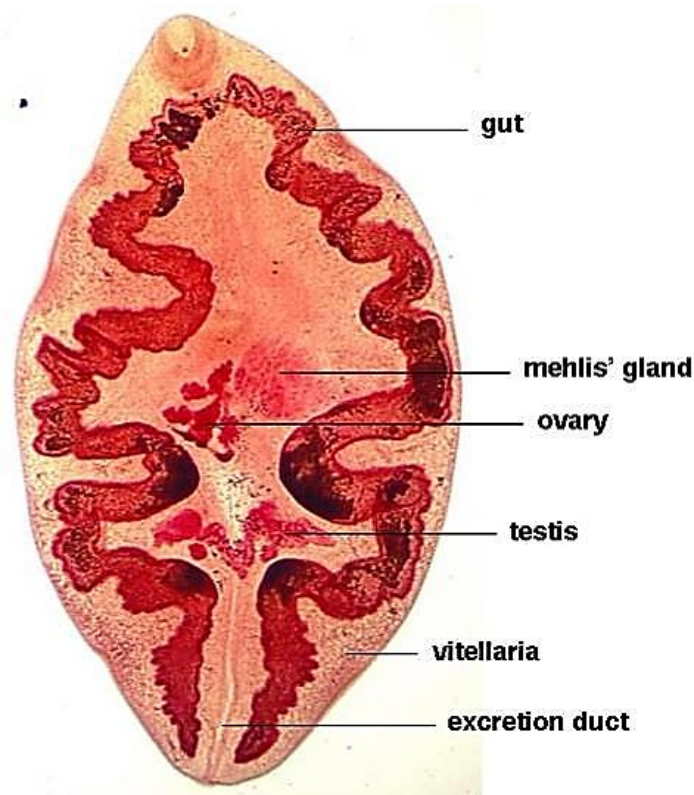


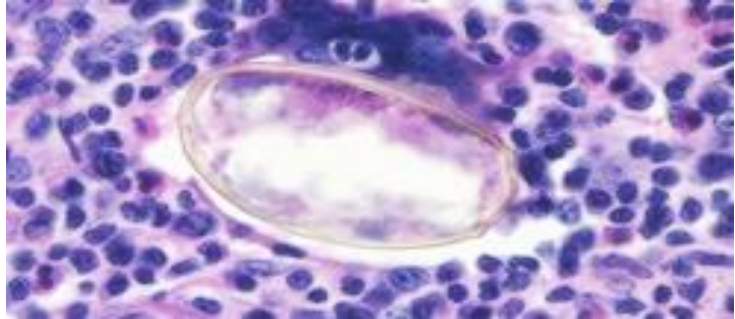
Paragonimus westermani



Paragonimus westermani (Kebert, 1878) Braun, 1899, the Oriental lung fluke. The most heavily endemic regions of Oriental paragonimiasis are in central China, Korea, Japan, Nepal, Thailand, and Philippines.

Morphology, Biology and Life Cycle

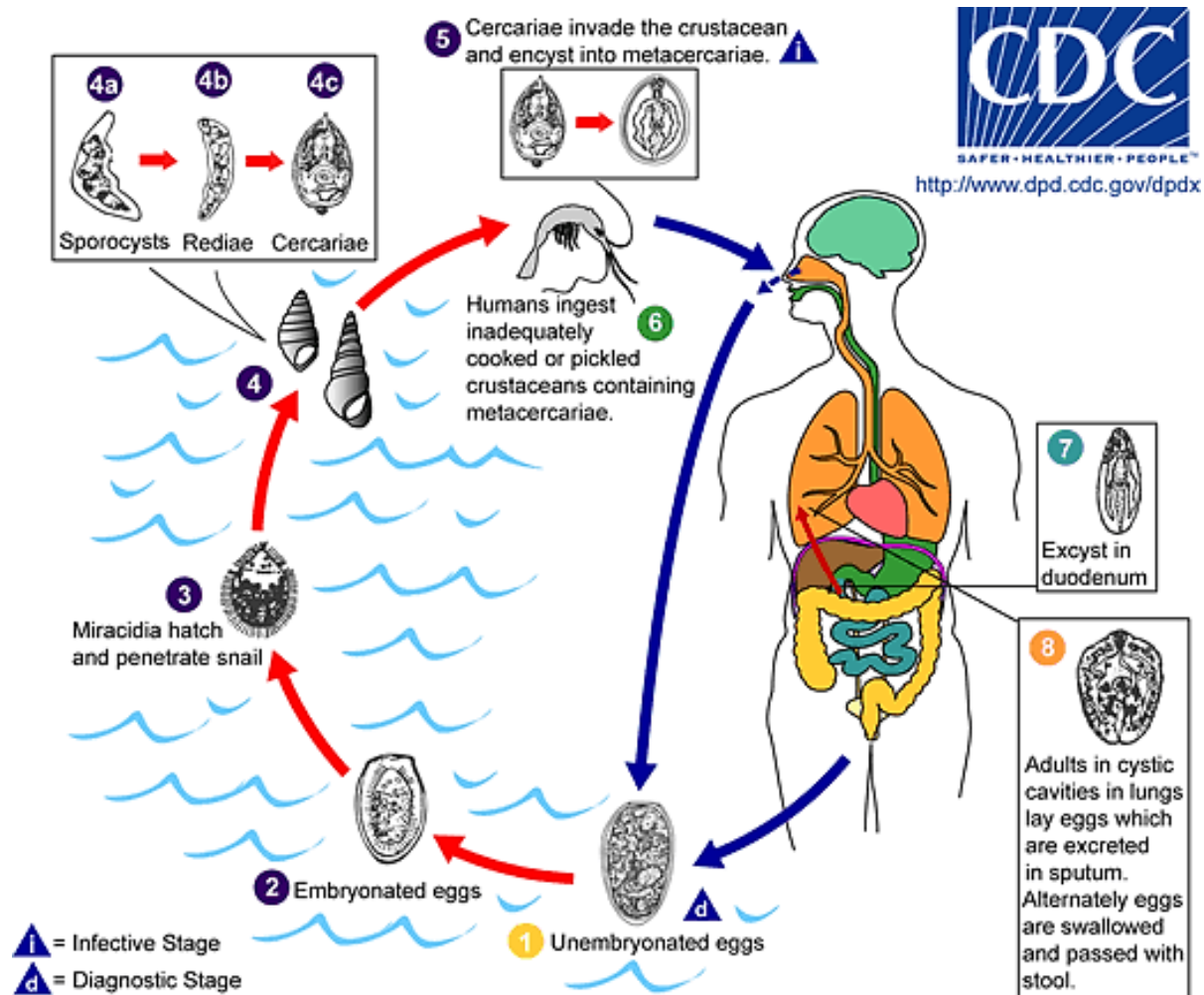
The adult Oriental lung fluke resides normally in fibrous capsules in the lungs, but it may also develop in other soft tissues of the body. The worm is a plump, ovoidal object, reddish-brown in the living state, gray or grayish-brown after preservation. It measures 7.5 to 12 mm in length, 4 to 6 mm in breadth and 3.5 to 5 mm in thickness.



