

Status of New Zealand indigenous aphids, 2002

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D.A.J. Teulon, M.A.W. Stufkens, C.D. von Dohlen, and J. Kean

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D.A.J. Teulon¹, M.A.W. Stufkens¹, C.D. von Dohlen² and J. Kean³

¹ New Zealand Institute for Crop & Food Research Ltd, Private Bag 4704, Christchurch, New Zealand

² Department of Biology, Utah State University, Logan, UT 84322, USA

³ Biocontrol & Biosecurity Group, AgResearch Ltd, PO Box 60, Lincoln, New Zealand

ABSTRACT

This report updates current knowledge of the New Zealand indigenous aphid fauna. Of the approximately 120 aphid species in New Zealand only about 13 are indigenous. These include: *Aphis coprosmae*, *A. cottieri*, *A. bealyi*, *A. nelsonensis*, *Aphis* sp. (on *Olearia*), *Paradoxaphis aristoteliae*, *P. plagianthi*, *Casimira* sp. (on *Ozothamnus*), *Euschizaphis* sp. (on *Dracophyllum*), *Euschizaphis* sp. (on *Aciphylla*), *Neophyllaphis totarae*, *Neophyllaphis* sp. (on *Podocarpus nivalis*) and *Sensoriaphis nothofagi*. There is also evidence for the existence of several other species.

New Zealand indigenous aphids constitute a distinctive component of the world aphid fauna and New Zealand fauna, with species belonging to Neophyllaphidinae, Taiwanaphidinae and Aphidinae (Aphidini). Some species have Gondwanan distributions and exhibit primitive features. At least one genus is endemic and another now comprises half the known world species. Recent molecular work places a group of native species as central to the global evolution of the species-rich Aphidinae. There has been very little published work on the biology or ecology of New Zealand indigenous aphids except for recent work on *Paradoxaphis plagianthi*. Native aphids appear to be predominantly host-specific, at least to host plant genera. Sexual forms have been found for some species but not others. For some species, the presence of sexual morphs during spring and summer suggests that the structure of their life cycle allows the egg stage to overcome summer conditions. One characteristic of some *Aphis/Paradoxaphis* species is their very patchy distributions.

Threats to their continued survival arise from habitat destruction, displacement by introduced aphids, and attack from introduced parasitoids and predators. The relative importance of these threats has yet to be determined.

Keywords: indigenous aphids, *Aphis* spp., *Paradoxaphis plagianthi*, *Casimira* sp., *Euschizaphis* spp., *Neophyllaphis* spp., *Sensoriaphis* sp., distribution, biology, taxonomy, rarity, threats

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1. Introduction

Of the approximately 120 aphid species in New Zealand, less than 10% are thought to be indigenous or native. Apart from the need to document these indigenous species, increased scientific interest in this insect group in recent years has focused on:

- investigating the impacts of introduced biological control agents on the indigenous fauna,
- exploring factors leading to the rarity of these and other organisms,
- elucidating the evolution and biogeography of aphids in a global context.

Consequently, more intensive field surveys have been done and the existence of at least seven new native species has been confirmed or discovered since 1997 (Teulon et al. 2002). There is also evidence for the existence of several other species and it is likely that there are still some undiscovered species.

This report summarises current knowledge of the New Zealand indigenous aphid fauna and is an update of a previous report (Teulon & Stufkens 1998). It lists the described, undescribed and suspected indigenous species found in New Zealand, and details their taxonomic status and uniqueness. It also summarises the small amount of available information on their biology and ecology, and describes the status of populations presently found in New Zealand along with the effort spent finding them. Finally, it lists potential threats to their continued survival. Appendix I provides detailed information on each species.

2. Size of fauna

Only eight indigenous species of aphid have been fully described and named (Table 1), and a further four species are being described (Table 2).

TABLE 1. NEW ZEALAND INDIGENOUS APHIDS: DESCRIBED SPECIES AND THEIR HOST PLANTS.

APHID SPECIES	HOST PLANT	REFERENCE
<i>Appis coprosmae</i> Laing ex Tillyard	<i>Coprosma</i> spp.	Tillyard 1926
<i>Appis cottieri</i> Carver	<i>Muehlenbeckia</i> spp.	Carver 2000
<i>Appis bealyi</i> Cottier	<i>Carmichaelia</i> spp.	Cottier 1953
<i>Appis nelsonensis</i> Cottier	<i>Epilobium</i> sp.	Cottier 1953
<i>Paradoxaphis aristoteliae</i> Sunde	<i>Aristotelia</i> sp.	Sunde 1987
<i>Paradoxaphis plagiantbi</i> Eastop	<i>Plagianthus</i> sp.	Eastop 2001
<i>Neophyllaphis totarae</i> Cottier	<i>Podocarpus</i> spp.	Cottier 1953
<i>Sensoriaphis notbofagi</i> Cottier	<i>Notbofagus</i> spp.	Cottier 1953

TABLE 2. NEW ZEALAND INDIGENOUS APHIDS:
UNDESCRIBED SPECIES AND THEIR HOST PLANTS.

UNDESCRIBED SPECIES	HOST PLANT
<i>Aphis</i> sp.	<i>Olearia</i> spp.
<i>Casimira</i> sp.	<i>Ozothamnus</i> sp.
<i>Euschizaphis</i> sp.	<i>Aciphylla</i> spp.
<i>Euschizaphis</i> sp.	<i>Dracophyllum</i> spp.
<i>Neophyllaphis</i> sp.	<i>Podocarpus nivalis</i>

One described species that was first found in New Zealand, *Thripsaphis foxttonensis* Cottier (1953), is now thought to be an introduced species because it has no close relatives in New Zealand (V.F. Eastop pers. comm.).

The endemism of the New Zealand *Casimira* sp. is also questionable. While the host plant of *Casimira* sp. (*Ozothamnus leptophylla*) is a true New Zealand endemic, it has no close relatives in New Zealand, only in Australia. In the field, *Casimira* sp. is always found in the presence of *Brachycaudus helichrysi*, and in the laboratory, it struggles on its host plant without *B. helichrysi* (M.A.W.S. unpubl. data). *Casimira* sp. might be a relatively recent introduction of an Australian species (not detected there) that has managed to survive on a New Zealand relative of its native host (V.F. Eastop, pers. comm.).

One specimen of an *Aphis* species collected from *Hebe* (probably *H. elliptica*) resembles the *Aphis* species on *Coprosma* and *Olearia*, but more specimens from *Hebe* are required to confirm that this is a new native species. A number of unidentified aphid specimens that are also possibly native to New Zealand have been found on indigenous plants.

The confounding effects of few and limited aphid surveys, and rarity and taxonomic uncertainty about indigenous aphids, lead specialists to believe that more species remain to be discovered in New Zealand (D.F. Hales. pers. comm.; V.F. Eastop, pers. comm.).

3. Survey and detection

The first indigenous aphids recorded, *Aphis coprosmae* and *Neophyllaphis totarae*, were collected in the 1920s. *Neophyllaphis totarae* was initially thought to be *Neophyllaphis podocarpi* from Japan (Cottier 1953). There was speculation that New Zealand had no indigenous aphids and that the one apparently indigenous species (*A. coprosmae*) would eventually be found to be introduced (Cottier 1953). This view may have discouraged any serious collection of indigenous aphids in New Zealand until 1953, when Cottier published his seminal book, *Aphids of New Zealand* (Cottier 1953), which contained six indigenous species, including the descriptions of four new species.

