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New and summary data on the Scarabaeoidea (Insecta Coleoptera) of the Circumsicilian Islands

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ABSTRACT According to research materials collected during faunal campaigns, made in Sicily in the last years, ten new Scarabaeoidea insects were reported in Circumsicilians Islands. In particular, I would signalize: in the Island of Pantelleria the *Hybosorus illigeri* Reiche, 1853 and the *Oryctes nasicornis grypus* (Illiger, 1803); in the Islands of Favignana and Marettimo the *Phyllognathus excavatus* (Forster, 1771); in the Island of Favignana the *Anomius castaneus* (Illiger, 1803), the *Euoniticellus pallipes* (Fabricius, 1798) and the *Trox fabricii* Reiche, 1853; in the Island of Marettimo the *Protaetia (Potosia) hypocrita* (Ragusa, 1905); in the Aegadian Islands and Ustica Island the *Aethiessa floralis squamosa* (Gory et Percheron, 1833) and the *Tropinota (Tropinota) squallida squallida* (Scopoli, 1763); in the Aegadian Islands the *Oxythyrea funesta* (Poda, 1761). On the whole, there are 82 species of beetles around Circumsicilian Islands and the interconnections betweens numbers of these insects for each islet and the surface are positive.

KEY WORDS Scarabaeoidea; Circumsicilian Islands; new faunistic data.

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INTRODUCTION

The current state of faunal knowledges about Scarabaeoidea insects of Circumsicilian Islands can be generally considered satysfactory.

Infact, since 1800, the study of these beetles of the Circumsicilian Islands has always been taken into account (Sparacio, 2022) both with the first works on these Islands of a more general character (Calcara, 1842, 1847; Riggio, 1888, 1889; Ragusa, 1875, 1892; Failla -Tedaldi, 1887), and, over time, with other more specialized works (Dellacasa, 1968; Focarile, 1970; Aliquò et al., 1973; Riggio & Massa, 1974; Aliquò & Romano, 1975; Sabatinelli, 1978; Carpaneto, 1979; Martìn Piera & Zunino, 1981; Arnone & Massa, 1993; Arnone et al., 1995, 2001, 2014; Ratti, 1987; Ziani 1997; Ruffo & Stoch, 2000-2005; Vitturi et al., 2003; Goggi, 2004; Carpaneto & Piattella, 2009; Lo Cascio et al., 2006; Agoglitta et al., 2006; Lisa & Lisa, 2007; Arnone, 2010; Tonelli et al., 2016; Sparacio, 2014, 2018; Sparacio & La Mantia 2018; Sparacio et al., 2018; Lo Cascio, 2020; Leo et al., 2021; Romano, 2021).

To further improve these knowledges, during the last decade, a valid amounts of ecological and faunistic data have been collected on other beetles of Circumsicilian Islands that, in this work, are reported for the first time.

MATERIAL AND METHODS

Specimens are preserved in the own author'collection and have been identified using Baraud (1977, 1992) and Ballerio et al. (2010).

The systematics and the nomenclature used follow Bezdek (2016).

RESULTS

Familia HYBOSORIDAE Erichson, 1847
Subfamilia HYBOSORINAE Erichson, 1847

Hybosorus illigeri Reiche, 1853

Material examined. Island of Pantelleria (TP) eastern scope of Mountain of Sant'Elmo, 36°49'18"N, 11°56'58"E, 22.VI.2021, legit C. Muscarella (CMC), 3 exx.

Distribution. *Hybosorus illigeri* is an Afrotropical-Indian-Mediterranean chorotype species known from much of central and northern Africa, southern Europe, Asia; introduced to the United states of America (Arnone, 1995; Ballerio et al., 2010; Pivotti et al., 2011; Bezdek, 2016). It is already known for the Circumsicilian Islands of Marettimo (Aliquò et al., 1971) and Linosa (Arnone et al., 1995).

Remarks. The specimens were found in an area without bushes, intensively grazed by horses, under dried faeces. It is an excellent flier and has a strong aptitude at photophily, so it cannot exclude the recent colonization of the Island from strains coming from Tunisia where the species is rather abundant in some northen localities (I. Sparacio, pers. com.). This is the first report of this specimen for Island of Pantelleria.

