Mantodea from Eastern Caribbean Islands

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Summary.

Whereas Mantises of Trinidad and Tobago have been comprehensively studied, species occurring on more northern islands of Lesser Antilles are little known. The present work aims at updating the current knowledge on Mantises from Eastern Caribbean Islands by compiling data from both published and grey literature, museum specimens as well as specimens we and others collected during surveys conducted over the last decades. *Thesprotiella insularis* (Bonfils, 1967) is revealed to be widely distributed on islands harboring moist and wet forests from Martinique to Guadeloupe. *Liturgusa dominica* Svenson, 2014 occurs in humid and subhumid forests of Dominica and Marie-Galante. *Gonatista reticulata* (Thunberg, 1815) and *Thesprotia caribea* Rehn & Hebard, 1938 appear restricted to the northernmost islands of the Northeast Lesser Antilles. *Musonia surinama* Saussure, 1869 is present in the grassland of St Martin and of Southern islands (Barbados, St. Vincent, and Grenada). *Lobocneme lobipes* (Redtenbacher, 1892) is only present in St. Vincent and Grenada. *Epaphrodita undulata* (Saussure, 1870) is re-established as synonym of *Epaphrodita musarum* (Palisot de Beauvois, 1805); this species was described from St. Lucia, but has not been recorded for over 150 years. Finally, a specimen of *Bantiella trinitatis* Giglio-Tos, 1915 was collected on Martinique in 1975, but this species was not collected again. Despite intensive searching, four non-endemic species once recorded on the archipelago have not been recorded again and might correspond to temporary settlements or to erroneous data. *Acontista multicolor* Saussure, 1870 does not appear to currently occur on Guadeloupe. Distribution, ecology and phenology of these species are discussed.

Résumé.

Les Mantes des îles de la Caraïbe orientale. Alors que les Mantes de Trinidad et Tobago ont été largement étudiées, les espèces présentes plus au nord et à l'est de l'archipel l'ont beaucoup moins été. L'objectif du présent article est d'actualiser les connaissances sur les mantes du nord-est des Petites Antilles, en nous appuyant sur les données publiées, celles présentes dans la littérature grise, les collections et les spécimens collectés durant les dernières décennies. *Thesprotiella insularis* (Bonfils, 1967) s'avère largement présent sur les îles arborant des forêts hygrophiles ou mésophiles de la Martinique à la Guadeloupe. *Liturgusa dominica* Svenson, 2014 est présent en Dominique et à Marie-Galante. *Gonatista reticulata* (Thunberg, 1815) et *Thesprotia caribea* Rehn & Hebard, 1938 ont leurs populations restreintes aux îles les plus au nord des Petites Antilles. *Musonia surinama* Saussure, 1869 est présent dans les milieux herbacés de St. Martin et dans ceux des îles du sud (Barbades, St. Vincent et Grenade). *Lobocneme lobipes* (Redtenbacher, 1892) est restreint à St. Vincent et Grenade. La synonymie entre *Epaphrodita undulata* (Saussure, 1870) et *Epaphrodita musarum* (Palisot de Beauvois, 1805) est rétablie ; cette mante est endémique de St. Lucie, mais n'a plus été signalée depuis plus de 150 ans. Enfin, un spécimen de *Bantiella trinitatis* Giglio-Tos, 1915 a été collecté en Martinique en 1975 mais n'a plus été signalé depuis. Malgré des recherches intensives, quatre espèces non endémiques, rencontrées une seule fois dans l'Archipel, pourraient correspondre à des établissements temporaires ou à des données erronées. *Acontista multicolor* Saussure, 1870 ne semble pas se reproduire actuellement en Guadeloupe. La distribution, l'écologie et la phénologie de ces espèces sont discutées.

Keywords:

Lesser Antilles; Caribbean; Mantodea; Acontistidae; Liturgusidae; Thespidae; Epaphroditidae; Mantidae; geographical distribution; ecology

The Caribbean region is considered a threatened biodiversity hotspot because of its high levels of biotic diversity and endemism and widespread habitat destruction (Myers et al. 2000; Mittermeier et al. 2005; Wetterer et al. 2016). A better preservation of this unique biodiversity requires knowing the distribution of the species harbored by these islands. This has been addressed for various groups of insects such as beetles (Chalumeau & Touroult 2005; Peck 2006; Ivie et al. 2008; Peck 2009; 2010, 2011, 2016; UICN Comité français, OFB, MNHN 2020), moths and butterflies (Martin Brown 1978; Miller & Miller 2001; Davies & Birmingham 2002; Fontenla 2003; Pierre & Lalanne-Cassou 2014; Touroult et al. 2014a; Zagatti et al. 2021), and bees (Meurgey 2014, 2016; Meurgey & Questel 2015; Meurgey & Dumbardon-Martial 2016, 2019; UICN Comité français, OFB, MNHN 2020). Unfortunately, the current decline in biodiversity is accompanied by a growing list of species that are not identified (Touroult et al. 2020a). Knowledge on the Mantises of the Lesser Antilles is very uneven. Whereas species of Trinidad and Tobago at the South of the archipelago are comprehensively known by both historical and recent records (Bruner 1906; Rehn 1911; Giglio-Tos 1915, 1927; Beier 1935a; Beebe et al. 1952; Crane 1952; McEDK 1953; Quesnel 1967; Terra 1995; Agudelo et al. 2007; Greener et al. 2014; Greener & Rutherford 2014), species occurring on more northern islands as well as their distribution are very little known.

