

Scale insects (Hemiptera: Coccoidea) as described by Linnaeus

CA Gertsson

Murarevägen 13, SE-227 30 Lund, Sweden.

Abstract: This article discusses 21 species of scale insects described by Linnaeus. Only 15 of these species, which belong to seven families, are officially recognized today. Details of the distributions of these species are presented in this paper. Special attention is paid to the Polish cochineal insect, *Porphyrophora polonica*. Linnaeus was particularly interested in this insect due to its importance as a source of crimson dye.

Key words: scale insects, Linnaeus.

Introduction

In *Systema Naturae*, *Fauna Suecica* and *Centuria Insectorum Rariorum* (1758, 1761, 1763 and 1767) Linnaeus recorded lists of 17, 12, 1 and 22 scale insect species respectively. The number of described species by Linnaeus is 21 according to Ben-Dov *et al.* (2007). Linnaeus used the genus *Coccus* to classify almost all scale insect species, including the type species now known as *Coccus hesperidum* L., 1758. His only exception was to classify the nettle ensign scale, *Orthezia urticae* (Linnaeus, 1758) as *Aphis urticae*, 1758.

The following observations are based on a compilation of Linnaeus' articles and information from ScaleNet (Ben-Dov *et al.* 2007).

Results

As apparent in Table 1, Linnaeus described 21 species of scale insects. This number has since been reduced and currently stands at 15 due to synonymy.

Table 1. Number of families and species listed by Linnaeus and valid names.

Families	Number of species listed by Linnaeus	Valid names
Coccidae	11	5
Conchaspididae	1	1
Diaspididae	3	3
Eriococcidae	1	1
Kermesidae	2	2
Margarodidae	2	2
Ortheziidae	1	1
Total	21	15

Although Linnaeus listed 11 species of the family Coccidae, soft scales, only five species are officially recognised today (Table 2). The cottony birch scale insect now includes the following five species, all now collectively classified under the valid name *Pulvinaria vitis*: *C. betulae*, *C. carpini*, *C. crataegi*, *C. oxyacanthae* and *C. vitis*. *P. vitis* is currently found in the Australian, Nearctic, Neotropical and Palaeartic regions. Indeed, collections of *P. vitis* have been made in the majority of countries in the Palaeartic region (Ben-Dov *et al.*, 2007). *Coccus crataegi* 1767, is listed by Ben-Dov *et al.* (2007) as described in 1766. The date 1766 is usually quoted for the 12th edition of *Systema Naturae*, Part I, pp. 1-532, but the description of this species actually appeared on p. 742 in Part II, dated 1767. Another three species described by Linnaeus are now synonyms of *Eulecanium tiliae*: *C. caprea*, *C. coryli* and *C. tiliae*. *E. tiliae* occurs most commonly in the Palaeartic region, but can also be

encountered in the Nearctic and Oriental regions (Ben-Dov *et al.*, 2007). The last three species in the family Coccidae described by Linnaeus are *C. hesperidum*, *C. myricae* and *C. rusci*. As shown in Table 2, *C. hesperidum* has retained Linnaeus' generic designation, whereas *C. myricae* and *C. rusci* are now known as *Ceroplastes myricae* and *Ceroplastes rusci* respectively. Whilst *C. hesperidum* and *Ceroplastes rusci* are cosmopolitan in distribution, *Ceroplastes myricae* appears to be restricted to the Afrotropical (the type locality, South Africa (Linnaeus, 1767)), Neotropical and Oriental regions (Ben-Dov *et al.*, 2007). The type material is probably lost (Ben-Dov, 1993). Of the records from the latter two regions, Williams (2007) wrote "it is remarkable how Cockerell (1893) recorded it from Jamaica, and Green (1900) from Assam and Calcutta, India." These records need to be verified

Table 2. The species listed by Linnaeus and valid species in seven families of scale insects.

