There are about 3,523 species of mosquitoes (Culicidae) described throughout the world (HARBACH 2012). Mosquitoes have a worldwide distribution with at least 553 species present in the Neotropical region, of which 468 are recorded from Brazil (GAFFIGAN et al. 2012). Records of geographical distribution are essential to improve our knowledge of the systematics of mosquitoes, as well as the need for the correct identification of species in studies of biodiversity, ecology and vector incrimination. In general, the knowledge of the biodiversity of Culicidae is of public health interest, since it enables a better understanding of the dynamics of transmission of infectious agents and the role of mosquito species as vectors, facilitating the adoption of control measures.

Because of its extensive and complex geographical structure, the Amazon region has many remote areas, such as the basins of the Nhamundá and Abacaxis rivers, located north and south of the Amazon River along the eastern border of the Brazilian State of Amazonas, where the Culicidae fauna is unknown. Unfortunately, very little is known about the geographic distribution of mosquitoes in the State of Amazonas. CERQUEIRA (1961), in a pioneering work, using information gathered from the collections of the defunct Serviço Nacional de Febre Amarela (National Yellow Fever Service) and material collected by the Instituto Nacional de Pesquisas da Amazônia (National Institute of Amazonian Research), reported the presence of 148 species in 24 locations within the State of Amazonas. Later, several papers were published on the geographical distribution of Culicidae in the Amazon, using information gathered from bibliographical references and material from the Entomology Museum of the Centro de Pesquisas René Rachou (Fiocruz) (René Rachou Research Center), adding new locality records for the state, where the number of known species increased to 175 in 114 locations representing 61% of the state's municipalities (XAVIER & MATTOS 1976). Unfortunately, after XAVIER & MATTOS (1976), there has not been any new publication compiling and updating the distribution records of species which can be found in the Amazon region.
in more recent publications. Most of these new records of distribution are found in publications resulting from inventories (Barbosa et al. 2008, Hutchings et al. 2002, 2005, 2008, 2010, 2011, Suárez-Mutis et al. 2009) and as a result of the description of new species (Forattini & Sallum 1992, Sallum & Hutchings 2003, Sallum et al. 1997).

It should be noted that many of the published records are not results of collections made with the purpose of studying the entire mosquito community, but mainly had epidemiological objectives (Cerqueira 1961, Deane 1947). Therefore, any list of species prepared for a given location which is based on published records may be incomplete and/or biased. For example, after collecting 119 species in the Jau National Park, 25% (30 species) were new records for the State of Amazonas (Hutchings et al. 2005) and of 145 species collected north of Manaus (Hutchings et al. 2011), 16% (23 species) are also new records for the State of Amazonas, including seven new records for Brazil. Outside of being biased, the geographical distribution of published records is still unrepresentative given the low coverage of the municipalities. Although the coverage includes 61% of the municipalities within the State of Amazonas, the sampled area of each municipality is still very small.

It is important to consider that an increase in the knowledge of the mosquito fauna of the Amazon region will permit us to obtain basic information of the faunal diversity, distribution and variety of ecosystems where mosquitoes occur, thus providing basic knowledge for studies on the control of diseases which affect humans and animals, whose infectious agents are transmitted by mosquitoes. In this work, we present the first results of mosquito collections from remote regions located near the political boundaries of the State of Amazonas, as part of the project “Amazonas: Diversidade de insetos ao longo de suas fronteiras” of the Programa de Apoio a Núcleos de Excelência (FAPEAM-CNPq).

Therefore, with the objective of serving as a base inventory for future surveys of Culicidae from the Amazon, the mosquito species collected inside the riparian and terra firme forests along the basins of the Nhamundá and Abacaxis rivers, Amazonas, Brazil, are reported herein.

MATERIAL AND METHODS

A mosquito inventory, conducted during a river expedition in areas near the eastern border of the State of Amazonas, Brazil (Fig. 1), includes collections of mosquitoes from seven different localities: two localities along the Nhamundá River, Municipality of Nhamundá (between 01°35’S, 057°37’W and 01°53’S, 057°03’W); and five localities along the Abacaxis River, including the Municipalities of Maués, Borba and Nova Olinda do Norte (between 05°15’S, 058°41’W and 04°28’S, 058°33’W). These localities are characterized by having most of their area covered by dense upland (terra firme) ombrophilous forests with low plateaus, together with riparian rain forests having dense alluvial and lowland vegetation (Floresta Ombrófila Densa Aluvial e de Terras Baixas) along the rivers, intermixed with areas of transition including Amazonian white sand (campinarana) and floodplain (varzea) forests. The tropical rainforest climate is warm and wet, characterized by being constantly humid, with temperature and precipitation with little annual variation. Based on climatic data from Parintins and Maués (RADAMBRASIL 1976), the

Figure 1. Localities sampled along the Nhamundá and Abacaxis Rivers, State of Amazonas, Brazil (The stars indicate the collecting locations described in Table I).
region has an annual relative humidity of 86% and a mean annual temperature of 26°C. A shorter dry season occurs from July to November with the lowest monthly precipitation being less than 50 mm along the Nhamundá River and over 150 mm along the Abacaxis River. The rainy season occurs between December and June, with the maximum precipitation in April. For the Nhamundá basin the mean annual precipitation is 1,750 mm, while the Abacaxis basin is greater than 2,750 mm.

Located in the far eastern region of the State of Amazonas, there are many difficulties in accessing the collection locations because of the long distance from urban centers. The most remote locality surveyed along the Nhamundá River is 240 km from Parintins and 630 km from Manaus, while the localities along the Abacaxis River are 360 km from Maués and 530 km from Manaus. The region, with a very low demographic density, only has small settlements which occupy marginal areas along the rivers. The main means of transport is by boat.

Mosquitoes specimens were mostly collected inside the riparian forest along existing and/or newly created trails, perpendicular to the river banks, and within continuous upland terra firme forest using a variety of capture methods including: CDC traps with different types of lighting (incandescent lamp (CDC) or ultraviolet fluorescent tube (UV CDC)); flight intercept traps (Malaise, Shannon, Suspended); and sweeping with nets. The CDC traps were installed every 50 m along trails, placed at 1, 10, 15 or 20 m above the ground, and were activated at dusk for a period of 12 hours, between 18:00 and 06:00 h. The Shannon traps, placed within small open understory areas, using an internal light source for attraction and a portable battery powered aspirator for capturing specimens, were used between 18:00 and 21:00 h. The 6 m long Malaise flight intercept traps, also placed within small open understory areas, were used for periods of up to three days and the Suspended flight intercept traps were hung one meter above the water level, along river margins, or at tree canopy level, also for periods of up to three days. Each sweeping collection, using entomological nets, was performed during a minimum of two hours at each location. Immature mosquitoes were collected from breeding sites found along trails, in the same areas where adults were captured. The immature mosquitoes were reared for the purpose of obtaining adult males and females, associated with larval and pupal exuviae. These reared specimens were mostly used to obtain a more accurate identification of adult female specimens captured using other methods.

