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A zoogeographical analysis of the Italian scale insect fauna ^(*)

Abstract - The paper presents the results of a zoogeographical analysis of the Italian scale insect fauna comprehending, to date, 365 species. Eleven species have not been inserted in the present zoogeographical analysis: these species were poorly described in the past, are of doubtful identification and are no more recorded since their description. The Italian scale insect species have been grouped into the following fundamental groups according to the distributional patterns currently used in faunistic studies of the West Palearctic Region : A) Fundamental elements of the West-Palearctic Region (226 species); B) Cosmopolitan elements or Cultural Immigrants (111 species); C) Endemic elements (17 species). The first group comprehends the following sub-groups: 1) Elements widely distributed in the Holarctic region (115 species); 2) Elements widely distributed in Europe (52 species); 3) Elements widely distributed in the Mediterranean Basin (57 species); 4) Afrotropical or Oriental elements present also in the Mediterranean area (2 species). Each fundamental group or sub-group comprehends several different elements having a more restricted distributional pattern. The analysis reveals that the Italian scale insect fauna (with the exclusion of the Cosmopolitan elements, that have no zoogeographical interest), is represented mainly by Elements widely distributed in the Holarctic region (31.51% of the total scale insect fauna). The Elements widely distributed in the Mediterranean Basin constitute 15.62%, very similar to those widely distributed in Europe 14.25%. The Afrotropical or Oriental elements represent less than 1% (0.51%) of the total scale insects fauna. A brief comment on each group is given.

Riassunto - *Considerazioni zoogeografiche sulla coccidofauna italiana.*

Vengono riportati i risultati di una analisi zoogeografica condotta sulle 365 specie finora note per la coccidofauna italiana. Non sono state prese in considerazione ai fini del presente studio 11 specie di dubbia identificazione delle quali esiste solo la descrizione originaria. Le rimanenti 354 specie sono state suddivise in base ai corotipi maggiormente impiegati per gli studi faunistici della Palearctide occidentale: A) Elementi faunistici fondamentali della Palearctide occidentale (226 specie); B) Elementi cosmopoliti o "cultural immigrants" (111 specie); C)

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Elementi endemici (17 specie). Il gruppo degli elementi faunistici della Palearctica occidentale comprende i seguenti sottogruppi: 1) Elementi ampiamente distribuiti nella regione Olartica (115 specie); 2) Elementi ampiamente distribuiti in Europa (52 specie); 3) Elementi ampiamente distribuiti nel bacino del Mediterraneo (57 specie); 4) Elementi afrotropicali od orientali presenti anche nell'area mediterranea (2 specie). Ciascun gruppo o sottogruppo comprende altri elementi con un più ristretto areale di distribuzione. Il risultato di tale analisi rivela che, a eccezione degli elementi cosmopoliti di ridotto interesse zoogeografico, nella coccidofauna italiana sono maggiormente presenti elementi ampiamente distribuiti nella regione Olartica (31,51% del totale). Gli elementi ampiamente diffusi nel bacino del Mediterraneo costituiscono il 15,62% mentre quelli ampiamente diffusi in Europa rappresentano il 14,25%. Gli elementi afrotropicali e orientali costituiscono meno dell'1% (0,51%) dell'intero complesso faunistico. Per ciascuno dei gruppi considerati viene fornito un breve commento.

Key words: scale insect, Italy, faunistic.

INTRODUCTION

Balachowsky (1932) and Bodenheimer (1934) were the first coccidologists to deal with the zoogeography of scale insects. Their valuable works are devoted respectively to the zoogeography of the Mediterranean Basin, with emphasis on the North-African region, and of the South-Eastern Palearctic region. Their analysis still constitutes the basis for zoogeographical researches.

In the past any attempt at zoogeographical analysis of the Italian scale insect fauna was prevented by the scarce knowledge on its composition. Besides, it was difficult to compare it with the faunas of other European and Mediterranean countries because of the global scarcity of available data.

Times have now changed. A number of faunistic papers published in recent years by several authors added numerous new records (Marotta & Tranfaglia, 1993; Pellizzari, 1994; 1994a; Mazzeo *et al.*, 1994; 1997; Longo *et al.*, 1995; Marotta *et al.*, 1997; Williams & Pellizzari, 1997). Moreover, the study of the scale insect fauna of Sardinia and Sicily, islands of relevant zoogeographical interest, gave a valuable contribution to our knowledge (Pellizzari & Fontana, 1996; Russo & Mazzeo, 1996). The above mentioned reasons let us try a first approach to a zoogeographical analysis of Italian scale insect fauna. It comprehends till now 365 species and, in comparison with the scale fauna of other countries, it appears to be sufficiently well known.

MATERIAL AND METHOD

The distribution of the species was deduced by the following sources: Russell, 1941; Hoy, 1963; Borchsenius, 1966; Kosztarab & Kozár, 1988; Ben-Dov, 1993; 1994;

Danzig, 1993. Additional data are from the above mentioned faunistic papers.

