

UNIVERSIDADE FEDERAL DO ESPÍRITO SANTO
CENTRO DE CIÊNCIAS HUMANAS E NATURAIS
PROGRAMA DE PÓS-GRADUAÇÃO EM CIÊNCIAS BIOLÓGICAS

**Contribuição ao conhecimento sobre os *Miobantia* Giglio-Tos
(Mantodea, Thespidae, Miopteryginae), com associação
molecular de sexos dimórficos e estágios imaturos, e descrição
de quatro espécies novas**

Marcus Vinícius Scherrer de Araújo

Vitória, ES
Fevereiro, 2013

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Orientador(a): Alexandre P. Aguiar

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RESUMO

O gênero neotropical de louva-a-deus *Miobantia* Giglio-Tos inclui seis espécies com uma história taxonômica complexa. Embora frequentemente encontradas na Mata Atlântica, pouco se sabe sobre elas e alguns obstáculos tornam difícil identificá-las, como o dimorfismo sexual elevado e o conhecimento de ambos os sexos para apenas uma das seis espécies. Este trabalho investiga os limites taxonômicos das espécies de *Miobantia* através de uma análise cladística, utilizando 99 caracteres morfológicos, além de seqüenciamento de 700 pb do gene mitocondrial COI para a associação de sexos dimórficos e ninfas. A variação intra-específica é também investigada a partir de um grande número de espécimes de *M. fuscata* (Giglio-Tos) para escolher características mais relevantes para a separação das espécies a serem utilizados nos comentários taxonômicos e nas chaves de identificação. O macho de *M. aptera* Giglio-Tos, e as fêmeas de *M. ciliata* (Stål) e *M. fuscata* são descritos pela primeira vez, e são fornecidas redescrições dos machos destas e da fêmea de *M. aptera* com base em numerosos dados complementares. *Miobantia nebulosa* (Giglio-Tos) é proposta como sinônimo júnior de *M. rustica* (Fabr.), com base na comparação entre seus tipos, incluindo a investigação de genitália masculina, e a espécie é redescrita. Adicionalmente, quatro novas espécies são aqui descritas: *M. sp. nov. 1 sp. nov.*, *M. sp. nov. 2 sp. nov.*, *M. sp. nov. 3 sp. nov.*, e *M. sp. nov. 4 sp. nov.*; ambos os sexos são descritos, com exceção apenas para o macho de *M. sp. nov. 2*. Chaves de identificação são fornecidas para machos e fêmeas das espécies válidas, e figuras das características diagnósticas são fornecidas para todos eles. A distribuição das espécies é mapeada de acordo com dados da literatura e 50 novos registros.

MANUSCRITO CIENTÍFICO

A ser submetido à revista *Zootaxa* (símbolos no texto: m# = ♂; f# = ♀).

Contribution to the knowledge of *Miobantia* Giglio-Tos (Mantodea, Thespidae, Miopteryginae), with molecular association of dimorphic sexes and immature stages, and description of four new species

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Abstract. The Neotropical praying mantis genus *Miobantia* Giglio-Tos includes six species with a complex taxonomic history. Although frequently found in the Atlantic Forest, little is known about these species and some obstacles make it difficult identifying these mantids, as the high sexual dimorphism and both sexes known only to one of the six species. This work investigates the taxonomic limits of the species of *Miobantia* through a cladistic analysis using 99 morphological characters, and sequencing of 700 bp of the mitochondrial gene COI for association of dimorphic sexes and nymphs. An investigation of intraspecific variation is also conducted based on a large number of specimens of *M. fuscata* (Giglio-Tos) to choose more relevant features for separation of the species to be used in taxonomic comments and identification keys. The male of *M. aptera* Giglio-Tos, and the females of *M. ciliata* (Stål) and *M. fuscata* are described for the first time, and redescription of the males of these and the female of *M. aptera* are provided based on much complementary data. *Miobantia nebulosa* (Giglio-Tos) is proposed as a junior synonym of *M. rustica* (Fabr.), based on comparison of the types, including investigation of the male genitalia, and the species is redescribed. Additionally, four new species are here described: *M. sp. nov. 1 sp. nov.*, *M. sp. nov. 2 sp. nov.*, *M. sp. nov. 3 sp. nov.*, and *M. sp. nov. 4 sp. nov.*; both sexes are described, except only for the male of *M. sp. nov. 2*. Identification keys are provided for males and females of all valid species, and figures of diagnostic features are provided for all of them. The species distribution is mapped according to literature data and 50 new records.

Key-words. praying mantis, Miopterigyni, taxonomy, COI, molecular sex association

Introduction

Miobantia is a Neotropical praying mantis genus proposed by the Italian entomologist Ermanno Giglio-Tos in 1917 for two females named by him as *Miobantia aptera*. The current species of this genus, however, were only recently combined by Terra (1995), who reported the complicated taxonomic history behind it. It started when Rhen, in April of 1904, chose *Miopteryx granadensis* Saussure as type species of *Miopteryx* Saussure, but Kirby, by October of the same year, chose *Miopteryx rustica* Fabricius with the same purpose. Giglio-Tos, in 1915, proposed *Promiopteryx* and transferred to it two species of *Miopteryx*, including *M. granadensis* which was chosen by him as type species of the new genus. Oblivious to the procedure of Rhen (1904), Giglio-Tos kept the name *Miopteryx* for the not transferred species, adopting then *M. rustica* as the type species of Saussure's genus. From this point, a series of nomenclatural acts were taken based on this complex scenario, resulting in the organization of the species initially grouped on *Miopteryx sensu* Saussure in two different genera: *Cnephomantis* Rhen, 1920 — treated as *Antimiopteryx* by Giglio-Tos (1927), and Beier (1935, 1964, 1968) — and *Promiopteryx* Giglio-Tos, 1915. Terra (1995) deciphered this problem and declared *Cnephomantis* as junior synonym of *Miobantia*, after noting high similarity between the species of these groups.

Miobantia is therefore currently composed by six species: *M. aptera* Giglio-Tos, 1917, *M. ciliata* (Stål, 1860), *M. fuscata* (Giglio-Tos, 1915), *M. nebulosa* (Giglio-Tos, 1915), *M. phryganea* (Saussure, 1869), and *M. rustica* (Fabricius, 1781). As with most Thespidae, they are small mantises, with a generally brown coloration and wingless females. Although very active, often found in leaf litter or in the parts of plants close to the ground, and quite frequently found on collecting expeditions in the Atlantic Forest (pers. obs.), *Miobantia* is a poorly known mantid group, clearly in need of revision, e.g., as pointed by Rivera (2010). Despite the intensive activity with nomenclatural changes, little information about these species has been added since the original descriptions. The descriptions date back to a period

between 1781 to 1917, lack many important details, and are based primarily on variable characters such as color and size. Similarly, the identification key for the *Antimiopteryx* spp. provided by Giglio-Tos (1927), a popular monograph on the World Mantodea, is based solely on color patterns of the wings. It keys only males for five of the six currently described species of *Miobantia*, but it is hardly useful due to the high intraspecific variation of the used characters.

Another obstacle for the identification of the species of this genus is their high sexual dimorphism. Only *M. aptera* and *M. phryganea*, of six known species of *Miobantia*, count with described females (Giglio-Tos, 1927). However, the male of *M. aptera* is unknown, and the available information about the female *M. phryganea* lacks details. Since the available features used in the literature to separate males of this genus are based on the wings, all of which showing high sexual dimorphism, all efforts for sexual association up to now seem to have been not much more than vague assumptions. The true range of variation between males and females of the same species, essential for their association, remain unknown. This lead to a situation where most *Miobantia* females were “traditionally” classified as *M. aptera*. There is also no information in literature about the oothecae and immature stages.

This work aims to contribute with the understanding of the taxonomic limits of *Miobantia* species using cladistic analyses as an aid to the delimitation of it, and a molecular-based approach to associate the males, females, and nymphs of each examined species. An investigation of their intraspecific variability is also conducted to select more stable characters to separate these species based on a large number of specimen of *M. fuscata*. Additionally, four new species are herein described for the genus and a new synonymy of *Miobantia rustica* (Fabricius, 1781) = *Miobantia nebulosa* (Giglio-Tos, 1915) is proposed. Identification keys to males and females are provided, the male genitalia and other important structures are imaged, and the distributions of the species are also mapped.

Material and Methods

Material examined. This work is based on 923 specimens and five oothecae of *Miobantia*, and another three specimens from genera related to *Miobantia*, used in the phylogenetic analyses, borrowed from the following institutions and curators (acronyms from Ehrmann, 2002, except MZUEFS and UFES):

MCTP – *Museu de Ciências e Tecnologia da Pontifícia Universidade Católica do Rio Grande do Sul*, Porto Alegre, Brazil (Gervásio S. Carvalho);

MZUEFS – *Museu de Zoologia da Universidade Estadual de Feira de Santana*, Feira de Santana, Brazil (Freddy Bravo);

QBUM – *Museu Nacional do Rio de Janeiro*, Rio de Janeiro, Brazil (Miguel A. Monné);

UFES – *Universidade Federal do Espírito Santo*, Vitória, Brazil (Marcelo T. Tavaves);

ZMB – *Museum für Naturkunde der Humboldt-Universität zu Berlin*, Berlin, Germany (Michael Ohl).

Cladistics. Phylogenetic relationships among specimens were investigated as an aid for the taxonomic delimitation of the species. All examined *Miobantia* were separated in groups of specimens according to its morphological pattern (morphospecies). Only males were evaluated on this first step, because of the high sexual dimorphism. A representative specimen of each morphospecies as well as the types of *Miobantia fuscata*, and *M. nebulosa*, were all used in the cladistic analysis. Morphological analysis included 99 morphological characters, codified as listed in Appendix 1. A

cotype of *M. rustica* was codified through digital photographs. The holotype of *Miobantia aptera* was not considered in this initial analysis because it is a female. The outgroup included one specimen of each following genera (label data of the specimens in Appendix 2): *Anamiopteryx* Giglio-Tos (Pseudomiopteriginae), *Chloromiopteryx* Giglio-Tos (Miopteryginae), and *Eumusonia* Giglio-Tos (Thespinae).

In this way, a matrix of 99 rows (characters) and 41 columns (taxa) was constructed. The analysis was made through heuristic searches with TNT 1.1 (Goloboff *et al.*, 2008b), using sectorial searches and the algorithms Ratchet and Drift, with 1000 iterations for each search, as well as the Tree Fusing method. Characters were downweighted according to their homoplasy (Goloboff *et al.*, 2008a) through implied weighting using values of k between 1 and 6 to explore multiple evolutive scenarios. The generated trees were visualized with WinClada 1.00.08 (Nixon, 2002). The support of the clades were tested in the program TNT by symmetric resampling (Goloboff *et al.*, 2003), with 1000 replications.

Preparation of genitalia. The male genitalia were investigated to assist separation of morphological patterns and compose part of the characters used in phylogenetic analysis. The preparations of the phallic complex were conducted according the classic methodology used in studies of praying mantises (*e.g.*, Cerdá, 1993) which consists of simple removal of the genitalia with tweezers, after a brief period of submergence of the abdomen tip of the specimen in water slightly heated. The phallic complex must then be placed in 10% KOH solution for about 30 minutes, to dissolve the associated musculature.

Species delimitation. The males were sorted in species according to the clades supported by the phylogenetic investigation, based on those that showed striking discontinuities in the morphological patterns compared to other clades, following the concept of Cracraft (1983). The new species were recognized as the species delimited by this method that (1) were not clustered with any of the included types of *Miobantia* (*i.e.*, of previously named spp.), (2) did not match any of the published description, and (3) did not match direct comparisons with the digital images of the types of *M. ciliata*, and *M. phryganea*, taxa not included in the cladistic analysis. Since *M. aptera* was known only by female, the identification of males for this species was performed only once completed the association between males and females (described below), by morphological comparison between the associated females and the holotype of *M. aptera*.

Association of dimorphic sexes and immature stages. For association females and nymphs with the species of the examined males, a pairwise distance matrix was generated in order to find more genetically related pairs of individuals. The molecular methodology was conducted by removing one midleg or hindleg of one to four males of each morphospecies, covering the maximum possible variation, and those of the examined females and nymphs. Only specimens from UFES were considered for this analysis; the material from other collections were not included to preserve its integrity, because they are mostly very old and the state of conservation of their genetic material is unknown. The legs were then subjected to the standard protocol for DNA extraction with NaCl/SDS/Proteinase K (Bruford *et al.*, 1992). The obtained products were used to amplify approximately 700 bp of the mitochondrial gene Cytochrome Oxidase I (COI) by Polymerase Chain Reaction (PCR) with the primers LCO 1490 (5'-GGTCAACAAATCATAAAGATATTGG-3') and HCO 2198 (5'-TAAACTTCAGGGTGACCAAAAAATCA-3') (Folmer *et al.*, 1994). The protocol used for PCR consists in temperatures of hot start at 94°C (1 min), denature at 94°C (40 s), anneal at 45°C (40 s), extension at 72°C (1 min), and final extension at 72°C (5 min), with 42 cycles. Sequencing

of DNA was performed by using a third party service, and the degree of saturation of its nucleotide substitutions was observed with Dambe (Xia & Xie, 2001).

In a first analysis, intra- and interspecific genetic distances were calculated only for males in MEGA5 using the evolutionary model Kimura 2-parameter (Kimura, 1980). Then, the pairwise distances were calculated among all sequenced males, females, and nymphs. The females or nymphs were associated with the species of the male genetically less distant of them if these distance values of associations were conclusive in comparison with those genetic distances found in intra- and interspecific analyses.

Although not all the examined males and females have been included in the molecular analyses, the achieved associations by DNA data were strictly necessary to identify the expected limits of morphological variation among the dimorphic sexes. From this point, a morphological investigation could be conducted within a reasonable level of confidence for associating the remaining specimens.

Intraspecific variability. A total of 867 specimens of *Miobantia fuscata* were considered in an additional morphological and molecular investigation. These specimens were obtained from 29 localities in Espírito Santo, southeastern Brazil, encompassing 19 cities. Morphological variation was discussed, and the genetic distance calculated, between and within all morphospecies. The more stable characters are identified and selected to produce the identification keys and the taxonomic comments of the description of each species of the genus. A total of 60 male genitalia of *M. fuscata* were dissected and compared.

Measurements, terminology, and descriptions. Specimens were examined and measurements taken using a Leica MZ12.5 stereomicroscope with an ocular micrometer. General morphological terminology follows Snodgrass (1935), except male genitalia terminology as in La Greca (1954). The anterior, middle, and posterior leg, coxa, trochanter, femur, and tibia, are all treated here preceded with the prefixes *fore*, *mid*, and *hind*-, respectively, as for example in *foreleg*, and *midtibia*. Wing venation nomenclature follows Roy (1999), except by tegmina and metathoracic wing, which are referred respectively as *forewing* and *hindwing*, and the addition of the forewing veins *M1* and *M2* originated from the bifurcation of vein M, and hindwing veins *CuA1* and *CuA2* originated from vein CuA. Descriptions were generated with the aid of the program DELTA 1.04 (Dallwitz *et al.*, 1999), except for color descriptions. Species descriptions, as well as the measurements and ratios, represent the holotype; DELTA's characters file is provided in Appendix 3. The head and the male genitalia of *M. fuscata*, the wings and vertex of *M. rustica*, and the forelegs of *M. ciliata*, could not be redescribed based on the respective type specimens because these structures were lacking or badly damaged. Also most characters of the head and abdomen of *M. ciliata* could not be seen in the available photographs; the male genitalia of this type could not be examined. In those particular cases, a separate description of such structures is provided under the item "Complementary description," based on another specimen. The genicular spines of the femora and the apical spur of the tibia were not included in the count of total spines of foreleg structures in descriptions. In the items "Distribution" and "Material Examined", the countries and states are listed from north to south, as standardized by Zanella *et al.* (2000).

Imaging and mapping. Photographs were taken using the extended-focus system EntoVision (GTVision, Hagerstown, Maryland) including a Leica M16 APO A macroscope attached to a JVC KY-75U 3-CCD digital video camera that feeds image data to a desktop computer through Cartograph software. The programs Archimed 5.3.1 and Gimp 2.6 were used to combine the stacks of images and finalize the resulting illustrations. The left dorsal phallomeres were imaged from the

dorsal perspective, unlike the ventral perspective of right dorsal, and ventral phallobes, to provide a better view of the anterior process, and of the dorsal face of the area between the phallobid apophysis and the membranous lobe. Legends of photographic illustrations show information to allow recognition of the particular specimens from which they were produced, including either the indication of holotype status or the unique label data.

The geographical coordinates, when not available from label data, were obtained from geoLoc (<http://smlink.cria.org.br/geoloc>) and from the Global Gazetteer v. 2.2 (<http://www.fallingrain.com/world/>). Distribution maps were generated using Quantum GIS 1.8.0 (<http://www.qgis.org>).

Results and Discussion

Phylogeny and species delimitation for males

Analysis of the data matrix (Appendix 4) using implied weighting with value of concavity of 1–6 produced the trees with the attributes listed in Table 1. The symmetric resampling support analysis with the most parsimonious trees of each concavity value presented the same topology, which is provided in Figure 1. The values of branch support are for analysis with $k = 1$, that was chosen because of its lower length, and higher Ci and Ri.

TABLE 1. Comparison of tree costs; tree length, Ci, and Ri are related to the strict consensus tree.

<i>k</i>	Nº of trees	fit	Score	Rearrangements	Length	Ci	Ri
1	5	57.60	33.40	402,342,164	289	47	72
2	4	65.70	25.30	423,828,209	301	45	70
3	6	70.56	20.44	430,989,862	300	46	70
4	5	73.76	17.24	435,016,260	300	46	70
5	5	76.05	14.95	435,386,933	300	46	70
6	5	77.79	13.21	455,750,516	301	45	70

The examination of the generated phylogenetic hypothesis combined with investigations of discontinuities of morphological patterns among the different clades suggests the existence of eight species of *Miobantia* in the cladograms, as shown in Figure 1 by the vertical bars on the right. The most useful characters to separate the species for males of this genus were the shape of vertex and frontal sclerite, the ocelli size and proximity, the pronotum shape, the pattern of distribution of dark spots on wings, primarily on vein R, the forewing vein M1 and hindwing CuA1 branching pattern, and, in special, the male genitalia features, such as the general form and curvature or extension of the distal and proximal processes of the ventral phallobere, and the anterior process, the phallobid apophysis, the left margin of dorsal lamina, and a well sclerotized area between the phallobid apophysis and the membranous lobe of the left dorsal phallobere. As in most Mantodea genera, the male genitalia was the most distinctive structure to successfully separate species of *Miobantia* — even very similar species, such as *M. rustica* and *M. ciliata* can be instantly distinguished with it.

Two different clades are recovered including types of previously named species of *Miobantia*. The clade under support of 80% (Fig. 1) contains most of the codified specimens and includes the holotype of *M. fuscata*. In addition, another clade contains both the *M. nebulosa* holotype and the *M. rustica* syntype (with 99% of support). The morphological comparison shows no relevant differences between them, especially in the male genitalia, indicating that these are synonyms. As *M. rustica* is the oldest name, it is the senior synonym of *M. nebulosa*. The sister group of this species in the cladogram comprises three specimens that fit the description of *M. ciliata* and share distinctive features

with the imaged holotype of *M. ciliata*, primarily the distinctive forewing vein R mostly uniformly dark colored. Therefore, these specimens were identified as *M. ciliata*.

The well supported monophyly of the group comprising *M. ciliata* and *M. rustica* is due to the synapomorphies which form an easily recognizable group, such as the forewing dark spots distinctly present on the longitudinal and transverse veins, the presence of darkish marks around the branches of vein M of forewing, the straight, short, and laterally projected anterior process of the left dorsal phallomere, and the left portion of the dorsal lamina of the left dorsal phallomere not projected, uniformly curved. Examination of wings and description of *M. phryganea* indicated that this species should be assigned to this group, because it shares at least the wing characteristics cited above. The other five species supported by the phylogeny did not fit the descriptions and did not present relevant similarities with the males of previously known species of *Miobantia*.

However, after the association of males and females, detailed below, the females associated to specimens MT00087, MT00195 and MT00051, grouped in a clade with support of 98%, proved to be conspecific with the holotype of *M. aptera*. Consequently, such males must be considered as *M. aptera*. The four remaining species are here interpreted as new to science, and described in the "Taxonomy" section, below. The synapomorphies of each species are also discussed in that section.

Association of dimorphic sexes and immature stages, and species delimitation for females

The intra- and interspecific genetic distances found are summarized in Table 2. Analyses of obtained sequences with DAMBE indicated start of saturation in transition mutation for genetic distances above 15%. The transversion mutations showed no saturation.