Adult and immature mosquitoes were captured, preserved and mounted following techniques detailed by B ELMING et al. (1967). Specimens were identified in the laboratories at INPA in Manaus, and were confirmed at the Laboratório de Sistemática e Ecologia de Culicídeos (LASEC), of the Faculdade de Saúde Pública (FSP/USP), in São Paulo and in the Laboratório de Transmissores de Hematozóários of the Instituto Oswaldo Cruz (IOC), in Rio de Janeiro, using the identification keys in LANE (1953a, b), FORATTINI (1965a, b, 2002), ZAVORTINK (1972, 1979), ARNELL (1973), VALENCIA (1973), BERLIN & BELMING (1980), SALLUM & FORATTINI (1996), as well as the PECOR et al. (1992) catalog for Culex (Melanoconion). Whenever possible, anatomical characteristics of the male genitalia were examined to confirm the identifications of both females and males. The collected material will be deposited in the Coleção de Invertebrados of the Instituto Nacional de Pesquisas da Amazônia (INPA-Manaus), in the Coleção Entomológica of Referência of the Faculdade de Saúde Pública, Universidade de São Paulo (FSP/USP) and in the Coleção de Culicídeos of the Instituto Oswaldo Cruz (IOC). The collection and specimen data was digitized, stored, archived and organized using the relational database structure provided by the Biota software version 2.04 (COLWELL 2012).

RESULTS

A total of 206 collections distributed in seven locations along the Nhamundá and Abacaxis Rivers, in the State of Amazonas, from May 14 to June 6, 2008, resulted in the capture of over 5,000 mosquitoes (Table I). Each collection corresponds to the capture yield of a trap (i.e. CDC, CDC UV, Shannon, Malaise, and Suspended) or method (i.e. sweeping, trapping, etc.). The specimens were identified in the laboratories at INPA-Manaus, and were confirmed at the Laboratório de Sistemática e Ecologia de Culicídeos (LASEC), of the Faculdade de Saúde Pública, Universidade de São Paulo (FSP/USP) and in the Laboratório de Transmissores de Hematozóários of the Instituto Oswaldo Cruz (IOC), in Rio de Janeiro, using the identification keys in LANE (1953a, b), FORATTINI (1965a, b, 2002), ZAVORTINK (1972, 1979), ARNELL (1973), VALENCIA (1973), BERLIN & BELMING (1980), SALLUM & FORATTINI (1996), as well as the PECOR et al. (1992) catalog for Culex (Melanoconion). Whenever possible, anatomical characteristics of the male genitalia were examined to confirm the identifications of both females and males. The collected material will be deposited in the Coleção de Invertebrados of the Instituto Nacional de Pesquisas da Amazônia (INPA-Manaus), in the Coleção Entomológica of Referência of the Faculdade de Saúde Pública, Universidade de São Paulo (FSP/USP) and in the Coleção de Culicídeos of the Instituto Oswaldo Cruz (IOC).

Table I. Collections of mosquitoes distributed in seven localities along the Nhamundá and Abacaxis Rivers in the State of Amazonas, Brazil.

| Locality | Locality name* | Municipality | Coordinates | Number of collections | Number of specimens |
|----------|----------------|--------------|-------------|----------------------|---------------------|
| ProN-001 | Area, Igarape do Area (LM), Rio Nhamundá (RM) | Nhamundá | 01°35'22"S, 57°37'06"W | 55 | 674 |
| ProN-002 | Cuipiranga, Lago do Aburi, Rio Nhamundá (RM) | Nhamundá | 01°53'42"S, 57°03'25"W | 43 | 259 |
| ProN-004 | Picada Pirarara, Rio Abacaxis (RM) | Maués | 05°15'09"S, 58°41'52"W | 26 | 512 |
| ProN-005 | Picada Borba, Rio Abacaxis (LM) | Borba | 05°13'19"S, 58°41'22"W | 20 | 659 |
| ProN-006 | Pacamiri, Rio Abacaxis (RM) | Maués | 04°35'49"S, 58°13'14"W | 29 | 1,118 |
| ProN-007 | Paxiuba, Rio Abacaxis (LM) | Borba | 04°29'00"S, 58°34'14"W | 32 | 2,044 |
| ProN-008 | Paxiuba, Rio Abacaxis (RM) | Nova Olinda do Norte | 04°28'36"S, 58°33'46"W | 1 | 24 |

Total | 206 | 5,290 |

* (LM) left margin of the basin; (RM) right margin of the basin.
immature rearing) (Table II). The CDC traps were used during 1,200 trap-hours and the CDC UV during 744 trap-hours. The Shannon traps were used in eight collections, totaling 28 trap-hours. The 6m Malaise flight intercept traps were used during 15 trap-days and the Suspended traps during nine trap-days. The net sweeping collections were done during 40 hours. A total of eight immature collections were performed in different habitats: Bromeliaceae leaf axils (three samples); lakes and streams (3); in a tree hole; and in a Bertholletia pixidium. More specific information on the sampling effort for each locality is presented in Table II.

Of the 5,290 specimens captured, 5,231 were identified and are distributed in 16 genera, representing 118 different taxa (among species and morphospecies) (Appendix 1). The morphospecies (identified as near F#) are similar to a known species, but it is believed that some may represent undescribed new taxa. Some identification could not be exact because of the absence of males, whose genitalia usually possess anatomical features that allow the specific diagnosis. These individuals were identified as morphotypes, indicating the species to which they are most similar.

Unfortunately, among the mounted, sorted and examined material, it was not possible to identify 1,815 specimens (34%) to the species level for several reasons: either there are no known characters to separate female individuals of different species or the characters used to separate these species were damaged. For some of these individuals it was only possible to identify to genus level because the characters which are used for identification are damaged and/or lost, and the rest of the collected material was recognized to subgeneric or informal taxonomic group (sections or groups) level (shown with the prefix “gr.”, “sG.” or “sec.” or the suffix “sp.” in Appendix 1). Most of the individuals that could not be identified to species level are females (1790 H“98%) and belong to the genus Culex (91%) (Appendix 1). It is interesting to note that only 13% of the specimens collected in this inventory were males.

