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SHORT COMMUNICATIONS

SCANNING ELECTRON MICROSCOPE STUDIES ON PHILOMETRA (RANJHINEMA) BENINENSIS OBIEKEZIE, 1986 (NEMATODA: PHILOMETRIDAE)

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Abstract. The complement of cephalic papillae in the gravid females of *Philometra (Ranjhinema) beninensis* Obiekezie, 1986 was investigated using scanning electron microscopy and the following distribution was observed: 8 fleshy lobes on the outer circle each with a pair of equal-sized papillae; 6 papillae on the inner circle grouped into 4 subdorsal and subventral papillae and 2 papillae on the lateral margin of the oral opening. Based on these observations, the subgeneric diagnosis of *Ranjhinema* Rasheed, 1963 is modified with a retention of its subgeneric status. SEM studies are further shown to be indispensable for the clarification of cephalic structures in the nematode family Philometridae Baylis et Daubney, 1926.

The taxonomic system for the nematode family Philometridae created by Rasheed (1963) was based principally on the numbers and arrangement of cephalic papillae. Due to their very small sizes, however, it has not been possible, using the methods of light microscopy alon correctly to determine the numbers and arrangement of such papillae. This has led to frequent reports of their complete absence in some species. The resulting taxonomic confusion was highlighted by Moravec (1986) in an SEM study of *Philometra ovata* formerly assigned to the genus *Thwaitia* by Rasheed (1963). It was the opinion of that author that, until more accurate information is obtained regarding the numbers, distribution and character of cephalic papillae using SEM methods, their significance for generic diagnosis in the Philometridae cannot be judged. Surprisingly, this research tool, widely applied in the taxonomy of other nematode families (Ansel et al. 1974, Marchiondo and Sawyer 1978), has not been similarly employed in the study of the Philometridae; apparently the only reports in this direction being those of Fagerholm (1982) and Moravec (1986). In this contribution, scanning electron microscopy is used to examine the cephalic end of gravid female *Philometra (Ranjhinema) beninensis* Obiekezie, 1986 with a view to a more accurate determination of the numbers of cephalic papillae neccessary for clarification of its position within the family Philometridae.

MATERIALS AND METHODS

Gravid female *Philometra (Ranjhinema) beninensis* freed from their encapsulations on the pectoral fins of *Polydactylus quadrifiliis* (Pl. I, Fig. 1) were fixed for several days in chilled 2.5 % glutaraldehyde

buffered with Sorensen's phospate buffer at pH 7.4. After washing in phosphate buffer, worms were dehydrated in graded ethanol series and Frigen II, then critical-point dried in liquid CO_2. Dried samples mounted on adhesive stubs were sputtered with gold (Balzer's Union Equipment) at 20–25 mA and 0.7 bar Argon for 30 sec. and subsequently examined with a Cambridge Stereoscan Electron Microscope S4-10 (Cambridge Scientific Instruments).

RESULTS

Scanning electron microscopy shows that cephalic papillae in the gravid female of *Ph. (R.) beninensis* are arranged in two circles. The papillae of the outer circle are contained in 8 lobes which are arranged in two rows of 4 each, dorsal and ventral, within grooves on the head (Pl. I, Fig. 2). The lobes are fleshy and prominently protruding with flattened bases and compressed lateral sides. SEM shows differences in their sizes, the two middle lobes in each row being somewhat larger than the others and more closely associated with each other. These fleshy lobes have been

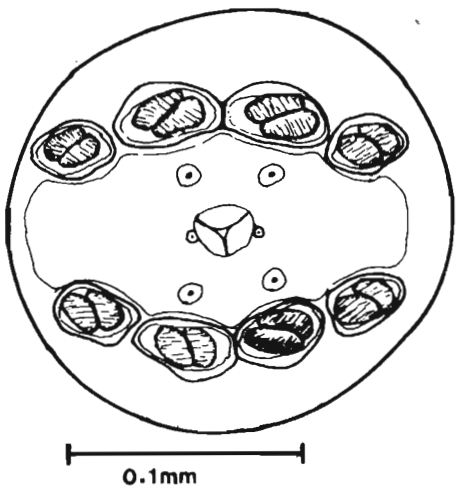

Fig. 1. Schematic arrangement of cephalic papillae in *Philometra (Ranjhinema) beninensis.*

