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## ARMoured SCALE INSECTS (HEMIPTERA: COCCOIDEA: DIASPIDIDAE) NEW TO SICILY: RECORDS AND OBSERVATIONS.

### ABSTRACT

ARMoured SCALE INSECTS (HEMIPTERA: COCCOIDEA: DIASPIDIDAE) NEW TO SICILY: RECORDS AND OBSERVATIONS.

The central location of Sicily in the Mediterranean basin makes studies of its fauna particularly interesting. Recent collections from the scrub vegetation on the South-East coast of Sicily and the slopes of Mount Etna have produced four new records of Diaspididae for Sicily: *Aonidia ?mediterranea* (Lindinger), *Ferreroaspis hungarica* (Vinis), *Mercetaspis isis* (Hall) and *Chionaspis etrusca* Leonardi. The presence of the first three species suggests old faunistic links with other regions, mainly eastern Mediterranean. Our findings are presented here in the hope of stimulating more such research.

Key words: *Callitris*, *Cupressus*, *Juniperus*, *Thuja*, *Tamarix*, *Acer*, *Cerasus*, *Carulaspis silvestrii*, *C. minima*, *C. juniperi*, ecology, host reaction.

### INTRODUCTION

Armoured scales were collected from natural vegetation on the south-eastern coast of Sicily and the eastern slopes of Mount Etna.

### MATERIALS AND METHODS

Adult female scales were prepared for slide-mounting using the method given by Williams & Watson (1998) and were mounted in either Faures medium or Canada balsam. These were identified using Balachowsky (1951, 1954), Vinis (1981) and Danzig (1993), and by reference to museum specimens.

### RESULTS

*Aonidia ?mediterranea* (Lindinger): previous records have been from Armenia, Azerbaijan, Greece, Spain, Algeria and Italy (Sardinia) on members of the Cupressaceae belonging to the genera *Callitris*, *Cupressus*, *Juniperus* and *Thuja*. The species is here recorded from Malta (on *Cu. sempervirens*, Malta Mosta, 13.III.1994, coll. D. Mifsud) and, tentatively, from Sicily for the first time.

The scale cover or test of adult female *A. ?mediterranea* collected from Sicily is very similar to those described by Balachowsky (1951) and Koronéos (1934). Balachowsky (1951) described the exuviae as pale yellow ('jaune paille'); Koronéos (1934) described them as bright orange. Our specimens have the first-stage exuviae yellowish and the second-stage exuviae bright orange; initially, the first-instar exuviae is covered with a thin, white waxy covering which is often lost later, so that the scale darkens with age.

The shape and number of the pygidial lobes in our material resemble those described by Balachowsky (1951) and Koronéos (1934); the third lobe mentioned by Lindinger (1912) is absent, but Balachowsky (1951) stated that 'chez quelques rares individus un léger tubercule à la place de L3 qui fait toujours défaut'; and Koronéos (1934): 'Malgré le désaccord sur les appendices du pygidium j'aime à croire qu'il s'agit de l'espèce décrite par Lindinger (I) N° 584 et qu'il a eu lieu erreur dans la description qu'il a donnée'.

The Sicilian specimens of *A. ?mediterranea* possess an unusually short, wide pygidium with two macroducts between each median and second lobe, whereas Balachowsky's (1951) description and illustration show only one duct in this position. The material consists of very few specimens and so it is difficult to be sure whether these differences are due to environmentally induced variation or whether the specimens represent an undescribed species.

In Sicily, *A. ?mediterranea* was collected from the district of Ragusa, near Donnalucata, on *Juniperus oxycedrus* ssp. *macrocarpa*, 7.X.1997, coll. S. Nucifora. The host-plants were growing in a coastal nature reserve known as 'macchia foresta del fiume Irminio' (forest scrub of the Irminio river), a sand dune habitat which is rare in Sicily. The vegetation consists of *J. oxycedrus* and other species of Mediterranean scrub plants. *Juniperus phoenicea* is the only other member of the Cupressaceae present in this habitat but *A. ?mediterranea* has not been found on it. Female scales were found on the needles (leaves) of *J. oxycedrus* ssp. *macrocarpa*, mainly on the lower surface; examination of the bark and fruit failed to locate any scales, and no males were recorded. *A. ?mediterranea* is rare in Sicily; only a few plants were infested, mostly on small shoots springing directly from the trunk, where they were sheltered from direct sunlight and from the wind blowing from the sea.

*Carulaspis silvestrii* Lupo and *Ca. minima* (Targioni Tozzetti) were frequently found with *A. ?mediterranea*. *A. ?mediterranea* and *Ca. silvestrii* were rare but *Ca. minima* is very abundant on *J. oxycedrus*, particularly on the fruit. *A. ?mediterranea* was not found on *J. hemisphaerica*, *J. phoenicea*,

*Cupressus* sp. or *Thuja* sp. near Donnalucata or in other localities, although *Ca. minima* has been found frequently on these hosts. *Carulaspis juniperi* (Bouché) also occurs in Sicily, but only on *J. hemisphaerica* at or above 1300m a.s.l. on Mount Etna and never in association with *A. ?mediterranea*.

