

# The Mantodea (Insecta: Dictyoptera) of Rio Grande do Norte, Brazil: First List of Species and Geographical Records

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**Abstract.** This study presents a list of the mantis species from the Brazilian state of Rio Grande do Norte and their distribution within the state. The records are derived from specimens deposited in the “Adalberto Antonio Varela Freire” Entomological Collection at the Federal University of Rio Grande do Norte. This collection holds a total of 1,816 specimens, representing 30 species distributed in 16 genera distributed in 44 localities. There are two new records to Brazil, 10 to the Northeastern region of Brazil (and Caatinga biome) and 25 to the Rio Grande do Norte.

**Keywords:** Atlantic Forest; Caatinga; Entomology; Neotropics; Praying mantis.

## Os Mantodea (Insecta: Dictyoptera) do Rio Grande do Norte, Brasil: Primeira Lista de Espécies e Ocorrências Geográficas

**Resumo.** Este trabalho apresenta a primeira lista de espécies de louva-a-deus do Rio Grande do Norte, bem como sua distribuição dentro do Estado. Os registros das espécies são oriundos de espécimes depositados na Coleção Entomológica “Adalberto Antonio Varela Freire”, localizada na Universidade Federal do Rio Grande do Norte. Essa coleção possui um total de 1.816 espécimes de Mantodea depositados, representando 30 espécies distribuídas em 16 gêneros.

**Palavras-chave:** Entomologia; Caatinga; Floresta Atlântica; louva-a-deus; Neotropical.

Lists of species are extremely important for many different fields of biological research, such as conservation, ecology, and taxonomy. These lists can be used to plan collecting schedules and provide historical information on the local fauna and flora, as well as providing a baseline for future research. Despite recent efforts, the diversity of the Brazilian Mantodea is still poorly known. Only three species lists are available for the 26 Brazilian states – one for the state of Rio Grande do Sul (DORNELES *et al.* 2005), one that documents the mantids of the Museum of Zoology of the University of São Paulo (RODRIGUES & CANCELO 2013), and other for the Parque Nacional da Serra das Confusões, in Piauí (MENEZES *et al.* 2013). MENEZES & BRAVO (2014) provided a list of Mantodea species of the semi-arid area of Brazil containing records from the States of Alagoas, Ceará, Paraíba Pernambuco, Piauí and Rio Grande do Norte. MENEZES (2015) made a short list of the Reserva Biológica de Pedra Talhada (ranging from the States of Alagoas and Pernambuco). More general lists of Neotropical mantises are provided by AGUDELO *et al.* (2007) and EHRMANN & KOÇAK (2009).

The Brazilian state of Rio Grande do Norte encompasses two critically endangered biomes, the Brazilian Atlantic Forest and the Caatinga, although no species lists of any insect group are available for the Rio Grande do Norte, despite the importance of this information for the planning of conservation strategies. There are only few records available are from BRAVO & CALOR (2014). Given this situation, the present study aimed to provide a list of the species of Mantodea from the Rio Grande do Norte, using material deposited in the “Adalberto Antonio Varela Freire” Entomological Collection (CAAVF) of the Federal University of Rio Grande do Norte.

## MATERIAL AND METHODS

The preserved specimens were all from the CEAAVF, and were either pinned or stored in vials containing 70% alcohol. We also collected mantodean specimens in the field to increase the number of taxa recorded. These specimens were collected between November 2011 and October 2013 (24 hours per month) consecutively by active searching with a flashlight, together with one light trap composed of a vertical sheet illuminated by a 250 W mercury lamp. This light trap was set in clearings or near the edge of the forest to improve the range of the illumination, and was turned on at 17:00 h and then turned off at 05:00 h, coinciding with the crepuscular periods at the end and beginning of the day, respectively. At least two collectors were present at each collect expedition. The specimens collected were euthanized with 70% alcohol and stored in Falcon tubes with 90% alcohol, and then catalogued and deposited at the CEAAVF.

Specimens were collected in the following municipalities (with GPS coordinates): Açú (05°34'36" S 36°54'31" W), Canguaretama (06°22'48" S 35°07'44" W), Ceará-Mirim (05°38'04" S, 35°25'32" W), Galinhos (05°05'26" S, 36°16'31" W), Jucurutu (06°02'02" S, 37°01'13" W), Macau (05°06'54" S, 36°38'04" W), Martins (06°05'16" S, 37°54'40" W), Nísia Floresta (06°05'28" W, 35°12'31" S), and Pau dos Ferros (06°06'36" S, 38°12'16" W).

