated bases, standing in line with or almost in line with a larger number of much smaller spines or bristles on the posteroventral surface, the longer spines sometimes with an outward curvature (fig. 80); apical antennal segment longer than subapical, never shorter than it; length of fore coxa variable in relation to length of fore tibia (Subgenus *Ploiaria*) 2

   Fore trochanters nearly bare or with few to numerous fine hairs, one or two of which are sometimes bristle-like; fore femur with the spines or bristles on the posteroventral surface more uniform in length, the larger bristles lacking enlarged elevated bases, and almost straight (fig. 74); apical antennal segment shorter than subapical, equal to it only in *setulifera;* fore coxa invariably longer than fore tibia (Subgenus *Luteva*) 16

2. Posterior lobe of head with a prominent median backwardly projecting spine (fig. 85) 3

   Posterior lobe of head lacking spine 4

3 Last tergite of male with a slender, obtuse, strap-shaped process extending back over hypopygium and closely adherent to it (fig. 86); hind margin of hypopygium as in figure 87; median process of seventh tergite of female extending distinctly farther caudad than the acute lateral angles (fig. 88). **denticauda**, new species (p. 63).

   Last tergite of male with a shorter, pointed process (fig. 92); hind margin of hypopygium as in figure 91; median process of seventh tergite of female extending but little farther caudad than the rounded lateral angles (fig. 90) ..... **hirticornis** (Banks) (p. 64).

4. Posterior lobe of head with an erect spinelet at margin of eye on each side behind constriction ..... **reticulata** (Baker) (p. 63).

   Posterior lobe of head not so armed 5

5. Posterior lobe of head with a more or less prominent median ridge 6

   Posterior lobe of head lacking such a ridge 7

6. Posterior lobe of head with a slight central elevation anteriorly, and another posteriorly, between which there is a low longitudinal ridge; anterior lobe of head sulcate behind; fore coxa little longer than fore tibia; a highly colored species, beak with two dark bands, mid and hind femora fuscous apically, each with a subapical pale annulus, the corresponding tibiae fuscous basally, with subbasal pale annuli. **granulata**, new species (p. 57).

   Posterior lobe of head with a more or less distinct median carina. (This is true of *uniseriata* and *punctipes* which run on other characters beginning with next couplet 7

7. Fore coxa shorter than fore tibia; wings entirely absent 8
Fore coxa as long as, or longer than, fore tibia; wings or wing pads present 9

8. The long spines on postero-ventral surface of fore femur forming a series distinctly laterad of the short setulae ..... **marginata** (Heineken) (p. 65).
The long spines on posteroventral surfaces of fore femur in the same series as the short setulae ..... **aptera**, new species (p. 66)

9. Fore coxa nearly twice as long as fore tibia (fig. 80); anterior lobe of head with a short but deep sulcus posteriorly: spines on fore femur distinctly longer than the femoral diammeter 10
Fore coxa but little longer than fore tibia; anterior lobe of head without a sulcus 12

10. Mesonotum rather depressed, with a broad elliptical sulcus extending nearly its entire length; only soft hairs between the strong postero-ventral spines on fore femur; thorax pale above; legs not banded; length 4 mm.; discal cell of fore wing as in figure 81, the inner apical part angulate.
uniseriata, new species (p. 61).
Mesonotum well arched both transversely and longitudinally, without median depression; legs banded; short spines between the strong postero-ventral spines on fore femur; larger species, darker colored; inner apical part of discal cell of forewings rounded (fig. 82) 11

11. Male hypopygial claspers nearly as long as genital segment; length of insect 6 mm ..... **punctipes**, new species (p. 62).
Male hypopygial claspers much shorter than genital segment; length of insect 8 mm ..... **similis**, new species (p. 62).

12. Distance between eyes on dorsum of head greater than the width of one eye: antennae short hispid or microscopically pubescent 13
Distance between eyes on dorsum of head not greater than width of one eye; basal two antennal segments distinctly hairy, the hairs longer than the diameter of segments 14

13. Fore tarsus fully two-thirds as long as fore tibia; hind border of male hypopygium as in figure 75 ..... **carolina** (Herrich-Schäffer) (p. 58).
Fore tarsus not two-thirds as long as fore tibia; hind border of male hypopygium as in figure 76 ..... **floridana** (Bergroth) (p. 59).

14. Wings whitish, without distinct markings; basal segment of antenna at least as long as entire insect 14*a*
Wings brownish, with dark markings; basal segment of antenna not as long as entire insect 15

14*a*. Discal cell of forewing broad, not over 2.5 as long as its greatest width and about four-fifths as long as the vein emanating from its apex; cross-vein at two-fifths from apex of longitudinal vein.
albipennis, new species (p. 60).
Discal cell of forewing narrow, at least five times as long as its greatest width and a little longer than the vein emanating from its apex; cross-vein at not more than one-third from apex of longitudinal vein.
umbrarum, new species (p. 60).

15. Antennal hairs but little longer than diameter of segments; hind border of male hypopygium as in figure 77 ..... **bispina**, new species (p. 59).
Antennal hairs four or five times as long as the diameter of segments; hind border of male hypopygium as in figure 79.
pilicornis, new species (p. 61).

16. Eye wider than interocular space (fig. 67) 17
Eye not wider than interocular space (fig. 72) 19

17. Large pale species, over 10 mm. in length; antennae conspicuously hairy; fore femur with two brown annuli, one before and one beyond the middle; mid and hind femora yellow, whitish apically, with one broad preapical dark brown band; thorax largely yellow ventrally, more conspicuously blackened on dorsum than on venter----**macrophthalma** (Dohrn) (p. 53).
Smaller, darker species, less than 10 mm. in length: fore femur with four brown annuli, including one at base and another at apex; mid and hind femora brown with one or two preapical pale annuli; thorax fuscous on venter---- 18
18. Pronotum twice as long as its greatest width; venation of forewing as in *varipennis*, the vein leaving apex of discal cell undulated, crossvein near its middle; mid and hind femora each with 2 preapical pale annuli; fore trochanter with one outstanding bristle----**brunnea**, new species (p. 54).
Pronotum about one third longer than its greatest width; discal cell of forewing as in *punctipes;* vein leaving apex of discal cell straight, cross-vein at one third length of that vein from apex; mid and hind femora each with 1 pale annulus; fore trochanter with two fine, rather widely separated outstanding bristles----**sicaria**, new species (p. 55).
19. Fore trochanter bare or with only soft hairs---- 20
Fore trochanter with soft hairs and a single outstanding bristle anteriorly; fore femora faintly banded, other legs nearly unicolorous, pale fuscous, knees narrowly pale----**setulifera**, new species (p. 55).
20. Mid and hind femora each with a subapical dark or reddish band---- 21
Mid and hind legs entirely pale----**varipennis**, new species (p. 56).
21. Apical cross-vein of forewing at or close to middle of vein from apex of discal cell; the elongate dark mark in middle of discal cell rather faint. **gundlachi** (Dohrn) (p. 56).
Apical cross-vein at one-third from base of vein from apex of discal cell; elongate dark mark in discal cell linear, almost black, appearing chitinized----**rufoannulata** (Bergroth) (p. 57).

REMARKS ON PREVIOUSLY DESCRIBED SPECIES OTHER THAN THOSE INCLUDED IN THE KEY.

californiensis (*Ploiaria*) BAKER, C. F. Pomona Coll. Journ. Ent., vol. 2, No. 2, May, 1910, pp. 226–7. [Claremont, Calif.]

May be the nymph of *P. reticulata* Baker. If adult it may be related to *P. marginata.*

fairmairei (*Emesodema*) DOHRN, A. Emesina, 1860, pp. 248–249 [West Indies].

megalops (*Ploiariopsis*) CHAMPION, G. C. Biologia, vol. 2, p. 174, Oct. 1898 [Volcan de Chiriqui, Panama].

Apparently *granulata* of our key is close to this species, which however has much larger eyes and pilose antennae; our species may prove to be the female of *megalops.*

praedator (*Ploiariopsis*), CHAMPION, G. C. Biologia, vol. 2, p. 174, Oct 1898 [Capetillo, Guatemala].

Agrees to some extent with our *uniseriata*, but the eyes are smaller, and the posterior lobe of head not sulcate anteriorly.

sonoraensis (*Ploiariopsis*), VAN DUZEE, E. P. Proc. Calif. Ac. Sci., ser. 4, vol. 12, No. 11, June 7, 1923, p. 144. [San Diego Id., Gulf of Calif.] Said to be allied to *megalops.*

texana (*Ploiaria*), BANKS, N. Emesidae, 1909, p. 44 [College Station, Tex.].

We have examined the type of this species (Mus. Comp. Zool.) and possibly we have renamed it in our *P. similis*. However, the abdomen of type is missing and the genitalia have neither been figured nor described; specific identification thus is impracticable.

SYSTEMATIC ARRANGEMENT OF THE SPECIES.

Fore trochanter of normal form, bare, pubescent, or with one or two bristles; spines of postero-ventral series of fore femur nearly uniform in length. Subgenus **Luteva**, sens. lat.

brunnea.
sicaria.
gundlachi.
macrophthalma.
rufoannulata.
setulifera.
varipennis.

Fore trochanter often produced ventrally as a base for the 1 to 3 spines or bristles with which it is armed; spines of postero-ventral series of fore femur very unequal in size, sometimes in a double row.

Subgenus **Ploiaria**, sens. lat.

Wings or wing-pads present in adults.

Fore coxa subequal to fore tibia, hind lobe of head with a median ridge.

granulata.

Fore coxa longer than fore tibia. Hind lobe of head unarmed.

albipennis.
bispina.
carolina.
floridana.
pilicornis.
umbrarum.

Hind lobe of head with a median carina.

punctipes.
similis.
uniseriata.

Hind lobe of head with orbital spinelets.

reticulata.

Hind lobe of head with two tubercles and a median spine.

denticauda.
hirticornis.

Wing pads absent in adults; fore coxa shorter than fore tibia.

aptera.
marginata.

PLOIARIA MACROPHTHALMA (Dohrn).

Luteva macrophthalmus DOHRN, A. Emesina, 1860, pp. 244–5, pl. 1, figs. 23, 24 [Brazil; Colombia].

A pale brownish-testaceous species with conspicuous black eyes and dark brown to black marks on each side of pronotum and mesonotum, disk of metanotum, and on mesopleura. The fore femur has two brown annuli, one before and the other beyond the middle;

mid and hind femora each with a pre-apical and tibiae with a faint sub-basal brown annulus. Forewing with four dark brown clouds, one at base of discal cell, one on costa, and another on hind margin at middle of discal cell, and one on costa at extremity of transverse apical vein.

Head as in figure 67; apical antennal segment 0.75 as long as subapical, basal 2 segments long-haired. Pronotum slender, longer than mesonotum, gradually narrowed to near posterior margin, then rather abruptly widened; mesonotum slightly sulcate centrally. Hind margin of preapical abdominal tergite broadly concave; hypopygium of male without a central spine, the claspers long, very slender, overlapping and much curved, fanglike. Fore coxa 1.75 as long as pronotum and four-fifths as long as fore femur; trochanters pilose; femur slender, the armature consisting of fine slightly irregular spines; fore tibia half as long as femur and twice as long as fore tarsus, without erect ventral setulae; tip of tarsus falling considerably short of base of femur; mid and hind legs very long and slender. Discal cell of forewing ending in a narrow point (fig. 68).

Length, 11–12 mm.

Locality, Portobello, Panama, April 18, 1912, February 21, 1911, and March 12, 1911, A. Busck (U.S.N.M.)

PLOIARIA BRUNNEA, new species.

A much darker species than *macrophthalma*, differing as stated in key and in having a much more noticeable white annulus at apex of each of the first two segments of antenna, that on basal one being much narrower.

Head as in figure 69, not so much narrowed posteriorly as in *macrophthalma*. Antennae and fore legs similar to those of preceding species in proportions. Pronotum and mesonotum slightly granulose and subopaque, not conspicuously shining as in *macrophthalma*, nor so gradually tapered.

Fore wing more conspicuously marked than in preceding species, the dark marks in cells more or less distinctly radiating from a central spot or streak. Apical tergite of male less concave than in preceding species, the hypopygium with a strong blunt upwardly directed protuberance in center, not conspicuously haired, the claspers stouter and more circularly curved, gradually tapered from base.

Length, 7 mm.

Holotype.—Male, Chapada, Brazil, June (Carnegie Mus.); allotype, Trinidad Rio, Panama, May 7, 1911, A. Busck (U.S.N.M.).

Allotype.—Female, Cat. No. 26716, U.S.N.M.

PLOIARIA SICARIA, new species.

Male.—Coloration similar to that of *brunnea* but with the lateral margins and a carinate line on each side of disk of mesonotum, white; the costa of forewing is more extensively reddish, and the cell beyond the apical cross vein is entirely fuscous instead of only partly so.

Proportions of fore tibia and fore femur 20:35 (in *brunnea* 25:45); claws of fore tarsi slightly unequal as in *brunnea*. Upper margin of hypopygium similar to that of *bispina* (fig. 77) but the spines much shorter: claspers as in figure 70, more abruptly narrowed than in *brunnea*.

Length, 8 mm.

Holotype.—Huachi Beni, Bolivia, September, 1922, W. M. Mann. [Mulford Biological Expedition] (U.S.N.M.).

Type.—Cat. No. 26717 U.S.N.M.

PLOIARIA SETULIFERA, new species.

Female.—A pale yellowish brown species without conspicuous markings, the apices of hind and mid femora whitish. Forewings with a few brown markings consisting of poorly defined spots or streaks, the most noticeable situated in middle of discal cell and just behind discal cell on inner side of wing.

Head similar to that of *pilicornis;* preapical and apical antennal segments about as in last two species as to proportions. Pronotum almost uniform in width to near posterior margin, where it is slightly flared, microscopically granulose and not sulcate; mesonotum with a very shallow broad central sulcus. Fore coxa about 1.5 as long as pronotum; fore trochanter with some fine hairs and one or two distinct, but short bristles; fore femur as in preceding two species; fore tibia half as long as femur, with a ventral series of decumbent setulae, which are directed apicad, very minute at base and becoming gradually longer apically; fore tarsus over three fourths as long as tibia, extending almost to base of femur.

Forewing as in figure 71.

Length, 8 mm.

Holotype.—West Lake, Cape Sable, Fla., February 26, 1919, A. Wetmore; Paradise Key, Fla., March 10, E. A. Schwarz and H. S. Barber (U.S.N.M.).

Type.—Female, Cat. No. 26718, U.S.N.M.

There are also three nymphs from the same localities which agree in most respects with the foregoing description. The wingpads are present, there are only two segments in the tarsi, and the armature of the fore legs is relatively stronger (especially in the bristling of the trochanter), more noticeably so in the younger specimens.

We have seen a species of this group, very closely related to *setulifera*, from Hong Kong, China, F. W. Terry (Bueno).

PLOIARIA GUNDLACHI (Dohrn).

Luteva gundlachi DOHRN, A. Emesina, 1860, p. 244, pl. 1, fig. 19 [Cuba].

A pale yellowish species with more or less distinct dark brown markings. The most constant marks are on the mesonotum and before the apices of the mid and hind femora, the former having three rudimentary vittae and the latter a broad subapical band. The wings have more numerous brown spots than in the three preceding species, three on costa (one at base of discal cell, one about one third from base, and the other about one fourth from apex) being most conspicuous; there are two elongate marks, one in discal cell and the other beyond the cell between the longitudinal vein and hind margin, from which emanate brown linear markings giving the wing a reticulated appearance.

Head as in figure 72. Pronotum slightly longer than mesonotum, almost parallel-sided to near posterior margin, then dilated, not sulcate; mesonotum slightly widened posteriorly and like the pronotum, opaque and with fine decumbent pubescence. Hind border of male hypopygium without a central spine, furnished with many stiff, backwardly directed hairs on each side near bases of claspers, the latter slender apically, much curved and hairy. Fore legs as in the preceding species. Transverse apical vein a little less than midway between apex of discal cell and apex of wing.

Length, 9–10 mm.

Localities, Balthazar, Grenada, West Indies, H. H. Smith (U.S. N.M.); Cayenne, French Guiana, February, 1917 (Carnegie Mus.); Mayaguez, Porto Rico, July, 1914 (Amer. Mus.).

PLOIARIA VARIPENNIS, new species.

Similar in color to the preceding species, but the preapical femoral band and mesonotal markings are very faint or absent. The markings of the forewings are darker, and of about the same pattern, but there is only one large dark brown spot on costa, namely, the one about one-third from base of discal cell, the others being very small and not more conspicuous than the other spots on wing.

Head as in *gundlachi*. Male hypopygium with a slight rounded central production of the hind border and with fewer and finer hairs than in last species, the claspers more abruptly curved. Fore wing as in figure 73. Fore legs as in figure 74.

Length, 10–11 mm.

Holotype.—A male; allotype, and five nymphs, Cacao, Trece Aguas, Alto Vera Paz, Guatemala, April 23. Paratype female, and

one nymph, same locality, April 11, and four nymphs, April 2, 13, and 21, E. A. Schwarz and H. S. Barber (U.S.N.M.).

Type, allotype, and paratype.—Cat. No. 26719 U.S.N.M.

PLOIARIA RUFOANNULATA (Bergroth).

Luteva rufoannulata BERGROTH, E. Psyche, vol. 18, No. 1, Feb. 1911, pp. 18–19 [Jamaica].

We have examined the type of this species. It is closely related to *gundlachi*, the principal distinctions being found in the wings. The markings of the forewings appear to furnish a ready means of identification. There are eight dark marks along costa, those opposite base, and middle of discal cell and the one at apex of the cross-vein being especially conspicuous, while there are two discal linear blackish brown marks that are especially prominent; one in discal cell and the other in the cell below the cross-vein; neither of these marks has radiating streaks emanating from it as is the case in *gundlachi*. Mid femur with a preapical reddish annulus, fore coxa with most of apical half, and fore femur with three bands of the same color.

The abdomen is missing in type so that we can not compare the genitalia with those of *gundlachi*, but in other structural characters the species are very close.

Length to tip of hemelytra, 9 mm.

Holotype.—Mandeville, Jamaica, E. P. Van Duzee (Van Duzee).

PLOIARIA GRANULATA, new species.

Female.—A dark-colored species with pale legs, the latter very characteristically marked, with a narrow fuscous subapical annulus and a broader apical one on each mid and hind femur, and a moderately broad basal annulus on each mid and hind tibia which have a median whitish spot on outer side that does not entirely encircle the tibia. The antennae are yellowish, fuscous at bases and apices of segments, the basal segment with a broad subbasal whitish annulus. The swollen bases of fore femoral spines fuscous, the spines yellow.

Eyes small, about half as long as distance from their anterior margin to apex of head; anterior lobe of head with a slight elevation on each side of sulcus; apical antennal segment about 1.75 as long as subapical; head and pronotum minutely granulate, each granule surmounted by a microscopic hair. Wing pads present, the mesothoracic pair largest. Abdomen slightly ovate, each tergite slightly produced on each side posteriorly, the amount of production increasing gradually to tergite 6, a slight median process near posterior margin of each tergite from second to seventh, inclusive.

the largest on tergite 6. Fore coxa a little longer than pronotum, minutely granulose, each granule with a microscopic pale hair which is directed towards apex of coxa; fore trochanter with two thorns on elevated bases; fore femur curved outwardly at middle, upper surface granulose as in coxae, the elevated bases of long postero-ventral spines about as long as the femoral diameter, the longest spines at least twice as long as their bases, the short spines also with elevated bases, one or two between each pair of the longer spines and slightly nearer to ventral surface than that series, the spines of postero-ventral series are curved outward and those of the antero-ventral series inward so that the tibia lies entirely clear of them when it is placed against the under surface of the femur; fore tibia with a series of distinct semierect setulae along postero-ventral surface and a similar series of longer setulae on basal half of antero-ventral surface; fore tarsus about two-thirds as long as tibia, with some setulae along the postero-ventral margin of basal segment.

Length, 4–4.5 mm.

Holotype.—Female Cacao, Trece Aguas, Alta Vera Paz, Guatemala, April 20; paratype female topotypical, April 14, E. A. Schwarz and H. S. Barber (U.S.N.M.)

Type and paratype.—Female, Cat. No. 26720, U.S.N.M.

PLOIARIA CAROLINA (Herrich-Schäffer).

Emesodema carolina Herrich-Schäffer, G. A. W. Die wanzenartigen Insecten, vol. 9, 1853, p. 8, fig. 936 [Carolina].

A dark brown species with a pale dorso-central line on head and thorax, the fore femora with fairly prominent pale annuli and the apices of mid and hind femora yellowish. The wings are brown and faintly marbled with darker brown, not distinctly reticulated with fine brown lines as in some other species; a darker spot in discal cell.

In the nymph there is a rather noticeable central elevation on anterior margin of posterior lobe of head, but in the mature specimens this is almost or entirely absent. The apterous forms have the pronotum tapered posteriorly and almost without a constriction before the hind margin on top, the sides somewhat flared; in the winged forms the hind margin is noticeably flared dorsally also. Male hypopygium with the hind border as in figure 75. Fore femur stout, with 6 or 7 long postero-ventral spines, the longest fully as long as the femoral diameter, the apical one well beyond middle of femur; fore tibia without readily distinguishable setulae, but somewhat densely haired.

Length, 4.5–5.5 mm.

Localities, Thomasville, Ga., May 6, 1912, male, Mrs. A. P. Taylor (U.S.N.M.); Wrightsville, N. C., April 16, 1916, female, W. T. Davis (Davis); Wilmington, N. C., one winged male, one apterous female, and one nymph, H. G. Barber (Barber).

PLOIARIA FLORIDANA (Bergroth).

Lutevа floridana BERGROTH, E. Two new American Ploeariinae (Hem., Reduviidae), Konowia, vol. 1, 1922, pp. 218–219, August 20, 1922 [Florida].

Male.—Very similar to the preceding species, differing as stated in the key. The pronotum is without the slight dorso-median sulcus of *carolina*, the eyes in the winged form are larger, and the longest spines on the postero-ventral surface of fore femur are not as long as the femoral diameter; fore tibia not so much expanded distally; central spine on posterior border of hypopygium apparently simple instead of paired (fig. 76). The forewing has the venation as in *denticauda* (fig. 89).

Length, 6 mm.

The type which we have examined, is from Florida (Van Duzee Coll.). We have the species also from Crescent City, Fla., Uhler Coll. (U.S.N.M.)

The crossvein connecting the apical longitudinal vein with costa is erroneously stated in the original description to be absent.

PLOIARIA BISPINA, new species.

Male.—Almost uniformly pale brownish yellow, paler than *carolina*, the fore femur not annulate, mid and hind legs with apices of femora and bases of tibiae whitish. Wings pale brownish, somewhat mottled.

Width of head across eyes almost as great as its dorsal length. Pronotum a little shorter than mesonotum, very slightly sulcate centrally. Fore coxa 1.5 as long as pronotum, slender, not granulose; spines on postero-ventral surface of fore femur numerous, three or four between each pair of the longer spines, the latter not longer than the femoral diameter, the apical long spine very short and but little beyond middle of femur; ventral setulae on fore tibia distinct at least on apical half or more. Posterior border of hypopygium as in figure 77.

Length, 5.5–6.5 mm.

Holotype.—Male, Mexico, 2154, no other data, C. F. Baker (U.S.N.M.). Paratype, males, Bartica, British Guiana (Acad. Nat. Sci. Phila.); Para, Brazil, August (Carnegie Mus.).

Other specimens in poor condition, labelled Cuba, 181 (U.S.N.M. and Acad. Nat. Sci. Phila.).

Type.—Cat. No. 26721 U.S.N.M.

PLOIARIA ALBIPENNIS, new species.

Male.—A pale stramineous species without conspicuous markings. The forewings are entirely unmarked, the veins on basal half slightly smoky, those on apical half very pale. The fore femora have a faint narrow preapical and a narrower and less distinct apical band brown, while the mid and hind pairs are pale brownish with a rather distinct preapical broad darker brown annulus; knees pale.

Basal segment of antenna long-haired, as long as 2+3, fourth about five-sixths as long as third. Fore coxa nearly as long as pronotum and mesonotum, and subequal to fore tibia; trochanter with two moderately strong spines, and a bristle; femur with about six outstanding spines, the intervening short spines set on elevated bases. A pair of slender spines inside of upper border of hypopygium as in *bispina*, the hypopygial claspers slender, abruptly curved near apex and pointed. Venation normal, discal cell about four-fifths as long as vein emanating from its apex, the latter distinctly curved, not reaching margin of wing, the cross vein nearly straight, at two-fifths length of posterior vein from apex.

Length, 7 mm.

Holotype.—Lower California, 1895, Diguet (Paris Mus.). Paratype, Frontera, Tabasco, Mexico, June, 1897, C. H. T. Townsend (Iowa).

PLOIARIA UMBRARUM, new species.

Male.—Brownish testaceous, the wings apparently immaculate; and only the apices of hind femora and bases of hind tibia whitish. The specimens were preserved in alcohol which may have changed the coloring.

Width of head less than its length; interocular space less than width of one eye. Prothorax and mesothorax subequal. Hypopygium without strong paired spines inside the apical border, the claspers rather angularly bent at middle, with acutely pointed tips. Fore coxa fully as long as prothorax and mesothorax combined, and very slightly longer than fore tibia; armature of fore femur rather fine, the longest bristles at middle shorter than femoral diameter. Venation as stated in key.

Length, 7 mm.

Holotype.—And one paratype male, Mandeville, Jamaica, in a cave. (U.S.N.M.)

This is the only species of the subfamily from the New World which we have any record of as occurring in caves but there are several species so recorded from the Eastern Hemisphere.

Type and paratype.—Cat. No. 26722, U.S.N.M.

PLOIARIA PILICORNIS, new species.

Male.—Similar to *bispina* in color but the fore femur has a faint subapical fuscous annulus.

The head is slightly broader than in *bispina* (fig. 78), the pronotum is not sulcate and is more constricted before the hind margin, the fore femora are stouter, the short spines are less numerous, the long spines are longer, the longest fully as long as the femoral diameter, and the apical one is at one-third the length of femur from apex. Hind border of hypopygium as in figure 79.

Length, 5.5 mm.

Holotype.—Higley, Ariz., June 27, 1917, E. G. Holt (U.S.N.M.).

Type—Cat. No. 26723 U.S.N.M.

PLOIARIA UNISERIATA, new species.

Male.—Brownish fuscous, dorsum of mesonotum yellowish-testaceous, antennae and legs brown, not noticeably annulated. Wings with dusky reticulation and a more prominent spot in discal cell and in area of wing just posterior to it on inner side.

Eyes large, as high as head and nearly half its length, width of one above equal to space between them; posterior margin of anterior lobe of head and anterior margin of posterior lobe each with a short deep sulcus in center, on each side of which the surface is slightly tumid; antennae long-haired. Pronotum not much tapered, very slightly flared posteriorly; mesonotum gradually widened posteriorly, with a shallow median dorsal sulcus; mesonotum ending in a rounded knob; metanotum with the margin raised and three discal carinae.

Fore coxa slender, about 1.25 as long as pronotum; trochanter with one long curved spine and one or two shorter bristles; femur curved, a little thicker than coxa, postero-ventral series of spines consisting of about six, their bases distinctly swollen, the longest more than twice as long as femoral diameter, the spines bent outward; ventral surface fine-haired, with a series of short erect setulae on median third; antero-ventral spines much shorter than postero-ventral, about seven in number, inwardly curved, a wider space in the series near base for the reception of the tarsus; tibia two-thirds as long as coxa, with fine setulae along antero-ventral surface which are about as long as tibial diameter; tarsus about as long as tibia, basal segment with microscopic setulae posteriorly (fig. 80). Transverse vein at one-third of the distance from tip of wing to apex of discal cell, the latter as in figure 81. Hypopygium rather long, black and polished medianly, claspers long and slender, much curved and tapered on apical half; apical tergite convex posteriorly.

Female.—Similar to the male in armature of the fore legs. The eyes are much smaller; there are only small wingpads present; the

abdomen is much more robust, and there are small but distinct processes on middle of hind margins of tergites; seventh tergite horizontal, with a short, triangular median process, the margin concave, then angled each side of it; eighth tergite deflexed, narrowed toward apex, which is transverse.

Length, Male, 4 mm.; nymph, 3.5 mm.

Holotype.—Male, San Thomas, Brownsville, Tex., May 30, 1904; allotype, Brownsville, Tex., May 21, 1904, H. S. Barber (U.S.N.M.).

Type and allotype.—Cat. No. 26724 U.S.N.M.

PLOIARIA PUNCTIPES, new species.

Male.—Brownish fuscous, with testaceous markings and gray pubescence on head and thorax. Legs and antennae testaceous-yellow, coxae and femora spotted and annulated with fuscous. Wings with fuscous markings much as in preceding species, but the dark spot in center of discal cell is more conspicuous and while in *uniseriata* there is an isolated dark spot just beyond apex of discal cell clear of the longitudinal vein in this species the spot touches the vein; markings somewhat more aggregated in clouds at apex of wing.

Posterior lobe of head not sulcate anteriorly, but with a low longitudinal median carina; subapical antennal segment fully three-fourths as long as apical. Pronotum narrower and longer than in *uniseriata*. Fore coxa slender, about 1.25 as long as pronotum; fore femur slender, slightly curved, long postero-ventral spines as in preceding species, but with one or two short spines between each pair of antero-ventral spines, a rather irregular series of short setulae ventrad of them; antero-ventral setulae on fore tibia very short; tibia and tarsus as in *uniseriata*. Apical sternite less than half as long as preceding one; hypopygium long, dark and polished medianly, claspers long, slender, much curved but not tapered, ending abruptly in a sharp point, posterior hypopygial border with a short stout spike. Discal cell of forewing and the hind wing as in figures 82 and 83.

