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SHORT NOTE

Prevalence and impact of the native blood-sucking louse-fly (*Ornithoica* sp.) on the North Island robin (*Petroica australis longipes*)

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Birds are hosts to many blood-sucking ectoparasites (Loye & Zuk 1991), with these parasites having diverse and wide-ranging effects on the health, reproductive success and behaviour of their hosts (Norris 1991; Oppliger *et al.* 1994; Weddle 2000). The North Island robin (*Petroica australis longipes*) displays common avian anti-ectoparasite behaviours such as auto-grooming, sun-bathing and anting (Kinsky 1957; Walter & Proctor 1999; Berggren 2005; pers. obs.), which suggests that ectoparasites are a significant burden to some individuals. One of the parasites found on North Island robins, the blood-sucking mite *Ornithonyssus bursa*, has been found to retard chick growth and significantly reduce fledging age (Berggren in press).

During a study of robins on Tiritiri Matangi (36°36′S, 174°53′E), an island situated 23 kilometres north of Auckland, another haematophagous ectoparasite was observed in the robin's plumage; the louse fly *Ornithoica* sp. (Rondani) (Diptera: Hippoboscidae) (Fig. 1). Louse flies are common parasites on bird species around the world (Colless & McAlpine 1991). The fly larvae are deposited either on the bird or inside the nest, and spend most of their life in the bird's plumage (Norris 1991). These flies have the potential to cause irritation because of their size (approximate 6 mm long) (Grant 1999), and because more than one can live on the same bird. In spite of its potential impact on birds' wellbeing, in only one New Zealand bird species, the stitchbird (*Notiomystis cincta*), has the frequency of the louse fly been quantified (M. Low pers. comm.). Because the robin population on Tiritiri Matangi Island was closely monitored, it offered an excellent opportunity to answer the following questions: (1) what is the prevalence of louse flies in the Tiritiri robin population? (2) do robin parameters such as age, sex, or body size affect louse fly distribution? and (3) is louse fly distribution affected by seasonal or micro-climatic conditions?

Fifty-six robin fledglings were caught approximately one month after leaving the nest during the 2001/02 breeding season (October – March), and 32 adults were caught during June 2003. Birds were caught using a hand net or spring-loaded trap, with mealworms placed on the ground as a lure and a net brought down over the bird when it came to feed on them. These birds were weighed (± 0.5 g), and measured for tarsometatarsal length (± 0.05 mm) at the time of capture. A body size index was created by dividing each individual's weight by tarsus length (Richner *et al.* 1993). Louse fly presence was determined by inspection of the birds' plumage and noting any louse flies crawling on or escaping from the individual during the 5-10 min measuring procedure. While the absolute numbers of louse flies could not be determined in many cases, it was judged as a relevant index of parasite presence. Two louse fly individuals caught during this procedure have been deposited at the Museum of New Zealand, Te Papa Tongarewa.

A simple index of territory micro-climate was derived to assess the effect of micro-climatic conditions on louse fly prevalence. If a territory was situated on the edge of a forest patch and facing the wet winds from the surrounding sea, or it incorporated an area that was continuously wet throughout the breeding season (creek, swamp) it was given a value of "1". Territories not satisfying these criteria were given a value of "0" for analyses. No parasiticides had been applied to the birds or their nests since the population was introduced.

The presence of flies was treated as a categorical variable for all analyses (presence/absence). A Mann-Whitney U-test examined the relationship between louse fly presence on time of breeding season and individual body size. A Fisher's exact test assessed the significance of territory micro-

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climate and sex on louse fly presence. Juveniles and adults were analysed separately except when analysing the effect of sex on fly presence. Sample sizes varied among tests as data could not be obtained for all individuals. All analyses were carried out using JMP (JMP 1995).

Of the robins monitored in this study, seven (12.5%) juveniles and four (12.5%) adults had a detectable level of louse fly infestation; a lower number than recorded in stitchbirds where 31 - 68% were parasitised (M. Low pers. comm.). The number of louse flies detected per individual ranged from one to four. There was no effect of sex on the presence of the parasite (males 4.5%, females 8%: Fisher's exact, $\chi^2 = 0.94$, $n = 88$, $P = 0.52$). Seasonal effect on likelihood of louse fly detection was significant; while juveniles were surveyed from October to March, only in February and March were louse flies detected (date birds examined, mean ± SD; for birds without flies 27 December ± 39 days, $n = 48$, *c.f.* birds with flies 12 February ± 33 days, $n = 7$: Mann-Whitney U, $z = 2.74$, $n = 55$, $P = 0.006$). As most louse flies are transferred from parents to chicks as nymphal lice (Lee & Clayton 1995), the presence of the parasite late in the breeding season might be a reflection of this life cycle. There was no effect of the presence of louse flies on the body size of juveniles (Mann-Whitney U, $z = 1.34$, $n = 55$, $P = 0.18$) or adults (Mann-Whitney U, $z = -1.34$, $n = 32$, $P = 0.17$). This suggests that the flies do not differentially parasitise smaller (and possibly lower quality) individuals and louse fly parasitism does not affect growth. There was a significant effect of micro-climate on the presence of louse flies, with parasites more likely to be present on juveniles in wetter territories (Fisher's exact test, $\chi^2 = 5.03$, $n = 52$, $P = 0.04$). This effect of micro-climate was not seen in the winter in adults (Fisher's exact test, $\chi^2 = 0.65$, $n = 32$, $P = 0.61$). This supports earlier findings (Berggren in press), where the frequency of another ectoparasite *O. bursa*, was positively correlated with humidity during the warm summer months.

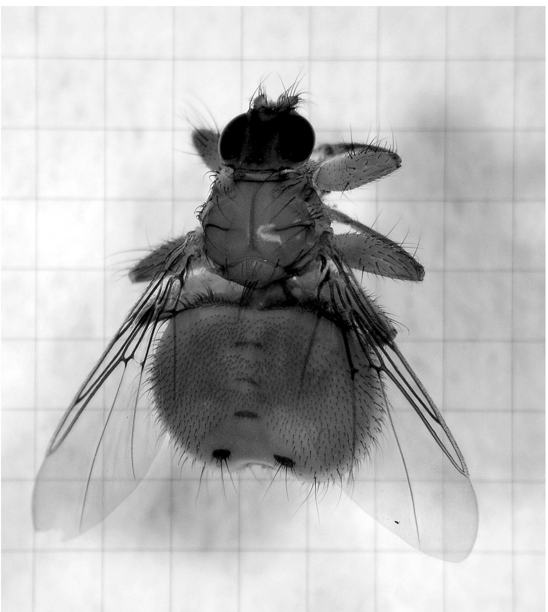

Figure 1 Dorsal view of the ectoparasitic louse fly *Ornithoica* sp. (Diptera: Hippoboscidae). The background grid is 1 x 1 mm.

Louse flies in birds have been found to be vectors for both blood parasites (Votypka *et al.* 2002) and skin parasites (Jovani *et al.* 2001). Thus, even if the louse fly does not directly harm the host, its presence may increase exposure to pathogenic parasites.

Prior to this study, only one investigation of parasites on North Island robins had been carried out (Berggren in press). In New Zealand, few studies have assessed the frequency and impact of parasites on bird fitness (but see Powlesland 1977; Stamp *et al.* 2002), thus it is difficult to generalise the importance of these invertebrates on productivity on New Zealand's avifauna. These effects are important to quantify, as management decisions regarding the treatment, or lack thereof, of parasites in native species are currently based on incomplete data. Consequently, more research, focused on the frequency and effect of parasites in endemic species, is appropriate.

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