

MARCELLO VERDINELLI (*) - ANTONIO SASSU (*) - ALESSANDRO MOLINU (*) - XENIA FOIS (*)

AN UPDATED LIST OF SARDINIA'S ANTS (HYMENOPTERA FORMICIDAE)

(*) CNR, Istituto per lo Studio degli Ecosistemi, Sede di Sassari, via E. De Nicola, 07100 Sassari, Italy; e-mail: m.verdinelli@ise.cnr.it

Verdiuelli M., Sassu A., Molinu A., Fois X. – An updated list of Sardinia's ants (Hymenoptera Formicidae).

A critical list of ant species of Sardinia based on current literature, present taxonomy and the unpublished records of a faunal survey is here presented. In the most recent checklist of Italian ants published in 1995, 68 species and subspecies were reported for Sardinia. Although in the next twelve years there has not been considerable myrmecological activity, an updating is desirable. Three species have to be added as new to Sardinia: *Cryptopone ochracea* (Mayr, 1855), *Myrmecina melonii* Rigato, 1999 and *Stenamma orousseti* Casevitz-Weulersse, 1990. After a comparison of the material collected during the survey and data from current literature, a total of 70 species and subspecies of Formicidae are now known to occur in the island. The presence of some species, based on old and doubtful records, is discussed.

KEY WORDS: faunal survey, new species, checklist.

INTRODUCTION

Italian ants have been studied since the 19th century and a large literature is currently available. Yet a number of faunal surveys was carried out in Mediterranean islands (e.g. by CECCONI, 1908; FINZI, 1924; DONISTHORPE, 1926, 1927) and a complete list of papers, published until December 31st 1969, is reported by BARONI-URBANI (1971a). In recent years, lists of ants coming from Corse (CASEVITZ-WEULERSSE, 1990b) and Pelagic islands (MELI, 1995) were published. The ant fauna of Sardinia seems well known as well. However, a great deal of faunal records were collected many years ago and new surveys are lacking. EMERY (1915) published the first critical checklist of Sardinian ants including in his work both unpublished data and the contribution of other authors. BARONI-URBANI (1971a), in his catalogue of the Formicidae species of Italy, listed 57 species or subspecies for Sardinia but he reported faunal data gathered exclusively from bibliographical information. Seven taxa were added as new since EMERY's list: *Aphaenogaster gibbosa fiorii* Emery, 1915, *Aphaenogaster subterranea ichnusa* Santschi, 1925, *Camponotus marginatus* (Latreille, 1798) [= *Camponotus aethiops* (Latreille, 1798)], *Formica lugubris* Zetterstedt, 1838, *Lasius bicornis* (Foerster, 1850), *Lasius brunneus* (Latreille, 1798), *Leptothorax parvulus* (Schenck, 1852) [= *Temnothorax parvulus* (Schenck, 1852)]. On the contrary, four species [*Camponotus fallax* (Nylander, 1856), *Formica fusca* Linnaeus, 1758, *Solenopsis latro msilana* Forel, 1894 and *Tetramorium diomedea* Emery, 1908], although their presence had already been excluded by EMERY (1914, 1915, 1916, 1925) and by KRAUSSE (1919), were reported for Sardinian fauna.

New data about ants collected in Sardinia during ten years by various collectors were published by CASEVITZ-WEULERSSE (1974). The author reported some new species to Sardinia: *Linepithema humile* (Mayr, 1868), *Plagiolepis vindobonensis* Lomnicki, 1925 (= *taurica* Santschi, 1920), *Strongylognathus testaceus* (Schenck, 1852), *Leptothorax lichtensteini* (Bondroit, 1918) [= *Temnothorax lichtensteini* (Bondroit, 1918)].

In 1995 the checklist of the ants of Italy (POLDI *et al.*, 1995), based on literature and unpublished data, was published and the number of Sardinian ant species increased to 68. In this list *Hypoponera eduardi* (Forel, 1894) and *Tetramorium diomedea* Emery, 1908 were removed from Sardinia's ant list but eleven taxa were reported as new: *Camponotus piceus piceus* (Leach, 1825), *Cardiocondyla nuda nuda* (Mayr, 1866), *Lasius citrinus* Emery, 1922, *Linepithema humile* (Mayr, 1868), *Epimyrma ravouxi* (André, 1896) [= *Myrmoxenus ravouxi* (André, 1896)], *Ponera sulcitana* Stefani, 1969 (sic!), *Trichoscopa membranifera* (Emery, 1869) [= *Pyramica membranifera* (Emery, 1869)], *Smithistruma tenuipilis* (Emery, 1915) [= *Pyramica tenuipilis* (Emery, 1915)], *Stenamma striatulum* Emery, 1894, *Strongylognathus testaceus* (Schenck, 1852), *Tetramorium caespitum* (Linnaeus, 1758).

