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The suckling of a Bottlenose dolphin calf (*Tursiops truncatus*) by a foster mother, and information on transverse birth bands

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Summary

Observations showed that a young female Bottlenose dolphin could still produce milk after a suckling interruption of 8 days, and that 31 days of adoptive suckling made a calf grow.

New-born Bottlenose dolphins have a number of pale grey transverse bands, which differ in structure from the normal skin; the *stratum spinosum* is thicker and there is no PAS positive material present in the superficial layers.

Key words: *Tursiops*, reproduction, adoptive suckling, foster parent, transverse birth bands.

Introduction

Over the last four decades that toothed whales have been kept in oceanaria, husbandry and veterinary techniques have gone through a steady development. The reproduction of toothed whales has improved, but has not reached a satisfactory level in all marine mammal facilities. However, recently improved veterinary techniques such as determination of blood hormone levels and ultrasonography facilitate early detection of pregnancy, and have already resulted in more full-term births of dolphins in some facilities. In the summer of 1989 two Bottlenose dolphins calves were born at the Harderwijk Marine Mammal Park. Unfortunately both calves eventually died, but the experience gained and contained in this report may help to improve the success rate in the future.

This report also contains some histological information on transverse birth bands, which can be seen on the skin of new-born Bottlenose dolphin calves.

Results and Discussion

Two pregnant female Atlantic Bottlenose dolphins (*Tursiops truncatus*) were kept in a rectangular pool (21 × 7.5 m; depth: 3 m) which was filled with artificial salt water (2.5%) at the relatively high temperature of 22°C. On July 5, 1989, a 7-year-old female (code: TtZH 013) gave birth to a full-term male calf (code: TtZH 102). This was her first calf, and she suckled it successfully until it hit the glass side of the pool and died of a brain haemorrhage 5 days after birth (Fig. 1). Eight days after the death of calf 102, the 26-year-old female (code: TtZH 008) gave birth to a full-term male calf (code: TtZH 103). She took hold of the calf in her mouth instead of nosing it away from the corners of the pool. This behaviour was immediately recognized, as she had accidently drowned her two previous calves in this way. Therefore calf 103 was removed 30 minutes after birth and put with foster mother 013, who was still producing milk after having lost her calf 8 days before. She suckled the new calf for 31 days. After this, calf 103 died from peritonitis and pleuritis linked to the wounds inflicted by its mother (TtZH 008) after birth. At death, calf 103 weighed 22.5 kg and had a standard length of 116 cm, indicating that a significant amount of milk had been transferred from the foster mother only.

These observations show that the young female Bottlenose dolphin 013 could still produce milk after a suckling interruption of 8 days, and that Bottlenose dolphins may allow foreign calves to suckle. Smolders (1988) observed adoptive suckling in a Bottlenose dolphin calf which drank from a near term female and later from a female which was still suckling her 15-month-old calf. Whether milk was transferred was not certain.

Cockcroft & Sauer (1990) report on many dolphin calves in the wild with fresh 'rake' or tooth marks on various parts of their bodies. They assumed that these marks resulted from attempts by cows to remove their calves from fishing nets in which they had been entangled. Maybe the behaviour of female 008 could be interpreted as a misplaced rescue effort.

Suckling

Before suckling, the calf usually started to swim underneath the foster mother, with its head touching the genital region. Suckling usually occurred at a depth of 1.5–2 m, often when the mother was moving along the long side of the pool. The suckling bouts