There was some spasmodic collecting of indigenous aphid species between 1920 and 1970 (see Teulon & Stufkens 1998). A.J. Healy found two new species (*Aphis bealyi* and *A. nelsonensis*) and W. Cottier was actively collecting *N. totarae*. A further new species (*Sensoriaphis nothofagi*) was found by J.M. Dingley in 1947. Based on information found in his unpublished correspondence, A.D. Lowe carried out some surveys for indigenous aphids in the 1960s. During the 1970s and 1980s a considerable amount of aphid collecting was carried out by a number of entomologists (see Teulon & Stufkens 1998), including collections by foreign scientists, among them the world renowned aphidologist V.F. Eastop, who visited New Zealand on several occasions. These scientists contributed significantly to the discovery of several new species.

Only two species, *N. totarae* and *S. nothofagi*, have been regularly collected since they were first discovered. Lack of collection records for other species provides some indication of their rarity. This is reinforced by anecdotal evidence on some species. Two researchers intimately associated with the discovery of *A. bealyi*, *A. nelsonensis* (A.J. Healy) and *Paradoxaphis aristoteliae* (R. Sunde) have both commented to David Teulon that they carried out a reasonable amount of surveying for their respective species but with very little success.

Since 1993, Crop & Food Research's Entomology Group has carried out regular surveys for indigenous aphids to include in quarantine tests for introduced aphid parasitoids (e.g. Stufkens & Farrell 1994). These surveys reinforced previous perceptions that only two species, *N. totarae* and *S. nothofagi*, were relatively common. However, results of more recent surveys (1997 to present) indicate that two further species, the *Euschizaphis* sp. on *Dracophyllum* and perhaps *A. bealyi*, can be added to this group. The known geographical distribution of *A. cottieri* has also significantly increased.

There appear to be few reports of native aphids found in surveys for flying aphids in crop areas (Lowe 1968; D.A.J. Teulon & M.A.W Stufkens, unpubl. data).

4. Abundance and rarity

Kean & Barlow (unpubl. report) developed a system for characterising the abundance and rarity of species based on their presently known geographical distribution and local abundance within that range. The system consists of a matrix of four categories with species defined as common, sparse, localised and scarce. We have used this system to categorise indigenous aphids based on our current knowledge.

Scarce: Restricted range and low local abundance.

- The majority of New Zealand native aphids fits into this category, but for some species this may reflect a lack of data.

- Of the recognised species, the rarest aphid is *A. nelsonensis*, which has not been recorded since 1965, followed by *A. coprosmae*, of which only two-three populations have been recorded, and none since 1998.
- The *Casimira* species on *Ozotamnus* has only been found at one location, in the Catlins, Southland.
- *Paradoxaphis aristoteliae* has been found at both ends of the South Island but, despite some effort, no further populations have been located.
- Current data on the *Aphis* sp. on *Olearia*, the *Euschizaphis* sp. on *Aciphylla*, and the *Neophyllaphis* sp. on *P. nivalis* are limited due to their recent discovery. It is therefore difficult to draw any definite conclusions on their relative abundance.

Localised: Narrow distribution but high local abundance.

- *Paradoxaphis plagianthi* may be moderately abundant, but only in the Christchurch area.
- *Aphis cottieri* on *Muehlenbeckia* has been recorded from relatively few locations but in appreciable numbers. The geographical separation of records for this aphid (Fiordland to Canterbury) suggests that more populations are likely to be found.

Sparse: Widespread but with low local abundance.

- *S. nothofagi* and the *Euschizaphis* sp. on *Dracophyllum* are relatively widespread but populations seldom reach high levels.

Common: Broad distribution and high abundance.

- *N. totarae* is widespread with sometimes high local abundance.
- *A. bealyi* on *Carmichaelia* now seems to be more common than was previously thought, with populations being recorded recently in Otago, Southland, Westland, and the central North Island.

Only *A. bealyi*, *Euschizaphis (Dracophyllum)*, *N. totarae*, and *S. nothofagi* have been found in the North Island. The greater representation of native species in the South Island may reflect the relative amount of sampling effort in each island.

5. Taxonomic distinctiveness

The Aphidoidea (aphids, phylloxerids, adellgids) form predominantly a northern temperate group. The total number of New Zealand aphids is small relative to the number found in Northern Hemisphere areas of comparative size. However, it is now apparent that New Zealand indigenous aphids constitute a distinctive component of both the world aphid fauna and the New Zealand fauna.

Three aphid sub-families are represented in New Zealand: Neophyllaphidinae (two spp.), Taiwanaphidinae (one sp.) and Aphidinae (ten spp.). New Zealand Aphidinae putatively belong to the tribe Aphidini. None of the indigenous aphids identified to date (2003) belongs to the other two Aphidinae tribes, Macrosiphini or Pterocommatini.

The following are some significant characteristics of the New Zealand aphid fauna:

- *Neophyllaphis* and *Sensoriaphis* are both primitive genera with Gondwanan distributions (Carver et al. 1991). The morphology of the genus *Neophyllaphis* closely matches one of the few, oldest (Upper Cretaceous) aphidid fossils. The life cycle of extant *Neophyllaphis* is believed to resemble that of the common aphid ancestor (Heie 1981).
- *Paradoxaphis* appears to be endemic to New Zealand (Sunde 1987; Remaudière & Remaudière 1997).
- *Casimira* might be a southern endemic genus. The type species, *C. canberrae*, is native to Australia, and the only other nominal species was described from India. However, the validity of the generic designation of this second species, *C. bhutanensis*, has been questioned (V.F. Eastop, pers. comm.).
- The recent characterisation of the two New Zealand *Euschizaphis* species now means that half the known species of this genera are found in New Zealand.
- Accepted dogma is that the southern Aphidinae (i.e. *Aphis*, *Paradoxaphis*, *Euschizaphis*, *Casimira*) are descendants of recent chance trans-tropical immigrants from the Northern Hemisphere (Eastop 2001; von Dohlen & Teulon 2002). However, recent molecular work has found that a group of four New Zealand endemic aphids belonging to the genera *Aphis* and *Paradoxaphis* form a highly supported lineage (possibly basal in the tribe Aphidini) estimated to be c. 15–30 million years old (Fig. 1). These results place this New Zealand group as central to the evolution of the species-rich Aphidinae, which contains many agricultural pests (von Dohlen & Teulon 2002).

6. Biology and ecology

There has been very little published work on the biology or ecology of New Zealand indigenous aphids (Cottier 1953; Sunde 1987; Blackman & Eastop 1994) except for recent work on *Paradoxaphis plagianthi* (Kean 2002). The life histories of all other native aphids require in-depth study.

6.1 *Paradoxaphis plagianthi*

This species was studied between 1999 and 2002 in a project examining the population dynamics of rarity. The following is a summary of some of the work carried out in this project (Kean 2002; Kean, unpubl. data). The main host of *Paradoxaphis plagianthi* is the ribbonwood (*Plagianthus regius*), but the aphid was sometimes found on young jasmine vines (*Parsonsia heterophylla*) beneath ribbonwood trees in late spring. Under laboratory conditions, *Paradoxaphis plagianthi* can also complete its development on *Hoberia*