The specimens were identified based on the descriptions and identification keys of BURMEISTER (1838); GIGLIO-TOS (1929); BEIER (1942); LA GRECA & LOMBARDO (1989); TERRA (1995); LOMBARDO (2000); AGUDELO & CHICA (2003); LOMBARDO & Ippolito (2004)

and ROY & EHRMANN (2009). Identifications were based on the external morphology of the body and the genitalia. The genitalia were extracted using a featherweight tweezer, and treated with 10% KOH whenever necessary.

The geographic coordinates were acquired from Google Earth™ based on the data provided by the specimen labels, and maps were produced from these coordinates on the <http://www.simplemappr.net> website. All the specimens have a voucher code with prefix namely “MAN” and a suffix number ranging from 01 to 773 ([Annex 1 - Metadata](#)).

Table 1. List of the insect species of the order Mantodea recorded in Rio Grande do Norte, Brazil according to classification of RIVERA & SVENSON (2016).

Taxon	Geographical Record
<b>ACANTHOPIIDAE</b>	
<b>Acanthopinae</b>	
<i>Decimiana hebardei</i> Lombardo, 2000 (♂9)	Ceará-Mirim (12); Monte Alegre (26); Natal (28); Serra Negra do Norte (41).
<i>Decimiana rehni</i> (Chopard, 1913) (♂1)	Macaíba (23).
Acontistinae	
<i>Acontista</i> sp. (♂ 304)	Alto Rodrigues (1); Mossoró (27); Pendências (34); Serra Negra do Norte (41).
<b>CHAETEESIIDAE</b>	
<i>Chaeteessa caudata</i> Saussure, 1871 (♂19)	Açu (3); Macau (24); Mossoró (27); Natal (28); Serra Negra do Norte (41).
<b>COPTOPTERYGIDAE</b>	
<i>Brunneria brasiliensis</i> Saussure, 1870 (♂58)(♀1)	Alto Rodrigues (1); Carnaubais (11); Jucurutú (20); Natal (28); Pedro Avelino (33); Serra Negra do Norte (41).
<i>Brunneria gracilis</i> Giglio-Tos, 1915 (♂58)	Goianinha; Jucurutú (20); Parnamirim (31); Pendências (34); Santa Maria (39); Serra Negra do Norte (41).
<i>Brunneria subaptera</i> Saussure, 1869 (♂11)	Caicó (8); Serra Negra do Norte (41).
<b>LITURGUSIIDAE</b>	
<i>Liturgusa annulipes</i> (Serville, 1839) (♂7)	Ceará-Mirim (12); Nísia Floresta (29).
<i>Liturgusa maya</i> (Saussure & Zehntner, 1894)(♂1)(♀1)	Natal (29); Nísia Floresta (29).
<i>Liturgusa parva</i> Giglio-tos, 1915 (♂2)	Nísia Floresta (29).
<b>MANTIDAE</b>	
<b>Stagmatopterinae</b>	
<i>Oxyopsis</i> sp. 1	Barra de Cunhaú (5); Parnamirim (31).
<i>Oxyopsis</i> sp. 2	Ceará-Mirim (12).
<i>Parastagmatoptera unipunctata</i> (Burmeister, 1838) (♂57)	Alto Rodrigues (1); Ceará-Mirim (12); Extremoz (14); Macaíba (23); Martins (26); Mossoró (27); Natal (28); Serra Negra do Norte (41).
<i>Stagmatoptera hyaloptera</i> (Perty, 1832) (♂53)(♀3)	Carnaubais (11); Ceará-Mirim (12); Jucurutú (20); Lagoa Pintada (21); Macaíba (23); Natal (28); Nísia Floresta (29); Serra Negra do Norte (41).
<i>Stagmatoptera pia</i> Saussure & Zehntner, 1894 (♂11)(♀3)	Ceará-Mirim (12); Macaíba (23); Natal (28); Nísia Floresta (29); Parnamirim (31); São José de Mipibú (40); Serra Negra do Norte (41).
<i>Stagmatoptera precaria</i> Linnaeus, 1758 (♂20)(♀5)	Ceará-Mirim (12); Macaíba (23); Mossoró (27); Natal (28) Nísia Floresta (29); Parnamirim (31); Santa Cruz (38); São José de Mipibú (40); Serra Negra do Norte (41).
<b>Vatinae</b>	
<i>Phyllovates brasiliensis</i> Piza, 1982 (♂3)	Carnaubais (11); Macaíba (23); Serra Negra do Norte (41).
<i>Phyllovates stollii</i> (Saussure & Zehntner, 1894) (♂16)	Carnaubais (11); Ceará-Mirim (12); Macaíba (23); Serra Negra do Norte (41).
<i>Zoolea descampsi</i> Ehrmann & Roy (♂3)	Ceará-Mirim (12); Parnamirim (31); Santa Cruz (38).
<b>MANTOIDIDAE</b>	
<i>Mantoida argentinae</i> La Greca & Lombardo, 1989 (♂10)(♀1)	Macaíba (12); Mossoró (27); Natal (28); Serra Negra do Norte (41).
<i>Mantoida brunneriana</i> Saussure, 1871 (♂81)(♀2)	Alto Rodrigues (1); Açu (3); Carnaubais (11); Mossoró (27); Nísia Floresta (29); Parnamirim (31); Serra Negra do Norte (41).
<i>Mantoida luteola</i> Westwood, 1889 (♂15)	Alto Rodrigues (1); Extremoz (14); Macaíba (23); Serra Negra do Norte (41).
<b>PHOTINIDAE</b>	
<b>Cardiopterinae</b>	
<i>Cardioptera brachyptera</i> Burmeister, 1838 (♂424)	Açu; Alto Rodrigues (1); Arês (2); Baía Formosa (4); Bom Jesus (7); Ipueira (17); Macaíba (23); Martins (25); Mossoró (27); Natal (28); Nísia Floresta (29); Parnamirim (31); Pendências (34); Poço Branco (35); Santa Maria (39); Serra Negra do Norte (41); Upanema (43).
<i>Cardioptera squalodon</i> Werner, 1932 (♀6)	João Câmara (19); Serra Negra do Norte (41).

