

The Scale Insects (Hemiptera: Coccoidea) on Bamboos in the Western-Paelearctic Region: New Records and Distributional Data

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Abstract: Bamboos were introduced into Europe from China and Japan in the early 1800s and their cultivation in parks and gardens became quite popular. The first records of scale insects on ornamental bamboos in Europe date to early in the XX century (i.e. *Kuwanaspis pseudoleucaspis*), but the presence of some species was unknown until recently due to their concealed habit (i.e. *Balanococcus kwoni* Pellizzari & Danzig). More recently, the increasingly world-wide trade of ornamental bamboos has led to the incidental introduction and spread of bamboo scales far from their native land. Due to recent surveys carried out in parks, commercial centres and nurseries in the Western Palearctic, several scale insects linked to bamboos, not previously recorded, have been discovered, namely Pseudococcidae: *Antonina pretiosa* Ferris and *Palmicultor lumpurensis* (Takahashi) and Diaspididae: *Batarasa lumampao* Takagi, *Odonaspis serrata* Ben-Dov, *Poliaspoides bambusae* Ülgentürk & Pellizzari and *Poliaspoides formosana* (Takahashi). An overview of the presence, distribution and spread of other bamboo scale insects (i.e. *Balanococcus kwoni*, *Chaetococcus bambusae* (Maskell), *Bambusaspis bambusae* (Boisduval) *Odonaspis greeni* (Cockerell)) known from the Region is reported.

Key words: Poaceae, Bambusoideae, Bambuseae, Diaspididae, Pseudococcidae, Asterolecaniidae

Introduction

Bamboos were first introduced into Europe from the monsoon-belt of South-East Asia, southern China and Japan, starting from the early 1800s and they soon became popular in parks and gardens due to their perennial and vigorous growing habit, and the desire for Japanese style gardens.

The scale insect fauna of bamboos is very rich, with more than 150 species belonging to several different families known in Asia (WANG *et al.* 1998), and with 127 species infesting bamboos just in China (FANG *et al.* 2001). Several new scale species linked to bamboos have recently been described by several authors (PELLIZZARI, DANZIG 2007, AONO

2009, TAKAGI 2009, TAKAGI, MARTIN 2010, WU 2010, WU *et al.* 2012).

The first record of an introduced bamboo scale insect in Europe was of *Kuwanaspis pseudoleucaspis* (MARCHAL 1908), dating from the early XX century whereas the presence of other species (i.e. *Balanococcus kwoni* Pellizzari & Danzig) was unknown until recently due to their concealed habit, low population levels and paucity of observations.

The increase in worldwide trade of ornamental bamboos led to the incidental introduction and unwanted spread of several bamboo scales far from their native land. Investigations carried out on bamboos in

parks, botanical gardens, plant-trade centres and nurseries has resulted in the detection of further species previously unknown in both Europe and Turkey.

This contribution updates the presence, distribution and status of this complex of highly specialized scale insects in Europe and Turkey based on the authors' records and bibliographic sources.

New records for European countries and Turkey are marked with an asterisk. Localities, collecting dates and host plant data are also included. The distributional and host plants data are taken from ScaleNet (BEN-DOV *et al.*, 2013), if devoid of citation.

Specimen depositories: the Scale Insect Collection of the Plant Protection Department, Faculty of Agriculture, Ankara University, Ankara, Turkey (*B. lumampao*, *O. greeni*, *O. serrata*, *P. bambusae*, *C. bambusae*); The Scientific Museums of the University, Dipartimento di Agronomia, Animali, Alimenti, Risorse Naturali e Ambiente, Padova (Italy) (*K. pseudoleucaspis*, *A. pretiosa*, *B. kwoni*, *P. lumpurensis*); the Scale Insect Collection, Università di Bari Aldo Moro, Dipartimento di Scienze del Suolo, della Pianta e degli Alimenti DiSSPA sez. Entomologia e Zoologia, Bari, Italy (*P. formosana*, *C. bambusae*).

Results

Fam. Diaspididae

Kuwanaspis pseudoleucaspis (Kuwana, 1902) (Fig. 1).

Kuwanaspis pseudoleucaspis is apparently the most widespread bamboo scale in Europe and has been recorded with certainty from Portugal, France, United Kingdom, Italy, Germany, Poland, Sweden, Slovenia, Croatia, Turkey, Russia and Ukraine, and it is likely that its presence in other countries has been overlooked because infested plants are almost symptomless. In fact, most recent records (MASTEN MILEK, SIMALA 2008, SELJAK, 2008) refer to infested old bamboos which had not been checked before. Apparently, high infestations do not affect the vigour of the host plant.

