Scale insects on *Freycinetia*: Variability in the appearance of some Diaspididae

Nicholas Martin\(^1\) and Milen Marinov\(^2\)

\(^1\)Research Associate, Landcare Research, c/o 15 Rutland Road, Mt. Wellington, Auckland 1051. Email: martinn@landcareresearch.co.nz
\(^2\)Plant Health & Environment Laboratory, Investigation and Diagnostic Centres and Response, Ministry for Primary Industries, 231 Morrin Rd, Auckland 1072. Email: milen.marinov@mpi.govt.nz

Abstract

The discovery of an unusual looking scale insect (Hemiptera: Coccomorpha: Diaspididae) on leaves of *Freycinetia banksii* A.Cunn. (Pandanaceae) revealed that the appearance of live insects of two species on that host plant was very variable. Two polyphagous species: *Anzaspis cordylinidis* (Maskell, 1879) and *Symeria pyriformis* (Maskell, 1879) were identified from microscope slide preparations. Important diagnostic characters of *A. cordylinidis* are illustrated. The scale covers of *A. cordylinidis* may be narrow and white, or wide and transparent. *S. pyriformis* has brown scale covers that vary in width and intensity of brown colouration. An undescribed species of *Leucaspis* was also present.

Introduction

on *F. banksii*, but the plant was not listed under material examined (Appendix A) and was not included in the host list for the species on page 75. Therefore, we consider *A. gahniae* on *F. banksii* as an erroneous record.

Recently a large number of scale insects, that did not look like any of the three species of Diaspididae known from the host plant, were collected from Orewa, Auckland. Further collections of Diaspididae were made from the same group of plants and other plants within the reserve. This paper reports our findings on the variable appearance of two species of Diaspididae and the situation concerning the species of *Leucaspis* on *F. banksii*.

**Methods**

On 17 July 2015 an almost-dead leaf of *Freycinetia banksii* was collected from Alice Eaves Scenic Reserve, Orewa. The leaf was from a heavily shaded horizontal stem of a plant that had several stems. The unusual looking diaspidid scales were photographed and the leaf submitted to the Ministry for Primary Industries (MPI) for identification in case the insect was an invasive species. Most of the scales were mature females and nymphs.

A second sample, collected on 1 August 2015, included heavily shaded leaves and dark green leaves in brighter light. The three species of Diaspididae on these leaves were also photographed before being given to MPI. Further surveys of the reserve were undertaken to try and locate further populations of Diaspididae on *F. banksii*.

The scale insects were slide mounted in the Plant Health and Environment Laboratory (PHEL), MPI and identified using the diagnostic keys provided in Henderson (2011) and Lagowska & Hodgson (2012).
Results

Two species of scale insects from the leaves of *F. banksii* were identified by PHEL: *Anzaspis cordylinidis* and *Symeria pyriformis*. Figure 1 illustrates important diagnostic characters of *A. cordylinidis* not included in Henderson (2011). Those were introduced in the Lagowska & Hodgson (2012) key to adult female Diaspididae closely related to “*Chionaspis*” recorded from the tropical South Pacific and New Zealand.

On the shaded leaves, *A. cordylinidis* was the most abundant species. The yellow female body and eggs could be seen through the wide, transparent scale cover (Fig. 2) that was unlike the typical narrower white scale of this species (Figs. 3 & 4). Specimens in the first collection had dark brown terminal exuviae, whereas the terminal exuviae of those in the second collection were mid-brown. *Symeria pyriformis* was also present on shaded leaves and had its usual brown colouration (Fig. 5).

*Symeria pyriformis* and a third diaspidid species (Fig. 6) were found on leaves in strong light. The third species (photographed, but not submitted to MPI) is probably a member of the unrevised genus *Leucaspis*, but it is not *L. ohakunensis*. Examination of the microscope slide collection in New Zealand Arthropod Collection (Landcare Research, Auckland) found two slides of scale insects from the base of *F. banksii* leaves collected from Gisborne in 1993. The slides were annotated to say that they were not *L. ohakunensis*. In the slide collection were specimens of *Leucaspis* sp. collected by RC Henderson in 2003 on *F. banksii* in the Waitakere Ranges.
Fig 1. Diagnostic features on *Anzaspis cordylinidis*: a) general view of the whole specimen with inlets showing more than four disk-pores around the anterior spiracle and two-barred ducts on mesothorax; b) (overleaf) enlarged pygidium showing one pair of marginal ducts close to median lobes.
Fig. 2. *Anzaspis cordylinidis* on leaves of *Freycinetia banksii* from Alice Eaves Scenic Reserve, Orewa, North Island, New Zealand; right, female scale with yellow body visible through transparent cover; centre, male scale; left, female scale with yellow body and eggs visible through transparent cover.
Fig. 3. *Anzaspis cordylinidis* on a leaf of *Cordyline australis*, from Riccaton, Christchurch, South Island, New Zealand, 2 November 2005. Note the pale brown terminal exuvia and the narrow white scale cover.

