STUDIES ON HISTOLOGY OF FOOT, MANTLE AND NERVOUS SYSTEM *Bellamaya Bengalensis* L.: WITH REFERNCE TO CHITTOR DISTRICT, ANDHRAPARDESH, INDIA.

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ABSTRACT:

In Indian ecosystem, Land snails form an important component in the forest ecosystem. In terms of number of species, the phylum Mollusca, to which land snails belong, is the largest phylum after Arthropoda. Mollusca provide unique ecosystem services including recycling of nutrients and they provide a prey base for small mammals, birds, snakes and other reptiles. However, land snails have the largest number of documented extinctions, compared to any other taxa. Till date approximately 1,129 species of land snails are recorded from Indian Territory, but only basic information is known about the molluscan taxonomy and little is known of their population biology, ecology and their conservation status. In this paper, we briefly review status, histological studies of various tissues of *Bellamaya Bengalensis* threats and conservation strategies of land snails of India.

Keywords: *Bellamaya Bengalensis,* Biodiversity, conservation, land snails, Tirumala Hills

MATERIAL AND METHODS:

HISTOLOGICAL STUDY OF TISSUES:

Fresh water gastropods tissues were used in the present study. The mice were autopsied and the testes were dissected out. The testicular tissue was fixed in aqueous Bouins fluid for 24 hours and dehydrated in alcoholic series, cleared in xylol and embedded in paraffin wax. Sections of 5μM thickness were made and stained in Harries haemato xylin–eosin and examined using microscope.

EXPERIMENTAL DESIGN:

Specimens were collected by hand picking. All specimens are carefully transported in large polythene vessels with aeration to Dept. of LPM, CVSc, Sri Venkateswara Verterinaty University, Tirupati. They were maintained in large aquaria tanks with enough hydrilla and frequent aeration (Fig. 1). The shell morphology (Fig. 2) and the morphology of soft bodies' animals were studied. The structure and anatomy of radula has been made. The chemistry of mucus of foot is studied. Systematic work was carried out based on morphological differences (Fig. 3).

A survey has been made on the taxonomy and distribution of fresh water gastropods of Chittoor district of AP. The following areas have been selected for collection are Tirumala Hills, Kalyanidam, Sheshadri hills, Kalahasthi, Piler, Madanapalli, Chittoor, Palamaneru, V. Kota and Kuppam seven species belonging to 5 genera and 4 families, vivparidae, pilidae, thiraidae, and planorbidae have been identified.

RESULTS AND DISCUSSION

The marked seasonal variations in number of molluscan species were observed in tirumala hills during 2009-10. During this period, It was come to notice that molluscan specimens were represented in study area by only two classes as Gastropoda and the Pelecypoda. The dominating class Gastropoda of mollusca included snails which was represented by 4 species including *Pila virens, Bellamya bengalensis,bellamaya dismilis, thira tuberc ulata, thira scabra, melania crenualata,* and indoplanorbis exustus. The systematic classification of mollucsa found in study area is given in the table. 1.

TABLE. 1: SYSTEMATIC CHECK LIST OF MOLLUSCA RECORDED FROM CHITTOOR DISTRICT OF ANDHRA PRADESH, INDIA.

Species Identified	Family	Genus	Description		Occurrence	No mollusca /m^2
			Genus	Subfamily		
Bellamya Jousseaume, 1886 *Bellamya bengalensis* (Lamarck, 1822) *Bellamya dissimilis* (Muller)	PILIDAE (= AMPULLARIDAE)	*Pila* Bolten, 1798 *Pila virens* (Lamarck, 1822)	*Pila* Bolten, 1798 *Pila virens* (Lamarck, 1822)	BELLAMYINAE	Kalyani dam, Piler, madanapalli	99-200
	THIARIDAE	*Thiara Bolten, 1798* *Thiara tuberculata* (Muller)			Tirumala hills, Kalahasthi	55-60
		Thiara scabra (Muller)			Madanapalli ,Piler, Kalahasthi	10-12
		Melanoides Olivier, 1807 *Melania crenulata* (Deshayes)			Tirumala hills, palamaneru.	55
*Indoplanorbis exustus*_ (Deshayes, 1834)	PLANORBIDAE	*Indoplanorbis* Annandale and Prashad, 1920.			Y.Kota ,Kuppam.	90-109
dissimilis, Thiara tuberculata, Thiara scabra, Pila virens, bengalensis	Bellamynae				Tirumal hills, Kuppam, chittoor madanapalli.	55-57

