PROC. ENTOMOL. SOC. WASH.
112(2), 2010, pp. 326–331

THE IDENTITY AND DISTRIBUTION OF THE MEALYBUG SPECIES *NIPAECOCCUS FILAMENTOSUS* (COCKERELL) (HEMIPTERA: PSEUDOCOCCIDAE)

DOUGLAS J. WILLIAMS AND DOUGLASS R. MILLER

(DJW) Department of Entomology, The Natural History Museum, Cromwell Road, London, SW7 5BD, UK; (DRM) Systematic Entomology Laboratory, Plant Science Institute, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, MD 20705 U.S.A. (e-mail: Douglass.Miller@ARS.USDA.GOV)

Abstract.—The mealybug *Nipaecoccus filamentosus* (Cockerell) was described originally as *Dactylopius filamentosus* Cockerell from South Caicos Island in the Turks and Caicos Islands. It has been listed in error from the Bahamas and from Mexico and the mealybug name wrongly applied to a similar species now known as *Nipaecoccus viridis* (Maskell). Furthermore, the name *Dactylopius filamentosus*, as first applied by Cockerell, has been recorded in error from various localities in the Old World because of erroneous synonymy early in the 19th century. The mealybug species *N. filamentosus* has neither been described nor illustrated adequately since it was first named over 100 years ago and its identity has remained obscure. We now describe and illustrate this mealybug and confirm that it is a local species occurring in the Caribbean area only.

Key Words: Turks and Caicos Islands, Coccoidea, lectotype, key to species

DOI: 10.4289.0013-8797.112.2.326

Cockerell (1893a) first named the mealybug species *Dactylopius filamentosus* Cockerell from South Caicos, in a list of West Indian scale insects, and added that the antennae were 7-jointed. He also indicated that he had sent the description of the species elsewhere for publication. Later, in another publication, Cockerell (1893b) described the mealybug species more fully as *Dactylopius filamentosus* (now known as *Nipaecoccus filamentosus* (Cockerell)), on a plant resembling *Vaccinium*, and recorded it from Cockburn's Harbour, South Caicos, Bahamas. The first publication (Cockerell 1893a) was published in April and the second (Cockerell 1893b) in September. We regard the short description in Cockerell (1893a) as validating the name and this has priority. Cause for the confusion about the country of origin stems from the fact that it is situated close to the Bahamas and at one time was annexed by it. At the time Cockerell described the mealybug, the Turks and Caicos Islands were a dependency of Jamaica. The Turks and Caicos Islands are, nevertheless, a separate territory, now an Overseas Territory of the United Kingdom and at present, the United Kingdom is responsible for insect

* Edited by Thomas J. Henry; accepted by Michael W. Gates

biodiversity in the Turks and Caicos Islands (Jones 2006). Older connections with the Bahamas and Jamaica have often led to erroneous records from these countries. *Nipaecoccus filamentosus* has neither been found in the present-day territory of the Bahamas nor in Jamaica, as listed by Fernald (1903), Ben-Dov, in part (1994) and Ben-Dov et al. (2006).

Soon after Cockerell described *Dactylopius filamentosus*, Fernald (1903) synonomized the name *Dactylopius vastator* Maskell with it, a species now known as *Nipaecoccus viridis* (Newstead)), described from Hawaii by Maskell (1895). This had repercussions throughout the Old World because, until recently, *N. viridis* has often been recorded erroneously as *Pseudococcus filamentosus* from various parts of Africa and southern Asia. For instance, Morrison (1920) recorded and illustrated *N. filamentosus* (as *Pseudococcus filamentosus*) from the Philippine Islands when the species actually was *N. viridis*. Records of *N. filamentosus* from the Afrotropical, the Oriental and the Palaearctic regions, listed by Ben-Dov (1994) and Ben-Dov et al. (2006) undoubtedly should refer to *N. viridis*.

The first attempt to unravel the erroneous synonymy was by Zimmerman (1948) who redescribed and illustrated the species formerly described by Maskell (1895) as *Dactylopius vastator* (as *Pseudococcus vastator*) from Hawaii. Ferris (1954) later described and illustrated this species as *Nipaecoccus vastator* from China. The name *Nipaecoccus vastator* was further synonymized with *Nipaecoccus viridis* (Newstead) by Ali (1970). These works led to *Nipaecoccus viridis* being correctly identified throughout Africa and the Oriental Region. The latest redescription of *N. viridis* is by Williams (2004) who also discussed its pest status in southern Asia.