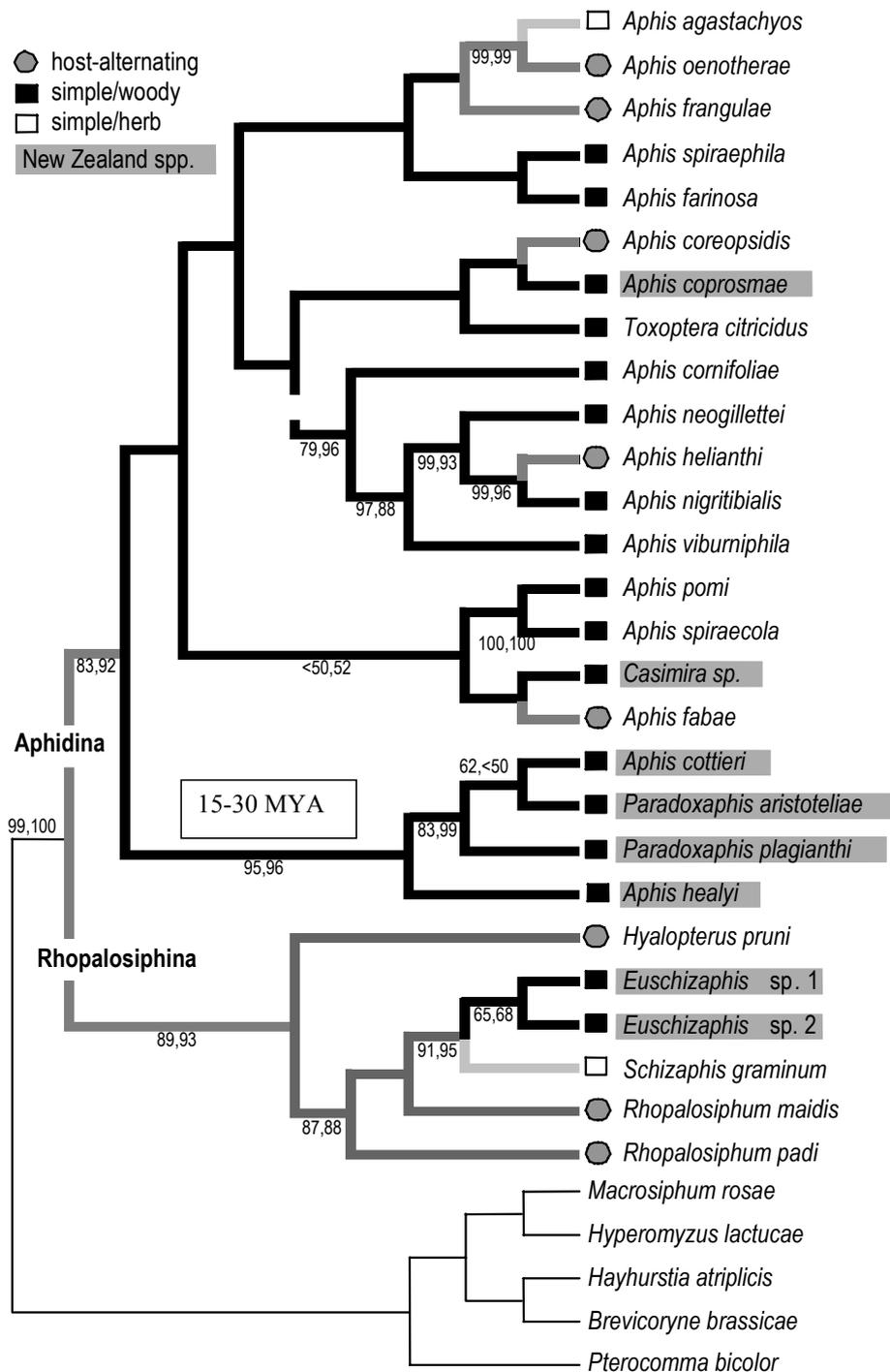


Figure 1. Results of combined maximum parsimony analysis of EF1a and tRNA leucine/COII sequences for the tribe Aphidini (von Dohlen, unpubl. data).

angustifolia, a close relative of its main host. The significance of these hosts for the persistence of this aphid is not understood. No oviparae, males or eggs have been observed for this aphid. Wingless female adults were present year round while winged female aphids were most common in late spring (Fig. 2). The species was most common in spring, with low population size over summer associated with a decline in leaf quality, dispersal of winged forms and increasing abundance of natural enemies. This aphid overwintered on plump

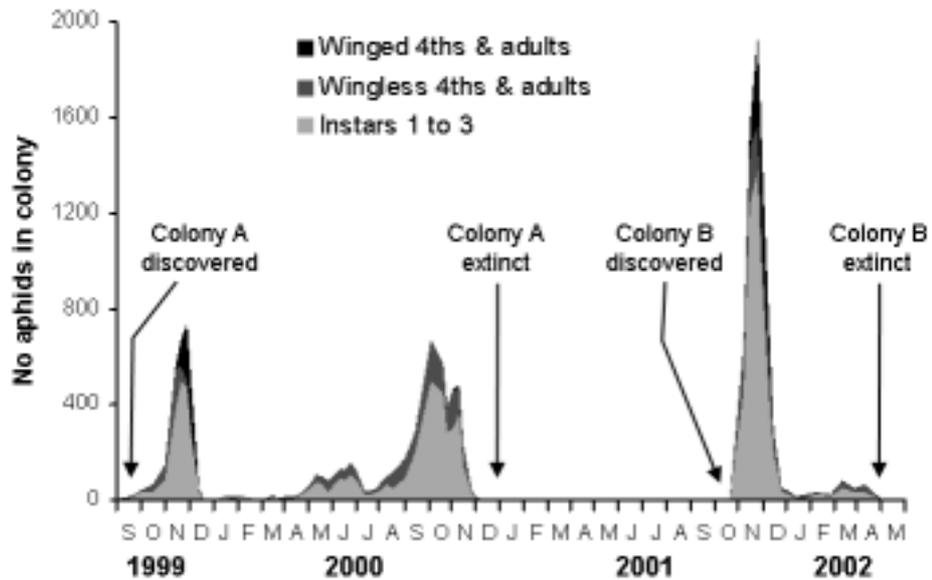


Figure 2. Dynamics of two large *Paradoxopbis plagiantbi* colonies studied at Riccarton Bush.

leaf and flower buds. Natural enemies included predators such as spiders, ladybirds, lacewings, hoverflies and possibly mites. It was sometimes attacked by a parasitoid wasp and *Entomophthora* fungus. While local colonies sometimes reached high population sizes, local extinctions were frequent, especially in summer. It is likely that the persistence of this species relies on a delicate balance between colonisation and local extinction rates.

6.2 HOST PLANTS

Based on present data, all New Zealand indigenous aphid species appear to be host-specific to plant genera. Some aphid species have been found on a number of plant species from the same genera (see Appendix D). *P. plagiantbi* has also been found on *Parsonsia heterophylla* but only in close proximity to its main host, *Plagianthus regius* (see above).

6.3 REPRODUCTION

Parthenogenetic viviparous females have been recorded for most species. For some sparsely collected species, winged morphs have not been recorded (see Appendix 1), but these would be expected to be found in a sizeable population.

The presence of sexual morphs (oviparae, male) and eggs indicates that sexual reproduction is likely to take place. Wingless oviparous females have been recorded for *S. nothofagi* (Cottier 1953), *N. totarae*, *A. cottieri*, the *Aphis* sp. on *Olearia* (in the laboratory), *P. aristoteliae* (in the laboratory) and the *Euschizaphis* sp. on *Dracophyllum*. The oviparae of *N. totarae* are winged (Cottier 1953), whereas the oviparae for the *Neophyllaphis* on *P. nivalis* are wingless (M. Carver, pers. comm.). Winged males have been recorded for *S. nothofagi* and *N. totarae* (Cottier 1953).

Eggs have been recorded for only *A. coprosmae* (Tillyard 1926), *A. cottieri* (in the laboratory), the *Aphis* sp. on *Olearia* (in the laboratory), *P. aristoteliae* (in the laboratory), the *Euschizaphis* sp. on *Dracophyllum* (in the laboratory), and the *Neophyllaphis* sp. on *P. nivalis* (D.F. Hales, pers. comm.). Sexual morphs have all been found on the same host plant as the viviparous morphs, indicating a lack of host alternation (heteroecy).

