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The Mallophaga of Leach's Petrels *Oceanodroma leucorhoa* from North Rona, Scotland.

J. A. Fowler and D. Hodson

The frequency distributions and population structures of Mallophaga infesting a number of procellariiform species have been described. Frequency distributions conform with a negative binomial distribution which suggests a "fundamental model" upon which, for example, more accurate statistical analyses (by means of precise data transformations) may be contemplated. Examination of Mallophagan population structures – especially those obtained from a series of consecutive samples – is a means of investigating population dynamics and may even provide an insight into the relationship between the ectoparasite and the host itself (see, for example, Fowler & Price, 1987, for a review of recent work in this field).

The Mallophagan populations of British breeding procellariiform species were described by Fowler & Miller (1984). However, only 7 Leach's Petrels *Oceanodroma leucorhoa* were deloused in that study. This paper describes the frequency distribution and population structure of Mallophaga collected from a much larger sample.

METHODS

Leach's Petrels were mist netted in the vicinity of the old village on North Rona, Western Isles (59° 10′N, 05° 48′W) between 3-17 July 1987. Catches were sometimes augmented by the use of a tape lure. It was not possible to assign individuals to age, sex or breeding class categories. Birds were deloused in glass vessels saturated with ethyl acetate vapour, exactly as described by Fowler & Cohen (1983). Ectoparasites thus removed were stored in 70% ethanol.

RESULTS

One hundred Leach's Petrels were deloused, yielding 149 Mallophaga. All but nine of these were *Halipeurus pelagicus* Denny 1842, for which the mean ($\bar{x}$) was 1.4 per bird, the variance (s^2) 3.04 and the median 1.7. The remaining Mallophaga comprised *Saemundssonia incisa* (8) and *Austromenopon* sp.(1) These lice are found on a number of small petrel species (R.L. Palma pers. comm.) The frequency distribution of *Halipeurus pelagicus* is shown in Figure 1A, together with the expected frequencies (closed circles) of a negative binomial distribution based on the exponent $k=1.121\pm0.397$ estimated from the sample data. The observed distribution is clearly in excellent agreement with that predicted by the negative binomial model ($X^2=1.55$, 3.d.f.,NS).

Individuals of *Halipeurus pelagicus* were readily sorted into size classes corresponding to 1st, 2nd, 3rd instar nyumphs, adult males and adult females. The population structure is depicted in Figure 1B, and reveals a structure dominated by older age-classes.

DISCUSSION

It is of interest that the dominant louse on the Leach's Petrel is the "elongate" *Halipeurus pelagicus* – the same species as the dominant louse on the Storm Petrel *Hydrobates pelagicus*.

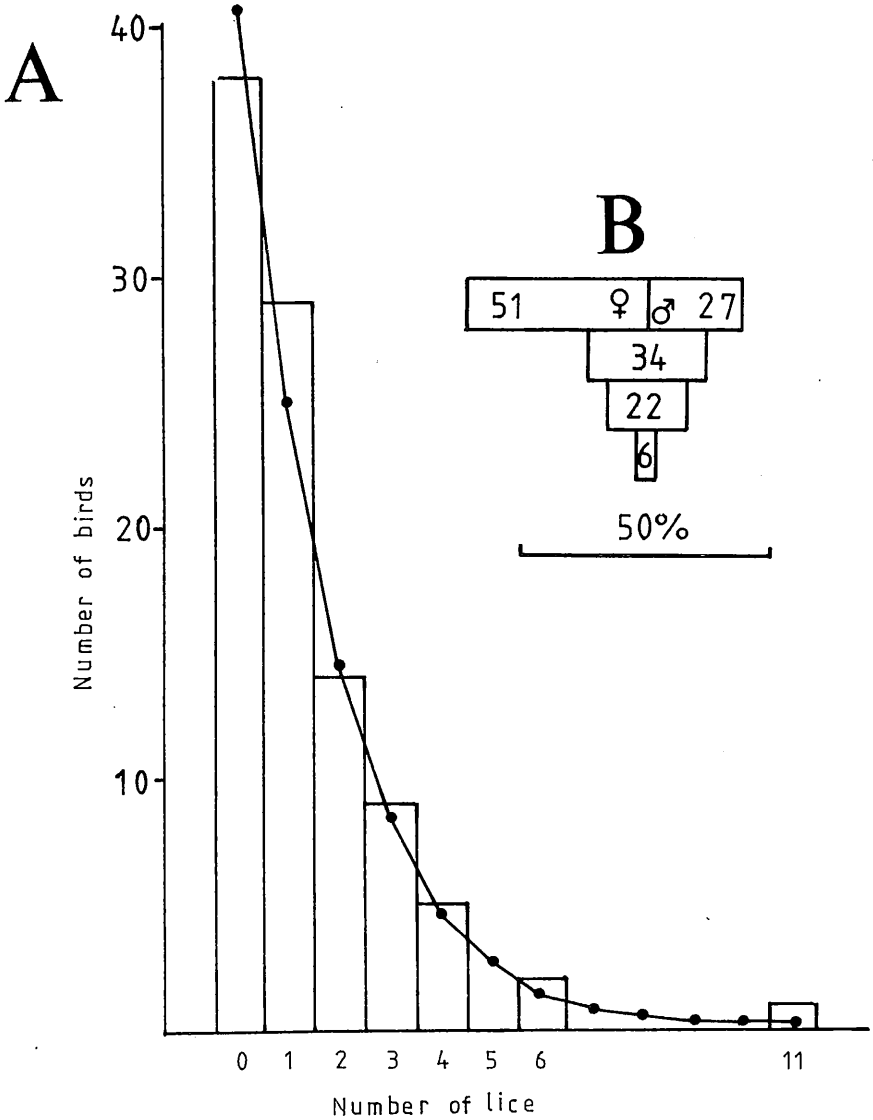

Fig. 1 A: Frequency distribution of *Halipeurus pelagicus* on Leach's Petrels. Joined closed circles are the expected frequencies of a negative binomial distribution; B (inset) : Population structure of *H.pelagicus* on Leach's Petrels in July 1987; each "tier" in the structure represents, in ascending order, 1st, 2nd, 3rd instar nymphs, adults. Numbers within the structures are the numbers of lice obtained.

The close agreement of the frequency distribution of the louse on Leach's Petrels with a negative binomial model comes as no surprise (e.g. Fowler & Price, 1987). However, the values of the mean and binomial exponent, k, are considerably lower than for similar Mallophaga on Storm Petrels and Wilson's Petrels *Oceanites oceanicus*, and result in a very much more positively skewed distribution, in which most individuals have zero or few lice, but in which most lice are found on a few birds.

The population structure of *Halipeurus pelagicus* is clearly dominated by adult classes. The proportion of nymphs in a louse population peaks when the population is in a vigorously reproducing phase (Marshall, 1981). When reproduction rates decline, so too does the proportion of nymphs, as their more ephemeral instars moult into the longer-lived adults. The structure observed therefore suggests that, at the time of sampling, breeding activity was waning, corresponding to the observations of *Philoceanus robertsi* on Wilson's Petrels *Oceanites oceanicus* in January and *Halipeurus pelagicus* on Storm Petrels in September (Fowler & Price, 1987).

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SUMMARY

The frequency distribution of an elongate feather louse *Halipeurus pelagicus* infesting Leach's Petrels conforms well with a negative binomial model. Its population structure suggests that, in July, the louse is in a declining state of breeding activity.

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J.A. Fowler and D. Hodson, The David Attenborough Laboratories, Leicester Polytechnic, Scraptoft, Leicester LE7 9SU.