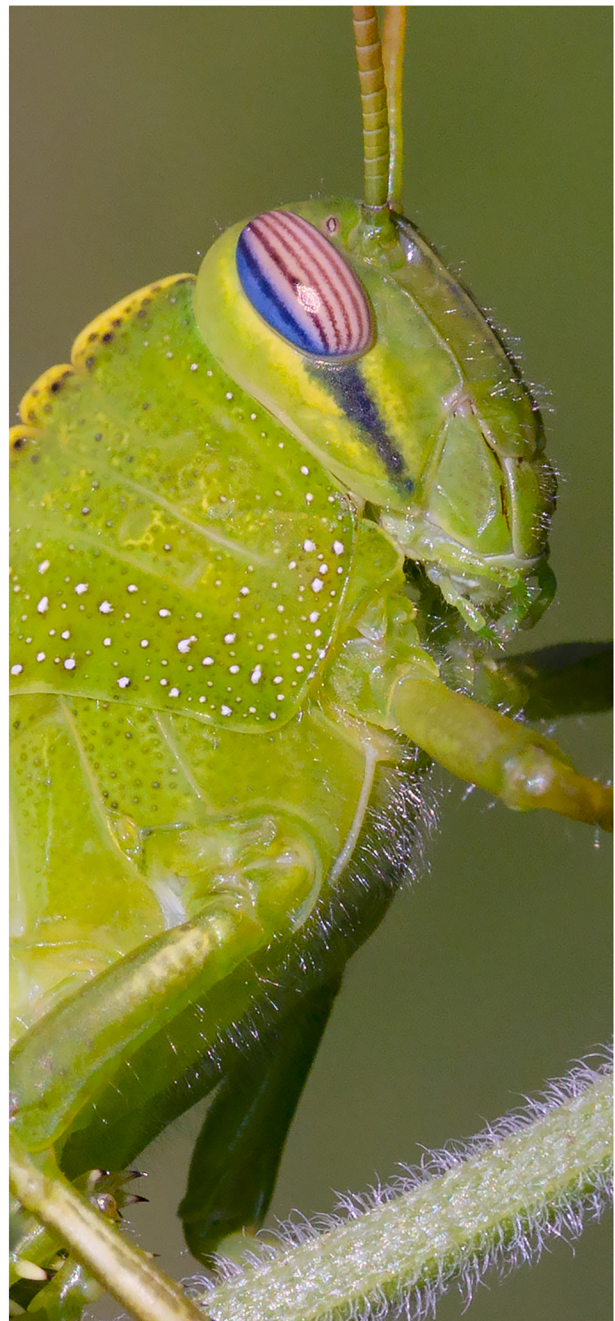
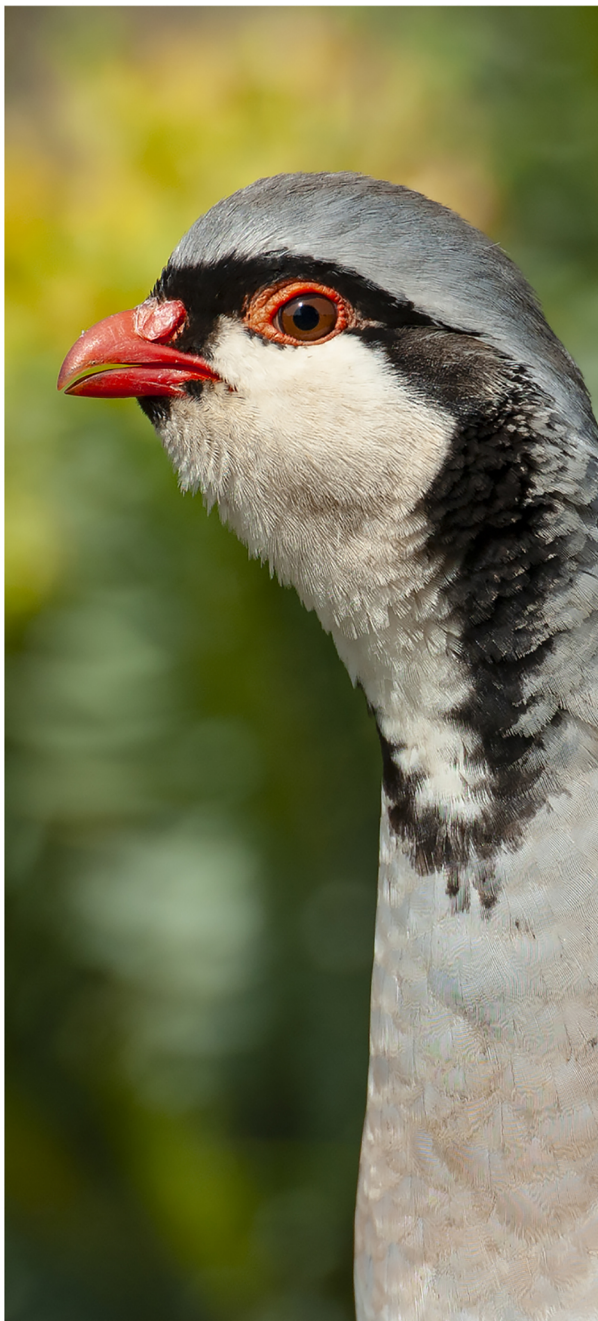


# LIFE ON ISLANDS

## BIODIVERSITY IN SICILY AND SURROUNDING ISLANDS

Studies dedicated to **Bruno Massa**



*edizioni danaus*

Tommaso La Mantia, Emilio Badalamenti, Attilio Carapezza,  
Pietro Lo Cascio & Angelo Troia (Editors)

# LIFE ON ISLANDS. 1

Biodiversity in Sicily and surrounding islands

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On the front cover a Sicilian rock partridge, *Alectoris graeca whitakeri* Schiebel, 1934 and an Egyptian locust, *Anacridium aegyptium* (Linnaeus, 1764); on the back cover a summer image of Linosa Island (photos T. Puma).

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## INSECTS OF LAMPEDUSA, LINOSA AND PANTELLERIA: ADDENDA TO THE 1995 CHECKLIST

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**SUMMARY:** 25 years after the publication of the Monograph “Arthropoda di Lampedusa, Linosa e Pantelleria” (Massa 1995a), a first update to the check-list of the Class Insects for the same islands is here presented. In the introduction, the main stages in the entomological exploration of Lampedusa, Linosa and Pantelleria are briefly reviewed, starting from the mid-1800s until the 1995 Monografia. The checking and verification of numerous sources, mainly bibliographic, allowed to collect over 500 published records concerning only one or more islands, which were sorted by Order of insects. A total of 362 insect species have been added to those listed in the 1995 Monografia: the total number of known taxa has passed from 1,403 to 1,765. In particular, Lampedusa has passed from 707 to 939 species, Linosa from 215 to 339 and Pantelleria from 850 to 1,028. Some species reported in contributions prior to 1995, and missed during the drafting of the Monografia, were also included. The knowledge gained up to now for each island and for each insect order is commented and compared to that discussed by Massa (1995b) in the final part of the Monografia. Then, some taxa are highlighted: for instance, those new to science described on specimens collected on the islands, and the specimens representing the first record for the Italian or European territory for a given species. The final part highlights the recent occurrence in these islands of many alien species, i.e. foreign to our fauna, just as it is steadily occurring in Sicily, too. Finally, through some examples, it is underlined that Linosa, compared to the other two islands, is at the moment the most underestimated concerning the effective extent of its entomological population.

**KEY WORDS:** Checklist, Insecta, Lampedusa, Linosa, Pantelleria.

**RIASSUNTO:** *Insetti di Lampedusa, Linosa e Pantelleria: addenda alla checklist del 1995.* A distanza di 25 anni dalla pubblicazione della Monografia “Arthropoda di Lampedusa, Linosa e Pantelleria” (Massa 1995a), viene qui presentato un primo aggiornamento alla check-list di queste isole, relativamente alla Classe degli Insetti. Nella parte introduttiva sono brevemente passate in rassegna le principali tappe nell’esplorazione entomologica di Lampedusa, Linosa e Pantelleria, a partire dalla metà dell’800 fino alla comparsa della Monografia del 1995. Il controllo e la verifica di numerose fonti, principalmente bibliografiche, hanno permesso di raccogliere oltre 500 reperti pubblicati, riguardanti una o più isole, che sono stati distinti per Ordine di insetti. Un totale di 362 specie di insetti sono state aggiunte a quelle già elencate nella Monografia del 1995: il numero complessivo di taxa noti passa così da 1.403 a 1.765. In particolare, Lampedusa passa da 707 a 939 specie, Linosa da 215 a 339 e Pantelleria da 850 a 1.028. Sono comprese in questi numeri anche alcune specie citate in contributi antecedenti il 1995 e sfuggiti durante la stesura della Monografia. Nei paragrafi dedicati a ciascun ordine sono commentate, per ognuna delle isole, le conoscenze oggi raggiunte rispetto a quelle raggiunte e discusse da Massa (1995b) nella parte conclusiva della Monografia. Successivamente, vengono messi in evidenza alcuni taxa: ad esempio, quelli nuovi per la scienza descritti su materiali raccolti nelle isole e gli esemplari che rappresentano la prima segnalazione per il territorio italiano o europeo di una determinata specie. Nella parte conclusiva si evidenzia la comparsa recente di molte specie aliene, ovvero estranee alla nostra fauna, così come ormai si verifica costantemente anche in Sicilia. Viene infine sottolineato, attraverso alcuni esempi, come Linosa, confrontata alle altre due isole, sia al momento la più sotto-stimata rispetto alla reale consistenza del suo popolamento entomologico.

**PAROLE CHIAVE:** Checklist, Insecta, Lampedusa, Linosa, Pantelleria.

### INTRODUCTION

25 years have passed since the publication of the monograph dedicated to the arthropod fauna of Lampedusa, Linosa and Pantelleria, which was published as a supplement to the Journal “*Il Naturalista Siciliano*” (Massa 1995a). The work, more than 900 pages, included more than 50 contributions by 58 specialists, who reported a total of 1,718 species of Arthropods, 1,403 of which belonging to the class of Insects, thus almost doubling the number of species known up to then for those islands (Table 1). Previous entomological research, which began in the mid-1800s, had been

carried out very slowly and discontinuously by individual scholars who had had the opportunity to explore some of these islands. Briefly retracing the main stages of these explorations, it must be certainly remembered Pietro Calcara (1819–1854), a doctor and professor of natural history at the University of Palermo, to whom we owe the first published works including lists of Arthropods for Linosa (Calcara 1846) and Lampedusa (Calcara 1847). The species of insects listed were, however, very few: only 3 for Linosa and 16 for Lampedusa; moreover, many of his identifications were subsequently questioned (Failla 1887). A more accurate entomological investigation, al-

though very limited in time, was carried out in Lampedusa in May 1886 by the Sicilian entomologist Luigi Failla Tedaldi (1853–1933). He published the results of his researches the following year, on the pages of the “*Il Naturalista Siciliano*” (Failla 1887), listing a total of 114 species: 66 of Coleoptera, 30 of Lepidoptera, 10 of Hymenoptera and 8 of Hemiptera. A few years later, Enrico Ragusa (1849–1924) returned to entomologically explore Lampedusa in July, adding 5 species of Lepidoptera and 30 of Coleoptera to the list published by Failla (Ragusa 1892). At Ragusa’s suggestion, a German entomologist friend of his, Karl Leopold Escherich, visited Linosa the following year, which was still unexplored in this respect. His findings, consisting of 24 species of Coleoptera and 3 of Orthoptera (Escherich 1893), were published on the “*Il Naturalista Siciliano*”. However, the first systematic exploration of the Pelagic Islands, which was organized under his direction between 1954 and 1956, is due to Edoardo Zavattari (1883–1972). The results of these researches were gathered in the Monograph “*Biogeografia delle isole Pelagie*” (Zavattari 1960), a full-bodied volume which included 415 species of insects collected in Lampedusa and Linosa. Enrico Ragusa was the first entomologist to visit Pantelleria, for which he published a list of 172 insect species, five of which were new to science (Ragusa 1875). Gestro (1880) visited the island a few years later, only for one day, but adding 11 species to those reported by Ragusa.