Distributional patterns were determined according to those recently proposed by Italian researchers and currently used in faunistic studies of the West Palearctic Region (Vigna Taglianti *et al.*, 1992). Eleven species have not been inserted in the present analysis: *Euripersia cribrata* (Menozzi, 1933), *Euripersia libera* (Leonardi, 1898), *Euripersia sardiniae* (Leonardi, 1908), *Euripersia silvestrii* (Leonardi, 1918), *Phenacoccus formicarum* Leonardi, 1908, *Pseudococcus farnesiana* (Targioni Tozzetti, 1888), *Pseudococcus longipes* Leonardi, 1908, *Pseudococcus notabilis* Leonardi, 1908, *Rhizococcus targionii* (Cockerell) 1884, *Rhodania hypogea* (Leonardi, 1908) and *Lecanopsis rhyzophila* Targioni Tozzetti, 1868. These were poorly described in the past and are no more recorded. They are of doubtful identification. In some cases the type species is lost and their identity is consequently rather obscure. For this reason we decided to exclude them.

RESULTS

The Italian scale insect species belong to the following fundamental groups :

- A) Fundamental elements of the West-Palearctic Region. This group comprehends the following sub-groups:
 - 1) elements widely distributed in the Holarctic region;
 - 2) elements widely distributed in Europe;
 - 3) elements widely distributed in the Mediterranean Basin;
 - 4) Afrotropical or Oriental elements present also in the Mediterranean area.
- B) Cosmopolitan elements or Cultural Immigrants.
- C) Endemic elements.

Each fundamental group or sub-group includes several different elements having a more restricted distributional pattern.

A) *Fundamental elements of the West-Palearctic Region*

- 1) Elements widely distributed in the Holarctic region.

This sub-group (table1) includes 115 species gathered in 11 distributional patterns. The most numerous are the Palearctic elements with 19 species and the Asiatic-European and Turanian-European elements, both with 18 species. The most representative species included here are: *Chionaspis salicis* (L.), *Planococcus vovae* (Nassonov), *Phenacoccus piceae* (Löw), *Puto pilosellae* (Šulc), *Chortinaspis subterranea* (Lindinger). Fourteen species are considered Eurosiberian. In Italy they are restricted to the Alps or sub-Alps, but one of them, i.e. *Phenacoccus pumilus* (Kiritshenko),

has been also recorded on Mount Etna in Sicily. *Puto superbus* (Leonardi) and *Leucaspis pusilla* Löw, once considered as Mediterranean elements (Balachowsky, 1932), on the basis of subsequent records have been enclosed among the Turanian-European-Mediterranean, numbering 8 species.

2) Elements widely distributed in Europe.

This sub-group (table 2) comprehends 52 species representative of three different distributional patterns: the European, with 33 species, the Central-European with 9 species, and the S-European with 10 species. The European and Central-European elements are mainly distributed in North Italy (i.e. *Puto antennatus* (Signoret) or *Chnaurococcus danzigae* Kozár & Kosztarab). Some species living on forest trees (i.e. *Matsucoccus pini* (Green), *Parthenolecanium rufulum* (Cockerell), *Nemolecanium graniforme* (Wünn)) follow the distribution pattern of their host plants and are present as far as Sicily. Three species linked to the oaks (i.e. *Asterodiaspis repugnans* (Russell), *A. roboris* (Russell), *Kuwanina rubra* Goux) exhibit a S-European distributional pattern.

3) Elements widely distributed in the Mediterranean Basin.

As was predictable this sub-group of elements is largely represented in the Italian fauna (table 3). It comprehends 57 species of which 27 exhibit a Mediterranean distributional pattern (i.e. *Gueriniella serratulae* (Fabricious), *Lecanodiaspis sardoa* Targioni Tozzetti and *Leucaspis riccae* Targioni Tozzetti), and 28 a West-Mediterranean distributional pattern. (i.e. *Adiscodiaspis ericicola* (Marchal), *Nipaecoccus delasusi* (Balachowsky) and *Puto palinuri* Marotta & Tranfaglia). The latter was described in 1993 from specimens collected in the Campania region. Later it was recorded in Sicily (Russo, 1995) and in Sardinia (Pellizzari & Fontana, 1996) demonstrating to have a large distribution.

4) Afrotropical or Oriental elements present also in the Mediterranean area.

In this sub-group there are only 2 species, namely *Ceroplastes rusci* (L.) and *Acanthomytilus sacchari* (Hall). Their distribution pattern appears Afrotropical-Mediterranean (table 4).

B) Cosmopolitan elements or Cultural Immigrants

The species belonging to this group are 111 (table 5). They have a well known extra-European origin and were incidentally introduced into Italy with cultivated and ornamental plants. Some of them are restricted to greenhouses or botanical gardens. On the other hand many species are actually well acclimatised plant pests and often result largely distributed throughout the Italian territory. These species have been also called "cultural immigrants" (Bodenheimer, 1934) or "obvious introductions" (Ben-

Dov, 1990). Several of them are considered Cosmopolitan elements because of their actual distribution, even if their native area is well known (i.e. *Pseudauleacaspis pentagona* (Targioni Tozzetti) or *Icerya purchasi* Maskell).

