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Scanning electron microscopy of the surface coat of *Blastocystis hominis*

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Abstract Scanning electron microscopy of *Blastocystis hominis* showed that its outer coat has a fibrillar structure and individual fibrils may extend up to 5 μm from the periphery of the parasite. The surface coat remains intact during cell division. Bacteria are often seen adhering to it, but for the first time a trophozoite of *Chilomastix mesnili* was also seen in this position. It is postulated that breakdown of attached organisms may provide nutrients for *Blastocystis*.

Introduction

A characteristic feature of *Blastocystis hominis* is its surface coat, which is fibrillar in structure and has also been called a slime layer or capsule (Zierdt et al. 1967). The surface coat varies in thickness and tends to become thinner or disappear after prolonged cultures (Stenzel et al. 1991). There is also evidence that it is being continuously formed by the parasite and shed in the environment (Zaman et al. 1997). The appearance of the surface coat has been well studied using the transmission electron microscope (TEM) (Stenzel and Boreham 1996) but not using the scanning electron microscope (SEM). In this paper we present scanning electron micrographs of a newly isolated strain of *B. hominis* in which the surface coat was particularly distinct.

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Materials and methods

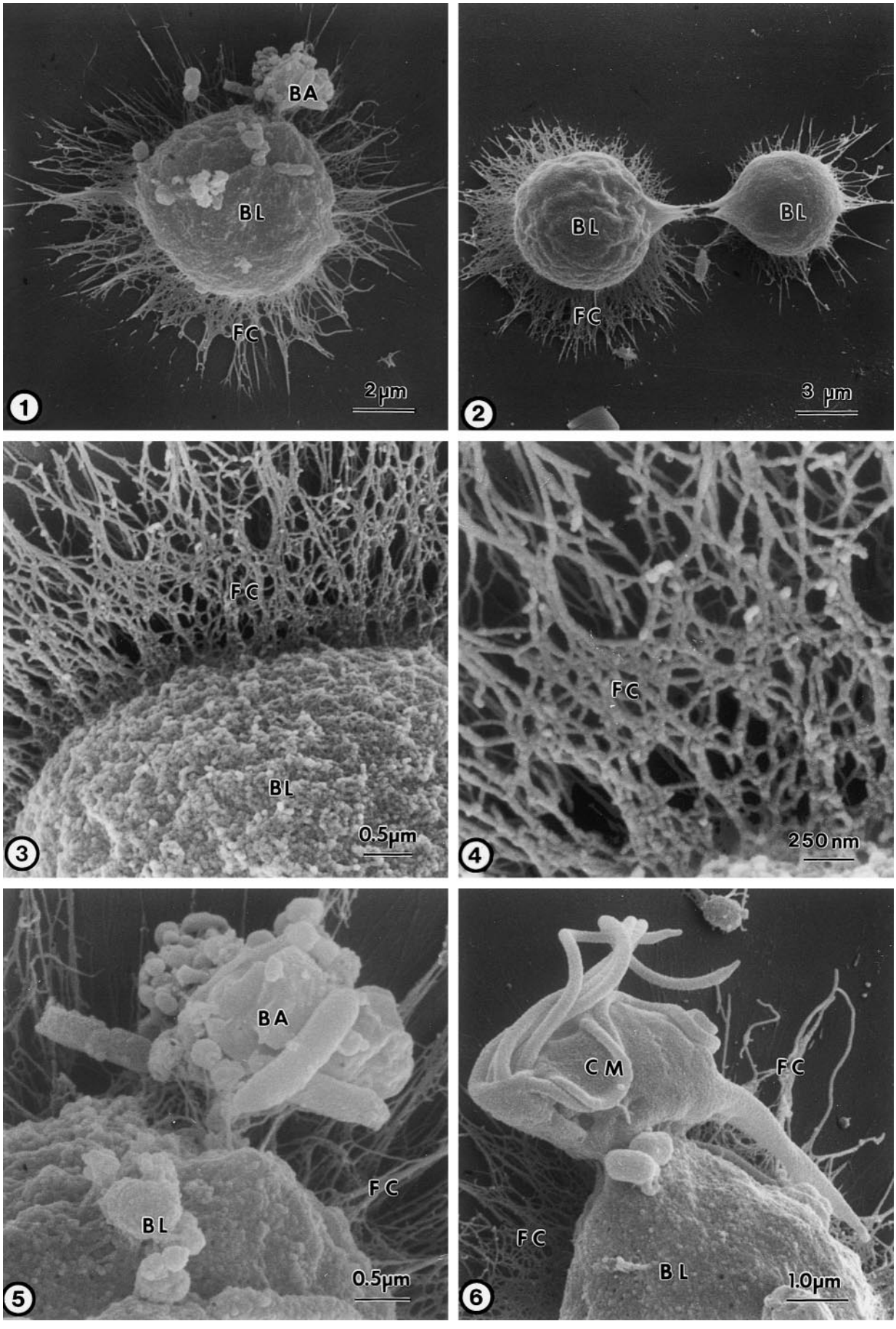
B. hominis were obtained from a heavily infected diarrhoeic faeces. The specimen for SEM was prepared by fixing in 2% glutaraldehyde in 0.1 M sodium cacodylate buffer (pH 7.3). After osmication, it was placed on poly-L-lysine-coated cover glass for 0.5 h in a moist chamber and then dehydrated in graded ethanols. After critical point drying in CO_2, the cover glass was placed on adhesive-coated stubs, gold coated and observed with a Philips XL30 field emission scanning electron microscope, which gives a better resolution than the conventional SEM.