shown under light microscopy to contain two equal-sized papillae each (Obiekezie 1986) but whose nerve endings are not prominent under SEM due to fleshy nature of the lobes. The inner circle consists of 6 papillae: 4 located subdorsally and subventrally (Pl. I, Fig. 2) and 2 minute ones situated on the lateral margin of the oral opening (Pl. I, Fig. 3). The cuticle has no ornamentation although it shows a folded appearance in some areas. Cuticular covering of the lobes is an extension of that of the general body surface (Pl. II, Fig. 1). Tail papillae are lacking (Pl. II, Fig. 2). A schematic distribution of cephalic papillae in *Ph. (R.) beninensis* is shown in Fig. 1.

DISCUSSION

Rasheed (1963) erected 3 subgenera within the genus *Philometra* Costa, 1845 namely: *Philometra* (*sensu stricto*), *Alinema* and *Ranjhinema*. The subgenus *Ranjhinema* was created for a nematode from the body cavity of *Polynemus tetradactylus* and characterized by the possession of 8 fleshy lobes with double papillae each on the outer circle, the absence of an internal circle of submedians, and the presence of two lobed tail papillae. Two species are presently recognized within the subgenus: *Ph. (R.) polynemii* Rasheed, 1963 and *Ph. (R.) beninensis* Obiekezie, 1986 both occurring among the Polynemidae. In this study SEM has demonstrated the presence in the latter species of an internal circle of submedian papillae not evident under light microscopy. There is a similarity in the distribution of the 6 papillae of the inner circle as shown for *Philometra ovata* by Moravec (1986) and for *Philometra (Ranjhinema) beninensis* in the present study. In both cases, 4 papillae are placed subdorsally and subventrally and 2 laterally on the oral margin. The two lateral papillae in particular have been consistently difficult to observe under light microscopy evidently due to their small size and location and were first convincingly demonstrated by Moravec (1986) in *Philometra ovata* using SEM. This number and arrangement of internal circle papillae is probably characteristic of the genus *Philometra sensu lato* and SEM will show whether the same is true for other philometrid genera. In the light of the present findings, therefore, the subgenus *Ranjhinema* is distinguished only by the number and character of its external circle papillae which, numbering 16, is double that in both *Philometra* (s.s.) and *Alinema*. We propose that its subgeneric status be upheld and the subgeneric diagnosis of Rasheed (1963) be modified as follows:

Subgenus *Ranjhinema*

Eight fleshy cephalic lobes on the outer circle, each of these with two equal-sized papillae. An internal circle of 6 submedian papillae. Tail with or without papillae. Anterior oesophagus is like an inverted broad-based flask. Males unknown. Parasites of marine fishes predominantly Polynemidae.

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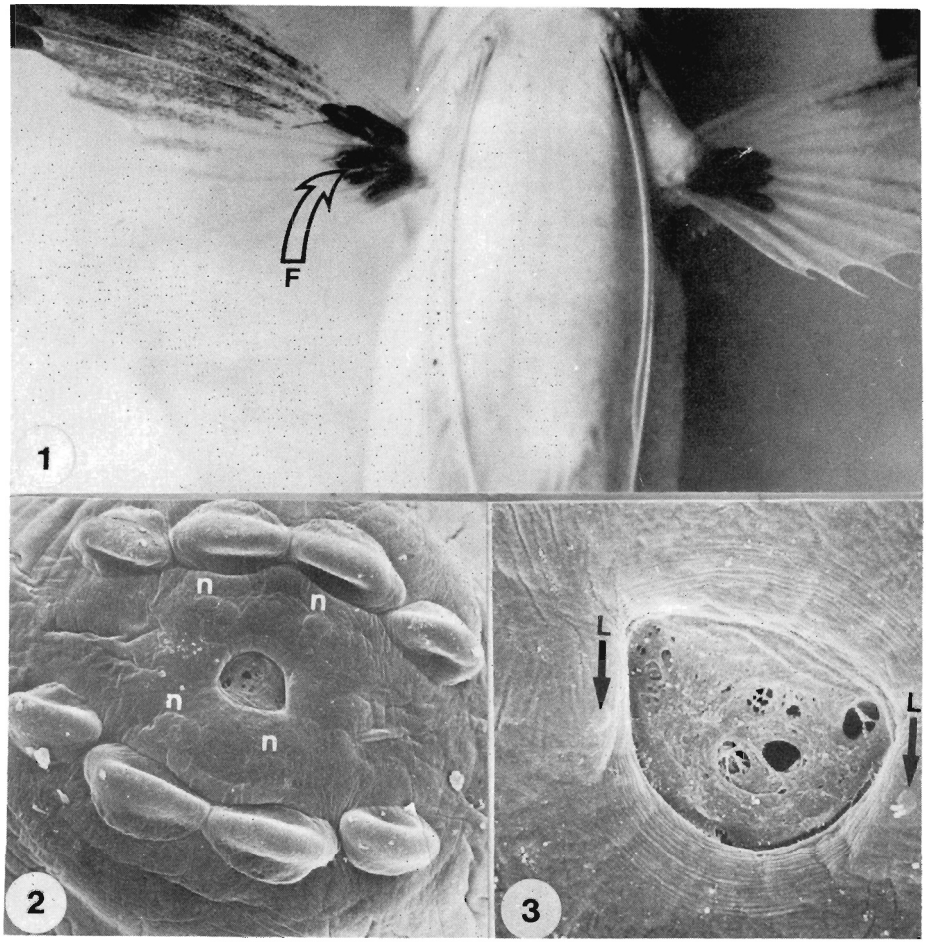

