

TAXONOMIC NOTES ON THE ORDER EMBIOPTERA. XV.

THE GENUS RHAGADOCHIR ENDERLEIN, AND GENERA CONVERGENT TO IT.

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(Eighty-three Text-figures.)

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Introduction.

The group of Embioptera whose males have R_{4+5} forked in both wings, the first segment of the left cercus echinulate, the tenth abdominal tergite completely cleft, and, in addition, the process of the left hemitergite complex, forms one of the most difficult in the Order when an attempt is made to frame a natural scheme of classification. Several genera combining the above characters have been dealt with already in this series (*Donaconethis*, *Dihybocercus*, *Odontembia* and *Enveja*). Apart from the species contained in these genera, it has been the current practice to place any species with the above combination of characters in the genus *Rhagadochir* Enderlein 1912. To continue on this course would be to allow a large number of ill-assorted forms to be brought together in one genus, which would act in effect as a dumping-ground for species not referable to other already-known genera. This results largely from the fact that the complexity of the process of the left hemitergite is a character which tends to arise frequently by convergence (Davis, 1938); it is found in such unrelated genera as *Oligotoma* and *Metoligotoma*, in addition to the four genera listed above, and the genera discussed in this paper.

The course here adopted, namely, the splitting-off of a number of small genera, seems to be the only possible one having due regard to geographic as well as structural facts. The greatest difficulty lies in the separation from *Rhagadochir* of its Neotropical parallels; indeed, the only entirely satisfactory key separating these series would be geographic, not structural. This does not imply, however, that a genus truly common to both sides of the Atlantic has been split arbitrarily into two units.

The fact that the type of Embiopteron with the process of the left hemitergite simple, such as is presumably to be considered as ancestral to the insects under discussion here, has no genus common to the two sides of the Atlantic, gives weight to the consideration that the Neotropical species with this process bifid should be separated generically from their African parallels, and considered as closely convergent rather than closely related. Granted this point, the subdivision of the African species into five genera (including *Rhagadochir*) is a natural corollary, as the structural differences of these five genera *inter se* are greater than those between some of them and the Neotropical series.

Against the charge that this course involves an orgy of generic splitting and a number of monotypic genera, it may be noted that the author has refrained

from splitting either *Oligotoma* or *Metoligotoma*, even into subgenera, on the complexity of the process of the left hemitergite; this convergent character, taken alone, could not justify the subdivision of an otherwise homogeneous array.

A truer perspective on the merits and demerits of the present course should result from the collection of further species, especially in Africa; this may also enlarge the concepts of some of the smaller genera, and terminate their monotypic state.

The difficulties of the present paper have not been lightened by the fact that Enderlein's description of the genotype, *Rhagadochir vosseleri*, omits some very important details (number of tarsal bladders, structure of inner process of right hemitergite and of the ventral parts of the terminalia).

GENUS RHAGADOCHIR Enderlein 1912.

Coll. zool. de Selys-Longchamps, fasc. 3, p. 54. Genotype, *Embia vosseleri* Enderlein, 1909, *Zool. Anz.*, Bd. 35, p. 181.

The genus may be delimited as follows: African Embioptera, the males with the following characters: Winged, the veins fairly well developed; R_{4+5} forked, the fork longer than the stem; M and Cu_{1a} simple, rather weak. Hind tarsi with two rather small bladders ventrally on the first segment. Tenth abdominal tergite completely divided; right hemitergite with a terminal process directed downwards, sharp or bifid; process of left hemitergite with a lateral lobe or flap. First segment of left cercus strongly clavate, echinulate. Right cercus-basipodite small.

The structure of the hind tarsus and right cercus-basipodite, not mentioned in Enderlein's description of the genotype, is assumed to be the same as in the two new species described below, which are fairly closely related to *Rh. vosseleri*, and from the same region.

RHAGADOCHIR VOSSELERI Enderlein (1909). Figs. 1-2.

Embia vossleri Enderlein 1909, l.c.—*Rhagadochir vosseleri* Enderlein, 1912, l.c. (Named after Professor Vosseler; Enderlein's original spelling 'vossleri' may be regarded as a lapsus calami. It has been corrected by Krauss (1911) and Enderlein himself (1912), and the amended spelling may be adopted.)

♂ (after Enderlein, 1909, 1912). Length $9\frac{1}{4}$ mm.; forewing $9\frac{1}{2}$ mm., hindwing $8\frac{1}{2}$ mm. Head, pronotum, legs and abdomen pale rusty-yellow, thorax pale yellowish-brown, metatarsus of the forelegs more brownish. Eyes and antennae black. Pubescence of antennae brown, of body and legs yellowish. Wings brown, pseudo-radial lines reddish-brown, veins dark brown, inter-venal lines colourless. Venation and terminalia as in figures 1-2 (after Enderlein, 1912).

♀ unknown.

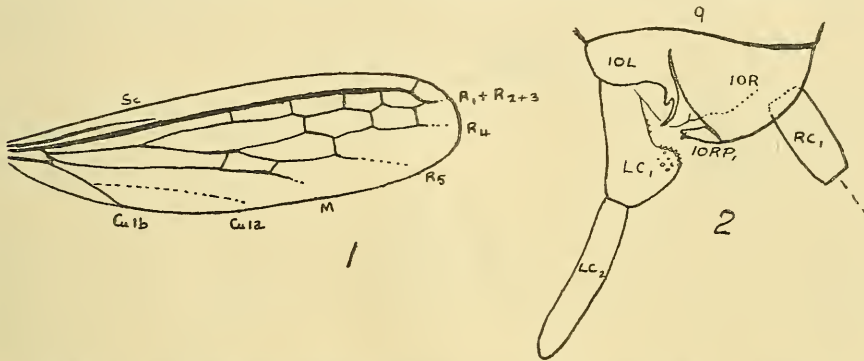
Locality.—Amani, Tanganyika (type in Berlin Zool. Museum).

The type requires re-examination. Enderlein does not give the number of bladders on the hind metatarsus, but related species described below have two. The tenth abdominal tergite is shown as incompletely split in Enderlein's figure, but this is almost certainly inaccurate. Fuller details of the processes of the hemitergites, and information concerning the ventral structures, would be desirable.

The data given by Friederichs (1934, p. 408, fig. 1b) do not refer to the type, nor do they do much to clarify the situation. His specimen, of which the exact locality is not given, is probably not conspecific with Enderlein's type.

RHAGADOCHIR CARPENTERI, n. sp. Figs. 3-12.

♂. Length 8 mm.; forewing 6.2 mm. × 1.4 mm.; hindwing 5.8 mm. × 1.4 mm.; head 1.3 mm. × 1.0 mm. General colour chocolate-brown, head dark brown, eyes black; wing-veins dark brown, bands mid-brown. Head (Fig. 3) with large prominent eyes, sides behind eyes converging posteriorly. Antennae incomplete; mandibles (Fig. 4) with acute terminal and subterminal teeth, the left with three, the right with two, incurved. Wings (Fig. 5) with fork of R_{4+5} longer than stem; most of R_5 , M, and Cu_{1a} obsolescent. Hind tarsi (Fig. 6) with two small ventral bladders on first segment, one on second. Terminalia (Figs. 7-12) with tenth tergite completely cleft, hemitergites widely separated by more or less membranous areas; right hemitergite (10R) produced backward and to the right into an acute, slender spine (10RP₁), directed downward. Inner margin of 10R



Figs. 1-2*.—*Rhagadochir vosseleri* Enderlein, ♂. 1. Right forewing, × 6. 2. Terminalia from above, × 30. (After Enderlein, 1912.)

produced forward as a chitinous rod (10RP₂). Lying between the hemitergites is a membranous flap, obtusely tapered, directed downward; it is chitinized medially, the chitinization apparently originating at the terminal part of 10RP₂. Left hemitergite (10L) curved backward from inner margin as a complex process (10LP) (Figs. 8-9), the inner margin of which continues backward as a slender, acute spine curved outward, the outer margin as a broad, obtuse process, more dorsal in position, and less heavily sclerotized. First segment of right cercus (RC₁) subcylindrical, arising from a small annular basipodite (RCB); second segment missing, but undoubtedly subcylindrical. First segment of left cercus (LC₁) distally produced inward to a rather slender echinulate lobe; second segment subcylindrical. Hypandrium (H) produced backward into an obtuse process (HP) to the right of the mid-line; left cercus-basipodite (LCB), situated between HP and base of LC₁, laminoid, distally produced into a subacute hook curving to the right and underlying the tip of HP.