C) Endemic elements

The Italian species recently described and known only for the type locality, or few other Italian localities, number 17 (table 6). In this zoogeographical analysis they have been considered as endemic elements. We can hypothesise that several of them have a larger distribution area. This could be the case of *Scythia aetnensis* Russo & Longo discovered in Sicily on *Festuca circummediterranea*, a grass widely distributed in the Mediterranean Basin. On the other hand, *Phenacoccus longoi* Russo is very likely a real endemic species. It lives on *Abies alba* in the Calabrian Apennine only and in this region its host plant has a disjunct area and differs from the plants of the same species living throughout the Italian peninsula (Bernetti, 1993).

DISCUSSION

This analysis reveals that the Italian scale insect fauna, excluding the Cosmopolitan (without a zoogeographical interest) and the Endemic elements, is represented mainly by elements widely distributed in the Holarctic region (31.51% of the total scale insect fauna). The elements widely distributed in the Mediterranean Basin constitute 15.62%, very similar to those widely distributed in Europe 14.25%. The Afro-tropical or Oriental elements represent less than 1% (0.51%) of the total scale insect fauna.

These data show that our knowledge on the scale insect fauna of Italy and of other countries is still incomplete and needs more intensive investigations. In fact, the knowledge on the species distribution reflects the intensity of the surveys carried out in the different territories.

Despite our efforts, the attribution of several species to a well-defined element seems in some cases doubtful or hazardous. It appears problematic to define, on the basis of few data, the pertinence of a species to a wider, instead of a more restricted but overlapping, distributional pattern. In these cases we take into account the distributional trend of the species and the host plants distribution. In any case we are aware that it could appear as the result of a compromise or a subjective judgement. The improving of our knowledge on distribution of several species, that could be achieved with more intensive surveys and new records, will help to bridge the gap. The actual distributional pattern of many species proposed in this analysis could change with subsequent records thus changing also the zoogeographical spectrum. Nevertheless we believe that this work represents a starting point for further zoogeographical studies.

Table 1 - Elements widely distributed in the Holarctic region.

GROUP	FAMILY	SPECIES
HOLARCTIC	ORTHEZIIDAE	<i>Arctorthezia cataphracta</i> (Olafsen, 1772)
	PSEUDOCOCCIDAE	<i>Dysmicoccus patulae</i> (Rau, 1938) <i>Heterococcus nudus</i> (Green, 1926) <i>Peliococcus serratus</i> (Ferris, 1925)
	ERIOCOCCIDAE	<i>Acanthococcus greeni</i> Newstead, 1898
	CRYPTOCOCCIDAE	<i>Cryptococcus fagisuga</i> Lindinger, 1936
	COCCIDAE	<i>Eriopeltis festucae</i> (Fonscolombe, 1834) <i>Eulecanium tiliae</i> (Linnaeus, 1758) <i>Planchonia arabisidis</i> Signoret, 1876
PALEARCTIC	ORTHEZIIDAE	<i>Orthezia urticae</i> (Linnaeus, 1758)
	PSEUDOCOCCIDAE	<i>Coccurea comari</i> (Künow, 1880) <i>Metadenopus festucae</i> Šulc, 1933 <i>Planococcus vovae</i> (Nassonov, 1908)
	ERIOCOCCIDAE	<i>Acanthococcus agropyri</i> (Borchsenius, 1949) <i>Acanthococcus insignis</i> (Newstead, 1891) <i>Acanthococcus micracanthus</i> Danzig, 1975
	COCCIDAE	<i>Parthenolecanium persicae</i> (Fabricius, 1776) <i>Pulvinaria vitis</i> (Linnaeus, 1758)
	DIASPIDIDAE	<i>Aulacaspis rosae</i> (Bouché, 1833) <i>Carulaspis carueli</i> (Signoret, 1869) <i>Chionaspis salicis</i> (Linnaeus, 1758) <i>Dynaspidiotus britannicus</i> (Newstead, 1898) <i>Lepidosaphes conchiformis</i> (Gmelin, 1789) <i>Lepidosaphes newsteadi</i> (Šulc, 1895) <i>Lepidosaphes ulmi</i> (Linnaeus, 1758) <i>Quadraspidiotus gigas</i> (Thiem & Gerneck, 1934) <i>Quadraspidiotus ostreaeformis</i> (Curtis, 1843) <i>Rhizaspidiotus canariensis</i> (Lindinger, 1911)
W-PALEARCTIC	ERIOCOCCIDAE	<i>Acanthococcus devoniensis</i> (Green, 1896)
	CEROCOCCIDAE	<i>Cerococcus cycliger</i> Goux, 1932
	COCCIDAE	<i>Lichtensia viburni</i> Signoret, 1873
	DIASPIDIDAE	<i>Leucaspis loewi</i> Colvée, 1882 <i>Quadraspidiotus zonatus</i> (Frauenfeld, 1868)
ASIATIC-EUROPEAN	PSEUDOCOCCIDAE	<i>Atrococcus achilleae</i> (Kiritschenko, 1936) <i>Atrococcus cracens</i> Williams, 1962 <i>Atrococcus paludinus</i> (Green, 1921) <i>Balanococcus boratynskii</i> Williams, 1962 <i>Balanococcus orientalis</i> Danzig & Ivanova, 1976 <i>Dysmicoccus walkeri</i> (Newstead, 1891) <i>Euripersia tomlini</i> (Newstead, 1892) <i>Heliooccus bohemicus</i> Šulc, 1912 <i>Neotrionymus monstus</i> Borchsenius, 1948 <i>Phenacoccus aceris</i> (Signoret, 1875) <i>Phenacoccus interruptus</i> Green, 1923 <i>Phenacoccus piceae</i> (Löw, 1883) <i>Puto pilosellae</i> (Šulc, 1898) <i>Rhizoecus albidus</i> Goux, 1936 <i>Spinococcus multispinus</i> (Siraiwa, 1939) <i>Trionymus perrisii</i> (Signoret, 1875)
	ERIOCOCCIDAE	<i>Acanthococcus glyceriae</i> (Green, 1921)
EUROSIBERIAN	COCCIDAE	<i>Rhodococcus perornatum</i> (Cockerell & Parrot, 1899)
	ORTHEZIIDAE	<i>Newsteadia floccosa</i> (De Geer, 1778) <i>Ortheziola vejdoskyi</i> Šulc, 1895
	PSEUDOCOCCIDAE	<i>Euripersia europaea</i> (Newstead, 1897) <i>Heliooccus danzigae</i> Bazarov, 1974 <i>Phenacoccus pumilus</i> Kiritschenko, 1931
	ERIOCOCCIDAE	<i>Acanthococcus munroi</i> Boratynski, 1962