to be continued...

## RESULTS

We analyzed a total of 1816 mantodean specimens, of which 1713 were deposited in the CAAVF and 103 were collected during fieldwork. Based on the analysis of these specimens, we identified 30 species distributed in 16 genera and eight families (Table 1). These specimens were recorded at 44 localities (Figure 1).

Table 1. Continuation...

Taxon	Geographical Record
<b>Photiomantinae</b>	
<i>Photiomantis planicephala</i> (Rehn, 1916) (♂354)(♀8)	Alto Rodrigues (1); Arês (2); Açú (3); Caicó (8); Caraúbas (10); Carnaubais (11); Ceará-Mirim (12); Currais Novos (13); Extremoz (14); Jardim do Seridó (18); Lajes (22); Macau (24); Martins (25); Mossoró (27); Natal (28); Parelhas (30); Parnamirim (31); Pendências (34); Riacho de Santana (36); Riachuelo (37); Serra Negra do Norte (41); Severiano Melo (42); Vera Cruz (44).
<b>Photinainae (Orthoderellini)</b>	
<i>Paraphotina caatingaensis</i> (Menezes & Bravo 2013) (♂47)	Caicó (8); Ceará-Mirim (12); Mossoró (27); Serra Negra do Norte (41).
<b>THESPIDAE</b>	
<b>Musoniellini</b>	
<i>Musoniella brasiliensis</i> Giglio-Tos, 1916 (♂91)(♀4)	Açú (3); Martins (25); Natal (28); Nísia Floresta (29); Serra Negra do Norte (41).
<i>Musoniella chopardi</i> Giglio-Tos, 1916 (♂13)(♀3)	Alto Rodrigues (1); Açú (3); Carnaubais (12); João Câmara (19); Lajes (22); Macaíba (23); Martins (25); Mossoró (27); Natal (28); Nísia Floresta (29); Parnamirim (31); Serra Negra do Norte (41).
<b>Thespini</b>	
<i>Thesprotia brevis</i> Giglio-Tos, 1915 (♂76)(♀1)	Mossoró (27); Natal (28); Nísia Floresta (29); Parelhas (30); Parnamirim (31); Serra Negra do Norte (41).
<i>Thesprotia infumata</i> Audinet-Serville, 1839 (♂30)	Carnaubais (11); Lagoa Salgada (21); Serra Negra do Norte (41).

