MEDICALLY IMPORTANT SNAILS OF KINMEN (QUEMOY) ISLANDS

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INTRODUCTION

Snails cause disease in man and domestic animals in many parts of the world. Studies in medical malacology reveal three groups of medically important mollusks, i.e. intermediate hosts of helminth parasites, carriers for pathogens and toxins, and venomous mollusks. Approximately 15 different species of freshwater snails serve as intermediate hosts in Taiwan (Pace, 1973; Lo, 1974). The control of important snail-borne diseases rely on the prevalence of the infective snails, environmental sanitation and habits of the people.

In the past 40 years, there is a paucity of information on snails of medical importance in Kinmen. *Bithynia manchourica* was first reported from Kinmen by Fan *et al.*, (1974) to relate the first case of human clonorchiasis on Kinmen. However, only two recorded localities were found. Lo and Fan (1975) employed the same species of snails collected from Yangming Lake of Kinmen for survival study. In 1980, a malacological survey was conducted in all five districts of Kinmen and the study reported herein constitutes the record of species, distribution, and ecological environments of Kinmen snails and their relationships to parasitic diseases.

MATERIALS AND METHODS

Kinmen lies off the southeast coast of China mainland, 2.2 nautical miles east of Hsiamen (Amoy), 150 nautical miles west of Taiwan (between 24° 25′ and 24° 34′ North Latitude, 118°19′ and 118°30′ East Longitude) It includes Kinmen Proper (Ta-Kinmen), Little Kinmen (Lieh-Yu), and many small islets with a total area of 148 sq km. These subtropical islets constitute a county of Fuchien Province, Republic of China.

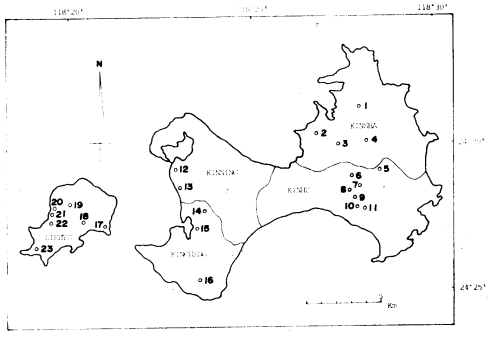

Fig. 1 – Map of Kinmen. Numbers indicate the collecting localities of freshwater and land snails reported in Table 1.

The survey was conducted in June, 1980 in 15 loci of Kinmen Proper and 7 localities of Little Kinmen. The collecting sites are shown Fig. 1. The natural environments of these habitats are recorded. Specimens of freshwater and land snails were collected by the using snail forceps and collecting hand nets. Most shells were cleaned and dried while some snails were killed and preserved in 70% ethanol. The snails were identified and classified mainly according to their characteristic features as described by Pace (1973).

RESULTS

The freshwater snail faunas of Kinmen and Taiwan are fundamentally similar. However, the ecological data show that some differences

Table 1

Collecting stations and ecological data of snails on Kinmen.

District	Station No.	Location	Description*	Bottom**	Vegetation***	Apparent pollution
Kinsha	1	Shamei	L	MS	A	±
	2	Houtse	P	SM	S	±
	3	Hotsuo	P	MS	A	+
	4	Houshiutou	P	MS	M	±
Kinhu	5	Chashan	P	M	N	+
	6	Yangming	L	SM	S	±
	7	Yingpitang	P	SM	A	±
	8	Shanwai	RS	S	M	–
	9	Hsinshili	IC	R; MS	S	±
	10	Taihu	L; IC	R; MS	M	–
	11	Jungyuan	P	SM	S	–
Kinning	12	Huhsia	L	SM; R	M	–
	13	Hsiapuhsia	P	M	N	+
Kincheng	14	Tungmenli	L	MS	M	–
	15	Hsimenli	TP	G	N	–
	16	Kukung	L	M	M	±
Liehyu	17	Ssuwei	TP	R	N	–
	18	Hsilu	P	MS	N	+
	19	Hsifang	IC; RF	SM	A	–
	20	Chungtun	P	MS	S	±
	21	Shangku	P	SM	S	+
	22	Houching	P	M	A	±
	23	Chingchi	P	M	S	±

*Description IC = irrigation canal, L = lake, p = pond, RF = rice field, RS = river or stream, TW = Temporatory water pool.
**Bottom: G = gravel, M = mud, MS = Muddy sand; R = rock, S = sand, SM = sandy mud.
***Vegetation: A = abundant, M = moderate, N = none, S = sparse.

exist (Table 1). Unlike Taiwan, rivers or streams are extremely rare in Kinmen. Most snails are found only in small ponds or man-made lakes. Pollution of artifical sludge is seen in a few stations, but not industrial pollutants. Most habitats are well conserved.

Eleven species of freshwater snails and three species of land snails were collected on Kinmen (Table 2).

The specimens obtained are kept in Department of Parasitology, National Yang-Ming Medical College for teaching and further research.

