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## CASE REPORT OF KIDNEY DISEASE IN A WILD CHINOOK SALMON, *Oncorhynchus tshawytscha*, IN THE SEA

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**Abstract:** An immature chinook salmon (*Oncorhynchus tshawytscha*) that had spent two winters at sea was found in a Puget Sound beach zone. Necropsy indicated the fish was infected with bacterial kidney disease (KD). This is the first report of KD from a wild fish in the marine environment.

### INTRODUCTION

Bacterial kidney disease (KD) was first described in salmonids in the United States at the Massachusetts State Hatchery by Belding and Merrill.<sup>1</sup> A similar account of an outbreak of this disease was reported at numerous Washington State hatcheries in the late 1940's.<sup>3</sup> During the last 30 years, salmonid hatcheries throughout the United States have had serious problems with KD. KD also has been reported in salmonids in Scotland<sup>9</sup> and France,<sup>5</sup> and in cultured pink salmon in sea water.<sup>2</sup> The generally accepted causative agent is a gram-positive diplobacillus, possibly of the genus *Corynebacterium*.

Although KD is recognized universally as a problem in salmonid hatchery operations, the disease rarely has been reported in wild specimens. KD has been isolated from wild salmonids in the northern United States<sup>10</sup> and in British Columbia,<sup>4</sup> and has been clinically diagnosed (i.e., the KD bacterium was not isolated) elsewhere in North America.<sup>6,8</sup> In all instances, however, the fish were obtained from and presumably had lived entirely in a freshwater environment. To the best of our knowledge, there have been no previous recordings of KD affecting wild salmonids in salt water.

### CASE REPORT

In July, 1976, National Marine Fisheries Service personnel at the Manchester Aquaculture Experimental Station on Puget Sound, Washington, found a chinook salmon (*Oncorhynchus tshawytscha*) at the water's edge. The gills were bright red, indicating little post-mortem change. The specimen was a 4.1-kg immature male, 60.3 cm long (Fig. 1). The fish was determined by scale analysis to be 2+ years old — it migrated to sea during its first year of life and then spent 2 years in salt water. All organs were normal except for numerous white, granulomatous lesions in the kidney (Fig. 2) and heart (Fig. 3). Microscopic examination of stained smears of these lesions revealed large numbers of gram-positive diplobacilli (Fig. 4).

### BACTERIOLOGY

Samples from the granulomatous lesions were aseptically transferred to culture tubes containing Mueller-Hinton agar with 0.1% L-cysteine hydrochloride (pH - 6.8) and incubated at 13 C. Sufficient bacterial growth was formed after 46 days of incubation to confirm a pure culture of gram-positive diplobacilli. Additional samples of kidney lesions were streaked on plates of trypticase soy agar with 1.5%



FIGURE 1. Lateral view of the wild, immature chinook salmon infected with bacterial kidney disease. The specimen was 60.3 cm long, weighed 4.1 kg, and from all outward appearances, appeared normal.

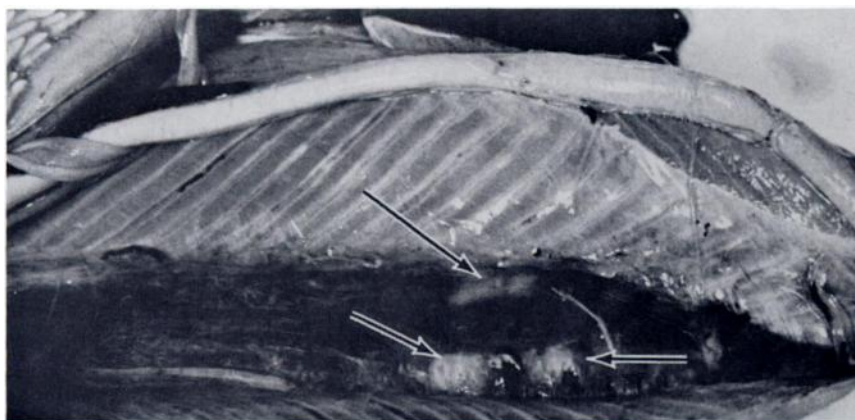


FIGURE 2. Posterior portion of the infected kidney showing visible lesions (arrows). Pure cultures of gram-positive diplobacilli were grown from material taken from these lesions.

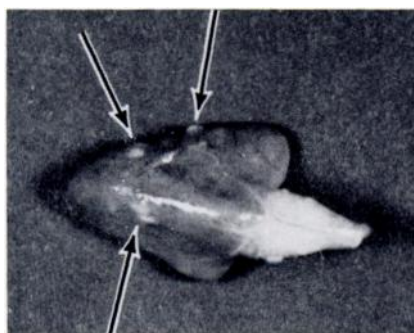


FIGURE 3. Heart from the infected fish. Arrows point out visible lesions that contained large concentrations of gram-positive diplobacilli.

NaCl and Mueller-Hinton agar with 0.5% NaCl and incubated at 24 C for 1 week. No growth was found on either media, indicating the absence of less fastidious marine bacteria. The gross lesions of the kidney and heart, in addition to the morphology of the isolated bacteria, leave little doubt that the adult chinook succumbed to KD.

#### DISCUSSION

Kidney disease is fairly common in cultured chinook salmon during their first winter in pens in seawater and becomes less common as cultured fish

get older.<sup>7</sup> The discovery of an advanced stage of KD in a 2-year-old chinook salmon in the sea poses a serious question concerning the carrier status of the disease and its implication on marine survival.

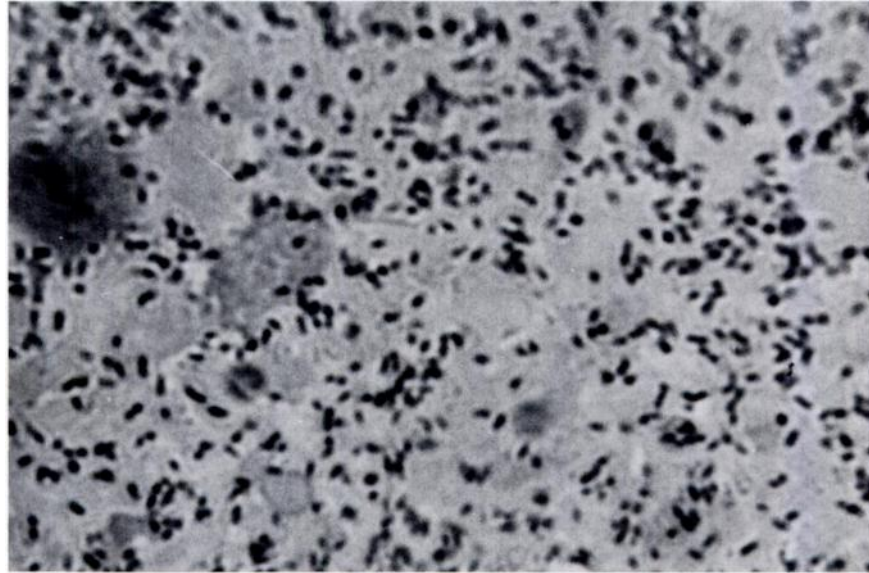


FIGURE 4. Microscopic view (mag. 800x) of gram-positive diplobacillus isolated from kidney lesions.

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