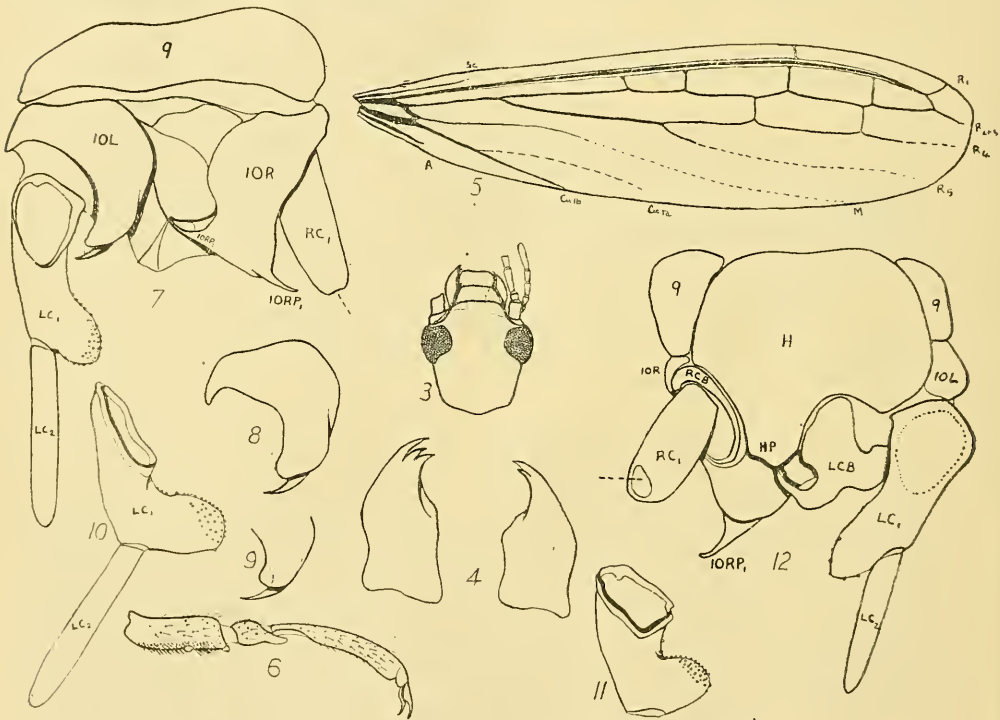
♀ unknown.

* Conventional lettering for venation. 9, ninth abdominal tergite; 10L, 10R, left and right hemitergites of tenth abdominal segment; 10RP₁, 10RP₂, posterior and inner processes of 10R; 10LP, process of 10L; LC₁, LC₂, RC₁, RC₂, first and second segments of left and right cerci; LCB, RCB, left and right cercus-basipodites; H, ninth abdominal sternite; HP, process of H.

Original figures all based on camera lucida outlines, except Figures 24-28, 51-57, and 67-69, which were prepared with constant reference to an ocular micrometer. Setae omitted except in Figures 6, 26, 51, and 77.

Locality.—Lulanguru, Tanganyika, November 1917, coll. Dr. G. D. Hale Carpenter, after whom the species is named. Holotype ♂ in the British Museum of Natural History.

The great structural similarity to the Neotropical species is discussed later. The erection of a new species on a single specimen may appear unwise, but it is considered as justified by the morphological and geographic interest of the specimen; considering both structure and locality, it is the most problematical specimen handled by the writer, so that omission of the details would be unpardonable. Moreover, the taxonomic characters are clear, and the exact locality is stated on the museum label.



Figs. 3-12.—*Rhagadochir carpenteri*, n. sp., holotype ♂. 3. Head from above, $\times 15$. 4. Mandibles from above, $\times 45$. 5. Right hindwing, $\times 15$. 6. Hind tarsus viewed laterally, $\times 45$. 7. Terminalia from above, $\times 45$ (left cercus in unnatural position). 8. Left hemitergite from above, $\times 45$. 9. Process of left hemitergite, viewed more from behind than in Fig. 8, $\times 45$. 10. Left cercus from above, $\times 45$. 11. First segment of left cercus viewed laterodorsally from the right, $\times 45$. 12. Terminalia from below, $\times 45$, left cercus in unnatural position.

RHAGADOCHIR BEAUXII, n. sp. Figs. 13-17.

♂. Length 11 mm.; head 2.4 mm. \times 1.9 mm. General colour dark golden-brown, pronotum and legs orange-yellow, head and antennae dark brown, eyes black, clypeus orange-brown. Wing-veins dark brown, bordered by bands of medium smoky-brown, lines between bands hyaline. Head (Fig. 13) similar in general form to *Rh. carpenteri*, the eyes relatively smaller. Antennae incomplete. Wings as in *Rh. vosseleri*. Tarsi as in *Rh. carpenteri*. Terminalia (Figs. 14-17) with

tenth abdominal tergite completely divided; posterior process of right hemitergite (10RP₁) simple, short and acute, directed inward and downward; inner process (10RP₂) subacute behind, in front contorted. Left hemitergite (10L) with its process (10LP) bifid, the main lobe acute, terminally directed downward and to the left; lateral process of 10LP flap-like, with its free edge rounded, directed upward, backward and to the right (Figs. 15, 16). Left cercus with inner margin of first segment (LC₁) produced inward in a prominent, rounded, echinulate lobe, nearer to apex than to base; second segment (LC₂) subcylindrical. Ventral structures (Fig. 17) as in *Rh. carpenteri*, but with the process of the left cercus-basipodite tapered, sinuous and acute, directed backward.

♀ unknown.

Locality.—Kabulamuliro, Uganda, vi.1916, Dre. E. Bayon. Holotype ♂ in Museo Civico di Storia Naturale, Genoa. Dedicated to Dre. Oscar de Beaux, Director of the above Museum.

Key to the Species of Rhagadochir (♂).

1. Posterior process of right hemitergite of tenth abdominal segment simple 2
 Posterior process of right hemitergite bifid *vosseleri* Enderlein.
2. Left cercus-basipodite with a subacute process curving to the right under the hypandrium *carpenteri*, n. sp.
 Left cercus-basipodite tapered backwards to a sinuous, subacute process
 *beauxii*, n. sp.

Note.—The type (♂) of *Embia (Rhagadochir) chudeaui* Navás 1922, *Rev. Acad. Cienc. Zaragoza*, vii, p. 29 (Mus. Paris), proved on examination to have the process of the left hemitergite simple. It is a normal species of *Embia* Latreille in the strictest sense, and will be dealt with under that genus. It is no relation to *Rhagadochir* in any sense.

Genus CHIREMBIA, n. gen.

Genotype, *Embia xanthocera* Navás, 1930, *Ann. Mus. Civico di Storia Naturale, Genoa*, vol. 55, p. 152, fig. 4.

African Embioptera, the males with the following characters: Winged, with R₄₊₅ forked, the fork longer than the stem; M and Cu_{1a} simple, weak; cross-veins few. Hind tarsi with only the terminal ventral bladder present. Tenth abdominal tergite completely divided; right hemitergite with an elongate posterior process curved downward, and an inner flap-like process similar to that in *Embia* Latreille. Process of left hemitergite bifid, with a distinct distal concavity between the lobes. First segment of left cercus produced inward distally into a prominent echinulate beak.

The differentiation from other genera is summarized in the generic key (infra). The genus is derivable from *Embia* by the elongation of the posterior process of the right hemitergite, the forking of the process of the left hemitergite, the excessive curvature of the first segment of the left cercus, and the weakening of the venation.

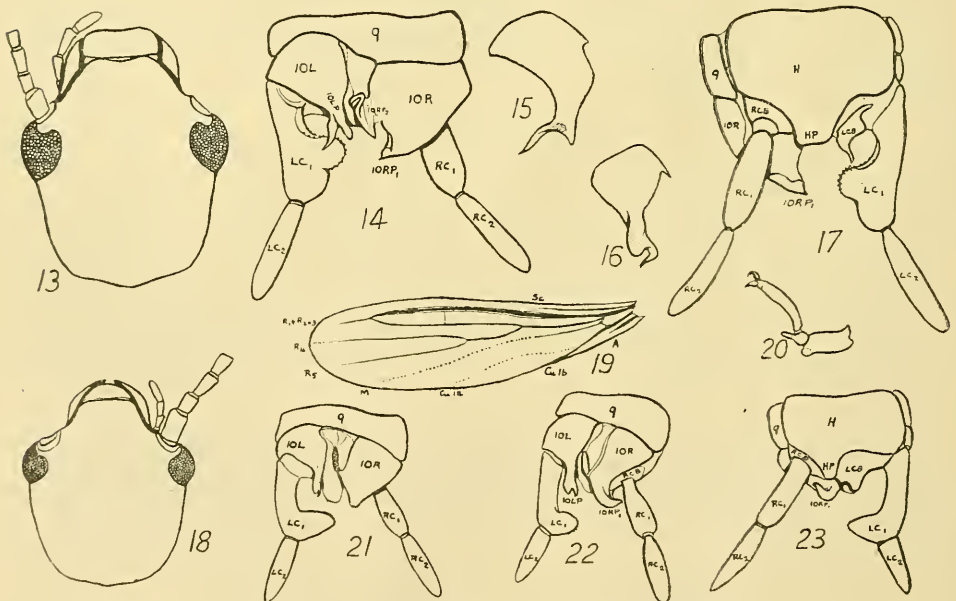
CHIREMBIA XANTHOCERA (Navás 1930). Figs. 18–23.

Embia xanthocera Navás 1930, l.c.

