

THE COCCOIDEA (HOMOPTERA) NATURALIZED IN SOUTH AUSTRALIA: A SECOND ANNOTATED LIST

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SUMMARY

This paper lists nine species of scale insects, naturalized in South Australia, that have not previously been recorded as occurring in the State. All have been identified by the author since 1956. Of these, *Trionymus dimidiatus* (León), *Rhizoecus falcifer* Künckel d'Herculais, *Phenacoccus graminosus* McKenzie and *Quadraspidiotus lenticularis* (Lind.) are reported from Australia for the first time. In addition, three species new to Australian records have been identified from material submitted from the other States.

INTRODUCTION

Since an earlier record (Brookes, 1957) several species of scale insects (Coccoidea) that have become naturalized in South Australia, have been recognized. These include four that have not been reported previously from Australian records.

A complete synonymy for each species has not been attempted; it has been selected to give the following citations, if available: the original description; the first recorded occurrence in Australia; the synonyms used in the Australian literature and the currently accepted reference to the genus.

Specimens were examined after being treated by either of two methods: the first involved partial maceration in 10 per cent aqueous potassium hydroxide, staining with acid or basic fuchsin, and mounting in a synthetic neutral medium, such as "Sira"; the second, clearing in lacto-alcohol and mounting in Berlese's fluid.

Family PSEUDOCOCCIDAE

Maconellicoccus hirsutus (Green)

Phenacoccus hirsutus Green, 1908. Mem. Dep. Agric. India, 2 (2), p. 25. When recording type localities of this tropical species Green says "also occurs in Tasmania" (sic).

Pseudococcus hibisci Hall, 1921. Bull. Soc. ent. Égypt, 4, p. 1.

Maconellicoccus hirsutus (Green), 1958. Ezzat, Y. M., 1958. Bull. Soc. ent. Égypte, 42, pp. 377-383. In this paper the nomenclatorial status of the species has been clarified.

Hibiscus mealy bug.

Host-plants: On stems and leaves of *Gossypium* (cotton), and causing a bunching of new growth of leaves of *Citrus medica* var. *acida* (lime) at Kimberley Research Station, near Wyndham, Western Australia. This is the first record, apart from Green's reference to Tasmanian material, of this species for Australia.

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Phenacoccus graminosus McKenzie

Phenacoccus graminosus McKenzie, 1960. *Hilgardia*, **29** (15), p. 717.

Rye-grass mealy bug.

Host-plants: This species lives principally on members of the Gramineae, usually clustered along the sheathing leaf-bases and in the crown at ground level, but occasionally in colonies among the spikelets.

P. graminosus has been collected at the Waite Institute on *Medicago sativa* L. (lucerne), *Hordeum vulgare* L. (barley), and *Trifolium repens* L. (white clover) grown in pot-culture experiments in glasshouses, and on *Trifolium fragiferum* L. (strawberry clover) growing in the open in demonstration plots of various pasture plants, including grasses.

In the field, it has been recorded on barley at Brinkworth, Kybunga and Port Noarlunga; on *Triticum aestivum* L. (wheat) at Redbanks; on *Phalaris tuberosa* L. (phalaris) at Auburn. It is considered of no economic importance. Specimens collected from some of the localities shown above have been designated by McKenzie (1960) as metatypes. This is the first record of *Phenacoccus graminosus* for Australia.

Rhizoeccus falcifer Künckel d'Herculais

Rhizoeccus falcifer Künckel, 1878. *Ann. Soc. ent. France*, (5) **8**, p. 164.

Ripersia terrestris Newstead, 1895. *Ent. Mon. Mag.*, **31**, pp. 213-236.

Rhizoeccus terrestris (Newstead). Fernald, 1903. *Coccidae of the World*, p. 114.

Rhizoeccus terrestris. Anon, 1952. *Insect Pest Survey* (Dep. Agric., N.S.W.). Heavily infesting plots of parsnips in the metropolitan area of New South Wales.

No common name.