Familia SCARABAEIDAE Latreille, 1802
Subfamilia APHODIINAE Leach, 1815

Anomius castaneus (Illiger, 1803)

Material examined. Favignana, Florio Establishment, 20.XI.2021, 37°55'46"N, 12°19'14"E, legit C. Muscarella, 40 exx.

Distribution. *Anomius castaneus* is a West Mediterranean species present in France, Spain, Portugal, Sardinia (isola di Sant'Antioco) and in Sicily (Ballerio et al., 2010).

Remarks. A predominantly autumn species related to fresh sheep and bovine feaces (Dellacasa & Dellacasa, 2006). Some specimens were collected under the light of the lamp post not far from the pasture. This is the first report of this specimen for Circumsicilian Islands.

Subfamilia CETONIINAE Leach, 1815

Aethiessa floralis squamosa (Gory et Percheron, 1833)

Material examined. Island of Favignana, Cala Rossa 37°55'18"N,12°21'50"E, 13.V.2016, legit C. Muscarella, 1 ex. Island of Levanzo, residential area, 37°59'12"N, 12°20'22"E, 21.VI.2017, legit C. Muscarella, 2 exx; Island of Levanzo, Torre saracena, 37°59'33"N, 12°20'49"E, 28.VI.2016, legit C. Muscarella, 3 exx; Island of Marettimo, Punta Troia, 37°59'25"N, 12° 3'41"E, 29.VI.2013, legit C. Muscarella, 1 ex; Island of Marettimo, residential area, 30.IV.2017, 3 exx; Island of Marettimo, Case Romane 37°58'8"N, 12° 3'54"E, 1.VI.2019, legit. C. Muscarella, 1 ex; Island of Ustica, Cala Sidoti, 38°42'27"N, 13° 9'42"E, 19.VI.2011, legit. C. Muscarella, 3 exX; Island of Ustica, residential area, 38°42'42"N, 13°11'27"E, 3.VI.2018, 1 ex.

Distribution. Sparacio (2009) notes how the Sicilian and northern Calabrian populations of *Cetoninae* are different from North Africans ones and attributes them to the *taxon* "squamosa" Gory & Percheron 1833, considered as subspecies by Ballerio et al. (2010), by Bezdek (2016) and Montreuil et al. (2022). This species was previously known in the Islands of Eolie (Arnone et al., 2011), Lampedusa e Pantelleria (Arnone et al., 1985). According to Arnone et al. (2006) the citation of "*Cetonia monio*" for the Island of Filicudi by Habsburg-Lothringen (1895) is connected to the same species.

Remarks. A common species in Sicily in the late spring/summer months on wild thistles and artichokes (Sparacio, 1995). This is the first report of this specimen for the Aegadian Islands and Ustica Island.

Protaetia (Potosia) hypocrita (Ragusa, 1905)

Material examined. A specimen of *Protaetia (Potosia) hypocrita* was photographed by Giovanni Aliotti in Marettimo islet, in the middle of the town, in an inflorescence of *Strelitzia* sp. on 5 June 2021.

DISTRIBUTION. It is an Endemic species of Calabria and Sicily, including Malta (Lobl & Smetana, 2016). This species is known at Lampedusa (Sabatinelli, 1978; Lisa & Lisa, 2007; Ballerio et al., 2010).

REMARKS. Adults of this species, in the late spring/summer months, have been found on wild artichokes or ripe fruit. This is the first report of this specimen for Island of Marettimo.

Tropinota (Tropinota) squallida squallida (Scopoli, 1763)

MATERIAL EXAMINED. Island of Favignana, Mountain of Santa Caterina, 37°55'52"N 12°18'40"E, 5.IV.2016, legit. C. Muscarella, 1 ex; Island of Favignana, Punta Faraglione, 37°56'59"N 12°18' 5"E, 13.V.2016, legit C. Muscarella, 2 exx; Island of Favignana, Costiera del Grosso, 37°55'10"N 12°18'24" E, 13.V.2016, legit C. Muscarella, 1 ex; Island of Levanzo, Pizzo del Monaco, 37°59'54"N 12°19'43"E, 21.VI.2017, legit C. Muscarella, 1 ex; Island of Ustica, Cala Sidoti, 38°42'27"N, 13° 9'42"E, 19.VI.2011, legit C. Muscarella, 1 ex; Island of Marettimo, Case Romane 37°58'8"N, 12° 3'54"E, 1.VI.2019, legit. C. Muscarella, 1 ex; Island of Ustica, residential area, 38°42'42"N, 13°11'27"E, 3.VI.2018, 2 exx, legit C. Muscarella; Island of Ustica, Mountain of Guardia dei Turchi, 38°42'27"N, 13°10'35"E, 3.VI.2018, 2 exx, legit C. Muscarella (CMC).