Nine species are currently recorded from Northeastern Lesser Antilles: *Gonatista reticulata* (Thunberg, 1815); *Musonia surinama* (Saussure, 1869); *Thesprotia caribea* Rehn & Hebard, 1938; *Thesprotiella insularis* (Bonfils, 1967); *Liturgusa dominica* Svenson, 2014; *Acontista multicolor* Saussure, 1870; *Lobocneme lobipes* (Redtenbacher, 1892); *Bantiella trinitatis* Giglio-Tos, 1915; and *Epaphrodita musarum* (Palisot de Beauvois, 1805).

Since these early accounts by Thunberg (1815), Brunner & Redtenbacher (1892), Saussure (1870), Rehn & Hebard (1938), Bonfils (1967), Mantises were scarcely reported on Northeastern Lesser Antilles in published accounts of scientific surveys (Miskimen & Bond 1970; Bennet & Alam 1985; Woodruff et al. 1998).

Besides these scarce records on Mantises of Northeastern Lesser Antilles, many specimens were collected by various entomologists. For example, between 1954 and 1977, Robert Pinchon collected Mantises among other insects in Martinique. Pinchon's specimens in MNHN were later identified by Roger Roy but the records remained unpublished. More recently, many entomologists regularly collected Mantises in the area. The present work aims at updating the current knowledge on Mantises from Northeast Lesser Antilles by compiling data from both published and grey literature, museum specimens as well as specimens we and others collected during surveys conducted over the last decades.

Material and methods

The geographic scope of the present work ranges includes Lesser Antilles localized north to Trinidad and Tobago (Windward and Leeward islands). The distribution maps were made using QGIS software 3.8 Zanzibar. The administrative area is from <http://www.diva-gis.org>.

The taxonomy used is from Schwarz & Roy (2019) and Rivera & Svenson (2016, 2020).

In addition to the authors' ones the following collections were examined by NM: Mantodea collection in the Muséum national d'Histoire naturelle (Paris, France), the Pinchon insect collection (Fort-de-France, Martinique), the insect collection of INRAE Antilles-Guyane (Petit-Bourg, Guadeloupe).

The continuum of the flora is divided into general zones (Peck 2016): littoral, xerophile zone (dry forest and shrubby environment), mesophile zone (sub humid forest), and hygrophile zone (rain forest). These intergrade into each other with distance from the salt influence of the sea, if the habitat is on the windward (east) or leeward (west) side of the island, and with increasing rainfall and decreasing average temperature accompanying an increase in elevation above sea level.

This work takes advantage of the huge contribution of the following entomologists who kindly transmitted their observations and/or who contributed to unpublished reports we examined:

Julien Chalifour, Cul-de-Sac, Saint-Martin; Mathieu Coulis, Fort-de-France, Martinique; Gwénael David, Lons-le-Saunier, France; Francis Deknuydt, Trois Ilets, Martinique; Régis Delannoye, La Trinité, Martinique; Thomas Dubreuil, Schoelcher, Martinique; Eddy Dumbardon-Martial, Fort-de-France, Martinique; Toni Jourdan, Baie-Mahault, Guadeloupe; Gilles Leblond, Sainte-Rose, Guadeloupe; Karl Questel, Saint Barthélemy; Daniel Romé, Le Vauclin, Martinique; Philippe Ravat, Anses d'Arlet, Martinique; Guillaume Viscardi, Le Carbet, Martinique. Many of these collectors are involved in very dynamic NGOs: Martinique Entomologie, Société Entomologique Antilles-Guyane (SEAG), Société d'histoire naturelle L'Herminier (SHNLH). These NGOs as well as NM produced reports we examined for the present work: (Touroult & Poirier 2012, 2013, 2014b; Touroult et al. 2015, 2016, 2017, 2018, 2019; Jourdan & Moulin 2020). These reports were produced for *Direction de l'Environnement et de l'Aménagement du Littoral* (DEAL Martinique or DEAL Guadeloupe).

Several data were recorded from the iNaturalist platform, which is one of the world's most popular online wildlife databases, helping participants (over 750,000 scientists and naturalists) to identify plant and animal species they observed. iNaturalist is a joint initiative by the California Academy of Sciences and the National Geographic Society (Moulin 2020).

During the field surveys by the authors, mantises were collected using the three main methods (manual collecting, light trapping and tree climbing) as listed in Brannoch et al. (2017).

