

A revision of the Neotropical species of the genus *Mnemosyne* STÅL, 1866 (Homoptera, Cixiidae)

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Summary

This paper is concerned with a taxonomic study of the Neotropical species of the genus *Mnemosyne*. The male genitalia of *M. cubana* STÅL and *M. planiceps* (FABRICIUS) are described for the first time. In addition to the five known species, 17 more are described as new to science. *Mnemosyne asymmetrica* METCALF, 1954 is synonymized with *M. cubana* STÅL, 1866, a lectotype is selected for *M. cubana* STÅL, and a key to the species is given.

Key-words: Homoptera, Cixiidae, *Mnemosyne*, Neotropical, taxonomy.

Résumé

Ce travail présente une étude taxonomique des espèces néotropicales du genre *Mnemosyne*. Les genitalia mâles de *M. cubana* STÅL et *M. planiceps* (FABRICIUS) sont décrits pour la première fois. En outre des cinq espèces déjà connues, 17 espèces sont décrites comme nouvelles pour la science. *Mnemosyne asymmetrica* METCALF, 1954 est mis en synonymie avec *M. cubana* STÅL, 1866. Un lectotype est sélectionné pour *M. cubana* STÅL. Une clé de détermination est présentée.

Mots-clés: Homoptera, Cixiidae, *Mnemosyne*, Néotropical, taxonomie.

Introduction

The genus *Mnemosyne* was erected by STÅL, 1866 to accommodate its Neotropical type species *Mnemosyne cubana*. METCALF (1936) lists 12 taxa all described from tropical regions. Since then *M. arenae* was described by FENNAH (1945) from Trinidad. *M. asymmetrica* by METCALF (1954) from the Bimini Islands, and *M. lamabokensis* by SYNAVE (1978) from the Central African Republic. The Afrotropical species were recently revised by myself (VAN STALLE, 1985) with the description of two further species bringing the total number to six for the African continent. The Oriental taxa described in *Mnemosyne* have never been the subject of a revision; at present six species are listed in Metcalf's catalogue of the Hemiptera (METCALF, 1936).

Previously only five species were listed as occurring in the Neotropical region. In all we have studied 150

specimens from ten museums, representing only a minor sample of the populations living in South America. Nevertheless we have recorded 23 species, 17 which are new to science. It is clear that intensive sampling will increase the number of species. Apparently active speciation has taken place in the Caribbean area and on the South American continent in comparison to the relatively better sampled Afrotropical fauna where only six species have been recorded with the same amount of material sampled.

The genus *Mnemosyne* closely resembles the species of the genus *Oliarus* STÅL. The species of *Mnemosyne* can generally be distinguished by their larger size and more robust habitus, and by the presence of granules in the cells of the tegmina. For the latter character, which is the 'easiest' one, some exceptions occur. The differences mentioned in keys refer to the venation pattern of the media: first (basal) fork closer to M3 and M4 than to M1 and M2, while the reverse is true in *Oliarus*. Another character which is used to distinguish *Mnemosyne* species is the five carinate state of the mesonotum. In contrast to what is generally admitted and in contrast to the Afrotropical species (VAN STALLE, 1985), many Neotropical species have only three distinct keels on the mesonotum caused by a reduction of the two submedian ones. The five carinate character state thus has to be treated with caution. This study has revealed two further characters for the recognition of this genus: the genital styles are fused at their base and a small impair process is present at the place of their fusion; the genital styles are separate in many other Cixiidae and in *Oliarus*. A further character was found in the tymbal organ where a short apodeme is present on each side when viewed from the head; the importance of this character can not be estimated for the moment since it has not been studied in most Cixiidae.

The species discussed in this paper are more or less ordered according to their phylogenetic relationships. In the key, which is partly based on male characters, an attempt is made to identify the species as far as possible without dissection of the male genitalia. In some cases however an examination of the aedeagus

is indispensable. As many taxa remain undescribed at present it is advisable to confirm each identification by examination of the aedeagus.

Where possible, homologous structures have been drawn at the same scale; in the figures of the tegmina the points refer to the granules and the barred areas refer to the colour pattern; the scale of the figures of the medioventral process of the pygofer is always twice as large as the lateral aspect of the pygofer.

Biology

MYERS (1929) gave a detailed description of the life history of *Mnemosyne cubana*. The nymphs live in the vicinity of roots in a silky secretion and are attended by ponerine ants. Information on the life history of other species is lacking.

Material

The material studied below is deposited in the collections of the following museums and institutions:

COB	Coll. L. O'BRIEN, Florida Agricultural and Mechanical University, U.S.A.
BMNH	British Museum (Natural History), U.K.
KBIN	Koninklijk Belgisch Instituut voor Natuurwetenschappen, Belgium.
CAS	California Academy of Sciences, U.S.A.
NCSU	North Carolina State University, U.S.A.
MRSN	Museo Regionale du Scienze Naturali, Italy.
ZM	Zoologisk Museum, Copenhagen, Denmark.
MNHN	Muséum National d'Histoire Naturelle, France.
USNM	United States National Museum.
BPBM	Bernice P. Bishop Museum, Honolulu, U.S.A.

Mnemosyne STÅL, 1866

Type species:

Mnemosyne cubana, STÅL, 1866.

Large Cixiidae (8-15 mm). General colour ochreous to brown; tegmina hyaline with brown colour marks. Frons and clypeus flat, carinae obsolete; median keel forked at level of junction of frons and vertex. Frontoclypeal suture bent, median ocellus present, clearly visible, obsolete or sometimes invisible. Rostrum long, appreciably exceeding hind coxae. Vertex with subapical transverse keel clearly marked or very obsolete, connected to the forked median keel of the frons. Base of vertex excavated, this excavation trapezoid due to the presence of a straight part in middle of hind margin; length in middle varying from equal to twice width at tip of basal emargination. Pronotum with obsolete keels, not narrowing in middle. Mesono-

tum with five longitudinal keels, the two submedian ones sometimes very obsolete or even lacking. Tegmina hyaline, veins ochreous to brown, granules present in at least the apical cells, sometimes present all over their surface; M3 not forked distally in the Carribean species (cfr. Fig. 10), forked in the continental species (Figs. 44, 51). Hind tibiae with unmovable lateral spines and apical spines as follows from inner to outer side: a group of three spines, the middle one very small in comparison to the two others, two subequal spines in the middle and a single large outer spine; hind tarsi with five spines on first and second tarsite (continental species) or six apical spines on the second tarsite (Carribean species). Tymbal organ with a short but distinct apodeme on each side.

Male genitalia: anal segment, pygofer and genital styles symmetrical or nearly so. Anal segment with a single apical lobe, sometimes armed with a long spine. Pygofer usually with lobes on lateral margins and a large and complex medioventral process. Genital styles with a relatively complex apex, fused at their base and having in common a small triangular process. Aedeagus connected to anal segment, consisting of a sclerified basal periandrium and a distal membranous flagellum, and provided with a number of spines and processes characteristic for each species.

Female genitalia: very uniform; pregenital sternite small, cephalic border rounded, caudal border straight. Anal segment rectangular. Ovipositor with three pairs of valvulae visible, first pair reduced, broadening basally, second pair of valvulae fused together over 2/3 of their length.

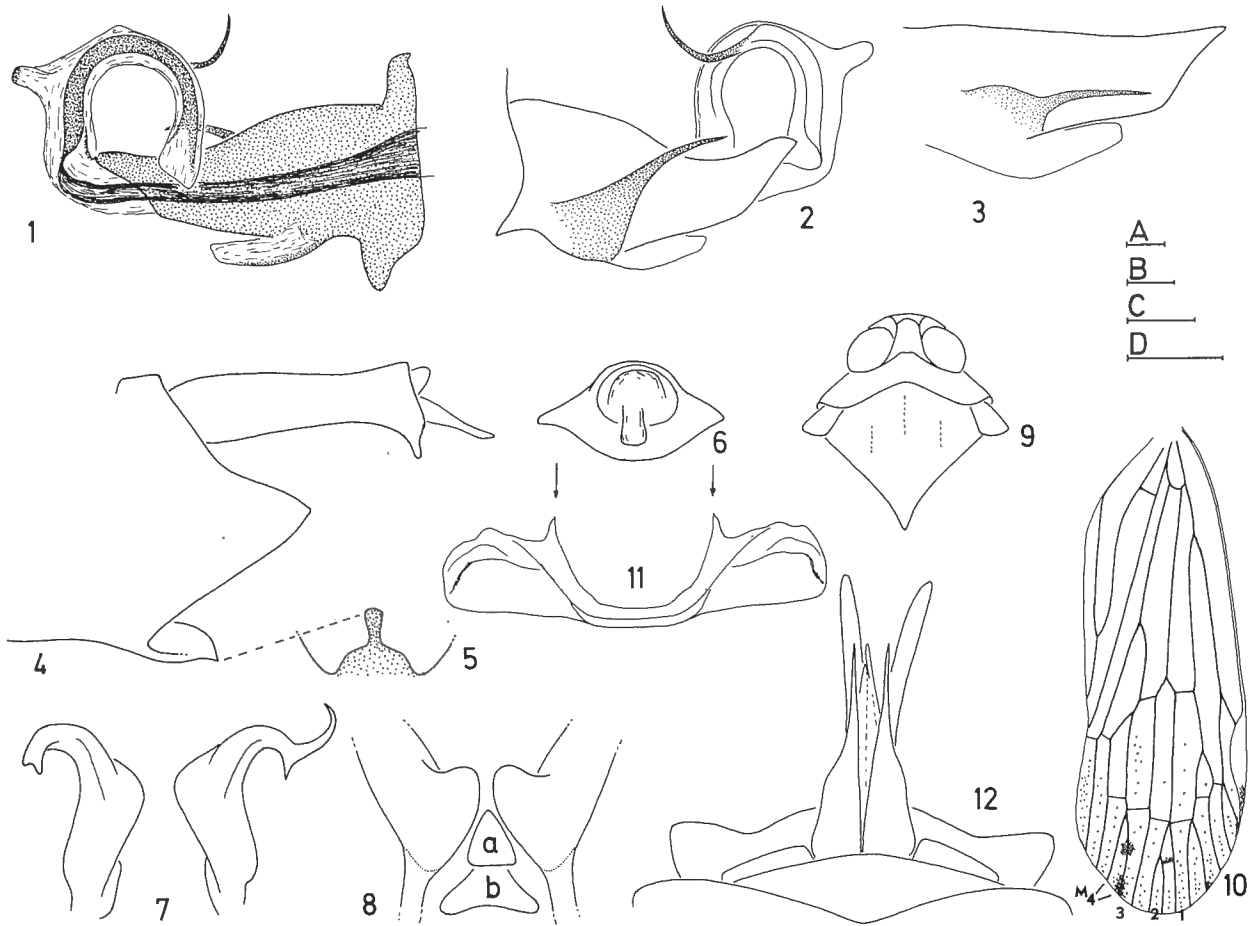
As already mentioned above the species can basically be divided in a Carribean and a continental group; the Carribean group consists of *Mnemosyne cubana*, *M. fasciata*, *M. pseudofasciata*, *M. dominicensis*, *M. oblongostriata*, *M. consoleae*, *M. granulata* and *M. vegensis* and differs from the continental species-group in the fact that on the tegmina (as is the case in the Afrotropical species) M3 is not forked and on the hind tarsi the chaetotaxy is 5/6. *M. arenae*, recorded from Trinidad is an exception and belongs to the continental group. It clearly evolved as a distinct species out of a continental stock after colonisation of the island.

