

NOTES ON THE DEVELOPMENT OF METACERCARIA AND ADULT OF ECHINOSTOMA PORTERI FASHUYI (ECHINOSTOMATIDAE)

S. A. FASHUYI

Department of Biological Sciences, University of Lagos, Lagos

Abstract. The metacercaria of *E. porteri* was found to retain its viability for a longer time in *Bulinus* (*Physopsis*) *globosus* (Morelet) than in *Bulinus* (*Bulinus*) *forskali* (Ehrenberg) and *Lymnaea natalensis* (Krauss) which is the natural host for other larval stages. It becomes infective to definitive hosts about 6 h after commencement of encystment and loses its viability after 14 days in the snail host. Development of adult takes place experimentally in chicks, pigeons and rats, but hosts show age resistance to infection. Growth of adult worm is most rapid between 4th and 6th day and declines after the 17th day. Proportionate increase in body length is higher than similar increases in size of other parts of the body.

The larval stages of *Echinostoma porteri*, a 35-spined trematode, were found naturally infecting *Lymnaea natalensis* collected from rice swamps in Bo town, Sierra Leone. The complete life cycle of the parasite was investigated in the laboratory (Fashuyi 1984). Although the biology of both larval and adult trematodes belonging to other families has been studied, not much attention has been focussed on the development of echinostomes. Previous investigations include postcercarial development of *Schistosomatium douthitti* (El-Gindy 1951), growth and development of *Fasciola hepatica* (Dawes 1962a, b), *Mesocoelium monodi* (Thomas 1965) and *Clinostomum tilapia* (Ukoli 1966).

MATERIAL AND METHODS

The cercariae which were shed by infected *Lymnaea natalensis* were left together in specimen tubes with healthy laboratory bred *Bulinus globosus*, *B. forskali* and *L. natalensis* in which they encysted. 25—30 metacercariae recovered after two days from *B. globosus* were fed each to two albino rats, five one-day-old and six five-week-old chicks, eight adult chicks and four adult pigeons using a stomach tube. Daily faecal egg counts of experimental animals were made using the formol-ether technique.

Chicks aged 1—3 days were similarly fed with 20—25 viable metacercariae. A bird was sacrificed daily for 28 days and examined. Trematodes found in the alimentary canal were flattened between two slides, fixed in 10 % formalin at 80 °C and stained in aceto-alum carmine. Body parts of worms were measured under the microscope.

RESULTS

Viability of metacercaria in different snail hosts

Metacercariae which were recovered from kidney of snails after being exposed to cercariae for definite periods were fed to 3-day-old chicks. The birds were killed after 10 days and examined for adult worms. The results obtained are shown in Table 1. Worm recovery was highest in chicks fed with metacercariae from *B. globosus* and lowest in those from *B. forskali*. Metacercariae lose their viability more readily in *B. forskali* than in *L. natalensis* and *B. globosus*.

Age of definitive hosts and infectivity of metacercaria

Metacercariae of different ages in *B. globosus* were fed to two age groups of chicks. Those in group I were 1—3 days old while the birds in group II were 5 weeks old.