6.4 SEASONALITY

As only *P. plagianthus* has been studied in any detail, there is very little information concerning the seasonality of most species. Most records are of winged and wingless parthenogenetic forms in spring, summer, and autumn months. The presence of oviparae and eggs in autumn and winter (e.g. *A. coprosmae*, *A. cottieri*, *Aphis* on *Olearia*) suggests that these species overwinter as eggs, a common feature of most aphid species in temperate latitudes. Parthenogenetic morphs of at least one species (*P. plagianthi*) have been found throughout the winter.

The occurrence of oviparous females (and for some species males) of *N. totarae*, *Neophyllaphis* on *P. nivalis*, *S. nothofagi* and *Euschizaphis* on *Dracophyllum* in spring and summer (Cottier 1953; Blackman & Eastop 1994, and various unpubl. data) suggests that the life cycles of these species are structured to allow the egg stage to overcome summer conditions. This occurs in *Neophyllaphis* and *Sensoriaphis* species in Australia (Carver & Hales 1974; Hales 1976).

6.5 PATCHY DISTRIBUTIONS

One characteristic of the *Aphis/Paradoxaphis* group is their patchy distribution. A number of species in this group (e.g. *A. coprosmae*, *P. aristoteliae*) are usually found inhabiting only a few host plants (sometimes only one) in a small area with surrounding host plants uninhabited.

7. Natural enemies

There has been relatively little research on the natural enemies (predators, parasitoids, pathogens) of native aphids. Table 3 provides a summary of available information for each species. For the most-studied species, *P. plagianthi*, the assortment of natural enemies (Table 3) was not thought to exert a major impact on the populations studied (J. Kean, pers. comm.).

A project is under way to document, collect and identify the hymenopteran parasitoids of all native aphids (Teulon & Stufkens, unpubl. data). Several native aphid populations have been observed with very high levels of parasitism

TABLE 3. SUMMARY OF NATURAL ENEMIES FOR THE MAIN NATIVE APHID SPECIES.

APHID SPECIES	COMMENTS
<i>Aphis coprosmae</i>	Aphids of the last known population near Lake Rotoroa, Nelson Lakes, were found to be heavily parasitised by unidentified aphelinid and aphidiine parasitoids in February 1997.
<i>Aphis cottieri</i>	Spiders, and sometimes ladybirds, syrphids, and lacewings, have been observed in large numbers with aphids at Kaitorete Spit. A small number of mummified aphids have also been collected from Kaitorete Spit and identified as being conspecific or closely related to <i>Aphidius ervi</i> (Carver 2000).
<i>Aphis bealyi</i>	Dark brown mummies were collected in January 1998 from the Hokonui Hills (Southland). In January 2002, a population on the Lake Christabel Track, Blue Grey River, was heavily parasitised.
<i>Aphis nelsonensis</i>	Unknown.
<i>Aphis</i> sp. (<i>Olearia</i>)	Mummified aphids have been collected.
<i>Paradoxaphis aristoteltiae</i>	Brown mummies were found in January 1997 and 1998 from samples at Dolamore Park.
<i>Paradoxaphis plagiantbi</i>	Natural enemies include spiders, ladybirds, lacewings, hoverflies and possibly mites. A parasitoid wasp and <i>Entomophthora</i> fungus have also been observed.
<i>Casimira</i> sp. (<i>Ozotamnus</i>)	Lacewings, ladybirds and spiders.
<i>Euschizaphis (Actiphyllo)</i>	A population at Porters Pass was heavily parasitised by an unidentified parasitoid in 2001.
<i>Euschizaphis (Dracophyllum)</i>	Black mummies have been found at most sites. External mummies were observed in the North Island.
<i>Neophyllaphis totarae</i>	A presumed-to-be indigenous parasitoid with an external mummy is found throughout New Zealand. An Auckland population was heavily parasitised in 1983.
<i>Neophyllaphis (P. nivalis)</i>	Unknown.
<i>Sensoryaphis notbofagi</i>	Ladybirds and syrphid larvae.

(Table 3) so it seems likely that parasitoids can be an important factor in aphid mortality in some circumstances.

We are in the process of identifying these parasitoids. Except for the presumed-to-be endemic parasitoid on *N. totarae*, very few parasitoids have been identified accurately. There are not many world authorities for this group, and we have had difficulty in arranging a suitable expert to view our specimens. It is likely that a number of these parasitoid species are endemic to New Zealand.

However, we suspect that at least some of the parasitoids attacking native aphids are species intentionally introduced for the control of pest species. Others may have been accidental introductions. Carver (2000) identified a small number of parasitoids attacking *A. cottieri* as being conspecific or closely related to *Aphidius ervi*. At least one introduced hyperparasitoid* has been reported attacking a parasitoid of *N. totarae* in the field (Valentine 1975).

* Hyperparasitoids (also known as 2° parasitoids) parasitise parasitoids (or 1° parasitoids) (Dent 1991).

8. Threats to survival

New Zealand indigenous aphids face a number of threats to their continued survival. The relative importance of these threats has yet to be determined.

8.1 HABITAT DESTRUCTION

This includes major disruption in the form of the complete removal of habitat and host plants, as well as less obvious destruction in the form of animals browsing the young growing shoots of aphid host plants, which are the preferred habitat for some aphid species (e.g. *A. bealyi* on *Carmichaelia*). Even small-scale habitat destruction may be detrimental to aphid species in the *Aphis/Paradoxaphis* group because of their patchy and highly aggregated distribution. The removal of one plant may bring about the destruction of the only aphid population in a given area.

8.2 DISPLACEMENT BY INTRODUCED APHIDS

The 100 or so introduced aphid species in New Zealand constitute a considerable proportion of the 1000 total insect invaders of New Zealand (Teulon & Stufkens 2002). The ratio of alien to indigenous aphid species is extremely high (8:1 in 2002) (Teulon & Stufkens 2002). A number of indigenous aphid species may be threatened as a result of displacement from their host plants by introduced species. For example, *A. nelsonensis*, which has not been recorded for over 30 years, may have been displaced on *Epilobium* by *Aphis* nr. *epilobii*.

8.3 ATTACK FROM INTRODUCED PARASITOIDS AND PREDATORS

Indigenous aphids may be threatened by attack from alien parasitoids and predators, including vespid wasps. At least one introduced aphid predator, *Coccinella unidecimpunctata*, is reported to have displaced its indigenous counterpart, *C. leonina*, in many areas of New Zealand (Watts 1986), and it probably includes indigenous aphids amongst its prey. A number of introduced parasitoids have been found to attack and kill several indigenous aphid species in the laboratory (Stufkens & Farrell 1994; Teulon & Stufkens, unpubl. data) and an introduced parasitoid, *Aphidius ervi*, appears to attack *A. cottieri* in the field (Carver 2000). We are currently investigating other possible instances of attack by introduced parasitoids on native aphid species.

8.4 CLIMATE CHANGE

Climate change represents a significant threat to global biodiversity and ecosystem integrity, including New Zealand indigenous aphid species and their host plants. For example, *P. plagiantbi* may be susceptible to increasing temperatures, as it is killed by constant temperatures of 25°C in the laboratory (J. Kean, unpubl. data).

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Appendix 1

SPECIES SUMMARIES

***Aphis coprosmae* Laing ex Tillyard *Coprosma* aphid
Aphidinae**

Host plant(s): *Coprosma rigida*, *C. crassifolia*

Description: Medium sized (1.6 mm) aphids, usually completely covered in fluffy white wax, which is also deposited on the branches inhabited by the aphids.