The differences in the male genitalia are less obvious but a basic plan with homologous spines can be recognised in the Carribean group as well as in the continental group) among the latter the structure of the aedeagus of the species described as "apud *cixioidis*" is different from the other species.

Key to species based on males

M. colombiae, only known from the female holotype (Figs. 44, 45) is not included in the key.

1. - Chaetotaxy hind tarsi 5/6 (Caribbean species), five teeth on the first tarsite and six on the second 2
 - Chaetotaxy hind tarsi 5/5 (continental species), five teeth on the first tarsite and five on the second 9
2. - Tegmina densely granulate in apical and subapical cells, in contrast to the anterior half where granules are only sparsely present (Fig. 10) 3
 - Tegmina densely granulate all over their surface, anterior and apical part equally granulate (Fig. 17) 6
3. - Pygofer with apex of medioventral process narrowed distally in ventral view (Fig. 5); right genital style with a spine at apex (Fig. 7) *M. cubana* STÅL
 - Pygofer with medioventral process not narrowed distally, or even widening (Figs. 24, 29) 4
4. - Pygofer with medioventral process widening distally (Fig. 29); aedeagus with right spine recurved basally (Fig. 31) *M. consoleae* sp. n.
 - Pygofer with medioventral process not distinctly widening (Fig. 24); aedeagus with right spine not recurved (Fig. 26) 5
5. - Aedeagus with left basal spine long and curved (Fig. 26) *M. dominicensis* sp. n.
 - Aedeagus with left basal spine short (Fig. 27) *M. oblongostriata* sp. n.
6. - Small species (8-9 mm); vertex as long as broad, with a sharp, straight subapical keel (Fig. 37); face entirely black, median keel missing . *M. granulata* sp. n.
 - Larger species (> 9 mm); vertex 1.5 to 2 times as long as broad, subapical keel bent (Fig. 43); face not entirely black, ochreous or with paler areas 7
7. - Vertex narrow, twice as long as broad. Pygofer with lateral lobes truncate (Fig. 40) and medioventral process slightly widening distally, hereby showing concave lateral margins, and appreciably longer than wide. Aedeagus with a very conspicuous basal process directed to left side (Fig. 42) *M. vegensis* sp. n.
 - Vertex broader, 1.5 times as long as broad. Pygofer with lateral lobes triangular; medioventral process as long as broad (Fig. 14). Aedeagus without a conspicuous process as described above 8
8. - Right genital style with a long and tapering apex (Fig. 16). Aedeagus with right basal process reaching to apex (Fig. 15) *M. fasciata* sp. n.
 - Right genital style with a short, hook-shaped apex (Fig. 20). Aedeagus with right basal process not reaching to apex (Fig. 18) *M. pseudofasciata* sp. n.
9. - Face yellowish, with brown transverse bands (Fig. 95) 10
 - Face without transverse bands 11
10. - Anal segment with a spine on apical lobe (Fig. 80) *M. anoriensis* sp. n.
 - Anal segment without such a spine *M. frontistriata* sp. n.
11. - Anal segment with a long spine on apex (Fig. 68) *M. kutariensis* sp. n.
 - Anal segment without a long spine on apex 12
12. - Pygofer without distinct processes on lateral margins or these only slightly bent 13
 - Pygofer with distinct processes on lateral margins (Figs. 77, 84, 89) 14
13. - Pygofer with lateral margins bent and medioventral process bifurcated distally; anal segment with a large apical process (Fig. 103) . *M. pernambucoensis* sp. n.
 - Pygofer with lateral margins almost straight and medioventral process with two additional processes on halfway their length (Figs. 109 & 111); anal segment with only a small apical process *M. sp. apud cixioides* (SPINOLA)
14. - Anal segment with a large apical process (Fig. 96), longer than width of anal segment in caudal view (Fig. 98) and obtuse, not tapering 15
 - Anal segment with apical process smaller, not as wide as described above, and sometimes tapering 16
15. - 10 to 12 mm; mesonotum fuscous, strongly contrasting with the pale colour of the pronotum; aedeagus as illustrated in Fig. 100 *M. araguensis* sp. n.
 - 8 mm; mesonotum ochreous, not strongly contrasting with the pronotum; aedeagus as illustrated in Fig. 101 *M. arenae* FENNAH
16. - Pygofer on each side with two distinct processes (Fig. 77, 84, 89) 17
 - Pygofer on each side with only one distinct process (Fig. 47, 56) 19
17. - Pygofer with medioventral process as illustrated in Fig. 85, broad at base and abruptly narrowing distally, tapering *M. flavicollis* sp. n.
 - Pygofer with medioventral process narrow throughout (Fig. 73) 18
18. - Processes on lateral margin of pygofer separated by a straight portion (Fig. 77); aedeagus with a denticulate process on right side (Fig. 79) *M. tenensis* sp. n.



Figs. 1-12. *Mnemosyne cubana* STÅL – 1 & 2: aedeagus, dorsal and ventral view; 3: aedeagus, ventral part, aberrant specimen from Cuba; 4: pygofer and anal segment; 5: medioventral process of pygofer; 6: anal segment, caudal view; 7: left and right genital style, lateral view; 8: fused base of genital styles, ventral view, with (a) the unpair median process, and (b) the dorsal part of the connectivum; 9: head, pronotum, mesonotum and tegulae; 10: right tegmen; 11: chitinized parts of tymbal organ, cephalic view; 12: external female genitalia, ventral view.
 Scale A (0.2. mm): 4-7; B (1 mm): 10; C (0.2 mm): 1-3, 8; D (1 mm): 9, 11, 12.

- Processes on pygofer meeting each other (Fig. 72); right process on aedeagus not denticulated. *M. ecuadorana* sp. n.
- 19. - Anal segment with apical lobe obtuse (Fig. 58); pygofer with medioventral process as illustrated in Fig. 57 *M. mabarumensis* sp. n.
- Anal segment with apical lobe tapering (Fig. 48, 64) 20
- 20. - Pygofer with a triangular process on lateral margins; medioventral process as illustrated in Fig. 65 *M. planiceps* (FABRICIUS)
- Pygofer with a truncate process on lateral margins; medioventral process as illustrated in Fig. 49 *M. braziliensis* sp. n.

Systematic account

***Mnemosyne cubana* STÅL, 1866**
 (Figs. 1-12)

Mnemosyne cubana STÅL, 1866: 391.
Mnemosyne cubana STÅL; STÅL, 1870: 746; HEIDEMAN and OSBORN, 1917: 348; MYERS, 1928: 15; 1929: 284, figs. 1-7.
Mnemosyne cutana (sic) STÅL; FOWLER, 1904: 102.
Mnemosina (sic) *cubana* STÅL; VALDES, 1910: 442; 1914: 103.
Mnemosyne cubanae (sic) STÅL; MUIR, 1923: 555.
Mnemosyne asymmetrica METCALF, 1954, 5, figs. 3-6, **syn. n.**

Material:
 Lectotype male, "Cuba", "typus", by present designation, NR.
 Paralectotype: 1 female, "Cuba", "var.", NR.

Additional material:

3 males, 2 females, Cuba, "La Havane", leg. P. SERRE, 1909, MNHN; 1 male, 1 female, Cuba, Valle del Yumuri, Matanzaz, VI.1970; 1 male, Soledad, 28.V.1925; 2 males, 2 females, Trinidad Mts, Mina Carlota, III.1925, J. G. MYERS, reared, BMNH; 3 males, 2 females (Paratypes *Mnemosyne asymmetrica*), South Bimini Isl., Bahama's, 12.VI.1950, CAZIER & RINDGE, NCSU, COB.

Description:

General colour varying from ochreous to brown; vertex as long as broad or slightly longer. Median keel on frons very obsolete, two paler spots visible laterally near frontoclypeal suture. Ocellus visible as a small, pale spot. Postclypeus slightly swollen, median keel lacking. Pronotum ochreous, with an inconspicuous keel laterally at level of tegulae. mesonotum somewhat darker than pronotum, with three obsolete longitudinal keels (Fig. 9), the two (additional) submedian ones almost invisible. Tegmina as illustrated in Fig. 10, densely covered with granules in the apical cells; no granules on costal margin. Chaetotaxy hind tarsi: 5/6.

Length: male 12-13 mm, female 14-15.5 mm.

Male genitalia: anal segment with a small apical lobe. Pygofer symmetrical, with a medioventral process as illustrated in Fig. 5. Genital styles asymmetrical, right one with a long spine at apex, left one without such a spine. Aedeagus with two long spines, one ventrally on base of perianthrium and another on flagellum; a third process on right side on sclerified perianthrium and a fourth short membranous process on flagellum, on basal 1/3.

Female genitalia: anal segment rectangular, narrow; ovipositor and pregenital sternite as illustrated in Fig. 12.

Diagnosis:

On Cuba two other species have been recorded, described below as *M. fasciata* and *M. pseudofasciata*. *M. cubana* can be distinguished from these by its large size, 12-15.5 mm in *M. cubana* while 9 to 11 mm in the taxa described below, by the hyaline tegmina where the granules are confined to the apical cells, and not spread over the whole surface as is the case in *M. fasciata* and *M. pseudofasciata*, and by the ochreous colour of the body while the face and mesonotum are dark brown to shiny black in *M. fasciata* and *M. pseudofasciata*.

Remarks:

The male genitalia of the lectotype have not been dissected; the aedeagus was perfectly visible due to the upward position of the anal segment, and the type was compared to the additional specimens listed above.

In contrast to what is mentioned in METCALF (1954) we have not observed any differences between *M. cubana* and *M. asymmetrica*, although several paratypes were dissected and the male genitalia compared to those of other Cuban populations; accordingly we have listed *M. asymmetrica* as a junior synonym of *M. cubana*.

The biology of this species has been discussed by MYERS (1929) to which we refer. I have examined specimens reared by MYERS and kept in the collections of the BMNH, and I confirm their identity.

***Mnemosyne fasciata* sp. n.**
(Figs. 13-17)

Material:

Holotype male, Cuba, Prov. Ote Zayas, Alayo-Farcia, Turquino, VI. 1963, BMNH.

Paratype: 1 male, Cuba, Sierra Maestra, P. Turquino, Faldd Norte, VI.1967, KBIN.