The pairwise matrix investigation associated one nymph to *Miobantia* sp. nov. 1, four females and one nymph to males posteriorly identified as *M. aptera*, two females to *M. ciliata*, and 29 females and 13 nymphs to *M. fuscata*. All genetic distances values between females or nymphs and its respective less distant male were below 7.02%, with average of 1.05%. These association values were far below the maximum intraspecific (17.7%), and minimum interspecific (13.2%) distances found and were therefore considered conclusive. Males from MCTP, MZUEFS, QBUM, and ZMB not included in this molecular analysis, as well as the male of *M. sp. nov. 2* from UFES, not sequenced because of the poor conservation of its genetic material, had no females or nymphs sequenced since all of these were successfully associated with the males included in molecular analysis.

TABLE 2. Intra- and interspecific genetic distance values found between males.

Species	n	Minimum–Maximum Intraspecific Distance [Average] (%)	Minimum–Maximum Interspecific Distance [Average] (%)		
			<i>M. aptera</i>	<i>M. ciliata</i>	<i>M. fuscata</i>
<i>M. aptera</i>	4	0.4–8.9 [6.91]	-	-	-
<i>M. ciliata</i>	4	0.2–1.4 [0.78]	16.1–14.7 [15.3]	-	-
<i>M. fuscata</i>	44	0.0–17.7 [12.53]	15.6–22.2 [18.6]	13.2–17.9 [15.8]	-
<i>M. sp. nov. 1</i>	2	12.5 [12.5]	26.4–22.4 [24.2]	21.9–19.4 [20.6]	20.2–27.2 [23.7]

Non-sequenced females that proved to be conspecific with sequenced females by morphological comparison were also associated with the respective males molecularly associated with such females. In this way, another six females and one nymph were identified as *M. fuscata* and three females as *M. aptera*, including the holotype for this species, fact responsible for the identification of the males associated with these females as *M. aptera*. Five oothecae and 28 nymphs

of first instar which emerged from them could also be associated to *M. fuscata* by including the progenitor females in the molecular analysis.

A morphological investigation of males and females of the species associated by the molecular method indicated that the vertex and the pronotum, although noticeably most swollen and robust in females, they maintain forms proportionally similar in both sexes. The same proved to occur with the general form of the frontal sclerite of the head. Another structure here discovered to be an important taxonomic character is the supranal plate. It is very short in males, making viewing difficult most variations, but in females it is longer than in males, and the variation of its form can successfully separate females of different species. Additionally, species with males that show the supranal plate slightly pointed were molecularly associated to females having the sides of the supranal plate distinctly converging towards a subrounded apex. On the other hand, species with males that show a supranal plate widely rounded, in most cases were related with females having the sides of the supranal plate somewhat parallel, and rounded apex.

Morphological analysis focusing on these features conclusively associated one female with males from *M. sp. nov. 1*, three females with males from *M. sp. nov. 3*, and one female with males of *M. sp. nov. 4*. In the case of *M. sp. nov. 1*, other features were also important to associate the dimorphic sexes, such as the relative distance from the internal spine 12 of the forefemur, and the external spine 1 of the foretibia to the other spines of its respective sets, and the presence of a small tubercle over which raises the central ocellus. Such features were uniquely found in specimens of *M. sp. nov. 1*.

The entire list of the males, females, and nymphs identified for each species as results of both molecular and morphological data is provided under the item “Material examined” of each species description, below. Although the association of males, females, and immature stages using molecular data was successful, it is noted that the high values of genetic distances found for the molecular marker used may not be as effective for such associations when the sample size is small, or when other species are not included for comparison. For example, if the genetic distance between a female and its less distant male for the present data set showed values between 13.2% (minimum interspecific distance found) and 17.7% (maximum intraspecific distance found), any conclusions based only on this information would be uncertain. In addition, the saturation level of transition mutations presented by these DNA sequences reinforces the problem with high distances. However, tests with sequencing of more conservative DNA regions of these mantises can possibly lead to more accurate choices of molecular markers, also effective with smaller sample numbers.

Taxonomy

***Miobantia* Giglio-Tos, 1917**

Miobantia Giglio-Tos, 1917a: 73–74; 1919: 62; 1927: 259; Beier, 1935: 6; 1964: 944; 1968: 9; Jantsch & Corseuil, 1988: 227; Terra, 1995: 42–43; Ehrmann, 2002: 225; Dorneles *et al.*, 2005: 224; Agudelo *et al.*, 2007: 120; Ehrmann & Koçak, 2009: 14; Rivera, 2010: 52.

=*Miopteryx* Kirby, 1904: 274; Giglio-Tos, 1915: 137; 1919: 60 (*non* Saussure, 1869: 55).

=*Cnephomantis* Rehn, 1920: 225.

=*Antimiopteryx* Giglio-Tos, 1927: 210; Beier, 1935: 6; Beier, 1964: 944, 1968: 9.

Type species: *Miobantia aptera* Giglio-Tos, 1917, by monotypy.

Diagnosis. Body small, general coloration darkish brown to pale yellow, ventrally often lighter, with dark spots of

variable distribution; dimorphic sexes, with apterous females, fully winged males, often distinctly smaller than females. Head with eyes rounded; frontal sclerite laterally wider than long, sides parallel to very slightly converging towards lower margin; vertex somewhat straight to markedly convex, inconspicuously to distinctly higher than imaginary line joining apex of eyes; vertex region between parietal suture and eye straight to slightly convex or markedly convex forming distinct, low bulge (juxtaocular bulge). Pronotum about 3 × as long as wide; lateral margin without denticulation in males, distinctly present in females; supracoxal dilatation faintly to markedly pronounced; metazone about 1.6–2.0 × as long as prozone. Forecoxa longer than metazone; forefemur with claw groove just basad femur middle, 4 discoidal, 4 external, 12 internal spines; foretibia with 7 external spines, spine 1 distinctly away from spine 2, 9–11 internal spines, dorsal spines absent. Wings' general pigmentation highly variable, even intraspecifically, ranging from grayish to markedly brownish or blackish; main longitudinal veins with dark spots, transverse veins sometimes with dark spots, large or small; forewing about same length or shorter than hindwing, reaching about half body length, its apex somewhat rounded; vein M branched, forming veins M1 and M2; vein M1 branched or not; hindwing vein CuA branched, forming veins CuA1 and CuA2; vein CuA1 branched or not. Supranal plate apex pointed, with sides slightly converging towards apex, or rounded.

Redescription. Body small (length from head to tip of abdomen 16.0–26.4 mm), females as large as males or distinctly larger (Figs 2–10).

Head (Figs 11–13): Labrum slightly convex, lower margin rounded; clypeus about 2.0 × as wide as long, sides distinctly converging towards lower margin; frontal sclerite wider than long, longitudinally very to moderately short, sides parallel to inconspicuously converging towards upper margin, lower margin slightly convex, upper edge uniformly convex, medially extended between toruli; antenna filiform, markedly longer in males than females; flagellomeres in males with swollen apex, in females with apex not swollen, entirely thinner than in males; region between each compound eye and toruli often with tiny tubercle; eyes rounded, protruding head; ocelli in females vestigial, in males small to large, regularly distant or close to each other, placed over a slight elevation; central ocellus about as elevated as, or distinctly more elevated than lateral ocellus, placed atop a small, conical tubercle; lateral ocellus rounded or distinctly elliptical; vertex somewhat straight to markedly convex, inconspicuously to distinctly higher than imaginary line joining apex of eyes; vertex region between parietal suture and eye not or more elevated towards parietal suture, straight to slightly convex or markedly convex forming distinct, low bulge (juxtaocular bulge); parietal suture lower portion markedly curved towards ocelli cuticle elevation; vertex region between parietal sutures with lateral portion sometimes abruptly or gradually elevated next parietal suture.

Pronotum (Figs 14 & 15): About 3.0 × as long as wide, smooth, with dense pilosity mostly on metazone posterior area; median keel more evident at metazone, in prozone often anteriorly inconspicuous; lateral margin without denticulation in males, distinctly present in females, with density of distribution variable across species; supracoxal dilatation faintly to markedly pronounced; metazone about 1.6–2.0 × as long as prozone, apical region with pair of very low cuticle bulge.

Meso- and Metanotum: Mesonotum posterior margin with pair of triangular, densely pilose expansions; meso- and metanotum with median longitudinal pilosity often higher than general thorax pilosity.

Legs (Fig. 16): Densely pilose in males, pilosity very short and more sparsely distributed in females. Forecoxa longer than metazone, anterior edge with median very faint denticulation in females, denticulation absent or inconspicuous in males; forefemur with anterior edge somewhat straight or very faintly convex, claw groove just basad femur middle, 4

discoidal spines, 4 external spines, spines 1 and 2 distinctly close to each other, 12 internal spines, crenulated internally to lateral spine lines; foretibia with 7 external spines, spine 1 distinctly away from spine 2, 9–11 internal spines, dorsal spines absent; foretarsus with basal tarsomere longer than remaining segments combined.

Wings (Figs 2–10): Apterous female; fully winged male. Forewing about same length or shorter than hindwing, about half as long as body length, its apex somewhat rounded; costal area about same width of forewing base, or slightly thinner; vein Sc somewhat parallel to vein R; vein R apically branched; vein M branched, forming veins M1 and M2; vein M1 branched or not; stigma long, very thin. Hindwing basally wide, apically rounded to distinctly pointed, or apex abruptly interrupted; vein R not branched; vein M basally branched; vein CuA branched, forming veins CuA1 and CuA2; vein CuA1 branched or not.

Abdomen: Dorsally slightly compressed in males, cylindrical in females; supranal plate rounded or faintly pointed, very short in males, longer in females, not overlaying ovipositor, sides somewhat parallel or distinctly converging towards apex (Fig. 17); cercus regularly sized, circular in cross-section; stylus circular in cross-section.

Male Genitalia (Figs 19–26): Ventral phallomere broad; distal process thin, short to long, its apex rounded or pointed; left posterior corner with prominent expansion (proximal process), from slightly to markedly projected, often long, curved, forming a slit with posterior margin of ventral phallomere. Right dorsal phallomere of regular shape. Left dorsal phallomere with anterior process short to long; portion between anterior process and phalloid apophysis triangularly expanded; area between phalloid apophysis and membranous lobe sometimes with well sclerotized region; phalloid apophysis very short to very long, with basal portion projected the to back or left, then curved to right towards apex, apical portion sometimes bent, not or slightly sharp; apical process (titillator) small, curved; membranous lobe wide to very slender; dorsal lamina posterior margin rounded or bent, sometimes projected; articular process elongate, slender.

Color (Figs 2–17): Body generally darkish brown to pale yellow, ventrally often lighter, with many dark spots of variable distribution. Head with ocelli margin dark in males, often with well pigmented transversal area between eyes, covering the ocelli cuticle elevation, sometimes pigmentation faint between ocelli. Legs with dark spots often densely distributed; forefemur sometimes with three, mid- and hinfemur sometimes with two, large transverse dark marks; tibiae often with three transverse dark marks; forefemur and foretibia with spines at apex; all tarsomeres apex dark. Wings general pigmentation highly variable, even intraspecifically, from grayish to markedly brownish, or blackish pigmented; main longitudinal veins with dark spots, transverse veins sometimes also with dark spots, spots large or small.

Ootheca (Fig. 18): Known for only one species. See *M. fuscata* redescription.

Distribution. Neotropical (Fig. 27). Recorded from Brazil, Paraguay, and Argentina. The northernmost record is for a male of *M. sp. nov.* 4, collected in Cachoeira da Fumaça, Feira de Santana, in the state of Bahia, Brazil (10°28'43"S 40°12'27"W). The southernmost record is for the types of *M. rustica*, collected in coastal Patagonia (exact locality is unknown).

Key to Species

Males

1. Forewing dark spots at vein R with marks of distinctly unequal sizes; forewing and hindwing costal margin apically with distinct bright marks (*e.g.*, Figs 2, 4, 7) ... 2

- Forewing dark spots at vein R with marks of about same sizes, or vein R entirely or mostly uniformly dark; forewing and hindwing costal margin apically without distinct bright marks (*e.g.*, Figs 3, 5, 6, 8–10) ... 4

2(1). Vertex inconspicuously more elevated than eyes (Figs 12E); forewing vein M1 branched. Dorsal habitus in Fig. 4 ... ***Miobantia fuscata* (Giglio-Tos, 1915)**

- Vertex distinctly more elevated than eyes (*e.g.*, Figs 12A & 13A); forewing vein M1 not branched ... 3

3(2). Frontal sclerite longitudinally very short (Fig. 11A); central ocellus about as elevated as lateral ocellus (Fig. 11A); distance between internal spines 12 and 11 about same distance between spines 10 and 11 or slightly shorter (Fig. 16A); foretibia external spine 1 away from spine 2 by space equivalent to one spine (Fig. 16J); hindwing vein CuA1 not branched; hindwing apex slightly short (Fig. 2); ventral phallomere of genitalia with distal process denticulations absent, its tip pointed, proximal process distinctly projected, curved backwards (Fig. 19). Dorsal habitus in Fig. 2 ... ***Miobantia aptera* Giglio-Tos, 1917**

- Frontal sclerite longitudinally moderately short (Fig. 11E); central ocellus distinctly more elevated than lateral ocellus (Fig. 11E); distance between internal spines 12 and 11 distinctly longer than distance between spines 10 and 11 (Fig. 16D); foretibia external spine 1 away from spine 2 by space equivalent to two spines (Fig. 16I); hindwing vein CuA1 branched; hindwing apex abruptly interrupted (Fig. 7); ventral phallomere of genitalia with distal process denticulations markedly present, its tip rounded, proximal process only slightly projected, not curved (Fig. 23) Dorsal habitus in Fig. 7 ... ***Miobantia* sp. nov. 1 Scherrer, sp. nov.**

4(1). Vertex somewhat straight or slightly convex (*e.g.*, Figs 12H, 13D, 13F); forewing with transverse veins of costal area without dark spots (*e.g.*, Figs 8–10) ... 5

- Vertex markedly convex (*e.g.*, Figs 12C, 12G); forewing with transverse veins of costal area dark spotted, even if inconspicuously (*e.g.*, Figs 3, 5, 6) ... 7

5(4). Ocelli very close to each other (Fig. 12H); forewing slightly shorter than hindwing (Fig. 8). Dorsal habitus in Fig. 8 ... ***Miobantia* sp. nov. 2 Scherrer, sp. nov.**

- Ocelli regularly distant from each other (*e.g.*, Figs 13D & 13F); forewing about same length than hindwing (*e.g.*, Figs 9 & 10)... 6

6(5). Frontal sclerite longitudinally very short (Fig. 11G); ocelli medium-sized (Fig. 11G); ventral phallomere of genitalia with distal process slightly long, with most marked sclerotization taking the entire process, basal dilatation present, its tip pointed, proximal process long, with apex rounded (Fig. 25). Dorsal habitus in Fig. 9 ... ***Miobantia* sp. nov. 3 Scherrer, sp. nov.**

- Frontal sclerite longitudinally moderately short (Fig. 11H); ocelli markedly large (Fig. 11H); ventral phallomere of genitalia with distal process short, with most marked sclerotization taking only the process tip, basal dilatation absent, its tip rounded, proximal process short, with apex pointed (Fig. 26). Dorsal habitus in Fig. 10 ... ***Miobantia* sp. nov. 4 Scherrer, sp. nov.**

7(4). Supracoxal dilatation very faintly pronounced (Fig. 14C); forewing vein R entirely or mostly uniformly dark. Dorsal habitus in Fig. 3 ... ***Miobantia ciliata* (Stål, 1860)**

- Supracoxal dilatation slightly pronounced (e.g., Fig. 14G); forewing vein R not dark, entirely spotted (e.g., Figs 5 & 6) ... 8

8(7). Ocelli slightly close to each other; forewing slightly shorter than hindwing; hindwing apex rounded (Fig. 6). Dorsal habitus in Fig. 6 ... ***Miobantia rustica* (Fabricius, 1781)**

- Ocelli regularly distant from each other; forewing much shorter than hindwing; hindwing apex slightly pointed (Fig. 5). Dorsal habitus in Fig. 5 ... ***Miobantia phryganea* (Saussure, 1869)**

Females (except phryganea, rustica, and sp. nov. 2)

1. Supranal plate sides parallel, or nearly so, apex rounded (e.g., Figs 17C, 17D, 17H, 17I) ... 2

- Supranal plate sides distinctly converging towards a subrounded apex (e.g., Figs 17E–17G) ... 4

2(1). Central ocellus on a very small, low tubercle (Fig. 13B); forefemur distance between internal spines 12 and 11 distinctly longer than distance between spines 10 and 11 (e.g., Fig. 16D); foretibia external spine 1 away from spine 2 by space equivalent to two spines (e.g., Fig. 16I). Dorsal habitus in Fig. 7C ... ***Miobantia* sp. nov. 1 Scherrer, sp. nov.**

- Central ocellus site without tubercle (e.g., Figs 12B & 12D); forefemur with distance between internal spines 12 and 11 about same distance between spines 10 and 11 or slightly shorter (e.g., Fig. 16A); foretibia external spine 1 away from spine 2 by space equivalent to one spine (e.g., Fig. 16J) ... 3

3(2). Vertex entirely markedly convex (Fig. 12D); supracoxal dilatation very faintly pronounced (Fig. 14D); foretrochanter light brown, with few dark marks. Dorsal habitus in Fig. 3B ... ***Miobantia ciliata* (Stål, 1860)**

- Vertex laterally convex, centrally slightly concave (Fig. 12B); supracoxal dilatation slightly pronounced (Fig. 14B); foretrochanter entirely dark, with only few evanescent bright marks laterally. Dorsal habitus in Fig. 2B & 2D ... ***Miobantia aptera* Giglio-Tos, 1917**

4(1). Vertex distinctly convex (Fig. 13E); frontal sclerite markedly short. Dorsal habitus in Fig. 9B ... ***Miobantia* sp. nov. 3 Scherrer, sp. nov.**

- Vertex somewhat straight (e.g., Figs 12F & 13G); frontal sclerite moderately short... 3

4(1). Vertex region between parietal suture and eye inconspicuously convex, nearly straight (Fig. 12F); forefemur with internal spine 12 distinctly shorter than spine 10 (e.g., Fig. 16C); pronotum with metazone slightly robust (Fig. 14F). Dorsal habitus in Fig. 4D ... ***Miobantia fuscata* (Giglio-Tos, 1915)**

- Vertex region between parietal suture and eye slightly but distinctly convex (Fig. 13G); forefemur with internal spine 12 about same size of spine 10 (e.g., Fig. 16F); pronotum with metazone markedly robust (Fig. 15F). Dorsal habitus in Fig. 10B ... ***Miobantia* sp. nov. 4 Scherrer, sp. nov.**

***Miobantia aptera* Giglio-Tos, 1917**

(Figs 2, 11B, 12A, 12B, 14A, 14B, 16A, 17C, 17D, 19, 27A)

Miobantia aptera Giglio-Tos, 1917a: 74; 1927: 259; Beier, 1935: 6; Jantsch & Corseuil, 1988: 227; Terra, 1995: 43; Ehrmann, 2002: 225; Dorneles *et al.*, 2005: 224; Agudelo *et al.*, 2007: 120; Ehrmann & Koçak, 2009: 14. Holotype f# (ZMB), examined.

Redescription, male from Alfredo Chaves, Brazil. Length of body 17.2 mm from head to tip of abdomen, of pronotum 4.1 mm, of metazone 2.8 mm, of forecoxa 3.4 mm, of forewing 15.5, of hindwing 17.2; maximum width of head 3.1 mm, of prozone middle 1.1 mm, of supracoxal dilatation 1.5 mm; metazone minimum width 0.7 mm.

Head (Fig. 12A): Frontal sclerite longitudinally very short, upper edge uniformly convex; small tubercle between each compound eye and toruli not pointed, represented by low cuticle elevation; ocelli slightly small, regularly distant from each other, central ocellus about as elevated as lateral ocellus, lateral ocellus distinctly elliptical; vertex slightly convex, distinctly higher than imaginary line joining apex of eyes, with region between parietal suture and eye more elevated towards parietal suture, nearly straight; parietal suture faintly marked.

Pronotum (Fig. 14A): With moderately long pilosity, supracoxal dilatation slightly pronounced; margin without denticulation.

Legs (Figs 16A): Forecoxa markedly longer than metazone; forefemur internal spine 6 with shape and size more similar to spine 5 than spines 2 and 4, distance between internal spines 12 and 11 about same distance between spines 10 and 11 or slightly shorter, internal spine 12 about same size of spine 10; foretibia external spine 1 away from spine 2 by space equivalent to one spine, external spine 2 slightly longer than spine 3, with 9 internal spines or 10 internal spines.

Wings (Fig. 2A): Forewing slightly shorter than hindwing; vein M1 not branched; vein CuA1 branches slightly sinuous. Hindwing apical angle moderately acute, vein CuA1 not branched, apex slightly short, slightly pointed.

Abdomen: Supranal plate very short, rounded.

