Necropsy Report
Killer Whale (Orcinus-orca) Samoa & calf
Age 14 yrs — SeaWorld of Texas

Name: Samoa (female) and calf

Species: Killer Whale (Orcinus orca)

Source: wild capture, November 1983, Berufjordur coast, Iceland, age: est. 5 yrs

Deceased: 6:22 a.m., 03-14-1992, SeaWorld of Texas, age: est. 14 yrs

Reported cause of death (per NMFS MMIR data)**:** Mycotic Meningoencephalitis

Necropsy info:
Conclusions- Dr's McBain, Dalton, Mathey, Cornell, and Hixson (1992): A primary mycotic endometritis developed which spread to the brain resulting in a fatal fulminating mycotic encephalitis.

Note: Gross examination of reproductive system found left horn contained a near term female fetus that weighed 104.5 kg.

Histopathology- Ronald R. Crawley, DVM, University of Texas (1992):
1. mycotic meningoencephalitis
2. mycotic endometritis
3. parasitic sinusitis
4. parasitic lymphadenitis

Summary of Microscopic Findings in Tissues: Clifford J. Hixson, VMD (1992):
Significant microscopic changes were present in the following tissues:
a. Brain: Dx, severe, diffuse, acute necrotizing encephalitis with intralesional fungal hyphae.
b. Uterus: Dx, severe, diffuse, acute necrotizing endometritis with intralesional fungal hyphae.
c. Placenta: Dx, mild, multifocal, acute placentitis with intralesional fungal hyphae.
d. Pterygoid Sinus: Dx, mild to moderate, diffuse, chronic sinusitis with numerous cross sections of intralesional nematodes.
e. Lung: Dx, mild, multifocal, acute hemorrhage.

Comment Clifford J. Hixson, VMD (1992): :
Systemic zygomycosis is most likely responsible for the death of both the mother killer whale and her calf. Severe tissue damage associated with luxuriant growth of fungal organisms is present in both the brain and uterus of the mother. Although fungal hyphae are evident in several areas of the placenta, there is no microscopic evidence of systemic invasion of fungal organisms in the calf.

For more on Samoa's death, see:
http://withoutmethereisnou.wordpress.com/2011/05/25/the-truth-behind-samoas-death-captivity-disease-not-found-in-wild-orcas/

Notes: Prior to reforms of the Marine Mammal Protection Act (MMPA) in 1994, holders of marine mammals for public display were required to submit necropsy reports (animal autopsy reports) for deceased animals, making the documents available to the public and scientific community. Presently, marine mammal parks in the U.S. are only required to provide a "cause of death" to the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) which maintains Marine Mammal Inventory Reports (MMIR). Details of marine mammal deaths are now a closely guarded secret at U.S. entertainment facilities.

The Orca Project acquired the following documents from the National Marine Fisheries Service (U.S.A) via the Freedom of Information Act for deaths that occurred prior to implementation of the 1994 MMPA changes.

For more information visit www.theorcaproject.com

Necropsy, Autopsy, Veterinarian, NOAA, NMFS, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, MMIR, Marine Mammal Inventory Report, MMPA, Marine Mammal Protection Act, Killer Whale, Orca, Shamu, Death, Die, SeaWorld, San Antonio, Texas, Samoa, calf

Sea World

May 1, 1992

Dr. Nancy Foster
Director, Office of Protected
Resources & Habitat Programs
National Marine Fisheries Service
1335 East-West Highway, Room 8268
Silver Spring, Maryland 20910

RE: Marine Mammal Collection/Inventory Report

Dear Dr. Foster:

Three copies of the attached serve as an update to our inventory reports.

Sincerely,

Barbara D. Heffernan

Barbara D. Heffernan
Director, National Affairs
1776 I Street, N.W. #200
Washington, D.C. 20006

Attachment: Marine Mammal Collection/Inventory Reports
SWO-Oo-8951 NMFS Inventory/Mortality Report
SWO-Oo-8951 Sea World Gross Necropsy Report

Sea World, Inc.
7007 Sea World Drive
Orlando, FL 32821-8097
(407) 351-3600
FAX (407) 345-5397

SEA WORLD
GROSS NECROPSY REPORT

Facility: Sea World of Texas **Prosector:** Drs. McBain, Dalton, Mathey, Cornell, and Hixson

Genus/Species: Orcinus orca **ID #:** SWO-Oo-8951

Age: 14 yrs. (estimated) **Sex:** Female

Date of Death: 3/14/92 **Date of Necropsy:** 3/14/92

EXTERNAL MORPHOMETRICS: (metric only)

WEIGHT: 2,788.2 kg

TOTAL LENGTH: 515 cm **GIRTH AT AXILLA:** 310 cm

GIRTH AT ANUS: 240 cm **FLUKE WIDTH:** 141.25 cm

DORSAL FIN HEIGHT: 62.5 cm

HISTORY:

This animal arrived at Sea World in May of 1989 from a small Brazilian oceanarium. She appeared to be in good health with no medical problems. She became pregnant in early 1991.