Abbreviations

ABS, Archbold Biological Station, Dominica; ANSP, Academy of Natural Sciences of Philadelphia, Philadelphia, PA, USA; CDR, Collection Daniel Romé, Le Vauclin, Martinique; CEDM, Collection Eddy Dumbardon-Martial, Fort-de-France, Martinique; CFD, Collection Francis Deknuydt, Trois Ilets, Martinique; CFM, Collection François Meurgey, Nantes, France; CGV, Collection Guillaume Viscardi, Le Carbet, Martinique; CGD, Collection of Gwénael David, Lons-le-Saunier, France; CJC, Collection Julien Chalifour, Cul-de-Sac, St. Martin; CKQ, Collection Karl Questel, Saint Barthélemy; CM, Carnegie Museum of Natural History, Pittsburgh, PA, USA; CMC, Collection Mathieu Coulis, Fort-de-France, Martinique; CMJ, Collection M. Jegu, Guadeloupe; CPG, Collection Pierre & Claudine Guezennec, Guadeloupe; CPR, Collection Philippe Ravat, Anses d'Arlet, Martinique; CRD, Collection Régis Delannoye, La Trinité, Martinique; CRPP, Collection R. P. Pinchon, Fort-de-France, Martinique; CRT, Collection Romain Tremblay, Guadeloupe; CSH, Collection Sylvain Hugel, Strasbourg, France; CTD, Collection Thomas Dubreuil, Schoelcher, Martinique; CTJ, Collection Toni Jourdan, Baie-Mahault, Guadeloupe; INRAE, Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement, Petit-Bourg, Guadeloupe; MNHN, Muséum national d'Histoire naturelle, Paris, France; RCNM, Research Collection of Nicolas Moulin, Montérolier, France; USNM, National Museum of Natural History, Smithsonian Institution, Washington, DC, USA.

Results

Annotated list of species

The species are presented according to the classification of families and sub-families of Schwarz & Roy (2019) and Rivera & Svenson (2020). For each species, the specimens are presented in the chronological order of their capture and/or observation.

Family Thespidae

Keys to genera are presented in recent work (Rivera & Svenson 2020). Distribution data are reproduced here with updates of classification.

Bantiella trinitatis Giglio-Tos, 1915 (Figure 8a–d)

Bantiella trinitatis Giglio-Tos 1915, p. 186.

Distribution. Guyana, Trinidad and Tobago, Venezuela.

Material examined. Martinique. 1♂, 'Martinique N.', 23.IV.1976, Carayon leg. (MNHN).

An adult male of *B. trinitatis* labelled as coming from Martinique is conserved in MNHN. This species is known from Trinidad and Tobago (Giglio-Tos 1915, 1927; Beebe et al. 1952; McEDK 1953; Marshall 1975; Terra 1995; Ehrmann 2002; Otte & Spearman 2005; Agudelo et al. 2007; Greener & Rutherford 2014; Patel et al. 2016; Rivera & Svenson 2020; Otte et al. 2021; iNaturalist 2021) and was not collected again in Martinique

despite strong sampling efforts over the last decades (Bonfils 1967; 1969; Touroult & Poirier 2012; Touroult et al. 2013, 2014b, 2015, 2016, 2017, 2018, 2019, 2020b; Jourdan & Moulin 2020).

***Musonia surinama* (Saussure, 1869) (Figures 1, 2a, b, 8e, f)**

Thespis surinama Saussure 1869, p. 70.

Distribution. Antigua (Pelican Island), Barbados, Colombia, Costa Rica, Ecuador, French Guyana, Grenada, Guyana, Nicaragua, Panama, St. Martin, St. Vincent, Surinam, Trinidad and Tobago, Venezuela.

Material examined. Grenada. 1♂, Grand Etang lake, St Andrew's parish, 12.III.2009, Meurgey leg. (CFM).

St. Martin. 2♂, Port Caraïbes Residence, Anse Marcel, attracted by habitation lights, XII.2012, 2014; 13♂ (genitalia preparation NM0202), Park View, Cul-de-Sac, attracted by habitation lights, 30.X.2015, 2016, 2018, 2019, IX–XI.2020; 1♀, Hope Estate, day, 21.XII.2020, Chalifour leg. (RCNM, CJC).

St. Vincent. 1♂, tall grass of a meadow, Mesopotomia valley, St Georges parish, 29.III.2012, Meurgey leg. (CFM); 1♂, on *Cyathea* sp., La Soufrière, Charlotte's parish, 13.IV.2012, Meurgey leg. (CFM); 1♂, on Banana tree, Troumaca, St Patrick's parish, 16.IV.2012, Meurgey leg. (CFM).

Other data. Antigua. 3♀, Pelican Island, V.1914 (Caudell 1922).

Barbados. 1♂, 1♀, no data for male and 'in May' for female; several nymphs, Hawkins Estate, Prof. Stoner (Caudell 1922); 1♂, 25.XII.1980, Brown leg. (Rivera & Svenson 2020); 4♂, Flagstaff Road, Bridgetown, 9. IV.2017, 12–14.IX.2017, Taylor leg. (INaturalist 2021).

Grenada. 1♂, Balthazar, St. George's Riv., Mount Gay Estate, III.1893? (Brunner von Wattenwyl 1893).

St. Vincent. Windward side, IX.1891? (Redtenbacher 1892).

M. surinama has been described after a male specimen from Suriname (Saussure 1869). In 1871, Saussure produced a more detailed description of this species. He indicated also that the specimen is conserved at the MNHN. However, this type is not cataloged in the entomological collections of the MNHN (<https://science.mnhn.fr>). Later, Ehrmann (2002) indicated that the type is conserved in the Geneva museum (MHNG). This location was later mentioned by Otte & Spearman (2005). However, neither Roy & Cuche (2008) nor Pfäuti & Hollier (2012) listed this type as present in their inventory of type material in the Geneva collections. In their comprehensive work on Thespidae, Rivera & Svenson (2020) examined a large number of collections and failed to locate the type. Therefore, at this stage, the type of *Musonia surinama* should be considered as lost. The holotype of *Mionyx lineatus* (Chopard, 1912) was later considered as synonym of *M. surinama*, and *Mionyx fuscescens* (Chopard, 1912) was confirmed as synonym of *M. surinama* (Rivera & Svenson 2020). In the same work, examination of numerous specimens indicated that *M. surinama* was restricted to northern South America, Trinidad, St. Vincent and Barbados.

