

The ectoparasites of some marine birds from Bamfield Marine Station, British Columbia, with particular reference to the common murre, *Uria aalge* (Pont.)

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Six espèces of birds from the region of the Bamfield Marine Station, British Columbia, were examined for ectoparasites. A total of seven species of Mallophaga belonging to five genera (*Saemundssonina*, *Austromenopon*, *Cummingsiella*, *Anatoecus*, and *Anaticola*) were recovered. One flea (*Mioctenopsylla traubi*, Siphonaptera), feather mites of the genus *Zachvatkinia*, other mites of the genera *Ameronothrus*, *Cymbaeremaeus*, and *Rhinonyssus*, and ticks of the genus *Ixodes* were also identified. Each host species and its ectoparasites are discussed separately. Differences in the ectoparasite burdens of juveniles and adults of both sexes of the common murre, *Uria aalge* (Pont.), are compared and contrasted.

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Six espèces d'oiseaux de la région de la Station Marine de Bamfield, Colombie Britannique, ont été examinées afin d'en étudier les ectoparasites. Sept espèces de Mallophages appartenant à cinq genres (*Saemundssonina*, *Austromenopon*, *Cummingsiella*, *Anatoecus* et *Anaticola*) y ont été identifiées. Une puce (*Mioctenopsylla traubi*, Siphonaptera), des acariens des genres *Zachvatkinia*, *Ameronothrus*, *Cymbaeremaeus*, *Rhinonyssus* et *Ixodes* ont également été trouvés. Le parasitisme est étudié chez chacune des espèces hôtes. Chez la marmette commune, *Uria aalge* (Pont.), le fardeau de parasites diffère selon qu'il s'agit d'oiseaux immatures ou adultes, de mâles ou de femelles.

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Introduction

The mallophagan fauna of the marine birds of Canada is poorly understood and, with the exception of papers by Eveleigh and Threlfall (1976), Fitzpatrick and Threlfall (1977), and Eveleigh and Amano (1977), virtually no information exists in the literature concerning this important group of ectoparasites. As part of a long-term, continuing study of the marine birds of the West Coast by the British Columbia Provincial Museum, an opportunity was provided during the summers of 1976 and 1977 to examine some birds for their ectoparasite burden, to determine the degree of infestation, and to determine the distribution of each species of parasite on its host. In order to determine whether or not adult and juvenile birds would show differing degrees of infestation, the common murre, *Uria aalge* (Pont.), one of the most numerous and accessible species in the area, was chosen for a comparative study.

The large populations of feeding marine birds in the Barkley Sound provide available and accessible sources of hosts during the summer months. Using a variety of collecting techniques individual birds were examined for total ectoparasite load and for

the distribution of each species of parasite within and between different morphological regions of the host. In two species the nest contents were also examined for ectoparasites. The following species of birds were studied: (1) common murre (*Uria aalge* (Pont.)), (2) pelagic cormorant (*Phalacrocorax pelagicus* Pallas), (3) California gull (*Larus californicus* Lawrence), (4) glaucous-winged gull (*Larus glaucescens* Naumann), (5) parasitic jaeger (*Stercorarius parasiticus* (L.)), and (6) harlequin duck (*Histrionicus histrionicus* (L.)).

Materials and Methods

The birds were collected mostly in the vicinity of Bamfield Marine Station (49°50' N, 125°8' W), by a number of techniques including shooting and "nest-trapping" (Table 1). Some dead birds, either floating or washed onto the shore, were also examined but included in the results only if in reasonably fresh condition. Collected specimens were treated according to the methods of Mehl (in Haarløv 1977) whereby the birds were placed individually in labelled plastic bags containing chloroform, thus preventing any further movement of the ectoparasites. On returning to the laboratory, the contents of each bag were either checked immediately for the presence and distribution of ectoparasites or frozen for future examination.

