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Author(s)	SHIMIZU, Mai
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1,212 (S.D.) worms. Adults of *C. osculatum* (89.3%) was dominant and adults of *P. decipiens* (17.9%) and *P. cystophorae* (10.7%) were also found. Larvae of *C. osculatum* (100%) and *Phocascaris* sp. (96.4%) were dominant species and *A. simplex* (57.4%) and *P. decipiens* (67.9%) were also found. Although 4th stage larvae of *Phocascaris* sp. were dominantly found among the

larvae identified, its adult stage was not commonly found in this animal. It is suggested that the ribbon seals are not important hosts of this species.

The number of larval nematode species per host was 2.75–3.18 in average, which was significantly more than that of adult nematodes, 0.97–1.18.

#### Development of *Echinococcus vogeli* in alternative host models using laboratory rodents.

Mai Shimizu

Laboratory of Parasitology,  
Department of Disease Control,  
School of Veterinary Medicine,  
Hokkaido University, Sapporo 060-0818, Japan

*Echinococcus vogeli*, a neotropical species of the genus *Echinococcus*, is one of the causative agents of parasitic zoonoses in Central and South America. The sylvatic cycle of the cestode involves the bush dog (*Speothos venaticus*) as the definitive host and the paca (*Cuniculap paca*) as the intermediate host. Very little is known about the developments of the parasite. In the present study, alternative definitive and intermediate host models for *E. vogeli* were established using Mongolian gerbils (*Meriones unguiculatus*) and AKR mice, and the growth of the parasite in the larval and tapeworm stages was observed.

For observation of the tapeworm stage development, Mongolian gerbils treated with prednisolone tertiary-butylacetate (PTBA) were orally inoculated with protoscoleces. The development of the worm was as follows; band formation at 7 days post infection (DPI), segmentation and formation of genital primordium and testes at 14 DPI, second proglottid formation, spermatozoa in testes and receptaculum seminis, and cleavage of ovum in uterus at 21

DPI, hook formation in oncospheres at 28 DPI and embryophore formation at 34 DPI. Morphologically mature eggs were first detected in feces at 35 DPI. Most of the mature worms were recovered from the upper one-third part of the small intestine. Time course of coproantigen excretion was analyzed by sandwich enzyme-linked immunosorbent assay using a monoclonal antibody EmA9 directed against *E. multilocularis* adult somatic antigen. The OD value increased from 7 DPI, thus indicating the possibility of early diagnosis of *E. vogeli* infection by this method. EmA9 reacted immunohistochemically with *E. vogeli* after 7 DPI. Infectivity of the eggs was not proven because *E. vogeli* cysts could not be recovered after oral inoculation of the eggs into Mongolian gerbils and AKR mice necropsied between 2 to 12 weeks post infection.

For observation of the larval stage development, metacestodes were surgically transplanted into the abdominal cavity of Mongolian gerbils. Development of metacestodes consisted of growth in diameter and exogenous proliferation of

small cysts. Histologically, cyst wall was composed of an inner thin germinal layer and an outer thick laminated layer. Inside the germinal layer, brood capsules and protoscoleces were formed and the protoscoleces were observed normally in the brood capsules. External development or protoscoleces on outer surface of brood capsules were partially observed. The strongly PAS-positive laminated layer was enclosed by host-produced tissues, and host reactions were espe-

cially strong around the cysts adhered to the host organs.

When *E. vogeli* cyst homogenate was inoculated into the abdominal cavity of Mongolian gerbils and AKR mice, polycystic hydatid cysts were recovered, which is probably the result of multiple exogenous proliferation of small cysts. There were differences in locations and shapes of cysts and in protoscoleces formation between these animals.

Production of monoclonal antibodies against  
*Echinococcus multilocularis* excretory/secretory antigens  
and its use in coproantigen detection

Emi Sunaga

Laboratory of Parasitology,  
Department of disease control,  
School of Veterinary Medicine,  
Hokkaido University, Sapporo 060-0818, Japan

Nine murine monoclonal antibodies (mAbs) against excretory/secretory (ES) antigens of adult *Echinococcus multilocularis* (EM) were produced. Three of them were IgG<sub>1</sub> (designated as Em a, Em h and Em i) and six were IgM (Em b, Em c, Em d, Em e, Em f and Em g). When the reactivity of mAbs were tested by ELISA against the various parasite antigens including *Echinococcus* and *Taenia* species, three types of reaction were observed (Em a ; Em b-g ; Em h and i). Only Em h and Em i selectively reacted to EM adult somatic and ES antigens and no cross-reactions were observed with *Taenia* species derived antigens including *Taenia hydatigena*. Western blot analysis of mAbs with EM ES antigens showed a smear in a broad molecular weight range. In immunohistochemistry, all of mAbs recognized the antigens of tegument and host intestinal epithelium around the worm. Because those reactions disappeared after periodate oxidation, it is suggested that the

epitope recognized by mAbs are composed of carbohydrates moieties.

Em i was applied to coproantigen detection and sandwich ELISA using Em i and rabbit polyclonal antibodies against EM ES antigens was performed, however, the sensitivity of the ELISA was found to be low. To improve the sensitivity of the coproantigen detection, avidin biotinylated peroxidase complex method was applied. Sandwich ELISA's using rabbit polyclonal antibodies as capture antibody, Em i as primary antibody and biotinylated anti-mouse horse IgG as secondary antibody (rAb / Em i / b-AntiM), and that using Em i as capture antibody and biotinylated mAb, EmA9, which had been produced against EM somatic antigens and used in the present coproantigen detection technique, as primary antibody (Em i / b-EmA9) were found to be appropriate for coproantigen detection.

The selected two methods were compared with current technique (rAb / b-EmA9) using