On February 28, 1992, a routine blood sample revealed an elevated white blood cell count. Behavior and food intake remained normal. Broad spectrum antibiotic treatment was started. Follow-up blood samples were done on March 3rd and 6th. Both revealed a decreasing white blood cell count. An EKG performed on March 8th confirmed fetal viability. A follow-up blood sample on March 11th revealed an elevated white blood count. Medication changes were made in response to the hemogram. Blood samples on March 12th and 13th revealed a total white blood cell count within the normal range. Treatment continued unchanged. Food intake declined on the 13th, suggesting parturition was imminent. Fetal flukes were observed protruding from the genital slit at 0400 March 14th. The animal died during labor at 0622.

GENERAL EXTERNAL APPEARANCE: (oral cavity, external nares, skin, eyes)

Shallow cutaneous fissures approximately 7cm long radiating from the blowhole. There was no evidence of external trauma.

SUBDERMAL CONDITION: (blubber, muscles, lymph nodes)

Good blubber layer of 8-10 cm.

CRANIAL EXAM: (ears, melon, pterygoid sinus)

The caudal and medial walls of both pterygoid sinuses were markedly thickened and nodular. Multiple nematode-like parasites were observed embedded in granulation tissue in the sinuses. The left eustachian tube was obliterated by granulation tissue and osteophytes resulting from the presence of parasites.

CENTRAL NERVOUS SYSTEM: (brain, pituitary, spinal cord)

The lateral surface of the right cerebral hemisphere was hemorrhagic. An 8 to 10 cm diameter area of malacia and cavitation was observed in the lateral center of the right cerebral hemisphere. It extended into the parenchyma. Two 4 cm diameter blood clots were associated with the area of malacia.

THORACIC CAVITY: (pleura)

No lesions noted.

UPPER RESPIRATORY SYSTEM: (nasal sacs, nares, larynx)

No lesions noted.

LOWER RESPIRATORY SYSTEM: (trachea, bronchi, lungs, lymph nodes)

Airways: Mainstem bronchi filled with white froth.

Both lungs filled with fluid: Uniformly dark red, white froth oozed out on cut section.

CARDIOVASCULAR SYSTEM: (heart, aorta, major vessels)

No lesions noted.

ABDOMINAL CAVITY: (lymph nodes)

There appeared to be an excessive amount of a clear, yellow fluid. Petechiation was observed on the peritoneal wall adjacent to the uterus.

DIGESTIVE SYSTEM: (esophagus, stomach, intestine, cecum, rectum, lymph nodes)

Oral Cavity: Small, approximately 3 cm X 1 cm, laceration, lateral aspect of tongue. (Occurred at time of death.)

Proximal Portion of Glandular Stomach: Irregular area of dark red discoloration.

Multiple small stones in 3rd or 4th compartment of stomach.

No gastric ulcers noted.

No lesions noted throughout intestine.

LIVER: (biliary system)

No lesions noted.

PANCREAS:

No lesions noted.

SPLEEN:

No lesions noted.

REPRODUCTIVE SYSTEM:

The left horn contained a near term female fetus that weighed 104.5 kg. ~~The fetal tissue displayed advanced autolysis.~~

Left Ovary: 10 X 8 X 8 cm corpus luteum.

Right Ovary: No lesions noted.

Gravid Horn Distended with Fetus: Uterine surface diffusely dark red. Placenta uniformly dark red. Multiple petechial and paintbrush hemorrhages on serosa of uterus.

URINARY SYSTEM: (kidneys, ureter, bladder, urethra)

No lesions noted.

ADRENAL GLANDS:

No lesions noted.

SKELETAL SYSTEM:

No lesions noted.

SPECIAL TESTS:

Parasitology

Microbiology

Histopathology

Magnetic Resonance Imaging (Brain)

Gross Summary:

1. Malacia and cavitation of the lateral center of the right cerebral hemisphere.
2. Multiple uterine hemorrhages.
3. Verminous pterygoid sinusitis.
4. Autolytic female calf in left uterine horn.

Parasite Summary:

Pterygoid sinuses: Crassicada sp. (a common North Atlantic nematode) were observed bilaterally in the pterygoid sinuses. Parasitic ova having a single operculum were observed in a small granuloma found in a lymph node.

Microbiology Summary:

Saksenaea vasiformis was isolated from the uterus. Hyphae observed microscopically in the uterus and brain tissue were identical.

Histopathology Summary:

1. mycotic meningoencephalitis
2. mycotic endometritis
3. parasitic sinusitis
4. parasitic lymphadenitis (incidental finding in a single lymph node)

Magnetic Resonance Imaging Summary:

Large right parietal necrotic cavity of mycotic origin with suggestions of extension to the ventricular ependymal surface.

Conclusions:

A primary mycotic endometritis developed which spread to the brain resulting in a fatal fulminating mycotic encephalitis.