(Table 1 - continued)

	CRYPTOCOCCIDAE KERMESIDAE COCCIDAE	<i>Greenisca brachypodii</i> Borchsenius & Danzig, 1966 <i>Greenisca gouxii</i> (Balachowsky, 1954) <i>Pseudochermes fraxini</i> (Kaltenbach, 1860) <i>Kermes roboris</i> (Fourcroy, 1785) <i>Eulecanium douglasi</i> (Šulc, 1895) <i>Eulecanium franconicum</i> (Lindinger, 1912) <i>Luzulaspis luzulae</i> (Dufour, 1864) <i>Palaeolecanium bituberculatum</i> (Targioni Tozzetti, 1868) <i>Parafairmairia bipartita</i> (Signoret, 1874)
CENTRAL-ASIATIC-EUROPEAN	PSEUDOCOCCIDAE DIASPIDIDAE	<i>Dysmicoccus multivorus</i> (Kiritchenko, 1936) <i>Longicoccus psammophilus</i> (Koteja, 1971) <i>Puto tauricus</i> (Borchsenius, 1948) <i>Suturaspis archangelskyae</i> (Lindinger, 1929)
CENTRAL-ASIATIC-MEDITERRANEAN	PSEUDOCOCCIDAE DIASPIDIDAE	<i>Mirococcus inermis</i> (Hall, 1925) <i>Chionaspis etrusca</i> Leonardi, 1908 <i>Lepidosaphes granati</i> Koronéos, 1934
TURANIAN-EUROPEAN-MEDITERRANEAN	PSEUDOCOCCIDAE ASTEROLECANIIDAE DIASPIDIDAE	<i>Chaetococcus phragmitis</i> (Marchal, 1909) <i>Puto superbus</i> (Leonardi, 1907) <i>Asterodiaspis bella</i> (Russell, 1941) <i>Chionaspis lepineyi</i> Balachowsky, 1928 <i>Diaspidiotus distinctus</i> (Leonardi, 1900) <i>Epidiaspis leperii</i> (Signoret, 1869) <i>Leucaspis pusilla</i> Löw, 1883 <i>Targionia vitis</i> (Signoret, 1876)
TURANIAN-EUROPEAN	PSEUDOCOCCIDAE ERIOCOCCIDAE COCCIDAE DIASPIDIDAE	<i>Chnaurococcus parvus</i> (Borchsenius, 1949) <i>Heliooccus cydoniae</i> Borchsenius, 1949 <i>Heliooccus glacialis</i> (Newstead, 1900) <i>Heliooccus sulcii</i> Goux, 1934 <i>Peliococcopsis caucasicus</i> (Borchsenius, 1939) <i>Peliococcus armeniacus</i> Borchsenius, 1949 <i>Peliococcus terrestris</i> Borchsenius, 1949 <i>Peliococcus tritubulatus</i> (Kiritchenko, 1940) <i>Phenacoccus avenae</i> Borchsenius, 1949 <i>Phenacoccus evelinae</i> (Tereznikova, 1968) <i>Phenacoccus ferulae</i> Borchsenius, 1949 <i>Acanthococcus cynodontis</i> (Kiritchenko, 1940) <i>Eriococcus buxi</i> (Fonscolombe, 1834) <i>Rhizopulvinaria artemisiae</i> (Signoret, 1873) <i>Sphaerolecanium prunastri</i> (Fonscolombe, 1834) <i>Chortinaspis subterranea</i> (Lindinger, 1912) <i>Lepidosaphes juniperi</i> Lindinger, 1912 <i>Syngenaspis parlitoriae</i> Šulc, 1895
TURANIAN-MEDITERRANEAN	DIASPIDIDAE	<i>Acanthomytilus intermittens</i> (Hall, 1924) <i>Ephedraspis ephedrarum</i> (Lindinger, 1912) <i>Lepidosaphes destefanii</i> Leonardi, 1907 <i>Lineaspis striata</i> (Newstead, 1897) <i>Melanaspis inopinata</i> (Leonardi, 1913) <i>Nuculaspis abietis</i> (Schrank, 1776) <i>Parlatoria oleae</i> (Colvée, 1880) <i>Quadraspidiotus ceconii</i> (Leonardi, 1908) <i>Targionia nigra</i> Signoret, 1870
EUROPEAN-MEDITERRANEAN	MARGARODIDAE ERIOCOCCIDAE COCCIDAE DIASPIDIDAE	<i>Matsucoccus feytaudi</i> Ducasse, 1938 <i>Acanthococcus aceris</i> Signoret, 1875 <i>Rhizopulvinaria dianthi</i> (Bodenheimer, 1943) <i>Leucaspis pini</i> (Hartig, 1839) <i>Quadraspidiotus labiatarum</i> (Marchal, 1909) <i>Quadraspidiotus lenticularis</i> (Lindinger, 1912) <i>Quadraspidiotus marani</i> Zahradnik, 1952 <i>Quadraspidiotus pyri</i> (Lichtenstein, 1881)

