

FURTHER DETAILS AND SEM OBSERVATIONS ON *HETERODERA CYNODONTIS*
SHAHINA & MAQBOOL, 1989 (NEMATODA : HETERODERIDAE)

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This short note gives results of scanning electron microscope (SEM) studies of the type population (Karachi) of *Heterodera cynodontis* Shahina & Maqbool, 1989.

For the SEM studies, females, cysts, males and juveniles were collected from a greenhouse culture on *Cynodon dactylon* at NNRC, University of Karachi. Specimens were fixed in 3 % glutaraldehyde solution buffered with 0.05 M phosphate (pH, 6.8) post-fixed using 1 % osmium rinsed in 0.05 M phosphate buffer. The nematodes were dehydrated in a graded series of ethanol, critical point dried from liquid CO₂ and Sputter-coated with a 20-30 nm layer of gold-palladium before examination at 20 kv using an Hitachi 405 at Rothamsted Experimental Station, Harpenden, Herts, UK.

Complementary description of *Heterodera cynodontis* Shahina & Maqbool, 1989

Females : Body pearly white, lemon shaped to more ovoid or rounded in young specimens. Thick subcrystalline layer present that is easily detached from the body wall of the mature cyst. Vulval cone well developed, surface with wavy striae. Lip region square with bulbous corners followed by a prominent, enlarged, disc-shaped annule (Fig. 1 A, B).

Cysts : The surface of the cyst at midbody region has a zig-zag pattern. The characteristic cuticular zig-zag pattern of ridges surrounding the fenestra is typical of the "goettingiana" group (Fig. 1 E, F). In unfenestrated cysts the terminus of the vulval slit to the fenestral edge has distinct parallel lines (Fig. 1 C, D). These lines are lost in the older fenestrated cysts (Fig. 1 F). Anus small but conspicuous, without a definite perianal pattern (Fig. 1 E).

Males : Lateral field with four lines, two incisures originate below the stylet knobs, three incisures at the level of median bulb, becoming four about 3-4 annules anterior to the excretory pore, outer bands areolated

(Fig. 2 C). Head slightly offset, hemispherical with 4-5 annules (Fig. 2 A). Cloacal aperture surrounded by raised indented lips (Fig. 2 D, E), spicules arcuate, shaft limits indistinct, blade arcuate, tapering towards tip and curved ventrally, with two pores to exterior (Fig. 2 E).

Second stage juveniles : Head slightly offset, rounded, with low profile (Fig. 2 G, H). Lip pattern type "4" of Stone's designation (Stone, 1975) bearing 2-3 annules and moderately developed cephalic framework (Fig. 2 F). Lateral fields composed of three areolated lines (Fig. 2 I). Tail gradually tapering, conoid with rounded terminus.

Remarks

Examination of type population specimens by SEM confirm the LM observations (Shahina & Maqbool, 1989) and provide more details of the structures. The nature of the female lips, head annules (en-face view) fenestral opening, vulval slit, perineal patterns and opening have been observed in greater detail. Anterior views of the second stage juveniles illustrate more details of the amphidial aperture, stoma, lateral lips and better definition of the lateral field, tail and anal opening. En-face views resemble the type "4" of Stones' designation, i.e. the rather "dumb-bell" like arrangement of juvenile lip pattern. SEM examination of the male confirms the presence of 4-5 head annules, and the lip pattern is dumb-bell shaped. At the level of excretory pore lateral lines merges anteriorly from three to four lines. Two pores are visible at the tip of the spicules.

Specimens of *H. cynodontis* were recently found from around the rhizosphere of corn (*Zea mays* L.), cotton (*Gossypium hirsutum* L.) and tomato (*Lycopersicon esculentum* L.) from Nawabpur, Bhawal Nagar, Nathoowalla (Punjab) and Turbat (Balochistan) respectively. In Karachi (Sindh) *H. cynodontis* was found on and around the roots of grass (*Cynodon dactylon* L.) from a lawn of the Aga Khan Hospital, HEJ Research Institute

of Chemistry, and Tropical Agriculture Research Centre, University of Karachi. With the exception of host and some ecological variations, no marked differences could be observed. The confirmation of the occurrence of *H. cynodontis* in widely separated regions of Pakistan indicates the ability of this nematode to adapt to various climatic conditions.