Signed: Leslie M. Walton **Date:** 23 April 1992

The University of Texas
Health Science Center at San Antonio
7703 Floyd Curl Drive
San Antonio, Texas 78284-7859

Department of Laboratory Animal Resources

(512) 567-6166

March 30, 1992

Accession Number: 92T3-98

Animal Number: SWO-00-8951

Submitted by: Dr. Dalton

Histopathology:

Slide A - brain, cerebral cortex. There is a necrotizing vasculitis of vessels in the meninges and cerebral cortex. There is hemorrhage, necrosis and scanty leucocytic exudation in the cortical tissue. The necrotic vessels and necrotic cerebral tissue both contain numerous hyphal elements that are non-septate, branching, thin walled, and irregularly shaped.

Slide B - brain, cerebral cortex. Same as A.

Slide C - brain, cerebral cortex. Same as A.

Slide D - brain, cerebral cortex. Same as A.

Slide E - lung, no lesion

Slide F - adrenal gland, focus of ischemic necrosis in adrenal cortex.

Slide G - myocardium, no lesion
thyroid gland, no lesion

Slide H - kidney, no lesion
lymph node, no lesion

Slide I - liver, no lesion
spleen, decreased lymphocytes in paracortical areas of germinal centers
non-glandular stomach, no lesion.

Slide J - small intestine (2), autolysis of villi, focal areas of mucosal hemorrhage.

Slide K - aorta, no lesion
trachea, no lesion

Slide L - pituitary gland, no lesion

~~**Slide M** - glandular stomach, mucosal congestion~~

Slide N - glandular stomach, no lesion

Slide O - small intestine (2), no lesion

Slide P - lymph node, small granuloma containing parasitic ova. The ova have a single operculum. The granuloma has a thick connective tissue wall.

Slide Q - mucosa of sinus, proliferative sinusitis characterized by fibrous nodules contain large nematodes.

Slide R - mucosa of sinus, same as slide Q.

Slide S - lymph node (2), small focus of hemorrhage and inflammation.

Slide T - lymph node, hemorrhagic lymphadenitis, no organisms seen.

Slide U - lymph node, small focus of hemorrhage.

Slide V - lymph node, medullary hemorrhage.

Slide W - uterus, severe necrohemorrhagic endometritis. There is hemorrhage, necrosis, and neutrophil exudation associated with hyphal invasion of endometrial glands, blood vessels and stroma of the superficial endometrium. Mycotic organisms were not found in the deepest layer of the endometrium or in the myometrium. The morphology of the fungus is the same as the organism seen in the brain.

Slide X - ovary, corpus luteum, no lesion.
placenta, no lesion.

Slide Y - ovary, inactive, no lesion.

Slide Z - ovary, inactive, no lesion.

Slide Z - ovary, inactive, no lesion.

Slide AA This tissue was included with tissues from the genital tract. It has a non-keratinized stratified squamous epithelium with a very irregular epithelial-submucosal junction. There are no adnexal structures. The submucosal tissues are fibromuscular, vagina?. No lesion.

Slide BB placenta, no lesion.
fetal myocardium, no lesion.

Slide CC fetal lung, no lesion.

Slide DD fetal lung, no lesion.
fetal kidney, no lesion.

Slide EE fetal liver, no lesion

DIAGNOSES:

1. mycotic meningoencephalitis
2. mycotic endometritis
3. parasitic sinusitis
4. parasitic lymphadenitis

COMMENT:

The morphology of the mycotic agent suggests it is one of the zygomyces. The mycotic organism was found only in uterus and brain. My impression is that a primary mycotic endometritis developed which spread to the brain and a fulminating encephalitis developed. The degree of autolysis of the fetal tissue is compatible with intrauterine death several days prior to the death of the dam.

Ronald Crawley

Ronald R. Crawley, D.V.M., Ph.D.

REF: B:Crawley/92T3-98

Subject: Summary of Microscopic Findings in Tissues from Killer Whale # SWO-00-8951, "Samoa"

13 APRIL 1992

To: Sea World of Texas

Significant microscopic changes were present in the following tissues:

a. Brain
   Dx, severe, diffuse, acute necrotizing encephalitis with intralesional fungal hyphae.
b. Uterus
   Dx, severe, diffuse, acute necrotizing endometritis with intralesional fungal hyphae.
c. Placenta
   Dx, mild, multifocal, acute placentitis with intralesional fungal hyphae.
d. Pterygoid Sinus
   Dx, mild to moderate, diffuse, chronic sinusitis with numerous cross sections of intralesional nematodes.
e. Lung
   Dx, mild, multifocal, acute hemorrhage.

The following tissues were examined microscopically and found to be unremarkable:
kidney, thyroid, liver, spleen, adrenal gland, heart, ovary, stomach (glandular and nonglandular), small and large intestine, multiple lymph nodes from various areas of the body, and pituitary gland.

The following fetal tissues exhibited autolytic change but were otherwise unremarkable:
heart, liver, kidney, and lung.

Comment:
Systemic zygomycosis is most likely responsible for the death of both the mother killer whale and her calf. Severe tissue damage associated with luxuriant growth of fungal organisms is present in both the brain and uterus of the mother. Although fungal hyphae are evident in several areas of the placenta,there is no microscopic evidence of systemic invasion of fungal organisms in the calf.

Clifford J. Hixson VMD
Diplomate, American College of
Veterinary Pathologists