Ectoparasites of the Pelagic Cormorant, *Phalacrocorax pelagicus*, from the Pribilof Islands, Alaska

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ABSTRACT Ectoparasites of the Pelagic Cormorant, *Phalacrocorax pelagicus* Pallas, collected from St. Paul Island, Alaska, included two species of insects and five species of acarines. Astigmatid mites, *Neottialges pelagicus* OConnor and *Scutomegninia* sp. (undescribed), were the most abundant group of ectoparasites. The majority of *N. pelagicus* were collected from the breast and belly, whereas a feather mite, *Scutomegninia* sp. (undescribed), was recovered almost exclusively from the wings. Two species of ticks, *Ixodes uriae* White and *Ixodes signatus* Birula, formed the second most numerous group and showed a pattern of space partitioning. Two chewing lice, *Pectinopygus insularis* Clay and *Eidmanniella pellucida* (Rudow), and one cryptostigmatid mite, *Ameronothrus nidicola* Sitnikova, which seems to be a facultative symbiont, were relatively rare. A dissolution technique for ectoparasite extraction is described in detail.

KEY WORDS *Phalacrocorax pelagicus*, ectoparasites, collection technique

THE PELAGIC CORMORANT, *Phalacrocorax pelagicus* Pallas, is a small cormorant with a wide geographic distribution. It breeds from northern Siberia to southern China, and from the Bering and Chuckchi Seas in Alaska to the Channel Islands in California (Godfrey 1966). Although pelagic cormorants do not nest on the Pribilof Islands, they are often sighted in the vicinity (Hunt et al. 1981). The Bering Sea population is estimated at ca. 48,000 (Sowls et al. 1978). Despite their abundance and wide distribution, little is known about their ectoparasites. In this paper, we present new information on the species composition and relative abundance of the ectoparasite fauna of pelagic cormorants from St. Paul Island of the Pribilof Islands (56°35′–57°11′N, 169°35′–170°24′W) in the eastern Bering Sea, Alaska, where the summer temperature normally ranges from 3 to 10°C and summer weather is mostly foggy and drizzling (Barth 1956).

Materials and Methods

Four fully grown adult (sex unknown) pelagic cormorants were collected from St. Paul Island, Alaska, in July 1980. They were shot off the coastal cliff, immediately placed in individual plastic bags and frozen, and kept frozen until ectoparasites were extracted.

In the laboratory, the birds were thawed, and each was sectioned into six different body regions (Fig. 1): head, neck, back, breast and belly, crissum (cloacal region) and tail, and wings. Ectoparasites were extracted by a dissolution technique modified from Cook (1954). Each section of skin was cut into pieces (ca. 5 cm^2) and mixed with 500 ml of 0.5% trypsin buffered to pH 7.5 with Na_2HPO_4 in a separate metal beaker (2,000 ml). After the skins were soaked at 37–38°C for 24 h, 500 ml of 5% KOH solution were added to each beaker and the mixture was boiled until both skin and feathers were completely dissolved. Ectoparasites were not dissolved because their exoskeleton is composed of chitinous carbohydrates. The boiled solution was filtered through a bronze screen (80 mesh). Ectoparasites and incidental arthropods were recovered from the filtrate under a dissecting microscope. This technique enabled us to recover the entire population of ectoparasites from the study birds. Species identification of all ectoparasites was made or confirmed by specialists. Representative voucher specimens of the ectoparasites are deposited in the Frost Entomological Museum at The Pennsylvania State University.

Results and Discussion

A total of 1,275 ectoparasites was collected from the four pelagic cormorants (i.e., each bird harbored a mean of 318.75 ectoparasites [Table 1]). The ectoparasite community consisted of two species of insects and five species of acarines. The insect fauna was represented by two species of lice (Mallophaga), *Pectinopygus insularis* Clay and *Eidmanniella pellucida* (Rudow), and composed

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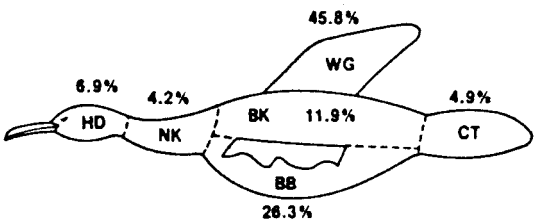

HD - Ixodes signatus
NK - Ixodes uriae
BK - Ixodes uriae, Neottialges pelagicus, Pectinopygus insularis
BB - Neottialges pelagicus
CT - Ixodes uriae
WG - Scutomegninia sp., Neottialges pelagicus, Ixodes uriae

Fig. 1. Total ectoparasite distributions (percent) and list of dominant ectoparasite species in six body regions of the Pelagic Cormorant: HD, head; NK, neck; BK, back; BB, breast and belly; CT, crissum and tail; and WG, wings.

only 3.1% of the total community. With respect to relative frequencies, the ectoparasite community was dominated by acarines (96.9%): *Ixodes uriae* White, *Ixodes signatus* Birula (Metastigmata); *Scutomegninia* sp. (undescribed) (Avenzoariidae), *Neottialges pelagicus* OConnor (Astigmata: Hypoderatidae); *Ameronothrus nidicola* Sitnikova (Cryptostigmata: Ameronothridae). Two species of astigmatid mites, including hypoderatid mites and feather mites, formed the most abundant taxa (67.7%). The second most abundant group included the two congeneric species of ixodid ticks (28.2%). One species of a nonparasitic cryptostigmatid mite (1.1%) was very rare.