An important contribution to the knowledge of Pantelleria’s beetle fauna was given by the German entomologist Walter Liebmann (1885–1974), who visited the island in May 1961, and he published the following year (Liebmann 1962) a list of 66 species not mentioned by Ragusa. Finally, it should be remembered the impulse given to the entomological research in Pantelleria by the Civic Museum of Natural History of Venice, which conducted three collecting campaigns between 1983 and 1986, under the coordination of Enrico Ratti and other Venetian entomologists. These investigations were then published in several scientific papers within the “*Bollettino del Museo Civico di Storia Naturale di Venezia*”. Between 1975 and 1994, research and collections both in the Pelagic Islands and Pantelleria received a new boost and they have intensified thanks to the considerable and powerful coordination work carried out by Bruno Massa, who managed to gather around him, in an ambitious project, an active group of specialists and colleagues. In over twenty years, the conspicuous materials gathered by dozens of collectors, those collected during the cruises of the *Urania* and *Bannock* as support ships between 1990 and 1992, funded by the C.N.R. and coordinated by Prof. Baccio Baccetti, as well as other

materials made available by colleagues, were largely sorted and sent to the numerous scholars of the different groups who had joined the initiative by Prof. Massa. In a second phase, the coordination of all the specialists proved to be no less burdensome, aimed to achieve, in a relatively short and close time, the determination of all the material and the drafting of the individual contributions. The efforts by Prof. Massa, however, were profusely rewarded with the publication, in December 1995, of the Monograph “*Arthropoda di Lampedusa, Linosa e Pantelleria*” (Massa 1995a), as a full-bodied supplement to the volume 19 of the “*Il Naturalista Siciliano*” (Fig. 1).

This publication, which from here onward I will quote for brevity as *Monografia* (Massa 1995a), has been over time a point of reference for anyone who wanted to deal with the study of terrestrial arthropods of these islands. After 1995, the update of entomological data by Bruno Massa and the Author has continued and it has then merged in 2008 in the checklist of the Arthropodofauna of Lampedusa, Lampione and Linosa included in Management Plan of the Pelagic Islands (Nicolini *et al.* 2009). This checklist had resumed the checklist by Lo Valvo & Massa (1995), and



Figure 1. Cover page of the supplement of the “*Il Naturalista Siciliano*”: *Arthropoda di Lampedusa, Linosa e Pantelleria* (Massa B. ed. 1995).

represented the first update published after 1995, which added about 80 insect species for the Pelagie Islands. In addition to some unpublished data collected by Prof. Massa, the update listed all the references reporting new records, without quoting the extended bibliography at the end, that is Carapezza (1997 and 2001), Magnano & Mifsud (2001), Di Marco *et al.* (2002), Pagliano (2003), Goggi (2004), Rivers *et al.* (2007), Lo Verde & Massa (2007), Skuhrová *et al.* (2007), Pisciotta *et al.* (2008a). A few years later, at the IX national conference on biodiversity held in Valenzano (Bari), Li Causi *et al.* (2013) presented a preliminary investigation on the entomological biodiversity of Lampedusa, stating that, through bibliographic sources, they found 71 species not reported in the *Monografia* (Massa 1995a), but without listing them in detail and citing only a few taxa. The bibliography includes some of the contributions already reported by Nicolini *et al.* (2009), and the following others: Mei (1996), Pisciotta *et al.* (2008b), Raspi *et al.* (2009), Birtele *et al.* (2010 and 2011). From 1995 to date, no updated summary on Pantelleria's entomofauna has been published.

## MATERIAL & METHODS

In this study, only the new records updated to 30.11.2020 are considered, without including the species already reported in the *Monografia* (Massa 1995a). This would have entailed the tax-

onomic interpretation, with the help of scholars and specialists for each taxonomic group and in light of the most recent contributions, of all the taxa listed at the time in the text and the checklist, edited by Lo Valvo & Massa (1995), and included at the end of the volume. Over the past 25 years, indeed, the nomenclature updates (gender shifts, synonymies, revisions, reinterpretation of subspecies etc.) have been such and so many that for this contribution I could not be able to deal with the update of the whole checklist. I mainly used bibliographic sources: first of all, the search engine Google Scholar has been consulted, allowing me to collect and review 118 publications reporting insect taxa not mentioned in the *Monografia* (Massa 1995a).

Then, information was also gathered by consulting the large database (Ckmap2005, Version 5.4.1) contained in the CD attached to the volume relating to the project of the digitalized Checklist of Italian fauna (Ruffo & Stoch 2005). This archive, compiled by several specialists, contains many unpublished data. Other records have been collected searching in naturalistic and entomological forums present on the web, that is naturamediterraneo.com and entomologiitaliani.net. I checked and verified these data, discarding all cases in which the correctness of the determination could not be ascertained; however, their use poses new issues for the scientific world and standardization and rules for their use/acceptance should be moved forward. For study area see also figures 2–6.



Figure 2. Pantelleria has been modified by man and large terraced areas and natural areas coexist on the island, with colonization processes following the abandonment of coltures (photo T. La Mantia).



Figure 3. The signs of cultivation are also evident in the crater of Monte Gibele but together with Montagna Grande it represents the forest heart of the island of Pantelleria (photo T. La Mantia).



Figure 4. The intense flowering of *Charybdis panocraton* (formerly *Scilla* or *Urginea maritima*) in Lampedusa attracts several insects (photo T. La Mantia).

Finally, some data were acquired through personal communications from friends and colleagues whom I thank here. The knowledge gained up to now for each island and for each insect order is commented and compared to that discussed by Massa (1995b) in the final part of the *Monografia*. Then, some taxa are highlighted; particularly those new to science described on samples collected on the islands, and the samples

representing the first record for the Italian or European territory for a given species.

For each order, all the species reported after the appearance of the Monograph (Massa 1995a) or omitted at the time. For the each order we reported: species and author; island to which the find refers (LAM = Lampedusa; LIN = Linosa; LMP = Lampione; PAN = Pantelleria); bibliographic reference; any explanatory note at the foot of the



Figure 5. Linosa despite the strong changes undergone by the vegetation over the centuries still hosts numerous arthropods of great interest (photo T. La Mantia).



Figure 6. The islet of Lampione hosts numerous arthropods of great biogeographical interest (photo T. La Mantia).

page. The new reports are indicated with the symbol "+", while the asterisk "\*" indicates that the species was already known for that island.

## RESULTS

More than 500 records concerning one or more islands have been reviewed and listed. Some species reported in contributions prior to 1995,

and missed during the drafting of the *Monografia*, were also included. A total of 362 insect species not listed in the *Monografia* (Massa 1995a) were added, increasing the total number of known taxa for all the islands from 1,403 to 1,765 (Table 1). In particular, the number of reported species increased from 707 to 939 (+ 232) in Lampedusa, from 215 to 339 (+ 124) in Linosa and from 850 to 1,028 (+ 178) in Pantelleria.



ORDER	Lampedusa and Lampione			Linosa			Pantelleria			Number of species		
	<1995	1995	2020	<1995	1995	2020	<1995	1995	2020	<1995	1995	2020
ODONATA	1	3	17	1	1	15	4	6	9	4	7	21
DERMAPTERA	3	3	4	3	3	3	2	2	2	4	4	5
ISOPTERA	0	0	1	0	0	1	0	2	2	0	2	2
BLATTODEA	4	6	6	3	3	3	1	5	5	4	6	6
MANTODEA	2	4	5	0	1	1	2	4	4	3	5	6
PHASMATODEA	0	0	0	1	1	1	0	1	1	1	1	1
ORTHOPTERA	22	34	39	9	10	13	8	23	26	27	45	51
THYSANOPTERA	0	0	0	0	3	3	0	1	1	0	3	3
HEM. HETEROPTERA	46	82	84	7	14	14	83	121	125	110	172	176
HEM. HOMOPTERA	34	38	40	5	20	23	15	128	132	49	148	153
NEUROPTERA	6	11	11	3	4	4	3	6	7	7	12	13
COLEOPTERA	173	267	330	50	83	141	284	390	416	433	586	692
DIPTERA	37	37	86	16	24	42	26	43	54	69	93	149
LEPIDOPTERA	63	76	119	16	19	45	25	70	123	85	126	212
HYMENOPTERA	60	142	190	7	25	26	16	48	121	76	188	267
EMBIOPTERA	0	0	1	0	0	0	0	0	0	0	0	1
SIPHONAPTERA	0	0	2	0	0	0	0	0	0	0	0	2
ZYGENTOMA	4	4	4	4	4	4	0	0	0	5	5	5
<b>Total</b>	<b>455</b>	<b>707</b>	<b>939</b>	<b>125</b>	<b>215</b>	<b>339</b>	<b>469</b>	<b>850</b>	<b>1028</b>	<b>877</b>	<b>1403</b>	<b>1765</b>

Table 1. Number of species known for Lampedusa, Linosa and Pantelleria sorted by insect order. (<1995 = before the publication of the Monografia (Massa 1995a); 1995 = after the publication of the Monografia; 2020 = following this update).

## ODONATA

Pavesi & Utzeri (1995) listed a total of 7 species of Odonata, but only five of which were reconfirmed from the material collected during repeated visits in all seasons from 1982 to 1992. The two authors believed that the population of these islands could be considered well known, due to their hostility for the maintenance of stable populations. Differently, the sighting or collection of specimens in migration or dispersal phases carried out in the following years especially by Andrea Corso, allowed to triple the total number of species reported for the three islands, thus adding 14 new taxa and bringing the total to 21 (Table 1). Linosa, where *Tramea basilaris* (Palisot de Beauvois 1807) was observed and photographed, represents for this species the first record for north of the Sahara, for Europe and the Western Palearctic. *Sympetrum sinaiticum* Dumont, 1977 and *Pantala flavescens* (Fabricius 1798), observed in Lampedusa and Linosa, are indicated for the first time for the Italian fauna.

### Aeshnidae

*Aeshna mixta* Latreille, 1805 - LAM +, LIN +, PAN + (Corso et al. 2012).

*Anax ephippiger* (Burmeister, 1839) - LAM \*, LIN +, LMP +, PAN + (Corso et al. 2012).

*Anax imperator* Leach, 1815 - LAM +, LIN +, LMP +, PAN \* (Corso et al. 2012).

*Anax parthenope* (Sélys, 1839) - LAM \*, LIN +, LMP +, PAN \* (Corso et al. 2012).

### Calopterygidae

*Calopteryx haemorrhoidalis* (Vander Linden, 1825) - LIN + (?) (Corso et al. 2012). Remarks: a female observed but not collected; hence the identification at specific rank is doubtful.

### Coenagrionidae

*Ischnura fontaineae* Morton, 1905 - LIN +, PAN \* (Corso et al. 2012).

*Ischnura genei* (Rambur, 1842) - LAM + (?), LIN + (Corso et al. 2012). Remarks: two specimens observed at Lampedusa but not collected; hence, the identification at specific rank is doubtful.

### Libellulidae

*Brachythemis impartita* (Karsch, 1890) - LIN + (Corso et al. 2012).

*Crocothemis erythraea* (Brullé, 1832) - LAM + (Romano 2006), LIN + (Corso et al. 2012).

*Orthetrum coerulescens anceps* (Schneider, 1845) - LAM + (Corso et al. 2012).

*Orthetrum nitidinerve* (Sélys, 1841) - LAM + (Corso et al. 2012).

*Orthetrum trinacria* (Sélys, 1841) - LAM +, PAN \* (Corso et al. 2012).

*Pantala flavescens* (Fabricius, 1798) - LAM +, LIN + (Corso et al. 2012).

*Sympetrum fonscolombii* (Sélys, 1840) - LAM \*, LIN \*, LMP +, PAN \* (Nicolini et al. 2009; Corso et al. 2012).

*Sympetrum meridionale* (Sélys, 1841) - LAM + (Corso *et al.* 2012).

*Sympetrum sinaiticum* Dumont, 1977 - LAM +, LIN + (?) (Corso *et al.* 2012). Remarks: a specimen observed at Linosa but not collected; hence, the identification at specific rank is doubtful.

*Sympetrum striolatum* (Charpentier, 1840) - LAM +, LIN +, PAN + (Corso *et al.* 2012).

*Tramea basilaris* (Palisot de Beauvois, 1807) - LIN + (Viganò *et al.* 2017).

*Trithemis annulata* (Palisot de Beauvois, 1807) - LAM + (Corso *et al.* 2012).

*Trithemis kirbyi* Sélys, 1891 - LAM + (Corso *et al.* 2012), LIN + (Corso *et al.* 2017).

#### DERMAPTERA, ISOPTERA, BLATTODEA, MANTODEA, PHASMATODEA, ORTHOPTERA

For these orders, Baccetti *et al.* (1995) listed a total of 63 species for the three islands distributed as follows: 4 Dermaptera, 2 Isoptera, 6 Blattodea, 5 Mantodea, 1 Phasmatodea and 45 Orthoptera (Table 1). In light of the intense research efforts on these groups, the authors stated that the population of these areas could be considered well known. To date, these considerations appear to be largely correct as only 8 species have been added after 1995; the total number of species known for these islands has thus increased up to 71 species.

##### DERMAPTERA Anisolabididae

*Anisolabis maritima* (Bonelli, 1832) - LAM + (Fontana *et al.* 2002).

##### ISOPTERA Kalotermitidae

*Kalotermes flavicollis* (Fabricius, 1793) - LAM +, LIN +, PANT \* (Sbrenna & Micciarelli Sbrenna 2008).