The following re-description is from the unique type (Mus. Genoa):

♂. Length 7.2 mm.; head 1.4 mm. × 1.2 mm.; forewing 5.5 mm. × 1.5 mm.; hindwing 4.5 mm. × 1.5 mm. General colour dark brown, head paler, ferruginous, eyes black, antennae yellowish-brown; wing-veins dark brown, bordered by mid-brown bands, lines between bands hyaline. Head (Fig. 18) with eyes rather small,

sides behind eyes converging slightly, smoothly rounded behind. Antennae incomplete. Wings (Fig. 19) with veins distributed as in *Rh. vosseleri*, but with very few cross-veins, and with a general weakening of the main veins; M distinct only for a short distance basally, thence represented by a row of macrotrichia and by bordering pigment-bands. Cu_{1a} represented only by macrotrichia and pigment-bands, which in both right wings are divided by an oblique hyaline line. The other veins, except the stem of the cubitus (Cu_{1b}), fail to reach the wing margin, although their continuations (as rows of macrotrichia) do so. Hind tarsi (Fig. 20) with only the terminal bladder present on the first segment, remainder of ventral surface of this segment clothed with setae, as in *Embia*. Terminalia (Figs. 21-23) with tenth abdominal tergite completely divided longitudinally, the right hemitergite (10R) tapered backward to a process (10RP₁), curving down and a little to the right, and terminally directed forward. Inner margin of 10R with a flat bar of chitin (10RP₂), as in *Embia*, separated from 10R by membrane except at posterior limit. Left hemitergite (10L) with inner margin produced back to an acute process (10LP), curved slightly to the left terminally; a flat lobe arises subterminally from the left of this process, directed laterodorsally to the left, with the outer margin roughened. Right cercus with two subequal subcylindrical segments (RC_1 , RC_2), arising from a subannular cercus-basipodite (RCB). Left cercus with first segment (LC_1) strongly incurved apically to a long echinulate



Figs. 13-17.—*Rhagadochir beausii*, n. sp., holotype ♂. 13. Head from above, $\times 15$. 14. Terminalia from above, $\times 20$. 15. Left hemitergite of tenth abdominal segment, viewed from above and to the left, $\times 20$. 16. Left hemitergite viewed from above and to the right, $\times 20$. 17. Terminalia from below, $\times 20$.

Figs. 18-23.—*Chirembia xanthocera* (Navás), holotype ♂. 18. Head from above, $\times 20$. 19. Left forewing, $\times 8$. 20. Hind tarsus viewed laterally, $\times 20$. 21. Terminalia from above, $\times 20$. 22. Terminalia from above and to the right, $\times 20$. 23. Terminalia from below, $\times 20$.

beak; second segment (LC₂) short, subcylindrical. Ninth sternite (H; fig. 23) produced backward to the right of the mid-line in a short obtuse lobe (HP), to the left of which is a concavity filled by the left cercus-basipodite (LCB); the latter is produced back to a flat obtuse lobe, curving downward terminally.

♀ unknown.

Locality.—Gaharre (or Gaarre), Dancalia (= Danakil, Ethiopia), xii.1929, Franchetti Expedition. Type in Mus. Genoa.

Genus NAVÁSIELLA, n. gen.

Genotype, *Oligotoma sulcata* Navás, 1923, *Rev. Acad. Cienc. Zaragoza*, viii, p. 16.

Rather small African Embioptera,* the males with the following characters: Winged, veins weak, R₄₊₅ forked, the veins distad to the fork subobsolescent; M and Cu_{1a} simple, obsolescent. Hind tarsi with a large terminal bladder ventrally on the first segment, and a small bladder medially on the ventral surface of this segment. Tenth abdominal tergite completely divided longitudinally; right hemitergite as in *Embia*, with a short acute posterior process and a flap-like inner process. Process of left hemitergite acute, with a flat lobe subterminally on the left, not separated from the main process by a deep concavity. First segment of left cercus produced inward in a long echinulate lobe or beak, directed slightly forward.

Differs from *Chirembia* in the hind tarsi, weaker venation, and in the structure of the posterior process of the right hemitergite and of the process of the left hemitergite. Resembles *Embia* more closely than does *Chirembia* in the structure of the hemitergites, but differs more from *Embia* than does *Chirembia* in the tarsi, wings, and left cercus.

NAVÁSIELLA SULCATA (Navás 1923). Figs. 24–28.

Oligotoma sulcata Navás 1923, l.c.

The following re-description is from the unique type (Mus. Paris):

♂. Length 7 mm.; head 1.3 mm. × 1.1 mm.; forewing 4.2 mm. × 1.2 mm.; hindwing 3.8 mm. × 1.1 mm. General colour very dark brown, with white pubescence; wings smoky-brown with hyaline streaks longitudinally. Head (Fig. 24) and thoracic scuta minutely rugose; head broad, sides behind eyes converging only slightly; eyes small. Wings (Fig. 25) as in generic description, R₄₊₅ distad to fork, M, and Cu_{1a}, represented only by rows of macrotrichia and bordering pigment-bands. Hind tarsi (Fig. 26) as in generic description. Terminalia (Figs. 27–28) with posterior process of right hemitergite (10RP₁) short, acute, directed inward and downward; inner process (10RP₂) subelliptical, continuous with right hemitergite (10R) posteriorly, anteriorly separated by membrane. Process of left hemitergite (10LP) acute, subterminal flap obtusely rounded, directed to the left. First segment of left cercus (LC₁) strongly incurved to a long process, directed slightly forward, terminally echinulate; second segment lacking in the type. Hyandrium (H) produced back to an obtusely-tapered process (HP) to the right of the mid-line; left cercus-basipodite (LCB) produced back to an obtuse lobe on the left of HP; left-hand margin of LCB furrowed longitudinally. Right cercus composed of two subcylindrical segments (RC₁, RC₂); right cercus-basipodite (RCB) small, subannular.

♀ unknown.

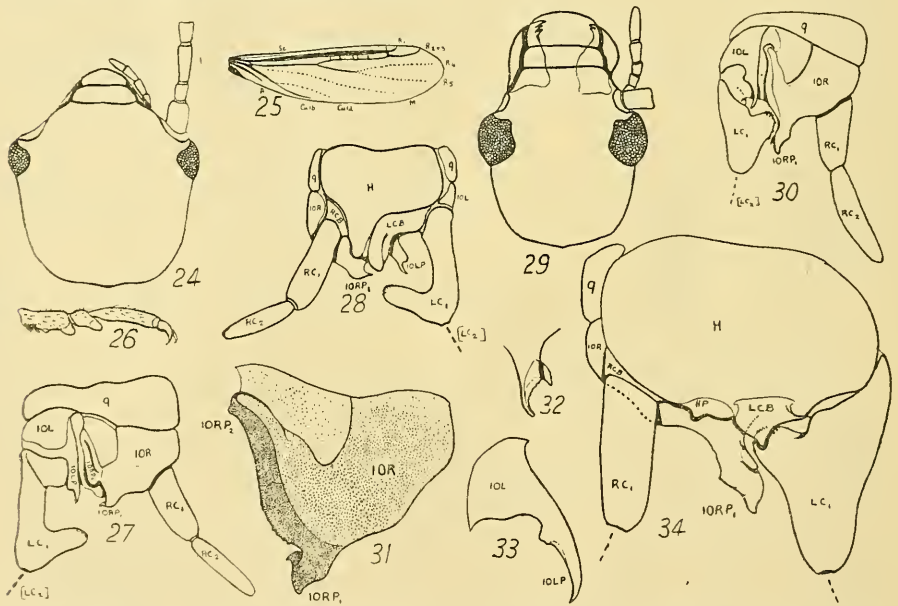
Locality.—Africa: Galla Annia, Gobele, vi.1903, Mission du Bourg de Bozas.

Genus PARACHIREMBIA, n. gen.

Genotype, *Embia (Rhagadochir) apicata* Silvestri 1921, *Trans. Ent. Soc. London*, p. 449, Pl. ix, x.

Medium-sized African Embioptera, the males with the following characters: Winged, R_{4+5} forked, the fork longer than the stem; M and Cu_{1a} simple; all veins well developed. Hind tarsi with only the terminal bladder on the first segment. Tenth abdominal tergite completely cleft longitudinally; right hemitergite produced backward to a bifid process; inner margin of right hemitergite produced forward towards ninth tergite as a chitinous rod. Process of left hemitergite acute, with a small protuberance on the left-hand margin near origin from hemitergite. First segment of left cercus clavate, internal lobe strong, echinulate, directed slightly forward. Right cercus-basipodite small.

The differences from other genera are shown in the generic key (infra). The closest genus structurally seems to be *Chirembia*, which has the hemitergites of different form, and the venation weaker.



Figs. 24-28.—*Navásiella sulcata* (Navás), holotype ♂. 24. Head from above, $\times 23$. 25. Right forewing, $\times 6\frac{2}{3}$. 26. Hind tarsus viewed laterally, $\times 23$. 27. Terminalia from above, $\times 23$. 28. Terminalia from below, $\times 23$.

