Title: Studies on the Epidemiology of Fasciolopsis buski in Thailand.

Principal Investigator: George S. Manning, CPT, MSC.

Associate Investigator: Robert S. Desowitz, Ph.D., D.Sc.

Assistant Investigators: Louis E.H. Allen SFC MT (ASCP)
Keturat Sukhavat MT
Vithoon Viyanant MT, B.Sc.

Period of Report: 1 October 1967—31 March 1968.

Objectives The main objective is to determine the distribution and incidence of fasciolopsiasis in Thailand. In addition, an effort will be made to find the snail intermediate host and water plants involved in the transmission of the disease. The second objective is to carry out experiments in the laboratory which will give us a better understanding of host susceptibility and environmental effects on the life cycle of Fasciolopsis.

Description Epidemiologic surveys will be made in all areas of Thailand that are considered capable of supporting the life cycle of Fasciolopsis buski.

The initial surveys of this study were carried out in an area with a wide range in climate conditions. Some villages were located in areas where the land is almost always above water, while others were underwater for the greater part of the year. From the information gathered on these surveys and our knowledge of the life cycle of F. buski we are now able to limit our studies to areas that have a great deal of water.

Before surveying an area, reconniassance is made to determine the feasibility of study. When an area is found to possess the requirements necessary for supporting F. buski, only then are villages selected for survey. Through the school principal or village headman arrangements are made for the people in an area to deliver fresh stool specimens the morning following the day in which they receive stool cups. Patients name, age, sex, and address, along with the appearance and consistency of the stool, are recorded at the time of collection on a punch card designed by the principal investigator. Other information such as methods of examination and parasitic findings are filled out at the time of examination. The findings reported are based on a single stool specimen examined by two different methods: formalin—ether concentration and MIF. The MIF is used so that a sample of each stool can be permanently maintained. In addition to human infections an effort will be made to determine the reservoir hosts of F. buski and the role that they play in transmission. To date pigs, cows, water buffaloes and dogs have been examined from several villages.

Stools positive for F. buski are brought into the laboratory where they are mixed with water and incubated at various temperatures. Daily checks are made on their development and hatching times are recorded. An attempt is now being made in the laboratory to infect various species of snails in order to establish the life cycle.

Attempts were made to infect two gibbons with metacercariae from plants gathered near the house of known infected persons living in Ban Samnor No. 2. Stools were checked daily and at the end of five

months both remained negative. As soon as metacercariae can be harvested from infected snails a variety of animals will be used for host studies.

Progress Surveys have now been completed on 24 villages in Supanburi Province. For convenience of reporting the villages will be divided into two groups: (1) those that experience high water for the greater part of the year and (2) those that seldom, if ever, have any high water.

In villages that have a great deal of water the dwellings (house, corrals, etc.) are built on stilts and the people use skiffs and canoes as their chief means of transportation. In these areas rice and morning glory are the chief vegetable crops. Many of the people also raise cows, pigs and water buffaloes; which are corralled near their houses. There is no sewage or refuse disposal; as a result garbage and excreta are dropped directly into the water under the houses (or corrals). The morning glory fields are located usually within a few feet of the houses, thus providing an excellent means whereby transmission of F. buski can occur. Metacercariae have been found on these water plants, and as the people and animals depend to a large extent upon them for their food, it is not surprising that many become infected.

In the villages that experience high water for only short periods each year the dwellings are also on stilts, however, there are normally roads making it possible to travel from one village to another by car. In these areas rice, sugar cane, water chestnuts and buffalo nuts are grown and cows, pigs and ducks are raised. Also many water buffalo are kept to work in the rice fields.

As in the area previously described, there is no sewage or refuse disposal. Some pit latrines are available but seldom used. From information gathered at the Supanburi health center it was found that only about 3% of the population has access to a toilet. Defecation, as a rule, takes place anywhere on the ground away from water as defecating in the rice fields or canals leading to the fields would be considered "unclean".

The village by village results are summarized in Table 6. The highest incidence of infection was found among children 5 to 18 years of age. The range in ages, of those infected, was from 3 to 67 years. The results are summarized in Table 7.

Among the animals a surprising number of pigs, cows and water buffaloes have been found to be infected. From examinations of stools, intestines and livers from the slaughter house in Supanburi, adult F. buski have been found, thus far, only in pigs. Fasciola adults have been found in a water buffalo, however, as yet none have been found in humans (personal communications with Dr. Supit Snitwong at Supanburi Hospital). Table 8. compares the incidence of infection among humans, pigs, cows, and water buffaloes from three villages.

From the incubation studies it is found that 26.5°C is near optimum as more than 80% of the eggs mature within three weeks (20—22 days). However, little or no development takes place at either 5° or 32°C. A wider range of temperatures will be used as more stools become available.

It was also found that F. buski development is arrested by adding positive stools to salt water and a one-half salt water solution. As a result the low-lying areas bordering the Gulf of Siam can be eliminated as potential sites of infection as they are frequently flooded at high tide.

Table 6. Incidence of infection with Fasciolopsis buski

I—Areas with high water most of the year.

Village	People examined (No.)	No. Pos. F. buski	% Pos.
Ban Samnor No. 1	453	37	8
Ban Samnor No. 2	115	60	52
Ban Samnor No. 3	160	15	9
Ban Samnor No. 4	102	17	17
Ban Longlar No. 1	29	1	3
Ban Kanlum No. 2	40	11	28
Ban Donthong No. 7	34	22	65
Ban Donkard No. 3	104	37	36
Ban Nongkrating No. 3 and Ban Pakkwao No. 5	34	5	15
Ban Konthee No. 1	143	20	14
Ban Nong—ong No. 2	98	2	2
Totals	1312	227	17

II—Areas with little or no high water.

Village	People examined (No.)	No. Pos. F. buski	% Pos.
Ban Koobua Nos. 1, 6	101	0	0
Ban Kokyaiket Nos. 1, 3, 5	35	0	0
Ban Kokyaiket No. 2	53	1	2
Ban Kokyaiket No. 4	66	2	3
Ban Suppraradthed No. 1	84	1	1
Ban Suppraradthed No. 2	55	2	4
Ban Suppraradthed No. 3, 5	25	0	0
Ban Suppraradthed No. 6	142	0	0
Totals	561	6	1

Table 7. Age distribution of individuals surveyed.

Age (years)	No. examined	No. Pos. F. buski	% Pos.
1—4	98	8	8
5—14	1313	184	14
15—24	65	11	17
25—44	233	21	9
45—50	122	7	6
60—over	42	1	2
Totals	1873	232	12

Table 8. A comparison of the incidence of infection among humans, pigs, cows and water buffaloes from three villages.

Village	Humans		Pigs		Cows		Water buffaloes	
	No. exam	% Pos.	No. exam	% Pos.	No. exam	% Pos.	No. exam	% Pos.
Ban Samnor No. 1 } Ban Supanburi }	452	8	377	9	26	15	2	0
Ban Samnor No. 2	115	52	8	50	49	82	17	100
Ban Konthee No. 1	143	14	—	—	11	73	13	69