The position of the species described originally as *Dactylopius filamentosus* was further complicated by Ferris (1921) who described it as *Pseudococcus filamentosus* from Mexico, Lower California, La Paz, on *Lysiloma* sp. and on an undetermined mimoaceous shrub at San Jose del Cabo. Ferris (1950) also described and illustrated the same material from Lower California for the first time in the genus *Nipaecoccus* as *N. filamentosus* (Cockerell). Williams and Granara de Willink (1992), however, after comparing the specimens recorded by Ferris with original material described by Cockerell, showed that they were different and named the Lower Californian species *Nipaecoccus cercidii* Williams and Granara de Willink. This left *Nipaecoccus filamentosus* (Cockerell) without an adequate description and illustration so that its identity has remained obscure.

Because the original slide preparations of *Dactylopius filamentosus* were labelled South Caicos, Bahamas, instead of South Caicos, Turks and Caicos Islands, and, because of the early synonymy of *D. vastator* (= *Nipaecoccus viridis*) with it, *N. viridis* was wrongly recorded in the Bahamas and Mexico in a distribution map by the Commonwealth Institute of Entomology (1983). *Nipaecoccus viridis* has never been found in the Bahamas and Mexico nor has it been found anywhere in the New World. It is listed as a major threat to U.S. agriculture by Miller et al. (2002) who suggest that its origin may be the Oriental Region. An error occurred in Williams and Granara de Willink (1992) when specimens from Mexico on *Lysiloma* sp. were listed under *N. filamentosus*. The record should have been under *N. cercidii*.

We can now establish that *N. filamentosus* is a local species presently known only from the Turks and Caicos Islands, Haiti, and from Puerto Rico in

the Caribbean area, and we take the opportunity to redescribe and illustrate the species.

Materials and Methods

The accompanying illustration shows the entire insect with a dividing line down the middle giving the dorsum on the left and the venter on the right. Enlargements of important characters are illustrated around the main figure. Abbreviations of depositories of the specimens examined are: BMNH, The Natural History Museum, Cromwell Road, London, UK; USNM, National Museum of Natural History (housed at USDA, Systematic Entomology Laboratory, Beltsville, Maryland, U.S.A.).

Nipaecoccus filamentosus (Cockerell) (Fig. 1)

Dactylopius filamentosus; Cockerell 1893a: 234; 1893b: 268.

Pseudococcus filamentosus; Fernald 1903: 101.

Nipaecoccus filamentosus; Ferris 1950: 106 (as a misidentification).

Description.—Adult female broadly oval; 1.8–2.8 mm long, 1.6–2.0 mm wide; anal lobes poorly developed, each with apical seta 110–150 μ long, without anal bar. Antennae each 238–285 μ long, 7-segmented. Eye on dorsal surface near antennal base. Legs well developed, robust; hind trochanter+femur 202–245 μ long, hind tibia+tarsus 188–210 μ long; hind tibia+tarsus/hind trochanter+femur 0.9–1.0. Hind coxa with 46–113 translucent pores, femur with 6–22, tibia with 7–17. Labium 100–145 μ long, 3-segmented. Circulus inconspicuous, 100–175 μ wide, divided by intersegmental line. Posterior ostioles small, anterior pair apparently absent. Cerarii numbering 4 or 5 pairs, restricted to abdomen. Anal ring with 6 setae, longest seta about 112–162 μ long. Anal-lobe cerarii, each with 2 conical setae each 18–23 μ long, 2 or 3 auxiliary setae, several large discoidal pores, few trilocular pores, and with or without basal sclerotization. Other cerarii increasingly smaller anteriorly, with 2 conical setae and few basal trilocular pores. Conical setae apparently representative of other cerarii present along body margin anteriorly but with widespread conical setae, without associated trilocular pores.

Dorsum with conical setae scattered over surface, longest seta on segment VII 18–20 μ long. Trilocular pores scattered in small numbers. Multilocular pores uncommon or absent from thorax, most numerous on posterior abdominal segments. Oral-rim tubular ducts usually abundant over surface, sometimes uncommon or absent from medial areas of thorax, rim indistinct. Oral-collar tubular ducts scattered over surface, interspersed with oral rims.

Venter with filamentous setae, except few conical setae near body margin on abdomen. Multilocular disc pores abundant on abdomen, rare or absent from thorax, absent from head. Trilocular pores uncommon. Discoidal pores most abundant laterally. Oral-rim tubular ducts restricted to marginal area. Oral-collar tubular ducts arranged segmentally, most abundant laterally.

Notes.—We have discovered two collections, other than the type series, from Haiti and Puerto Rico. The only differences between these collections and the type series that we have observed are slight sclerotization on the anal lobes, many more large discoidals on the dorsum of the abdomen, and fewer translucent pores on the hind femur and tibia.