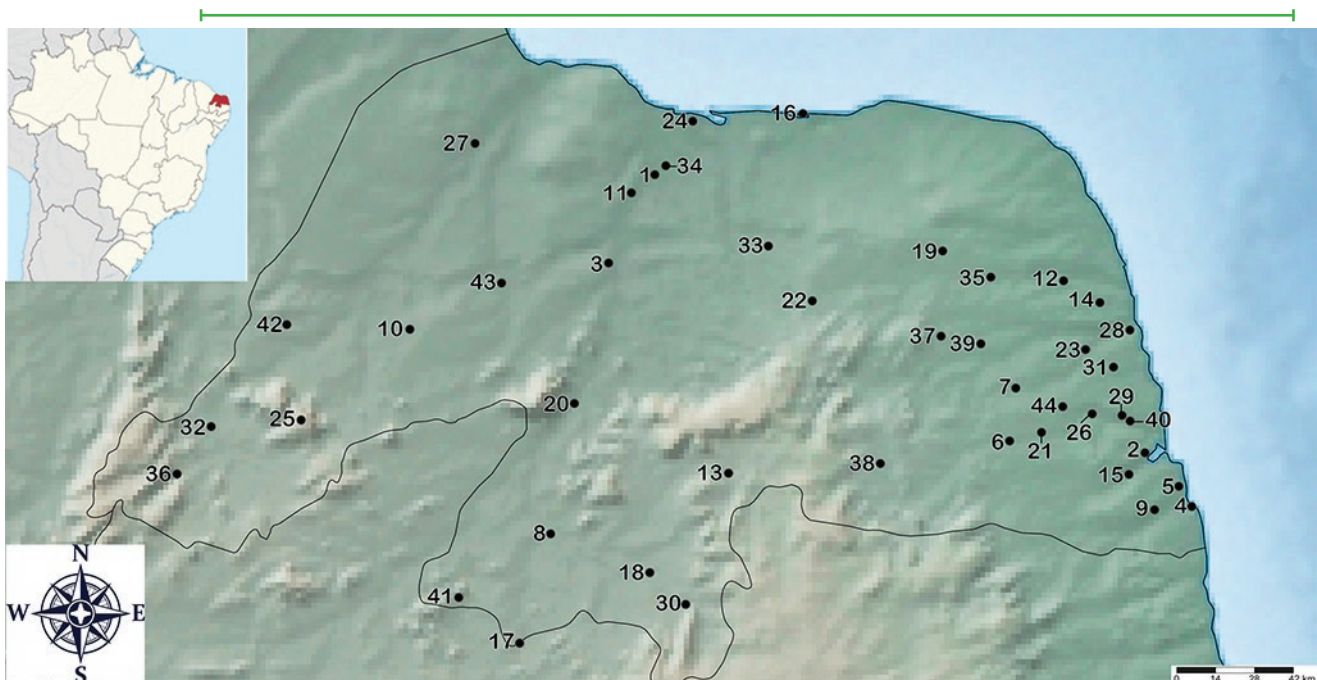


Figure 1. Distribution of the collecting localities of Mantodea in Rio Grande do Norte, Brazil, registered in the Coleção Entomológica Adalberto Antonio Varela Freire. Figure made by authors. Black dots represents the city registered and the number on the left to the dot or following a line refers to name of the location. Numeration and naming in alphabetical order = 1: Alto Rodrigues; 2: Arês; 3: Açú; 4: Baía Formosa; 5: Barra de Cunhaú; 6: Boa Saúde; 7: Bom Jesus; 8: Caicó; 9: Canguaretama; 10: Caraúbas; 11: Carnaubais; 12: Ceará-mirim; 13: Currais Novos; 14: Extremoz; 15: Galinhos; 16: Goianinha; 17: Ipeueira; 18: Jardim do Seridó; 19: João Câmara; 20: Jucurutú; 21: Lagoa Salgada; 22: Lajes; 23: Macaíba; 24: Macau; 25: Martins; 26: Monte Alegre; 27: Mossoró; 28: Natal; 29: Nísia Floresta; 30: Parelhas; 31: Parnamirim; 32: Pau dos Ferros; 33: Pedro Avelino; 34: Pendências; 35: Poço Branco; 36: Riacho de Santana; 37: Riachuelo; 38: Santa Cruz; 39: Santa Maria; 40: São José de Mipibú; 41: Serra Negra do Norte; 42: Severiano Melo; 43: Upanema; 44: Vera Cruz.