To determine the distribution of parasites the methods of Eveleigh and Threlfall (1976) were used, whereby the host was divided arbitrarily into 12 morphological regions (Fig. 1). Plac-

- | | |
|----------------|-----------|
| 1 CROWN | 7 BACK |
| 2 AURICULAR | 8 BREAST |
| 3 GULAR | 9 ABDOMEN |
| 4 NAPE | 10 WINGS |
| 5 JUGULUM | 11 LEGS |
| 6 SIDE OF NECK | 12 TAIL |

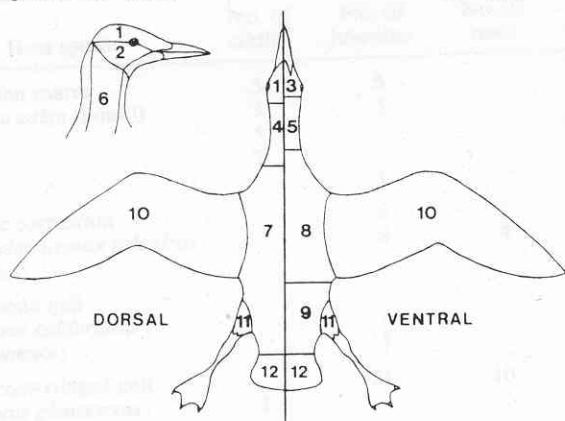


FIG. 1. Body regions of hosts (from Eveleigh and Threlfall (1976)).

ing the bird against a white background, each region was then carefully and systematically scrutinized by deflecting the feathers with forceps, removing any parasites seen, and placing them in 70% ethanol. The bird was then weighed. Four to six representative parasites from each group were mounted on microscope slides for identification.

Results and Discussion

Three groups of ectoparasites, Mallophaga (lice), Siphonaptera (fleas), and Acarina (ticks and mites) were recovered from the six species of birds examined. Each host species and its ectoparasite load are discussed separately below:

(1) Common Murre, *Uria aalge* (Pont.)

The comparative data presented in Table 2 refer only to the shot birds, and the pairing of adult and juvenile classes was done on the basis of kinship, a single adult and its young per nest. All 25 *U. aalge* specimens examined were infected with Mallophaga belonging to three different species: *Saemundssonina calva* (Kellogg), *Austromenopon uriae* Timmermann, and *Quadriceps* (= *Cummingsiella*) *obliquus* (Mjoberg). These were identified to genus by the Biosystematics Research Institute Ottawa, and subsequently identified to the species level by comparison with specimens in the Spencer Memorial Museum, University of British Columbia, Vancouver. Timmermann (1972, 1974) considers the genus *Quadriceps* synonymous with *Cummingsiella* and for the sake of consistency with Eveleigh and Threlfall (1976) and Eveleigh and

Amano (1977) who have adopted this nomenclature, the latter generic assignment will be used.

Saemundssonina calva, the so-called "head" louse of the common murre, was the least common and most restricted in distribution of the three species. It was found primarily on the crown, auricular, and gular regions (regions 1, 2, and 3, respectively) usually clinging to the skin. Ash (1960) has noted that some Mallophaga will actually bite and penetrate the skin causing damage to the bird. Only 56% of the birds examined were infested and only at low levels of infestation, a mean value of 1.9 per bird, within the range 1-4. These data are almost identical with those obtained for *S. calva* on *U. aalge* on the east coast of Canada by Eveleigh and Threlfall (1976). In contrast with that study, however, this species of ectoparasite was also recovered from juvenile birds, 75% of those examined being infested at a mean rate of 2.2 per bird, range 1-4.

All common murres examined, except two adults, harboured *Austromenopon uriae*, the mean total per bird being 5.6, within the range 1-13. One of these two adults also lacked *S. calva* and the other had only a single specimen present. *Austromenopon uriae* was more prevalent than *S. calva*, particularly among the juvenile stages. Its distribution was also different, being found primarily in the jugulum, back, breast, and abdomen areas (regions 5, 7, 8, and 9, respectively). Thus there was little overlap in distribution between these two species. The juveniles were almost three times more heavily infested than adults, the mean parasite burden of *A. uriae* being 7.25, within the range 1-13, while for adults it was 2.5, within the range 0-5. Again these results are, in general terms, very similar to those of Eveleigh and Threlfall (1976). A difference in degree of infestation, however, seems to occur between the east and west coast common murres, the east coast members being more heavily burdened with *A. uriae* (chicks, mean 15.8, range 11-21; adults, mean 3.5, range 1-23). This could be attributed to seasonal variation in degree of infestation, as has been demonstrated for other mallophagans on the common puffin (*Fratercula arctica* (L.)), the dovekie (*Plautus alle* (L.)), and the thick-billed murre (*Uria lomvia* (L.)) (Eveleigh and Threlfall 1976).

