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Observations of Monarch butterfly over-wintering behaviour in Christchurch

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Introduction

The monarch butterfly (*Danaus plexippus* (L.)) is native to Central and upper South America. During the 1800s the monarch spread throughout the Pacific, Australasia and large areas of Southeast Asia (Vane-Wright 1993, Zalucki & Clarke 2004). Vane-Wright (1993), as part of his 'Columbus hypothesis', argued that the present distribution was the result of a steady east to west progression induced by the 'spill over' of unnaturally high populations in North America as a result of changes in land management. However, recent, more in-depth analysis of the available historical literature by Zalucki & Clarke (2004) has cast doubt on these ideas. Instead, they propose a classical hierarchical diffusion model to explain the current distribution; i.e., a small number of spot introductions (perhaps anthropogenic) followed by radial dispersion from those points (Zalucki & Clarke 2004).

The origin of monarch butterflies in New Zealand is still unclear. The first reported sightings in the early 1840s by Sturm (1878) were published 38 years after the event. These sightings were reported to have resulted in the transfer of pinned specimens to international colleagues (Zalucki & Clarke 2004), however such specimens have never been found. Both Fereday (1874) and Sturm (1878) considered the monarch butterfly to be endemic to New Zealand. Certainly the fact that Maori elders had a traditional name for the monarch butterfly (kâkâhu) would suggest a non-recent arrival (Zalucki & Clarke 2004). However, the first reliable published accounts of monarch butterflies in New Zealand were not until 1868 (Ramsay 1964) and February 1873 (Fereday 1874).

Unlike North America, little is known about the behaviour of the monarch butterfly in New Zealand. The large-scale annual mass migrations of monarch butterflies between North America and the Transvolcanic Mountains in Mexico have been widely studied (Brower 1977, Urquhart & Urquhart 1978, 1979, Wassenaar & Hobson 1998, Knight *et al.* 1999, Garland & Davis 2002, Mouritsen & Frost 2002, Reppert *et al.* 2004). By contrast, a single study by Wise (1980) has investigated dispersal behaviour in New Zealand. Results from the recovery of 12.4 % of 6500+ tagged

monarch butterflies indicated no evidence of any long-distance migration patterns (Wise 1980). However, Wise's research between 1967-1974 and reports by Ramsay (1964) about Monarch aggregations in 1959 are the earliest published records of over-wintering behaviour in New Zealand. Until recently, we were unaware of such over-wintering behaviour in New Zealand, and were surprised to be shown a large colony of over-wintering monarch butterflies by Nick Ledgard (Forest Research) in the University of Canterbury staff club gardens in late autumn 2003 (Figure 1). Curiosity regarding the extent of this phenomenon prompted us to place a small article in 'The Press', a Christchurch-based newspaper. Here, we summarise the information provided by the public in response to the newspaper article.

Results and Discussion

The small article appeared in 'The Press' on a Saturday in June 2003. Arriving at work on Monday there was already an overwhelming response, with more than 40 messages on the answering machine and more than 20 e-mails awaiting our attention. Clearly the monarch butterfly has struck a chord with people from Christchurch and further afield, with reports from Ashburton, Blenheim and Nelson. A summary of the responses to the article is given in Table 1. It appears that over-wintering behaviour has been occurring in Christchurch for at least 20 years. However, most sightings have been in the last five years. This is not surprising given that we are dealing with anecdotal reports that in most cases were not recorded in personal diaries or other written forms at the time of observation.

The majority of over-wintering sightings were made in suburban Christchurch, with very few reports from the central city or Hagley Park/Botanic Gardens. This was somewhat surprising, as this type of 'doughnut-shaped' spatial distribution would not be expected if monarch butterflies showed no distinct preference in their dispersal (see Wise 1980). We hypothesise that this spatial distribution is due to a paucity of host-plant material or suitable over-wintering sites in the central city. The major host plant, *Asclepias fruticosa* L. (the swan plant), is not native to New Zealand and is generally found in home gardens, of which there are few in the central city. Aside from the Botanic Gardens and Hagley Park (which has a few known sightings of over-wintering monarchs) there are only a small number of apparently (authors' perception) suitable groves of trees that might provide appropriate environmental conditions for over-wintering. Suburban parks and home gardens on the other hand provide much more frequent opportunities for over-wintering monarch butterflies.