Results and discussion

The surface coat showed a typical fibrillar appearance and a few individual fibrils extended up to 5 μm from the periphery of the parasite (Fig. 1). Occasionally a dividing cell with the surface coat surrounding both daughter cells was also seen (Fig. 2), indicating that the surface coat remains intact during division. At higher magnification, the surface coat was mesh-like in appearance with fibrils randomly criss-crossing each other (Figs. 3, 4). Bacteria either singly or in clumps were often seen adhering to the coat (Figs. 1, 5). This particular faecal specimen also contained a large number of *Chilomastix mesnili* trophozoites and a trophozoite of *C. mesnili* could also be seen adhering to the surface coat (Fig. 6). *C. mesnili* is recognizable by its typical

▶

Fig. 1 *Blastocystis hominis* showing the outer fibrillar coat (*FC*). (*BA* bacterial clump, *BL B. hominis*)
Fig. 2 *B. hominis* dividing form (*BL B. hominis, FC* outer fibrillar coat)
Fig. 3 *B. hominis* showing the outer fibrillar coat (*FC*) at higher magnification (*BL B. hominis*)
Fig. 4 *B. hominis* showing the outer fibrillar coat (*FC*) at higher magnification
Fig. 5 *B. hominis* showing a bacterial clump (*BA*) attached to the outer fibrillar coat (*FC*)
Fig. 6 *B. hominis* showing a trophozoite of *Chilomastix mesnili* attached to the outer fibrillar coat (*FC*)


BA
BL
FC
2μm
1
BL
BL
FC
3 μm
2
FC
BL
0.5μm
3
FC
250nm
4
BA
FC
BL
0.5μm
5
CM
FC
FC
BL
1.0μm
6

elongated posterior extremity and the flagella emerging from the cytostomal area.

The function of the surface coat is not known but as *B. hominis* does not have a cytostome, it could be an entrapment mechanism for bacteria and other small organisms, for nutritive purposes. Previous studies with the TEM have shown that bacteria attached to the surface coat show loss of electron density, indicating a deleterious effect on the bacteria as a result of this attachment (Zaman et al. 1997). The surface coat may also help the parasite to adhere to the epithelial lining of the gut. In the case of *Entamoeba histolytica*, adhesins are produced by the parasite which enable it to attach to intestinal epithelial cells (Arroyo and Orozco 1987). It will be interesting to determine whether *Blastocystis* produces similar adhesins by means of which bacteria and other organisms adhere to its surface coat.

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