

**GA 706**

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"Hope," a pan-tropical spotted dolphin (*Stenella attenuata*), stranded near Freeport in Brazoria County on August 4, 1995. Although she was unresponsive for some time, her initial condition improved gradually over a period of weeks. Through the dedicated efforts of many volunteers, she survived until October 10th, when it was judged necessary to end her struggle. She was never "right", and always displayed some degree of brain impairment. While she was for a time able to swim by herself, she deteriorated, and eventually lay persistently on her right side. She was seen to inhale water several times.

It was never clear what the primary cause of her illness was. She was found to have developed anti-bodies against morbillivirus, the cause of dolphin distemper, and this was thought to be a possibility. However, the concentration of antibody (titer) did not change, as it should have done if she had the active disease. Other causes were entertained, such as parasitism.

At the necropsy we could find no evidence of chronic morbillivirus disease in any of the tissues examined, either grossly or microscopically. There was no evidence of superinfection, and no sign of depletion of the lymphoid system. Superinfection, in this case the development of bacterial and fungal infections because of immune system impairment caused by virus disease, often is expressed in dolphins with distemper as hemorrhagic bronchitis caused by a common fungus.

What we did find were several brain lesions, three in the occipital lobes that were old enough to have collapsed and become gliotic (scarred), and two, an old and

a relatively new hemorrhagic one, in the left basal ganglia region, involving the left root of the corpus callosum and the internal capsule. The basal ganglia are structures in the central part of the brain that are involved with coordination of movement, and sensation. The corpus callosum is a major nerve connection between the sides of the brain. The internal capsule is a nerve tract that contains fibers that govern movement. All of these lesions contained many worm eggs (ova) that have a strong resemblance to those of the flatworm of the genus *Nasitrema*. This is a well-known infestation of the air sinuses in many dolphin species, and entry into the brain is a common cause of dolphin stranding (mainly *Delphinus*) in southern California. The evolution of the lesions in Hope was consistent with her stranding being caused by them, and with her later change in behavior associated with the newer lesions.

The ova were not exactly like the familiar *Nasitrema* eggs, and whether this represents a different species, or a reaction to medication I cannot say. No adult worms were found in the brain, which is not unusual in animals with similar lesions. I think these lesions are enough to account for the clinical neurological deficit. There was also a marked necrotizing bronchopneumonia in the right lung (the down-hill lung in this right-leaning animal). I attribute this to aspiration of water. There are ova in the tissue here as well, and general signs of foreign body reaction as well as bacterial infection. Cultures revealed mixed organisms, as might be expected from aspiration of tank water. Aspiration because of impairment of reflexes like swallowing is very common in humans with impaired consciousness or certain chronic neurological diseases.

We have not seen parasitism of the brain in any of the *Tursiops* we have examined over the past five years, but ova were found in the coverings of the brain of one other *Stenella*. This may be evidence of species susceptibility, or simply that our *Tursiops* tend to be inshore animals, while the *Stenella* tend to be offshore. This could make their intensity of exposure different. I am inclined to

think in terms of species susceptibility to brain invasion, as the worm is common in the air sinuses of *Tursiops*.

In summary, my opinion is that Hope's exposure to morbillivirus was at some time in the past, and there was no active disease. Her problems stemmed from parasitism of the brain by a fluke, probably *Nasitrema*, with destruction of important neural structures. This explains her neurological deficits. Because of her impairment, she aspirated contaminated water leading to severe pneumonia. I think this has to be seen as an inevitable outcome in an animal with an injury such as Hope's.