

# Aquabirna and Herpes Viruses

## *I. Causative Agent and Disease*

Many different viruses occurring in wild shrimp and crabs have been described globally but few have been documented in Alaska. In part this may be due to the paucity of studies conducted on wild crustacean populations, the geographic isolation of Alaska and the absence of a commercial mariculture industry for shrimp that has prevented importation of exotic crustacean viruses from other parts of the world. Two viruses have been reported from king crabs in Alaska, a herpes-like virus and an aquabirna-like virus, while suspicious intranuclear inclusion bodies have been observed in Dungeness crabs.

A herpes-like virus reportedly infects the bladder and antennal gland epithelium in red, blue and golden king crabs. The virus nucleocapsid is 140 X 165 nm in diameter with two electron-dense layers surrounding a central electron-dense cylinder of approximately 55-60 X 90-105 nm. Enveloped particles were not observed by transmission electron microscopy and no other biochemical features are known. An aquabirna-like virus was reported infecting labyrinth epithelium of the antennal gland from a single asymptomatic blue king crab. The virus particles were icosahedral, about 65 nm in diameter and present within cytoplasmic inclusion bodies containing microtubular structures. Intranuclear inclusion bodies of possible virus origin have been observed in the cells of the urinary bladder, hepatopancreas and female seminal receptacle of Dungeness crabs.

## *II. Host Species*

The herpes-like virus infects blue, red and golden king crabs from Cook In-

let, Bristol Bay, Pribilof Islands and the western Aleutian Islands. The aquabirna-like virus was found in a single male blue king crab from Glacier Bay in southeast Alaska while the intranuclear inclusions were observed in 4% of the Dungeness crabs collected from Excursion Inlet, Freshwater Bay and Bridget Cove near Juneau.

## *III. Clinical Signs*

No outward or internal clinical signs are reported for either virus. The herpes-like virus is associated with massive destruction of the bladder, antennal gland and sometimes hindgut epithelium, strongly suggestive of a lethal disease. The aquabirna-like virus was contained within cytoplasmic inclusion bodies in the labyrinth epithelium of the antennal gland. In the same tissue an adenocarcinoma (discussed in other section) of probable tegmental gland epithelial origin was also present. However, there is no evidence that the virus was the cause of or otherwise was specifically associated with the neoplasm. The intranuclear inclusions in Dungeness crabs were incidental findings on routine histological examination.

## *IV. Transmission*

The mode of transmission is unknown for either virus but suspected to be horizontal from animal to animal via ambient seawater.

## *V. Diagnosis*

Neither virus has been isolated in cell culture. The herpes-like virus infection is recognized by cytopathology in histological sections comprised of hypertrophied epithelial cell nuclei of the bladder and antennal gland. Examina-

tion by TEM confirms that the enlarged nuclei contain marginated chromatin, a rarified eosinophilic stroma with one or more pleomorphic eosinophilic inclusion bodies associated with typical herpes-like virus particles scattered throughout the nuclear stroma. TEM confirmation of virus particles has been done for only one such diseased blue king crab. The aquabirna-like virus may have been an incidental subclinical finding that was only recognized by serendipitous observation with TEM unless the grossly visible neoplasm was somehow virus-associated. The intranuclear inclusion bodies in the Dungeness crabs were detected by histological examination.

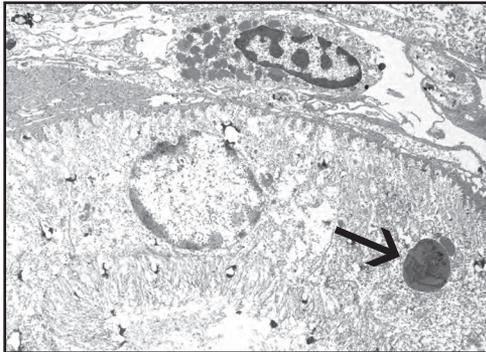
These inclusions were basophilic causing nuclear enlargement, compression and eccentricity of the nucleoplasm and nucleolus with margination of chromatin.

**VI. Prognosis for Host**

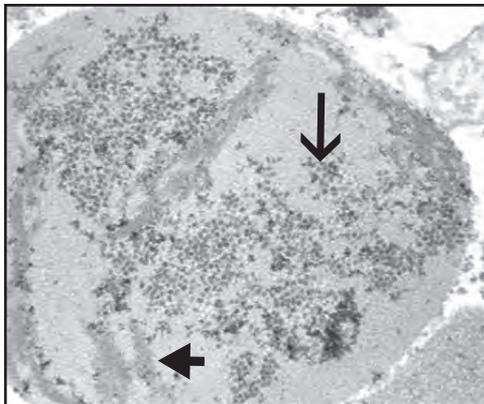
The host prognosis regarding infection by either virus is unknown but the herpes-like virus is suspected to cause king crab mortality.