Table 2 - Elements widely distributed in Europe.

GROUP	FAMILY	SPECIES
EUROPEAN	MARGARODIDAE	<i>Matsucoccus pini</i> Green, 1925
		<i>Xylococcus filiferus</i> Löw, 1883
	PSEUDOCOCCIDAE	<i>Atrococcus luffi</i> (Newstead, 1901)
		<i>Chnaurococcus subterraneus</i> (Newstead, 1893)
		<i>Heliococcus radicola</i> Goux, 1931
		<i>Peliococcopsis parviceraria</i> (Goux, 1937)
		<i>Peliococcus manifestus</i> Borchsenius, 1949
		<i>Phenacoccus hordei</i> (Lindeman, 1886)
		<i>Phenacoccus incertus</i> (Kiritchenko, 1940)
		<i>Phenacoccus mespili</i> (Signoret, 1875)
		<i>Puto antennatus</i> Signoret, 1875
		<i>Spinococcus calluneti</i> (Lindinger, 1912)
		<i>Trionymus dactylis</i> Green, 1925
		<i>Trionymus newsteadi</i> (Green, 1917)
	ERIOCOCCIDAE	<i>Acanthococcus bezzii</i> (Leonardi, 1907)
		<i>Acanthococcus pseudinsignis</i> (Green, 1921)
		<i>Acanthococcus roboris</i> Goux, 1931
		<i>Gregoporia rosacea</i> (Balachowsky, 1932)
	KERMESIDAE COCCIDAE	<i>Kermes gibbosus</i> Signoret, 1875
		<i>Eulecanium sericeum</i> (Lindinger, 1906)
		<i>Lecanopsis festucae</i> Borchsenius, 1952
		<i>Lecanopsis formicarum</i> Newstead, 1893
		<i>Luzulaspis dactylis</i> Green, 1928
		<i>Nemolecanium graniforme</i> (Wünn, 1921)
		<i>Parafairmairia gracilis</i> Green, 1916
		<i>Parthenolecanium pomeranicum</i> (Kawecki, 1954)
		<i>Parthenolecanium rufulum</i> (Cockerell, 1903)
		<i>Phyllostroma myrtilli</i> (Kaltenbach, 1874)
	DIASPIDIDAE	<i>Physokermes hemicryphus</i> (Dalman, 1825)
		<i>Physokermes piceae</i> (Schränk, 1801)
		<i>Carulaspis visci</i> (Schränk, 1781)
		<i>Diaspidiotus alni</i> (Marchal, 1909)
		<i>Diaspidiotus bavaricus</i> (Lindinger, 1912)
CENTRAL-EUROPEAN	PSEUDOCOCCIDAE	<i>Chnaurococcus danzigae</i> Kozár & Kosztarab, 1976
		<i>Mirococcopsis nagyí</i> Kozár, 1981
		<i>Rhizoecus caesii</i> Schmutterer, 1956
		<i>Rhizoecus poltavae</i> Laing, 1929
		<i>Ripersiella periolana</i> Goux, 1985
		<i>Trionymus hamberdi</i> (Borchsenius, 1949)
	KERMESIDAE	<i>Kermes corticalis</i> (Nassonov, 1908)
		<i>Acanthomytilus jablonowskii</i> Kozár & Matile Ferrero, 1975
	DIASPIDIDAE	<i>Rhizaspidotus balachowskyi</i> Kozár & Matile Ferrero, 1983
S-EUROPEAN	MARGARODIDAE	<i>Kuwanina rubra</i> Goux, 1938
	PSEUDOCOCCIDAE	<i>Antonina purpurea</i> Signoret, 1875
		<i>Antoninella inaudita</i> Kiritchenko, 1938
		<i>Pellizzaricoccus gabrielis</i> Kozár, 1991
		<i>Lecanopsis clodiensis</i> (Pellizzari, 1995)
	COCCIDAE	<i>Aclerda subterranea</i> Signoret, 1874
	ACLERDIDAE	
	ASTEROLECANIIDAE	<i>Asterodiaspis repugnans</i> (Russell, 1941)
		<i>Asterodiaspis roboris</i> (Russell, 1941)
	DIASPIDIDAE	<i>Quadraspidotus sulci</i> Balachowsky, 1950
		<i>Quadraspidotus thymbrae</i> Koronéós, 1934

Table 3 - Elements widely distributed in the Mediterranean Basin.