DISCUSSION

Snails, as required intermediate hosts in the life cycle of parasitic helminths infecting man and a variety of animals, occupy a position of utmost importance in man's war against disease. Their role in sustaining the parasitic larvae indirectly implicates them as responsible for some of the most serious and

Table 2

The distribution of each snail species at the collecting sites.

Snail sp.	Collection site
Aegista sp.*	8, 23
Bithynia fuchsiana	1, 3, 4, 6, 10, 12
B. manchourica	3
*Bradybaena similaris**	15
Cipangopaludina chinensis	14
C. japonica	2, 3, 5, 6, 11, 14, 16, 18, 20, 21, 23
Gyraulus spirallus	3, 21, 23
Hippeutis umbilicalis cantori	3, 4, 5, 6, 7, 8, 10, 12, 13, 14, 20, 23
H. u. umbilicalis	6
Lamellaxis sp.*	17, 22
Lymnaea ollula	2, 3,4,7, 8, 9, 13 16, 18, 21
L. swinhoei	1, 2, 3, 4, 9, 11, 14, 16, 18, 19, 20, 21, 22, 23
Melanoides tuberculata	7, 8, 14, 23
Segmentina hemisphaerula	5, 6, 14
Sinotaia quadrata	1, 4, 5, 6, 14, 16, 20, 21, 23

*Land snails.

economically important human infections. These diseases are usually associated with tropical and subtropical regions in southern China.

Although nearly every kind of mollusk harbour some form of parasite, only relatively few snails are of medical or veterinary importance. Of these, almost all live in freshwater. A few land snails, e.g. *Cionella lubrica* are vectors of lancet liver flukes in domestic and wild mammals (Belding, 1965), other land snails are important in the spread of *Angiostrongylus cantonensis* in Taiwan (Chiu, 1964; Chen, 1972; Wen, 1973).

Freshwater mollusks are found in many regions and habitats, in deep lakes, shallow ponds, temporatory water pools, mudflats, rice fields, irrigation canals, rivers, swift maintain streams, sewers, shelters, and even on and in other animals as parasites. Some snails have been known to remain in a dormant state underground for a very long period of time (Khaw and Fan, 1964; Fan and Khaw, 1966).

Bithynia manchourica was the only Kinmen snail reported in literature. In this study, both *B. fuchsiana* and *B. manchourica* were found on Kinmen. They are similar in general morphology and probably mistaken previously, since *B. fuchsiana* is the predominant species on Kinman (about 50 : 1 in our collection and a wider distribution). Both species may serve as the first intermediate host of *Clonorchis sinensis* which was first reported in Kinmen by Wang *et al.*, (1971).

Three species of viviparids were seen on Kinmen. *Cipanogopaludina chinensis* has been known as intermediate host of *Angiostrongylus cantonensis* (Chang *et al.*, 1968) and two species of human echinostomes, *Euparyphium olicanum* and *E. recurvatum* (Belding, 1965). There are no records to indicate that the other two viviparids *C. japonica* and *Sinotaia quadrata* are important vectors of human parasites.

Segmentina hemisphaerula is the most medically important species among the planorbid snails found in Kinmen. It is the intermediate host of *Fasciolopsis buski* (Hsieh, 1959; Lo 1967) and several human echinostomes, *Echinostoma cinetorchis*, *E. macrorchis*, and *E. revolutum* (Yamashita, 1964). Of the other planorbids, *Hippeutis umbilicalis cantori* may serve as a vector for *F. buski*, *Gyraulus spirallus* is capable to transmit *E. macrorchis* (Ito, 1964), while *H. u. umbilicalis* is suggested

as a possible intermediate host of *Paragonimus westermani* (Abbott, 1948).

Lymnaeids inhabit almost all types of freshwater habitats. Both *Lymnaea ollula* and *L. swinhoei* are widely distributed on Kinmen. These aquatic pulmonate snails can tolerate waters of low oxygen tension caused by pollution since they can take air directly into their mantle cavities. Both species are snail hosts of *Fasciola hepatica*, *E. revolutum*, and *Echinoparyphium recurvatum*.

Although snails of Family Thiaridae are widely distributed in almost all habitats including brackish water, *Melanoides tuberculata* is the only species established itself on Kinmen at present. Belding (1965) listed this species as an intermediate host of *P. westermani* and *Diorchitrema formosanum*.

Three known land snail species were found on Kinmen. However, only *Bradybaena similaris* is of medical importance as it is one of the snail hosts of *A. cantonensis* in Taipei (Chiu, 1964). Further studies on transmission dynamics are important and essential to the eventual control of human parasitic diseases.

SUMMARY

A survey and collection of the snails of medical importance were conducted in June, 1980 on Kinmen Islands. More than 2,700 snails were collected from 23 different localities. They were preserved, carefully classified, and compared in habitat distribution with snails of Taiwan. A total of fourteen species of snails was found. This study has led to the establishment of snail fauna of Kinmen. The relationships of these snails with some snail-borne diseases are discussed.

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