DISTRIBUTION. *Tropinota (Tropinota) squallida squallida* is a polytypical species with European-Mediterranean chorotype. The nominal subspecies is present in southern Europe, from Iberian Peninsula to the Balkans **(**Ballerio et al., 2014; Lobl & Smetana, 2016). This species is well known in the Aeolian Islands (Arnone et al., 2011), Lampedusa and Pantelleria (Arnone et al., 1985). Probably the citation of Calcara (1842) should be reported to this species.

REMARKS. Spring/summer species very common in Sicily, where it lives together with the congeneric but much rare *Tropinota hirta* (M. Arnone pers. com.). Probably the ancient mention of "*Cetonia hirta*" (Calcara, 1842) for Island of Ustica is due to this specimen. This is the first report of this specimen for the Aegadian Islands of and Ustica Island.

Oxythyrea funesta (Poda, 1761)

MATERIAL EXAMINED. Island of Favignana, Monte S. Caterina, 37°55'52"N 12°18'40"E, 5.IV.2016, legit C. Muscarella, 2 ex; Island of Favignana, Punta Faraglione, 37°56'59"N 12°18' 5"E, 13.V.2016, legit C. Muscarella, 1 ex; Island of Favignana, Costiera del Grosso, 37°55'10"N 12°18'24" E, 13.V.2016, legit C. Muscarella, 1 ex; Island of Levanzo, near Cala Minnola, 37°59'36"N 12°21'1.79"E, 21.VI.2017, legit C. Muscarella, 2 exx; Island of Marettimo, residential area, 30.IV.2017, 2 exx; Island of Ustica, Guardia dei Turchi Mountain, 38°42'27"N, 13°10'35"E, 3.VI.2018, 1 ex, legit. C. Muscarella.

DISTRIBUTION. *Oxythyrea funesta* is a Central Asian-European-Mediterranean chorotype species found in North Africa, South-Central Europe, Asia to the Caucasus (Ballerio et al., 2010; Lobl & Smetana, 2016). This specimen is well known in the Island of Eolie (Arnone et al., 2001). The ancient mentions of Islands of Ustica (Calcara, 1842 sub *Cetonia stictica*) and Lampedusa (Failla-Tedaldi, 1887 sub *Oxythyraea stictica*) are difficult to be interpreted taxonomically because on previous papers, where they are mentioned, they were confused with other related species (Arnone et al., 2005).

REMARKS. They put themselves in action from February to late July living usualy on the flowers. This is the first report of this specimen for the Aegadian Islands and Ustica Island.

Subfamilia DYNASTINAE MacLeay, 1819

Oryctes (Oryctes) nasicornis *cf.* ***grypus*** (Illiger, 1803)

MATERIAL EXAMINED. Island of Pantelleria, santuario di M. Margana 36°48'57"N, 11°57'36"E, 2.VI.2021, legit C. Muscarella; Island of Pantelleria, Lago di Venere 36°48'41"N, 11°58'35"E, 1.VI.2021, legit C. Muscarella, 1 female, to the light; ibidem, 20.VII.2021, 1 male; Island of Pantelleria, Montagna Grande, 36°46'43"N 12° 0'1"E, 21.VII.2021, legit C. Muscarella, to the light, 2 females; Island of Pantelleria, Bugeber, 36°48'34"N, 11°59'11.44"E, July 2021, legit G. Policardo, 1 male; Island of Pantelleria, July 2021, legit L. Fontanarosa, 1 male.