Morphs: Eggs, winged and wingless viviparous females

First record: 1922 on *C. rigida* near Nelson by A. Philpott and R.J. Tillyard

Plant part: On twigs near growing tips

Distribution*: **NZAC Boundaries** **DOC Conservancies**

Aniseed Valley Nelson (NN) Nelson-Marlborough

Lake Rotoroa Buller (BR) Nelson-Marlborough

Land status of collection sites:

Aniseed Valley: Transit NZ

Lake Rotoroa: Nelson Lakes National Park

Natural enemies: *Coprosma* aphids on a single plant near Lake Rotoroa, Nelson Lakes, were found to be heavily parasitised by unidentified aphelinids (black mummies) and aphidiines (brown mummies) in February 1997.

Rarity: Only two or three populations of this aphid have been observed in the field: one in the Aniseed Valley (near Nelson) in 1922/23 (Tillyard 1926; Cottier 1938, 1956), and again in the Aniseed Valley from 1993 to 1997, and one near Lake Rotoroa (Nelson Lakes) from 1997 to 1999. At present there are no known populations. In each case the aphid was found on only one plant, even though similar plants of the same species were close by. M.A.W. Stufkens has carried out regular searches for this aphid from 1993 to the present in the North and South Islands with only two populations (see above) being discovered.

Notes: According to Tillyard (1926) this species lays large, dark gray, oval eggs in rows along the stem of the plant; these hatch in September, producing black larvae. Winged adults have been found in December and February and wingless adults in December to March. The original record was from *C. rigida* whereas the two recent collections of this aphid have been from *C. crassifolia*.

The collection dates for this species in Cottier (1953) appear to be incorrect. Cottier (1953) states that the Aniseed Valley collections were made on 3 Dec 1933, but specimen slides in the New Zealand Arthropod Collection, Auckland, and the Natural History Museum, London, only indicate 23 Mar 1922 and 3 Dec 1923 for collections. Cottier (1938) lists the collection dates as 1922/23. Presumably the dates on the specimens are correct.

* Distribution localities are based on New Zealand Arthropod Collection (NZAC) boundaries (Crosby et al. 1976) and New Zealand Conservancies (Molloy & Davis 1994).

Specimen(s): Crop & Food Research, Lincoln
New Zealand Arthropod Collection, Auckland
Natural History Museum, London

References: Tillyard (1926), Cottier (1938, 1953), Stufkens & Farrell (1994)

***Aphis cottieri* Carver**
Aphidinae

Host plant(s): *Muehlenbeckia complexa*, *M. australis*

Description: Large brown-black aphids

Morphs: Oviparous females, winged and wingless viviparous females

First record: February 1967 on *M. australis* at Springburn, Canterbury

Plant part: Vine, leaves and stems

Distribution:	NZAC Boundaries	DOC Conservancies
Springburn	Mid Canterbury (MC)	Canterbury
29 m north of Te Anau	Otago Lakes (OL)	Southland
Kaitorete Spit	Mid Canterbury (MC)	Canterbury
Quail Island	Mid Canterbury (MC)	Canterbury
Banks Peninsula	Mid Canterbury (MC)	Canterbury

Land status of collection sites:

Springburn:	Unknown
29 m north of Te Anau:	Fiordland National Park
Kaitorete Spit:	Farmland
Quail Island:	Quail Island Ecological Restoration Trust Land
Banks Peninsula:	Farmland

Natural enemies: Spiders and sometimes ladybirds, syrphids, and lacewings have been observed in large numbers with aphids at Kaitorete Spit. A small number of mummified (parasitised) aphids have also been collected from Kaitorete Spit. These appear to be conspecific with or closely related to *Aphidius ervi* (Carver 2000).

Rarity: In 1997 and 1998 M.A.W. Stufkens made three unsuccessful searches for this aphid in the area where it was originally found in Fiordland by D.F. Hales (née White) in 1972. The aphid was unintentionally rediscovered by S. Pawson in November 1998 at Kaitorete Spit, where it appears to be at least locally common and has been recorded regularly since. A further specimen, collected by A.D. Lowe in Springburn, Canterbury, in February 1967, was rediscovered in 2000 in the NZAC. The aphid was also found on Quail Island, Lyttelton Harbour, in 2000, and over a wide area of Banks Peninsula adjacent to Kaitorete Spit in 2001.

Notes: Oviparae have been collected from the field in April. Eggs have been observed in a laboratory colony in August. Wingless adults have been collected in November, December, and February, and winged adults in November and December.

Specimen(s): Crop & Food Research, Lincoln
New Zealand Arthropod Collection
Australian National Insect Collection, Canberra

References: Carver 2000, Ross 2001

***Aphis bealyi* Cottier**
Aphidinae

Host plant(s): *Carmichaelia australis* (= *subulata*), *C. odorata*

Description: Large (2.0–2.2 mm) dark-green to black aphids.

Morphs: Winged & wingless viviparous females

First record: 1943 on *Carmichaelia australis* (= *subulata*) from Mount Cass near Waipara by A.J. Healy (Cottier 1953)

Plant part: Aphids congregate on the terminal parts of the shrubs, especially new growth, flowers and seed pods

Distribution:	NZAC Boundaries	DOC Conservancies
Mt Cass (nr Waipara)	North Canterbury (NC)	Canterbury
Hitchin Hills	North Canterbury (NC)	Canterbury
Cheviot	North Canterbury (NC)	Canterbury
Eyrewell	Mid Canterbury (MC)	Canterbury
Crown Range Rd	Otago Lakes (OL)	Otago
Hokonui Hills	Southland (SL)	Southland
Blue Grey River	Buller (BR)	West Coast
Hihitahi	Taupo (TO)	Wanganui

Land status of collection sites:

Mt Cass (nr Waipara): Farm

Hitchin Hills: Farm

Cheviot: Unknown

Eyrewell: Unknown

Waimumu Crk head-

waters, Hokonui Hills: Private farm

Crown Range Rd: ?Private farm

Blue Grey River: Victoria State Forest boundary

Hihitahi: Hihitahi Forest Sanctuary

Natural enemies: Brown mummies were collected in January 1998 from the Hokonui (Southland) population. In January 2002, a population on a *Carmichaelia* plant on the Lake Christabel Track, Blue Grey River, was heavily parasitised. The identity of these parasitoids is presently unknown.

Rarity: Until recently this species was seldom recorded. A.J. Healy found it on *Carmichaelia* in the hills to the east of the inland road between Waipara and Kaikoura in the South Island. The insect was first collected at Mount Cass in May 1943 and a second collection was made from the Hitchin Hills, Hurunui River, in November 1944. It was also recorded, but not collected, in Cheviot in November 1944 (Cottier 1953). Except for the Hurunui site, where the aphids

were found on *Carmichaelia* shrubs covering about 1.5 acres (0.6 ha), A.J. Healy states that the aphids were not common; while working on nasella tussock in North Canterbury between 1944 and 1978 he kept 'an eye out for the aphid', although he was not actively searching for it (A.J. Healy 1998, pers. comm.). He observed the aphid only once more during this time on a single plant in November 1969 by the Charwell River bridge on the inland Kaikoura Road. There are also specimens collected by R.J. McKenzie on *Carmichaelia* in Eyrewell in 1958.

Between 1993 and 1998 M.A.W. Stufkens and co-workers revisited all of A.J. Healy's sites on several occasions, as well as many other sites throughout New Zealand, specifically to find the aphid, but without success. In January 1998, however, M.A.W. Stufkens rediscovered *A. healyi* on several plants in a patch of *C. australis* (approx. 0.25 ha) in the Hokonui Hills in Southland. A few days later he also found this aphid on one small *C. australis* plant close to the road in the Crown Range, Central Otago, after searching many plants in the area. In November 1998 the aphid was found on *C. australis* at Hihitahi in the central North Island. A heavily parasitised population was found on *C. odorata* in the Blue Grey River, Westland, in January 2002.

Notes: Both winged and wingless adults have been collected from November to February and May.

