

COCconeis DIATOM ON THE SKIN OF FRANCISCANA

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ABSTRACT

Two species of diatoms are described from the skin films of Franciscana caught in the adjacent waters to Uruguay. *Cocconeis ceticola* is common diatom on skin films, and one other naviculoid species is also found on this dolphin.

INTRODUCTION

Many diatoms have been reported from skin films of larger baleen whales and sperm whales both in the North Pacific and in the Antarctic (Hart, 1935; Nemoto, 1956). Species of diatoms are various, but *Cocconeis ceticola* is found generally on whales examined. Those parasitic diatoms are common on all larger whales in the polar waters and include many species which have not generally found in pelagic plankton (Nemoto, 1956). *Cocconeis ceticola* and its varieties and forms are common on *Balaenoptera* species and sperm whales, and some peculiar naviculoid diatoms, *Stauroneis* species are also found on sperm whales, which have not been described as a pelagic form.

Although many descriptions on parasitic diatoms have been made on larger whales including killer (*Orcinus orca*) and Baird beaked (*Berardius bairdii*) whales, few observations on diatom films on the skin of small cetaceans have been reported. Only a few descriptions have been made by Harrison and Thurley (1974) and Brownell (1975) recently.

Among many Franciscana studied in Uruguay, some specimens had green-brown films of diatoms on the body surface. We studied these diatoms with reference to diatoms found on other whales.

DESCRIPTIONS

The Franciscana (*Pontoporia blainvillei*) has been studied from 1971 to 1973 in Punta

del Diablo, Uruguay by one of us Brownell. The progress report on the biology of those Franciscana studied is already given by Brownell (1975). Diatom films were mainly observed on the dorsal and lateral surface of the most fresh dolphins examined (Brownell, 1975). This observation suggests that more Franciscana may have had diatom films on the skin surface if they were examined in more fresh and un-rubbed condition. The catch of those dolphins is done by gillnets by fishermen (Brownell, 1975), which possibly have removed diatom films with epidermis of the skin of dolphins.

TABLE 1. OBSERVATIONS OF DIATOM FILMS ON SKIN FILMS OF FRANCISCANA IN URUGUYAN WATERS

Field No.	Sex	Body length (cm)	Weight (kg)	Date caught	Remarks
717	M	119	19.5	9 Aug. 1971	Diatom film collected from left side of dorsal fin.
721	F	104	16.4	11 Aug. 1971	Diatom film collected.
753	M	131	—	25 Aug. 1972	Diatoms present on dorsal side and lateral tail stock, flippers and side of head. Sample collected from tail stock.
762	M	110	19.0	13 Sept. 1972	Diatom film around base of dorsal fin.
771	M	111	—	24 Sept. 1972	Diatom film present.
774	M	115	—	25 Sept. 1972	Diatom film covering all of the animal-areas of heaviest concentration were around the gape and tail stock-areas of next heaviest concentration were flukes (dorsal and ventral), the flippers (dorsal and ventral) and the dorsal fin.
869	F	130.5	27.3	5 Jan. 1973	Diatom film collected.
872	M	142	31.4	11 Jan. 1973	Heavy diatom film on dorsal and lateral surfaces.
889	F	136.5	29.1	23 Jan. 1973	Some diatoms on dorsal surface of flippers, dorsal fin, and tail stock.
895	F	112.5	17.3	28 Jan. 1973	Heavy diatom film on tail stock.

Diatom films are observed at least 10 dolphins in the studies carried out since 1971, in which three diatom specimens have been collected from three dolphins. The data of observations are given in Table 1. Generally diatom films are found on the side of dorsal fin and the dorsal surface of flippers and tail stocks. It is considered also that diatom films are common on the surface of dorsal fins and flukes. The seasons of catch of dolphins are both in winter (January) and summer (August) of the southern ocean, and dolphins which have been caught in both seasons were infected with diatoms.

The collected samples are examined by scanning electron and ordinary microscopes. Among all samples, *Cocconeis ceticola* specimens are found. On one porpoise (RLB-717), naviculoid diatoms are also found.

Cocconeis diatoms found on the skin films of Franciscana are considered all *ceticola* type and the variety form such as *constricta* form has not been found in samples. Although the shape of *ceticola* is somewhat oval but it is similar to those found on sperm whales. Sizes of diatoms are all within the general distribution of size which are reported up to date (Nemoto, 1958). Another naviculoid diatom

is also found in specimens collected from No. 721 dolphin. This naviculoid diatom is considered to be one of the definite records from the skin films of whales like the report by Harrison and Thurley (1974), although there was some description of *Navicula* sp. from fin whales (Amemiya, 1916), which is considered as *Stauroneis* species.