So, *M. surinama* appears to be restricted to northern South America, Trinidad, Grenada, St. Vincent and Barbados (Saussure 1869, 1871; Stål 1877; Redtenbacher 1892; Brunner von Wattenwyl 1893; Saussure & Zehntner 1894; Kirby 1904; Bruner 1906; Chopard 1912; Hebard 1919, 1921, 1922, 1924, 1933; Caudell 1922; Giglio-Tos 1927; Beier 1935a; La Greca 1939; Terra 1995; Ehrmann 2002; Otte & Spearman 2005; Agudelo et al. 2007; Patel et al. 2016; Roy 2019; Moulin & Roy 2020; Rivera & Svenson 2020; Otte et al. 2021). The absence of this species surprising (see discussion). The species appears well settled on these northern localities since it has been observed at various times and islands. We detected no morphological differences between specimens from St. Martin and the specimens from French Guiana and Panama.

***Thesprotiella insularis* (Bonfils, 1967) (Figures 3a, b, 4a, b, 9a–d)**

Oligonyx insularis Bonfils 1967, p. 244.

Distribution. Dominica, Guadeloupe, Marie-Galante, Martinique.

Material examined. Guadeloupe. 13♂ (holotype, paratypes), 1♀ (allotype), Petit-Bourg, Duclos, between 1962 and 1965, Bonfils leg. (MNHN-INRAE); 1♂, Massif de la Soufrière, La Citerne, 19.I.1966, Bonfils leg. (MNHN); 1♂, Vieux-Habitants, 8.VIII.2010, David leg. (CGD); 1♂, Vieux-Habitants, La Grivelière, 12. VIII.2010, Meurgey leg. (CFM); 1♂, Capesterre-belle-eau, Marquisat, Routhiers, 16.II.2011, Meurgey leg. (CFM); 1 nymph, Trois-Rivières, 21.VIII.2013, Guezennec leg. (CPG); 1♂, Sainte Rose, Route forestière de Duportail, 23.III.2015, Meurgey leg. (CFM); 1♂, Deshaies, Piton de Sainte Rose, 14.V.2015, Meurgey leg. (CFM); 1♂, Bouillante, crête de village, 22. V.2015, Meurgey leg. (CFM); 1♂, Capesterre, au niveau de l'observatoire, Grand Etang, 16.II.2016, Meurgey leg. (CFM); 1♂, Saint-Claude, Trace Victor Hughes, Matouba, 13.VI.2016, Meurgey leg. (CFM); 1♀, Gourbeyre, Chemin du Bassin Bleu, forêt, 13.XI.2016, Hugel leg. (CSH); 1♀, Pointe Noire, trace du Morne Léger, 23.XI.2016 Hugel leg. (CSH); 6♂, Gourbeyre, le Houelmont, sentier découverte, 18 m Canopy, 15. VI.2017, Meurgey leg. (CFM); 8♂, Trois-Rivières, Chutes du Carbet, parcelles Parc National de Guadeloupe, 25 m canopy, 20.VI.2017, Meurgey leg. (CFM); 1♀, Deshaies, Morne Mazeau, Route forestière vers Borne Bois d'Inde, 24.VI.2017, Hugel leg. (CSH); 4♂, Saint-Claude, Bains-Jaunes, 21 m canopy, 27. VI.2017, Meurgey leg. (CFM); 1♂, Petit-Bourg, Piolet, route de la Traversée, 12.III.2018, Meurgey leg. (CFM); 1♀, Saint-Claude, Saut d'eau de Matouba, 2.III.2019, Touroult leg. (RCNM); 1 nymph, Pointe-Noire, trace Contrebandiers, 3.III.2019, Touroult leg. (RCNM); 1♂, Goyave, Route forestière de Moreau, 19.III.2019, Guezennec leg. (CPG); 1♂, Saint-Claude, Ma Folie, 19. III.2019, Guezennec leg. (CPG); 1♀, Saint-Claude, 19. IV.2019, Guezennec leg. (CPG); 1♀, Sainte-Rose, Boucle de Sofaïa, 15.VI.2019, Coulis leg. (CMC); 1 nymph, Sainte-Rose, trace des Contrebandiers, 13.VII.2019, Jegu leg. (CMJ); 1♂, Vieux-Habitants,

Refuge des 3 Crêtes, 2.V.2020, Jourdan leg. (CTJ); 1♀, Bouillante, Duprat, D14, 25.V.2020, Tremblay leg. (CRT).

Marie-Galante. 1♀, Grand Bourg, Les Sources, VIII.2004, Hugel leg. (CSH); Grand Bourg, Les Sources, 2.VIII.2007, Hugel leg. (CSH); 1♂, 2♀, 1 nymph, 1 ootheca, Grand Bourg, Coulée Oulière haut, 8.VIII.2011, Hugel leg. (CSH); 1♀, Capesterre de Marie-Galante, Les Balisiers, 6.VIII.2017, Hugel leg. (CSH); 1♀, Capesterre de Marie-Galante, les Balisiers, hand catching, 5.VI.2019, Moulin leg. (RCNM); 1♂, Saint-Louis, Les Sources, LED trap, 6.VI.2019, Moulin leg. (RCNM); 1 nymph, Saint-Louis, Ravine Potens, hand catching, 6.VI.2019, Moulin leg. (RCNM).