During the period of study, the density of Gastropoda inTirumala hills ranged between 99 organisms/m2 (in winter) to 202 organisms/m2 (in summer), whereas Minimum density of Gastropoda was recorded in monsoon season (55 and 60 organisms/m2 respectively. Class Pelecypoda had its minimum population (10 organism/m2 and 12 organism/m2) in winter and maximum population (55 organism/ m2).

HISTOLOGICAL STUDIES:

FOOT:

Foot is typically a muscular mass that forms the ventral part of the body and is continuous dorsally with the head and visceral mass. its ventral surface usually forms a flat creeping sole on which the animal moves on. Histological the foot consists of a frame work of interlacing muscle fibers and connecting tissue along with many gland and blood spaces. Foot is covered by layer epithelial cells. The epithelial layer is adopted for locomotion. Therefore entire ventral aspect of foot consists of cilia (Fig: 3). Foot consist mucus glands. Epidermis is composed of mucus cells. The epithelium on the ventral surface of the foot with height about 25 µm is thrown into folds where as the epithelium at the sides and the dorsal surface with about height 17µm and straight without any folds.

The epithelium is followed by basement membrane which in turn followed by a layer of circular muscle fibers. The glands are present on more its ventral side. The whole foot is filled with parenchymatous tissue with scattered connective tissue consists, muscle fibers, nerves and blood spaces. The unicellular glands also called as

mucocytes occur in the epidermis. Mucocytes are present more in number at the ventral margins of epidermis. (Fig: 4)

MANTLE:

The mantle cavity and its associated organs together with buccal mass and the radula (Fig: 5) are basic molluscans features. The mantle cavity has been moved by the process of torsion from its primitive posterior position to a new, anterior position to above the head. This change may have enabled the animal to withdraw its head quickly into protection afforded by the shell when alarmed. The mantle cavity occupies the anterior position of both the gut and the nervous systems are twisted. The rectum opened as usual into the mantle cavity and face discharged from anus which is situated above and behind the head.

NERVOUS SYSTEM:

The central nervous system is consists of ganglia: buccal ganglion, cerebral ganglion, pleural ganglion, pedal ganglion and visceral ganglion. The cerebral ganglia is innerative and the head tentacles, eyes statocysts. It lies dorsal to the buccal mass with their commisure overlying the proximal portion of the esophagus, rest is situate on the top of the radular sac thst is they are positioned ventral to the esophagus. The left cerebral and its cerebro pleuralconnective are closely applied to the lateral walls of the esophagus (Fig: 7).

Many forested areas, which are devoid of large and charismatic mammal species, have high land snail diversity In India. However, these reserve forests generally receive little protection status as they fall outside the protected area network. These reserve forests are open access and hence they are prone to a variety of

anthropogenic disturbances such as collection of minor forest products, grazing, fire, etc. Significant proportions of endemic species are distributed in these non-protected areas and hence are vulnerable to extinction. Current habitat conservation practice is focused on encompassing iconic but generally widely distributed or low risk species. Conversely habitats with the highest total of biological diversity are not targeted till now. Land snails are of potential values as indicators of high diversity habitats for a wide range of plant and animal groups. Thus, the snails can be utilized for identifying biodiversity rich habitats that should be given high conservation priorities. In addition, the high geographical turnover of many land snail species exemplifies the value of local scale conservation in capturing biological diversity in general (Ponder 1997; Raheem et al. 2009). For example, the low elevation evergreen reserve forests of Agumbe, Hulikal, etc., in the central Western Ghats have lower levels of protection but harbour high species diversity of land snails (Aravind 2005). The top down approach of conserving large mammals will exclude the majority of land snails, other invertebrates and plants from protection (Aravind et al. 2005). Hence, for effective conservation of land snails, some of the species rich areas surrounding the protected areas such as Agumbe, Hulikal and similar areas rich in land snail diversity need to be given additional protection. In India and other developing countries, where information is seriously lacking, an alternative approach to maximize the conservation of rare and endemic species is by identifying sites with high diversity and endemism and protecting the habitat itself (Gaston 1996).