A number of people noted that few monarch butterflies were seen in the summers following the exceptionally heavy snow falls in 1992. This may indicate that monarch butterflies in Christchurch are close to the limit of their environmental tolerance. Despite this, monarch butterflies have been seen in South Canterbury, Otago and occasionally in Southland. In the last 5 - 10 years monarch butterflies have been

Table 1. Information on Monarch butterfly over-wintering sites provided by the public in June 2003 in response to a small article in a Christchurch newspaper, The Press.

City	Suburb	Site	Tree/s
Ashburton		Ashburton Domain	Pine
Blenheim		Whitney St	Pine
Christchurch	Avondale	Avondale Golf Course	Wattle, *Eucalyptus* and cypress
	Avonside	Avonside Girl's High School	Walnut or pines
	Avonside	Woodham Park	Conifer, others
	Bishopdale	Bishopdale park	?
	Bromley	Ruru Lawn Cemetary	Conifer
	Burnside	Burnside Park	?
	Burwood	Ascot Golf Course	Pine
	Casebrook	Grampian St playground	Deciduous and a fir tree
	Cashmere	Centennial Park	Black birch?
	City	Cambridge Tce	?
	Halswell	25 Kennedys Bush Rd	Pine
	Hei Hei	Carmen Rd Reserve	?
	Linwood	Edmonds Garden	Tortured willow
	Linwood	Linwood crematorium	Conifer
	Merivale	49 Papanui Rd	Giant sequoia, ivy flowers
	Merivale	Carlton Mill Bridge	Small confer
	Merivale	St Andrews College	Lawson Cypress
	New Brighton	Blighs Garden	Macrocarpa and pine
	New Brighton	Rawhiti Golf Course	Pine
	North Linwood	Linwood Cemetary	*Eucalyptus*
	North Linwood	Linwood Cemetary	Conifers
	Northcote	Redwood Park	?
	Opawa	Newbury Lodge	?
	Opawa	Newbury St	Oak
	Opawa	Risingholme Centre	Fir
	Papanui	Papanui Domain	*Macrocarpa*
	Papanui	St James Park	Lime?
	Parklands	Parklands hospital	?
	Riccarton	Mona Vale	Birch?
	Riccarton	Shand Cres Park	*Eucalyptus*

Table 1 (extended)

Butterfly abundance	When seen	Date checked by authors
Thousand	?	
Large numbers	20 years ago	
?	?	
?	Been there for several years	
Large numbers		15 June 2003: present
?	Seen early May	
Branches weighed down with butterflies	?	15 June 2003: smaller numbers present
?	?	
Few hundred	Seen once	
?	?	
Only a few	Seen one day, not next	
?	Past 3 weeks	
?	Several years	
?	?	
?	?	
?	2 years running	15 June 2003: none seen
?	?	
?	?	
?	Every year for last 5 years or more	
Thousands		15 June 2003: few seen
?	Several years	
?	?	15 June 2003: few seen
Hundreds	?	15 June 2003: none seen
Hundred	?	
?	?	
Thousands	Seen once 2-3 years ago	
?	14 years ago	
Thousands	15 years ago	
Thousands	Mid-May 2003	14 June 2003: smaller numbers present
?		
Large numbers	March 2003	14 June 2003: none found
20-30	For a couple of years	

(Table 1, continued)

City	Suburb	Site	Tree/s
Christchurch (continued)	Richmond	Washbourne Park?	?
	Shirley	69 Golf Links Rd	Pine
	Somerfield	Ashgrove Tce	Oak
	Somerfield	Ernle Clark Reserve	Sequoia? (previously in oak)
	Spreydon	Simeon Park	?
	Spreydon	Spreydon Domain	?
	St Albans	Abberly Park	?
	Sydenham	Bradford Park	*Eucalyptus* (previously reported on poplar, chestnut)
	Waimairi Beach	Waimairi Beach Golf Course	Pine
	Westhaven	Horseshoe Lake	Willows and poplars
Kaiapoi		Murphy Park	Ivy-covered tree
Nelson		Cathedral Grounds	Deciduous
	Richmond	Sth Lorimer? Lane	?
Rangiora		Matawhai Park	*Eucalyptus*
		Victoria Park	?

sighted regularly during March, April and May in Dunedin. These individuals were probably the progeny of adults that had migrated from outside the region earlier in the summer. Host plants are now readily available further south, especially in Dunedin where some home-gardens have entire shrubberies of swan plants (Brian Patrick, *personal communication*). In the last three years, 'tatty' individuals have been recorded in September/October, which may indicate the beginning of small-scale (as yet unobserved) over-wintering behaviour in Dunedin (Brian Patrick, *personal communication*). As such, it would appear that the monarch butterfly is gradually becoming more acclimatised and slowly spreading to New Zealand's more southern provinces.