Genitalia (Fig. 19): Ventral phallomere distal process short, with most marked sclerotization taking at least half the area of the process, denticulation absent, tip pointed, basal swelling absent; proximal process faintly sclerotized, markedly projected, long, curved, distinctly turned backwards, with basal portion slightly wide, apex rounded, slightly slender than base; slit between posterior margin of ventral phallomere and proximal process deep. Left dorsal phallomere with anterior process slightly long, markedly large, markedly curved at about middle, oriented forwards, apex about as wide as middle; expanded portion between anterior process and phalloid apophysis short, oriented forwards; a well sclerotized area between phalloid apophysis and membranous lobe which is marked, small, reaching anterior area of membranous lobe; phalloid apophysis regularly long, slender, its basal portion projected to the left, subapically slightly bent, apically almost straight, not sharp; membranous lobe wide; dorsal lamina posterior margin with left portion projected, expanded, uniformly curved.

Color: Head, thorax except appendices, and abdomen, light brown, dorsally darker. Head: area between mouthparts and toruli pale yellow, with few, very sparse, irregular dark marks, except by mandible apex, and maxillary terminal segment dark; scape pale yellow, except by apical frontal dark mark; pedicel dark, with apical margin pale yellow; flagellum entirely light brown; area between toruli and vertex darkish brown, with several minute darker spots, mostly on transversal darker band between eyes covering the ocelli cuticle elevation, dark band inconspicuous between ocelli; head dorsal region with irregular darkish marks, transversal dark band on it apical area. Pronotum: dorsally

entirely with very faint dark spots; margin pale yellow with moderately large dark spots; ventrally with black median stripe on its posterior 0.30. Legs: light brownish to pale yellow, tarsomeres apically darkish, tarsomere 1 centrally darkish; forecoxa with many dark spots; forecoxa apical margin medially dark; foretrochanter entirely dark, with only few evanescent bright marks laterally; forefemur with dark spots of moderate, anteriorly with three large darkish marks, visible at the lateral and medial areas of femur, posteriorly with dark longitudinal mark from femur base to claw groove, apical region anteriorly with longitudinal dark mark; foretibia with few dark spots of irregular sizes; fore- and midtibia with three large transversal areas of dense concentration of dark spots, one at each extremity and another at middle, mid- and hindfemur with two on its apical half, hindfemur with area between dark transversal bands lighter than remaining leg parts. Mid- and hindlegs with dense dark spots of irregular sizes. Wings: light brownish, regularly translucent; costal margins apically, and some veins of forewing, with bright large marks, not restricted to vein limits; forewing dark spots present only on main veins, transverse veins without dark spots; vein R spotted, with marks of unequal sizes, spaced from each other by $2.0\text{--}3.0 \times$ length of smallest spots; area around vein M branches without darkish marks.

Female holotype. Length of body 21.4 mm from head to tip of abdomen, of pronotum 5.3 mm, of metazone 3.4 mm, of forecoxa 4.6 mm; maximum width of head 4.2 mm, of prozone middle 1.6 mm, of supracoxal dilatation 2.1 mm; metazone minimum width 1.1 mm. General morphology and coloration similar to male, except by body larger, more stout than holotype; head with vertex laterally convex, centrally slightly concave (Figs 11A & 12B); ocelli vestigial; pronotum with distinct denticulation along entire lateral margin, more pronounced posteriorly, metazone slightly more robust (Fig. 14B); forecoxa anterior edge with median distinct denticulation; foretibia with 9 internal spines; apterous; supranal plate slightly longer than males, sides somewhat parallel (Fig. 17D); abdomen with several dark spots, irregular dark marks.

Immature Stages. *Nymph, immature male, unknown instar.* Length of body 11.1 mm; antenna 7.4 mm. General morphology and coloration as in adults, except by flagellum basally stout, becoming very slender towards apex; ocelli vestigial; foretibia with external spines 1 and 3 slightly lower than the others, spine 2 markedly higher than spines 4–6, spine 7 more than $2.0 \times$ as high as spine 2. Wings vestigial. Cercus basally stout, very slender towards apex. Subgenital plate with stylus present.

Variability, male. Male paratypes very similar to holotype, except by head with parietal suture line uniformly curved; forewing veins CuA-a and CuA-b1 nearly straight. General body dark marks and spots high variable on size and intensity; wings with general coloration slightly variable, paratype from MN with forewing with evanescent darkish brown marks between veins, paratype from Sooretama with wings distinctly dark. This specimen also with general body coloration with pale yellow tint, dark marks distinctly more marked than others specimens.

Female. Other examined females very similar to holotype, except by foretibia with 10 internal spines. Paratype from Sooretama general body coloration with pale yellow tint, dark marks distinctly more marked; paratype from Vitória with general body coloration with dark green tint when observed alive; after drying with same coloration of holotype, dark marks slightly more marked; females from Guarapari with general body coloration more similar to holotype, with dark marks more rare and faint than other collected females.

Comments. *Miobantia aptera* was described by Giglio-Tos (1917a) as single species of the genus based on two females. However, the holotype differs from paratype by having the frontal sclerite slightly wider, eyes less protruding, vertex laterally convex, centrally slightly concave (*vs.* entirely slightly convex), metazone of pronotum distinctly longer and slender, and supranal plate rounded (*vs.* slightly pointed). Based on such differences, the types were considered non-conspecific specimens. The sex association procedure detailed above resulted in the identification of morphological

correspondence between the paratype of *M. aptera*, as well as other two females, and the males of *M. sp. nov. 3*. Therefore, the paratype of *M. aptera* was taken as paratype of this new species.

Males of *M. aptera* are most similar to males of *M. fuscata* and *M. sp. nov. 1* based on the presence of forewing dark spots at vein R, with marks of distinctly unequal sizes, and fore- and hindwings costal margin apically with distinct bright marks. However, it can be easily separated from these two species by the foretrochanter entirely dark with only few evanescent bright marks laterally, and the hindwing with vein CuA1 not branched. Although the examination of male genitalia can successfully separate it from *M. sp. nov. 1* based on the distal process of ventral phallomere with slender apex and proximal process long and curved, it can also allow the misidentification of it as *M. fuscata*. In this case, *M. aptera* can be isolated by the distal process of ventral phallomere with denticulation absent, its tip pointed, most marked sclerotization spotted at least the posterior half of the process, and left dorsal phallomere with well sclerotized area between phalloid apophysis and membranous lobe extended, reaching anterior area of membranous lobe.

The females are most likely to be mistaken for *M. ciliata* due to have the combination of the central ocellus site without tubercle, the forefemur with distance between internal spines 12 and 11 about same distance between spines 10 and 11 or slightly shorter, the foretibia external spine 1 away from spine 2 by space equivalent to one spine, and the supranal plate with sides parallel and rounded apex. However, females of *M. aptera* can be readily separated from this species by having the vertex laterally convex, centrally slightly concave, the supracoxal dilatation slightly pronounced, the foretrochanter entirely dark with only few evanescent bright marks laterally, and the hindfemur with area between the two transverse dark bands lighter than remaining leg parts.

Distribution. (Fig. 27A) Brazil. Recorded from Rio de Janeiro (type locality), and eight localities of Espírito Santo: from Reserva Biológica de Sooretama, Sooretama (19°02'55"S 40°08'48"W); from Fazenda Juliberto Stur, Pancas (19°12'54.8"S 40°47'52.5"W); from Reserva Natural Vale, Linhares (19°09'06"S 40°04'14"W); from Fazenda Paulo Seick, Santa Maria de Jetibá (20°02'31.1"S 40°41'51.3"W); from Mata Pico do Eldorado, Domingos Martins (20°22'17"S 40°39'29"W); from Reserva Biológica de Duas Bocas, Cariacica (20°16'21"S 40°28'40"W); Universidade Federal do Espírito Santo *campus* Goiabeiras, Vitória (20°16'29.49"S 40°18'16.87"W); from Reserva Natural Oitrem, Matilde, Alfredo Chaves (20°33'S 40°48'W). Agudelo, Lombardo and Jantsch (2007) indicated the occurrence of this species also in the states of Rio de Janeiro, Paraná and Rio Grande do Sul, in Brazil, based on a previous study of Jantsch (1999). However, two females identified by such author as *M. aptera* and included in the original distribution record made by him in 1999 (registered for São Borja and Garabi, from Rio Grande do Sul), was examined and taken as par types of *M. sp. nov. 3*. Although these occurrence records were based also on other specimens, these misidentifications suggest the need for more detailed investigations of such data. The other specimens examined by Jantsch (1999) were recorded from the locality of Represa Rio Grande, Rio de Janeiro (around 22°55'S 43°26'W); the locality of Morretes, Paraná (around 25°28'S 48°49'W); and Porto Alegre, Rio Grande do Sul (around 30°02'S 51°12'W). The distribution record for Paraguay (Agudelo *et al.* 2007, Ehrmann 2002) was based on an original paratype included in Giglio-Tos' description, now the allotype of *M. sp. nov. 3*.

Material Examined. 19 m#m#, 7 f#f#, 1 nymph. *Holotype*: f# from **BRAZIL**, Rio de Janeiro, Mus. Berlin, *Miobantia aptera* Giglio-Tos, E. Giglio-Tos *det.*, Holotypus Nr. (ZMB). *Described male*: m# from **BRAZIL**, Espírito Santo, Alfredo Chaves, Matilde, Reserva Natural Oitrem, Malaise, COAzevedo *et al. leg.* [specimen MT00051 in the cladistic analysis] (UFES). *Other specimens*: **BRAZIL**: 1 f# from Espírito Santo, Sooretama, Reserva Biológica de Sooretama, 11-18.XI.2011, Malaise, COAzevedo *et al. leg.* (UFES); 1 m# same data except Reserva Biológica de Sooretama, Trilha Ana - Malaise 6, 06-14.XII.2011, Malaise, MTTavares *et al. leg.* [MT00195] (UFES); 1 m# from

Espírito Santo , Pancas, Fazenda Juliberto Stur, Área 2, point T7, 24-31.I.2003, Malaise, MTTavares, COAzevedo *et al. leg.* (UFES); 1 nymph from Espírito Santo, Linhares, Reserva Natural Vale, next to the labs, 13.I.2011, lighting trap, MVScherrer & MCCarreiro *leg.* (UFES); 1 f# same data except Reserva Natural Vale, Bicuiba, Trilha 1, Pt.02, 29.V-8.VI.2010, Malaise, APAguiar *et al. leg.*; 1 f# from Espírito Santo, Santa Maria de Jetibá, Fazenda Paulo Seick, Área 1, Bosque 2, 06-13.XII.2002, Malaise, MTTavares *et al. leg.* (UFES); 1 m# from Espírito Santo, Domingos Martins, Mata Pico do Eldorado, point B2, 03-10.XII.2004, Malaise, MTTavares *et al. leg.* (UFES); 3 m# m# same data except Mata Pico do Eldorado, T2; 1 m# same data except Mata Pico do Eldorado, T3; 1 m# same data except Mata Pico do Eldorado, T7; 1 m# same data except Mata Pico do Eldorado, T8; 1 m# same data except Mata Pico do Eldorado, B3, 26.XI-03.XII.2004; 1 m# same data except Mata Pico do Eldorado, B4; 1 m# same data except Mata Pico do Eldorado, T2 [MT00087]; 1 m# same data except Mata Pico do Eldorado, T3; 1 m# same data except Mata Pico do Eldorado, T8; 2 f# f# from Espírito Santo, Cariacica, Reserva Biológica de Duas Bocas, Pau Amarelo, 21-27.X.2005, Malaise, APAguiar *et al. leg.* (UFES); 1 m# same data except Pau Amarelo, point 18, 21-30.X.2005; 1 m# same data except Pau Amarelo, point 21, 26.X-05.XI.2005; 1 f# from Espírito Santo, Vitória, UFES (Goiabeiras), Prédio da Botânica, 26.IV.2010, 20:10 h, manual, JTCunha *leg.* (UFES); 1 m# from Espírito Santo, Alfredo Chaves, Matilde, Reserva Natural Oitrem, Malaise, COAzevedo *et al. leg.* (UFES); 1 m# from [locality missing] “59.2 = 59.1”, N°58/Proc.702, *Miobantia* sp., Agudelo *det.* 02.XI.2010 (QBUM).

***Miobantia ciliata* (Stål, 1860)**

(Figs 3, 11B, 12C, 12D, 14C, 14D, 16B, 17H, 20, 27B)

Mantis ciliata Stål, 1860: 313. Holotype m# (Swedish Museum of Natural History, Stockholm, Sweden - NHRS), examined through digital images.

Miopteryx ciliata: Saussure, 1871: 111–112; Kirby, 1904: 274; Chopard, 1913: 761; Giglio-Tos, 1917b:154.

Parastagmatoptera ciliata: Kirby, 1904: 298; Rehn, 1911: 10.

Antimiopteryx ciliata: Giglio-Tos, 1927: 211; Sjöstedt, 1930: 7; Beier: 1935: 7.

Miobantia ciliata: Jantsch & Corseuil, 1988: 228; Terra, 1995: 43; Ehrmann, 2002: 225; Agudelo *et al.*, 2007: 120; Ehrmann & Koçak, 2009: 14.

Redescription, male holotype. Length of body about 22.6 mm from head to tip of abdomen.

Head: Ocelli medium-sized, central ocellus about as elevated as lateral ocellus, lateral ocellus distinctly elliptical; vertex markedly convex, distinctly higher than imaginary line joining apex of eyes, with region between parietal suture and eye more elevated towards parietal suture.

Pronotum (Fig. 14C): Supracoxal dilatation very faintly pronounced; margin without denticulation.

Wings (Fig. 3C): Forewing slightly shorter than hindwing; vein M1 branched; vein CuA1 branches slightly sinuous. Hindwing apical angle moderately acute, vein CuA1 branched, apex slightly short, slightly pointed.

Color: Body entirely light brown, with small dark spots. Legs: light brownish, with several dark spots; Mid- and hindlegs pale yellow, with several dark spots of irregular sizes, without transversal dark bands. Wings: light brown, very translucent; forewing main longitudinal veins with dark spots present, transverse veins of discoidal area also with few spots, of costal area without spots; vein R basal 0.6 entirely dark colored; area around vein M branches with one larger darkish mark; hindwing main longitudinal veins apically dark spotted.

Complementary description, male from Alfredo Chaves, Brazil. Length of body 19.1 mm from head to tip of abdomen, of pronotum 3.8 mm, of metazone 2.44 mm, of forecoxa 3.6 mm, of forewing 17.6, of hindwing 19.1; maximum width of head 3.2 mm, prozone middle 1.2 mm, supracoxal dilatation 1.4 mm; metazone minimum width 0.9 mm.

Head (Figs 11B & 12C): Frontal sclerite longitudinally very short, upper edge uniformly convex; small tubercle between each compound eye and toruli not pointed, represented by low cuticle elevation; ocelli medium-sized, regularly distant from each other, central ocellus about as elevated as lateral ocellus, lateral ocellus distinctly elliptical; vertex markedly convex, distinctly higher than imaginary line joining apex of eyes, with region between parietal suture and eye more elevated towards parietal suture, nearly straight; parietal suture faintly marked.

Legs (Fig. 16B): Forecoxa markedly longer than metazone; forefemur internal spine 6 with shape and size more similar to spine 5 than spines 2 and 4, distance between internal spines 12 and 11 about same distance between spines 10 and 11 or slightly shorter, internal spine 12 about same size of spine 10; foretibia external spine 1 away from spine 2 by space equivalent to one spine, external spine 2 slightly longer than spine 3, with 9 internal spines.

Abdomen (e.g., Fig. 17A): Supranal plate very short, rounded.

Genitalia (Fig. 20B): Ventral phallomere distal process slightly long, with most marked sclerotization taking at least half the area of the process, denticulation absent, tip pointed, basal swelling absent; proximal process faintly sclerotized, markedly projected, short, curved, turned diagonally backwards to central portion, with basal portion very wide, apex with slightly long, slender point; slit between posterior margin of ventral phallomere and proximal process deep. Left dorsal phallomere with anterior process short, markedly large, straight, oriented to left, apex about as wide as middle; expanded portion between anterior process and phalloid apophysis short, oriented forwards; a well sclerotized area between phalloid apophysis and membranous lobe which is evanescent; phalloid apophysis regularly short, moderately stout, its basal portion projected to the left, subapically markedly bent, apically almost straight, not sharp; membranous lobe wide; dorsal lamina posterior margin with left portion not projected, uniformly curved.

Color: Body entirely light brown to pale yellow, with several, small dark spots. Head: area between mouthparts and toruli pale yellow, with few dark spots, except by mandible apex, and maxillary terminal segment, clypeus apically dark; scape pale yellow, except by apical frontal dark mark; pedicel dark, with margins pale yellow; flagellum entirely pale yellow; area between eyes covering the ocelli, head posterior area darkish brown, with several minute darker spots. Pronotum: dorsally entirely, densely marked with small dark spots; ventrally pale yellow, with dark spots more sparsely distributed, black median stripe. Legs: pale yellow, with only few dark spots; foretrochanter laterally with larger dark spots; forefemur with dark spots restrict to anterior edge; foretibia with inconspicuous, few dark spots. Mid- and hindlegs pale yellow, with several dark spots of irregular sizes, without transversal dark bands. Wings: light brown, very translucent; forewing main longitudinal and transverse veins with dark spots present, spots of transverse veins more evident in costal and discoidal area; vein R entirely dark colored from base to apical branching; area around vein M branches with two darkish marks; hindwing main longitudinal veins apically dark spotted.

Female from Guarapari, Brazil. Length of body 23.3 mm from head to tip of abdomen, of pronotum 5.5 mm, of metazone 3.5 mm, of forecoxa 4.7 mm; maximum width of head 4.3 mm, prozone middle 1.4 mm, supracoxal dilatation 2.3 mm; metazone minimum width 1.4 mm. General morphology and coloration similar to described males, except by body larger, more stout than males; ocelli vestigial (Fig. 12D); pronotum with faint denticulation along lateral margin, more evident posteriorly (Fig. 14D); forecoxa anterior edge with median faint denticulation; apterous; supranal plate longer than in males, but not overlaying ovipositor, sides somewhat parallel (e.g., Fig. 17H); forefemur medially with

three large transversal bands, basal one extends to femur posterior region, from femur base to claw groove; hind femur with two large transversal areas of dense concentration of dark spots on its apical half, apical mark darker.

Variability, male. Male paratypes very similar to described males, except by foretibia with 9–10 internal spines, pronotum sometimes with moderately long pilosity. General body dark marks and spots high variable on size and intensity; wings with general also coloration high variable; paratypes with body darker, forecoxa entirely, trochanter mostly laterally with larger dark spots; forefemur with dark spots of moderate, spots larger on anterior edge; foretibia with few dark spots of irregular sizes; wings distinctly brown, less translucent than in described male, dark spots on forewing transverse veins and hindwing veins sometimes inconspicuous, area around vein M branches with one to three darkish marks (*e.g.*, 3D).

Female. Female paratype very similar to allotype, except by distinct shorter body length of 20,5 mm; foretibia with 9 internal spines; general coloration lighter, darkish marks and spots more rare and faint.

Comments. This species is most similar to *M. phryganea* and *M. rustica* because they have similar shape and coloration pattern of the wings, and the vertex convex. However, males of *M. ciliata* can be easily distinguished from those of *M. rustica* by having the supracoxal dilatation very faintly pronounced, forewing vein R entirely dark or almost so, ventral phallomere with distal process slightly long, proximal process with short and robust point, and left dorsal phallomere with phalloid apophysis very short and basally projected the to back. It can also be separated from males of *M. phryganea* by having the supracoxal dilatation very faintly pronounced, forewing only slightly shorter than hindwing, and forewing vein R entirely dark or almost so.

The females of *M. ciliata* are most similar to those of *M. aptera* due to have the combination of the central ocellus site without tubercle, the forefemur with distance between internal spines 12 and 11 about same distance between spines 10 and 11 or slightly shorter, the foretibia external spine 1 away from spine 2 by space equivalent to one spine, and the supranal plate with sides parallel and rounded apex. However, females of *M. ciliata* can be readily separated from this species by having the vertex entirely markedly convex, the supracoxal dilatation very faintly pronounced, the foretrochanter light brown with few dark marks, and the hindfemur with area between the two transverse dark as pigmented as the remaining leg parts.

Distribution. (Fig. 27B) Brazil. Recorded from Rio de Janeiro (type locality), and from two localities of Espírito Santo: Reserva Particular do Patrimônio Natural Oitrem, Matilde, Alfredo Chaves (20°33'S 40°48'W); and Parque Estadual Paulo César Vinha, Guarapari (20°36'S 40°25'W). Terra (1995) also recorded this species for the locality of Campos do Jordão, state of São Paulo, Brazil (around 22°43'S 45°34'W). Agudelo, Lombardo and Jantsch (2007) indicated the occurrence of this species also in the states of Rio Grande do Sul and Santa Catarina, in Brazil, based on a previous study of Jantsch (1999). However, one male identified by such author as *M. ciliata* and included in the original distribution record made by him in 1999 was examined and taken as the holotype of *M. sp. nov.* 3. Although these occurrence records were based also on other specimens, this misidentification suggests the need for more detailed investigations of such data. One of these other specimens examined by Jantsch (1999) were recorded from the locality of Colorado, Rio Grande do Sul (28°31'S 53°00'W); the examined material relating to the record from Santa Catarina was not listed in the cited work.