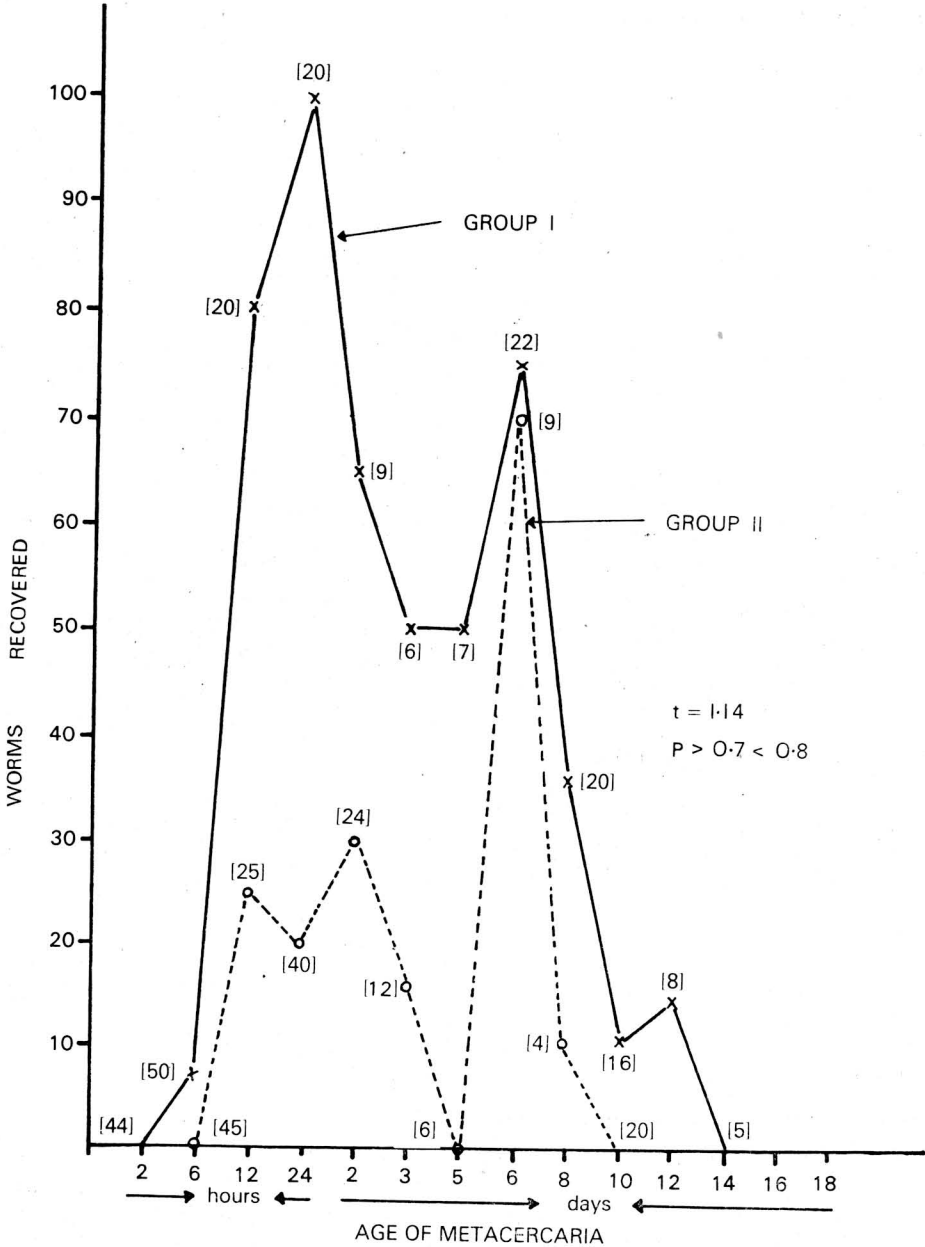


Fig. 1. Worms recovered (in percentage) from 1—3 days old (Group I) and 5 weeks old (Group II) chicks after being fed with metacercariae. Quantity of metacercariae are in parentheses.

Table 1. Effect of age of metacercaria in different snail hosts on its ability to infect chicks

Snail host of metacercaria	Metacercariae fed to chicks		Worm recovery after 10 days		
	Quantity	Age (days)	Quantity	%	Mean %
<i>Lymanaea natalensis</i>	32	5	20	62.50	39.92
	18	7	11	61.11	
	17	10	5	29.41	
	15	12	1	6.66	
<i>Bulinus forskalii</i>	23	5	12	52.17	17.20
	12	7	2	16.66	
	20	10	—	0.00	
	8	12	—	0.00	
<i>Bulinus globosus</i>	20	5	15	75.00	61.58
	12	7	10	83.33	
	25	10	10	40.00	
	25	12	12	48.00	

They were killed and examined for trematodes 10 days afterwards. The results presented in Fig. 1 show that the ability of metacercariae to infect and survive in both age groups of birds were significantly different by 70 to 80 % as calculated by the Student's t-test.