Martinique. 1♂, Morne Rouge, Périnelle, 17.I.1954, Pinchon leg. (CRPP); 3♂, Gros Morne, Annexe, 27. IV.1955, Pinchon leg. (CRPP); 1 nymph, Colson, 5. VI.1966, Pinchon leg. (CRPP); 1♂, Gros Morne, Bonfils leg. 1969 (MNH); 1♀, Trinité, 4.XI.1975, Pinchon leg. (CRPP); 1♂, Sainte-Marie, 2.XII.1975, Pinchon leg. (CRPP); 1♂, La Médaille, Fort-de-France, 19.I.1977, Pinchon leg. (CRPP); 1♂, Marigot, Morne Laroche, 30. III.2008, David leg. (CGD); 1♂, Fonds Saint-Denis, Arborétum de l'Alma, 3.VIII.2008, Hugel leg. (CSH); 1♂, Morne Vert Pré, Le Vert Pré, VI.2010, Delannoye leg. (CRD); 1♀, Route forestière de Grand Fond, Fond Saint-Denis, 20.IX.2010, Deknuydt leg. (CFD); 1 nymph, Piton du Carbet, 1.III.2011, Romé leg. (CDR); 1♀, Route forestière de Grand Fond, Fond Saint-Denis, 12.IX.2011, Delannoye leg. (CRD); 1♂, Morne Bellevue, Le Marigot, 10.IV.2012, Deknuydt leg. (CFD); 1♀, La Montagne du Vauclin, Le Vauclin, 22.IV.2012, Romé leg. (CDR); 1♀, La Montagne du Vauclin par Ensfielder, Le Vauclin, 24.IV.2012, Delannoye leg. (CRD); 1♀, Maison du Moine, 26.VII.2012, Delannoye leg. (CRD); 1 nymph, La Montagne du Vauclin par Ensfielder, Le Vauclin, 11. II.2014, Delannoye leg. (CRD); 1♀, Forêt de l'Épinay, 26.II.2014, Romé leg. (CDR); 1♀, Morne Bigot, Les Anses d'Arlet, 15.XII.2014, Ravat Ph. (CPR); 1♂, Morne Constant, Le Diamant, 10.X.2015, Touroult & Poirier leg. (RCNM); 1♂, Morne Gentil, Les Anses d'Arlet, 13.X.2015, Touroult & Poirier leg. (RCNM); 1 nymph, Rivière Rouge, Gros Morne, 26.IV.2016, Delannoye leg. (CRD); 1♂, Rivière Rouge, Malaise Trap, 2–9. XI.2017, Dumbardon-Martial leg. (CEDM); 1♂, Morne Sulpice, 24.XI.2017, Moulin & Ramage leg. (RCNM); 1 nymph, Morne-Rouge, 3.IV.2019, Touroult leg. (RCNM); 1♂, Le François, Morne Valentin, 28.IV.2019, Poirier & Touroult leg. (RCNM); 1♀, Rivière Pilote, Forêt de Lépinay, 22.XII.2019, Romé leg. (CDR); 1♀, Montagne du Vauclin, Vauclin, 21.IV.2020, Romé leg. (CDR); 1♀, Les Anses d'Arlet, Morne Bigot, 12. VIII.2020, Ravat leg. (CPR); 1 nymph, Fort-de-France, Station thermale Absalon, 25 m Canopy in *Dacryodes excelsa* (Burseraceae), 7.X.2020, Moulin leg. (RCNM); 1 nymph, Le Marigot, 25.X.2020, Dubreuil leg. (CTD); 1 nymph, Fonds Saint-Denis, Morne Piquet, 15.XII.2020, Viscardi leg. (CMC).

Other data. Dominica. 3♂, S. Chiltern, 5.XI–10. XII.1964, Spangler leg. (USNM) (Rivera & Svenson 2020); 1♂, Trois Pitons, 22.X.1964, Spangler leg. (USNM) (Rivera & Svenson 2020); 2♂, 1.3 mi. E of Pont Casse, 12.V–27.IV.1964, Flint leg. (USNM) (Rivera & Svenson 2020); Nymphs, Alford Estate, Chopin, 20.XII.1966, Bonfils & Jean-Bart leg. (Bonfils 1967); 1♂, St. Paul Springfield State 2.5 km ENE Canefield 15°21'N, 61°22'W, 450 m, 11–18.VI.1991, Rawlins & Thompson leg. (CM); 1♂, I.1999, Montgomery leg. (ANSP) (Rivera & Svenson 2020).

Recent studied on morphology of many species of Thespididae (Rivera & Svenson 2020) allowed transfer of *Oligonyx insularis* Bonfils, 1967 to the genus *Thesprotiella*. *T. insularis* is found in Basse-Terre in Guadeloupe, Marie-Galante, Martinique, Dominica (Bonfils 1967, 1969; Terra 1995; Ehrmann 2002; Otte & Spearman 2005; Agudelo et al. 2007; Meurgey 2011; Patel et al. 2016; Meurgey & Ramage 2020; Jourdan & Moulin 2020; Otte et al. 2021). An *Oligonyx* female was also mentioned by McEDK (1953) on Trinidad and Tobago, but the specimen was not collected, and Greener & Rutherford (2014) suggested that Kevan confused the specimen with *Thesprotia filum*.