GROUP	FAMILY	SPECIES
MEDITERRANEAN	MARGARODIDAE	<i>Dimargarodes mediterraneus</i> (Silvestri, 1906) <i>Guerriniella serratulae</i> (Fabricius, 1775)
	PSEUDOCOCCIDAE	<i>Asphodelococcus asphodeli</i> (Bodenheimer, 1927) <i>Phenacoccus yerushalmi</i> Ben-Dov, 1985 <i>Trabutina leonardii</i> Silvestri, 1920
	MICROCOCCIDAE	<i>Micrococcus silvestrii</i> Leonardi, 1907 <i>Micrococcus similis</i> Leonardi, 1907
	KERMESIDAE	<i>Kermes bacciformis</i> Leonardi, 1908 <i>Kermes vermilio</i> Planchon, 1864 <i>Nidularia pulvinata</i> (Planchon, 1864)
	CEROCOCCIDAE	<i>Pollinia pollini</i> (Costa, 1857)
	COCCIDAE	<i>Filippia follicularis</i> Targioni Tozzetti, 1867
	LECANODIASPIDIDAE	<i>Lecanodiaspis sardoa</i> Targioni Tozzetti, 1869
	ACLERIDAE	<i>Aclerda berleseii</i> Buffa, 1897
	ASTEROLECANIIDAE	<i>Asterodiaspis ilicicola</i> (Targioni Tozzetti, 1888) <i>Planchonia zanthenes</i> (Russell, 1941)
	DIASPIDIDAE	<i>Aonidia lauri</i> (Bouché, 1833) <i>Aonidia mediterranea</i> (Lindinger, 1910) <i>Aspidiotus hedericola</i> Leonardi, 1920 <i>Duplacionaspis berleseii</i> (Leonardi, 1898) <i>Epidiaspis gennadii</i> (Leonardi, 1898) <i>Gonaspidiotus minimus</i> (Leonardi, 1896) <i>Leucaspis riccae</i> Targioni Tozzetti, 1881 <i>Leucaspis signoreti</i> Targioni Tozzetti, 1868 <i>Pallulaspis retamae</i> (Hall, 1926) <i>Rhizaspidiotus donacis</i> (Leonardi, 1920) <i>Rungaspis capparis</i> (Bodenheimer, 1929)
W-MEDITERRANEAN	MARGARODIDAE	<i>Neomargarodes europaeus</i> Goidanich, 1969
	PSEUDOCOCCIDAE	<i>Coccidohystrix splendens</i> Goux, 1943 <i>Dysmicoccus pietroi</i> Marotta, 1992 <i>Euripersia inquilina</i> (Leonardi, 1908) <i>Euripersia montana</i> (Newstead, 1898) <i>Nipaeococcus delassusi</i> (Balachowsky, 1925) <i>Peliococcus cycliger</i> (Leonardi, 1908) <i>Peliococcus vivarensis</i> Tranfaglia, 1981 <i>Puto palinuri</i> Marotta & Tranfaglia, 1993 <i>Rhizococcus gentianae</i> Panis, 1968 <i>Trionymus myrmecarius</i> (Leonardi, 1908)
		<i>Acanthococcus acutus</i> (Goux, 1938)
		<i>Kermes ilicis</i> (Linnaeus, 1758)
		<i>Chlamydolecanium conchioides</i> Goux, 1933
		<i>Eulecanium emerici</i> (Planchon, 1864)
		<i>Eulecanium ericae</i> (Balachowsky, 1936)
		<i>Lecanopsis myrmecophila</i> Leonardi, 1908
		<i>Rhizopulvinaria grassei</i> (Balachowsky, 1936)
		<i>Rhizopulvinaria maritima</i> Canard, 1967
		<i>Saissetia ficinum</i> (Paoli, 1915)
		<i>Adiscodiaspis ericicola</i> (Marchal, 1909)
		<i>Diaspidiotus viticola</i> (Leonardi, 1913)
		<i>Duplacionaspis sicula</i> (Lupo, 1938)
	DIASPIDIDAE	<i>Evallaspis ampelodesmae</i> (Newstead, 1897) <i>Mercetaspis sphaerocarphae</i> Gomez Menor, 1927 <i>Quadraspidiotus jaapi</i> (Leonardi, 1920) <i>Quadraspidiotus salicis</i> (Lupo, 1953) <i>Saharaspis ceardi</i> (Balachowsky, 1928)
E-MEDITERRANEAN	MARGARODIDAE	<i>Marchalina hellenica</i> (Gennadius, 1883)
	DIASPIDIDAE	<i>Parlatoria blanchardi</i> (Targioni Tozzetti, 1892)

Table 4 - Afrotropical or oriental elements present also in the Mediterranean area.