Culex presented the highest number of species (45 H“42%) and the largest number of individuals (4,653 H“89%). The genus Anopheles, which represents 3% of the total sample (166 specimens), had the second highest number of species (13 H“12%), followed by Wyeomyia with 11 species (H“10%), and less than 1% of individuals. Psorophora and Aedes, respectively with 9 and 8 species each (H“7%), represent the third largest (178 H“3%) and the fourth largest number of individuals (90 < 2%).

The most abundant species was Culex (Mel.) vaxus Dyar, 1920 (587 individuals collected, representing 17% of the material identified to species level) followed by Cx. (Mel.) eknomios Forattini & Sallum, 1992, Cx. (Cux.) mollis Dyar & Knab, 1906, Cx. (Mel.) theobaldi Lutz, 1904, and Cx. (Cux.) declarator Dyar & Knab, 1906 (with 481, 456, 415 and 255 individuals, respectively). The five most abundant species (<5% of the recorded species) represent 66% of specimens identified to the species level.

Table II. Method of capture, sampling effort and number of mosquitoes collected along the Nhamundá and Abacaxis Rivers in the State of Amazonas, Brazil.

| Method of capture | Species/Method | Total number | Number of specimens | Sampling effort |
|-------------------|----------------|--------------|---------------------|----------------|
|                   | Exclusive number |              | Total | Nhamundá River | Abacaxis River |
| CDC trap          | 51             | 2,573        | 152   | 2,421          |
|                   | 7              | 100c:1,200h  | 44c:528h | 56c:672h      |
| CDC (UV) trap     | 62             | 1,777        | 299   | 1478           |
|                   | 12             | 62c:744h     | 34c:408h | 28c:336h     |
| Shannon Trap      | 31             | 406          | 155   | 251            |
|                   | 3              | 8c:28h       | 5c:17h | 3c:11h        |
| Net sweeping      | 51             | 376          | 219   | 157            |
|                   | 17             | 20c:40h      | 9c:18h | 11c:22h        |
| Malaise Trap      | 18             | 56           | 41    | 15             |
|                   | 4              | 5c:15d       | 3c:9d | 2c:6d          |
| Suspended Trap    | 18             | 69           | 48    | 21             |
|                   | 6              | 3c:6d        | 1c:3d | 2c:3d          |
| Immature collections | 9             | 33           | 19    | 14             |
|                   | 4              | 8c           | 2c    | 6c             |
| Total             | 118            | 5,290        | 933   | 4,357          |
|                   | 53             | 206c         | 98c   | 108c           |

The values in italics indicate the sampling effort for the method used: number of collections (#c); trap-hours (#h); or trap-days (#d).
Among the 110 species identified, there are eight new species distribution records for the State of Amazonas: Psorophora (Jan.) discruciens (Walker, 1856); Culex (And.) lateopilusus (Theobald, 1903); Culex (Mel.) rooti Rozeboom, 1935; Culex (Mel.) trigeminatus Clastrier, 1970; Culex (Mcx.) aurus Lane & Whitman, 1951; Onirion bruci (Del Ponte & Cerqueira, 1938); Wyomyia (Spi.) aningae Motta & Lourenço, 2005; and Wyomyia surinamensis Brujniij, 1959. There are also 203 specimens of at least nine morphospecies (marked as near F # in Appendix 1), of which five also represent new geographical records for the State of Amazonas. These morphospecies, which probably represent species not yet described, belong to three different genera. Aedes (Ochlerotatus) has a total of four species of two morphotypes: Ae. (Och.) near pectinatus F1 and Ae. (Och.) near sG Infirmatus F1. Culex (Melanocoron) has 196 specimens of six morphotypes: Cx. (Mel.) near creole F1, Cx. (Mel.) near easter F1, Cx. (Mel.) near silvai F1, Cx. (Mel.) near vaxus F1, Cx. (Mel.) near vaxus F3 and Cx. (Mel.) near venezuelensis F1. Wyomyia (Hystatomyia) has two specimens of one morphotype: Wy. (Hys.) near baltae F1. Among the nine morphotypes identified (Anopheles (Nys.) goeldi/dunhami, Anopheles (Nys.) konderi/oswaldoi, Anopheles (Ster.) nimbus/thomasi, Aedes (Och.) lastatus/oligopistus, Aedes (Och.) seratus/nubilus, Culex (Ad.) clastrieri/guyanensis, Culex (Car.) urichi/anduzei, Culex (Cux.) coronator/usquatus and Culex (Cux.) mollis/declarator) there are seven species (indicated in bold above) which could potentially also increase the number of species recorded within each sampled locality.

Together, the nocturnal collecting methods (CDC, CDC-UV and Shannon Traps) were responsible for 90% of the captured mosquitoes, of which the CDC traps (with a total combined sampling effort of 162 trap-nights) were responsible for more than 83%. Net sweeping accounted for 7%, followed by the Suspended and Malaise flight intercept traps, with 1.3% and 1% of the specimens, respectively (Table II). Both types of CDC traps together were responsible for collecting 62% (73) of the species level taxa, of which the CDC-UV trap alone collected 53% of the species level taxa. The adult specimens of Aedeomyia, Orthopodomyia and Uranotaenia were only collected at night (CDC, CDC-UV and Shannon), while Haemagogus was only collected during the day and Onirion was only registered by rearing larvae. The methods of capture for each taxon can be seen in the final columns of Appendix 1. Net sweeping, and the CDC type traps combined, were responsible for the highest number of species which were only and exclusively collected with a specific method of capture, although every method did collect exclusive species (see details in Table II). The diurnal mosquitoes are not equally represented in this inventory, compared to the nocturnal mosquitoes because the sampling effort was greater for the nocturnal collecting methods.

Of the 118 different species level taxa identified during this inventory, 48 (41%) were collected in both river basins, while 29 species (24%) were found only along the Nhamundá River and 41 species (35%) were only found along the Abacaxis River (Appendix 1). The results of the mosquito inventory for each separate river basin are presented below.