Material Examined. 4 m#m#, 2 f#f#. *Described male:* m# from **BRAZIL**, Espírito Santo, Alfredo Chaves, Matilde, Reserva Natural Oitrem, 600-800 m, 14-21.X.2009, Malaise, COAzevedo *et al. leg.* [specimen MT00047 in the cladistic analysis] (UFES). *Described female:* f# from **BRAZIL**, Espírito Santo, Guarapari, Parque Estadual Paulo César Vinha, Restinga, Mata 2, 26.XI-02.XII.2006, Malaise, BArújo & MSantos *leg.* (UFES). *Other specimens:*

BRAZIL: 1 f# from Espírito Santo, Alfredo Chaves, Matilde, Reserva Natural Oitrem, 600-800 m, 14-21.X.2009, Malaise, COAzevedo *et al. leg.* (UFES); 1 m# from Espírito Santo, Guarapari, Parque Estadual Paulo César Vinha, Restinga, Mata 7, 02-09.XI.2006, Malaise, BAraújo & MSantos *leg.* (UFES); 1 m# same data except Restinga, Mata 9 [MT00043]; 1 m# same data except Restinga, Mata 7, 09-16.XI.2006 [MT00033]. *Images of the holotype:* m# from **BRAZIL**, *ciliata* Stål, F. Sahlb., Typus, 27-35, NRM-MANT 0000674. Photographs taken by Gunvi Lindberg (NHRS).

***Miobantia fuscata* (Giglio-Tos, 1915)**

(Figs 4, 11C, 12E, 12F, 14E, 14F, 16C, 17E, 18, 21, 27C)

Miopteryx fuscata Giglio-Tos, 1915: 139–140. Holotype m# (ZMB), examined.

Cnephomantis fuscatus: Rehn, 1920: 225.

Antimiopteryx fuscata: Giglio-Tos 1927: 212; Beier, 1935: 7.

Miobantia fuscata: Terra, 1995: 43; Ehrmann, 2002: 225; Agudelo *et al.*, 2007: 120; Ehrmann & Koçak, 2009: 14.

Redescription, male holotype. Length of pronotum 4.3 mm, of metazone 2.8 mm, of forecoxa 3.8 mm, of forewing 15.5 mm, of hindwing 16.3 mm; maximum width of head 3.2 mm, prozone middle 1.2 mm, supracoxal dilatation 1.7 mm; metazone minimum width 0.9 mm.

Head (*e.g.*, Figs 11C & 12E): Frontal sclerite longitudinally moderately short, upper edge uniformly convex; small tubercle between each compound eye and toruli not pointed, represented by low cuticle elevation; ocelli medium-sized, regularly distant from each other, central ocellus about as elevated as lateral ocellus, lateral ocellus distinctly elliptical; vertex somewhat straight, inconspicuously or not higher than imaginary line joining apex of eyes, with region between parietal suture and eye not elevated towards parietal suture, nearly straight; parietal suture regularly marked.

Pronotum (*e.g.*, Fig. 14E): With moderately long pilosity, supracoxal dilatation regularly sized; margin without denticulation.

Legs (*e.g.*, Fig. 16C): Forecoxa markedly longer than metazone; forefemur internal spine 6 with shape and size more similar to spine 5 than spines 2 and 4, distance between internal spines 12 and 11 about same distance between spines 10 and 11 or slightly shorter, internal spine 12 distinctly shorter than spine 10; foretibia external spine 1 away from spine 2 by space equivalent to one spine, external spine 2 slightly longer than spine 3, with 9 internal spines.

Wings (Fig. 4B): Forewing slightly shorter than hindwing; vein M1 branched; vein CuA1 branches markedly sinuous. Hindwing apical angle moderately acute, vein CuA1 branched, apex slightly short, rounded.

Color: Body dorsally darkish brown, ventrally pale yellow. Head: area between mouthparts and toruli pale yellow, with few, very sparse, irregular dark marks, except by mandible apex, and maxillary terminal segment dark; scape pale yellow; pedicel dark, with apical margin pale yellow; flagellum light brown, flagellomeres apically dark brown; area between toruli and vertex darkish brown with large, marked, irregular dark marks, mostly on transversal darker band between eyes covering the ocelli cuticle elevation; head dorsal region with irregular darkish marks, transversal dark band on its apical area. Pronotum: dorsally markedly dark pigmented, with few irregular, evanescent bright marks; margin entirely pale yellow with moderately large dark spots; ventrally pale yellow with few, evanescent dark spots, black median stripe faint, on its entire length. Legs: pale yellow with dark marks, tarsomeres apically darkish, tarsomere 1 centrally darkish; forecoxa with many dark spots; trochanter medially darkish; forefemur with dark spots of moderate size, with three inconspicuous, large, transversal dark marks, posteriorly with dark longitudinal mark from femur base to claw groove, apical region anteriorly with faint, small longitudinal dark mark; foretibia with few dark spots

of irregular sizes; fore- and midtibia with three large transversal areas of dense concentration of faint dark spots, one at each extremity and another at middle, mid- and hindfemur with two on its apical half. Mid- and hindlegs with dense darkish spots of irregular sizes. Wings: brown, regularly translucent, costal margins apically with few bright marks; forewing dark spots present only on main longitudinal veins, transverse veins without dark spots; vein R spotted, with marks of unequal sizes, spaced from each other by $2.0\text{--}3.0 \times$ length of smallest spots; area around vein M branches without darkish marks.

Complementary description, male from Linhares, Brazil. Length of body 16.8 mm from head to tip of abdomen, of pronotum 4.3 mm, of metazone 2.7 mm, of forecoxa 4.0 mm; of forewing 15.5; of hindwing 16.1; maximum width of head 3.2 mm, prozone middle 1.3 mm, supracoxal dilatation 1.7 mm; metazone minimum width 0.9 mm.

Abdomen: Supranal plate very short, rounded.

Genitalia (Fig. 21C): Ventral phallomere distal process short, with most marked sclerotization taking only the process tip, denticulation faintly present, tip slender but rounded, basal swelling absent; proximal process faintly sclerotized, markedly projected, long, curved, distinctly turned backwards, with basal portion slightly wide, apex rounded, distinctly slender than base; slit between posterior margin of ventral phallomere and proximal process deep. Left dorsal phallomere with anterior process slightly long, moderately large, markedly curved at about middle, oriented forwards, apex about as wide as middle; expanded portion between anterior process and phalloid apophysis short, oriented forwards; a well sclerotized area between phalloid apophysis and membranous lobe which is marked, small, not reaching membranous lobe; phalloid apophysis regularly long, slender, its basal portion projected to the left, subapically markedly bent, apically concave, slightly sharp; membranous lobe wide; dorsal lamina posterior margin with left portion projected, expanded, uniformly curved.

Female from Linhares, Brazil. Length of body 16.0 mm from head to tip of abdomen, of pronotum 5.0 mm, of metazone 3.2 mm, of forecoxa 4.2 mm; maximum width of head 3.6 mm, prozone middle 1.2 mm, supracoxal dilatation 1.7 mm; metazone minimum width 0.9 mm. General morphology and coloration similar to male, except by body slightly smaller, but more stout than holotype; head with vertex slightly higher than imaginary line joining apex of eyes, with region between parietal suture and eye slightly more elevated towards parietal suture (Fig. 12F); ocelli vestigial; pronotum with distinct denticulation along entire lateral margin, more pronounced posteriorly, metazone slightly more robust (Fig. 14F); forecoxa anterior edge with median distinct denticulation; apterous; supranal plate longer than in males, but not overlaying ovipositor, with sides distinctly converging towards a subrounded apex (*e.g.*, 17E); abdomen darkish brown with several dark spots, irregular dark marks.

Immature stages. First instar. Length of body 2.5 mm; antenna 3.3 mm. Head with median carina between frontal sclerite upper edge middle and central ocellus; ocelli vestigial; vertex straight, not elevated. Foreleg spines in pilose shape. Forefemur with 4 discoidal spines, the 3^o with pilose part diagonally inserted on cuticular elevated base, 4 external spines, 12 internal spines, spines 1–4, and 12 distinctly higher than the others; foretibia with 7 external spines, spines 1 and 3 almost indistinct, spines 2 and 7 distinctly higher than the others, spine 7 swollen, sinuous, 8 internal spines. Body general coloration brown with darker marks in similar positions of adults dark marks, dark spots absent; antenna with flagellum alternating between segment with apical half whitish and segment entirely brown, except flagellum apical 0.3 entirely brown. Apterous. Genitalia not modified.

Second instar. Length of body 6.5 mm; antenna 4.0 mm. Head similar to first instar. Foreleg spines shape as in adult. Forefemur with discoidal spines 3 regularly shaped, internal spines 2, 4, and 12 distinctly higher than the others; foretibia with external spines 1 and 3 distinctly lower than the others, spines 2 and 7 distinctly higher than the others,

spine 7 swollen, sinuous, 9–10 internal spines. Body general coloration brown with darker marks in similar positions of adults dark marks, dark spots present; antenna with flagellum entirely brown. Apterous. Genitalia not modified.

Third to last instar. Length of body about 10.0–15.7 mm; antenna 4.7–7.0 mm. General morphology and coloration as in adults, except by head with median carina between frontal sclerite upper edge middle and central ocellus progressively indistinct; ocelli vestigial; forefemur internal spine 12 only little higher than spine 10; foretibia with external spines 1–6 with about same size, except by spine 2 only little higher than the others, spine 7 distinctly higher than the others. Male wings vestigial in last instar, otherwise apterous. Genitalia progressively developed, sexes are recognizable.

Ootheca. (Fig. 18) Pale yellow with 10 to 14 eggs positioned in two rows. Measurements: length of 5.94 mm, height of 4.05 mm, and width of 3.25 mm.

Variability, male. Other examined males similar to holotype, except by foretibia with 9–10 internal spines; wings costal margins apically often with more marked bright marks. The analysis of a large set of individuals of this species showed that male genitalia presented some particularly variable structures. Some different character states seem to be related with populations of same locality. It is observed for males from localities in the northern Espírito Santo, such as Pinheiros, Conceição da Barra, and some groups from Sooretama and Linhares, which have the ventral phallomere proximal process expanded, with apex slightly slender than base (*e.g.*, Figs 21C.2, 21E.2, 21G.2) while males from Fazenda Oriente, in Atílio Vivacqua, and Itapemirim, in the southern state, have the ventral phallomere with proximal process slender, with apex distinctly slender than base (*e.g.*, Fig. 21H.2). Another variable genitalia characters were the angulation and width of the distal process of the ventral phallomere (*e.g.*, Figs 21–.2), but always maintaining the overall shape, the apical width of the anterior process of the left dorsal phallomere (*e.g.*, Figs 21–.3 & 21–.4), and the general shape of the membranous lobe (*e.g.*, Figs 21–.3), but always large. These characters seem also to be related with populations of same locality, but apparently not following the geographical north-south variation shown by the dorsal phallomere proximal process. Although the found variability of the male genitalia for this species was frequent, it comprises clearly only slight variations of the same pattern, not overlaying the other species pattern or even difficulting its identification. Additionally, the number of spines of forefemur and external side of foretibia was constant in all examined material. The number of foretibia internal spines varies from 9 to 10, very rarely 11, with variation frequently found even among right and left leg of the same specimen.

General body dark spots and general coloration, especially wings colors are high variable. Similarly with male genitalia variability, coloration seems vary in relation with different localities. Paratypes from Aracruz, Guarapari, Itarana, and Vila Velha have wings light brown colored, regularly translucent, with dark spots very faint (*e.g.*, Fig. 4E), Fig, the paratypes from Conceição da Barra, Itapemirim, and some paratypes from Santa Leopoldina, and Santa Tereza have wings dark brown colored, with more evident dark spots, general body coloration darker than holotype, with dark spots and marks more evident, hindtibia with three large, marked transversal dark bands. In the other hand, about 60% of paratypes from Pinheiros have wings almost white, very translucent, with faint dark spots, general body coloration lighter than holotype, with dark spots and marks less evident (*e.g.*, Fig. 4F); the other 40% have similar wings, but less translucent and with slightly grayish tint. The remaining material examined is more similar to holotype, paratypes from Linhares, and Sooretama especially with large darkish evanescent marks on wings. Though high variable wing coloration found, the pattern of forewing vein R dark spots of distinctly unequal sizes, the absence of dark spots in transverse veins, and the presence of bright marks on both wings costal margins (even if sometimes faintly marked) remained constant.

It is also remarkable that anomalies of wing venation had an observed frequency of 15,8% among the males of *M. fuscata*. The most common abnormalities were the forewing vein M1 not branched or branched twice, the vein M2 branched, and the hindwing vein CuA1 not branched or branched twice. However, abnormal venation patterns were very rarely repeated in the corresponding wing of the other side of body.

All variation mentioned above contributed to the separation of 23 morphospecies later associated to *M. fuscata*, in the delimitation of the species. This high variability is also supported by the molecular data, which indicated the existence of genetic distances of up to 17.7% between individuals of this species. These distances between individuals of different morphospecies were above 2%, while distances between individuals of the same morphospecies were rarely above 1% (often 0–0.1%). However, after all analyzes this large number of morphospecies proved to be only local varieties. Even with high variation of some characteristics, the general patterns of the distinct species are easily recognizable by the features stated in the item "Comments" of each species, specially the comparison of the male genitalia between the examined specimens.

Female. Other examined females very similar to described female, except by mostly slightly larger than described one, foretibia with 10–11 internal spines. General body dark marks and spots, and coloration high variable. The quantity of dark spots along the body varies from nearly absent with the presence of only a few larger marks, to dark spots densely present along the entire body. Unlike the color variation in males, this variation in females seem little related to the locality. For example, among females collected in Pinheiros, about 50% have light colored body with a few dark markings, while the other half of them presents a darker colored body with dark spots more frequent and evident.

Comments. Males of *M. fuscata* are most similar to males of *M. aptera* and *M. sp. nov. 1* based on the forewing dark spots at vein R with marks of distinctly unequal sizes, and the forewing and the hindwing costal margin apically with distinct bright marks. However, *M. fuscata* can be instantly distinguished from these two species by the forewing with vein M1 branched. Although the examination of male genitalia can successfully separate it from *M. sp. nov. 1* based on the distal process of ventral phallomere with slender apex and the proximal process long and curved, it can also allow the misidentification of it as *M. aptera*. In this case, *M. fuscata* can be identified by the distal process of ventral phallomere with denticulation faintly present, its tip rounded, with most marked sclerotization taking only the process tip, and the left dorsal phallomere with well sclerotized area between phalloid apophysis and membranous lobe restricted, not reaching the membranous lobe.

The females are most likely to be mistaken for *M. sp. nov. 4* due to have the combination of head with vertex distinctly convex, frontal sclerite markedly short, and supranal plate with sides distinctly converging towards a subrounded apex. However, it can be isolated from females of *M. sp. nov. 4* by having the vertex region between parietal suture and eye inconspicuously convex, nearly straight, pronotum with metazone slightly robust, and forefemur with internal spine 12 distinctly shorter than spine 10.

Distribution. (Fig. 27C) Brazil. The exact type locality is unknown. Recorded from Espírito Santo by Rhen (1920), here registered for 29 localities: Parque Estadual de Itaúnas, Conceição da Barra (18°20'S 39°40'W); Floresta Nacional do Rio Preto, Conceição da Barra (18°24'S 39°50'W); Reserva Biológica Córrego do Veado, Pinheiros (18°22'S 40°09'W); Reserva Biológica Sooretama, Sooretama (19°02'55"S 40°08'48"W); Reserva Natural Vale, Linhares (19°09'S 40°01'W); Desengano - Salvador Lagoa Azul, Linhares (19°37'S 40°17'W); Fazenda Juliberto Stur, Pancas (19°17'10.5"S 40°46'23.8"W); Fazenda São José, Aracruz (around 19°49'S 40°16'W); Estação Biológica Santa Lúcia, Santa Teresa (19°57'55"S 40°32'25"W); Museu de Biologia Mello Leitão, Santa Teresa (19°56'10"S 40°36'0"W); a third unknown locality of Santa Teresa; Bom Destino, Itarana (19°51'27"S 40°34'51.4"W); Fazenda Clarindo Kruger, Santa Maria de

Jetibá (20°04'29.7"S 40°44'51.3"W); Fazenda Paulo Seick, Santa Maria de Jetibá (20°02'31,1"S 40°41'52,3"W); Suíça, Santa Leopoldina (20°04'54.6"S 40°35'38.9"W); Alto Rio das Farinhas, Santa Leopoldina (20°05'44.8"S 40°36'42.3"W); Meia Léguas, Santa Leopoldina (around 20°06'S 40°31'W); Mestre Álvaro, Serra (around 20°10'S 40°18'W); Cidade Continental, Serra (around 20°13'S 40°13'W); Mata Pico do Eldorado, Domingos Martins (20°22'17"S 40°39'29"W); Reserva Biológica Duas Bocas, Cariacica (20°16'21"S 40°28'40"W); Reserva Ecológica Jacarenema, Vila Velha (around 20°24'S 40°20'W); Marechal Floriano (around 20°25' S 40°40'W); Reserva Natural Oitrem, Matilde, Alfredo Chaves (20°33'S 40°48'W); Picadão, Alfredo Chaves (20°27'53"S 40°42'35"W); Parque Estadual Paulo Cesar Vinha, Guarapari (20°36'S 40°25'W); Fazenda Usina Paineiras, Itapemirim (20°56'29"S 41°03'06"W); Fazenda José Carlos Lutoza, Atílio Vivacqua (20°55'57.6"S 41°11'21.1"W); and Fazenda Oriente, Atílio Vivacqua (20°58'38.6"S 41°10'10.6"W). Also registered from Santa Catarina, and Rio Grande do Sul (Agudelo *et al.* 2007), based on a previous study of Jantsch (1999). One male identified by such author as *M. fuscata* was examined and matched with the concept of *M. fuscata* considered in the present work. The exemplar included in the original distribution record for Santa Catarina is indicated for the locality of Nova Teutônia (27°11'S 52°23'W); the examined material relating to the record from Rio Grande do Sul was not listed in the cited work.