Observations of *T. insularis*, irrespective of the island, have usually been made in sub humid or rain forests. FM, as part of a study on the *Anolis* Daudin, 1802 (Squamata, Dactyloidae) of Guadeloupe (Legreneur et al. 2017), was able to access the canopy, between 18 and 25 m high, where he observed many males of *T. insularis*. These observations appear to confirm the arboreal preference that Bonfils suggested in 1967 and 1969. The ground-level observations of this species are likely to occur in individuals that have fallen from higher vegetation. NM has also observed a nymph at 25 m in the crown of a white gum tree (*Dacryodes excelsa*, Burseraceae), in the heights of the former spa of Absalon in Martinique.

T. insularis is a subendemic species of the Lesser Antilles: it is narrowly distributed in an area including part of the Lesser Antilles; with the status 'LC' in the Red Lists of the Fauna of Martinique (UICN Comité français, OFB, MNHN 2020) because it is widespread, and its habitats are not threatened now. (Jourdan & Moulin 2020). Its status in Guadeloupe should be published at the end of 2021 by the IUCN.

***Thesprotia caribea* Rehn & Hebard, 1938 (Figures 5a, b, 9h, i)**

Thesprotia caribea Rehn & Hebard 1938, p. 36.

Distribution. Antigua.

Other data. Antigua. 1♀, Holotype, 1♂, Allotype, VI.1918, Stoner leg. (USNM) (Rivera & Svenson 2020); 6♀, Paratypes, nymphs, hills and valleys, vicinity of English Harbor (village), VII.1918, Stoner leg. (Caudell 1922).

Thesprotia caribea is found on Antigua (Rehn & Hebard 1938; Terra 1995; Ehrmann 2002; Otte & Spearman 2005; Agudelo et al. 2007; Patel et al. 2016; Otte et al. 2021). This species was later listed as occurring in “Antigua & Barbuda” without further details (Rivera & Svenson 2020). In the area considered in the present work, this species appears restricted to Antigua. Indeed, despite years of surveys, this species is lacking in records from Guadeloupe and Montserrat, respectively the largest and the closest islands around Antigua [Jourdan & Moulin (2020) and this work for Guadeloupe, Ivie et al. (2008) for Montserrat].

Family Liturgusidae

Liturgusa dominica Svenson, 2014 (Figures 6a, b, 10a–d)

Liturgusa dominica Svenson 2014, p. 110.

Material examined. Marie-Galante. 1♂, 1♀, Saint-Louis, Les Sources, 2.VIII.2007, Hugel leg. (CSH); 3♂, 1♀, 1 nymph, Saint-Louis, Les Sources, 6.VIII.2011, Hugel leg. (CSH); 2♀, Saint-Louis, Les Sources, 7.VIII.2017, Hugel leg. (CSH); 2♂, Capesterre de Marie Galante, Les Balisiers, 6.VIII.2017, Hugel leg. (CSH); 1 nymph, Saint-Louis, Ravine Poirier, 29.V.2018, Leblond leg. (CFM); 4♂, 3♀, Saint-Louis, Les Sources, hand catching, 4–5.VI.2019, Moulin leg. (RCNM); 3♂, 1♀, Capesterre de Marie-Galante, Les Balisiers, hand catching, 5.VI.2019, Moulin leg. (RCNM).

Dominica. 1♂, 2♀, 1 nymph, Spanny falls trail, 26. VII.2008, Hugel leg. (CSH, ABS). **Other data. Dominica.** 1♀, Paratype, Fond Figes, 16. III.1964, Bray leg. (USNM) (Rivera & Svenson 2020); 1♂, Holotype, 1♀, Allotype, 1 nymph and 3♂, Paratypes, Grand Bay, –15°14'22.32"N 61°19'12.36"W, Flint leg. (USNM) (Rivera & Svenson 2020); 1 nymph, Paratype, Clarke Hall, 22–31.X.1966, Gurney leg. (USNM) (Rivera & Svenson 2020); 1♀, Paratype, B.W.I., La Haut Estate, 18.I.1979, Finnamore leg. (Lyman Museum) (Rivera & Svenson 2020).

Liturgusa dominica was described after specimens collected in the 1960s on Dominica; this description was included in a review (Svenson 2014) of the Neotropical genus of bark-mimicking Mantises *Liturgusa* Saussure, 1869. The species was considered as endemic to Dominica since no other specimens were available.

In Marie-Galante, *L. dominica* occurs in the wettest areas of the sub humid forest around the Saint-Louis river. These are the most humid habitats of the island, which is a raised coral atoll of low elevation. These areas show some similarities with the locality where we observed *L. dominica* in Dominica. This species can be locally extremely abundant, with several specimens and oothecae present on almost all the trunks of more than 10 cm in diameter. Specimens can be observed both day and night.