Type material.—From the syntypes we have selected an adult female as lectotype (to maintain nomenclatural stability) that is mounted singly on a slide with the following data: right label

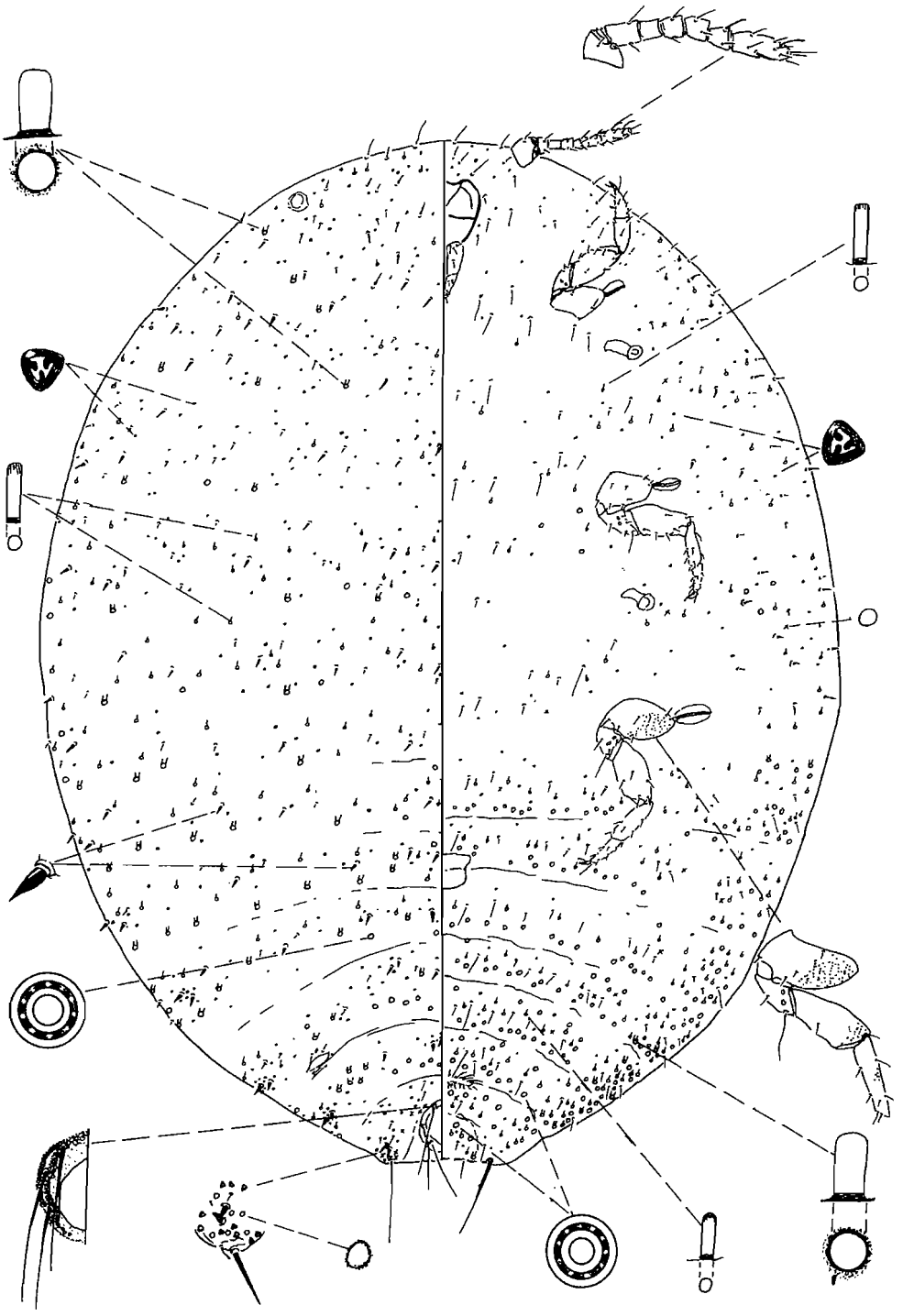

Fig. 1. Adult female *Nipaecoccus filamentosus* (Cockerell). Turks and Caicos Islands—South Caicos Island, Cockburn Harbor, June 1892, on plant resembling *Vaccinium*, H. Strachan collector.

"Dactylopius/ filamentosus/ Cockerell/ LECTOTYPE"; left label "Pseudococcus/ filamentosus (Ckll.)/ TYPE/ On plant resembling/ Vaccinium/ South Caicos, Bahamas/ Dr. Hy. Strachan/ June, 1892/ Tinsley Coll." The slide is deposited in the USNM along with 6 other slides containing 8 adult female paralectotypes and 9 first-instar paralectotypes. In addition, the BMNH holds 5 slides containing 9 adult female paralectotypes.

