

JANSEN, M.G.M.

Section Entomology, Plant Protection Service, Geertjesweg 15, P.O. Box 9102, 6700 HC
Wageningen, The Netherlands

**AN ANNOTATED LIST OF THE SCALE INSECTS
(HEMIPTERA: COCCOIDEA) OF THE NETHERLANDS.**

ABSTRACT

AN ANNOTATED LIST OF THE SCALE INSECTS (HEMIPTERA: COCCOIDEA) OF THE NETHERLANDS.

Sixty-six species of scale insects (Hemiptera: Coccoidea) have been recorded in The Netherlands up to August 1998. The species belong to 9 families, the most numerous of which are the Coccidae (19 species), the Pseudococcidae (15 species) and the Diaspididae (15 species). Nine species are recorded here for the first time: *Matsucoccus matsumurae* (Kuwana), *Parthenolecanium rufulum* (Cockerell), *Phyllostroma myrtilli* (Kaltenbach), *Physokermes bemicryphus* (Dalman), *Quadraspidiotus marani* Zahradnik, *Quadraspidiotus perniciosus* (Comstock), *Steingelia gorodetskia* Nasonov, *Trionymus aberrans* Goux and *Trionymus tomlini* Green. *Carulaspis visci* (Schrank) must be removed from the list.

Key words: Ortheziidae, Margarodidae, Eriococcidae, Cryptococcidae, Kermesidae, Asterolecaniidae, Dutch climate, ecology, zoogeography, introduced species, quarantine interceptions.

INTRODUCTION

In the past, three checklists of Dutch scale insects have been published (De Graaf *et al.*, 1862; van der Goot, 1912; Reyne, 1957). The last list was published over forty years ago and so there has been a growing need for more up-to-date information. Reyne (1957) listed 57 species, partly unidentified, from the open of The Netherlands. Since then, several new species have been recorded (Reyne, 1958, 1963, 1965; van Rossem *et al.*, 1979; Jansen, 1996a, 1996b).

Information on scale insects can also be found in the Dutch Plant Protection Service Annual Reports. These are not an obvious source of data and have only a small distribution, and so are almost unknown. The purpose of this publication is to compile an up-to-date checklist of the Coccoidea known to occur in The Netherlands from all literature sources and from the collection material available, so that this information can be used for a project devoted to the composition of the Dutch fauna.

MATERIAL AND METHODS

The faunal list is based on published data and collection material and is partly the result of recent field work. The collections of the Dutch Plant Protection Service at Wageningen, the Institute of Systematics and Population Biology (Zoologisch Museum), Amsterdam and at the National History Museum, Naturalis, Leiden, were consulted. Collection material of the Dutch Plant Protection Service is partly the result of finds by quarantine inspectors and private owners and contains predominantly microscopic slides.

The collection of the Zoologisch Museum at Amsterdam is based on the Reyne-collection which contains both microscopic slides and material preserved on alcohol. Reyne collected scales in the period 1940-1965. Van der Goot and Hille Ris Lambers, who were working on aphids, also collected many scales during their field trips. Unfortunately the collection of Van der Goot, who was working in the beginning of this century (until 1912), could not be traced and is probably lost. The specimens collected by Hille Ris Lambers are part of the Reyne collection. In the period 1912-1940, nobody paid special attention to scale insects and only a small part of the material collected prior to 1940 seems to have been preserved.

Regular collecting trips have been made by the author in the last few years to different parts of The Netherlands to rediscover specimens of species recorded previously and to look for new species in interesting habitats. The insects collected by the author in recent years are deposited as microscopic slides or dry material in the Dutch Plant Protection Service. Unless otherwise stated, all slides of species new to the Dutch fauna are deposited in the collection of the Dutch Plant Protection Service, Wageningen. Part of this collection is still unidentified, never published or only recorded in one of the annual reports of the Service.