Nhamundá River

The inventory along the Nhamundá river basin, sampled from May 16 to 19, includes specimens from 98 collections in two localities (Table I), resulting in 933 mosquitoes from 15 genera, representing 77 different taxa identified to species level (between species and morphospecies) (Appendix 1). It was not possible to identify 256 specimens (H" 27%) to the species level for the reasons previously discussed. For this basin, the sampling effort included 528 CDC trap-hours, 408 CDC (UV) trap-hours, 17 Shannon trap-hours, 9 Malaise trap-days, 3 Suspended trap-days, 18 net sweeping hours and two immature collections (in a Bertholetia pixidium and a Bromeliaceae leaf axil) (Table II).

In the Nhamundá River basin, the genus Culex presented the highest number of species (26 H" 38%) and the largest number of individuals (712 H" 77%). The genus Wyomyia, which represents 4% of the total sample (34 specimens), had the second highest number of species (11 H" 16%), followed by Psorophora with only seven species represents the second largest number of species (71 H" 8%). Anopheles had 6 species (H" 9%), and less than 4% of the individuals, while Aedes with five species had the third largest number of individuals (45 < 5%). The most abundant taxon was the morphospecies Culex (Mel.) near vaxus F3 (142 individuals collected, representing 23% of the specimens identified to species level) followed by Cx. (Mel.) vaxus Dyar, 1920, Cx. (Mel.) bequaerti Dyar & Shannon, 1925, Psorophora (Jan.) ferox (Humboldt, 1819), and Cx. (Cux.) mollis Dyar & Knab, 1906 (with 122, 64, 38 and 29 individuals, respectively). The five most abundant species (<7% of the recorded species) represent 64% of specimens identified to the species level.

Among the 70 species, collected along the Nhamundá River, there are six new species distribution records for the state of Amazonas. There are also 159 specimens of at least seven morphospecies (9% of the species level taxa), of which four represent new geographical records for the State of Amazonas. These morphospecies, which probably represent species not yet described, belong to three different genera: Ae. (Och.) near sG Infirmatus F1, Cx. (Mel.) near creole F1, Cx. (Mel.) near silvai F1, Cx. (Mel.) near vaxus F1, Cx. (Mel.) near venezuelensis F1 and Wy. (Hys.) near baltae F1.

Abacaxis River

The inventory along the Abacaxis river basin, sampled from May 26 to June 4, includes specimens from 108 collections in five localities (Table I), resulting in 4,357 mosquitoes, from 15 genera, representing 89 different taxa identified to species level (including species and morphospecies) (Appendix 1). It was not possible to identify 1588 specimens (H" 36%) to the species level for the reasons previously discussed. For this basin, the sampling effort included 672 CDC trap-hours, 336
 CDC (UV) trap-hours, 11 Shannon trap-hours, six Malaise trap-days, three Suspended trap-days, 22 net sweeping hours and six immature collections (in lakes and streams (three samples), in two Bromeliaceae leaf axils, and in a tree hole (Table II). In the Abacaxis River basin, Culex presented the highest number of species (37 H° 44%) and the largest number of individuals (3,941 H° 92%). Anopheles, which represents 3% of the total sample (136 specimens), had the second highest number of species (13 H° 15%), followed by Psorophora and Aedes with six species (H° 7%) each, representing the third largest (107 H° 3%) and the fourth largest number of individuals (45 = 1%). The most abundant species was Cx. (Mel.) ekonomios Forattini & Sallum, 1992 (479 individuals collected, representing 18% of the material identified to species level) followed by Culex (Mel.) vaxus Dyar, 1920, Cx. (Cax.) mollis Dyar & Knab, 1906, Cx. (Mel.) theobaldi Lutz, 1904, and Cx. (Cax.) declarator Dyar & Knab, 1906 (with 465, 427, 392 and 245 individuals, respectively). The five most abundant species (<6% of the recorded species) represent 74% of specimens identified to the species level.

Among the 84 species, collected along the Abacaxis River, there are three new species distribution records for the State of Amazonas. There are also 43 specimens of at least five species collected, north of Manaus, 16% (23 species) were new records resulting from the different methods of capture and sampling efforts of this inventory (Table II), future mosquito surveys should give priority to the use of CDC type traps and net sweeping in order to maximize collecting results, when time and field resources are limited. Additionally, there are three new species distribution records for the State of Amazonas. There are also 43 specimens of at least five species collected, north of Manaus, 16% (23 species) were new records resulting from the different methods of capture and sampling efforts of this inventory (Table II), future mosquito surveys should give priority to the use of CDC type traps and net sweeping in order to maximize collecting results, when time and field resources are limited. This mosquito inventory is part of a larger entomological inventory of different locations within remote and sparsely populated areas near the border regions of the State of Amazonas which also resulted in the collection of a large number of other insects, including Lepidoptera (Casagrande et al. 2012). The information presented here represents the largest standardized mosquito inventory ever executed, within the Nhamundá and Abacaxis river basins, with the identification of epizootic and enzootic cycles of the Mucambo virus. Cx. spissipes is a potential vector of the Bimiti, Caraparu, Oroiba and Itaqui viruses, of the Bunyaviridae family and of the VEEV III-B subtype (Shope et al. 1988, Walton & Grayson 1988).

DISCUSSION

Among the 118 species level taxa collected in this inventory, there are 13 (11%) new geographical distribution records for the State of Amazonas. Other mosquito surveys from upland terra firme sites have similar results: of the 145 species collected, north of Manaus, 16% (23 species) were new records collected in the Jau National Park (Hutchings et al. 2005) and in the Juami-Japura Ecological Station (Hutchings et al. 2010), while only one An. (Nys.) darlingi specimen (≤0.4%) was found in areas north of Manaus (Hutchings et al. 2011). In contrast, An. (Nys.) darlingi can be the most prevalent species inside deforested areas of the Amazon region (Castro et al. 2006), whereas species of An. (Nys.) albitarsis complex can become more frequent depending on the land use (Conn et al. 2002).

Furthermore, there are Culex species which are potential vectors of arboviruses. For example, Cx. gnomatus, the second most common Culex species in these samples, is highly susceptible to infection by enzootic (ID and IE) and epizootic strains (IAB and IC) of the Venezuelan Equine Encephalitis Virus (VEEV) (Turrell et al. 2000). It is worth mentioning that Cx. pedroi, also a common species in these collections, is considered a potential enzootic vector of the Eastern Equine Encephalitis Virus (EEEV), in Brazil, as well as of the VEEV and other arboviruses (Galindo & Srihongse 1967, Galindo et al. 1966, Srihongse & Galindo 1967). Moreover, it is interesting to note that Atkinson (1972) observed that Cx. portesi may be involved in the transmission of enzootic and epizootic transmission cycles of the Mucambo virus. Cx. spissipes is a potential vector of the Bimiti, Caraparu, Oroiba and Itaqui viruses, of the Bunyaviridae family and of the VEEV III-B subtype (Shope et al. 1988, Walton & Grayson 1988).