Egg output in different hosts

The results of faecal egg count in different experimental hosts are shown in Fig. 2. The trematode grows to maturity in both birds and rats, although the young chicks were more receptive, while adult chicks were completely resistant to infection. The pigeons suffered from severe gastro-enteritis and some expelled live worms with faeces between 17th and 19th day after infection.

Growth of adult worms

The mean sizes of worms recovered each day are presented in Fig. 3. Growth in length was most rapid between 4th and 6th days and continued till the 17th day after which it declined. The development of other body parts followed the same pattern. Proportionate increase in size of body was determined by regarding the smallest size of parts as 1. Values relating the size of others to 1 were calculated. The results indicate that proportionate increase in length of adult 8-day-old worms was higher than similar increases of the acetabulum when compared with a 3-day-old worm. Increase in length was mostly in the postacetabular region.

DISCUSSION

The viability span of the metacercaria of *E. porteri* seems to be short. The metacercaria of *E. nudicaudatum*, for example, was found to be viable after 14 months in the snail host (Nasir 1960). Although the results in Table 1 show that the metacercaria of *E. porteri* retains its viability for a longer time in *B. globosus* than in *L. natalensis*, the only host in which other larval stages develop (Fashuyi, in press), and *B. forskalii*, most metacercariae lose their viability rapidly after the 10th day (Fig. 1).

E. porteri is capable of developing to maturity in both birds and rats (Fig. 2). Similar situations have been reported in *Echinostoma liei* (Jeyarasasingam et al. 1972), *E. lindoense* (Lie 1964) and *E. paraensei* (Lie and Basch 1967). Adult stages of *E. rodriguezi* (Hsu et al. 1968) and *E. leonense* (Fashuyi 1976) develop only in chicks and pigeons but not in rats. The results obtained from faecal egg