RESULTS

The total number of species recorded in the open is 66, including nine species which are new to the Dutch fauna: *Matsucoccus matsumurae* (Kuwana), *Parthenolecanium rufulum* (Cockerell), *Phyllostroma myrtilli* (Kaltenbach), *Physokermes hemicyphus* (Dalman), *Quadraspidiotus marani* Zahradnik, *Quadraspidiotus perniciosus* (Comstock), *Steingelia gorodetskia* Nassonov, *Trionymus aberrans* Goux and *Trionymus tomlini* Green. The 66 species belong to 9 families; of these, the most speciose families are the Coccidae (19 species), the Pseudococcidae (15 species) and the Diaspididae (15 species). *Carulaspis visci* is removed from the Reyne list because it is here considered to be a misidentification of *C. juniperi*.

Species list.

Abbreviations: I - introduced and established species; G - greenhouse species; N - new to the fauna; Po - occasional pest species; Pc - common pest species; R - rare species, found in only 1-3 sites; S - Status unknown (collection material not located); PPS - Plant Protection Service.

ORTHEZIIDAE

- Newsteadia floccosa* (De Geer)
R *Orthezia urticae* (Linnaeus)
R *Ortheziola vej dovskyi* Sulc

MARGARODIDAE

- N *Matsucoccus matsumurae* (Kuwana) - Zeist, *Pinus sylvestris*, on trunk: 7♀♀, 27.III.1969, H. Burger; 6♀♀, 22.IV.1969, D. Doom; 2♀♀, 29.IV.1969, H. Burger; 6♀♀, 7.V.1969, D. Doom; 12♀♀, -.VI.1969, D. Doom; 4♀♀, 28.VIII.1969, H. Burger; 2♀♀, 5.IX.1969, D. Doom.
R,S *Porphyrophora polonica* (Linnaeus)
N *Steingelia gorodetskia* Nasonov - 5♀♀, Leersum, Leersummerveld, *Carex x elythroides*, on the roots, 6.VI.1997, M. Jansen; 1♀, 1♂, Roozendaal, Bedriegertjes, *Betula pendula*, under bark, 23.IV.1997, M. Jansen.

PSEUDOCOCCIDAE

- R *Atrococcus paludinus* (Green)
Chnaurococcus subterraneus (Newstead)
Euripersia tomlini (Newstead)
R *Heterococcus nudus* (Green)
G,Po *Phenacoccus aceris* (Signoret)
Phenacoccus hordei (Lindeman)
R *Phenacoccus sphagni* (Green)
Rhizoecus albidus Goux - 3♀♀, Rhenen, *Ballota nigra*, roots, 2.X.1982, E. Hille Ris Lambers.
R *Rhodania occulta* Schmutterer
Spinococcus calluneti (Lindinger)
N *Trionymus aberrans* Goux - 1♀, Scheveningen, dunes, *Ammophila arenaria*, 3.VII.1995, F. Kozár, coll. Plant Protection Institute, Budapest.
Trionymus newsteadi (Green)

Trionymus perrisii (Signoret)

Trionymus radicum (Newstead) R

- N *Trionymus tomlini* Green - 3 nymphs, Veenendaal, Blauwe Hel:
Holcus lanatus, 24.VII.1997, M. Jansen; 1♀, 2 nymphs, *Holcus lanatus*, 23.VIII.1997, M. Jansen; 3♀♀, *Phalaris arundinacea*, between leaves, 14.VII.1997, M. Jansen.

ERIOCOCCIDAE

- R,S *Acanthococcus aceris* Signoret
Acanthococcus devoniensis (Green)
R *Acanthococcus greeni* (Newstead)
R *Anophococcus inermis* (Green)
Po *Gossyparia spuria* (Modeer)
R *Rhizococcus insignis* (Newstead)

CRYPTOCOCCIDAE

- Po *Cryptococcus fagisuga* Lindinger
Po *Pseudochermes fraxini* (Kaltenbach)

KERMESIDAE

- Kermes quercus* (Linnaeus)
R,S *Kermes roboris* (Fourcroy)

COCCIDAE

- Eriopeltis festucae* (Fonscolombe)
Eriopeltis lichtensteini Signoret
Eulecanium ciliatum (Douglas)
Eulecanium tiliae (Linnaeus)
R *Lecanopsis formicarum* Newstead
R *Lichtensia viburni* Signoret
R *Luzulaspis* sp.
Palaeolecanium bituberculatum (Targioni Tozzetti)
Pc,G *Parthenolecanium corni* (Bouché)
Parthenolecanium fletcheri (Cockerell)
Parthenolecanium pomeranicum (Kawecki)