Fig. 1. Gravid female worms at the base of pectoral fins of *Polydactylus quadrifiliis*. ($\times \frac{1}{2}$). **Fig. 2.** SEM of head region showing distribution of cephalic papillae: n = 4 inner circle papillae. ($\times 500$). **Fig. 3.** Larger magnification showing two minute papillae (L) on lateral margin of oral opening. ($\times 2\,000$).

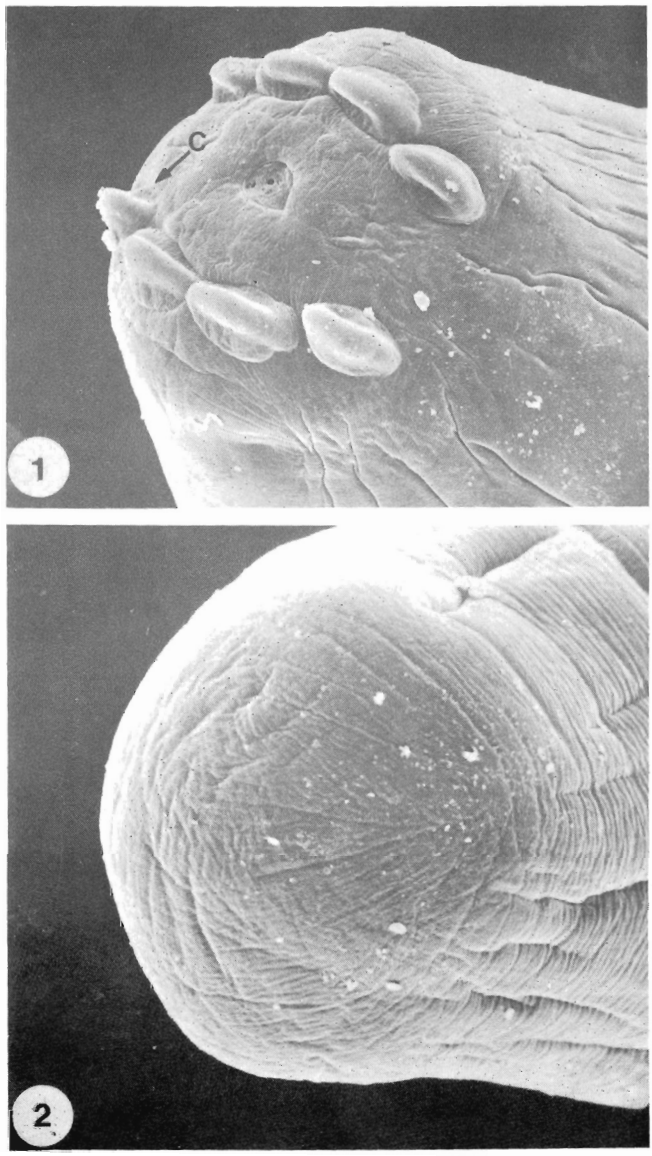

Fig. 1. Lateral view of head region (Note extension of cuticle, C, over cephalic lobes). (× 400). **Fig. 2.** Tail region. (× 1 000).