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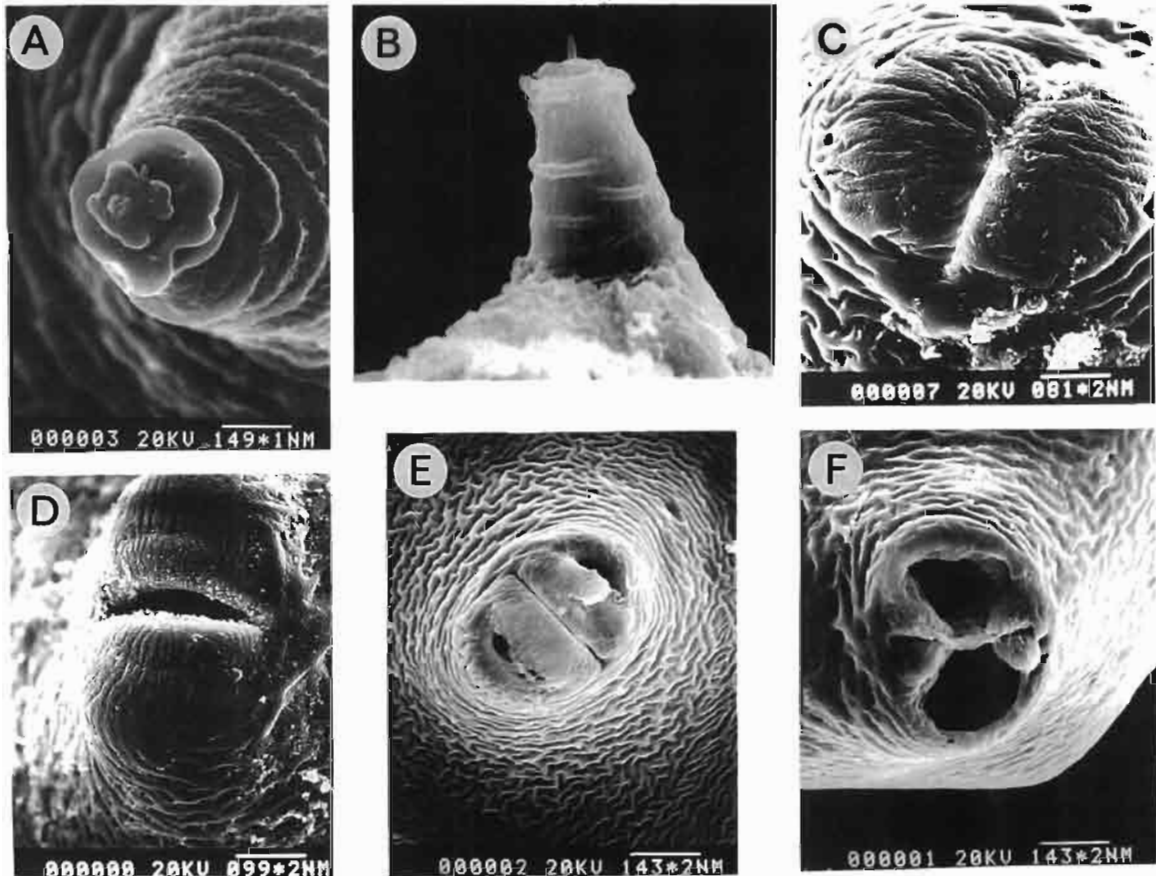


Fig. 1. *Heterodera cynodontis* Shahina & Maqbool, 1989, SEM micrographs. A : Female, en-face view; B : Female, head region, lateral view; C, D : Young cysts semifenestra with distinct wave line extended from the outer edge to vulval slit; E, F : Fenestra ambifenestrata, vulval slit and cuticular zig-zag ridges around fenestra.