GROUP	FAMILY	SPECIES
AFROTROPICAL-MEDITERRANEAN	COCCIDAE	<i>Ceroplastes rusci</i> (Linnaeus, 1758)
	DIASPIDIDAE	<i>Acanthomytilus sacchari</i> (Hall, 1923)

Table 5 - Cosmopolitan or subcosmopolitan species

GROUP	FAMILY	SPECIES
COSMOPOLITAN	PSEUDOCOCCIDAE	<i>Antonina graminis</i> (Maskell, 1897) <i>Chorizococcus rostellum</i> (Lobdell, 1930) <i>Phenacoccus graminicola</i> Leonardi, 1908 <i>Planococcus citri</i> (Risso, 1813) <i>Planococcus ficus</i> (Signoret, 1875) <i>Pseudococcus affinis</i> (Maskell, 1894) <i>Pseudococcus calceolariae</i> (Maskell, 1878) <i>Pseudococcus longispinus</i> (Targioni Tozzetti, 1867) <i>Acanthococcus araucariae</i> (Maskell, 1879) <i>Gossyparia spuria</i> (Modeer, 1778) <i>Ceroplastes sinensis</i> Del Guercio, 1900 <i>Chloropulvinaria floccifera</i> (Westwood, 1870) <i>Coccus hesperidum</i> Linnaeus, 1758 <i>Eucalymnatus tessellatus</i> (Signoret, 1873) <i>Eupulvinaria hydrangeae</i> (Steinweden, 1946) <i>Parasaissetia nigra</i> (Nietner, 1861) <i>Parthenolecanium corni</i> (Bouché, 1844) <i>Saissetia oleae</i> (Olivier, 1791) <i>Asterodiaspis variolosa</i> (Ratzeburg, 1870) <i>Aonidiella aurantii</i> (Maskell, 1879) <i>Aspidiotus nerii</i> Bouché, 1833 <i>Carulaspis juniperi</i> (Bouché, 1851) <i>Hemiberlesia rapax</i> (Comstock, 1881) <i>Lepidosaphes beckii</i> (Newmann, 1869) <i>Lepidosaphes gloverii</i> (Packard, 1869) <i>Lindingaspis rossi</i> (Maskell, 1891) <i>Parlatoria pergandii</i> Comstock, 1881 <i>Parlatoria ziziphi</i> (Lucas, 1853) <i>Pseudaulacaspis pentagona</i> (Targioni Tozzetti, 1886) <i>Quadraspidiotus perniciosus</i> (Comstock, 1881) <i>Unaspis euonymi</i> (Comstock, 1881)
	ERIOCOCCIDAE COCCIDAE ASTEROLECANIIDAE DIASPIDIDAE	
PANTROPICAL	MARGARODIDAE ORTHEZIIDAE PSEUDOCOCCIDAE	<i>Icerya purchasi</i> Maskell, 1879 <i>Orthezia insignis</i> Douglas, 1887 <i>Dysmicoccus brevipes</i> (Cockerell, 1893) <i>Dysmicoccus mackenziei</i> Beardsley, 1965 <i>Dysmicoccus neobrevipes</i> Beardsley, 1959 <i>Hypogeococcus pungens</i> Granara de Willink, 1981 <i>Nipaecoccus nipae</i> (Maskell, 1893) <i>Phenacoccus madeirensis</i> Green, 1923 <i>Rhizoecus cacticans</i> (Hambleton, 1946) <i>Rhizoecus falcifer</i> Kunckel d'Herculais, 1878 <i>Spilococcus mammillariae</i> (Bouché, 1844) <i>Acanthococcus cactearum</i> (Leonardi, 1908) <i>Acanthococcus coccineus</i> (Cockerell, 1894) <i>Ceroplastes cirripediformis</i> Comstock, 1881 <i>Ceroplastes floridensis</i> Comstock, 1881 <i>Protopulvinaria pyriformis</i> (Cockerell, 1894) <i>Saissetia coffeae</i> (Walker, 1852) <i>Asterolecanium epidendri</i> (Bouché, 1844) <i>Bambusaspis bambusae</i> (Boisduval, 1869) <i>Phoenicococcus marlatti</i> Cockerell, 1899 <i>Abgrallaspis cyanophylli</i> (Signoret, 1869)
	ERIOCOCCIDAE COCCIDAE ASTEROLECANIIDAE PHOENICOCOCCIDAE DIASPIDIDAE	

(Table 5 - continued)

