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## CEREBRAL ABSCESS ASSOCIATED WITH STRANDING IN A DOLPHIN

G. S. COLGROVE<sup>1</sup> and G. MIGAKI<sup>2</sup>

**Abstract:** A captive Atlantic bottlenosed dolphin (*Tursiops truncatus*) was examined after being found beached in the shallows of its lagoon enclosure. An abscess was found in the right cerebral hemisphere, and *Staphylococcus aureus* was isolated from the lesion. Histopathologic examination of the brain revealed a pyogenic meningoencephalitis.

### INTRODUCTION

There are numerous reports of wild cetaceans being found on beaches in various parts of the world. Such animals are generally termed stranded.<sup>3</sup> While the causes of cetacean strandings are not always apparent, at least two conditions which may produce disorientation or incoordination have been associated with the stranding phenomenon. Fraser (quoted in Norris)<sup>4</sup> and Reysenback De Hann<sup>5</sup> reported that the pterygoid or acoustic sinuses of stranded cetaceans are frequently infested with nematodes. Ridgway and Daily,<sup>6</sup> and Ridgway and Johnston<sup>7</sup> found cerebral and cerebellar abscesses containing trematode ova in stranded Pacific dolphin (*Delphinus sp.*)

This report describes the finding of a cerebral abscess due to *Staphylococcus aureus* in a stranded, captive Atlantic bottlenosed dolphin (*Tursiops truncatus*).

### CASE REPORT

An adult female bottlenosed dolphin was one of six captive dolphins that had been maintained in a fenced lagoon for approximately 9 months. On the morning of 6 April, she was found partially beached in a rocky, shallow area at one end of the lagoon enclosure. The animal was removed from the lagoon and transported to a nearby building for observation and

treatment. Numerous skin lacerations were present on the head, body and flukes, and the animal appeared in shock. Fluid therapy, corticosteroids, and antibiotics were administered, but the dolphin died approximately 30 hrs after the stranding was discovered.

The most significant necropsy finding was a cerebral abscess located beneath the cortex of the right cerebral hemisphere (Figure 1), approximately 2 cm from the longitudinal fissure. The abscess measured 1.5 cm in diameter, contained cream-colored pus, and appeared well encapsulated. Coagulase positive *S. aureus* was isolated from the abscess.<sup>3</sup>

Histologic examination of sections through the brain revealed both an acute and a chronic inflammatory process. In some sections there was an acute pyogenic abscess characterized by large accumulations of degenerated polymorphonuclear neutrophils with no evidence of a fibrous capsule (Figure 2). Numerous colonies of bacteria were found in the pyogenic exudate. Tissue sections stained with MacCallum-Goodpasture method revealed these bacteria to be gram-positive cocci arranged in large clusters morphologically resembling the genus *Staphylococcus*. An acute pyogenic leptomeningitis was found near the abscess (Figure 3). In other sections of the brain there were

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<sup>3</sup> Bacterial identification was made by Accu-Path Laboratory, Inc., Honolulu, Hawaii.



FIGURE 1. Incised abscess in the right cerebral hemisphere of the dolphin.

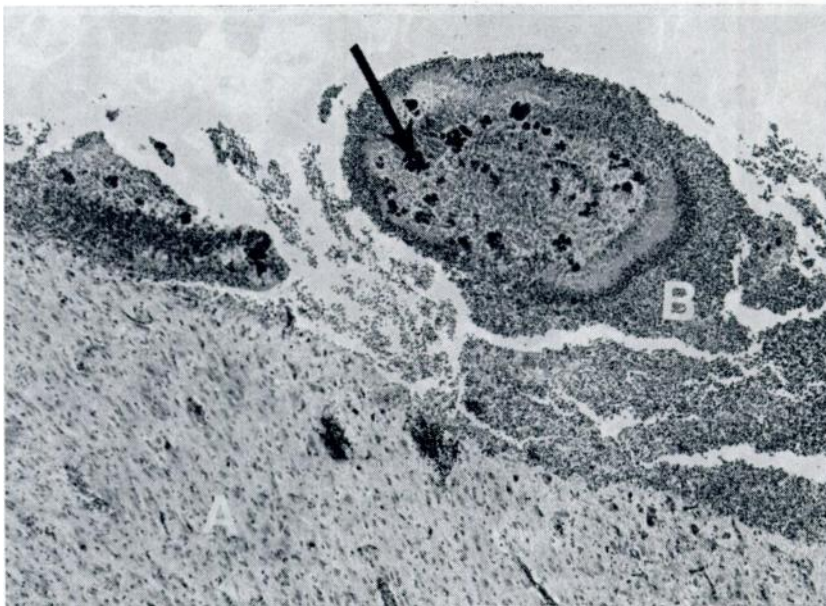


FIGURE 2. Cerebrum (A) containing abscess composed of degenerated polymorphonuclear neutrophils (B). Note large colonies of bacteria (arrow). H&E X50.

