

## DISCOVERY OF CLONORCHIS SINENSIS

Jeffrey Yeh

In 1874, a 20 year old Chinese carpenter was admitted to the Medical College Hospital in Calcutta, India because of jaundice and fever for two weeks; several hours after his admission, he died. In the post-mortem examination, Professor of Pathology, James McConnell, noted numerous coiled flukes protruding from the bile ducts of the distended liver. McConnell also described ova in the bile. Although Clonorchis infection was found in an ancient corpse buried in 278 BC in the Han Dynasty, McConnell's report in the Lancet was the first description of *Clonorchis sinensis* in the English medical literature. He speculated that the necrosis of the liver was caused by the flukes. Spencer Cobbold suggested that the species be named *Distoma sinense*, since it was discovered in a Chinese patient. In 1907, Arthur Looss proposed a new genus *Clonorchis* because of the branched testes of the flukes. The name derived from the Greek words Chlon meaning "branched" and Orchis meaning "testis."

**Fish as a second intermediate host:** In 1911, Japanese zoologist, Harujiro Kobayashi, found a fluke that was encysted in freshwater fish which inhabited the same regions where Clonorchis infection was endemic. He fed cats, which had been suspected as a reservoir, the flesh of these infected fish and the cats all contracted *C. sinensis*. By 1965, numerous fish species were found to be intermediate hosts for *C. sinensis*, although only a few species of fish were linked to human infections.

**The snail as the primary intermediate host:** The Japanese pathologist, Masatomo Muto, showed that the primary intermediate hosts of *C. sinensis* were snails. He infected natural, cyst-free fish by letting them incubate in the same tank with infected snails. These infected fish were then fed to uninfected dogs and guinea pigs. The ova of *C. sinensis* were subsequently found in the dogs and guinea pig feces a few weeks later; at autopsy, adult *C. sinensis* were also observed in the biliary tract. Muto correctly inferred that fish were a necessary stage in the development of *C. sinensis* because rabbits infected directly with cercariae from snails did not become infected.

**Mode of Infection:** Muto and other researchers observed that after leaving the snail and swimming free, the cercariae attached to the fish. Once attached, the cercariae penetrated underneath the scales and became encysted in the subcutaneous tissues and muscles as metacercariae. Takayuki Mukoyama found immature flukes in experimental mammals as early as six hours after ingestion of infected fish, but only in the biliary tract, duodenum, and stomach. He concluded that the flukes did not penetrate the intestinal mucosa but instead migrated directly to the biliary tract.

### Preventive Measures

McConnell speculated that his patients might have become infected by ingestion of contaminated fish since, "the Chinese delight in putrid messes of half-raw fish." Kobayashi found that when whole fish were roasted over live charcoals or boiled in water for 15 minutes and then fed to cats and rabbits, infection failed to develop. However, when the fish were cooked in warm water for 15 minutes, the *C. sinensis* remained viable. This led to the public health recommendations for avoidance of ingesting uncooked fish.



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Clonorchis sinensis

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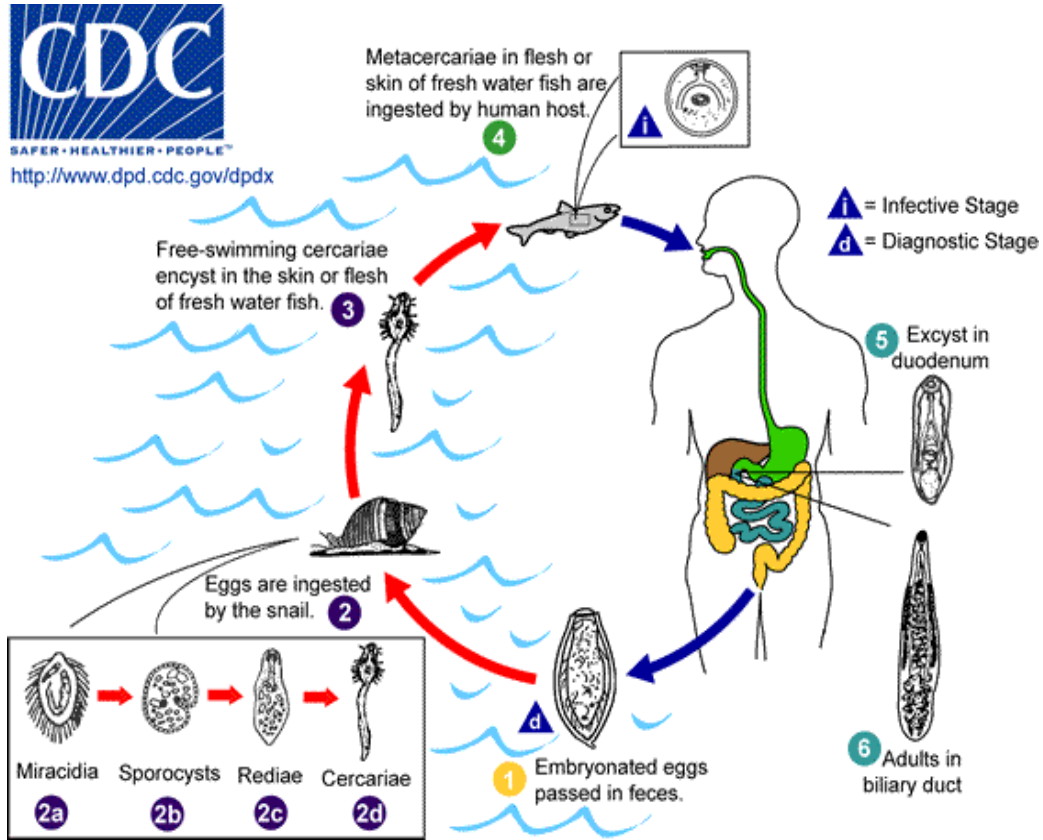
## References