Description:

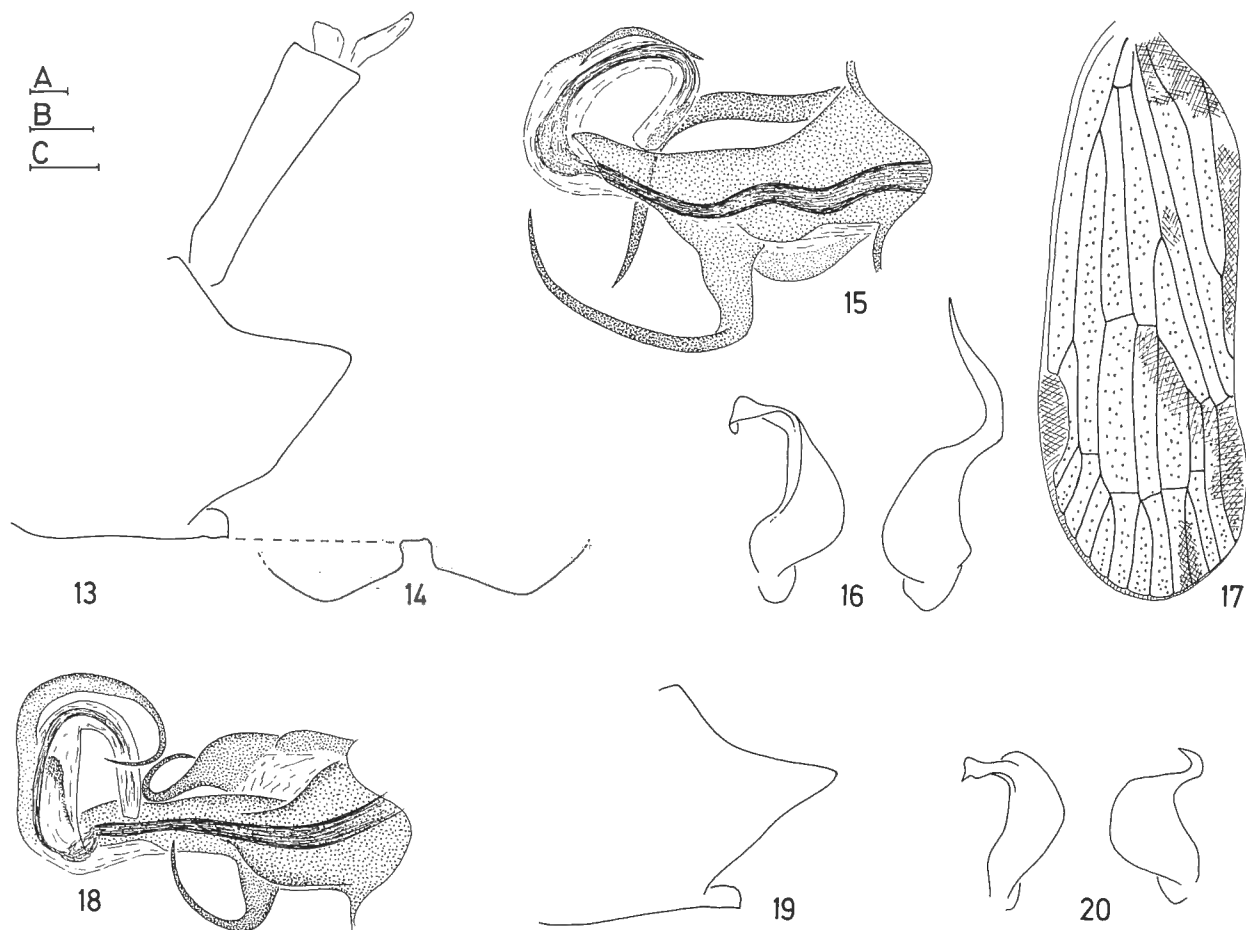
Vertex 1.5 times as long as broad, pale yellowish in basal compartment and black in anterior compartment, both colours sharply limited by the subapical keel. No distinct keel between vertex and frons, but black colour of anterior compartment of vertex clearly limited from black colour of face by a narrow yellowish streak at supposed place of keel. Face shiny, black, with a broad brown transverse band at level of ocellus; the latter well visible and marked with yellow. Colour of postclypeus varying from brown in middle to almost black laterally. No distinct median keel on frons and postclypeus, only indicated by a paler streak. Pronotum and tegulae yellowish brown. Mesonotum black, with five very obsolete longitudinal keels. Tegmina with brown colour marks as illustrated in Fig. 17 and densely granulate over its entire surface and on costal margin. Chaetotaxy hind tarsi: 5/6.

Length: 9.5-11 mm.

Male genitalia: anal segment without an apical process, symmetrical. Pygofer with a triangular lobe on each side, and a short medioventral process as illustrated in Fig. 14. genital styles asymmetrical, right one much longer and tapering. Aedeagus with two long spines implanted basally on sclerified perianthrium and a third spine on flagellum.

Diagnosis:

M. fasciata can be distinguished from *M. cubana* by the presence of granules on the entire surface of the tegmina. It is closely related to *M. pseudofasciata* from which it can be distinguished by the shape of the triangular lobes on the pygofer which are less sharp, and by the different shape of the genital styles and spines on the aedeagus.



Figs. 13-17. *Mnemosyne fasciata* sp. n., holotype – 13: pygofer and anal segment; 14: medioventral process of pygofer; 15: aedeagus; 16: left and right genital style; 17: left tegmen.

Figs. 18-20. *Mnemosyne pseudofasciata* sp. n., holotype – 18: aedeagus; 19: pygofer; 20: left and right genital style.
Scale A (0.2 mm): 13, 14, 16, 19, 20; B (1 mm): 17; C (0.2 mm): 15, 18.

***Mnemosyne pseudofasciata* sp. n.**
(Figs. 18-20)

Material:

Holotype male, Cuba, La Gran Piedra, Zayas, VI. 1963, Alayo-Garcia, BMNH.

Description:

External characters like those of *M. fasciata*.

Length: 10 mm.

Male genitalia: the male genitalia of *M. pseudofasciata* differ from those of *M. fasciata* by the shape of the lateral processes on the pygofer which are longer and sharper (as is the medioventral process), the shape of the genital styles, and the shape of the spines on the aedeagus.

***Mnemosyne dominicensis* sp. n.**
(Figs. 21-26)

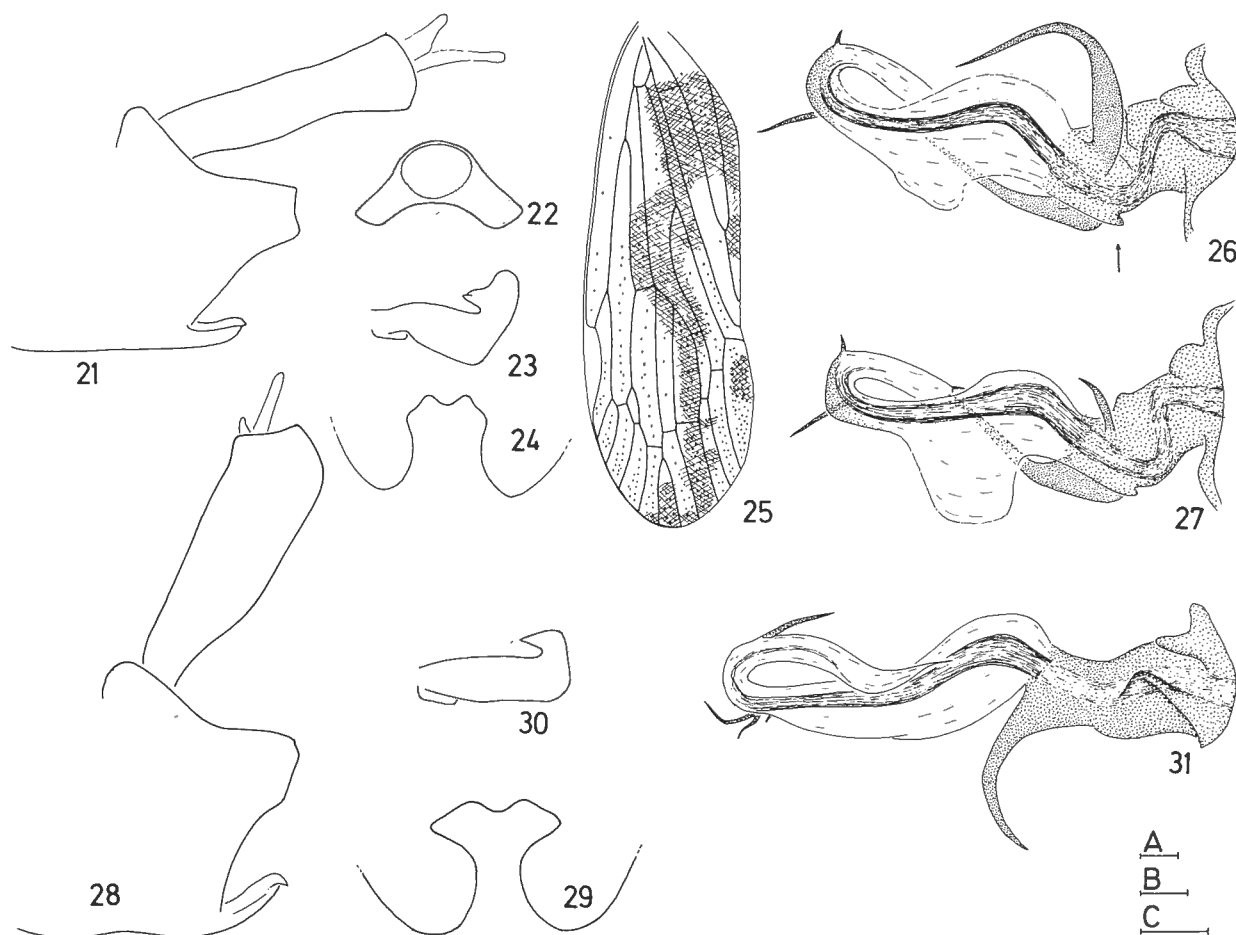
Material:

Holotype male, Dominican Rep., La Vega, 15 km NE Jacabacoa, 25.V.1978, CW & B O'BRIEN & MARSHALL, "on pine trunk", COB.

Paratypes: 9 males, 6 females, same data as holotype; 2 females, La Vega, 7 km SE Bonao, 29.V.1978, COB, KBIN.

Description:

Vertex 1.2 times as long as broad, basal compartment brown to dark brown, apical part black, keels yellowish. Frons brown to dark brown, keels paler, median ocellus present. Pronotum and tegulae ochreous, mesonotum brown, with five indistinct, concolorous keels. Tegmina with granules over the entire surface, hyaline in male, veins, stigma and some indistinct spots on apical margin brown, in female with a brown



Figs. 21-26. *Mnemosyne dominicensis* sp. n., holotype – 21: pygofer and anal segment; 22: anal segment, caudal view; 23: left genital style; 24: medioventral process of pygofer; 25: left tegmen; 26: aedeagus, dorsal view; arrow indicates implantation of lateral spine.

Fig. 27. *Mnemosyne oblongostriata* sp. n., holotype – 27: aedeagus, dorsal view.

Figs. 28-31. *Mnemosyne consoleae* sp. n., holotype – 28: pygofer and anal segment; 29: medioventral process of pygofer; 30: left genital style; 31: aedeagus, dorsal view.

Scale A (0.2 mm): 21-24, 28-30; B (1 mm): 25; C (0.2 mm): 26, 27, 31.

streak extending from basal part of clavus to apex of tegmina (Fig. 25). Chaetotaxy hind tarsi 5/6.

Length: male: 9.5-12 mm; female: 10.5-12 mm.

Male genitalia: anal segment, pygofer and genital styles symmetrical. Aedeagus with two long spines on sclerified perianthrium, third small spine basally on right side (not visible on Fig. 26 but indicated with arrow) and three small spines on flagellum, one at apex (like *L. oblongostriata*).