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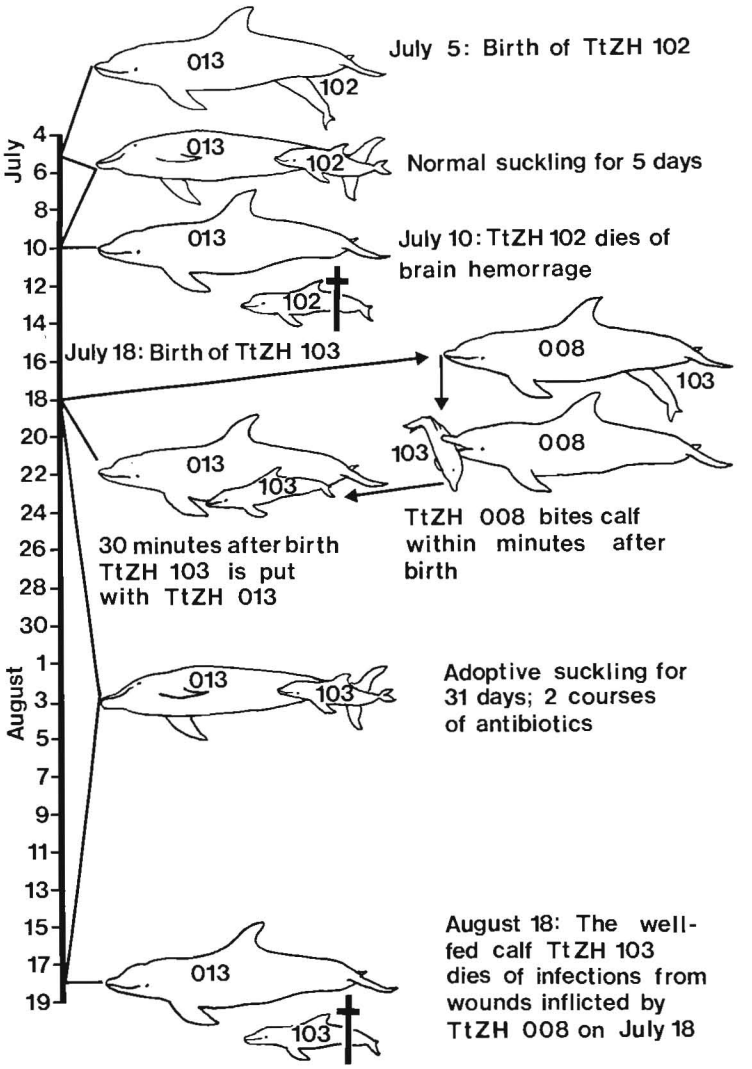

Figure 1. The sequence of events leading to adoptive suckling.

lasted for a maximum of 10 seconds. At first this seemed short, and the length of each bout was thought to be limited by the length of the pool. However, the calf was breathing on average 4 times per minute, which meant that it had 15 seconds to dive down, suckle and surface. This indicates that suckling bouts of longer than 10 seconds are unlikely during the first month after birth. Peddemors (1988) also observed short suckling bouts of 4 to 7 seconds of a Bottlenose dolphin calf in a pool.

Measures taken

At the Harderwijk park, if the behaviour of a female dolphin and her calf is normal, changes in the environment are minimized. However, during the suckling period of calf 103 and foster mother 013, the behaviour was often far from desirable and measures had to be taken.

A few times the calf started to roam by itself, because the foster mother spent some time lying on the bottom of the pool. The calf then started to swim around in panic, using energy for unnecessary swimming which could have been preserved for growth. Sometimes another female was put into the pool temporarily, because this activated the swimming behaviour of the foster mother and promoted normal echelon swimming with the calf. Normally the foster mother and the calf were kept alone to avoid the stealing of the calf by other females.