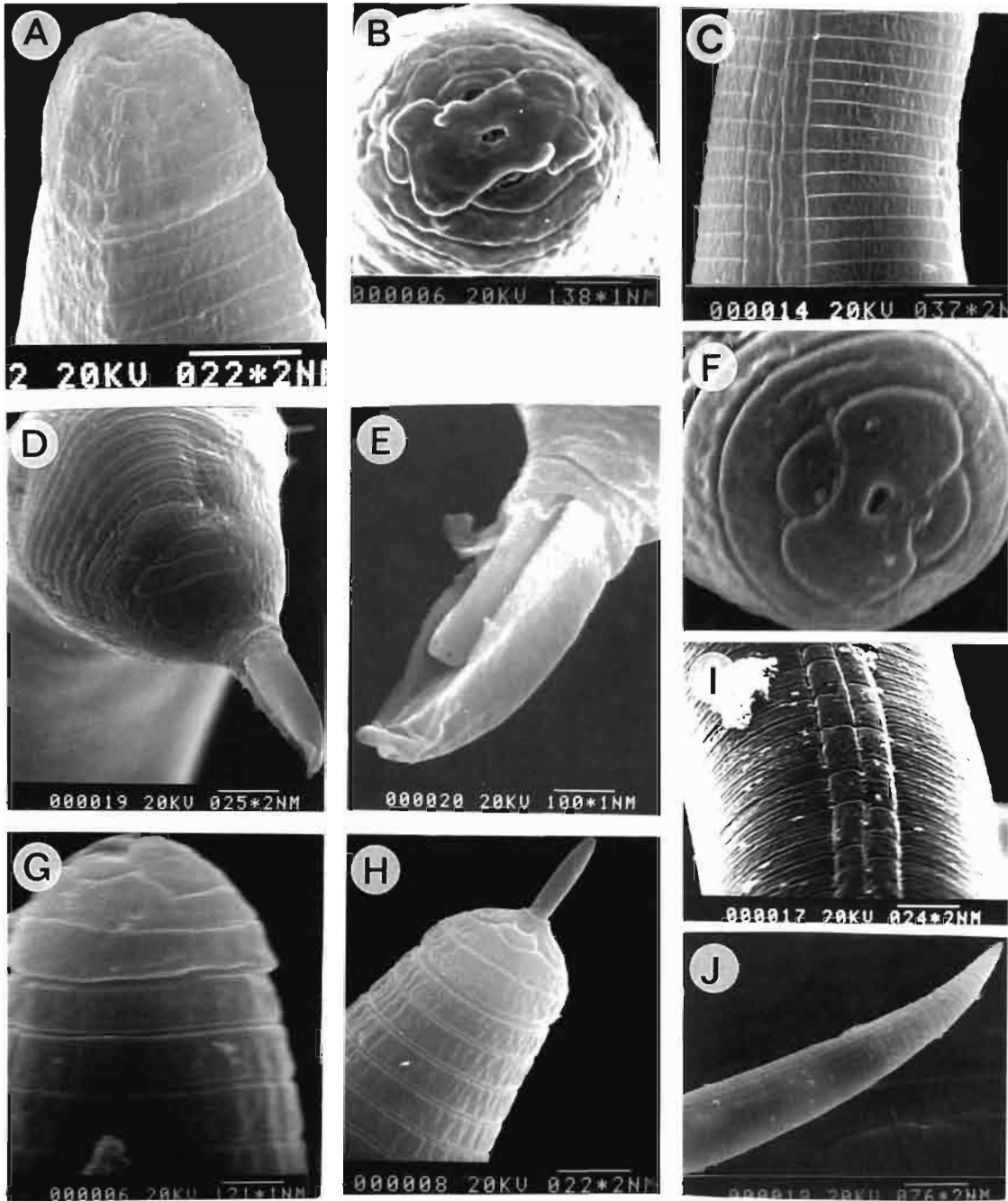


Fig. 2 : *Heterodera cynodontis* Shahina & Maqbool, 1989, SEM micrographs. A : Male head region, lateral view; B : Male head region, en-face view; C : Lateral field of the male at level of excretory pore; D : Tail region of the male showing protruded spicules; E : Enlargement of spicule showing two pores; F : Second stage juvenile head, en-face view; G, H : Second stage juvenile, lateral view; I : Second stage juvenile lateral field at mid body showing areolation; J : Second stage juvenile, tail region.