

Pigment Aberrations in Fish

I. Causative Agent and Disease

Pigment aberrations of flesh, occasionally observed in salmonids and other fish species, are not caused by any known infectious agents. In unpolluted waters, the abnormal pigmentation is often due to genetic or congenital defects resulting in abnormal overall body color or localized epidermal discoloration, most often yellow in salmonids. Other abnormal pigmentation occurs in Chinook salmon where the skeletal muscle is white rather than orange due to a genetic inability to retain carotenoid pigments from consumed prey. Partial or complete albinism may also cause yellow/green to white body color. Certain prey species and natural plant materials in the environment can influence body color, as observed in the blue-green flesh of lingcod inhabiting kelp forests. Industrial pollution also affected flesh color of Atlantic salmon in Scotland causing a yellow/orange to red pigmentation from exposure to paper mill effluent. This caused hemolytic anemia and hyperbilirubinemia resulting in jaundice, both externally and within the internal mesenteric fat.

II. Host Species

In Alaska, albinism is common in cultured chum salmon fry while adult white king salmon occur occasionally or frequently, depending on the fish stock. Varying degrees of white and red skeletal muscle can produce a marbled appearance. White flesh also occurs in sockeye and coho salmon while yellow pigmented epidermis occurs in cutthroat trout, Chinook salmon, pink salmon and most frequently in sockeye salmon. Other aberrations include epidermal yellow/green marbling in pink salmon, pink flesh in halibut and pike, and blue-green pigmentation in lingcod.

III. Clinical Signs

Aberrant external pigmentation in fish is generally confined to the epidermis. Complete albinos have no melanin pigment within any tissue. Marbled or completely white-fleshed Chinook or other salmon require observation of filleted skeletal muscle.

IV. Transmission

Aberrant pigmentation has no infectious cause and cannot be transmitted. Coloration is most likely due to pigments obtained from food consumed, the natural environment or is hereditary allowing parent fish to pass the trait on to some of their offspring, as is the case for some stocks of "white" king salmon. Albinism is caused by a genetic defect in tyrosinase that metabolizes tyrosine to the black pigment melanin.

V. Diagnosis

Diagnosis is based on the observation of uncomplicated aberrant pigmentation. Yellow pigmentation extending into the internal body fat suggests jaundice that is symptomatic of a systemic disease process that is not related to uncomplicated pigment aberration.

VI. Prognosis for Host

Abnormal pigmentation from natural food and plant materials or hereditary defects causes no physical harm to affected fish except that the unnatural coloration may be more conspicuous to predators.

VII. Human Health Significance

There are no human health concerns associated with uncomplicated aberrant pigmentation in fish from unpolluted waters.

NON-INFECTIOUS DISEASES



Left: Marbled white flesh of sockeye salmon; **Center:** Marbled white-fleshed coho salmon compared to normal red on right; **Right:** Blue-green pigmented lingcod.



Left: Yellow pigmented sockeye salmon; **Center:** Yellow pigmented ventral foci on cutthroat trout; **Right:** Yellow pigmented area in the epidermis of a Chinook salmon.



Left: Pink fleshed halibut; **Center:** Pink fleshed northern pike; **Right:** Yellow-green marbled epidermis of pink salmon likely due to partial albinism.