

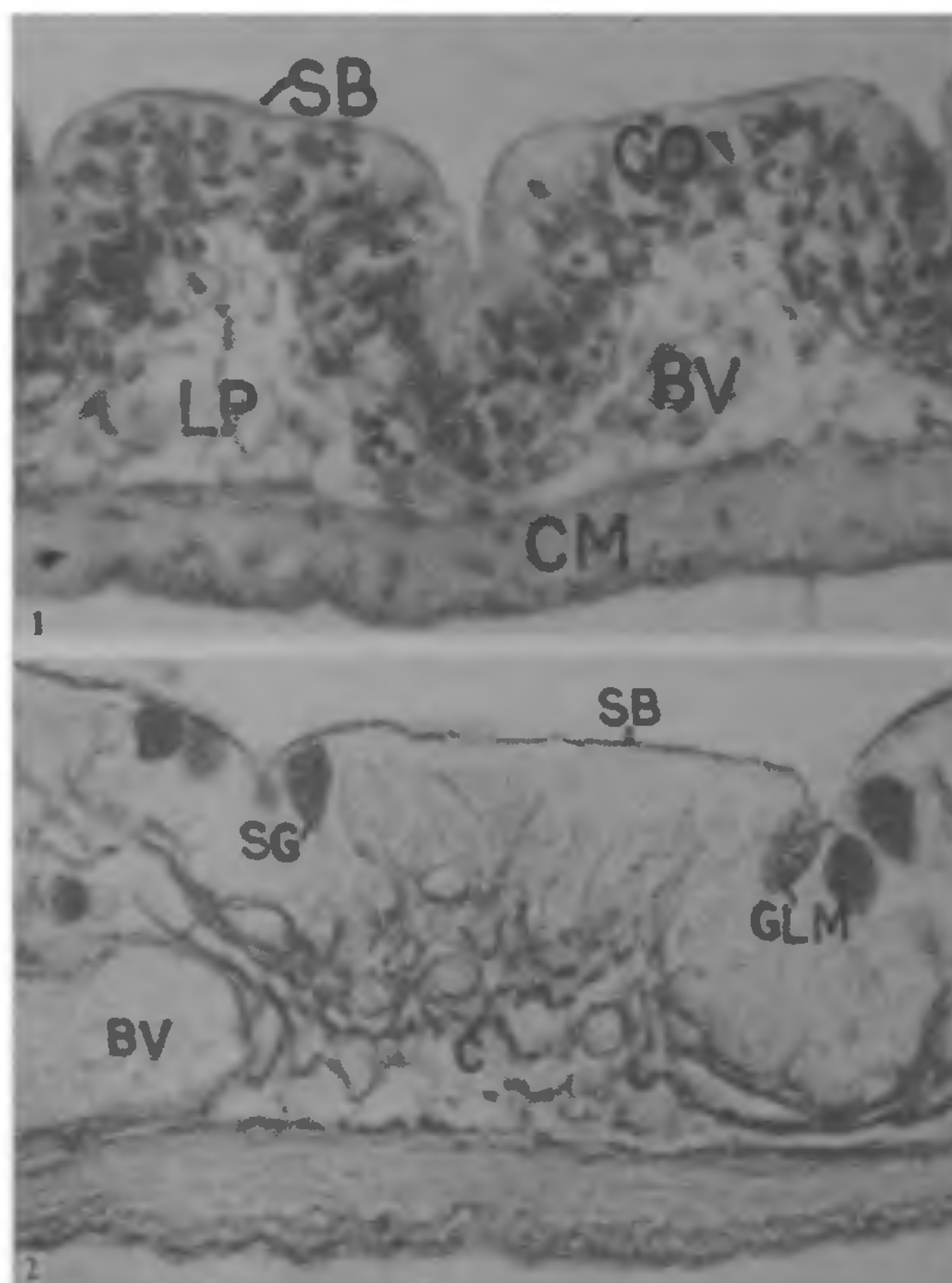
connectivus is found to be present. Khatter<sup>11</sup> also showed its presence in *Schizodectylus monstrosus*. Posterior recurrent nerves have been utilised as a basis of classification of Orthoptera and related orders by Nesbitt<sup>5</sup> who placed the families like Mantidae, Blattidae, Phasmidae and the order Isoptera and Dermaptera in one group as they all possess a single, posterior recurrent nerve. He placed families like Tettigonidae, Rhaphidophoridae, Gryllidae and Acrididae in another group as they possess a pair of posterior recurrent nerves. The presence of paired oesophageal nerves and ingluvial ganglion in *H. furcifer*, a member of the family Acrididae, also supports Nesbitt's contention.

