



## Description of nymphal instars and adult female of *Kermes vermilio* Planchon (Hemiptera, Coccoidea, Kermesidae), with a synopsis of the European and Mediterranean species

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### Summary

The morphology of the 1<sup>st</sup>-instar, 2<sup>nd</sup>-instar male and female, 3<sup>rd</sup>-instar female and adult female of *Kermes vermilio* Planchon (Hemiptera Coccoidea Kermesidae) are described and illustrated; micrographs of some morphological details are also provided. An identification key to instars and a table showing the present status of knowledge on the morphology of European and Mediterranean *Kermes* instars is included.

**Key words:** gall-like scales, morphology, instar descriptions, identification key

### Introduction

The genus *Kermes* Boitard, 1828, includes 63 species, distributed throughout the northern hemisphere and strictly linked to Fagaceae of the genus *Quercus*, although some Asiatic *Kermes* have been collected off other fagaceous genera such as *Castanea*, *Castanopsis*, *Pasania*, *Lithocarpus* and two North American species off *Chrysolepis* (Miller *et al.*, 2005; Ben-Dov *et al.*, 2012). Twenty *Kermes* species have been recorded so far in Europe and the Mediterranean Region, all off deciduous and evergreen oaks (Table 1).

*Kermes vermilio* Planchon lives on evergreen oaks, mainly on *Quercus ilex* L., and occurs throughout the Mediterranean countries. In the past, it was of great economic importance as a red dye source until it was replaced by the Mexican cochineal insect, *Dactylopius coccus* Costa, 1829.

In Italy, the species has only been reported rarely as a pest but, since 1987, it has become invasive on ornamental *Q. ilex* trees and heavy infestations have been recorded in urban environments, mainly in Central and Southern Italy (Belcari & Minnocci, 1989; Belcari, 1991; Del Bene & Landi, 1992; Andreatta, 1996; Marotta *et al.*, 1999). In the small town of Rapolla (South Italy, Basilicata region), the infestation was so heavy in Spring 1993 that up to 750 individuals/m of branch were recorded. This heavy infestation provided the opportunity to study its biology (Marotta *et al.*, 1999) and the morphology of the different instars. During this morphological study, the presence of frontal lobes on 2<sup>nd</sup>-instar males and females, 3<sup>rd</sup>-instar females and prepupae, previously known only in the Fam. Eriococcidae (Williams, 1985), was observed for the first time in the family Kermesidae (Marotta & Tranfaglia, 1999).

The morphology of *Kermes* species, based on microscopic characters, is still largely unknown. With regard to Mediterranean and European species, Leonardi (1920) gave a description of the first instars of *K. vermilio*, *K. roboris* (Fourcroy), *K. ilicis* (Linnaeus) and *K. bacciformis* Leonardi. Balachoswky (1950) described and illustrated in detail the first instars of *K. vermilio*, *K. roboris*, *K. quercus* (Linnaeus), *K. ilicis* and *K. bacciformis* and, later (1953), the first instars of three new species, namely *K. echinatus*, *K. palestiniensis* and *K. spatulatus*. Borchsenius (1960) described and illustrated the first instar and the adult male and female of *K. quercus*, and also nymphal instars of other *Kermes* species (see Table 1). Tsalev (1964) described and illustrated the first instar of *K. gibbosus*