**VII. Human Health Significance**

There are no known zoonotic human health concerns associated with infection of king or Dungeness crabs by poikilothermic viruses.



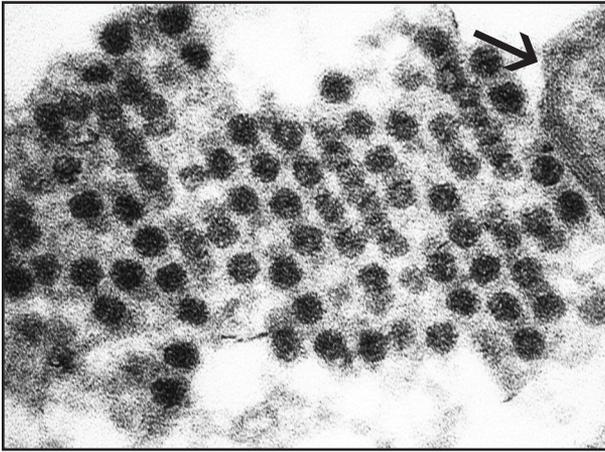
TEM of a labyrinth epithelial cell of the antennal gland in blue king crab with cytoplasmic inclusion (arrow)



Higher magnification of inclusion showing icosahedral aquabirna-like virus particles (arrow) with associated microtubular structures (arrowhead)

## Crustacean Viruses

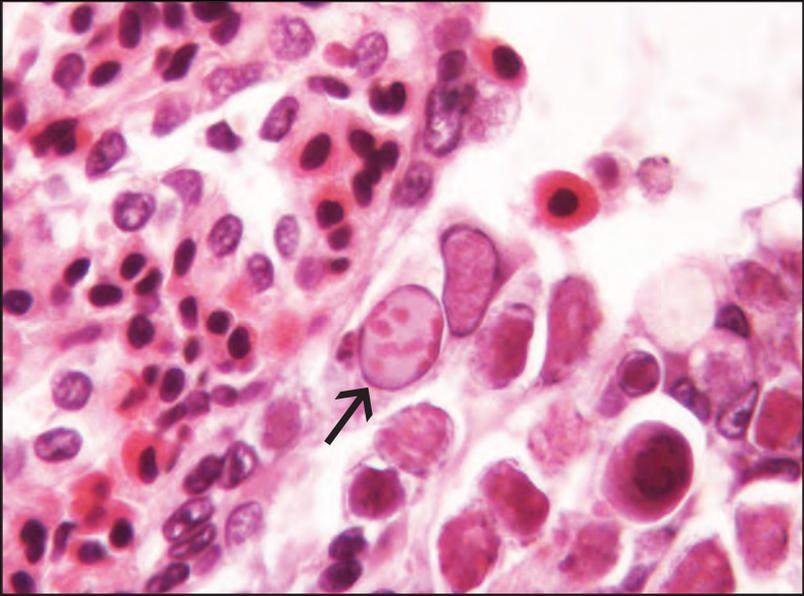
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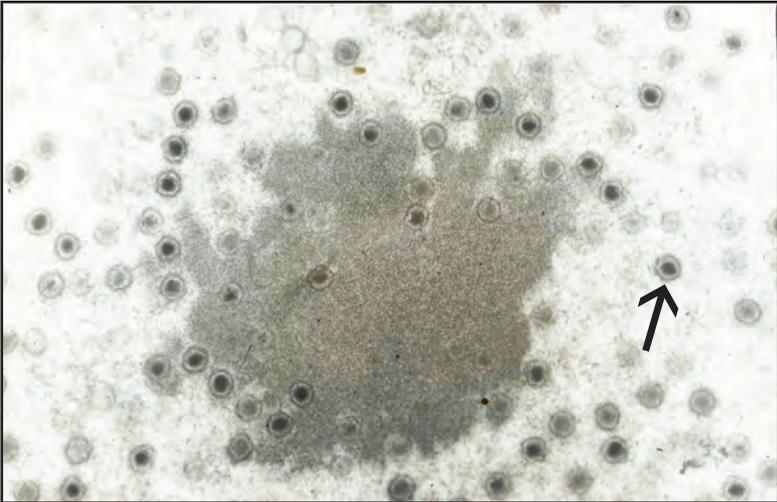
Higher magnification of blue king crab aquabirna-like virus particles with associated microtubular structure (arrow)



Histological section of intranuclear inclusion body (arrow) in a bladder epithelial cell of Dungeness crab



Histological section of blue king crab antennal gland epithelium with hypertrophied nuclei (arrow) containing one or more eosinophilic intranuclear inclusion bodies associated with a herpes-like virus (Photo: J. Frank Morado, National Marine Fisheries Service, Seattle)



TEM of herpes-like virus particles (arrow) associated with intranuclear inclusions in antennal gland epithelium of blue king crab (Photo: J. Frank Morado, National Marine Fisheries Service, Seattle)