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accessory respiratory organs among teleosts<sup>1-5</sup>. However, it is also believed that aerial respiration, as exhibited by a few teleosts inhabiting torrential mountain streams, is an adaptation for drought only<sup>6</sup>, since these streams carry well-oxygenated water during the wet season. The *Lepidocephalichthys guntea*, a torrential loach has been observed to use posterior region of intestine as an accessory respiratory organ. The present communication is the first report of the structural modification of the specialized region of the intestine in relation to its aerial respiratory habit.

Live fishes from local streams were collected and pieces of intestine were fixed in alcoholic Bouins.



Figures 1, 2. 1. T. S. of posterior intestine showing striated border (SB) of undifferentiated columnar cells (CO) of stumpy villi with large number of granulated cells. The lamina propria (LP) is rich in blood vessels (BV). Note the thin layer of circular muscle (CM) in the periphery ( $\times 400$ ). 2. T.S. of same showing PAS-positive goblet cells (SG) with large number of globular masses (GLM). Note the collagen fibres (C) in submucosa. A large blood vessel is also evident (BV) ( $\times 400$ ).

## ON THE STRUCTURAL ADAPTATION OF AN INTESTINAL BREATHER *LEPIDOCEPHALICHTHYS GUNTEA* (HAM.), A TORRENTIAL LOACH

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DEPLETION of dissolved oxygen is considered to be the primary factor which has stimulated the evolution of



Sections ( $7\ \mu$  thick) were prepared with routine histological stains for the present study.

*L. guntea* spends most of its time buried in sandy bottom but often comes to surface with swift movement to gulp atmospheric air and again return to previous position. It was also noticed that the posterior intestine and rectum always contained one or two large air bubbles resulting in the dilation of these regions. These air bubbles are swallowed through the mouth and the used air is voided through the anus.

The alimentary canal in *L. guntea* is a straight tube. The region carrying out respiratory function exhibits many specialized features. The wall has become thin and highly vascular, the inner layer is thrown into stumpy villi instead of normal triangular ones, found elsewhere with digestive role. The mucosal epithelium is also beset with undifferentiated columnar and goblet cells, of which the latter are restricted to the tips of the stumpy villi. The specialized area is also comparatively rich in highly granulated cells placed at various heights (figure 1). The submucosa contains a large amount of circularly-disposed collagen fibres and numerous huge patches of blood vessels (figure 2). The latter extends upto the inner as well as outer most layers of the wall of the digestive tube.

A few members of the family cobitidae have been reported to use their digestive tract for aerial respiration<sup>2-5</sup>. An increase in the length of their intestine has been recorded. However, in *L. guntea* the ratio of body length to digestive tract is 3.5. Absence of digestive role in the specialized area is evidenced by the presence of stumpy villi. Abundance of mucus cells in the region perhaps facilitates gaseous exchange<sup>2,3,7</sup>. Similarly undifferentiated columnar and eosinophilic granular cells have been recorded in the modified intestine of other intestinal breathers<sup>2,3,7</sup>. The authors opine that the thick layer of circularly-disposed collagen fibres in submucosa is a preventive adaptation to check the dispensing effect of trapped air. The presence of the vascular elements in the innermost layer of the intestine wall, close to the trapped air facilitates the diffusion of gases.

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### PROTEIN CHANGES IN *CHILO PARTELLUS* (SWINHOE) (LEPIDOPTERA:PYRALIDAE) DURING VITELLOGENESIS

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THE protein constitution of the haemolymph is influenced by the complex relations of the metabolism, synthesis and uptake of proteins by the body tissues<sup>1</sup>. The haemolymph level reflects changes in both the rate of synthesis in the fatbody and the rate of uptake into the oocytes<sup>2</sup>.

From the biochemical point of view, investigations of the haemolymph, fatbody and ovarian proteins are of particular interest because they provide us with an adequate background to judge the synthetic activity of the fatbody associated with the development of the ovaries. Hence, the quantitative estimation of the proteins in the fatbody, haemolymph and ovary of late fifth instar larvae, pupae and the adult was carried out to show their interrelationship.

The stem borer *Chilo partellus* is the most destructive pest of *Sorghum vulgare* Pers (jowar). For experimental purpose the above insect was reared in the laboratory on artificial diet<sup>3</sup> at a temperature of  $27 \pm 1^\circ\text{C}$  and RH  $65 \pm 5\%$ . Haemolymph was collected using the rapid centrifugation method of Nation and Thomas<sup>4</sup>. To inhibit the tyrosinase activity of the haemolymph, phenylthio-urea was added to it. The haemolymph was centrifuged at 2500 rpm to remove haemocytes. The fatbody and ovaries were rinsed free of haemolymph, homogenized, and centrifuged at 2500 rpm for 10 min and the soluble fatbody and the ovary proteins were obtained. Quantitative estimation of proteins was carried out according to Lowry *et al.*<sup>5</sup>. The colour intensity was read as percentage absorption in the Speckal at  $750\ \text{m}\mu$ .