Due to the overwhelming response by the public, on the suggestion from the authors, the Christchurch City Council in collaboration with the New Zealand Entomological

(Table 1, extended)

Butterfly abundance	When seen	Date checked by authors
?	For a couple of years	
?	There every year	
?		
Large clusters		14 June 2003: present
Few hundred		14 June 2003: present
?	Every year for last 5 years	
Few hundred	Have been there most years for the past 15 years	7 June 2003: present
Few hundred	Seen for 3-4 years	14 June 2003: present
?	Seen last few years	
Hundreds	First time seen	
?	?	
?	?	
?	More than one year	
?	?	
Big numbers last year	Two years	

Society produced a brochure on the over-wintering behaviour of monarch butterflies in the city. A copy of this brochure can be obtained at the following web address:

http://www.ccc.govt.nz/parks/theenvironment/monarchbutterflies.pdf

Ten thousand copies were printed and have been distributed to Christchurch libraries and council service centres. The effect of these brochures was quite immediate. The weekend following an interview on Newstalk ZB that mentioned the brochure, over-wintering monarch butterflies in St James Park, Papanui, were reportedly putting on ‘a great show’. What surprised some onlookers was the sheer number of people in the park that came specifically to look at the butterflies. Obviously the monarch butterfly has wide public appeal. Our aim is to capitalise on this and try to foster an increased awareness and appreciation for other New Zealand insects.

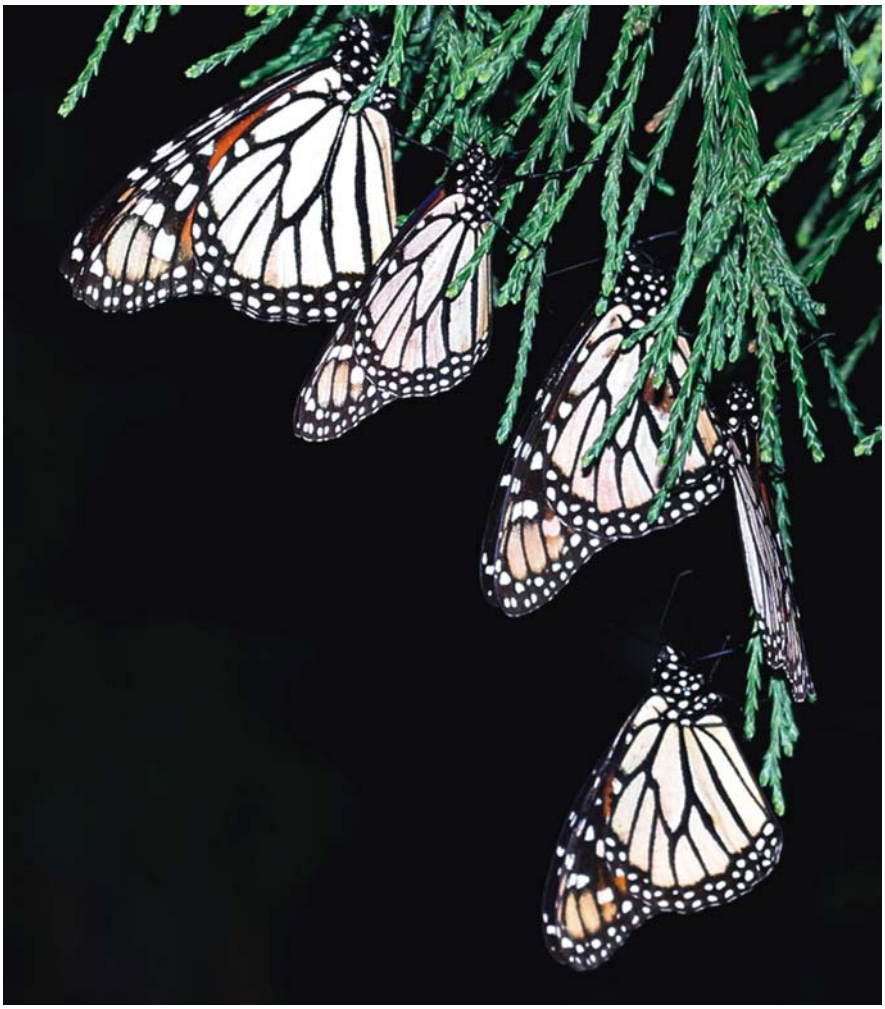

Figure 1. Monarch butterfly aggregation.

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