SHORT COMMUNICATIONS

PROTEIN PROFILES AS AN AID TO TAXONOMY AMONG CARYOPHYLLIDEAN CESTODES

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UNTIL recently, taxonomy of caryophyllaeid cestodes has been based exclusively on conventional morphological grounds. Taxonomy based on morphological grounds poses difficulties. Under different physiological conditions or in different hosts the same species may manifest striking morphological differences[1,2]. Hence, delimitation of taxa of closely related species becomes often difficult. Vik[1] and Voge[3] have both stressed on the need for physiological, immunological and biochemical approaches to helminth taxonomy.

Electrophoretic analysis of tissue protein has been used as a taxonomic tool in many groups of organisms. Sibley[4] opined that protein patterns of an organism are a reflection of its genetic constitution.

Electrophoretic technique has been used in taxonomic studies on trematodes[5-11], cestodes[12,13], etc. Species-specific protein patterns exist and species could be readily differentiated on the basis of PAGE protein profiles. Stage-specific and sex-specific proteins also have been made out in *Schistosoma mansoni*[10]. However, no work has been done so far on the protein patterns of caryophyllaeids.

This paper includes a study of PAGE protein profiles of *Lytocestus indicus* Moghe, 1925, *Introvertus raipurensis* Satpute & Agarwal, 1980 and *Lucknowia indica* Niyogi, Gupta & Agarwal, 1982, all parasitizing intestine of *Clarias batrachus*.

Soluble whole body protein patterns were determined by Disc polyacrylamide gel electrophoretic method of Ornstein[14] and Davis[15]. Fresh worms were homogenised in ice cold 0.25 M sucrose solution to approximately 5% (w/v). Gel columns prepared in pyrex tubes according to the method of Davis[15]. Gel columns in each tube included 7% running gel, 4.5% spacer gel and sample gel containing 2–3 μl of appropriately diluted sample. Care was taken to introduce approximately the same quantity of sample in each tube. Current (2–5 mA) per tube was passed until the marker dye migrated to the anode end of the tubes. Staining was done in Coomassie brilliant blue solution for 90 min. and destaining in 5% acetic acid solution until the gel columns nearly lost colour and the discs became prominent. The protein discs were numbered according to their position from the cathode end.

Analysis of protein profiles of these worms *revealed* 24 bands in *L. indicus* and 17 bands each in *L. indica* and *I. raipurensis* (figures 1, 2). Based on their electrophoretic mobilities, in all 40 protein discs were identified in the three species. Taxon-specific electrophoretic patterns were clearly noticeable, *viz.* disc nos. 1, 2, 3 and 4 were specific to *L. indica*; discs 5, 6, 33, 34, 40 and 41 were found to occur only in *L. indicus*; while discs 35, 36 & 37 were found characteristic of *I. raipurensis*. However, similarities in respect of electrophoretic profiles of some proteins were also obvious, namely, discs 11, 26 and 29 occurred in both *L. indicus* and *I. raipurensis*; disc no. 38 was found both in *L. indicus* and *L. indica*; while, disc nos. 9 and 14 corresponded in *I. raipurensis* and *L. indica*.

It is obvious that taxon-specific differences exist between *L. indicus*, *I. raipurensis* and *L. indica* (figure 1). *L. indica* is most unusual in having four high molecular weight protein discs (1–4), with much less