Specimen(s): Crop & Food Research, Lincoln
New Zealand Arthropod Collection, Auckland
Natural History Museum, London

***Aphis nelsonensis* Cottier**

Aphidinae

Host plant(s): *Epilobium* sp.

Description: Small aphid (c. 1.3 mm long)

Morphs: Winged and wingless viviparous **females**

First record: 1946 from Whangamoia Saddle, Nelson, by A.J. Healy (Cottier 1953).

Plant part: Leaves and stems

Distribution: ***NZAC Boundaries*** ***DOC Conservancies***

Whangamoia Saddle Nelson (NN) Nelson-Marlborough

Cass Mid Canterbury (MC) Canterbury

Land status of collection sites: Unknown

Natural enemies: Unknown

Rarity: This aphid has been collected on only two occasions, once by A.J. Healy about a mile from the summit, Whangamoia Saddle, between Rai Valley and Nelson, at an altitude of about 900 feet (270 m) in November 1946 (Cottier 1953); and once by A.D. Lowe from Cass, Canterbury, in January 1965 (Natural History Museum, London). The aphid has not been seen since, despite concerted efforts to find it by M.A.W. Stufkens between 1993 and 2000.

Notes: Winged adults have only been collected in January and wingless adults in January and November.

The *Epilobium* species could not be identified by A.J. Healy because the leaves and stems were so badly malformed due to the presence of the aphid (Cottier 1953), and the host plants from A.D. Lowe's collections were not identified to the species level either (Natural History Museum, London).

Cottier (1953) records that the original collection of this aphid was on 25 November 1946 in Nelson by A.J. Healy (see above) although slides in both the New Zealand Arthropod Collection and the Natural History Museum indicate that the location for aphids collected on this date by A.J. Healy was Blenheim. It appears that the slides were labelled incorrectly. A.J. Healy (pers. comm. 1998) stated that the original collections were made on 25 Nov 1946 in Nelson, as described in Cottier (1953), and that he did not collect any *A. nelsonensis* in Blenheim.

In recent aphid surveys of *Epilobium*, another aphid species, the introduced *Aphis* nr *epilobii*, is the only species that has been found. This species was first observed in New Zealand in 1962 (Lowe 1966) and has possibly displaced *A. nelsonensis* on *Epilobium*.

Specimen(s): New Zealand Arthropod Collection, Auckland
Natural History Museum, London

References: Cottier (1953), Lowe (1966)

***Aphis* sp. Aphidinae**

Host plant(s): *Olearia odorata*, *O. bullata*

Description: Similar to *A. coprosmae* but without extensive white fluff

Morphs: Eggs and oviparous females in laboratory colonies. Wingless and winged viviparous females.

First record: Collected by Jose Derraik in March 1999 from *O. bullata* (and *Coprosma propinqua*) Brookdale, Rock and Pillar Range, Central Otago

Plant part: Growing tips of new shoots

Distribution: *NZAC Boundaries* *DOC Conservancies*

Brookdale, Rock & Pillar Range Central Otago (CO) Otago

Omarama Stm Central Otago (CO) Otago

Land status of collection sites: Both private (?) farmland

Natural enemies: Mummified aphids have been collected but the parasitoids have not yet been identified

Rarity: This aphid was only recently discovered and is known from only two locations in the South Island. Return visits to these sites have confirmed resident populations. There has been no searching for this aphid at other sites to date.

Specimen(s): Crop & Food Research, Lincoln

***Aphis* sp.**
Aphidinae

Host plant(s): *Hebe ?elliptica*

Description: Unknown

Morphs: Only one wingless female

First record: 1972 on *Hebe ?elliptica* near Greymouth by V.F. Eastop

Plant part: Unknown

Distribution: ***NZAC Boundaries*** ***DOC Conservancies***

Greymouth Buller (BR) Nelson-Marlborough

Land status of collection sites: Unknown

Natural enemies: Unknown

Rarity: V.F. Eastop collected only one specimen, in October 1972 from Greymouth.

There is unlikely to have been much effort exerted on searching for this aphid before 1997. Since then, M.A.W. Stufkens has searched for this aphid on the West Coast on two occasions, without success.

Notes: As only one specimen was collected from *Hebe* there is some question as to whether this plant is its true host.

Specimen(s): Natural History Museum, London

***Aphis* undescribed species**
Aphidinae

Host plant(s): *Samolus*

Description: Unknown

Morphs: Unknown

First record: Punakaiki, Westland

Plant part: Unknown

Distribution: ***NZAC Boundaries*** ***DOC Conservancies***

Punakaiki Westland West Coast

Land status of collection sites:

Punakaiki: ?Paparoa National Park

Natural enemies: Unknown

Rarity: Only specimen collected. MAW Stufkens has searched for this aphid three times since January 1996, but without success.

Notes: V.F. Eastop has recently found these specimens. Initially he suspected they were the same species as that found on *Ozothamnus*, but after remounting they appear to be a 'proper *Aphis*' (i.e. not part of the New Zealand *Aphis*, *Paradoxaphis*, *Casimira* group) with marginal tubercles on abdominal segments 1 and 7 (V.F. Eastop pers. comm. 2002).

Specimen(s): Crop & Food Research, Lincoln
Natural History Museum, London

***Paradoxaphis aristoteliae* Sunde**
Aphidinae

Host plants: *Aristotelia serrata*

Description: Reddish-brown black head and dusky thorax (Blackman & Eastop 1994)

Morphs: Winged and wingless viviparous females. Wingless oviperae and eggs have been recorded in the laboratory

First record: 1982 from *Aristotelia serrata*, Dolamore Park, Gore, Southland, by C Butcher

Plant part: Leaves

Distribution: *NZAC Boundaries* *DOC Conservancies*

Dolamore Park, Gore

Southland (SL)

Southland

L. Rotoroa, Nelson Lakes

Buller (BR)

Nelson-Marlborough

Land status of collection sites:

Dolamore Park: The trees are on Transit NZ land just outside the park

Lake Rotoroa: Nelson Lakes National Park

Natural enemies: Brown mummies, indicating parasitism, were found in January 1997 and 1998 from samples from Dolamore Park.

Rarity: This aphid has been recorded from only two places in New Zealand. It was collected in Dolamore Park, Gore, in 1982 and 1983 by C. Butcher and J. Butel and more recently from 1993 to 2000 by M.A.W. Stufkens. Since 1993 M.A.W. Stufkens has observed the aphid regularly in Dolamore Park, but it was almost always restricted to four plants. The second location at which this aphid has been recorded is Lake Rotoroa, Nelson Lakes, where it was collected in 1983 by A.K. Walker, R.G. Sunde and V.F. Eastop. M.A.W. Stufkens and co-workers (including V.F. Eastop on one occasion) have searched for this aphid in Nelson Lakes on a number of occasions from 1993 to 2000 but have not rediscovered the aphid in this area.

A. serrata shrubs growing in the Waitakere Ranges, 25 km west of Auckland, and in Christchurch, were examined on several occasions, but no specimens of this aphid were found (Sunde 1987). Since 1993 M.A.W. Stufkens has looked for this aphid in other areas throughout New Zealand on numerous occasions without success.

Notes: Collected from November to March.