Length, 6 mm.

Holotype.—La Chorrera, Panama, May 17, 1912, A. Busck (U.S.N.M.).

Type.—Male, Cat. No. 26725, U.S.N.M.

PLOIARIA SIMILIS, new species.

Male.—Similar to the preceding species in color and structure, differing as stated in key, and in size. Forewings as in figure 84.

Length, 8 mm.

Holotype.—Los Borregas, Brownsville, Tex., May 23, 1904, H. S. Barber (U.S.N.M.).

Type.—Male, Cat. No. 26726, U.S.N.M.

PLOIARIA RETICULATA (Baker).

Ploiariopsis reticulata BAKER, C. F. California Emesidae (Hemiptera), Pomona College Journal of Entomology, vol. 2, No. 2, May, 1910, pp. 225–6 [Claremont, Calif.].

Male.—Head and thorax testaceous yellow, mottled with fuscous. Antennae stramineous, basal segment fuscous at base and apex and with a rather broad subapical and a narrow apical whitish annulus; beak annulate. Mesonotum with 2 linear submedian brown vittae, laterad of these the disk is grayish, each lateral margin broadly brown. Abdomen black, faintly speckled with yellowish, spiracles white. Legs stramineous, fore pair mottled with blackish and rather imperfectly annulate, mid and hind femora with faint brownish dots on basal half and each with 3 broad brown annuli on apical half. Forewings with brownish fuscous markings, forming reticulations on the greater part of disk, the most distinct marks being 2 long blackish streaks, one in apical half of discal cell and the other beyond that cell and behind the longitudinal vein but distinctly clear of it, the hind margin of the vein narrowly brown.

Head about as broad as long, with a small sharp spike at eye margin just behind transverse dorsal constriction, and a small round protuberance behind eye on side of head; antennae long-haired, third segment fully as long as fourth. Pronotum slightly flared posteriorly. Hypopygium with a bifid process projecting upward inside of hind border, the claspers not very long, curved, tapered at apices.

Fore trochanters produced into an acute process below which is armed with 2 or 3 spines. Forewing with discal cell subequal in length to longitudinal vein beyond it, the transverse apical vein faint, situated at nearly three fourths of the distance from apex of discal cell to apex of wing, the longitudinal vein bent down apically.

Length, 9 mm.

Redescribed from a male paratype, Claremont, Calif., Metz (Cornell Univ.).

Dr. C. F. Baker reports the species common about Claremont.

PLOIARIA DENTICAUDA, new species.

Male.—This species is colored like *granulata*, but the femoral and tibial annulation is much less distinct. Head as in figure 85.

In addition to the characters mentioned in the key it differs from *granulata* as follows: The fore coxae, fore femora, and pronotum are not granulose and haired as in that species, the postero-ventral spines on fore femur are in an almost regular series, the bases of the longer spines are pale, but little differentiated from the spines and both combined are but little longer than the femoral diameter; the fore tibia has the series of setulae on postero-ventral surface very

weak and short and that on basal half of antero-ventral surface practically absent; the fore tarsi are as long as tibiae. The male hypopygium is as shown in figures 86 and 87, the tergites are not produced on sides and the processes on the middle of hind margins of tergites except the last one are very small. The series of males contains winged and subapterous specimens; the venation of the forewing is shown in figure 89.

Female.—Similar to the male but the apical tergites are as described in key (fig. 88), and the antennae are very short hispid instead of long-haired.

Length, 5–5.5 mm.

Holotype.—Male, Fort Yuma, Ariz., January 23, H. G. Hubbard; allotype, Palm Springs, Calif., February 7, H. G. Hubbard, paratypes same data as foregoing (U.S.N.M.); and Calipatria, Calif., November 28, 1921, E. R. Kalmbach (Biol. Survey). Broken specimens not designated as type material: Williams, Ariz., May 27 and June 9, E. A. Schwarz and H. S. Barber (U.S.N.M.).

Type, allotype, and paratypes.—Cat. No. 2672, U.S.N.M.

PLOIARIA HIRTICORNIS (Banks).

Ploiariopsis hirticornis BANKS, N. Emesidae, 1909, p. 44 [Southern Pines, N. C.].

Ploiaria carolina BANKS, N. Emesidae, 1909, pp. 44–45 [Southern Pines, N. C.]. The female of *P. hirticornis*.

This species closely resembles the last in structure of the fore legs, but the coxae are more slender and nearly twice as long as the tibiae, the fore tarsi are as long as the tibiae, the elevated bases of the long spines of postero-ventral series are about as in the last species, white, and the spines are blackish; the pronotum is longer and narrower than in *granulosa*, the abdomen has no lateral projections on tergites and the dorsal tubercles are small anteriorly, increasing in size posteriorly; the seventh tergite of the female has the lateral angles slightly produced and a longer central process (fig. 90); the apical border of the male hypopygium is as in figure 91; apical tergite as in figure 92. All our specimens have minute wing pads except one male paratype which is fully winged; the wings are rather closely reticulated with fuscous, the heaviest markings being in discal cell and along hind side of vein emanating from it.

Length, 5–6 mm.

Localities, Mulligans Hill, D. C., December 10, 1916, H. S. Barber (U.S.N.M.); Southern Pines, N. C., December 28, 29, 1908, A. H. Manee, type material (McAtee, Mus. Comp. Zool.). The holotype examined.

An immature female from Shreveport, La. (Mus. Comp. Zool.) has the abdomen inflated, especially posteriorly, median tubercles

on all tergites, that on five most prominent; eighth tergite concave apically, without process.

PLOIARIA MARGINATA (Heineken).

Cerascopus marginatus HEINEKEN, C. Zool. Journ., Jan.–May, 1829 (1830), pp. 36–40, pl. 2, fig. 5 [Madeira].

Cerascopus canariensis NOUALHIER, MAURICE. Note sur le genre Ploiaria Scop. Reut. (Emesodema Spin., Cerascopus Hein.) et description de quatre especes nouvelles palearctiques. Rev. d'Ent., vol. 14, 1895, p. 168 [Canary Islands].

Male.—Brownish fuscous, with a longitudinal central line on head and thorax, two round spots on each lobe of head and upper sides of pronotum, the lateral margins of pronotum and mesonotum and ventral surface of head and thorax yellowish. Antennae and legs brownish yellow, darker just before apices of femora and yellowish at apices.

Antennae short-hispid, apical segment about 1.75 as long as subapical; eyes small, not occupying over half the height of head, and shorter than distance from their hind margin to posterior margin of head, surface of head microscopically granulose; fore coxa as long as pronotum and about two thirds as long as fore tibia, with microscopic subdecumbent hairs, but not granulose; fore femur stout, surface as in coxa, outer series of strong spines on posterodorsal surface numbering four or five, their bases elevated, their entire length not greater than diameter of femur, the inner series not interrupted opposite bases of the strong spines, consisting of many closely placed setulae; antero-ventral series with no isolated bristle at or near base as in the species which have the tarsus falling short of apex of coxa; tibia two thirds as long as femur, the antero-ventral and postero-ventral hairs short; tarsus extending to middle of trochanter, fully half as long as tibia, basal segment without evident setulae. Pronotum with a rounded low tubercle each side of neck, tapered posteriorly, constricted just behind anterior margin, widest in front of middle, a distinct constriction between pronotum and mesonotum, the latter widening to above coxal insertions, with a median linear sulcus and slight longitudinal ridge along each side of dorsum separating the pale color of disk from the dark sides. Abdominal tergites without processes, the spiracles on top of connexival fold, the apical tergite with hind margin rounded; hypopygium as in figure 93, the claspers farther from apex than in any of the other species seen and the apical hook larger.

Female.—Differs from male chiefly in character of abdomen, which is broader, especially apically and has the spiracles on outer side of connexival fold; widest part of abdomen about at the juncture of fourth and fifth tergites, sixth tergite somewhat narrowed

apically the end slightly convex; seventh tergite semi-circular; eighth a little longer, depressed medianly and emarginate apically.

Length, 4.5–5.5 mm.

Data for specimens examined: La Valli Province, Buenos Aires, Argentina, May 15, 1920, B. S. Donaldson (McAtee); Brazil, on orchids, H. B. Shaw (U.S.N.M.); Teneriffe, Canary Ids., A. Cabrera; Laguna, Oct. 1, 1910 (Bueno).

PLOIARIA APTERA, new species.

Female.—Much paler than *marginata*, the dorsum of thorax but little darker than the venter.

Head as in the preceding species, but the eyes comparatively larger and the subapical antennal segment appreciably longer than the apical. Fore coxae, femora, and tibiae similar in lengths to those of *marginata*, the postero-ventral long and short spines in an almost straight series, only two or three of the short spines between each pair of the long spines and none opposite their bases; there is an isolated spine near base on antero-ventral surface, the antero-ventral series of setulae on apical half of tibia is stronger than in *marginata*. Abdomen ovate, distorted in type, but evidently lacking well developed median processes on hind margins of tergites.

Length, 5.5 mm.

Holotype.—Female, Galiuro Mountains, Ariz., May 24, H. G. Hubbard (U.S.N.M.).

This and the preceding species lack wing pads, the present one having a very faint ridge on each posterior lateral angle of mesonotum and metanotum which may represent the wing pads. We know of no American species of this genus except these two in which the adults have neither wings nor wing pads.

Genus GARDENA Dohrn.

Gardena DOHRN, A., Emesina, 1860, p. 214, monobasic, genotype *G. melinarthrum* Dohrn [Ceylon.]; Nachträge 1873, p. 64.—CHAMPION, G. C. Biologia vol. 2, p. 167, 1898.

As amplified in the Nachträge, Dohrn's characterization of *Gardena* may be accepted in the sense of Champion for American species. However, there remains one notable discrepancy to be explained; Dohrn describes the prothorax as being subequal in length to the mesothorax and metathorax together. Measured on the median dorsal surface the prothorax in American species is twice or more than twice as long as the other divisions of the thorax together. However, illustrations of Asiatic species show the same condition, so the discrepancy probably is due to error or is to be explained by difference in method of taking the measurements.

Characters common to all the American species besides those mentioned in the generic key are: head lacking spines, prothorax (measurements taken on dorsum) twice or more than twice as long as meso- and meta-thoraces taken together (even in wingless forms); the anterior division of prothorax is trumpet-shaped with a low tubercle each side in front and expands posteriorly in the winged forms into a capacious, inverted, scoop-shaped, highly polished portion which completely covers the mesothorax, hind margin usually somewhat concave with a slight median swelling, but there are notable departures from this character in some species; mesopleura and mesosternum highly polished, either subnude or with a bare stripe in front of coxa; hind margins of sternites 2–6 in both sexes more or less emarginate medianly and arcuate laterally, most pronouncedly so on 6; sixth sternite in males visible from above, forming apparently an almost complete body ring; in most species it is overlaid dorsally by a flap-like process of sixth tergite; the ninth sternite also is largely exposed dorsally, where it is divided by a broad V-shaped cleft open posteriorly (fig. 97, and others); the surface of hypopygial segments is polished; all of the legs and the antennae exceed the body in length; antennae of males with abundant long hairs decreasing in length and erectness distally; especially from middle of second segment; wing venation as in figure 94; fore tibia and tarsus as in figure 95.

Coloration in the genus is very uniform, the species being chiefly castaneous, darkest on front legs, prothorax, and genitalia; the mid and hind trochanters and knees are stramineous, the pale base of tibia being more or less interrupted by fuscous; the tegmina and wings in most cases are dusky hyaline, whitish at base.

KEY TO THE SPECIES.

Males.

1. Cylindrical part of prothorax sulcate in center of dorsum posteriorly; hind lobe usually transversely wrinkled anteriorly 2
   Prothorax without sulcus; hind lobe usually not distinctly wrinkled 8
2. Hind margin of hypopygium more or less sinuate or emarginate in middle (figs. 96, 98, 102, 104); sixth tergite with a longer slender process (figs. 97, 108) 3
   Hind margin of hypopygium practically straight (fig. 105); 7th tergite with a shorter, and usually more rounded process (figs. 109, 112) 4
3. Supero-posterior angles of hypopygium strongly produced, projecting when viewed from behind, much above hind margin; median process of seventh tergite elongate, but falling considerably short of apex of hypopygium (fig. 97); hind margin of pronotum concave, with a slight median swelling.
   americana Champion (p. 69).

Supero-posterior angles of hypopygium elevated but little above hind margin; median process of seventh tergite elongate, falling but little short of apex of hypopygium (fig. 108); hind margin of pronotum undulated, extending farthest posteriorly on each side of median line.

crispina, new species (p. 70).

4. Apex of hypopygial clasper circularly curved, the supero-anterior angle not produced (fig. 106); fore femur not evidently banded.

domitia, new species (p. 71).

Apex of hypopygial clasper not circularly curved, the supero-anterior angle produced (figs. 99, 100, 101); fore femur with one or more bands 5

5. Clasper fitting into a groove which extends forward on the outer side below supero-posterior angle of hypopygium (fig. 111); posterior angle of clasper a weak hook, process of anterior angle much stouter (fig. 99).

eutropia, new species (p. 71).

Clasper not fitting into such a groove, and of different shape 6

6. Both branches of clasper slender (fig. 100); supero-posterior angle of hypopygium spine like; hind lobe of pronotum almost smooth.

marcia, new species (p. 72).

Both branches of clasper stout (fig. 101); supero-posterior angle of hypopygium obtuse, not spine like 7

7. Antennae copiously hairy; hind lobe of pronotum strongly wrinkled in front, granulate behind ..... **pipara**, new species (p. 72).

Antennae not hairy, hind lobe only slightly wrinkled in front and almost smooth behind ..... **pyrallis**, new species (p. 73).

8. Hind margin of hypopygium with a sharp tooth on each side of a rounded median emargination (fig. 104); seventh tergite with a moderate, pointed median process (fig. 114) ..... **poppaea**, new species (p. 74).

Hind margin of hypopygium slightly or not at all emarginate, and lacking teeth; seventh tergite either convex or with a distinct process 9

9. Hind lobe of pronotum much more than half as long as the less than usually slender anterior portion, bearing three pale yellow vittae; forewings almost uniform stramineous in color; seventh tergite with a broadly triangular process; clasper circularly curved similar to figure 106.

agrippina, new species (p. 73).

Hind lobe of pronotum not half as long as the very slender anterior portion, without pale vittae; hind margin nearly straight across, the declivity just anterior to hind margin slightly carinate medianly; bases of forewings much paler in color than remainder; seventh tergite convex posteriorly but not produced; clasper not circularly curved (fig. 103).

faustina, new species (p. 73).

Females.

1. Cylindrical part of prothorax sulcate in center of dorsum posteriorly; hind lobe distinctly transversely wrinkled anteriorly; seventh sternite more or less produced apically (figs. 110, 113) 2

Prothorax without sulcus; hind lobe not distinctly transversely wrinkled; seventh sternite convex but not produced apically.

faustina, new species (p. 73).

2. Seventh sternite with a short rather acute process at middle of posterior margin (fig. 107); mid and hind femora each with a preapical as well as an apical pale band ..... **messalina**, new species (p. 72).

Seventh sternite with a longer process (figs. 110, 113) 3

3. Mid and hind femora each with a preapical and an apical pale yellow band; process of seventh sternite long and slender, reaching nearly to apex of hypopygium ..... pipara, new species (p. 72).
Mid and hind femora lacking preapical pale band 4
4. Process of seventh sternite broad, the apex rounded and not reaching apex of abdomen (fig. 113) ..... caesonia, new species (p. 70).
Process of seventh sternite narrower, extending to apex of abdomen, and there somewhat upcurved (fig. 110) ..... domitia, new species (p. 71).

SYSTEMATIC ARRANGEMENT OF THE SPECIES.

Cylindrical part of prothorax sulcate in center of dorsum posteriorly.

americana.
caesonia.
crispina.
domitia.
eutropia.
marcia.
messalina.
pipara.
pyrallis.

Cylindrical part of prothorax not sulcate.

agrippina.
faustina.
poppaea.

GARDENA AMERICANA Champion.

Gardena americana CHAMPION, G. C., Biologia, vol. 2, pp. 167–8, pl. 10, fig. 12, 1898 (part).

We have not identified the female of this species but the males are rather paler in general color than most of the species, being yellowish-brown, castaneous on posterior expansion of prothorax, meso- and meta-thorax and genitalia; sternites 7 and 8 distinctly emarginate medianly and arcuate laterally; ninth sternite, or hypopygium, with the apical margin triangularly excised medianly (fig. 96) between the elevated supero-posterior angles, within which lie the terete, somewhat curved and capitate hairy claspers; the part of ninth sternite visible from above is longer than sixth tergite without its median process; the latter is ligulate, rounded apically and its length compared to the tergite is as 15:35 (fig. 97). Fore tibia and tarsus as in figure 95; fore wings as in figure 94.

Length, 18–20 mm.

Two specimens seen, one labeled only Cordoba in the Uhler Collection (U.S.N.M.), and the other collected by J. S. Hine at Mazatenango, Guatemala, February 3, 1905 (Ohio State Univ. Coll.).

It is only through the great kindness of W. E. China of the British Museum that we are enabled to announce this determination of *Gardena americana.* With a copy of our key in hand Mr. China has worked over the type series and informs us that the specimen figured

in the Biologia Centrali-Americana (reference above) has been taken as the type and that it is the present species which we designated as No. 2 in the key sent to him. Mr. China has kindly furnished a report upon the entire British Museum series which is well worth recording.

SERIES OF GARDENA AMERICANA CHAMPION IN THE BRITISH MUSEUM.

Mexico.

1, male, Atoyac, Vera Cruz equals species 2, that is, *americana*.

2, female, Atoyac, Vera Cruz equals species 6, that is, *caesonia*.

3–8, males, Teapa, Tabasco equals species 2, that is, *americana*.

9, female, Dos Arroyos, Guerrero equals species 6, that is, *caesonia*.

9*a*, female, Chilpancingo, Guerrero equals species 6, that is, *caesonia*.

Panama.

10–15, males and females, Bugaba equals species 4, that is, *faustina*.

Guatemala.

16, male, Teleman, Vera Paz; prothorax sulcated but hypopygium mutilated.

17, male, Mirandilla equals species 2, that is, *americana*. This is the type specimen figured in Biologia, vol. 2, pl. 10, fig. 12.

Colombia.

18, male, Mazo equals species 2, that is, *americana*.

19, male, locality illegible, equals species 2, that is, *americana*.

It is worth noting that the above tabulation agrees in the association of sexes as concerns species 4 (*faustina*); and it strongly indicates that species 6 (*caesonia*) is the female of *americana*. For the present, however, we will allow these forms to stand under different names.

GARDENA CAESONIA, new species.

Female.—Eighth tergite only a third a long as wide, bluntly rounded apically; 9th longer than broad, almost parallel-sided viewed from above, truncate apically; process of 7th sternite long triangular, pointed (fig. 113).

Length, 20 mm.

Holotype.—Female, Guatemala (U.S.N.M.). Paratype, Frontera, Tabasco, Mexico, June, 1897, C. H. T. Townsend (Iowa).

Type.—Female, Cat. No. 26729, U.S.N.M.

GARDENA CRISPINA, new species.

Male.—Coloration as described for the genus; hind margins of sternite 7 and 8 moderately emarginate medianly, of 7 slightly con-

cave, and of 8 a little convex laterally; 9th sternite polished, its hind margin with a shallow rounded emargination (fig. 98); that part of 9th sternite visible from above shorter than 7th tergite without median process, the latter ligulate, rather pointed and nearly as long as remainder of its tergite, proportion to whole tergite as 18 is to 37, (fig. 108).

Length, 18 mm.

Holotype.—Male Turrialba, Costa Rica, Schild and Burgdorf (U. S.N.M.).

Type.—Male, Cat. No. 26730, U.S.N.M.

GARDENA DOMITIA, new species.

Male.—Hypopygium strigate, not so shining as usual, part visible from above about as long as 7th tergite including process, the latter broad, rounded apically, its length compared to the whole tergite as 12 is to 27 (fig. 109); hind margin of hypopygium transverse (fig. 105); clasper as in figure 106.

Female.—Connexivum elevated posteriorly, pale-edged; 6th tergite rounded apically; 8th semi-circular in shape; 9th broad, somewhat inflated, depressed on each side apically; 7th sternite prominently inflated anteriorly, posterior process as described in key, the margins each side of it slightly sinuate. (fig. 110).

Length, 20–22 mm.

Holotype.—Male, allotype female, with genital segments well preserved, and another pair with them damaged, Pachitea, Peru. (Bueno).

Paratypes.—Male, Lower Mamore River, Bolivia, Dec. 1913, 2 females, La Juntas, Bolivia, Dec. 1913, Quatra Ojos, Nov. 1913, J. Steinbach (Carnegie Mus.)

GARDENA EUTROPIA, new species.

Male.—Color about the same as in *pipara.* Process of 7th tergite of moderate length, in proportion to remainder of tergite as 2 is to 3, its apex rounded. Hind margin of 6th sternite with a broad and deep median emargination, and strong sinuations on each side; seventh and eighth sternites distinctly although shallowly concave medianly and convex laterally. Ninth sternite long, opening upward, the posterior margin straight; viewed from above the flaring part of cleft is short, bordered each side by a broad, sloping, truncate process, beneath which the claspers are withdrawn (fig. 111); claspers as described in key (fig. 99).

Length, 17 mm.

Holotype.—Male, Santarem, Brazil. (Carnegie Mus.)

GARDENA MARCIA, new species.

Male.—Color as in *pipara;* posterior lobe of pronotum almost lacking transverse wrinkles. Lobe of seventh tergite very short, in proportion to remainder of tergite as 2 is to 5, broadly rounded. Hind margin of sixth sternite broadly and deeply emarginate medianly, arcuate laterally; seventh and eighth sternites shallowly concave medianly and convex laterally, the former nearly straight across. Ninth sternite short, opening posteriorly and upwardly, its hind margin nearly straight; cleft of upper surface opening gradually from the base (fig. 112), supero-posterior angles, produced, elevated and spinelike at apices, hollowed out beneath for reception of the claspers, which are as described in key (fig. 100).

Length, 14 mm.

Holotype.—Male, Santarem, Brazil. (Carnegie Mus.)

GARDENA MESSALINA, new species.

Female.—Fore femora each with a faint subapical pale band; mid femora and tibiae each with two pale bands. Seventh tergite very slightly convex on hind margin, eighth moderately long, semi-elliptical; ninth very convex transversely, somewhat constricted near middle of exposed portion, rounded apically. Sixth sternite with a deep emargination posteriorly involving the entire hind border; seventh sternite long, with a short, median triangular process posteriorly (fig. 107) sides of hind margin slightly concave; eighth sternite broadly exposed on sides, profoundly emarginate in middle.

Length, 17 mm.

Holotype.—Female, Victoria, Texas. (U.S.N.M.).

Type.—Female, Cat. No. 26731, M.S.N.M.

This is a wingless but mature specimen, which, because of different leg markings is treated as a different species from *G. poppaea*, represented by a wingless male, also from Victoria.

GARDENA PIPARA, new species.

Male.—Head and body chiefly castaneous, the appendages yellow-brown; apex of first antennal segment, two bands on front femur, apex of mid and hind femur and subapical annulus, bases of mid and hind tibia and sub-basal annulus paler; wings dusky fumose. Seventh tergite rather short, its body exceeding the short rounded lobe only as 3 is to 2. Seventh and eighth sternites shallowly emarginate medianly, convex laterally; ninth or hypopygium, long, opening upward and backward, the hind margin nearly straight, the supero-posterior angles moderately elevated, the expanded part of dorsal cleft short, claspers as described in key (fig. 101).

Female.—Coloration as in male. Seventh tergite broadly rounded, and narrowly abruptly declivate apically; eighth tergite short, rounded apically, almost horizontal; ninth tergite long, slightly inflated above, abruptly narrowed below; the apical half is transversely rounded, marked off by two oblique depressions, and the middle of apical margin is slightly excised. Seventh sternite rather prominently inflated subbasally, apical margin straight across except at middle, which is produced as a long, slender pointed process, reaching nearly to apex of body.

Length, 18–20 mm.

Holotype.—Male, Province del Sara, Bolivia, April 1913, J. Steinbach.

Allotype and paratype.—Two females, same locality, 350 meters elevation, December, 1912, J. Steinbach. Paratype, two females, Chapada, Brazil, June. (All these specimens in Carnegie Museum.) Paratype male, La Zanga, Paraguay, V. Benzon (Copenhagen Museum), and another, Santa Cruz, Bolivia, September, 1917 (Pennington).

GARDENA PYRALLIS, new species.

Male.—Paler than *G. pipara*, the leg markings, etc., therefore not so distinct; hind lobe of pronotum much smoother as described in key; genitalia very similar.

Length, 16 mm.

Holotype.—Llanos, Venezuela, F. Geay (Paris Mus.).

GARDENA AGGRIPINA, new species.

Male.—Paler in ground color and with more pale markings than is usual in the genus; fore femur with three distinct pale bands, and front legs with other pale areas; pronotum with a median broad, and two lateral narrow pale vittae on posterior lobe; wings stramineous almost throughout; mid and hind legs pale, the femora and tibiae each with a distinct sub-basal and another faint darker annulus. Hind margins of sternites 7 and 8 concave medianly, convex laterally, of 9 nearly straight, cleft of ninth sternite, as seen from above, about one-third the length of part dorsally exposed; process of seventh tergite, well-developed, rounded apically, length compared with that of remainder of tergite as 9 is to 17.

Length, 16 mm.

Holotype.—Provincio del Sara, Bolivia, 350 meters elevation, Dec. 1912, J. Steinbach (Carnegie Mus.).

GARDENA FAUSTINA, new species.

Male.—Chiefly distinguished by the long and slender prothorax and the prominently convex but scarcely produced hind margin

of tergite 7 (fig. 115); sternites 7 and 8 are concave medianly, convex laterally; part of sternite 9 exposed dorsally about as long as tergite 7, the V-shaped cleft short, the supero-posterior angles truncate, not elevated but somewhat flaring laterally, posterior margin shallowly emarginate medianly (fig. 102); clasper ending in a flattish hook the blade of which is long acuminate and directed upward (fig. 103).

Female.—The hind margin of 7th tergite is slightly convex, transverse; the 8th tergite is semi-elliptical and the ninth longer than wide, somewhat narrowed and bluntly rounded apically; the 7th sternite is moderately convex apically.

Length, 20–22 mm.

In this species the coxae and adjoining parts vary from yellow to black in color and the hind part of thorax and tip of abdomen are quite dark, contrasting strongly with the yellow-brown abdomen, front part of body, and legs.

Holotype.—Male, Porto Bello, Panama, Feb. 28, 1911, E. A. Schwarz; allotype female, Feb. 21, other data the same; paratype males, Porto Bello, Panama, Feb. 15, 28, 1911, A. Busck; Trinidad River, Panama, May 7, 1911, A. Busck. A male and female from Biologia series of "*americana*" are labelled, Bugaba, 800–1,500 feet, Champion, and Caldera, Panama, Champion, respectively. All preceding specimens in United States National Museum. Four females, Cacagualito, Colombia, May, and one from Chapada, Brazil, Sept. (Carnegie Mus.). One male, French Guiana, Nov., 1914, R. Benoist (Paris Mus.).

Type, *allotype* and *paratypes.*—Cat. No. 26732, U.S.N.M.

GARDENA POPPAEA, new species.

Male.—Posterior margin of hypopygium with two teeth, the superoposterior angles considerably elevated (fig. 104), portion of this sternite visible from above as long as 7th tergite including process, the latter barely lapping base of V-shaped cleft of hypopygium, its length compared to entire tergite as 3 is to 8 (fig. 114); claspers retracted, their form unknown.

Length, 20 mm.

Holotype.—Male, Victoria, Tex., Feb. 1905, J. D. Mitchell (U.S.N.M.).

While this specimen is entirely wingless it is obviously mature.

Type.—Male, Cat. No. 26733, U.S.N.M.

Genus EMESAYA, new name.

For *Emesa* of authors not of Laporte (1833, p. 84) who named *E. mantis* Fabricius as type. Since this species belongs to the genus

subsequently called *Westermannias* the latter name therefore falls into synonymy, and the insects formely known as *Emesa* are left without a distinctive name. See fuller data under the name *Emesa* as accepted in this paper (p. 38).

Genotype.—Ploiaria brevipennis Say. For full reference see under *Emesaya brevipennis* Say (p. 78). This new name is intended to combine a reminder of the long familiar term with a tribute to the pioneer American naturalist Thomas Say.

Characters of the genus besides those mentioned in the key to genera are: Mid and hind legs and antennae longer than body; head without frontal spine, the transverse sulcus convex posteriorly, its ends in front of eyes, its middle course between them; prothorax in unwinged forms somewhat shorter than meso- and meta-thoraces together, in winged forms decidedly longer, expanded posteriorly and entirely covering dorsum of mesothorax, its hind margin more or less concave medianly; wings extending only to about middle of abdomen; sutures between tergites difficult to distinguish, those seen are straight; sixth tergite of male ending in a long apically rounded flap covering hypopygium; sutures between sternites convex anteriorly, that between 5 and 6 most so; hypopygium of male long, somewhat compressed, hind margin with a median process; in females the seventh tergite is approximately semi-circular in outline, the eighth is oblong, somewhat tapering apically, with the apex variously modified, yielding the most valuable characters for the separation of species; the connexivum is more elevated in females than in males. Structure of fore tibia and tarsus and venation of wings as in figures 136, 137, and 138, respectively.

