



## Redescription of males of the aphid species *Cinara (Cupressobium) tujafilina* and *Cinara (Cupressobium) cupressi* (Hemiptera, Lachninae)

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### Abstract

This paper presents the first comprehensive description of the winged males of *Cinara tujafilina* and *Cinara cupressi* (Hemiptera, Lachninae) and establishes the morphological characters enabling differentiation between them. We show that some populations of *C. tujafilina*, a species considered to be anholocyclic, may not have lost the genetic ability to produce males and under favourable conditions can develop in a holocyclic manner.

**Key words:** *Cinara*, Lachninae, anholocyclic, life cycle, male, *Thuja* sp.

### Introduction

Aphids of the genus *Cinara* (Hemiptera, Aphidoidea, Lachninae) feed on Coniferae, and live without host alternation on the leaves, branches, trunks and roots of their hosts. Most aphid species are holocyclic, which means that during spring and summer, when vegetation is abundant, they breed parthenogenetically, whereas sexually reproducing individuals (males and amphigonous females) appear in autumn. The sexual females lay eggs, which overwinter. A different strategy is an anholocyclic life cycle, which entails exclusively parthenogenetic reproduction throughout the year. Only 3% of aphid species are anholocyclic (Blackman 1980; Dixon 1998). Some aphid species have populations that develop holocyclically or anholocyclically, depending on habitat conditions.

*Cinara (Cupressobium) tujafilina* (del Guercio 1909) comes from Asia and occurs particularly in Japan and China and is spread worldwide (Nieto Nafria *et al.* 2012). It feeds on plants in the Cupressaceae such as *Callitris*, *Chamaecyparis*, *Cupressus*, *Juniperus*, *Libocedrus*, *Thuja* (usually *T. orientalis* L.), *Thujopsis* and *Widdringtonia* (Blackman & Eastop 2013). In Europe it has been reported from many countries e.g. the U.K. (Bray 1953; Carter & Maslen 1982), Italy (Colombo & Parisini 1984) and Poland (Durak *et al.* 2006, 2008); however, its range is constantly expanding due to climatic changes (mild winter) and to its host being planted more widely. Due to a large number of generations developing during the year, this species, like *Cinara cupressi* (Buckton 1881), may cause a slow process of defoliation. *Cinara tujafilina* was considered to be an anholocyclic species, with parthenogenesis being the only means of reproduction throughout the year (Blackman & Eastop 2013). However, one male specimen of this species (redescribed herein) was collected in Kyrgyzstan in 1979 from *Thuja occidentalis* (Zhuravlev 2003). Subsequently an oviparous female was found in Iran (Remaudière & Binazzi 2003). This is the only information in the literature about sexual morphs of *C. tujafilina*.

*Cinara (Cupressobium) cupressi* (Buckton 1881) is widespread all over the world, mainly feeding on *Cupressus* sp., but it also infests other Cupressaceae (Blackman & Eastop 2013). Much of the information on this species relates to winged and wingless parthenogenetic female morphs, which infest plants in the growing season. Oviparae and alate males occur in October in Europe, but their descriptions, particularly that of the male, are very poor (Heie 1995). In regions with warm winters the species may form permanently anholocyclic populations (Blackman & Eastop 2013).

Sexual morphs constitute an important element of an aphid species description, as they often differ