Host-plants: On the roots of *Salvia*, *Petunia*, *Schotia*, *Polygonum* and other cultivated plants in home gardens in Adelaide. If present in large numbers this mealy bug may kill the host-plant.

Ripersiella rumicis (Maskell)

Ripersia rumicis Maskell, 1891. *Trans. N.Z. Inst.*, **24**, pp. 1-64.

Ripersiella rumicis (Maskell). Cockerell, T. D. A., 1901. *Proc. Biol. Soc. Wash.*, **14**, p. 165; Morrison and Morrison, 1922. *Proc. U.S. Nat. Mus.*, **60** (12), p. 54.

Ripersiella Tinsley, 1899. Hambleton, E. J., 1946. *Rev. Ent.*, Rio de J., **17**, p. 59.

No common name.

Host-plants: Heavily infesting roots of grasses in a lawn, Adelaide. This occurrence represents the first record for Australia.

Trionymus diminutus (Leonardi)

Dactylopius calceolariae Maskell, 1879. *Trans. N.Z. Inst.*, **11**, pp. 187-228 (as a misidentification).

Pseudococcus diminutus Leonardi. Leonardi, G., 1918. *Bull. Lab. Zool. Sc. Agr. Portici*, **12**, p. 198.

Pseudococcus (*calceolariae* Maskell?). Jarvis, E., 1916. *Div. Ent. Sug. Exp. Sta. Qd.*, *Bull.* **3**, p. 32. A mealy bug "thought to be identical with *P. calceolariae* of Maskell" extremely prolific on sugar-cane in Queensland.

Trionymus diminutus (Leonardi). Morrison, H., 1925. J. agric. Res., **31** (5), pp. 485-500. After examining specimens labelled "*Dactylopius calceolariae*" from the Maskell collection Morrison re-assigned them to several other genera, including *Trionymus*; the specimens collected on *Phormium tenax* Forst. (New Zealand flax) he identified as *Trionymus diminutus* (Leonardi).

Trionymus Bergroth, 1899. Ferris, C. F., 1950. Atlas of the Scale Insects of North America, **5**, p. 251.

No common name.

Host-plant: On leaves of *Phormium tenax* Forst. (New Zealand flax) growing in a home garden in Adelaide. This is the first record of this species in Australia.

Family COCCIDAE

Coccus elongatus (Signoret)

Lecanium elongatum Signoret. Signoret, V., 1873. Soc. Ent. de France Ann. (5) **3**, p. 404.

Lecanium longulum. Douglas, J. W., 1887. Ent. Mon. Mag., **24**, p. 97.

Lecanium ficus Maskell, 1897. Ent. Mon. Mag., **33**, p. 243.

Coccus elongatus (Signoret). Sanders, J. G., 1909. J. econ. Ent., **2**, p. 438.

Lecanium longulum Douglas. Froggatt, W. W., 1921. Agric. Gaz. N.S.W., **26** (7), pp. 603-615.

On *Anona reticulata* (custard apple) at Darwin.

Long, soft scale.

Host-plant: On *Ceratonia siliqua* L. (carob tree) growing as a hedge in a home garden in Adelaide. This is the only occurrence observed by the author.

Pulvinaria hydrangeae Steinweden

Coccus floccifera Westwood, 1870. Gard. Chron., p. 308 (misidentification).

Pulvinaria floccifera (Westwood). Essig, E. O., 1916. Calif. State Comm. Hort. Monthly Bull., **5**, pp. 112-197.

Pulvinaria floccifera (Westwood). Froggatt, W. W., 1915. Agric. Gaz. N.S.W., **26**, pp. 411-423.

Pulvinaria hydrangeae Steinweden. Steinweden, J. B., 1946. Microentomology, **11** (1), pp. 1-28. A critical study of North American species of *Pulvinaria* including *P. hydrangeae* n.sp.

Hydrangea "mealy bug".

Host-plant: A common pest on stems and leaves of *Hydrangea hortensis* in suburban gardens in Sydney.

