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ACQUISITION OF MALLOPHAGA BY RING-BILLED GULL CHICKS, LARUS DELAWARENSIS

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ABSTRACT

Ninety Ring-billed Gull chicks, *Larus delawarensis*, Ord, were examined for lice during their first 30 days post hatching. Chicks as young as one day old were found to harbour *Saemundssonia lari* (Giebel 1874). Infestation peaked between the 3rd and 9th day of age, subsequently there was a significant decline in both prevalence and number of lice per host.

INTRODUCTION

Seasonal peaks in mallophagan populations have long been known to be associated with the reproductive activity of avian hosts (e.g. Ash 1960, Everleigh and Threlfall 1976, Woodman and Dicke 1954), and the synchrony has been interpreted as an adaptation enabling the parasite to efficiently exploit the new host generation (Foster 1969, Hood and Welch 1980). This report concerns observations on the acquisition of lice (Mallophaga) by Ring-billed Gull chicks, *Larus delawarensis*, during the 30 days post hatching.

MATERIALS AND METHODS

The study site was located on the western periphery of the Ring-billed Gull colony at the Port of Rogers City, Presque Isle County, Michigan, and contained 314 nests. This area was divided into three areas containing nearly equal numbers of nests. During the 1982 breeding season, 200 one-day old chicks were marked with colored cellulose tape loosely applied to either or both legs. Chicks of known age were then sampled one per day from each sub-area for 30 days. Chicks were sacrificed, placed in separate plastic bags to contain all lice which might migrate post-

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mortem, carried to a field laboratory, and refrigerated at approximately 5°C until examined. All chicks were examined within 5 hours.

Chicks were examined with the aid of a stereoscopic microscope while deflecting the down and feathers with forceps and fine toothed-comb. All lice recovered were preserved in 70% ethanol. To facilitate microscopic examination they were passed through increasing concentrations of ethanol to xylene and mounted in synthetic resin (Permount). The frequency distribution of lice per chick was considered using goodness of fit tests to the Poisson distribution. Correlation analysis for trends in abundance was performed using the General Linear Models procedures of the Statistical Analysis System (SAS 1982). For analysis of trends in prevalence the collection was divided into 5 periods of 6 days each, and subjected to Kolomogrov-Smirnov goodness of fit test.

RESULTS

One hundred ninety-nine adults and nymphs of *Saemundssonia lari* (Giebel 1874) were recovered from 35 of 90 (39%) chicks examined (=5.2 per infested chick, range 1-18). Lice were collected from chicks of all ages, but no nits (lice eggs) were observed.

The frequency distribution of lice on the nesting chicks did not conform to a random distribution. Goodness of fit test to the Poisson distribution found lice to be nonrandomly distributed throughout the sample ($P = 0.001$).

The intensity of the infestation appeared to peak between the 3rd and 9th day of age (Fig. 1), and there was a significant ($P = 0.05$) negative correlation between the number of lice per infested bird and age ($r = 0.295$). Kolomogrov-Smirnov goodness of fit tests indicated that the observed order in the frequencies of the 5 groups was unlikely to be due to chance ($0.005<P<0.01$).

DISCUSSION

Saemundssonia lari were acquired by Ring-billed Gull chicks as young as 1 day of age. This agrees with the work of other authors for different species of birds and lice (Everleigh and Threlfall 1976, Markov 1937, van den Brock 1967). However, early transfer is not in itself remarkable. Preening activity of adult gulls is likely to deposit lice throughout the vicinity of the nest. Uninjured Mallophaga are quite active, and may be quite capable of relocating in the nest. During this study lice were observed on unhatched gull eggs and among nest materials.

The distribution of lice in the sample was not remarkably unlike that reported for lice on Puffins, *Fratercula artica* by Everleigh and Threlfall (1976), and is roughly a hollow curve as predicted for parasites by Williams (1964). However, such hollow curves are found in many distributions when the mean frequency is small. Testing for goodness of fit to distributions such as the negative binomial was not considered, because such tests cannot in themselves distinguish between spatial and temporal distributions and the aggregation of lice in time (i.e. the early age groups) was obvious.

