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Research Note

The Infectivity of Laboratory Colonies of *Oncomelania* Snails to Changhua Strain, Taiwan of *Schistosoma japonicum*

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It is well known that Japanese, Philippine and Chinese strains of *Schistosoma japonicum* are strains adapted for human. The different geographic strains of *S. japonicum* showed different degrees of infectivity in five subspecies of *Oncomelania* snails (DeWitt, 1954; Hsu and Hsu, 1960; Iwanaga, 1976a,b). Hsu and Hsu (1956) introduced that the Formosana strain of *S. japonicum* was a non-human zoophilic strain. Infectivity studies with the Formosana strain of *S. japonicum* in *Oncomelania* snails carried out by several investigators (DeWitt, 1954; Moose and Williams, 1963), but there have been few detailed observations on infectivity of Formosana strain of *S. japonicum* to five subspecies of laboratory-reared *Oncomelania* snails.

This paper give further details on the experimental infection of laboratory colonies of *Oncomelania* snails with Formosana strain of *S.japonicum*. The snails employed were five subspecies of laboratory-reared *Oncomelania* as previously described by Iwanaga (1972, 1975). The laboratory colonies were obtained as follows: *Oncomelania hupensis nosophora* originating from Yamanashi, Japan; *O.h.hupensis* from Shanghai, China; *O.h.quadrasi* from Leyte, Philippine; *O.h.formosana* from Changhua, Taiwan and *O.h.chiui* from Shihmen, Taiwan. The snails used for this study were adult snails. It was for this reason that the higher infection rates were found in adult snails than those of young snails for observations on the infectivity of *Oncomelania* snails to *S. japonicum* (Iwanaga, 1976a, b). The Formosana strain of *S. japonicum* used in the present study originated from infected snails collected in Changhua area, Taiwan, and the life cycle was maintained in our laboratory with use of mice and laboratory colonies of *O.h.formosana*. Snails were individually exposed to 1, 3 and 5 miracidia. The exposures were made in small tubes, allowing 18 to 20 hours for penetration. After exposure, the snails were kept in inner soil-filter circulating tanks for 6 weeks after exposure, and then replaced on petri dishes which contained moistened filter papers. Six weeks after exposure to miracidia, the snails were tested for cercarial emergences. Snails were examined weekly for additional 15 weeks. Snails without shedding cercariae were dissected and examined for sporocysts and cercariae 22 weeks after exposure to miracidia.

The results are shown in Table 1. The infection rate of *S. japonicum* to *O.h.formosana* exposed individually to 5 miracidia was 68.4%, similarly, 30.3% for *O.h.nosophora*, 30.8% for *O.h.hupensis* and 51.3% for *O.h.chiui*, but *O.h.quadrasi* showed markedly lower infection rate (3.7%) than that of the other snails. DeWitt (1954) reported that Changhua strain of *S. japonicum* was not able to develop in *O.h.hupensis*, but the present study demonstrated

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Table 1 Infection rate of *Oncomelania* snails exposed to *Schistosoma japonicum*, Changhua strain

Snail subspecies	No. of miracidia								
	1 miracidium			3 miracidia			5 miracidia		
	a	b	c	a	b	c	a	b	c
O.h.formosana	95	42 (44.2)*	3 (3.2)*	105	69 (65.7)	4 (3.8)	155	106 (68.4)	8 (5.2)
O.h.nosophora	90	17 (18.9)	2 (2.2)	110	32 (29.1)	6 (5.5)	165	50 (30.3)	9 (5.5)
O.h.hupensis	80	16 (20.0)	2 (2.5)	100	28 (28.0)	7 (7.0)	120	37 (30.8)	7 (5.8)
O.h.chiui	85	34 (40.0)	3 (3.5)	120	70 (58.3)	6 (5.0)	115	59 (51.3)	11 (9.6)
O.h.quadrasi	80	2 (2.5)	3 (3.8)	100	4 (4.0)	11 (11.0)	135	5 (3.7)	20 (14.9)

a, No. of snails examined; b, No. of snails infected; c, No. of snails died; *( ), Infection rate and mortality (%).

that the snail was susceptible to this strain of parasite. DeWitt (1954) and Moose and Williams (1963) noted that the snails were kept in simple breeding-systems (as clay pots and glass bowls) after exposure to miracidia. For infection rates and mortalities of the snails to *S. japonicum*, Iwanaga (1976a, b) compared three types of breeding-system, the inner soil-filter circulating tank, the petri dish with filter paper and the petri dish with agar medium, on breeding of snails after exposure to miracidia. As the result, the highest infection rate and mortality were observed in the inner soil-filter circulating tank among the three systems. Therefore, it is likely that infection rates and mortalities of the snails to *S. japonicum* differ from environments of snail-breeding after exposure to miracidia. But it needs further consideration for them. The snails exposed to 3 miracidia showed almost the same infection rates as those exposed to 5 miracidia in this study. Chiu (1967) reported that the infection rates of *O.h.chiui* exposed to 2 to 3 and 6 miracidia per snail were 69.2% and 100%, respectively, and Chiu (1967) also indicated that *O.h.chiui* was confirmed to be a good potential intermediate host for the Changhua strain of *S. japonicum*. In this study, the infection rates of *O.h.chiui* exposed to 3 and 5 miracidia per snail were showed 58.3% and 51.3%, respectively, and the result showed lower infection rates than that of Chiu (1967). This problem is a debatable point.

From the results of our previous and present studies on infectivity of four different geographic strains of *S. japonicum* in five *Oncomelania* subspecies (Iwanaga, 1976a, b; Iwanaga *et al.*, 1979a, b; Iwanaga and Tsuji, 1982a, b; Iwanaga *et al.*, 1984), it was of interest that each different geographic strain of *S. japonicum* showed higher infection rate for the *Oncomelania* from its own endemic area. On the other hand, *Oncomelania* snails from some endemic areas were also shown to be capable of serving as the intermediate hosts for different geographic strains of *S. japonicum*.

On the other hand, six new focal snails of *O.hupensis* were found in Taiwan and several new focal snails were shown to be able to serve as intermediate hosts for the parasite strain of Changhua (Lee *et al.*, 1982). Furthermore, the new focal snails in Taiwan were tested for susceptibility to various geographic strains of *S. japonicum* (Cross and Lo, 1980; Lee and Fan, 1982; Lee *et al.*, 1982). Lee *et al.* (1982) reported that Changhua race of *O. hupensis* was found to be slightly susceptible to Chinese strain of *S. japonicum* and Lee and Fan (1982) noted that the snails from Taitung, Taiwan was susceptible to the Japanese strain of the parasite. These results suggested that human pathogenic strains of *S. japonicum* were accidentally introduced into Taiwan.

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