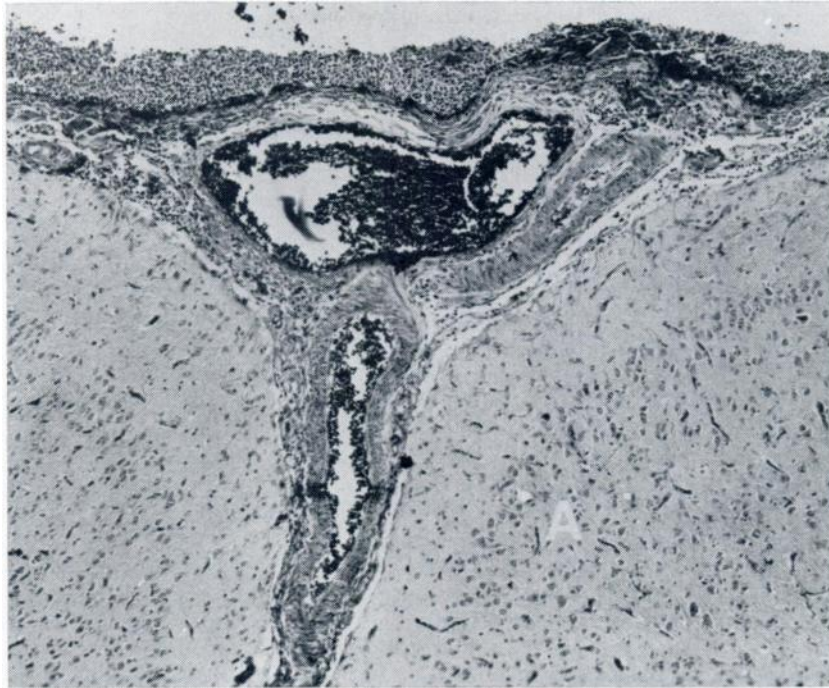


FIGURE 3. Acute pyogenic leptomeningitis of the cerebrum (A). Note the extensive pyogenic exudate in the meninges. H&E X56.

focal areas of chronic leptomeningitis characterized by large accumulations of plasma cells, lymphocytes and macrophages.

#### DISCUSSION

Prior to the stranding incident, the dolphin was in apparent good health and no manifestations of disease of the central nervous system were observed. Personnel who discovered the beached animal gained the impression that the stranding had required deliberate effort on the part of the dolphin. Attempts to return the dolphin to the water were met with strong resistance, and since tidal fluctuations within the lagoon were neither rapid nor extreme, it seemed unlikely that the animal had been involuntarily grounded by receding tides.

Pyogenic infections of the central nervous system may arise via the bloodstream, by implantation in wounds, or by direct extension to the brain from adjacent structures.<sup>1</sup> Histologically it appeared that this dolphin had a chronic leptomeningitis and subsequently developed an acute pyogenic leptomeningitis and a large acute pyogenic abscess. A direct open wound of the brain could have caused the abscess or it could have been secondary to a pyogenic embolus from lungs, skin, heart or elsewhere. Any infection leading to a septicemia could result in a cerebral abscess. The cause of the chronic leptomeningitis is not apparent, but a remote infection is suspected. No evidence of a pyogenic infection was observed in the lungs or heart.

Medway and Schryver<sup>8</sup> isolated the genus *Staphylococcus* from the lungs of

several small cetaceans that died of bronchopneumonia. It is interesting to note that in one case, *Staphylococcus sp.* was recovered from the cerebrospinal fluid of a pilot whale (*Globicephala melaena*) with bronchopneumonia and septicemia, but no mention was made in

the report of any lesions in the central nervous system.

Ketterer and Rosenfeld<sup>2</sup> reported a septic embolic nephritis due to *S. aureus* in a dolphin (*Tursiops aduncus*). The primary infection was a subcutaneous abscess.

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