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A pygmy killer whale (*Feresa attenuata*) stranded at Sagami Bay, Japan

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Abstract

A female pygmy killer whale (*Feresa attenuata*) was rescued on the east side of Sagami Bay, Japan, and was treated for two weeks in Enoshima Aquarium. Blood was collected and a blowhole swab was taken and examined. During the necropsy, osteoarthritis of the scapula and humerus in the left was observed. Five different species of parasites were found.

Introduction

The pygmy killer whale (*Feresa attenuata*), though a rare species, can be found worldwide in various deep tropical and warm temperate waters (Caldwell & Caldwell, 1971; Ross & Leatherwood, 1994). There have been twelve records of pygmy killer whales in Japan (Yamada, 1954; Nishiwaki *et al*., 1965; Nishiwaki, 1967; Uchida, 1994; Yoshida, 1994). This is the first published report of clinical treatment of a stranded pygmy killer whale in Japan.

Methods

On 23 June 1994, a female pygmy killer whale was found unable to swim at Ashina marina in Kanagawa, Sagami Bay (35°13′N; 139°36′E). The animal had drifted to a corner of the marina and was caught by the aquarium staff. After the initial physical examination, it was judged that a rescue attempt would be necessary, because the whale was extremely debilitated and was floating rather than swimming. The animal was transported to Enoshima Aquarium. After the arrival, blood was collected for clinical pathology (Table 1). A blowhole swab was taken for fungal and bacterial cultures (Table 2).

Mixed solutions of lactated Ringers solution and 10% glucose, with multiple vitamins, were administered via the tail flukes (5 to 6 liters per day). Gentamicin (300 mg, every 12 hours) and Cefazolin (5 g, every 12 hours) were administered via an intravenous route. Cimetidine (400 mg, every 6 hours), for protection of the gastric mucosa was administered intravenously. In addition sulpyrine (1.5g every 12 hours) was administered intramuscularly as an antipyretic and analgesic drug. Since the whale did not feed voluntarily, force feeding was administered via a stomach tube three days after arrival, utilizing whole squid and minced mackerel, totaling up to 2 to 4 kg per day.

Results and discussion

According to the first blood data on 23 June 1994, the whale was diagnosed as having a general bacterial infection, severe anemia and liver disease. Since the whale was extremely debilitated, it was treated in the tank, maintained within the water in a stretcher while supported by sponges. The skin was kept moist by showering the whale with saltwater. A 24 hour watch on the animal was maintained.

On 5 July 1994, the blood data was shown marked leukocytosis, reticulocytosis, and marked elevations in GOT, γ-GTP, LDH and total bilirubin (Table 1). These results suggest a number of possible causes including the antibiotics were not effective, possible hepatic necrosis caused by the drug-induced liver injury, and/or acute stress from being kept in the stretcher.

The whale died on 7 July 1994, fourteen days after the rescue. Shortly after death, a necropsy was performed at the Enoshima Aquarium. The internal organs were preserved with 10% formalin and brought to the Nippon Veterinary and Animal Science University, Tokyo, where they were examined at the Department of Veterinary Pathology. Internal and external parasites were collected and those species were identified by Dr M. Machida at the National Science Museum (Table 3).

The body length was 213 cm and the weight was 127 kg. There were 9 teeth on each side of the upper jaw, and 11 on each side of the lower. According to the standard number of teeth (Ross & Leatherwood, 1994), this whale was identified as a

Table 1. The first blood data taken after the rescue on 23 June 1994, and the last data taken two days before the death of the pygmy killer whale on 5 July 1994