Figs. 29-34.—*Parachirembia apicata* (Silvestri), ♂ (plesiotype). 29. Head from above, $\times 17$. 30. Terminalia from above, $\times 17$. 31. Right hemitergite of tenth abdominal segment viewed from above, $\times 33$. 32. Extremity of right hemitergite, viewed from the right and somewhat below, $\times 33$. 33. Left hemitergite from above, $\times 33$. 34. Terminalia from below, $\times 33$.

PARACHIREMBIA APICATA (Silvestri 1921). Figs. 29-34.

Embia (Rhagadochir) apicata Silvestri 1921, l.c.

Silvestri's excellent description is based on specimens from Agege, near Lagos, coll. C. O. Farquharson, from the bark of the Pará rubber tree (v. *Trans. Ent. Soc. London*, 1921, pp. 413-416, for details of the habitat). Two males in the British

Museum are labelled 'Southern Nigeria, C. O. Farquharson: 1915—116', and a piece of web, bearing the same label and museum number, has the additional data 'Web of Embiidae from Pará tree'. These males are evidently members of the series, others of which formed Silvestri's types. They agree exactly with Silvestri's description. The accompanying description and figures are from one of these, which has been labelled plesiotype.

♂. Length 10.5 mm.; head, length 1.9–2.0 mm., breadth 1.4–1.6 mm.; forewing 10.3 mm. × 3.0 mm. General colour dark brown, thoracic nota pale yellowish-brown, eyes black; wing-veins dark brown, bordered by bands of medium smoky-brown, lines between bands hyaline. Head (Fig. 29) similar in outline to *Rh. beauii*; left mandible with three acute incurved teeth terminally, right with two. Wings as in generic description (v. Silvestri, l.c., figs. 1–2). Hind tarsi with first segment furnished with only the terminal bladder (v. Silvestri, l.c., fig. 6). Terminalia (Figs. 30–34) with tenth abdominal tergite completely cleft, right hemitergite (10R) produced backward, inward and downward to a long process (10RP₁), irregularly tapered, apex directed outward, subobtusate, with a subterminal ventral tooth arising from the left side and curving downward (Figs. 31–32). Inner margin of right hemitergite heavily sclerotized, forming a forwardly-directed process (10RP₂) not quite reaching the posterior border of the ninth tergite; free edge of 10RP₂ slightly echinulate posteriorly. Left hemitergite (10L) with inner margin produced back to a slender process (10LP), terminally falciform-acute, directed to left, with a very short, blunt lateral lobe near the base directed to the left (Fig. 33). Right cercus with two subequal subcylindrical segments (RC₁, RC₂), with a vestigial cercus-basipodite (RCB). Left cercus with first segment (LC₁) clavate, the middle of the inner margin produced inward and forward to a large rounded echinulate lobe; second segment missing in specimens seen by the writer, but according to Silvestri's figures (l.c., figs. 7, 8) simple, subcylindrical. Ninth sternite (H; fig. 34) with right-hand part of distal margin carrying a small blunt process (HP), heavily sclerotized; left cercus-basipodite (LCB) fused distally to the left side of H, heavily sclerotized, produced backward to a blunt, papillose end.

♀. Silvestri (l.c.) has described the female. As is the case throughout the Order, it is of little taxonomic importance.

Locality.—Agege, near Lagos, Nigeria. Plesiotype ♂ in the British Museum.

Genus MACREMBIA, n. gen.

Genotype, *Embia lunaris* Navás 1926, *Mem. Pont. Accad. delle Scienze, Nuovi Lincei*, Series ii, vol. 9, p. 108.

Medium-sized African Embioptera, the males with the following characters: Winged, R₄₊₅ forked, the fork longer than the stem; M and Cu_{1a} simple; all veins well-developed, cross-veins numerous. Hind tarsi with two large ventral bladders on first segment, one on second. Tenth abdominal tergite completely divided longitudinally; right hemitergite with a short posterior process directed inward, and a flap-like inner process, as in *Embia*. Process of left hemitergite bifid, with a deep distal concavity between its lobes. Right cercus-basipodite relatively large, produced to the left.

The right hemitergite and its processes agree with *Embia* Latr., from which *Macrembia* is differentiated by the left hemitergite, right cercus-basipodite, hind tarsi, etc. The left cercus agrees with *Parachirembia*, but the hemitergites and their processes, the right cercus-basipodite, and the tarsi, differentiate it completely.

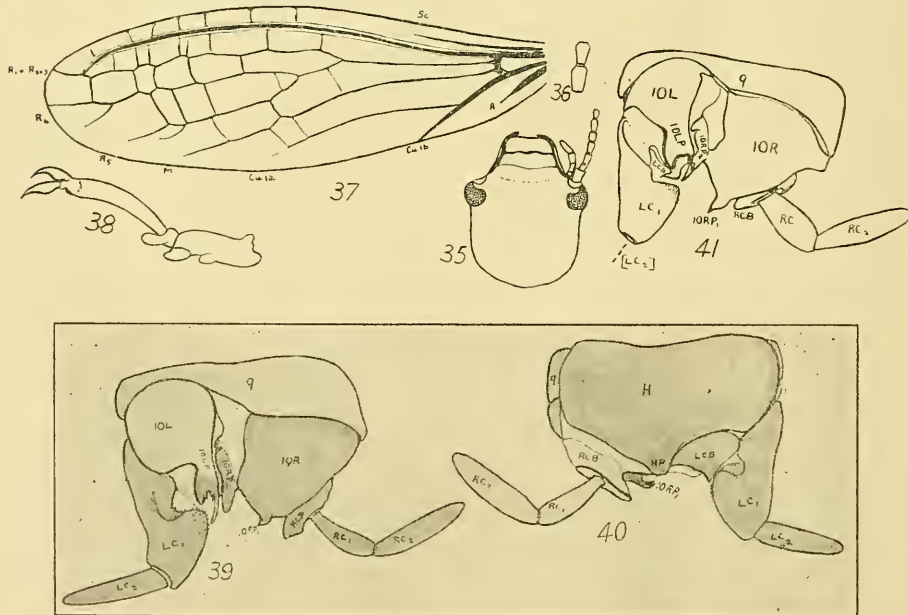
Macrembia differs from *Rhagadochir* in the right cercus-basipodite, and in the strength of development of the venation and tarsal bladders; it differs from *Dihyocercus* End. in the form of the left cercus and right cercus-basipodite, and in the branching of the cubitus, but is in some respects rather closely related.

MACREMBIA LUNARIS (Navás 1926). Figs. 35-41.

Embia lunaris Navás 1926, l.c.

Navás' description contains little of taxonomic importance. He named two types, one (the first-named) being lodged in the Musée du Congo, Tervueren. The following description and figures are from this specimen, which may be regarded as the holotype (lectotype):

♂. Length 12 mm.; head 3.0 mm. × 2.5 mm.; forewing 10 mm. × 3 mm.; hindwing 9 mm. × 3 mm. General colour dark brown, pronotum and posterior part of head orange-brown, wing-veins dark brown, bordered by mid-brown pigment-bands, between which are hyaline lines. Head (Fig. 35) large, sides behind eyes not converging, but smoothly rounded posteriorly. Left antenna incomplete, right with 29 short segments (Fig. 36), total length 3 mm. Wings with numerous cross-veins, all veins strong, R_{4+5} with fork twice length of stem, cubitus two-branched. The left forewing (Fig. 37) shows a venational anomaly, in that the stem of R_{4+5} , before the fork, is very short, and both R_1 and R_2 are shortly bifid terminally. Hind tarsi (Fig. 38) with two large ventral bladders on first segment, one on second. Terminalia (Figs. 39-40) with tenth abdominal tergite completely



Figs. 35-40.—*Macrembia lunaris* (Navás), holotype ♂. 35. Head from above, × 7. 36. Two of distalia, × 17. 37. Left forewing, showing venational aberration (R_1 and R_2 both forked), × 7. 38. Hind tarsus viewed laterally, × 17. 39. Terminalia from above, × 17. 40. Terminalia from below, × 17.

Fig. 41.—*Macrembia lunaris* (Navás), ♂, aberrant specimen from Northern Rhodesia. Terminalia from above, × 17.

divided longitudinally; right hemitergite (10R) posteriorly produced downward and inward to a simple process (10RP₁), short and acute; inner margin of 10R with a flat sclerotized strip or flap (10RP₂), separated from body of 10R, except at posterior limit, by membranous areas. Anteriorly, 10RP₂ has a small accessory lobe, rounded and weakly rugose. Left hemitergite (10L) with inner margin produced back to a process (10LP), elongate, acute, terminally curved slightly to the left, with a flat lateral lobe, placed more dorsally, on the left-hand side, directed backward; concavity between lobe and main process echinulate. Right cercus with two subcylindrical segments, the first (RC₁) slender at the base, where it arises from the large cercus-basipodite (RCB), the second (RC₂) slightly longer and thicker. Left cercus with first segment (LC₁) produced inward to an echinulate lobe directed forward, second segment (LC₂) subcylindrical. Ninth sternite (H) and left cercus-basipodite (LCB) much as in *Parachirembia apicata*, the terminal process of H less prominent.

Locality (of lectotype).—Elisabethville (R. Lubumbashi), Congo, 1920, Dr. Bequaert (Mus. Congo).

