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# *Fasciolopsis* and Fasciolopsiasis

FASCIOLOPSIASIS is a disease of rural people in areas of eastern Asia where certain water plants are eaten raw. It is not of great public health importance.

## Description of Pathogen and Disease

The literature on fasciolopsiasis is not large, although the disease is attracting increased research interest in Bangladesh and elsewhere.

### *Identification*

Fasciolopsiasis is an infection of the small intestine, particularly the duodenum, by the trematode *Fasciolopsis buski*. In the majority of cases the infection is light, and there are no symptoms. Heavy infections may cause intestinal obstruction and symptoms such as nausea, diarrhea, fever, and abdominal pains. Patients may show edema of the face, the abdominal wall, and the legs within 20 days after massive infection. Ascites is common, as is eosinophilia; secondary anemia occurs occasionally; death is rare.

Diagnosis is by finding flukes or characteristic eggs in the feces. Treatment is by oral drug therapy with hexylresorcinol, tetrachlorethylene, or bithionol.

### *Occurrence*

*Fasciolopsis buski* occurs in man in Southeast Asia, especially in central and south China. It seems to be restricted to areas where cultivation of water plants such as water caltrop, water chestnuts, water hyacinth, and water bamboo takes place and in communities that consume uncooked infected plants. Endemic areas are found in Bangladesh, Kampuchea, China, India, Indonesia, Laos, Taiwan, Thailand and Vietnam (figure 28-1). Human infections reported in Japan, the Philippines, and Malaysia probably occur in people who have emigrated from endemic areas.

### *Infectious agent*

*Fasciolopsis buski*, a trematode, is the giant intestinal fluke of man. The adult is fleshy, elongated, and ovoid and is the largest trematode of man, measuring 20–75 millimeters by 8–20 millimeters (figure 28-2). The eggs are 130–140 micrometers by 80–85 micrometers and are very similar to those of *Fasciola* hepatica.

### *Reservoirs*

Man, pigs, and dogs are definitive reservoir hosts of adult flukes. Pigs are especially important in the maintenance of endemic fasciolopsiasis in central Thailand and some other areas.

### *Transmission*

The adult worm, which lives attached to the wall of the small intestine, lays about 25,000 unembryonated eggs per day. The eggs are passed in the feces. When the eggs reach fresh water they develop and hatch under favorable conditions (temperature 27–32°C) within 3–7 weeks.

The hatched miracidia penetrate a freshwater planorbid snail, and a process of asexual multiplication occurs that results in developed cercariae, which then emerge into the water. They swim in the water and become attached to aquatic vegetation such as seed pods of water caltrop, bulbs of water chestnuts, and roots of lotus, water bamboo, and others. There they encyst as metacercariae.

When ingested with edible plants, the metacercariae excyst in the duodenum of man, and the young flukes develop.

### *Prepatent and incubation periods*

Mature flukes develop and start laying eggs within 3–4 months after infective cysts have been ingested.