Fig. 4. *Anzaspis cordylinidis* on a leaf of *Phormium tenax*, from Piha, West Auckland, North Island, New Zealand, 24 August 2013. Note the dark brown terminal exuviae and the parallel sides of the larger female scale.
Fig. 5. *Symeria pyriformis*, on leaves of *Freycinetia banksii*; left, linear shape of the scale cover of scale on edge of leaf; right, female scale with body visible through transparent cover.

Fig. 6. *Leucaspis* sp. on leaves of *Freycinetia banksii*; mature female scales showing dark brown scale cover exposed (right) or under the initial white wax covering (centre); right, probably a male scale cover. Note the white first instar exuviae in each photograph.
Later surveys based on inspection of leaves and microscope examination of live scales, found that *S. pyriformis* was the commonest scale insect on *F. banksii* in the Orewa reserve. Several other populations of *A. cordylinidis* were found in the same reserve. Again the insect was commonest on old leaves, usually at the base and often where there was debris. Females of *Leucaspis* sp. were found on two more plants; they were most abundant on the base of leaves of a large clump of plants.

**Discussion**

Henderson (2011) described the variability in appearance and colour of *A. cordylinidis* and *S. pyriformis*, which she found was related to host plant and exposure to light, respectively. *Anzaspis cordylinidis* was recorded by Henderson (2011) from *Cordyline* species (Asparagaceae), *Phormium* species (Hemerocallidaceae), *Rhopalostylis sapida* H.Wendl. & Drude (Palmae), *Uncinia* sp. (Cyperaceae) and *Freycinetia banksii* (Pandanaceae). This scale species has since been found on *Austroderia splendens* (Connor) N.P.Barker & H.P.Linder (Gramineae) (NA Martin & J Richmond, unpublished data) and *Libertia ixioides* (G.Forst.) Spreng. (Iridaceae) (NA Martin & M Marinov, unpublished data). Henderson (2011) described the live female scale as being elongate, more so on *Cordyline* than *Freycinetia, Phormium* or *Uncinia*, and having a white scale cover with the terminal exuviae pale on *Cordyline* and dark brown on *Freycinetia, Phormium* and *Uncinia*. She described the female’s body and eggs as being yellow. Henderson (2011) did not find specimens with very wide, transparent scale covers such as were found on shaded leaves of *F. banksii* in the Orewa reserve. In our collections the terminal exuviae was dark brown on one leaf and mid-brown on a second. Photographs of the scales on the same leaf of *Cordyline banksii* Hook.f collected from Waitakere Ranges, show the terminal exuviae colour varying from dark to pale brown.
Henderson (2011) noted that the brown colour of *S. pyriformis* varies in intensity depending upon location on the plant, going from light brown when on the underside of leaves to orange-brown or medium brown when on the upper side of leaves, to very dark brown when on stems or leaf midribs of some tree species. The scale cover is normally pear-shaped but may be narrower when the insect is on stems and narrow leaves. We found dark brown scale covers on leaves in bright light and transparent scale covers on insects on heavily shaded leaves (Fig. 4). Body colour can also vary from pale to pinkish (Henderson 2011), but the most remarkable variation associated with host plant is the production of fluffy white wax by the first instar nymphs on rimu, *Dacrydium cupressinum* Lambert (Podocarpaceae).

**Conclusions**

Some species of Diaspididae are variable in shape and colour. Identification guides based on the appearance of live scale insects need to be host-plant specific, or at least include reference to differences in appearance on different hosts. Collection notes indicating the scale position on hosts (i.e. on shaded versus exposed leaves, or bark versus leaves) would also be useful for formal descriptions of species where there is variation in the appearance of the live scale, but no difference in taxonomically important structures.

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References

