

Occurrence of *Bombus hortorum* (L.) (Hymenoptera: Apoidea) on Rakiura (Stewart Island)

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This note reports for the first time the occurrence of *Bombus hortorum* on Rakiura SI.



Fig 1. Queen *Bombus hortorum* captured at Oban, Rakiura, when foraging on foxglove flowers (*Digitalis purpurea* L.), on 5 December 2014. The small mites are *Kuzinia laevis* (Dujardin).

On 2 December 2014, two *Bombus hortorum* were seen in foxglove flowers (*Digitalis purpurea* L.) in the village of Oban, Rakiura SI. On 3 December one queen and one worker were captured on brassica flowers (*Brassica* sp.) on the side of Bay Road on the outskirts of Oban, and on 5 December one worker *B. hortorum* was captured on the same flowers at the same site, and one queen was captured on foxglove flowers about two blocks away. Both workers

carry large yellow pellets of brassica pollen, and one worker is dusted liberally on the dorsal area of the mesosoma posterior to the scutellum and over the dorsum of the metasoma with white pollen. Both queens are without pollen in their corbiculae, they show no signs of wear, and there are many mites *Kuzinia laevis* (Dujardin) on one queen (Fig 1), and fewer on the other.

In addition to *B. hortorum*, queen and worker *B. terrestris* (L.) were seen many times, and two workers of this species were captured on 3 December on the roadside brassicas as they collected large pollen pellets.

According to Macfarlane and Gurr (1995), “Dempsey (1967) first recorded bumble bees (species unrecorded) from Stewart I.”. From specimens in insect collections Macfarlane and Gurr (1995) found that worker *Bombus terrestris* were first collected in 1955, which indicated that the species was nesting there, and it was present also on the adjacent Codfish Island and Big South Cape Island.

Both *B. terrestris* and *B. hortorum* (and *B. ruderatus* (F.) and *B. subterraneus* (L.)) were recorded as present in Southland SL (and other areas of New Zealand) by Gurr (1964). Rakiura lies about 30 km across Foveaux Strait from the southern shoreline of Southland near Invercargill, but islands of various sizes lie within the Strait. The largest of these is Ruapuke Island which is 16 square km and which lies 14 km off the coast of Southland and 27 km from Rakiura, but from which bumble bees have not been recorded. Centre Island (= Raratoka Island) is 86 ha. and lies about 8 km from the Southland coast and 25 km from Rakiura, and bumble bees have been recorded present but the species is not known.

Macfarlane and Gurr (1995) found *B. terrestris* present on 16 New Zealand islands (and unidentified bumble bees were present on 3 other islands), but there were no reports for *B. hortorum*, or the other two species of bumble bee present in New Zealand (*B. ruderatus* and *B. subterraneus*). Of the 19 islands, 16 were from 2.3 – 8.3 km offshore, so apparently until the colonisation of Rakiura, *B.*

hortorum has been unable to cross stretches of water greater than 2.3 km. – unless the species is on at least one of the three islands with unidentified bumble bees.

How then did *B. hortorum* reach Rakiura? The most obvious method would be the inadvertent transport of a fertilized queen by aircraft or ships which regularly cross Foveaux Strait from coastal Southland. One or more fertilized queens could have entered aircraft at the airport at Invercargill (or elsewhere in the home range of the species in the South and North Islands), and exited on arrival at the only airstrip near Oban, or at coastal beaches where light aircraft sometimes land. From Invercargill flights to Oban take 20 minutes, and the ferry from Bluff to Oban takes one hour. Queen bumble bees would easily survive the trips.

The absence of wear and the lack of pollen on the two queens captured at Oban indicate that they are new queens which have recently emerged from a colony or colonies, and the presence of workers carrying pollen shows that a colony (or colonies) was established and active. Donovan and Wier (1978) suggested that in the South Island there could be up to three generations of *B. hortorum* nests in one calendar year, so new queens appearing in December nearly certainly would go on to found their own nests that same season.

Using population genetic data, Lye et al. (2011) estimated that the New Zealand *B. hortorum* population originated from an effective 19 queens, with intermediate values of 10-39. Gurr (1972) established the species at Palmerston North WI by releasing 87 queens on 11 November 1965 which were collected in South Canterbury SC. By 1985 bees had reached Upper Hutt WN (Macfarlane pers. obs. unpublished), Hawkes Bay HB by 1989 when first looked for (N. Pomeroy pers. comm. 2010), the Waikato WO by late 2013 (D. Pattemore pers. comm. 2013), and Mamaku, 13 km W. of Lake Rotorua BP, by February 2015 (A. Frost pers. comm. 2015). Macfarlane and Griffin (unpublished) believed that *B. hortorum* did not establish near Blenheim MB from their release of a

total of 229 queens from Canterbury MC in October and December 1979 and October 1980, but the release of 570 queens in 1983 was successful. Also, their release of from 4-12 queens at Nelson NN in November 1981 resulted in establishment.

If only one or a few queens reached Rakiura, then unless more queens also reach the island the present population will soon become very inbred. But the establishment of three new populations, at Palmerston North, near Blenheim, and at Nelson, shows that the species can survive and thrive after being subjected to two genetic bottlenecks. However, whether it can survive an extreme bottleneck of perhaps just one queen founding the population on Rakiura remains to be seen.

References

- Dempsey GW. 1967. *The spell of Stewart Island*. Wellington. A. W. and A. H. Reed. 208 pp.
- Donovan BJ, Wier SS. 1978. Development of hives for field population increase, and studies on the life cycles of the four species of introduced bumble bees in New Zealand. *New Zealand Journal of Agricultural Research*, **21**: 733-756.
- Gurr L. 1964. The distribution of bumblebees in the South Island of New Zealand. *New Zealand Journal of Science*, **7**(4): 625-642.
- Gurr L. 1972. The introduction of bumblebees into North Island, New Zealand. *New Zealand Journal of Agricultural Research*, **15**: 635-638.
- Lye GC, Lepais O, Goulson D. 2011. Reconstructing demographic events from population genetic data: the introduction of bumblebees to New Zealand. *Molecular Ecology*, **20**: 2888– 2900.
- Macfarlane RP, Gurr L. 1995. Distribution of bumble bees in New Zealand. *New Zealand Entomologist*, **18**: 29-36.