THE MORPHOLOGY OF A SENSORY RECEPTOR IN THE NIPPLED TUBERCLES OF SCHISTOSOMA MATTHEEI

F. J. KRUGER(1) and V. L. HAMILTON-ATTWELL(2)

ABSTRACT


During scanning electron microscopy (SEM) of the tegument of Schistosoma mattheei, a structure was observed within the nippled tubercles.

It is postulated that it is a sensory receptor with a tactile function.

INTRODUCTION

The morphology of a ciliated sensory receptor in Schistosoma spp. has been studied in great detail by means of scanning and transmission electron microscopy (Morris & Threadgold, 1967; Silk & Spence, 1969; Smith, Reynolds & Von Lichtenberg, 1969; Senft & Gibler, 1977; Gluckman & Passmoor, 1978; Price & Voge, 1983). A ciliated receptor was observed in S. mattheei by Tulloch, Kuntz, Davidson & Huang (1977). Senft & Gibler (1977) recognized another type of receptor in S. mansoni which they described as a "naked, rounded boss with a central bull's eye". Hamilton-Attwell & Van Eeden (1981) described raised nipple-like areas on the tubercles on the tegument of adult S. mattheei. In this paper a structure observed within these tubercles is described and illustrated.

MATERIALS AND METHODS

Praomys (Mastomys) coucha, infected with adult S. mattheei, were perfused, as described by Jackson, Dettman & Higgins-Opitz (1982). The parasites were fixed in Bullock's (1984) modification of Karnovsky's solution (Hayat, 1972), post-fixed in osmium tetroxide (2 %) and uranyl acetate (2 %), dehydrated and stored in absolute alcohol. Specimens were sonicated in absolute alcohol at 20 kc/s (o.1A) in a sonication beaker. Thereafter, the specimens were critical point-dried, glued to stubs, carbon and gold sputter-coated to a thickness of approximately 50 nm and studied with a Cambridge Stereoscan 250 at 5 and 10 KV.

RESULTS

Sonication removed chunks of tegument from the specimens. By being in contact with the resonating glass of the beaker, the tegumental epithelium of the tubercles was the first part of the tegument to be removed.

The removal of the tegumental epithelium from the tubercles exposed the basal lamina (Fig. 3). In the case of a spined tubercle (Fig. 1), the spine bases, socketed in the basal lamina, and the interstitial connective tissue could be seen.

The tubercles which contained receptors displayed a raised or sometimes dimpled area covered with a thin perforated lamina (Fig. 2). The internal structure of a receptor uncovered by sonication is depicted in Fig. 3. It consists of an internal bulb with a distal protruding process. Nerve-like fibres radiate from the process and penetrate the bulb. Other fibres from corpuscular bodies, embedded in the tegumental epithelium (Fig. 3), also penetrate the internal bulb. On close inspection numerous of these corpuscles were observed on the surfaces of all the tubercles.

A number of ciliated sensory receptors could be seen protruding from the sides of the tubercles in Fig. 1 & 2.

FIG. 1. Scanning electron micrograph of the sonicated tegument of S. mattheei. Sonication removed the tegumental epithelium (TE) from the spined tubercles exposing the basal lamina (BL), spine bases (SB) and interstitial connective tissue (IC). Note the ciliated sensory receptor (CS) on the tegument between tubercles and on the tubercle bases: × 2000

FIG. 2. Nippled and non-nippled, naked tubercles with the tegumental epithelium removed from one tubercle. The nipples (NP) are covered with a thin, perforated lamina (LA). Also to be seen are the presumed sensory corpuscles (LA) and the ciliated sensory receptors (CS): × 2000

(1) Research Institute for Diseases in a Tropical Environment (Nelspruit 1200) of the South African Medical Research Council
(2) Department of Zoology, Potchefstroom University for C.H.E., Potchefstroom 2520

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flow of the surrounding medium. During the present study, ciliated receptors were predominantly found on the tegument between and on the bases of the tubercles. This arrangement in relation to the nippled areas and the corpuscles on the tubercles lend support to the theory of Morris & Threadgold (1967), viz., that they detect the direction of the flow of the medium.

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