

RESEARCH COMMUNICATION

HOST CELLULAR COMPONENTS ADHERING TO THE TEGUMENT OF SCHISTOSOMES FROM CATTLE, BUFFALO, HIPPOPOTAMUS AND LECHWE

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ABSTRACT

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The teguments of adult *Schistosoma mattheei* from cattle and buffalo, *S. hippopotami* from hippopotamus and *S. margrebowiei* from lechwe were examined by means of scanning electron microscopy for cells possibly engaged in immunological action.

Leukocytes were observed on the teguments of the schistosomes from all 4 host species. Although certain of these cells seemed to be fused to the surface membrane of the worms, they did not display pseudopodia.

The tegument of certain schistosomes from buffalo exhibited cells the size of platelets with dendritic structures connected to the tegument of the parasite.

The results seem to indicate that, as with laboratory hosts, naturally infected domestic and wild hosts are unable to mount an effective cellular response against the tegument of live adult schistosomes. The possible role of platelets in immunology against schistosomes is mentioned.

The antibody-dependant, cell-mediated, immunological response of sensitized permissive laboratory hosts is effective against schistosomules but not against adult worms (Caulfield, Korman, Butterworth, Hogan & David, 1980). The teguments of adult schistosomes are capable of evading this response. Delicate experiments have been performed to record the incorporation of host antigen into the tegument of adult schistosomes (Mclaren & Terry, 1982); the turnover rate of the outer bilayer (Saunders, Wilson & Coulson, 1987) and their resistance to oxidant killing by host leukocytes (Mkoji, Smith & Prichard, 1988a; Mkoji, Smith & Prichard, 1988b). Live schistosomes obtained from laboratory hosts exhibit only erythrocytes (Fig. 1) and unbound leukocytes on the tegumental surface.

It is well known that wild animals have the ability to tolerate parasite infections which are potentially lethal to domestic stock. For instance, a combination of various types of response are responsible for the control of trypanosome infections in wild animals (Mulla & Rickman, 1988). Recent scanning electron microscope (SEM) studies, the aim of which was to characterize the tegument of *Schistosoma mattheei* from cattle and buffalo (Kruger, Hamilton-Attwell & Schutte, 1986; Kruger, Hamilton-Attwell, Tiedt, Visser & Joubert, 1988), of *S. hippopotami* from *Hippopotamus amphibius* (Kruger, Hamilton-Attwell, Joubert & Visser, 1988) and of *S. margrebowiei* from lechwe (Kruger, Hamilton-Attwell, Tiedt, Visser & Joubert, 1988), presented an opportunity to also record and compare the cellular components adhering to the teguments of these schistosomes from domestic and wild hosts. The origin of the hosts, the location within the hosts from which the schistosomes were collected, the method of extrication and fixation and the SEM techniques employed, have been described in the above papers. All schistosomes were alive at the time of collection; no dead worms, trapped in granuloma, were studied.

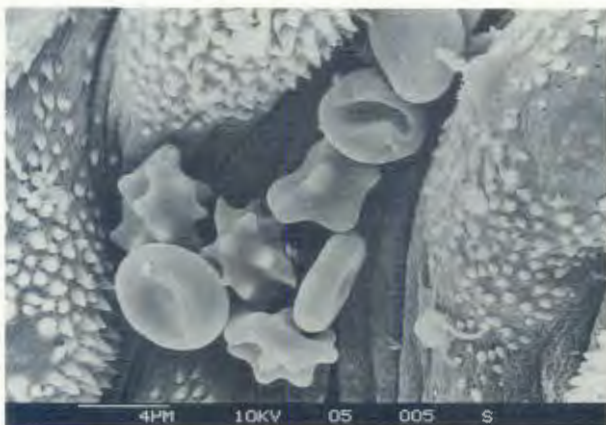


FIG. 1 Normal and crenated erythrocytes on the tegument of a *S. haematobium* male from a laboratory infected *Saccostomus campestris*



FIG. 2 A slightly oblate cell adhering to the tegument of a *S. mattheei* female from an ox

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The predominant non-erythrocyte cell type found on the tegument of cattle was circular and approximately 12  $\mu\text{m}$  in diameter. No pseudopodia extended from these cells, but some of them seemed to be slightly oblate and fused to the surface membrane of the schistosome (Fig. 2). The size of these cells falls within the limits of a number of bovine leukocyte classes (Jain, 1986).