A specimen (♂) in the British Museum of Natural History, from Northern Rhodesia (Congo Border: Tutivi Pt., 15 miles east of Kipushi; 25/11/1927, H. Silvester Evans), is referable to this species, but has slight variations in the terminalia (Fig. 41). The left cercus-basipodite is acute, directed to the left; the concavity between the lobes of the process of the left hemitergite, and the anterior part of the inner process of the right hemitergite, are smooth. In all other respects, including colour and size, this specimen agrees with the lectotype.

Genus PARARHAGADOCHIR, n. gen.

Genotype, *Embia trinitatis* de Saussure, 1896, *Journ. Trinidad Club* (Port of Spain), vol. 2, no. 12, p. 293.

Medium-sized to rather small Neotropical Embioptera, the males with the following characters: Winged, R₄₊₅ forked in both wings, M and Cu_{1a} simple, veins rather weakly developed, obsolescent terminally. Hind tarsi with first segment carrying a terminal ventral bladder; medial bladder not apparent except in one species, where the extra bladder appears to be a constant character. Tenth abdominal tergite completely cleft longitudinally; right hemitergite produced backward and downward to a process, acute or weakly bifid; inner margin of right hemitergite produced forward towards ninth tergite as a sclerotized rod; space between this process and left hemitergite occupied by an obtuse membranous flap directed downward and backward, with a medial chitization connecting to the end of the inner process of the right hemitergite. Process of left hemitergite strongly bilobed; right lobe acute, separated from left lobe by a deep concavity; left lobe broader, obtuse, flattened, less heavily sclerotized. First segment of left cercus clavate, echinulate.

In specimens of only one South American species, with the above combination of characters, seen by the writer, was the second or medial ventral bladder present on the hind metatarsus. In one additional case, the sclerotization and pigmentation of the area where this additional bladder occurs in other genera was weaker, although no projection of this area of weakness occurred. In one species, however, (infra) the extra bladder was constantly present. It seems necessary to assume temporarily that a single hind metatarsal bladder is characteristic of this series (genus), two occurring in only one aberrant series (species).

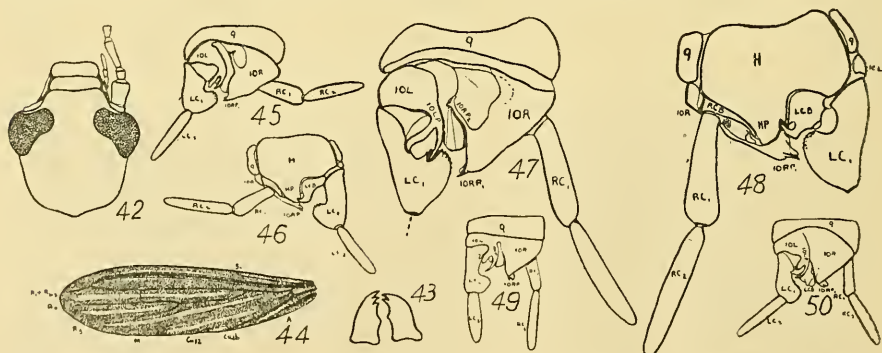
The terminalia of this series are not generically separable from the East African species *Rhagadochir carpenteri*, although they are not very closely related to *Rh. beauxii*, nor, probably, to *Rh. vosseleri* End., of which full details are lacking. The unique specimen of *Rh. carpenteri* has two hind metatarsal bladders (Fig. 6). Discarding the attractive theory that the problem of *Rh. carpenteri* is to be explained by the transposition of museum labels at some time, and that it is in reality Neotropical, we must assume that this species represents an amazingly close case of convergence, the terminalia of the end product being indistinguishable generically from the Neotropical species, though possibly reached by a different sequence of evolutionary steps. On the concept advanced earlier (Davis, 1938, p. 263 et seq.), this is not impossible. The fact that *Rh. carpenteri* is from East Africa is significant; the known West African species (of *Parachirembia*, *Macrembia*, etc.) are much further removed from the Neotropical species.

PARARHAGADOCHIR TRINITATIS (de Saussure 1896). Figs. 42-48.

Embia trinitatis de Saussure, 1896a, *Journ. Trinidad Club*, vol. 2, no. 12, p. 293; de Saussure, 1896b, *Mitt. Schweiz. Entomol. Gesellschaft*, Bd. 9, Hft. 8, p. 352.

The following re-description is from one of de Saussure's cotypes (♂; Mus. Geneva); this was a dried specimen, which was macerated and cleared. The type locality was given as Trinidad; the detailed locality is probably Port of Spain, where Urich, the collector, was then stationed. The description is supplemented from a well-preserved (alcoholic) male from St. Augustine, Trinidad (coll. N. A. Weber, 10.5.35; Museum of Comparative Zoology, Harvard University). The specimens seem to agree exactly; certain figures of the St. Augustine specimen are given, in addition to those of the cotype, as some structures are much clearer in the former.

♂. Length (after de Saussure, 1896a, b) 7-8 mm.; length of forewing 7 mm. The dimensions of the cotype seen by me are: Length 8 mm.; head 1.3 mm. × 1.0 mm.; forewing 5.2 mm. × 1.4 mm.; hindwing 4.8 mm. × 1.5 mm. The



Figs. 42-46.—*Pararhagadochir trinitatis* (Sauss.), cotype ♂. 42. Head from above, × 17. 43. Mandibles from above, × 17. 44. Left forewing, × 7. 45. Terminalia from above, × 17. 46. Terminalia from below, × 17.

Figs. 47-48.—*Pararhagadochir trinitatis* (Sauss.), ♂, St. Augustine, Trinidad. 47. Terminalia from above, × 33. 48. Terminalia from below, × 33.

Figs. 49-50.—*Pararhagadochir flavicollis* (Enderlein). 49. ♂ from Venezuela (type), terminalia from above, × 11. 50. ♂ from Bolivia (type), terminalia from above, × 11. (After Enderlein, 1912, figs. 29, 30.)

dimensions of the St. Augustine specimen are: Length 7.5 mm.; head 1.2 mm. \times 0.9 mm.; forewing 6.4 mm. \times 1.6 mm.; hindwing 5.2 mm. \times 1.6 mm. General colour of alcoholic specimen dark brown, head very dark, eyes black; wings with mid-brown veins and rather pale brown longitudinal bands, hyaline inter-venal lines narrow; prothorax cream (in the dried cotype, much darker, orange, still very distinct, however, from the general body-colour). Head (Fig. 42) relatively broad, eyes very large; sides behind eyes clearly convergent posteriorly. Antennae incomplete in the cotype; in the St. Augustine specimen, left broken, right with 23 segments, total length 4 mm. (de Saussure, l.c., gives 21–22 segments). Mandibles (Fig. 43) incurved, the left with three, the right with two acute teeth. Wings (Fig. 44) as in generic description; cross-veins few (in the St. Augustine specimen, more cross-veins are present than in Figure 44, from the cotype: R_1 – R_{2+3} (1), R_{2+3} – R_1 (2), and traces of three between R_1 and the costa). R_5 distinct only at base, M and Cu_{1a} scarcely at all; veins, when subobsolescent, represented, as elsewhere, by rows of macrotrichia and by the bordering pigment-bands. Hind tarsi with only the terminal bladder present on the first segment. Terminalia (Figs. 45–46, cotype; Figs. 47–48, St. Augustine specimen) with tenth abdominal tergite completely cleft; right hemitergite (10R) subtriangular, inner margin with a basal membraneous concavity, distally represented as a sclerotized rod (10RP₂), projecting forward towards ninth tergite. Posteriorly, 10R is produced backward and downward into a heavily-sclerotized, acute process (10RP₁), with a small obtuse subterminal lobe, placed ventrally and projecting to the left. Median membraneous flap as in *Rhagadochir carpenteri*. Process of left hemitergite (10LP) bifid, inner lobe slender, acute, curved to the left, outer lobe slender, sinuous, subobtuse, less heavily sclerotized. Left cercus with first segment (LC₁) clavate, inner lobe large, subterminal, directed slightly forward, distally echinulate; second segment (LC₂) slender, subcylindrical. Right cercus composed of two elongate subcylindrical segments (RC₁, RC₂), the first somewhat dilated distally; right cercus-basipodite (RCB) small, with a trace of an extra distal sclerite, as in *Clothoda urichi* (Sauss.). Hypandrium (H) produced into an obtuse lobe (HP) to the right of the mid-line; concavity to the left of HP occupied by laminoid left cercus-basipodite (LCB), which is produced as an incurved spine underlying the tip of HP, as in *Rhagadochir carpenteri*.

♀. See de Saussure (1896a, b). The colour of the dried ♀ cotype seen by the writer agreed with that of the dried ♂, from which it may be assumed that the pronotum is cream in living or alcoholic material.

Note.—Krauss (1911, p. 42) incorrectly refers this specimen to *Oligotoma*. Enderlein (1912, p. 30) refers to *Embia trinitatis* Sauss., a lapsus calami for *trinitatis*.

PARARHAGADOCHIR FLAVICOLLIS (Enderlein 1909). Figs. 49–50.