Research on land snails in India should focus on their distribution patterns, taxonomy and ecology. Taxonomic expertise is a basic foundation for estimation of

global biodiversity and formulation of policy on conservation of biological diversity (Golding & Timberlake 2002; Budha 2005). One of the greatest impediments for malacological research in India has been a severe lack of trained malacologists. However, more funds need to be allocated for capacity building in the areas of taxonomy, natural history, ecology and biology of the species in India. Developing databases on ecology, breeding behavior, distribution and other details of land snails should be encouraged and made accessible in the public domain, which could change the esoteric status of malacology.

Fig. 1 : *Bellamya bengalensis* Specimens.

Fig. 1

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Fig. 2: Shell of Bellamya *bengalensis*

Fig. 2

Fig. 2a: Without shell and operculum of *Bellamya bengalensis*

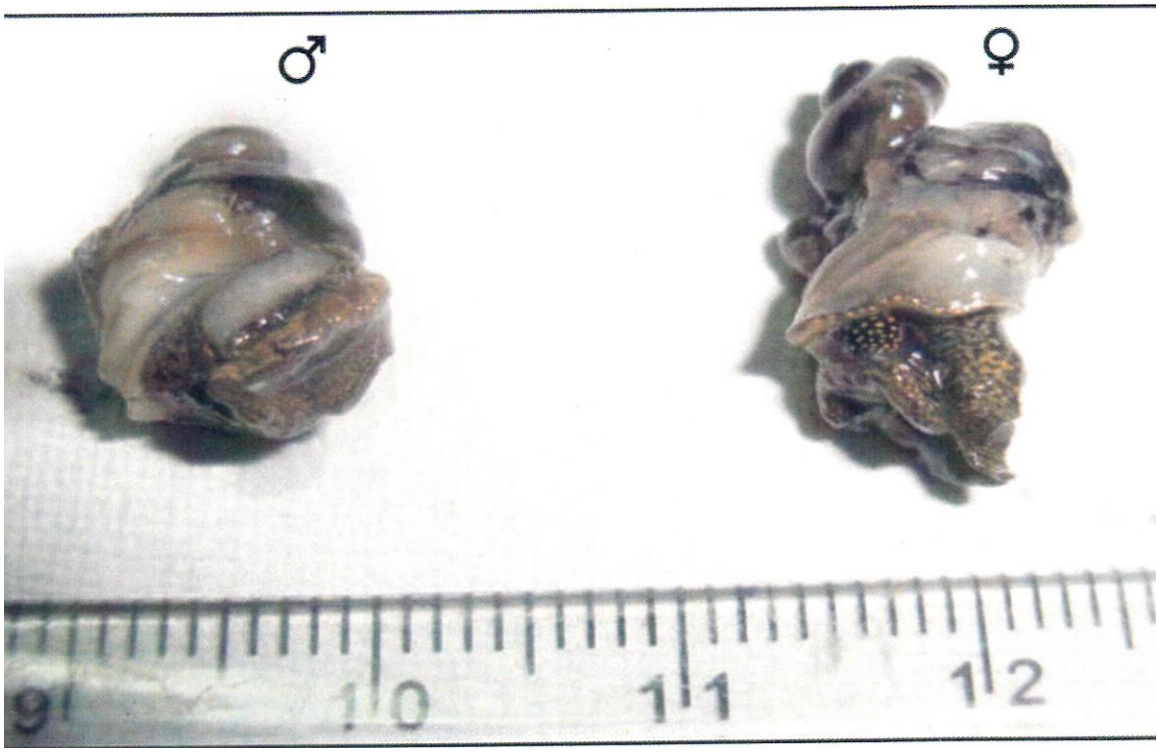

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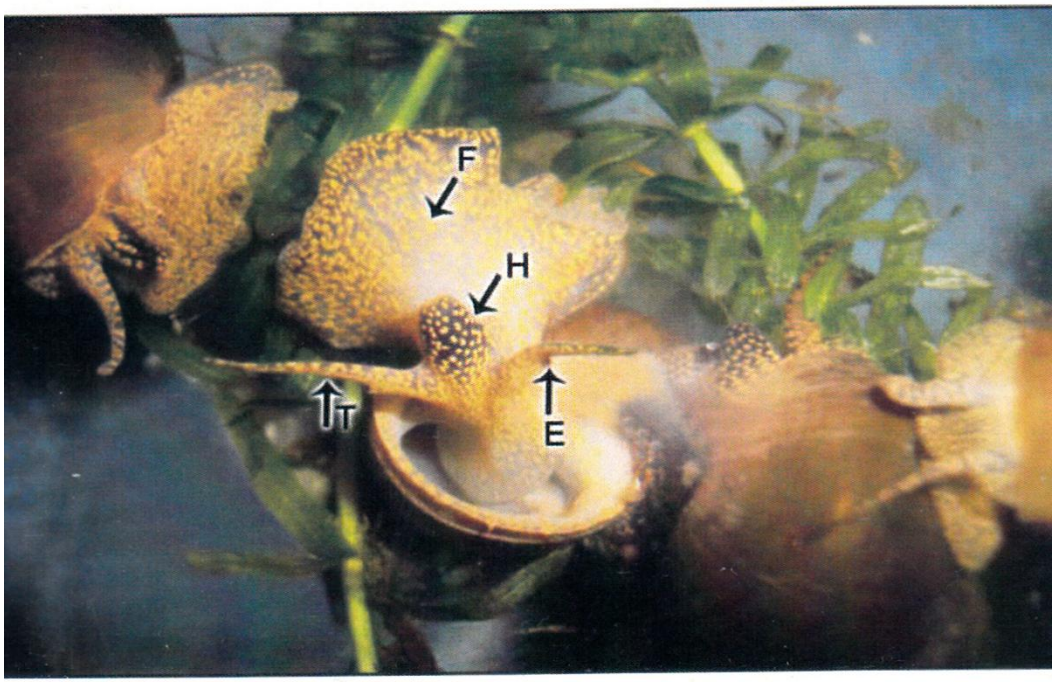
Fig: 2b: Specimen with head, foot, tentacles with eyes



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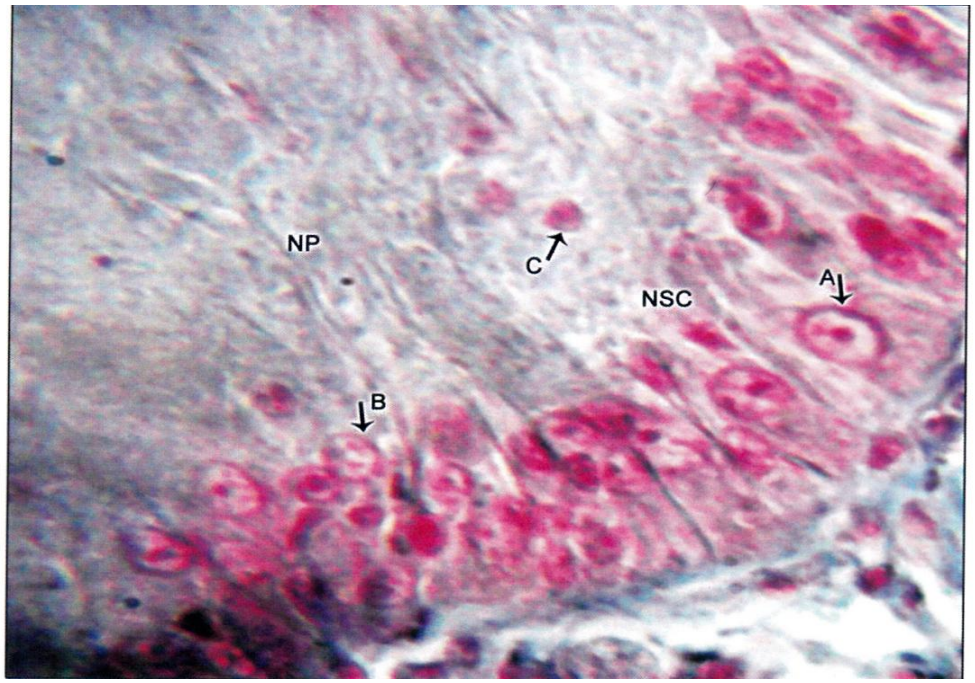