Diagnosis:

M. dominicensis resembles *M. oblongostriata*, *M. consoleae*, *M. granulata*, and *M. vegensis*. It differs from *M. oblongostriata* only in the structure of the aedeagus, and from *M. vegensis* in the structure of the medioventral process of the pygofer and in the structure of the aedeagus. *M. dominicensis* differs

from *M. consoleae* in the presence of an oblong brown streak on the tegmina (absent in females of *M. consoleae*) and from *M. granulata* in the larger size (8-9 mm in *M. granulata*) and the brown colour of the face (black in *M. granulata*).

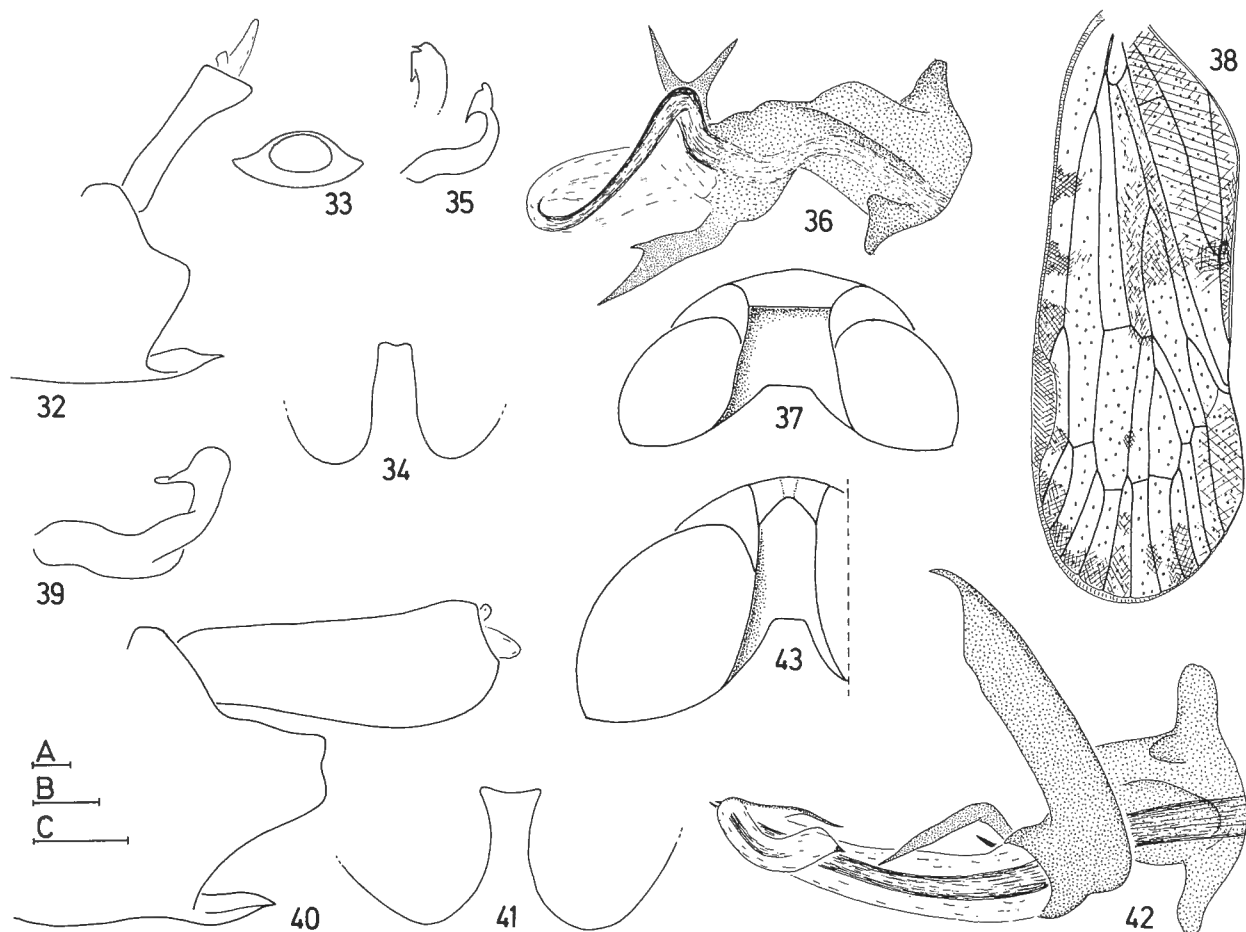
***Mnemosyne oblongostriata* sp. n.**

(Fig. 27)

Material:

Holotype male, Dominican Rep., La Estrel. 11 km E. Hondo Valle, 7.VIII.1979, B. MARSHALL, "on pine trunk", COB.

Paratypes: 5 males, 8 females, same data as holotype, COB, KBIN; 1 male, Haiti, Port au Prince, VII. 1925, BMNH; 1 female, same loc., G. Lion, 1911, MNHN.



Figs. 32-38. *Mnemosyne granulata* sp. n., holotype – 32: pygofer and anal segment; 33: anal segment, caudal view; 34: medioventral process of pygofer; 35: left genital style, lateral view, with a caudal view of the apex; 36: aedeagus, dorsal view; 37: head; 38: left tegmen.

Figs. 39-43. *Mnemosyne vegensis* sp. n., holotype – 39: left genital style; 40: pygofer and anal segment; 41: medioventral process of pygofer; 42: aedeagus, dorsal view; 43: head.
Scale A (0.2 mm): 32-35, 37, 39-41, 43; B (0.2 mm): 36, 42; C (1 mm): 38.

Description:

External characters like those of *M. dominicensis*.
Chaetotaxy hind tarsi 5/6.

Male genitalia: anal segment, pygofer and genital styles like those of *M. dominicensis*; aedeagus with left basal spine very short, no additional small spine basally near right spine and one small spine on apex of flagellum.

Diagnosis:

M. oblongostriata differs from *M. dominicensis*, *M. vegensis* and *M. consoleae* in the structure of the male genitalia. It differs from *M. granulata* in its larger size and the brown face, while in *M. granulata* its size is smaller (8-9 mm) and the face is black.

Mnemosyne consoleae sp. n.

(Figs. 28-31)

Material:

Holotype male, Dominican Rep., San Juan, 28 km SE San Juan, 6.VIII. 1979, L. B. O'BRIEN, "on *Consolea moniliformis*" (a tree prickly-peer cactus), COB.

Paratypes: 9 males, 5 females, same data as holotype, COB, KBIN, BMNH.

Description:

Externally resembling *M. dominicensis*, but fewer granules between veins of tegmina. These hyaline, and females without a distinct longitudinal streak, only a small brown spot on inner apical and fifth apical cell. Chaetotaxy 5/6.

Length: male: 9-10 mm, female: 12.5-13 mm.

Male genitalia: anal segment and pygofer symmetrical and resembling those of *M. dominicensis* and *M. oblongostriata*; pygofer differing in the shape of the medioventral process. Genital styles as illustrated in Fig. 30, symmetrical. Aedeagus with a large spine on right side of sclerified periandrium; flagellum tapering, a spine on left side and a triramose process on right side near apex.

Diagnosis:

This species is closely related to *M. dominicensis*, *M. oblongostriata* and *M. vegensis*, from which it can mainly be distinguished by the shape of the male genitalia; it can also be distinguished from *M. vegensis* in the sparse granulation of the proximal half of the tegmina. *M. consoleae* differs from *M. granulata* in its larger size and the brown colour of the face (black in *M. granulata*) and in the sparse granulation of the anterior part of the tegmina.

***Mnemosyne granulata* sp. n.**
(Figs. 32-38)

Material:

Holotype male, Dominican Rep., La Vega, 19 km SE Constanza, 26.V.1978, CW & LB O'BRIEN & MARSHALL, COB.

Paratypes: 2 females, same data as holotype, COB, KBIN.

Description:

Vertex as long as broad (Fig. 37), black, ochreous in hind edges; subapical keel straight, not convex as in most species. Face black, median keel on frons and postclypeus lacking; median ocellus present, pale. Antennae black. Pronotum and tegulae pale ochreous, pectoral plates brown. Mesonotum ochreous with five longitudinal keels, the two submedian ones very obsolete. Abdomen black. Tegmina densely punctate, major part fumated with brown; tegmina of holotype figured, female paratypes darker and almost totally covered with brown. Legs black, chaetotaxy hind tarsi 5/6.

Length: 8-9 mm.

Male genitalia: anal segment, pygofer and genital styles symmetrical, as illustrated in Fig. 32 to 35; medioventral process of pygofer narrow. Aedeagus with two spinose processes on sclerified periandrium, each bidentate.

Diagnosis:

M. granulata can be distinguished from the four other Dominican taxa, namely *M. dominicensis*, *M. oblongostriata*, *M. consoleae*, and *M. vegensis*, by its external morphology, its small size, the black colour of the face, the broad vertex with a straight subapical keel and the densely granulated tegmina.

***Mnemosyne vegensis* sp. n.**
(Figs. 39-43)

Material:

Holotype male, Dominican Rep., La Vega, 23 km SE Jarabacoa, 25.V.1978, W. & LB O'BRIEN & MARSHALL, COB.

Paratypes: 1 male, Dominican Rep., La Vega, 12 km E Constanza, 10.VIII.1979, G. B. MARSHALL, KBIN.

Description:

Vertex narrow, two times as long as broad, ochreous, hind edges and keels paler. Face ochreous, median keel paler, ocellus present. First joint of antennae pale ochreous, second segment brown, with five indistinct keels. Tegmina with granules in all cells, a spot between claval veins, an oblong mark along commissural border, some smaller spots on inner apical margin and two spots on apex brown. Chaetotaxy hind tarsi 5/6.

Length: 12 mm.

Male genitalia: anal segment, pygofer and genital styles symmetrical, as illustrated in Fig. 39 to 41. Aedeagus as illustrated in Fig. 42, with a very characteristic transverse process; in addition to this with two small spines on sclerified periandrium and three spines on apex; flagellum tapering.

Diagnosis:

This species is closely related to *M. dominicensis* and *M. oblongostriata*, from which it can be distinguished by the proportions of the vertex, which is twice as long as broad in *M. vegensis* while 1.2 times in the other species mentioned above. The most important diagnostic character however is the structure of the male genitalia, namely the presence of a very characteristic transverse process on the aedeagus.

***Mnemosyne colombiae* (WALKER, 1851)**
(Figs. 44-45)

Cixius colombiae WALKER, 1851: 339.