Material Examined. 793 m#m#, 35 f#f#, 39 nymphs. *Holotype*: m# from **BRAZIL**, *Miopteryx fuscata* Giglio-Tos typus, E. Giglio-Tos *det.*, Holotypus Nr., Mantis, Ca. No. 653. (ZMB). *Described male*: m# from **BRAZIL**, Espírito Santo, Linhares, Reserva Natural Vale, estrada próximo à porteira à direita da entrada, point 19, 21-29.V.2010, Malaise, APAGuiar *et al. leg.* [specimen MT00030 in the cladistic analysis] (UFES). *Described female*: f# from **BRAZIL**, Espírito Santo, Linhares, Reserva Natural Vale, ao lado dos Laboratórios, 13.I.2011, lighting trap, MVScherrer & MCCarreiro *leg.* (UFES). *Other specimens*: **BRAZIL**: 1 m# from Espírito Santo, Conceição da Barra, Parque Estadual de Itaúnas, 23-25.XI.2006, Malaise, MTTavares *et al. leg.* (UFES); 3 m#m# same data except 23-28.XI.2006; 5 m#m# same data except point 7, 23-25.XI.2006; 2 m#m# same data except point 14 [one of them MT00061]; 6 m#m# same data except point 3, 31.X-15.XI.2006; 1 f# same data except Conceição da Barra, Floresta Nacional do Rio Preto, 200? [no further data]; 1 m# from Espírito Santo, Pinheiros, Reserva Biológica Córrego do Veado, 08.VI.2011, manual, BFSantos *leg.* (UFES); 1 f# same data except 09.VI.2011, F Dal Vecchio *leg.*, 14 nymphs from ootheca laid by the previous female; 1 f# same data except lighting trap, BFSantos *leg.*; 2 m#m# same data except manual, BFSantos *leg.* [one of them MT00074]; 1 m# same data except MVScherrer *leg.*; 1 f# same data except 10.VI.2011, HYamaguti *leg.*; 5 m#m#, 1 f#, 1 nymph same data except MVScherrer *leg.*; 1 nymph same data except 12.VI.2011, BFSantos *leg.*; 1 f# same data except 13.VI.2011; 1 m# same data except Reserva Biológica Córrego do Veado, Estrada Oeste, point 8, 12-14.VI.2011, yellow pan trap, MTTavares *et al. leg.*; 1 m# same data except Trilha Água Limpa, point 16, 09-11.VI.2011, Malaise, MTTavares *et al. leg.* [MT00073]; 2 m#m# same data except point 17; 1 m# same data except point 18; 3 m#m# same data except point 19; 1 m# same data except point 20; 1 m# same data except point 29; 1 m# same data except point 16, 09-11.VI.2011, yellow pan trap, MTTavares *et al. leg.*; 1 m# same data except point 30; 2 m# same data except point 30, 11-13.VI.2011, Malaise, MTTavares *et al. leg.*; 4 m#m# same data except point 19, 15-17.VI.2011; 4 m#m# same data except Malaise 3, 27.XI-06.XII.2011; 3 m#m# same data except Malaise 5; 2 m#m# same data except Malaise 6; 1 m# same data except Malaise 7; 1 f# same data except Trilha da Anta, point 5, 09-11.VI.2011, yellow pan trap, MTTavares *et al. leg.*; 1 m# same data except point 8, Malaise, MTTavares *et al. leg.*; 1 m# same data except point 9; 1 m# same data except point 15; 1 f# same data except point 2, 10.VI.2011, manual, MVScherrer *leg.*; 1 m# same data except 10-12.VI.2011, Malaise, MTTavares *et al. leg.*; 2 m#m# same data except point 1, 11-13.VI.2011; 1 m# same data except point 11; 1 m# same data except point 14; 1 f# same data except point 2, 14-16.VI.2011, yellow pan trap; 2 m#m# same data except point 1,

15-17.VI.2011, Malaise; 1 m# same data except point 2; 1 m# same data except point 10; 1 m# same data except point 11 [MT00070]; 1 m# same data except point 13; 1 m# same data except point 14; 3 m## same data except point 15; 4 m##, 3 f##, 1 nymph same data except Trilha Jaboti, 11.VI.2011, manual, BFSantos *leg.*, 14 nymphs from ootheca laid by a female of the previous set; 10 m## same data except Malaise 2, 27.XI-06.XII.2011, Malaise, MTTavares *et al. leg.*; 3 m## same data except Malaise 3; 11 m## same data except Malaise 4; 8 m## same data except Malaise 5; 11 m## same data except Malaise 6; 2 m## same data except Malaise 8; 1 m# from Espírito Santo, Sooretama, Reserva Biológica Sooretama, 14.XII.2012, BCARAújo & TRBrotto *leg.* (UFES); 1 f# same data except Reserva Biológica Sooretama, Sede, 02.VI.2011, BFSantos *leg.*; 1 nymph same data except Trilha Sede, 31.V.2011, MTTavares *et al. leg.*; 1 f# same data except 03.VI.2011, HYamaguti BFSantos *leg.*; 1 m# same data except 08.VI.2011, Malaise, MTTavares *et al. leg.*; 15 m## same data except 11-18.XI.2011, Malaise, COAzevedo *et al. leg.*; 1 m# same data except Trilha da Sede, point 12, 31.V-2.VI.2011, Malaise, MTTavares *et al. leg.*; 1 m# same data except 06-08.VI.2011; 3 m## same data except Trilha Ana, Malaise 3, 06-12.XII.2011; 1 m# same data except Malaise 5; 14 m## same data except Malaise 6; 8 m## same data except Malaise 7; 13 m## same data except Malaise 8; 5 m## same data except Malaise 1; 9 m## same data except Malaise 2; 1 m# same data except Malaise 3; 11 m## same data except Malaise 4; 5 m## same data except Malaise 5; 4 m## same data except Malaise 6; 10 m## same data except Malaise 7; 3 m## same data except Malaise 8; 1 m# same data except Estrada Córrego Cupido, 37 m, 30.X.2011 [MT00058]; 1 m# same data except Estrada Cupido, point 30, 31.V-2.VI.2011; 1 f# from Espírito Santo, Linhares, Reserva Natural Vale, 08.VII.2010, manual, APAguiar *et al. leg.* (UFES); 1 f# same data except 21.I.2011, MCCarreiro *leg.*; 7 m## same data except Reserva Natural Vale, Ao lado do laboratório, 13.I.2011, lighting trap, MVScherrer *et al. leg.*; 1 m# same data except Bicuiba, trilha 2, point 4, V.2010, Malaise, APAguiar *et al. leg.*; 1 m# same data except point 3 [MT00029]; 2 m## same data except trilha 1, point 1, 29.V-08.VII.2010; 3 m## same data except point 2; 1 m# same data except point 4; 7 m## same data except Descampado Macanaiba Pele de Sapo, point 10; 1 f# same data except Estrada Bicuiba, point 28, 24-26.I.2011, yellow pan trap; 1 m# same data except Estrada Bicuiba, trilha 2, point 15, 18-25.I.2011, Malaise; 7 m## same data except Estrada da Gávea, borda do rio, point 16, 19-25.I.2011; 3 m## same data except Estrada da Gávea, point 6, 21-26.I.2011; 6 m## same data except Estrada da Oiticica próximo a Ponte, point 18, 29.V-08.VII.2010; 4 m## same data except Estrada do Campo; 1 f# same data except Estrada do Campo Próx. a Administração, point 20, 24-26.I.2011, yellow pan trap; 1 m# same data except Estrada do Campo, point 05, 23-29.V.2010, Malaise; 5 m## same data except point 06, 17-23.V.2010; 5 m## same data except 23-29.V.2010; 13 m## same data except 29.V-08.VII.2010; 1 nymph same data except Estrada entre Roxinho e Bicuiba, point 7, 22-24.V.2010, yellow pan trap; 1 m# same data except 23-29.V.2010, Malaise; 2 m## same data except 29.V-08.VII.2010; 1 m# same data except point 8; 1 m# same data except point 15, 16-18.I.2011, yellow pan trap; 1 f# same data except 20-22.I.2011; 1 m# same data except Estrada Experimental 1, Farinha Seca, point 15, 19-29.V.2010, Malaise; 15 m## same data except 29.V-08.VII.2010; 12 m## same data except Estrada Experimental 2, Farinha Seca, point 16, 19-29.V.2010 [one of them MT00027]; 2 m## same data except Estrada Farinha Seca, point 12, 21-26.I.2011; 1 m# same data except Estrada Flamengo após a Estrada da Oiticica e Guaribu Sabão, point 4; 3 m## same data except 14-21.I.2011; 7 m## same data except Estrada Flamengo próximo a porteira, point 5; 1 m# same data except 21-26.I.2011; 1 nymph same data except Estrada Flamengo, point 53, 24-26.V.2010, yellow pan trap; 1 f# same data except Estrada Ipê Amarelo, point 27, 17-19.I.2011; 1 m# same data except Estrada Macanaiba Pele de Sapo, point 7, 15-21.I.2011, Malaise; 1 m# same data except 21-26.I.2011; 5 m## same data except Estrada Oiticica, point 10, 15-21.I.2011; 4 m##, 1 nymph same data except 21-26.I.2011; 1 f# same data except point 17, 16-18.I.2011, yellow pan trap; 4 m##

same data except Estrada Orelha da Onça, point 9, 21-26.I.2011, Malaise; 4 m##m# same data except 15-21.I.2011; 7 m##m# same data except Estrada Paraju, point 14, 17-25.I.2011; 4 m##m# same data except Estrada próximo a porteira, point 13, 16-21.I.2011; 2 m##m# same data except Estrada próximo à porteira à direita da entrada, point 19, 21-29.V.2010; 5 m##m# same data except 29-08.V.2010; 2 f##f# same data except Estrada Roxinho, point 13, 16-18.I.2011, yellow pan trap; 7 m##m# same data except Estrada X, point 6, 29.V-08.VII.2010, Malaise; 1 m# same data except Flamengo, baixada após a torre, point 12, 23-30.V.2010; 4 m##m#, 1 f# same data except Macanaiba Pele de Sapo, point 10, 29.V-08.VII.2010; 1 f# same data except Margem da Farinha Seca, 19.V.2010, manual, MCCarreiro & FFGomes *leg.*; 1 nymph same data except Margem do Rio, alagado, point 22, 17-19.I.2011, yellow pan trap, APAGuiar *et al. leg.*; 19 m##m# same data except Mussununga Flamengo, point 09, 29.V-08.VII.2010, Malaise; 6 m##m# same data except 23-30.V.2010; 1 nymph same data except Trilha atrás do viveiro de mudas, 14.I.2011, manual, MVScherrer *leg.*; 1 f# same data except Trilha atrás do viveiro de mudas, point 1, 24-26.V.2011, yellow pan trap, APAGuiar *et al. leg.*; 1 m# same data except Trilha atrás do viveiro de mudas, point 3, 14-21.I.2011, Malaise; 3 m##m# same data except Trilha do campo aberto próximo a administração, point 2, 13-20.I.2011; 1 f# same data except point 19, 16-18.I.2011, yellow pan trap; 1 nymph same data except Trilha Estrada Flamengo, point 39, 24-26.V.2011; 14 m##m# same data except Trilha próximo ao rio, Gávea, point 17, 19-29.V.2010, Malaise; 1 f# same data except Trilha próximo ao viveiro, 27-29.V.2010, yellow pan trap; 20 m##m#, 1 f# same data except Trilha próximo ao viveiro, point 14, 29.V-08.VII.2010, Malaise; 5 m##m# same data except 19-29.V.2010; 1 m# same data except Linhares, Desengano - Salvador Lagoa Azul, point mata 1, Malaise 1, 03-10.XI.2007, Malaise, FGRampinelli *et al. leg.*; 1 m# same data except point mata 1, Malaise 2; 1 m# same data except point mata 1, Malaise 3; 1 m# from Espírito Santo, Pancas, Faz. Juliberto Stur, [no further data] (UFES); 2 m##m# same data except Fazenda Juliberto Stur, área 1, point B1, 31.I-07.II.2003, Malaise, MTTavares & COAzevedo *leg.*; 6 m##m# same data except área 1, B2, 24-31.I.2003, Malaise; 7 m##m# same data except T2; 3 m##m# same data except área 2, T7; 1 m# from Espírito Santo, Aracruz, Fazenda São José, Malaise 1, 06-13.X.2007, Malaise, FGRampinelli *et al. leg.* (UFES); 3 m# same data except point 2 [one of them MT00013]; 3 m##m# same data except point 3; 2 m##m# same data except point 4; 1 m# from Espírito Santo, Santa Teresa, Malaise 4, 19-26.X.2007, Malaise, FGRampinelli *et al. leg.* (UFES); 1 m# same data except Santa Teresa, Estação Biológica Santa Lúcia, B2, 19-23.X.2007, Malaise, MTTavares *et al. leg.*; 1 m# same data except Estação Biológica Santa Lúcia, Trilha Tapinoã, 16-22.X.2010 [MT00049]; 1 m# same data except Estação Biológica Santa Lúcia, Trilha Itapinuã, 17-23.X.2011; 1 m# same data except Estação Biológica Santa Lúcia, Trilha Indaiáçu, área de pedra, B2, 06-09.XI.2009; 2 m##m# same data except Estação Biológica Santa Lúcia, point P2, Trilha, 15-19.X.2010; 1 m# same data except Santa Teresa, Museu de Biologia Mello Leitão, 23.II.2001, manual, RKawada *leg.*; 3 m##m# from Espírito Santo, Itarana, Bom Destino, point P2, 22-25.II.2004, Malaise, BCARAújo *leg.* (UFES) [one of them MT00069]; 1 m# from Espírito Santo, Santa Maria de Jetibá, Fazenda Clarindo Kruger, point T7, 06-13.XII.2002, Malaise, MTTavares *et al. leg.* (UFES); 3 m##m# same data except B5, 29.XI-06.XII.2002; 1 m# same data except B8; 1 m# same data except T5; 1 m# same data except Santa Maria de Jetibá, Fazenda Paulo Seick; 1 m# same data except Fazenda Paulo Seick, Área 1, point B2, 06-13.XII.2002; 1 m# same data except B4; 2 m##m# same data except 29.XI-06.XII.2002; 4 m##m# same data except T2, 06-13.XII.2002; 2 m##m# same data except 29.XI-06.XII.2002; 4 m##m# same data except B1; 1 m# from Espírito Santo, Santa Leopoldina, Suiça, Mata, 361 m, 05-12.XI.2007, Malaise, COAzevedo *et al. leg.* (UFES); 1 m# same data except Mata, 361 m, Malaise 6; 1 m# same data except Malaise 7 [MT00085]; 2 m##m# same data except Malaise 8; 2 m##m# same data except Santa Leopoldina, Alto Rio das Farinhas, 14-24.V.2008, Malaise, CWAichert & Furieri *leg.* [one of them MT00021]; 3 m##m# same data except Santa Leopoldina, Meia Légua, Mata próximo a trilha, 31.III-06.IV.2007, Malaise, FGRampinelli *et al. leg.*; 5 m##m#

same data except Meia Légua, Point próximo a cerca de divisão; 5 m#m# same data except Meia Légua, Trilha 1; 1 m# same data except Trilha 2; 1 m# same data except Trilha 3; 12 m#m#, 1 nymph same data except Trilha 5 [one m# MT00084]; 1 m# from Espírito Santo, Serra, Mestre Álvaro, 16.IV.1987, manual, APAguiar *leg.* (UFES).; 1 f# same data except Serra, Cidade Continental, Setor África, 16.XI.2009, MVScherrer *leg.*; 3 m#m# from Espírito Santo, Domingos Martins, Mata Pico do Eldorado, point B1, 03-10.XII.2004, Malaise, MTTavares *et al. leg.* (UFES); 6 m#m# same data except B2; 5 m#m# same data except B4; 2 m#m# same data except B5; 2 m#m# same data except B8; 10 m#m# same data except T1; 3 m#m# same data except T2; 1 m# same data except T3; 4 m#m# same data except T4; 3 m#m# same data except T5; 4 m#m# same data except T6; 11 m#m# same data except T7; 3 m#m# same data except T8; 3 m#m# same data except B2, 26.XI-03.XII.2004, Malaise, MTTavares *et al. leg.*; 2 m#m# same data except B3; 2 m#m# same data except B4; 1 m# same data except B6; 4 m#m# same data except T2 [one of them MT00088]; 2 m#m# same data except T6; 8 m#m# same data except T7; 1 m# from Espírito Santo, Cariacica, Reserva Biológica de Duas Bocas, 08.II.2003, MTTavares *et al. leg.* (UFES); 1 f#, 1 nymph same data except Reserva Biológica de Duas Bocas, Pau Amarelo, 21-27.X.2005, Malaise, APAguiar *et al. leg.*; 2 m#m# same data except 20-28.X.2005; 1 m# same data except 21-30.X.2005; 3 m#m# same data except Pau Amarelo, point 1, 20-28.X.2005; 2 m#m# same data except point 5; 2 m#m# same data except 28.X-05.XI.2005; 3 m#m# same data except point 7, 20-28.X.2005; 1 m# same data except point 8; 9 m#m# same data except point 10, 21-30.X.2005; 1 m# same data except point 13; 7 m#m# same data except point 14; 2 m#m# same data except point 17; 1 m# same data except point 18; 1 m# same data except point 9, 28.X-05.XI.2005; 3 m#m# same data except point 21; 2 m#m# same data except point 22; 1 m# same data except Reserva Biológica de Duas Bocas, Sede, point 2, 09-13.III.2009, Malaise, BFSantos *et al. leg.*; 4 m#m# same data except Sede, point 4; 2 m#m# same data except Sede, point 5 [one of them MT00077]; 2 m#m# from Espírito Santo, Vila Velha, Reserva Ecológica Jacarenema, point 4, 30.X-06.XI.2002, Malaise, COAzevedo *et al. leg.* (UFES); 4 m#m# same data except point 7 [one of them MT00064]; 4 m#m# same data except point 9 [one of them MT00016]; 1 m# from Espírito Santo, Marechal Floriano, 09.IV.2004, CLMPereira *leg.* (UFES); 8 m#m# from Espírito Santo, Alfredo Chaves, Matilde, Reserva Natural Oitrem, 600-800 m, 14-21.X.2009, Malaise, COAzevedo *et al. leg.* [one of them MT00052] (UFES); 1 f# same data except 14.X.2009, manual, COAzevedo *leg.*; 4 m#m# same data except Alfredo Chaves, Picadão, Mata, Malaise 4, 714 m, 8-15.X.2007, Malaise, COAzevedo *et al. leg.* [one of them MT00053]; 1 m# same data except Malaise 8; 1 m# from Espírito Santo, Guarapari, Parque Estadual Paulo Cesar Vinha, Restinga, Mata 3, 02-10.XII.2006, Malaise, BArújo & MSantos *leg.* (UFES); 1 m# same data except Mata 12, 15-26.V.2006; 1 m# same data except Mata 8, 2-10.XII.2006; 2 m#m# same data except Mata 2, 26.XI-2.XII.2006; 1 m# same data except Mata 4, 08-15.V.2006 [MT00034]; 1 m# same data except 02-09.XII.2006; 1 m# same data except Mata 10, 16-26.XI.2006; 1 m# same data except Mata 5; 1 m# same data except Mata 7; 2 m#m# same data except Mata 8; 1 m# same data except 26.XI-02.XII.2006; 1 f# from Espírito Santo, Itapemirim, Mata da Usina Paineiras, point 14, 01-02.III.2008, yellow pan trap, APAguiar *et al. leg.* (UFES); 1 m# same data except Itapemirim, Fazenda Usina Paineiras, 19-26.XI.2010, Malaise, MTTavares *et al. leg.* [MT00031]; 3 m#m# same data except Fazenda Usina Paineiras, point B1/Pt.1; 4 m#m# same data except B2/Pt.1; 2 m#m# same data except B3/Pt.1; 4 m#m# same data except B4/Pt.1; 3 m#m# same data except B5/Pt.1; 2 m#m# same data except B5/Pt.2; 4 m#m# same data except B6/Pt.1; 5 m#m# same data except B7/Pt.1; 3 m#m# same data except B9/Pt.2; 3 m#m# same data except B10/Pt.2; 2 m#m# same data except B11/Pt.2; 3 m#m# same data except B13/Pt.2; 1 m# same data except B15/Pt.2; 1 m# from Espírito Santo, Atílio Vivacqua, Fazenda José Carlos Lutoza (UFES); 1 m# same data except Fazenda José Carlos Lutoza, Área 1, point B3, 13-20.II.2003, Malaise, MTTavares & COAzevedo *leg.*; 1 m# same data except points T2+T4+T6+B2, 20-27.II.2003; 1 m# same data except points T3; 4

m#m# same data except Atílio Vivacqua, Fazenda Oriente, Área 2 [one of them MT00066]; 3 m#m3, 1 nymph same data except Área 2, points T8+B4+B6+B8, 13-20.II.2003; 1 m# same data except 20-27.II.2003; 11 m#m# same data except point T5, 20-27.II.2003; 1 m# same data except 20-27.II.2003; 1 m# from Espírito Santo, exact locality unknown, point trilha 2, 31.III-6.IV.2007, Malaise, FGRampinelli *leg.* (UFES).

***Miobantia phryganea* (Saussure, 1869)**

(Figs 5, 6A, 27D)

Miopteryx phryganea Saussure, 1869: 64; Kirby, 1904: 274; Giglio-Tos, 1917b:154. Two syntypes m#m# (Natural History Museum of Geneva, Switzerland - MHNG), one of them examined through digital images.

= *Miopteryx pryganea* Saussure, 1870: 237 (misspelled).

Antimiopteryx phryganea: Giglio-Tos 1927: 211; Beier, 1935: 7

Miobantia phryganea: Jantsch & Corseuil, 1988: 228; Terra, 1995: 43; Ehrmann, 2002: 225; Agudelo *et al.*, 2007: 120; Ehrmann & Koçak, 2009: 14

Comments. Saussure (1869) proposed *Miopteryx phryganea* for two males syntypes examined by him. The examined pictures showed the syntype is in better condition, the other is lacking both forelegs (Peter Schwendinger pers. comm.). No lectotype is here designed. This species was considered by Kirby (1904) as junior synonym of *M. ciliata*. Giglio-Tos (1917b) however disagreed and kept these two separate species. The results of the present investigation supports Giglio-Tos' opinion, with males of *M. phryganea* differing from those of *M. ciliata* by having the supracoxal dilatation slightly pronounced, forewing much shorter than hindwing, and forewing vein R entirely dark or almost so (Fig. 5). Males of *Miobantia phryganea* are also similar to *M. rustica* because they have similar shape and coloration pattern of the wings, but it can be easily separated from this species by having the ocelli regularly distant from each other, the forewing much shorter than hindwing, and the apex of hindwing inconspicuously pointed.

Distribution. (Fig. 27D) Brazil. The exact type locality is unknown. Terra (1995) recorded this species for the locality of Santo Amaro (23°38'60"S 46°42'00"W), district of São Paulo, São Paulo state, Brazil. Agudelo, Lombardo and Jantsch (2007) indicated the occurrence of this species also in the states of Rio de Janeiro, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul, Brazil, based on a previous study of Jantsch (1999). However, one male identified by such author as *M. phryganea* and included in the original distribution record made by him in 1999, from Porto Alegre (Rio Grande do Sul) was examined and taken as paratype of *M. sp. nov.* 3. Although these records were based also on other specimens, this misidentification suggests the need for more detailed investigations of such data. The other specimens examined by Jantsch (1999) were recorded from the locality of E. P. Rio Grande, Rio de Janeiro (around 22°55'S 43°26'W); three localities of Paraná: Morretes (around 25°28'S 48°49'W), Fênix (around 23°53'S 51°57'W), and Pinhão (25°43'S 51°37'W); the locality of Florianópolis, Santa Catarina (around 27°35'S 48°34'W); and six localities of Rio Grande do Sul: Novo Hamburgo (around 29°41'S 51°08'W); a second specimen from Porto Alegre (around 30°02'S 51°12'W); Viamão (around 30°05'S 51°02'W); Guaíba (around 30°07'S 51°19'W); Gravataí (around 29°57'S 50°59'W); and Sapiranga (around 29°38'S 51°00'W).

