extremity measuring 0.37–0.25×0.19–0.16 mm., cirrus sac posterior to ventral sucker, 0.15×0.08 mm. Genital pore immediately above the ventral sucker. Ovary multilobed, median, a little anterior to testes measuring 0.24×0.17 mm. Uterus extending between ovary and ventral sucker filled with yellowish eggs measuring 0.01×0.02 mm. Vitelline follicles small extending from posterior to ventral sucker, reaching near the level of ovary. Excretory bladder not distinguishable.

The genus *Hepatiarius* was created by Feizullaev[1] with *H. longissimus* as a type species. Because of a cylindrical, long body, tandem testes close to the posterior extremity and multilobed ovary, the specimens belong to the genus *Hepatiarius*. The genus has only two species, *H. longissimus* Feizullaev[1], *H. sudarikovi* Feizullaev[1], and the present form differs from both, in body size, long oesophagus and extension of Vitellaria. Hence it is regarded as a new species.

This is the first record of this genus from India and the species has been named in honour of Late Prof. Bandawes, an outstanding parasitologist.

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GLUTAMATE DEHYDROGENASE ACTIVITY IN NORMAL AND AESTIVATED *PILA GLOBOSA* — A POSSIBLE NEUROENDOCRINE REGULATION

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THE active life of the snail, *Pila globosa* is interrupted during drought conditions by aestivation when the animal undergoes a state of metabolic dormancy[1,2]. There is also a decrease in the activities of respiratory enzymes and the animal survives by anaerobic glycolysis slowly utilizing the glycogen reserve[3–5]. Changes in glutamate level in soft parts of the aestivating snail constitute a significant event during aestivation[6–8]. However, very little information is available regarding the involvement of hormonal principle(s) in the aestivation metabolism of *Pila globosa*. Hence an attempt was made to study the activity pattern of glutamate dehydrogenase (GDH) under the influence of different ganglia viz. cerebral, buccal, pleuropedal, supra-intestinal and visceral.

The collection and the maintenance of *Pila globosa* and the method of inducing aestivation have been described elsewhere[9]. Three-month-old aestivated snails were used for the present study. The five ganglia viz. cerebral, buccal, pleuropedal, supra-intestinal and visceral from active and aestivated snails were isolated separately and the extracts of the like ganglia were pooled. One per cent extract in 80% ethanol was made, centrifuged and the supernatant was collected. A hole was drilled near the operculum and 0.2 ml of the extract was injected (from active to aestivated and vice versa) into the foot

Table 1 *Activity levels of GDH (μ mol of formazan formed/mg protein/h) in the hepatopancreas of active/aestivated snail administered with ganglionic extracts of aestivated/active snail*

	Activity in the controls	Activity after the administration of ganglionic extracts				
		Cerebral	Buccal	Pleuropedal	Supra-intestinal	Visceral
Active	0.53 ± 0.038	0.90 ± 0.031 (69.81)	0.63 ± 0.052 (18.86)	0.71 ± 0.059 (33.96)	0.72 ± 0.063 (35.84)	0.76 ± 0.054 (43.39)
Aestivated	0.12 ± 0.011	0.23 ± 0.013 (91.66)	0.16 ± 0.014 (33.33)	0.19 ± 0.017 (58.33)	0.20 ± 0.009 (66.66)	0.21 ± 0.011 (75.00)

Each value is mean ± SD of six individual observations; Values in the parentheses are per cent changes over control. All values are significant at $P < 0.05$.

carefully under asceptic conditions and the hole was closed immediately with sealing wax. The controls received the same treatment except that, in place of the extract, 0.2 ml of 80% ethanol was injected. The snails were allowed to move about in containers having autoclaved water with 1000 I.U. of penicillin/litre added to it. After 1 h, hepatopancreas was isolated in cold and 5% homogenate was prepared in cold 0.25 M sucrose. The GDH activity was estimated[10] and the specific activity was expressed in μmol of formazan formed/mg protein/h.

The results (table 1) showed that the specific activity of hepatopancreatic GDH (assayed in the direction of ammonia formation) was significantly decreased in aestivated snail. The ganglionic extracts when administered elicited an increase in GDH activity. Activation of GDH was greater with active snail ganglia as compared to ganglionic extracts of aestivated snail.

The decrease in GDH specific activity in hepatopancreas of aestivated snail could be attributed to the inactive state of the enzyme. Similar decrease in the GDH was also reported along with the other respiratory enzymes during aestivation in *Pila*[2,11]. Diminished activity of GDH during aestivation might be due to low oxidation of glutamate suggesting prevalence of an inherent protective mechanism in the hepatopancreas during torpid state. Also, it is possible that the elevated free amino acid content during aestivation might lead to inactivation of GDH because of its dissociation to monomeric units[12]. Hence an elevation in proteolysis during aestivation could also be attributed as one of the causative factors for the inactivation of GDH resulting in the decreased production of ammonia. Besides, the decrease in GDH activity is also in good agreement with low transamination which in turn reflects the low O_2 demands of the snail during suspended animation[13]. The reduction in transaminase activity results in decreased production of glutamate and decreased GDH activity. In general, the decrease in specific activity of GDH during aestivation also suggests that snails acquire an inherent protective mechanism during aestivation to mitigate the ammonia toxicity by minimizing further addition of ammonia by GDH. Following ganglionic treatment, GDH activity was increased in the hepatopancreas of active as well as aestivated snails. But the extent of activation was greater with active snail ganglionic extracts when compared with the extracts from aestivated snail. Many factors like changes in the levels of metabolites and the redox state of cell control the activity of GDH in the cell. The present study shows that while the exact mechanism for the increase in GDH activity is not known, some or all of the above mentioned factors might be synergistically responsible for its elevation. Also, elevated amino acid levels[13] may also be responsible for the hike in GDH activity as many amino acids are known to stimulate this enzyme[14]. Also, the possible increase in the transamination under ganglionic influence provides elevated quantities of glutamate resulting in a significant increase in GDH activity. The varied effects of ganglia possibly due to the release of an inhibitory principle or the quantum of the active principle(s) and the secretion of such principle(s) by aestivating snail ganglia may be less as compared to active snail ganglia.

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