Eggs of *Paragonimus* taken from a lung biopsy

Egg of *P. westermani* are broadly ovoidal, golden-brown in color, measure 80 to 118 microns by 48 to 60 microns. They are unembryonated when laid by the parent worm. When deposited in the pulmonary capsules the egg usually accumulates around the worm, but some eggs reach the respiratory passages and are coughed up, imparting a rusty tinge to the sputum. Many are swallowed, pass down the digestive tract and evacuated in the feces. If the eggs reach running water, they embryonate in 16 or more days, then hatch. The free-swimming miracidia enter suitable operculate snails, including several species of *Semisulcospira*. Within these snails, the miracidium transforms into a first generation sporocyst, in which rediae are developed. Each redia, in turn, produces a brood of cercariae, which escape from the snail and are temporarily free in the water. These cercariae invade the viscera and muscles of freshwater crabs, in the soft tissues of which they become encysted.

When the viable cysts are ingested by human, excystation occurs in the duodenum and the young worms migrate through the intestinal wall to the peritoneal cavity, burrow through the diaphragm, enter the lungs, and finally settle down, usually in pairs, near a bronchiole where they develop into adult worms within a fibrous capsule laid down by the host.



Pathogenicity and Symptomatology

If the lung fluke reaches the pulmonary parenchyma, the host-tissue reaction consists of an eosinophilic and neutrophilic infiltration around the growing worm, followed by the development of a thick fibrous envelope 6 to 10 mm in diameter in the deeper lung tissue. Almost invariably small blood vessels in the capsule provide leakage from the cystic cavity into the bronchiole, so that with the irritation caused by discharge of eggs and the fluke's metabolites into a bronchiole, paroxysmal coughing occur, frequently resulting in hemorrhage, with blood in sputum.

Worms have also been discovered in many ectopic locations, including the liver, intestinal wall, mesenteric lymph nodes, peritoneum, and brain. In these abnormal

sites there is a tendency for development of abscesses, or the lesion may be suppurative or frankly ulcerative.

There may be no symptoms other than the occasional coughing up of rusty sputum, Shortness of breath but there may be a history of periodic hemoptysis or at least of occasional discharge of blood-tinged sputum. However, dyspnea, fever, and anorexia have been observed in cases of extensive pulmonary involvement. Secondary anemia rarely occurs as a result of the hemoptysis.

Diagnosis

A specific diagnosis can readily be made by the recovery of the eggs of *P.westermani* in rusty or blood-tinged sputum, or from the feces, pleural aspirate or peritoneal abscesses.

Treatment

Triclabendazole, WHO-recommended medicines for treatment of paragonimiasis. 20 mg/kg, in two divided doses of 10 mg/kg, to be administered on the same day.

Epidemiology

The definitive host commonly acquires the infection from eating the tissues or freshwater crabs. These crustaceans live typically in clear, fresh water, usually mountain streams, which are contaminated with the egg-laden excreta of human and reservoir hosts, which provide the inoculum for the molluskan hosts and subsequently the crustaceans.

Control

For the individual in endemic areas, the disease may be prevented by care not to eat crabs or cryfishes unless they have been thoroughly heated, and care not to contaminate fingers during preparation of the raw crustaceans for the table. No public health program has been developed to control the infection.