- Parthenolecanium rufulum* (Cockerell) - Recorded in the Annual Report of the Dutch Plant Protection Service (Jansen, 1995b). Imported from Hungary in great numbers on *Quercus* sp., Opheusden, 7.XII.1994, J. Heesters; 1♀, Kaatsheuvel, next to Efteling, *Quercus* sp., 19.III.1998, J. Heesters.
- N *Phyllostroma myrtilli* (Kaltenbach) - 1♀, Leersum, Leersummerveld, *Vaccinium myrtillus*, 6.VI.1997, M. Jansen.
- N *Physokermes hemicryphus* (Dalman) - 2♀♀, Lottum, *Picea abies*, 9.XI.1965, PPS; 16♀♀, Lottum, *Picea abies*, 5.V.1966 (coll. Zoologisch Museum, Amsterdam and coll. PPS, Wageningen), PPS; 10♀♀, Tegelen, *Picea abies*, 4.V.1966 (coll. Zoologisch Museum, Amsterdam and coll. PPS, Wageningen), PPS; 3♀♀, Venlo, *Picea abies*, 10.V.1967, PPS.
- R *Physokermes piceae* (Schrank)
- G,I,Pc *Pulvinaria floccifera* (Westwood)
- I,Pc *Pulvinaria hydrangeae* (Steinweden)
- I,Po *Pulvinaria regalis* Canard
- G,Pc *Pulvinaria vitis* (Linnaeus)

ASTEROLECANIIDAE

- Po *Asterodiaspis variolosa* (Ratzeburg)

DIASPIDIDAE

- Aulacaspis rosae* (Bouché)
- Pc *Carulaspis juniperi* (Bouché)
- Chionaspis salicis* (Linnaeus)
- Diaspidiotus bavaricus* (Lindinger)
- Po *Epidiaspis leperii* (Signoret)
- Pc *Lepidosaphes ulmi* (Linnaeus)
- Leucaspis pini* (Hartig)
- Nuculaspis abietis* (Schrank)
- I,R *Pseudaulacaspis pentagona* (Targioni Tozzetti)
- Quadraspidiotus gigas* (Thiem & Gerneck)
- N *Quadraspidiotus marani* Zahradnik - Recorded in an Annual Report, Dutch Plant Protection Service (Anonymous, 1955). 1♀, Wageningen, *Pyrus communis*, 31.I.1955, PPS; 2♀♀, Wageningen, *Pyrus communis*, 14.IX.1954, H. Burger; 8♀♀, Beesel, *Malus* sp., 19.II.1960, PPS; 2♀♀, Rijckholt, *Pyrus* sp., 25.II.1954, H. Verest, PPS; 4♀♀, Blerick, unknown plant, 24.II.1960, PPS.