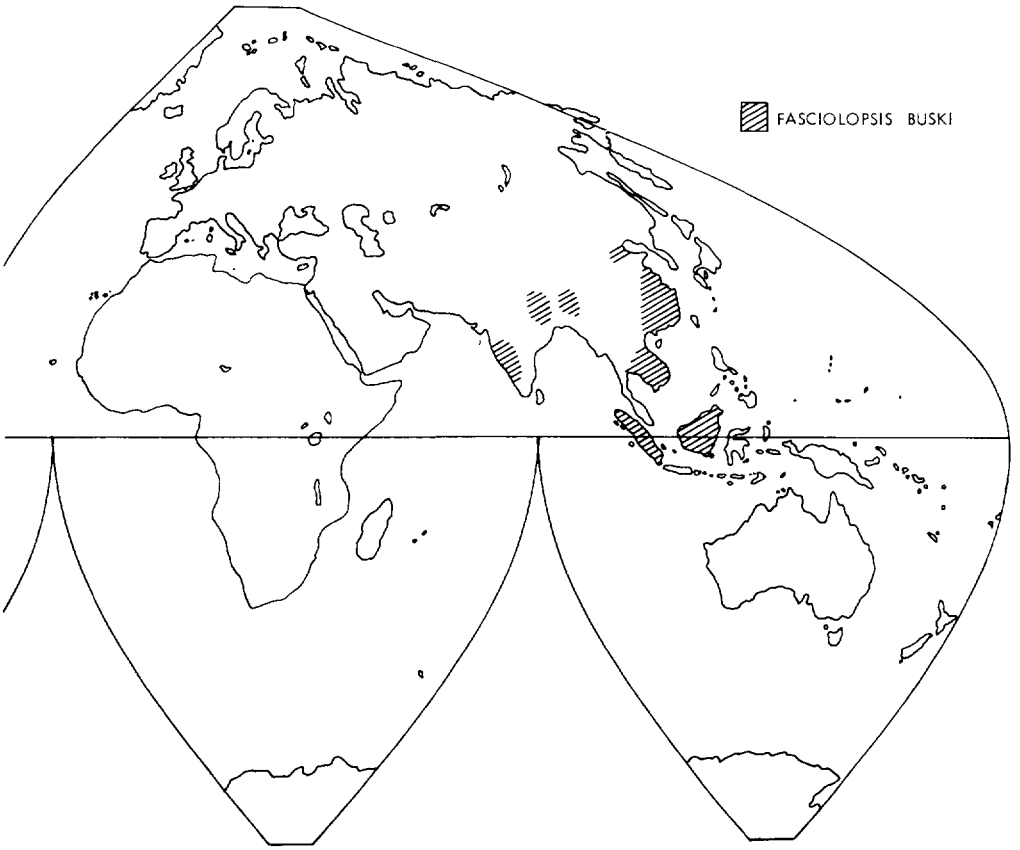


Figure 28-1. *Known geographical distribution of* Fasciolopsis buski. The infection may occur in areas as yet unrecorded

Massive infection can lead to symptoms within 20 days, but more usually symptoms develop slowly or not at all.

*Period of communicability*

Eggs may be passed in the feces as long as a mature worm is present in the intestine. Adult worms live for only about 6 months in man.

*Resistance*

There is no resistance proved. Malnourished individuals are more prone to symptoms.

*Epidemiology*

Prevalences of fasciolopsiasis are over 70 percent in some endemic foci. The seed pods of water caltrop are an important source of infection, especially where they are cultivated in ponds enriched with night soil. Water chestnut, water bamboo, water hyacinth, lotus, and watercress are also implicated as sources of infection. Before the nuts of water caltrop or the bulbs of water chestnut are eaten, the outer covering is removed with the teeth, and this may be the primary mode of infection. This practice is especially common among children, who are usually more heavily infected than adults. Peak prevalences have been reported in the 10–14 age group in central Thailand (Sadun and Maiphoom 1953) and in Taiwan (Hsieh 1960) and in the 5–14 age group in Bangladesh (Rahman, Idris and Khan 1981). In Taiwan, Thailand, and other areas, water plants are harvested and fed to pigs, and this helps to maintain a high prevalence of fasciolopsiasis in pigs.

Reports of fasciolopsiasis epidemiology include those from Bangladesh (Rahman, Idris and Khan 1981). China (Barlow 1925; Chu and others 1959), Taiwan (Hsieh 1960; Lee 1972), Thailand (Manning, Brockelman and Viyanant 1971; Manning and Ratanarat 1970; Sadun and Maiphoom 1953), and elsewhere in Southeast Asia (Cross 1969).

Figure 28-2. *An adult* Fasciolopsis buski *under a light microscope.* Scale bar = 5 millimeters. (Photo: Wellcome Museum of Medical Science)

## Control Measures

Metacercariae on plants can be killed by drying the plants or dipping them in boiling water.

The use of excreta as fertilizer in fields and ponds is an important factor in the transmission of fasciolopsiasis. It is relatively simple to treat the excreta and kill the *Fasciolopsis* eggs because these eggs are quite susceptible to adverse conditions. In areas where pigs are important in maintaining a reservoir of *Fasciolopsis*, steps must be taken to prevent pig excreta from reaching water in which plants for human consumption are grown.

The transmission of fasciolopsiasis depends on the customs and habits of inhabitants of endemic areas who grow and eat water plants. Public health education should promote changes in night soil reuse and disposal and in the consumption of raw water plants.