Cummingsiella obliqua (= *Quadriceps obliquus*) was by far the most abundant of the three mallophagan species on *U. aalge* (Table 2). Like *A. uriae* it was most prevalent on regions 5, 7, 8, and 9, and the two species were found intermingled in these body regions. These so-called "body" lice

TABLE 1. Details of host species of birds examined during the study

Host species	No. of adults	No. of juveniles	No. of nests	Locality	Date collected	Method of capture
Common murre (<i>Uria aalge</i> (Pont.))	5	5		Cape Beale	19 Aug. 1977	Shot
	3	3		Cape Beale	24 Aug. 1977	Shot
	5			Trevor Channel	10 Aug. 1976	Found dead
	3			Trevor Channel	16-20 Aug. 1977	Found dead
		1		Cape Beale	5 Aug. 1977	By hand
Pelagic cormorant (<i>Phalacrocorax pelagicus</i> Pallas)		6	3	Bearia Rocks	11 Aug. 1976	By hand
		8	4	Edward King Island	17 Aug. 1977	By hand
California gull (<i>Larus californicus</i> Lawrence)		1		Bamfield Inlet	10 Aug. 1976	Found dead
Glaucous-winged gull (<i>Larus glaucescens</i> Naumann.)	1	21	10	Bearia Rocks	16 Aug. 1977	By hand
				University of Victoria	8 Feb. 1978	Found dead
Parasitic jaeger (<i>Stercorarius parasiticus</i> (L.))	1			Victoria	10 Aug. 1976	Shot
Harlequin duck (<i>Histrionicus histrionicus</i> (L.))	6			Victoria	7 Mar. 1978	Shot

TABLE 2. Numbers of ectoparasites on eight pairs of common murrelets

	Pairs of common murrelets															
	1		2		3		4		5		6		7		8	
	A, 1.00	J, 0.76	A, 1.08	J, 0.71	A, 0.97	J, 0.76	A, 1.07	J, 0.57	A, 1.17	J, 0.80	A, 0.99	J, 0.61	A, 1.11	J, 0.84	A, 0.83	J, 0.92
<i>Saemundsonia calva</i> (1, 2, and 3)*	0	0	0	0	2	4	0	3	1	1	1	1	0	2	0	2
<i>Austromenopon uriae</i> (5, 7, 8, and 9)*	2	1	4	10	5	12	4	13	4	4	0	1	1	5	0	12
<i>Cummingsiella obliqua</i> (5, 7, 8, and 9)*	94	17	18	105	25	47	9	17	7	3	6	7	6	52	20	94
Total	96	18	22	115	32	63	13	33	12	8	7	9	7	59	20	108

NOTE: The letters A and J stand for adult and juvenile stages, respectively. The number following, in each case, is the weight in kilograms.
*The numbers refer to body regions (see Fig. 1).

were readily distinguished, however, not only by taxonomic criteria (they belong to different suborders of Mallophaga), but also by the fact that *C. obliqua* is quite sedentary when compared with *A. uriae* which moves rapidly among the feathers when disturbed. *Cummingsiella obliqua* was present on every bird examined at a mean level of 32.9 per individual, within the range 3-105. Juvenile birds (mean 42.8, range 3-105) were, on average, twice as heavily infested as adult birds (mean 32.1, range 6-94). These results confirm the observation of Eveleigh and Threlfall (1976) that *C. obliqua* is the dominant mallophagan on *U. aalge*.

Not all mallophagan species occurred with equal frequency. Of the 16 infested adult murrelets, 87.5% were infested by more than one species, 62.5% being infested by two species (principally *A. uriae* and *C. obliqua*), and 25% by all three species. Of the eight juveniles shot every individual had at least two species of mallophagans and six birds had all three. In contrast with the results of Eveleigh and Threlfall (1976), two adult murrelets were found to harbour only *S. calva* and *C. obliqua*, 10 hosts (41.7%) harboured *A. uriae* and *C. obliqua* only, while none was found to harbour only *S. calva* and *A. uriae*. Total numbers of mallophagans per com-

mon murrelets were seen the average individual, double mean value (range breeding also reached alcid species examine load on the consider counterp lice per m average this may the host-studies co and habit nester wi (Eveleigh) A juve among ke with the t and fed w it died 3 gorged tic a causal r site burde (1976) hav tion (722 common r ward its de Bamfield l these birds *Cymbaeren* close in ch nikova, 19 One speci mite, *Rhino*