The wings (45.8%) and breast and belly (26.3%) supported most individual ectoparasites, whereas relatively few were on the back (11.9%), head (6.9%), crissum and tail (4.9%), and neck (4.2%) (Fig. 1). The two species of chewing lice and a feather mite, *Scutomegninia* sp. (undescribed), are permanent ectoparasites. They represented 33.1% of the total. The two species of ticks and the hypoderatid mite, which are obligate but temporary ectoparasites, composed 65.8%.

Insecta. Fifteen adults (8 males, 7 females) and 23 nymphs of *P. insularis* were recovered (9.5 per bird) (Table 1). The lice inhabited mainly the major body trunk: back (47.4%), neck (23.7%), and breast and belly (21.1%). This species is known only from pelagic cormorants and was first collected in Oregon (Clifford et al. 1970) and described by Clay (1973). Other species of this genus parasitize shorebirds of the families Pelecanidae, Sulidae, Anhingidae, Fregatidae, and Phalacrocoracidae (Emerson 1972). In general, *Pectinopygus* species are highly host-specific, especially within the Phalacrocoracidae (Clifford et al. 1970).

E. pellucida (Rudow), of which only two adult females were collected, was previously recorded from pelagic cormorants in California (as *E. kuwani*) (Marshall & Nelson 1967) and in Oregon (Clifford et al. 1970).

We did not encounter any fleas in this study, but two species have been reported to infest pelagic cormorants, *Mioctenopsylla arctica* Rothschild in Russia (Kir'iakova 1963 [cited in Marshall & Nelson 1967]) and *Ceratophyllus pelecani* Augustson from nests in California (Marshall & Nelson 1967).

Acari. Two species of *Ixodes* coexisted on the same birds, with a total of 359 ticks. Although *I. signatus* is generally known as a cormorant tick (Doss et al. 1974), *I. uriae* was much more abundant in this study (61 ticks per infested bird). The major hosts of *I. uriae* are considered to be murres and kittiwakes (Karpovich 1970, Eveleigh & Threlfall 1975), but it seems to attack any hosts available in communal nesting sites of seabirds (Mehl & Traavik 1983).

The majority of *I. uriae* were recovered from

Table 1. Number of ectoparasites on four pelagic cormorants from St. Paul Island, Alaska

Parasite	Body region						Total parasites	Infestation rate[a]
	Head	Neck	Back	Breast and belly	Crissum and tail	Wings		
Insecta								
Mallophaga								
P. insularis	1	9	18	8	0	2	38	9.50
E. pellucida	0	1	0	1	0	0	2	0.50
Acari								
Metastigmata								
I. uriae	12	22	73	14	38	85	244	61.00
I. signatus	67	12	10	20	0	6	115	28.75
Astigmata								
Scutomegninia sp. (undescribed)	0	1	0	0	2	379	382	95.5
N. pelagicus	8	9	51	290	15	107	480	120.00
Cryptostigmata								
A. nidicola	0	0	0	2	7	5	14	3.5
Total	88	54	152	335	62	584	1,275	318.75

[a] Mean number of parasites per host examined.

the wings (34.8%) and back (29.9%), whereas more than half (58.3%) of the *I. signatus* were from the head (Table 1). It seems that these two congeneric ticks avoid direct competition by occupying different microhabitats. A similar pattern of habitat partitioning between these two species has been observed on murres and kittiwakes on the Pribilof Islands (Choe 1982).

Adult ticks were rare (1.6% of *I. uriae*, 3.5% of *I. signatus*) compared with nymphs (20.9% of *I. uriae*, 13.9% of *I. signatus*) and larvae (77.5% of *I. uriae*, 82.6% of *I. signatus*). Rarity of adults has been reported in many *Ixodes* ticks (e.g., Randolph 1975), perhaps related to exceptionally high fecundity and predation pressure.

Mites were the most numerous group of ectoparasites on pelagic cormorants. *N. pelagicus*, recently described by OConnor (1985), was the most abundant ectoparasite, making up 37.6% of the total ectoparasite population. All specimens were deutonymphs and averaged 160 mites on each of the three infested birds. The majority were on the breast and belly (60.4%) and wings (22.3%). Most specimens appeared fully engorged and may have been ready to leave the host birds at the time they were collected. Species of this genus have been reported from shorebirds of the families Phalacrocoracidae, Pelecanidae, Fregatidae, and Sulidae (OConnor 1985).

A feather mite, *Scutomegninia* sp. (undescribed), averaged 127.3 mites on each of the three infested birds. This species inhabited the wing feathers almost exclusively (99.2%). Unlike the other ectoparasites collected, adults (166 males, 132 females) were much more common (78.0%) than nymphs.

A cryptostigmatid mite, *A. nidicola*, was occasionally encountered. Murres and kittiwakes from the same area also harbor this mite (Choe 1982). Evans et al. (1961) collected various species of *Ameronothrus* from intertidal algae and lichens. These mites, which seem to be a facultative symbiont, generally dwell in bird nests, but may also feed on keratinophilic fungi from the skin and feathers of birds. These mites usually have no or highly reduced prodorsal sensilla, and this suggests that they are adapted to an aquatic habitat (Krantz 1978). This adaptation may enable the mites to survive even when the host birds forage under water.

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