**Batarasa lumampao* Takagi, 2009. (Fig. 12).

This species was previously known only from the type locality, Palawan, in the Philippines, on *Schizostachyum lumampao* (TAKAGI 2009). Recently, *B. lumampao* has been recorded indoors in Turkey (Ankara, 15.ii. 2011, ex *Bambusa siamensis*, S. Ülgentürk).

According to TAKAGI (2009), the scales colonise the nodes of the host plant and the adult females live in dense groups, standing on their prosoma. The female does not develop a distinct test cover but its body is partially encased in the second exuvial cast and the pygidium is naked.

Odonaspis greeni Cockerell, 1902. (Fig. 2, 3)

Odonaspis greeni is widely distributed in Asia and was introduced to the Americas. Apparently the first European record was in a greenhouse at Praga, Czech Republic (ZAHRADNICK 1957); more recently it was recorded from southern Italy on *Bambusa* sp. in a nursery (PORCELLI 1992), in greenhouse in Spain (SORIA *et al.* 1998) and indoors in Turkey (Ankara, 15.ii. 2011, ex *Bambusa siamensis*, S. Ülgentürk).

Odonaspis secreta (Cockerell, 1896). (Fig. 7, 8).

Odonaspis secreta was originally described from bamboo in Japan, but it is presently a cosmopolitan species, and has been recorded widely in Asia, America and the Palaearctic (BEN-DOV, 1988). It was first collected in Europe by Lindinger in 1912, along the Croatian coast (MASTEN MILEK, SIMALA 2008) and later in Southern France (BALACHOWSKY 1930). It is also known in Georgia, the Caucasus and Crimea. It occurs beneath the leaf sheathes and on the culm.

**Odonaspis serrata* Ben-Dov, 1988. (Fig. 7, 8).

The only data for this species until recently were those reported in the original description: i.e. from Sri Lanka and Vietnam, on *Arundinaria* sp. and *Bambusa* sp. (BEN-DOV 1988). This species was recently collected indoors in Turkey (Ankara, 15.ii. 2011, ex *Bambusa siamensis*, S. Ülgentürk), representing the first record of this species in the Western Palaearctic Region.

**Poliaspoides bambusae* Ülgentürk & Pellizzari, 2013. (Fig. 13).

On February 15, 2011 an apparently new diaspidid species was collected off plants of *Bambusa siamensis* (Poaceae) imported from Asia (precise origin unknown), growing indoors in a shopping centre at Ankara (Turkey). The scales were concealed under the leaf sheathes of the host plant.

The adult female and the first-instar nymph of the new species have been described and illustrated (ÜLGENTÜRK, PELLIZZARI 2013).

**Poliaspoides formosana* (Takahashi, 1930). (Fig. 9, 10, 15)

This species is mainly known from Asia and in some African countries on *Bambusa multiplex*,

Bambusa sp., *B. stenostachya* and *B. vulgaris* (DE LOTTO 1967). It is now also known from Italy on *Dendrocalamus* sp. (Milano, 05.ii.1989, F. Porcelli). This is a new record for Europe.

Fam. Pseudococcidae

Antonina crawi Cockerell, 1900

This almost cosmopolitan species is present in Spain and France and was collected long ago in the Czech Republic and Ukraine (Crimea). Recently it was recorded in Croatia (MASTEN MILEK, SIMALA 2008) from *Bambusa* sp. It lives under the leaf sheaths.

**Antonina pretiosa* Ferris, 1953

Antonina pretiosa was previously only known outside Asia in the USA and Cuba (Ben-Dov et al. 2013). However, it was found to be quite numerous on *Phyllostachys* sp. plants, growing outdoors in the Jardim Tropical in Lisbon (Portugal) (23.viii.2012, G. Pellizzari). It occurred on the stems of the bamboo plants, especially at the nodes and under the leaf sheaths. The infested plants had sooty mould and were in poor condition.

Balanococcus kwoni Pellizzari & Danzig, 2007. (Fig. 6).

Apparently native to South Korea, *B. kwoni* was first recorded in Italy on *Pseudosasa* sp. (PELLIZZARI, DANZIG 2007) and is now known in two Italian regions (Veneto and Liguria) (PELLIZZARI, SACCO 2010). It has become widely naturalised also in the United Kingdom (England) on many bamboo genera (*Bambusa*, *Fargesia*, *Pharus*, *Phyllostachys*, *Pleioblastus*, *Pseudosasa* and *Sinarundinaria*) since at least 1998 (MALUMPHY, BADMIN 2012). According to Germain (2011, personal communication), it has been also recorded in France, in a nursery, on *Fargesia jiuzhaigou*.

