

## INVESTIGATION OF A PACIFIC PILOT WHALE STRANDING ON SAN CLEMENTE ISLAND

JOHN D. HALL, WILLIAM G. GILMARTIN, JOEL L. MATTSSON

Naval Undersea Research and Development Center, San Diego, California 92132

**Abstract:** Twenty-eight Pacific pilot whales (*Globicephala scammoni*) swam ashore on San Clemente Island off southern California on 8 January 1971. Investigation of the stranding led to collection of information on the bacteriology, reproductive tissue histopathology, liver mercury and DDE contents, and herd statistics of the species. These data together with the knowledge that squid were spawning just offshore and the meteorological conditions at the time led the authors to conclude that the stranding was a natural event precipitated by these optimal biological, beach, and tide conditions.

Sometime between midnight Thursday and 0400 on Friday, 8 January 1971, 28 Pacific pilot whales, *Globicephala scammoni*, swam ashore and stranded at Pyramid Cove on San Clemente Island, 60 miles off the Southern California coast.

The authors were notified of the stranding at noon on Saturday, 9 January. Preparations for an investigation were begun at once and the authors were flown by Navy helicopter to the island, arriving at the stranding site at 1400 Sunday, 10 January. By the time they arrived all the whales were dead and strewn along the high tide line for 200 yards. Most were oriented parallel with the beach (Fig. 1). Their carcasses were mutilated by unknown individuals who had been there prior to our arrival.

The herd was composed of at least 6 males and 21 females. It was impossible to examine one animal which was buried in the sand by tidal action.

The 6 males ranged from 11'0" to 15'5". The 21 females ranged from 10'3" to 15'10" in length. Male pilot whales are known to grow to at least 20 feet, while females probably do not get over 18 feet in length.

Tissue samples taken from the testes of two males (12'10"; 14'10") showed inactive spermatogenesis. No spermatozoa were found in the tubules.<sup>1</sup> Male pilot whales may undergo a rutting season, so the lack of active spermatogenesis is not necessarily an indication of sexual immaturity.

The uterus and ovaries of seven females were examined. Two of the seven females were pregnant; examination revealed both fetuses to be male measuring 33" and 41". At least three other females were lactating. Ovarian tissues taken from the seven animals showed follicles in various stages of development. Several ovaries contained large corpora albicans, and encapsulated masses in the ovaries were identified as corpora lutea.<sup>1</sup>

The predominance of females, most of which were sexually mature, along with the absence of a really large bull male, leads us to believe that the pod was made up of mature females and juveniles of both sexes.

All the animals were in an advanced state of decomposition. For this reason the gastro-intestinal tract was not systematically explored. However, we did

<sup>1</sup> Histology performed at Armed Forces Institute of Pathology, Washington, D.C. 20305.



FIGURE 1. Pacific pilot whales at Pyramid Cove on San Clemente Island, 10 January 1971.

find squid beaks in the stomachs of several animals. The visceral and parietal serosal surfaces of abdomen and thorax appeared normal except for post-mortem changes and the presence of several parasitic nodules. Skin from many contact surfaces, e.g. flukes, chin, pectoral fins, was abraided off, apparently due to thrashing, post-mortem degeneration, and tidal action.

Swabs for bacterial cultures were taken from the incised lung parenchyma and lower intestines of seven animals. Isolates of significance include *Corynebacterium pyogenes* from five lung and six intestinal cultures; *Bordetella bronchiseptica* from the lung of one animal from which *C. pyogenes* was also grown; and *Vibrio parahemolyticus* from the lung tissue of another.

*Corynebacterium pyogenes* may be questioned as a primary etiologic agent since it is isolated regularly from clinically normal porpoises and sea lions. *Bordetella* species are known to cause bronchopneumonia in other mammals but without histopathology the organism's pathogenesis in this situation is uncertain. *Vibrio parahaemolyticus* can be an enteropathogen in man but is isolated from sea water and marine life in the Puget Sound area (Ronald A. LeClair, personal communication).

Liver tissues from six whales were analyzed by the technique of flameless atomic absorption spectrophotometry with quadruplicate analysis on 0.7 gg

wet weight samples of liver.<sup>2</sup> Samples from four females contained mercury in concentrations ranging from 15.9 ppm to 23.9 ppm, while in two males the quantities were 8.5 ppm and 16.7 ppm. The six liver specimens (two male, four female) averaged 16.9 ppm Hg.

Pesticide analysis performed on liver samples from five whales showed DDE concentrations ranging from 0.29 ppm to 2.40 ppm. The mean of five samples was 1.06 ppm DDE.<sup>3</sup>

These mercury and DDE concentrations are compared with data from some other marine mammal species and man in Table I.

TABLE 1. Mercury and DDE levels in some marine mammals and man.

Organism	Tissue	(Mercury)		(DDE)	
		Range (ppm)	Mean (ppm)	Range (ppm)	Mean (ppm)
Pacific Pilot Whale	Liver	8.5 - 23.9	16.9	1.06	0.29 - 2.40
Common Dolphin	Liver	11.1	11.1		
California Sea Lion (Gilmartin, unpublished data)	Liver	37.9 - 68.1	52.9	9.28	1.12 - 28.45
Northern Fur Seal <sup>1</sup>	Liver	19.0 - 172.0	67.2		
Man <sup>1</sup>	Kidney	0.0 - 26.3	2.75		
Sea Water <sup>2</sup>			.00003		

It is difficult to assess the clinical significance of these mercury and DDE tissue residues. Reports of any clinical symptoms in other mammals directly related to chronic mercury or DDE organ concentrations are not available. Hogs fed methyl mercury reportedly first showed signs of illness when liver mercury levels reached 6.8 ppm. When mercury concentrations reached 30 ppm the animals were considered sufficiently ill to be euthanatized "in extremis", and levels over 75 ppm were acutely lethal. However, since a distinction between methyl mercury and inorganic mercury in the pilot whale tissue was not made, a

correlation between the symptoms observed in the acute poisoning experiment with swine and in the actions of these pilot whales is impossible.

The mean pilot whale liver mercury and DDE levels are well below the concentrations reported in apparently normal California sea lions and Alaskan fur seals (Table I).

An extensive escarpment which runs parallel to the east side of San Clemente Island is considered a major pathway for marine mammal travel.<sup>4</sup> Records indicate that marine mammals, notably pilot whales, have previously stranded in Pyramid Cove.<sup>5</sup> We consider the meteorologi-

<sup>2</sup> Analyses performed at White Mountain Research Station, Univ. of California, Berkeley 94720.

<sup>3</sup> Analyses performed at Toxicology Dept. Univ. of California, Davis 95616.

cal and biological conditions to have been nearly optimal for a stranding.<sup>3</sup> The tide was flooding on a gently sloping sandy beach with a steep drop-off about 600 meters off shore; there was almost no wind or surf, and squid (a primary food of pilot whales) were reported to

be spawning in Pyramid Cove at the time.

The above data, along with the lack of significant pathological evidence, leads us to believe that this stranding was a natural phenomenon similar to others that have occurred in Pyramid Cove in the past.

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