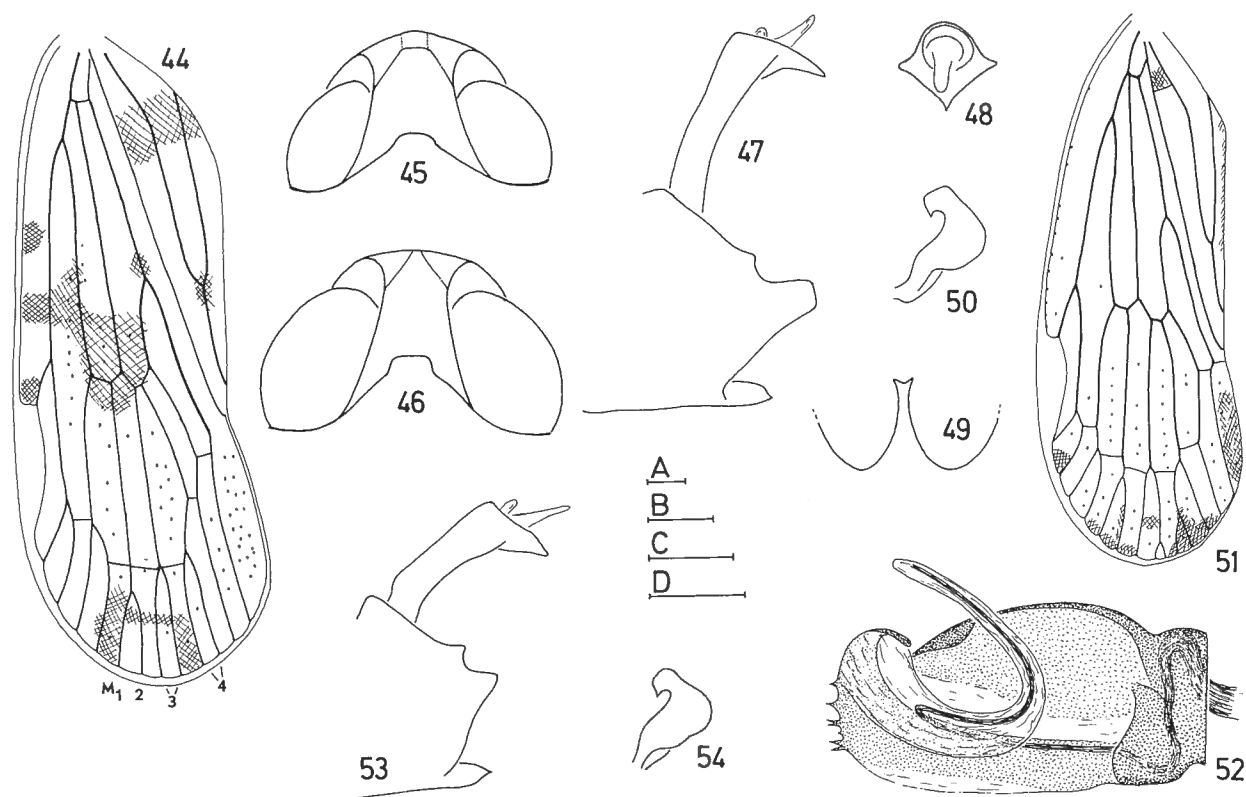
Material:

Holotype female, "Colombia", BMNH.

Description:

General colour ochreous to brown. Vertex as long as broad, pale ochreous. Face ochreous, darker than vertex, with a median, concolorous keel, median ocellus not visible. pronotum pale ochreous dorsally, more fuscous laterally. Mesonotum ochreous to brown, with three keels, the two submedian ones reduced and almost invisible. Tegmina with brown spots as indicated in Fig. 44. Legs ochreous, hind tarsi of holotype lacking.

Length tegmina: 6.6 mm.



Figs. 44-45. *Mnemosyne colombiae* (WALKER), holotype – 44: left tegmen; 45: head.

Figs. 46-54. *Mnemosyne braziliensis* sp. n., 46-52: holotype – 46: head; 47: pygofer and anal segment; 48: anal segment, caudal view; 49: medioventral process of pygofer; 50: left genital style; 51: left tegmen; 52: aedeagus, dorsal view; 53-54: specimen Santa Barbara: 53 pygofer and anal segment; 54: genital style.

Scale A (0.2 mm): 45-48, 50, 53, 54; B (0.2 mm): 49; B (1 mm): 51; C (0.2 mm): 52; D (1 mm): 44.

Diagnosis:

M. colombiae is one of the smallest species known at present; since the male genitalia of this species are unknown it is difficult to place it among the other taxa described here. In external characters it comes close to *M. braziliensis*. The tegmina are equally long and the granulation pattern is the same. In both species the vertex is equally wide at base, but in *M. braziliensis* the apical part is more narrow. We prefer to treat both forms as different species until more material has been sampled from Columbia.

Remark:

M. colombiae was listed by Metcalf (1936) as a junior synonym of *M. planiceps*; the types of both taxa have been compared and they undoubtedly represent separate species.

***Mnemosyne braziliensis* sp. n.**

(Figs. 46-54)

Material:

1 male, Brazil, Minas Gerais, Pedra Azul, XII. 1970, F. M. OLIVEIRA, BMNH.

Possibly conspecific: 1 male, 3 females, Brazil, Minas Gerais, Santa Barbara, Caraca, I.1970, F. M. OLIVEIRA, BMNH, KBIN.

Description:

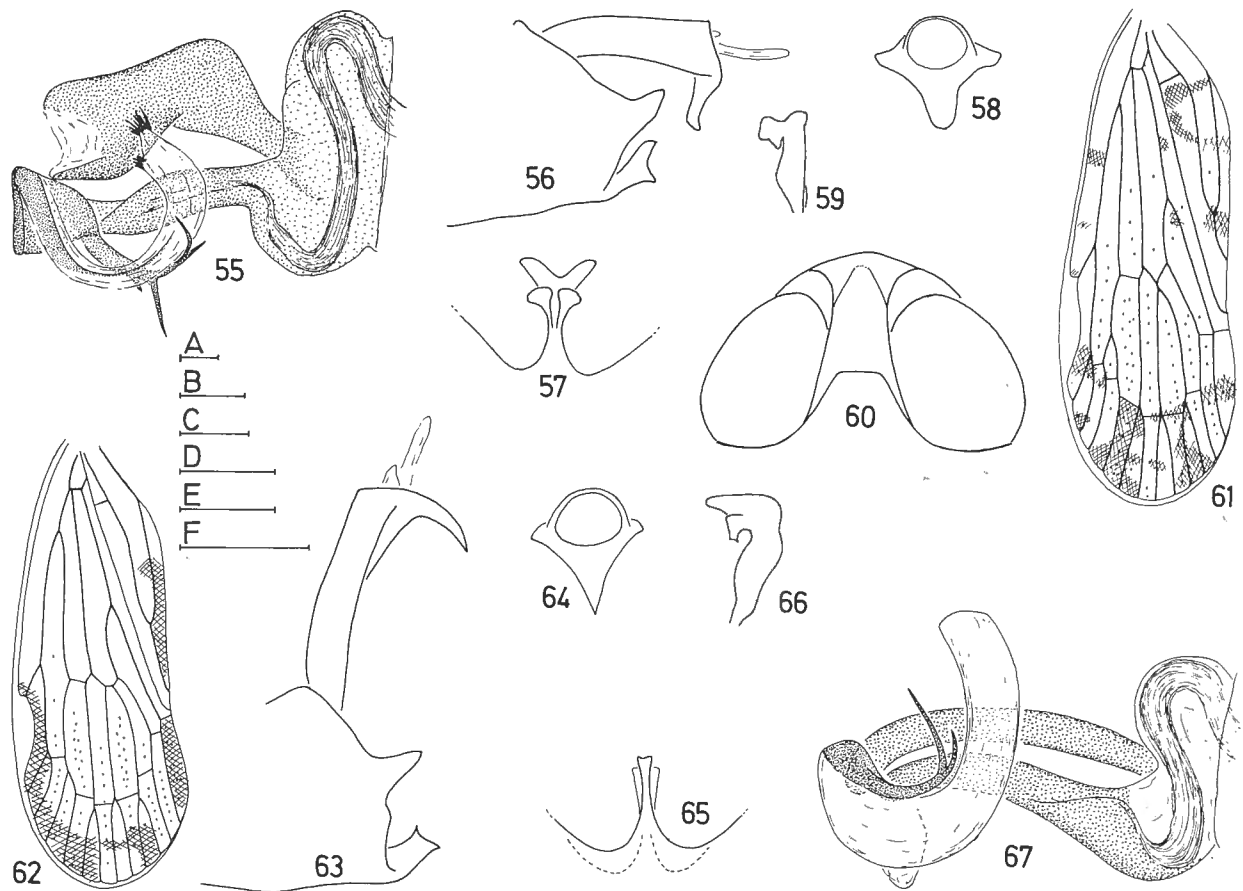
General colour pale ochreous, mesonotum somewhat darker; tegmina with veins pale ochreous and a few brown spots in the apical part and in clavus, as illustrated in Fig. 51. median ocellus on face not visible. Few distinct longitudinal keels on mesonotum. Chaetotaxy hind tarsi 5/5.

Length: 9 mm.

Male genitalia: anal segment, pygofer and genital styles symmetrical. Aedeagus consisting of two chitinous plates, the left one bearing teeth on its apical margin.

Diagnosis:

M. braziliensis can be distinguished from other taxa by the shape of the pygofer, with its lateral margins slightly incised and the slender form of the medioventral process, and by the characteristic shape of the aedeagus. The differences with *M. colombiae* are discussed under this species.



Figs. 55-61. *Mnemosyne mabarumensis* sp. n., holotype – 55: aedeagus, dorsal view; 56: pygofer and anal segment; 57: medioventral process of pygofer; 58: anal segment; 59: left genital style; 60: head; 61: left tegmen.

Figs. 62-67. *Mnemosyne planiceps* (FABRICIUS), holotype – 62: left tegmen; 63: anal segment and pygofer; 64: anal segment; 65: medioventral process of pygofer; 66: left genital style; 67: aedeagus, dorsal view.
Scale A (0.2 mm): 56, 58-60, 63, 64, 66; B (0.2 mm): 57, 65; C (1 mm): 61; D (1 mm): 62; E (0.2 mm): 55; F (0.2 mm): 67.

Remark:

The additional specimens are externally identical to the holotype of *M. braziliensis*. The male genitalia are slightly different: the lateral margins of the pygofer are more incised and in the aedeagus the right lobe is smaller and teeth are lacking.

***Mnemosyne mabarumensis* sp. n.**
(Figs. 55-61)

Material:

Holotype male, Brit. Guiana, N. W. Distr., Mabaruma, 9.V.1929, J. G. MYERS, BMNH.
Paratype: 1 female, same data as holotype, V.1929, KBIN.

Description:

Vertex 1.6 times as long as broad (Fig. 60); general

colour pale ochreous, mesonotum somewhat darker. No median ocellus on face visible. Mesonotum with three keels, the two submedian ones being reduced, almost lacking. Tegmina with brown spots and granules as illustrated in Fig. 61; costal margin not granulated. legs with chaetotaxy hind tarsi 5/5.

Length: 8.5-9.5 mm.

Male genitalia: anal segment, pygofer and genital styles symmetrical, as illustrated in Fig. 56 to 59. Aedeagus with four small spines on flagellum and two groups of bristles on apex.

Diagnosis:

This species can be recognized by the characteristic medioventral process on the pygofer, and the small triangular lobe on each lateral margin. The aedeagus is characterized by the shape of the left chitinous plate and the presence of two groups of bristles on the apex of the flagellum.

Mnemosyne planiceps (FABRICIUS, 1803)
(Figs. 62-67)

Flata planiceps FABRICIUS, 1803: 48.

Ricania planiceps (FABRICIUS); SCHAUM, 1850: 73;
DOHRN, 1859: 67.

Mnemosyne planiceps (FABRICIUS); STÅL, 1869: 91;
FOWLER, 1904: 102, pl. XI, figs. 7, 8a-b, 8; DISTANT,
1907: 283; MUIR, 1923: 556; MYERS, 1928: 15.

Material:

Holotype male, "Amer. merid.", ZM.

