

test 'A', the results were uniformly negative. Saponins are absent in all except *Sesamum indicum* where their doubtful presence is indicated. Tannins are absent in *Pedaliium murex* and *Sesamum indicum* while they are doubtfully present in the other two taxa. Negative reaction for Noller's test and positive reaction for Liebermann Burchard test in *Sesamum indicum* and *S. laciniatum* indicate the presence of steroids in these taxa while in *Pedaliium murex* and *Martynia annua*, both triterpenoids and steroids are absent. *Martynia annua* and *Sesamum laciniatum* differ from *Pedaliium murex* and *S. indicum* in the presence of leucoanthocyanins. Negative results were obtained for Siringin test 'A' for all the taxa except *Pedaliium murex* where, only the walls of the xylem elements developed blue colour and this may be considered as a doubtfully positive reaction. *Martynia annua* stands apart from the remaining taxa in the positive reaction for HCN test.

Thus from the above observations it is clear that *Martynia annua* resembles the other taxa of Pedaliaceae in a majority of chemical characteristics. On the basis of the distribution pattern of phenolic acids in the leaves and fruits of *Martynia*, *Pedaliium* and *Sesamum* Das, Rao and Rao<sup>4</sup> supported the separation of *Martynia* from Pedaliaceae into an independent family Martyniaceae.

In important anatomical characters like the presence of mucilage hairs, ranunculaceous type of stomata and vessels with simple perforation plates (Metcalf and Chalk<sup>8</sup> and in essential embryological features such as simultaneous cytokinesis of pollen mother cells, anatropous unitegmic and tenuinucellate ovules, Polygonum type of embryo sac ontogeny, cell-lar endosperm with haustoria and Onagrad type of embryogeny, the taxa resemble closely one another (Davis<sup>5</sup>).

Thus, from a consideration of all these aspects it is suggested that the separation of *Martynia* into an independent family, Martyniaceae, does not seem justified. This is consistent with the view of Cronquist<sup>3</sup> who included Martyniaceae in Pedaliaceae.

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#### A CASE OF EFFECTIVE CONTROL OF SEVERE INFESTATION OF *TRICHODINA* ON FRY OF *CYPRINUS CARPIO* LINN.

THE ciliate, *Trichodina*, is a common ectoparasite in the Gangetic carps<sup>1</sup> and also in *Cyprinus carpio*<sup>2</sup>. It posed a serious problem when two crops of hatchlings of *Cyprinus carpio* were stocked in nursery ponds in the Fisheries Research Station, Patna. Two days after release, fry in the first nursery showed *Trichodina* which developed into a severe infestation of the entire fry population by the fourth day. The parasite was found attached to the exterior of the fry and also gliding along the slimy film over the body of the fry (Fig. 1).