Parameter	Date	
	June 23	July 5
WBC ($\times 10^2$/mm^3)	147	289
Bas (%)	0.0	0.0
Eos (%)	0.0	0.0
Sta (%)	3.0	6.0
Seg (%)	81.0	83.0
Lym 9%)	12.0	6.0
Mon (%)	4.0	5.0
RBC ($\times 10^4$/mm^3)	210	190
Hb (g/dl)	6.3	6.6
Ht (%)	22.3	22.1
MCV (μ^3)	106.2	116.3
MCH ($\mu\mu$g)	30.0	34.7
MCHC (%)	28.3	29.9
Pl ($\times 10^4$/mm^3)	23.7	24.6
Ret (‰)	73	143
Fib (mg/dl)	338	188
TP (g/dl)	8.5	6.3
PFr		
A/G	1.01	0.89
Alb (%)	50.3	47.0
α_1G (%)	9.5	5.7
α_2G (%)	5.0	3.8
βG (%)	4.5	4.8
γG (%)	30.7	38.7
GOT (IU/l)	358	1283
GPT (IU/l)	178	82
LDH (IU/l)	2762	5430
CPK (IU/l)	218	703
γ-GTP (IU/l)	104	250
ALP (IU/l)	58	131
T-Bil (mg/dl)	0.06	0.37
BUN (mg/dl)	65.2	74.2
CRE (mg/dl)	1.7	0.9
Na (mEq/l)	148	154
Cl (mEq/l)	104	122
K (mEq/l)	4.1	—
Ca (mg/dl)	11.0	—
Fe (μg/dl)	26	177
T-Cho (mg/dl)	177	133
TG (mg/dl)	38	4
FFA (mEq/l)	0.60	0.31
AMY (IU/l)	9	6
TTT (KU)	—	1.0
ZTT (KU)	—	8.0
PGST (ng/ml)	<0.2	—

pygmy killer whale (*Feresa attenuata*). The teeth were examined microscopically, and the layers within the cementum were counted, numbering 20.

Table 2. Bacteria sampled and identified in the pygmy killer whale

Date	Location	Organism
23 June	Blowhole	*Vibrio fluvialis*
1 July	Blowhole	*Pseudomonas aeruginosa*
		Candida sp.
7 July*	Blowhole	*Pseudomonas putrefaciens*
		Streptococcus faecalis
	Fecal	*Pseudomonas putrefaciens*
		Pseudomonas aeruginosa
		Escherichia coli

*These bacteria were sampled at the necropsy.

By this method, and on the basis of tooth wear, this animal was judged to be 20 years old.

Erosions and numerous ulcers, 0.5 to 2 cm in diameter, were observed in the mucosa of the fundic stomach. The histopathology revealed degeneration and desquamation in the mucosa. Numerous black, hard ovoid nodes, approximately 0.5 to 1 cm in diameter, were located in the fundic and pyloric stomachs. The histopathological examination revealed these nodes to be cysts on the tunica submucosa and the tunica muscularis, which both contained numerous trematodes, presumed to be *Braunia cordiformis*. The examination also revealed desquamation of mucosa at the infestation area. An inflammatory infiltrate, comprised of lymphocytes, was in the lamina propria. Degeneration and desquamation of the mucosa of the intestine were observed. The lungs were congested. The histopathology revealed calcified bronchial epithelium and alveoli. An inflammatory infiltrate, comprised mainly of macrophages, was found in the alveoli.

Osteoarthritis was observed at the left scapulohumeral joint (Figs 1–2). The necks of the humerus and the scapula exhibited coagulation necrosis, and the head of the humerus was separated. The body of the humerus was thickened. The scapula was deformed and appeared porous at its margin. In both of the bones, the surface had lost its normal smooth appearance and developed splits into its substance which led to a roughened appearance. They were yellowish gray in color. Healing was apparent between the ulna, radius, and humerus. The circumference of the right scapula was swollen externally. The muscles were congested and edema was present in the subcutaneous tissue.