Although in the next twelve years there has not been considerable myrmecological activity, some papers that mention new species for Sardinia were published. These papers and some new records suggested that further new species could be discovered and have raised the need for an updating. In the present paper a provisional checklist of Sardinia's ants, based on the 1995 list and new records, is proposed. Furthermore, comments on some species and doubtful past records are given.

MATERIALS AND METHODS

A faunal survey was carried out in Sardinia from 2003 to 2007 and ant specimens were collected in as many places as possible (Fig. 1).

Different sampling methods were applied. In most cases ants were collected by hand and whenever possible, at least one hour sampling period was devoted to every new locality. Ants were collected in the surroundings by locating the nest entrance, by overturning stones and looking for ant trails on the soil surface or on trees or other plants. During the survey pitfall traps, light traps and entomological umbrella were used as well. In order to collect strictly endogean species, ground and litter sam-



Fig. 1 – Map of Sardinia including positions of sample sites.

ples were collected and the ants were extracted by using Berlese's funnels. The ants were preserved in 70% ethanol and a new vial was used for each nest sample whenever possible. Some specimens from homogeneous species groups were mounted for determination. All ants are now stored in the collection of the first author at the CNR, Istituto per lo Studio degli Ecosistemi, Sede di Sassari. In order to recognize species belonging to subgenus *Lasius* s. str., workers were measured following investigation methods reported by SEIFERT (1992). Taxonomic changes are based on the latest publications (BOLTON, 1995, 2003; BOLTON *et al.*, 2007; SEIFERT, 1992, 2003, 2005).

When necessary, specimens were compared with ant material deposited in the following institutions: Museo Civico di Storia Naturale, Genova (MCSN); Dipartimento di Valorizzazione e Protezione delle Risorse Agroforestali - Entomologia e Zoologia applicate all'ambiente «Carlo Vidano», Torino (DiVaPRA); Dipartimento di Scienze e Tecnologie Agroambientali - Istituto di Entomologia «G. Grandi», Bologna (DiSTA); Naturhistorisches Museum, Basilea (NMB); Dipartimento di Biologia Animale ed Ecologia dell'Università, Cagliari (DiBAE); Dipartimento di Protezione delle Piante dell'Università, Sezione di Entomologia, Sassari (DiPP).

RESULTS

There are three new species to be added to the Sardinia ant checklist, 16 name changes that refer to species already

mentioned on the 1995 list, 4 subspecies raised to species status, 3 taxa removed because of synonymy, 2 species removed because of misidentification, 6 species removed as they are based on doubtful and/or old records whilst 4 taxa, already cited in old literature but not listed in the 1995 list, are here reported instead. As a whole we collected 50 species belonging to 25 genera (table 1). Several of them are very common and then we report just additional details concerning both new records and species that were absent from the 1995 list. The provisional alphabetical list follows the nomenclature in BARRY BOLTON's catalogue (1995) combined with the nomenclature in his CD-ROM current version (BOLTON *et al.*, 2007).