Fig. 3 : Foot showing ventral and dorsal epithelial cells, muscle fibers, and connective tissue

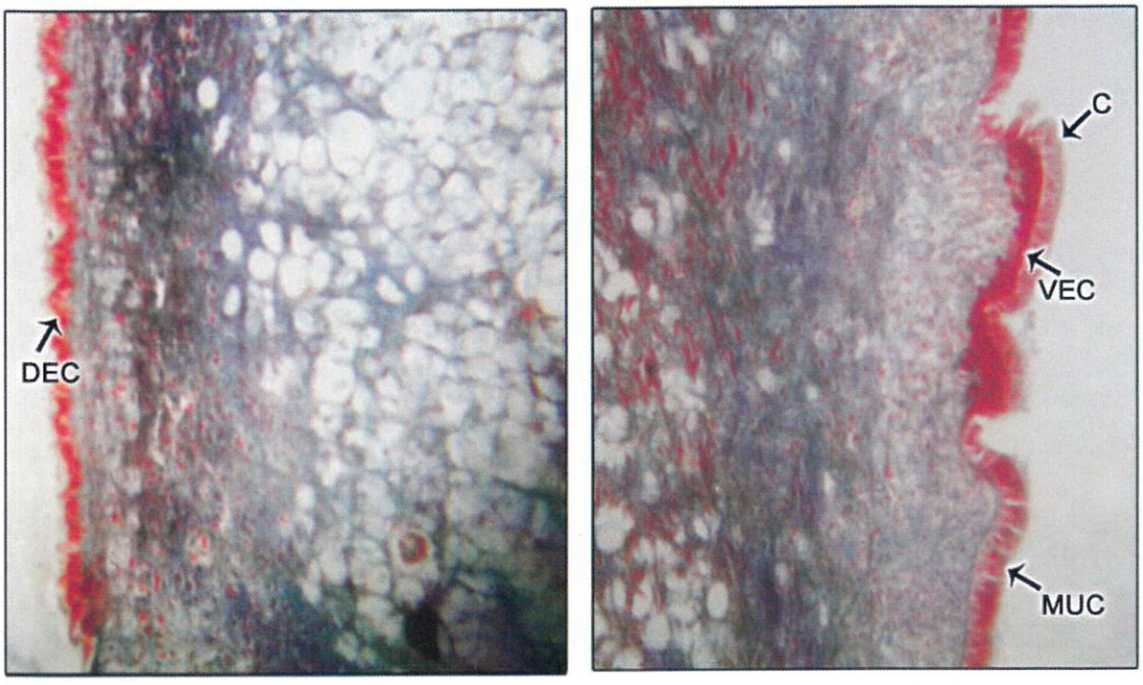

Fig. 4: non ciliated columnar epithelial cells on dorsal surface and enlarged view of cilia on ventral surface.