Other specimens examined.—Turks and Caicos Islands—South Caicos Island, Cockburn Harbor, June 1892, on plant resembling *Vaccinium*, H. Strachan collector (type series). Haiti—Coffee Station near Miragoane, June 1929, on coffee, R. C. Smith. Puerto Rico—April 25, 2002, on *Bucida buceras*.

Key to the species of *Nipaecoccus* in Central and South America Possessing Oral-Rim Tubular Ducts (Modified From Williams and Granara de Willink 1992)

1 Circulus present 2
– Circulus absent. . . . . *cercidii* Williams and Granara de Willink
2 Translucent pores present on hind coxa, femur, and tibia . . . . . *filamentosus* (Cockerell)
– Translucent pores absent from hind leg. . . . . *guazumae* Balachowsky

Acknowledgments

We thank Penny Gullan, University of California, Davis, California, U.S.A., for kindly sending the specimens from Mexico originally seen by Ferris. We are grateful to Chris Hodgson of The National Museum of Wales, Cardiff, UK; John Davidson, University of Maryland, College Park, USA; and Gary Miller and Alex Konstantinov, Systematic Entomology Laboratory, Beltsville, MD, USA for their suggestions and criticisms of this manuscript.

Literature Cited

Ali, S. M. 1970. A catalogue of Oriental Coccoidea Part IV. (Insecta: Homoptera: Coccoidea). Indian Museum Bulletin 5: 71–150.

Ben-Dov, Y. 1994. A Systematic Catalogue of the Mealybugs of the World (Insecta: Homoptera: Pseudococcidae and Putoidae) with Data on Geographical Distribution, Host Plants, Biology and Economic Importance. Intercept Limited, Andover, UK, 686 pp.

Ben-Dov, Y., D. R. Miller, and G. A. P. Gibson. 2006. ScaleNet: a database of the scale insects of the world. [Online]. Available from http://www.sel.barc.usda.gov/catalogs/pseudoco/Nipaecoccusfilamentosus.htm (accessed 25.10.2008).

Cockerell, T. D. A. 1893a. A list of West Indian Coccidae. Journal of the Institute of Jamaica 1: 252–256.

———. 1893b. The West Indian species of *Dactylopius* (cont.). Entomologist 26: 266–268.

Commonwealth Institute of Entomology. 1983. *Nipaecoccus viridis* (Newst.) (*N. vastator* (Mask.) (Hem., Coccoidea) (Yellow mealybug). Distribution Maps of Pests, Series A (Agricultural) No. 446, 2 pp.

Fernald, M. E. 1903. A Catalogue of the Coccidae of the world. Bulletin of the Hatch Agricultural Experimental Station 88, 360 pp.

Ferris, G. F. 1921. Report upon a collection of Coccidae from Lower California. Stanford University Publications, University Series, Biological Sciences 1: 61–132.

———. 1950. Atlas of the Scale Insects of North America, v. 5, The Pseudococcidae (Part I). Stanford University Press, Palo Alto, California, 277 pp.

———. 1954. Report upon scale insects collected in China (Homoptera: Coccoidea). Part V. Microentomology 19: 51–56. Figures 32–42.

Jones, A. 2006. Insects in the UK Overseas Territories: a short review of endemism with an introduction to the "Falklands Islands Invertebrates Conservation Project." Antenna 30: 14–29.

Maskell, W. M. 1895 (1894). Further coccid notes: with description of new species from New Zealand, Australia, Sandwich Islands,

and elsewhere, and remarks upon many species already reported. Transactions and Proceedings of the New Zealand Institute 27: 36–75.

Miller, D. R., G. L. Miller, and G. W. Watson. 2002. Invasive species of mealybugs (Hemiptera: Pseudococcidae) and their threat to U.S. Agriculture. Proceedings of the Entomological Society of Washington 104: 825–836.

Morrison, H. 1920. The nondiaspine Coccidae of the Philippine Islands, with descriptions of apparently new species. Philippine Journal of Science 17: 147–202.

Williams, D. J. 2004. Mealybugs of southern Asia. The Natural History Museum, London, UK and Southdene SDN. BHD. Kuala Lumpur, Malaysia, 896 pp.

Williams, D. J. and M. C. Granara de Willink. 1992. Mealybugs of Central and South America. CAB International, London, England, 635 pp.

Zimmerman, E. C. 1948. Insects of Hawaii, Homoptera: Coccoidea. 5: i–vii, 464 pp.