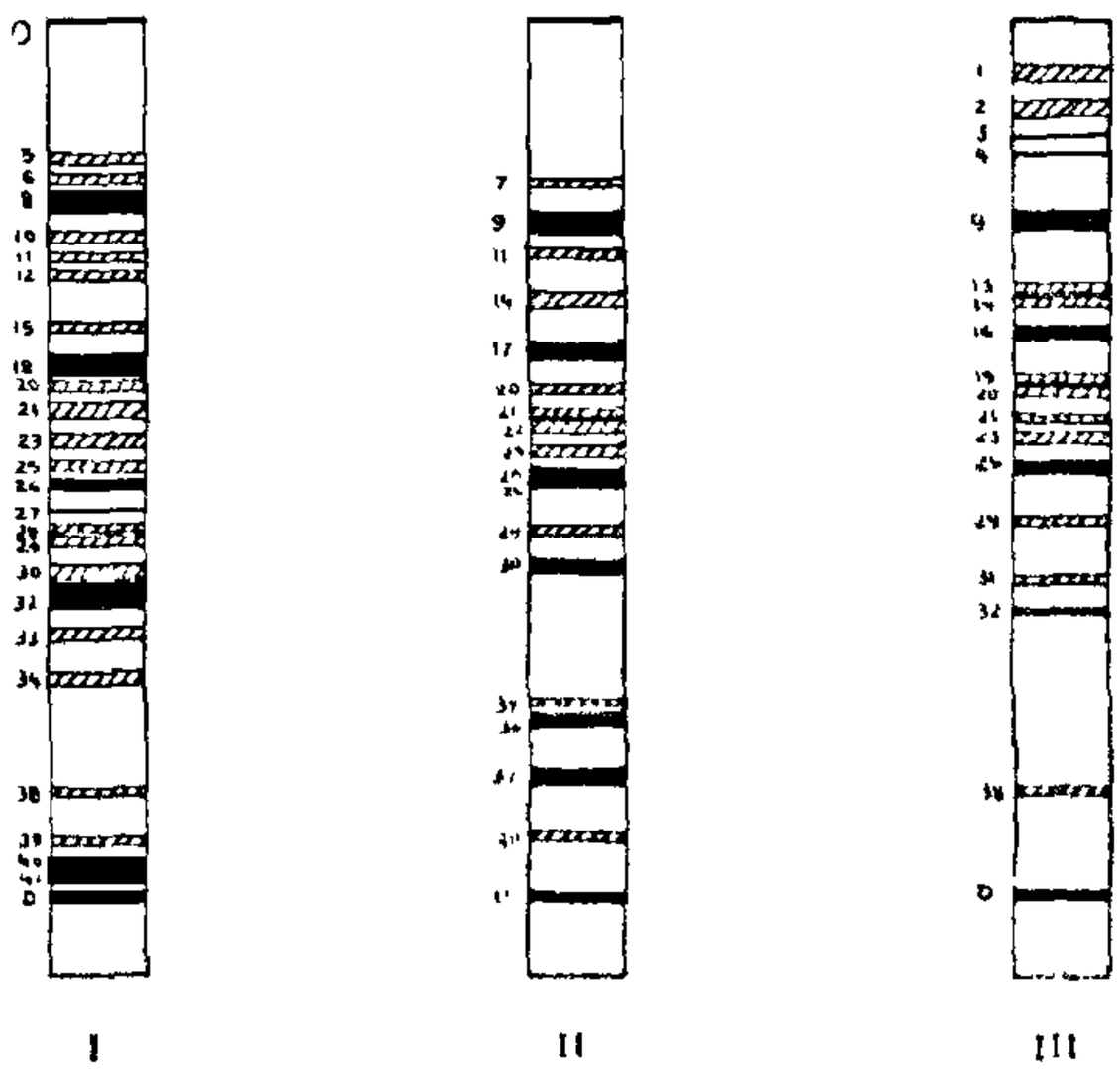

Figure 1. Qualitative protein profiles of 3 species of Caryophyllaeids (Graphical representation). (I) *L. indicus*, (II) *I. raipurensis* and (III) *L. indica*. O-Origin, D-Dye front.

electrophoretic mobilities. *L. indica* inhabits posterior intestine, whereas, *L. indicus* and *I. raipurensis* occur in anterior intestine. The two habitats must differ substantially in their micro-environments and the present authors are obliged to speculate that this is directly manifested in protein profiles of *L. indica* vis-a-vis *L. indicus* and *I. raipurensis*. The authors consider protein discs 1 to 4 of *L. indica* species specific.

L. indicus and *I. raipurensis* both occur in anterior intestine, quite often concurrently, and are competitors in the true sense. Earlier study[16] has revealed that although the two species share the same habitat, they cause very different pathology of host tissue. While *L. indicus* herniates through mucosa and even submucosa and is a tissue feeder, *I. raipurensis* lies smugly fitting its hold-fast in the crypt of Lieberkuhn between folds of villi and never penetrates intestinal wall. Occurrence of disc nos. 5, 6, 33, 34, 40 and 41 specifically in *L. indicus* and of discs 35, 36 and 37 in *I. raipurensis* are the natural consequence of differences in adaptational modifications between the two species.