(2) *Pelagicus Pallas*

Seven ne either on the caves on Ed All of the r larvae, pupa *traubi* Ho Ceratophyll nest, howev toparasites. that adult *M* feed, and spe is the first

mon murre are presented in Table 2, and it can be seen that all birds were hosts to ectoparasites, the average level of infestation being 39 lice per individual, range 7-115. Juvenile birds had exactly double the ectoparasite burden of adults, with a mean value of 52 (range 8-115) compared with 26 (range 7-96). This suggests that ectoparasite breeding occurs on immature hosts, a conclusion also reached by Eveleigh and Threlfall (1976) for all alcid species, except the razorbill (*Alca torda* L.), examined in their study. The overall mallophagan load on the west coast common murre seems to be considerably higher than that on its east coast counterpart, 100% infestation with an average of 39 lice per host compared to 82% infestation with an average of 10 lice per host. Once again, however, this may be due to seasonal variations both within the host-parasite relationship and between the two studies concerned. It could also be due to the habits and habitats of the host, since *U. aalge* is a ledge nester with frequent contact between individuals (Eveleigh and Threlfall 1976).

A juvenile common murre found floundering among kelp on 5 August 1977 was heavily infested with the tick, *Ixodes uriae*. The bird was captured and fed with fish for 3 days, but despite these efforts it died 3 days later. Approximately 180 fully engorged ticks were removed, and one can only infer a causal relationship between the heavy ectoparasite burden and mortality. Eveleigh and Threlfall (1976) have also suggested that a heavy lice infestation (722 *Austromenopon uriae* specimens) on a common murre chick could have contributed toward its death. Many dead birds are handed into the Bamfield Marine Station by fishermen. Some of these birds were found to harbour the oribatid mite, *Cymbaeremaeus* sp., and an undescribed species close in characters to *Ameronothrus oblongus* Sitnikova, 1975, (Norton, personal communication). One specimen also harboured a mesostigmatid mite, *Rhinonyssus* sp.

(2) *Pelagic Cormorant, Phalacrocorax pelagicus Pallas*

Seven nests of the pelagic cormorant were found either on the cliffs of Bearia Rocks (1976) or in caves on Edward King Island (1977) (see Table 1). All of the nests inspected were found to harbour larvae, pupae, and adults of the flea *Mioctenopsylla traubi* Holland and Jellison (Siphonaptera, Ceratophyllidae). The juvenile birds checked in the nest, however, were free of fleas and other ectoparasites. Rothschild and Clay (1961) have noted that adult *M. traubi* remain on the host only to feed, and spend most of their time in the nest. This is the first Canadian record of this species of

siphonapteran, although it has been recorded previously from the nests of kittiwakes (*Rissa* sp.) on the Pribiloffs and from a cormorant's nest on Cook Inlet, Alaska (Holland, personal communication). It is also known from *Phalacrocorax* taken in the Kurils, U.S.S.R. (Holland, personal communication).

(3) *California Gull, Larus californicus Lawrence*

One newly killed juvenile California gull was examined, and was found to harbour many *Cummingsiella punctata* (Timm.). They were distributed mainly over body regions 5, 6, 7, 8, and 9.

(4) *Glaucous-winged Gull, Larus glaucescens Naumann*

Twenty-one juvenile gulls were examined by hand in the nest and only one harboured an ectoparasite. This was a single specimen of the tick *Ixodes uriae* (White) located on the jugular area (region 5) of the young gull. Later, a newly killed adult male gull became available and it also proved to be host to a single ectoparasite specimen, the mallophagan *Saemundssonina* sp. (*S. lari* ?) located on the nape of the neck (region 4).

(5) *Parasitic Jaeger, Stercorarius parasiticus (L.)*

A single specimen of *Saemundssonina* sp. was recovered from a parasitic jaeger. Feather mites of the genus *Zachvatkinia* were found attached in various locations. They may be *Zachvatkinia stercorarii* (Dubinin, 1949); however, the genus *Zachvatkinia* needs revision (W. T. Atyeo, personal communication). *Zachvatkinia stercorarii* has already been reported from *Stercorarius pomarinus*, *Catharacta loennbergi*, and *C. macormacki* (W. T. Atyeo, personal communication).

(6) *Harlequin Duck, Histrionicus histrionicus (L.)*

Six harlequin ducks were checked and found to harbour two species of Mallophaga: *Anatoecus* sp. found only on the head region, and *Anaticola crassicornis* (Scopol.) over the whole body. Neither species has been previously recorded from this host.

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