McConnell JF. Remarks on the anatomy and pathological relations of a new species of liver flukes. Lancet 1875;ii:271,274.

<http://www.users.on.net/~david.grove/BOOK.PDF>

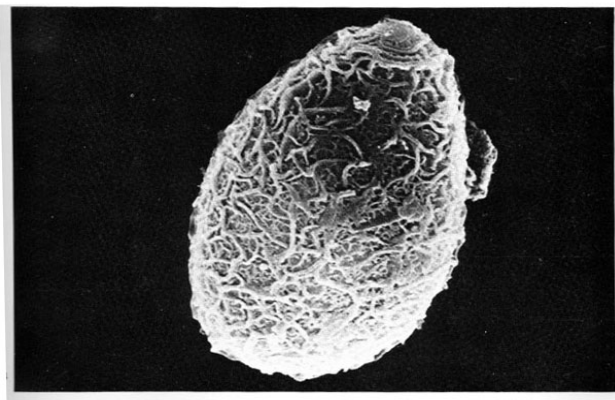
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## Life Cycle of Clonorchis Sinensis

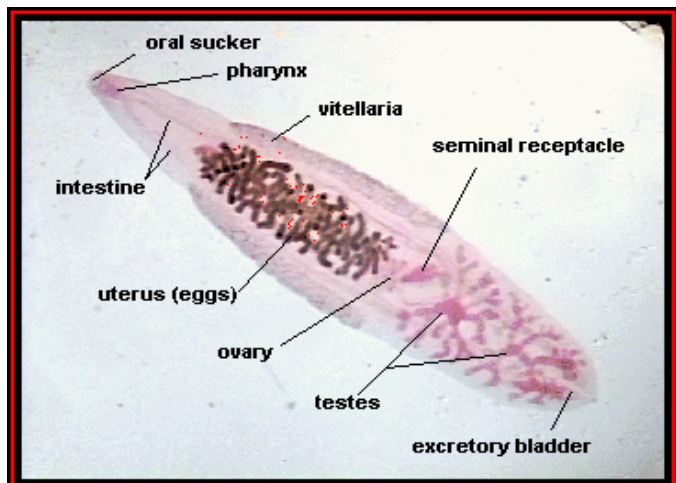


## Additional Photos

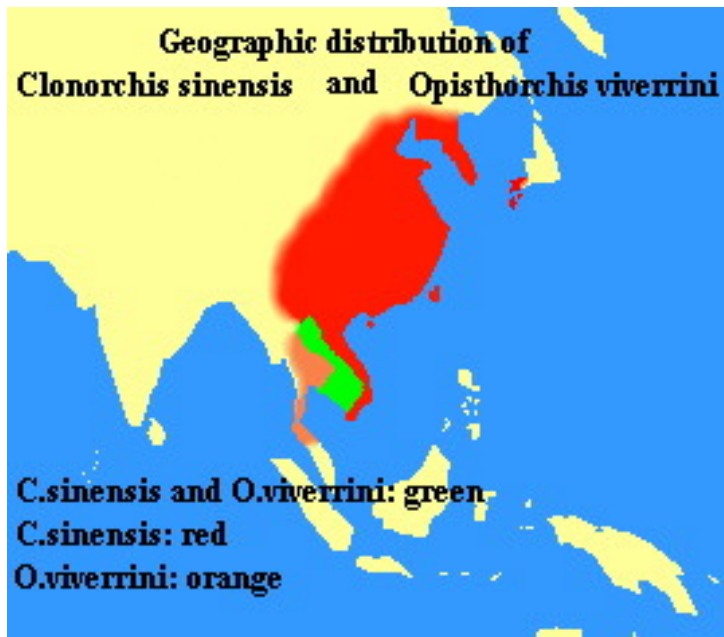
Egg



Adult Fluke



### Geographic Distribution



A grass carp (*Ctenopharyngodon idellus*) that are common hosts for *C. sinensis*.

