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SCANNING ELECTRON MICROSCOPY OF *SETARIA DIGITATA* [Nematoda : Filaroidea]

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ABSTRACT

Yadav, A. K. and Tandon, V., 1991. Scanning electron microscopy of *Setaria digitata* (Nematoda : Filaroidea). *J. Vet. Parasitol.*, 5 :

Scanning electron microscope studies of bovine filariid: *Setatia digitata* showed that the anterior end posseses a raised cuticular peribuccal crown. In males, the ventral aspect of the posterior extremity revealed neatly arranged ventral bands, whereas in females the cuticle showed scantly and irregularly arranged minute papillate structures. Three pairs of precloacal, one pair of adcloacal and three pairs of postcloacal papillae were evident in males. Many of the surface fine features of *S. digitata* distinguish it from other species of the genus *Setaria*.

Introduction

Setaria digitata, a bovine filariid nematode, has been found to be of common occurrence in the cattle of north-eastern states of India (Yadav *et al.*, 1989). There has been difficulty in the identification of species when a multiple infection by different species of *Setaria*, *S. cervi*, *S. labiatopapillosa*, and *S. marshalli*, occur in natural infections of cattle and buffaloes in India. The present study was, therefore, undertaken with a view to assisting in the identification of *S. digitata*, and aimed at elucidating the surface fine features of the species with the aid of scanning electron microscopy (SEM).

Materials and Methods

The parasites were collected from the peritoneal cavity of cattle and buffaloes, slaughtered at Shillong. These were killed in slightly warm water and then fixed in 5% neutral buffered formalin. Following standard methods (Snyder, 1985), the specimens were dried using tetramethylsilane (Dey *et al.*, 1989) and examined under a JEOL JSM 35-CF Scanning Microscope, operated at 15 Ke V.

Results

The mouth opening is round and encircled by projecting cutacularised formations known as peribuccal ring (Fig. 1). The latter possesses a pair of cuticular elevation which are notched at the apex (Fig. 2). In between the cuticular striations scantly and irregularly scatte-

red minute papillate structures are present (Fig. 3). The spirally curved posterior end bears a pair of small lateral appendages near the tail tip and terminates into a rounded knob (Figs. 4–5). In males, the region anterior to the cloaca exhibits characteristic ornamentations of cuticle known as ventral bands, where the strips of transversely running ridges are intercepted regularly by narrower strips of longitudinal ridges (Fig. 6–7). The post-deirid appears as a blunt tuberance emerging from a deep wide pit a little in front of the cloaca (Fig. 8). Of the caudal papillae, three pairs each of pre- and post cloacal and a pair of adcloacal papillae are present, in addition to a central papilliaeying in front of the cloaca (Fig. 9). A single tongue-shaped spicule is seen projecting from the cloacal orifice (Fig. 10)

Discussion

The application of SEM to *S. digitata* has provided several informations such as the shape of the mouth opening, pattern of finer longitudinal striations, topography of the tail, and the number and the arrangement of the caudal papillae. etc., which could be useful for correct identification of species of *Setaria*.

S. labiatopapillosa can be differentiated from *S. digitata* in having a slit-like or oval mouth opening (Shoho and Uni, 1977). The characteristic microstriations comprising the ventral bands were first illustrated by Helle and Blix (1973) with the aid of SEM in *Dipetalonema spirocauda*. In *S. labiatopapillosa* these microstriations though present (Shoho and Uni, 1977) are not so neatly arranged as in *S. digitata*. According to Gibbons (1986), the region possessing these bands, known as 'area rugosa', is an essential feature of the superfamily Filaroidea. The minute papillate structures abounding on the cuticular surface of *S. digitata* seem comparable to those illustrated in another filariid, *Brugia malayi* (Zaman, 1983). Small tubercles were also illustrared in the caudal region of the females of *Wuchereria bancrofti* and *Brugia* spp. (Buckley, 1952; Buckley *et al.*, 1958). The topography of the posterior end of female could easily differentiate *S. digitata* from *S. marshalli* and *S. cervi*. In *S. marshalli* the posterior extremity appears to be having a distinct circlet of spikes, with the lateral appendages lying relatively close to the tail tip when compared to *S. digitata* (Shoho and Uni, 1977); in *S. cervi* the same is reported to be equipped with a knob with roughly bifurcated end that consists of blunt spines (Almeida *et al.*, 1991). The exact number and the position of the caudal papillae visualised in the present SEM pictures remove all controversy related to their account by previous authors. Gupta and Kalia (1978) stated that *S. digitata* possesses 3 to 4 pairs of pre- and 4 pairs of post cloacal papillae. Further, the presence of an additional pair of post-cloacal papillae (total 4 pairs) in *S labiatopapillosa* distinguishes it from *S. digitata*. The latter possesses only three pairs of such papillae. The arrangement and general appearance of caudal papillae in the males of *S. digitata* could be compared closely with that elucidated for *Dirofilaria* spp. by Wong and Brummer (1978). The post-deirid which has often been overlooked in light microscopic studies was first observed in *S. nelsoni* by Soho (1976). *S. digitata* is also distinguishable from *S. marshalli* on the basis of general appearance of the post-deirid. In *S marshalli*