Material Examined. Images of the syntype: m# from **BRAZIL**, *Miopteryx phryganea* Sss., Syntypus. Photographs taken by Peter Schwendinger (MHNG).

***Miobantia rustica* (Fabricius, 1781)**

(Figs 6, 11D, 12G, 14G, 16H, 17C, 22, 27E)

Mantis rustica Fabricius, 1781: 350; 1787: 229; 1793: 23; Gmelin-Linné, 1790: 2051; Olivier, 1792: 630. Lectotype m# (British Museum of Natural History, London, England - BM), here designed, examined through digital images.

Miopteryx rustica: Saussure, 1871: 260; 1872, 277; Chopard, 1913: 76; Kirby, 1904: 274.

Antimiopteryx rustica: Giglio-Tos 1927: 211–212; Beier, 1935: 7.

Miobantia rustica: Jantsch & Corseuil, 1988: 228; Terra, 1995: 43; Ehrmann, 2002: 225–226; Agudelo *et al.*, 2007: 120; Ehrmann & Koçak, 2009: 14.

= *Miopteryx perloides* Saussure, 1869: 64; 1870: 237.

= *Miopteryx nebulosa* Giglio-Tos, 1915: 139. **Syn. nov.**

Antimiopteryx nebulosa: Giglio-Tos, 1927: 212; Beier: 1935: 7.

Miobantia nebulosa: Jantsch & Corseuil, 1988: 228; Terra, 1995: 43; Ehrmann, 2002: 225; Agudelo *et al.*, 2007: 120; Ehrmann & Koçak, 2009: 14.

Redescription, male lectotype. Length of body about 20.3 mm.

Head (e.g., Figs 11D & 12G): Frontal sclerite longitudinally very short, upper edge uniformly convex; small tubercle between each compound eye and toruli not pointed, represented by low cuticle elevation; ocelli medium-sized, slightly close to each other, central ocellus about as elevated as lateral ocellus, lateral ocellus distinctly elliptical; vertex markedly convex, distinctly higher than imaginary line joining apex of eyes, with region between parietal suture and eye more elevated towards parietal suture, nearly straight; parietal suture faintly marked.

Pronotum (e.g., Fig. 14G): With moderately long pilosity, supracoxal dilatation slightly pronounced; margin without denticulation.

Legs (Fig. 16H): Forecoxa markedly longer than metazone; forefemur internal spine 6 with shape and size more similar to spine 5 than spines 2 and 4, distance between internal spines 12 and 11 about same distance between spines 10 and 11 or slightly shorter, internal spine 12 about same size of spine 10; foretibia external spine 1 away from spine 2 by space equivalent to one spine, external spine 2 slightly longer than spine 3, with 9 internal spines.

Wings (Fig. 6C): Vein M1 branched. Hindwing apical angle moderately acute.

Genitalia (Fig. 22C): Ventral phallomere distal process very long, with most marked sclerotization taking at least half the area of the process, denticulation absent, tip pointed, basal swelling absent; proximal process markedly sclerotized, markedly projected, short, curved, turned diagonally backwards to central portion, with basal portion very wide, apex with short, robust point; slit between posterior margin of ventral phallomere and proximal process shallow. Left dorsal phallomere with anterior process short, markedly large, straight, oriented to left, apex about as wide as middle; expanded portion between anterior process and phalloid apophysis short, oriented to left; a well sclerotized area between phalloid apophysis and membranous lobe which is indistinct; phalloid apophysis very short, moderately stout, its basal portion projected the to back, subapically markedly bent, apically almost straight, not sharp; membranous lobe wide; dorsal lamina posterior margin with left portion not projected, uniformly curved.

Color: Body entirely light brown to pale yellow. Head: area between mouthparts and toruli pale yellow; area between toruli and vertex with small, few, irregular dark marks, transversal darker band between eyes covering the ocelli cuticle elevation markedly evanescent, between ocelli absent, except around ocelli. Pronotum: dorsally with irregular dark marks, mostly laterally; margin with moderately large dark spots more evident on prozone. Legs: generally with

dark spots. Wings: light brown, very translucent; forewing dark spots present, on main and transverse veins, spots very marked, transverse veins spots most evident on costal area; vein R spotted, with marks distinctly of about same sizes, spaced from each other by $2.0\text{--}3.0 \times$ length of smallest spot.

Complementary description, male holotype of *Miopteryx nebulosa*. Length of body 22.1 mm from head to tip of abdomen, of pronotum 4.9 mm, of metazone 3.1 mm, of forecoxa 4.6 mm; of forewing 18.0; of hindwing 19.3; maximum width of head 3.7 mm, prozone middle 1.3 mm, supracoxal dilatation 1.8 mm; metazone minimum width 1.0 mm.

Wings (Fig. 6A): Forewing slightly shorter than hindwing; vein M1 branched; vein CuA1 branches markedly sinuous. Hindwing apical angle moderately acute, vein CuA1 branched, apex slightly short, rounded.

Abdomen: Supranal plate very short, subrounded, faintly pointed.

Color: Body entirely light brown to pale yellow. Head: area between mouthparts and toruli pale yellow, with few, small dark spots, except by mandible apex, and maxillary terminal segment, dark, frontal sclerite with upper corners dark; scape pale yellow, except by apical frontal dark mark; pedicel dark, with margins pale yellow; area between around toruli and vertex, head posterior area darkish brown, with small, few, irregular dark marks, transversal darker band between eyes covering the ocelli cuticle elevation markedly present, except between ocelli, but present around it. Pronotum: dorsally with irregular dark marks, mostly laterally; margin with moderately large dark spots; ventrally with dark spots more sparsely distributed, black median stripe on its posterior 0.10. Legs: with several dark spots, tarsomeres apically darkish, tarsomere 1 centrally darkish; forecoxa entirely, trochanter mostly medially with larger dark spots; forefemur with dark spots of moderate, with three large, transversal dark marks more evident medially; fore- and midtibia with three large transversal of dense concentration of faint dark spots, one at each extremity and another at middle, mid- and hindfemur with two on its apical half. Mid- and hindlegs with dense darkish spots of irregular sizes. Wings: light brown, very translucent; forewing dark spots present on main and transverse veins, transverse veins spots most evident on costal area; vein R spotted, with marks distinctly of about same sizes, spaced from each other by $2.0\text{--}3.0 \times$ length of smallest spots; area around vein M branches with two darkish marks on right forewing, one on left forewing. Abdomen: with dark spots densely distributed; dorsally with median, longitudinal large dark band.

Female. Unknown.

Variability, male. Specimens from QBUM and coloration very similar to described specimens, except by dark marks and spots high variable on size and intensity, in individual collected at Estrada Rio-São Paulo in 1947 spots rare, inconspicuous on pronotum and forelegs. Transversal darker band between eyes covering the ocelli cuticle elevation faint to restricted only to ocelli margin.

Comments. Fabricius' (1781) description of *Mantis rustica* was based in two syntypes. Martin Stiewe (British Museum of Natural History, London) dissected the male genitalia of both types and found no differences between them (George Beccaloni pers. comm.). The imaged syntype is proposed as lectotype because it is in better conditions; the other is lacking the head (George Beccaloni pers. comm.).

Males of this species are most similar to *M. ciliata* and *M. phryganea* because they have similar shape and coloration pattern of the wings, and the vertex convex. However, *M. rustica* can be easily separated from males of *M. ciliata* by having the supracoxal dilatation slightly pronounced, the forewing vein R spotted, the ventral phallomere with distal process very long, proximal process with short and robust point, and the left dorsal phallomere with phalloid apophysis very short and basally projected the to back. It can also be isolated from males of *M. phryganea* by having the ocelli slightly close to each other, forewing only slightly shorter than hindwing, and apex of hindwing more rounded.

The holotype of *Miopteryx nebulosa* was examined and it shares all the same states for the characters mentioned above with the lectotype of *Miobantia rustica*. In fact, Giglio-Tos (1915) originally described it as similar to *Miopteryx rustica*, except by having the central ocellus not pronounced, vertex testaceous, transversal darker band between eyes passing over ocelli cuticle elevation markedly present, forewing more slender and longer, with transverse veins of costal area darker, the discoidal area with two dark larger marks, hindwings with costal area apically opaque-ferruginous. However, the material here in examined pointed such characters as being highly variable within the other species of the genus, especially the dark band between the eyes, which varies even among the additional material examined for this species. Additionally, the male genitalia of the types of both species was examined and showed no relevant differences (Figs 22A & 22C). Therefore, *Miopteryx nebulosa* is here designed as junior synonym of *Miobantia rustica* and is taken for complementing the redescription of this species.

Distribution. (Fig. 27E) The type locality is the coastal Patagonia, Argentina. Recorded also from Brazil, on two localities of Rio de Janeiro: Fazenda Peuedo, Itatiaia (around 22°30'S 44°34'W); and Km 47 of Rio-São Paulo road (around 22°46'S 43°41'W). Terra (1995) recorded this species for three localities of São Paulo, Brazil: Fazenda Pau d'Alho, Itu (23°08'38"S 47°40'45"W); Floresta Estadual Edmundo Navarro de Andrade, Rio Claro (22°24'43"S 47°33'5"W); and São Sebastião (around 23°48'S 45°25'W). Though not mentioned in the given distribution of the species, Terra (1995) also listed examined material for *M. rustica* from Viçosa, on Minas Gerais (around 20°45'S 42°53'W), and Angra dos Reis, on Rio de Janeiro (around 23°00'S 44°18'W). Agudelo, Lombardo and Jantsch (2007) also indicated the occurrence of this species in the state of Espírito Santo, based on a previous study of Jantsch (1999). However, the particular specimen identified by such author as *M. rustica* and included in the distribution record made by him in 1999, from Linhares, on Espírito Santo, was examined and taken as paratype of the newly *M. sp. nov.* 1.

Miopteryx nebulosa is recorded from Brazil (exact type locality unknown), but Terra (1995) added the record for Santo Amaro, São Paulo district, on São Paulo (23°38'60"S 46°42'00"W).

Material Examined. 4 m#m#. Described male: m# from **BRAZIL**, *Miopteryx nebulosa* Giglio-Tos typus, E. Giglio-Tos *det.*, Holotypus Nr., Mantis, Ca. No. 653. (ZMB). Other specimens: **BRAZIL:** 1 m# from Rio de Janeiro, Itatiaia, Fazenda Peuedo, 15.XI.1942, Wygod. (QBUM); 1 m# from Rio de Janeiro, Estrada Rio-São Paulo, Km 47, II.1945, Wygod.; 1 m# same data except 3.I.1947. Images of the lectotype: m# from **ARGENTINA**, Patagonia, 63 47, BMNH(E)#877364, BMNH(E)#669455. Photographs taken by Gavin Svenson (Cleveland Museum of Natural History), except by the male genitalia dissected and photographed by Martin Stiewe (British Museum of Natural History, London).

***Miobantia sp. nov.* 1 Scherrer, sp. nov.**

(Figs 7, 11E, 13A, 13B, 15A, 15B, 16D, 16I, 17C, 17I, 23, 27F)

Description, male holotype. Length of body 21.4 mm from head to tip of abdomen, of pronotum 5.3mm, of metazone 3.5 mm, of forecoxa 4.1 mm; of forewing 16.0; of hindwing 18.3; maximum width of head 3.4 mm, prozone middle 1.3 mm, supracoxal dilatation 2.0 mm; metazone minimum width 0.9 mm.

Head (Figs 11E & 13A): Frontal sclerite longitudinally moderately short, upper edge uniformly convex; small tubercle between each compound eye and toruli in form of slightly pointed crest; ocelli medium-sized, regularly distant from each other, central ocellus distinctly more elevated than lateral ocellus by low tubercle, lateral ocellus rounded; vertex somewhat straight, distinctly higher than imaginary line joining apex of eyes, with region between parietal suture and eye more elevated towards parietal suture, markedly convex, forming distinct, low bulge (juxtaocular bulge); parietal

suture regularly marked; vertex region between parietal sutures laterally abruptly elevated next parietal suture, centrally slightly concave.

Pronotum (Fig. 15B): With very long pilosity, supracoxal dilatation markedly pronounced; margin without denticulation.

Legs (Figs 16D & 16I): Forecoxa slightly longer than metazone; forefemur internal spine 6 with shape and size more similar to spines 2 and 4 than the spine 5, distance between internal spines 12 and 11 distinctly longer than distance between spines 10 and 11, internal spine 12 distinctly shorter than spine 10; foretibia external spine 1 away from spine 2 by space equivalent to two spines, external spine 2 about same size of spine 3, with 10 internal spines.

Wings (Fig. 7A): Forewing much shorter than hindwing; vein M1 not branched; vein CuA1 branches nearly straight. Hindwing apical angle slightly acute, vein CuA1 branched, apex abruptly interrupted.

Abdomen: Supranal plate very short, rounded.

Genitalia (Fig. 23A): Ventral phallomere distal process short, with most marked sclerotization taking the entire process, denticulation markedly present, tip wide, rounded, basal swelling present; proximal process markedly sclerotized, only slightly projected, with basal portion slightly wide, apex rounded. Left dorsal phallomere with anterior process slightly long, markedly large, slightly curved at base, oriented forwards, apex about as wide as middle; expanded portion between anterior process and phalloid apophysis long; a well sclerotized area between phalloid apophysis and membranous lobe which is marked, large, wide; phalloid apophysis regularly long, slender, its basal portion projected to the left, somewhat contiguously curved with entire phalloid apophysis, apically concave, slightly sharp; membranous lobe wide; dorsal lamina posterior margin with left portion projected, distinctly bent.

Color: Head, thorax except appendices, dorsally dark, ventrally pale yellow, abdomen entirely dark. Head: area between mouthparts and toruli pale yellow, with few, very sparse, small dark spots, except by mandible apex, and maxillary terminal segment dark; scape pale yellow, except by apical frontal dark mark; pedicel dark, with apical margin pale yellow; flagellum mostly dark, alternating between segment with apical half pale yellow and segment entirely dark from segment 10 to apex; area between toruli and vertex dark pigmented, with large bright marks of irregular forms and intensities; pale yellow median line starting at foramen magnum, bifurcating just before the ocelli cuticle expansion, going along with parietal suture to eye; ocelli cuticle expansion centrally with another pale yellow median line. Pronotum: dorsally entirely dark colored, with pale yellow evanescent marks of irregular forms; margin pale yellow with moderately large dark spots; ventrally pale yellow, with few, sparse dark spots, black median stripe on its posterior half. Legs: pale yellow, with dark marks, tarsomeres apically darkish, tarsomere 1 centrally darkish; forecoxa with large dark spots; trochanter laterally with few large dark spots, medially with large longitudinal dark mark; forefemur with dark spots of moderate, anteriorly with two distinct areas of spots concentrations, visible at the lateral and medial areas of femur, posteriorly with dark longitudinal mark from femur base to claw groove, apical region anteriorly with longitudinal dark mark; foretibia with few dark spots of irregular sizes; fore- and midtibia with three large transversal areas of dense concentration of dark spots, one at each extremity and another at middle, hindfemur with two on its apical half. Mid- and hindlegs with dense dark spots of irregular sizes. Wings: mostly dark, slightly translucent; costal margins apically, some veins of forewing, hindwing apical part with bright large marks, not restricted to vein limits; forewing dark spots present only on main veins, transverse veins without dark spots; vein R spotted, with marks of unequal sizes, spaced from each other by 2.0–3.0 × length of smallest spots; area around vein M branches without darkish marks.

Female allotype. Length of body 26.4 mm from head to tip of abdomen, of pronotum 8.1 mm, of metazone 5.3 mm, of forecoxa 6.4 mm; maximum width of head 4.7 mm, prozone middle 1.7 mm, supracoxal dilatation 3.0 mm; metazone

minimum width 1.4 mm. General morphology and coloration very similar to male, except by body markedly larger, more stout than holotype; head with vertex centrally straight (Fig. 13B); ocelli vestigial; pronotum with distinct denticulation along entire lateral margin, more pronounced anteriorly, metazone slightly more robust (Fig. 15A); forecoxa anterior edge with median distinct denticulation; apterous; supranal plate longer than in males, but not overlaying ovipositor, side parallel (Fig. 17I). General coloration lighter, dark marks less marked; head with dark marks on parietal suture, area between parietal sutures with densely distributed evanescent dark spots.

Immature Stages. *Nymph, unknown instar.* Length of body 8.7 mm; antenna 4.7 mm. General morphology and coloration as in adults, except by ocelli vestigial; forefemur internal spine 11 vestigial; foretibia with external spines 1 and 3 lower than the others, spine 2 only slightly higher than spines 4–6, spine 7 distinctly higher than the others. Apterous. Cercus basally stout, very slender towards apex.

Variability, male. Paratypes very similar to holotype, except by the foretibia with 11 internal spines; hindwing large bright marks restricted to costal area apical parts; genitalia ventral phallomere of paratypes from Domingos Martins and Santa Teresa with posterior right quadrant centrally with three distinct, thick hairs, left dorsal phallomere of paratype from Linhares with anterior process apex slightly wider than its middle. General body dark marks and spots high variable on size and intensity; wings with general coloration high variable, paratypes from Domingos Martins and Linhares with wings distinctly brown, paratype from Santa Teresa with wings light brown, very translucent, bright marks inconspicuous (Fig. 7B). Flagellum with about flagellomere 25 to apex alternating between segment with apical half pale yellow and three segments entirely dark, apparently because flagellomeres are duplicated from this point.

Comments. It is the most distinctive species examined, both male and female can be instantly separated from all other species of *Miobantia* by having the small juxtaocular tubercle between each compound eye and toruli prominent, in the form of a low and lightly pointed crest, the central ocellus on small and low tubercle, the flagellum with bright transverse marks, the forecoxa only slightly longer than metazone, the forefemur with distance between internal spines 12 and 11 distinctly longer than distance between spines 10 and 11, and the foretibia external spine 1 away from spine 2 by space equivalent to two spines. Males also have the forewing vein M1 not branched, while the hindwing vein CuA is branched, a unique venation pattern among species of the genus, as well as the hindwing apex abruptly interrupted. In addition, the male genitalia have the ventral phallomere with proximal process only slightly projected and the dorsal lamina of the left dorsal phallomere with the left portion distinctly bent.

Distribution. (Fig. 27F) Brazil. Recorded from five localities of Espírito Santo: Reserva Biológica Córrego do Veado, Pinheiros (type locality) (18°22'04"S 40°8'29"W); Reserva Natural Vale, Linhares (19°09'06"S 40°04'14"W); Estação Biológica Santa Lúcia, Santa Teresa (19°57'55"S 40°32'25"W); Mata Pico do Eldorado, Domingos Martins (20°22'17"S 40°39'29"W); and Vitória (around 20°19'S 40°21'W).

Material Examined. 4 m#m#, 1 f#, 1 nymph. *Holotype:* m# from **BRAZIL**, Espírito Santo, Pinheiros, Reserva Biológica Córrego do Veado, Trilha da Anta, point 1, 09-11.VI.2011, Malaise, MTTavares *et al. leg.* [specimen MT00046 in the cladistic analysis] (UFES). *Allotype:* f# from **BRAZIL**, Espírito Santo, Vitória, 18.VI.1981 (UFES). *Paratypes:* **BRAZIL:** 1 nymph from Espírito Santo, Linhares, Reserva Natural Vale, Estrada Baba de Boi, point 18, 16-18.I.2011, yellow pan trap, APAGuiar *et al. leg.* (UFES); 1 m# same data except Linhares, 25.VI.1990, JSSantos *leg.*, *Miobantia rustica*, L.Jantsch *det.*, 28.VII.1993 (MCTP); 1 m# from Espírito Santo, Santa Teresa, Estação Biológica Santa Lúcia, T1, 19-23.X.2007, Malaise, MTTavares *et al. leg.* [MT00045] (UFES); 1 m# from Espírito Santo, Domingos Martins, Mata Pico do Eldorado, point T3, 03-10.XII.2004, Malaise, MTTavares *et al. leg.* [MT00090] (UFES).

***Miobantia* sp. nov. 2 Scherrer, sp. nov.**

(Figs 8, 11F, 12H, 14H, 16E, 24, 27F)

Description, male holotype. Length of body 17.1 mm from head to tip of abdomen, of pronotum 4.1 mm, of metazone 2.6 mm, of forecoxa 3.6 mm; of forewing 18.8; of hindwing 19.6; maximum width of head 3.4 mm, prozone middle 1.3 mm, supracoxal dilatation 1.7 mm; metazone minimum width 0.8 mm.

