into irregular areas, having numerous small eruptions in the center and necrotic edges. The areas increase in size and can cover the entire animal. Yeasts have been cultured from the lesions but may be from a secondary infection. The other skin lesion is also shown in Fig. 3 (2). From day to day small rectangular and slightly elevated spots develop in the skin. This is also seen in animals in captivity. The spots can disappear in a few days and in one case they seemed to disappear in response to treatment with penicillin. Erysipelas has been suspected as a cause of the disease due to the characteristic shape of the spots and because of its known occurrence in other dolphins (RIDGWAY, 1972).

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OCCUPATIONAL THERAPY FOR HARBOUR PORPOISES, *Phocoena phocoena*.

by M. Amundin, Marine Bio-Acoustic Investigations, Odense University, Denmark.

Summary

Two harbour porpoises, a male and a female, both around 10 months old, which had to be left alone for periods between bio-acoustical investigations, developed stereotyped motor patterns and signs of boredom. Therefore, toys of different kinds were introduced to them as occupational therapy. Several kinds of toys were accepted, although some were more preferred than others. A progressively decreased approach-time to new toys was observed, ranging from hours in the inexperienced animal to a couple of minutes in the experienced one. The play activity was most intense in the hour before feeding, and one of the animals spent as much as appr. 65% of this hour in play. A female, which during an early isolation developed a „cage habit", could be partly diverted from this if provided with toys.

Introduction

Inherent to the sea mammal pool is its sterile structure, comprising only bottom, four walls and various amounts of crystal clear water. This, of course, is a necessity for the maintenance of a high hygienic standard. However, this extreme dullness of environment may contribute to the negative aspects of holding mammals in captivity, namely the low survival rate and fertility of the captives, at least where dolphins are concerned. In some dolphinaria, where the pools are supplied with real sea water, it has been possible to create a much more complex environment by introducing other sea creatures. It is typical in such pools that the most births and longest survivals are recorded.
Another aspect of this problem is connected with the audience. Inevitably the day will come when people no longer are interested in seeing animals just swimming around, doing nothing besides awkward, stereotypical cage habits.
In our case we have harbour porpoises which, in between bio-acoustical training and measurement, are left alone, sometimes for months.

Occupational therapy in the form of various training programmes had to be dismissed because the necessary amount of man-hours was unavailable. Therefore we introduced toys to the animals and observed their responses towards them. The results are not claimed to be strictly scientific since, among other things, there was no control group. Therefore those presented here should mainly be taken to emphasize the problem with occupational therapy, and stimulate further investigations in this field.

Materials and methods

The toys were introduced to two juvenile harbour porpoises, a female and a male, raised in capivity from the age of about one and three months respectively. The female lived alone during the two months prior to the arrival of the male.
The pool is approximately 40 m^3, with a water depth of around 1 metre, filled with chlorinated, artificial sea water. The water temperature follows the seasonal variations, ranging from +5°C to +25°C.

Results and discussion

Normally a harbour porpoise responds promptly to a strange object in the pool by increasing speed and keeping close to the bottom as long as possible away from the object. If there is more than one animal, they synchronize their swimming and keep tightly together (ANDERSEN & DZIEDZIC, 1964). If panic-struck, the surfacing is performed in a long flat jump at high speed, if not, it is quick but quiet (pers. obs.). According to how frightening the object is, this response remains from some seconds to several minutes. Once the direct fear reaction has passed the animal still keeps away from the object, and can do so for days. The above described reactions were

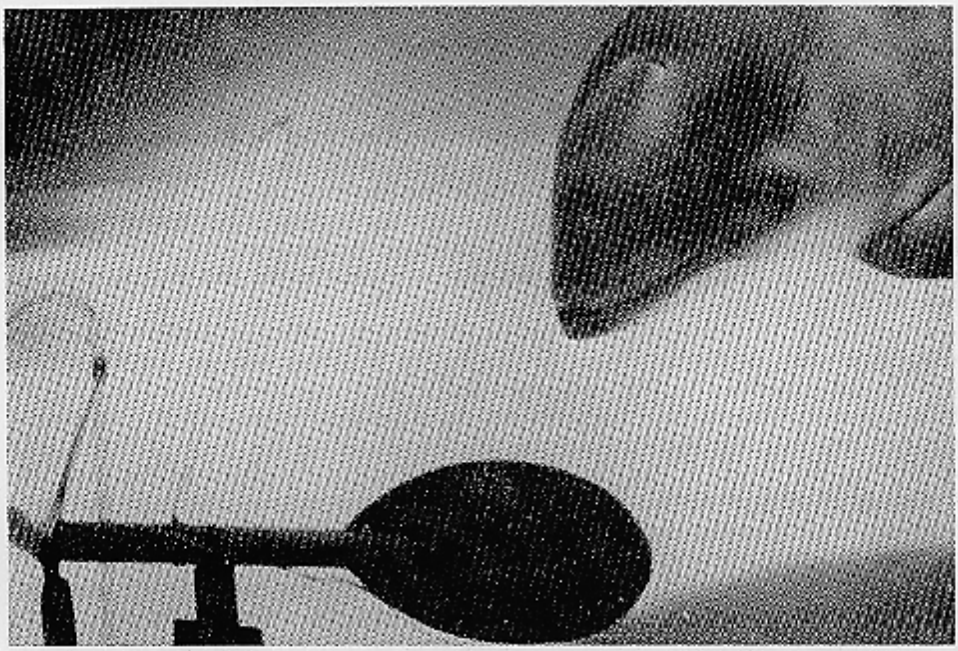

Fig. 1. The male inspecting the vane.