Specimen(s): Crop & Food Research, Lincoln

New Zealand Arthropod Collection, Auckland

Natural History Museum, London

MAF National Plant Pest Reference Laboratory, Auckland

References: Sunde (1987), Blackman & Eastop (1994)

***Paradoxaphis plagianthi* Eastop**
Aphidinae

Host plant(s): *Plagianthus regius* (formerly *P. betulinus*)

Populations have also been found on *Parsonsia heterophylla*

Description: Small to medium sized (1.3–2.0 mm) oval brown aphids with a median dorsal green strip on the abdomen

Morphs: Only winged and wingless viviparous females

First record: 1972 on *Plagianthus regius* in the Christchurch Botanic Gardens by V.F. Eastop and A.D. Lowe

Plant part: Buds, leaves and twigs near new growth and older leaves

Distribution: *NZAC Boundaries* *DOC Conservancies*

Various Christchurch Mid Canterbury (MC) Canterbury

Lincoln Mid Canterbury (MC) Canterbury

Land status of collection sites:

Chch City Council: Christchurch Botanic Gardens, Riccarton Bush, Ashgrove Reserve

Landcare Research: Canterbury Agricultural Science Centre, Lincoln

Univ. Canterbury: Ilam Homestead

Natural enemies: Natural enemies included predators such as spiders, ladybirds, lacewings, hoverflies and possibly mites. It was sometimes attacked by a parasitoid wasp and *Entomophthora* fungus.

Rarity: This aphid has been recorded infrequently until recently. A.D. Lowe (unpubl. correspondence) mentions a species collected from *Plagianthus* in Christchurch in August 1966, but no specimens can be found in any collections. It was collected again from *Plagianthus* in the Christchurch Botanic Gardens by V.F. Eastop and A.D. Lowe in 1972; a specimen from this date is found in the Natural History Museum, London. Apparently this was the same tree upon which the original aphid was found (V.F. Eastop, pers. comm.). A.D. Lowe revisited this tree regularly until he died in 1980 but did not record the aphid again (V.F. Eastop, pers. comm.). In January 1997, however, M.A.W. Stufkens along with V.F. Eastop rediscovered the aphid on what was probably the same tree described in the other records. It was found on it regularly until the tree was cut down in 2001. A few specimens were also caught in a malaise trap in Riccarton Bush, Christchurch, in late 1996, and several colonies have been found there since 1999. The aphid has also been found at a number of sites in Christchurch City (Ashgrove Reserve, Ilam Homestead, Christchurch Girls' High School). A population was artificially established on *P. regius* at Lincoln, Canterbury. In November 2000 sizeable populations of *P. plagianthi* were found on *Parsonsia heterophylla* in close proximity to *P. regius* in Riccarton Bush and in the Ashgrove Reserve. From 1999 to 2002 a research project was undertaken to examine the population dynamics of this aphid.

Notes: Collection dates include most months of the year.

Specimen(s): Crop & Food Research, Lincoln
Natural History Museum, London

Reference(s): Eastop 2001, Kean 2002

***Casimira* undescribed species**

Aphidinae

Host plant(s): *Ozothamnus leptophylla* (formally *Casinia*)

Description: Yellowish aphid with darker thorax

Morphs: Winged and wingless viviparous females

First record: 1994 in a malaise trap, Tautuku Bay, Catlins, by J. Ward

Plant part: Flower heads and dense compact growth

Distribution: **NZAC Boundaries** **DOC Conservancies**

Tautuku Bay, Catlins Southland (SL) Otago

Land status of collection sites:

Tautuku Bay: Tautuku Education Centre Campus

Natural enemies: Lacewings, spiders and ladybirds (M.A.W.S. unpubl. data)

Rarity: In February 1997 M.A.W. Stufkens identified the host plant of this species as *Ozothamnus leptophylla*. He found the aphid to be abundant in one small area (c. 1 ha) of the Education Centre Campus, Tautuku Bay, in the Catlins. It was not found on other *Ozothamnus* plants close by and has not been found in extensive surveys of other areas of the South Island.

Notes: Winged adults have been collected in December and January and wingless adults in October, December and January.

The endemism of the New Zealand *Casimira* sp. is questionable. The type species of this genus, *C. canberrae*, is native to Australia, and the only other nominal species was described from India. While the plant host of *Casimira* sp. (*Ozothamnus leptophylla*) is a true New Zealand endemic, it has no close relatives in New Zealand, only in Australia. In the field, *Casimira* sp. is always found in the presence of *Brachycaudus helichrysi*, and struggles on its host plant in the laboratory without *B. helichrysi* (M.A.W. Stufkens, unpubl. obs.). *Casimira* sp. might be a relatively recent introduction of an Australian species (not detected there), which has managed to survive on a New Zealand relative of its native host (V.F. Eastop, pers. comm.). *Casimira* might still constitute a southern endemic genus, since the validity of the generic designation of *C. bhutanensis* has been questioned (V.F. Eastop, pers. comm.).

V.F. Eastop (pers. comm.) no longer considers this to be the same species as that found on *Samolus* (see *Aphis* on *Samolus*).

Specimen(s): Crop & Food Research, Lincoln
Natural History Museum, London

***Euschizaphis* undescribed species**

Aphidinae

Host plant(s): *Aciphylla* sp. including *A. aurea*

Description: Pale green

Morphs: Winged and wingless viviparous females

First record: 1983 from the Cardrona Valley, Central Otago, by J.M. Cox

Plant part: Leaf blades

Distribution:	NZAC Boundaries	DOC Conservancies
Cadrona Valley	Central Otago (CO) or Otago Lakes (OL)	Otago
Porters Pass	Mid Canterbury (MC)	Canterbury
Brookdale	Central Otago (CO)	Otago

Land status of collection sites:

Otago:	Farmland
Porters Pass:	Farmland
Brookdale:	Farmland

Natural enemies: The records in the Natural History Museum note that at least one specimen was parasitised. A population at Porters Pass was heavily parasitised by an unidentified parasitoid in 2001.

Rarity: This species was first recorded by J.M. Cox in January 1983. Between 1996 and 2001, M.A.W. Stufkens and co-workers searched the Cardrona Valley on two occasions and *Aciphylla* plants from many localities throughout the South Island, but did not find this species anywhere. However, in October 2001, S. Pawson found it on several *Aciphylla aurea* plants at Porters Pass. Aphids in these populations were also observed in November 2001 and March 2002. Another population was discovered at Brookdale in the Rock and Pillar Range, Central Otago, in March 2002.

Notes: At least four introduced aphid species (i.e. *Cavariella aegopodii*, *Macrosiphum euphorbiae*, *Brachycaudus belicbrysi*, *Myzus persicae*) have been recorded from *Aciphylla* during the searches for the native species, and Cottier (1953) recorded five introduced aphid species on *Aciphylla*. Teulon (unpubl. data) found that most introduced aphids were found in the flowers of *Aciphylla* whereas the native species was found on the leaf blades.

Specimen(s): Crop & Food Research, Lincoln
Natural History Museum, London

***Euschizaphis* undescribed species**
Aphidinae

Host plant(s): *Dracophyllum pronum*, *D. uniflorum*, *D. palustre*,
D. subulatum

Description: Large oval dark green aphid

Morphs: Wingless viviparous females, wingless oviparous females and eggs

First record: 1972 from Lake Sylvester (nr. Cobb Valley) by L.A. Mound

Plant part: Found on the leaves (needles)

Distribution:	NZAC Boundaries	DOC Conservancies
Lake Sylvester	Nelson (NN)	Nelson-Marlborough
St James Walkway, Lewis Pass end	Buller (BR)	West Coast
Arthurs Pass	Mid Canterbury (MC)	Canterbury
Otira Valley	Westland (WD)	West Coast

Distribution (continued):	NZAC Boundaries	DOC Conservancies
Porters Pass	Mid Canterbury (MC)	Canterbury
St Arnaud Range	Marlborough (MB)	Nelson-Marlborough
Mt Isobel	Marlborough (MB)	Canterbury
Mt Ruapehu	Taupo (TO)	Tongariro-Taupo
Mt Ngaurahoe	Taupo (TO)	Tongariro-Taupo
Pureora Forest Park	Taupo (TO)	Waikato
Mt Egmont	Taranaki (TK)	Wanganui

Land status of collection sites: Various, including Arthur's Pass National Park, Nelson Lakes National Park, Kahurangi National Park, Lake Sumner Conservation Park, Pureora Forest Park.