Head (Figs 11F & 12H): Frontal sclerite longitudinally very short; small tubercle between each compound eye and toruli not pointed, represented by low cuticle elevation; ocelli markedly large, very close to each other, central ocellus about as elevated as lateral ocellus, lateral ocellus distinctly elliptical; vertex somewhat straight, distinctly higher than imaginary line joining apex of eyes, with region between parietal suture and eye more elevated towards parietal suture, nearly straight; parietal suture faintly marked; vertex region between parietal sutures laterally gradually elevated next parietal suture, centrally slightly concave.

Pronotum (Fig. 14H): With moderately long pilosity, supracoxal dilatation regularly sized; margin without denticulation.

Legs (Fig. 16E): Forecoxa markedly longer than metazone; forefemur internal spine 6 with shape and size more similar to spine 5 than spines 2 and 4, distance between internal spines 12 and 11 about same distance between spines 10 and 11 or slightly shorter, internal spine 12 about same size of spine 10; foretibia external spine 1 away from spine 2 by space equivalent to one spine, external spine 2 slightly longer than spine 3, with 9 internal spines.

Wings (Fig. 8): Forewing slightly shorter than hindwing; vein M1 branched; vein CuA1 branches markedly sinuous. Hindwing apical angle moderately acute, vein CuA1 branched, apex slightly short, slightly pointed.

Abdomen: Supranal plate very short, rounded.

Genitalia (Fig. 24): Ventral phallomere distal process short, with most marked sclerotization taking the entire process, denticulation markedly present, tip wide, rounded, basal swelling absent; proximal process markedly sclerotized, markedly projected, long, somewhat straight, turned diagonally backwards to lateral portion, with basal portion slightly wide, apex rounded; slit between posterior margin of ventral phallomere and proximal process deep. Left dorsal phallomere with anterior process very long, moderately large, markedly curved at about middle, oriented forwards, apex about as wide as middle; expanded portion between anterior process and phalloid apophysis short, oriented forwards; a well sclerotized area between phalloid apophysis and membranous lobe which is marked, large, wide; phalloid apophysis regularly long, slender, its basal portion projected to the left, subapically markedly bent, apically concave, slightly sharp; membranous lobe slender; dorsal lamina posterior margin with left portion projected, expanded, uniformly curved.

Color. Body entirely pale yellow. Head: area between mouthparts and toruli with few, irregular dark spots, except by mandible apex, and maxillary terminal segment dark; scape pale yellow, except by apical frontal dark mark; pedicel dark, with margins pale yellow; flagellum entirely light brown; area between toruli and vertex with several minute light brownish spots, mostly on transversal darker band between eyes covering the ocelli cuticle elevation; head dorsal region with irregular darkish marks, transversal dark band on it apical area. Pronotum: with few, very sparse, small dark spots, mostly laterally; margin with slightly larger, sparse dark spots; ventrally with black median stripe on its posterior half. Legs: forecoxa entirely, trochanter mostly medially with regularly sized dark spots; forefemur anterior edge with 4 faint dark spots along its length, claw groove, area next to internal spines with irregular, large darkish marks; fore- and midtibia with three large transversal areas of dense concentration of dark spots, one at each extremity and

another at middle. Hindfemur with two faint transversal dark bands on its apical half; tarsomeres apically darkish, tarsomere 1 centrally darkish. Wings: light brown, forewing cells, hindwing apical cells with central slightly brownish mark, very translucent; forewing dark spots present only on main veins, transverse veins without dark spots; vein R spotted, with marks distinctly of about same sizes, spaced from each other by $2.0\text{--}3.0 \times$ length of smallest spots; area around vein M branches without darkish marks.

Female. Unknown.

Variability. Unknown.

Comments. This species are most similar to *M. sp. nov. 2* and *M. sp. nov. 3*, based on the very translucent wings, with costal margins of both wings without bright marks, the forewing costal area without dark spots, the forewing vein R with dark spots of about same sizes, with vein M1 branched, and the hindwing vein CuA1 also branched. *Miobantia sp. nov. 2* can however be instantly isolated from the males of these species by having the characteristic ocelli markedly large and very close to each other. Additionally, the combination of the following features of the male genitalia is also diagnostic for separate *M. sp. nov. 2* from these species: the ventral phallomere distal process short, with most marked sclerotization taking the entire process and denticulation markedly present, its tip wide and rounded, and with basal swelling absent; and the proximal process markedly projected and long, somewhat straight but turned diagonally backwards to lateral portion, with basal portion slightly wide, the apex rounded, with the slit between posterior margin of the ventral phallomere and the proximal process deep.

Distribution. (Fig. 27F) Brazil. Recorded only from the type locality: Ribeirão do Meio, in Conceição do Castelo, Espírito Santo (around $20^{\circ}21'S$ $41^{\circ}14'W$).

Material Examined. *Holotype*: m# from BRAZIL, Espírito Santo, Conceição do Castelo, Propriedade Ribeirão do Meio, trilha ao lado da lagoa, 17-24.III.2007, Malaise, APAGuiar *et al. leg.* [specimen MT00063 in the cladistic analysis] (UFES).

***Miobantia sp. nov. 3* Scherrer, sp. nov.**

(Figs 9, 11G, 13D, 13E, 15C, 15D, 16F, 17F, 25, 27F)

Description, male holotype. Length of body 17.5 mm from head to tip of abdomen, of pronotum 4.0 mm, of metazone 2.4 mm, of forecoxa 4 mm; of forewing 16.9; of hindwing 17.3; maximum width of head 3.2 mm, prozone middle 1.2 mm, supracoxal dilatation 1.7 mm; metazone minimum width 1.0 mm.

Head (Figs 11G & 13D): Frontal sclerite longitudinally very short, upper edge uniformly convex; small tubercle between each compound eye and toruli not pointed, represented by low cuticle elevation; ocelli medium-sized, regularly distant from each other, central ocellus about as elevated as lateral ocellus, lateral ocellus distinctly elliptical; vertex slightly convex, distinctly higher than imaginary line joining apex of eyes, with region between parietal suture and eye more elevated towards parietal suture, slightly convex; parietal suture regularly marked; vertex region between parietal sutures laterally abruptly elevated next parietal suture, centrally following lateral part overall outline.

Pronotum (Fig. 15C): With moderately long pilosity, supracoxal dilatation markedly pronounced; margin without denticulation.

Legs (*e.g.*, Fig. 16F): Forecoxa markedly longer than metazone; forefemur internal spine 6 with shape and size more similar to spine 5 than spines 2 and 4, distance between internal spines 12 and 11 about same distance between

spines 10 and 11 or slightly shorter, internal spine 12 about same size of spine 10; foretibia external spine 1 away from spine 2 by space equivalent to one spine, external spine 2 slightly longer than spine 3, with 9 internal spines.

Wings (Fig. 9A): Forewing about same length than hindwing; vein M1 branched; vein CuA1 branches markedly sinuous. Hindwing apical angle moderately acute, vein CuA1 branched, apex slightly long, markedly pointed.

Abdomen: Supranal plate very short, subrounded, faintly pointed.

Genitalia (Fig. 25B): Ventral phallomere distal process slightly long, with most marked sclerotization taking the entire process, denticulation markedly present, tip pointed, basal swelling present; proximal process markedly sclerotized, markedly projected, long, somewhat straight, turned diagonally backwards to lateral portion, with basal portion slightly wide, apex rounded; slit between posterior margin of ventral phallomere and proximal process deep. Left dorsal phallomere with anterior process very long, moderately large, markedly curved at about middle, oriented forwards, apex distinctly wider than middle width; expanded portion between anterior process and phalloid apophysis short, oriented forwards; a well sclerotized area between phalloid apophysis and membranous lobe which is marked, large, slender; phalloid apophysis regularly long, slender, its basal portion projected to the left, somewhat contiguously curved with entire phalloid apophysis, apically concave, not sharp; membranous lobe slender; dorsal lamina posterior margin with left portion projected, expanded, uniformly curved.

Color: Body dorsally darkish brown, ventrally pale yellow. Head: area between mouthparts and toruli entirely pale yellow, except by mandible apex, and maxillary terminal segment dark; scape pale yellow; pedicel dark, with margins pale yellow; flagellum entirely light brown; area between toruli and vertex with several minute light brownish spots, mostly on transversal darker band between eyes covering the ocelli cuticle elevation; head dorsal region with few, faint irregular darkish marks. Pronotum: dorsally with irregular darker marks; margin few, faint, small dark spots; ventrally with black median stripe on its posterior half. Legs: pale yellow, with darkish marks, tarsomeres apically darkish; forecoxa medially with few, faint dark spots; forefemur medially with three areas of dense concentration of evanescent spots, restricted to anterior area, posteriorly with basal area, claw groove brownish. Mid- and hindleg femur, tibia without dark spots or marks. Wings: faintly light brownish, with few, evanescent, irregularly sized darkish marks mostly on forewing; forewing dark spots present only on main veins, transverse veins without dark spots; vein R spotted, with marks distinctly of about same sizes, very away from each other by more than $3 \times$ length of smallest spots; area around vein M branches without darkish marks.

Female allotype. Length of body 18.5 mm from head to tip of abdomen, of pronotum 4.7 mm, of metazone 2.8 mm, of forecoxa 4.6 mm; maximum width of head 3.8 mm, prozone middle 1.6 mm, supracoxal dilatation 2.1 mm; metazone minimum width 1.4 mm. General morphology and coloration similar to male, except by body larger, more stout than allotype; head with vertex distinctly more elevated (Fig. 13E); ocelli vestigial; pronotum with distinct denticulation along lateral margin, more evident posteriorly, metazone markedly more robust (Fig. 15D); forecoxa anterior edge with median distinct denticulation; apterous; supranal plate longer than in males, but not overlaying ovipositor, with sides distinctly converging towards a subrounded apex (Fig. 17F); area between mouthparts and toruli entirely with few dark spots, mostly on labrum; pronotum dorsally light brown to pale yellow, with small dark spots, mostly laterally; foreleg with tarsomere 1 centrally darkish, coxa, femur, tibia with more darkish spots, darkish marks more evident than in males; fore- and midtibia with three large transversal areas of dense concentration of dark spots, one at each extremity and another at middle, mid- and hindfemur with two faint transversal dark bands on its apical half; abdomen with several darkish spots, irregular dark marks.

Variability, male. Male paratypes very similar to holotype, except by foretibia with 9–10 internal spines. General body dorsally pale yellow in paratypes, dark marks and spots high variable on size and intensity; head with area between toruli and vertex with transversal darker band between eyes sometimes absent, only ocelli margin marked dark.

Female. Female paratypes very similar to allotype, except by female from Garabi with foretibia with 9 internal spines; body dark marks distinctly less marked; both female paratypes with limit between supracoxal dilatation and metazone distinctly evident, margin with denticulation inconspicuous on prozone. Female from Garabi with dark marks distinctly less marked.

Comments. Males of this species are most similar to those of *M. sp. nov. 2* and *M. sp. nov. 4*, based on the very translucent wings, with costal margins of both wings without bright marks, the forewing costal area without dark spots, the forewing vein R with dark spots of about same sizes, with the vein M1 branched, and the hindwing vein CuA1 also branched. However, it can be easily isolated from males of these two species by having the ocelli medium-sized, vertex slightly convex, with region between parietal sutures laterally abruptly elevated next to the parietal suture, supracoxal dilatation markedly pronounced, hindwing apex distinctly pointed, and ventral phallomere with distal process slightly long, pointed, with basal swelling present.

The female of *M. sp. nov. 3* is somewhat similar to those of *M. fuscata* and *M. sp. nov. 4* due to the presence of a supranal plate with sides distinctly converging towards a subrounded apex, but it can be readily distinguished from those species by having the vertex distinctly convex and the frontal sclerite markedly short (*vs.* vertex somewhat straight and frontal sclerite moderately short).

Distribution. (Fig. 27E) Recorded from San Bernardino, Paraguay (around 25°16'S 57°19'W), and from Brazil, on Nova Teutônia, Santa Catarina (27°11'S 52°23'W), and on three localities of Rio Grande do Sul: Garabi; São Borja (28°39'S 56°00'W); and Porto Alegre (type locality) (30°02'S 51°12'W).

Material Examined. 4 m#m#, 3 f#f#. **Holotype:** m# from **BRAZIL**, Rio Grande do Sul, Porto Alegre, 03.II.1985, Jantsch *leg.*, *Miobantia ciliata*, L.Jantsch *det.*, 0776 [specimen MCTP0776 in the cladistic analysis] (MCTP). **Allotype:** f# from **PARAGUAY**, 3952, K. Fiebrig, 27.VII.1905, F. N° 803/05, [paratype of] *Miobantia aptera* Giglio-Tos, E. Giglio-Tos *det.* (UFES). **Paratypes:** **BRAZIL:** 2 m#m# from Santa Catarina, Nova Teutônia, X.1995, Fritz Plaumann *leg.*, G1115 (QBUM); 1 f# from Rio Grande do Sul, Garabi, 3-12.I.1989, ELerner *leg.*, *Miobantia aptera* L.Jantsch *det.*, 1505 (MCTP); 1 f# from Rio Grande do Sul, São Borja, 08.VII.1980, AALise *leg.*, *Miobantia aptera* L.Jantsch *det.*, 0469 (MCTP); 1 m# from Porto Alegre, 25.XI.1988, ALAzevedo *leg.*, *Miobantia phryganea* L.Jantsch *det.*, 1504 (MCTP).

***Miobantia sp. nov. 4* Scherrer, sp. nov.**

(Figs 10, 11H, 13F, 13G, 15E, 15F, 16G, 16J, 17B, 17G, 26, 27F)

Description, male holotype. Length of body 19.2 mm from head to tip of abdomen, of pronotum 4 mm, of metazone 2.5 mm, of forecoxa 3.9 mm; of forewing 16.9; of hindwing 17.1; maximum width of head 3.2 mm, prozone middle 1.2 mm, supracoxal dilatation 1.7 mm; metazone minimum width 0.9 mm.

Head (Figs 11H & 13F): Frontal sclerite longitudinally moderately short, upper edge uniformly convex; small tubercle between each compound eye and toruli not pointed, represented by low cuticle elevation; ocelli markedly large, regularly distant from each other, central ocellus about as elevated as lateral ocellus, lateral ocellus distinctly elliptical;

vertex somewhat straight, inconspicuously or not higher than imaginary line joining apex of eyes, with region between parietal suture and eye not elevated towards parietal suture, slightly convex; parietal suture regularly marked.

Pronotum (Fig. 15E): With moderately long pilosity, supracoxal dilatation regularly sized; margin without denticulation.

Legs (Figs 16G & 16J): Forecoxa markedly longer than metazone; forefemur internal spine 6 with shape and size more similar to spine 5 than spines 2 and 4, distance between internal spines 12 and 11 about same distance between spines 10 and 11 or slightly shorter, internal spine 12 about same size of spine 10; foretibia external spine 1 away from spine 2 by space equivalent to one spine, external spine 2 slightly longer than spine 3, with 10 internal spines.

Wings: Forewing about same length than hindwing; vein M1 branched; vein CuA1 branches slightly sinuous. Hindwing apical angle moderately acute, vein CuA1 branched, apex slightly short, rounded.

Abdomen (Fig. 17B): Supranal plate very short, subrounded, faintly pointed.

Genitalia (Fig. 26A): Ventral phallomere distal process short, with most marked sclerotization taking only the process tip, denticulation faintly present, tip slender but rounded, basal swelling absent; proximal process faintly sclerotized, markedly projected, short, curved, distinctly turned backwards, with basal portion slender, apex with slightly long, slender point; slit between posterior margin of ventral phallomere and proximal process deep. Left dorsal phallomere with anterior process very long, very slender, slightly curved at base, oriented forwards, apex about as wide as middle; expanded portion between anterior process and phalloid apophysis short, oriented forwards; a well sclerotized area between phalloid apophysis and membranous lobe which is marked, small, not reaching membranous lobe; phalloid apophysis very long, slender, its basal portion projected to the left, subapically markedly bent, apically almost straight, not sharp; membranous lobe wide; dorsal lamina posterior margin with left portion projected, narrow, uniformly curved.

Color: Body entirely pale yellow, dorsally slightly darker than ventrally. Head: area between mouthparts and toruli with few, irregular darkish marks, except by mandible apex, and maxillary terminal segment dark; scape pale yellow, except by apical frontal dark mark; pedicel dark, with margins pale yellow; flagellum entirely light brown; area between toruli and vertex with few, large, irregular darkish marks, mostly on transversal darker band between eyes covering the ocelli cuticle elevation; head dorsal region with irregular darkish marks, transversal dark band on its apical area. Pronotum: with large, irregular darkish marks; margin with few, inconspicuous dark spots restricted to prozone; ventrally with black median stripe on its posterior half. Legs: entirely pale yellow, except by tarsomeres apically dark, femora apically with two, tibiae with three large, inconspicuous transversal darkish bands. Wings: grayish, except by forewing cells, hindwing apical cells with central inconspicuously brownish mark, very translucent; forewing dark spots present only on main veins, transverse veins without dark spots; vein R spotted, with marks distinctly of about same sizes, spaced from each other by $2.0\text{--}3.0 \times$ length of smallest spots; area around vein M branches without darkish marks.

Female allotype. Length of body 19.2 mm from head to tip of abdomen, of pronotum 4.8 mm, of metazone 2.9 mm, of forecoxa 4.4 mm; maximum width of head 4.0 mm, prozone middle 1.5 mm, supracoxal dilatation 1.9 mm; metazone minimum width 1.1 mm. General morphology and coloration similar to male, except by body larger, more stout than male; vertex inconspicuously more elevated (Fig. 13G); ocelli vestigial; pronotum with distinct denticulation along lateral margin, metazone markedly more robust (Fig. 15F); forecoxa anterior edge with median distinct denticulation; apterous; supranal plate longer than in males, but not overlaying ovipositor, with sides distinctly converging towards a subrounded apex (Fig. 17G). General body with slightly, inconspicuous green tint, more evident on tibiae and tarsi; head with darkish marks smaller, more densely distributed, darker band between eyes less evident than in male; legs medially

with few darkish spots, forefemur dorsally with two transversal, large, faint darkish bands; abdomen with several dark spots, irregular dark marks.

Variability, male. Paratypes very similar to holotype, except by foretibia with 9–10 internal spines; hindwing with apex slightly but distinctly pointed; paratype from Feira de Santana with right forewing vein M-a1 and hindwing vein CuA-a1 branched. General body dark marks and spots high variable on size and intensity; paratype from Pindobaçu with forewing with evanescent darkish brown marks between veins.

Comments. Males of this species are most similar to those of *M. sp. nov. 2* and *M. sp. nov. 3*, based on the very translucent wings, with costal margins of both wings without bright marks, the forewing costal area without dark spots, the forewing vein R with dark spots of about same sizes, with vein M1 branched, and the hindwing vein CuA1 also branched. It can however be securely distinguished from males of those two species by having the head with frontal sclerite longitudinally moderately short, the vertex general elevation inconspicuously higher than imaginary line joining apex of eyes, the hindwing apex rounded, the genitalia with ventral phallomere distal process most marked sclerotization taking only the process tip, its tip slender but rounded, the proximal process projection short, and the left dorsal phallomere with phalloid apophysis very long.

Females of *M. sp. nov. 4* are most similar to those of *M. fuscata* due to have the combination of head with vertex distinctly convex, frontal sclerite markedly short, and supranal plate with sides distinctly converging towards a subrounded apex. It can however be separated from females of *M. fuscata* by having the vertex region between parietal suture and eye distinctly, but slightly convex, pronotum with metazone markedly robust; and forefemur with internal spine 12 about same size of spine 10.

Distribution. (Fig. 27F) Brazil. Recorded from three localities of Bahia: Cachoeira da Fumaça, Pindobaçu, Feira de Santana (10°28'43"S 40°12'27"W); Serra de São José, district of Maria Quitéria, Feira de Santana (12°09'19"S 38°59'48"W); and Serra da Jibóia, Pedra Branca, Santa Terezinha (type locality) (12°51'S 39°28'W).

Material Examined. 3 m#m#, 1 f#. *Holotype*: m# from **BRAZIL**, 1 m# from Santa Terezinha, Pedra Branca, Serra da Jibóia, 18.IX.2009, manual noturna, MMenezes *leg.* [specimen MZUEFS46390 in the cladistic analysis] (MZUEFS). *Allotype*: f# from **BRAZIL**, Santa Terezinha, Pedra Branca, Serra da Jibóia, 24.VII.2009, manual, MMiranda & MMenezes *leg.* (MZUEFS). *Paratypes*: **BRAZIL**: 1 m# from Feira de Santana, Pindobaçu, Cachoeira da Fumaça, 18.XII.2009, lighting trap, EMenezes *et al. leg.* (MZUEFS); Bahia, Serra de São José, 10.V.2010, manual, MMenezes *leg.* (MZUEFS).

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Appendix 1

Character list used for the codification of the cladistic matrix.

