A Note on the Occurrence of Diatoms on the Feathers of Diving Seabirds

DONALD A. CROLL[1] AND ROBERT W. HOLMES[2,3]
[1]*Moss Landing Marine Laboratory, Moss Landing, California USA, and*
[2]*Marine Science Institute, University of California, Santa Barbara, California 93106 USA*

Although the occurrence of diatom growths on the skin of some marine vertebrates, especially cetaceans, is well documented (e.g. Hart 1935; Nemoto 1956, 1958; Morejohn 1980), no investigators have reported the attachment and growth of these microalgae on the feathers of aquatic birds. The importance of water birds in the dispersal of algae, however, has been established (e.g. Proctor 1959, 1966; Schlichting 1960; Slides 1973; Wutrich and Matthey 1980). We report here observations of the colonization by diatoms on the contour feathers of diving seabirds. Furthermore, when these diatom growths are dense, their hosts appear to be "oiled."

The operation in Monterey Bay, California of a gill net fishery that incidentally captures diving seabirds has facilitated the collection of large numbers of fresh carcasses of Common Murres (*Uria aalge*). Close examination of discolored feathers of some of these

[3] Reprint requests should be sent to second author.

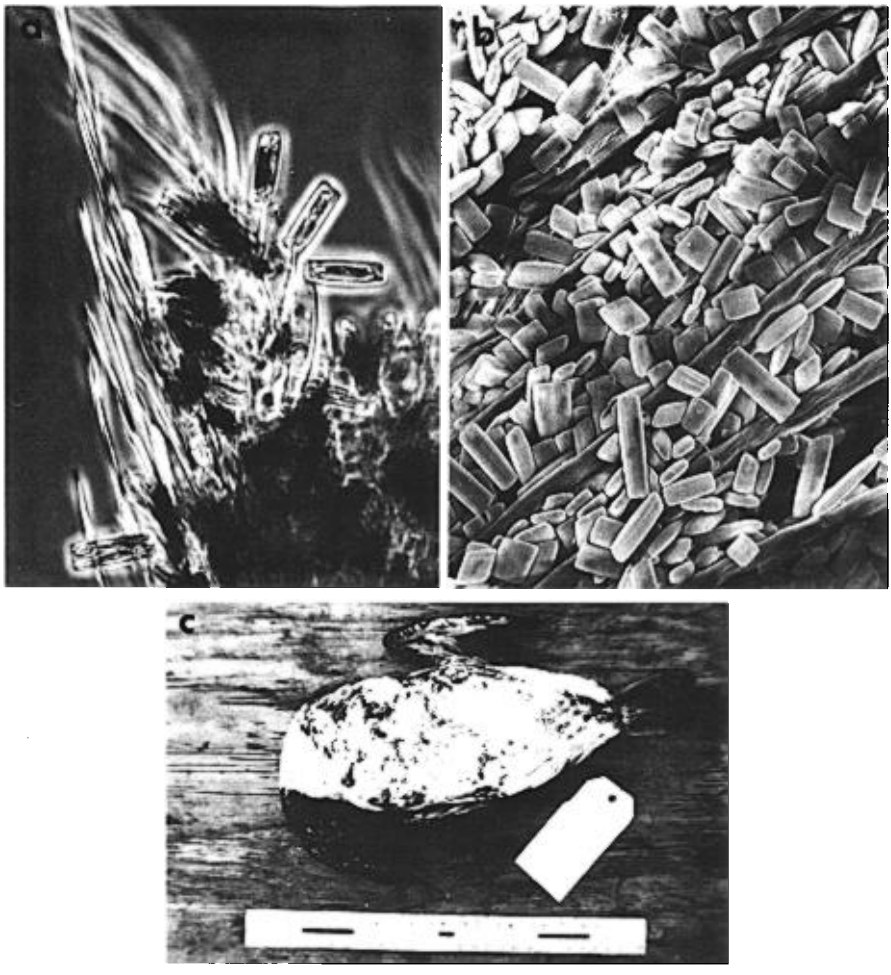

Fig. 1. Diatoms on the contour feathers of the Common Murre (*Uria aalge*). A. Light microscope photograph of the tip of a feather showing diatoms attached to the barbules (440×). B. Scanning electron microscope photograph of a portion of a dried feather. The barbules are partially obscured by dense diatom growth (463×). C. Macroscopic appearance of the contour feathers of a specimen with moderately heavy and patchy diatom growths.

specimens has frequently revealed an epizoic growth of diatoms on the back, breast, and anal regions. An examination of these feathers with the compound microscope and scanning electron microscope shows that the diatoms attach themselves to each other and to the barbs of exposed feathers (Fig. 1) and/or occur in a gelatinous matrix presumably produced by the diatoms. The firm attachment of the diatoms to the feathers of the Common Murre is attested to by the fact that they still may be observed on some prepared skins of museum specimens (e.g. Santa Barbara Natural History Museum specimen numbers 1350 and 2275; University of California, Santa Barbara, Zoology Museum specimen numbers 7605 and 3498).

The diatom flora of the Common Murre and of three additional species of marine diving birds (see below) consists mostly of new pennate species that are currently being described (Holmes et al. in prep.). Observations to date reveal that this flora is consistently one of low diversity. From two to five diatom taxa are observed on any given specimen, with one taxon, an undescribed *Synedra* species, comprising 90% or more of the valves observed. This particular taxon is most often attached to the feather barbules by a mucilagenous pad secreted at one end of the frustule. These diatoms are heavily pigmented, always appear healthy, and are found only on the exposed tips of the feathers.

A total of 186 Common Murres has been examined for diatoms. Of that number, 168 were collected in July 1981 and 18 were collected in October 1981. Forty birds (23.8%) collected in July and eight birds (44.4%) collected in October were found to have abundant diatoms. Although no Common Murres collected in winter or spring have yet been examined, one Arctic Loon (*Gavia arctica*) collected in April 1981 was found to have epizoic diatoms, and two of 18 Red-throated Loons (*Gavia stellata*) (11.1%) collected in January 1982 likewise had diatoms on the breast.

Aggregations of these epizoic diatoms may become so dense that a brownish matting of the contour feathers occurs, causing the bird to appear lightly oiled. An examination of the feathers with a compound microscope, however, will reveal the diatom growth. Researchers working on seabirds, particularly those studying the incidence of oiling in seabirds, should take note of this possible source of confusion.

It is reasonable to believe that epizoic diatoms on Common Murres and other diving birds are exploiting a favorable microhabitat. The feathers provide a substratum for attachment that is generally in the euphotic zone, as a diving seabird spends the majority of its time on the water surface. This habitat is also probably rich in inorganic and organic nutrients, especially close to the anal region.

Diatoms on seabirds may also lead to some insight into movements of the host species. Hart (1935) used the occurrence of diatom growths on cetaceans to study their movements into and out of the Antarctic. In addition, Hartman (1979) used the presence of marine diatoms on manatees to indicate that these animals spend time in the marine environment. A similar study of diatom growths on seabird feathers might shed some light on seabird movements.

Feathers suspected of carrying diatom growths can be examined fresh or preserved in 5% formalin seawater. Due to the lack of data on the occurrence of diatoms on feathers of aquatic birds, the authors would greatly appreciate samples of feathers, along with information as to host species, location, date, and method of collection.

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Received 18 March 1982, accepted 12 May 1982.