##### MANTODEA Mantidae

*Ameles picteti* (Saussure, 1869) - LAM + (Battiston & Fontana 2005).

##### ORTHOPTERA

###### Acrididae

*Acrotylus longipes longipes* (Charpentier, 1845) - LAM +, LMP + (Massa 2011).

*Aiolopus thalassinus thalassinus* (Fabricius, 1781) - LAM \*, PAN + (Fontana *et al.* 2005).

*Chorthippus brunneus brunneus* (Thunberg, 1815) - LAM + (Fontana *et al.* 2005).

*Schistocerca gregaria* (Forskål, 1775) - LAM + (Cillo *et al.* 2012).

###### Gryllidae

*Brachytrupes megacephalus* (Lefèbvre, 1827) - LAM +, LIN \* (Prazzi *et al.* 2014).

*Gryllomorpha dalmatina* (Ocskay, 1832) - LIN + (Corso & Viganò 2019).

###### Mogoplistidae

*Pseudomogoplistes squamiger* (Fischer, 1853) - LIN +, PAN + (Fontana *et al.* 2005).

##### Tettigoniidae

*Decticus albifrons* (Fabricius, 1775) - LAM \*, LIN \*, PAN + (Fontana *et al.* 2005).

*Phaneroptera nana nana* Fieber, 1853 - LAM +, PAN \* (Fontana *et al.* 2005).

*Platycleis sabulosa* Azam, 1901 - LIN + (Fontana *et al.* 2005).

#### HEMIPTERA HETEROPTERA

Carapezza (1995) listed a total of 172 species for this order for the three islands, 62 of which reported for the first time (Table 1). He wrote that the knowledge of the Heteroptera of the Italian islands of the Sicilian Channel could be considered satisfactory. In fact, after 25 years, this is the Order that has registered the smallest numerical increase. Only four species have been reported for the three islands after 1995, two of which by Carapezza himself (1997, 2001). The total number of known species increased up to 176 species.

##### Coreidae

*Leptoglossus occidentalis* Heidemann, 1910 - PAN + (Buck 2018a).

##### Corixidae

*Sigara lateralis* (Leach, 1817) - LAM \*, PAN + (Bacchi & Rizzotti Vlach 2005).

##### Lygaeidae

*Lygaeus creticus* Lucas, 1854 - PAN + (Cianferoni *et al.* 2018).

*Spilostethus pandurus* (Scopoli, 1763) - LAM \*, PAN + (Buck 2017a).

##### Miridae

*Closterotomus tunetanus* (Wagner, 1942) - LAM + (Carapezza 1997).

##### Pyrrhocoridae

*Scantius aegyptius aegyptius* (Linnaeus, 1758) - LAM \*, LIN \*, LMP +, PAN \* (Lo Cascio & Pasta 2012).

##### Reduviidae

*Oncocephalus putoni* Reuter, 1882 - LAM + (Carapezza 2001).

#### HEMIPTERA HOMOPTERA

The Homoptera Hemiptera were the subject of several contributions within the *Monografia* (Massa 1995a). The research carried out in that period allowed to triple the number of known species, from 49 to 148. In particular, the largest increase concerned Pantelleria, with 113 species added to the 15 previously known species (Table 1). The authors of various contributions (D'Urso & Guglielmino 1995; Rapisarda 1995; Barbagallo 1995; Russo 1995) agreed that the knowledge acquired was still far from the effective extent of this Order for the three islands. However, the subsequent research

has not brought significant changes, and only 5 species have been added to those already known, bringing the total to 153 species.

#### Aphididae

*Aploneura lentisci* (Passerini, 1856) - LAM \*, LIN +, PAN \* (Nicolini *et al.* 2009).

*Dysaphis crataegi* (Kaltenbach, 1843) - LMP +, PAN \* (Lo Cascio & Pasta 2012).

#### Cixiidae

*Tachycixius remanei* D'Urso, 1999 - PAN + (D'Urso 1999).

#### Issidae

*Clybeccus declivus* (Dlabola, 1986) - LAM +, PAN + (Gnezdilov 2003).

*Latilica tunetana* (Matsumura, 1910) - LIN +, PAN + (Gnezdilov & Mazzoni 2004).

*Numidius litus* Gnezdilov, Guglielmino & D'Urso, 2003 - PAN + (Gnezdilov *et al.* 2003). Remarks: D'Urso & Guglielmino (1995) referred to *Hysteropterum algiricum* (Lucas 1849) the specimens from Pantelleria. Further studies allowed us to assign them to this new species, occurring also in Tunisia.

#### Pseudococcidae

*Trabutina mannipara* (Hemprich & Ehrenberg, 1829) - LIN + (Nicolini *et al.* 2009; Cerasa & Lo Verde 2018).

### NEUROPTERA

Only one species of Neuroptera has been added to the 12 species already listed for the three islands by Pantaleoni & Lo Valvo (1995). However, it is a new species for science, collected in Pantelleria and described on a male at the larval stage and then developed in captivity. Numerous other specimens of this species were subsequently collected on the same island and also in Sicily, in the province of Trapani. The authors have hypothesized that the distribution of this species may also include northern Tunisia.

#### Myrmeleontidae

*Myrmeleon punicanus* Pantaleoni & Badano, 2012 - PAN + (Pantaleoni & Badano 2012).

### COLEOPTERA

Beetles undoubtedly represent the larger entomological group on the islands. Numerous specialists were involved by Prof. Massa for the various contributions in the *Monografia* (Massa 1995a), and more than 60 families were treated in the text or in the checklist provided at the end of the volume, edited by Lo Valvo & Massa (1995). The field research allowed to increase the total number of beetle species known for the three main islands from 433 to 586. Some families were

more deeply investigated than others, as a consequence of the contribution from various specialists for different insect groups. The researches carried out successively by numerous coleopterologists, mostly Italian, has allowed to further increase the number of known species, namely from 586 to 692. Table 2 shows, for each family of Coleoptera and for each island, the number of species known before the publication of the *Monografia* (Massa 1995), after its publication and, finally, this update.

Among the systematic groups for which the exploration was considered sufficient (Massa 1995a), the major changes in the last two decades have concerned the Curculionoidea (Attelabidae, Apionidae, Brachyceridae and Curculionidae). Osella & Riti (1995), who had dealt with the study of this group, considered the until then acquired knowledge (98 species known) as good and they estimated a possible future percentage increase of around 20%. Instead, with the current data (126 known taxa), almost a 30% increase has been already reached. Diotti *et al.* (2017), spending less than a week in Lampedusa (from 3 to 7 May 2016), were able to collect 30 species of Curculionoidea, including 11 newly recorded for the island. Given the considerably high number of dune and backdune herbaceous plants potentially hosting curculionids, these authors believed that a capillary collection with mowing could remarkably increase the species known for Lampedusa. Among taxa more or less recently reported, three species of Curculionidae are new to science: *Otiorhynchus (Arammichnus) poggii* Di Marco, Osella et Zuppa, 2002 described for Lampione, *Echinodera diottii* Stüben, 2010, described for Pantelleria, *Neumatoma annamariae* Magrini, Abbazzi et Petrioli, 2013, described for Lampedusa. Since they have not been reported outside these islands, they are endemic, along with the many others already known. Still among the Curculionoidea, the most interesting additions are *Chiloneus hoffmanni* (González 1970) (Curculionidae), once considered endemic to Malta and now found in Lampedusa (Casalini *et al.* 2017), *Brachycerus normandi* Desbrochers des Loges 1898 (Brachyceridae), once known only for North Africa and now reported by Colonnelli *et al.* (2016) for Lampedusa and *Allomalina setulosa* (Tournier, 1868) (Nanophyidae), a widely distributed species, collected by shaking flowering branches of *Tamarix africana* Poir. (Diotti *et al.* 2017) and new to Italy. The number of species known up to date of Cerambycidae has almost doubled, from 11 to 19 species. *Agapanthia lopadusae* Rapuzzi et Sparacio, 2017 is certainly the most interesting species added to the endemisms of Lampedusa. Among the Meloidae, a particular mention deserves *Meloe saharensis* Chobaut, 1898, reported for

Family	Lampedusa and Lampione			Linosa			Pantelleria			Total number of species		
	<1995	1995	2020	<1995	1995	2020	<1995	1995	2020	<1995	1995	2020
Alleculidae <sup>1</sup>	1	1	1	0	0	0	1	1	1	2	2	2
Anobiidae	2	6	7	0	0	3	2	6	6	4	11	13
Anthicidae	4	8	8	3	4	4	7	8	8	8	12	12
Aphodiidae	6	8	8	4	5	7	6	7	9	13	14	16
Apionidae <sup>2</sup>	5	7	13	0	0	2	8	16	16	13	19	26
Attelabidae	0	0	0	0	0	0	0	1	1	0	1	1
Bostrychidae <sup>3</sup>	0	1	1	0	0	1	0	4	4	0	4	5
Brachyceridae	4	4	5	0	0	1	1	2	2	4	4	5
Bruchidae	0	2	5	0	0	0	3	12	12	3	14	17
Buprestidae	2	4	4	0	0	0	3	6	6	5	9	9
Byrrhidae	0	1	1	0	0	0	0	0	0	0	1	1
Cantharidae	0	1	1	0	0	0	2	2	4	2	3	5
Carabidae	22	28	30	10	18	22	39	40	42	57	66 <sup>4</sup>	68
Catopidae	0	0	0	0	0	0	4	4	4	4	4	4
Cebionidae	0	2	2	0	0	0	0	0	0	0	2	2
Cerambycidae	2	6	14	1	2	5	4	10	11	5	11	19
Cetoniidae	3	3	3	0	1	2	2	2	3	3	3	5
Chrysomelidae	4	12	17	0	3	5	22	25	28	24	35	42
Cleridae	1	1	1	0	0	1	0	0	1	1	1	3
Coccinellidae	3	17	22	0	0	5	4	14	14	7	25	30
Corylophidae	1	1	2	0	0	0	2	2	2	3	3	4
Cryptophagidae	0	2	3	0	0	2	9	9	9	9	10	13
Cucujidae	0	0	0	0	0	0	2	2	2	2	2	2
Curculionidae	24	38	56	2	11	20	24	48	51	47	74	94
Dermestidae	4	5	6	0	0	1	3	3	3	6	7	9
Drilidae	1	1	1	0	0	0	0	0	0	1	1	1
Dynastidae	0	0	0	1	1	1	1	1	1	1	1	1
Dytiscidae	0	0	1	0	0	0	3	3	3	3	3	4
Elateridae	1	1	1	1	1	1	1	1	3	2	2	4
Geotrupidae	0	0	0	0	0	1	1	1	1	1	1	2
Histeridae	7	10	11	0	0	0	10	11	12	15	16	18
Hybosoridae	0	0	0	0	1	1	0	0	0	0	1	1
Hydraenidae	0	0	1	0	0	0	0	0	0	0	0	1
Hydrophilidae	1	1	2	0	0	0	5	5	5	6	6	7
Ipidae	0	0	0	0	0	0	1	1	1	1	1	1
Kateteridae	0	1	1	0	1	1	1	2	2	1	2	2
Lampyridae	0	1	1	0	0	0	0	0	0	0	1	1
Languriidae	0	0	0	0	0	0	1	2	2	1	2	2

Lariidae	0	1	1	0	0	0	1	1	1	1	2	2
Latridiidae	2	4	4	0	1	2	5	6	6	5	8	8
Leiodidae	0	0	0	0	0	0	1	1	1	1	1	1
Leptinidae	0	0	0	0	0	0	1	1	1	1	1	1
Lyctidae	0	0	0	0	0	0	0	1	1	0	1	1
Meloidae	4	6	7	0	0	0	1	2	2	5	7	8
Melolonthidae	2	2	2	0	0	1	3	4	4	5	5	5
Melyridae	8	10	10	1	1	1	9	12	12	14	17	17
Merophysiidae	0	1	1	0	0	0	1	2	2	1	3	3
Mordellidae	4	4	5	0	0	0	1	1	1	5	5	6
Mycetophagidae	0	1	1	0	0	1	1	1	1	1	1	1
Nitidulidae	0	7	7	0	1	1	7	18	19	7	18	19
Oedemeridae	3	3	3	0	0	0	0	1	1	3	4	4
Phalacridae	2	2	4	0	1	3	2	5	5	3	6	8
Ptiliidae	0	0	0	0	0	0	0	0	1	0	0	1
Ptinidae	1	1	2	0	0	1	0	1	1	1	2	4
Scaphididae	0	0	0	0	0	0	1	1	1	1	1	1
Scarabaeidae	2	2	2	0	1	2	4	4	4	4	4	5
Scolytidae	0	1	1	0	0	2	0	1	1	0	1	3
Scraptiidae	0	1	1	0	1	1	0	0	0	0	2	2
Scydmaenidae	3	3	3	0	0	0	0	0	0	3	3	3
Silvanidae	0	0	1	0	0	0	1	1	1	1	1	1
Staphylinidae	12	13	16	11	12	21	48	50	55	65	67 <sup>5</sup>	82
Tenebrionidae	31	31 <sup>6</sup>	32	16	17	19	24	24	25	51	51	52
Trogidae	1	1	1	0	0	0	1	1	1	1	1	2
<b>Total</b>	<b>173</b>	<b>267</b>	<b>333</b>	<b>50</b>	<b>83</b>	<b>141</b>	<b>284</b>	<b>390</b>	<b>416</b>	<b>433</b>	<b>586</b>	<b>692</b>

Table 2. Number of species known for Lampedusa, Linosa and Pantelleria sorted by family of Coleoptera. Periods: <1995 = before the publication of the Monografia (Massa 1995a); 1995 = after the publication of the Monografia; 2020 = following this update. Notes: <sup>1</sup>today considered as a subfamily of Tenebrionidae; <sup>2</sup>it also includes the Nanophyidae family; <sup>3</sup>it includes the Lyctinae subfamily, reported as Lyctidae family by Nardi & Ratti, 1995; <sup>4</sup>Vigna Taglianti (1995) also lists 21 dubious or erroneous species; <sup>5</sup>this number includes 7 species of Staphylinidae Pselaphinae: 2 for Lampedusa, 1 for Linosa and 7 for Pantelleria; <sup>6</sup>three taxa were recorded only for Lampedusa.