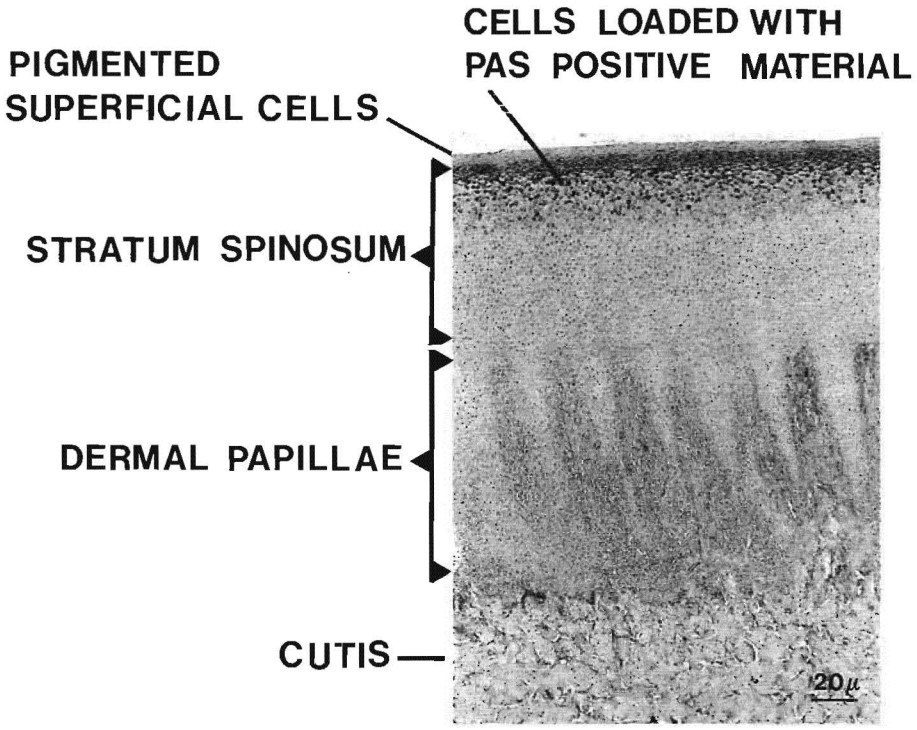

Figure 2. Dark, normal skin at the margin of a white band of a 5-week-old Bottlenose dolphin. Note the normal thickness of the *stratum spinosum*. PAS positive material is present in the superficial layers of the *stratum spinosum*. PAS technique, 40 ×. (Photo: P. Zwart).

In some cases, when the foster mother was too rough with the calf, the trainers intervened by walking up to the side of the pool. Then the foster mother became protective of the calf, and started to swim echelon with it.

Twelve days after birth the respiratory rate of the calf increased. It was caught with a dip-net, an antibiotic (gentamycin, dd 2 ml) was administered intramusculary, and the skin wounds were treated with an antibiotic spray (Aureomycin-spray (R) by Cyanamid). This was repeated for 4 successive days after which the breathing rate returned to normal. Twenty-three days after birth the breathing rate increased again, and 2 days later a 5-day course of intramuscular antibiotic (gentamycin, dd 2 ml), antibiotic spray (Aureomycin-spray (R) by Cyanamid), and a hormone (flumetasone, dd 1.5 ml) was administered. This treatment was unsuccessful; the infection had spread from the small skin wounds to the pleura and the peritoneum, as shown during necropsy.

General recommendations for management

Immediately after birth, female dolphins often need some time to recover from labour. At the Harderwijk park, calves have been left to fend for themselves, and sometimes swim against the glass side of the pool. Therefore, strips of black self-adhesive tape have been put on the glass, making it more visible for the calf. This has had the desired effect of stopping the calf from hitting the glass.

Because it is unknown what percentage of Bottlenose dolphin mothers' suckling behaviour is genetically determined and what is learned by watching other females suckling their calves, some facilities train their pregnant dolphins to present their nipples to the trainer or to an object. This is done to habituate the animals to a foreign object touching their genital area.

Some parks advise the commencement of routine training, including husbandry behaviour training, during the last month of pregnancy. They believe that this daily schedule should be continued after birth, so that the mother finds comfort in the routine and does not get bored.

Pool corners with 90 degree angles should be avoided, since calves can get trapped in them. Several weeks before birth the corners can be rounded off using nets. Any other sharp corners in the pool, such as those found near side channels and water outlets,