frequently seen in the process of introducing the various toys to our animals. However, the more toys that were introduced, the weaker and shorter became these responses. The underwater vane (Fig. 1) that was the last to be introduced created only 1.5 minutes of sub-optimal fear reactions, whereafter both animals stopped at a distance of some 3 metres from the object, observing it for 5-10 seconds. In the first 15 minutes after introduction they observed the vane several times from as close as 1 metre. After 15 minutes the vane was removed. When the vane was re-introduced about a week later, only very weak fear reactions were elicited. After some seconds both animals observed it from a metre's distance, and after about 5 minutes, the male nipped a propeller. The vane was again removed after 15 minutes.
The porpoises' activity pattern was gradually shifted towards the toys. This was most clearly demonstrated by the female. During her isolation at the beginning of her captivity, she developed a stereotyped path, swimming up-side-down, bumping her neck along the bottom. This activity occupied appr. 95% of her time. When we tried to divert her from doing this by putting obstacles in her way, she immediately found a new path as stereotyped as the earlier one (AMUNDIN, in prep.).

When the male was introduced to her she was completely indifferent, but when we started to give them toys this „cage habit" very gradually began to break up. Around 7 months after the development of the habit her playing with the various toys occupied a maximum of appr. 65% of the observed time, and the bottom rubbing only 16% (the observations were restricted to the hour prior to feeding, three feedings

were given daily, when the most intense playing was seen). Of the appr. 65%, 30% included rope-chewing (Fig. 2), and in one case, the artificial „sea-grass", half a meter of ¾-inch nylon rope was swallowed, drawn out again, etc. As a result the rope became all fatty from the stomach content. Some toys, such as an artificial duck, were completely uninteresting, while some were more frightening than others, e.g. a mirror. In the case with the mirror, it was typically not the mirror itself that was frightening, but the animal's own image.

Since our pool is comparatively shallow, with fast water circulation, we have had no problem keeping the bottom clean, dispite some toys lying there. In fact no vacuum cleaning at all was necessary. The toys floating on the surface, though, needed occasional cleaning, and all the toys with ropes needed frequent checks as to the condition of the knots.

Very little violence is seen in the play of the harbour porpoise. Therefore the toys used here did not need any special strength. This is most probably not the case with, for example, *Tursiops* or other larger dolphins. Another important thing to remember in the toy design is that they must be constructed so as not to be sucked out through the drains. To keep the porpoises accustomed to accepting new objects, it is probably wise to keep introducing as great a variety of things as possible every now and then, and remove the ones that have lost their interest.

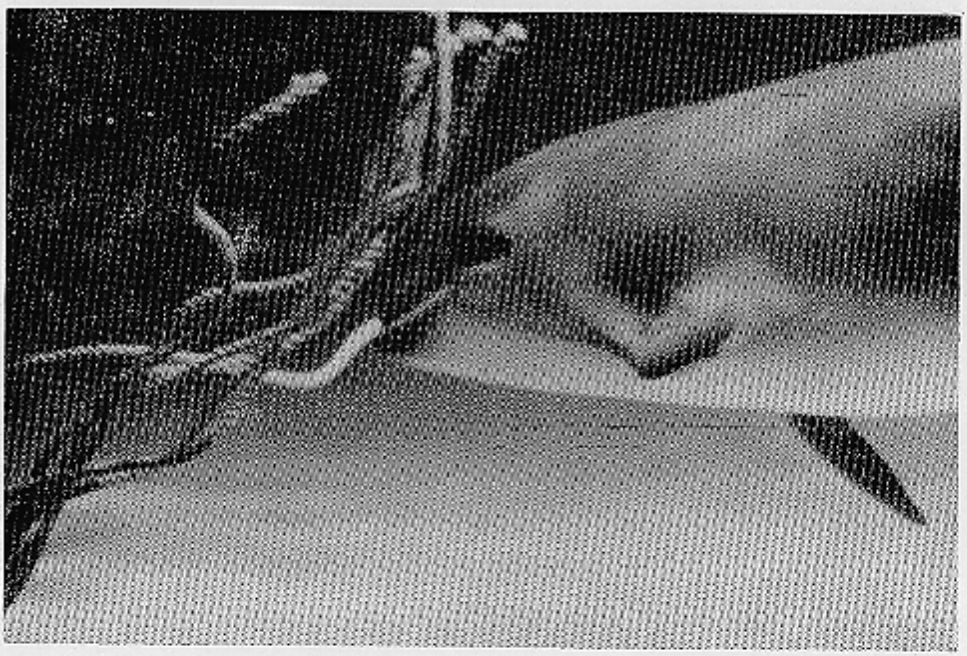

Fig. 2. The female chewing on the artificial sea-grass.