Coloration in the genus is simple, the general tone varying from stramineous to reddish (erythrization being especially characteristic of maturity); the whole head and body has a fine short sericeous pubescence, bare spots and lines in which account for most of the apparent markings, as a line over anterior half of pronotum and head, forked in front of transverse constriction, a straight line under each eye, cirrhose maculations on pronotum, and dotting over both upper and lower surfaces of abdomen; the mesosternum and mesopleura are entirely sericeous, not glossy as in *Gardena*. The front legs are more or less dark spotted and the spines dark-tipped; at least the knees (femora-tibial joints) of mid and hind legs are pale, often there is another distinct pale band each side of this joint. When the antennae are not entirely pale the first segment is pale apically. The wings vary from stramineous to fuscous-hyaline, often paler at base.

KEY TO THE SPECIES.

Males.

1. Hind margin of hypopygium without median process, nearly straight across. **manni**, new species (p. 83).
   Hind margin of hypopygium with a median process, sometimes partly concealed by the claspers 2
2. Hind margin of hypopgyium nearly straight across, bearing on its inner side a process which extends upward and forward between (and usually concealed by) apices of claspers (fig. 121) 3
   Hind margin of hypopygium produced, in the plane of its outer surface, into a process which is not concealed between apices of claspers 4
3. Clasper broadly concave on upper margin, swollen at base and expanded on inner side toward apex into a triangular lobe (fig. 133), not hairy. **pollex**, new species (p. 82).
   Clasper convex on upper margin, neither swollen at base nor expanded laterally toward apex, hairy, the hairs on inner surface long and erect (fig. 122) ..... **brevipennis** (Say) (p. 78).
4. Process tapering gradually from base, slender and pointed, a little recurved apically; clasper nearly terete, strongly curved and somewhat bulbous apically (figs. 130–131) ..... **apiculata**, new species (p. 81).
   Process notched on the sides at base, broadly expanding apically, with a terminal notch; clasper nearly straight, curved only near apex which is not bulbous (figs. 118, 119, 120) ..... **incisa**, new species (p. 78).

Females.

1. Eighth tergite with the lateral angles produced considerably beyond middle of hind margin (fig. 123) 2
   Eighth tergite with the lateral angles produced no farther than middle of hind margin, or rounded (figs. 129, 131*a*) 5
2. Seventh tergite with a pair of divergent carinae bounding disk, within and distinct from the ridges which divide the upper surface from the downfolded lateral portions of the tergite[11] (fig. 116) 3
   Seventh tergite without such carinae 4
3. Fore femur about 7.5 mm. long; fore coxa hardly twice as long as head. **brevicoxa** (Banks) (p. 77).
   Fore femur about 9 mm. long; fore coxa fully twice as long as head. **banksi**, new species (p. 77).
4. Hind margin of eighth tergite between the processes decidedly concave, the emargination broadly U-shaped; seventh and eighth tergites with a median longitudinal bare and slightly elevated line (fig. 127); side of eighth tergite subangulate posteriorly ..... **lineata**, new species (p. 81).
   Hind margin of eighth tergite between the processes nearly straight, the emargination nearly rectangular (fig. 123); seventh and eighth tergites lacking such a line; side of eighth tergite not at all angulate posteriorly (fig. 124) ..... **brevipennis** (Say) (p. 78).
5. Hind margin of eighth tergite bisinuate, the lateral angles and median point about equally produced (fig. 129) ..... **modica**, new species (p. 81).
   Hind margin of eighth tergite with the lateral angles rounded and the median portion apiculate or much produced 6

[11] In partially collapsed or distorted specimens, the seventh tergite is prone to fold along the lines of the lateral and central carinae; these accidental and usually unsymmetrical folds must not be mistaken for the true carinae which are clear-cut and symmetrical.

6. Median portion of hind margin of eighth tergite apiculate (fig. 131*a*). **apiculata**, new species (p. 81).

Median portion of hind margin of eighth tergite produced in a rather long, keel-like process (figs. 134, 135)_____**pollex**, new species (p. 82).

REMARKS ON PREVIOUSLY DESCRIBED SPECIES OTHER THAN THOSE INCLUDED IN THE KEY AND SYNONYMY.

affinis [*Emesa*] DOHRN, Emesina 1860, pp. 222–3 [Columbia].

No hypopygial characters mentioned; the color markings described in themselves have no significance; examination of type necessary to identification. Champion (Biologia, vol. 2, 1898, p. 168) synonymizes this species with *longipes* DE GEER=*brevipennis* SAY.

longipes [*Emesa*] FABRICIUS, Systema Rhyngotorum, 1803, p. 263 [America]. Stal refers this to *Zelus*. See p. 39.

SYSTEMATIC ARRANGEMENT OF THE SPECIES.

(*Females only.*)

Eighth tergite with the lateral angles produced farther than middle of hind margin.

Seventh tergite with a pair of divergent carinae. **brevicoxa.** **banksi.**

Seventh tergite lacking such carinae. **brevipennis.** **lineata.**

Eighth tergite with lateral angles not so much produced or even rounded, median portion of this tergite more or less produced posteriorly. **modica.** **apiculata.** **pollex.**

EMESAYA BREVICOXA (Banks).

Emesa brevicoxa BANKS, N. Emesidae, 1909, p. 48 [Los Angeles, Calif.].

Described from a single female which remains the unique representative of the form. This specimen, now in the Museum of Comparative Zoology has been studied in the course of the present revision. The carinae of seventh tergite, not mentioned in original description are very distinctive, grouping the species with the new form *banksi* described below. The coloration is scarcely different from that of *E. brevipennis;* however it was noted that the mid and hind tibiae are entirely pale except for a sub-basal dusky band on each. Approximate measurements are: Length of head and body together 29 mm.; of front coxa, 5 mm.; of front femur 7.5 mm.

EMESAYA BANKSI, new species.

Agrees with *E. brevicoxa* Banks in carination of seventh tergite (fig. 116; lateral view of female hypopygium, fig. 117) but differs in measurements of front legs as indicated in key. The posterior lateral angles of eighth tergite are less produced than in *E. brevicoxa* and much less than in average specimens of *E. brevipennis*

Say. General color pale reddish-brown, short gray pubescence abundant; leg bands only faintly indicated.

Length about 29 mm.

Holotype.—Female, San Antonio, Texas, Sept. 18–27 (Museum of Comparative Zoology).

Paratype.—Female, vicinity of La Paz, Lower California, 1903, L. Diguet (Paris Mus.).

EMESAYA INCISA, new species.

Somewhat smaller than *E. brevipennis*, and most of the specimens are paler than the average color in the genus, this being especially true of the legs and antennae; the dark annuli therefore unusually prominent.

Male.—Ground color stramineous, broad vittae on sides of head and posterior lobe of pronotum (sometimes whole of this expansion), dorsum of abdomen more or less, leg bands and dots fuscous. Genitalia as described in key (see figs. 118, 119, 120).

Length, 24–27 mm.

Males from Palm Springs, Calif., Feb. 25, H. G. Hubbard (holotype); Monclova, Mex., Nov. 23, 1909, E. A. Schwarz (U.S.N.M.); Higley, Ariz., July 10, 1917, E. G. Holt (Biol. Survey).

Type and paratype.—Male, Cat. No. 26734, U.S.N.M.

This may be the male of one of the preceding two species.

EMESAYA BREVIPENNIS (Say).

Ploiaria brevipennis SAY, THOMAS. American Entomology, vol. 3, 1828, pp. 105–6, pl. 47 [Philadelphia]; Complete Writings, vol. 1, 1859, pp. 105–6.

Cimex longipes DE GEER, CHARLES. Memoires pour servir a l'Histoire des Insectes, vol. 3, 1773, pp. 352–4, pl. 35, figs. 16–17 [Pennsylvania]. This name though older than Say's is preoccupied by *Cimex longipes* Linnaeus, Systema Naturae, ed. 12, 1767, p. 724.

Emesa filum? GRIFFITH, EDWARD. The Animal Kingdom arranged in conformity with its organization, by the Baron Cuvier * * * with supplementary additions to each order by Edward Griffith, vol. 15, 1832, p. 244, pl. 97, fig. 3. [North America.] Index p. 786 states "*Emesa filum? Filum,* read *brevipennis* of Mr. Say."

Emesa pia AMYOT, C. B. J. and SERVILLE, A. Histoire naturelle des Insectes, 1843, p. 394. [Philadelphia.]

Emesa pia HERRICH-SCHÄFFER, G. A. W. Die wanzenartigen Insecten, IX, 1853, p. 114, fig. 937. [North America.]

Dmesa choctawana KIRKALDY, G. W. Hemiptera, Old and New, No. 2, Can. Ent., vol. 41, No. 11, Nov. 1909, p. 388. New name for *brevipennis* Dohrn not of Say. However, Dohrn's *brevipennis* probably is Say's species and no new name was required. The generic name an obvious typographical error.

KEY TO THE SUBSPECIES.

1. Processes of 8th tergite shorter and more rounded as seen from above; disk of tergite stramineous, with more copious and longer pubescence, giving it a sericeous appearance ..... occidentalis.

Processes of 8th tergite longer, more slender and pointed; disk of tergite darker, pubescence shorter and sparser 2

2. Pale annuli on mid and hind legs tending to obsolescence, especially in males, often the knees only pale ..... australis.

Full complement of pale leg markings usually evident in both sexes. brevipennis.

EMESAYA BREVIPENNIS BREVIPENNIS (Say).

In general color this subspecies varies from rubiginous to fuscous with the pale leg markings distinct; nymphs and teneral specimens are paler, mature specimens redder or darker. Genitalia as described in key (figs. 121 to 124). Fore tibia and tarsus as in figure 136; wings as in figures 137, 138.

Length, 28–36 millimeters.

Many specimens have been examined from a range with the following States as its extremes: Massachusetts, Missouri, Florida, and Texas. The species has been recorded also from Iowa.

The eggs (fig. 125) of this species are about 2 millimeters in length, long-elliptical in outline, the opercle with a large central, truncately conical tubercle, the periphery of which is more or less eroded at the base; the main body of the egg is black in ground color, somewhat compressed and with longitudinal rows of membranous, saw-tooth-shaped exfoliations, the bases of which are almost continuous; these lines of projections are arranged more or less in concentric ellipses (if we may use the expression) on the flat sides of the egg. Specimens examined were laid by a female captured on Plummer Island, Md., October 6, 1912. This individual laid about 20 eggs before October 11. M. Faunce. Another female collected at the same locality by E. A. Schwarz and H. S. Barber, November 16, 1912, also laid eggs in confinement.

Nymphs about 6 millimeters long collected at Plummer Island, April 20, by H. S. Barber are pale ivory color with fuscous markings as follows: A slender vitta from base of antenna along side of head, interrupted at eye; two more or less interrupted vittae along sides of all divisions of thorax; a slender line along outside of each front coxa and trochanter; front femur with a short vitta and 2 partial bands; mid and hind femora and tibiae each with 2 bands near the knee; apex of abdomen below with 2 series of markings, each consisting of a dot and 2 dashes; spiracles black. The posterior lobe of head is much more swollen than in adult.

EMESAYA BREVIPENNIS AUSTRALIS, new subspecies.

From the Gulf States southward to Panama occurs what seems to be a geographical race characterized by a strong tendency, which is almost universal among the males, to lack all pale leg markings except at knees. We have not been able to correlate this character

with any structural differences, whether of genitalia or otherwise, although it is noticeable that in this form the processes of the eighth tergite often are shorter than in northern specimens.

The obvious question as to whether any of the several synonyms of *Emesa brevipennis* apply to this subspecies apparently must be answered in the negative. Two of these names, *longipes* De Geer and *pia* Amyot and Serville, were founded on specimens coming from the same State as Say's material, namely from Pennsylvania, where only one form is known to occur. *E. pia* Herrich-Schäffer has the characters of the old, not the new, subspecies, and *choctawana* Kirkaldy applies to a form agreeing in description with, and which probably is, true *E. brevipennis* Say. Dohrn's key [12] attributes the principal character of our new subspecies to *E. longipes* De Geer, but his fuller description (pp. 221–2), based on De Geer's type, contradicts the statement in the key; De Geer's description does not mention the character at all, and his name is unavailable, as we have noted in the synonymy.

Specimens of the new subspecies examined are:

Holotype.—Male, Taboga Island, Panama, Feb. 27, 1912. A. Busck; allotype, same locality and collector, June 14, 1911 (U.S.N.M.).

Paratypes with the following data: Taboga Island, Panama, June 14, 1911, Feb. 22, 27, 1912, A. Busck; Ancon, Canal Zone, Panama, A. H. Jennings; Limon, Canal Zone, Panama, Aug. 24, 1918, H. Morrison; Gamboa, Canal Zone, Panama, July 17, 1918, H. Dietz and J. Zetek; Panama, June 25, Wirt Robinson; Paraiso, C. Z., Panama, Jan. 28, 1911, E. A. Schwarz; Cacao Trece Aguas, Guatemala, April 8, E. A. Schwarz; Altenas, Costa Rica, Schild and Burgdorf; Anahuac, Tex., Nov. 8, 1918, H. S. Barber (U.S.N.M.); Orange, Tex., July, 1914, Wm. T. Davis (Davis); Spring Creek, Decatur Co., Ga., July, 1912; Bainbridge, Ga., July 15, 1912 (Cornell Univ.); Gainesville, Fla., July 20, 1918, C. J. Drake (Drake).

Type, allotype, and paratypes.—Male, Cat. No. 26735, U.S.N.M.

EMESAYA BREVIPENNIS OCCIDENTALIS, new subspecies.

A pair of specimens from the Uhler Collection (U. S. Nat. Mus.) marked L. Cal. are selected as holotype (female) and allotype (male) of this subspecies. The general color is rufo-stramineous with all markings whether darker or paler much less noticeable than in *E. b. brevipennis*. Length 31–34 mm.

A paratype female from Palo Alto, Calif., July 25, 1892, W. G. Johnson (Cornell Univ.) agrees in hypopygial characters (fig. 126) but is much shorter (26 mm.) and somewhat darker in coloration.

[12] Emesina, 1860, p. 217.

A female of the *brevipennis* complex from La Belle, Fla., April 28, 1912 (Amer. Mus.) has the 8th tergite merely concave posteriorly, the lateral angles not forming teat-like processes, but since a male collected at same place and time is not separable from *E. brevipennis* the unusual character of the female is attributed to individual variation.

EMESAYA LINEATA, new species.

Female.—Knees of posterior two pairs of legs pale, the middle legs with, the hind legs without, a faint subbasal pale annulus on femur; legs in general pale, head and body dark reddish-brown. Apex of abdomen as in figure 127.

Length, 31 mm.

Holotype.—Female, Crescent City, Fla. Broken specimen (U.S.N.M.)

Type.—Female, Cat. No. 26736, U.S.N.M.

EMESAYA MODICA, new species.

A dark species varying from reddish-brown to fuscous, the usual pale markings present, however; bare spots about setae on ventral surface of abdomen much less conspicuous than in *E. brevipennis;* hypopygium as described in key (figs. 128, 129).

Length, 33 mm.

Holotype.—Female, Cordoba, Mex., F. Knab. (U.S.N.M.)

Type.—Female, Cat. No. 26737, U.S.N.M.

Another female specimen probably of this species, but having the genitalia badly mashed is from Cachi, Costa Rica, April 27, 1910, C. H. Lankester (Acad. Sci. Phila.).

Length, 34 mm.

EMESAYA APICULATA, new species.

Male.—General color deep castaneous, coxal margins, beak except apex, antennal tubercles, wedge-shaped markings behind and inside eyes, margins of posterior lobe of pronotum and connexivum ivory-colored. First joint of antenna pale at apex and near base. Legs in general much paler than body; front ones with the lower surfaces and a broad subterminal and narrower subbasal annulus on tibia, and two narrow annuli near apex of femur ivory color; mid and hind legs with apices of femora and bases of tibiae ivory, sharply contrasting with general color, the other annuli but faintly indicated. Wings dusky hyaline, scarcely paler at bases.

Hypopygium (fig. 130) of moderate length, opening upward, hind margin and claspers as described in key (fig. 131) hind margin of sixth sternite slightly concave medianly, more so laterally; seventh

nearly straight across; process of sixth tergite long, but not quite reaching apex of hypopygium, almost parallel-sided for most of its length, a little constricted beyond middle, transversely wrinkled basally, rather abruptly narrowed, bluntly-pointed and punctate apically.

Length, 30–32 mm.

Specimens: Males, Province del Sara, Bolivia, December, 1913, J. Steinbach (Carnegie Museum, Acc. No. 5068); Buena Vista, Bolivia, J. Steinbach (Carnegie Mus. Acc. 5573); Rio Autuz, Amazon, September, Roman (Stockholm Mus.). The last specimen differs in having hind margin of sixth sternite convex instead of slightly concave medianly. A female nymph, E. Bolivia, J. Steinbach (Carnegie Mus., Acc. No. 5572) probably is this species; as usual with nymphs of the genus it is more profusely and boldly marked than the adults.

Holotype.—The first specimen listed.

An adult female, for geographical reasons regarded as belonging to this species, bears the following data: French Guiana, R. Oberthür, 1899 (Paris Mus.). It differs in coloration from the male only in being a little duller, the markings especially of the front legs being less contrasted. The seventh tergite is very broad apically, the whole margin of the disk a little swollen; eighth tergite strongly carinate along the nearly parallel sides of disk, the carinae thickest at base, each with deep impression basally, apex of tergite rounded subangulate medianly (figs. 131*a*, 132).

Emesaya precatoria (*Emesa precatorius* Fabricius, J. C.[13] [Middle America]), seems to be much like *E. apiculata.* We have been supplied, through the kindness of Dr. William Lundbeck, with sketches and notes relating to the type specimen, which differs chiefly from the species here described in the emargination of the male clasper (fig. 131*b*) and shape of the apical hypopygial process (fig. 131*c*).

EMESAYA POLLEX, new species.

Male.—Chiefly castaneous, the legs and antennae paler; the tylus, middle of head just behind it, areas inside eyes and posterior lobe of thorax tending to be paler. Darkening of the disk of latter in some specimens gives the effect of pale marginal stripes. The connexivum is touched with luteous. Front tibia and femur with pale areas but scarcely banded; mid and hind femora with evident terminal and faint subterminal, tibiae with basal and subbasal, pale annuli. Tip of first antennal segment pale. Wings hyaline, a little denser at base.

[13] Systema Rhyngotorum, 1803, pp. 263–264.

Hypopygium long, opening upward (fig. 132*a*) ; spine and claspers as described in key (fig. 133). Sixth sternite with a shallow rounded emargination medianly, the sides first convex, then concave, posteriorly; 7th sternite with hind margin of approximately the same shape, but lacking median emargination. Process of 6th tergite narrowing very gradually, rounded apically, not quite reaching apices of claspers.

Length, 23–26 mm.

Holotype.—Male, Corumba, Brazil, May (Carnegie Museum, Acc. No. 2966). Paratypes male, two, same locality as type, highlands in March; and another, Province del Sara, Bolivia, February, 1913, Steinbach (Carnegie Museum) ; male, Brazil, G. Fallon (Paris Mus.).

A female certainly of this species from Santarem, Brazil (Acc. No. 2966, Carnegie Mus.) is selected as allotype. Coloration agrees very closely with that of the male. The seventh tergite is somewhat narrowly rounded apically, and the eighth is rather compressed, deep-sided and pointed apically, otherwise as described in key and figured (figs. 134, 135). Another female, labeled merely Amazon River (Stockholm Mus.), and one Goyaz, Jatahy, Brazil, Breddin (Berlin Mus.).

EMESAYA MANNI, new species.

General color castaneous, posterior lobe of pronotum, wings, and legs paler brown, the fore femur with a subapical and the fore tibia with two pale bands. Male hypopygium as noted in key, the claspers oblong, not touching each other apically, the extremity pointed within, apical tergite moderately pointed and slightly surpassing hypopygium. Length, 32 mm.

Holotype.—Male, Huachi Beni, Bolivia, September, 1921, Wm. M. Mann (U.S.N.M.).

Type.—Male, Cat. No. 26738, U.S.N.M.

Genus METAPTERUS Costa.

Metapterus, Costa, Achille. Additamenta ad Centurias Cimicum Regni neapolitani. Atti del real Istit. d'Incorag. Sci. nat. Napoli. 1860, p. 10.

This is the only bibliographical reference in the paper not personally verified. We have been unable to find this publication in the largest scientific libraries in the United States. The genotype is *Metapterus linearis* Costa, whether by original designation or otherwise, we are unable to say.

Barce, Stal, C. Hemiptera Africana descripsit, vol. 3, 1865, pp. 162–163. [A genus without species here.] Analecta hemipterologica, Berliner Entomologische Zeitschrift, vol. 10, 1866, p. 168. [Monobasic, *B. annulipes*, new species, genotype.]

Carambis Stal, C. Hem. Afr. 3, 1865, p. 163. [A genus without species here.] Anal. hemip. Berlin Ent. Zeitschr., vol. 10, 1866, p. 168. [Monobasic, genotype, *Emesa caspica* Dohrn.] This synonymy clears up Stal's reference to specimens of *Carambis* from America. (Enum. Hemip. 2, 1872, p. 127.)

Mantisoma, IAKOVLEV, V. E. Materials for the entomological fauna of European Russia, Proc. Russian Ent. Soc., St. Petersburg, vol. 7, 1874, pp. 34–35, pl. 1, fig. 2. [Monobasic, genotype *M. aptera*, new species.] The citation of this genus from Horae Soc. Ent. Ross., sometimes seen, is, of course, incorrect.

In the form of the forelegs this genus resembles *Emesaya*, *Gardena*, and *Ghilianella*, but is readily distinguished from them by the characters indicated in the generic key (figs. 139, 141.). In the caudal elongation of the apical abdominal tergite of the male, which covers the dorsal surface of the hypopygium to or beyond the apex, the genus resembles some of the species in *Ghilianella*, but the cephalic and some other characters readily separate it from that genus. The venation of the forewings (fig. 142) is evidence of relationship to *Emesaya* and *Gardena*, but the fore tarsal structure and the form of the hypopygia are quite different and indicate that *Metapterus* is no more closely related to these genera than to *Ghilianella*. The apical antennal segment is at least four times as long as the subapical.

Our identification of *Barce* with *Metapterus* is based on comparison of the two type species, the specimens of *Metapterus linearis* in our hands being some identified by Dr. A. L. Montandon. The male hypopygium of this species has a longer central spine than in the most closely related American species (*uhleri*, *neglectus*) and this causes the last tergite to appear more decidedly arcuate. The hypopygial claspers are rectangularly bent at about midway to apices, the apical half projecting upward like the central thorn, whereas in the North American species the claspers are slightly or almost imperceptibly curved. The female of *M. linearis* resembles that of *uhleri* most closely, the apical tergite being without notch, and the sixth sternite without a broad central emargination; the apical tergite is broadly deflexed on apical half.

KEY TO THE SPECIES.

Males.

1. Basal spine of postero-ventral series on fore femur less than its own length from base of femur; apical outline of hypopygium from side irregular (fig. 147)_____aberrans, new species (p. 86).
   Basal spine of postero-ventral series on fore femur more than its own length from base of femur; apical outline of hypopygium from side usually regularly rounded_____ 2
2. Head with a pale yellowish stripe along venter which is of about equal width on its entire length, filling the interocular space, and without a dark spot on each side behind eye; upper margin of hypopygium with a squarish backwardly curved process which is more or less emarginate at tip (fig. 158), no erect spine within the upper border of hypopygium_____ 3

Head with a pale yellowish stripe along venter which is narrower than interocular space or has a distinct dark spot on each side behind eye; upper margin of hypopygium not produced backward at apex, with a long spine within upper border (figs. 151, 152)---------- 5

3. Fore coxa about twice as long as fore tibia---------- 4
   Fore coxa less than 1.5 as long as fore tibia---------banksii (Baker) (p. 87).
4. Mid and hind femora each with more than one brown band; seventh tergite obtusely rounded, projecting little if any beyond hypopygium (fig. 157).
   annulipes (Stal) (p. 88).
   Mid and hind femora each with only one brown band; seventh tergite more acutely rounded and projecting more or less beyond hypopygium.
   fraternus (Say) (p. 89).
5. Apical spine of hypopygium conspicuously backwardly curved at tip (fig. 150); general color fuscous; surface rugulae of abdomen both above and below forming a distinct reticulation----------uhleri (Banks) (p. 86).
   Apical hypopygial spine straight or almost so, only slightly curved at tip (fig. 153); general color stramineous; surface rugulae of abdomen chiefly longitudinal, not forming a reticulation---------neglectus, new species (p. 87).

Females.

1. Basal postero-ventral spine on fore femur less than its own length from base of femur; apical tergite entire----------aberrans, new species (p. 86).
   Basal postero-ventral spine on fore femur more than its own length from base of femur---------- 2
2. Head with a pale yellowish stripe on venter which is not decidedly narrower than interocular space nor with a dark spot on each side behind eye---------- 3
   Head with a pale yellow stripe on venter which is narrower than interocular space or has a dark spot on each side behind eye---------- 5
3. Fore coxa only about one third longer than fore tibia--banksii (Baker) (p. 87).
   Fore coxa nearly or quite twice as long as fore tibia---------- 4
4. Mid and hind femora each with more than one brown band; spines on postero-ventral surface of fore femur less elongate, the process between bases of antenna less pronounced, wing pads in apterous forms less developed than in *fraternus;* notch in apex of apical tergite of an open type, its sides varying from concave to nearly straight---------annulipes (Stal) (p. 88).
   Mid and hind femora each with one brown band; spines on postero-ventral surface of fore femur more elongate, the process between bases of antennae more pronounced, the wing pads in apterous forms better developed than in *annulipes;* notch in apical tergite of a narrower type, its sides more or less convex, the apex of the notch more acute (fig. 162).
   fraternus (Say) (p. 89).
5. Seventh tergite entire or barely emarginate at apex (fig. 148) general color of species fuscous----------uhleri (Banks) (p. 86).
   Seventh tergite with a short and acute apical incision (fig. 154); general color stramineous----------neglectus, new species (p. 87).

SYSTEMATIC ARRANGEMENT OF THE SPECIES.

Male hypopygium with an erect spine inside of hind margin.
   Fore coxa but little longer than fore tibia; first spine of fore femur at less than its length from base of femur. aberrans.

Fore coxa 1.5 or more longer than fore tibia; first spine of fore femur at more than its own length from base. uhleri.
neglectus.

Male hypopygium with a squarish process on hind margin; first spine of fore femur at more than its length from base.
Fore coxa less than 1.5 times as long as fore tibia. banksii.
Fore coxa nearly twice as long as fore tibia. annulipes.
fraternus.

METAPTERUS ABERRANS, new species.

A small, dark, robust species, wth characters of male hypopygium and female genital segments similar to those of *uhleri*. The head lacks the process between the bases of antennae and the labrum is but little protruded, in one specimen almost imperceptibly so. The pronotum has a very deep constriction near posterior margin and its hind margin has a short backwardly projecting process in middle. Wing pads small. Apical tergite in female as in *uhleri* but shorter; male hypopygium as seen from the side as in figure 147, the upper posterior margin with an erect spine.

Length, 7–8 mm.

Holotype.—Male, allotype, and one male paratype, Austin, Tex., January 3, 1901 (Bueno).

METAPTERUS UHLERI (Banks).

Barce uhleri BANKS, N. Emesidae, 1909, p. 47 [Southern Pines, N. C.].

This species, *aberrans* and *neglectus*, agree with *linearis*, the genotype, in having an erect spine inside the hind border of male hypopygium, but like all the other American species known to us differs from *linearis* in that the male claspers are not abruptly bent apically and directed upward on each of the apical spine. *M. aberrans*, *uhleri*, and *neglectus* have another character also in common with *linearis*, namely that the pale streak on lower surface of head is narrower than interocular width or is interrupted by a dark spot behind each eye. The external genital characters of both sexes of *M. uhleri* are illustrated by figures 148 to 151, the fore leg by figure 146.

Length, 7–9 mm.

Data for specimens examined: Forest Hills, Mass., March 30, 1915, F. X. Williams; Truro, Mass., Sept. 4, 1904; North Attleboro, Mass., Oct. 3, 1920, C. A. Frost (Parshley); Hyannisport, Mass., Aug. 18, 1899, J. L. Zabriskie (Am. Mus.); New York (Cornell Univ.); Central Park, Long Island, N. Y., April 11, 1915, G. P. Englehardt (Bueno); Sea Cliff, Long Island, N. Y., N. Banks (Paratype, McAtee); Ithaca, N. Y., July 21, 1921, Aug. 22, 1892 (Cornell Univ.); White Plains, N. Y., Oct. 25, 1908 (Bueno); Cape May County, N. J., April 10, 11, 1911, Wm. T. Davis (Davis); Lakehurst, N. J., May 2, 1908, H. G. Barber; Vienna, Va., Aug., 1919,

H. G. Barber (Barber); Southern Pines, N. C., December, N. Banks (Paratypes, U.S.N.M.); also same locality, Feb., March, June, Sept., Dec., A. H. Manee (Davis Coll. Cornell Univ., Bueno, Drake, Barber, Parshley); South Dakota (Parshley); Oxbow, Saskatchewan, April 14, 21, 22, 1907, F. Knab (U.S.N.M.).

