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A taxonomic revision of the Kermesidae (Hemiptera: Coccoidea) in Israel, with a description of a new species

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Abstract

A taxonomic revision is presented of the six Kermesidae species from Israel, namely, *Kermes echinatus* Balachowsky, *K. greeni* Bodenheimer, *K. nahalali* Bodenheimer, *K. spatulatus* Balachowsky, *Nidularia balachowskii* Bodenheimer, and *K. hermonensis* Spodek & Ben-Dov **sp. n.** *Kermes bytinskii* Sternlicht, **syn. n.** is established as a junior synonym of *K. nahalali* Bodenheimer and a lectotype for *K. nahalali* is designated. This study includes descriptions, redescriptions and illustrations of the adult female, adult male and all developmental stages for these six species. Keys are provided to distinguish between instars, adult females, adult males and immature stages for all species.

Key words: Israel, Kermesidae, oaks, *Quercus* sp., scale insects

Introduction

Species of the scale insect family Kermesidae (Hemiptera: Coccoidea) are distributed in the Nearctic, Oriental and Palaearctic regions of the world (Ben-Dov *et al*., 2013). The family contains about one hundred valid species in ten genera. All species are known to develop exclusively on Fagaceae, with the exception of species that belong to the genus *Eriokermes*, associated with Cupressaceae (Miller & Miller, 1993). Oak (*Quercus*) is the main host although a few Asiatic *Kermes* have been collected off fagaceous trees that belong to other genera such as *Castanea*, *Castanopsis*, *Lithocarpus* and *Pasania*, and some North American species have been collected off *Chrysolepis* (Ben-Dov *et al*., 2013). Most females and males develop on twigs and branches and in bark crevices, although some species develop on leaves (Sternlicht, 1969; Bullington & Kosztarab, 1985; Hu, 1986; Podsiadlo, 2005).

For the most part Kermesidae species are not known to cause any visible damage to their host trees although there are a few reports of branch dieback, flagging, reduced growth rates and occasionally tree death, mainly in urban areas (Kozár, 1974; Hamon, 1977; Solomon *et al*., 1980; Viggiani, 1991; Pellizzari *et al*., 2012; Podsiadlo, 2012). Some species of *Kermes* are known for their importance as a natural source of crimson dye for the textile industry (Amar *et al*., 2005; Cardon, 2007).

Most species of Kermesidae appear to be univoltine (Balachowsky, 1950, 1953; McConnell & Davidson, 1959; Sternlicht, 1969; Hamon *et al.*, 1976; Koteja, 1980; Bullington & Kosztarab, 1985; Hu, 1986; Kosztarab & Kozár, 1988; Viggiani, 1991; Liu *et al*., 1997; Marotta *et al.*, 1999). However, Podsiadlo (2011, 2013) showed that

antennae. The study of adult female *Kermes* species in all regions remains incomplete, particularly because the majority of descriptions were based on post-reproductive females or first-instar nymphs. Much more taxonomic work on Kermesidae is required to fully understand the relationship between the species in Israel and Kermesidae species of other regions.

Conclusions

This study presents a taxonomic revision of the Kermesidae species of Israel. Prior to this study, nine species of Kermesidae belonging to two genera, *Kermes* and *Nidularia* were reported from the country. We studied the type-series of all species, as well as freshly-collected material and conclude that there are only six species in Israel: *K. echinatus, K. greeni, K. hermonensis, K. nahalali, K. spatulatus* and *N. balachowskii.* Although *K. biblicus* and *N. pulvinata* have been reported from Israel, we did not collect them, nor did we find material in any of the entomological collections at ICVI, BMNH, MNHN or TAU. We have, therefore, concluded that these species do not occur in Israel. *Kermes bytinskii* is here synonymized with *K. nahalali*. *Kermes palestiniensis* was synonymized with *K. greeni* in an earlier study (Spodek *et al.*, 2012a).

The Kermesidae is comprised of about 100 species belonging to ten genera. The present work is a comprehensive taxonomic contribution to the knowledge of this family in Israel and the Palaearctic region. Further similar studies on this group of scale insects in other regions would greatly enhance our understanding of this family.

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