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SOME IMMUNOLOGICAL ASPECTS OF
TAENIA HYDATIGENA
INFECTIONS IN SHEEP.

A thesis presented in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Veterinary Science at Massey University.

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ABSTRACT

The literature on the biology, distribution, prevalence and importance of *T. hydatigena*, the biology of its life cycle, and the immunology of the relationships between taeniids and their hosts, is reviewed.

In three experiments, serum was transferred from immune donors to non-immune recipients before the latter were given a homologous challenge infection. Highly significant protection was achieved in recipients of serum from lambs given three immunizations of solubilized *T. hydatigena* oncospheres or three oral infections, but not in recipients of serum from lambs given a single low-level oral infection. Comparison of sera of recipients by ELISA using solubilized *T. hydatigena* oncosphere antigen, revealed that unprotected recipients had substantially lower levels of anti-*T. hydatigena* antibodies than protected recipients. The donors of the sera which did not protect the recipients also had low ELISA absorbances but were, themselves, immune to a challenge infection.

The importance of antibody in causing death of oncospheres was examined *in vitro*. Oncospheres were cultured in the presence or absence of antibody, complement, and leukocytes from immune or non-immune animals, and their effects and interactions on larval survival assessed after 10 days culture. No reduction of larval survival occurred when antibody was absent. The major effect of antibody was mediated by complement. In the presence of antibody and complement, leukocytes further reduced larval survival but in the absence of complement, their influence was unclear.

The involvement of colostral antibody from orally infected ewes in protecting neonatal lambs was also examined. A significant, short-acting, immunity was transferred from ewes which had received either three oral doses of 150 activatable oncospheres, or an initial dose of 100 activatable oncospheres followed by two of 10 000. The correlation between the number of cysts resulting from the challenge infection and the level of anti-*T. hydatigena* antibody in their serum at the time of challenge, was highly significant. There appeared to be a critical level of antibody, above which virtually complete protection resulted and below which, there was very little. Significant relationships existed between the levels of antibody in the sera of the one-week-old lambs and their dams on the day of parturition, and in the whey of colostrum collected on the same day.
The duration of the colostral immunity suggested that IgG₂ might be more effective than IgG₁ against *T. hydatigena* oncospheres. Culturing oncospheres with fractionated IgG from serum and colostrum indicated that increasing levels of both IgG₁ and IgG₂ resulted in decreasing levels of larval survival. However, the effect of increasing levels of IgG₂ was much more marked than with IgG₁.

A preliminary attempt to identify antigens able to induce protection against a challenge infection in sheep, indicated that antigens of less than 30 kDa molecular weight significantly protected recipients of them. The antigens on a Western blot of *T. hydatigena* oncospheral antigen which were recognized by immune sheep serum did not correspond with the antigens stained by the protein stains, Coomassie blue or silver stain. This suggests that protective antigens may be predominantly carbohydrate rather than protein.
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