## DISCUSSION

The relatively small number of female specimens (38 of the total of 1816) found in the present study can be attributed to the principal methods using by the collectors of the specimens available in the CAAVF, i.e., light traps, which do not attract the females of many apterous or brachypterous species (TERRA & AGUDELO 2012). In this case, females can only be collected using active searches, which are hampered by the cryptic coloration of these insects.

The distribution patterns of the different mantodean taxa varied considerably in this study. The species of the genus *Liturgursa*, for example, were only found in fragments of Atlantic Forest in coastal areas. This is probably because of the microhabitat occupied by these insects – tree bark covered with lichen –

from which their common name of “bark mantises” is derived (SVENSON 2014). This type of microhabitat is common in the relatively humid interior of the Atlantic Forest, but not in the more arid Caatinga which has a prolonged dry season, when the lichen tends to disappear from the trees, together with the animals that occupy this substrate. However, there are humid areas in Caatinga, in example of the city of Martins (25), in Rio Grande do Norte, which probably have specimens of Liturgusidae living there, but so far were not found. The species of the genus *Oxyopsis* were also found exclusively in coastal area, not only in fragments of Atlantic forest, but also in environments dominated by dunes. *Photiomantis planicephala* (Rehn) is the most common and widespread species in the collection, being present in both humid and arid areas, and at all elevations, recorded in 23 areas. *Cardioptera brachyptera* (Burmeister) and *Parastagmatoptera unipunctata* Burmeister are also found in all areas between sea

level and the state's highlands, but only in humid habitats with a well-defined rainy season.

A very large proportion of all the specimens were collected at two localities, Natal and Serra Negra do Norte. Natal is the state capital of Rio Grande do Norte, and its federal university (UFRN) has an entomology course, for which students are continually collecting new insect specimens. The second site, Serra Negra do Norte, located in the semi-arid region in Caatinga biome, was the main area in which professor Adalberto Antonio Varela Freire (*in memoriam*) collected specimens over a 30-year period. The eastern portion of the state is the least well sampled. This area encompasses highlands with a number of waterfalls and a mosaic of Atlantic forest habitats. It seems likely that additional mantodean species adapted to different elevations will be found in this area, and in other parts of the state, and further research into the distribution of the mantises throughout the region is clearly needed.

Our list includes two new records for Brazil (*Decimiana hebardei* Lombardo, 2000, and *Thesprotia brevis* Giglio-Tos, 1915), and 10 for the country's Northeast region, including the Caatinga biome (*Brunneria subaptera* Saussure, 1869, *Brunneria gracillius* Giglio-Tos, 1915, *Liturgusa maya* (Saussure and Zehntner, 1894); *Liturgusa parva* Giglio-Tos, 1915; *Musoniella brasiliensis* Giglio-Tos, 1916; *Musoniella chopardi* Giglio-Tos, 1916; *Phyllovates brasiliensis* Piza, 1982; *Phyllovates stollii* (Saussure and Zehntner, 1894) and *Thesprotia infumata* Audinet-Serville, 1839). With the exception *Brunneria brasiliensis* Saussure, 1870; *C. brachyptera*; *Mantoida brunneriana* Saussure, 1871; *P. planicephalla*, and *Stagmatoptera hyaloptera* (Perty, 1832) the remaining 25 species are new records for Rio Grande do Norte. MENEZES & BRAVO (2014) identified specimens of *C. brachyptera* from CEAUVF as *Cardioptera parva* Beier, 1942. However, by comparing these specimens with type specimens photos and through genitalia analyzes, we determined these specimens as *C. brachyptera*. We hope that this list will provide a useful database for the development of further ecological and zoogeographic research by students in Rio Grande do Norte, and further afield in Brazil, given the scarcity of data on the mantodeans of this country. A short term contribution of this list is to the Catalogo Taxonômico da Fauna do Brasil, which is a catalog of all Brazilian animals' species. This catalog currently lists 244 valid species of Mantodea to Brazil (AGUDELO 2016).

Less than 15% of the original cover of the Atlantic Forest now remains (RIBEIRO *et al.* 2009), although there is no reliable estimate of deforestation rates in the Caatinga. Worse still, less than 2% of the total area of the Caatinga is currently protected in conservational units (TABARELLI *et al.* 2000). This facilitates deforestation in Rio Grande do Norte, and while are knowledge of the state's mantodean diversity is still incipient, ongoing habitat clearance may result in the loss of species before they have even been identified. In this case, our species list is not only an important contribution to the understanding of the diversity of the order Mantodea, but also to the conservation of these biomes.

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