ANAS DOMESTICA AS A DEFINITIVE HOST AND
OPHICEPHALUS ARGUS AS A SECOND INTERMEDIATE
HOST OF CLONORCHIS SINENSIS

YOSHITAKA KOMIYA, SUEO KONDO

National Institute of Health, Tokyo

The natural infection of Clonorchis sinensis has been noted widely among carnivorous mammals such as human, dog, cat and weasel etc. This infection is experimentally reproducible in rabbits and guinea pigs together with a number of other mammals, while there remains a great deal to be discussed as to whether a certain species of birds can be a definitive host.

The infection of Clonorchis sinensis in birds was first observed by J. Asada (1920). He examined 6 Nycticorax nicticorax and found in one of them 13 pieces of Clonorchis sinensis infesting on its gall bladder, and the flukes were found to accommodate eggs containing perfectly developed miracidium in their uterus and their ovulation was found to be quite active.

Pseudorasbora parva was experimentally fed to several Nycticorax nicticorax. They were sacrificed 45 days later and 5 pieces of Clonorchis were found upon dissecting though small in size.

At the same time, he fed Anas domestica with Carassius auratus and Pseudorasbora and found 7 pieces of Clonorchis sinensis infesting on the gall bladder in one of them. He reported, however, that their sizes were smaller in comparison with those usually found in the other hosts.

On the other hand, H. Tanabe (1920) reported that an attempt of experimental infection of Anas domestica and Anas boschas with Clonorchis sinensis was not successful. Similar experimental infection tried on 9 Egretta sp. showed the flukes, in a very early stage of the development, infest sporadically in their coecum and large intestine but the majority of them were found already dead and on the way of excretion.

Shanghai area in China has been known as an endemic area of Clonorchis sinensis. Stool examination of Japanese residents (restaurant employees) were performed in 1935 by Komiya, Kawana and Tao. The ova of Clonorchis sinensis were found to be present in approximately 21%
of the individuals examined. The flukes were found to infest 60% of the cats in the area and 40% of the dogs (Komiya and Kawana, 1935). More than 100 Anas domestica were dissected around the same period. Metorchis orientalis were found infesting in their gall bladder in the percentage of 35 and Metorchis taiwanensis was also observed approximately in the percentage of 20, but none of them were found to harbor Clonorchis sinensis.

Later, in the summer of 1944, however, upon dissecting 7 Anas domestica, we happened to find, in one of them, 17 pieces of Clonorchis sinensis in the gall bladder. But careful examination of the flukes revealed that they were smaller in size than those naturally infesting cats and dogs; nearly all of them were much thinner; the ovaries were poorly developed; uterus was less convoluted; both testes were not completely dendritic and often there were deformed testes almost lacking vitellaria in one side or one side testis remaining in a form of an irregular mass practically without branching.

As for the uterus, all of the flukes were found harboring more or less number of ova, but when examined, by squeezing out those ova located near the birth pore, their cells were found quite poorly developed and the majority were found containing a few drops of larger or smaller oil-droplet-like substance in their egg shell, and not a single ovum containing a miracidium was encountered. Generally, the shape of the ova was irregular.

Five to seven Pseudorasbora parva and Sarcocheilichthys sinensis which were known to harbor the cysts of Clonorchis sinensis were fed to 5 Anas domestica. None of them were found to harbor Clonorchis sinensis when dissected 35 days after the infection. The result of an additional experiment made on Anas domestica was also negative.

In view of the above mentioned findings and reports, Anas domestica is considered not an adequate definitive host to Clonorchis sinensis, though there are rare instances of Clonorchis sinensis is parasitic to it. It would be more reasonable to regard that it is rather exceptional to see the parasite develops to an adult and remains in Anas domestica.

Next is the problem on the possibility of Ophicephalus argus Cantor as a second intermediate host for Clonorchis sinensis. In Harbin (Manchuria), Asada (1937) found, for the first time, the encysted larvae of Clonorchis sinensis in Ophicephalus argus and reported on its possibility as
a second intermediate host. Later, Kubo et al. (1941) examined a large number of *Ophicephalus argus* also in Mancuria, but not a single case infested with encysted larvae was found and they particularly emphasized the negative results they obtained. In response to the above, Asada (1941) added that the Ophicephalus from which he found encysted larvae of *Clonorchis sinensis* was caught in the River Sungari and that the infestation, though smaller in number, was evidently proved.

Komiya and others examined the infestation of various kinds of metacercaria, especially *Clonorchis sinensis* among fresh water fish in Shanghai area, the reports of which have already been published (Komiya et Kawana, 1939; Komiya et Tajimi, 1940; Komiya 1942). In that particular area, *Sarcocheilichthys sinensis* and *Pseudorasbora parva* were found most heavily infested with the metacercaria of *Clonorchis sinensis*, usually in the rate of 80% to 100% of the cases examined. When Komiya and others were examining over a hundred of *Ophicephalus argus* for a period of several years, not a single case infested with *Clonorchis sinensis* was found.

In the spring of 1945, when a number of *Ophicephalus argus* were examined for the purpose of the investigation on the larval forms of various parasites in their muscles, a case infested with more than 10 pieces of encysted metacercaria of *Clonorchis sinensis* was discovered. As to the body structure of the metacercaria found in the cyst, it was quite identical to those harbored in *Sarcocheilichthys* or *Pseudorasbora* mentioned in the above except that the size of cysts was slightly smaller than the other ones.

As the development test of these metacercariae in the definitive host was not performed, a decisive conclusion is not obtainable as to the possibility of Ophicephalus to be a biologically adequate second intermediate host while as is evident in the above mentioned, it is possible that Ophicephalus can harbor the metacercaria of *Clonorchis sinensis*; but at the same time, it can be generally acknowledged that natural infestation by the larva is extremely rare.

In fact, *Ophicephalus argus* is the second intermediate host to Gnathostoma, an infection source of Yangtze oedema (Chōkō fushu in Japanese), rather than to *Clonorchis sinensis* as Komaya and others have reported previously (Komaya, Kitamura, Komiya et Kondo, 1944). The rate of natural infestation of *Ophicephalus argus* by the larva of Gnathostoma in
China was 50 to 100% (Komiya and Kondo, 1950), in Fukuoka and Saga Prefecture (Japan) about 70% (Umetani, 1949). *Ophicephalus argus*, therefore, should be regarded important as an infection source of Gnathostoma, a causative parasite for cutaneous gnathostomiasis such as so-called creeping disease and Yangtze oedema.

**REFERENCES**


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