the post-deirid looks like a needle-like formation (Shoho and Uni, 1977)

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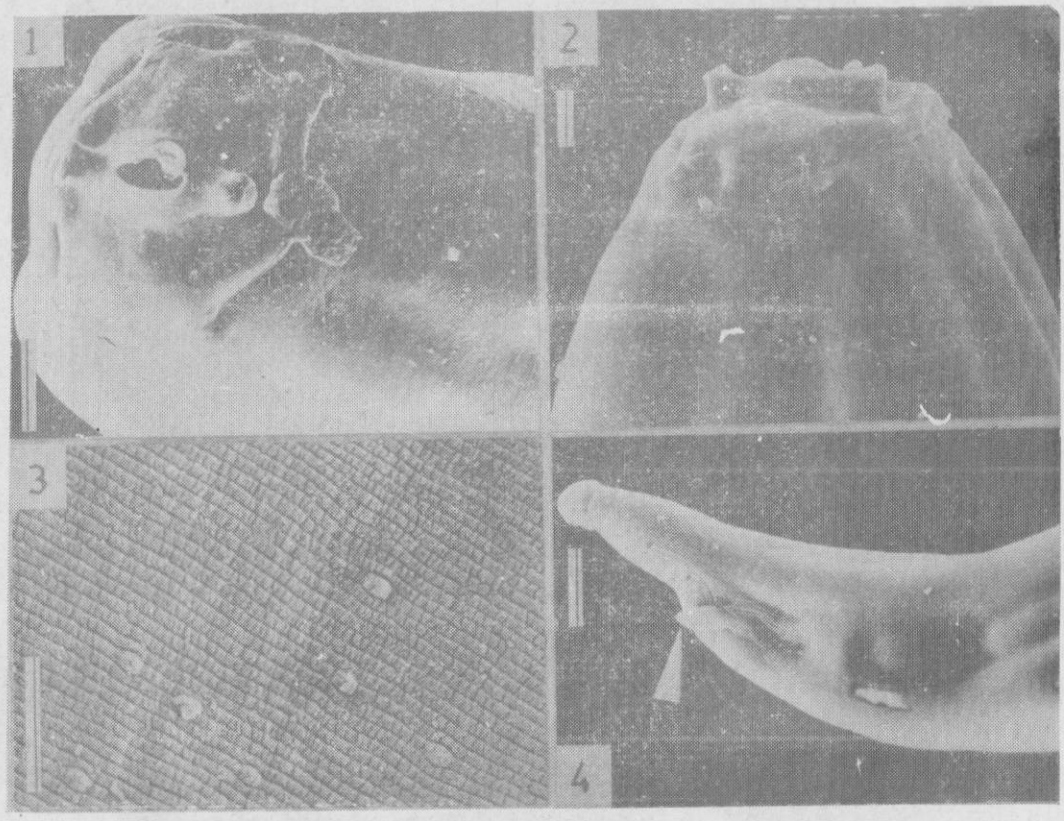

All figures are scanning electron microphotographs of *Seteria digitata*.

Fig. 1. Anterior end, *en face* view, showing oral opening surrounded by a raised cuticular area of peribuccal ring (Bar=20 μ m).

Fig. 2. Anterior end, dorsolateral view, showing lateral lips notched at the apex (Bar= 20 μ m).

Fig. 3. Transverse bands composed of longitudinally running microstriations, note the presence of tubercles throughout the body surface (Bar=5 μ m).

Fig. 4. Caudal extremity of female, showing small lateral appendages, marked by arrowhead (Bar=30 μ m).