Natural enemies: Unidentified aphidiine have been reared from mummies at many sites. Parasitised aphids were found in appreciable numbers on two occasions. The Pureora population had parasitoids with external mummies.

Rarity: Not recorded since its discovery in 1972 until 1997/98 when M.A.W. Stufkens (with V.F. Eastop in 1997) carried out an extensive South Island survey. It is now known from a number of places in the South Island, but only north of Porters Pass, and in the North Island, and appears to be quite common.

Notes: Wingless forms of this species have been found from October to April. Winged forms have only been observed at the Pureora Forest Park site. Oviparae were found at Arthurs Pass in February 1997 and on Mt Ruapehu in November 1998. Eggs were laid on *Dracophyllum* in February in a laboratory culture at Lincoln. Found up to 4000 feet (1220 m). The population at Pureora Forest Park has characters that suggest it may be a separate species.

Specimen(s): Crop & Food Research, Lincoln
Natural History Museum, London

***Neophyllaphis totarae* Cottier **Totara aphid**
Neophyllaphidinae**

Host plants: *Podocarpus totara*, *P. ballii*, *P. nivalis*, *P. acutifolia*, *P. waiboensis*

[Records for *P. nivalis* are thought to relate to a separate species]

Description: Wingless morphs are dark purplish-brown, dusted with whitish powder, usually feeding singly on leaves or in small colonies on young twigs

Morphs: Winged and wingless viviparous females, winged oviparous females, winged males and eggs. M. Carver (pers. comm.) now considers the extensively glanduliferous (wax-plate bearing) wingless viviparae as fundatrices and/or their descendants rather than a separate species as was previously reported (Teulon & Stufkens 1998)

First record: Before 1925 from Westland by C.R. Foweraker (Miller 1925)

Plant part: Usually found singly on leaves or in small groups on young leaves and twigs (Cottier 1953)

Distribution:	NZAC Boundaries	DOC Conservancies
Westland (various)	Westland (WD)	West Coast
Lake Matheson	Westland (WD)	West Coast
Lake Mapouriki	Westland (WD)	West Coast
Canavans Knob	Westland (WD)	West Coast
Nelson	Nelson (NN)	Nelson-Marlborough
Aniseed Valley, Nelson	Nelson (NN)	Nelson-Marlborough
Renwick	Marlborough (MB)	Nelson-Marlborough
Arthurs Pass	North Canterbury (NC)	Canterbury
Christchurch (various)	Mid Canterbury (MC)	Canterbury
Dunedin Botanical Garden	Dunedin	Otago
Totara Flat, Eglington R.	Otago Lakes (OL)	Southland
Auckland (various)	Auckland (AK)	Auckland
Waitakere Ranges	Auckland (AK)	Auckland
Mt Egmont	Taranaki (TK)	Wanganui
Palmerston North (various)	Wanganui (WI)	Wanganui
Hihitahi	Rangitikei (RI)	Wanganui
Taupo	Taupo (TO)	Tongariro-Taupo
Tongariro National Park	Taupo (TO)	Tongariro-Taupo
Pureroa State Park	Taupo (TO)	Wanganui
Mt Holdsworth	Wairarapa (WA)	Wellington
Silverstream, Hutt Valley	Wellington (WN)	Wellington
Rotorua	Bay of Plenty (BP)	Bay of Plenty
Kauaeranga, Coromandel	Coromandel (CL)	Waikato
Urewera National Park	Gisborne (GB)	East Coast-Hawke's Bay

Land status of collection sites: Various including National Parks

Natural enemies: This aphid is parasitised by a species that is presumed to be indigenous. A putative description and name has been given to this parasitoid (Mackauer, unpubl. manuscript). It produces a whitish to light-brown mummy found beneath the host remains and has been found in the North and South Islands (NN, WD, AK). *N. totarae* was heavily parasitised by an aphidiine in Auckland in 1983 (V.F. Eastop, pers. comm.).

Rarity: A relatively common species found in the North and South Islands. It has been found consistently by a number of workers since first recorded in the 1920s.

Notes: Wingless parthenogenetic adults collected from September to April (winged: October to March). Winged oviparae and males are found in spring and summer (Blackman & Eastop 1994).

This aphid infests its hosts sparsely. It does not seem to form large colonies. It is usually found singly on leaves or in small groups on young twigs (Cottier 1953). However, dense populations have been observed on new foliage (M.A.W.S. unpubl. data).

This species was initially thought to be the introduced *N. podocarpi* (see Miller 1925 and Cottier 1953), which is not found in New Zealand.

Specimen(s): New Zealand Arthropod Collection, Auckland
Natural History Museum, London
MAF National Plant Pest Reference Laboratory - Lincoln

References: Miller (1925), Cottier (1953), Blackman & Eastop (1994)

***Neophyllaphis* undescribed species
(Neophyllaphidinae)**

Host plants: *Podocarpus nivalis*

Description: Similar to *N. totarae*

Morphs: Eggs, wingless oviparae and wingless viviparae

First record: February 1972 on *P. nivalis* at Arthurs Pass by D.F. Hales (née White)

Plant part: New growth and old leaves

Distribution: *NZAC Boundaries* *DOC Conservancies*
Arthur's Pass North Canterbury (NC) Canterbury

Land status of collection site:

Arthur's Pass National Park

Natural enemies: Unknown

Rarity: This putative species has only been found in a small area in Arthur's Pass and Otira

Notes: Collected by D.F. Hales (née White) from *P. nivalis* in Arthur's Pass at 3000 feet (910 m) and later from the same area by M. Stufkens (December 2001, February 2002). Considered to be a separate species by M. Carver (pers. comm.), based on morphological characters, and by C. von Dohlen, based on molecular characters.

Specimens: Crop & Food Research, Lincoln
Australian National Insect Collection, Canberra

***Sensoriaphis nothofagi* Cottier
Taiwanaphidinae**

Host plants: *Nothofagus truncata*, *N. fusca*, *N. solandri* (var. *cliffortioides*)

Description: Wingless morphs are yellowish-green to brownish on young stems. Alatae become mature on the undersides of leaves (Cottier 1953; Sunde 1979; Blackman & Eastop 1994)

Morphs: Winged and wingless viviparous females, wingless oviparous females, winged males

First record: 1947 from Little Barrier Island (Cottier 1953)

Plant part: Young stems and leaves. New water shoots.

Distribution:	NZAC Boundaries	DOC Conservancies
Little Barrier Is	Coromandel (CL)	Auckland
Mt Albert	Auckland (AK)	Auckland
Kauri Park, North Shore	Auckland (AK)	Auckland
Pukekohe	Waikato (WA)	Waikato
Lake Rotoiti, Nelson Lakes	Buller (BR)	Nelson-Marlborough
Dunedin Botanic Gardens	Dunedin (DN)	Otago
29 miles north of Te Anau	Otago Lakes (OL)	Southland
Totara Flat, Eglinton R.	Otago Lakes (OL)	Southland

Land status of collection sites:

Various, including National Parks

Natural enemies: Ladybirds and syrphid larvae (M.A.W.S. unpubl. data)

Rarity: Spasmodically common and widespread in New Zealand. The aphid tends to be found on trees close to the forest edge (M.A.W.S. pers. obs.).

Notes: Winged and wingless parthenogenetic adults have been collected from September to May. Oviparae and winged males occur from September to February (Blackman & Eastop 1994).

Specimen(s): Crop & Food Research, Lincoln
New Zealand Arthropod Collection, Auckland
Natural History Museum, London
MAF National Plant Pest Reference Laboratory - Auckland

References: Cottier (1953), Sunde (1973, 1979), Blackman & Eastop (1994)