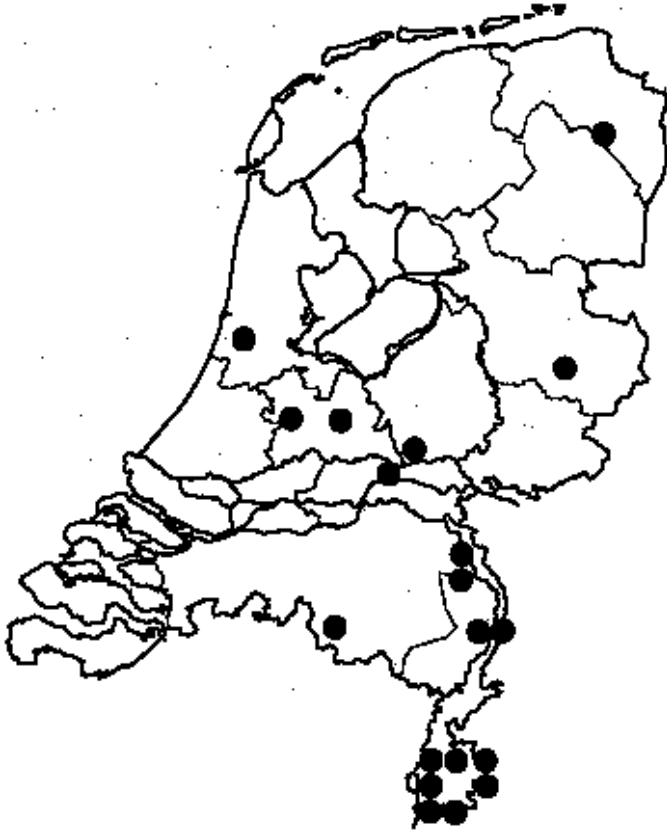


Fig. 1. Distribution map of *Quadraspidiotus perniciosus* (Comstock) in The Netherlands in the period 1950-1998.

Pc *Quadraspidiotus ostreaeformis* (Curtis)

N *Quadraspidiotus perniciosus* (Comstock) - Fig. 1. Although regularly imported into The Netherlands for more than 50 years and found in many locations, the records listed below, which do not appear to be a direct result of import, have never been published. In 1950, an eradication programme was started and a year later, at Maasbree, an experimental field was designated on an isolated site to gain insight in its host plant range, its noxiousness and its vitality in the Dutch climate. Records: 1 slide, Wageningen, unknown plant, Jan 1950, identification Reyne, PPS; 1 slide, Eijsden, *Malus* sp, 10.IX.1951, P. Vlaming; 1 slide, Rijssen, unknown plant, 18.VII.1951, H. van Vugt; 1 slide, Zeist, *Pyrus* sp.,

27.IV.1951, H. van Vugt; 1 slide, Haarlem, unknown plant, 4.VIII.1952, J. Scheele; 1 slide, Eijsden, *Malus* sp., 5.VI.1953, P. Vlaming; 1 slide, Eijsden, *Malus* sp., 19.VI.1951, L. van Cruchten; 1 slide, Heijen, *Pyrus* sp., 6.IX.1952, P. Vlaming; 1 slide, Rimburch, unknown plant, 22.VI.1951, P. Vlaming; 1 slide, Eijsden, *Malus* sp., 15.X.1953, H. Verest; 1 slide, Kamerik, *Pyrus* sp., 19.V.1951, L. Eigeman; 1 slide, Beek, unknown plant, 9.V.1951, L. van Caldenborgh; 1 slide, Gronsveld, *Malus* sp., 4.XII.1953, H. Verest; 5 slides, Eijsden, *Malus* sp., 17.X.1952, P. Vlaming; 3 slides, Eijsden, *Malus* sp., 24.V.1952, P. Vlaming; 1 slide, Heerlen, *Pyrus* sp., 19.IV.1951, P. Vlaming; 1 slide, Rijckholt, *Malus* sp., 23.III.1954, H. Verest; 1 slide, Sint Geertruid, *Malus* sp., 12.XI.1953, H. Verest; 1 slide, Geleen, *Pyrus* sp., 4.IV.1951, B. Wehman; 1 slide, Amby, *Malus* sp., 12.IV.1954, H. Verest; 1 slide, Reusel, *Malus* sp., 8.III.1951, J. Snellen; 1 slide, Wageningen, unknown plant, 24.I.1951, G.H. Jansen; 2 slides, Moerslag, *Malus* sp., 18.XI.1952, J. Vreeburg; 2 slides, Valkenburg, unknown plant, 19.VI.1953, P. Vlaming; 3 slides, Epen, *Malus* sp., 2.VI.1953, P. Vlaming; 1 slide, Terwinselen, *Pyrus* sp., 29.VII.1954, H. Verest; 1 slide, Veendam, *Pyrus* sp., 22.VII.1953, Jansen; 2 slides, Blerick, unknown plant, 24.II.1960, PPS; 1 slide, Hoensbroek, unknown plant, 17.VIII.1954, H. Verest; 1 slide, Rimburch, unknown plant, 16.VI.1953, P. Vlaming; 1 slide, Blerick, unknown plant, 22.X.1959, PPS; 1 slide, Rijckholt, *Malus* sp., 7.V.1953, P. Vlaming; 1 slide, Amby, *Malus* sp., 8.IV.1954, H. Verest; 1 slide, Beneden-Leeuwen, unknown plant, 7.V.1954, J. Bremmer; 1 slide, Rimburch, unknown plant, 2.III.1953, P. Vlaming; 1 slide, Mesch, *Malus* sp., 22.V.1953, P. Vlaming; 1 slide, Blerick, unknown plant, 23.III.1960, PPS; old females and nymphs, Maasbree, experimental field, *Prunus* sp., 7.I.1994, M. Jansen & J. Schamp.