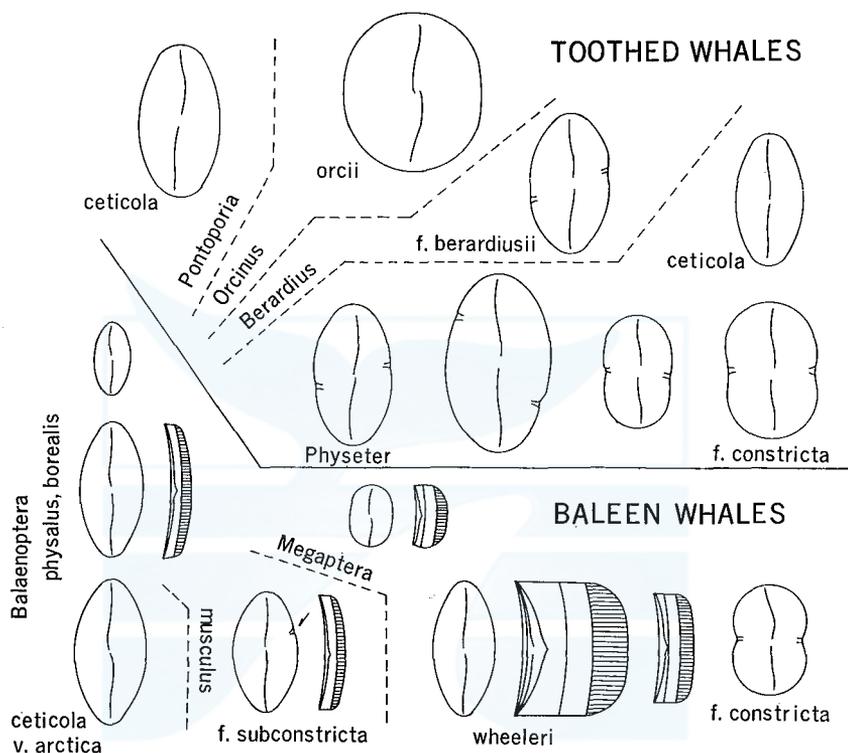


Fig. 1. Variety and deformation of *Cocconeis* diatoms on whales.

DISCUSSION

Many descriptions and discussions have been reported on diatom infection on the skin films of larger cetaceans. On the other hand, rather small numbers of observation have been reported on smaller cetaceans including dolphins. In the Antarctic and both in the Atlantic and the Pacific, many diatom films have been observed from blue, fin, humpback and sei whales even from sperm whales (Hart, 1935; Nemoto, 1956). Diatom films have also been observed in moderate sized whales of bottle-nose (*Hyperoodon ampullatus*) and the killer whales (*Orcinus orca*) (Bennett, 1920) in the Antarctic. Although diatom films have been observed on dolphins in other occasions, few precise descriptions have been reported after 1920.

The notice of diatom films on dolphins, *Lagenorhynchus cruciger* and *Cephalorhynchus commersonii* was reported at South Georgia by Hart (1935), however no taxonomical observation was made on those diatoms. Harrison and Thurley (1974)

described two species of diatoms on the surface of one young *Phocoena* stranded alive in the British coast. Species are *Synedra tabulata* (Ag.) Cleve and *Navicula ramosissima* (Ag.) Cleve, the latter species is closely related to our specimen.

Diatoms found on Franciscana here are mainly common parasitic diatom *Cocconeis ceticola* Nelson. This species is found on many whales and dolphins, but it also shows many variety forms according to host whale species. As shown in Fig. 1, typical *ceticola* form is found on *Balaenoptera* species namely fin, and sei whales. It is also found on blue whales and *subconstricta* form which has constriction in one side is reported (Nemoto, 1958). *C. ceticola* group found on other whales sometimes shows different forms and variations. *Cocconeis wheeleri* found on humpback whales is large and thick as compared with typical *C. ceticola*. *Cocconeis ceticola* found on toothed whales also shows the variation of shape mostly in the outline. Generally *ceticola* found on sperm whales bears more oval outline. Some specimens of *C. ceticola* from sperm whales have the constriction in both sides in oval shape and called *C. ceticola* f. *constricta*. The size of oval *C. ceticola* including *constricta* form on sperm whales is larger than those found on fin and sei whales.