Froggatt (1915) recorded *Pulvinaria floccifera* (Westwood) as being a very common insect on many garden shrubs, such as *Camellia*, *Euonymus*, etc., in Sydney.

Steinweden (1946) in describing the species *P. hydrangeae* stated that this insect has frequently been misidentified in the past as *P. floccifera* (Westwood), from which it is clearly distinct. Since none of the specimens identified by Froggatt is now available for re-examination, it is possible that they too were misidentified. Specimens submitted for identification by the Department of Agriculture of New South Wales were identified in 1960 by the author as *P. hydrangeae*.

Family DIASPIDIDAE

Hemiberlesia rapax (Comstock)

- Aspidiotus camelliae* Signoret (non Boisd.). Signoret, V., 1869. Soc. Ent. de France, Ann. (4), 9, p. 117.
- Aspidiotus rapax* Comstock. Comstock, J. H., 1881. Report of the Entomologist for 1880. In: U.S. Dep. Agr., Comm. Agr. Rept., pp. 235-373.
- Aspidiotus camelliae* Boisd. Maskell, W. M., 1894. Trans. N.Z. Inst., 27, pp. 35-75. On *Melaleuca nodosa* in Sydney.
- Aspidiotus rapax* Comstock. Fuller, C., 1899. Trans. ent. Soc. Lond., 1899, pt. 4, pp. 435-473. "This is a very common species, and occurs upon a large variety of indigenous plants."
- Hemiberlesia* Cockerell. Ferris, G. F., 1938. Atlas of the Scale Insects of North America, 511-232.

The greedy scale.

Host-plants: This cosmopolitan species was found for the first time in South Australia at Mypolonga on twigs of *Malus sylvestris* Mill. (apple) and *P. communis* L. (pear). It is of no economic importance.

Pinnaspis aspidistrae (Signoret)

- Chionaspis aspidistrae* Signoret. Signoret, V., 1869. Soc. Ent. de France, Ann. (4), 9, p. 443.
- Chionaspis brasiliensis* Signoret. Maskell, W. M., 1893. Trans. N.Z. Inst. 25, pp. 201-252. On *Orchid* sp., Tweed River, N.S.W. Maskell, W. M., 1896. Ent. Month. Mag., 32, pp. 223-226. Maskell considered that *C. brasiliensis* was a variety of *C. aspidistrae*.
- Hemichionaspis aspidistrae* (Signoret). Cooley, R. A., 1897. Mass. Agr. Exp. Stn. Spec. Bull. [not seen].
- Pinnaspis aspidistrae* (Signoret). Kuwana, I., 1926. The Diaspine Coccidae of Japan, IV. Dept. Finance, Imp. Plant. Quar. Serv. Tech. Bull., 4, p. 36.
- Pinnaspis* Cockerell. Ferris, G. F., 1937. Atlas of the Scale Insects of North America, 51-96.

Fern scale.

Host-plants: On stem and leaves of *Adiantum* in Adelaide. This represents the first record of this species for South Australia.

Pinnaspis stracheni (Cooley)

- Hemichionaspis minor stracheni* Cooley. Cooley, R. A., Mass. Ag. Exp. Sta., Spec. Bull., p. 54 [not seen].
- Hemichionaspis minor* Maskell. Hill, G. F., 1915. Bull. Northern Territory of Australia No. 13 of the Dep. External Affairs. On *Agave sisalana* Perrine (sisal hemp).
- Pinnaspis* Cockerell. Ferris, G. F., and Rao, V. P., 1947. The Genus *Pinnaspis* Cockerell (Homoptera : Coccoidea : Diaspididae). Microentomology, 12 (2), pp. 25-58.

Hibiscus snow-scale.

On the stems of *Passiflora edulis* Sims (passion fruit) at Kimberley Research Station, Western Australia.

