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COCCIDIOIDOMYCOSIS IN A CALIFORNIA SEA LION (*Zalophus californianus*)[1]

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Abstract: Coccidioidomycosis in an adult male California sea lion (*Zalophus californianus*) is described. The animal was housed in a zoo in Tucson, Arizona, for approximately 5 years. This is believed to be the first reported case of coccidioidomycosis in a marine mammal.

INTRODUCTION

Coccidioidomycosis, also known as coccidioidal granuloma, Valley fever, San Joaquin Valley fever, Posada's disease, California disease, and desert rheumatism, is a dust-borne fungal infection of many warm-blooded animals. The infectious agent, *Coccidioides immitis,* is a dimorphic fungus that assumes both a saprophytic and parasitic phase. The parasitic form probably is not a natural form of the fungus, but rather an adaptation that occurs when mycelia or spores are inhaled and come into contact with suitable mammalian tissue.[10] The saprophytic form of *C. immitis* is found within the Lower Sonoran Life Zone, an area encompassing desert regions of Texas, New Mexico, Arizona, California, Nevada and Utah.[9] Infective areas continue into the deserts of Mexico, extending southward to South America. The entire area includes portions of Central America, Venezuela, and the Gran Chaco-Pampa region of Paraguay, northern Argentina, and Bolivia.[1,4] Endemic areas are characterized by hot, dry summers, mild winters, a short peroid of precipitation, and alkaline soil.[10,14] Sparse vegetation, dusty winds, and an arid climate have created a limited ecological range within which the growth and dissemination of *C. immitis* are most favorable.

Although animals and human beings are not believed to be directly infectious to each other, Castleberry *et al.*[3] reported transmission from a female rhesus monkey (*Macaca mulatta*) to her infant, probably through inhalation of exudate from the mother's forearm. Maddy[9] contends that such potential for transmission exists, although it is unlikely to occur. The normal route of infection is via the respiratory tract by inhalation of dust-borne spores.[1,8] Once contracted, the disease can manifest itself in one of two ways. One course is a benign, acute, self-limiting infection of the respiratory tract, and the second is a chronic, generalized, progressive disease clinically similar to tuberculosis that results in a 50% mortality rate in untreated human cases.[1,4,8]

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Coccidioidomycosis has been reported in a variety of animals, including cattle, sheep, dogs, swine, horses, burros, rodents, chinchillas,[2,5,9] coyotes,[16] cats[15] and primates.[1,11] In addition, the disease has been reported in the following captive free-living wild animals: a llama (*Lama* sp.) raised in California;[9] two Bengal tigers (*Leo tigris*) maintained in a Davis, California, compound;[9] a giant red kangaroo (*Macropus rufus*) shipped from Australia to the El Paso Zoo, Texas; a tapir (*Tapirus terrestris*)[9] and mountain gorilla (*Gorilla beringeri*)[11] exhibited at the San Diego Zoo, California; a sooty mangabey (*Cercocebus atys*) transported to Davis, Californa, from Sierra Leone;[12] and a gelada baboon (*Theropithecus gelada*) imported to Canada from Southern Califronia.[13]

Because of the paucity of reports of systemic fungal infections in marine mammals and the lack of a previous report of coccidioidomycosis in a pinniped, this report of *C. immitis* infection in a sea lion is warranted.

CASE HISTORY

An adult male California sea lion (*Zalophus californianus*) of unrecorded age was one of a group of animals housed at a Tucson, Arizona, zoo for approximately 5 years until its death in June 1975. The animal had been anorexic for several days prior to death. A *Clostridial* infection was suspected because of hemorrhagic myositis and edema but no gas.

RESULTS

Gross Findings

Patchy areas of consolidation were seen in the lungs. The liver was pale and contained multiple white foci. Similar white foci were also noted in the spleen and kidney. All other organs appeared essentially normal.

Histopathologic Findings

Multiple discrete suppurative granulomas were observed in the liver and spleen. The granulomas were composed