DISTRIBUTION. *Oryctes nasicornis* is a poyitypical species with a wide distribution in the Paleartic era with about 20 subspecies (Baraud, 1992; Bezdek, 2016). According to Baraud (1992) the subspecies *grypus* is present in Sicily and Calabria, which is also distributed in Portugal, Spain and North Africa, while transitional forms with subspecies *curniculatus* would be present in Sardinia. However, there is no agreement in the literature about the real distribution of these specimens in Italy (Ballerio, 2010; Carpaneto et al., 2011). In the Circumsicilian Islands it was already known for the Islands of Eolie (Carpaneto, 1985; Arnone et al., 2001) and Lampedusa (Calcara, 1847), a citation, the last one, never again confirmed and excluded by Arnone et al. (1995).

REMARKS. *Oryctes nasicornis* is a showy and not very elusive species, easily attracted to artificial light in the summer months, so it is surprising how it has escaped previous research on the Scarabaeoidea of Island of Pantelleria (cf Ragusa, 1875; Mariani, 1955; Liebmann, 1962; Ratti, 1987; Arnone et al., 1995) considering also that it has been found in several Island's localities. The most probably hypothesis is that it may be a recent colonization. As just emphatized, this is the first report of this specimen for the Island of Pantelleria.

Phyllognathus excavatus (Forster, 1771)

MATERIAL EXAMINED. Island of Favignana, downtown, 20.IX.2015, legit P. Balistreri, 1 ex; Island of Favignana, Punta Burrone, 37°55'4"N, 12°20'24"E, 19.IX.2021, legit C. Muscarella, 2 exx; Island of Favignana, Spiaggia Praia, 37°55'45 "N, 12°19'33"E, 4.I.2022, 5 larve; Island of Marettimo, downtown, 9.IX.2021, legit V. Vaccaro, 1 ex; Island of Marettimo, Paese, 37°58'5"N, 12° 4'16"E, 20.IX.2021, legit C. Muscarella, 1 ex.

DISTRIBUTION. *Phyllognathus excavatus* is a Mediterranean Turanian species found in Europe, North Africa and Asia (Ballerio, 2010). This specimen is well known in the Islands of Ustica (Riggio, 1887 sub *silenus*), Eolie (Arnone et al., 2001), Linosa and Pantelleria (Arnone et al., 1995).

REMARKS. *Phyllognathus excavatus* is a common species that can be found from late August to September, and it is attracted in numbers by artificial lights. Almost certainly, this species is also present in Levanzo islet. This is the first report of this specimen for the Aegadian Islands.

Subfamilia SCARABAEINAE Latreille, 1802

Euoniticellus pallipes (Fabricius, 1798)

MATERIAL EXAMINED. Island of Favignana, Florio Establishment, 37°55'46"N, 12°19'14"E, 20.IX.2021, legit C. Muscarella, 1 ex.

DISTRIBUTION. *Euoniticellus pallipes* is a Central Asian-European-Mediterranean chorotype species found in almost all of Italy (Ballerio, 2010). This specimen is known for Island of Vulcano (Arnone et al., 2001).

REMARKS. *Euoniticellus pallipes* is a species associated with coastal and otherwise low-altitude localities. In Sicily, it often is associated with his congener *E. pallens* (Olivier, 1789) (I. Sparacio, pers. com.). This is the first report of this specimen for the Aegadian Island.

Familia TROGIDAE MacLeay, 1819

Trox fabricii Reiche, 1853

MATERIAL EXAMINED. Island of Favignana, north of Punta Sottile, 37°55'17.50"N, 12°19'15.55"E, 4.I.2022, legit C. Muscarella 1 ex - the beetle had landed on a dead sea urchin.

DISTRIBUTION. *Trox fabricii* is a West-Mediterranean species found in northern Africa, Iberian Peninsula and Sicily (Ballerio et al., 2010). For the Circumsicilian Islands it is already known from the Islands of Marettimo (Aliquò & Romano, 1975), Lampedusa, Pantelleria (Gridelli, 1960, Ratti, 1987, Arnone et al., 1995) and Ustica (Riggio, 1887).

REMARKS. This species is common keratinophagous in Sicily, expecially in the winter months associated with raptor boluses, fox faeces, mammal and bird carcasses. This is the first report of this specimen for the Islands of Favignana.