In their natural environment harbour porpoises search out shallow, sea-weed covered areas, where they can be seen nosing around at the bottom (AMUNDIN & AMUNDIN,

in press). What they are looking for is not clear, but the same nosing can be seen in the pool, where even the smallest wrinkles are thoroughly inspected with eyes and sonar. This activity can be made more interesting if walls and bottom are provided with „structure-plates". These plates might include various materials of different forms and structure, and can be designed in a way that gives extra beauty to the pool. They should be easily handled to facilitate cleaning and eventual relocation.

The majority of dolphinaria cannot be supplied with real sea water; they are restricted to recirculation systems with artificial sea water and chemical cleaning agents. The chemicals prevent introduction of plants and all kinds of gill-breathing creatures, whereas many other animals must be excluded due to their heavy pollution of the water. These speculations spawn the idea of an underwater aquarium (Fig. 3), with different kinds of fish and water plants. The supply of food, light and aeration is done via a „snorkel". If the aquarium is made out of plastic it permits the porpoises to inspect its inhabitants both visually and with their sonar. These aquaria will also present more beauty to the audience, especially if there are several of them artistically placed, and with individual lighting. Because of the minimal maintenance, fresh water aquariums are to be preferred, but with some extra effort the fauna and flora from

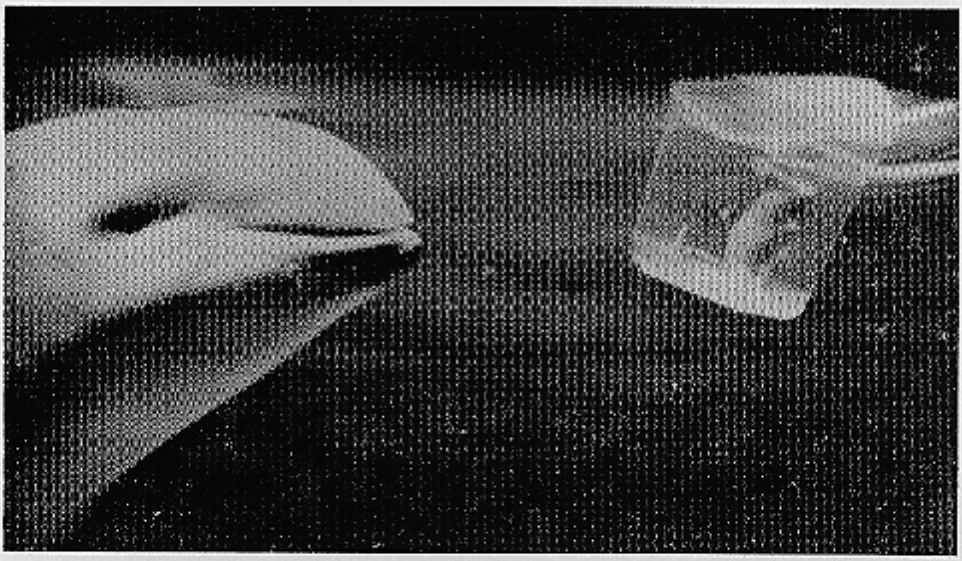

Fig. 3. The female inspecting a goldfish.

the porpoises' own habitat can be supported. Here indeed is a field for a lot of experimenting and designing!

As a final remark I would like to suggest that, in the discussion on hygienic standards and minimum requirements of the sea mammal pool, not only water quality should be dealt with, but also the „pedagogic" quality of the enclosure.

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LOBOMYCOSIS IN AN ATLANTIC BOTTLE-NOSED DOLPHIN IN THE DOLPHINARIUM HARDERWIJK

by Poelma, F. G., DVM, Dept. of Special Animal Pathology, State University Utrecht, G. A. de Vries, Centraal Bureau voor Schimmelcultures, Baarn, E. A. Blythe-Russell, M. H. F. Luykx.

Summary

Lobomycosis was observed in a *Tursiops truncatus* (Mont. 1821) of the Dolfinarium Harderwijk, Netherlands. *Petriella setifera* was isolated from the tissue but its etiological significance is still uncertain.

Introduction

Until 1971, Lobomycosis was only known as a disease of the human skin. In that same year, however, MIGAKI et al (1971) reported a case in an Atlantic bottle-nosed dolphin *Tursiops truncatus* (Mont. 1821), captured in the intercoastal waterway of the Gulf of Mexico near Sarasota, Florida. A few weeks later a second case was observed in a dolphin of the same species kept in Marineland Research Laboratory, Marineland, Florida (WOODARD, 1972) In neither case was the etiological agent isolated so that the diagnosis could only be based on the similarity of the microscopical and macroscopical aspects of the lesions.

In May, 1971, a third case was observed in a dolphin belonging to the species *Sotalia guianensis* van Beneden which was captured in the estuary of the Surinam river (DE VRIES and LAARMAN, 1973). Two fungi were isolated from the tissue *Torulopsis haemulonii*, a true yeast, and *Glenospora graphii* Vuill., a hyphomycete with a yeast-like stage. They were not regarded to be of etiological significance.