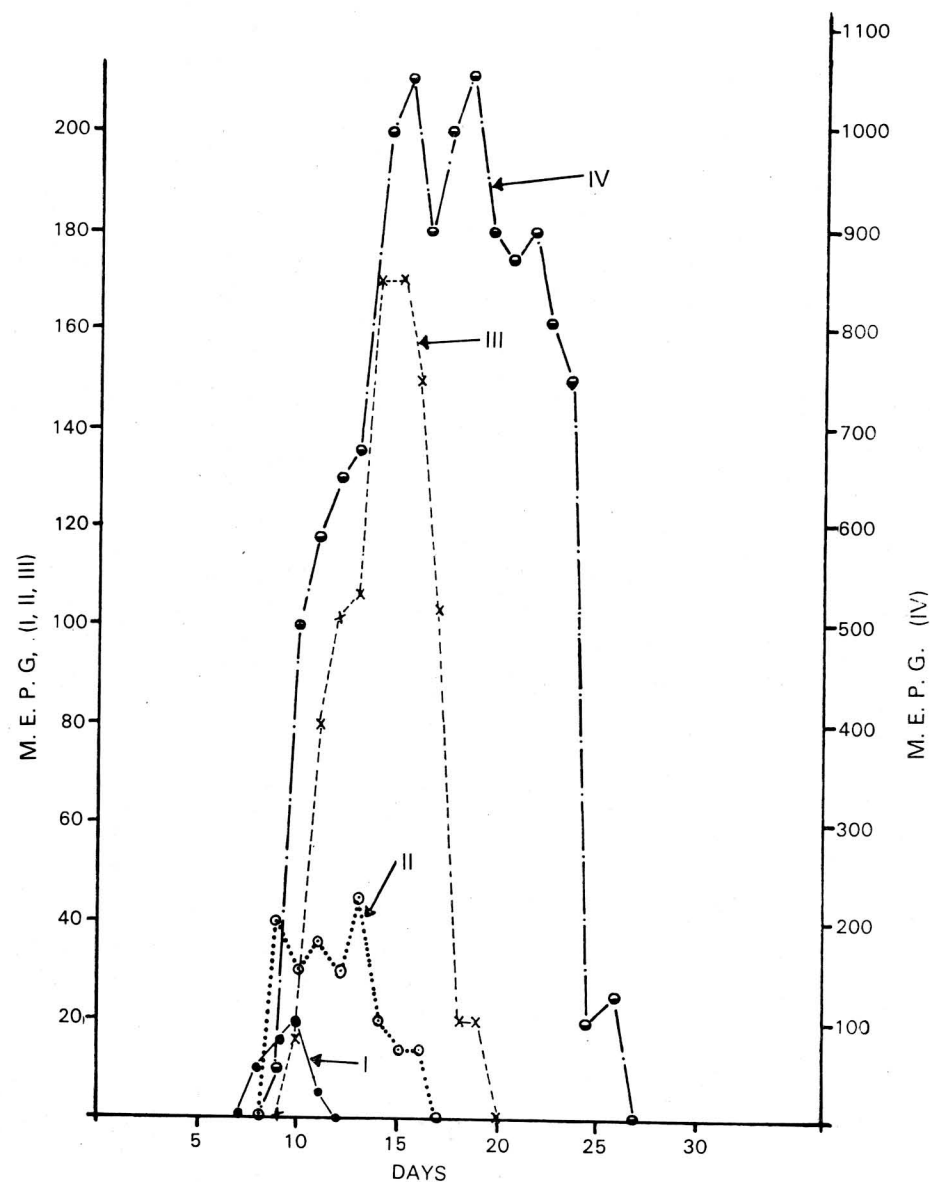


Fig. 2. Mean eggs per gram (M.E.P.G.) of faeces counted from experimental hosts after being fed with metacercariae. I — albi o rats, II — five weeks old chicks, III — adult pigeons, IV — one day old chicks.