Lampedusa, which represents the first record for Italy and the third for Europe. Among the 15 species of Staphylinidae that are added to those already known, it is interesting the record of *Heterothops canariensis* Israelson, 1979, a species once known only for the Canary Islands and Morocco and recently found in Lipari and Linosa (Bordoni 2013).

It should be emphasized that the in-depth

study of some taxa, already known for the islands and hitherto identified as species also present in Sicily, revealed their *status* either as a distinct species or subspecies and therefore endemic of the islands of the Channel of Sicily. They are *Carabus morbillosus lampedusae* Born, 1925 (Carabidae), *Probaticus cossyrensis* Sparacio, 2007 (Tenebrionidae), *Agapanthia lopadusae* Rapuzzi et Sparacio, 2017 (Cerambycidae), *Pachydemus lo-*

*padusanorum* Sparacio, La Mantia et Bellavista, 2018 (Fig. 7), *Pseudoapterogyna maraventanoi* Sparacio, 2018, and *Pseudoapterogyna euphytus lamantiai* Sparacio 2014 (Melolonthidae).

#### Anobiidae

*Gastrallus corsicus* Schilsky, 1898 - LAM \*, LIN + (Goggi 2004).

*Metholcus cylindricus* (Germar, 1817) - LAM \*, LIN + (Goggi 2004).

*Nicobium castaneum* (Olivier, 1790) - LIN + (Goggi 2004).

*Ptinus obesus* Lucas, 1849 - LMP + (Lo Cascio & Pasta 2012).

#### Aphodiidae

*Bodilus lugens* (Creutzer, 1799) - LIN + (M. Arnone [pers. comm.])

*Calamosternus algericus* (Mariani & Pittino, 1983) - LIN + (Arnone 2010).

*Labarrus lividus* (Olivier, 1789) - LIN \*, PAN + (Violi 2015a).

*Subrinus vitellinus* (Klug, 1845) - LAM \*, LIN \*, PAN + (Ziani 1997).

#### Apionidae

*Allomalina setulosa* (Tournier, 1868) - LAM + (Diotti *et al.* 2017). Remarks: according to the recent classification, this taxon belongs to the family Nanophyidae.

*Apion marchicum* Herbst, 1797 - LAM + (Goggi 2004).

*Apion pisi* (Fabricius, 1801) - LIN + (Goggi 2004).

*Apion trifolii* (Linnaeus, 1768) - LIN + (Goggi 2004).

*Aspidapion aeneum* (Fabricius, 1775) - LAM +, PAN \* (Diotti *et al.* 2017).

*Aspidapion soror* (Rey, 1895) - LAM + (Goggi 2004).

*Ceratapion gibbirostre* (Gyllenhal, 1813) - LAM + (Diotti *et al.* 2017).

*Corimalia tamarisci* (Gyllenhal, 1838) - LAM + (Diotti *et al.* 2017). Remarks: according to the recent classification, this taxon belongs to the family Nanophyidae.

*Malvapion malvae* (Fabricius, 1775) LAM \*, LMP +, PAN \* (Goggi 2004).

#### Bostrychidae

*Xylopertha praeusta* (Germar, 1817) - LIN + (Goggi 2004).

#### Brachyceridae

*Brachycerus normandi* Desbrochers des Loges, 1898 - LAM + (Colonnelli *et al.* 2016).

*Brachycerus schatzmayri* Zumpt, 1937 - LAM \*, LIN + (Goggi 2004).

#### Bruchidae

*Bruchidius pusillus* (Germar, 1824) - LAM + (Goggi 2004).

*Bruchidius raddianae* (Anton & Delobel, 2003) - LAM + (Toma *et al.* 2017).

*Spermophagus sericeus* (Geoffroy, 1785) - LAM + (Goggi 2004).

#### Cantharidae

*Malthinus inflavus* Marseul, 1878 - PAN + (Dodero 1916).

*Malthinus pallidipes* Fairmaire, 1884 - PAN + (Constantin 1979).

#### Carabidae

*Amara simplex* Dejean, 1828 - LAM \*, LIN + (Goggi 2004).

*Calosoma olivieri* Dejean, 1831 - LAM \*, PAN + (Romano 2010). Remarks: from a record of A. Corso (Fig. 8).



Figure 7. *Pachydemus lopadusanorum* is a narrow endemic melolonthid beetle recently described for Lampedusa (male on the left, female on the right) (photos M. Romano).

*Carabus morbillosus lampedusae* Born, 1925 - LAM +, LIN \* (Rapuzzi & Sparacio 2015). Remarks: the population of *Carabus morbillosus* (Fabricius) from Lampedusa was referred by Vigna Taglianti (1995) to the nominal subspecies. Rapuzzi & Sparacio (2015) have reconsidered the subspecies "*lampedusae*", previously treated as synonym of this latter. The species is also recorded for Linosa (Vigna Taglianti 1995), but its subspecific status is still unresolved.

*Cymindis suturalis* Dejean, 1825 - LAM \*, LIN + (Goggi 2004).

*Dromius crucifer crucifer* (Lucas, 1846) - LAM +, LIN + (Goggi 2004).

*Harpalus attenuatus* Stephens, 1828 - LAM \*, LIN + (Goggi 2004).

*Poecilus gisellae* (Csiki, 1930) - LAM +, PAN + (Schatzmayr 1930). Remarks: this record was reported by Casale *et al.* (2005).

*Syntomus fuscomaculatus* (Motschulsky, 1844) - LAM \*, LIN \*, LMP +, PAN \* (Lo Cascio 2004).

#### Cerambycidae

*Agapanthia lopadusae* Rapuzzi & Sparacio, 2017 - LAM + (Rapuzzi & Sparacio 2017). Remarks: a population of this species, identified as *Agapanthia asphodeli* (Latreille), was already recorded for Lampedusa by Pisciotta *et al.* (2008a).

*Cephalocrius syriacus* (Reitter, 1895) - PAN + (Sparacio *et al.* 2019).

*Chlorophorus glabromaculatus* (Goeze, 1777) - LAM + (Pisciotta *et al.* 2008a).

*Chlorophorus varius* (Müller, 1766) - LAM + (Pisciotta *et al.* 2008a).



Figure 8. *Calosoma olivieri* is a large ground beetle rarely recorded in Sicily and some surrounding islands (photo M. Romano).

*Hylotrupes bajulus* (Linnaeus, 1758) - LAM +, LIN + (Goggi 2004).

*Parmena algirica* Castelnau, 1840 - LAM \*, LIN +, PAN \* (Goggi 2004) (Fig. 9).

*Penichroa fasciata* (Stephens, 1831) - LAM \*, LIN + (Goggi 2004) (Fig. 10).



Figure 9 (left). The longhorn beetle *Parmena algirica* is a north-African species that occurs in the Pelagie islands. Figure 10 (right). The longhorn beetle *Penichroa fasciata* (photos M. Romano).

- Phoracantha recurva* Newman, 1840 - LAM + (Pisciotta *et al.* 2008a).  
*Stenopterus ater* (Linnaeus, 1767) - LAM + (Pisciotta *et al.* 2008a).  
*Stenopterus rufus rufus* (Linnaeus, 1767) - LAM + (Pisciotta *et al.* 2008a).  
*Trichoferus holosericeus* (Rossi, 1790) - LAM +, PAN \* (Pisciotta *et al.* 2008a).
- Cetoniidae**  
*Cetonia aurata sicula* Aliquò, 1983 - LIN + (Goggi 2004).  
*Protaetia (Potosia) opaca* (Fabricius, 1787) - PAN + (Sparacio & La Mantia 2018).
- Chrysomelidae**  
*Cassida vittata* Villers, 1789 - LAM +, PAN \* (Goggi 2004).  
*Cryptocephalus blanduloides* Normand, 1947 - PAN + (Sassi 2005).  
*Cryptocephalus curvilinea* Olivier, 1808 - LAM + (Sassi 2005).  
*Cryptocephalus fulvus* (Goeze, 1777) - LIN + (Goggi 2004).  
*Cryptocephalus macellus* Suffrian, 1860 - PAN + (Sassi 2005).  
*Cryptocephalus politus* Suffrian, 1853 - LAM + (Goggi 2004).  
*Hispa atra* Linnaeus, 1767 - PAN + (Maulik 1939).  
*Longitarsus echii* (Koch, 1803) - LAM +, LIN \* (Baviera & Biondi 2015).  
*Phyllotreta rufitarsis* Allard, 1859 - LAM \*, LIN + (Heikertinger 1941).  
*Psylliodes marcida* (Illiger, 1807) - LAM + (Baviera & Biondi 2015).
- Cleridae**  
*Opilo domesticus* (Sturm, 1837) - PAN + (Di Giovanni 2007).  
*Tarsostenus univittatus* (Rossi, 1792) - LIN + (Goggi 2004).
- Coccinellidae**  
*Chilocorus bipustulatus* (Linnaeus, 1758) - LAM +, PAN \* (Goggi 2004).  
*Henosepilachna elaterii elaterii* (Rossi, 1794) - LAM + (Goggi 2004).  
*Hippodamia variegata* (Goeze, 1777) - LAM \*, LIN + (Goggi 2004).  
*Myrrha octodecimguttata formosa* (Costa, 1849) - LAM +, LIN + (Goggi 2004).  
*Oenopia doublieri* (Mulsant, 1846) - LAM + (Goggi 2004).  
*Rhizobius litura* (Fabricius, 1787) - LAM \*, LIN + (Goggi 2004).  
*Scymnus interruptus* (Goeze, 1777) - LAM + (Goggi 2004).  
*Scymnus nubilus* Mulsant, 1850 - LAM \*, LIN +, PAN \* (Goggi 2004).  
*Stethorus punctillum* (Weise, 1891) - LIN + (Goggi 2004).
- Corylophidae**  
*Teplinus velatus* (Mulsant & Rey, 1861) - LAM + (Goggi 2004).
- Cryptophagidae**  
*Cryptophagus cellaris* (Scopoli, 1763) - LIN + (Goggi 2004).  
*Cryptophagus fasciatus* Kraatz, 1852 - LAM + (Angelini 2005).  
*Micrambe vini* (Panzer, 1797) - LIN + (Goggi 2004).
- Curculionidae**  
*Acalles teter* Bohemann, 1844 - LIN +, PAN \* (Goggi 2004).  
*Amaurorhinus bewickianus* (Wollaston, 1860) - LMP +, PAN \* (Osella *et al.* 2005).  
*Amaurorhinus obscuripennis* Pic, 1905 - LAM + (Goggi 2004).  
*Baris coerulescens* (Scopoli, 1763) - LAM + (Goggi 2004).  
*Chiloneus hoffmanni* (González, 1970) - LAM + (Casalini *et al.* 2017).  
*Echinodera diottii* Stüben, 2010 - PAN + (Stüben 2010).  
*Horridorhinus asper* (Allard, 1870) - LAM \*, LIN +, PAN \* (Goggi 2004).  
*Hypera (Hypera) jucunda* (Capiomont, 1868) - LAM + (Diotti *et al.* 2017).  
*Larinus (Larinus) carinirostris* Gyllenhal, 1835 - LAM + (Diotti *et al.* 2017).  
*Lixus brevirostris* Boheman, 1835 - LAM + (Goggi 2004).  
*Lixus fasciculatus* Boheman, 1835 - LIN + (Goggi 2004).  
*Mecinus simus* (Mulsant & Rey, 1859) - LAM \*, LIN + (Goggi 2004).  
*Microplontus rugulosus* (Herbst, 1795) - LAM +, PAN \* (Diotti *et al.* 2017).  
*Mogulones peregrinus* (Gyllenhal, 1837) - LAM + (Diotti *et al.* 2017).  
*Neumatoma annamariae* Magrini, Abbazzi et Petrioli, 2013 - LAM + (Magrini *et al.* 2013).  
*Otiorhynchus poggii* Di Marco, Osella et Zuppa, 2002 - LMP + (Di Marco *et al.* 2002).  
*Phyllobius etruscus* Desbrochers, 1873 - LIN + (Goggi 2004).  
*Pselactus spadix* (Herbst, 1795) - LAM + (Osella *et al.* 2005).  
*Rhamphus pulicarius* (Herbst, 1795) - LAM +, LIN + (Goggi 2004).  
*Rhinusa moroderi* (Reitter, 1907) - LAM + (Diotti *et al.* 2017), PAN + (Caldara 2008).  
*Rhynchophorus ferrugineus* (Olivier, 1790) - LAM + (Lo Verde & Massa 2007), LIN + (Fiorello *et al.* 2015).  
*Rhynocyllus conicus* (Frölich, 1792) - LAM +, PAN \* (Goggi 2004).  
*Sibinia (Sibinia) primita* (Herbst, 1795) - LAM + (Diotti *et al.* 2017).  
*Smicronyx nebulosus* (Tournier, 1874) - LIN + (Goggi 2004 sub *S. rugicollis* Rey).  
*Torneuma clandestinum* Magnano et Mifsud, 2001



- LAM + (Magnano & Mifsud 2001). Remarks: previously recorded for Lampedusa as *Torneuma filum* Solari (in litteris) (*nomen nudum*) (see Gridelli 1960).