L. dominica is neither present on the other islands of Guadeloupe (Guadeloupe, Terre-de-Haut and Terre-de-Bas of the Saintes island, the Desirade island), nor in St. Martin, in Martinique, in Saint Lucia, and in Saint-Vincent (Touroult & Poirier 2012; Touroult et al. 2013, 2014b, 2015, 2016, 2017, 2018, 2019; Patel et al. 2016; Jourdan & Moulin 2020). These islands have been surveyed extensively, as was Montserrat (Marske 2004), where the species is not recorded either.

L. dominica is a subendemic species of the Lesser Antilles. In Marie-Galante, its habitats are reduced (Joseph 2009; Ramade 2009) even if the populations are large in the known wooded ravines (Jourdan & Moulin 2020). Its Red List status in Guadeloupe should be published at the end of 2021 by the IUCN.

Family Acanthopidae

Acontista multicolor Saussure, 1870

Acontista multicolor Saussure 1870, p. 229.

Distribution. Guadeloupe, Venezuela, Trinidad & Tobago.

Material examined. Guadeloupe. 1♀ Holotype, ‘Guadalupe’ (MNHN).

Despite intensive searching over the last decades, this species has not been found on Guadeloupe. Therefore, *Acontista multicolor* may be either currently very rare or extinct on Guadeloupe, or the historical mentions may correspond to an erroneous record. Indeed, Saussure (1870) mentions the name of the locality “Guadalupe” which is a very frequent toponym in America, and does not necessarily correspond to the island of Guadeloupe. This species is nevertheless present in Trinidad & Tobago.

Family Epaphroditidae

Gonatista reticulata (Thunberg, 1815) (Figure 9e–g)

Mantis reticulata Thunberg 1815, p. 288.

Distribution. Saint Barthélemy, Dominican Republic, Puerto Rico.

Other data. Saint Barthélemy. 1♂ Holotype (Thunberg 1815).

Between the publication of Lombardo & Perez-Gelabert (2004) and that of Agudelo et al. (2007), *G. reticulata* has been reported from the United States, which seems unlikely. Indeed, the Arizona data in Jantsch (1999) was included in 2007 without verification. Later, the distribution of this species is corrected, and its absence is confirmed from the United States (Svenson & Rodrigues 2017).

Since its discovery by Thunberg (1815) from “Insula Bartholemi”, *G. reticulata* has never been seen in Saint Barthélemy.

Gonatista reticulata is probably present in Saint Barthélemy and well known in Dominican Republic, and Puerto Rico (Thunberg 1815; Saussure 1869; Caudell 1912; Giglio-Tos 1927; Beier 1935b; Terra 1995; Ehrmann 2002;

Otte & Spearman 2005; Agudelo et al. 2007; Patel et al. 2016; Otte et al. 2021; INaturalist 2021). The indicated presence in Cuba is an error due to repeated confusion. These specimens from Cuba are *G. grisea*.

***Epaphrodita musarum* (Palisot de Beauvois, 1805) (Figures 10e, 11d)**

Mantis musarum Palisot de Beauvois 1805, p. 111.

Distribution. St. Lucia, Hispaniola.

Material examined. St. Lucia: 1♂, Holotype of *Epaphrodita undulata*, ‘Ste Lucia’ (MNHN).

The single male from St. Lucia was recently considered as a valid species (Roy 2005). Nevertheless, the morphological diversity of males of *E. musarum* males from Dominican Republic do not allow it to be distinguished from *E. musarum*. Three males from Dominican Republic kept in collection (RCNM) were compared to the male labeled from St. Lucia (Table 1).

We therefore restore the synonymy established by Giglio-Tos (1927): *Epaphrodita undulata* (Saussure, 1870), synonym of *Epaphrodita musarum* (Palisot de Beauvois, 1805).

Family Mantidae

***Lobocneme lobipes* Brunner & Redtenbacher, 1892 (Figure 7, b)**

Lobocneme lobipes Brunner & Redtenbacher 1892, p. 206.

Distribution. St. Vincent, Grenada.

Other data. Grenada. 1♀, Mount Gay Estate, Granville (Windward side), – III.1893 (Brunner von Wattenwyl 1893).

St. Vincent. 1♂, Holotype, south end of island, open swampy land near sea, beaten from bushes, 27.IX.1891, Smith leg. (BM) (Redtenbacher 1892); 1♀, St. Vincent, 30. VIII.1902, Campbell leg. (Rehn 1905); 1♂, Kingstown, 15. V.1937, Lombardo leg. (Ippolito & Lombardo 2015).

Lobocneme lobipes is the only mantid of the Mantidae family present in Northern Lesser Antilles. The species is known in Grenada and St. Vincent (Redtenbacher 1892; Brunner von Wattenwyl 1893; Saussure & Zehntner 1894; Kirby 1904; Rehn 1911; Giglio-Tos 1914, 1927; Marshall 1975; Terra 1995; Ehrmann 2002; Otte & Spearman 2005; Agudelo et al. 2007; Ippolito & Lombardo 2015; Patel & Singh 2016; Otte et al. 2021).

The male holotype of *L. lobipes* is illustrated in a recent publication by Ippolito & Lombardo (2015). The female allotype from Grenada is illustrated in a publication by Brunner von Wattenwyl (1893).

FM reportedly observed *L. lobipes* specimens in rain forests of St. Vincent without collecting them. The genus *Lobocneme* is close to *Parastagmatoptera*. The latter is known to be mainly arboricolous in French Guyana (Roy 2019; Moulin & Roy 2020). *L. lobipes* could plausibly occur in sub humid and rain forests.