DISCUSSION AND CONCLUSIONS

Summarizing the exposed data, I can state that the beetles *Hybosorus illigeri* and *Oryctes nasicor-*

nis grypus are new to the Island of Pantelleria; the beetle *Phyllognathus excavatus* is new to the Islands of Favignana and Marettimo; the specimen *Protaetia (Potosia) hypocrita* is new to Marettimo islet; and again, the beetles *Aethiessa floralis squamosa*, *Tropinota (Tropinota) squallida squallida* and *Oxythyrea funesta* are new to the greater Aegadian Islands and Ustica Island; the species *Euoniticellus pallipes* appears for the first time on the Aegadian Islands (Favignana), as well as the beetle *Anomius castaneus* for the Circumsicilian Islands (Favignana) and, lastly, the beetles *Trox fabricii* was seen for the first time in the Island of Favignana.

From the analysis of the present literature, including this work, 82 taxa, including species and subspecies, are reported in the Circumsicilian Islands (Figs. 1, 2) or 41% of the scarabaeoidea faunistic data known for Sicily (198, cf. Arnone & Romano, 2021). This is a rather high number considering both the modest territorial extension of the area considered (268 km^2 circa) and the fact that it is fragmented into areas of modest size.

Of these, 5 are endemics species exclusive to the area under consideration: *Pachydema lopadusanorum* Sparacio, La Mantia et Bellavista 2018 for the Islands of Lampedusa and Pantelleria, *Geotrogus euphytus lamantiai* Sparacio 2014 for the Island of Pantelleria, *Geotrogus maraventanoi* Sparacio, 2018 for the Island of Lampedusa, *Firminus massai* Arnone, Lo Cascio et Grita, 2014 e *Anoxia (Mesanoxia) moltonii* Sabatinelli, 1976 for Aeolian Islands (see also Muscarella & Baragona, 2017); 6 are the taxa known for the Sicilian district exclusively in its satellite Islands: *Rhizotrogus pallidipennis* Blanchard, 1850, *Onitis alexis septentrionalis* Balthasar, 1942, *Megatelus contractus* (Klug, 1845) for the Island of Pantelleria, *Protaetia (Potosia) cuprea cuprea* (Fabricius, 1775) for the Island of Lampedusa, *Copris hispanus* (Linnaeus, 1764) for the Islands of Lampedusa and Pantelleria, *Psammodius plicicollis* Erichson, 1848 for Stromboli islet.

The total number of Scarabaeoidea taxa on each individual Island seems to be clearly correlated with area ($\log^{10}$ r=0.662, P 0.063) while no significant correlations appear with either distance from the nearest continental area or maximum altitude.

The only Island that deviates significantly is Vulcan with 42 species, by far the richest of the Islands under consideration. The populations also appear to be correlated with stochastic factors. In particular, coprophages (which together represent 61% of the fauna considered) are mainly influenced by the availability of *pabulum*, which consists, essentially, of droppings from grazing animals. The