Head

1. Length of frontal sclerite: [0] very short; [1] moderately short
2. Alignment of lateral margins of frontal sclerite: [0] distinctly converging anteriorly; [1] somewhat parallel or inconspicuously converging anteriorly
3. Development of small tubercle between each compound eye and toruli: [0] prominent, in form of low crest moderately pointed; [1] very low, represented by low cuticle elevation
4. Ocelli size: [0] large; [1] medium-sized; [2] slightly small; [3] markedly small
5. Ocelli proximity: [0] regularly distant from each other; [1] slightly close to each other; [2] very close to each other
6. Relative height of central ocellus: [0] about as elevated as lateral ocellus; [1] distinctly more elevated than lateral ocellus
7. Form of cuticle projection of central ocellus: [0] somewhat conical; [1] almost rounded, slightly medially pointed; [2] distinctly rounded
8. Form of central ocellus: [0] distinctly transversally elliptical; [1] somewhat rounded
9. Form of lateral ocellus: [0] somewhat rounded; [1] distinctly elliptical
10. Depth of parietal suture: [0] shallow; [1] deep
11. Overall shape of vertex: [0] markedly convex; [1] slightly convex; [2] somewhat straight
12. General elevation of vertex: [0] inconspicuously or not higher than imaginary line joining apex of eyes; [1] distinctly higher than imaginary line joining apex of eyes
13. Form of region of vertex between parietal suture and eyes: [0] straight or slightly convex; [1] slightly high, forming smooth bulge; [2] very high, forming marked juxtaocular tubercle
14. Angle of region between parietal suture and eyes: [0] not elevated towards parietal suture; [1] more elevated towards parietal suture
15. Form of lateral part of vertex region between parietal suture: [0] abruptly elevated next parietal suture; [1] gradually elevated next parietal suture; [2] continuously lined with remaining regions of vertex
16. Form of central part of vertex region between parietal suture: [0] continuously lined with lateral part overall outline; [1] concave

Pronotum

17. Density of pronotum pilosity: [0] very sparse; [1] moderately dense
18. Length of pronotum pilosity: [0] slightly long; [1] short
19. Presence of margin denticulation: [0] absent; [1] present
20. Development of median keel of prozone: [0] faint; [1] moderately marked, with anterior part very low to indistinctly marked
21. Supracoxal dilatation: [0] wide; [1] regularly pronounced; [2] faintly pronounced; [3] inconspicuous

22. Development of median keel of metazone: [0] faint; [1] marked
23. Size of pair of tubercles at posterior area of metazone: [0] moderately low or high; [1] very low

Meso- and Metanotum

24. General shape of triangular expansion of posterior margin of mesonotum: [0] small; [1] slightly large; [2] very large
25. Tip length of triangular expansion of posterior margin of mesonotum: [0] short; [1] slightly long; [2] very long
26. Pilosity length of triangular expansion of jugal field of mesonotum: [0] short; [1] high
27. Size of meso- and metanotum median longitudinal pilosity: [0] same pattern of other areas of thorax; [1] higher than pilosity of other areas of thorax

Legs

28. Forecoxa relative length: [0] about same length of metazone or slightly longer; [1] much longer than metazone
29. Relative distance of external spines 1 and 2 of forefemur: [0] markedly shorter than distance of spines 2 and 3; [1] slightly shorter than distance of spines 2 and 3; [2] same distance of spines 2 and 3
30. Relative size of internal spine 6 of forefemur: [0] more similar to spines 2 and 4 than the spine 5; [1] more similar to spine 5 than spines 2 and 4
31. Relative distance of internal spines 12 and 11 of forefemur: [0] distinctly longer than distance of spines 10 and 11; [1] about same distance of spines 10 and 11 or slightly shorter
32. Relative size of internal spine 12 of forefemur: [0] distinctly shorter than spine 10; [1] about same size of spine 10
33. Number of external spines of foretibia: [0] 5; [1] 6; [2] 7
34. Distance of base to external spine 1 of foretibia: [0] about 0.2 of tibia length; [1] about 0.4 of tibia length
35. Distance of external spine 1 of foretibia spine 2: [0] markedly distant; [1] regularly distant
36. Length of distance of external spine 1 of foretibia from spine 2, if markedly distant: [0] equivalent to two spines; [1] equivalent to one spine
37. Size of external spine 2 of foretibia: [0] slightly shorter than spine 3; [1] same size of spine 3; [2] slightly longer than spine 3
38. Number of internal spines of foretibia: [0] 9; [1] 10; [2] 11; [3] 13
39. Presence of transversal dark marks on hind femur: [0] indistinct or absent; [1] distinct

Wings

40. Wings general color: [0] light brownish; [1] dark brownish; [2] blackish
41. Uniformity of coloration: [0] uniform; [1] distinctly tarnished
42. Pattern of the stains: [0] large, irregularly distributed; [1] medium, somewhat sparsely distributed; [2] small, densely distributed
43. Translucency of wings: [0] very translucent, wings hyaline or almost so; [1] regularly translucent; [2] faintly translucent, wing pigmentation very marked

44. Relative length of forewing: [0] longer than hindwing; [1] about same length than hindwing; [2] shorter than hindwing
45. Presence of dark spots at forewing: [0] absent; [1] present
46. Locality of forewing dark spots: [0] only on main veins, transverse veins without dark spots; [1] on main and transverse veins
47. Presence of dark spots at vein R of forewing: [0] indistinct, vein R entirely dark; [1] present
48. Form of dark spots at vein R of forewing: [0] some spots distinctly larger than other; [1] spots of about equal size
49. Presence of darkish marks around vein M branches of forewing: [0] absent; [1] present
50. Number of darkish marks around vein M branches of forewing: [0] 3; [1] 2; [2] 1
51. Branching of vein M1 of forewing: [0] vein M1 not branched; [1] vein M1 branched
52. Form of branches of vein CuA1 of forewing: [0] nearly straight; [1] sinuous, even if slightly
53. Ratio between AA1 length and hindwing maximum length: [0] very long; [1] slightly long; [2] slightly short; [3] very short
54. Hindwing angulation between imaginary line tangent to the costal border and imaginary line tangent to apical border: [0] very acute; [1] regularly acute; [2] slightly acute
55. Presence of branches of vein CuA1 of hindwing: [0] branched; [1] not branched

Abdomen

56. Shape of supranal plate: [0] markedly pointed; [1] subrounded, slightly pointed; [2] rounded
57. Length of supranal shield: [0] short; [1] slightly long; [2] very long

Male Genitalia, Ventral Phallomere

58. Most marked sclerotization of distal process of ventral phallomere: [0] taking the entire process; [1] taking at least half the area of the process; [2] taking only the process tip
59. Presence of denticulation of distal process of ventral phallomere: [0] present, even if inconspicuously; [1] absent
60. Intensity of denticulation of distal process of ventral phallomere: [0] denticulation evident; [1] inconspicuous
61. Width of apex of distal process of ventral phallomere: [0] wide; [1] slender
62. Form of the tip of distal process of ventral phallomere: [0] rounded; [1] pointed
63. Presence of basal swelling of distal process of ventral phallomere: [0] absent; [1] present
64. Basal width of distal process of ventral phallomere: [0] large; [1] slender
65. General length of distal process of ventral phallomere: [0] short; [1] slightly long; [2] very long
66. Sclerotization intensity of proximal process of ventral phallomere: [0] faintly sclerotized; [1] slightly marked; [2] very marked
67. Insertion of proximal process of ventral phallomere: [0] continuous with posterior margin of ventral phallomere; [1] with a slit between it and posterior margin of ventral phallomere, even if very shallow
68. Projection of proximal process of ventral phallomere: [0] only slightly projected; [1] markedly projected
69. Length of projected proximal process of ventral phallomere: [0] short; [1] long
70. Overall curvature of projected proximal process of ventral phallomere: [0] somewhat straight; [1] curved

- 71. Overall width of projected proximal process of ventral phallomere: [0] regular; [1] slender; [2] expanded
- 72. Apical width of projected proximal process of ventral phallomere: [0] slightly slender than base; [1] distinctly slender than base
- 73. Direction of projected proximal process of ventral phallomere: [0] turned diagonally backwards to lateral portion; [1] distinctly turned backwards; [2] turned diagonally backwards to central portion
- 74. Slit between posterior margin of ventral phallomere and proximal process: [0] deep; [1] shallow
- 75. Basal width of projected proximal process of ventral phallomere: [0] regularly wide; [1] very wide
- 76. Form of the tip of projected proximal process of ventral phallomere: [0] rounded; [1] pointed

Male Genitalia, Left Dorsal Phallomere

- 77. Presence of anterior process of left dorsal phallomere: [0] indistinct; [1] distinct
- 78. Length of anterior process of left dorsal phallomere: [0] very long; [1] slightly long; [2] short
- 79. Shape of anterior process of left dorsal phallomere: [0] curved, even if slightly; [1] straight
- 80. Curvature of anterior process of left dorsal phallomere: [0] markedly curved; [1] slightly curved
- 81. Width of anterior process of left dorsal phallomere, if large: [0] moderately large; [1] markedly large
- 82. Direction of anterior process of left dorsal phallomere: [0] lateral; [1] forwards
- 83. Apical width of anterior process of left dorsal phallomere: [0] about the same width than middle or inconspicuously wider; [1] distinctly wider than middle width
- 84. Shape of expanded portion between anterior process and phalloid apophysis of left dorsal phallomere: [0] not triangular; [1] triangular
- 85. Length of expanded portion between anterior process and phalloid apophysis of left dorsal phallomere: [0] long; [1] short
- 86. Direction of expanded portion between anterior process and phalloid apophysis of left dorsal phallomere: [0] forward; [1] lateral
- 87. Presence of well sclerotized area between phalloid apophysis and membranous lobe of left dorsal phallomere: [0] indistinct; [1] evanescent; [2] marked
- 88. Extension of well sclerotized area between phalloid apophysis and membranous lobe of left dorsal phallomere, if medium or small: [0] medium, expanded backwards; [1] small
- 89. Width of small well sclerotized area between phalloid apophysis and membranous lobe of left dorsal phallomere: [0] extended, reaching anterior area of membranous lobe; [1] restricted, not reaching membranous lobe
- 90. Width of medium sized well sclerotized area between phalloid apophysis and membranous lobe of left dorsal phallomere: [0] wide; [1] slender
- 91. Length of phalloid apophysis of left dorsal phallomere: [0] vestigial; [1] very short; [2] slightly short; [3] moderately long; [4] very long
- 92. Width of phalloid apophysis of left dorsal phallomere: [0] moderately stout; [1] slender
- 93. Basal direction of phalloid apophysis of left dorsal phallomere: [0] right; [1] back; [2] left
- 94. Form of apical curvature of phalloid apophysis of left dorsal phallomere, if bent backwards: [0] not or inconspicuously bent; [1] distinctly bent

95. Apical shape of phalloid apophysis of left dorsal phallomere: [0] concave, even if slightly; [1] almost straight or convex
96. Apical width of phalloid apophysis of left dorsal phallomere: [0] contiguously wide with the entire phalloid apophysis; [1] slightly sharpen
97. General width of membranous lobe of left dorsal phallomere: [0] wide; [1] slender
98. Form of left portion of posterior margin of dorsal lamina of left dorsal phallomere: [0] projected, expanded, uniformly curved; [1] projected, distinctly bent; [2] projected, narrow, uniformly curved; [3] not projected, uniformly curved
99. Size of apical process (titillator) of left dorsal phallomere: [0] large; [1] small

Appendix 2

Label data of the specimens of the outgroup in cladistic analyses.

Anamiopteryx sp.: **BRAZIL**, Espírito Santo, Pinheiros, Reserva Biológica Córrego do Veado, Água Limpa, 27.XI-06.XII.2011, Malaise, MTTavares, *et al. leg.*

Chloromiopteryx sp.: **BRAZIL**, Espírito Santo, Santa Teresa, Estação Biológica Santa Lúcia, 17-23.IV.2011, DBarbosa *leg.*

Eumusonia sp.: **BRAZIL**, Espírito Santo, Pinheiros, Reserva Biológica Córrego do Veado, 09.VI.2011, LAVianna *leg.*

Appendix 3

DELTA characters file used to generate the morphological descriptions.

- #1. Frontal sclerite longitudinally/
 - 1. very short/
 - 2. moderately short/
- #2. <Frontal sclerite> upper edge/
 - 1. uniformly convex/
 - 2. <bent>/
- #3. Small tubercle between each compound eye and toruli <prominence>/
 - 1. in form of slightly pointed crest/
 - 2. not pointed, represented by low cuticle elevation/
 - 3. indistinct/
- #4. Ocelli <size>/
 - 1. markedly large/
 - 2. medium-sized/
 - 3. slightly small/
 - 4. vestigial/
- #5. <Ocelli proximity>/
 - 1. regularly distant from each other/
 - 2. close to each other/
 - 3. slightly close to each other/
 - 4. very close to each other/
- #6. Central ocellus <height>/
 - 1. about as elevated as lateral ocellus/
 - 2. distinctly more elevated than lateral ocellus by low tubercle/
- #7. Lateral ocellus <form>/
 - 1. rounded/
 - 2. distinctly elliptical/
- #8. Vertex <overall shape>/
 - 1. markedly convex/
 - 2. slightly convex/
 - 3. somewhat straight/
 - 4. laterally convex, centrally slightly concave/
- #9. <Vertex general elevation>/
 - 1. inconspicuously or not higher than imaginary line joining apex of eyes/
 - 2. distinctly higher than imaginary line joining apex of eyes/
- #10. <Vertex> with region between parietal suture and eye <angulation>/
 - 1. not elevated towards parietal suture/

- 2. more elevated towards parietal suture/
- #11. <Vertex region between parietal suture and eye, dilatation>/
 - 1. nearly straight/
 - 2. slightly convex/
 - 3. markedly convex, forming distinct, low bulge (juxtaocular bulge)/
- #12. Parietal suture <depth>/
 - 1. faintly marked/
 - 2. regularly marked/
- #13. Vertex region between parietal sutures laterally/
 - 1. abruptly elevated next parietal suture/
 - 2. gradually elevated next parietal suture/
- #14. <Vertex region between parietal suture> centrally/
 - 1. following lateral part overall outline/
 - 2. slightly concave/
- #15. With <pilosity length>/
 - 1. very long pilosity/
 - 2. moderately long pilosity/
 - 3. short pilosity/
- #16. Supracoxal dilatation/
 - 1. markedly pronounced/
 - 2. regularly sized/
 - 3. slightly pronounced/
 - 4. very faintly pronounced /
- #17. <Pronotum> margin/
 - 1. without denticulation/
 - 2. with distinct denticulation along entire lateral margin, more pronounced posteriorly/
- #18. Forecoxa <relative length>/
 - 1. slightly longer than metazone/
 - 2. markedly longer than metazone/
- #19. <Forecoxa> anterior edge/
 - 1. with denticulation inconspicuous/
 - 2. with median very faint denticulation/
- #20. Forefemur internal spine 6 with shape and size <relative size>/
 - 1. more similar to spines 2 and 4 than the spine 5/
 - 2. more similar to spine 5 than spines 2 and 4/
- #21. <Forefemur> distance between internal spines 12 and 11/
 - 1. distinctly longer than distance between spines 10 and 11/
 - 2. about same distance between spines 10 and 11 or slightly shorter/
- #22. <Forefemur> internal spine 12 <relative size>/
 - 1. distinctly shorter than spine 10/

2. about same size of spine 10/
- #23. Foretibia external spine 1 away from spine 2 by space equivalent to/
1. two spines/
 2. one spine/
- #24. <Foretibia> external spine 2 <size>/
1. about same size of spine 3/
 2. slightly longer than spine 3/
- #25. <Foretibia number of internal spines> with/
1. 0 internal spines/
 2. 6 internal spines/
 3. 9 internal spines/
 4. 10 internal spines/
 5. 11 internal spines/
 6. 13 internal spines/
- #26. Forewing <relative length>/
1. about same length than hindwing/
 2. slightly shorter than hindwing/
 3. much shorter than hindwing/
- #27. <Forewing> vein M1 <number of branches>/
1. not branched/
 2. branched/
- #28. <Forewing> vein CuA1 branches <form>/
1. nearly straight/
 2. slightly sinuous/
 3. markedly sinuous/
- #29. Hindwing apical angle <between imaginary line tangent to the costal border and imaginary line tangent to apical border>/
1. very acute/
 2. moderately acute/
 3. slightly acute/
- #30. <Hindwing> vein CuA1 <branches>/
1. branched/
 2. not branched/
- #31. <Hindwing> apex <length>/
1. abruptly interrupted/
 2. slightly short/
 3. slightly long/
- #32. <Hindwing apex shape>/
1. rounded/
 2. slightly pointed/

- 3. markedly pointed/
- #33. Supranal plate <length>/
 - 1. very short/
 - 2. slightly elongate, not overlaying ovipositor/
- #34. <Supranal plate shape>/
 - 1. subrounded, faintly pointed/
 - 2. rounded/
- #35. Ventral phallomere distal process <size>/
 - 1. short/
 - 2. slightly long/
 - 3. very long/
- #36. <Ventral phallomere distal process> with most marked sclerotization taking/
 - 1. the entire process/
 - 2. at least half the area of the process/
 - 3. only the process tip/
- #37. <Ventral phallomere distal process> denticulation/
 - 1. markedly present/
 - 2. faintly present/
 - 3. absent/
- #38. <Ventral phallomere distal process> tip/
 - 1. wide, rounded/
 - 2. slender but rounded/
 - 3. pointed/
- #39. <Ventral phallomere distal process> basal swelling/
 - 1. absent/
 - 2. present/
- #40. <Ventral phallomere> proximal process <sclerotization intensity>/
 - 1. faintly sclerotized/
 - 2. markedly sclerotized/
- #41. <Ventral phallomere proximal process length>/
 - 1. only slightly projected/
 - 2. markedly projected/
- #42. <Ventral phallomere proximal process projection>/
 - 1. short/
 - 2. long/
- #43. <Ventral phallomere proximal process overall curvature>/
 - 1. somewhat straight/
 - 2. curved/
- #44. <Ventral phallomere proximal process overall direction>/
 - 1. turned diagonally backwards to lateral portion/

- 2. distinctly turned backwards/
 - 3. turned diagonally backwards to central portion/
- #45. <Ventral phallomere proximal process> with basal portion/
- 1. slender/
 - 2. slightly wide/
 - 3. very wide/
- #46. <Ventral phallomere proximal process> apex/
- 1. rounded/
 - 2. with slightly long, slender point/
 - 3. with short, robust point/
- #47. <Ventral phallomere proximal process apex width>/
- 1. slightly slender than base/
 - 2. distinctly slender than base/
- #48. Slit between posterior margin of ventral phallomere and proximal process/
- 1. deep/
 - 2. shallow/
- #49. Left dorsal phallomere with anterior process <length>/
- 1. very long/
 - 2. slightly long/
 - 3. short/
- #50. <Left dorsal phallomere anterior process width>/
- 1. markedly large/
 - 2. moderately large/
 - 3. very slender/
- #51. <Left dorsal phallomere anterior process shape>/
- 1. markedly curved at about middle/
 - 2. slightly curved at base/
 - 3. straight/
- #52. <Left dorsal phallomere anterior process> oriented/
- 1. to left/
 - 2. forwards/
- #53. <Left dorsal phallomere anterior process> apex <width>/
- 1. about as wide as middle/
 - 2. distinctly wider than middle width/
- #54. <Left dorsal phallomere> expanded portion between anterior process and phalloid apophysis <length>/
- 1. long/
 - 2. short/
- #55. <Left dorsal phallomere expanded portion between anterior process and phalloid apophysis> oriented/
- 1. forwards/
 - 2. to left/

- #56. <Left dorsal phallomere> a well sclerotized area between phalloid apophysis and membranous lobe which is
 <presence>/
1. indistinct/
 2. evanescent/
 3. marked/
- #57. <Left dorsal phallomere well sclerotized area between phalloid apophysis and membranous lobe size>/
1. large, slender/
 2. large, wide/
 3. small, not reaching membranous lobe/
 4. small, reaching anterior area of membranous lobe/
- #58. <Left dorsal phallomere> phalloid apophysis <length>/
1. very short/
 2. regularly short/
 3. regularly long/
 4. very long/
- #59. <Left dorsal phallomere phalloid apophysis width>/
1. moderately stout/
 2. slender/
- #60. <Left dorsal phallomere phalloid apophysis> its basal portion projected to/
1. back/
 2. the left/
- #61. <Left dorsal phallomere phalloid apophysis apical portion>/
1. somewhat contiguously curved with entire phalloid apophysis/
 2. subapically slightly bent/
 3. subapically markedly bent/
- #62. <Left dorsal phallomere phalloid apophysis apical portion shape> apically/
1. concave/
 2. almost straight/
- #63. <Left dorsal phallomere phalloid apophysis apical portion sharpness>/
1. not sharp/
 2. slightly sharp/
- #64. <Left dorsal phallomere> membranous lobe <general width>/
1. wide/
 2. slender/
- #65. <Left dorsal phallomere> dorsal lamina posterior margin with left portion/
1. projected, expanded, uniformly curved/
 2. projected, distinctly bent/
 3. projected, narrow, uniformly curved/
 4. not projected, uniformly curved/