Considering the number of specimens and/or species resulting from the different methods of capture and sampling efforts of this inventory (Table II), future mosquito surveys should give priority to the use of CDC type traps and net sweeping in order to maximize collecting results, when time and field resources are limited.

This mosquito inventory is part of a larger entomological inventory of different locations within remote and sparsely populated areas near the border regions of the State of Amazonas which also resulted in the collection of a large number of other insects, including Lepidoptera (Casagrande et al. 2012). The information presented here represents the largest standardized mosquito inventory ever executed, within the Nhamundá and Abacaxis river basins, with the identification...
of 118 taxa distributed in seven different locations within four different counties (Nhamundá, Maués, Borba, Nova Olinda do Norte), of which few or no geographical records have been previously published.

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Appendix 1. Mosquito species collected along the Nhamundá and Abacaxis Rivers, Amazonas, Brazil.

| Taxa | Number a | River | Sex b | Method of Capture c |
|------|----------|-------|-------|---------------------|
|      |          | Nhamundá | Abacaxis | CDC | CDC-UV | Shannon | Sweeping | Malaise | Suspens | Immature |
| Anophelinae | | | | | | | | | | |
| Anopheles | | | | | | | | | |
| (Anopheles) | | | | | | | | | |
|       | | | | | | | | | |
|     eiseni Coquillett, 1902 | 1 | 1 | F | | | | | | |
|     forattini Wilkerson & Sallum, 1999 | 21 | 2 | 19 | 20F+Mgen | 3 | 5 | 13 | | | |
|     mappatoiensis Lutz & Neiva, 1911 | 2 | 2 | F | | | | 1 | 1 | | |
|     pervyssii Dyar & Knab, 1908 | 1 | 1 | F | | | | | | X |
|     shannoni Davis, 1931 | 5 | 1 | 4 | F | 2 | 1 | 2 | | | |
|     (Anopheles) sp. | 7 | 7 | F | | | | | | | |
|     (Nyssorhynchus) | | | | | | | | | |
|       goeldii Rozeboom & Gabaldon, 1941 | 1 | 1 | Mgen | | | | | X |
|       kondi s.l. | 7 | 7 | F | | | | 4 | 3 | | |
|       oswaldoi s.l. | 26 | 2 | 24 | F | 5 | 19 | 2 | | | |
|       triannulatus (Neiva & Pinto, 1922) | 2 | 1 | 1 | Mgen+F | 1 | 1 | | | | |
|       goeldii / dunhami | 3 | 2 | 1 | F | | | | | | |
|       kondi / oswaldoi | 1 | 1 | Fdam | | | | | | | |
|       (Nyssorhynchus) sec. Albimanus | 1 | 1 | Fdam | | | | | | | |
|       (Nyssorhynchus) sp. | 27 | 27 | Fdam | | | | | | | |
|     (Stethomyia) | | | | | | | | | |
|       canori Floc & Abonnenc, 1945 | 2 | 2 | Mgen | 1 | 1 | | | | |
|       kompi Edwards, 1930 | 8 | 1 | 7 | F | 5 | 1 | 2 | | | |
|       nimbus (Theobald, 1902) | 10 | 4 | 6 | 9Mgen+F | 7 | 2 | 1 | | | |
|       thomasi Shannon, 1933 | 2 | 2 | Mgen | X | | | | | | |
|       nimbus / thomasi | 33 | 15 | 18 | F | | | | | | |
| Anopheles sp. | 6 | 2 | 4 | Fdam+2Mdam | | | | | | |
| Total Anopheles | 166 | 30 | 136 | | | | | | | |
| Culicidae | | | | | | | | | |
| Aedeomyiini | | | | | | | | | |
| Aedeomyia | | | | | | | | | |
|     (Aedeomyia) | | | | | | | | | |
|     squamipennis (Lynch Arribalzaga, 1878) | 6 | 1 | 5 | F | 5 | | 1 | | | |
| Total Aedeomyia | 6 | 1 | 5 | | | | | | | |
| Aedini | | | | | | | | | |
| Haemagogus | | | | | | | | | |
|     (Haemagogus) | | | | | | | | | |
|     baresi Cerqueira, 1960 | 2 | 2 | F | | | | | X | | |
|     janthinomys Dyar, 1921 | 1 | 1 | Mgen | X | | | | | | |
| Haemagogus sp. | 1 | 1 | Fdam | | | | | | | |
| Total Haemagogus | 4 | 1 | 3 | | | | | | | |
| Aedes | | | | | | | | | |
|     (Howardina) | | | | | | | | | |
|     arborealis Bonne-Wepster & Bonne, 1919 | 1 | 1 | F | | | | | X | | |
|     fulvithorax (Lutz, 1904) | 1 | 1 | F | | | | | | X | | |

Continues
### Appendix 1. Continued.