Additional material:

1 male, 1 female, Brit. Guiana, Demerara R., 18.III.
1913, BMNH, KBIN.

Description:

General colour ochreous, mesonotum somewhat darker. Vertex 1.5 times as long as broad. Median ocellus on face not visible. Mesonotum with three keels, the two submedian ones not visible. Tegmina like those of *M. braziliensis*, apex irregularly mottled with brown and granules in the apical and subapical cells; costal margin not granulated. Chaetotaxy hind tarsi 5/5.

Length: 11-11.5 mm.

Male genitalia: anal segment, pygofer and genital styles symmetrical; anal segment with a tapering apical process (Figs. 63 and 64); pygofer on each side with a triangular process and a slender medioventral process (Figs. 63 and 65). Aedeagus with a long process inserted on left side on base and reaching to apex, and a spinose process on apex inserted near implantation of flagellum, and forked into two small spines, the dorsal one longer than the ventral one.

Diagnosis:

M. planiceps resembles *M. kutariensis*, *M. ecuadorana*, *M. tenensis*, *M. anoriensis*, *M. flavicollis*, *M. frontistriata*, *M. araguensis*, and *M. arenae* in the general structure of the aedeagus. It differs from all these species in the shape of the apical lobe of the anal segment, in the form of the lateral lobes and medioventral process on the pygofer and in details in the structure of the aedeagus, such as the number of spines and the proportion and shape of the large sinistral process.

Mnemosyne kutariensis sp. n.
(Figs. 68-71)

Material:

Holotype male, Brit. Guiana: Kutari Sources, I-II.
1936, G. A. HUDSON, BMNH.

Paratype: 1 female, same data as holotype, KBIN.

Description:

Vertex as long as broad. General colour pale ochreous, mesonotum somewhat darker; face irregularly suffused with brown, median ocellus hardly visible. Mesonotum with three distinct keels, the two submedian ones very obsolete. Tegmina like those of *M. braziliensis*, granulated in the apical and subapical cells and some brown spots on the clavus and apex. Chaetotaxy hind tarsi 5/5.

Length: 11-12 mm.

Male genitalia: anal segment with a long spinose process. Pygofer on each side with two small processes separated by a U-shaped excavation and a slender medioventral process. Genital styles as illustrated in Fig. 70. Aedeagus with the left process reaching to apex and bent over its distal part; flagellum with a spinose process inserted on halfway along its length and a further spine between the latter and apex.

Diagnosis:

M. kutariensis can be recognized from all other Neotropical taxa by the presence of a long spine on the apex of the anal segment.

Mnemosyne ecuadorana sp. n.
(Figs. 72-76)

Material:

Holotype male, Ecuador, Tena, 23.II.1923, F. X. WILLIAMS, BMNH.

Paratypes: 3 males, 10 females, same locality, II-III.
1923, BMNH, KBIN.

Description:

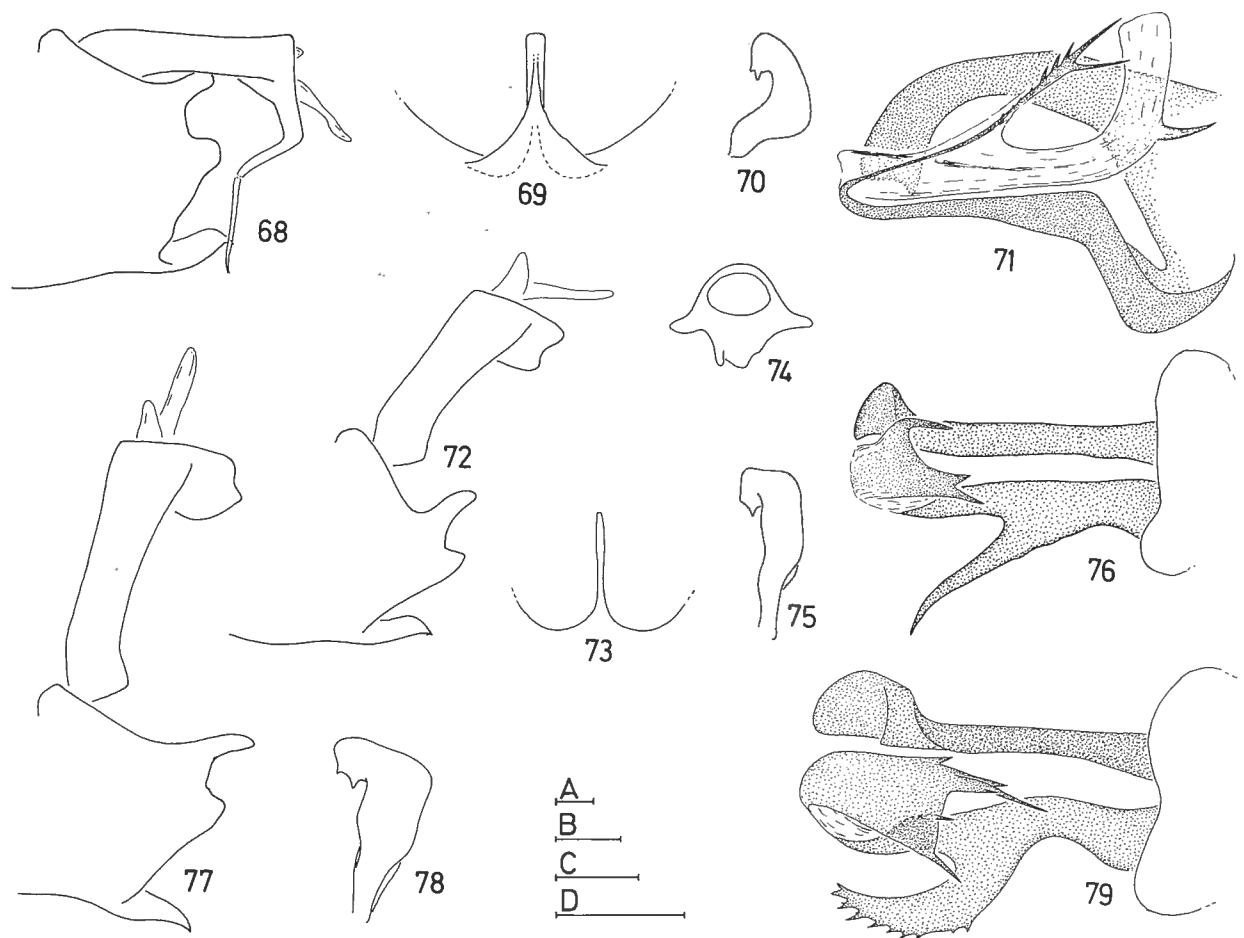
Vertex 1.2 times as long as broad. Vertex, mesonotum and abdomen brown, face, pronotum, tegulae and legs ochreous. Median ocellus not visible. Mesonotum with three distinct keels, the two additional submedian ones very obsolete. Tegmina with veins ochreous to brown and a few brown spots in apical part; granules only in the apical and subapical cells; costal margin regularly covered with small granules. Chaetotaxy hind tarsi: 5/5.

Length: 10-11 mm.

Male genitalia: anal segment with a small apical lobe; pygofer on each side with two small processes, the dorsal one larger than the ventral process, and separated from each other by an excavation; medioventral process long and narrow. Genital styles as illustrated in Fig. 75. Aedeagus (Fig. 76) with left process reaching to apex, straight and spoon-shaped at apex; three additional teeth on flagellum and a further large spine on right side.

Diagnosis:

M. ecuadorana can be distinguished from related taxa by the presence of unequal processes on the pygofer, the narrow medioventral process and the character-



Figs. 68-71. *Mnemosyne kutariensis* sp. n., holotype – 68: anal segment and pygofer, spine on anal segment broken off; 69: medioventral process of pygofer; 70: left genital style; 71: aedeagus, dorsal view.

Figs. 72-76. *Mnemosyne ecuadorana* sp. n., holotype – 72: anal segment and pygofer; 73: medioventral process of pygofer; 74: anal segment, caudal view; 75: left genital style; 76: aedeagus, dorsal view.

Figs. 77-79. *Mnemosyne tenensis* sp. n., holotype – 77: anal segment and pygofer; 78: left genital style; 79: aedeagus, dorsal view.

Scale A (0.2 mm): 68, 70, 72, 74, 75, 77, 78; B (0.2 mm): 69, 73; C (0.2 mm): 76; D (0.2 mm): 71.

ristic shape of the processes on the aedeagus. It is most closely related to *M. tenensis* from which it differs in details of the structure of the pygofer and genital styles, and in the absence of teeth on the right process of the aedeagus.

***Mnemosyne tenensis* sp. n.**
(Figs. 77-79)

Material:

Holotype male, Ecuador, tena, 19.II.1923, BMNH.
Paratypes: 1 male, 2 females, same locality, III-IV. 1923, BMNH, KBIN; 1 female, Ecuador, Feltons - 12 km up, Napo, Pano river, BMNH.

Description:

Externally resembling *M. ecuadorana* but somewhat larger than this species; apex of tegmina bordered with brown from tip of clavus to stigma; median ocellus on face present, but small; chaetotaxy hind tarsi 5/5.

Length: 13-14 mm.

Male genitalia: anal segment, pygofer and genital styles resembling those of *M. ecuadorana*, but differing in small details (see Fig. 77 & 78); medioventral process identical. Aedeagus as illustrated in Fig. 79, differing from *M. ecuadorana* in details of the structure of the spines on the flagellum and in the presence of teeth on the right process.

Diagnosis:

The differences are discussed under *M. ecuadorana*. It differs from other related taxa in the shape of the lobes on the anal segment and pygofer.

***Mnemosyne anoriensis* sp. n.**
(Figs. 80-83)

Material:

Holotype male, Colombia, dept. of Antioquia, above Rio Anori, 500 m, 22.IX.1970, D. G. YOUNG, blacklight trap, Florida State Collection of Arthropods.

Description:

Vertex 1.6 times as long as broad, brown with yellowish borders. Face pale ochreous, an indistinct brown transverse band near vertex and a second on frontoclypeal suture. Median ocellus small. Pronotum and tegulae pale ochreous, mesonotum ochreous, with three distinct keels, each keel suffused by a broad brown band; these bands are connected with each other along anterior border. Tegmina hyaline, veins yellowish, a black spot basally in clavus, one in inner apical cell and some indistinct spots on apex; stigma yellowish; no granules in cells. Legs pale ochreous, chaetotaxy hind tarsi 5/5.

Length: 10 mm.

Male genitalia: anal segment asymmetrical, apical process with a long spine on left side. Pygofer with a slender process on each side, excavated on dorsal margin, and a broad medioventral process. Genital styles symmetrical, as illustrated in Fig. 82. Aedeagus with a long and thin basal process on left side, rounded apically, and some small tooth-shaped spines on flagellum.

Diagnosis:

M. anoriensis resembles *M. flavicollis*, *M. frontistriata*, *M. araguensis* and *M. arenae* in the form of the aedeagus, characterized by the presence of a long and slender process inserted on left side of base. This process shows no infraspecific variation in all examined specimens, and is characteristic for each species. Furthermore *M. anoriensis* can be recognized from all other species by the presence of an apical spine on left side of anal segment. *M. anoriensis* and *M. frontistriata* are the only known species with two transverse brown bands on the frons.