***Chionaspis etrusca*** Leonardi: recorded previously from Algeria, Morocco, Tunisia, Italy, Sardinia, Israel, Republic of Georgia, India and Pakistan on *Tamarix* spp. In Sicily, it was collected from the district of Ragusa, 4km from Donnalucata, on the bank of the Irmínio river, on *Tamarix* sp., 7.X.1997, coll. S. Nucifora. *C. etrusca* was particularly abundant on the rare *Tamarix gallica* growing along the bank of the Irmínio river, near its mouth; it also occurred in small numbers on *Tamarix africana*, a commoner species with lush vegetation that favoured sites between the sand dunes which provided shelter from the wind. This scale was also collected on *Tamarix* sp. from district of Messina, near Milazzo, 18.X.1998, coll. S. Nucifora; and from the district of Catania, Torre Archirafi beach, 2.II.1999 and 19.II.1999, coll. S. Nucifora.

*Chionaspis etrusca* showed a preference for branches 4-6 cm in diameter. Both sexes occurred at these locations at quite high densities on the bark (about 500 specimens on 30cm of a twig 4cm in diameter), but tended to be in single sex aggregations within the colony.

The scale cover of adult female *C. etrusca* is white and elongate, broader distally, with yellowish or pale brown exuviae at the narrow end. The characters of the slide-mounted adult female match those shown in Balachowsky's (1954) illustration. The scale cover of the male is similar to that of the female but smaller, white and non-carinate, with pale yellow terminal exuviae.

***Mercetaspis isis*** (Hall): recorded previously from Turkmenistan, Tadjikistan, Israel, Egypt, Iraq, Iran and Pakistan on *Tamarix* sp. It was collected in Sicily from the district of Ragusa, Donnalucata coast, on the bark of the trunk, twigs and branches of *Tamarix* sp., 16.I.1997, coll. S. Nucifora. A heavy infestation was found on a single, very old, isolated, roadside tree, with a trunk circumference of about 160cm and a height of more than 4m. *Tamarix* sp. occur on various other parts of the Sicilian coast but so far no other infestations of *M. isis* has been found.

In life, the scale cover of female *M. isis* is mussel-shaped and off-white, with yellow exuviae located at the narrow end. The insects consistently possessed massive median lobes, which were frequently retracted into the pygidium. Such massive development of the median lobes is unusual in the genus *Mercetaspis*.

***Ferreroaspis hungarica*** (Vinis): recorded previously from Turkmenistan, Tadjikistan and Hungary on *Acer campestre*, *A. pubescens* and *Cerasus* sp. In Sicily, it was collected from the district of Catania, near Milo, 550m a.s.l., on twigs and small branches of *Acer obtusatum*, 3.I.1997, coll. S. Nucifora. It occurred on maple (*A. obtusatum*) on the east slope of Mount Etna, near the towns of S. Alfio and Zafferana, between 550 and 850m. a.s.l. A small wood of *A. obtusatum* and *Ostrya carpinifolia* near Milo was infested. The scale also occurred on maples growing as isolated plants or in occasional small groups on uncultivated marginal land in the area. Maples are less common on the western slopes of Mount Etna, but this area has not yet been examined for the presence of *F. hungarica*.

*Ferreroaspis hungarica* is difficult to find because of its cryptic colour and small size. The female scale is mussel-shaped and brown in life. The first-stage exuviae is glassy and transparent; the second-stage exuviae is brown, glossy, elongated and broadest at the posterior end. Frequently the first exuviae is lost, making the scale more difficult to detect. The insects occur on twigs, generally at levels between 0.1 and 5 individuals per 30cm of young twig. Males have not been observed in Sicily, but were recorded by Vinis (1981) and Kosztarab & Kozár (1988).

A reaction by the plant was observed at some feeding sites of *F. hungarica*. Sometimes a dark, amorphous mass was present at the point of stylet insertion. This mass was easily dislodged because contact with the twig occurred at only one point; no imprint was left when it was removed. The mass was compact, not compressible but easily crushed; inside was a dark, amorphous material. It seems likely that this material consists of solidified plant exudate (rather than a proliferation of cells), and was probably an accumulation of sugars where sap seepage had dried. Normally an individual of *F. hungarica* was on top of each mass, but sometimes it was partially included within it.

#### DISCUSSION

*A. ?mediterranea*, *F. hungarica* and *M. isis* are here recorded from the Central Mediterranean region for the first time. All have previously known distributions mainly towards or beyond the eastern end of the Mediterranean sea, suggesting a past faunal link between these regions. *Ch. etrusca* is a new record for Sicily, but is well established in the Mediterranean region; it is not clear whether its origin lies further east, or whether the eastern records reflect introductions from the Mediterranean.

## ACKNOWLEDGEMENTS

We would like to thank Prof. Giuseppina Pellizzari of the University of Padova, Agripolis, Legnaro, Italy, for bringing a record of *A. mediterranea* from Sardinia to our attention; also Mr Richard Vane-Wright, Keeper of Entomology, The Natural History Museum, London, who kindly permitted free access to the Museum's collections and library for this research.

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