| Taxa                        | Number | River       | Sex | Method of Capture |
|-----------------------------|--------|-------------|-----|-------------------|
|                             |        | Nhamundá    | Abacaxis |                  |
| *(Ochlerotatus)*             |        |             |       |                   |
| *fulvus* (Wiedemann, 1828)  | 17     | 12          | 5     | Mgen+16F          |
| *olgopistus* Dyar, 1918     | 1      | 1           | F     | X                 |
| *rhacophilus* (Costa Lima, 1933) | 15  | 2           | 13    | 14F+Mgen          |
| *scapularis* (Theobald, 1901) | 5    | 5           | F     | 1 4               |
| *near pectinatus* F1*       | 3      | 3           | Mgen  | 1 3               |
| *near sG* Infirmatus F1*    | 1      | 1           | Mgen  | X                 |
| *hastatus* / *olgopistus* *| 1      | 1           | Fdam  |                   |
| *serratus* / *nubilus* *    | 10     | 5           | 5     | Fdam              |
| *(Ochlerotatus)* sG *Infirmatus* | 25  | 16          | 9     | F                 |
| *(Ochlerotatus)* sp.         | 2      | 2           | Fdam  |                   |
| *(Protomacleaya)*            |        |             |       |                   |
| *argyrothorax* Bonne-Wepster & Bonne, 1919 | 2  | 2           | Mgen+F| X                 |
| *Aedes* sp.                  | 1      | 1           | Fdam  |                   |
| **Total Aedes**              | 90     | 45          | 45    |                   |
| *(Psorophora)*              |        |             |       |                   |
| *(Grabhamia)*               |        |             |       |                   |
| *dimidiata* Cerqueira, 1943 | 3      | 3           | F     | 1 1 1             |
| *(Janthininosoma)*          |        |             |       |                   |
| *albigenu* (Peryassú, 1908) | 35     | 3           | 32    | F                 |
| *albipes* (Theobald, 1907)  | 13     | 5           | 8     | 47F+2Mgen         |
| *amazonica* Cerqueira, 1960 | 49     | 10          | 39    | 8 10 1 30         |
| *circumflava* Cerqueira, 1943 | 1  | 1           | F     | X                 |
| *discrucians* (Walker, 1856) * | 2  | 2           | Mgen  | X                 |
| *ferox* (Humboldt, 1819)    | 44     | 38          | 6     | 3SMgen+9F         |
| *(Psorophora)*              |        |             |       |                   |
| *ciliata* (Fabricius, 1794) | 1      | 1           | F     | X                 |
| *cilipes* (Fabricius, 1805) | 1      | 1           | Mgen  | X                 |
| **Psorophora sp.**          | 29     | 9           | 20    | 28Fdam+Mdam       |
| **Total Psorophora**         | 178    | 71          | 107   |                   |
| *(Culicini)*                |        |             |       |                   |
| *(Culex)*                   |        |             |       |                   |
| *(Aedinius)*                |        |             |       |                   |
| *accelerans* Root, 1927     | 2      | 1           | 1     | F                 |
| *amazonensis* Lutz, 1905    | 5      | 2           | 3     | F                 |
| *guayanensis* Clastrier, 1970 | 1  | 1           | F     | X                 |
| *clastrieri* / *guayanensis* * | 4  | 1           | 3     | F                 |
| *(Aedinius)* sp.            | 3      | 3           | Fdam  |                   |
| *(Anoedioiorpa)*            |        |             |       |                   |
| *luteopleurus* (Theobald, 1903) * | 1  | 1           | F     | X                 |
| *originator* Gordon & Evans, 1922 | 2  | 2           | Mgen+F| X                 |
| *(Anoedioiorpa)* sp.        | 10     | 1           | 9     | Fdam              |

Continues
### Appendix 1. Continued.

| Taxa | Number | River | Sex | Method of Capture |
|------|--------|-------|-----|------------------|
|      | Nhamundá | Abacaxis |     | CDC | CDC-UVC | Shannon | Sweeping | Malaise | Suspended | Immature |
| (Carrollia) | | | | | | | | | | |
| urichii (Coquillett, 1906) | 5 | 5 | 3F+2Mgen | X |
| urichii / anduzei | 2 | 2 | F | |
| (Carrollia) sp. | 1 | 1 | Fdam | |
| (Culex) | | | | | | | | | | |
| bidens Dyar, 1922 | 1 | 1 | F | X |
| chidesteri Dyar, 1921 | 2 | 2 | F | X |
| declarator Dyar & Knab, 1906 | 255 | 10 | 245 | 245F+Mgen | 163 | 82 | 10 |
| dolosus Lynch Arrabalza, 1891 | 1 | 1 | F | X |
| mollis Dyar & Knab, 1906 | 456 | 29 | 427 | 450F+6Mgen | 275 | 165 | 10 | 4 | 1 | 1 |
