Hepatomas in Marine Fish from an Urban Estuary

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Increased concern for the effects of urban wastes on aquatic animals prompted our investigation of the health of demersal fishes in the Duwamish River estuary, Seattle, Washington. The study of two diseases found in English sole (Parophrys vetulus) and starry flounder (Platichthys stellatus)--fin erosion (WELLINGS et al. 1976) and epidermal papillomas--led to the finding of hepatomas in English sole. The frequency, gross pathology, and histopathology of the liver neoplasm will be reported here.

Methods and Materials. English sole were collected at eight stations in the Duwamish River at two-month intervals over a seven-month period, July 1975 to January 1976. Control English sole were captured at Point Pully, a few miles south of Seattle on Puget Sound. Live or freshly dead fish were measured, weighed, sexed, and autopsied. Livers and spleens were freed of extraneous tissues and weighed, and portions of these organs, and occasionally other major organs, were fixed in 10% Formalin. The fixed tissues were embedded in paraffin, sectioned, and stained with hematoxylin-eosin, Periodic Acid-Schiff Reaction, Oil Red O, Sudan Black B, or the Masson's trichrome method.

Results. The overall average frequency of hepatomas in English sole whose livers were examined histologically was 32% (20 out of 62 fish). No frequency differences between sexes were seen. Insufficient numbers of fish have been examined to establish a geographical distribution in the Duwamish River.

Hepatoma-containing livers were usually abnormally colored. The colors were either yellow, cream, dark brown, cocoa, or greenish brown, as opposed to the reddish brown color of normal English sole livers. Abnormally colored livers appeared larger than normal, and this was supported by liver weight vs. body weight measurements. The average liver-somatic index (liver weight x 100/body weight) of hepatoma-bearing sole was 2.63 ± 0.115 for fish averaging 261 mm in length, and for control sole the average liver-somatic index was

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1.12 ± 0.201 for 29 fish with an average length of 259 mm.

Tumor-bearing fish were generally normal in appearance, except that the only two fish in the total sample with fin erosion also had hepatomas. With the exception of having greatly distended gall bladders, their other major internal organs were grossly and histologically normal-appearing.

The histopathological characteristics of livers with hepatomas were (1) loss of normal cord structure resulting in part from extensive fatty vacuolation of hepatocytes; (2) blood congestion of major blood vessels and sinusoidal spaces; and (3) focal degeneration, hypertrophy, and pleomorphism of hepatocytes. Most hepatomas were basophilic nodules composed of minimally deviated hepatocytes, many of which appeared to be invasive. In some cases, fibrotic trabeculae and pancreatic tissue were associated with the hepatomas. Two or more hepatomas were found per liver.

The cause of the hepatomas is not known, although PCBs are suspected because English sole in the Duwamish River are known to contain high levels of PCBs (WELLINGS et al. 1976).

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References

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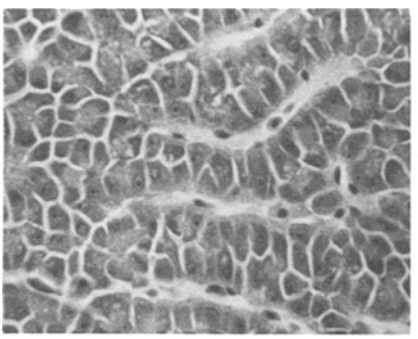

Fig. 1. Section of normal sole liver. H+E. x430

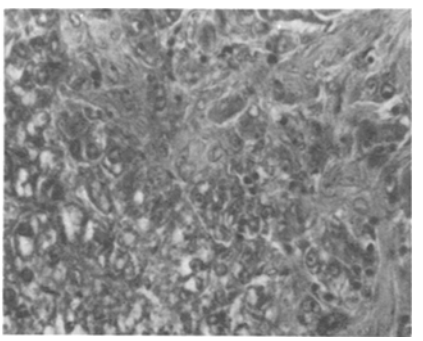

Fig. 2. Section of liver with hepatoma. H+E. x450