

# Carcinonemertes Egg Predator

## I. Causative Agent and Disease

Worms belonging to the phylum Nemertea include the genus *Carcinonemertes* sp. in the family Carcinonemertidae. These nemerteans are specialized ectosymbionts that feed on the eggs of decapod crustaceans. Feeding is accomplished by puncturing the egg membrane with a knife-like stylet on the end of a proboscis that is everted with the foregut into the egg to ingest the contents. These egg predators can be major sources of egg mortality as demonstrated for several economically important decapod crustacean species. Egg predation was implicated in the collapse of the Dungeness crab fishery in southern California in 1960 and localized brood failure in the early 1980s for red king crabs in the Kodiak, Island and Cook Inlet areas of Alaska. At least six species of *Carcinonemertes* have been described from crabs; *C. carcinophila* (with 2 subspecies), *C. coei*, *C. epialti*, *C. errans*, *C. mitsukurii* and *C. regicides*. The effects of another nemertean egg predator, *Pseudocarcinonemertes homaris*, on the American lobster have been more difficult to quantify.

## II. Host Species

Nemertean egg predators have been reported on many host species of crabs primarily in North America including commercially important species such as Dungeness crab, Tanner crab, red king crab, blue crab and the American lobster. The nemertean worm described from Alaska is *C. regicides* found on Tanner and red king crabs where significant egg predation/mortality in the latter host was implicated as causing previous localized population declines.

## III. Clinical Signs

Clinical signs of infestation include dull pink to orange adult worms visible within the egg clutch, usually found on the funicular strands (stalks binding fascicles of setae) attaching the eggs to the pleopods of ovigerous female crabs. Empty or partially eaten eggs may be obvious in the egg mass where worms can be found inside when infestation is high. Juveniles may be present ensheathed in mucus on the uncalcified cuticle of the ventral surface of the host abdomen.

## IV. Transmission

Variations occur depending on worm species but generally female *Carcinonemertes* are fertilized internally by entrance of waterborne male sperm through tegmental pores. The embryos are extruded through the gonoduct to hatch externally where the haplonemertean larvae undergo direct development into the juvenile stage during a planktonic existence. Juveniles settle out on crabs of any age or sex, produce a sheath of mucus and attach to various protected areas on the host exoskeleton. Attached worms apparently subsist by absorbing dissolved amino acids through the skin that leak from the crab arthrodiol membranes. When female crabs oviposit the resident worms migrate to the egg mass to feed and reproduce. Infested male crabs can transmit juvenile worms to female crabs during mating and transfer also occurs from the old to the new cuticle when a host crab molts.

## V. Diagnosis

Diagnosis of *Carcinonemertes* infestation is determined by finding worms on the cuticle or in the egg mass of the host

crab and/or the presence of empty or partially eaten crab eggs. Species identification is based on morphological characteristics which, for *C. regicides*, include among others a smaller adult length of 1.0 mm, presence of an excretory system and a large anterior proboscis chamber or rynchocoelum.

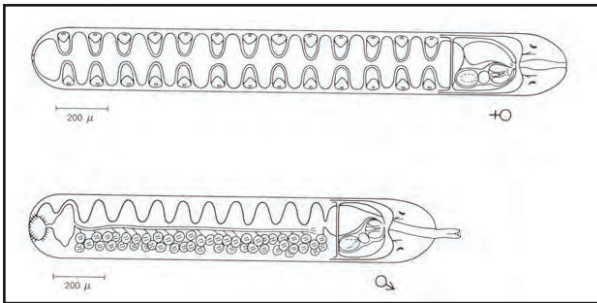
**VI. Prognosis for Host**

In ovigerous female crabs, heavy infestations of *Carcinonemertes* may cause extensive loss of eggs and subsequent

poor recruitment into the population if the prevalence of infestation is high. Epibiont fouling of egg masses may also result indirectly from worm feeding activity that produces a rich organic substrate from punctured eggs and worm feces.

**VII. Human Health Significance**

There are no zoonotic human health concerns regarding the presence of nemertean egg predators on decapod crustaceans.



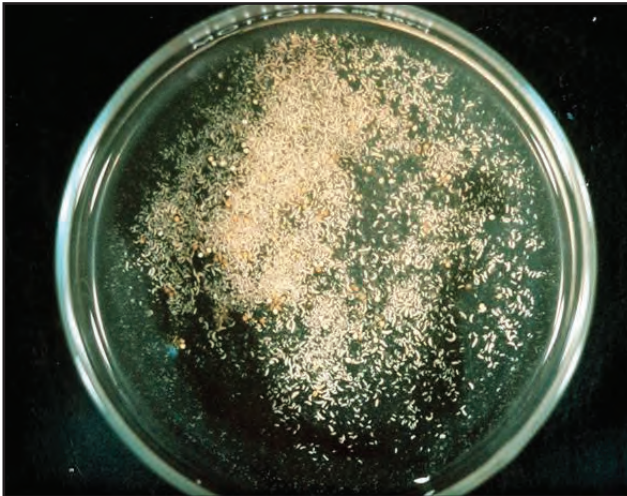
Drawing of *Carcinonemertes regicides* (J. Shields, Virginia Institute of Marine Science)

## *Carcinonemertes* Egg Predator

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Egg mass of a female red king crab infested by *Carcinonemertes* (Photo: J. Shields, Virginia Institute of Marine Science)



*Carcinonemertes* worms removed from egg mass above (Photo: J. Shields, Virginia Institute of Marine Science)



Higher magnification of king crab eggs infested by *Carcinonemertes regicides*  
(Photo: J. Shields, Virginia Institute of Marine Science)



Higher magnification of single *Carcinonemertes regicides* worm  
(Photo: J. Shields, Virginia Institute of Marine Science)