| usquattissimus Dyar, 1922 | 1 | 1 | Mgen | X |
| coronator / usquatus | 36 | 19 | 17 | F |
| mollis / declarator | 3 | 3 | Fdam | |
| (Culex) gr. Coronator | 17 | 17 | F | |
| (Culex) sp. | 245 | 8 | 237 | 243Fdam+2Mdam | |
| (Melanoconion) | | | | | | | | | | |
| adamesi Sirivanakarn & Galindo, 1980 | 2 | 2 | F | X |
| alogistus Dyar, 1918 | 3 | 3 | Mgen | 1 | 2 |
| bequaerti Dyar & Shannon, 1925 | 77 | 64 | 13 | 48F+29Mgen | 10 | 52 | 13 | 2 |
| brachiatus Hutchings & Sallum, 2008 | 1 | 1 | Mgen | X |
| caudatus Clastrier, 1970 | 8 | 8 | Mgen | 5 | 3 |
| caudelli (Dyar & Knab, 1906) | 24 | 22 | 2 | Mgen | 2 | 16 | 3 | 3 |
| clarki Evans, 1924 | 4 | 4 | F | 2 | 2 |
| comatus Sénévet & Abonnenc, 1939 | 1 | 1 | Mgen | X |
| coppenamensis Bonne-Wepster & Bonne, 1919 | 4 | 4 | Mgen | 1 | 3 |
| corentynensis Dyar, 1920 | 1 | 1 | Mgen | X |
| crybda Dyar, 1924 | 13 | 13 | F | 8 | 4 | 1 |
| dolichophylus Clastrier, 1970 | 3 | 1 | 2 | 2F+Mgen | 1 | 1 | 1 |
| eastor Dyar, 1920 | 4 | 4 | Mgen | 1 | 2 | 1 |
| eknomios Forattini & Sallum, 1992 | 481 | 2 | 479 | 468F+13Mgen | 309 | 154 | 4 | 14 |
| fairchilii Galindo & Blanton, 1954 | 9 | 3 | 6 | Mgen | 2 | 3 | 4 |
| foliater Komp & Rozeboom, 1951 | 1 | 1 | Mgen | X |
| gnomatos Sallum, Hutchings & Ferreira, 1997 | 124 | 124 | F | 82 | 40 | 1 | 1 |
| innovator Evans, 1924 | 3 | 3 | Mgen | 1 | 1 | 1 |
| johnsoni Galindo & Mendez, 1961 | 24 | 24 | 19Mgen+5F | 9 | 15 |
| pedro Sirivanakarn & Belkin, 1980 | 6 | 3 | 3 | 5F+Mgen | 2 | 3 | 1 |
| phyllados Hutchings & Sallum, 2008 | 15 | 5 | 10 | Mgen | 2 | 9 | 2 | 2 |
| pilosus (Dyar & Knab, 1906) | 5 | 4 | 1 | Mgen | 1 | 1 | 1 | 1 |
| portesi Senevet & Abonnenc, 1941 | 3 | 3 | Mgen | X |
| putumayensis Matherson, 1934 | 1 | 1 | Mgen | X |
| rooti Rozeboom, 1935 | 2 | 1 | 1 | Mgen | 1 | 1 |
| spissipes (Theobald, 1903) | 91 | 4 | 87 | 88F+3Mgen | 77 | 7 | 2 | 5 |
| symbiotos Sallum & Hutchings, 2003 | 5 | 1 | 4 | Mgen | 1 | 2 | 2 | Continues |
| Taxa                        | Number * | River         | Sex b | Method of Capture c |
|----------------------------|----------|---------------|-------|---------------------|
|                            |          | Nhamundá | Abacaxis | CDC | CDCUV | Shannon | Sweeping | Malaise | Suspended | Immature |
| *theobaldii* Lutz, 1904    | 415      | 23  | 392  | F  | 251 | 149 | 15 |
| *trigeminatus* Clastrier, 1970  | 1       | 1  | Mgen  | X  |     |     |     |
| *vaxus* Dyar, 1920         | 587      | 122 | 465  | 395F+192Mgen | 208 | 221 | 108 | 45 | 2 | 3 |
| near creole F1              | 4        | 4  | Mgen  | X  |     |     |     |
| near eastor F1              | 5        | 5  | Mgen  | 2  | 1 | 2 |
| near silvai F1              | 8        | 5  | 3  | Mgen  | 4  | 1 | 2 | 1 |
| near vaxus F1               | 19       | 3  | 16  | MgenN | 3  | 6  | 8 | 2 |
| near vaxus F3               | 158      | 142 | 16  | 138F+20Mgen | 24 | 56  | 24 | 52 | 2 |
| near venezuelensis F1*      | 2        | 2  | Mgen  | X  |     |     |     |
| *(Melanoconion)* sG Bastagarius | 3   | 3  | Mdam  |     |     |     |     |
| *(Melanoconion)* sG Caudelli | 3       | 3  | F    |     |     |     |     |
| *(Melanoconion)* sG Distinguendus | 1  | 1  | Mdam  |     |     |     |     |
| *(Melanoconion)* sG Pilusus  | 2        | 2  | F    |     |     |     |     |
| *(Melanoconion)* gr. Atratus | 9       | 1  | 8  | F    |     |     |     |     |
| *(Melanoconion)* gr. Educator | 34     | 15 | 19  | 33F+Mdam |     |     |     |     |
| *(Melanoconion)* gr. Pilusus  | 61       | 12 | 49  | 57F+Mdam |     |     |     |     |
| *(Melanoconion)* gr. Saramaccensis | 8 | 8  | F    |     |     |     |     |
| *(Melanoconion)* sec. Melanoconion | 119 | 3 | 116 | F    |     |     |     |     |
| *(Melanoconion)* sec. Spissipes | 2   | 2  | F+Mdam  |     |     |     |     |
| *(Melanoconion)* sp.        | 1160     | 166 | 994 | 1124Fdam+36Mdam |     |     |     |     |
| *(Microculex)* aurous Lane & Whitman, 1951 * | 1 | 1 | Mgen | X |     |     |     |
| *(Phenacomyia)* airozai Lane, 1945 | 67 | 67 | 66F+Mgen | 40 | 27 |     |     |
| *(Phenacomyia)* sp.         | 3        | 3  | Fdam  |     |     |     |     |
| *(Subg. incerto)* flochi Duret, 1969 | 11 | 8 | 3 | 9 Mgen+2F | 8  | 3  |     |
| Culex sp.                   | 2        | 2  | Fdam  |     |     |     |     |
| Total Culex                 | 4653     | 712 | 3941 |     |     |     |     |

