

Nematopsis and Other Gregarines

I. Causative Agent and Disease

Oocysts of several different species of *Nematopsis* gregarines of the family Porosporidae, subclass Gregarina, class Sporozoa infest various tissues of many species of bivalve molluscs causing no significant harm to the hosts. Encysting trophont stages of other gregarine-like organisms observed primarily in oysters infest the epithelial mucosa of the gut, again causing little tissue damage. A third type of systemic gregarine-like trophozoite stage has been reported in bivalves infesting all tissues causing localized hemocyte accumulations and phagocytosis, but otherwise is not pathogenic.

II. Host Species

Gregarine parasites are cosmopolitan in the oceans of the world while individual species may have more confined distributions. Oocysts of *Nematopsis* species commonly reported from eastern and Pacific oysters belong to *N. ostrearum* and *N. prytherchi* that also infest other scallops and clams and use at least 5 xanthid species of crab as final hosts. Oocysts of *Nematopsis duorari* infest several marine molluscs and the parasite uses the pink shrimp as a definitive host. Other unidentified gregarine-like encysting trophont stages in the gut mucosa have been reported from the eastern oyster on the Atlantic coast of the U.S. and in Pacific oysters and Manila clams in the Pacific Northwest while the systemic gregarine-like trophozoite has been reported from Washington State and British Columbia, Canada in Pacific oysters and Manila clams. In Alaska, oocysts of *Nematopsis* sp. have not been observed in Pacific oysters but have been found in the gills and connective tissues of littleneck clams, basket cockles, blue mussels,

rock scallops and weathervane scallops.

Localized gregarine-like trophont stages in the gut and gills have been observed in Alaskan Pacific oysters, blue mussels and rock scallops while systemically distributed gregarine-like trophozoites have been found in Pacific oysters, blue mussels and littleneck clams.

III. Clinical Signs

These gregarine organisms are found incidentally in apparently healthy bivalve molluscs showing no outward clinical signs of disease. Oocysts and vegetative stages within bivalve tissues are discovered by routine histological examination.

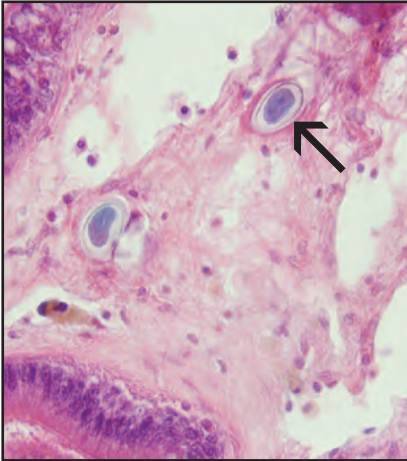
IV. Transmission

The life cycle of gregarines requires two hosts, a marine mollusc as the intermediate host and a marine arthropod, generally a crustacean, as the final host. Trophozoites in the gut of a crustacean host give rise to gametocysts and gamete formation resulting in sporulation and the production of gymnosporos. Gymnosporos, released from ruptured gametocysts, are eliminated with feces and eventually come into contact with a suitable mollusc. Gymnosporos cause a host cellular response and are engulfed by phagocytes that pass back into the mollusc host through the mantle epithelium. The engulfed gymnosporos gives rise to sporozoites which, in the genus *Nematopsis*, form resistant oocysts each containing one sporozoite. Sporozoites in oocysts are eaten when the bivalve host is consumed by the crustacean final host and give rise to trophozoites which completes the life cycle.

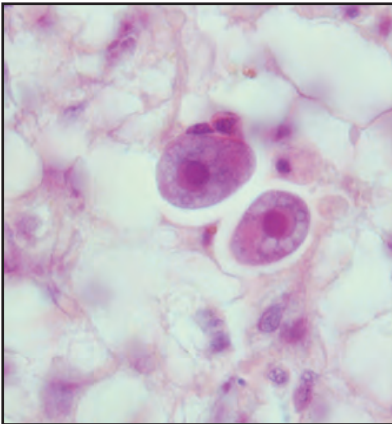
V. Diagnosis

Wet mounts of infected tissues

reveal typical oocysts while histological examination is less sensitive but allows detection of both oocysts and vegetative troph stages within the bivalve tissues. *Nematopsis* oocysts are characterized by a thick hyaline capsule enclosing a densely basophilic worm-like sporozoite coiled within. Oocysts in oysters range in size from 14-19 μm X 10-16 μm and are found most commonly in the gill connective tissues. The term “gregarine-like” is used for organisms resembling the vegetative stages of gregarines for



Histological section of oocysts (arrow) of *Nematopsis* sp. in the connective tissues of weathervane scallop



Histological section of gregarine trophont stages in the connective tissue of Pacific oyster

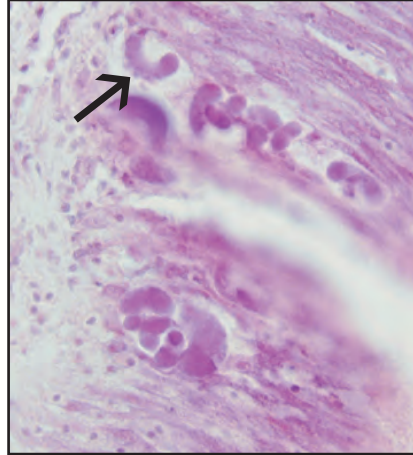
which spores have not been found to allow definitive identification.

VI. Prognosis for Host

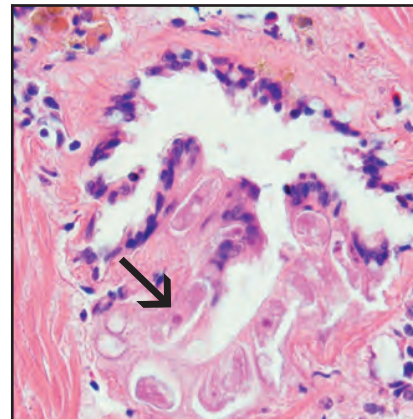
Gregarine parasites do not appear to negatively impact their intermediate bivalve mollusc hosts.

VII. Human Health Significance

There are no zoonotic human health concerns regarding the occurrence of gregarine parasites in bivalve mollusc tissues.



Histological section of gregarine-like trophont stages (arrow) in the intestinal epithelium of Pacific oyster



Histological section of gregarine trophont stages (arrow) within the water tubules of the gill in basket cockle