Live females are dark red in colour. They lay dark red eggs in a white waxy ovisac that sometimes covers part of the female body. Post-reproductive (dead) females, egg-laying females, eggs in the ovisacs and dead males were collected under the leaf sheaths of *Pseudosasa japonica* in Padua (Italy) in November. The species overwinters in the egg stage; which hatch at the end of March onwards and the first adults (males and females) were observed on late April. There are probably 3-4 generations during the year.

Chaetococcus bambusae (Maskell, 1893)

This species is widely distributed all over the world, and has been found on several genera of bamboos (*Arundinaria*, *Bambusa*, *Dendrocalamus*,

Gigantochloa, *Indosasa*, *Lingnania*, *Miscanthus*, *Phyllostachys*, *Schizostachyum*). In the Western Palaearctic region, it has been recorded only in southern Italy, Turkey, Crimea and Georgia (PORCELLI 1992, BODENHEIMER 1953, BEN-DOV *et al.* 2013). Recently, it was found indoors in Turkey (Ankara, 15.ii.2011, ex *Bambusa siamensis*, S. Ülgentürk).

**Palmicultor lumpurensis* (Takahashi, 1951)

Palmicultor lumpurensis is fairly widespread in some Asiatic countries (China, Vietnam, Korea, Malaysia, Philippines), and is invasive on bamboos in Australia (Queensland) and in Florida. (U.S.A) (WILLIAMS 2003, HODGES, HODGES 2004). *P. lumpurensis* was collected in a nursery in France in 2008 on *Bambusa* plants originally produced in Portugal and again in 2009, on *Phyllostachys* growing outdoors (Germain, 2011, personal communication). More recently, it has been recorded outdoors in the Jardim Tropical in Lisbon (Portugal), on plants infested also by *Antonina pretiosa* (23.viii.2012, *Phyllostachys* sp., G. Pellizzari).

Trionymus bambusae (Green, 1922)

This oriental species (Bangladesh, India, Sri Lanka and Taiwan) has been recorded in the Western Palaearctic region only in The Netherlands and Belgium, in greenhouses and outdoors, on *Semiarundinaria fastuosa*, *Pseudosasa japonica* and *Fargesia* sp. (JANSEN 2009).

