The results show that AChE activity is present mainly in the nervous system of this cestode. When the nervous system of several species of cestodes[10,11], was incubated in O-acetyl-5-bromoindoxyl for localization of NSE, AChE activity was also found. In this study, the absence of reaction when eserine (10^{-5} μM) was used as an inhibitor with AThChI indicates that AChE is the chief enzyme. Contradictory results have been obtained in studies on the occurrence of AChE in embryos of cestodes[2,3,12,13]. But Rybicka[14] reported that only true AChE activity occurs in embryos. In the present study, the embryos showed only NSE activity.

AChE present in suckers and rostellum may be the chief neurotransmitter in the neuromuscular processes in contraction and eversion. In addition to neuromuscular transmission other roles have also been ascribed to this enzyme. Schwabe *et al.*[15] suggested that AChE is involved in permeability and osmoregulation of the hydatid cyst wall of *Echinococcus granulosus*. Arme[1] observed involvement of the enzyme in lipid excretion in *Ligula intestinalis*. According to Lee[10] and Ogilvie *et al.*[16] this enzyme acts as a biochemical hold-fast.

Parasite secretions may elicit immune response in the host. In the case of *A. multitesticulata* also, the secreted AChE may induce an immune response.

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FUNCTIONAL SIGNIFICANCE OF ARGINASE IN AESTIVATING SNAIL, *PILA GLOBOSA* (SWAINSON): NEUROENDOCRINE INVOLVEMENT

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THE mechanisms involved in the regulation of aestivation metabolism in molluscs have not been worked out thoroughly. This communication reports the functional significance of arginase in the hepatopancreas of the aestivating snail (*Pila globosa*) and possible neuroendocrine involvement in the regulation of aestivation metabolism with reference to excretion.

The collection, maintenance and mode of induction of aestivation in snails have been described elsewhere[1]. Three-month-aestivated snails were selected for the study. The five ganglia, viz. cerebral, buccal, pleuropedal, supra-intestinal and visceral, were isolated separately from both normal and aestivated snails. Ganglionic extracts (1%) were prepared in 80% ethanol and centrifuged at 1000 *g* for 20 min. The extracts (0.2 ml) prepared from active snails were injected into five batches (six snails each) of aestivating snails through a hole drilled near the operculum under aseptic conditions and the holes were closed immediately with sealing wax. Similarly, extracts of ganglia from aestivated snails were administered to five batches (six snails each) of active snails. Control snails received only 0.2 ml of ethanol. The snails were allowed to move freely in their containers in autoclaved water containing 1000 IU of penicillin per litre. After 60 min the hepatopancreas was isolated in the cold for estimation of

Table 1 *Effect of administration of ganglionic extracts on specific activity of arginase (µmol urea/mg protein/h) and urea (µmol g wet wt) in hepatopancreas of freshwater snail Pila globosa*

	Control	Cerebral	Buccal	Pleuropedal	Supra-intestinal	Visceral
Active snails administered ganglionic extracts from aestivated snails						
Arginase	0.032 ± 0.002	0.015 ± 0.001 (−53.13%)	0.011 ± 0.001 (−65.63%)	0.024 ± 0.002 (−25.00%)	0.01 ± 0.0003 (−68.75%)	0.009 ± 0.0004 (−71.88%)
Urea	0.52 ± 0.046	0.25 ± 0.013 (−51.92%)	0.16 ± 0.001 (−69.23%)	0.39 ± 0.06 (−25.00%)	0.11 ± 0.008 (−78.85%)	0.13 ± 0.009 (−75.00%)
Aestivating snails administered ganglionic extracts from active snails						
Arginase	0.052 ± 0.004	0.035 ± 0.002 (−32.69%)	0.030 ± 0.002 (−42.31%)	0.045 ± 0.003 (−13.46%)	0.026 ± 0.001 (−50.00%)	0.021 ± 0.001 (−59.62%)
Urea	0.96 ± 0.071	0.52 ± 0.032 (−45.83%)	0.36 ± 0.025 (−62.50%)	0.76 ± 0.043 (−20.83%)	0.25 ± 0.021 (−73.96%)	0.29 ± 0.024 (−69.79%)

Each value is mean ± SD of six individual observations.
All values are significant at $P < 0.05$.

arginase[2] and urea[3]. Protein was estimated by the method of Lowry *et al.*[4]

The specific activity of arginase and level of urea in hepatopancreas of normal, aestivated and ganglionic extract-administered snails are presented in table 1. The results show that during aestivation the specific activity of arginase increased by 62% and was accompanied by an increase in urea. However, when ganglionic extracts were administered to the snails (extracts from active snails to aestivated snails and *vice versa*), arginase activity and urea level decreased. Visceral ganglionic extract produced the greatest effect on arginase and supra-intestinal ganglion extract produced the greatest effect on urea. In general, the effect produced by ganglionic extracts from aestivated snails was more than that of extracts from active snails.

The increased arginase activity and urea in the hepatopancreas of aestivating snail are due to increased availability of arginine through elevated proteolysis[5]. This elevated arginase activity and urea reflect the metabolic centrality of hepatopancreas in combating ammonia stress during aestivation. When ganglionic extracts of aestivated snails were administered to active snails, both arginase activity and urea level decreased. It appears that endocrine factor(s) in ganglionic extracts caused an increase in urease activity, which in turn enhanced the hydrolysis of urea, resulting in the decreased level of urea. In aestivating snails, ganglionic extracts from active snails had a similar effect, causing reduced formation of urea. The variation in the extent of reduction in arginase activity and urea produced by the different ganglionic extracts indicate the presence of more than one humoral agent in the nerve ganglia.

Prima facie, the altered arginase activity pattern indicates the differential ureogenic capacity of the tissue. Variation in the urea level is an index of the balance between rates of formation and mobilization. The 'high' and 'low' activity of arginase in the hepatopancreas of aestivating and active snails also exemplify such 'balance'. However, low ureogenic capacity as reflected by decreased arginase activity and low urea content in the hepatopancreas of snails administered ganglionic extracts indicates that hepatopancreas may not be an 'important contributor' to urea production.

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EFFECT OF pH ON PHOSPHATE SOLUBILIZATION BY MICROBES

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THE pH of the nutrient medium is one of the important factors determining the uptake of inorganic