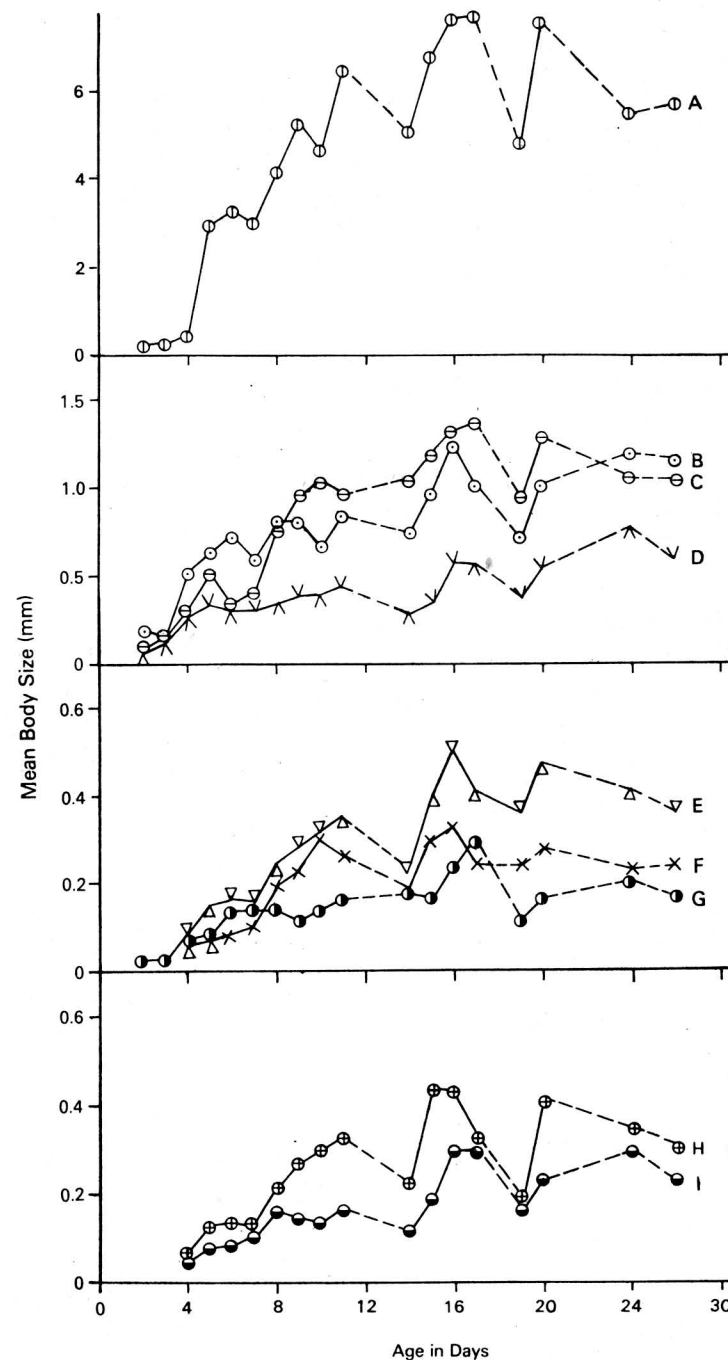


Fig. 3. Growth of the body parts of adult *E. porteri* in young chicks. A — body length, B — preacetabular distance, C — body diameter, D — collar diameter, E — posterior testis length, F — ovary length, G — oral sucker length, H — anterior testis length, I — oral sucker diameter.

counts show that young day-old chicks are better hosts than older birds or rats. A form of age resistance by chicks against echinostomum was observed by Senger (1954), while the pigeons suffered severe gastroenteritis before expelling adult worms with faeces on the 17th and 19th day after infection (Fig. 2). Pigeons experimentally infected with *E. londonense* were reported by Khan (1961) to suffer similar situation.

The growth pattern in *E. porteri* shares common features with that of other trematodes. Most of the increase in length occurred in the postacetabular region just as in *Clinostomum tilapiae* (Ukoli 1966), *Fasciola hepatica* (Dawes 1962a, b) and *Mesocoelium monodi* (Thomas 1965). However, in *F. hepatica*, the diameter of flukes about 0.5 mm long is approximately 2/3 the body length while the mean breadth is about half the body length in larger specimens (Dawes 1962). The body length increases considerably in *E. porteri* as it matures with little increase in diameter resulting in a much lower diameter to length ratio.

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ПРИМЕЧАНИЯ К РАЗВИТИЮ МЕТАЦЕРКАРИЙ И ПОЛОВОЗРЕЛЫХ ЭКЗЕМПЛЯРОВ ТРЕМАТОДЫ *ECHINOSTOMA PORTERI* FASHUYI (ECHINOSTOMATIDAE)

С. А. Фашуй

Резюме. Было обнаружено, что метацеркарии трематоды *E. porteri* переживают более долгое время в *Bulinus (Physopsis) globosus* (Morelet), чем в *Bulinus (Bulinus) forskalii* (Ehrenberg) и *Lymnaea natalensis* (Krauss), который является естественным хозяином других личиночных стадий. Метацеркарии станут инфекционными для окончательного хозяина приблизительно 6 ч после начала энцистирования и потеряют жизнеспособность через 14 дней в моллюске. После экспериментального заражения куриц, голубей и крыс, метацеркарии развивались в половозрелые экземпляры, но хозяева оказались резистентными по возрасту против заражения. Рост половозрелых червей протекает очень быстро на 4—6-й день и замедляется на 17-й день. Относительный рост тела в длину больше, чем рост других частей тела.

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S. A. F., Department of Biological Sciences,
University of Lagos,
Lagos, Nigeria