*Torneuma exstinguendum* Magnano et Mifsud, 2001 - LAM + (Magnano & Mifsud 2001). Remarks: previously recorded for Lampedusa as *Torneuma doderoi* Solari (in litteris) (*nomen nudum*) (see Gridelli 1960).

*Trachyphloeus laticollis* Boheman, 1843 - LIN +, PAN \* (Goggi 2004).

*Tychius (Tychius) bicolor* C.N.F. Brisout de Barneville, 1862 - PAN + (Baviera & Caldara 2020).

*Tychius (Tichyus) capucinus* Boheman, 1843 - LAM + (Diotti et al. 2017).

#### **Dermestidae**

*Attagenus rossii* Ganglbauer, 1904 - LAM + (Háva 2015).

*Thorictus grandicollis* Germar, 1842 - LIN + (Goggi 2004).

#### **Dytiscidae**

*Cybister tripunctatus africanus* (Castelnau, 1834) - LAM + (Prazzi et al. 2020).

#### **Elateridae**

*Cardiophorus ulcerosus* (Gené, 1836) - PAN + (Baviera & Platia 2018).

*Drasterius bimaculatus* (Rossi, 1790) - PAN + (Gestro 1880; Binaghi 1941).

#### **Geotrupidae**

*Thorectes intermedius* (Costa, 1839) - LIN + (Agoglietta et al. 2006).

#### **Histeridae**

*Hypocaccus rugifrons* (Paykull, 1798) - PAN + (Dahlgren 1962).

*Saprinus calatravensis* Fuente, 1899 - LAM + (Penati & Vienna 2005).

#### **Hydraenidae**

*Ochthebius subinteger* Mulsant & Rey, 1861 - LAM + (Audisio & De Biase 2005a).

#### **Hydrophilidae**

*Cercyon arenarius* Rey, 1885 - LAM + (Ragusa 1894).

#### **Latridiidae**

*Corticaria fulvipes* (Comolli, 1837) - LAM \*, LIN + (Goggi 2004).

#### **Meloidae**

*Meloe saharensis* Chobaut, 1898 - LAM + (Ruiz et al. 2010).

#### **Melolonthidae**

*Pachydema lopadusanorum* Sparacio, La Mantia & Bellavista, 2018 - LAM + (Sparacio et al. 2018). Remarks: this species was previously identified as *Pachydema hirticollis* (Fabricius) by Arnone et al. (1995: 456), who reported it for Lampedusa and Pantelleria.

*Pseudoapterogyna maraventanoi* Sparacio, 2018 - LAM + (Sparacio 2018), LIN + (Goggi 2004, sub *P. vorax* (Marseul), LMP +. Remarks: the population of *Pseudoapterogyna* from Lampedusa was previously referred to *P. vorax*

(Marseul) (Arnone et al. 1995: 455), which was also recorded for Lampione (Goggi 2004; Lo Cascio 2004) and Linosa (Goggi, 2004). Looking forward to new insights on the identity of these populations, they are all referred to the new endemic species described by Sparacio (2018).

*Pseudoapterogyna euphytus lamantiai* Sparacio, 2014 - PAN + (Sparacio 2014). Remarks: the population of *P. euphytus* (Buquet) from Pantelleria, previously recorded by Arnone et al. (1995: 455), has been referred to the new endemic subspecies by Sparacio (2014) (Fig. 11).

#### **Melyridae**

*Aplocnemus pectinatus* (Küster, 1850) - LAM +, LMP +, PAN \* (Lo Cascio & Pasta 2012).

#### **Mordellidae**

*Mordellistena oranensis* Pic, 1900 - LMP + (Goggi 2004).

#### **Mycetophagidae**

*Berginus tamarisci* Wollaston, 1854 - LAM +, LIN +, PAN \* (Goggi 2004).

#### **Nitidulidae**

*Carpophilus marginellus* Motschulsky, 1858 - PAN + (Audisio & De Biase 2005b).

#### **Phalacridae**

*Olibrus castaneus* Baudi, 1870 - LAM +, LIN + (Goggi 2004).

*Olibrus particeps* Mulsant & Rey, 1861 - LAM +, LIN + (Goggi 2004).

#### **Ptiliidae**

*Ptenidium pontealecianum* Strassen, 1955 - PAN + (Sörensson 2011).



Figure 11. *Pseudoapterogyna euphytus lamantiai* is an endemic subspecies of melolonthid beetle recently described for Pantelleria (photo M. Romano).

**Ptinidae**

*Dignomus brevipilis* (Desbrochers des Loges, 1875) - LIN + (Goggi 2004).

*Niptodes elongatus* (Boieldieu, 1854) - LAM + (Goggi 2004).

**Scarabaeidae**

*Euoniticellus fulvus* (Goeze, 1777) - LIN + (Agoglitta *et al.* 2006).

**Scolytidae**

*Phloeotribus scarabaeoides* (Bernard, 1788) - LIN + (Goggi 2004).

*Pityogenes chalcographus* (Linnaeus, 1761) - LIN + (Goggi 2004).

**Silvanidae**

*Oryzaephilus surinamensis* (Linnaeus, 1758) LAM +, PAN \* (Ratti 2007).

**Staphylinidae**

*Astenus melanurus* (Küster, 1853) - LIN + (Bordoni 2013).

*Atheta coriaria* (Kraatz, 1856) - LIN + (Bordoni 2013).

*Brachygluta dentiventris* (Saulcy, 1876) - PAN + (Poggi & Sabella 2005).

*Eusphalerum luteum* (Marsham, 1802) - LIN + (Bordoni 2013).

*Eusphalerum pallens* (Heer, 1841) - LAM +, LIN + (Bordoni 2013).

*Geostiba plicatella* (Fauvel, 1878) - LAM + (Adorno 2012).

*Heterothops canariensis* Israelson, 1979 - LIN + (Bordoni 2013).

*Heterothops dissimilis* (Gravenhorst, 1802) - LIN + (Goggi 2004).

*Medon brunneus* (Erichson, 1839) - PAN + (Ciceroni *et al.* 1995).

*Medon despectus* (Fairmaire, 1860) - LIN + (Assing 2005, 2006).

*Mycetoporus mulsanti* Ganglbauer, 1895 - LIN + (Goggi 2004).

*Myrmecopora laesa* (Erichson, 1839) - PAN + (Assing 1997).

*Ocypus fortunatarum* Wollaston, 1871 - PAN + (Pilon 2005).

*Omalium allardii* Fairmaire & Brisout de Barneville, 1859 - PAN + (Zanetti 2005).

*Remus sericeus* Holme, 1837 - LAM + (Calcara 1846).

*Tachyporus nitidulus* (Fabricius, 1781) - LIN +, PAN \* (Bordoni 2013).

**Tenebrionidae**

*Alphitobius diaperinus* (Panzer, 1797) - LAM + (Violi 2013a), LIN + (Goggi 2004), PAN \*.

*Eutagenia aegyptiaca tunisea* Normand, 1936 - LAM \*, LMP + (Lo Cascio & Pasta 2012).

*Gonocephalum assimile* (Küster, 1848) - LIN + (Goggi 2004).

*Machlopsis doderoi* Gridelli, 1930 - LAM \*, LMP + (Goggi 2004).

*Probatiscus cossyrensis* Sparacio, 2007 - PAN + (Sparacio 2007). Remarks: the population of *Probatiscus* for Pantelleria was referred to *P. anthrax* (Seidlitz) by Aliquò (1995). The new species described by Sparacio (2007) is endemic to this island.

*Scaurus tristis* Olivier, 1795 - LAM \*, LIN \*, PAN \* (Focarile 1969). Remarks: record omitted by Aliquò (1995).

**DIPTERA**

The Diptera of the three main islands were not subject to particular investigations during the preparation of the *Monografia* (Massa 1995a). As Massa (1995) wrote in his concluding remarks, for most of the families in this order there were still large knowledge gaps on the real extent of the populations, with the exception of some families subject to special collections conducted in Pantelleria by the Civic Museum of Natural History of Venice. Compared to the 69 species reported in previous years, only 24 species were added in the checklist by Lo Valvo & Massa (1995), thus reaching 93 species. However, during the current literature research, I found that 19 species, reported in a contribution by Canzoneri *et al.* (1990) dedicated to the knowledge of the dipterological fauna of the Pelagie islands, was missed in the aforementioned checklist. In this contribution, 17 species are reported for the first time, and four of these (*Chersodromia pontica*, *Chersodromia nigrosetosa*, *Tethina canzonerii*, *Tethina grisea*) are new to Italy. The total of the species known up to date for the three islands has thus increased up to 146 species. In particular, the island of Lampedusa has registered the greatest increase, more than doubling the species known, from 37 to 84.

**Agromyzidae**

*Phytomyza phillyreae* Hering in Buhr, 1930 - LAM +, PAN \* (Nicolini *et al.* 2009).

**Anthomyiidae**

*Anthomyia pluvialis* (Linnaeus, 1758) - LAM + (Pisciotta *et al.* 2008b).

**Bombyliidae**

*Anthrax aethiops* (Fabricius, 1781) - LAM + (Birtele *et al.* 2011).

*Bombylius canescens* Mikan, 1796 - LAM + (Birtele *et al.* 2011).

*Bombylius discolor* Mikan, 1796 - LAM + (Birtele *et al.* 2011).

*Heteralonia pygmalion* (Fabricius, 1805) - LAM + (Birtele *et al.* 2011).

**Calliphoridae**

*Calliphora vicina* Robineau-Desvoidy, 1830 - LAM + (Pisciotta *et al.* 2008b).

*Chrysomya albiceps* (Wiedemann, 1819) - LAM + (Pisciotta *et al.* 2011).

**Canacidae**

- Canace nasica* (Haliday, 1839) - LAM + (Canzoneri et al. 1990), PAN + (Munari & Bramuzzo 2018).  
*Tethina albissima* Collin, 1966 - LAM + (Canzoneri et al. 1990).  
*Tethina albosetulosa* (Strobl, 1900) - LAM + (Canzoneri et al. 1990).  
*Tethina canzonerii* Munari, 1981 - LAM +, LIN + (Canzoneri et al. 1990).  
*Tethina grisea* (Fallén, 1823) - LAM + (Canzoneri et al. 1990).  
*Tethina mixta* Collin, 1966 - LAM + (Canzoneri et al. 1990).  
*Tethina munarii* Carles-Tolrà, 1993 - LIN +, PAN + (Munari & Bramuzzo 2018).  
*Tethina pallipes* (Loew, 1865) - LAM + (Munari & Bramuzzo 2018).  
*Tethina sp. prope strobliana* (Mercier, 1923) - LIN + (Canzoneri et al. 1990).

**Cecidomyiidae**

- Asphondylia capparidis* Rübsaamen, 1894 - LAM + (Nicolini et al. 2009), LIN + (Skuhravá et al. 2007), PAN \*. Remarks: Peri et al. (2006) considered that the populations from Linosa and Pantelleria belonged to *Asphondylia gennadii* (Marchal).  
*Asphondylia conglomerata* De Stefani, 1900 - LAM + (Nicolini et al. 2009).  
*Cystiphora sonchi* (Vallot, 1827) - LAM + (B. Massa pers. comm., on *Sonchus asper*, B. Massa leg., 3.3.2014).