Rarely a female specimen of this species has a distinct notch in posterior margin of apical tergite. The color varies somewhat and the varietal name *brunnea* Banks[14] was applied to specimens with pale spots on the connexivum and pale irrorations on the venter; the color of the dorsum suggests bronzed leather. Type examined at the Museum of Comparative Zoology. The proportion of winged specimens in the whole material is small.

METAPTERUS NEGLECTUS, new species.

A larger and much paler species than *uhleri*, the general color being yellowish brown. Male hypopygium similar to that of *uhleri*, differing in having the apical spine without a conspicuously recurved tip (fig. 152, 153). Female differing as stated in the key, the apical tergite as in figure 154.

Length, 11–12 mm.

Holotype.—Male, Lakehurst, N. J., May 13, 1917, under a pile of old bricks, W. T. Davis (Davis). Allotype, Winchester, Mass., L. L. Thaxter (U.S.N.M.). Paratypes: male, Lakehurst, N. J., March 30, 1907, H. G. Barber (Barber); White Plains, N. Y., one male, August 31, 1909; one male, March, 1919, under a stone; one male, April 4, 1909; one male, April 9, 1911; one female, April 30, 1911; Staten Island, N. Y., March 29, 1903 (Bueno).

Allotype.—Female, Cat. No. 26739, U.S.N.M.

METAPTERUS BANKSII (Baker).

Barce banksii Baker, C. F. California Emesidae, Pomona Coll. Journ. Ent. 2, No. 2, May, 1910, p. 227 [Claremont, Calif.].

Similar in color to *fraternus*, differing as stated in key. The fore tibia of male is about three-sevenths as long as fore femur while in the preceding two species it is but little over one-third as long. The male hypopygium is very much less keeled on apical half than in *fraternus* and has the small process at apex above larger, while from the rear view it is much less tapered below (fig. 155). Both sexes have the process between bases of antennae moderately well developed.

Length, 9–12 mm.

Data for specimens examined:

Palm Springs, Calif., February 17; California, no other data, Uhler Coll. (U.S.N.M.); San Mateo County, Calif. (Cornell Univ.); Pasadena, Calif., June 17, 1908 (Ball).

[14] Emesidae, 1909, p. 47.

METAPTERUS ANNULIPES (Stal).

Barce annulipes STAL, C. Berlin Ent. Zeitschr., vol. 10, 1866, p. 168 [Wisconsin].

Emesodema simplicipes SAY Ms., Uhler, P. R. Notices of the Hemiptera Heteroptera in the collection of the late T. W. Harris, M. D. Proc. Boston Soc. Nat. Hist., vol. 19, pp. 430–431, Nov. 1878 [Salem, Mass.]. The synonymy of this name with *annulipes* is by no means certain, and would not be adopted on the basis of the original description. The type specimen, however, is reported to agree with *annulipes*. Without this testimony we should be inclined to use the same *simplicipes* for the following species and to drop Say's name as unidentifiable.

A brownish fuscous species, varying considerably in intensity of color, the darker specimens having the annulations of the legs most distinct. The broad yellowish stripe on ventral surface of head is uniform in width throughout and not narrower than interocular space, a character *annulipes* has in common with *banksii* and *fraternus*.

The principal structural characters for distinguishing *annulipes* among this group of species are enumerated in the key and illustrated in figures 156, 157, 158, 159; the comparatively small size of the process between bases of antennae appears to be a reliable character, judging from our material, which is quite extensive. The fore tibia and tarsus are illustrated by figure 145.

Length, 10–11 mm.

Data for specimens examined: Monmouth, Me., Oct. 10, 1920, C. A. Frost; Jackson, N. H., Sept. 22, 1907, Bryant (Parshley); Contoocook, N. H., Aug. 23, 1923, E. W. Hall (Iowa State Coll.); Andover, Mass., Nov. 9, 1915, F. X. Williams; Sherborn, Mass., Oct. 17, 1920, C. A. Frost; North Attleboro, Mass., Oct. 3, 1920, C. A. Frost; Cold Spring Harbor, L. I., N. Y., July 30, Aug. 2, 1922, H. M. Parshley (Parshley); Cypress Hills, L. I., N. Y., May 18, 1909, Chas. J. Martin (Am. Mus.); Indian Lake, Sabael, N. Y., Aug. 15, 1921 (Barber); White Plains, N. Y., March 2, 1919, Aug. 31, 1908, Oct. 19, 1919, Nov. 21, 1914 (Bueno); N. Y., Scudder (U.S.N.M.); Paterson, N. J., July 25 (Am. Mus.); Roselle, N. J., Oct. 5, 1913, H. G. Barber (Barber.); Penn Station, Pa., June 6 (Cornell Univ.); Aug. 2, 1902. M. Wirtner (Bueno), Aug. 6, 1905, M. Wirtner (Cornell Univ., U.S.N.M.); Henson Creek, Prince Georges County, Md. (Cornell Univ.); Plummer Island, Md., July 5, 1911, July 17, 1914, July 20, 1911, Sept. 2, 10, 1916, E. A. Schwarz and H. S. Barber, July 22, 1915, Aug. 29, 1905, and 1912, H. S. Barber (U.S.N.M.); Glen Echo, Md., July 23, 1921, J. R. Malloch (Biol. Surv.); Great Falls, Va., Sept. 5, 1916, W. L. McAtee; Virginia near Plummer Island, Md., March 18, 1917, W. L. McAtee (McAtee), July 21, 1912, R. A. Cushman, Sept. 21, 1912, H. S. Barber, Fairfax County, Va., Aug. 16, 1911, H. S. Barber (U.S.N.M.); Glen-

carlyn, Va., Oct. 10 (Cornell Univ.); Vienna, Va., Aug. 9, 1916, H. G. Barber (Barber); Ridgeway, Ont., Aug. 6, 1887 (Iowa State Coll.); Columbus, Ohio, Oct. 14, 17, 1906 (Ball); Wis. (U.S.N.M.); Winnipeg, Manitoba (Ball); Ames, Iowa, Sept. 13, 1907 (Iowa State Coll.), Aug. 13, 1895 (Ball).

METAPTERUS FRATERNUS (Say).

Ploiaria fraterna SAY, THOMAS, Descriptions of new species of Heteropterous Hemiptera of North America, 1831; Complete Writings, vol. 1, 1859, pp. 358–359 [New Orleans].

A fairly common species, closely related to the preceding, averaging larger, and with more southern and western distribution. All our specimens from Texas, Louisiana, and Mississippi, and one from Missouri are winged, the others including one from Missouri are furnished with minute wing pads only. In the winged forms the fore wings are brownish with upper surface irregularly granulose, the slight elevations or granules darker than the remainder of wing. Distinguishable from *annulipes* as stated in the key, and illustrated in figures 160 to 162.

Length, 12–13 mm.

Data for specimens examined: Cold Spring Harbor, L. I., N. Y., July 1902, H. G. Barber (Barber); White Plains, N. Y., August 31, 1909, September 4, 1911, September 13, 1919, October 10, 1909, October 23, 1921, November 7, 1909; Palisades, N. J., August 20 (Bueno); Woodbury, N. J., January 1, 1905 (Drake); Bay Ridge, Md., August 3, 1905, (Cornell Univ.); Plum Point, Md., August 10, 1913, W. L. McAtee (McAtee); Chesapeake Beach, Md., August 3, 1913, A. Wetmore (Biol. Survey), September 4, N. Banks, September 2, 1908 (Cornell Univ.); Cabin John Bridge, Md., August, 1907, W. Palmer; Plummer Island, Md., October 4, 1912, October 26, 1913, laid eggs (See figs. 163, 164), H. S. Barber; Jackson Island, Md., July 3, 1911; Offutt Island, Md., October 3, 1919, H. S. Barber (U.S.N.M.); Glen Echo, Md., October 15, 1892, O. Heidemann (Iowa State Coll.); Washington, D. C., October 7, 1885, November 5, 1881 (U.S.N.M.), July 10, Feb. 5, 1893, F. C. Pratt (Cornell Univ.); Great Falls, Va., September 5, 1916, October 4, 1916, W. L. McAtee (McAtee, Drake, Biol. Survey); Falls Church, Va., August 30, 1904, October 1, September 5, November 2, N. Banks (Cornell Univ.); Southern Pines, N. C., December (Parshley); Daytona, Fla., (Cornell Univ.); Ohio (Drake); Natchez, Miss., May 13, 22, 25, 1909, E. S. Tucker; Baton Rouge, La., June 1, 1893, H. S. Weed (U.S.N.M.); Falls City, Nebr., July 31, H. G. Barber (Barber); Lincoln, Nebr., July, at light (Iowa State Coll.); Wichita, Kansas; Missouri; Charleston, Md., October 28, 1915; Durant, Okla., June 2, 1905, F. C. Bishopp; Texas; Dallas, Tex., May 10, 1908, E. S. Tucker, November 27, 1906, R. A. Cushman; Columbus, Tex., June 16 (U.S.N.M.).

It is only by assumption that this species has been identified with that described by Say. The original description is very inadequate, and the few tangible characters mentioned in it do not apply well to the present species. It would be no injustice to drop Say's name, as unidentifiable.

Genus GHILIANELLA Spinola.

Ghilianella SPINOLA, M. Di alcuni Generi d'Insetti Artroidignati nuovamente proposti dal Socio Attuale Signor Marchese Massimiliano Spinola nella sua Tavola Sinottica di questo Ordine. Memorie di Matematica e di Fisica della Societa Italiana delle Scienze residente in Modena, vol. 25, pt. 1, 1852, pp. 142–143. Monobasic: Genotype, *G. filiventris*, new species [Para].

The inclusion and brief definition of *Ghilianella* in the Tavola Sinottica (p. 85) of the same work, is responsible for citation of that reference as the original description of the genus. However, we prefer the reference here given where the genus and its genotype are described at length.

Characters of the genus besides those mentioned in the key to genera are: the presence between bases of antennae of a projection varying from a mere wart to a prominent porrect or decurved spine (fig. 165); head and thorax more or less granulate, the former with a profound constriction anterior of eyes; meso- and meta-thorax each tricarinate (or with a median carina and lateral rows of tubercles above) and usually unicarinate below; abdomen more or less carinate or keeled below; front tibia with a patch of short pale golden hairs on inner side apically and a tuft of longer ones at the apex inferiorly; mid and hind legs and antennae each longer than body. Color varies much according to age, usually the nymphs are pale and the color darkens steadily with age until the final stage is dark reddish brown or even blackish; in some species, however, the adults are pale; when the legs have pale markings they are almost invariably as follows: mid and hind femora with two postmedian bands and a subapical spot, and tibiae with a sub-basal spot; in the pale species, dark markings tend to appear at these same places; frontal and femoral spines mostly pale. The whole head and body of *Ghilianella* species are sparsely pale haired, the hair tending to aggregate in patches about base of frontal spine, juncture of head and pronotum, and on sides anteriorly of meso- and metathoraces.

The principal characters for separating the species are derived from the terminal segments of the abdomen and are rarely mentioned in previous descriptions. We have had little success therefore in identifying described species of which we have not seen specimens. Precise determination of these species depends upon examination of the types practically all of which are in Europe. We have fortu-

nately been able through the kindness of Dr. E. Bergroth to examine the types of his species, aid which has been of the utmost value in the study of the present genus.

However, inability to inspect other type specimens can not be permitted to prevent a revision of the genus which proves to be richer in species than has previously been suspected. This latter fact in itself insures that few of our species will prove identical with the older ones, while the total to be discovered in neotropical regions can only be indicated by an estimate so large that it would be considered absurd by many entomologists.

KEY TO THE SPECIES.

Males.

1. Mesothorax distinctly longer than prothorax; shape of abdomen various_ 2
   Mesothorax little if any longer than prothorax; abdomen gradually widening from base_____ 20
2. Abdomen with an abrupt bulbous swelling behind middle (figs. 196, 201) _____ 3
   Abdomen without bulbous swelling (figs. 169, 210)_____ 14
3. Spine between antennae well developed, acute; head and prothorax usually distinctly granulose; claspers of hypopygium with upper and lower margins in most species without a rounded subapical notch above or below; metathorax usually much attenuated anteriorly_____ 4
   Spine between antennae not developed, a mere wart, blunt; head and prothorax but little granulose; claspers of hypopygium long, obtriangular with at least the upper margin notched_____ 13
4. Hypopygium with a large apical hook like process which has an emargination or concavity on each side of hook, not entirely filled by the claspers (figs. 193, 194, 200)_____ 12
   Hypopygium with a small apical process which is visible only under high magnification, the upper margin of hypopygium but little concave, the claspers entirely filling the space between the margin and the process (fig. 197) _____ 5
5. Fifth tergite bearing a pair of strongly divergent long conical horns, equal in length to entire bulbosity (fig. 205)_____**mirabilis**, new species (p. 124).
   Fifth tergite without such horns_____ 6
6. Seventh tergite short, sixth entirely incorporated into the bulbosity which thus appears almost terminal (fig. 201)_____ 7
   Seventh tergite long, sixth not wholly incorporated into bulbosity which is distinctly subterminal_____ 8
7. Sixth tergite more than half as long as fifth, provided with a smaller elevation similar in shape to that of fifth (fig. 201).
   filiventris Spinola (p. 123).
   Sixth tergite less than half as long as fifth, without elevations.
   atriclava Bergroth (p. 123).
8. Widest part of bulbosity in fourth segment; top of abdomen with 2 distinct longitudinal lines of gray hairs_____**globifera** Bergroth (p. 110).
   Widest part of bulbosity in fifth segment_____ 9
9. Fifth tergite lacking subangulate ridged elevations; sixth trisinuate posteriorly_____**claviventris** Bergroth (p. 109).
   Fifth tergite with subangulate ridged elevations; sixth slightly convex posteriorly _____ 10

10. Elevation of fifth tergite distinctly inside lateral margins of disk.
approximata, new species (p. 117).
Elevations of fifth tergite on lateral margins of disk, the margins passing over as carinae 11
11. Elevations of fifth tergite at middle; clasper oblong, about a third as wide as long (fig. 197) ..... **perigynium**, new species (p. 120).
Elevations of fifth tergite nearer posterior margin; clasper much narrower, terete ..... **recondita**, new species (p. 119).
12. Seventh tergite with a longitudinal carina on apical half, tip of tergite projecting well beyond apex of hypopygium; apical central hook of latter relatively small, not much curved at base and not standing well clear of the sternite at base so that it is only visible as a hook under a moderate magnification (fig. 193) ..... **globulata**, new species (p. 118).
subglobulata, new species (p. 121).
Seventh tergite without longitudinal carina, tip of tergite projecting little if any beyond apex of hypopygium; apical hook of latter much curved at base, standing well clear of the sternite so that it is usually visible as a hook to the unaided eye (fig. 200) ..... **uncinata**, new species (p. 122).
13. Hypopygial claspers each with a deep excavation on upper margin before apex, the lower margin entire (fig. 199); fifth sternite with regular microscopic striae which run from base to apex and are slightly outwardly directed ..... **strigata**, new species (p. 121).
Hypopygial claspers each with a deep rounded excavation on upper margin before apex, and a deep incision about opposite on lower margin (fig. 194); fifth sternite lacking regular striae, granular, the granulations being partially grouped in irregular transverse rows.
patruela, new species (p. 119).
14. Abdomen nearly as wide at hypopygium as at any point proximad of it 15
Abdomen notably widest at third or fourth segment; seventh tergite remarkably elongated and slender, projecting beyond apex of hypopygium by at least the length of latter (figs. 187, 188) 19
15. Hypopygium almost annular, the terminal hook large, flanked each side by a space which is not filled by the broadly triangular claspers; seventh tergite not especially narrowed subapically, apex a strong process projecting well beyond hypopygium (fig. 180) ..... **apiculata**, new species (p. 111).
Hypopygium more elongate, hook small, concealed between apices of claspers; apex of seventh tergite not strongly tuberculate nor projecting far beyond hypopygium (fig. 181) 16
16. Hypopygium somewhat inflated, notably deeper vertically than adjacent part of abdomen 18
Hypopygium scarcely inflated and but little deeper than abdomen 17
17. Claspers oblong, almost truncate apically, slightly beveled off at inferior angle ..... **ica**, new species (p. 111).
Claspers broader basally, rather pointed apically, superior angle sloped off with a long bevel (fig. 181) ..... **pachitea**, new species (p. 111).
18. Seventh tergite longer, much narrowed and slightly transversely corrugated subapically, the apex pointed and slightly keeled.
aracataca, new species (p. 112).
Seventh tergite shorter, but little narrowed and faintly transversely wrinkled subapically, the apex triangular, bluntly pointed.
colona, new species (p. 112).
19. Abdomen widest at fourth segment, each tergite with a pair of small round spots of pale yellow pile on hind margin; spiracles yellow.
assa-nutrix Bergroth (p. 114).

Abdomen widest at fifth segment, tergites lacking pilose spots; spiracles blackish_____**gladiator**, new species (p. 115).

20. Hind margin of sixth sternite almost straight; head and thorax copiously, coarsely granulate; seventh tergite triangular apically, not keeled, extending little if any beyond hypopygium (fig. 175); apical antennal segment only a little longer than subapical_____**pascoei** Bergroth (p. 106).

Hind margin of sixth sternite with a broad central rounded concavity and smaller lateral ones, the sternite longest at a point between the lateral margin and median line_____ 21

21. Head and thorax conspicuously granulate; length 15 to 17 mm.
minimula, new species (p. 105).

Head and thorax not conspicuously granulate; longer species_____ 22

22. Eighth sternite visible on its entire width, the spiracle moderately pedunculate_____ 23

Eighth sternite with the sides more or less concealed_____ 27

23. Abdomen nearly cylindrical; clasper very broadly triangular, width at apex equaling length (fig. 177)_____**personata**, new species (p. 108).

Abdomen otherwise; clasper not so broadly triangular_____ 24

24. Abdomen clavate, posterior angles of tergites subangularly ampliate; tergites lacking dark warts on middle of hind margins.
angulata (Uhler) (p. 128).

Abdomen parallel-sided; tergites 2–6 each with a small dark wart at middle of hind margin_____ 25

25. Narrowed portion of seventh tergite distinctly longer than terminal expanded part (fig. 170)_____**persimilis**, new species (p. 103).

Narrowed portion of seventh tergite distinctly shorter than terminal expanded part_____ 26

26. Claspers of about same width throughout their length; pale species.
productilis Barber (p. 102).

Claspers wide subbasally, much narrowed apically; dark species.
simillima, new species (p. 102).

27. Eighth sternite visible only at center, its sides, including spiracles, covered; abdomen with flecks of denser pubescence; fore femur gradually thickened from base to first ventral spine_____**maculata**, new species (p. 108).

Spiracles of eighth sternite exposed; head, thorax and abdomen with patches of dense golden pubescence; fore femur thickened on basal half of that part basad of the first ventral spine (fig. 215).
insidiatrix Bergroth (p. 126).

KEY TO THE SPECIES.

Females.

1. Mesothorax (viewed from above) longer than prothorax_____ 2

Mesothorax not longer than prothorax_____ 17

2. Abdomen with a bulbous swelling beyond middle, and prominent lateral elevations on either fifth or sixth tergites (figs. 196, 201)_____ 3

Abdomen without bulbous swelling or lateral elevations on fifth and sixth tergites_____ 12

3. Fifth tergite the widest, its sides before hind margin prominently elevated, usually standing above connexivum_____ 4

Sixth tergite about as wide as or wider than fifth, bearing a large median tubercle (fig. 184)_____ 15

4. Sixth tergite lacking a large median tubercle, though fifth and sixth tergites may be more or less elevated at middle of hind margin 5
Sixth tergite with a prominent, median, falcate tubercle on its hind margin. **bethei** (Dohrn) (p. 112).
5. Fifth tergite with a pair of divergent, long conical horns, each nearly equal in length to width of tergite (fig. 208) ..... **mirabilis**, new species (p. 124).
Fifth tergite without such horns 6
6. Elevations of fifth tergite distinctly inside lateral margins of disk. **approximata**, new species (p. 117).
Elevations of fifth tergite on lateral margins of disk, the margins passing over them as carinae 7
7. Pronotum not noticeably granulose; abdomen with one or more pairs of large pale pilose spots on dorsum and venter ..... **signata**, new species (p. 120).
Pronotum distinctly granulose; abdomen not or very inconspicuously spotted 8
8. Eighth tergite as long as wide 10
Eighth tergite much shorter than wide 9
9. Posterior lateral angles of seventh tergite produced no farther posteriorly than median convexity of hind margin which is more or less tuberculate. **globulata**, new species (p. 118).
Posterior angles of seventh tergite produced distinctly beyond middle of hind margin, which is merely convex, not at all tuberculate. **subglobulata**, new species (p. 121).
10. Posterior lateral angles of seventh tergite produced distinctly beyond middle of hind margin which is not tuberculate ..... **gladiator**, new species (p. 115).
Posterior lateral angles of sixth tergite produced no farther than median convexity of hind margin which is slightly tuberculate 11
11. Seventh sternite about twice as long on median line as sixth, with a broad convex process apically which is slightly emarginate medianly. **perigynium**, new species (p. 120).
Seventh sternite only a third longer than sixth; somewhat angulate apically. **recondita**, new species (p. 119).
12. Seventh tergite with the posterior angles produced as divergent, acute processes; other tergites ornamented on their hind margins with a pair of spots of golden pubescence; abdomen boat-shaped ..... **assa-nutrix** Bergroth (p. 114).
Posterior angles of seventh tergite not so produced; abdomen clavate, not so ornamented 13
13. Tergite 7 about as wide as long, with a distinct median tubercle posteriorly; sternite 7 merely convex medianly, but little produced. **filiventris** Spinola (p. 123).
Tergite 7 not tuberculate; sternite 7 much produced and acute posteriorly 14
14. Tergite 7 much longer than wide, middle of hind margin conspicuously declivate, the lateral angles prominent, acute; sternites 5 to 7 as in figure 191 ..... **stipitata**, new species (p. 116).
Tergite 7 little longer than wide, hind margin not declivate medianly, almost straight across, the lateral angles and median point only very slightly emphasized; sternites 5 to 7 as in figure 192 ..... **similata**, new species (p. 116).
15. Fifth tergite about equal in length to its width at hind margin; abdomen with a bulbous swelling beyond middle ..... **pendula**, new species (p. 116).
Fifth tergite about twice as long as its width at hind margin; abdomen tapered from base to apex, or slightly clubbed apically 16

16. Seventh sternite very slightly longer than sixth, the latter with the hind margin slightly concave——**cuneata**, new species (p. 113).
Seventh sternite at least 1.5 as long as sixth on median line, the latter with a very deep concavity on hind margin——**aracataca**, new species (p. 112).
17. Posterior angles of tergites more or less ampliate or produced, the outline of dorsum of abdomen as seen from above not a continuous straight or curved line (fig. 210)—— 18
Posterior angles of tergites (except sometimes the seventh) not produced, the outline or dorsum of abdomen a continuous straight (fig. 169) or curved line—— 23
18. Fore femur notably thicker near base than at first strong spine (fig. 213)—— 19
Fore femur enlarging gradually from base to first strong spine (fig. 185)—— 21
19. A strong tubercle on hind margin of sixth tergite (fig. 184)—— 20
No obvious tubercle on hind margin of sixth tergite.
glabrata, new species (p. 128).
20. Eighth tergite with disk prominently elevated each side of a broad median sulcus; ninth tergite convex medianly the margin slightly elevated; corrugations of these tergites indistinct——**insidiatrix** Bergroth (p. 126).
Eighth and ninth tergites with disk depressed and margins elevated, each longitudinally carinate and transversely corrugated.
amicula, new species (p. 127).
21. Angulations of tergites more pronounced; apex of sixth notably wider than that of seventh (fig. 210)—— 22
Angulation of tergites less pronounced; apex of sixth tergite scarcely wider than that of seventh——**peruviana**, new species (p. 125).
22. Elevated margins of ninth tergite produced apically as distinct spines (fig. 211)——**annectens**, new species (p. 125).
Elevated margins of ninth tergite not forming spines (fig. 213).
truncata, new species (p. 126).
23. Basal spine of fore femur at less than its own length from base of femur (i. e. juncture of the trochanter); fore tibia and tarsus combined three-fourths as long as femur (fig. 167); spine between bases of antennae much reduced, a mere wart——**galapagensis** Heidemann (p. 100).
Basal spine of fore femur at distinctly more than its own length from base of femur; other characters not as above—— 24
24. Seventh sternite distinctly produced on middle of hind margin—— 25
Seventh sternite not produced—— 31
25. Hind margin of seventh tergite without tubercle—— 26
Hind margin of seventh tergite more or less tuberculate—— 28
26. Hind margin of seventh tergite concave medianly.
personata, new species (p. 108).
Hind margin of seventh tergite not concave medianly—— 27
27. Hind margin of seventh tergite straight across—**semipallida** Bergroth (p. 100).
Hind margin of seventh tergite angulate, produced medianly but not tuberculate——**alterata**, new species (p. 107).
28. Median tubercle on hind margin of seventh tergite extending farther posteriorly than lateral angles; ninth tergite with 3 finger-like ridges at apex. (fig. 172)——**persimilis**, new species (p. 103).
Median tubercle on hind margin of seventh tergite not extending as far posteriorly as laterial angles; apex of ninth tergite lacking finger-like longitudinal ridges—— 29

29. Apex of ninth tergite distinctly upcurved, transversely wrinkled and with a low median longitudinal carina; process of seventh sternite large.
productilis Barber (p. 102).
Apex of ninth tergite otherwise; process of seventh sternite small---- 30
30. Apex of ninth tergite distinctly decurved, longitudinally strigate, and with a strong median carina, the lateral margins depressed.
succincta, new species (p. 105).
Apex of ninth tergite slightly decurved, the lateral margins strongly elevated, depressed median area with a carina which extends from the upper transversely corrugated third of the sternite.
aliena, new species (p. 106).
31. Eighth tergite visible only as two small rounded laterally situated protuberances, below apex of seventh tergite, not continued downward in center over base of ninth tergite (fig. 174)---------**alveola**, new species (p. 104).
Eighth tergite covering base of ninth tergite---------- 32
32. Sixth tergite with a prominent protuberance, seventh with a smaller one on middle of hind margin (fig. 178)---------- 33
Sixth tergite without a prominent protuberance---------- 34
33. Abdomen ten times as long as its greatest width; first antennal joint with several dark bands----------**varicornis** Dohrn (p. 101).
Abdomen not so long and slender, clavate; ninth tergite rounded apically, the depressed apex overlaid by two short tapering ridges (fig. 179).
perversa, new species (p. 110).
34. Hind margin of sixth sternite almost straight; apex of ninth tergite with a strong bidentate tubercle on each side--**bicaudata**, new species (p. 101).
Hind margin of sixth sternite more or less concave---------- 35
35. Sixth sternite a third longer on sides than in middle (fig. 176).
pascoei Bergroth (p. 106).
Sixth sternite not so deeply emarginate posteriorly---------- 36
36. Apex of ninth tergite overlaid by two strong finger-like processes (fig. 173); length over 30 mm----------**longula**, new species (p. 104).
Apex of ninth tergite with a low median carina; length less than 20 mm.
minimula, new species (p. 105).

REMARKS ON PREVIOUSLY DESCRIBED SPECIES OTHER THAN THOSE INCLUDED IN THE KEY.

analis (*Emesa*) DOHRN. Emesina, 1860, pp. 229–230, pl. 1, fig. 5 [Surinam].

This species runs to the division of our key including *apiculata* and *aracataca*. Dohrn's figure shows that the hypopygium is not annular with a large hook as in the former, and that the sixth tergite projects far beyond hypopygium which is not true of the latter.

annulata (*Emesa*) DOHRN. Nachträge, 1863, pp. 65–6 [S. A.?].

Closely related to *analis*, "last dorsal segment scarcely petiolate." This indicates that the species is to be compared with *aracataca* and may possibly be identical.

argentina BERG, CAROL. Tres Reduviidae novae argentinae. Communicaciones del Museo Nacional de Buenos Aires, vol. 1, No. 6, May 23, 1900, pp. 189–190 [prope Buenos Aires].

Not a *Ghilianella*, possibly a Ploiaria but the characters given do not permit its being run in our key to that genus.

brasiliensis (*Emesa*) DOHRN. Emesina, 1860, pp. 227–8 [Brazil].

Abdomen with high and sharp lateral carinae, mid and hind femora each with 2 yellowish rings.

bulbifera CHAMPION. Biologia, vol. 2, 1898, p. 171, pl. 10, figs. 17–18 [Panama].

The male runs to *recondita* among our species, but has the sixth segment less involved in the bulbosity and the seventh tergite not surpassing hypopygium and apparently not apiculate. The female described by Champion probably is a different species; specimens seemingly agreeing with Champion's description of that sex are given a new name on page 116.

gerstaeckeri (*Emesa*) DOHRN. Emesina, 1860, pp. 223–4 [Haiti].

There is very little doubt that all of the American species in section B or Dohrn's key to Emesa, are *Ghilianella*. The present species is said to have the sixth (that is seventh) segment bispinose apically.

gibbiventris CHAMPION. Biologia, vol. 2, 1898, p. 172, pl. 10, fig. 20 [Panama].

This species is of a different type from any we have seen, since while the pro- and meso-thorax are subequal in length, the abdomen in the male is bulbous.

Granulata CHAMPION. Biologia, vol. 2, 1898, pp. 171–2, pl. 10, fig. 19 [British Honduras].