**Mansonii**

Coquillettidia

*(Rychnotaenia)*

*arrabalzagae* (Theobald, 1903) | 2 | 1 | 1 | F | 1 | 1 |

*lynec* (Shannon, 1931) | 4 | 4 | 3F+M | 1 | 3 |

Coquillettidia sp. | 1 | 1 | F |     |

Total Coquillettidia | 7 | 6 | 1 |

**Mansonia**

*(Mansonia)* sp. | 1 | 1 | F |     |

Total Mansonia | 1 | 0 | 1 |

**Tribe Orthopodomyiini**

Orthopodomyia

*isiceps* (Coquillett, 1905) | 4 | 4 | 3F+Mgen | X |     |

Orthopodomyia sp. | 1 | 1 | Mdam |     |

Total Orthopodomyia | 5 | 1 | 4 |     |

Continues
### Appendix 1. Continued.

| Taxa                           | Number | River     | Sex | Method of Capture |
|-------------------------------|--------|-----------|-----|-------------------|
|                               |        | Nhamundá  | Abacaxis | CDC-UV | Shannon | Sweeping | Malaise | Suspended | Immature |
| **Limatus**                   |        |           |         |       |         |          |         |           |          |
| *durhami* Theobald, 1901      | 1      | 1         | F       |       |   X     |          |         |           |          |
| *flavisetosus* De Oliveira Castro, 1935 | 1      | 1         | F       |       |   X     |          |         |           |          |
| *pseudomethysticus* (Bonne-Wepster & Bonne, 1919) | 4      | 2         | 2       | F     | 1 2 1 |          |         |           |          |
| *Limatus* sp.                 | 3      | 3         | Fdam    |       |         |          |         |           |          |
| **Total Limatus**             | 9      | 6         | 3       |       |         |          |         |           |          |
| **Onirion**                   |        |           |         |       |         |          |         |           |          |
| *brucei* (Del Ponte & Cerqueira, 1938) & | 1      | 1         |         |       |   X     |          |         |           |          |
| **Total Onirion**             | 1      | 1         | 0       |       |         |          |         |           |          |
| **Sabethes**                  |        |           |         |       |         |          |         |           |          |
| *(Sabethes)*                  |        |           |         |       |         |          |         |           |          |
| *amazonicus* Gordon & Evans, 1922 | 2      | 1         | 1       | F     |       |          |         |           |          |
| *cyanus* (Fabricius, 1805)    | 1      | 1         |         | F     |         |          |         |           |          |
| *spixi* Cerqueira, 1961       | 4      | 2         | 2       | 3F+M  | 2 2   |          |         |           |          |
| *(Sabethoides)*               |        |           |         |       |         |          |         |           |          |
| *glaucooarnson* (Dyar & Shannon, 1925) | 4      | 2         | 2       | F     |       |          |         |           |          |
| *tridentatus* Cerqueira, 1961 | 3      | 2         | 1       | F     |         |          |         |           |          |
| *(Sabethoides)* sp.           | 5      | 2         | 3       | 4F+Mgen | 2 2   |          |         |           |          |
| *Sabethes* sp.                | 2      | 1         | 1       | Fdam  |       |          |         |           |          |
| **Total Sabethes**            | 21     | 11        | 10      |       |         |          |         |           |          |
| **Trichoprosopon**            |        |           |         |       |         |          |         |           |          |
| *digitatum* (Rondani, 1848)   | 8      | 2         | 6       | SF+3Mgen | 1 2 4 1 |          |         |           |          |
| *Trichoprosopon* sp.          | 1      | 1         | Fdam    |       |         |          |         |           |          |
| **Total Trichoprosopon**      | 9      | 2         | 7       |       |         |          |         |           |          |
| **Wyeomyia**                  |        |           |         |       |         |          |         |           |          |
| *(Cruzmyia)*                  |        |           |         |       |         |          |         |           |          |
| *kummi* Lane & Cerqueira, 1942| 1      | 1         |         | F     |         |          |         |           |          |
| *(Dendromyia)*                |        |           |         |       |         |          |         |           |          |
| *testei* Senevet & Abonnenc, 1939 | 2      | 2         |         | Mgen+F |       |          |         |           |          |
| *ypsipola* Dyar, 1922         | 1      | 1         |         | F     |         |          |         |           |          |
| *(Dodecamyia)*                |        |           |         |       |         |          |         |           |          |
| *aphobema* Dyar, 1918         | 3      | 3         |         | Mgen  | 1 2 4 1 |          |         |           |          |
| *(Exallomyia)*                |        |           |         |       |         |          |         |           |          |
| *tarsata* Lane & Cerqueira, 1942 | 7      | 6         | 1       | 6F+M  | 2 4 1  |          |         |           |          |
| *(Hystatonymia)*              |        |           |         |       |         |          |         |           |          |
| near baltae F1 a               | 2      | 2         | Mgen    | 1 1   |       |          |         |           |          |
| *(Hystatonymia)* sp.          | 2      | 1         | 1       | Mgen+F |       |          |         |           |          |
| *(Phoniomyia)*                |        |           |         |       |         |          |         |           |          |
| *splendidida* (Bonne-Wepster & Bonne, 1919) | 1      | 1         |         | Mgen  |       |          |         |           |          |
| *(Phoniomyia)* sp.            | 1      | 1         |         | F     |         |          |         |           |          |
| *(Spilonympha)*               |        |           |         |       |         |          |         |           |          |
| *aningae* Motta & Lourenço, 2005 a | 1      | 1         |         | F     |       |          |         |           |          |

*Continues*
### Appendix 1. Continued.

| Taxa                                      | Number a | River | Sex b | Method of Capture c |
|-------------------------------------------|----------|-------|-------|---------------------|
|                                           |          |       |       |                     |
| **(Subg. incerto)**                       |          |       |       |                     |
| *aporonoma* Dyar & Knab, 1906             | 5        | Nhamundá | 4 | 1 | F | 3 | 2 |  |
| *argenteorostris* Bonne-Wepster & Bonne, 1919 | 2        | Abacaxis | 1 | 1 | F | X |  |
| *flui* Bonne-Wepster & Bonne, 1919        | 2        |       | 1 | 1 | F | 1 | 1 |  |
| *surinamensis* Bruijning, 1959 e          | 1        |       | 1 | 1 | Mgen | X |  |
| *prox. moerbista*                         | 2        |       | 2 | 1 | F | 1 | 1 |  |
| *gr. Flui*                                | 1        |       | 1 | 1 | Mgen |  |  |
| *Wyomyia* sp.                            | 8        |       | 5 | 3 | 7F+M |  |
| **Total Wyomyia**                         | 42       |       | 34 | 8 |  |
| **Uranotaeniini**                         |          |       |     |                     |
| **Uranotaenia**                           |          |       |     |                     |
| *(Uranotaenia)*                           |          |       |     |                     |
| *apicalis* Theobald, 1903                 | 5        |       | 4 | 1 | F | 1 | 4 |  |
| *ditaenionota* Prado, 1931                | 1        |       | 1 | 1 | F | X |  |
| *geometrica* Theobald, 1901               | 4        |       | 4 | 1 | F | 1 | 3 |  |
| *lowii* Theobald, 1901                    | 3        |       | 3 | 1 | F | X |  |
| *pallidoventer* Theobald, 1903            | 1        |       | 1 | 1 | F | X |  |
| *(Uranotaenia) sp.*                       | 18       |       | 1 | 1 | 12F+6M | 2 | 1 | 1 |  |
| **Total Uranotaenia**                     | 37       |       | 6 | 1 | Fdam |  |
| **Toxorhynchitinae**                      |          |       |     |                     |
| **Toxorhynchitini**                       |          |       |     |                     |
| *(Lynchiella)*                            |          |       |     |                     |
| *haemorrhoidalis* Fabricius, 1787         | 1        |       | 1 | 1 | F | X |  |
| *Toxorhynchites sp.*                      | 1        |       | 1 | 1 | Mgen |  |  |
| **Total Toxorhynchites**                  | 2        |       | 1 | 1 |  |  |
| **Number of mosquitoes identified**       | 5231     |       | 928 | 4303 | 4610F+621M |  |
| **Specimens not identified**              | 59       |       | 5  | 54  |  |  |
| **Total number of specimens**             | 5290     |       | 933 | 4357 |  |  |

a Indicates the total number of specimens for each taxon.
b Indicates the sex and/or condition of the specimens collected: M = male; F = female; dam = damaged specimen; gen = identified using genitalia dissection.
c X = specimens of the taxon were only captured using this method.
d It was not possible to identify these specimens to species level because either there are no known characters which can be used to separate the females of these two species, or the characters used to separate these species are damaged.
e First published record for the state of Amazonas.
f First geographical range extension for this species since it was described (Hutchings & Sallum 2008).
g Includes a paratype of this species (Hutchings & Sallum 2008).
h Includes either immature specimens which died during the rearing process or adult specimens which were damaged during the mounting process.

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