		<i>Aspidiotus destructor</i> (Signoret, 1869) <i>Aspidiotus spinosus</i> Comstock, 1883 <i>Aulacaspis tubercularis</i> (Newstead, 1906) <i>Chrysomphalus aonidum</i> (Linnaeus, 1758) <i>Chrysomphalus dictyospermi</i> (Morgan, 1889) <i>Diaspis boisduvalii</i> Signoret, 1869 <i>Diaspis bromeliae</i> (Kerner, 1778) <i>Diaspis coccis</i> Lichtenstein, 1882 <i>Fiorinia florinae</i> (Targioni Tozzetti, 1867) <i>Furchadaspis zamiae</i> (Morgan, 1890) <i>Genaparlatoria pseudaspidotus</i> (Lindinger, 1905) <i>Gymnaspis aechmeae</i> Newstead, 1898 <i>Hemiberlesia lataniae</i> (Signoret, 1869) <i>Howardia biclavus</i> (Comstock, 1883) <i>Ischnaspis longirostris</i> (Signoret, 1882) <i>Lepidosaphes pinnaeformis</i> (Bouché, 1851) <i>Melanaspis bromiliae</i> (Leonardi, 1899) <i>Parlatoria camelliae</i> Comstock, 1883 <i>Parlatoria proteus</i> (Curtis, 1843) <i>Pinnaspis aspidistrae</i> (Signoret, 1869) <i>Pinnaspis buxi</i> (Bouché, 1851) <i>Pinnaspis strachani</i> (Cooley, 1899) <i>Pseudaulacaspis cockerelli</i> (Cooley, 1897) <i>Pseudoparlatoria parlatorioides</i> (Comstock, 1883)
AFRICAN	PSEUDOCOCCIDAE	<i>Vryburgia rimariae</i> Tranfaglia, 1981
AFROTROPICAL	PSEUDOCOCCIDAE	<i>Delottococcus euphorbiae</i> (Ezzat & McConnell, 1956) <i>Trochiscococcus speciosus</i> (De Lotto, 1961)
	COCCIDAE	<i>Inglisia lounsburyi</i> (Cockerell, 1900) <i>Pulvinariella mesembryanthemi</i> (Vallot, 1830)
	DIASPIDIDAE	<i>Selenaspis albus</i> McKenzie, 1953 <i>Umbaspis regularis</i> (Newstead, 1911)
ASIATIC	PSEUDOCOCCIDAE	<i>Chaetococcus bambusae</i> (Maskell, 1892) <i>Rhizoecus hibisci</i> Kawai & Takagi, 1971
	COCCIDAE	<i>Ceroplastes japonicus</i> Green, 1921 <i>Coccus pseudomagnoliarum</i> (Kuwana, 1914)
	DIASPIDIDAE	<i>Abgrallaspis degeneratus</i> (Leonardi, 1896) <i>Aonidiella citrina</i> (Coquillett, 1891) <i>Aonidiella taxus</i> Leonardi, 1906 <i>Kuwanaspis bambusae</i> (Kuwana, 1902) <i>Odonaspis greeni</i> Cockerell, 1902 <i>Pseudonidia paeoniae</i> (Cockerell, 1899) <i>Unaspis yanonensis</i> (Kuwana, 1923)
AUSTRALIAN	PSEUDOCOCCIDAE	<i>Balanococcus diminutus</i> (Leonardi, 1918)
NEARCTIC	COCCIDAE	<i>Neopulvinaria innumerabilis</i> (Rathvon, 1854)
	ERIOCOCCIDAE	<i>Ovaticoccus agavium</i> (Douglas, 1888)
	DIASPIDIDAE	<i>Diaspidiotus osborni</i> (Newell & Cockerell, 1898) <i>Diaspis echinocacti</i> (Bouché, 1833)
NEOTROPICAL	PSEUDOCOCCIDAE	<i>Dysmicoccus grassii</i> (Leonardi, 1913) <i>Phenacoccus eschscholtziae</i> McKenzie, 1961 <i>Planococcus halli</i> Ezzat & McConnell, 1956 <i>Pseudococcus microcirculus</i> McKenzie, 1960 <i>Rhizoecus americanus</i> (Hambleton, 1946) <i>Rhizoecus dianthi</i> Green, 1926 <i>Rhizoecus latus</i> (Hambleton, 1946) <i>Vryburgia amaryllidis</i> (Bouché, 1837)
	PHOENICOCCIDAE	<i>Limacoccus brasiliensis</i> (Hempel, 1934)
	DIASPIDIDAE	<i>Acutaspis perseae</i> (Comstock, 1881) <i>Greeniella fimbriata</i> (Ferris, 1955) <i>Lepidosaphes serrifrons</i> (Leonardi, 1898)

Table 6 - Endemic elements.

GROUP	FAMILY	SPECIES
SICILIAN-APENNINIAN	MARGARODIDAE PSEUDOCOCCIDAE ERIOCOCCIDAE	<i>Porphyrophora italica</i> Goidanich, 1963 <i>Phenacoccus neohordei</i> Marotta, 1992 <i>Acanthococcus rosannae</i> (Tranfaglia & Esposito, 1985)
APENNINIAN	PSEUDOCOCCIDAE ERIOCOCCIDAE	<i>Atrococcus salviae</i> (Tranfaglia, 1981) <i>Coccidohystrix zangherii</i> Kozár & Pellizzari Scaltriti, 1989 <i>Phenacoccus longoi</i> Russo, 1994 <i>Puto marsicanus</i> Marotta & Tranfaglia, 1993 <i>Ripersiella vidanoi</i> Marotta & Tranfaglia, 1995 <i>Trionymus scaramellai</i> Marotta & Tranfaglia, 1994 <i>Acanthococcus latialis</i> (Leonardi, 1907)
SICILIAN	PSEUDOCOCCIDAE COCCIDAE DIASPIDIDAE	<i>Balanococcus santilongoi</i> Mazzeo, 1996 <i>Dysmicoccus psoraleae</i> Russo & Mazzeo, 1997 <i>Phenacoccus silvanae</i> Longo & Russo, 1989 <i>Rhizoecus lelloi</i> Mazzeo, 1996 <i>Scythia aetnensis</i> Russo & Longo, 1990 <i>Carulaspis silvestrii</i> Lupo, 1966
SARDINIAN	PSEUDOCOCCIDAE	<i>Dysmicoccus kozari</i> Pellizzari & Fontana, 1996

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