## Occurrence and Survival in the Environment

The four stages of *Fasciolopsis* found in the environment are eggs, miracidia, cercariae, and encysted metacercariae. Eggs hatch in water within 3–7 weeks at 27–32°C, and hatching is inhibited at temperatures above and below this range (Barlow 1925). In winter in Taiwan, with water temperatures below 20°C, immature eggs may survive but do not continue their development (Suzuki 1922). Eggs die in human urine within a few hours (Komiya 1964) and in feces within 18 days (Barlow 1925). Eggs are rapidly killed by desiccation. Miracidia in water must find an appropriate snail within 8 hours or die.

Encysted metacercariae are killed by desiccation, direct sunlight, and warm temperatures. They survive for up to 30 minutes in direct sunlight, 15 minutes at 60°C, and 1 minute in boiling water (Barlow 1925;

Komiya 1964). Metcercariae are also killed in 2 percent acetic acid in 9 days, 5 percent salt solution in 3 hours, and soybean sauce in 30 minutes (Komiya 1964).

## Inactivation by Sewage Treatment Processes

The fate of *Fasciolopsis* eggs in sewage treatment plants has not been studied. Most transmission is associated with direct enrichment of ponds with feces or night soil rather than with accidental contamination from poorly treated sewage effluents. In addition, fasciolopsiasis is endemic in poor rural areas where most people use simple latrines, or no latrines, and certainly produce no sewage.

## Inactivation by Night Soil and Sludge Treatment Processes

*Fasciolopsis* eggs in night soil or sludge may be killed by drying, freezing, heating, or storage for 18 days (Barlow 1925). Eggs survived for up to 28 days in biogas plants in China (Hou 1959).

## Literature Cited

Barlow, C. H. (1925). *The Life Cycle of the Human Intestinal Fluke*, Fasciolopsis buski. *American Journal of Hygiene* Monographic Series no. 4.

Chu, S. H., Peng, W. W., Chou, C. C., Lo, C. Y., Liu, T. C., Hsien, T. C., Chang, P. C., Chu, P. L., Wu, W. C. and Chang, Y. S. (1959). Mass treatment of *Fasciolopsis buski* infestation among school children in Canton. *Chinese Medical Journal*, **78,** 273.

Cross, J. H. (1969). Fasciolopsiasis in Southeast Asia and the Far East: A review. In *Proceedings of the Fourth Southeast Asian Seminar on Parasitology and Tropical Medicine, Schistosomiasis and other Snail-transmitted Helminthiases*, ed. Harinasuta, C., pp. 177–196. Bankok: Thai Watana Panich Press.

Hou, T. C., Chung, H. L., Ho, L. Y. and Weng, H. C. (1959). Achievements in the fight against parasitic diseases in New China. *Chinese Medical Journal*, **79,** 493–520.

Hsieh, H. C. (1960). Studies on the epidemiology of *Fasciolopsis buski* in South Taiwan. *Formosan Science*, **14,** 95–120.

Komiya, Y. (1964). *Fasciolopsis buski*. In *Progress of Medical Parasitology in Japan*, **1,** eds. Morishita, K., Komiya, Y. and Matsubayashi, H., pp. 277–285. Tokyo: Meguro Parasitological Museum.

Lee, H. H. (1972) *Fasciolopsis buski* infection among children of Liu-ying Primary School in Tainan Hsien south Taiwan. *Chinese Journal of Microbiology*, **5,** 110–114.

Manning, G. S., Brockelman, W. Y. and Viyanant, V. (1971). An analysis of the prevalence of *Fasciolopsis buski* in central Thailand using catalytic models. *American Journal of Epidemiology*, **93,** 354–360.

Manning, G. S. and Ratanarat, C. (1970). *Fasciolopsis buski* (Lankester, 1857) in Thailand. *American Journal of Tropical Medicine and Hygiene*, **19,** 613–619.

Rahman, K. M., Idris, M. and Khan, A. K. A. (1981). A study on fasciolopsiasis in Bangladesh. *Journal of Tropical Medicine and Hygiene*, **84,** 81–86.

Sadun, E. H. and Maiphoom, C. (1953). Studies on the epidemiology of the human intestinal fluke. *Fasciolopsis buski* (Lankester) in Central Thailand. *American Journal of Tropical Medicine and Hygiene*, **2,** 1070–1084.

Suzuki, S. (1922). Effects of certain physical and chemical influences upon the eggs of *Fasciolopsis buski*. *Taiwan Igakkai Zasshi*, **21,** 1.