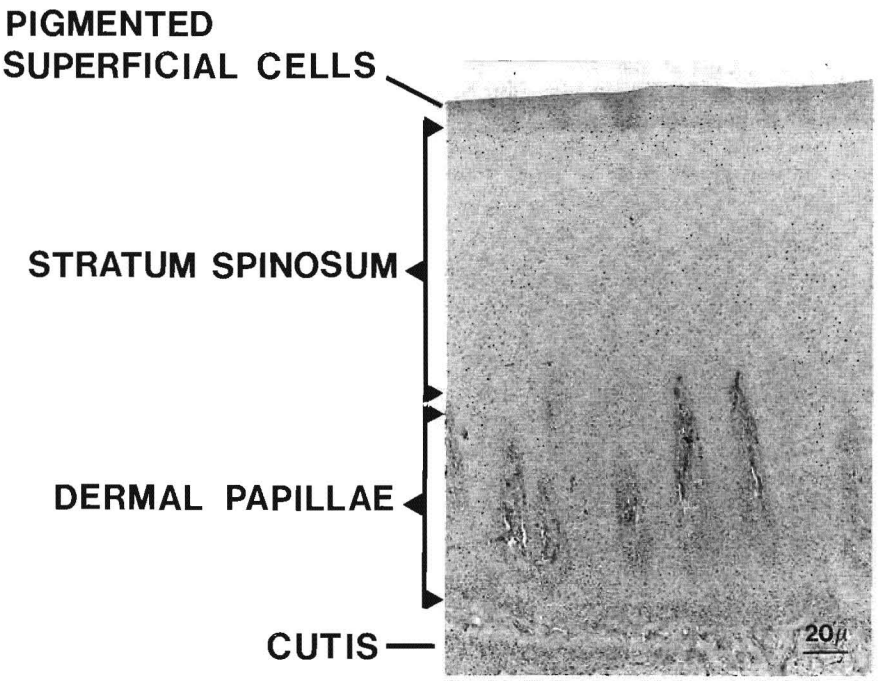

Figure 3. Centre of a transverse band of a 5-week-old Bottlenose dolphin. Note the thicker *stratum spinosum* and the absence of PAS positive material in the superficial layers of the *stratum spinosum*. PAS technique, 40 ×. (Photo: P. Zwart).

should be placed out of the animal's reach. Nets and net-gates can often be used for this purpose.

Transverse birth bands

Distributed over the body between the pectoral fins and the anus of new-born Bottlenose dolphin calves, several (around 6) pale grey transverse bands are visible on the skin (McBride & Kritzler, 1951). These lines are 1.5 to 2 cm wide, and about 8 cm apart. They fade away around the age of 6 weeks, the most posterior last. These bands are probably bending folds, resulting from intra-uterine bending of the foetus when it lies doubled up in one of the uterine horns (Slijper, 1966).

Using a dissecting microscope, at magnifications of 5, 10 and 25 times, it can be recognized that the skin surface on the transverse bands differs from the normal skin in that it is smooth, but with some very fine longitudinal ridges. Normal skin is slightly knobbled.

Macroscopically, on cross section of the normal skin between the bands, the epidermis is seen to be made up of three layers: (1) a very thin superficial black layer, (2) an intermediate whitish layer and (3) a thicker black layer. The dermis and the *panniculus adipositas* can be recognized.

Histology of the skin reveals that the thin superficial layer consists of flattened epithelial cells in which the intracellular melanin granules are spread in a horizontal plane (Fig. 2). In the underlying *stratum spinosum*, the melanin granules are spread in the area peripherical to the nuclei. The deeper black layer consists of elongated dermal papillae rich in melanocytes. As is known from domestic animals, melanin granules are provided to the epithelial cells of the *stratum germinativum* by the melanocytes (Banks, 1981).

The transverse bands are characterized by an increase in thickness of the epidermis. Histologically, a broadening of the *stratum spinosum* can be seen (Fig. 3). The pale grey colour of the transverse bands is apparently caused by the thick, whitish *stratum spinosum* screening the black layer of dermal papillae. In addition, cells in the superficial layer of the *stratum spinosum* in the normal dark skin are rich in Periodic-Acid-Schiff (PAS) positive material (probably mucopolysaccharids). At the margins of the transverse bands there is a diminution in those cells loaded with the PAS positive material. In the central area of the grey bands the PAS positive material is absent. No differences can be observed in the number of fat droplets stored in the epithelial cells of the normal coloured skin and those of the pale grey transverse bands.

The transverse bands represent a specialized characteristic of the skin of juvenile Bottlenose

dolphins. The morphology and possibly the intracellular metabolism differs from the normal skin. A functional explanation fails at the moment. The bands do not represent areas without pigment, as was suggested by McBride & Kritzler (1951). At the site of the transverse bands the *stratum spinosum* is thicker than of the normal skin, shielding the pigment of the underlying dermal papillae.

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References

Banks, W. J. (1981) Applied veterinary histology. Williams and Wilkins, Baltimore, 93.

Cockcroft, V. G. & Sauer, W. (1990) Observed and inferred epimeletic (nurturant) behaviour in bottlenose dolphins. *Aquatic Mammals* **16**(1), 31–32.

McBride, A. F. & Kritzler, H. (1951) Observations on pregnancy, parturition, and postnatal behaviour in the bottlenose dolphin. *Jour. of Mammal.* **32**(3), 251–266.

Peddemors, V. (1988) Kelpie, our first successful dolphin birth. *South African Ass. for Mar. Biol. Res.* **16,** 32–33.

Slijper, E. J. (1966) Functional morphology of the reproductive system in cetacea. In: K. S. Norris (ed.), Whales, dolphins, and porpoises. Berkeley and Los Angeles: University of California Press, 278–319.

Smolders, J. (1988) Adoptive behaviour in the bottlenose dolphin. *Aquatic Mammals* **14**(2), 78–81.