Similarities of certain protein discs, between the three species of caryophyllaeids studied, obviously are due to evolutionary relationships. This study fully vindicates the contention, advocated by the earlier workers, that taxon-specific protein profiles do occur and that they can be very useful tools in delimitation of helminth species.

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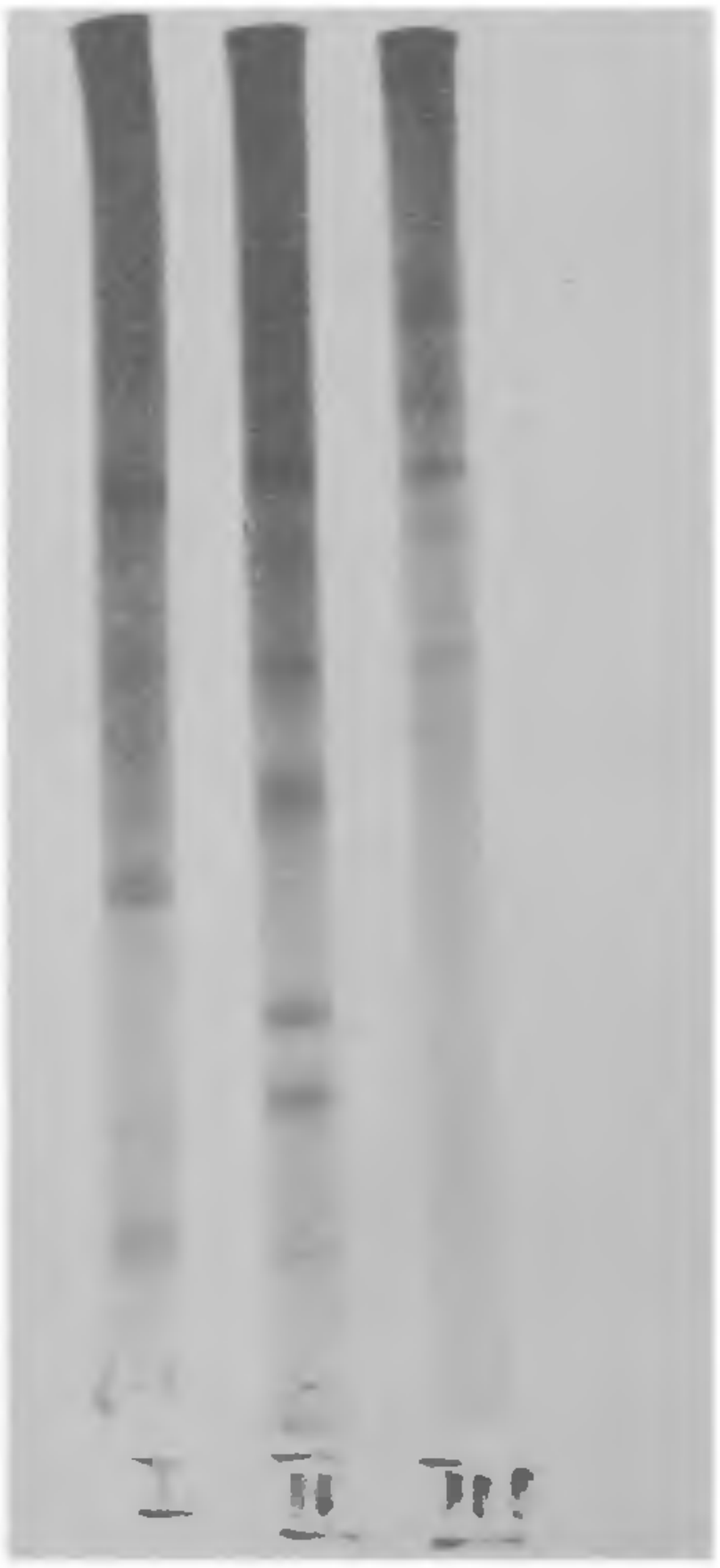

Figure 2. Protein profiles in three species of caryophyllaeids. I. *L. indicus*, II. *I. raipurensis*, III. *L. indica*.

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