Unidentifiable, the terminal abdominal segments of the type being missing.

ignorata DOHRN. Emesina, 1860, pp. 238–9, pl. 1, figs. 9, 11 [La Guayra, and Brazil].

The male runs to *recondita* in our key but does not have the seventh tergite produced beyond hypopygium. Champion[15] describes and illustrates a species under Dohrn's name, but he defines the species on characters not mentioned by Dohrn, and does not speak of seeing the type; hence there is no certainty that the identification is correct.

imbecilla (*Emesa*) DOHRN. Emesina, 1860, pp. 228–9 [Para].

Mid and hind femora each with three pale rings; described from a specimen with collapsed abdomen; may not be identifiable.

signoreti (*Emesa*) DOHRN. Emesina, 1860, p. 227, pl. 1, fig. 1 [Jamaica].

This species has the mid and hind femora each with apex and two subapical rings paler, not agreeing in this respect with any species having the same shaped abdomen (figured) that we have examined.

spinolae DOHRN. Emesina, 1860, p. 238 [Amazon River].

Abdominal segments 1–3 yellow and longer even than in *filiventris* indicates a species distinct from any here described.

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[15] Biologia, vol. 2, pp. 170–1, pl. 10, figs. 15–16, 1898.

SYSTEMATIC ARRANGEMENT OF THE SPECIES.

Claws of fore tarsus two, the inner short, closely applied to the base of outer. (Subgenus *Ghiliancella* Spinola.)

Inner row of armature of fore femur consisting of hairs or bristles which may or may not arise from wart-like bases (fig. 186), usually a single spine at apical end of the series; fore femur usually slender, enlarging slightly from base toward first stout spine (fig. 185).

Fore femur rather stout, first strong spine at less than its own length from base (that is apex of trochanter); abdomen racket-shaped.

galapagensis.

Fore femur usually more slender, first strong spine at more (usually considerably more) than its own length from base.

A small wart (dark in mature specimens) at middle of hind margin of each of tergites 2–6; spiracles dark, prominent; a dark blotch or spot on inner side of upper surface of fore femur near apex.

Metathorax shorter than mesothorax; unspined portion of fore femur shorter than spined part——————**semipallida.**

varicornis.

bicaudata.

Metathorax nearly or quite as long as mesothorax; unspined portion of fore femur nearly equal in length to spined part.

simillima.

productilis.

persimilis.

longula.

No such warts on tergites 2–6; species lacking the above combination of characters.

Mesothorax not longer than prothorax; abdomen not bulbous.

Prothorax longer; spineless part of fore femur shorter than spined portion——————**alveola.**

minimula.

succincta.

Mesothorax and prothorax about equal in length.

Spineless part of fore femur distinctly shorter than spined portion.

aliena.

pascoei.

alterata.

Spineless part of fore femur nearly as long as spined portion.

maculata.

personata.

Mesothorax distinctly longer than prothorax; abdomen bulbous.

claviventris.

globifera.[16]

Inner row of armature of fore femur consisting of spines (which may alternate large and small or be almost equal in size) and between them longer fine hairs (fig. 204).

Fore femur slender in most cases, with the unspined portion relatively long; abdominal tergites not angulate produced.

Mesothorax shorter than prothorax; abdomen nearly parallel-sided——————**perversa.**

[16] See footnote 17, p. 99.

Mesothorax longer than prothorax.
Abdomen long, nearly parallel-sided---apiculata.[17]
ica.
Abdomen clavate---pachitea.
colona.
bethei.
aracataca.
cuneata.
assa-nutrix.
[filiventris, female].
gladiator, male.
stipitata.
similata.
Abdomen bulbous.
Bulbosity longer than wide---gladiator, female.
pendula.
Bulbosity as wide as or wider than long.
Bulbosity subterminal---approximata.
globifera.[18]
globulata.
patruela.
perigynium.
recondita.
signata.
strigata.
subglobulata.
uncinata.
Bulbosity terminal---atriclava.
filiventris, male.
mirabilis.

Fore femur stouter, the unspined portion relatively short, but little longer than basal spine; abdominal tergites angulate produced at sides posteriorly; prothorax longest, mesothorax and metathorax successively shorter---peruviana.
truncata.
annectens.

Claw of fore tarsus single; inner row of armature of fore femur consisting of chitinous tubercles or spines, with a few long hairs intermixed (fig. 212); a strong spine on outer side slightly distad of basal spine, out of alignment with the others and slightly outwardly directed; posterior angles of abdominal tergites slightly ampliate.

Claw separated from tarsus by a suture; fore femur rather slender as a whole, but notably thicker near base than at first strong spine (fig. 215) (Subgenus *Ploeodonyx* new subgenus, type species *Ghilianella insidiatrix* Bergroth).

insidiatrix.
amicula.
glabrata.

Claw entirely fused with tarsus; fore femur rather stout, little if any thicker at base than at first strong spine; hind margin of prothorax with two rather long, blunt, divergent teat-like processes. (Subgenus *Lissonyx*, new subgenus, type species *Emesa angulata* Uhler.)

angulata.

[17] Armature of fore femur unknown.
[18] Armature of fore femur unknown, the species entered in two places in the list.

DESCRIPTIONS OF THE SPECIES.

GHILIANELLA GALAPAGENSIS Heidemann.

Ghilianella galapagensis HEIDEMANN, O. H. Papers from the Hopkins Stanford Galapagos Expedition, 1898–1899. Entomological Results (1) Hemiptera, Proc. Washington Acad. Sci., vol. 3, pp. 367–8, Aug. 23, 1901 [Hood Island].

Female.—General color testaceous, the abdomen considerably clouded with fuscous; abdomen gradually widened to juncture of fifth and sixth segments and tapered from thence to apex, the expansion involving more segments (3–7) and having more of them (4–7) of nearly equal width than in other species; dorsal sutures transverse, the tergites with small but progressively increasing elevations on the hind margins of 2–6; posterior angles of tergite 7 rather prominent, the hind margin between nearly straight, with a median elevation; eighth tergite two-thirds as long as broad, very slightly sculptured, apex very broadly rounded; exposed portion of tergite 9 much shorter than 8, depressed apically on each side of a short keel; hind margins of sternites 4–5 nearly transverse, slightly inclined anteriorly, of 2, 3, and 6, more or less emarginate medianly and arcuate laterally, 6 most so; seventh tergite convex medianly, concave laterally, eighth just the reverse, with a large median emargination, seventh with a small one. Fore leg and its armature as in figures 167, 168.

Length, 12.5 mm.

Holotype.—Female, Hood Island, Galapagos Archipelago, May 18, 1899 (type No. 4931, U.S.N.M.).

A nymph also, Albemarle Island, March 11, 1899 (U.S.N.M.).

GHILIANELLA SEMIPALLIDA Bergroth.

Ghilianella semipallida BERGROTH, E. Ploeariinen 1906, pp. 317–318 [Venezuela].

Female.—A specimen without antennae, or mid and hind legs, and with the abdomen collapsed, Corozal, Collection E. Bergroth, is the only one we have seen. General color of upper surface stramineous, of lower pale castaneous. Frontal spine porrect, sharp. Head sparsely granulate, divisions of thorax with practically no granulations on top and only a few along the sides; mesothorax longer than either of the other divisions. Abdomen very long and slender, apparently widening gradually from base to apex; tergites without tubercles; hind margin of seventh about straight across; eighth semicircular; ninth longer, cuneate portion of disk raised above lateral portions, its point coalescing at apex with the slightly elevated margins. Seventh sternite slightly angulate medianly, slightly concave laterally; eighth sternite broadly exposed on each side.

Length, 23 mm.

Corozal, Venezuela (Coll. E. Bergroth). The type.

GHILIANELLA VARICORNIS (Dohrn).

E.[mesa] varicornis DOHRN, A. Emesina, 1860, pp. 226–227 [Porto Rico].
Ghilianella variicornis BERGROTH, E. Ploeariinen 1906, p. 317.

Dohrn had a male with collapsed abdomen and his description deals mainly with coloration; Bergroth describes the structural characters from a female, the specimen examined during the present revision.

Female.—Closely related to *G. productilis* Barber, of the same long slender form, and coloration including the characteristic dark dots; those on posterior lobe of head and on pronotum are obsolete, however, in the specimen at hand, while there is a faint pair on front lobe of head. Legs stramineous, mid and hind pairs variegated, the mid tibiae each with a single distinct, and the femora with numerous indistinct, fuscous annuli; some longitudinal striping each side of the knee-joint. Basal segment of antenna with numerous faint brown annuli. Frontal spine prominent, decurved; head and thorax moderately granulate; the divisions of thorax decreasing in length from front to rear; a tubercle each side of base of head on anterior margin of pronotum, prominent, rather pointed, much more distinct than in *G. productilis.* Abdomen widening very gradually from base to apex, tubercled as in *G. productilis*, the lateral angles and median tubercle of 7 about equally produced; eighth semi-octagonal in shape, transversely wrinkled and indistinctly longitudinally keeled, the apex rather pointed, and the margins between apex and lateral angles slightly concave; ninth longer than eighth, faintly transversely corrugated, slightly narrowed apically, apex concave, with the lateral angles each side of the concavity distinctly pointed as seen from behind, broader as seen from side. Seventh sternite distinctly concave medianly, the sides of hind margin also shallowly concave.

Length, 26.5 mm.

Porto Rico (Coll. E. Bergroth).

GHILIANELLA BICAUDATA, new species.

Female.—Testaceous, legs and thorax above washed with rufous and lightly marked, the thorax below and abdomen above more heavily, variegated, with fuscous; a pair of dark blotches near hind margin of each sternite; species in general appearance much like *productilis.* Abdomen widening gradually to juncture of fourth and fifth segments, then tapering very slightly to end; connexivum slightly elevated; central strips of tergites with a longitudinal ridge; seventh tergite with the lateral angles slightly flaring and projecting well posteriorly, the hind margin between them nearly straight and bearing at the middle a terete, pointed, porrect tubercle, which slightly exceeds the lateral angles (fig. 169); eighth tergite

more than twice as wide as long, strongly transversely corrugated, apical margin wide, erose; ninth tergite longer than eighth, transversely wrinkled, narrowed apically, the posterior angles raised into two strong bidentate tubercles; hind margins of sternites 2–6 slightly concave; seventh somewhat convex medianly and concave laterally; eighth narrowly visible on each side.

Length, 24 mm.

Holotype.—Female, Cayamas, Cuba, Jan. 24, E. A. Schwarz (U.S.N.M.).

Type.—Female, Cat. No. 26740, U.S.N.M.

GHILIANELLA SIMILLIMA, new species.

A species closely allied to *productilis*, agreeing with it even in shape of seventh tergite (in contrast to *persimilis*), but in the single male specimen at hand, dark castaneous so that the characteristic dark dots of this group of species are much obscured. However, they are discernible upon close inspection. Legs and antennae paler castaneous than body but without pale annuli. Hypopygium rather short, opening upward, the sides rather pinched in, the upper margin flaring laterally and ridged posteriorly, claspers as described in key.

Length, 29 mm.

Holotype.—Male labelled "Cuba, Sojo, 6 Al. 83" (Paris Mus.).

GHILIANELLA PRODUCTILIS Barber.

Ghilianella productilis Barber, H. G. Insects of Florida, vol. 2, Hemiptera, Bull. Amer. Mus. Nat. Hist., vol. 33, pp. 502–3, Aug. 21, 1914. [Marco, Fla.]

Male.—General color light reddish-brown, more or less variegated with fuscous; the legs and antennae stramineous, punctate but not annulate with the general color. There is a distinct black dot on the upper surface of each fore femur near the apex, a pair of dots about middle of posterior lobe of head, and another pair sometimes larger than the preceding about middle of pronotum; each abdominal sternite from 3–6, also bears near its hind margin a pair of black dots which tend to become larger and blotch-like posteriorly. Pilosity fine, short, pale, more abundant toward apices of mid and hind legs and antennae. Abdomen almost parallel-sided, widest at hypopygium, a black wart on middle of hind margin of tergites 2–6, the connexivum more or less elevated, the spiracles dark. Seventh tergite somewhat longer than sixth, a little constricted beyond middle, the apical moiety faintly transversely corrugated, lanceolate in outline, with a rounded keel apically, and projecting a little beyond hypopygium. Posterior margins of sternites 2–6, more or

less emarginate medianly, and arcuate laterally, most pronounced on 6; 7 a little emarginate, 8 a little convex medianly, both slightly concave laterally; claspers oblong.

Female.—Color as in male; form of abdomen much the same, seventh tergite about one-third shorter than sixth, the lateral angles produced distinctly beyond the keeled and slightly tuberculate middle of hind margin; eighth tergite about semicircular, keeled longitudinally and corrugated transversely; ninth somewhat longer than eighth, keeled, corrugated herringbone fashion, narrowed, rounded, and upturned apically; sutures between sternites less sinuate than in male; seventh sternite somewhat shorter than sixth, its hind margin concave laterally and forming a distinct rounded process medianly; eighth sternite appearing as an elliptical plate on each side, spiracle barely visible.

Length, 23–25 mm.

Holotype.—Male, Marco, Fla., April 19, 1912, Wm. T. Davis (Coll. Davis); males, females, and nymphs from Big Pine, Fla., March 8, 1919, H. S. Barber; and Vict. de las Tunas, Cuba, W. M. Mann (U.S.N.M.).

In the male nymph the eighth tergite is broadly visible across base of anal tube, the ninth apparently is membraneous, the seventh has a large upwardly and backwardly projecting pointed process, and the lateral angles slightly pointed tuberculate; in the female nymph the seventh tergite has a rather prominent erect tubercle, the eighth and ninth are keeled and less rounded apically than in adult since they form the roof of complete segments inclosing the anal tube.

GHILIANELLA PERSIMILIS, new species.

Male.—Very similar to male of *productilis;* the only tangible difference seems to be that in this species the narrowed portion of the seventh tergite is distinctly longer than the terminal expanded, then apiculate part (fig. 170), while in *productilis* it is distinctly shorter. Hypopygium of male as in figure 171.

Female.—Color much as in male; very similar to female of *productilis*, the chief distinction, being in the form of tergites 7–9 and sternite 7; these have been mentioned in the key, to the descriptions in which may be added that the eighth tergite is much broader than long, transversely wrinkled, and very obtusely angulate at apex; tergite 9 is somewhat wrinkled above and much narrowed apically; hind margin of sternite 7 is only slightly convex medianly and concave laterally (fig. 172).

Length, 21–23 mm.

Holotype.—Male, allotype female, Vict. de las Tunas, Cuba, W. M. Mann. (U.S.N.M.)

Type and allotype.—Male, Cat. No. 26741, U.S.N.M.

A female nymph with same data has the lateral angles of seventh tergite less prominent, the median tubercle long, and elevated at an angle of 45°; eighth and ninth tergites indistinctly keeled and transversely wrinkled. Another female nymph, apparently of this species has the data: Havana, Cuba, 1908, P. Serre (Paris Mus.).

GHILIANELLA LONGULA, new species.

Female.—Color dark reddish brown, legs paler, femoral and frontal spines whitish; head and thorax only slightly granulate; hairs throughout abundant, short grayish to yellowish; abdomen attaining nearly its full width at third segment, widening almost imperceptibly caudad, except at end of seventh tergite, the posterior angles of which are flaring and moderately angulate-produced; hind margin of this tergite between the produced angles nearly straight, bearing medianly a porrect tubercle considerably shorter than the lateral productions; eighth tergite broad, much wrinkled, the processes much elevated, free and pointed apically (fig. 173); hind margins of sternites 2–6, moderately emarginate medianly, and slightly sinuate laterally; seventh sternite convex medianly, concave laterally.

Length, 32 mm.

Holotype.—Female, San Blas, Pinar del Rio, Cuba, 1918, W. M. Mann (U.S.N.M.).

Type.—Female, Cat. No. 26742, U.S.N.M.

GHILIANELLA ALVEOLA, new species.

Female.—Legs stramineous tinged with reddish; head and thorax testaceous, darker below, conspicuously granulate; abdomen testaceous, marbled with fuscous, lightly above and heavily below; abdomen widening gradually to apex of seventh tergite, lateral strips of tergites and the connexivum coelevated, vertical except at extreme apex; sutures between tergites transverse, each tergite with an indistinct longitudinal ridge, darker colored posteriorly; seventh tergite roughened on disk, expanded apically, the posterior angles prominent, rounded, the margin between them convex, bearing at the middle a short pointed tubercle; eighth tergite as described in key; ninth transversely corrugated, and broadly longitudinally sulcate from base to near apex where elevations each side of the sulcus are interrupted, apical margin elevated, calloused (fig. 174); hind margin of sixth sternite decidedly sinuate laterally, the preceding sternites with only a suggestion of this form; hind margin of seventh sternite very broadly and shallowly emarginate; eighth sternite visible as an elliptical plate on each side.

Length, 20 mm.

Holotype.—Female, Balthazar, Grenada, H. H. Smith (U.S.N.M.).

Type.—Female, Cat. No. 26743, U.S.N.M.

GHILIANELLA MINIMULA, new species.

Male.—Head and body dark reddish-brown, legs and antennae yellowish, fuscous near joints; head and thorax decidedly granulate, pubescence short and sparse. Frontal spine strong, porrect, head with a pair of divergent pointed tubercles just behind transverse sulcus. Abdomen widest at the anterior part of fifth segment, tapering gradually both fore and aft; seventh tergite narrowing rather rapidly from middle to the rather broadly rounded apex which projects a little beyond hypopygium. Hind margins of all sternites emarginate medianly, those of 5 and 6 most so, that of 7 very broadly and shallowly, and that of 8, narrowly and slightly. Hypopygium short, opening upward, claspers short, tapering from base to apex.

Female.—Color, granulation and pubescence, also spine and tubercles of head as in male. Abdomen widening to end of seventh tergite, which has a moderate median tubercle a little farther produced than the hind angles. Eighth tergite short, semi-elliptical, ninth moderately long, rounded at apex, each with a median carina and transverse corrugations. Sutures between sternites on the same plan as in male, hind margin of seventh prominent but not produced medianly, concave laterally; eighth visible only on sides.

Length, 15–17 mm.

Holotype.—Male, paratype female, allotype, female, Chapada, Brazil, September, no date, and August, respectively (Carnegie Mus.).

GHILIANELLA SUCCINCTA, new species.

While this species runs in our key to the same couplet with *G. productilis*, it is not as closely related to that species as is *persimilis*, lacking the long terete head and characteristic dark dots, in addition to having a distinctively shaped abdomen.

Female.—Fuscous, spotted and marbled with ochraceous; head and thorax indistinctly granulate, but with plentiful, short, crinkly, pale reddish hair, abdomen more sparsely provided with similar but straight hairs; the seventh tergite is but little longer than wide (in *productilis* it is twice as long as wide); lateral pieces of this tergite produced posteriorly as short rounded angles, the hind margin between them slightly convex but not tuberculate medianly; eighth tergite semi-elliptical, with broad median carina and transverse corrugations; ninth as described in key. Hind margin of sixth sternite slightly emarginate medianly and less so laterally, of seventh rather strongly concave, with a short triangular process in the middle.

Length, 23 mm.

Holotype.—Female, Para, Brazil (Carnegie Mus.).

GHILIANELLA ALIENA, new species.

Female.—Legs and antennae yellow, head and body darker, brown, the former practically without markings, the abdomen with some paler marblings. Frontal spine porrect, stramineous; pubescence short, grayish. Prothorax longest, metathorax shortest; thorax and head conspicuously granulate. Abdomen long and smoothly clavate, widest at distal part of fourth segment. Seventh tergite nearly square, the hind margin declivate, the posterior angles and median tubercle slightly and about equally produced; eighth tergite semicircular, carinate medianly, corrugated laterally; ninth as described in key. Seventh sternite moderately convex medianly, concave laterally.

Length, 18 mm.

Holotype.—Female, Sarare, Venezuela, 1896, F. Geay (Paris Mus.).

A teneral female, same data, apparently of the same species, is 21 mm. long.

GHILIANELLA PASCOEI Bergroth.

Ghilianella pascoei Bergroth, E. Ploeariinen 1906, pp. 315–317 [Venezuela].

Male.—General color dark reddish brown (less mature specimens yellow-brown, variegated with darker), hairs numerous but short and little aggregated into patches; abdomen widening gradually from base to hypopygium; seventh tergite a fourth longer than sixth, somewhat corrugated transversely on posterior two-thirds; second sternite slightly sinuate laterally, third and fourth almost transverse, fifth rounded emarginate medianly, sixth almost transverse, seventh and eighth shallowly emarginate medianly, slightly convex laterally, spiracle of latter included within border of segment; hypopygium rather short, claspers oblong, narrowed apically the upper margin convex (fig. 175). Sternites 2–7, finely wrinkled transversely.

Female.—Color as in male; in pale specimens the abdomen is marbled and leg markings are evident; abdomen widening gradually from base to juncture of fourth and fifth segments, narrowing little posterior of that point; connexivum more or less carinate; hind margins of tergites 2–6 very slightly elevated medianly, otherwise unmodified; tergite 7 with the posterior angles prominent and very slightly flaring, middle of hind margin with a small angulate prominence, extending about as far posteriorly as lateral angles, margin between prominences slightly concave and declivate; eighth tergite rather long, convex posteriorly, short median line, two transverse lines near upper end of former, and margin, slightly elevated, arcuate both transversely and longitudinally, median line almost

carinate on upper third, apex rounded; hind margins of sternites 2–6 emarginate medianly, 6 most so, this sternite a fourth longer on side than on middle (fig. 176); seventh sternite a third longer than sixth on median line, its hind margin convex medianly, concave laterally, eighth sternite visible as an elliptical plate on each side, or when exposed, rounded emarginate medianly, convex laterally.

Length, 17–22 mm.

Pair from La Guaila, Venezuela (Coll. E. Bergroth), male, the type. Three males, Trinidad, March 26, 1916, R. A. Wood (Acad. Nat. Sci. Phila.); one male Botanic Garden, Port-of-Spain, Trinidad, Oct. 13, 1918, Harold Morrison (U.S.N.M.).

Females agreeing with *pascoei* in general appearance and in most characters but differing in details of eighth and ninth tergites from the female assigned to this species by Bergroth are left without definite determinations for the present. All of these have the head and thorax conspicuously granulate, the sternites finely corrugated transversely, and both sternites and tergites up to and including 7 similar to those of *pascoei*. Three from Trinidad, March 26, 1916, R. A. Wood (Acad. Nat. Sci. Phila.), and one from Montserrat, Trinidad, June 29, A. Busck (U.S.N.M.), have the eighth tergite depressed medianly, with transverse wrinkles or irregular elevations each side of the depression; and ninth tergite is arcuate both transversely and longitudinally, but is depressed apically and more or less concave between the apices of the somewhat elevated lateral margins. A single female from Ivon Beni, Bolivia, January, 1922, M. R. Lopez (U.S.N.M.), has the eighth tergite distinctly carinate medianly and corrugated transversely on each side; the ninth tergite has a median carina above which widens so as to cover the whole apex, this part of the tergite being distinctly elevated above the sides of the disk, apex truncate. While these variations are rather greater than we should expect in a single species, the weight of evidence in hand seems to be against attributing them to specific distinctness.

GHILIANELLA ALTERATA, new species.

Female.—Dark castaneous; beak, antennae and mid and hind legs yellow-brown but unmarked; frontal spine stramineous. Head and thorax copiously granulate and yellowish-white haired; prothorax longest, metathorax shortest of the three divisions. Abdomen smoothly clavate, attaining its greatest width at posterior part of fourth segment; tergites except 1, longer than wide, seventh with the posterior angles prominent but not produced, median portion declivate and triangularly produced, slightly surpassing lateral angles. Eighth tergite short and broad, faintly rugose; ninth much longer, narrowing rapidly and rounded apically; middle of apex

and some irregular small areas each side of the median line depressed. Seventh sternite moderately subangulately produced in the middle of hind margin, concave laterally.

Length, 22 mm.

Holotype.—Female, Sarare, Venezuela, 1899, F. Geay (Paris Mus.).

GHILIANELLA MACULATA, new species.

Male.—Head, thorax and legs yellow brown; frontal and femoral spines pale; abdomen reddish brown; pilosity of head and thorax gray, abundant, markedly pollinose; pile of abdomen pale tawny, aggregated into irregular spots especially on segments 3–6, spots more numerous anteriorly and on sides of both tergites and sternites; abdomen nearly circular in cross-section, forming almost a smooth cone based on hypopygium; seventh tergite a little longer than sixth, transversely corrugated on posterior third, tapered from the middle, and apiculate, terminating in a moderate point which extends well beyond hypopygium. Sternum without keel; sutures between sternites emarginate medianly, arcuate laterally, this condition most pronounced between sixth and seventh; eighth sternite almost transverse posteriorly, with a narrow rounded emargination; ninth sternite very narrowly visible, with a similar but smaller emargination; claspers closely fitting the upper margin of hypopygium, their own upper margin broadly emarginate medianly. Fore leg and its armature as in figures 185 and 186.

Length, 28 mm.

Holotype.—Male, Cayamas, Cuba, Jan. 16, E. A. Schwarz. (U.S.N.M.)

Type.—Male, Cat. No. 26744, U.S.N.M.

GHILIANELLA PERSONATA, new species.

Male.—Light to dark reddsh-brown, almost uniform; head and thorax without granulations, short gray slightly flocculent pubescence abundant, much shorter and less conspicuous on abdomen. Abdomen widening gradually to hypopygium, dorsum convex, without ridges or tubercles, sutures mostly obsolete; seventh tergite long, narrowed gradually from a point two-fifths of its length from base, terminal fifth more abruptly tapering, moderately pointed, thickened and projecting beyond hypopygium. Sternum unkeeled, ventral sutures as described in key, hind margin of seventh sternite nearly straight, and eighth narrowly and slightly emarginate; ninth sternite or hypopygium long, with a transverse impression bounding the thickened margin, opening upward and backward, the apex projecting as a rounded triangle, the claspers broadly triangular, (fig.

177), filling the space between hypopygium and seventh tergite, except for a narrow vertical space between their apices.

Female.—Color and pubescence as in male; abdomen widening gradually from base, the dorsal sutures evident; seventh tergite with the hind angles moderately produced as obtusely pointed processes, margin between distinctly concave, without tubercle; eighth tergite semielliptical, with a median carina interrupting the transverse corrugations; ninth tergite rather short, median carina and cross corrugations low, indistinct, apex narrowly rounded. Seventh sternite moderately produced medianly as a rounded lobe, the sides of hind margin concave; eighth sternite visible only as a long ellipse on each side.

Length, 25–28 mm.

Holotype.—Male, paratype male, allotype female, Chapada, Brazil, collected in July, April, and August, respectively (Carnegie Mus.).

GHILIANELLA CLAVIVENTRIS Bergroth.

Ghilianella claviventris BERGROTH, E. Ploeariinen 1906, pp. 318–9 [Venezuela].

Male.—Dark reddish-brown, frontal spine, connexivum, hind edge of sixth tergite, posterior third of seventh and a few other edgings, yellowish. Head and thorax scarcely granulate; pale reddish pubescence very short, fine and sparse. Abdomen widening gradually to apical fourth of fourth segment, which is abruptly inflated and together with the fifth and most of the sixth segment forms a globular expansion of the abdomen; remainder of abdomen tapering posteriorly and upcurved. The fifth tergite is finely longitudinally strigate and is smoothly inflated, without ridged elevations laterally. The sixth tergite is distinctly trisinuate posteriorly, and the seventh narrowing from the basal third, has the posterior half transversely wrinkled and an acuminate apex which slightly surpasses hypopygium. Sutures between sternites concave anteriorly, that between sixth and seventh most so; hind edge of seventh conspicuously emarginate medianly and only slightly less so laterally; eighth sternite visible on its entire width, nearly straight posteriorly; ninth sternite, or hypopygium, rather long, more or less granulate and transversely wrinkled, opening upward, claspers oblong, somewhat upturned and bluntly pointed at apex.

Length, 26 mm.

Two males, Colonia Tovar, E. Simon 1.11.88 (Coll. E. Bergroth). One the type. Another male Cerro del Avila, 6,000 feet, Venezuela, December, 1913, S. M. Klages (Carnegie Mus.).

GHILIANELLA GLOBIFERA Bergroth.

Ghilianella globifera Bergroth, E. Plocariinen 1906, pp. 319–320 [Venezuela].

Color throughout dark reddish-brown, legs and antennae without pale markings; the sharp downwardly slanting frontal spine, most of beak, the spiracles and edgings on genital segments pale. Gray pubescence rather plentiful, a little more prominent on fourth to sixth sternites and in two percurrent lines on dorsum. Bulbosity farther forward than in any other species examined, widest at fourth segment and sixth not at all involved in it; seventh tergite long, the process making up two-thirds of length, wrinkled transversely, ridged longitudinally, and punctate apically, rather pointed. Seventh sternite well exposed, eighth moderately long, opening upward, claspers oblong, narrowed and incurved apically.

Length, 19 mm.

Male, Caracas (Coll. E. Bergroth.). The type.

Two males, Sarare, Venezuela, F. Geay, 1896; and two (one teneral and damaged), Llanos, Venezuela, F. Geay, 1896 (Paris Mus.).

Length of these specimens, 18.5–20 mm.

GHILIANELLA PERVERSA, new species.