DISCUSSION AND CONCLUSION

We suppose that all new taxa added to BARONI URBANI's checklist were checked by POLDI *et al.* (1995) and we have evidence of that from both recent publications and our samples. Apart from taxonomic changes and new records for Sardinia, the proposed list of Sardinia ants differs to some extent from the last one published in 1995. *C. fallax*, *F. fusca*, *S. latro msilana* were removed from the previous list for the lack of recent records. *Lasius* (*Chthonolasius*) *citrinus* Emery, 1922 was probably considered by POLDI *et al.* (1995) as synonym of *Formica umbrata* Nylander, 1846 sensu MAYR (1853) and then reported for Sardinia in 1995 list. As we have not been able to collect the species and to find recent records in literature, we decided to remove it from our provisional checklist. *L. lasioides* is not here considered as a new species for Sardinia. It is locally abundant, also in urban area. Since the revision of the genus *Lasius* s. str. (SEIFERT, 1992), *L. lasioides* might be referred to the unique record of *L. brunneus* for Sardinia (GRANDI, 1935) which we have not collected yet in the island. *L. paraliensis* was already reported for Sardinia by SEIFERT (1992) and as we have never found *L. alienus* (Foerster, 1850), this last species probably does not occur in Sardinia. We collected all castes of *T. simrothi* which is widespread in Sardinia. However samples we collected from different localities are constituted by workers which resembles *T. erraticum erraticum* (Latreille, 1798) both for clypeal incision and propodeum shape. Unfortunately, we have not been able yet to catch some male so that a safe determination is not possible. *T. lichtensteini* and *P. taurica* are included in the provisional checklist as we have precise and recent records (CASEVITZ-WEULERSSE, 1974). For opposite reasons we cannot list some taxa [*Proceratium algiricum* Forel 1899, *Messor sanctus* Emery, 1921, *Temnothorax affinis* (Mayr, 1855), *Lasius* (*Chthonolasius*) *umbratus* (Nylander, 1846)] reported by BERNARD (1967) for Sardinia.

It is very difficult to gather precise information about presence and geographical distribution of ant species in Sardinia. Old papers are sometimes incomplete and recent faunal studies are lacking. Our results do not mean that there is no need for further work in the inventory and taxonomy of Sardinia's ants. It is probable that there are additional species of ants still to be found in Sardinia or that taxa we excluded here might be re-discovered in the future. We can deduce it because there are a number of species on the list that are known from only one collection, or from one or two sites; there are probably other equally rare species that nobody has been lucky enough to find.

Table 1. Provisional list of Sardinian ants with indication of species collected and endemic status. Notes, referring to additional details concerning both new records and species missing in the 1995 checklist, follow this table.

