[Jpn. J. Parasitol., Vol. 37, No. 3, 182–184, June, 1988]

Research Note

Scanning Electron Microscopy of Egg-shell Surface of *Schistosoma japonicum* (Chinese strain)

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(Received for publication; January 16, 1988)

Key words: *Schistosoma japonicum*, egg-shell surface, scanning electron microscopy.

The external morphology of adult *Schistosoma japonicum* in several geographic strains has been viewed using scanning electron microscopy (SEM). The Japanese strain of this parasite was reported by Sakamoto and Ishii (1977). Voge *et al.* (1978a) examined Japanese, Philippine, and Chinese (Formosan and mainland) strains. Ma and He (1981) investigated the Chinese (mainland) strain. The Malaysian strain was examined by Sobhon *et al.* (1983). Subsequently Sobhon *et al.* (1986) compared Chinese, Philippine and Indonesian strains. The adults of *S. mekongi*, the structure of which closely resembled that of *S. japonicum*, were also evidenced using SEM (Voge *et al.* 1978b, Kruatrachue *et al.* 1979, Vongpayabal *et al.* 1982 and Sobhon *et al.* 1984).

As regards the eggs, Ishii (1972), and Sakamoto and Ishii (1976) observed the Japanese strain of *S. japonicum*. The Chinese strain was reported by Zhang *et al.* (1986). *S. mekongi* eggs were viewed by Kruatrachue *et al.* (1979). No one as yet has compared the surface ultrastructure between the strains. In the present study, eggs of the Chinese strain were examined using SEM and the external structure was compared with the findings of Sakamoto and Ishii (1976).

Adult worms obtained from rabbits originated in Jiangxi Province, People's Republic of China. The eggs from the female uteri were washed in physiological saline and fixed in 10% formalin. They were processed for scanning electron microscopy. The eggs were immersed in distilled water to remove the formalin, rinsed twice in Millonig's phosphate buffer (pH 7.4), and postfixed in 1% osmium tetroxide for 2 h. They were again rinsed in the same buffer, dehydrated in increasing concentrations of ethanol, transferred to iso-amyl acetate and dried in liquid carbon dioxide, using a Hitachi HCP-2 critical-point dryer. The specimens were further mounted on studs and coated with gold in an ion-sputtering apparatus (JEOL FC-1100) and examined with a JEOL JSM-U3 scanning electron microscope operated at 15 kV.

The eggs were oval-shaped and about 50 x 30 μm. Each had a small spinose process (or spine) near the rounded end (Fig. 1). This spine looked like a recurved hook and was about 4.0 μm in length. The shell surface was entirely covered with long microvilli-like chitinous projections. These long projections were entangled each other and looked like cobwebs (Fig. 2), measuring about 5.0 to 7.0 μm long and 0.3 to 0.5 μm wide. The number of the projections was 5 to 7 per 1 μm^2. Among these long projections, there were short microprojections that were approximately 0.05 μm in diameter. They were more densely distributed than the long chitinous projections (Fig. 3). The number of those microprojections was

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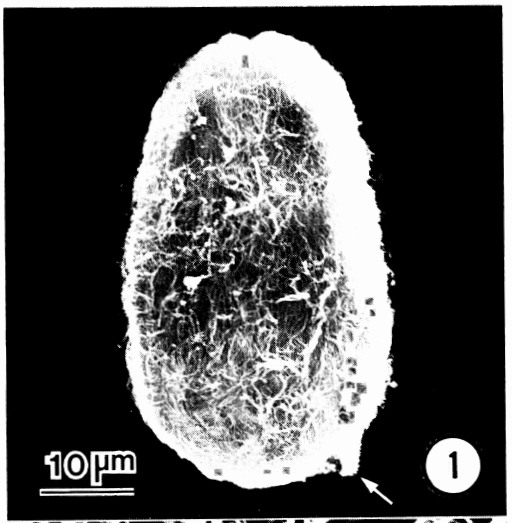

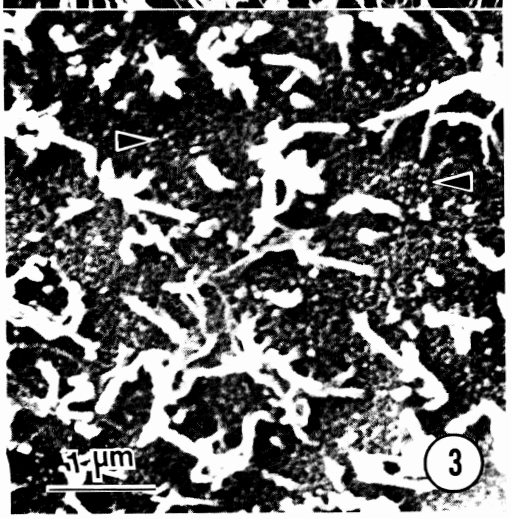

about 60 to 80 per 1 μm^2.

The *S. japonicum* eggs in feces were often attached to and enclosed with much feces debris under conventional light-microscopic examination. But it has not been known the reason. Transmission electron microscopy showed that each egg had projections on the surface (Inatomi 1962, Schnitzer *et al.* 1971). Subsequently, SEM revealed the egg-shell surface as three dimensional images (Sakamoto and Ishii 1976). The egg had two types of projections on the surface; one was a long chitinous projection and the other short microprojection. Consequently, these long chitinous projections supposed to catch the intraluminal contents while the eggs were in intestines. Zhang *et al.* (1986) referred to the presence of two types of the projections on the Chinese strain egg-shell surface. However those projections were demonstrated unclearly in the microphotographs. Kruatrachue *et al.* (1979) noted a scanning electron micrograph of the egg of *S. mekongi.* But two types of the projections on the surface were unclear.

The Chinese strain of *S. japonicum* eggs was found possessing the same structure as that of the Japanese strain. Present study revealed the approximate length of the long microvilli-like chitinous projections, the number of those projections per 1 μm^2 and the number of the microprojections per 1 μm^2 on the egg-shell surface.

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Fig. 1. Egg of *S. japonicum* (Chinese strain), showing the cobweb-like surface and a minute spine (arrow).
Fig. 2. Surface of the egg-shell. It is evident that the long microvilli-like chitinous projections protrude from the surface.
Fig. 3. A higher magnification of the egg-shell surface. Short microprojections are evidently recognizable among the long chitinous projections. Arrows indicate the microprojections.

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