Pc *Quadraspidiotus pyri* (Lichtenstein)
 Quadraspidiotus zonatus (Frauenfeld)

DISCUSSION

Bearing in mind the number of species of Coccoidea recorded from the United Kingdom and from Germany, the fauna of The Netherlands is likely to be much richer than suggested by the above records and could probably be

doubled. This checklist is therefore to be considered as a starting point for further investigation.

The scale insect fauna known from the open in The Netherlands has only been studied superficially in the past. During the period 1950-1955, the Dutch Plant Protection Service gave much attention to the scales living on trees and shrubs with the aim of detecting the newly introduced *Quadraspidiotus perniciosus*. As a result, *Quadraspidiotus marani* and *Epidiaspis leperii* (Signoret) were found but only during that period. However, there have been no further surveys since 1955.

The Dutch climate is oceanic and characterized by much wind in the coastal zones, relatively warm winters, generally a lack of summer warmth and substantial rainfall in all seasons. The geomorphological structure can be briefly characterized as flat landscape, interrupted in places by relicts from the ice ages, with few hills and an absence of mountains and valleys. In addition, the Dutch landscape has been greatly influenced by man, and most heaths, fens and bogs are now cultivated. Nor do the few south-facing xerotherm slopes, which are mostly woodland, contribute to a high number of thermophilous species. In this respect, the most interesting habitats are the sand-dunes alongside the coast, and the hills with calcareous grasslands in the most southern part of the country. *Atrococcus paludinus* (Green) and *Trionymus tomlini* were found in 1997 in a semi-natural marsh, in which the use of materials such as fertilizers was forbidden.

Some Dutch species which seem to be typical for the temperate zones are *Chnaurococcus subterraneus* (Newstead), *Rhodania occulta* Schmutterer, *Eriopeltis lichtensteini* Signoret and *Eulecanium ciliatum* (Douglas). Another characteristic element of the Dutch scale insect fauna is *Phenacoccus sphagni* (Green), recently found in a new location, which is only otherwise known from the United Kingdom. *Epidiaspis leperii* (Signoret), *Phyllostroma myrtilli* (Kaltenbach) and *Acanthococcus aceris* Signoret can be considered as Central-European elements. However, the scanty ecological data concerning the occurrence of many other interesting species in The Netherlands, which are known from only a few locations, make a detailed zoogeographical analysis impossible.

Regular trade and transport of vegetative material has brought about the introduction of such exotic species as *Pseudaulacaspis pentagona* (Targioni Tozzetti) and *Quadraspidiotus perniciosus*. Although the latter has been regularly imported into The Netherlands for more than 50 years and has been recorded from many locations, no records of this species in The Netherlands

have ever been published. In 1950, an eradication programme was started and a year later, at Maasbree, an experimental field was designated on an isolated site to gain insight into its host plant range, its noxiousness and its vitality in the Dutch climate. The distribution of these records is shown in Fig. 1.

In addition, *Pulvinaria regalis* Canard and *Pulvinaria hydrangeae* (Steinweden) were probably introduced into other European countries where they spread rapidly and, together with the related *Pulvinaria floccifera*, they are now amongst the most common species in The Netherlands and have become established in towns and villages throughout the country and are locally common in some nature reserves (Jansen, 1996a).