Species list	collected	notes	endemism
<i>Aphaenogaster gibbosa fiorii</i> Emery, 1915	-		
<i>Aphaenogaster sardoa sardoa</i> Mayr, 1853	+		
<i>Aphaenogaster senilis senilis</i> Mayr, 1853	+		
<i>Aphaenogaster spinosa spinosa</i> Emery, 1878	+	(1)	
<i>Aphaenogaster subterranea ichnusa</i> Santschi, 1925	-		[E]
<i>Aphaenogaster subterranea subterranea</i> (Latreille, 1798)	+		
<i>Camponotus (Camponotus) vagus vagus</i> (Scopoli, 1763)	+		
<i>Camponotus (Colobopsis) truncatus</i> (Spinola, 1808)	+		
<i>Camponotus (Myrmentoma) gestroi gestroi</i> Emery, 1878	+		
<i>Camponotus (Myrmentoma) lateralis lateralis</i> (Olivier, 1792)	+		
<i>Camponotus (Myrmentoma) piceus</i> (Leach, 1825)	+		
<i>Camponotus (Tanaemyrmex) aethiops aethiops</i> (Latreille, 1798)	+	(2)	
<i>Cardiocondyla mauritanica</i> Forel, 1890	+	(3)	
<i>Crematogaster scutellaris scutellaris</i> (Olivier, 1792)	+	(4)	
<i>Cryptopone ochracea ochracea</i> (Mayr, 1855)	+	(5)	
<i>Formica (Formica) lugubris</i> Zetterstedt, 1838	+		
<i>Formica (Serviformica) cunicularia</i> Latreille, 1798	+		
<i>Formica (Serviformica) rufibarbis rufibarbis</i> Fabricius, 1793	+		
<i>Hypoponera eduardi</i> (Forel, 1894)	+	(6)	
<i>Hypoponera</i> sp. (= ? <i>sulcitana</i> Stefani, 1970)	+	(7)	
<i>Lasius (Cautolasius) flavus</i> (Fabricius, 1782)	-		
<i>Lasius (Chthonolasius) bicornis</i> (Foerster, 1850)	+	(8)	
<i>Lasius (Lasius) emarginatus</i> (Olivier, 1792)	+		
<i>Lasius (Lasius) lasioides</i> (Emery, 1869)	+	(9)	
<i>Lasius (Lasius) niger niger</i> (Linnaeus, 1758)	+		
<i>Lasius (Lasius) paralienus</i> Seifert, 1992	+	(10)	
<i>Leptanilla doderoi</i> Emery, 1915	?	(11)	
<i>Leptanilla revelierii</i> Emery, 1870	?	(11)	
<i>Linepithema humile humile</i> (Mayr, 1868)	+		
<i>Messor capitatus</i> (Latreille, 1798)	+		
<i>Messor minor minor</i> (André, 1883)	+		
<i>Messor structor structor</i> (Latreille, 1798)	+		
<i>Messor wasmanni</i> Krausse, 1910	+	(12)	
<i>Monomorium subopacum subopacum</i> (F. Smith, 1858)	-		
<i>Myrmecina graminicola graminicola</i> (Latreille, 1802)	+		
<i>Myrmecina melonii</i> Rigato, 1999	-	(13)	[E]
<i>Myrmica spinosior</i> Santschi, 1931	+	(14)	
<i>Myrmoxenus (Myrmoxenus) kraussei</i> (Emery, 1915)	-		
<i>Myrmoxenus (Myrmoxenus) ravouxi</i> (André, 1896)	+	(15)	
<i>Pheidole pallidula obscura</i> Santschi, 1936	-	(16)	[E]
<i>Pheidole pallidula pallidula</i> (Nylander, 1849)	+		
<i>Plagiolepis pygmaea pygmaea</i> (Latreille, 1798)	+		
<i>Plagiolepis taurica</i> Santschi, 1920	-	(17)	
<i>Ponera coarctata</i> (Latreille, 1802)	+		
<i>Ponera testacea</i> Emery, 1895	-	(18)	
<i>Pyramica argiola</i> (Emery, 1869)	-	(19)	
<i>Pyramica baudueri</i> (Emery, 1875)	-	(19)	
<i>Pyramica membranifera</i> (Emery, 1869)	+	(19)	
<i>Pyramica tenuipilis</i> (Emery, 1915)	-	(19)	
<i>Solenopsis fugax fugax</i> (Latreille, 1798)	+		
<i>Solenopsis orbula orbula</i> Emery, 1875	+		
<i>Stenammina orousseti</i> Casevitz-Weulersse, 1990	-	(20)	
<i>Stenammina sardoum</i> Emery, 1915	-		
<i>Stenammina striatulum</i> Emery, 1895	+	(21)	
<i>Strongylognathus testaceus</i> (Schenck, 1852)	-	(22)	
<i>Tapinoma simrothi simrothi</i> Krausse, 1911	+		
<i>Temnothorax exilis</i> (Emery, 1869)	+		
<i>Temnothorax kraussei</i> (Emery, 1916)	+		
<i>Temnothorax lichtensteini</i> (Bondroit, 1918)	-		
<i>Temnothorax nylanderi nylanderi</i> (Foerster, 1850)	-		

(Continued)

Continued Tab. 1

Species list	collected	notes	endemism
<i>Temnothorax parvulus</i> (Schenck, 1852)	+	(23)	
<i>Temnothorax recedens</i> (Nylander, 1856)	+		
<i>Temnothorax sardous</i> (Santschi, 1909)	+		[E]
<i>Temnothorax specularis</i> (Emery, 1916)	+		
<i>Temnothorax tuberculatum tuberculatum</i> (Fabricius, 1775)	+		
<i>Temnothorax unifasciatus unifasciatus</i> (Latreille, 1798)	+		
<i>Tetramorium brevicorne</i> Bondroit, 1918	+		
<i>Tetramorium caespitum caespitum</i> (Linnaeus, 1758)	-	(22)	
<i>Tetramorium meridionale</i> Emery, 1870	+		
<i>Tetramorium semilaeve semilaeve</i> André, 1883	+		