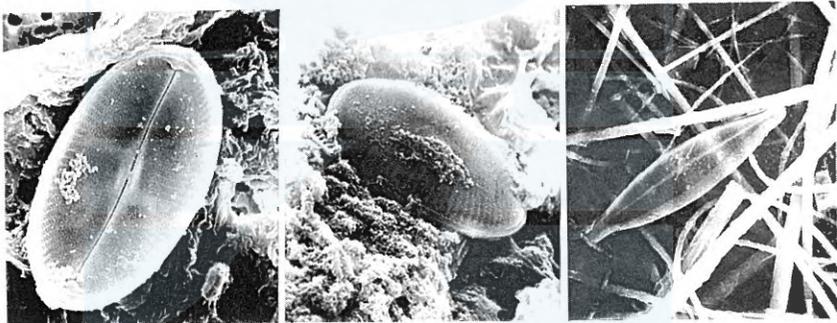


Fig. 2. Diatoms found on Franciscana caught in Uruguay waters. Left and middle: *Cocconeis ceticola*, Right: *Navicula* sp.

Kliashtorin (1962) found *constricta* form from *Berardius bairdii*. He named this *Cocconeis ceticola* f. *berardii*, but this is the similar type from sperm whales illustrated by Nemoto (1958, Fig. 3-M; 11–15 in plate II). Another round type is described from *Orcinus orca* as a new species *Cocconeis orcii* by Kliashtorin (1962). This species is also considered as one variety of *Cocconeis ceticola* on killer whales.

We do not find any variation of forms of *Cocconeis ceticola* on Franciscana but oval *ceticola* type. Size of *C. ceticola* found on Franciscana are also ranging within the usual range of *Cocconeis ceticola* of normal and oval types and its varieties. The size is generally less than 40 μ .

The future study of diatom films of dolphins is thus needed for more diversified species among cetaceans especially for dolphins. Perhaps *constricta* forms of *Cocconeis ceticola* will be found on smaller toothed whales and dolphins too. Among organisms attached to cetaceans from diatoms to lampreys and whalesucker (Dailey and Brownell, 1972), some ectoparasites are considered to be indicative of whales'

migration. The most of records of parasitic diatoms have been recorded from the waters colder than 20°C. Especially *Cocconeis ceticola* has only been reported in the polar waters.

The water temperature around the fishing ground of Franciscana are ranging between 13° and 23°. The seasonal difference of water temperature is not so great as to show clear decline or decrease of infection of diatoms on the skin. Perhaps more extensive research on dolphins and whales reveals the infection of *Cocconeis* diatoms on whales are common in Uruguay waters throughout the year.

REFERENCES

- AMEMIYA, I., 1916. [The propagation of diatoms on the skin of whales] (In Japanese). *Rep. Jap. Soc. Sci. Fish.*, 1: 378-379.
- BENNETT, A. G., 1920. On the occurrences of diatoms of the skin of whales (With an appendix by Nelson, E.W.) *Proc. Roy. Soc. London.*, 91: 352-357.
- BROWNELL, JR. R. L. 1974. Progress report on the biology of the Franciscana dolphin, *Pontoporia blainvillei*, in Uruguayan waters. *J. Fish. Res. Bd. Can.*, 32: 1073-1078.
- DAILEY, M. D., and R. L. BROWNELL, JR., 1972. A checklist of marine mammal parasites. In: Sam H. Ridgway [ed.], *Mammals of the sea. Biology and medicine.* 528-589. Charles C. Thomas, Springfield Ill.
- HARRISON, R. J. and K. W. THURLEY, 1974. Structure of the epidermis in *Tursiops*, *Delphinus*, *Orcinus* and *Phocoena*. In: R. J. Harrison (ed.), *Functional anatomy of marine mammals*, 45-71. Academic Press.
- HART, T. J., 1935. On the diatoms of the skin film of whales and their possible bearing on problems of whale movements. *Discovery Rep.* 10: 249-282.
- KLIASHTORIN, L. B., 1962. The diatoms of the skin film of whales in the Far Eastern seas. *Trudy Inst Okeanology A.N. U.S.S.R.* 58: 314-321.
- NEMOTO, T., 1956. On the diatoms of the skin film of whales in the Northern Pacific. *Sci. Rep. Whales Res. Inst.*, No. 11:97-132.
- NEMOTO, T., 1958. *Cocconeis* diatoms infected on whales in the Antarctic., *Sci. Rep. Whales Res. Inst.*, 13: 185-191. 3 pls.

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