Female.—Legs testaceous with more or less distinct dark bands, ground color elsewhere testaceous, but obscured largely above, and almost entirely below, by fuscous to black marbling; granulations prominent on head, inconspicuous on thorax; pubescence short and fine; proportions of pro-, meso-, and meta-thoraces as 8, 6, and 3; abdomen widening gradually to junction of fifth and sixth segments, tapering gradually posteriorly; unusually narrow median strips of tergites with indistinct longitudinal ridge; hind margin of tergite 6 with a prominent backwardly projecting tubercle; that of tergite 7 with a short, porrect, blunt tubercle from which the margin slopes away on each side to the simply rounded lateral angles; eighth tergite nearly as long as wide, the general form broadly elliptical, the disk wrinkled and granulate, the apex apiculate. Hind margins of all sternites more or less sinuate laterally, 3 least and 6 most so, the latter sternite a fourth wider on sides than in middle; seventh sternite slightly convex medianly and concave laterally; eighth visible as an elliptical plate on each side (fig. 178). Appearance of female hypopygium from rear as in figure 179.

Length, 18 mm.

Holotype.—Female, Aracataca, Magdalena, Colombia, August 12, 1920, in heavy forest with dense undergrowth, J. A. G. Rehn (Ac. Nat. Sci. Phila.).

GHILIANELLA APICULATA, new species.

Male.—General color dull blackish, pale vestiture unusually abundant, patch at anterior end of metathorax crossing the notum, pubescence on top of abdomen arranged in lines: beak, frontal and hypopygial spines pale yellow to reddish, spiracles concolorous; sixth tergite with a slight prominence on middle of hind margin; sternum without keel; sternites 4–6 more or less emarginate medianly and sinuate laterally, this feature becoming more pronounced posteriorly; seventh sternite broadly emarginate medianly, eighth about transverse; ninth with supero-posterior angles prominent, extending as far posteriorly as base of hypopygial hook (fig. 180), the latter anteriorly and upwardly directed, the apex bent forward, divaricate, and apparently otherwise modified.

Length, 27 mm.

Holotype.—Male, Blanton Mine, north of San Christobal, Republic of Dominica, July 26, 1919, Harold Morrison (U.S.N.M.).

Type.—Male, Cat. No. 26745, U.S.N.M.

GHILIANELLA ICA, new species.

Male.—Color castaneous, chiefly dark, scarcely relieved by pale markings. Frontal process mammiform; head and thorax scarcely granulate. Seventh tergite narrowed gradually from middle to near apex, then rather abruptly pointed, transversely corrugated on posterior half. Seventh sternite rounded emarginate medianly, almost straight laterally; eighth nearly straight posteriorly, spiracle moderately pedicellate; ninth rather long, opening upward, a little elevated along hind margin which is produced between the claspers, where it bears the anteriorly directed somewhat curved process, which is a little widened and slightly concave at apex; claspers oblong, beveled off on lower side at apex.

Length, 28 mm.

Holotype.—Male, Rio Ica, Crevaux, 1880 (Paris Mus.).

GHILIANELLA PACHITEA, new species.

Male.—Differs from *pascoei* Bergroth in having the ventral spines on fore femora and the one between the bases of antennae dark brown instead of stramineous; also the spine between bases of antennae is much stouter and a little shorter than in *pascoei;* the cross striation of abdominal sternites is much finer than in that species, and the hypopygium is as in figure 181.

Length, 22 mm.

Holotype.—Male, Pachitea, Peru (Bueno).

GHILIANELLA COLONA, new species.

Male.—Similar in general to *G. aracataca*, but the pubescence of head and thorax less abundant and none of it pollinose; abdomen gradually widening to seventh segment, which differs from that of *aracataca* as described in key; eighth sternite almost straight on hind margin, the spiracles conspicuously pedunculate.

Length, 22 mm.

Holotype.—Male, Don Diego, Dept. Magdalena, Colombia (Carnegie Mus.). A nymph with same data probably is this species.

GHILIANELLA BETHEI Dohrn.

Ghilianella bethei DOHRN, A. Nachträge, 1863. pp. 68–70 [Bogota].

Female.—Fuscous, relieved by ochraceous spots and clouding; leg bands faint. Head and thorax distinctly granulate, short pale pubescence rather abundant, that of abdomen shorter and less plentiful. Frontal spine pale, decurved. Abdomen widening to apex of fifth segment and narrowing gradually to end, clavate rather than bulbous in shape. Fifth tergite with angular dilatations near hind angles, sixth with a prominent, acute, falcate tubercle; seventh nearly straight across hind margin, the middle of latter slightly elevated and with a short pointed tubercle; eighth tergite semi-circular, transversely rugose, but scarcely longitudinally carinate; 9th rather inflated basally, obsoletely rugose, depressed subapically, with the apical margin rounded and elevated. Sutures between sternites inclined anteriorly and showing more or less anterior curvature medianly; hind margin of seventh moderately angulate, prominent medianly and slightly concave laterally.

Length, 20–22 mm.

Cacagualito, Colombia, May; Bonda, Colombia, June (Carnegie Mus.).

The specimens listed seem to answer well to the original description, the only real discrepancy being that none of them show "a slight cross furrow" on the apical half of tergite 5. However, this appearance in Dohrn's specimen may have been due to bending at the time of capture or to some effect of drying.

GHILIANELLA ARACATACA, new species.

Male.—Dark reddish-brown, pubescence rather abundant, more or less pollinose in character anteriorly; beak yellow-brown, frontal spine whitish, leg bands moderately distinct; abdomen gradually widened to fifth segment, sixth narrowed, seventh swollen, as thick as fifth; tergites slightly elevated at the middle of their posterior margins, seventh twice as long as sixth; sternites 2–7 more or less emarginate apically and sinuate laterally, the sixth most pronounced

in these respects, eighth with a small, triangular median projection, the supero-posterior angles rounded, and the spiracles not conspicuously pedunculate (fig. 182).

Female.—Similar to the male in color, pilosity somewhat less conspicuous, pollinosity rather more so; abdomen widest at fifth segment, tapering gradually both fore and aft, tubercle of sixth tergite, projecting posteriorly, bluntly falcate; seventh tergite with a straight median porrect process extending considerably beyond the prominent but not produced lateral angles; eighth tergite rounded triangular somewhat broader than long; ninth with the sides convexly sloping apically, the median line keeled and apiculate (fig. 183); sternites 2–4 slightly emarginate medianly, and sinuate laterally, entire posterior margins of sternites 5 and 6 anteriorly arcuate, the latter most deeply, this sclerite being a fifth longer on sides than in middle: seventh sternite concave on sides of posterior margin, with a rather prominent rounded median projection; eighth sternite visible as an elliptical plate on each side (fig. 184).

Length, 22–24 mm.

Holotype.—Male and allotype female, Aracataca, Magdalena, Colombia, Aug. 6, 1920, in heavy forest with dense undergrowth. J. A. G. Rehn (Acad. Nat. Sci., Phila.)

GHILIANELLA CUNEATA, new species.

Female.—Yellowish to reddish brown, the leg bands more or less distinct, the abdomen marbled with fuscous; pubescence in no way unusual; abdomen widened gradually to apex of sixth segment, then tapering to apex of seventh; hind margin of all of the tergites prominent medianly, sixth with large slightly falcate tubercle, and the posterior angles a little prominent and expanded; the hind margin of the seventh with a short, median, pointed tubercle which extends slightly farther posteriorly than the prominent lateral angles; eighth tergite considerably wider than long, with transverse corrugations and a central keel which is produced in a point slightly beyond general line of the posterior margin; ninth tergite much longer than eighth, somewhat wrinkled transversely, the narrowed apex with a broad prominent keel; sutures between sternites 2–6 slightly anteriorly directed, that between six and seven quite concave anteriorly; sternite seven about a fourth longer than six on the median line, its hind margin slightly concave laterally, somewhat produced medianly, the extreme apex with a small emargination; eighth sternite narrowly visible on each side.

Length, 23–26 mm.

Holotype.—Female, Alhajuelo, Panama, April 18, 1911, Aug. Busck; five female paratypes, Porto Bello, Panama, March 16, 1911,

Feb. 19, A. Busck; Feb. 17, 1911, E. A. Schwarz; Upper Pequiru River, Camp No. 3, Panama, A. H. Jennings; Buena Ventura, Panama, March 1911, A. Busck (U.S.N.M.).

Type and paratypes.—Female, Cat. No. 26746, U.S.N.M.

GHILIANELLA ASSA-NUTRIX Bergroth.

Ghilianella assa-nutrix Bergroth. Ploeariinen 1906, pp. 314–5 [Venezuela].

Male.—General color dark reddish-brown, frontal spine pale; the usual patches of pilosity a little more extensive than in average species, the metathoracic patches contiguous over dorsum, color of pile in general sordid yellowish, tending to be golden in the denser patches; in addition to the typical patches there are two small rounded spots on the posterior margin of each tergite from 2–6, largest on 4; most of the first tergite and adjacent disk of second also are covered by a patch of golden pubescence; seventh tergite more than twice as long as sixth, strongly transversely corrugated about the middle, and tapering apically into a long, roof-shaped, pointed process which exceeds hypopygium by more than length of latter; sternum unkeeled; sutures between sternites directed moderately forward; posterior margin of six and seven rounded emarginate medianly, and arcuate laterally; eighth narrow, transverse, spiracle moderately pedunculate; hypopygium with a terminal, anteriorly and upwardly directed hook, margin receding and arcuate each side of this; claspers oblong, bluntly rounded apically (fig. 187).

Female.—Color and pubescence as in male. Abdomen widening gradually from anterior part of second segment to about middle of fifth, and increasing in depth, as seen from side, to anterior part of seventh segment. Hind margins of tergites 1–5 nearly straight, of six slightly convex posteriorly, of seven slightly prominent medianly, concave each side of this, with acute divergent lateral processes as described in key; eighth tergite short, semielliptical, depressed medianly, and with obliquely transverse wrinkling each side of the depression; ninth tergite longer than eighth, an oblique impression each side of middle near base, the median line elevated, especially near apex, where it forms a distinct carina joining the raised apical margin; the surface near apex is polished, with two subsidiary oblique ridges each side of the median one. Hind margins of sternites more or less concave posteriorly, that of six most so; seventh slightly convex medianly, and concave laterally; eighth moderately exposed, the spiracle barely visible from the side.

Length, 28–30 mm.

Male and female San Esteban, Venezuela, March, 1888, E. Simon (Coll. E. Bergroth). One the type.

Two males, San Esteban, Venezuela, Oct.–Nov., 1910, M. A. Carriker, jr. (Acad. Nat. Sci. Phila.). One male, Caracas (Cophenhagen Mus.).

GHILIANELLA GLADIATOR, new species.

Male.—General color dark reddish-brown, pilosity much more abundant than usual, short, grayish; abdomen widest at fifth segment, tapering gradually both fore and aft; seventh tergite twice as long as sixth, with a projection similar to that of *assa-nutrix;* all sternites more or less emarginate medianly and arcuate laterally, 6 and 7 most pronouncedly so; eighth varying from slightly emarginate to transverse, narrow, spiracle moderately prominent; hypopygial spine small, margins not excavated each side of it, claspers long, narrow, slightly enlarged apically (fig. 188).

Female.—General color reddish-brown to blackish; short, fine yellowish pubescence abundant, much denser than usual on head and thorax, particularly about rear parts of the posterior divisions of the latter and on the fourth and fifth tergites; bulbosity of abdomen rather long, including half of fourth, all of fifth and sixth, and half of seventh segments; sutures between tergites 2–7 all nearly transverse; the ninth tergite is narrowly keeled along the sides, and more prominently elevated medianly, especially at the narrowed apex; the sutures between sternites 2–5 slope anteriorly, the hind margin of the fifth is emarginate medianly and arcuate laterally, and that of the sixth concave throughout; the seventh sternite is prominently angulate produced medianly, and the eighth is narrowly visible on each side.

Length, 24–26 mm.

Holotype.—Male, allotype female, and paratype male, Trinidad, March 26, 1916, R. A. Wood. (Ac. Nat. Sci., Phila.)

Paratype.—Female, Port-of-Spain, Trinidad, F. W. Urich (U.S.N.M.), Cat. No. 26747, U.S.N.M.

The latter specimen is accompanied by some eggs (figs. 189, 190) and newly emerged nymphs; the former are 1.75 mm. in length, with sparse longitudinally arranged, irregular granulations, a nipple-like longitudinally striate cap, which is surrounded by about 18 delicate, tapered, and finely pointed appendages of the main egg case, the apices of which are bent inward at about the same level as peak of the cap (fig. 189). The nymphs are notable chiefly for the surprisingly advanced state of development of the thorax and its appendages, and for the very undeveloped condition of the abdomen; they are certainly equipped for capture before digestion of prey.

The males and females here listed are associated as one species not only because of their general agreement in color and form but specifically because they share a character unusual in the genus, namely, absence of central keel on meta- and meso-sterni.

GHILIANELLA STIPITATA, new species.

Female.—Much like the same sex of *G. filiventris* except in shape of abdomen and details of genital segments. Length of prothorax and mesothorax as 3 is to 4. The abdomen is smoothly, almost round clavate, with the fifth segment the largest in all dimensions; tergites 4–7 are relatively longer than in *filiventris*, the last especially being distinctive as described in key (fig. 191). Eighth tergite rather long and narrow, the middle line and margins slightly elevated, apex rounded; ninth tergite longer than eighth, narrowing and rounded apically, the median line, some irregular oblique branches from it, and the apex somewhat elevated. Seventh sternite rather strongly and acutely produced medianly, concave laterally.

Length, 25 mm.

Holotype.—Female, Llanos, Venezuela, 1895, F. Geay (Paris Mus.).

GHILIANELLA SIMILATA, new species.

Female.—Much like *stipitata* in form, but head and thorax decidedly less granulate, and the mid and hind femora each with 3 pale bands on apical half, instead of unicolorous as in that species. Length of prothorax and mesothorax as 3.75 is to 4. The seventh tergite is as described in key, the eighth nearly semicircular, depressed medianly, and obscurely wrinkled; ninth about as long as eighth, but considerably narrower and somewhat tapered posteriorly, margins and median line elevated, apex blunt, slightly convex. Venter as in figure 192.

Length, 19–20 mm.

Holotype.—And another female, Caracas, Meinert (Copenhagen Mus.).

GHILIANELLA PENDULA, new species.

Ghilianella bulbifera CHAMPION (females) Biologia, vol. 2, p. 171, fig. 18, Oct. 1898. [Bugaba, Panama.]

Female.—Color varying from yellowish- to dark reddish-brown, the paler specimens have the abdomen more or less variegated with fuscous and the leg bands more distinct; pubescence and granulation in no way unusual. Abdomen rather smoothly clavate, widest at fifth and sixth segments (the sixth tergite widest), but the bulbosity includes the entire sixth segment; posterior angles and middle of hind margin of segments 4–7 prominent, most conspicuously so on six where the median elevation is a large slightly posteriorly inclined cone; on the hind margin of seventh tergite a small triangular prominence extends slightly farther posteriorly than the prominent but blunt lateral angles; eighth tergite broader than long, rounded apically, ninth a trifle longer than eighth, narrowed, and the margins

raised apically, but 8 and 9 with low median keels and more or less corrugated; hind margins of sternites 4–6 emarginate medianly, arcuate laterally, the lateral convexity on 6 being almost angulate; seventh sternite a third longer than 6, slightly angulate-produced medianly; eighth narrowly visible on each side.

Length, 21–24 mm.

Holotype.—Female, Cabima, Panama, May 18, 1911, Aug. Busck; paratype female, Alhajuela, Panama, A. H. Jennings; another female without locality.

Type and paratype.—Female, Cat. No. 26748, U.S.N.M.

For disposition of males of *bulbifera* see page 97.

GHILIANELLA APPROXIMATA, new species.

Male.—Head, thorax and appendages, bulbosity and hypopygium piceous, remainder of abdomen chiefly, frontal spine, anterior tibia and tarsus, and spines of front femur, yellow-brown or paler. Pubescence sordid gray, rather dense and matted over thorax and in patches elsewhere. Bulbosity formed chiefly by fifth segment, fourth and sixth only slightly involved. Seventh tergite rather long, neither wrinkled nor coarsely punctate as in many species, rather sharply apiculate and slightly surpassing hypopygium. Sternites of ordinary form, eighth almost straight across on hind margin, slightly concave laterally, moderately exposed. Ninth sternite long, opening upward, claspers oblong, pointed apically.

Female.—Generally paler than male, with edgings and much marbling of yellow-brown; legs with usual pale markings. Mesothorax shorter than in male, but longer than either of its fellow thoracic parts. Bulbosity involving more of fourth and sixth segments, the elevations of fifth tergite more remote from lateral margins than in male. Hind margin of sixth tergite concave each side the median point, which is about as far produced posteriorly as the rounded lateral angles; hind margin of seventh tergite of similar shape, declivous each side of median prominence; eighth tergite semi-circular, low carinate medianly and radiately corrugated each side in best developed specimen; ninth longer, narrowed and notched at apex, the margins elevated above the disk which has three coarse transverse wrinkles. Eighth sternite broadly exposed, angles each side the median cleft are thickened, pointed, black, and with a tuft of long golden hairs.

Length, 24–25 mm.

Holotype.—Male, Rurrenabaque, Bolivia, Oct. 1921; allotype female, Huachi, Bolivia, 1922; another female Corenda, Bolivia, 1921, and two males, Huachi, Bolivia, Sept. 1921, W. M. Mann (U.S.N.M.).

Type, allotype, and paratypes.—Cat. No. 26749, U.S.N.M.

GHILIANELLA GLOBULATA, new species.

Ghilianella ignorata CHAMPION, Biologia, vol. 2, pp. 170–171, pl. 10, figs. 15–16, 1898 [Mexico, Honduras, Guatemala, Panama], not of Dohrn, Emesina, 1860, pp. 238–9, pl. 1, figs. 9–11 [La Guayra and Brazil].

Male.—Color dark reddish-brown, sometimes with irregular dark maculations, legs and antennae without pale annuli or sometimes with markings as described for female; head and thorax strongly granulate; segments 2–4 of abdomen slender, widening gradually to apical fourth of fourth, which is abruptly expanded, bulbosity composed chiefly of the fifth segment which is about three times as wide as anterior part of fourth; fifth tergite angulate dilated at about middle of sides, margin receding abruptly behind the dilation; sixth segment about half as wide as fifth, the tergite rounded emarginate posteriorly; seventh tergite about twice as long as sixth, projecting considerably beyond hypopygium, strongly transversely corrugated, and with a conspicuous central keel on posterior half. Sixth sternite with a rather deep rounded median emargination, seventh emarginate, both medianly and laterally, eighth transverse, narrow; hypopygium inflated, with a slightly projecting, moderately large terminal hook, the tip of which is concealed between the oblong claspers (fig. 194).

Female.—Color somewhat paler, front femora with two partial bands, mid and hind femora with two bands and a subapical spot, and hind tibiae with subbasal spot, pale; the abdomen is stouter throughout, the fourth and fifth segments in particular being broader and more involved in the bulbosity; sixth tergite slightly emarginate and a little elevated in the middle behind; seventh tergite equally but only slightly prominent; eighth tergite about a third shorter than ninth, the latter transversely wrinkled and longitudinally keeled, depressed on each side of keel apically; fifth sternite shallowly and sixth more deeply emarginate posteriorly; 7th with a short rounded projection; eighth sternite visible as a narrow elliptical plate on each side.

Length, 23–26 mm.

Holotype.—Male, Cacao Trece Aguas, Alta Vera Paz, Guatemala, April 9; allotype female, same locality April 23, 8 male and 4 female paratypes, same locality, March 27, 29, 30, April 2, 7, 15, 18, 22, 26, 29, E. A. Schwarz and H. S. Barber; 1 male paratype, same locality June, 1907, and 1 female Nov.–Dec., 1906, G. P. Goll; 1 female, Polochi River, Guatemala, March 22, Barber and Schwarz, 1 male, La Ceiba, Honduras, Jan. 24, 1916, F. J. Dyer (U.S.N.M.); 1 female, Yurimaguas, Peru, June 14, 1920, H. S. Parish (McAtee).

Type, allotype, and paratypes.—Cat. No. 26750, U.S.N.M.

Nymphs.—Several nymphs presumably of this species are at hand from Cacao, Trece Aguas, March 27 to April 26. There is a rather prominent triangular elevation on the middle of the hind margin of each tergite, that on the seventh being most prominent and angularly projecting; the lateral angles also are tuberculate prominent; the eighth and ninth tergite roofing the anal tube of the female have only suggestions of the corrugations and keels they later acquire.

GHILIANELLA PATRUELA, new species.

Male.—Color dark reddish brown, pale markings of legs merely suggested; granulations of head and thorax nearly obsolete, a few small ones on sides of mesothorax; abdomen about as in *strigata*, lacking the wartlike elevations, however, and the suture between the fourth and fifth tergites is straight across, instead of posteriorly convex as in that form; all sternites rounded emarginate medianly, arcuate laterally, the posterior ones more pronouncedly so; hypopygium rather long, the posterior margin bisinuate on each side, the lower angle conspicuous but by no means so much so as in *strigata*, the more slender genital hook arising from within the angle and directed posteriorly and upwards, the apex simply truncate; claspers and fifth sternite as described in key (fig. 194).

Length, 20 mm.

Holotype.—Male, San Carlos, Costa Rica, Schild and Burgdorf. (U.S.N.M.).

Type.—Male, Cat. No. 26751, U.S.N.M.

GHILIANELLA RECONDITA, new species.

Color reddish-brown to pitchy-black, legs and antennae without pale annuli, spines of fore tibiae yellowish; spine between antennae also yellowish, and with an enlarged base; head, and thorax distinctly granulate.

Male.—Segments 2–4 of abdomen very slender, the fourth abruptly expanded apically, forming anterior fourth of the bulbosity; the latter composed chiefly of the fifth segment which is greatly expanded, the sides elevated and forming rather pointed tubercles somewhat behind the middle; sixth segment posteriorly only a third as wide as fifth and somewhat shorter; seventh tergite almost twice as long as fifth, acuminate apically and projecting somewhat beyond hypopygium (fig. 195); seventh sternite slightly emarginate at the middle of hind margin, eighth half as long as the seventh.

Female.—Segments 2–4 of abdomen less slender, the fourth not so abruptly expanded, about half of sixth segment involved in the bulbosity (fig. 196); seventh tergite slightly bisinuate apically, the

posterior lateral angles and median convexity not at all prominent; eighth tergite about as long as ninth, the latter not especially modified apically, that region being only slightly impressed medianly; fourth and fifth sternites broadly but shallowly emarginate at the middle of hind margin; seventh sternite slightly angulated at middle of hind margin; eighth sternite narrowly visible on each side of hypopygium.

Length, 18–20 mm.

Holotype.—Male, allotype, female, and 3 paratypes, 2 males and 1 female from Minca, Magdalena, Colombia, 2,500 feet, July 24–25, 1920, and 1 paratype male from Aracataca, Magdalena, Colombia, dense undergrowth, J. A. G. Rehn (Acad. Nat. Sci., Phila.).

GHILIANELLA PERIGYNIUM, new species.

Male.—Similar to *recondita* in many respects, but longer and with more abundant grayish-yellow pile; general color reddish-brown, connexivum of segments 2–4 narrowly pale; hypopygium much as in *recondita*, claspers differing as described in key (fig. 197); seventh sternite more deeply emarginate and sixth sternite also with a broad, deep median emargination.

Female.—Similar in color to male, tending to be somewhat paler with dark mottlings; structure about the same as in female of *recondita*, eighth tergite not depressed medianly near apex and the latter somewhat flaring or upturned and notched medianly, while it is rather rounded off in *recondita;* hind margin of seventh sternite concave laterally, convex medianly, with a slight emargination at the extreme apex.

Length, 23–28 mm.

Holotype.—Male, allotype female, and one paratype female, Pachitea, Peru (Bueno).

GHILIANELLA SIGNATA, new species.

Female.—General color dark reddish brown, shading to blackish on distal parts of legs and abdomen; head and thorax unusually free from granulations, some present along dorsal carinae of mesothorax; pile pale tawny, distribution on head and thorax about typical, aggregated into scattering minute tufts and regularly arranged large patches on abdomen, a pair of latter on posterior margin of fourth tergite, and a pair covering postero-lateral angles of fourth, fifth, and sixth sternites; bulbous expansion of abdomen including fifth segment, posterior third of segment 4, and anterior third of segment 6; lateral elevations of segment 5 somewhat posteriorly directed, a little wrinkled dorsally and bluntly falcate; segments 6 and 7 conjointly elevated at middle of suture, the elevation surmounted by a minute nipple on 6; tergite 7 a little longer than 6, hind margin

moderately prominent medianly and laterally, thus being slightly bisinuate; eighth tergite much broader than long, broadly rounded apically, strongly corrugated and keeled; ninth tergite pale basally, with broad, rounded, low, pale side margins; disk dark, corrugated, and keeled, the apex narrowed and bent so that it is at right angles to general plane of tergite (fig. 198); ventral sutures little specialized; hind margin of seventh sternite slightly angulate-produced medianly, concave laterally; eighth sternite rather broadly exposed each side, the spiracle, however, only barely visible, the hind margin deeply rounded emarginate medianly.

Length, 25 mm.

Holotype.—Female, Hacienda Cincinnati, Sierra San Lorenzo, Magdalena, Colombia, Trail to Vista Nieve, 4,500–4,700 feet, July 21, 1920, J. A. G. Rehn (Acad. Nat. Sci. Phila.); female paratype, Vista Nieve, Colombia, Dec. 16, 1922 (C. Carriker).

GHILIANELLA STRIGATA, new species.

Male.—General color yellowish-brown, legs with faint yellowish annuli in the standard positions; the head and thorax are only obsoletely warty, almost smooth; the mesothorax and the metathorax with a few warts on the sides; abdomen abruptly expanded at posterior third of segment 4, segment 5 widest, the tergite with rounded elevations laterally; segments 2–5 each with a wart-like elevation on middle of hind margin, most conspicuous on 4; segment 6 rapidly tapering to about half width of 5; tergite 7 half again as long as 6, transversely corrugated posteriorly, moderately acuminate and extending slightly beyond hypopygium; sternites 6–8 rounded emarginate medianly, arcuate laterally, the eighth about a third as wide as seventh, the spiracle conspicuously pedunculate; ninth sternite longest on lower half, which forms apically a prominent rounded angle from which arises the long anteriorly and upwardly directed genital hook, the apex of which is bluntly trilobate; claspers and fourth sternite as described in key (fig. 199).

Length, 22–23 mm.

Holotype.—Male, San Carlos, Costa Rica; paratype male, Costa Rica, Schild and Burgdorf (U.S.N.M.).

Type and paratype.—Cat. No. 26752, U.S.N.M.

GHILIANELLA SUBGLOBULATA, new species.

Male.—Practically a copy of *globulata* except in the following particulars. Pedicel of abdomen is shorter and thicker, each of segments 2–4 being shorter than width of bulbosity which the corresponding segments of *globulata* equal; sixth tergite not longer than wide at base, while it is distinctly longer in *globulata*. Ninth sternite not opening so nearly posteriorly as in *globulata*, the hook higher

therefore, and less easily distinguished; claspers oblong, incurved at tips, each with a distinct rounded subapical notch in upper margin.

Female.—Females assigned to this species are still closer duplications of *globulata* than is the male, for the reason that the abdomen is short and the segments of the same proportions as in that species. The only tangible difference is that the posterior angles of seventh tergite are distinctly produced beyond median part of hind margin which is merely convex and not at all tuberculate.

Length, 19–21 mm.

Holotype.—And one other male, allotype female, Venezuela, Noualhier, 1898 (Paris Mus.); two other females, Maracaibo, Venezuela, Wibske (Copenhagen Mus.).

Two teneral and damaged females which may belong here have the prominences of fifth tergite more conspicuous, projecting distinctly beyond sides of abdomen. If assignment to the present species is correct the indication would be that these prominences may undergo a reduction from the condition attained in the nymphal or teneral state in the processes of ecdysis or hardening. The data for these specimens is Venezuela, one collected by G. Fallon, 1895, the other by Noualhier 1898 (Paris Mus.).

GHILIANELLA UNCINATA, new species.

Male.—Color dark reddish-brown, head and thorax with more abundant short, semipollinose hair than usual in the genus; legs with faint pale bands disposed as in last species; abdomen a little stouter than in allied species, about a third of segment 4, and about half of segment 6 involved in the bulbosity; tergite 5 widely angularly emarginate anteriorly, tergite 6 almost transverse posteriorly, with a small rounded elevation on middle of hind margin; seventh tergite about half again as long as sixth, faintly corrugated, without keel but more or less apiculate, extending little if any beyond hypopygium. Sternites all more or less angulate emarginate posteriorly and sinuate laterally, the former condition most marked on 7, the latter on 6; eighth sternite plainly visible, shallowly rounded emarginate; ninth sternite long, straight, rather trough-like, terminating in a large, prominent hook; claspers oblong, narrowed above subapically, the apices turned inward and slightly upward (fig. 200).

Length, 21–25 mm.

Holotype.—Male, Trinidad Rio, Panama, March 29, 1912, A. Busck; paratype males same locality March 23, November 2, 5; Cabima, Panama, May 18, 1911; Alhajuelo, Panama, April 15, 1911; Porto Bello, Panama, March 10, 13, 1911; April 21, 1912, all A. Busck; last locality, Feb. 17, 1911, E. A. Schwarz; and no date, A. H. Jennings, 12 in all (U.S.N.M.).

Type and paratypes.—Cat. No. 26753, U.S.N.M.

GHILIANELLA ATRICLAVA Bergroth.

