

SHORT COMMUNICATION

HETEROLOGOUS RESISTANCE TO
ECHINOSTOMA REVOLUTUM IN
MICE I-EFFECT OF PRIMARY
SINGLE-SEX SCHISTOSOMA
MANSONI INFECTION.

By

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Our previous studies in heterologous resistance to far-related trematodes demonstrated that mice harbouring primary patent *Schistosoma mansoni* (*S. mansoni*) infection confer high or complete resistance on a subsequent challenge with *Echinostoma revolutum* (*E. revolutum*), (Sirag et al., 1980) and that primary patent *Schistosoma bovis* (*S. bovis*) infection in calves induce significant resistance on a subsequent challenge with *Fasciola hepatica* (*F. hepatica*), (Sirag et al., in press). The failure of primary prepatent *S. mansoni* infection in mice to produce significant resistance to a challenge with *E. revolutum* (Sirag et al., 1980) has led us to the assumption that patency or egg-granuloma formation in the primary infection is a prerequisite for the induction of resistance to a challenge infection.

Our present work was therefore extended to investigate the validity of the aforementioned theory by studying the effect of a primary single-sex *S. mansoni* infection in mice of a subsequent challenge with *E. revolutum*. For this purpose, a strain of inbred albino mice weighing 20-25 grams at the time of primary infection were used. The primary infection of mice was conducted with single-sex (male or female) *S. mansoni* (Puerto-Rican strain) obtained from individual snails of *Biomphalaria glabrata* exposed to one miracidium only resulting in either male or female schistosome infection. Mice were then exposed to 120 cercariae each using the paddling method described by (Preston & James, 1972). Metacercariae of *E. revolutum* for the secondary infection (challenge) were obtained from *Biomphalaria pfeifferi* snails and they were administered to mice by stomach tube. The worms from the primary infection were recovered by the perfusion technique described by Smitheri & Terry, (1965) while the *E. revolutum* worms of the challenge infection were recovered from the intestines of the necropsied mice.

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As illustrated in the Table, experiments I and II and experiment III comprise experiments on mice primarily infected with female (Group A) or male (Group AI) *S. mansoni* cercariae respectively and were 90 days old at the time of challenge with eight *E. revolutum* metacercariae. Each experiment was separately controlled by mice previously non-infected but challenged with *E. revolutum* (Group B). Necropsies were performed 8 days after the challenge infection. The degree of heterologous resistance was evaluated by comparing the number of worms recovered from the infected (experimental) and previously non-infected (control) mice.

The results of the *E. revolutum* worm recovery in the Table showed that the mean burden of *E. revolutum* in the group of mice primarily infected with *S. mansoni* male or female for 90 days at the time of challenge were comparable with that of the challenge control groups. The difference between the group means was not significant ($P > 0.05$). The data, although being limited as far as the male infection is concerned, show that single-sex schistosome infection does not induce any resistance to a subsequent challenge with *E. revolutum*. Our present results were consonant with the findings of Christensen et al., (1978) that far-related prepatent trematodes (*S. mansoni* Vs *F. hepatica*)

produce no heterologous resistance with either of the parasites indicating that heterologous resistance depends on the presence of adult egg production worms at the time of challenge. Nevertheless, the studies by Christensen et al., (1980) in mice with primary single-sex schistosome infection confirmed this assumption in showing that such single-sex schistosome infection induce no resistance to *F. hepatica* challenge.

However, further work is still needed on this area to cast more light on the nature of the heterologous resistance in the far-related trematodes in view of Pelley & Hillyer, (1978) findings that cross-reacting antigens exist between eggs and adult of *S. mansoni* and *F. hepatica* adult worms.

References

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SHORT COMMUNICATION

HETEROLOGOUS RESISTANCE TO *ECHINOSTOMA REVOLUTUM* IN SINGLE-SEX SCHISTOSOMA MANSONI INFECTION

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Our previous studies in heterologous resistance to *E. revolutum* demonstrated that mice having primary patent schistosomiasis caused by *E. revolutum* infection could fight off subsequent infections on a subsequent challenge with *E. revolutum* (Sirag et al. 1980) and that primary patent schistosomiasis by *E. revolutum* in mice induced significant resistance to subsequent challenges with *E. revolutum* (Sirag et al. in press). The failure of primary patent schistosomiasis to induce resistance in mice to produce significant resistance to a challenge with *E. revolutum* (Sirag et al. 1980) has led us to the assumption that primary or egg-antigenic formation in the primary infection is a prerequisite for the induction of resistance to a challenge infection.

Our present work was therefore extended to investigate the validity of the immunological theory by studying the effect of a primary single-sex schistosomiasis infection in mice of a subsequent challenge with *E. revolutum*. For this purpose, a strain of mixed albino and black mice weighing 30-35 grams at the time of primary infection was used. The primary infection of mice was conducted with eggs of *E. revolutum* (male or female) 2 months (Festo-Roman strain) obtained from the divided seeds of *Biomphalaria glabrata* exposed to one sex infection only resulting in either male or female schistosomiasis infection. Mice were then exposed to 150 cercariae each using the bathing method described by Preston & James (1972). Microscopical examinations for the secondary infection (challenged) were obtained from *Biomphalaria glabrata* shells and they were either found to be free of schistosomiasis. The worms from the primary infection were recovered by the technique described by Smithers & Terry (1965) while the *E. revolutum* worms of the challenge infection were recovered from the intestines of the unoperated mice.

Female *Biomphalaria glabrata* - Schistosoma

The results of the *E. revolutum* worm recovery in the mice showed that the mean burden of *E. revolutum* in the group of mice previously infected with a maximal dose of cercariae for 30 days at the time of challenge was comparable with that of the challenge control group. The difference between the two groups means was not significant ($P > 0.05$). The data although very limited as far as the male infection is concerned show that single sex schistosomiasis does not induce any resistance to a subsequent challenge with *E. revolutum*. Our present results were consistent with the findings of Christensen et al. (1977) that the related *Biomphalaria* (*S. mansoni* V. *E. japonica*) infection produced no heterologous resistance with either of the parasites indicating that heterologous resistance depends on the presence of adult egg production within the time of challenge. Nevertheless, the studies by Christensen et al. (1980) in mice with primary single-sex schistosomiasis infection confirmed the assumption in showing that such single-sex schistosomiasis infection induce no resistance to *E. japonica* challenge.

However, further work is still needed on this area in order to clarify the nature of the heterologous resistance to the far-related *tricuspidatus* in view of the fact that Hillyer (1977) findings that cross-reacting antigens exist between eggs and adult of *S. mansoni* and *E. japonica* adult worms.

References

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