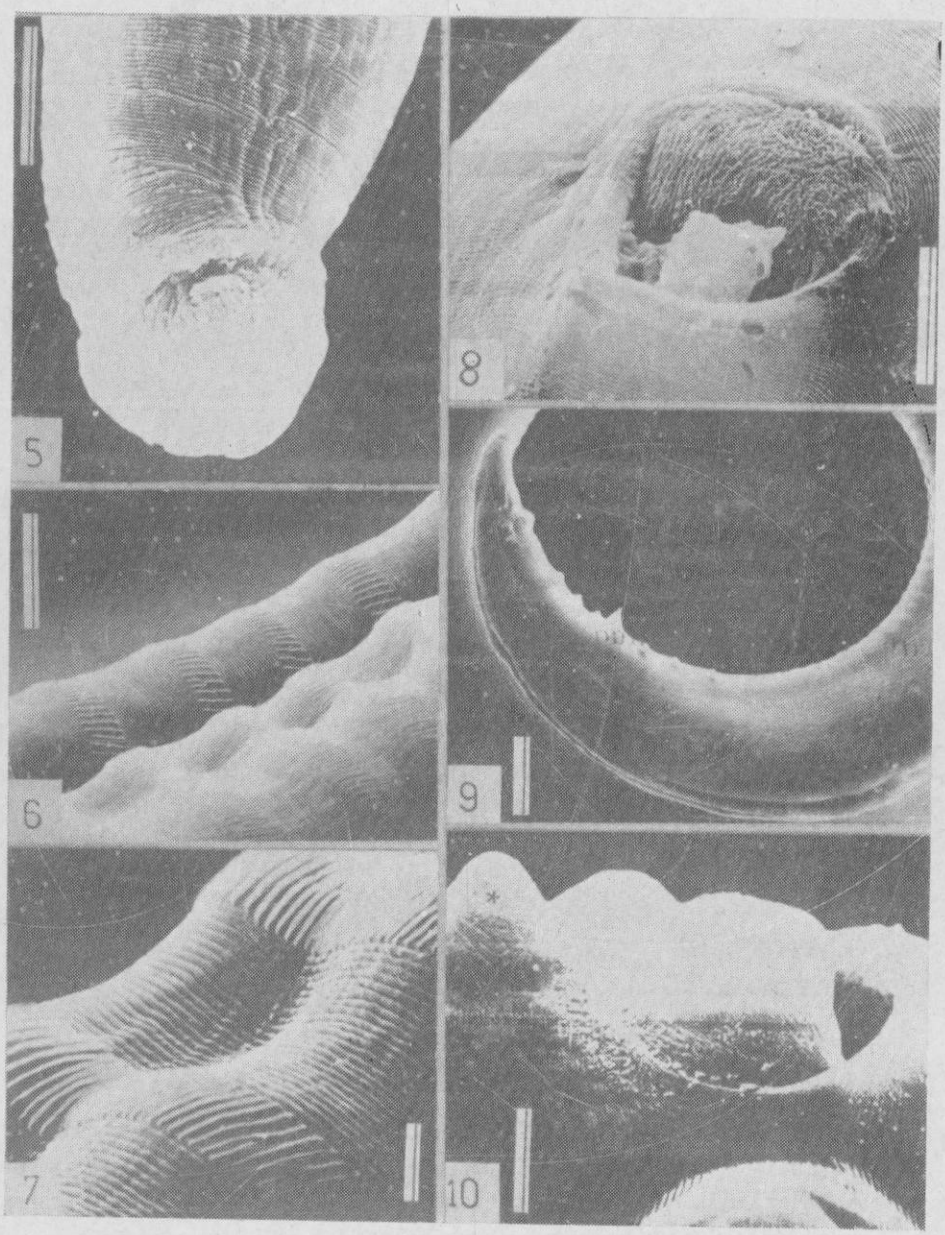

Fig. 5. Caudal extremity of female; enlarged to show a terminal rounded knob (Bar= 10 μ m).

Fig 6 & 7. Cuticular ornamentations of ventral bands, note the strips of transversely. striated cuticle alternating with those of having longitudinal striations (Bar Fig 6=10 μ m, Fig 7=2 μ m).

Fig 8. Post-deirid, positioned at a little distanca in front of the cloace (Bar=10 μm).

Fig. 9. Caudal extremity of male, showing arrangement of papillae (Bar=20 μ m).

Fig. 10. Caudal extremity of male, showing a central papillae (asterisked) and terminal end of spicule (Bar=5 μ m).