Ghilianella atriclava BERGROTH, E. New Neotropical Ploeariinae. Psyche, vol. 18, No. 1, Feb., 1911, pp. 19–20 [French Guiana].

Body in general yellow-brown, bulbosity and legs piceous, the latter practically without pale markings. Frontal spine pale, short, decurved. Abdomen long pedicillate, increasing but slightly in thickness from base to posterior third of fourth segment which abruptly expands and together with the fifth and sixth segments forms an almost globular expansion beyond which the short seventh segment projects but little. Elevations of fifth tergite large, subacute, compressed, longitudinally ridged; sixth and seventh tergites very short, the latter transversely corrugated on the apical half, which is short acuminate; ninth sternite short, opening upwards, the claspers oblong, the upper posterior angles truncate.

Length, 24 mm.

Male, French Guinana (Coll. E. Bergroth). The type.

GHILIANELLA FILIVENTRIS Spinola.

Ghilianella filiventris SPINOLA, M. Generi Insetti Artroidignati, 1852, pp. 143, 144 [Para].

Dohrn [19] describes and illustrates a species of *Ghilianella* as *filiventris* Spinola and it is upon this work that the present identification is based. Certainly the males before us are the same species that Dohrn figured; discrepancies in color from what he described are not a matter for concern in this genus. The specimens agree also with Spinola's description and some of them are from the type locality. The association of sexes here made is based on examination of a series of 18 specimens from the same locality collected at the same season, the genitalia of a number of which show evidences of recent use.

Male.—Color chiefly dark reddish (one specimen has peduncle yellowish); head and thorax copiously granulate; fine, short pubescence plentiful on head and thorax, sparse on abdomen and legs. Abdomen reaching the greatest degree of pedunculation seen in any species, segments 2, 3, and most of 4 forming a stalk of almost uniform diameter, the apex of fourth segment abruptly expanded, and together with the fifth and sixth forming a globular expansion which on account of the shortness of the seventh segment seems almost to terminate the abdomen (fig. 201); this is the only species observed to have ridged prominences near posterior angles of the sixth as well as on the fifth tergite; the seventh tergite has the basal portion almost square, this tapering rapidly into a short more or less upturned apiculation, slightly surpassing the hypopygium

[19] Emesina, 1860, pp. 237, 238, pl. 1, figs. 8, 10.

(fig. 202). Sternites 5, 6, and 7 are shorter than in less bulbous species and each is broadly emarginate medianly; the ninth sternite or hypopygium is short and opens upward; the claspers are short-oblong, narrowed apically. Fore leg and its armature as in figures 203, 204.

Female.—In color like the male, with a greater tendency, however, to yellowish spotting or marbling; granulation and pubescence about the same. The abdomen widens gradually from base to apex of fourth segment, from which point to end of seventh the width is nearly uniform; it is thus a very good illustration of the clavate form; the median line of tergites is slightly elevated, subapically the lateral margins of tergite 6 tend to project beyond the common lateral outline of abdomen, and the hind margin of tergites 5 and 6 is bisinuate, the slight median angulation and the lateral angles projecting about equally posteriorly; hind margin of the seventh tergite slightly concave, with a distinct small median tubercle; eighth tergite almost semicircular, radiately wrinkled; ninth truncate cuneate, the base faintly transversely corrugated, the apex raised medianly, more or less concave distally, sometimes faintly longitudinally ridged; the hind margins of sternites 2 and 3 are emarginate medianly, those of 4, 5, and 6 are nearly simply concave; that of 7 is convex medianly and slightly concave laterally; and the exposed portions of 8 are elliptical.

Length, 23–27 mm.

Santarem, April–July 1919, S. M. Klages; Chapada, Para, all Brazil (Carnegie Mus.); a male labelled Amazon, Stevens (Stockholm Mus.); two females Itaituba, Amazon, Brazil, Noualhier, 1898; three males, Para, and one Amazonas, Noualhier, 1898 (Paris Mus.).

GHILIANELLA MIRABILIS, new species.

Male.—Head and thorax moderately granulate; pubescence short; color castaneous, varying in depth, but without definite pale markings anywhere; frontal spine porrect, sharp, stramineous. Abdomen terete and of nearly uniform diameter from base to posterior fourth of fourth tergite which expands abruptly to form anterior wall of bulbosity. The largest component of the latter is the remarkably horned fifth segment described in key (figs. 205, 206), but the sixth segment is wholly included and the seventh is so short that the bulbosity is practically terminal. Seventh tergite an approximately equilateral triangle (fig. 207), corrugated transversely, and elevated and apiculate distally. Hind margin of the fourth sternite with a shorter and deeper median, and broader but shallower lateral concavities; fifth deeply concave, thus being very short on median line; sixth also deeply concave but of about same length in middle as on sides; seventh longer, with a short but distinct median emargina-

tion; eighth sternite barely visible; ninth short, strongly curved, opening upward; claspers oblong, narrowed apically.

Female.—Similar in general to male, but showing traces of pale leg markings, and abdominal marblings. Abdomen from base to and including fifth segment like that of male, the horns of fifth tergite shorter however (fig. 208); bulbosity much longer than in male, due to greater length of sixth and seventh segments which may be said to form part of it. Hind margin of seventh tergite with the median point and lateral angles slightly more prominent than intervening portions; eighth semicircular; ninth much longer, cuneate, faintly corrugated basally and striate apically, the apex rounded, margin slightly thickened (fig. 209). Sternites up to 6 inclusive of about same shape as in male, seventh much longer on median line than fifth and sixth together, the hind margin somewhat convex medianly and slightly concave laterally; eighth broadly exposed on each side.

Length, 27–29 mm.

Male holotype, female allotype, and a teneral male, Rio Autuz, Amazon, Roman (Stockholm Mus.).

GHILIANELLA PERUVIANA, new species.

Female.—Dark castaneous, pubescence short and inconspicuous; head and thorax rather strongly granulate; central region of tergites with a percurrent ridge; a strong blunt tubercle at hind margin of 6; seventh with the hind margin nearly straight, bevelled off medianly on each side of the fairly prominent apex of longitudinal ridge; eighth tergite semicircular, considerably depressed medianly, with a low carina in the depression; ninth tergite tapering rather rapidly, rounded and slightly emarginate apically; with indistinct corrugations and no prominent longitudinal or marginal ridges.

Length, 22 mm.

Holotype.—Female, El Campamiento, Col. Perene, Peru, June 21, 1920, Cornell University Expedition, Lot 569 (Cornell Univ.).

GHILIANELLA ANNECTENS, new species.

Emesa angulata UHLER, P. R. Heteroptera of St. Vincent, Proc. Zool. Soc. Lond., pp. 717–8, Nov. 21, 1893 [Panama specimens in part].

Female.—Testaceous, more or less variegated with fuscous and washed with rufous; thorax and head decidedly granular; pubescence sparse; abdomen widening gradually to apex of sixth segment, seventh somewhat narrower but nearly parallel-sided; tergites with a percurrent nodulose median ridge, becoming more prominent posteriorly and culminating in a large backward sloping tubercle on hind margin of tergite 6; posterior angles of tergites 3–6 progressively elevated and expanded, thus interrupting the lateral out-

line of abdomen as seen from above (fig. 210); seventh tergite almost straight across hind margin, the lateral angles slightly prominent and the median line near apex with a small recumbent tubercle which scarcely projects beyond the medianly depressed hind margin; eighth tergite broadly elliptical, wrinkled transversely and with a median keel which is elevated posteriorly and forms a small projection on hind margin; ninth tergite twice as long as eighth, with sinuate transverse wrinkles, a low median keel, the sides elevated and toothed posteriorly, the apex narrowed, depressed and black in color (fig 211); sutures between sternites while not greatly modified have a tendency toward median emargination and lateral sinuation; 6 is more concave behind and 7 somewhat produced medianly and concave laterally; an elliptical, vertically ridged and horizontally wrinkled portion of eighth sternite visible on each side. Armature of fore femur as in figure 212.

Length, 20 mm.

Holotype.—Male, Panama, Scudder (Uhler Collection, U.S.N.M.).

Type.—Male, Cat. No. 26754, U.S.N.M.

GHILIANELLA TRUNCATA, new species.

Emesa angulata Uhler, P. R. Heteroptera of St. Vincent, Proc. Zool. Soc. Lond., pp. 717–8, Nov. 21, 1893 [Panama specimens, in part].

Very similar to the preceding; ninth tergite differing as noted in key; eighth with the median keel not projecting behind posterior margin (figs. 213, 214).

Length, 21 mm.

Holotype.—Female, labelled *Emesa angulata* Uhler, Panama (U.S.N.M.).

Type.—Cat. No. 27091 U.S.N.M.

GHILIANELLA (PLOEODONYX) INSIDIATRIX Bergroth.

Ghilianella insidiatrix, Bergroth, E. Konowia, vol. 1, pp. 219–220, August 20, 1922 [French Guiana].

Male.—Head and body dark, legs and antennae paler castaneous; front femora with 2 pale bands across the spined portion; antennae pale at base; mid and hind legs with faint pale annuli. Frontal spine short but pointed and decurved; head and thorax practically without granulation but prothorax is obsoletely rugulose; tubercles of pronotum each side of neck rather prominent, also a pair on hind margin; divisions of thorax successively shorter posteriorly. Pubescence golden, short and sparse in general, but aggregated in dense patches as follows: Posterior lobe of head above (front lobe also of more than average hairiness), top and sides of front end of pronotum, top and sides of thorax at sutures between meso- and meta-thoraces, and between metathorax and abdomen; upper surfaces

of mid and hind coxae, first tergite, series of blotches practically forming a ring about abdomen at front of fourth segment, and similar patches or indications of them on following two segments. Abdomen widest about middle of fifth segment, holding its width well posteriorly, but narrowed considerably anteriorly especially segment 2; a slight elevation on the ampliate posterior angle of each tergite, and on middle of hind margin of sixth; median strip of dorsum with a series of squarish depressions; seventh tergite obsoletely ridged, wrinkled transversely on posterior half, narrowed in rounding fashion then abruptly apiculate, apex projecting slightly beyond hypopygium. Sternites of ordinary shape, seventh shallowly emarginate medianly, nearly straight laterally, eighth well exposed and broadly convex medianly, retreating laterally but not covered by seventh, spiracle moderately pedunculate; ninth sternite rather long, opening upward; claspers oblong, not narrowed apically. Fore leg and its armature as in figures 215, 216.

Length, 21–22 mm.

Holotype.—Male, French Guiana [Coll. Bergroth]. Other male specimens: Bourdonville, French Guiana, R. Benoist, August, 1914; Lunier River, Tumac Humac Mts., French Guiana, 1898, F. Geay; Napo River, Upper Amazon, 1899, Sarkady (Paris Mus.).

This series shows considerable variation in the extent of the patches of golden hair, and some in thickness of claspers, but these are not regarded as of taxonomic import.

We are accepting the female (allotype from French Guiana, examined by us) assigned to this species by Bergroth. His specimens of this sex apparently were collected at the same time and place as the males and probably are of the same species. However, among the three species of females of this group we have examined, one (*glabrata*) agrees better in structural characters with the male *insidiatrix* than does the specimen from Bergroth's collection. All of the females differ considerably from the male in characters other than those used in defining the subgenus. The frontal spine is much blunter, there are no patches of golden hair, and the leg markings are much fainter.

The allotype from Bergroth collection is pale castaneous, with the head and thorax almost free from granulations. The hypopygium is as described in key; the following details may be added: There is no longitudinal carina in the depression of tergite 8; and the apical margin of tergite 9 has on each side two ridges which are confluent medianly. Length, 25 mm.

GHILIANELLA (PLOEODONYX) AMICULA, new species.

Female.—Description in most particulars would read like that of *insidiatrix*, from which the present species differs chiefly by hypo-

pygial characters as described in key; eighth tergite is moderately long, squarish apically, with subobsolete radiating ridges.

Length, 23.5 mm.

Holotype.—Female, Charvein, French Guiana, November, 1914; R. Benoist (Paris Mus.).

GHILIANELLA (PLOEODONYX) GLABRATA, new species.

A rather dark species with the head and body fuscous and the appendages yellowish to reddish-brown. Head and thorax practically without granulations; pubescence rather sparse, short, pale reddish. Central region of tergites nodulose but hardly tuberculate; hind margin of seventh tergite slightly concave, with a small median pointed tubercle. Eighth tergite almost semicircular, strongly transversely wrinkled; ninth tergite with a few strong cross wrinkles, tapering rather rapidly, otherwise as described in key.

Length, 24 mm.

Holotype.—Female, Essequebo River, British Guiana, July, 1921, Aug. Busck (U.S.N.M.).

Type.—Female, Cat. No. 26755, U.S.N.M.

GHILIANELLA (LISSONYX) ANGULATA (Uhler).

Emesa angulata UHLER, P. R. A list of the Hemiptera-Heteroptera collected in the Island of St. Vincent by Mr. Herbert H. Smith, with Descriptions of New Genera and Species. Proc. Zool. Soc. Lond., 1893, pp. 717–718 [St. Vincent, W. I.].

Male.—General color yellow-brown, more fuscous on underside of thorax and hypopygium; legs banded and upper surface more or less variegated with dark-brown; mid and hind femora each with four dark bands and tibiae with 3, the latter also more or less darkened apically; front tibiae each with one pale band, and femora with two bands and some pale spots above; head and thorax with few and inconspicuous granulations; each succeeding division of thorax is shorter than that in front of it; abdomen widening gradually to juncture of fifth and sixth segments and narrowing as gradually to middle of seventh tergite posteriorly; the posterior angles of tergites 3–6 are slightly expanded laterally; tergite 7 is decidedly narrowed about the middle, transversely corrugated and broadly rounded apically, with a prominent median apiculation reaching about as far posteriorly as any part of hypopygium; hind margins of sternites 2–5 fairly straight, a little emarginate medianly, that of sixth decidedly so and arcuate laterally, of seventh and eighth on same plan as that of sixth but less pronounced; spiracle of eighth rather pedunculate; ninth sternite elongate, rather compressed posteriorly, with a strong anteriorly and almost horizontally

directed apical hook; claspers obtriangular, broadened apically, the angles rounded (fig. 217).

Female.—Frontal spine and pronotal tubercles much smaller than in male, color of head, thorax, and legs paler, the dark markings merely indicated, abdomen more heavily maculated with fuscous; posterior angles of tergites 3–6 expanded laterally into rather prominent slightly backwardly directed teeth; tergites 4–6 each with a tubercle on median line near hind margin; seventh tergite almost parallel-sided, the hind angles but slightly concave, with a small median tubercle; eighth tergite about two-thirds as long as wide, transversely wrinkled and apiculate medianly; ninth tergite transversely corrugated, narrowed subapically, the margins raised, the disk depressed and smooth apically; hind margins of sternites 2–5 slightly emarginate medianly and sinuate laterally, of 6 deeply concave; seventh sternite nearly twice as long as sixth, the hind margin convex medianly, slightly concave laterally; eighth sternite barely visible from side.

Male, labelled St. Vincent Island, H. H. Smith. Length 17 millimeters.

Female, labelled Balthazar, Windward Side, Grenada, W. I., H. H. Smith. Length 18 millimeters.

The female from Grenada here described, with shorter pronotal tubercles, and with elevations on the hind margins of tergites 4–6, and other differences, may well be a species distinct from the true *angulata* of St. Vincent. However, settlement of this question may well await the availability of more material.

APPENDIX 1.

GENOTYPES OF THE FABRICIAN GENERA.

Certain authors claim that Fabricius indicated types of various hemipterous genera by repeating generic characters in the specific descriptions of the so-called genotypes. Much is made also of the fact that in most cases some of the phrases in these descriptions begin with italicized words.

In examining these claims it will be well to state the historical background of the case. Of the various early authors credited with the selection of genotypes in Hemiptera, Latreille (Considerations générales, etc., 1810) is the only one who asserts his definite intention (l'indication de l'espèce qui leur sert de type) and who consistently names only a single species to a genus. Lamarck and Laporte frequently cite more than one species to a genus and are only credited with fixing types when they happen to name just one illustration of a genus. Now it is clear that using the term in the modern sense

these last two authors were not selecting genotypes. Because of *ex post facto* considerations we credit them with so doing when they accidentally mention but one species for a genus, but essentially we are putting a false construction on their work. Their system of citing illustrations of genera was followed by much later authors (as for instance Fieber, 1866); Stal who named more genera than any other hemipterist described many of them without any species, and never made a practice of naming genotypes; Reuter also still later paid little or no attention to type designation. In fact conscious selection of genotypes is a comparatively modern development in taxonomy and it is only in the most recent catalogues that an effort has been made to indicate definite type fixations for all the genera in large groups of insects.

In the light of these facts what probability is there that Fabricius in 1803 or earlier as in 1794 (as some authors claim) took action that we can consider as genotype fixation? The answer is there is no probability whatever that such was the case. Going further into the matter it should be said in this connection that the works of Fabricius have been viewed in an entirely different way than those of the other early authors. The latter are credited with type fixation only when they chanced to name a single species as an illustration of a genus or in connection with the description of a new genus. Fabricius had only one such instance in the Systema Rhyngotorum (1803), but in numerous cases he gave a preponderantly structural description of one of the species in a genus (not a repetition of the generic characters as has been stated) and in most of these instances he italicized the names of the different anatomical parts described. The statistics in the matter are: 45 genera are recognized in the Systema Rhyngotorum, of which 30 have species with special structural descriptions, and all but 2 of these have the italicized words. If Fabricius had been intentionally indicating genotypes it is highly probable he would have given all the genera uniform treatment: instead of only two-thirds of them. Further light can be had by tracing the matter back to the Entomologica Systematica (vol. 4, 1794). Kirkaldy finding some of the chiefly structural descriptions of species in that work logically accepted them as being as good indications of genotypes as those in the Systema Rhyngotorum. Other hemipterists do not agree with him, but the so-called type fixations in the earlier work stand or fall with those in the later, as they have exactly the same basis. In both works the descriptions in questions are merely more structural than others (compare genus *Membracis* for instance), and neither work gives them for all the genera. nor uniformly so far as italicization is concerned.

The four genotypes accepted by Kirkaldy from the earlier work are here listed with comment on their treatment in the later.

1794	1803
1. *Coreus scapha*_____	Given a much shorter though structural description.
2. *Lygaeus valgus*_____	The structural description is transferred to *tenebrosus*.
3. *Miris dolabratus*____	No species has a structural description.
4. *Gerris lacustris*_____	Species is transferred to Hydrometra retaining the structural description.

Again we would repeat the question, Does this look like type fixation?, and again we answer, It does not. If Fabricius had been fixing genotypes he would not have altered his choice from a certain species in his earlier to another in the later work (2); after selecting a type in the former treatise he would not have left a genus entirely without one in the latter (3); nor would he have attempted to make the same species serve as type for two different genera (4).

It has been asserted that Fabricius somewhere has mentioned his intention of selecting genotypes, and that Fallén says he did, etc. We have examined the Philosophia Entomologica, 1778, and there is nothing in it to indicate that Fabricius had any conception of genotypes. He says nothing about selecting types in the Systema Rhyngotorum so the requirements of the International Code of Nomenclature, that type fixation must be definite, are not met. What Fabricius or any other author may have thought or said subsequent to publication has no effect on nomenclatorial practice.

APPENDIX 2.

SUMMARY OF GENERA AND SPECIES.

Genera seen.

Genus synonyms indented.	Described species seen.	Described species not seen.	New species.	Total.
Emesopsis Uhler 1893	1			1
Empicoris Wolff 1811	8		4	12
Ploiariodes White 1881.				
Ploiariola Reuter 1888.				
Stenolemus Signoret 1858	2	1	8	11
Phantasmatophanes Kirkaldy 1908.				
Stenolemoides, new subgenus.				
Deliastes Dohrn 1863	1		1	2
Panamia Kirkaldy 1907	1			1
Lutevopsis Champion 1898	1	1		2
Emesa Fabricius 1803	2	4	5	11
Westermannia Dohrn 1860.				
Westermannias Kirkaldy 1904.				
Myiagreutes Bergroth 1911.				
Phasmatocoris Breddin 1904.				
Rothbergia, new subgenus.				
Polauchenia, new genus			2	2
Ploiaria Scopoli 1786	8	6	14	28
Cerascopus Heineken 1830.				
Emesodema Spinola 1840.				
Luteva Dohrn 1860.				
Ploiariopsis Champion 1898.				
Gardena Dohrn 1860	1		11	12
Emesaya, new name	2	2	[a] 7	11
Emesa Authors.				
Metapterus Costa 1860	4		2	6
Barce Stal 1865.				
Carambis Stal 1866.				
Mantisoma Łakovlev 1874.				
Ghilianella Spinola 1852	13	12	36	61
Ploeodonyx, new subgenus.				
Lissonyx, new subgenus.				
Total	44	26	90	160

[a] Three new subspecies also described.

Genera not seen.

Genus.	Described species not seen.	Total.
Emesella Dohrn 1860	3	3
Malacopus Stal 1862	1	1
Palacus Dohrn 1863	2	2
Total	6	6

INDEX

Page numbers in boldface type indicate the principal account of the group concerned.

Generic names in parentheses are those of combinations not valid in the sense of this paper.

Plate 1.

Fig. 1. *Emesopsis nubila*, fore wing, 3 mm.[20]
2. *Empicoris rubromaculatus*, apex of abdomen of male from below. 0.25 mm.
3. *Empicoris vagabundus*, apex of fore wing. 2.25 mm.
4. *Empicoris orthoneuron*, fore wing, markings omitted. Apical notch possibly too pronounced. 2.75 mm.
5. *Empicoris orthoneuron*, male hypopygium from below. 0.2 mm.
6. *Empicoris winnemana*, apex of fore wing. 2 mm.
7. *Empicoris winnemana*, cross-veins of hind wing. 1 mm.
8. *Empicoris armatus*, apex of abdomen of male from below. 0.25 mm.
9. *Empicoris culiciformis*, same from side. 0.25 mm.
10. *Empicoris culiciformis*, hind wing. 2.75 mm.
11. *Empicoris errabundus*, fore wing. 3 mm.
12. *Empicoris errabundus*, apex of abdomen of male from below. 0.25 mm.
13. *Empicoris errabundus*, fore tibia and tarsus. 1 mm.
14. *Stenolemus arizonensis*, fore wing. 7 mm.
15. *Stenolemus arizonensis*, hind wing. 5.5 mm.
16. *Stenolemus arizonensis*, apex of abdomen of male from side. 0.75 mm.
17. *Stenolemus pristinus*, fore leg. Femur 1.8 mm.

S—Stigma; B—Basal discal cell; D—Discal cell.

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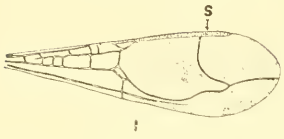
[20] Since the scale of the drawings varies, length in mm. is given in each case for the object shown or some definite part thereof.



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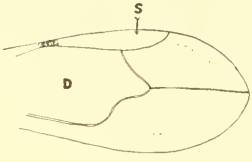

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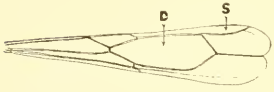

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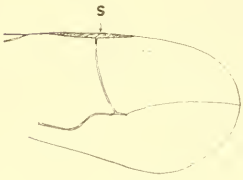

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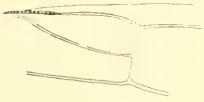

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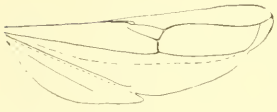

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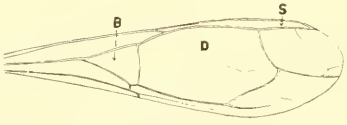

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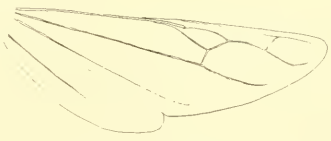

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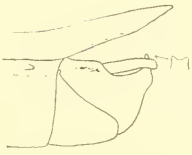

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STRUCTURAL DETAILS OF EMESOPSIS, EMPICORIS, AND STENOLEMUS

FOR EXPLANATION OF PLATE SEE PAGE 136


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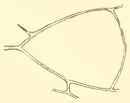
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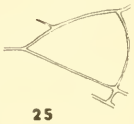
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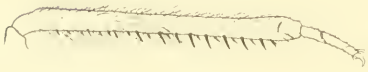
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STRUCTURAL DETAILS OF STENOLEMUS AND MYIOPHANES

FOR EXPLANATION OF PLATE SEE PAGE 139

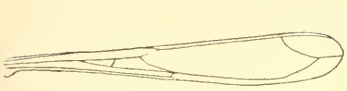
PLATE 2.

FIG. 18. *Stenolemus arizonensis*, fore tibia and tarsus. 3.5 mm.
19. *Stenolemus pallidipennis*, profile of head and thorax. Length without antenna, head to end of pronotum 3 mm.
20. *Stenolemus pallidipennis*, fore leg. Femur 2 mm.
21. *Stenolemus pallidipennis*, fore wing. 7.5 mm.
22. *Stenolemus pallidipennis*, hind wing. 5.75 mm.
23. *Stenolemus schwarzi*, fore wing. 7 mm.
24. *Stenolemus variatus*, basal discal cell of fore wing. 1 mm.
25. *Stenolemus interstitialis*, same. 1 mm.
26. *Stenolemus hirtipes*, fore wing. 7 mm.
27. *Stenolemus hirtipes*, fore tibia and tarsus. 2 mm.
28. *Stenolemus mexicanus*, basal discal cell of fore wing. 1.2 mm.
29. *Stenolemus spiniger*, fore wing. 6.5 mm.
30. *Stenolemus spiniger*, profile of head and thorax. Length without antenna, head to end of pronotum. 3.5 mm.
31. *Stenolemus spiniger*, thoracic spines in profile. 0.75 mm.
32. *Stenolemus perplexus*, same. 0.75 mm.
33. *Myiophanes tipulina*, fore wing. 13 mm.

Plate 3.

Fig. 34. *Deliastes reticulatus*, fore wing. 6.75 mm.
35. *Deliastes reticulatus*, apex of male abdomen from behind. 1 mm.
36. *Deliastes reticulatus*, apex of abdomen of female from behind. 1 mm.
37. *Deliastes stramineipes*, process of hypopygium of male from behind. 0.2 mm.
38. *Panamia ornata*, fore wing. 4.75 mm.
39. *Panamia ornata*, head from above. 0.5 mm.
40. *Panamia ornata*, apex of abdomen of male from side. 0.5 mm.
41. *Panamia ornata*, same from behind. 0.3 mm.
42. *Panamia ornata*, hind wing. 4.5 mm.
43. *Luteropsis longimanus*, fore wing. 5.5 mm.
44. *Luteropsis longimanus*, head from above. 1.1 mm.
45.[21] *Emesa annulatus*, fore wing.
46.[21] *Emesa mantis*, same.
47. *Emesa marmoratus*, same. 8 mm.
48.[21] *Emesa annulatus*, apex of abdomen of female from side.
49.[21] *Emesa annulatus*, same from behind.
50.[21] *Emesa mantis*, apex of abdomen of female from side.
51.[21] *Emesa mantis*, same, from behind.
52.[21] *Emesa mantis*, head and anterior part of prothorax from above.
53. *Emesa marmoratus*, hind wing. 7.5 mm.

[21] Figs. 45, 46, 48, 49, 50, 51, 52, from sketches by W. E. China.