**Culicidae**

- Aedes albopictus* (Skuse, 1894) - LAM +, LIN +, PAN + (Di Luca et al. 2017).  
*Aedes mariaae* (Sergent & Sergent, 1903) - LIN +, PAN + (Toma et al. 2020).  
*Aedes zammitii* (Theobald, 1903) - LAM + (Coluzzi et al. 1974).  
*Anopheles sergentii* (Theobald, 1907) - PAN + (D'Alessandro & Saccà 1967).  
*Culex laticinctus* (Edwards, 1913) - LAM +, LIN +, PAN (Toma et al. 2020).  
*Culex pipiens* Linnaeus, 1758 - LAM\*, PAN + (Toma et al. 2020).  
*Culiseta longiareolata* (Macquart, 1838) - LAM +, LIN +, PAN + (Toma et al. 2020).

**Dolichopodidae**

- Aphrosylus aculeatus* (Negrobov, 1979) - LIN +, PAN + (Canzoneri et al. 1990). The species is erroneously reported as "*acuminatus*" (*lapsus calami*)

**Ephydriidae**

- Allotrichoma laterale* (Loew, 1860) - LIN +, PAN \* (Canzoneri et al. 1990).  
*Asmeringa inermis* Becker, 1903 - LAM + (Canzoneri et al. 1990).  
*Atissa pygmaea* (Haliday, 1833) - LIN + (Canzoneri et al. 1990).  
*Clanoneurum cimiciforme* (Haliday, 1855) - LIN + (Canzoneri et al. 1990).  
*Hecamede albicans* (Meigen, 1830) - LAM +, LIN +, PAN \* (Canzoneri et al. 1990).

*Psilopa biskrae* (Becker, 1907) - LIN + (Canzoneri et al. 1990).

*Psilopa nigritella* Stenhammar, 1844 - LIN + (Canzoneri et al. 1990).

**Hybotidae**

- Chersodromia adriatica* Chvala, 1970 - LAM +, LIN + (Canzoneri et al. 1990).  
*Chersodromia nigrosetosa* Chvala, 1970 - LAM + (Canzoneri et al. 1990).  
*Chersodromia pontica* Chvala, 1970 - LAM + (Canzoneri et al. 1990).

**Milichiidae**

*Milichiella lacteipennis* (Loew, 1866) - LAM + (Raspi et al. 2009).

**Muscidae**

- Coenosia tigrina* (Fabricius, 1775) - LAM + (Pisciotta et al. 2008b).  
*Lispe nana* Macquart, 1835 - LIN + (Canzoneri et al. 1990).  
*Musca autumnalis* De Geer, 1776 - LAM + (Pisciotta et al. 2011).  
*Muscina levida* (Harris, 1780) - LAM + (Pisciotta et al. 2008b).

**Rhinophoridae**

*Stevenia deceptoris* (Loew, 1847) - LAM + (Pisciotta et al. 2011).

**Sarcophagidae**

- Blaesoxipha (Servaisia) erythrura* (Meigen, 1826) - LAM + (Pisciotta et al. 2008b), PAN + (Raffone 2009). *Sarcophaga ferox* Villeneuve, 1908 - LAM + (Pisciotta et al. 2011).  
*Sarcophaga variegata* (Scopoli, 1763) - LAM + (Pisciotta et al. 2011).

**Scatophagidae**

*Scathophaga stercoraria* (Linnaeus, 1758) - LAM + (Pisciotta et al. 2008b).

**Stratiomyidae**

*Nemotelus cylindricornis* Rozkosny, 1977 - PAN + (Mason 2005).

**Syrphidae**

- Chrysotoxum intermedium* (Meigen, 1822) - LAM + (Birtele et al. 2010).  
*Eumerus barbarus* (Coquebert, 1804) - LAM + (Birtele et al. 2010).  
*Eumerus pulchellus* Loew, 1848 - LAM + (Birtele et al. 2010).  
*Eumerus pusillus* Loew, 1848 - LAM + (Birtele et al. 2010).  
*Episyrphus balteatus* (De Geer, 1776) - LAM + (Birtele et al. 2010).  
*Eristalinus taeniops* (Wiedemann, 1818) - LAM + (Birtele et al. 2010).  
*Eristalis similis* (Fallén, 1817) - LAM + (Birtele et al. 2010).  
*Meliscaeva auricollis* (Meigen, 1822) - LAM + (Birtele et al. 2010).  
*Paragus coadunatus* Rondani, 1847 - LAM + (Birtele et al. 2010).  
*Simosyrphus aegyptius* (Wiedemann, 1830) - LAM + (Birtele et al. 2010).

*Xanthandrus comtus* (Harris, 1780) - LAM + (Birtelle *et al.* 2010).

#### **Tephritidae**

*Capparimyia savastani* (Martelli, 1911) - LAM +, LIN +, PAN \* (Nicolini *et al.* 2009).

#### **Trioxscelididae**

*Trioxscelis frontalis* (Fallén, 1823) - LAM + (Pisciotta *et al.* 2008b).

### **LEPIDOPTERA**

Lepidoptera were the subject of a contribution by Romano & Romano (1995), who allowed to considerably increase their knowledge, bringing the taxa known for Pantelleria up to 70 species, from the 25 species up to then known, as well as adding 41 species to those already known for the three main islands, from 85 to 126 species. Indeed, the same two Authors wrote “...our degree of knowledge of this fauna is still little more than sufficient, especially with regard to heterocera lepidoptera and among them the microlepidoptera, of which still little or almost nothing is known.” Subsequent research carried out by numerous Italian and foreign entomologists has demonstrated the correctness of this consideration. With the data gathered here, the lepidopterofauna has been enriched with 86 species, bringing the total number of known species from 126 to 212 species. In particular, the number of species for Linosa has more than doubled from 19 to 45 species (Table 1), thus demonstrating its potential also in relation to the other groups still little or nothing investigated on the island. Among the species reported for Lampedusa, *Bifascioides leucomelanella* (Rebel, 1917) (Cosmopterigidae), *Ceutholopa isidis* (Zeller, 1867), *Herpetogramma licarsisalis* (Walker, 1859) (Crambidae), *Isturgia pulinda* (Walker, 1860), *Somabrachys aegrotus* (Klug, 1830) (Somabrachyidae) and *Azanus ubaldus* (Stoll, 1782) (Lycaenidae) are new to Italy, whilst *Aglossa rubralis* Hampson, 1900 (Pyralidae) and *Oar pratana* (Fabricius, 1794) (Geometridae) are new to Europe.

Among the species reported for Pantelleria, *Thaumetopoea mediterranea* Trematerra *et Scalerio*, 2017 (Notodontidae) is new to science, whilst *Streblote pandas* (Hübner, 1820) (Lasiocampidae) is new to Italy and *Selidosema erebaria* (Oberthür, 1883) (Geometridae) is new to Europe.

#### **Cosmopterigidae**

*Bifascioides leucomelanella* (Rebel, 1916) - LAM + (Pinzari & Pinzari 2019).

#### **Crambidae**

*Achyra nudalis* (Hübner, 1796) - PAN + (Aistleitner & Aistleitner 2001).

*Antigastra catalunalis* (Duponchel, 1833) - LIN + (Bottero 2014a).

*Cynaeda dentalis* ([Denis & Schiffermüller, 1775]) - LAM \*, LIN + (Bottero 2014b).

*Herpetogramma licarsisalis* (Walker, 1859) - LAM + (Fiumi & Guidi 2011).

*Loxostege sticticalis* (Linnaeus, 1761) - LIN + (Bottero 2014c).

*Palpita unionalis* (Hübner, 1796) - LIN +, PAN \* (Aistleitner & Aistleitner 2001).

*Spoladea recurvalis* (Fabricius, 1775) - LAM + (Bottero 2014d).

*Udea ferrugalis* (Hübner, 1796) - PAN + (Aistleitner & Aistleitner 2001).

*Uresiphita gilvata* (Fabricius, 1794) - LIN \*, PAN + (B. Massa pers. comm., larvae on *Anagyris foetida*, xi.2008).

#### **Danaidae**

*Danaus chrysippus* (Linnaeus, 1758) - LAM \*, LIN + (Balletto *et al.* 2005), PAN + (Buck 2018b).

#### **Drepressaridae**

*Agonopterix sp.* (cf. *kaekeritziana* (Linnaeus, 1767)) - LAM + (Aistleitner & Aistleitner 2001).

#### **Erebidae**

*Arctia villica* (Linnaeus, 1758) complex - LAM +, PAN + (Corso 2011).

*Catocala dilecta* (Hübner, 1808) - PAN + (Buck 2019).

*Coscinia cribraria* (Linnaeus, 1758) - LAM +, LIN +, PAN \* (Corso 2011).

*Cymbalophora pudica* (Esper, 1785) - LAM \*, LIN +, PAN \* (Corso 2011).

*Dysgonia algira* (Linnaeus, 1767) - LAM \*, PAN + (Aistleitner & Aistleitner 2001).

*Eublemma parva* (Hübner, 1808) - LAM + (Pinzari & Pinzari 2019).

*Euplagia quadripunctaria* (Poda, 1761) - LAM +, PAN + (Corso 2011).

*Hypena lividalis* (Hübner, 1796) - LAM + (Pinzari & Pinzari 2019).

*Metachrostis velox* (Hübner, 1813) - PAN + (Aistleitner & Aistleitner 2001).

*Ophiusa tirhaca* (Cramer, 1773) - PAN + (Buck 2017b).

*Pandesma robusta* (Walker, 1858) - LAM + (Pinzari & Pinzari 2019), PAN + (Aistleitner & Aistleitner 2001).

*Utetheisa pulchella* (Linnaeus, 1758) - LAM \*, LIN + (Corso 2011), PAN + (Aistleitner & Aistleitner 1998).

#### **Gelechiidae**

*Palumbina guerinii* (Stainton, 1858) - LIN + (Bottero 2014e).

*Pexicopia malvella* (Hübner, 1805) - LMP + (Lo Cascio & Pasta 2012).

*Tuta absoluta* (Meyrick, 1917) - LAM + (Pinzari & Pinzari 2019).

#### **Geometridae**

*Catarhoe basochesiata cupreata* (Herrich-Schäffer, 1838) - PAN + (Fischer 2009).

*Comptosia argenticaria* (Herrich-Schäffer, 1839) - PAN + (Buck 2017c).

*Crocallis auberti* Oberthür, 1883 - PAN + (Fischer 2009).

*Eucrostes indigenata* (de Villers, 1789) - LAM \*, LIN + (Bottero 2014f).

*Eupithecia centaureata* ([Denis & Schiffermüller, 1775]) - LAM + (Fiumi *et al.* 2007), PAN + (Fischer 2009).

*Eupithecia scopariata* (Rambur, 1833) - PAN + (Fischer 2009).

*Eupithecia ultimaria* Boisduval, 1840 - LIN + (Aistleitner & Aistleitner 2001).

*Glossotrophia asellaria romanaria* (Millière, 1869) - PAN + (Fischer 2009).

*Idaea completa* (Staudinger, 1892) - LAM + (Aistleitner & Aistleitner 2001).

*Idaea efflorata* Zeller, 1849 - PAN + (Fischer 2009).

*Idaea filicata* (Hübner, 1799) - PAN + (Aistleitner & Aistleitner 2001).

*Idaea fractilineata subrufaria* (Staudinger, 1900) - PAN + (Aistleitner & Aistleitner 2001).

*Idaea infirmaria* (Rambur, 1833) - LIN + (Bottero 2014g).

*Idaea ostrinaria* (Hübner, 1813) - PAN + (Fischer 2009).

*Idaea seriata* (Schrank, 1802) - LAM \*, LIN +, PAN \* (Bottero 2014g).

*Isturgia pulinda* (Walker, 1860) - LAM + (Fiumi & Guidi 2011).

*Larentia clavaria* (Haworth, 1809) - LAM + (Romano 2014), PAN + (Fischer 2009).

Remarks: the record for Lampedusa is based on specimens collected by the staff of the Natural Reserve.

*Nebula ibericata* (Staudinger, 1871) - LIN + (Bottero 2014h).

*Oar pratana* (Fabricius, 1794) - LAM + (Fiumi & Guidi 2011).

*Orthonama obstipata* (Fabricius, 1794) - PAN + (Fischer 2009).

*Pachycnemia hippocastanaria* (Hübner, 1799) - PAN + (Violi 2015b).

*Pachycnemia tibiaria pravieli* (Herbulot, 1944) - PAN + (Fischer 2009).

*Phaiogramma etruscaria* (Zeller, 1849) - LAM + (Fiumi *et al.* 2007).

*Phyllometra argentaria* (Bang-Haas, 1910) - PAN + (Fischer 2009).

*Rhodometra sacraria* (Linnaeus, 1767) - LAM \*, PAN + (Aistleitner & Aistleitner 2001).