In this whale, *Nasitrema* sp. was observed from the pterygoid sinus. *Pseudomonas aeruginosa* was isolated from the blowhole. At necropsy, the lungs were congested, histopathology revealed a macrophage infiltrate and fibrinogen deposition in the alveoli. Sweeney (1978) pointed out that the

Table 3. Parasites found in the pygmy killer whale

Parasite	Infection site	Number of parasites
Nasitrema sp.	Pterygoid sinus	Over 200 individuals
Campula sp.	Bile ducts	Over 150 individuals
Trematoda*	Fundic and pyloric stomachs	Numerous cysts
Pennella sp.	Skin	—
Conchoderma virgatum	Attached to *Pennella* sp.	—

*Since Trematodes were observed from histological section, they could not be identified. It was presumed to be *Braunia cordiformis* (J. C. Sweeney & W. D. Harding, pers. comm.).

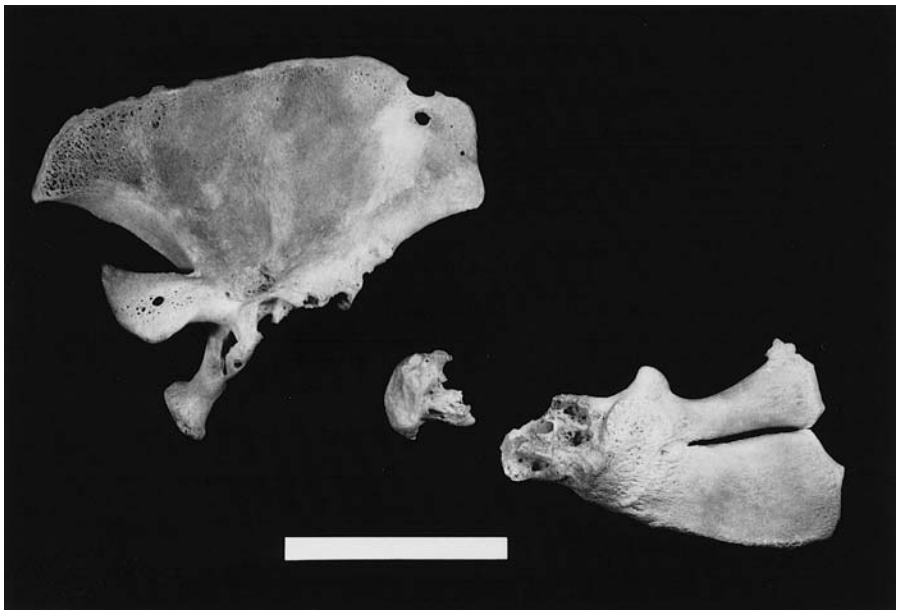

Figure 1. Exterior view of the left scapula, humerus, radius and ulna of the pygmy killer whale. Bar: long side = 10 cm, short side = 1 cm.

trematoda *Nasitrema* sp. can cause infections of the pterygoid sinus, leading ultimately to sinusitis, respiratory obstruction and bacterial pneumonia. *Pseudomonas aeruginosa* has been associated with fatal bronchopneumonia and dermatitis in Atlantic bottlenosed dolphin (Diamond *et al*., 1979).

Conclusion

There have been numerous reports of osteoarthritis in humans (Bennett, 1966; Lanyon, 1982). Osteoarthritis has rarely been observed at the scapulohumerus joint in whales. It is probable that the osteoarthritis had been present chronically, perhaps contributing to the anemic state at the time of clinical presentation, as well as leading to difficulty in maintaining normal swimming status. The flippers contribute a small share to the steering effect and particularly help to balance the animal on its course (Slijper, 1962). It is speculated that the infectious agents may have reached the affected bony structures via the blood stream, the lymphatic vessels, or by direct implantation of microorganisms (Bennett, 1966). Three or four days before the rescue, three whales were sighted by a local fisherman in this marina. It seems probable that this particular whale separated from the others and drifted onto shore.

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Figure 2. Interior view of the left scapula, humerus, radius and ulna of the pygmy killer whale. Bar: long side = 10 cm, short side = 1 cm.

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