***Mnemosyne flavicollis* sp. n.**
(Figs. 84-88)

Material:

Holotype male, Barro Colorado Is., C.Z. Panama, 19.V.1967, D. M. DE LONG & C. A. TRIPLEHORN, COB.

Paratypes: 3 males, Panama, at night, Cerro Campana, 29.VI.1974, leg. O'BRIEN and MARSHALL, COB; 1 male, Canal zone, FT GULICK, at light, IX.1979, H. J. HARLAN; 1 male, Canal zone, FT SHERMAN, 2.VIII.1974, O'BRIEN & MARSHALL; 2 females, Canal Zone, night, Coco Solo Hospital, 22.V.1978, O'BRIEN & MARSHALL; 1 female, Canal zone, Barro Colorado Is., 8.VIII.1967, O'BRIEN; 1 male, Panama, Canal zone, Barro Colorado Is., 9°10'N-79°50'W, 4.VI.1977, H. A. HESPENHEIDE; 1 male, Panama, Las Cumbres, lights, 25.II.1974, H. WOLDA; 1 male, same loc., 22.XI.1973; 3 males, 2 females, same loc., 25.VII.1974, 5.XII.1973, 26.XII.1973, 15.XI.1973, 12.XI.1973, COB, KBIN, BMNH; 1 male, Colombia, Valle del Cauca, Bajo Anchiceya, 400 m, 23.III.1984, M. Suarez T, NCSU.

Description:

Vertex 1.3 times as long as broad. Face, vertex, pronotum and tegulae and ventral part of body and legs pale ochreous. Mesonotum brown, with three keels which are suffused with black. Tegmina hyaline with a variable number of brown spots, female usually darker than male, and only a few granules in the cells especially in the inner apical cell and in two subapical cells; costal margin regularly granulated. Chaetotaxy hind tarsi 5/5.

Length: 8.5-10 mm.

Male genitalia: anal segment, pygofer and genital styles symmetrical or nearly so. Pygofer and its medioventral process as illustrated in Fig. 84 and 85. Aedeagus with a slender process implanted on left side on base and reaching to halfway its length; flagellum with a row of small spines on its ventral side.

Diagnosis:

M. flavicollis can be recognized from all other species by the characteristic form of the medioventral process and the lateral margins of the pygofer.

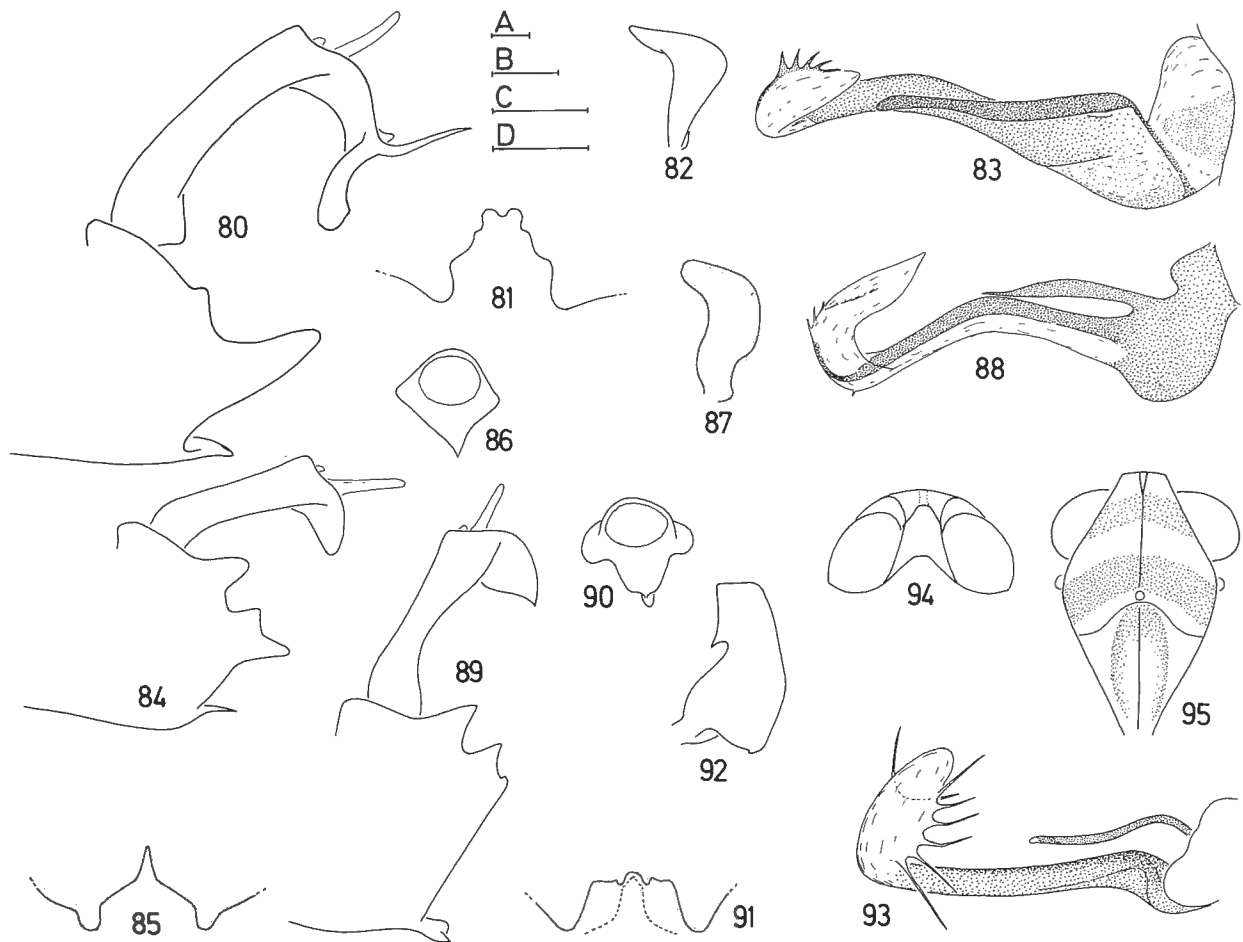
***Mnemosyne frontistriata* sp. n.**
(Figs. 89-95)

Material:

Holotype male, Ecuador, Pichilingue, Los Rios, 40 m, 2.II.1955, E. I. SCHLINGER & E.S. ROSS, CAS. Paratypes: 1 female, Ecuador, 16 mi N Latacunga, Cotopaxi, 3000 m, 21.II.1955; 1 female, Ecuador, 16 mi E Santo Domingo de los Colorados, Pichincha, 24.II.1955, CAS, KBIN; 2 males, 2 females, Ecuador, Bucay 1000 ft, F. X. WILLIAMS, 7.X.1922, BPBM, BMNH.

Description:

Vertex 1.2 times as long as broad, yellowish to brown. Frons pale ochreous with two transverse brown bands and postclypeus brown in middle, as illustrated in



Figs. 80-83. *Mnemosyne anoriensis* sp. n., holotype – 80: anal segment and pygofer; 81: medioventral process of pygofer; 82: left genital style; 83: aedeagus, dorsal view.

Figs. 84-88. *Mnemosyne flavicollis* sp. n., holotype – 84: anal segment and pygofer; 85: medioventral process of pygofer; 86: anal segment, caudal view; 87: left genital style; 88: aedeagus, dorsal view.

Figs. 89-95. *Mnemosyne frontistriata* sp. n., holotype – 89: anal segment and pygofer; 90: anal segment, caudal view; 91: medioventral process of pygofer; 92: left genital style; 93: aedeagus, dorsal view; 94 & 95: head, dorsal and frontal view.

Scale A (0.2 mm): 80, 82, 84, 86, 87, 89, 90, 92; B (0.2 mm): 93; C (0.2 mm): 81, 83, 85, 88, 91; D (1 mm): 94, 95.

Fig. 95; median ocellus not visible. Pronotum pale yellowish, mesonotum fuscous, with three keels. Tegmina hyaline with some indistinct brown spots, granules present in the apical and subapical cells and on costal margin. Chaetotaxy hind tarsi 5/5.

Length: 9-10.5 mm.

Male genitalia: anal segment, pygofer and genital styles symmetrical, as illustrated in Fig. 89 to 92. Aedeagus with a slender process implanted on left side of base, rounded apically, and reaching to half-way length of aedeagus.

Diagnosis:

This new species resembles *M. anoriensis* in the presence of transverse brown bands on the face. It can be distinguished from this species by the different

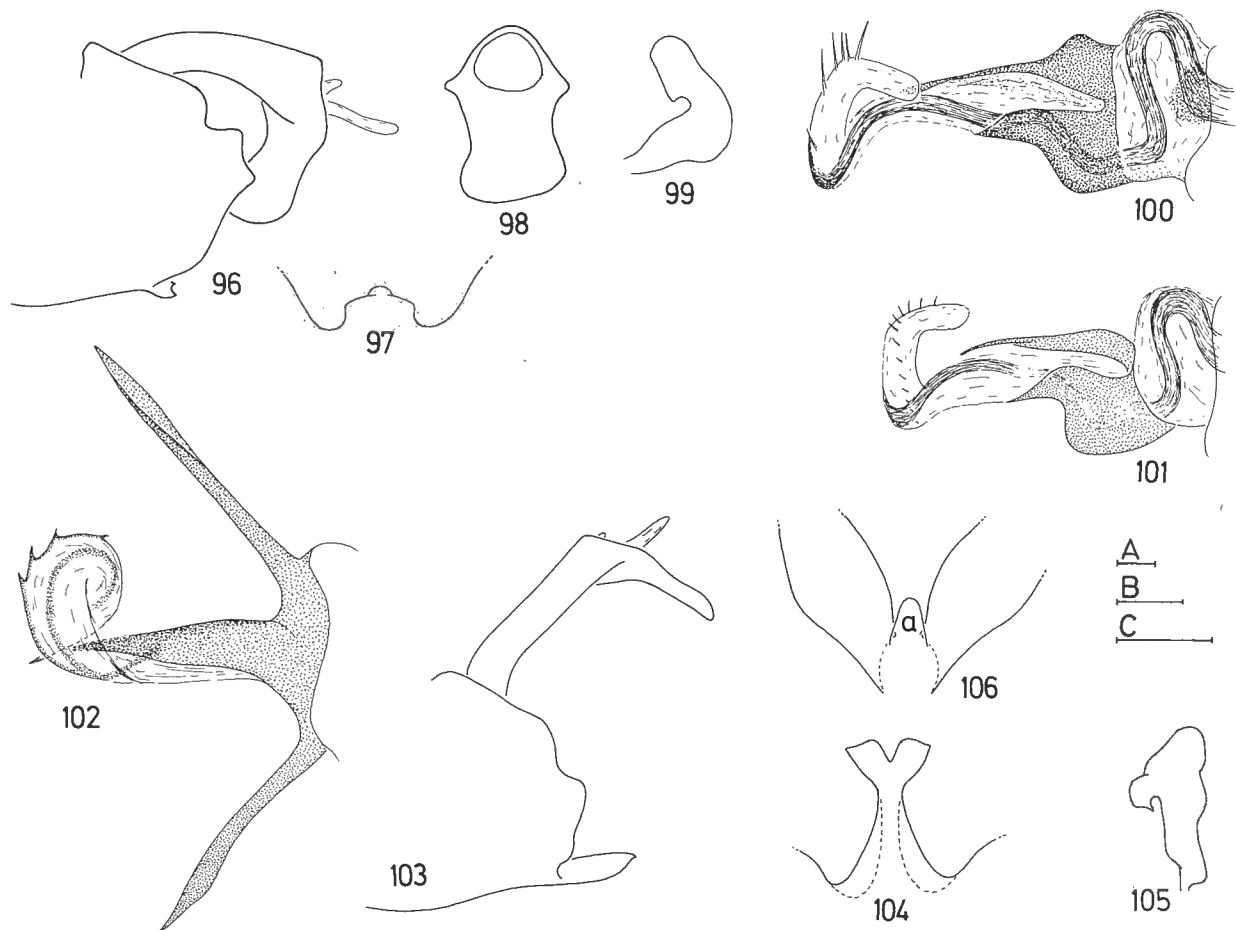
shape of the anal segment, pygofer and genital styles, as well as by the different form of the aedeagus. *M. frontistriata* resembles *M. flavicollis* in the form of the pygofer; it can be distinguished from this species by the different shape of the medioventral process of the pygofer, as well as the different form of the genital styles and the left process on the aedeagus.