*Scopula marginepunctata* (Goeze, 1781) - PAN + (Fischer 2009).

*Scopula minorata* (Boisduval, 1833) - PAN + (Fischer 2009).

*Selidosema erebaria* (Oberthür, 1883) - PAN + (Fischer 2009).

*Tephronia codetaria sicula* (Wehrli, 1933) - PAN + (Fischer 2009).

### Hesperiidae

*Charcarodus* sp. - LMP + (Lo Cascio & Pasta 2012).

*Gegenes nostradamus* (Fabricius, 1793) LAM + (Romano 2009; Vodă *et al.* 2016) (Fig. 12).

### Lasiocampidae

*Streblote panda* Hübner, 1820 - PAN + (Aistleitner & Aistleitner 1998).



Figure 12. The dingy swift *Gegenes nostradamus* is a small butterfly belonging to the family Hesperidae, relatively common in the coastal dunes (photo M. Romano).

### Lycaenidae

*Azanus ubaldus* (Stoll, 1782) - LAM + (Caporale & Guidi 2013).

*Lampides boeticus* (Linnaeus, 1767) - LAM +, LIN +, PAN + (Vodă *et al.* 2016).

*Leptotes pirithous* (Linnaeus, 1767) - LAM +, PAN \* (Vodă *et al.* 2016).

*Polyommatus celina* (Austaut, 1879) - LAM +, LIN +, PAN + (Vodă *et al.* 2016). Remarks : this species was previously identified as *Polyommatus icarus* (Rottemburg) by Romano & Romano (1995), who reported it for Lampedusa and Pantelleria.

*Zizeeria karsandra* (Moore, 1865) - LAM + (Fiumi *et al.* 2007). Remarks: the population of *Zizeeria* from Lampedusa was previously referred to *Zizeeria knysna* (Trimer) (Romano & Romano, 1995: 700).

### Noctuidae

*Agrotis lata* Treitschke, 1835 - LAM + (Fiumi *et al.* 2007).

*Cryphia ochsi* (Boursin, 1940) - PAN + (Aistleitner & Aistleitner 2001).

*Cucullia calendulae* Treitschke, 1835 - LAM + (Fiumi *et al.* 2007).

*Cucullia santolinae* Rambur, 1834 - PAN + (Aistleitner & Aistleitner 2001).

*Hadena confusa* (Hufnagel, 1766) - PAN + (Buck 2017d).

*Helicoverpa armigera* (Hübner, 1808) - LAM + (Pinzari & Pinzari 2019).

*Leucania punctosa* (Treitschke, 1825) - LAM + (Fiumi *et al.* 2007).

*Leucania putrescens* (Hübner, 1824) - LAM + (Fiumi *et al.* 2007).

*Mniotype spinosa* (Chrétien, 1910) - LAM + (Fiumi *et al.* 2007).

*Mythimna vitellina* (Hübner, 1808) - PAN + (Aistleitner & Aistleitner 2001).

*Noctua comes* Hübner, 1813 - PAN + (Aistleitner & Aistleitner 2001).

*Noctua pronuba* (Linnaeus, 1758) - LAM \*, LIN +, PAN \* (Corso 2010).

*Paradrina selini* (Boisduval, 1840) - PAN + (Aistleitner & Aistleitner 2001).

*Spodoptera ciliium* Guenée, 1852 - LAM + (Pinzari & Pinzari 2019), LIN + (Bottero 2014).

*Spodoptera littoralis* (Boisduval, 1833) - LAM + (Fiumi *et al.* 2007).

#### **Notodontidae**

*Thaumetopoea mediterranea* Trematerra & Scalerio, 2017 - PAN + (Trematerra *et al.* 2017).

#### **Papilionidae**

*Papilio machaon* Linnaeus, 1758 - LAM \*, PAN + (Balletto *et al.* 2005).

#### **Pieridae**

*Colias crocea* (Fourcroy, 1785) - LAM \*, LIN +, PAN \* (Vodá *et al.* 2016).

*Pieris rapae* (Linnaeus, 1758) - LAM \*, LIN +, PAN \* (Vodá *et al.* 2016).

#### **Plutellidae**

*Plutella xylostella* (Linnaeus, 1758) - LAM + (Pinzari & Pinzari 2019).

#### **Psychidae**

*Luffia lapidella* (Goeze, 1783) - PAN + (Aistleitner & Aistleitner 1998).

*Penestoglossa dardoinella* (Millière, 1863) - PAN + (Aistleitner & Aistleitner 2001).

*Ptilocephala sp.* (? *muscella* ([Denis & Schiffermüller, 1775]) - LAM + (Aistleitner & Aistleitner 2001).

#### **Pyralidae**

*Aglossa rubralis* Hampson, 1900 - LAM + (Zilli & Pavesi 2015).

*Apomyeloides ceratoniae* (Zeller, 1839) - PAN + (Aistleitner & Aistleitner 2001).

*Cadra calidella* (Guenée, 1845) - LAM + (Pinzari & Pinzari 2019).

*Ceutholopha isidis* (Zeller, 1867) - LAM + (Pinzari & Pinzari 2019).

*Ephestia welseriella* (Zeller, 1848) - LAM + (Pinzari & Pinzari 2019).

*Euzophera bigella* (Zeller, 1848) - LAM + (Pinzari & Pinzari 2019).

#### **Sesiidae**

*Bembecia hymenopteriformis* (Bellier, 1860) - LAM + (Aistleitner & Aistleitner 2001), PAN + (Aistleitner & Aistleitner 1998).

#### **Somabrachyidae**

*Somabrachys aegrota* (Klug, 1830) - LAM + (Fiumi *et al.* 2007).

#### **Sphingidae**

*Acherontia atropos* (Linnaeus, 1758) - LAM +, LIN +, PAN \* (Corso 2010).

*Agrius convolvuli* (Linnaeus, 1758) - LAM \*, LIN +, PAN \* (Corso 2010).

*Daphnis nerii* (Linnaeus, 1758) - LIN + (Corso 2010).

*Deilephila elpenor* (Linnaeus, 1758) - PAN + (Corso 2010).

*Hippotion celerio* (Linnaeus, 1758) - LAM +, PAN + (Corso 2010).

*Hyles euphorbiae* (Linnaeus, 1758) - LAM \*, LIN +, PAN \* (Corso 2010).

*Hyles livornica* (Esper, 1780) - LAM \*, LIN +, PAN \* (Corso 2010).

*Hyloicus pinastri* (Linnaeus, 1758) - PAN + (Corso 2010).

*Macroglossum stellatarum* (Linnaeus, 1758) - LAM \*, LIN +, LMP +, PAN \* (Corso 2010).

*Smerinthus ocellatus* (Linnaeus, 1758) - PAN + (Corso 2010).

*Sphinx ligustri* Linnaeus, 1758 - PAN + (Corso 2010).

#### **Tortricidae**

*Acleris variegana* ([Denis & Schiffermüller, 1775]) - PAN + (Aistleitner & Aistleitner 2001).

*Cacoecimorpha pronubana* (Hübner, 1799) - PAN + (Aistleitner & Aistleitner 2001).

*Lobesia botrana* ([Denis & Schiffermüller, 1775]) - LAM + (Pinzari & Pinzari 2019).

### **HYMENOPTERA**

Hymenoptera were the subject of several contributions published within the *Monografia* (Massa 1995a), which increased the number of species known for the three main islands from 76 to 188 species. With the current update, a further increase up to 267 species has been registered (Table 1). Massa (1995b), in his conclusive considerations on the state of knowledge in the three islands, analyzed differently the families belonging to this order. For the Gasteruptionidae, Ichneumonidae and Aculeta (*partim*), Massa reported the opinion of Pagliano & Scaramozzino (who studied these families and listed a total of 106 taxa, of which 65 new to at least one island), as follows: “*Their study shows that while the Hymenopteroafauna of the Pelagie can be considered exhaustively known, much still needs to be done for Pantelleria*”. The surveys carried out in the last 25 years, mainly by Pagliano (2003, 2011, 2017) who returned several times on these islands, allowed to increase our knowledge on the Hymenopteroafauna of Lampedusa, which increased from 97 to 136 taxa. Above all Pantelleria, as already hypothesized in 1995, has registered the most significant increase, from 16 to 78 species known. Instead, still limited is the current knowledge concerning Linosa, with only six species known up to now, surely an underestimated value compared to the effective extent. For the Mutillidae and Bradynobaenidae, studied by Arnone and Romano (1995), the number of known species has increased from 12 to 14. The Chrysoidea, treated by Olmi (Dryinidae and Bethyloidea) and by Arnone and Romano (Chrysididae) today include 13 taxa compared to the 9 listed in 1995. The Formicidae, studied by Mei (1995), who car-

ried out specialist collections in the islands, were sufficiently investigated already in 1995. Indeed, after 25 years, only one species is added to those already known, and one species is new to Lampedusa, although being already recorded for Pantelleria. Overall, 43 species of Formicidae were found up to date in the three islands, 21 of which in Lampedusa, 13 in Linosa and 26 in Pantelleria. Among the other Hymenoptera families not treated in the previous contributions, but listed in the checklist edited by Lo Valvo & Massa, the Leucospidae family deserves attention, being increased from one to four species known. Among the new records for Lampedusa, *Physetopoda silviae* Pagliano 2011 (Mutillidae) is a new species and *Micromeriella aureola* (Klug, 1832) (Scoliidae) is new to Europe. *Megachile concinna* Smith, 1879 (Megachilidae), new to Italy, was found in Linosa, whilst *Lasioglossum pseudoplanulum* (Bluethgen, 1924) (Halictidae), found in Pantelleria, is new to Italy.

#### Andrenidae

*Andrena flavipes* Panzer, 1799 - LAM +, PAN \* (Pagliano 2003).

*Andrena nigroaenea* (Kirby, 1802) - PAN + (Pagliano 2003).

*Andrena pilipes* Fabricius, 1781 - PAN + (Pagliano 2003).

*Andrena vulpecula* Kriechbaumer, 1873 - PAN + (Pagliano 2003).

*Panurgus dentipes* Latreille, 1811 - LAM \*, PAN + (Pagliano 2003).

#### Anthophoridae

*Amegilla albigena* (Lepeletier, 1841) - PAN + (Pagliano 2003).

*Amegilla quadrifasciata* (Villers, 1789) - LAM \*, PAN + (Pagliano 2003).

*Anthophora retusa* (Linnaeus, 1758) - PAN + (Pagliano 1994).

*Ceratina saundersi* Daly, 1983 - LAM + (Pagliano 2003).

*Nomada fulvicornis* Fabricius, 1793 - PAN + (Pagliano 2003).

*Pasites maculatus* Jurine, 1807 - LAM + (Pagliano 2003).

*Thyreus orbatus* (Lepeletier, 1841) - PAN + (Pagliano 2003).

*Thyreus ramosus* (Lepeletier, 1841) - LAM \*, PAN + (Pagliano 2003).

#### Apidae

*Bombus terrestris* (Linnaeus, 1758) - LAM + (Pagliano 2011), PAN + (Pagliano 2003).

#### Braconidae

*Chelonus* cf. *subseticornis* Tobias, 1971 - PAN + (Pagliano 2003).

#### Chalcididae

*Brachymeria coloradensis* (Cresson, 1872) - PAN + (Pagliano 2003).

*Brachymeria minuta* (Linnaeus, 1767) - PAN + (Pagliano 2003).

*Psilochalcis benoisti* (Steffan, 1948) - LAM + (Pagliano 2003).

#### Chrysididae

*Chrysis grohmanni* Dahlbom, 1854 - LAM + (Violi 2013b), PAN + (Pagliano 2003).

*Hedychridium krajniki* Balthasar, 1946 - LAM + (Pagliano 2011).

#### Colletidae

*Colletes nigricans* Gistel, 1857 - LAM \*, PAN + (Pagliano 2003).

*Hylaeus clypearis* (Schenck, 1853) - LAM \*, PAN + (Pagliano 2003)

*Hylaeus punctatus* (Brullé, 1832) - LAM + (Pagliano 2011), PAN + (Pagliano 2003).

*Hylaeus taeniolatus* Foerster, 1871 - LAM +, PAN + (Pagliano 2003).

#### Crabronidae

*Astata boops* (Schrank, 1781) - LAM \*, PAN + (Pagliano 2003).

*Bembecinus tridens* (Fabricius, 1781) - LAM + (Pagliano 2011).

*Bembix oculata* Panzer, 1801 - LAM +, LIN \*, PAN \* (Pagliano 2003).

*Cerceris sabulosa algerica* (Thunberg, 1815) - LAM \*, PAN + (Pagliano 2003).

*Crossocerus elongatulus trinacrius* Beaumont, 1959 - LAM +, PAN + (Pagliano 2003).

*Ectemnius hypsae* (De Stefani, 1894) - PAN + (Pagliano 2003).

