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Phage display library as a useful tool for *Fasciola hepatica* antigen characterization

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Fasciolosis is an important zoonotic disease that is responsible for a significant loss in the agriculture industry and animal productivity, primarily through infection of sheep and cattle. Losses in animal productivity due to liver fluke have been estimated at over US$3.2 billion per annum.

Current methods of parasite control are predominantly based on the use of anthelmintic drugs. However, issues with food safety, reinfection, and the development of drug resistant strains have led to an increasing search for an alternative treatment like vaccine. However, despite decades of research, there is no commercially available vaccine against *F. hepatica*. The diagnosis of *F. hepatica* infection is also problematic especially in big herds of animals. Understanding the parasite biology and disease progression would overcome those problems leading to better control of the parasite. The use of monoclonal antibodies in identification and characterisation of parasite molecules is a promising tool for discovery of new drug targets, diagnostic antigens or vaccine candidates. Phage display antibody libraries offer an alternative to hybridoma technology for the generation of monoclonal antibodies. Despite utility of the monoclonal antibodies in several fields of research there has been limited application of antibody libraries in the study of trematode parasites.

In the present study, we therefore, aimed to produce monoclonal antibodies specific for *F. hepatica* molecules.

Our project led to construction of two single-chain variable fragment (scFv) phage display libraries using established primers and protocols: 1) library from naive mice and 2) immune library from rats infected with *F. hepatica*. In the process called panning we were able to identify several monoclonal antibodies that can specifically bind *F. hepatica* cathepsin B2, L1 and can recognise several antigens from adult *F. hepatica* tissue homogenate.

Our results highlight the potential applicability of such libraries to facilitate the study of *F. hepatica* and other parasites biology.

In addition, we evaluated the possible use of selected monoclonal antibodies for diagnostic purposes of *Fasciola hepatica* infections. Monoclonal antibodies specific for molecules secreted by the parasite were used to detect parasitic antigens in blood serum of infected sheep. We identify higher OD values in some of the tested antibodies along with progression of parasite invasion. This may indicate the potential use of selected monoclonal antibodies to detect parasite circulating antigen and allow early detection of infection.

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Altogether, phage display antibody library is a tool which could significantly accelerate and facilitate production of specific monoclonal antibodies that can be of great importance in parasitology.

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