Embia flavicollis Enderlein 1909, *Zool. Anz.*, Bd. 35, p. 184.—*Rhagadochir flavicollis* Enderlein, 1912, *Coll. zool. de Selys-Longchamps*, fasc. 3, p. 56, figs. 29, 30.

This species is closely related to *P. trinitatis* (Sauss.), in size (length 6.5–8 mm.; length of forewing 6–6.5 mm., of hindwing 5.3–6 mm.), colour (exactly similar), venation (similar, but with more cross-veins), and form of the male terminalia. It will probably prove to be distinct only subspecifically. Enderlein (1912) figures and describes two males (the types; Mus. Stettin), one from Bolivia, one from Venezuela; the former is cited first in the text (1909, 1912), the latter figured first (1912); the former should probably be called the

holotype. Enderlein's figures of the terminalia (dorsal view only) cannot be regarded as entirely accurate, as the tenth abdominal tergite is shown as incompletely split; however, drawing a comparison between these figures and *P. trinitatis*, the following details may be noted:

(1). The posterior process of the right hemitergite (10RP₁) is out-curved. It seems to resemble that of *P. trinitatis* in its component parts, having a sharp spine and an obtuse lobe; whether the latter is membraneous cannot be decided from Enderlein's verbal description or line figures.—(2). The left lobe of the process of the left hemitergite is smoothly elliptical, and broader than in *P. trinitatis*.—(3). The left cercus-basipodite (Anhang des 9. Sternites) is different in form, apparently having no incurved hook underlying the hypandrium (trägt aussen einen kleinen stumpfen Zapfen, innen zwei stumpfe Ecken).

I am unwilling to reduce the specific status without personal study of the types or of other material from the same region. The relationship to the species re-described below is close, perhaps closer than to *P. trinitatis*.

PARARHAGADOCHIR TRACHELIA (Navás 1915). Figs. 51-66.

Rhagadochir trachelia Navás 1915, *Mem. R. Acad. cienc. y artes de Barcelona*, vol. 12, no. 7, p. 19, fig. 9.

The original description is from a male from Argentina (Santiago del Estero). I have not seen this type (Mus. La Plata); the present description is from a male (Mus. Paris), also from the Province of Santiago del Estero (10 km. from Lugones, railway from Rosario to Tucuman; December 1909, coll. E.-R. Wagner); it has been identified by Navás as '*Embia trachelia*' (on the label below the specimen; cf. also Navás, 1923, p. 10). It agrees with the original description (as far as it goes). The fact that it was identified by the author of the species is not as conclusive as might be supposed, as the terminalia of the dry specimen had not been prepared. Unless examination of the type should later prove the contrary, the determination may be accepted.

♂. Length 8 mm.; forewing 6 mm. × 1.5 mm.; hindwing 5 mm. × 1.5 mm. General colour rather dark brown, head especially dark, eyes black; prothorax (dry) yellowish-brown; wing-veins dark brown, longitudinal bands smoky-brown (i.e. colour throughout as in *P. trinitatis*). Head, venation, and hind tarsi (Fig. 51) as in *P. trinitatis*. Terminalia (Figs. 52-57) as in *P. trinitatis*, with the following differences: Posterior process of right hemitergite (10RP₁) simply tapered, without any apparent membraneous lobe; process of left hemitergite (10LP) with left-hand lobe broadly elliptical, right-hand lobe longer, somewhat sinuous; first segment of left cercus (LC₁) with inner echinulate lobe not directed at all forward; and left cercus-basipodite (LCB) obtusely tapered, without an incurved hook.

Also in the Paris Museum are seven males agreeing superficially with the above; time did not permit of the detailed examination of the terminalia, so that the identification is provisional. All have been identified by Navás as '*Embia trachelia*'. The localities are: Two more from the same locality as above; one from (apparently) the same locality, with the further specification 'Chuna Pampa'; and one from each of the following: 'Chaco de Santiago del Estero, Bords du Río Salado, env. d'Icaño, Jan. 1910, E. Le Mout'; 'Chaco de Santiago del Estero, Bords du Río Salado, La Palisa del Bracho, 25 km. N.O. (N.W.) d'Icaño, Jan. 1907, E.-R. Wagner'; 'Gran Chaco, Colonia Florencia, Bords du Río Tapenaga, 1903, E.-R. Wagner'; and 'Chaco de Santa Fé, Bords du Río Las Garzas, 20 km. O. (W.) d'Ocampo, E.-R. Wagner, 1903'.

A series of males in the Museum of Comparative Zoology, Harvard University, from Villarrica, Paraguay (coll. F. Schade), appears to be referable to *P. trachelia* (Nav.). Two of these were examined in detail:



Figs. 51-57.—*Parahagadochir trachelia* (Navás), ♂ (Santiago del Estero, 10 km. from Lugones; Mus. Paris). 51. Hind tarsus viewed laterally, × 23. 52. Terminalia from above, × 23. 53-56. Process of left hemitergite, various aspects, × 50. 57. Terminalia from below, × 23.

Figs. 58-63.—*Parahagadochir trachelia* (Navás), ♂ (Villarrica, Paraguay; Museum of Comparative Zoology). 58. Head from above, × 25. 59. Posterior part of right hemitergite, viewed from above, × 50. 60. Left hemitergite viewed from above, × 50. 61. Process of left hemitergite viewed from above, and slightly to the right and in front, × 50. 62. The same viewed from below and behind, × 50. 63. First segment of left cercus from above, × 50.

Figs. 64-66.—*Parahagadochir trachelia* (Navás), ♂ (Villarrica, Paraguay; Museum of Comparative Zoology. Second specimen referred to in text). 64. Posterior process of right hemitergite from above, × 50. 65. Process of left hemitergite from above and to the right, × 50. 66. Left cercus from above, × 50.

Figs. 67-69.—*Parahagadochir argentina* (Navás), ♂ (Las Garzas; Mus. Paris), 67. Terminalia from above, × 23. 68. Process of left hemitergite viewed from above and to the right, × 50. 69. Terminalia from below, × 23.

Figs. 70-73.—*Parahagadochir argentina* (Navás), ♂ (Villarrica, Paraguay; Museum of Comparative Zoology). 70. Hind tarsus viewed laterally, × 50. 71. Process of left hemitergite from above, × 50. 72. Left cercus from above, × 50. 73. Terminalia from below, × 25.

Figs. 74-75.—*Parahagadochir argentina* (Navás), ♂ (Villarrica, Paraguay; Museum of Comparative Zoology. Second specimen referred to in text). 74. Posterior part of right hemitergite viewed from above and to the right, × 50. 75. First segment of left cercus from above, × 50.

(1) (Collected in January; Figs. 58-63): Length 6.4 mm.; head 1.2 mm. \times 0.9 mm.; forewing 5.6 mm. \times 1.4 mm.; hindwing 5.2 mm. \times 1.5 mm. Colour, head (Fig. 58), venation and hind tarsi as in the specimen described above; terminalia (Figs. 59-63) also substantially in agreement, but with slight differences in the process of the left hemitergite and the left cercus.

(2) (Collected in December; Figs. 64-66): Length 7.0 mm.; head 1.2 mm. \times 0.9 mm.; forewing 5.4 mm. \times 1.4 mm.; hindwing 5.0 mm. \times 1.5 mm. Colour, head, hind tarsi, and terminalia agreeing with the above, but with slight variations in the posterior process of the right hemitergite (Fig. 64; trace of an inner membraneous lobe apparent), the process of the left hemitergite (Fig. 65; lobes of process shorter), and the first segment of the left cercus (Fig. 66; echinulate lobe somewhat different in form).

PARAHAGADOCHIR ARGENTINA (Navás 1918). Figs. 67-75.

Embia (Rhagadochir) argentina Navás 1918, *Brotéria*, Série Zoológica, vol. xvi, p. 104, fig. 4.

This species was described from two males from Argentina, one from Punta Lara, Province of Buenos Aires, coll. C. Bruch, 13/10/15 (Mus. La Plata), the second from Santa Fé, coll. P. Muhn, 6/1/15 (Navás Collection). The first-named may be regarded as the holotype. A full description of this specimen would be very desirable.

Two males in the Paris Museum (Chaco de Santa Fé: Las Garzas, Bords du Rio Las Garzas, 25 kil. O. (W.) d'Ocampo, E. R. Wagner, 1903) have been identified by Navás as '*Embia argentina*' (on the labels below the specimens; cf. also Navás, 1923, p. 10). The terminalia of these dried specimens had not been prepared, so that the identification by Navás, the author of the species, again cannot be taken as positive. The following description and figures (67-69) are from one of these males.

♂. Length 8.5 mm.; forewing 6.5 mm. \times 1.5 mm.; hindwing 5.5 mm. \times 1.5 mm. Colour as in *P. trachelia* (Nav.), but with the prothorax concolorous with the rest of the body. Head as in *P. trachelia*, but with the hind part a little squarer. Venation as throughout the genus. My notes on the hind tarsus of this specimen are inconclusive, but it would appear from other specimens (infra) that this series has two metatarsal bladders, in contradistinction to other members of the genus studied. Terminalia (Figs. 67-69) within the range of *P. trachelia* (Nav.) as recognized above.