*Liris praetermissus* (Richards, 1928) - LAM + (Pagliano 2009a).

*Mimesa grandii* Maidl, 1933 - PAN + (Pagliano 2003).

*Miscophus eatoni* Saunders, 1903 - LAM + (Pagliano 2003).

*Oxybelus mucronatus* (Fabricius, 1793) - PAN + (Pagliano 2003).

*Philanthus triangulum abdelcader* Lepeletier, 1845 - LAM \*, PAN + (Pagliano 2003).

*Pison atrum* (Spinola, 1808) - LAM \*, PAN + (Pagliano 2003).

*Pemphredon rugifer* (Dahlbom, 1844) - LAM + (Pagliano 2011).

*Solierella compedita* (Piccioli, 1969) - LAM + (Pagliano 2003).

*Solierella seabrai corsa* de Beaumont, 1964 - PAN + (Pagliano 2003).

*Tachysphex mediterraneus* Kohl, 1883 - PAN + (Pagliano 2003).

*Tachysphex nitidior* de Beaumont, 1940 - LAM + (Pagliano 2011).

*Tachytes freygessneri* Kohl, 1881 - LAM +, PAN \* (Pagliano 2017).

*Trypoxylon clavicerum* Lepeletier & Serville, 1828 - PAN + (Pagliano 2003).

*Trypoxylon kolazyi* Kohl, 1893 - LAM + (Pagliano 2003).

*Trypoxylon scutatum* Chevrier, 1867 - LAM \*, PAN + (Pagliano 2003).

#### Dryinidae

*Gonatopus atlanticus* Olmi, 1984 - LIN \*, PAN + (Olmi 1999).

*Gonatopus camelinus* Kieffer, 1904 - PAN + (Olmi 1999).

*Gonatopus nearcticus* (Fenton, 1927) - PAN + (Olmi 1999).

#### Encyrtidae

*Ericydnus strigosus* (Nees, 1834) - PAN + (Kerrich 1967).

#### Formicidae

*Aphaenogaster splendida* (Roger, 1859) - LAM +, PAN \* (Schifani & Alicata 2018).

*Nylanderia jaegerskioeldi* (Mayr, 1904) - PAN \* (Schifani & Alicata 2018).

#### Gasteruptionidae

*Gasteruption diversipes* (Abeille, 1879) - LAM +, PAN + (Pagliano 2003).

*Gasteruption jaculator* (Linnaeus, 1758) - LAM \*, PAN + (Pagliano 2003).

*Gasteruption opacum* (Tournier, 1877) - LAM + (Pagliano 2017), PAN + (Pagliano 2003).

#### Halictidae

*Halictus fulvipes* (Klug, 1817) - LAM \*, PAN + (Pagliano 2003).

*Halictus tectus* Radoszkowski, 1875 - PAN + (Pagliano 2003).

*Lasioglossum griseolum* (Morawitz, 1872) - PAN + (Pagliano 2003).

*Lasioglossum interruptum* (Panzer, 1798) - PAN + (Pagliano 2003).

*Lasioglossum minutissimum* (Kirby, 1802) - PAN + (Pagliano 2003).

*Lasioglossum nitidulum* (Fabricius, 1804) - LAM + (Pagliano 2011).

*Lasioglossum pseudoplanulum* (Bluethgen, 1924) - PAN + (Pagliano 2003).

*Sphecodes gibbus* (Linnaeus, 1758) - PAN + (Pagliano 2003).

*Sphecodes marginatus* von Hagens, 1882 - LAM \*, PAN + (Pagliano 2003).

#### Ichneumonidae

*Amblyteles armatorius* (Foerster, 1771) - PAN + (Pagliano 2009b).

*Anomalon cruentatum* (Geoffroy, 1785) - LAM +, PAN + (Pagliano 2003).

*Clistopyga incitator* (Fabricius, 1793) - PAN + (Korenko & Di Giovanni 2019).

*Exeristes roborator* (Fabricius, 1793) - LAM \*, PAN + (Pagliano 2003).

*Heterischnus ridibundus* (Costa, 1885) - LAM + (Pagliano 2003).

*Hypsicera subtilitor* Aubert, 1969 - LAM + (Pagliano 2011).

*Syzeuctus irrisorius* (Rossi, 1794) - LAM + (Pagliano 2003).

*Trychosis legator* (Thunberg, 1824) - LAM + (Pagliano 2011).

#### Leucospidae

*Leucospis dorsigera* Fabricius, 1775 - LAM + (Pagliano 1998), PAN + (Pagliano 2003).

*Leucospis gigas* Fabricius, 1793 - LAM +, PAN + (Pagliano 2003).

*Leucospis intermedia* Illiger, 1807 - LAM + (Pagliano 2017).

#### Megachilidae

*Anthidium cingulatum* Letreille, 1809 - LAM + (Pagliano 2011).

*Anthidium manicatum* (Linnaeus, 1758) - PAN + (Pagliano 2003).

*Heriades crenulatus* Nylander, 1856 - LAM + (Pagliano 2011), PAN + (Pagliano 2003).

*Hoplitis curvipes* (Morawitz, 1872) - LAM + (Pagliano 2003).

*Megachile concinna* Smith, 1879 - LAM + (Pagliano 2011).

*Megachile pilidens* Alfken, 1924 - LAM \*, PAN + (Pagliano 2003).

*Osmia aurulenta* (Panzer, 1799) - LAM + (Pagliano 2011).

*Osmia signata* Erichson, 1835 - LAM + (Pagliano 2011).

*Osmia submicans* Morawitz, 1870 - PAN + (Pagliano 2003).

#### Mutillidae

*Physetopoda lucasii* (Smith, 1855) - PAN + (Lo Cascio 2015).



Figure 13. The velvet ant *Physetopoda punctata* (photo M. Romano).



*Physetopoda punctata* (Latreille, 1792) - LAM \*, LIN + (Lo Cascio 2015) (Fig. 13).

*Physetopoda silviae* Pagliano, 2011 - LAM + (Pagliano 2011). Remarks: previously recorded for Lampedusa by Pagliano (2003) sub *Physetopoda halensis* (Fabricius, 1787).

#### **Pompilidae**

*Agenioideus arenicola* (Priesner, 1955) - LAM +, PAN + (Pagliano 2003).

*Agenioideus usurarius* (Tournier, 1889) - LAM +, PAN + (Pagliano 2003).

*Anoplius infuscatus* (Vander Linden, 1827) - PAN + (Pagliano 2003).

*Anospilus orbitalis* (Costa, 1863) - LAM \*, PAN + (Pagliano 2003).

*Auplopus carbonarius* (Scopoli, 1763) - LAM + (Pagliano 2011).

*Episyron gallicum* (Tournier, 1889) - PAN + (Pagliano 2003).

#### **Scoliidae**

*Campsomeriella thoracica* (Fabricius, 1787) - LAM + (Generani *et al.* 2005).

*Micromeriella aureola* (Klug, 1832) - LAM + (Pagliano 2017).

#### **Sphecidae**

*Prionyx viduatus* (Christ, 1791) - LAM \*, PAN + (Pagliano 2003).

*Sceliphron caementarium* (Drury, 1770) - PAN + (Buck 2018c).

*Sceliphron destillatorium* (Illiger, 1807) - LAM + (Pagliano 2003).

*Sceliphron spirifex* (Linnaeus, 1758) - LAM \*, PAN + (Pagliano 2003).

*Sphex flavipennis* Fabricius, 1793 - LAM \*, PAN + (Pagliano 2003).

*Sphex funerarius* Gussakovskij, 1934 - LAM \*, PAN + (Pagliano 2003).

#### **Tiphiidae**

*Poecilotiphia roussellii* (Guerin-Méneville, 1838) - LAM \*, PAN + (Pagliano 2003).

#### **Vespidae**

*Ancistrocerus gazella* (Panzer, 1798) - LAM + (Pagliano 2003).

*Ancistrocerus longispinosus* (Saussure, 1855) - PAN + (Pagliano 2003).

*Eumenes mediterraneus* Kriechbaumer, 1879 - LAM \*, PAN + (Pagliano 2003).

*Euodynerus variegatus* (Fabricius, 1793) - LAM \*, PAN + (Pagliano 2003).

*Polistes gallicus* (Linnaeus, 1767) - LAM + (Pagliano 2003).

*Rhynchium oculatum* (Fabricius, 1781) - LAM + (Pagliano 2011), PAN + (Pagliano 2003).

*Tachyancistrocerus rhodensis* (Saussure, 1855) - LAM + (Pagliano 2003).

### **EMBIOPTERA, SIPHONAPTERA and ZYGENTOMA**

In the *Monografia* (Massa 1995a), Embioptera and Siphonaptera were not included. In fact, the presence of *Embia ramburi* Rimsky-Korsakow 1905 (Embioptera) had already been reported for

Lampione by Kohlmeyer (1960), as found by Lo Cascio & Pasta (2012). Moreover, the same authors also reported a second species of Embioptera collected in Lampione, still under investigation and not yet determined. Mei (1996) was the first to report the presence of two species of Siphonaptera in Lampedusa: *Nosopsyllus barbarus* (Jordan & Rothschild, 1912), a species of North African origin reported for several Mediterranean islands, and *Ctenocephalides felis* (Bouché, 1835), a cosmopolitan species. The latter is the flea that has the cat as the primary host, but it may be found on many other hosts, more or less accidental, including man. The only record for Lampedusa, reported by Mei (1996), is a female collected by L. Latella on herself!

#### **EMBIOPTERA Embiidae**

*Embia ramburi* Rimsky-Korsakow, 1905 - LMP + (Kohlmeyer 1960).

#### **SIPHONAPTERA**

##### **Ceratophyllidae**

*Nosopsyllus barbarus* (Jordan & Rothschild, 1912) - LAM + (Mei 1996).

##### **Pulicidae**

*Ctenocephalides felis* (Bouché, 1835) - LAM + (Mei 1996).

##### **ZYGENTOMA Lepismatidae**

*Ctenolepisma ciliata* (Dufour, 1831) - LAM\*, LIN \*, LMP + (Lo Cascio & Pasta 2012).

### **DISCUSSION AND CONCLUSIONS**

Although I could have missed some data, the number of new records here gathered represents a considerable update, both quantitatively and qualitatively, to the overall number of known species in the studied islands. However, in my opinion, and also based on these recent findings, the entomological knowledge reached for the Pelagic islands and for Pantelleria, especially for some groups, is still far from being considered exhaustive. Moreover, the entomofauna of these islands is naturally subject to continuous fluctuations, so that new species could be added, whereas other species, once present, could go extinct, especially due to the ever more rapid and intense climatic and environmental changes. For instance, many species collected by the early explorers of the late 1800s have not found in the islands for some time. On the other hand, in recent years several species foreign to native ecosystems have also made their first appearance in these islands, thanks to the intensification of global trade and probably favoured by climate change. These species have currently well established and regularly reproduce, with consequences on the indigenous entomofauna the extent of which could be effectively assessed only over time. Among the

alien species recently reported for the three islands, I remember the following: *Bruchidius rad-diana* (Anton & Delobel 2003), collected in Lampedusa, which represents the first record for Italy, *Rhynchophorus ferrugineus* (Olivier, 1790) and *Phoracantha recurva* Newman, 1840 among the beetles, *Aedes albopictus* (Skuse, 1894) (tiger mosquito) among Diptera, *Leptoglossus occidentalis* Heidemann, 1910 among Hemiptera and *Sceliphron caementarium* (Drury, 1770) among Hymenoptera. A final consideration concerns the island of Linosa, which, undoubtedly, holds objective poverty of entomofauna compared to Lampedusa and Pantelleria. However, through this literature search, I found that more accurate research on some groups has brought about in recent years a significant increase in the number of known species. For instance, Goggi (2004), who visited Linosa for three consecutive years (in September 2001, May 2002 and June 2003), alone added almost 50 new species of beetles to those already known. Considering that the beetle species reported up to that moment were just over 80, in percentage terms the increase is at around 60%. Even more significant is the increase among the Lepidoptera, for which Corso (2011) and Aistleitner & Aistleitner (2001) collected and reported 14 new species. Still in Linosa, Marcello Bottero, a Genoese naturalist, photographed, in the months of October and November 2014, the moths laid on the walls in the evening attracted by the light, and then he shared the photos on the naturamediterraneo forum (<https://www.naturamediterraneo.com/forum>), where almost all the species were identified. Here, I reported only 9 taxa (all are new to Linosa) which were determined with sufficient reliability, omitting the others with probable but non-verifiable determination. In light of these new data, the lepidopterofauna of Linosa increased from 19 to 43 species known, thus more than doubling! Odonata, known for their attitude to migrate and disperse over large territories in an attempt to colonize them, represent a special case; the number of sighted species increased from 1 to 15. In conclusion, I am convinced that Linosa is currently the most underestimated island for what concerns the effective extent of its entomological population.

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