Prevalence and intensity both peaked between the 3rd and 9th days of age, prior to which time chicks were observed to spend a substantial time beneath the brooding adults. By the time chicks were no longer brooded they achieved sufficient coor-

dination to effectively preen. While the intimate association between adult and chick provides ample opportunity for infestation, it is interesting to note that after a week to 10 days the chicks spent little time being brooded, and the percentage of infested chicks over this age fell from 72% to 11%. In a similar study of Black-headed Gull chicks, *Larus ridibundis*, van den Broek (1967) also found the number of lice per chick to decline as chicks aged. It appears that the association of chicks and parents is indeed an important feature affecting the efficiency of mallophagan transfer.

In terms of mallophagan population dynamics the acquisition of lice by a host is only the first step in establishing a new infrapopulation. In order for the colonization to be successful the mallophaga must also reproduce. Unless offset by recruitment of new individuals the decline in population, due perhaps to a combination of host preening activity, reduction in immigration rate, and mortality, will lead to local extinction. The best evidence of mallophagan reproduction is the presence of nits on the feathers or down. In the current study no nits were observed. Van den Broek (1967) did find nits on Black-headed Gull chicks of all ages. Future studies concerning the phenology of colonization of new host individuals and dynamics of mallophagan populations should be directed at establishing the timing of lice reproduction on juvenile birds.

The observed population trend of *S. lari* on Ring-billed Gull chicks was substantially different from the expected. Populations declined both in terms of number of infected hosts and number of lice per host, suggesting that adult-to-chick transfer of *S. lari* to *L. delawarensis* occurs soon after the hosts hatch. The decline in density was temporally, if not causually, associated with the end of the host brooding period. The timing of establishment of mallophagan populations as evidenced by nits was not determined.

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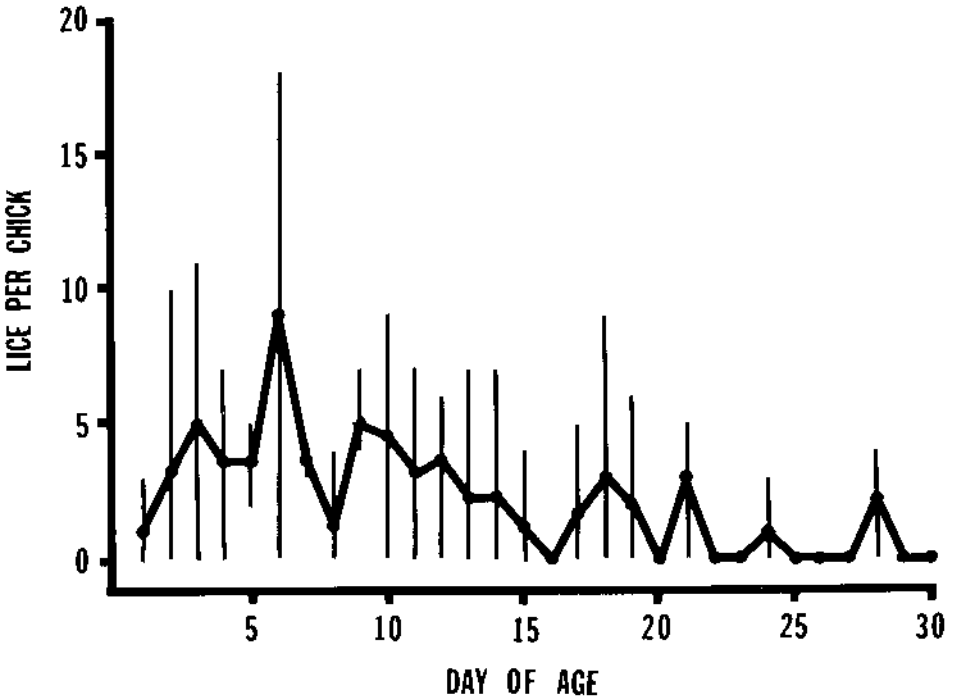

Fig. 1. Number (mean and range) of *Saemundssonia lari* on Ring-billed Gulls during the 30-day period post hatching.