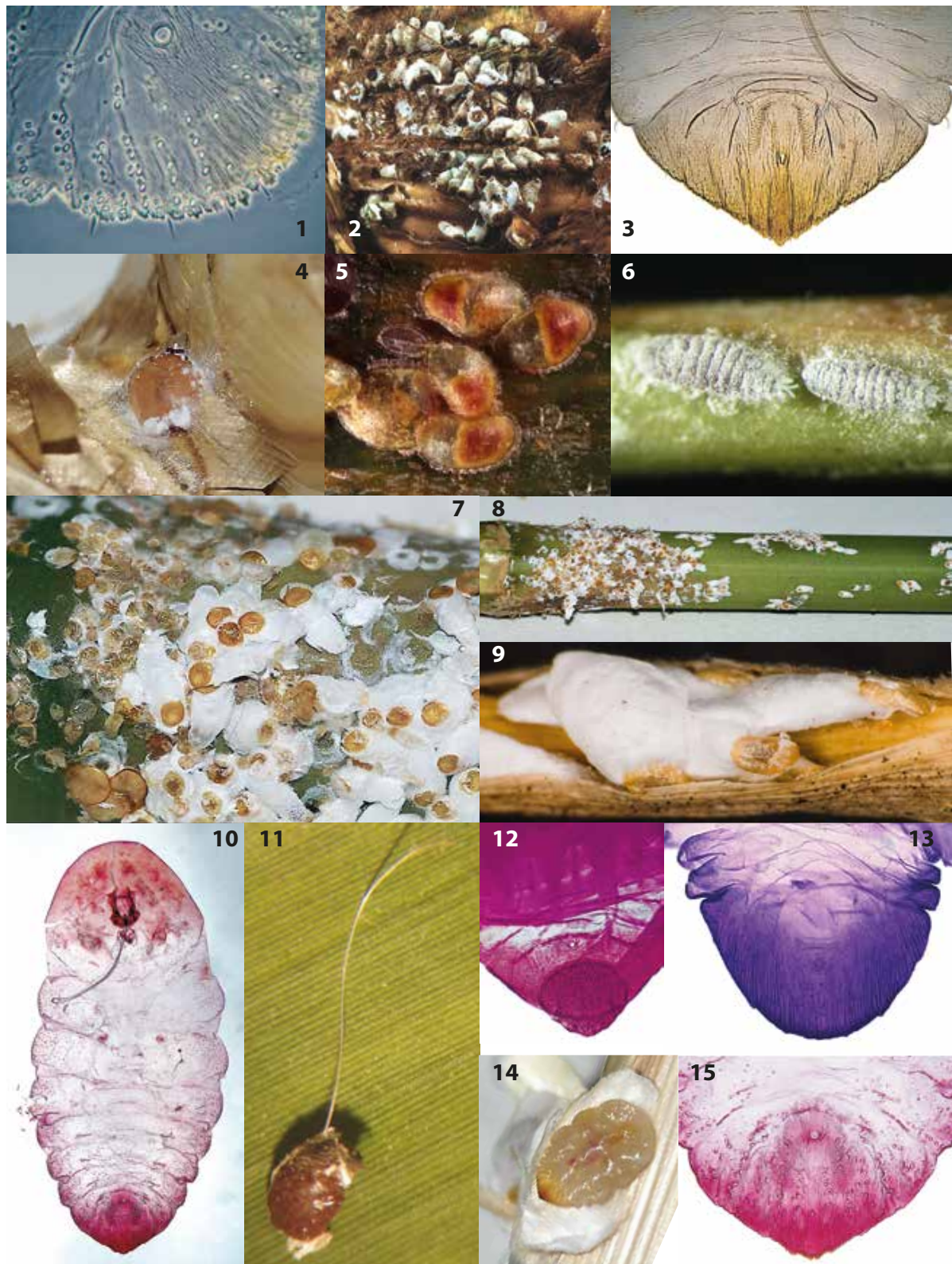
Fam. Asterolecaniidae

Bambusaspis bambusae (Boisduval, 1869). (Fig. 5.)

Bambusaspis bambusae is a pest of bamboos throughout much of the world and is present outdoors in some European countries, such as Portugal (FRANCO *et al.*, 2011), Canary islands (SORIA *et al.*, 1998), France, Italy and Sicily (LONGO *et al.* 1989, GERMAIN *et al.* 2002, PELLIZZARI, SACCO 2010) It has been recorded also in greenhouses in The Netherlands (STUMPF, LAMBDIN 2006). *B. bambusae* has been collected from many species of bamboos, mostly of the genera *Bambusa* and *Dendrocalamus*.

Bambusaspis miliaris (BOISDUVAL, 1869)

Bambusaspis miliaris has been recorded from many species of Bambusoideae and is widely distributed in Africa, Australasia, Central and South Americas. With regard to Europe, it is known so far only in greenhouses, and outdoors in southern France (GERMAIN *et al.* 2002, 2003). High infestations on leaves and stems make the plants unsightly.



Figs. 1-14. Bamboo scale insects found in Europe and Turkey. **1.** *Kuwanaspis pseudoleucaspis* (Kuwana, 1902) part of pygidium focus on dorsum phase contrast; **2, 3.** *Odonaspis greeni* Cockerell, 1902, demes on bamboo rhizome and pygidium in bright field; **4.** *Chaetococcus bambusae* (Maskell, 1893) hidden among culm sheath; **5.** *Bambusaspis bambusae* (Boisduval, 1869) infesting a culm; **6.** *Balanococcus kwoni* Pellizzari & Danzig; **7, 8.** mixed demes of *Odonaspis secreta* (Cockerell) and *Odonaspis serrata* Ben-Dov; *O. serrata* has sub-circular armours and second instar exuvia; **9, 10, 15.** *Poliaspoides formosana* (Takahashi) infesting secondary culm, whole body on slide and pygidium in bright field; **11.** *Antonina pretiosa* Ferris, 1953 with its long anal wax tube; **12.** *Batarasa lumampao* Takagi, 2009 and **13.** *Poliaspoides bambusae* Ülgentürk & Pellizzari pygidia; **14.** *Odonaspis serrata* Ben-Dov, a female purposely extracted from its armour

Conclusion

Occasional observations carried out by the authors on bamboo plants have resulted in the collecting of five species not previously recorded in the Western Palaearctic region (namely *Antonina pretiosa*, *Batarasa lumampao*, *Odonaspis serrata*, *Poliaspoides bambusae*, *P. formosana*, *Palmicultor lumpurensis*).

The above reported distributional data on bamboo scales in Europe and Turkey are surprisingly few

when one considers that bamboos have been present for a long time and are common and widespread as ornamentals throughout the region and are increasingly imported from Asia.

More intensive surveys on bamboo plantings in parks, gardens, nurseries, greenhouses and anywhere where they are used as ornamentals will surely lead to further records linked to these plants, providing a better understanding of their distribution in the Western Palaearctic region.

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