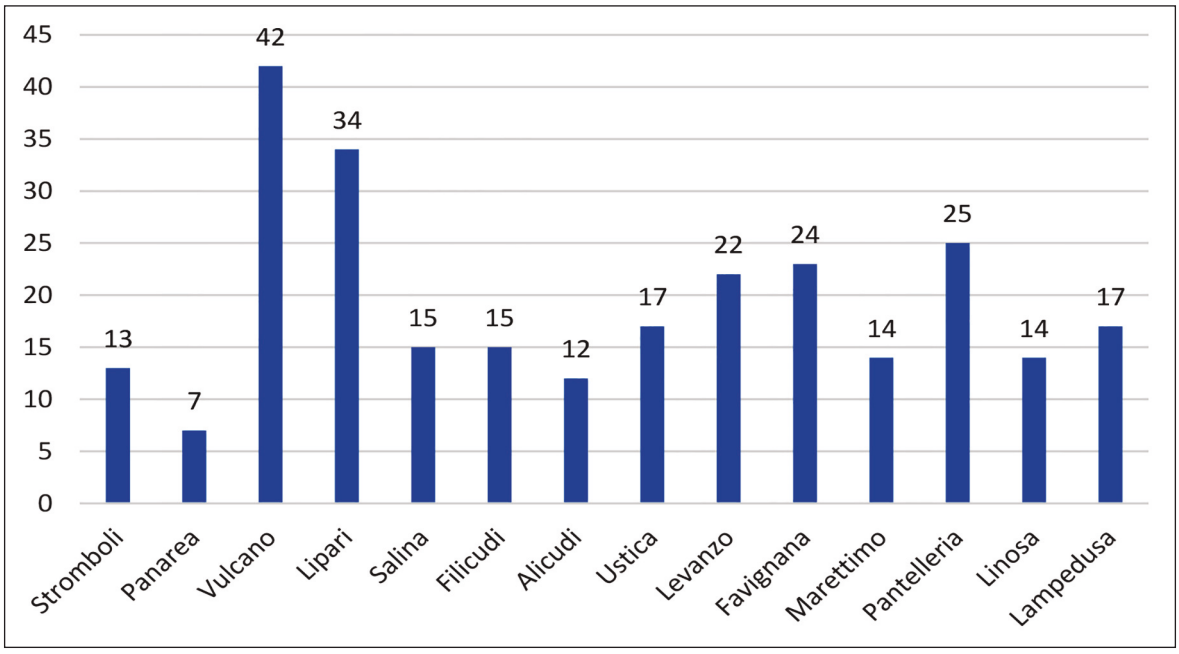

Figura 1. Number of taxa per Island

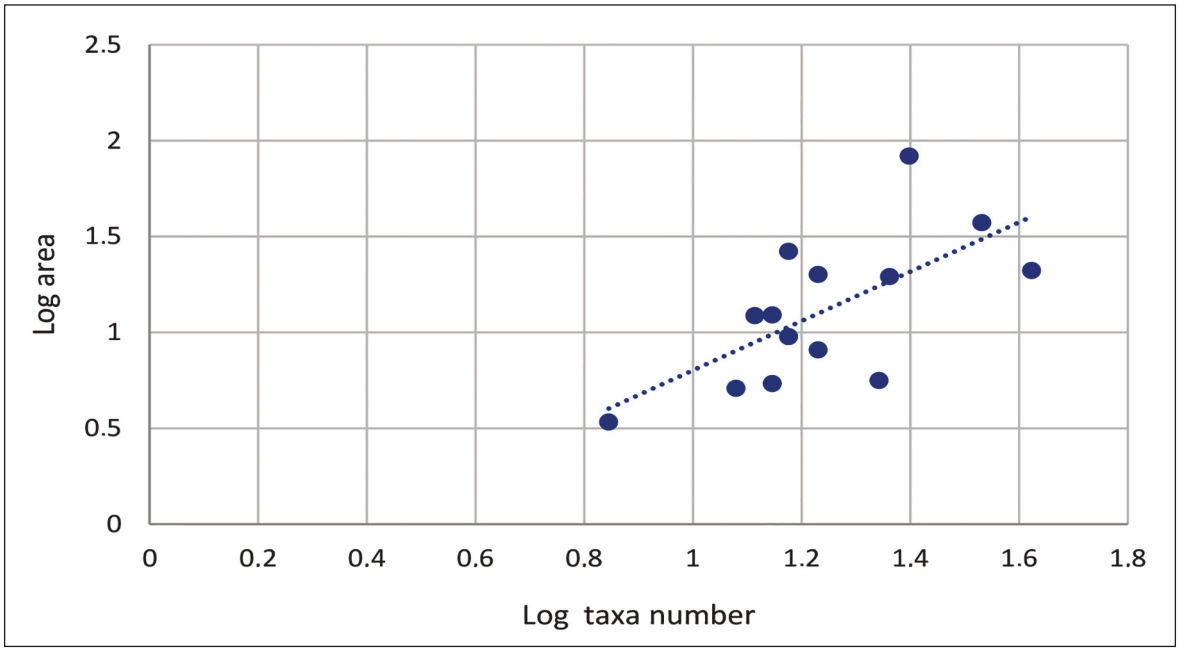

Figure 2. Regression curve for the area / species relationship on a log10 basis.

latter represents a resource that tends to be variable in space and time and has contracted sharply in the last half century on many small Islands due to the retreat from zootechnical practices (Arnone et al., 1995, 2001; Massa, 1995).

Therefore, there is a population subject to continuous instances of new colonizations - the great majority scarabaeoidea data reported are flyer species capable of covering even longe distances with favorable winds - as recent finding of *O. nasicornis* and of *H. bigiber* for the Island of Pantelleria, but also subject to rapid extinction events as emerged at the Islands of Lampedusa and Pantelleria (Arnone et al., 1995; Massa, 1995).

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