

# CURRENT STATUS OF FOOD-BORNE PARASITIC ZOOSES IN TAIWAN

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**Abstract.** More than 50 species of zoonotic parasites (nematodes-18 spp., trematodes-19 spp., cestodes-10 spp., protozoa-2 spp., and arthropods-2 spp.) have been reported in Taiwan. Among them, *Angiostrongylus cantonensis*, *Clonorchis sinensis* and *Taenia saginata* are the most important and most common food-borne parasites. Angiostrongyliasis is highly endemic in southern and eastern Taiwan. About 80% of patients are children below 15 years of age, mostly infected after eating *Achatina fulica* during May and September. Patients residing in the mountainous and remote areas are more susceptible than those in the urban districts. *Cipangopaludina chinensis* and *Ampullarium canaliculatus* are additional important sources of infection. Albendazole is effective in treating infections in animals. Levamisole has been shown to shorten and lighten the course and symptoms in clinical trials. Clonorchiasis is endemic in Miao-li in northern, Sun-moon lake in central, and Mei-nung in southern Taiwan. Recent surveys, however, have shown endemic areas to be more extensive. Hakkanses and farmers have a greater tendency of infection than other groups. Praziquantel, 3 doses of 20 mg/kg body weight for one day, is an effective treatment. Taeniasis saginata is mainly caused by eating raw beef or viscera of wild animals by the aborigines. A single dose of 150 mg praziquantel cures almost 100%.

## INTRODUCTION

More than 50 species of zoonotic parasites have been reported in Taiwan. This paper gives an overview of these parasites and several common and important food-borne parasites transmitted between man and vertebrate animals in Taiwan.

### ZOOONOTIC PARASITES IN TAIWAN

Zoonotic parasites in Taiwan are listed as follows:

#### Nematodes

About 18 species of nematodes are reported to be zoonotic. Among them, *Angiostrongylus cantonensis* (Chen, 1979; Hwang and Chen, 1988) is the most important and is widely distributed on the island; the others (Hsieh, 1959), such as *Ancylostoma braziliense*, *A. ceylanicum*, *Capillaria hepatica*, *C. philippinensis* (Chen *et al*, 1989), *Diploscaptor corotata*, *Dirofilaria conjunctivae*, *Strongyloides stercoralis*, *Toxocara* sp. and *Trichostrongylus orientalis* are reported sporadically. There are other nematodes found in animals on Taiwan which are transmitted from animals to man, but no

confirmed human infections have been reported. These are *Anisakis* sp. (Yamaguchi *et al*, 1970), *Gnathostoma doloresi*, *G. hispidum*, *G. spinigerum*, *Gongylonema scutatum*, *Haemonchus contortus*, *Macracanthorhynchus hirudinaceus*, *Mecistocirrus digitatus*, *Metastrongylus elongatus*, *Moniliformis moniliformis*, *Oesophagostomum apiostomum*, and *Syphacia obvelata*.

#### Trematodes

There are about 19 species of flukes reported as the zoonotic parasites. At present, *Clonorchis sinensis* (Yen *et al*, 1985; Yen *et al*, 1989) is the most widely distributed food-borne trematode in Taiwan, and *Fasciolopsis buski* (Lee *et al*, 1989) is in some limited areas in the south. However, *Dicrocoelium dendriticum*, *Echinoparyphium recurvatum*, *Echinostoma revolutum*, *Fasciola hepatica*, *Heterophyes heterophyes*, *Metagonimus yokogawai*, *Paragonimus westermani* are occasionally found in humans. The following trematodes (Hsieh, 1959) are reported from vertebrate animals in Taiwan, but possible infections could occur in humans: *Centrocestus formosanus*, *Echinostoma cientorchis*, *E. perfoliatum*, *Eurytrema pancreaticum*, *Haplorchis pumilio*, *H. taichui*, *H. yokogawai*, *Metagonimus minutus*, *Schistosoma japonicum*, *Stamnosoma formosanus* and *Trichobilharzia yokogawai*.

**Cestodes**

There are more than 11 species of cestodes reported as zoonotic on Taiwan. *Taenia saginata* is the most common and highly endemic in the mountainous areas on Taiwan. Others (Hsieh, 1959), such as, *Dipylidium caninum*, *Hymenolepis diminuta*, *H. nana*, *Raillietina celebensis*, *R. madagascariensis*, *Sparganum mansonioides*, *Sparganum proliferum* (Liao *et al*, 1984), *Taenia crassicolis*, and *T. solium* are sporadically reported in humans.

**Protozoa**

Infections of *Balantidium coli*, *Giardia lamblia*, *Leishmania donovani* (Morgan *et al*, 1962), *Pneumocystis carinii* (Chu and Hsu, 1975), and *Toxoplasma gondii* have been reported from man and animals in Taiwan. *Cryptosporidium* (Kuo *et al*, 1984), and *Sarcocystis lindemanni* are also transmitted from animals to man.

**Arthropods**

*Trombicula akamushi* is an important vector of Tsutsugamushi disease with high transmission between man and rodents in off-shore islands. Pentastome (Lu *et al*, 1989), infections possibly *Armillifer agkistrodontis* was first recovered from a person after a snake meal in Taiwan.

**IMPORTANT FOOD-BORNE PARASITIC ZONOSSES**

Angiostrongyliasis is highly endemic in the southern and eastern parts of Taiwan. About 80% of the patients are children below 15 years of age. They become infected mostly from eating *Achatina fulica* (the giant African snail) during the rainy season, from May to September. Patients residing in the mountainous and remote areas are more often infected than those in the urban districts. In addition to the giant African snail, *Cipangopaludina chinensis*, the rice paddy snail, and *Ampullarium canaliculatus*, the giant pond snail, also act as important sources of infection in this island. Albendazole (Hwang and Chen, 1988) has been found very effective in killing worms in animal experiments, and levamisole (Hwang and Chen, 1989) has been shown to shorten and lighten the course and symptoms in human cases.

Clonorchiasis is mainly endemic in three parts of Taiwan, Miao-li in the north, Sun-moon lake in

the middle, and Mei-nung in the south. Recent surveys show the parasite to extend to many other areas of Taiwan due to an increase of the population consuming raw fresh water fish. Hakkinese and farmers show a greater tendency of infection than other groups. Treatment with praziquantel (3 doses of 20 mg/kg body weight for one day) gave high anthelmintic activity.

Taeniasis *saginata* is acquired by eating raw beef or viscera of wild animals. This disease occurs more in aborigines, with prevalences of 10 to 20%. A single dose of 150 mg praziquantel has yielded a cure rate of almost 100% (Fan *et al*, 1986).

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