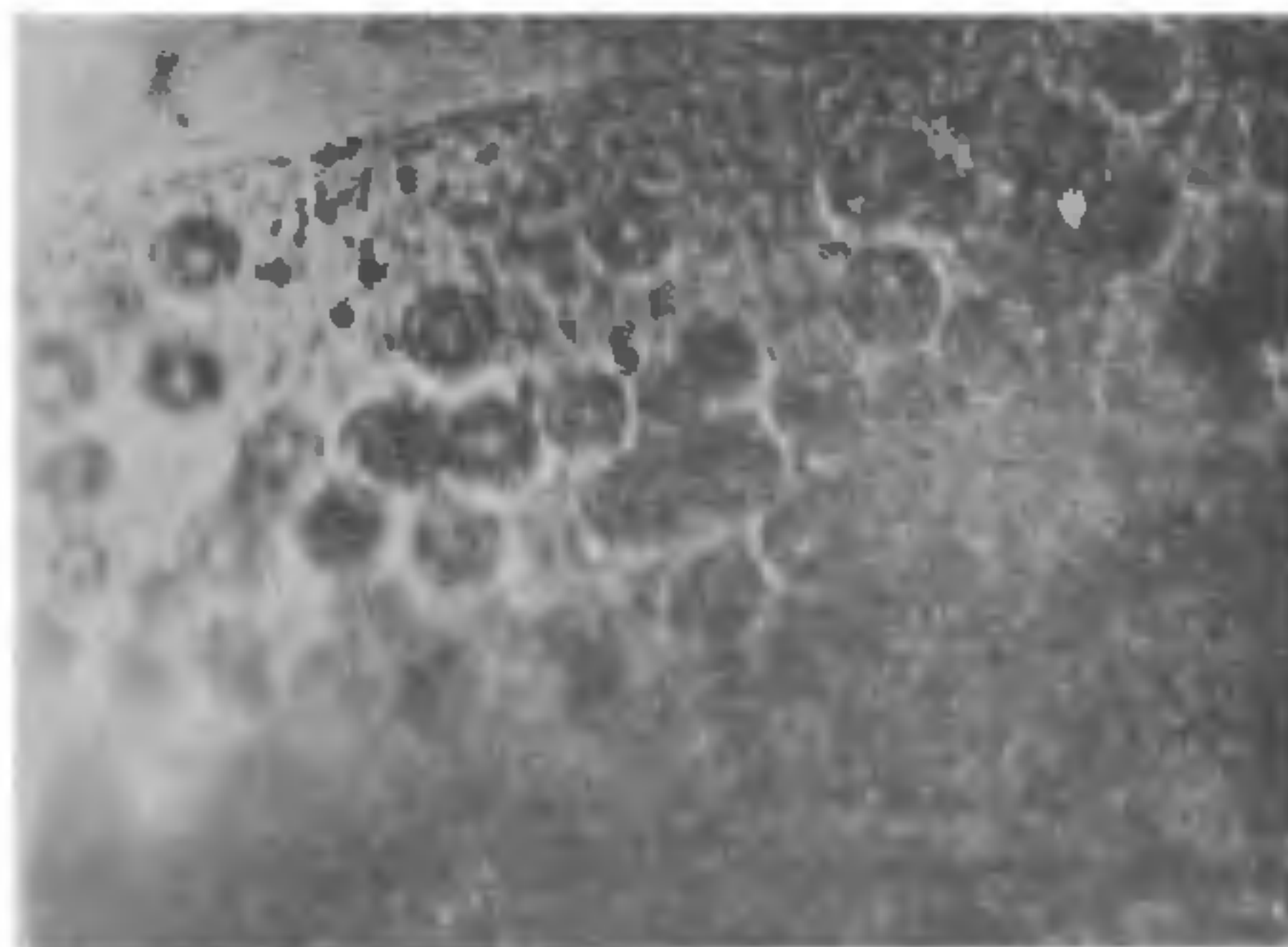


FIG. 1. Photomicrograph of a part of the body of fry of *C. carpio* infested with *Trichodina* ( $\times 100$ ).

The infestation occurred in the second nursery also in the same manner indicating a common source of

the pathogen—obviously, a perennial pond from which the water was originally drawn. Although *Trichodina* could not be located in fish specimens including *C. carpio* from the pond, the ciliate did occur occasionally in plankton hauls. It may be recalled *Trichodina* can exist in plankton form<sup>1</sup> and may inhabit the body surface of a variety of aquatic animals besides fish<sup>2</sup>.

The infested fry did not present any apparent symptoms. However, earlier observations that the parasite was dangerous under severe infestation<sup>4</sup> and may damage epithelial cells of the skin<sup>1,5</sup> prompted attention towards remedial measures. Bathing the affected fishes in various chemical solutions<sup>5-7</sup> could not be done here. To choose a chemical for direct application in the ponds, trials were conducted in the laboratory on infested fry using the pond water. The observations are presented in Table I.

TABLE I

Chemotherapeutic trial on fry of *C. carpio* infested with *Trichodina*.

Sl. No.	Treatment	Dose	Observations
1.	Quick lime	5 gm/litre	Fry all alive with infestation of <i>Trichodina</i> as before
2.	Common salt	10 gm/litre	do.
3.	Potassium permanganate	1 ppm	do.
4.	Glacial acetic acid	1 : 10000	do.
5.	Glacial acetic acid	1 : 5000	Fry all dead/No trace of <i>Trichodina</i>
6.	Formalin	1 : 10000	50% fry dead/living ones free of the infestation
7.	Copper sulphate	0.5 ppm	Fry all alive and free of the infestation
8.	Control	..	Fry all alive and infested with <i>Trichodina</i> .

Clearly copper sulphate was the most effective of the chemicals tried. At 0.05 ppm *Trichodina* infestation disappeared a day after the application. No adverse effects of copper sulphate treatment were noticed either in the density of plankton or condition of fry which grew satisfactorily. Possibly, alkaline

nature of the water helped early removal of the residual copper<sup>8</sup>. It may be noted in this connection that in a study of toxicity, copper is least toxic to *C. mrigala* at pH 8.2<sup>9</sup>. By close of the rearing operations, nearly a lakh and a half fry and fingerlings were distributed from the nurseries, indicating 74% survival from the hatching stage.

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#### EFFECT OF STARVATION ON THE MID-GUT EPITHELIUM OF THE ADULT *ODONTOPUS VARICORNIS* (DIST.)

THE mesenteron of Heteroptera has been divided into a number of mid-gut regions on the basis of its morphological characteristics<sup>1</sup>. Thus, in the alimentary canal of *Chrysocoris purpureus* four distinct mid-gut regions have been recognized<sup>2</sup>. Studies on these different mid-gut regions have shown that the upper and lower regions are concerned with the function of secretion and absorption respectively. According to Goodchild<sup>3</sup> the first two mid-gut regions of the alimentary canal of cacao capsid bugs have secretory function, while the third mid-gut region seems to perform an absorptive function. The present study aims at finding out the effect of starvation on the mid-gut epithelium of the adult *Odontopus varicornis* with a view to understanding the secretory functions of different mid-gut regions.