Journal of Helminthology (2008) **82,** 95–96 doi: 10.1017/S0022149X0785824X

Research Note

Longevity of *Echinostoma caproni* in Balb/c mice

B. Fried* and R.C. Peoples

Department of Biology, Lafayette College, Easton PA 18042, USA

Abstract

This study used Balb/c mice to examine the longevity of *Echinostoma caproni*. Five mice each exposed to 75 encysted metacercariae (cysts) were necropsied at 23 weeks postinfection (PI) (160 days PI). Two of the 5 were infected with a total of 33 worms; 23 in one mouse and 10 in the other. Body and organ area measurements showed that these worms were robust and normal in appearance. No signs of atrophy of any of the genital structures were observed. The mean ± SE of eggs/uterus per worm ($n = 10$) was 243 ± 6. This strain of mouse will be suitable to study the effect of long-term survival on the host–parasite relationship of *E. caproni* in Balb/c mice.

Information on longevity of digeneans is restricted to a few studies on some medically important species (see review in Sandground, 1936). Thus, fasciolids may persist in various ruminants for 5 years or more and human schistosomes and opisthorchids may live for 20–30 years. However, most digeneans survive in their definitive hosts for several months or 1–2 years (Sandground, 1936). Precise information on the longevity of adult non-human digeneans in laboratory hosts is, for the most part, unavailable. In most studies on digeneans in laboratory hosts, the experiments were terminated prior to the time when all adult worms were eliminated from the hosts (see, for example, Toledo *et al.*, 2005).

Hosier & Fried (1991) determined the longevity of the intestinal trematode *Echinostoma caproni* in ICR mice; the study was not terminated until 29 weeks postinfection (PI) and showed that mice, each infected with 25 encysted metacercariae (cysts), could support a relatively high percentage of worms up to 20 weeks PI. From 20 to 29 weeks PI, there was a diminution in worm growth (degrowth) based on body area measurements. There was also an anteriad shift in the worm population from the ileum–jejunum to the duodenum. The duodenum is an unusual site for this digenean (see review in Fried & Huffman, 1996).

We have recently begun using Balb/c mice in our laboratory because of the availability of this strain from a breeding colony at our institution. Our first study with this strain (Bandstra *et al.*, 2007) showed that it was susceptible to *E. caproni* infection using a cyst inoculum of 75 per mouse. Because of our success with this model, the purpose of this study was to test the longevity of *E. caproni* in Balb/c mice using five hosts (see details of mouse exposure and maintenance in Bandstra *et al.*, 2007), each exposed to 75 cysts. To determine if the exposed mice became infected, faecal samples were taken from each mouse at 2, 4 and 6 weeks postexposure. All mice were positive with *E. caproni* eggs based on the detection of eggs in the stool. All mice were necropsied at 23 weeks (160 days) PI, following methods described in Stillson & Platt (2007); the intestine was divided into five equal zones from the pylorus to ileo-caecal valve to identify worm location in the gut. Worms were removed, pooled and fixed in hot 5% neutral buffered formalin. The worms were left unstained and mounted on glass slides in glycerin jelly. Measurements ($n = 10$) were made on body length, maximum width, oral sucker, acetabulum, ovary and testes and were converted to areas (table 1).

Two of the five hosts were infected at 23 weeks PI with a total of 33 worms; one host contained 10 and the other 23 worms. All worms were located in sections 3 and 4, the ileum–jejunum region. All worms looked normal, i.e. showed no signs of abnormal testes ovary or uterus. Such abnormalities in the genital system would be indicators of ageing of digeneans in a host (see Bakke, 1988). The worm uteri were distended with eggs, and uterine egg counts of 10 worms showed a mean of 243 ± 6 eggs/worm.

*E-mail: friedb@lafayette.edu

https://doi.org/10.1017/S0022149X0785824X Published online by Cambridge University Press

Table 1. Mean ± SE morphometric values (mm) of ten randomly selected *E. caproni* worms from two adult Balb/c mice necropsied 23 weeks postinfection.

	Length	Width	Area[a]
Body	7.77 ± 0.22	1.43 ± 0.03	11.14 ± 0.53
Oral sucker	0.24 ± 0.01	0.23 ± 0.01	0.06 ± 0.01
Acetabulum	0.74 ± 0.02	0.72 ± 0.01	0.53 ± 0.01
Ovary	0.29 ± 0.01	0.43 ± 0.02	0.12 ± 0.01
Anterior testis	0.59 ± 0.03	0.60 ± 0.02	0.36 ± 0.03
Posterior testis	0.78 ± 0.02	0.57 ± 0.01	0.44 ± 0.02

[a] Values for area are given in mm^2.

The condition of the uterus and the number of eggs/worm suggested that the eggs were viable; however, embryonation experiments were not done. The morphometric data are reported in table 1. These data suggest that body and organ measurements were normal in comparison with similar measurements made on adults of *E. caproni* (Hosier & Fried, 1991; Balfour *et al.*, 2001)

Numerous factors affect long-term worm recovery in the mouse–*E. caproni* model, including strain of mouse, age of cysts, and number of cysts used to infect the mice. The results of this study show that Balb/c mice can sustain normal-appearing worms in the ileum–jejunum region for >5 months; this host will be useful for studies that examine long-term effects of the *E. caproni* infection on both the parasite and the host.

References

Bakke, T.A. (1988) Abnormalities in adult digeneans, with special reference to *Phyllodistomum umblae* (Fabricius) (Platyhelminthes). *Zoologica Scrypta* **17**, 123–134.

Balfour, C.D., Rossi, M. & Fried, B. (2001) Effects of a 100 metacercarial cyst inoculum on the host-parasite relationship of *Echinostoma caproni* and ICR mice. *Journal of Helminthology* **75**, 321–324.

Bandstra, S.R., Murray, K.E., Fried, B. & Sherma, J. (2007) High performance thin layer chromatographic analysis of neutral lipids in the feces of Balb/c mice infected with *Echinostoma caproni*. *Journal of Liquid Chromatography and Related Technologies* **30**, 1437–1445.

Fried, B. & Huffman, J.E. (1996) The biology of the intestinal trematode *Echinostoma caproni*. *Advances in Parasitology* **38**, 311–368.

Hosier, D.W. & Fried, B. (1991) Infectivity, growth, and distribution of *Echinostoma caproni* (Trematoda) in the ICR mouse. *Journal of Parasitology* **77**, 640–642.

Sandground, J.H. (1936) On the potential longevity of various helminths with a record for a species of *Trichostrongylus* in man. *Journal of Parasitology* **22**, 464–470.

Stillson, L.L. & Platt, T.R. (2007) The crowding effect and morphometric variability in *Echinostoma caproni* (Digenea: Echinostomatidae) from ICR mice. *Journal of Parasitology* **92**, 242–246.

Toledo, R., Espert, A., Muñoz-Antoli, C., Marcilla, A., Fried, B. & Esteban, J.G. (2005) Kinetics of antibodies and antigens in serum of mice experimentally infected with *Echinostoma caproni* (Trematoda: Echinostomatidae). *Journal of Parasitology* **91**, 978–980.

(Accepted 23 July 2007)
First Published Online 16 November 2007
© 2007 Cambridge University Press

https://doi.org/10.1017/S0022149X0785824X Published online by Cambridge University Press