Cells similar in shape to those found on *S. mattheei* from cattle were present on the tegument of *S. hippopotami*. These cells varied in size between 6  $\mu\text{m}$  and 25  $\mu\text{m}$  in diameter. They were concentrated on the head and neck of male schistosomes (Fig. 3), particularly in regions least likely to have contact with the host endothelium.



FIG. 3 Cells adhering to the head and neck areas of a *S. hippopotami* male collected from an hippopotamus

The tegument of *S. margrebowiei* from lechwe exhibited relatively few leukocytes, but there were abundant erythrocytes trapped between the tubercles (Fig. 4).

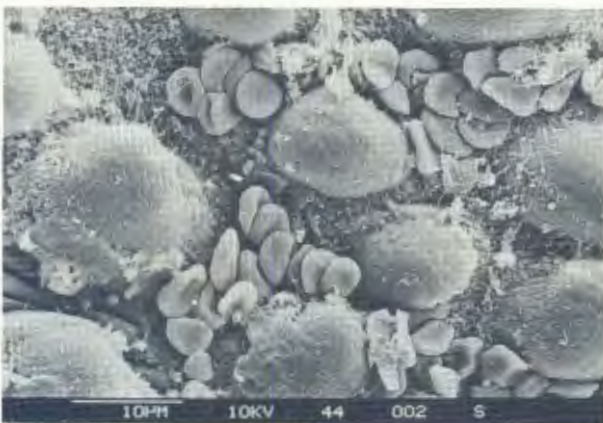


FIG. 4 Erythrocytes trapped by fibrin fibres between the tubercles of a *S. margrebowiei* male collected from a lechwe

There were also few leukocytes on the tegument of the *S. mattheei* from buffalo. However, cells the size of platelets with dendritic structures adhering to the surface membrane occurred on certain of the schistosomes (Fig. 5).

Fig. 6 shows eosinophils with pseudopodia adhering to a *S. haematobium* egg from the urine of a human (Kruger, in press). These cells have previously been found to be cytotoxic towards ova

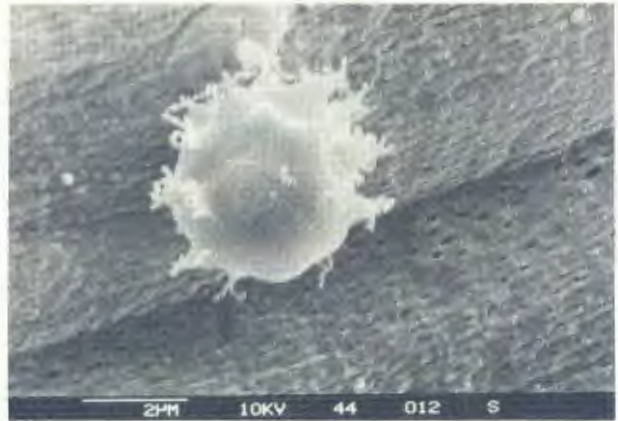


FIG. 5 A cell the size of a blood platelet showing dendritic structures adhering to the tegument of a *S. mattheei* male from a buffalo

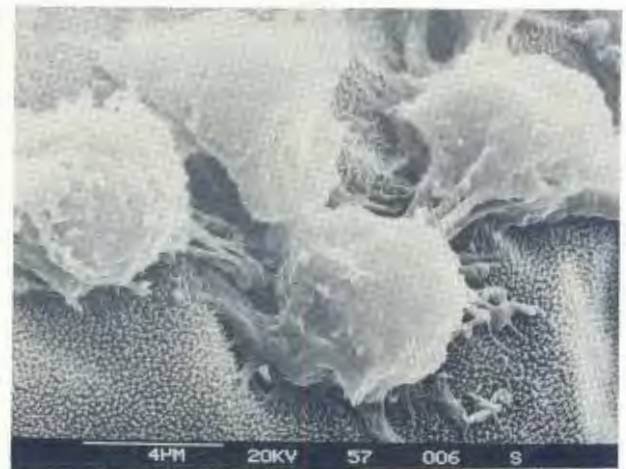


FIG. 6 Eosinophils degranulating on the eggshell of a *S. haematobium* egg from the urine of a human

(Sher, Wadee, Mason & Fripp, 1980). Since leukocytes were not observed in similar circumstances in the current study, it appears that, as in laboratory hosts, natural hosts are unable to mount an effective cellular response against the tegument of live adult schistosomes. However, it is interesting to note that platelets, in addition to their role in hemostasis, have an immunological function in schistosomiasis. During passive transfer of purified cell preparations from immune donor rats to naive recipients, platelets procured more protection than any type of white blood cell (Capron, Dessaint, Capron, Ouma & Butterworth, 1987).

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