A series of males in the Museum of Comparative Zoology, Harvard University (Villarrica, Paraguay, coll. F. Schade) appears to be referable to *P. argentina* (Nav.). Two of these were studied in detail:

(1) (Collected in August; Figs. 70-73): Length 8.5 mm.; head 1.4 mm. \times 1.0 mm.; forewing 5.9 mm. \times 1.4 mm.; hindwing 5.4 mm. \times 1.6 mm. Colour as in the Las Garzas specimen, i.e. prothorax concolorous. Head and venation as in Las Garzas specimen. Hind tarsi (Fig. 70) with two definite ventral bladders on first segment. Terminalia (Figs. 71-73) essentially as in the Las Garzas specimen.

(2) (Collected in November; Figs. 74-75): Length 8.5 mm.; head 1.5 mm. \times 1.0 mm.; forewing 6.0 mm. \times 1.5 mm.; hindwing 5.5 mm. \times 1.5 mm. Colour, head, venation, and hind tarsus as in the preceding specimen. Terminalia as in the preceding, with minor differences, e.g. the posterior process of the right hemitergite (Fig. 74) has an extra membraneous lobe, and the echinulate lobe of the first segment of the left cercus (Fig. 75) is directed slightly forward.

Finally, I have received details from Mr. E. S. Ross, of the University of California, of a male from Sierra Córdoba, Argentina (Cornell Univ. Collection). This agrees in size and colour, and in the structure of the hind tarsi and terminalia, with the present concept of *P. argentina*.

Note.—The last word concerning *Pararhagadochir trachelia* and *P. argentina* will depend on a thorough examination of the types (Mus. La Plata); supplementary data could be obtained by a detailed examination of those series in the Museum of Comparative Zoology and the Paris Museum, some specimens of which have been described above. On the present data, *P. argentina* seems to differ from *P. trachelia* in the more robust build, squarer shape of the hind part of the head, concolorous prothorax, additional hind metatarsal bladder, and possibly in its earlier appearance in the season. The intra-specific variability observed in the present concepts of the two species, i.e. minor details in the terminalia, should be noted in weighing specific or subspecific criteria in this genus. The variation in the posterior process of the right hemitergite (10RP₁) is probably unimportant; the appearance of an additional membranous lobe, noted in some specimens of each of these species, may well depend on chance occurrences in preservation and preparation. The variations in other structures (e.g. the left hemitergite and cercus, and the cercus-basipodites) seem more likely to represent original structural differences.

Little emphasis can be attributed to the fact that the figures given by Navás (1918, figs. 4a, 4b), for parts of the terminalia of *P. argentina*, fail to agree with the present description of this species.

PARARHAGADOCHIR sp. indet. Figs. 76–79.

A single male in the Museum of Comparative Zoology (Parintins, Brazil, 2/x/–, coll. Parish) does not appear to be referable to any known species, but it seems unwise to erect a new species, in such a difficult genus, on a single specimen. Full details are given, as several interesting characters are present:

♂. Length 5 mm.; head 1.1 mm. × 0.9 mm.; forewing 3.6 mm. × 1.2 mm.; hindwing 3.4 mm. × 1.2 mm. General colour dark brown, prothorax concolorous. The form of the head (Fig. 76) agrees with *P. trinitatis*. The hind tarsi (Fig. 77) have but one bladder present on the ventral surface of the first segment, and this is placed distally; but in a mid-ventral position on this segment, i.e. in the position where an extra bladder occurs in *P. argentina*, as well as in members of many other genera, there is an area, free from setae, where the pigmentation and sclerotization are weak, though no protuberance of this area occurs. The terminalia (Figs. 78–79) are suggestive of *P. trinitatis* in some respects, with the following differences: The base of the process of the left hemitergite (10LP) is broader; the echinulate lobe of the first segment of the left cercus (LC₁) is very smoothly rounded; the left cercus-basipodite (LCB) is obtusely tapered, without an incurved hook, thus agreeing with *P. trachelia* and *P. argentina*, in opposition to *P. trinitatis*; and the right cercus-basipodite (RCB) is slightly different in form.

In some respects, this specimen agrees more closely with *P. tenuis* (End.) and *P. adspersa* (End.) (infra) than with the species described earlier. In spite of its small size, the venation of this specimen is no weaker than in other members of the genus.

I have received from Mr. E. S. Ross details of a specimen (♂) which appears to agree with the above in most respects. This specimen is from Saramacca, Surinam (Cornell Univ. Collection).

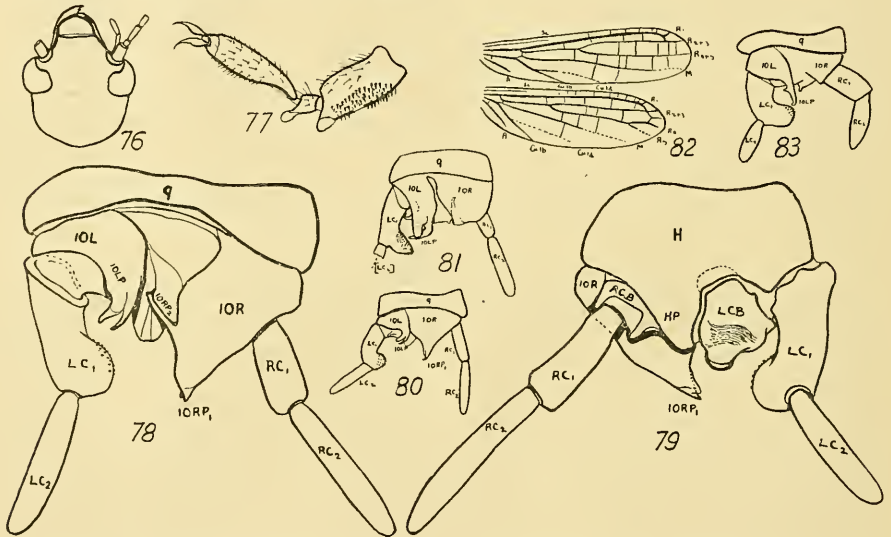
PARARHAGADOCHIR TENUIS (Enderlein 1909). Fig. 80.

Embia tenuis Enderlein 1909, *Zool. Anz.*, Bd. 35, p. 186.—*Rhagadochir tenuis* Enderlein, 1912, *Coll. zool. de Selys-Longchamps*, fasc. 3, p. 60, figs. 34–35.

♂ (after Enderlein, 1909, 1912): Length 6.5 mm. (approx.); length of forewing 6 mm., of hindwing 5½ mm. (approx.). General colour dark brown, eyes black; wings pale brown with hyaline lines, veins brown. Head and wings as in *P. flavicollis*; number of tarsal bladders not stated. Terminalia as in Figure 80 (after Enderlein, 1912, fig. 34).

Locality.—Bolivia: Provinces of Sara and Yungas. Types in Stettin and Berlin Museums.

The terminalia do not differ greatly from *P. argentina*, which this species would displace if the synonymy were proved. Without first-hand study of the types, the relationship cannot be gauged.



Figs. 76-79.—*Pararhagadochir* sp. indet., ♂ (Parintins, Brazil; Museum of Comparative Zoology). 76. Head from above, $\times 17$. 77. Hind tarsus viewed laterally, $\times 47$. 78. Terminalia from above, $\times 50$. 79. Terminalia from below, $\times 50$.

Fig. 80.—*Pararhagadochir tenuis* (Enderlein), ♂. Terminalia from above, $\times 16$. (After Enderlein, 1912, fig. 34.)

Fig. 81.—*Pararhagadochir adspersa* (Enderlein), ♂. Terminalia from above, $\times 12$. (After Enderlein, 1912, fig. 32.)

Figs. 82-83.—*Calamoclostes albistriolatus* Enderlein, ♂. 82. Right fore- and hindwings, $\times 3$. 83. Terminalia from above, $\times 10$. (After Enderlein, 1912, figs. 10, 11.)

PARARHAGADOCHIR ADSPERSA (Enderlein 1909). Fig. 81.

Embia adspersa Enderlein 1909, *Zool. Anz.*, Bd. 35, p. 185.—*Rhagadochir adspersa* Enderlein, 1912, *Coll. zool. de Selys-Longchamps*, fasc. 3, p. 58, figs. 32–33.

♂ (after Enderlein, 1909, 1912): Length 9 mm.; length of forewing 10.5 mm., of hindwing 9.5 mm. General colour as in the preceding species, wings very finely flecked with brown; structure of head, and venation, as throughout the genus. Number of hind metatarsal bladders not stated. Terminalia as in Figure 81 (after Enderlein, 1912, fig. 32).

Locality.—Bolivia: Province of Sara. Type in the Stettin Museum.

The broad process of the left hemitergite, and the relatively long internal lobe of the first segment of the left cercus, appear to differentiate this species clearly from any other named species.