NOTES

- (1) *A. nitida* Krausse, 1912 is junior synonym of *A. spinosa* (BARONI URBANI, 1971b; CASEVITZ-WEULERSSE, 1990a).
- (2) *C. marginatus* (Latreille, 1798) is considered as junior synonym of *C. aethiops* (PISARSKI, 1975; AGOSTI & COLLINGWOOD, 1987).
- (3) Porto Torres (SS), Isola Asinara, Cala Arena, 41°06'18" N, 8°19'11" E: 12 workers, 25.IX.2003; 1 worker, 28.I.2004. Porto Torres (SS), Isola Asinara, Cala Sant'Andrea, 41°00'49" N, 8°14'33" E: 1 worker 25.IX.2003; 83 workers, 27.VII.2004. Porto Torres (SS), Isola Asinara, Cala Sabina, 41°05'16" N, 8°20'46" E: 2 workers, 21.X.2004. Alghero (SS), Canal de l'Oma Molt, 40°31'25" N, 8°20'03" E, 60 m a.s.l.: 1 worker, 25.IX.2006. Sant'Antioco (CI), Calasetta, DiPP entomology collection: 2 workers, 29.XI.1969. All records belong to *C. mauritanica* which seems to have a coastal geographic distribution. According to SEIFERT (2003) who stated that *C. nuda* seems to be restricted to the tropical and subtropical Pacific region, we considered all previous records coming from Sardinia as doubtful and then we removed *C. nuda* from the provisional checklist because of misidentification.
- (4) The misspelled name *Cremastogaster*, used by MAYR (1861) and many later authors, is here ignored.
- (5) Porto Torres (SS), Isola Asinara, Cala Arena, 41°06'18" N, 8°19'11" E: 2 workers, 25.IX.2003; 1 dealate queen, 27.VII.2004; 5 dealate queens, 21.X.2004. New species to Sardinia. We have not been able yet to collect *C. ochracea* in other localities and then its actual geographical distribution in Sardinia remains unknown.
- (6) Porto Torres (SS), Isola Asinara, Cala Sant'Andrea, 41°00'47" N, 8°14'55" E: 1 worker, 15.V.2004. Porto Torres (SS), Isola Asinara, Cala Arena, 41°06'18" N, 8°19'11" E: 1 worker, 15.V.2004; 7 workers and 2 ergatomorphic females, 01.VII.2004. Boroneddu (OR), Sa Perda Longa, 40°07'03" N, 8°52'30" E: 40 workers, 1 ergatomorphic female, 01.IX.2005. Belvi (NU), Su Enazzu, 39°58'43" N, 9°11'05" E, 550 m a.s.l.: 1 worker, 8.VIII.2006; 1 worker, 5.IX.2006; 1 worker, 21.IX.2006; 12 workers, 30.V.2007. Sassari (SS), Agrarian Faculty garden, 40°43'04" N, 8°33'11" E, 207 m a.s.l.: 1 alate queen, 23.VI.2005. Sorso (SS), Platamona, 40°49'09" N, 8°28'46" E: 1 dealate queen, 18.VIII.2006.
- * This species was not reported in the 1995 list.
- (7) Carbonia (CI), Grotta dei Fiori, Su Porcili: 12 workers, 1 ergatoid male, VI-X.2004; 61 workers, 6 males, 11 ergatomorphic females, VII-XII.2005; 121 workers, 7 ergatoid males, 4 ergatomorphic females, IV-VIII.2006. Cuglieri (OR), Grotta di Cappas, Tegas: 11 workers, IV-XI.2005; 30 workers, 2 ergatoid males, 11 alate queens, IV-VIII.2006. We did not examine the holotype because the type series is missing. However we studied an alate queen and two workers, deposited in DiBAE collection, which carried a label with only the type locality (Grotta dei Fiori). Comparing our samples with the presumed type material there is no longer any doubt that STEFANI'S (1970) ant belongs to *Hypoponera* genus. According to POLDI *et al.* (1995) we consider the species as doubtful. It is plausible that this species might be referred to other *Hypoponera* species already described.
- (8) Orgosolo (NU), Grotta risorgente di Sas Venas: 1 worker, 18.IV.2004. Rare species, only a previous record is known from Sardinia (POLDI, 1962).
- (9) Sassari (SS), 40°43'30" N, 8°33'25" E, 198 m a.s.l.: 1 worker, 14.VII.1994; 1 worker, 31.V.1995; 2 workers, 19.VI.1995; 2 males, 28.VI.1995; 1 worker, 23.VIII.1995. Porto Torres (SS), Isola Asinara, Elighe Mannu, 41°05'30" N, 8°18'25" E: 10 workers, 21.X.2004. Luras (OT), Santo Baltolu di Carana, 41°00'30" N, 9°15'25" E, 219 m a.s.l.: 5 workers, 01.V.2007. Domusnovas (CI), Marganai, 39°20'46" N, 8°37'18" E, 221 m a.s.l.: 9 workers, 21.VI.2007.
- (10) Belvi (NU), Su Enazzu, 39°58'43" N, 9°11'05" E, 550 m a.s.l.: 49 workers, 27.VII.2006; 10 workers, 08.VIII.2006; 3 workers, 24.VIII.2006; 7 workers, 1 queen, 05.IX.2006; 4 workers, 2 queens, 1 male, 21.IX.2006; 2 workers, 05.X.2006; 1 worker, 16.X.2006; 2 workers, 08.I.2007. Tonara (NU), Su Azzile, 39°59'07" N, 9°08'25" E, 617 m a.s.l.: 3 workers, 02.IV.2007. Samugheo (OR), Pont'Ecciu, 39°58'17" N, 8°59'09" E, 151 m a.s.l.: 4 workers, 19.VI.2007.
- (11) Recent records coming from Sardinia were published (LEO & FANCELLO, 1990). We just caught *Leptanilla* males pertaining to two different species. Although we have not collected yet males together with other castes, it is very likely they have to be associated to *doderoi* and *revelierii*.
- (12) Revived from synonymy and raised to species (CASEVITZ-WEULERSSE, 1990a).
- (13) Endemic species from Sardinia described by RIGATO (1999).
- (14) Raised to species by SEIFERT (2005). We have never collected *M. sabuleti*.
- (15) Belvi (NU), Su Ajone, 39°57'46" N, 9°10'57" E, 585 m a.s.l.: 1 alate queen, 04.X.2005. Its presence in Sardinia was reported by MEI (1992b) as personal communication by BUSCHINGER.
- (16) *P. pallidula emeryi* KRAUSSE (1912a) is junior synonym of *P. pallidula obscura* (BOLTON *et al.*, 2007).
- (17) Only one record is reported from Sardinia (CASEVITZ-WEULERSSE, 1974). Not listed by POLDI *et al.* (1995).
- (18) Previously considered as synonym of *P. coarctata*, it was raised to species level by SEIFERT (2003). Already reported for Sardinia as subspecies (KRAUSSE, 1912b; EMERY, 1915).
- (19) Recent records are reported by FANCELLO & LEO (1991).
- (20) New species to Sardinia (Santa Lucia, Siniscola, NU), reported by DUBOIS (1998).
- (21) Baunei (OG), Grotta di Su Canale: 1 worker, X.2003. MEI (1992a) collected this species in Sardinia for the first time but his record was ignored by DUBOIS (1998).
- (22) Reliable and recent records are known (CASEVITZ-WEULERSSE, 1974; POLDI, 1974; SANETRA *et al.*, 1999).
- (23) Domusnovas (CI), Marganai, 39°20'46" N, 8°37'18" E, 221 m a.s.l.: 11 workers, 21.VI.2007. Iglesias (CI), Marganai, 39°21'01" N, 8°35'07" E, 757 m a.s.l.: 10 workers, 1 dealate queen, 26.VI.2007. Only a previous old record from Sardinia (Grandi, 1935).