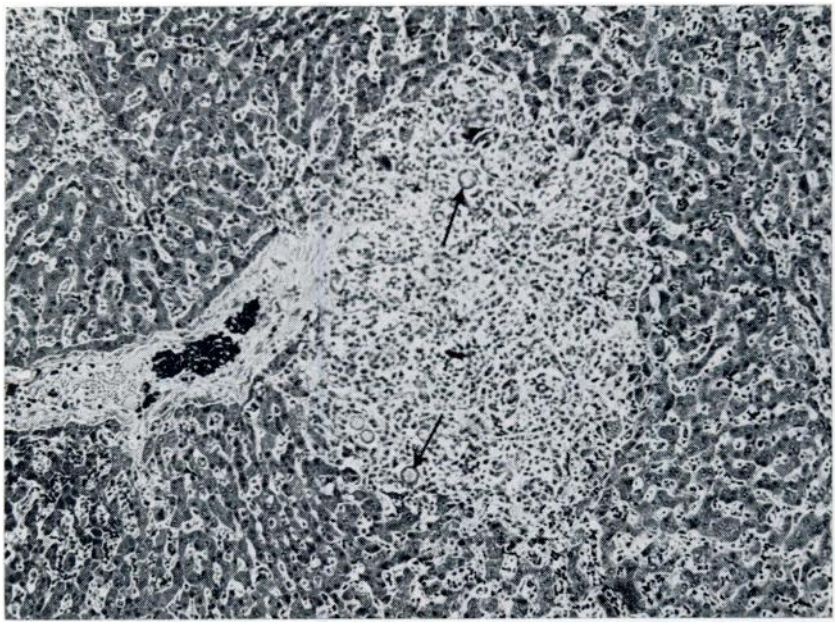

FIGURE 1. Focus of a suppurative granulomatous process in the liver containing spherules of **C. immitis** (arrows). H & E stain. X 105. AFIP Neg. 75-10747.

of many small collections of degenerated polymorphonuclear neutrophils surrounded by epithelioid cells and fibrous tissue (Fig. 1). Some epithelioid cells had coalesced, forming multinucleate giant cells that resembled the Langhans type. Within the granulomas were large spherical yeasts measuring 20 to 30 μm in diameter, with thick walls having the morphologic features typical of those described for *C. immitis*. Endospores were readily observed in the mature spherules (Fig. 2).

Though *C. immitis* was not found in the lungs, there was a mild chronic pneumonitis characterized by small aggregates of lymphocytes, plasma cells, histiocytes and fibrous tissue. The kidney also revealed a mild chronic inflammatory process in which there were small collections of mononuclear leukocytes composed primarily of plasma cells and lymphocytes surrounding the convoluted tubules in the cortices.

DISCUSSION

Presence of the typical granulomatous inflammatory lesions containing *C. immitis* in the liver and spleen of a captive adult California sea lion is indicative of a systemic infection. The chronicity and the malignancy of the disease were demonstrated by the fact that initial lung lesions, presumably caused by *C. immitis*, were in the process of healing. The fungus had invaded the blood vascular channels, however, and metastatic lesions had developed. The extent and distribution of lesions in this sea lion could not be determined, as the lung, liver, spleen, and kidney were the only organs examined histologically.

The purpose of this report is to reemphasize the fact that coccidioidomycosis should be a prime consideration in any chronic systemic illness of animals and man living within endemic areas of the southwestern United States and Central and South America. The California sea lion, never previously reported with systemic coccidioidomycosis, represents another new and susceptible host species.

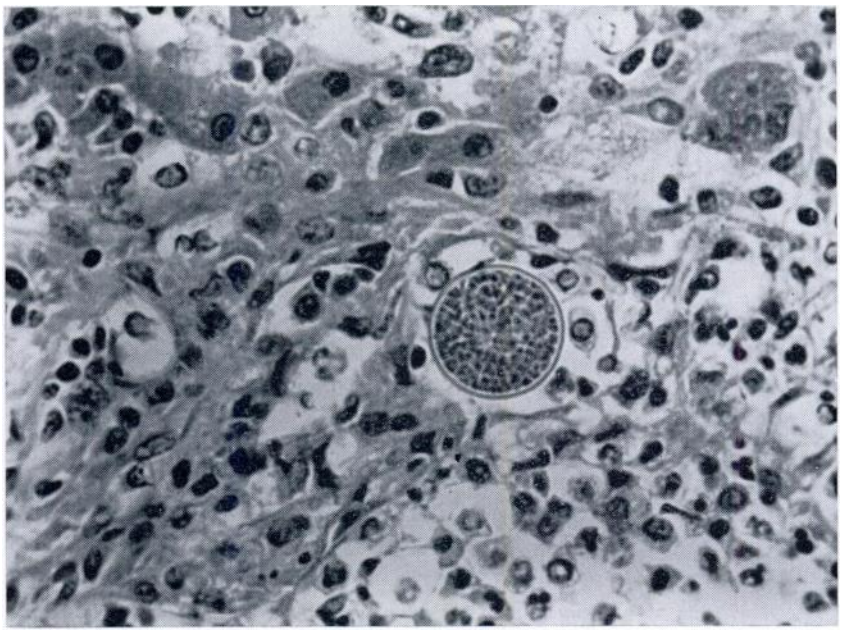

FIGURE 2. Spherule at higher magnification containing endospores. H & E stain. X 615. AFIP Neg. 75-12230.

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