Note.—The genus *Pararhagadochir* offers considerable difficulty both in its relationship to other genera and in the differentiation of its component species. The former may be attributed to convergence; the latter to individual variation, and also in part to the inadequacy of some existing descriptions. I have not attempted a specific key; the six previously-described species have been allowed as distinct, and details of the structure of an unnamed species have been put on record. I have adopted a conservative attitude with regard to any changes in specific status, or to the addition of new species, as I have seen material of only three of the six species, and in the case of only one, the genotype, has this been a properly-authenticated type.

Genus CALAMOCLOSTES Enderlein 1909.

Zool. Anz., Bd. 35, p. 188. Genotype, *Calamoclostes albistriolatus* Enderlein 1909, l.c., p. 189.

Neotropical Embioptera, the males winged, with R_{4+5} simple in the forewing, shortly forked in the hind; tenth abdominal tergite completely cleft, process of left hemitergite with a short lateral lobe; first segment of left cercus clavate, echinulate.

The genus may be allowed in Enderlein's sense, with a protest against the erection of a genus on a venational character present in one pair of wings of a unique specimen, in an Order in which venational anomalies are frequent: e.g. *Clothoda urichi* (Sauss.) has R_{4+5} normally forked, exceptionally simple in one or more wings.

The genus could probably be substantiated on other characters, as the terminalia of the genotype seem to differ clearly from any other known series; such a course would retain the genus, under a new concept, even if it were proved that, in the original concept, it was based on a venational anomaly.

However, having only Enderlein's line figures before me, and no details of the hind metatarsal bladders, it is impossible to place the genus, under a new concept, in the general scheme. I have therefore retained it, provisionally and temporarily, in Enderlein's sense.

CALAMOCLOSTES ALBISTRIOIATUS Enderlein 1909, l.c. Figs. 82-83.

♂ (after Enderlein, 1909, 1912): Length 10 mm.; length of forewing 9 mm., of hindwing 8 mm. General colour blackish-brown; wings brown, with fine hyaline inter-venal lines and hyaline striae at cross-veins. Veins dark brown. Head with rather small eyes; sides behind eyes converging posteriorly, almost straight. Number of hind metatarsal bladders not stated. Wings (Fig. 82) (in unique specimen) with R_{4+5} simple in forewing, forked in hind; M and Cu_{1a} simple, the latter subobsolescent. Cross-veins rather numerous. Terminalia (Fig. 83) with tenth abdominal tergite completely cleft; processes of right hemitergite obscure in the figure, not described; process of left hemitergite elongate, terminally curved to the left, subacute, with a small projection to the left from near the base. Right cercus with two subcylindrical segments; first segment of left cercus curved inward in a rounded echinulate lobe; second segment subcylindrical. Ventral structures not figured, nor described.

Locality.—Baños, Ecuador, at 1800 metres above sea-level. Type in Stettin Museum.

Key.

The following key distinguishes, as adequately as possible, the genera of Embioptera whose males have the process of the left hemitergite complex, the first segment of the left cercus echinulate, and R_{4+5} forked in at least the hindwings. The characters are for the males; abbreviations, as used throughout this paper and explained under the text-figures, are used for the parts of the terminalia.

1. R_{4+5} simple in forewing, shortly forked in hindwing *Calamoclostes* End.
 R_{4+5} forked in all wings, the fork at least as long as the stem 2
2. Mandibles huge, overlying labrum *Enveja* Navás.
Mandibles not as above 3
3. Teeth on LC_1 less than ten, very large 4
Teeth on LC_1 smaller, less than ten in number 5
4. Hind legs with one ventral bladder on metatarsus; M tending to fork
..... *Donaconethis* End.
Hind legs with two ventral bladders on metatarsus; M simple .. *Odontembia* Davis
5. LC_1 with more than one echinulate lobe internally; Cu three-branched
..... *Dihyboercus* End.
 LC_1 with only one internal echinulate lobe; Cu two-branched 6
6. R_{4+5} subobsolescent beyond fork *Navásiella* Davis.
 R_{4+5} not as above 7
7. 10LP with a distal concavity between lobes 8
10LP with lateral lobe very short, no distal concavity *Parachirembia* Davis.
8. 10RP₂ a flat elliptical flap, separated from 10R by membrane except at posterior
limit 9
10RP₂ not as above 10
9. Two large bladders on ventral surface of hind metatarsus; RCB very large
..... *Macrembia* Davis
One hind metatarsal bladder; RCB small *Chirembia* Davis.
10. Hind metatarsus with two bladders on ventral surface; African .. *Rhagadochir* End.
Hind metatarsus with only the terminal ventral bladder present (except in one
species); Neotropical *Pararhagadochir* Davis.

List of References.

- DAVIS, C., 1938.—Studies in Australian Embioptera, Part iii. PROC. LINN. SOC. N.S.W.,
lxiii, 3-4.
- ENDERLEIN, G., 1909.—Die Klassifikation der Embiiden, nebst morphologischen und physio-
logischen Bemerkungen, besonders über das Spinnen derselben. *Zool. Anz.*, Bd. 35.
- , 1912.—Embiidinen, in *Coll. zool. de Selys-Longchamps*, fasc. 3.
- FRIEDERICH, K., 1934.—Das Gemeinschaftsleben der Embiiden und Näheres zur Kenntnis
der Arten. *Arch. f. Naturg.*, N.F., Bd. 3, Hft. 3.
- KRAUSS, H. A., 1911.—Monographie der Embien. *Zoologica*, Hft. 60, Bd. 23 (Stuttgart).
- NAVÁS, L., 1915.—Neurópteros Nuevos o Poco Conocidos, Sexta Série. *Mem. R. Acad.
cienc. y artes de Barcelona*, vol. 12, no. 7.
- , 1918.—Embiópteros de la América Meridional. *Brotéria*, Série Zoológica,
vol. xvi.
- , 1922.—Algunos Insectos del Museo de París. *Rev. Acad. Cienc. Zaragoza*, vii.
- , 1923.—Comunicaciones Entomológicas. 6. Notas sobre Embiópteros. *Ibid.*, viii.
- , 1926.—Insecta Nova, Series xi. *Mem. Pont. Accad. delle Scienze*, Nuovi Lincei,
Series ii, vol. 9 (Rome).
- , 1930.—Spedizione del Barone Raimondo Franchetti in Danalia: Insetti
Neuroterteri ed Affini. *Ann. Mus. Civ. Storia Naturale*, Genoa, vol. 55.
- SILVESTRI, F., 1921.—Description of a New Species of Embiidae from Southern Nigeria.
Trans. Ent. Soc. London, 1921.
- DE SAUSSURE, H., 1896a.—Two Embiidae from Trinidad. *Journ. Trinidad Club*, vol. 2,
no. 12 (Port of Spain).
- , 1896b.—Note sur la Tribu des Embiens. *Mitt. Schweiz. entomol. Gesellschaft*,
Bd. 9, Hft. 8.

NOTES AND CORRIGENDA.

The following notes and corrigenda refer to Parts i-xiv of this Series of papers, published in these Proceedings, vol. lxiv, 1939.

Part i: Page 188, lines 14-15, for *O. ruficollis* de Saussure, 1896 read *O. ruficollis* (de Saussure, 1896), Krauss, 1911

Part iv: Page 374, line 5 from bottom, *for* having read *have*

Part v: Page 382, line 11, '*Dihyobocercus berlandi* Navás 1922, and *D. gromieri* Navás 1934': The latter species, though obviously congeneric with the former, was described as *Embia gromieri*, and had in fact never been referred to *Dihyobocercus*.

Part vi: Page 475, Explanation to Figs. 1-3, for *ferrox* read *ferox*. At bottom of page, from 'Conventional' to end, read

Conventional lettering for venation.

9, ninth abdominal tergite; 10L, 10R, left and right hemitergites of tenth abdominal segment; 10LP, process of 10L; 10RP₁, 10RP₂, posterior and inner processes of 10R; 10RP, process of 10R (when only one is present); LC₁, LC₂, RC₁, RC₂, first and second segments of left and right cerci; LCB, RCB, left and right cercus-basipodites; H, ninth abdominal sternite (hypandrium); HP, process of H.

Part xiii: Pages 567-572, for *Berlandiella* read *Berlandembia*

Part xiv: Pages 573-575, for *Saussurella* read *Saussurembia*

The two homonyms noted above are due to the fact that no reference books of names of genera were available when these papers were written. Lists of proposed new genera were sent to a friend in Sydney, from whom the erroneous information was received that none was preoccupied. My thanks are due to Mr. G. P. Whitley, of the Australian Museum, for calling the homonymy to my attention. The details are set out below.

BERLANDEMBIA, nom. nov.

Berlandiella Davis 1939, Proc. Linn. Soc. N.S.W., lxiv, 5-6, p. 567. Non *Berlandiella* Mello-Leitão 1929, Arch. Mus. nac. Rio de Janeiro, 31, p. 122 (Arachnida).

SAUSSUREMBIA, nom. nov.

Saussurella Davis 1939, Proc. Linn. Soc. N.S.W., lxiv, 5-6, p. 573. Non *Saussurella* I. Bolivar 1887, Ann. Soc. ent. Belgique, 31, p. 196 (Orthoptera).