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RIASSUNTO

UN ELENCO AGGIORNATO
DELLE FORMICHE DELLA SARDEGNA
(HYMENOPTERA FORMICIDAE)

Nel 1995 venne pubblicato l'elenco aggiornato delle specie di formiche italiane sulla base della letteratura più recente e di dati faunistici inediti. Per la Sardegna furono segnalate 11 nuove specie e il numero totale di formicidi crebbe a 68 tra entità specifiche e subspecifiche. Benché negli anni seguenti la mirmecofauna della Sardegna non sia stata molto studiata e ben poche pubblicazioni siano state dedicate all'argomento, le recenti revisioni relative ad alcuni taxa hanno suggerito la stesura di un nuovo elenco di specie che tenesse conto, oltre che di alcuni aggiornamenti tassonomici e nomenclatoriali, anche di nuovi dati faunistici raccolti dagli Autori della presente nota. Sono riportate tre nuove specie per la Sardegna: *Cryptopone ochracea ochracea* (Mayr, 1855), *Myrmecina melonii* Rigato, 1999 e *Stenamma orousseti* Casevitz-Weulersse, 1990. Dallo studio del materiale raccolto e dall'esame dei dati riportati in letteratura viene proposto per l'isola un elenco comprendente 70 tra specie e subspecie. Inoltre viene discussa la presenza di alcune specie basata su segnalazioni vecchie e/o dubbie.

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