Linnaeus' species	Valid names
Coccidae	
<i>Coccus betulae</i> , 1758	
<i>C. carpini</i> , 1758	
<i>C. crataegi</i> , 1767	<i>Pulvinaria vitis</i>
<i>C. oxyacanthae</i> , 1758	
<i>C. vitis</i> , 1758	
<i>C. caprea</i> , 1767	
<i>C. coryli</i> , 1758	<i>Eulecanium tiliae</i>
<i>C. tiliae</i> , 1758	
<i>C. hesperidum</i> , 1758	<i>C. hesperidum</i>
<i>C. myricae</i> , 1767	<i>Ceroplastes myricae</i>
<i>C. rusci</i> , 1758	<i>Ceroplastes rusci</i>
Conchaspidae	
<i>Coccus capensis</i> , 1763	<i>Conchaspis capensis</i>
Diaspididae	
<i>C. aonidum</i> , 1758	<i>Chrysomphalus aonidum</i>
<i>C. salicis</i> , 1758	<i>Chionaspis salicis</i>
<i>C. ulmi</i> , 1758	<i>Lepidosaphes ulmi</i>
Eriococcidae	
<i>C. uvae ursi</i> , 1759	<i>Eriococcus uvaeursi</i>
Kermesidae	
<i>C. ilicis</i> , 1758	<i>Kermes ilicis</i>
<i>C. quercus</i> , 1758	<i>Kermes quercus</i>
Margarodidae	
<i>C. cacti</i> , 1758	<i>Protortonia cacti</i>
<i>C. polonicus</i> , 1758	<i>Porphyrophora polonica</i>
Ortheziidae	
<i>Aphis urticae</i> , 1758	<i>Orthezia urticae</i>
Coccidae ?	
<i>Coccus phalaradis</i>	?
<i>Coccus pilosellae</i>	?

Linnaeus recognized only one species, *C. capensis*, in the small family of false armored scales now known as the Conchaspidae, and the species is now valid as *Conchaspis capensis* and is only known from the Afrotropical region (Ben-Dov *et al.*, 2007). Linnaeus' species *C. aonidum*, *C. salicis* and *C. ulmi* (Diaspididae) have also been transferred to other genera. They are now known as *Chrysomphalus aonidum*, *Chionaspis salicis* and *Lepidosaphes*

ulmi respectively. *C. aonidum* and *L. ulmi* have a cosmopolitan distribution. *C. salicis* is very common in the Palaearctic region but also occurs in the Nearctic and Oriental regions (Ben-Dov *et al.*, 2007). *Eriococcus uvaeursi* (Eriococcidae) has been credited to Linnaeus (1761). However, Linnaeus (1761) described this insect as *Coccus uvae ursi*. Of the 12 species of *Coccus* that Linnaeus listed at the same time, this is the only species listed as a trinomen. Perhaps this was an oversight by Linnaeus because, in the 12th edition of *Systema Naturae*, Linnaeus (1767) listed the insect correctly as *Coccus uvaeursi*. This name was made valid by a description of the species by Linnaeus (1759), a work originally published in Swedish (Linnaeus, 1759; Williams & Gertsson, 2005). This species is known to occur in much of the Palaearctic region (Ben-Dov *et al.*, 2007). The family Kermesidae, gall-like scales, includes *C. ilicis* and *C. quercus*. The former, a typical Mediterranean species known now as *Kermes ilicis*, lives on twigs and branches of *Quercus* spp. The other species, now with the valid name *Kermes quercus*, the stripped kermes, is known from the Palaearctic region. This species lives on *Quercus* spp. as well, but mostly in bark crevices of the trunk (Ben-Dov *et al.*, 2007). In the family Margarodidae, giant scales, Linnaeus described two species, *C. cacti* and *C. polonicus*. The Neotropical *C. Cacti*, now *Protortonia cacti*, is found on Cactaceae (Ben-Dov *et al.*, 2007). Linnaeus was particularly interested in the Polish cochineal scale, *Porphyrophora polonica*, which Linnaeus described as *C. polonicus*, owing to its importance as a source of crimson dye. This species lives on herbaceous plants growing in sandy and arid soils. Its primary host is the perennial knawel (*Scleranthus perennis*), but it has also been known to feed on plants of more than 28 genera in 17 plant families. The Polish cochineal insect was once commonly found throughout the Palaearctic region, from France to China, but today dwells mainly in Central Europe (Dahlbom, 1837; Ben-Dov *et al.*, 2007; Vahedi & Hodgson, 2007). According to Kozár (1998), the species has become rare and deserves protection. Linnaeus writes in the article "Svensk Coccionell" (1759): "Besides the above mentioned cochineal insect, there is another cochineal insect found in Europe which lives on the roots of a plant called knawel or *Scleranthus*; there are two types of this plant, one is annual, or grows yearly from seed, and the other is perennial, or remains with its roots from year to year. The former grows everywhere in our country, but the latter only in Skåne [a province in south Sweden]. The cochineal insects occur almost entirely on the latter and are thus quite rare in this country, but their real and principal home is the Ukraine or Poland, and for this reason they are generally called Polish cochineal insects or *Coccus Polonica*". This species and others belonging to *Porphyrophora* became less important towards the end of the 17th century than *Dactylopius coccus* Costa (Dactylopiidae). *D. coccus* was easier to harvest as it could be collected several times a year. This species also has a much more concentrated dye (Vahedi & Hodgson, 2007). *Porphyrophora polonica* has not been found in Sweden since the time of Linnaeus. The Nettle ensign scale, *Orthezia urticae* (Ortheziidae), Linnaeus described as *Aphis urticae*. This insect is a polyphagous species distributed throughout the Palaearctic region and in the regions of Afrotropical, Australasian and Oriental regions (Kozár, 2004; Ben-Dov *et al.*, 2007). In *Systema Naturae* (1761), Linnaeus listed two other species, *Coccus pilosellae* and *C. phalaridis* (Coccidae ?). These two species are unrecognizable. According to Ben-Dov *et al.* (2007), *C. phalaridis* is an unclassified species which is placed in a genus that no longer belongs to the family, and cannot, at present, be assigned to a valid genus.