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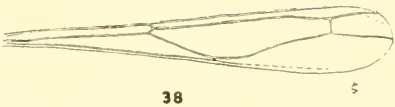

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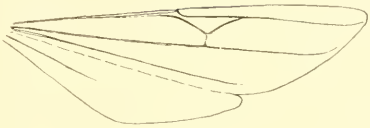

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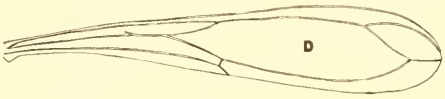

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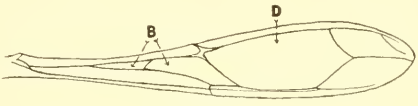

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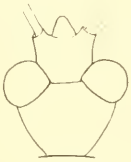

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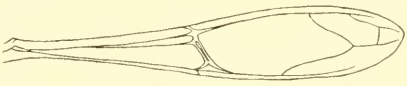

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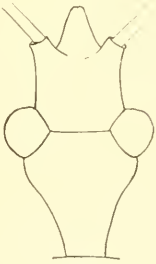

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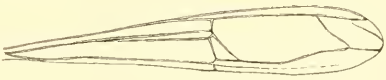

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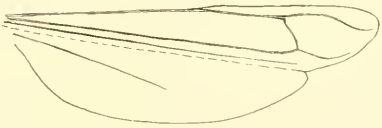

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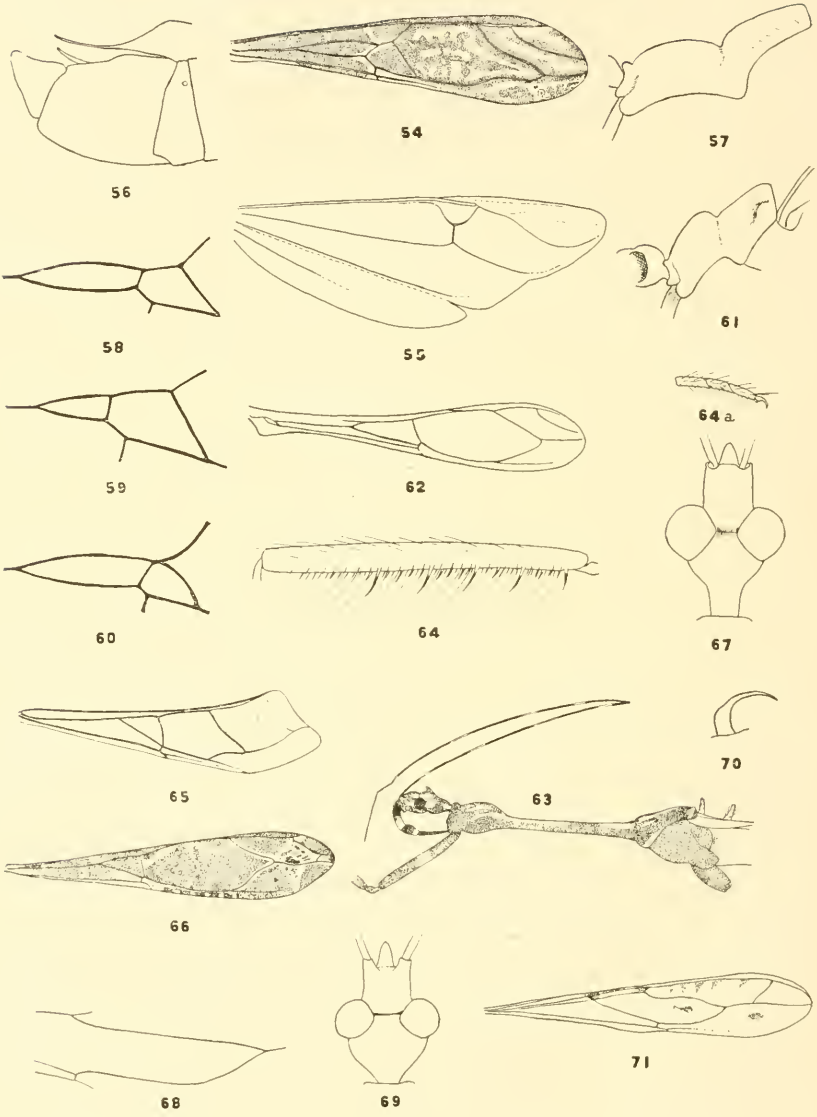
STRUCTURAL DETAILS OF DELIASTES, PANAMIA, LUTEVOPSIS, AND EMESA

FOR EXPLANATION OF PLATE SEE PAGE 140



STRUCTURAL DETAILS OF EMESA, POLAUCHENIA, AND PLOIARIA

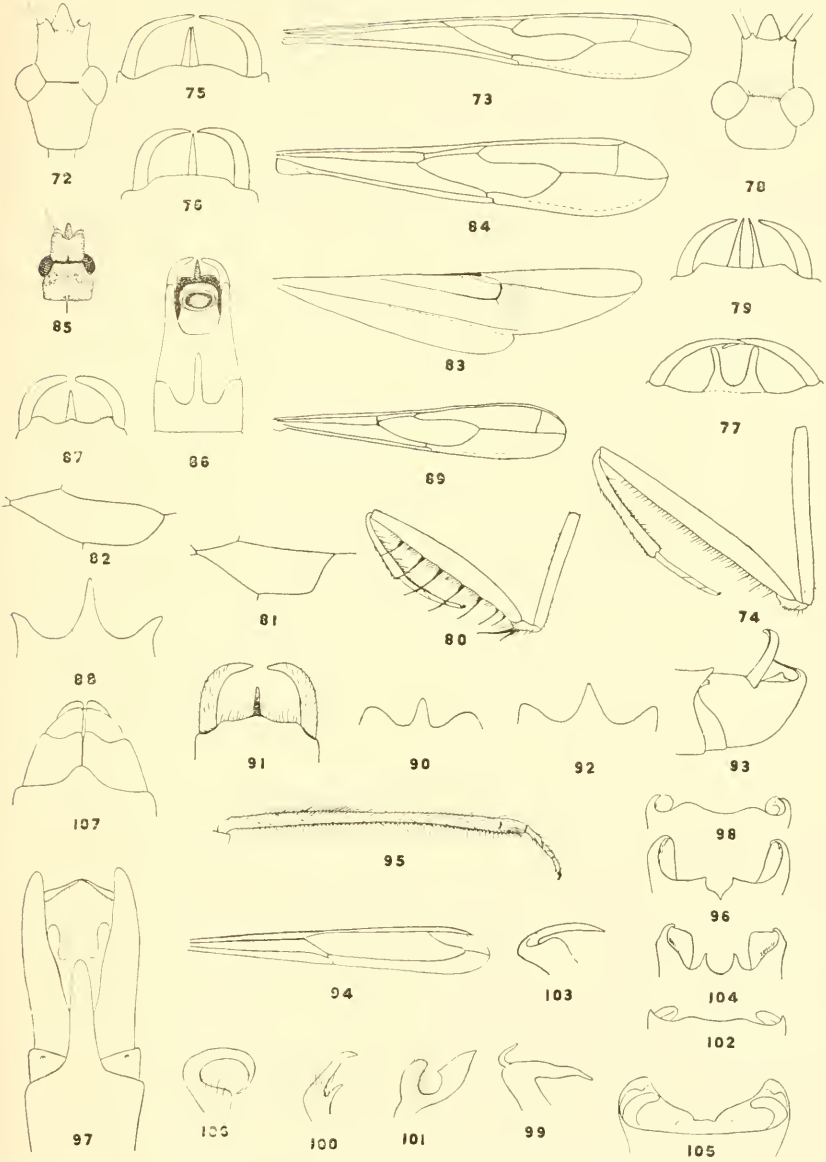
FOR EXPLANATION OF PLATE SEE PAGE 143

Plate 4.

Fig. 54. *Emesa praecellens*, fore wing. 10.5 mm.
55. *Emesa praecellens*, hind wing. 9 mm.
56. *Emesa spectrum*, apex of abdomen of male from side. From type; not measured.
57. *Emesa rapax*, prothorax from side. 2.75 mm.
58. *Emesa rapax*, basal discal cell of fore wing. 2.5 mm.
59. *Emesa testaceus*, same. 1.9 mm.
60. *Emesa diffinis*, same. 1.5 mm.
61. *Emesa diffinis*, prothorax from side. 1.5 mm.
62. *Emesa? difficilis?*, fore wing, from sketch by W. E. China.
63. *Polauchenia protentor*, head and prothorax in profile. 6.75 mm.
64. *Polauchenia protentor*, fore femur. 4.5 mm.
64*a*. *Polauchenia protentor*, fore tarsus. 1.1 mm.
65. *Polauchenia protentor*, fore wing, markings omitted. 6 mm.
66. *Polauchenia biannulata*, fore wing. 10 mm.
67. *Ploiaria macrophthalma*, head from above. 1 mm.
68. *Ploiaria macrophthalma*, apex of discal cell of fore wing. 1.5 mm.
69. *Ploiaria brunnea*, head from above. 0.75 mm.
70. *Ploiaria sicaria*, right clasper of male hypopygium. 0.2 mm.
71. *Ploiaria setulifera*, fore wing. 5.5 mm.

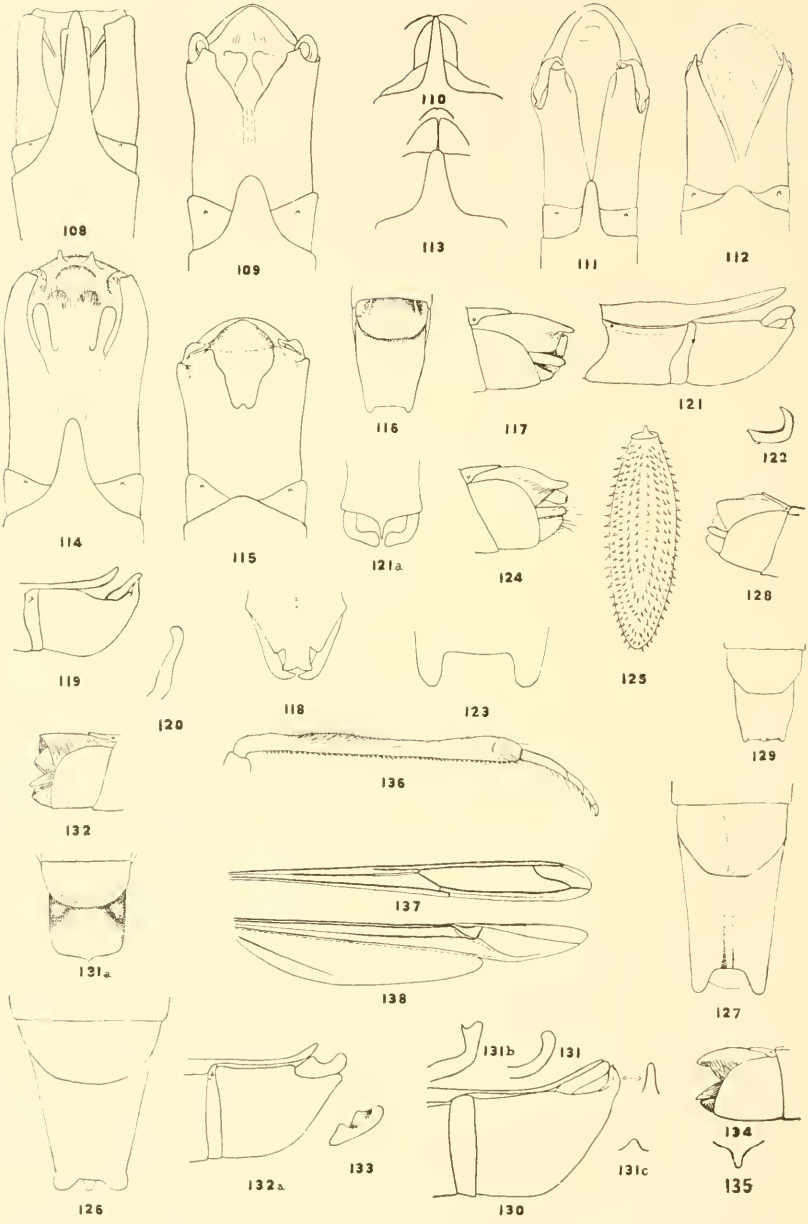
Plate 5.

Fig. 72. *Ploiaria gundlachi*, head from above. 0.8 mm.
73. *Ploiaria varipennis*, fore wing, markings omitted. 7 mm.
74. *Ploiaria varipennis*, fore leg. Femur 3.2 mm.
75. *Ploiaria carolina*, hypopygium male, hind margin. 0.33 mm. wide.
76. *Ploiaria floridana*, same. 0.3 mm. wide.
77. *Ploiaria bispina*, same. 0.25 mm. wide.
78. *Ploiaria pilicornis*, head from above. 0.66 mm.
79. *Ploiaria pilicornis*, male hypopygium, hind margin. 0.2 mm.
80. *Ploiaria uniseriata*, fore leg. Trochanter plus femur, 1 mm.
81. *Ploiaria uniseriata*, discal cell of fore wing. 1 mm.
82. *Ploiaria punctipes*, same. 1.2 mm.
83. *Ploiaria punctipes*, hind wing. 3.5 mm.
84. *Ploiaria similis*, fore wing. 5.9 mm.
85. *Ploiaria denticauda*, head from above. 0.66 mm.
86. *Ploiaria denticauda*, apex of abdomen of male from above. 0.66 mm.
87. *Ploiaria denticauda*, male hypopygium, hind margin. 0.2 mm.
88. *Ploiaria denticauda*, apical tergite of female. 0.33 mm. wide.
89. *Ploiaria denticauda*, fore wing. 4.25 mm.
90. *Ploiaria hirticornis*, apical tergite of female. 0.33 mm. wide.
91. *Ploiaria hirticornis*, male hypopygium, hind margin. 0.25 mm. wide.
92. *Ploiaria hirticornis*, apical tergite of male. 0.25 mm. wide.
93. *Ploiaria marginata*, male hypopygium. 0.6 mm.
94. *Gardena americana*, fore wing. 8 mm.
95. *Gardena americana*, for tibia and tarsus. 3.75 mm.
96. *Gardena americana*, hypopygium of male, hind margin. 0.75 mm.
97. *Gardena americana*, apex of abdomen of male from above. 1.25 mm.
98. *Gardena crispina*, male hypopygium, hind margin. 0.66 mm.
99. *Gardena cutropia*, hypopygial clasper of male. 0.2 mm.
100. *Gardena marcia*, same. 0.15 mm.
101. *Gardena pipara*, same. 0.15 mm.
102. *Gardena faustina*, male hypopygium, hind margin. 0.75 mm.
103. *Gardena faustina*, hypopygial clasper of male. 0.1 mm.
104. *Gardena poppaea*, male hypopygium, hind margin. 0.75 mm.
105. *Gardena domitia*, same. 0.8 mm.
106. *Gardena domitia*, hypopygial clasper of male. 0.1 mm.
107. *Gardena messalina*, apex of abdomen of female from below. 0.66 mm.



STRUCTURAL DETAILS OF PLOIARIA AND GARDENA

FOR EXPLANATION OF PLATE SEE PAGE 144



STRUCTURAL DETAILS OF GARDENA AND EMESAYA

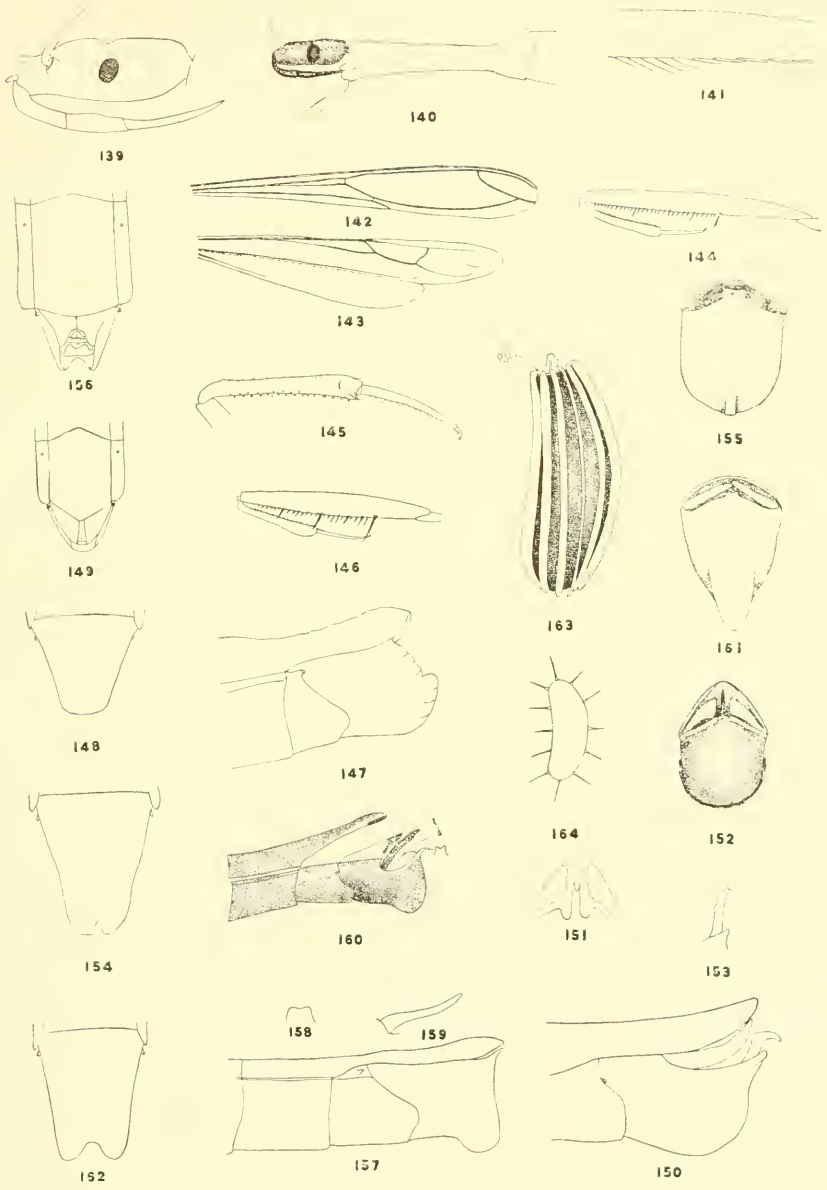
FOR EXPLANATION OF PLATE SEE PAGE 146

108. *Gardena crispina*, apex of abdomen of male from above. 1.25 mm.
109. *Gardena domitia*, same. 2 mm.
110. *Gardena domitia*, apex of abdomen of female from below. 0.33 mm.
111. *Gardena eutropia*, apex of abdomen of male from above. 2 mm.
112. *Gardena marcia*, same. 0.5 mm.
113. *Gardena caesonia*, apex of abdomen of female from below. 0.75 mm.
114. *Gardena poppaea*, apex of abdomen of male from above. 1.25 mm.
115. *Gardena faustina*, same. 1.25 mm.
116. *Emesaya banksi*, apex of abdomen of female from above. 1.1 mm.
117. *Emesaya banksi*, same from side. 1 mm.
118. *Emesaya incisa*, apex of abdomen of male from below. 0.5 mm.
119. *Emesaya incisa*, same from side. 1.25 mm.
120. *Emesaya incisa*, hypopygial clasper of male from above. 0.66 mm.
121. *Emesaya brevipennis*, apex of abdomen of male from side. 2.2 mm.
121*a*. *Emesaya brevipennis*, same from below. 0.75 mm. wide.
122. *Emesaya brevipennis*, hypopygial clasper of male from above. 0.5 mm.
123. *Emesaya brevipennis*, apex of apical tergite of female. 0.6 mm. wide.
124. *Emesaya brevipennis*, apex of abdomen of female from side. 1.25 mm.
125. *Emesaya brevipennis*, egg. 2.1 mm.
126. *Emesaya brevipennis occidentalis*, apex of abdomen of female from above. 1.1 mm.
127. *Emesaya lineata*, same. 0.66 mm.
128. *Emesaya modica*, same from side. 0.5 mm.
129. *Emesaya modica*, same from above. 0.5 mm.
130. *Emesaya apiculata*, apex of abdomen of male from side. 1.6 mm.
131. *Emesaya apiculata*, hypopygial clasper of male. 0.5 mm.
131*a*. *Emesaya apiculata*, apex of abdomen of female from above. 0.8 mm.
131*b*.[22] *Emesaya precatoria*, male from above.
131*c*.[22] *Emesaya precatoria*, male hypopygial process from behind.
132. *Emesaya apiculata*, apex of abdomen of female from side. 0.8 mm.
132*a*. *Emesaya pollex*, apex of abdomen of male from side. 1.25 mm.
133. *Emesaya pollex*, hypopygial clasper of male. 0.2 mm.
134. *Emesaya pollex*, apex of abdomen of female from side. 1 mm.
135. *Emesaya pollex*, apex of last tergite of same from above. 0.2 mm.
136. *Emesaya brevipennis*, fore tibia and tarsus. 4 mm.
137. *Emesaya brevipennis*, fore wing. 10.5 mm.
138. *Emesaya brevipennis*, hind wing. 10 mm.

[22] From sketches supplied by William Lundbeck.

PLATE 7.

FIG. 139. *Metapterus fraterna*, head from side. 1.25 mm.
140. *Ischnonyctes*, species, head and prothorax in profile. 2.8 mm.
141. *Metapterus fraternus*, section of fore tarsus showing ventral armature. 0.33 mm.
142. *Metapterus fraternus*, fore wing. 6.5 mm.
143. *Metapterus fraternus*, hind wing. 6 mm.
144. *Ischnonyctes*, species, fore leg except coxa. Femur 3 mm.
145. *Metapterus annulipes*, fore tibia and tarsus. 1.9 mm.
146. *Metapterus uhleri*, fore leg except coxa. Femur 1.8 mm.
147. *Metapterus aberrans*, apex of abdomen of male from side. 1 mm.
148. *Metapterus uhleri*, apical tergite of female from above. 0.6 mm.
149. *Metapterus uhleri*, apex of abdomen of female from below. 1.2 mm.
150. *Metapterus uhleri*, apex of abdomen of male from side. 1 mm.
151. *Metapterus uhleri*, hypopygial hook and apices of claspers of male from rear. 0.2 mm.
152. *Metapterus neglectus*, male hypopygium from behind. 0.7 mm.
153. *Metapterus neglectus*, hypopygial hook from side. 0.2 mm.
154. *Metapterus neglectus*, apical tergite of female from above. 0.9 mm.
155. *Metapterus banksii*, male hypopygium from behind. 0.7 mm.
156. *Metapterus annulipes*, apex of abdomen of female from below. 1 mm.
157. *Metapterus annulipes*, apex of male abdomen from side. 2 mm.
158. *Metapterus annulipes*, hypopygial hook of male from behind. 0.15 mm. wide.
159. *Metapterus annulipes*, hypopygial clasper of male. 0.6 mm.
160. *Metapterus fraternus*, apex of abdomen of male from side. 1.8 mm.
161. *Metapterus fraternus*, hypopygium of male from behind. 0.8 mm.
162. *Metapterus fraternus*, apical tergite of female from above. 0.8 mm.
163. *Metapterus fraternus*, egg. 1 mm.
164. *Metapterus fraternus*, same, cross section. 0.3 mm.



STRUCTURAL DETAILS OF METAPTERUS AND ISCHNONYCTES

FOR EXPLANATION OF PLATE SEE PAGE 148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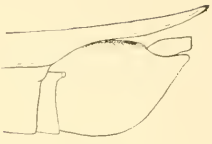
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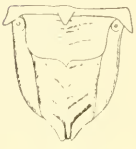
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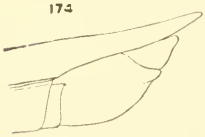
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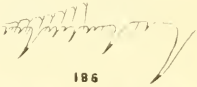
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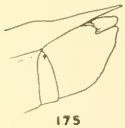
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STRUCTURAL DETAILS OF GHILIANELLA

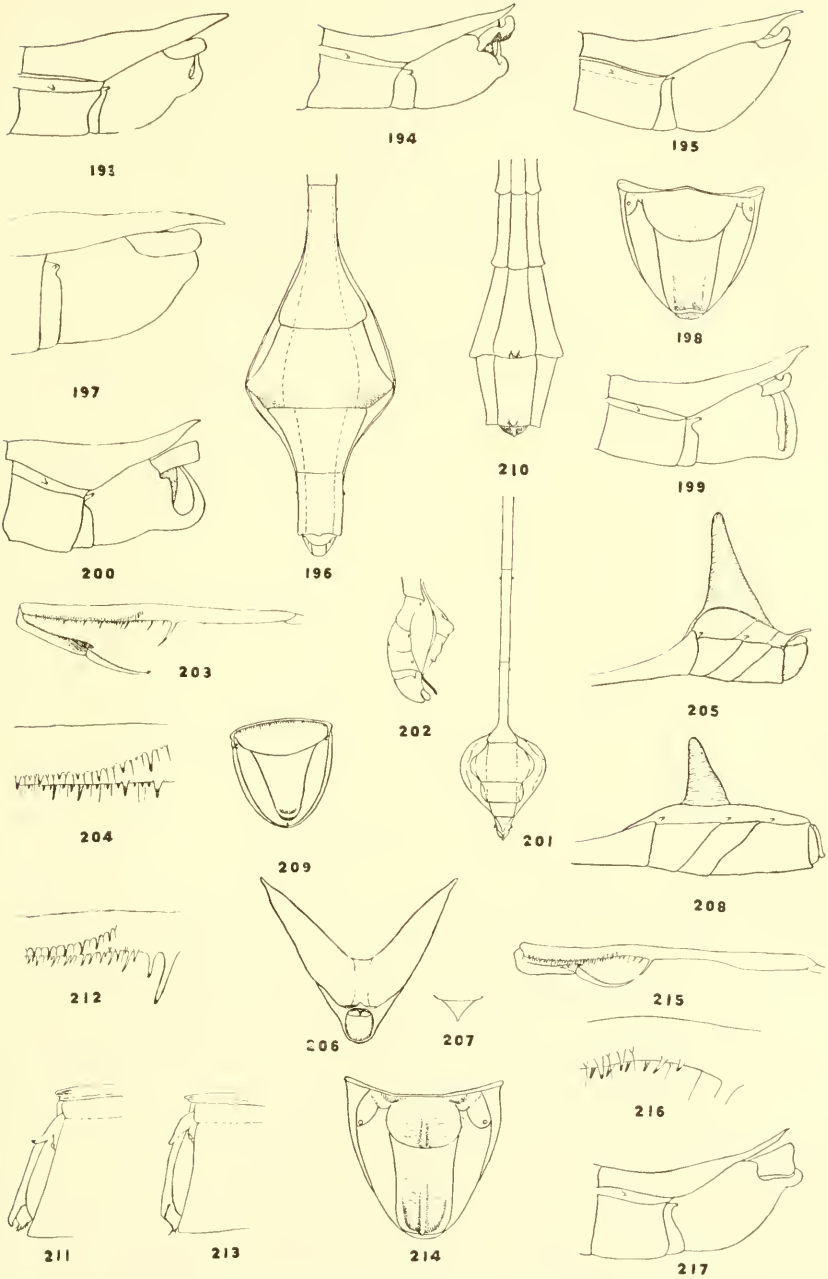
FOR EXPLANATION OF PLATE SEE PAGE 151

Plate 8.

Fig. 165. *Ghilianella*, species. Head in profile. About 2 mm.
166. *Ghilianella*, species. Section of fore tarsus showing ventral armature. About 0.3 mm.
167. *Ghilianella galapagensis*, fore leg except coxa. Femur 3.6 mm.
168. *Ghilianella galapagensis*, section of fore femur. About 0.2 mm.
169. *Ghilianella bicaudata*, apex of abdomen of female from above. 5.2 mm.
170. *Ghilianella persimilis*, apical tergite of male from above. 2.5 mm.
171. *Ghilianella persimilis*, apex of abdomen of male from side. 2 mm.
172. *Ghilianella persimilis*, apex of abdomen of female from behind. 0.8 mm.
173. *Ghilianella longula*, same. 1 mm.
174. *Ghilianella alveola*, same. 1 m.
175. *Ghilianella pascoci*, apex of abdomen of male from side. 1.25 mm.
176. *Ghilianella pascoci*, apex of abdomen of female from side. 4 mm.
177. *Ghilianella personata*, apex of abdomen of male from side. 2 mm.
178. *Ghilianella perversa*, apex of abdomen of female from side. 5.5 mm.
179. *Ghilianella perversa*, same from behind. 1.25 mm.
180. *Ghilianella apiculata*, apex of abdomen of male from side. 2. mm.
181. *Ghilianella pachitea*, same. 1.8 mm.
182. *Ghilianella aracataca*, same. 3 mm.
183. *Ghilianella aracataca*, apex of abdomen of female from behind. 1.1 mm.
184. *Ghilianella aracataca*, same from side. 2.25 mm.
185. *Ghilianella maculata*, fore leg except coxa. Femur 6.2 mm.
186. *Ghilianella maculata*, section of fore femur. 0.5 mm
187. *Ghilianella assa-nutrix*, apex of abdomen of male from side. 4.75 mm.
188. *Ghilianella gladiator*, apex of abdomen of male from side. 3 mm.
189. *Ghilianella gladiator*, egg. 1.6 mm.
190. *Ghilianella gladiator*, same, cap. 0.2 mm.
191. *Ghilianella stipitilata*, abdomen of female from below. 6 mm.
192. *Ghilianella similata*, same. 4.75 mm.

PLATE 9.

FIG. 193. *Ghilianella globulata*, apex of abdomen of male from side. 3.25 mm.
194. *Ghilianella patruela*, same. 3 mm.
195. *Ghilianella recondita*, same. 1.9 mm.
196. *Ghilianella recondita*, apical portion of abdomen of female from above. 6 mm.
197. *Ghilianella perigynium*, apex of abdomen of male from side. 1.5 mm.
198. *Ghilianella signata*, apex of abdomen of female from behind. 1.25 mm.
199. *Ghilianella strigata*, apex of abdomen of male from side. 2.25 mm.
200. *Ghilianella uncinata*, apex of abdomen of male from side. 2.5 mm.
201. *Ghilianella filiventris*, abdomen of male from above. 10 mm.
202. *Ghilianella filiventris*, apex of same from side. 3.5 mm.
203. *Ghilianella filiventris*, fore leg except coxa. Femur 5.5 mm.
204. *Ghilianella filiventris*, section of fore femur. 0.7 mm.
205. *Ghilianella mirabilis*, apex of abdomen of male from side. 6 mm. long, 5 mm. high.
206. *Ghilianella mirabilis*, same from behind. 5 mm. across points.
207. *Ghilianella mirabilis*, apical tergite of male from above. 0.8 mm.
208. *Ghilianella mirabilis*, apex of abdomen of female from side. 6 mm.
209. *Ghilianella mirabilis*, same from behind. 1 mm.
210. *Ghilianella annectens*, apex of abdomen of female from above. 6 mm.
211. *Ghilianella annectens*, same from side. 1.5 mm. high.
212. *Ghilianella annectens*, section of fore femur in front of basal spine. 1 mm.
213. *Ghilianella truncata*, apex of abdomen of female from side. 1.25 mm. high.
214. *Ghilianella truncata*, same from behind. 1.25 mm. high.
215. *Ghilianella insidiatrix*, fore leg except coxa. Femur 7 mm.
216. *Ghilianella insidiatrix*, section of fore femur. 1 mm.
217. *Ghilianella angulata*, apex of abdomen of male from side. 2 mm.



STRUCTURAL DETAILS OF GHILIANELLA

FOR EXPLANATION OF PLATE SEE PAGE 152