The number of introduced species found during quarantine interceptions and in greenhouses is 162 (Jansen, 1995a), and thus only a very few of these species have become acclimatized and established. For instance, *Chaetococcus phragmitis* (Marchal) has been regularly introduced in large numbers from several Central European countries on *Phragmites australis* for many decades but no specimens have been found on its host to-date. In addition, Hofker *et al* (1991) presented evidence that it was unlikely that *Phenacoccus avenae* Borchsenius, which is regularly intercepted at quarantine on bulbs and corms of various Liliaceae, Iridaceae and Amaryllidaceae, could survive a Dutch winter. Another species, *Coccus besperidum* Linnaeus, a common greenhouse species which was found on *Hedera helix* in a garden in Wageningen, did not survive either.

ACKNOWLEDGEMENTS

The author is indebted to Dr Ferenc Kozár, Plant Protection Institute, Budapest, for information about *Trionymus aberrans* and checking *Parthenolecanium rufulum*; and to Dr. Imre Foldi, National Museum of Natural History, Paris, for checking *Matsucoccus matsumurae*. For consulting the collection and for the loan of specimens of *Carulaspis juniperi*, I am grateful to Mr Willem Hogenes, Institute of Systematics and Population Biology (Zoological Museum), Amsterdam, and to Dr Jan van Tol, Natural History Museum, Naturalis, Leiden.

REFERENCES

- ANONYMOUS, 1955 - [Ziekten en plagen in 1954.] *Verslagen en Mededelingen Plantenziektenkundige Dienst Wageningen*, 127 (Jaarboek 1954/1955): 99.
- GOOT, P. VAN DER, 1912 - Naamlijst van inlandsche Coccidae. *Entomologische Berichten, Amsterdam*, 3: 285-290.
- GRAAF, H.W. DE, SIX, G.A., SNELLEN VAN VOLLENHOVEN, S.C., 1862 - Tweede Naamlijst van inlandsche Hemiptera. *Tijdschrift voor Entomologie*, 5: 72-95.
- HOFKER, K., CONIJN, C., VAN ALPHEN, J.J.M., 1991 - Is the Iris mealybug, *Phenacoccus*

avenae Borchsenius, able to multiply itself and spread in bulbfields in the Netherlands? *Mededelingen Faculteit Landbouwwetenschappen Rijksuniversiteit Gent*, 56: 995-1001.

- JANSEN, M.G.M., 1995a - Scale insects (Homoptera: Coccinea) from import interceptions and greenhouses in the Netherlands. *Israel Journal of Entomology*, 29: 131-146.
- JANSEN, M.G.M., 1995b - *Parthenolecanium rufulum* (Cockerell), introduced in the Netherlands. *Verslagen en Mededelingen Plantenziektenkundige Dienst Wageningen*, 177 (Annual Report Diagnostic Center 1994): 45-47.
- JANSEN, M.G.M., 1996a - The genus *Pulvinaria* in the Netherlands (Coccinea: Coccidae). In Aphids and other Homopterous Insects. Skierniewice, 1996: 59-63.
- JANSEN, M.G.M., 1996b - *Pseudaulacaspis pentagona* (Homoptera: Coccoidea: Diaspididae), een nieuwe soort voor onze fauna? *Entomologische Berichten, Amsterdam*, 55: 174-176.
- REYNE, A., 1957 - Snavelinsecten - Rhynchota, I, Nederlandse schildluizen (Coccidae). *Wetenschappelijke Mededelingen van de Koninklijke Nederlandse Naturhistorische Vereniging*, 22: 1-44.
- REYNE, A., 1958 - *Phenacoccus sfbagni* (Green) in Holland. *Entomologische Berichten, Amsterdam*, 18: 20-26.
- REYNE, A., 1963 - Nederlandse Schildluizen II. *Entomologische Berichten, Amsterdam*, 23: 115-117.
- REYNE, A., 1965 - Nederlandse Schildluizen III. *Entomologische Berichten, Amsterdam*, 25: 96-97.
- ROSSEM, G. VAN, VAN DE BUND, C.F., BURGER, H.C., DE GOFFAU, L.J.W., 1979 - Bijzondere aantastingen door insekten in 1978. *Entomologische Berichten, Amsterdam*, 39: 68-71.