***Mnemosyne araguensis* sp. n.**

(Figs. 96-100)

Material:

Holotype male, Venezuela, Aragua, Rancho Grande, 1100 - 1500 m, 7.V.1978, O'BRIEN & MARSHALL, on three trunk, COB.



Figs. 96-100. *Mnemosyne araguensis* sp. n., holotype – 96: anal segment and pygofer; 97: medioventral process of pygofer; 98: anal segment, caudal view; 99: left genital style; 100: aedeagus, dorsal view.

Fig. 101. *Mnemosyne arenae* FENNAH, paratype – 101: aedeagus, dorsal view.

Figs. 102-106. *Mnemosyne pernambucoensis* sp. n., holotype – 102: aedeagus, dorsal view; 103: anal segment and pygofer; 104: medioventral process of pygofer; 105: left genital style; 106: base of genital styles, ventral aspect, with (a) the unpair median process.

Scale A (0.2 mm): 96, 98, 99, 103, 105; B (0.2 mm): 97, 104, 106; C (0.2 mm): 100-102.

Paratypes: 2 males, 4 females, same data as holotype, COB, KBIN.

Description:

Vertex 1.3 times as long as broad; head pronotum and tegulae pale ochreous, mesonotum fuscous with tip ochreous, three distinct keels and two very obsolete submedian ones. Median ocellus not visible. Tegmina hyaline, a longitudinal band on commissural margin, inner apical cell and some small spots on apex fuscous; females usually darker, with some additional spots in costal, median and cubital cell; granules present in the apical and subapical cells, some females with a few granules in the costal, radial, median and cubital cell. Legs ochreous, hind femora brown, chaetotaxy hind tarsi 5/5.

Length: 10.5-11.5 mm.

Male genitalia: anal segment with a large asymmetrical apical process; pygofer and genital styles symmetrical (Figs. 96, 97 and 99). Aedeagus with a thin process implanted on left side of base and reaching to level of apex of flagellum; the latter armed with a series of thin spines arranged in a row.

Diagnosis:

M. araguensis closely resembles *M. arenae* in the shape of the male genitalia. It differs from this species in details of the structure of the aedeagus (compare Figs. 100 and 101) and in differences in external morphology: *M. araguensis* is larger in size (*M. arenae*: 8 mm) and the mesonotum is fuscous and strongly contrasting with the pale colour of the pronotum.

***Mnemosyne arenae* FENNAH, 1946**
(Fig. 101)

Mnemosyne arenae FENNAH, 1946: 418, Pl. 7, figs. 17-26.

Material:

Holotype male, Trinidad, Arena Forest, 13.IV.1938 (not examined), USNM.

Paratypes: 1 male, 1 female, Trinidad, Arena forest, 3.IV.1938, A. M. ADAMSON, BMNH (examined).

Additional: 1 male, Trinidad, Port of Spain, 30.I.1912, G. A. K. MARSHALL, BMNH; 1 male, 7 females, Trinidad, N. Range, Cooker Trace, 3 mi. E. Arima-Blanchisseuse Rd, 7-11.V.1985, C.W. & L. B. O'BRIEN, COB.

Description:

General colour pale ochreous. Vertex 1.5 as long as broad. Median ocellus on face present. Mesonotum with three distinct keels and two very obsolete submedian ones. Tegmina hyaline, with or without brown spots halfway along length and apically, one female from Arima-Blanchisseuse with a distinct brown band from near base to apex along commissural margin; veins yellowish; granules in all cells except in clavus, but always scarcely represented and arranged in one single row. Chaetotaxy hind tarsi 5/5.

Length: 8 mm.

Male genitalia: anal segment, pygofer and genital styles as in *M. araguensis*; the genitalia differ from this species in the shape of the aedeagus, namely the form of the left process implanted basally on the periandrium, the outline of the periandrium in dorsal view, as well as the number of spines on the flagellum.

Diagnosis:

M. arenae is closely related to *M. araguensis*; the differences are discussed under this species.

***Mnemosyne pernambucoensis* sp. n.**
(Figs. 102-105)

Material:

Holotype male, Brazil, Pernambuco Caruaru, IV.1972, M. ALVARENGO, BMNH.

Paratypes: 1 male, Brazil, Pernambuco, 1898, coll. NOUALHIER, MNHN; 1 male, Brazil, Mato Grosso, 12°50'S-51°45'W, dry forest, U.V. light, B.E. FREEMAN, II.1968, BMNH, MNHN.

Description:

General colour pale ochreous. Vertex brown, 1.4 times as long as broad. Median ocellus on face hardly visible. Mesonotum with three distinct keels and two very obsolete submedian keels. Tegmina hyaline,

veins yellowish, granules present on costal margin and in all cells but only a few or none in subcostal, median and cubital cell, and when present arranged in one row except in inner apical cell where they are abundant. Chaetotaxy hind tarsi 5/5.

Length: 9 mm.

Male genitalia: anal segment with an apical process; lateral margins of pygofer sinuate, medioventral process bifurcate at apex, as illustrated in fig. 104. Genital styles as illustrated in Fig. 105. Aedeagus (Fig. 102) with two long spines inserted on base. Flagellum circularly curved, tapering distally, and with a row of small spines. The left basal spine on the aedeagus is shorter and slightly bent in the paratype from Mato Grosso.

Diagnosis:

M. pernambucoensis can be distinguished from all other species by the bifurcate medioventral process of the pygofer and by the presence on the aedeagus of a long straight spine on each side of the base.

***Mnemosyne cixioides* (SPINOLA, 1852)**
(Figs. 107-108)

Achilus cixioides SPINOLA, 1852: 246, pl. 3, figs. 2, 2a-d.

Mnemosyne cixioides (SPINOLA); FENNAH, 1965: 235.

Material:

Holotype female, without locality label, with red museum label "*Achilus cixioides*" and "holotype", MRSN.

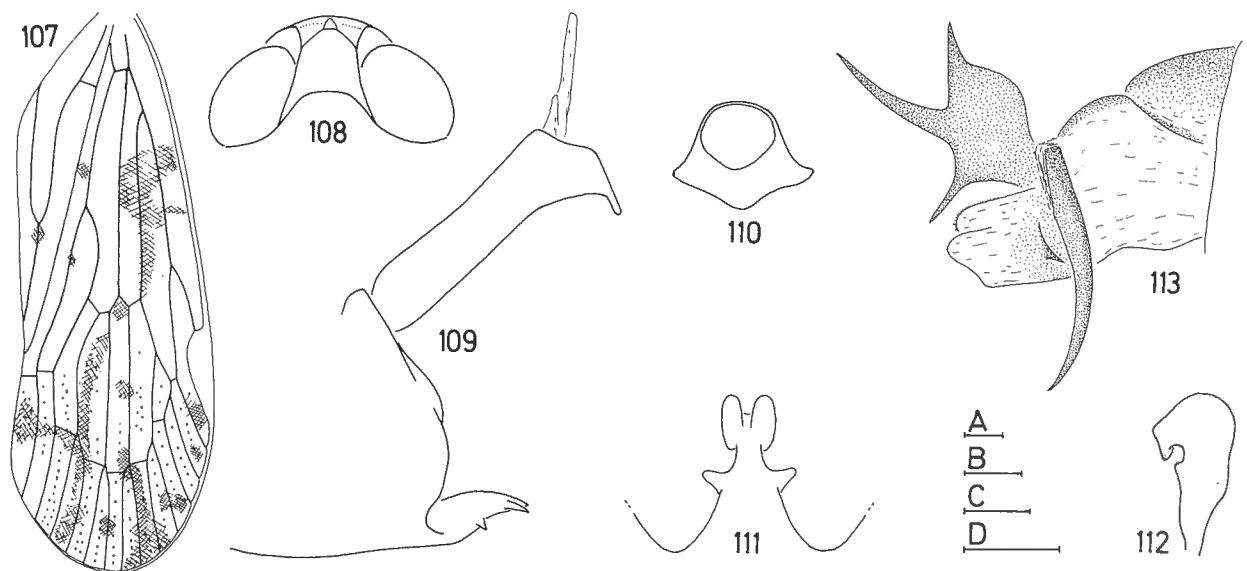
Additional material compared to type and possibly conspecific: 1 female, Peru, Loreto; Ucayali, R. Yarina Cocha, 18.XI.1955, leg. P. HOCKING, COB; 1 female, Brazil, Benevides, X.1918, S. M. KLAGES, COB; 1 female, Teffe, Amazonas, M. DE MAHAN, 1879, COB; 1 female, Bresil, Para, Gounelle, coll. NOUALHIER, 1898, MNHN; 1 male, described below as "apud *Cixioides*".

Description:

Vertex (Fig. 108) as long as broad, black, base yellowish. Face ochreous, irregularly infumed with brown, keels paler, anteclypeus brown; median ocellus present. Pronotum and mesonotum ochreous, mesonotum with three keels, the two additional submedian ones almost invisible. Tegmina (Fig. 107) with ochreous veins and brown colour marks as illustrated in Fig. 107. Legs ochreous, chaetotaxy hind tarsi 5/5. Length: 14 mm.

Diagnosis:

M. cixioides can be distinguished from all other species by its large size, the shape and proportions of the vertex and the pattern of granules on the tegmina.



Figs. 107-108. *Mnemosyne cixioides* (SPINOLA), holotype – 107: right tegmen; 108: head.

Figs. 109-113. *Mnemosyne* sp. apud *cixioides* – 109: anal segment and pygofer; 110: anal segment, caudal view; 111: medioventral process of pygofer; 112: left genital style; 113: aedeagus, dorsal view.
Scale A (0.2 mm): 109, 110, 112; B (1 mm): 107; C (0.2 mm): 111, 113; D (1 mm): 108.

***Mnemosyne* species apud *cixioides* SPINOLA**
(Figs. 109-113)

Material:

1 male, Brazil, Amazonas vic(inity) Manaus, Reserva Ducke, G. B. FAIRCHILD, COB.

Description:

External features like the preceding species but somewhat darker.

Length: 12 mm.

Male genitalia: anal segment, pygofer and genital styles symmetrical. Pygofer with a very characteristic medioventral process. Aedeagus as illustrated in Fig. 113.

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