Quadraspidotus lenticularis (Lindinger)

- Aspidiotus lenticularis* Lindinger. Lindinger, L., 1912. Die Schildläuse (Coccidae) Europas, Nordafrikas und Vorderasiens, einschliesslich der Azoren, der Kanaren und Madeiras. Stuttgart, Uhnen., pp. 149 and 230.

- Targionidea lenticularis* (Lindinger). MacGillivray, A. D., 1920. *The Coccidae*, p. 449. Scarab Co., Urbana, Illinois.
- Aspidiotus lenticularis* var. *maroccanus* Green. Green, E. E., 1928. *Ann. Mag. Nat. Hist.*, (10) 1, pp. 374-376. On a racial form of *Aspidiotus lenticularis* Lindgr. with some remarks upon the Leonardi classification of the Aspidioti.
- Quadraspidotus lenticularis* (Lindinger). Balachowsky, A., 1950. *Les Cochenilles de France, d'Europe, du Nord de l'Afrique et du Bassin méditerranéen*, 5. Aspidiotini. *Actualités Sci. et Indus. Ent. Appl.*, 1087, p. 433.

No common name.

Quadraspidotus lenticularis was identified for the first time in Australia in November, 1958. It occurred as a light infestation on young wood and also on older, lichen-encrusted wood on *Pyrus communis* L. (pear) and *Prunus domestica* L. (plum) at Mypolonga, South Australia. At about the same time this species was found ovipositing on young wood of plum at Paracombe in the Adelaide Hills, and on apple and *Crataegus* (hawthorn) at Coonawarra in the south-east of the State. *Q. lenticularis* was found on the older wood of *Olea europaea* L. (olive) at the Waite Institute. This species is of no economic importance.

Quadraspidotus perniciosus (Comstock)

- Aspidiotus perniciosus* Comstock. Comstock, J. H., 1880. *Rep. U.S. Dep. Agric.*, 1880, p. 304 (1801).
- Aspidiotus perniciosus* Comstock. Olliff, A. S., 1892. *Agric. Gaz. N.S.W.*, 1892, p. 698. On pear trees at Maitland, N.S.W.
- ?*Aonidia fusca* Maskell. Maskell, W. M., 1894. *Trans. and Proc. N.Z. Inst.*, 27, pp. 35-75. On *Persica vulgaris* (peach) at Bulga, N.S.W.
- Quadraspidotus* McGillivray. Balachowsky, A., 1950. *Les Cochenilles de France, d'Europe, du Nord de l'Afrique et du Bassin méditerranéen*, 5. Aspidiotini. *Actualités Sci. et Indus. Ent. Appl.*, 1087, pp. 397-488.
- Quadraspidotus perniciosus* (Comstock). Kilpatrick, D. T., 1959. *Jour. Agric. S. Aust.*, 63 (5), pp. 208-210.

San José scale.

Host-plants: *Pyrus communis* L. (pear), *Malus sylvestris* Mill. (apple), *Prunus persica* (L.) Batsch., and *P. amygdalus* Batsch. (almond).

Quadraspidotus perniciosus was recognized for the first time in South Australia in October, 1958, when it was found on a few peach trees growing in an irrigated citrus orchard at Mypolonga. This occurrence involved a light infestation of young laterals and a heavy infestation of older branches. Subsequently, almond, apple and pear trees in thirteen additional orchards were found to be infested. Following an intensive eradication campaign, two small infestations recurred in 1961 and 1962.

Small, isolated outbreaks of San José scale were discovered in 1960 at Mount Gambier in mature apple trees in three home gardens, and at Aldgate in the Adelaide Hills, where a few old apple trees in a commercial nursery were very lightly infested.

In February, 1961, an extensive outbreak was found on mature pear trees in the irrigated orchards of Renmark, about thirty properties being involved. Since then it has been identified on apple, plum, peach and walnut.

Smaller outbreaks of San José scale were found on pear at Waikerie in 1961 and on peach at Lyrup the following year. At Waikerie the infestation which was traced from imported nursery stock has spread to many trees in a newly planted area.

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