Discussion and conclusion

We recorded nine species of Mantodea on Eastern Caribbean Islands. The islands have neither been connected in the past nor have they been connected to the continent. Southern Lesser Antilles emerged around 15–20 million years ago and the Northern Lesser Antilles emerged more recently, around 5–1.25 million years ago (Liebherr 1988; Wetterer et al. 2016; Crews & Esposito 2020). Therefore, all terrestrial species occurring on these islands result from at least one event of colonization (Rosen 1975).

Four species are only found on these islands and should therefore be considered as endemic to this part of the Caribbean: *Thesprotiella insularis*, *Thesprotia caribea*, *Liturgusa dominica* and *Lobocneme lobipes* (Table 2). Three endemic species (*T. insularis*, *L. dominica* and *L. lobipes*) are not restricted to one single island but occur on nearby islands in the island arc. Interestingly, all of these endemic species display an arboricolous ecology and are all found in sub humid and rain forests; except *T. caribea*, which occurs in herbaceous areas.

The five other species occur on other islands of the Caribbean (*Gonatista reticulata*, *Epaphrodita musarum*) or are more widely distributed in Central America (*Musonia surinama*, *Bantiella trinitatis*, *Acontista multicolor*). *A. multicolor*, *E. musarum*, *G. reticulata* and *B. trinitatis* are arboricolous species, whereas *M. surinama* occurs in more herbaceous areas. These four species with wide distribution occur more in dry habitats compared to the habitat of the three endemic species (*T. insularis*, *L. dominica* and *L. lobipes*). While the distribution of endemic species is restricted to adjacent islands in the arc, non-endemic species are either known from one single island or from islands scattered on the archipelago. It is worth mentioning that the four non-endemic species known from one single island (*Acontista multicolor*, *Epaphrodita musarum*, *Bantiella trinitatis* and *Gonatista reticulata*) are only known from one single record and have not been collected again (Table 2). These scarce observations may either correspond to temporary settlements and/or to species occurring at very low density. It might also correspond to under sampling, particularly for *T. caribea* observed only in Antigua in 1918, *E. musarum* only in St. Lucia before 1870, like *A. multicolor* in Guadeloupe, and for *G. reticulata* the rediscovery of which is pending on tree trunks of St. Barthélemy.

One of the non-endemic species, *Musonia surinama*, is discontinuously distributed, occurring on the southern-most and a few northern-most islands (Table 2). Curiously, this species is lacking from large islands on the middle of the arc. Yet, some of these islands apparently display large rather dry herbaceous habitats suitable for the species, particularly the southern part of Martinique and the eastern part of Guadeloupe.

The discontinuous distribution of *Musonia surinama* in the arc may be explained by various colonization scenarios, involving distinct colonization waves, including one from the south as it has been shown for other

groups (Martin Brown 1978; Woods 1990; Hedges 1996a, 1996b; Miller & Miller 2001; Davies & Birmingham 2002; Fontenla 2003). It may also involve more recent introduction in one area from the other one. It is possible that tropical storms carried timber with oothecae or even live specimens from island to island. A species of the genus *Mantoida* has been observed in captivity preferably depositing its oothecae in small holes directly in the wood. Such crevices occur in the wild, for example as exit holes of other insects, such as saproxylic beetles (Wieland & Schütte 2011). The transfer of Mantodea oothecae via driftwood has previously been described (Werner 1909, 1915; Beier 1939; Ehrmann 2002; Harris 2007). Oothecae of bark mantises (*L. dominica*, *G. reticulata*) and arboricolous species (*T. insularis*, *L. lobipes*) are usually attached to branches, on tree trunks (Svenson 2014; Rivera & Svenson 2016; Brannoch et al. 2017) or deposited on the underside of leaves. Therefore, the dispersal of Mantodea via hurricanes and driftwood carrying oothecae or insects would provide a plausible explanation (Clark 1904). Wind dispersal of insects is a well-known phenomenon that may have played a role in some species such as *B. trinitatis* (Wiktelius 1981; Pasek 1988).

However, species dispersions can also be due to human trade, accidental introductions (Harris 2007). For example, 8% of the entomofauna in Guadeloupe is considered introduced by industry, agriculture, and trade (Meurgey & Ramage 2020). The same goes for Barbados (Clark 1904; Nutting 1919).

Alternatively, to scenarios involving colonization events, this discontinuous distribution with areas of occurrence separated by large suitable habitats may result from local extinctions (Wunderle 2008). Indeed, the very habitat of *Musonia surinama* may have been in competition with past farming practices on these large islands, and insectivorous species such as mantids are likely to be directly and indirectly impacted by past use of pesticides (Krooss & Schaefer 1998; Clermont-Dauphin et al. 2004; Cabidoche et al. 2009; Crabit et al. 2016).

Such speculative explanation linked to farming practices may also be consistent with the current lack of endemic mantid species on the herbaceous habitats of islands such as Guadeloupe and Martinique. On the other hand, agricultural practices can neither fully explain the lack of these species on central islands of the arc, since open forest and edges may be able to harbor graminicolous species too. Although a large proportion of these islands is protected (over 60%), most of the protected areas are covered by forest (Gould et al. 2020).

Ongoing molecular studies may help to explain the current distribution of endemic and non-endemic mantids on these islands.

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