Acknowledgements

I extend special thanks to Dr D.J. Williams, The Natural History Museum, London, for his comments and suggestions.

References

- Ben-Dov, Y. 1993. A Systematic Catalogue of the Soft Scales of the World (Homoptera: Coccoidea: Coccidae) with data on geographical distribution, host plants, biology and economic importance. Flora and Fauna Handbook No. 9, Sandhill Crane Press, Gainesville, Florida. 536 pp.
- Ben-Dov, Y., Miller, D.R. & Gibson, G.A.P. 2007. ScaleNet. A Database of the Scale Insects of the World. <http://www.sel.barc.usda.gov/scalenet/scalenet.htm>.
- Cockerell, T.D.A. 1893. Records of West Indian Coccidae. I. Journal of the Institute of Jamaica
- Dahlbom, A.G. 1837. Kort underrättelse om skandinaviens insekters allmänna skada och nytta i hushållningen. En bok för lantbrukare och naturforskare. Lund. pp. 143-146.
- Green, E.E. 1900. Remarks on Indian scale insects (Coccidae), with descriptions of new species. Indian Museum Notes, 5:1-13.
- Kozár, F. (Ed.). 1998. Catalogue of Palaearctic Coccoidea. Plant Protection Institute, Hungarian Academy of Sciences, Budapest.
- Kozár, F. 2004. Ortheziidae of the world. Plant Protection Institute, Hungarian Academy of Sciences, Budapest.
- Linnaeus, C. 1758. Insecta. Hemiptera. *Coccus*. Systema Naturae. Salvii, Holmiae. 823 pp.
- Linnaeus, C. 1759. Svensk Coccionell. Kongliga Vetenskaps Akademiens Handlingar, Stockholm 20:6-30.
- Linnaeus, C. 1761. Insecta. Hemiptera. *Coccus* In: Fauna Suecica Laur. Salvii, Stockholmiae. 578 pp.
- Linnaeus, C. 1763. Centuria Insectorum Rariorum. Upsaliae. V.4, V + 32 pp.
- Linnaeus, C. 1767. Insecta. Hemiptera. *Coccus*. Systema Naturae. Salvii, Holmiae.
- Vahedi, H.A. & Hodgson, C.J. 2007. Some species of the hypogeal scale insect *Porphyrophora* Brandt (Hemiptera: Sternorrhyncha: Coccoidea: Margarodidae) from Europe, the Middle East and North Africa. Systematics and Biodiversity 5 (1):3-122.
- Williams, D.J. 2007. Carl Linnaeus and his scale insects (Hemiptera: Coccoidea). In: Zhang, Z.-Q. & Shear, W.A. (Eds). "2007, Linnaeus Tercentenary: Progress in Invertebrate Taxonomy. Zootaxa, 1668:1-766.
- Williams, D.J. & Gertsson, C.A. 2005. Linnaeus and his several descriptions of the scale insect *Coccus uvaursi*, now known as *Eriococcus uvaursi* (Linnaeus) (Hemiptera: Coccoidea: Eriococcidae). Journ. of Nat. Hist. Vol. 39 (38):3419-3422.