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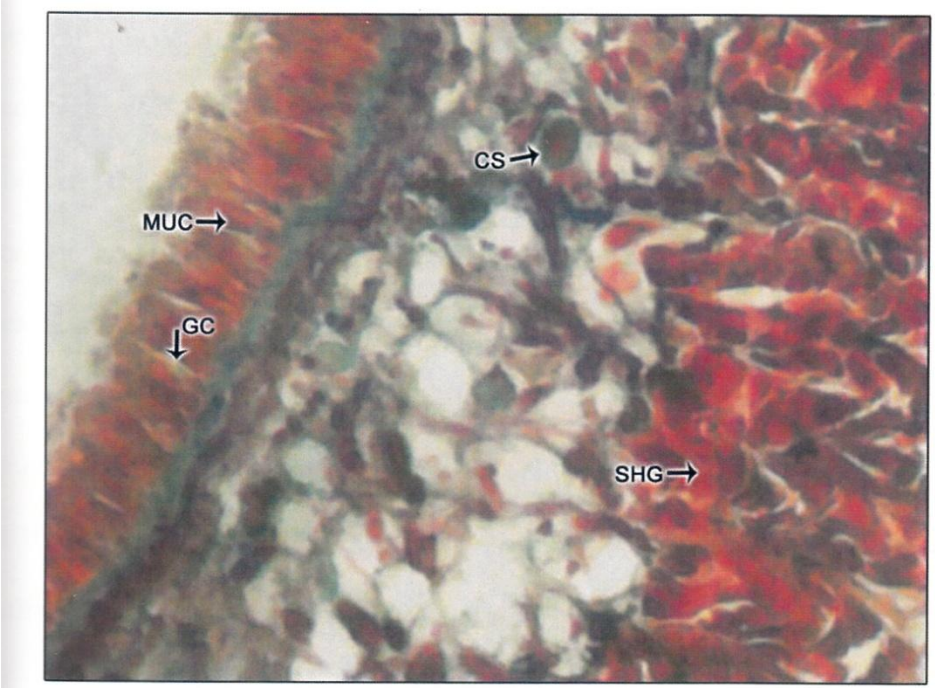

Fig 5: Enlarged view of Mantle of *Bellamya bengalensis*

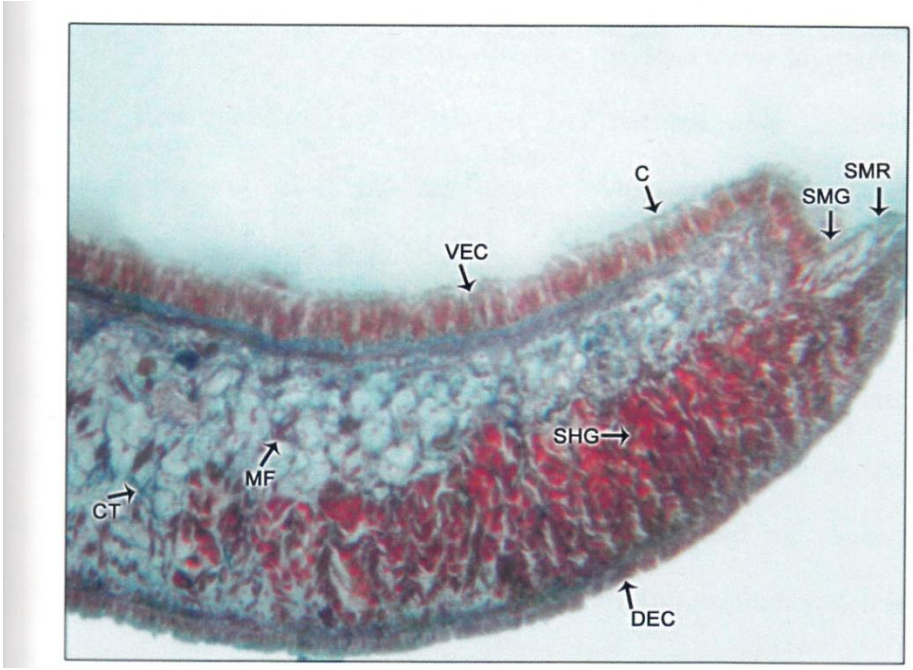

Fig. 6: Mantle showing dorsal and ventral epithelium and muscle fibers.

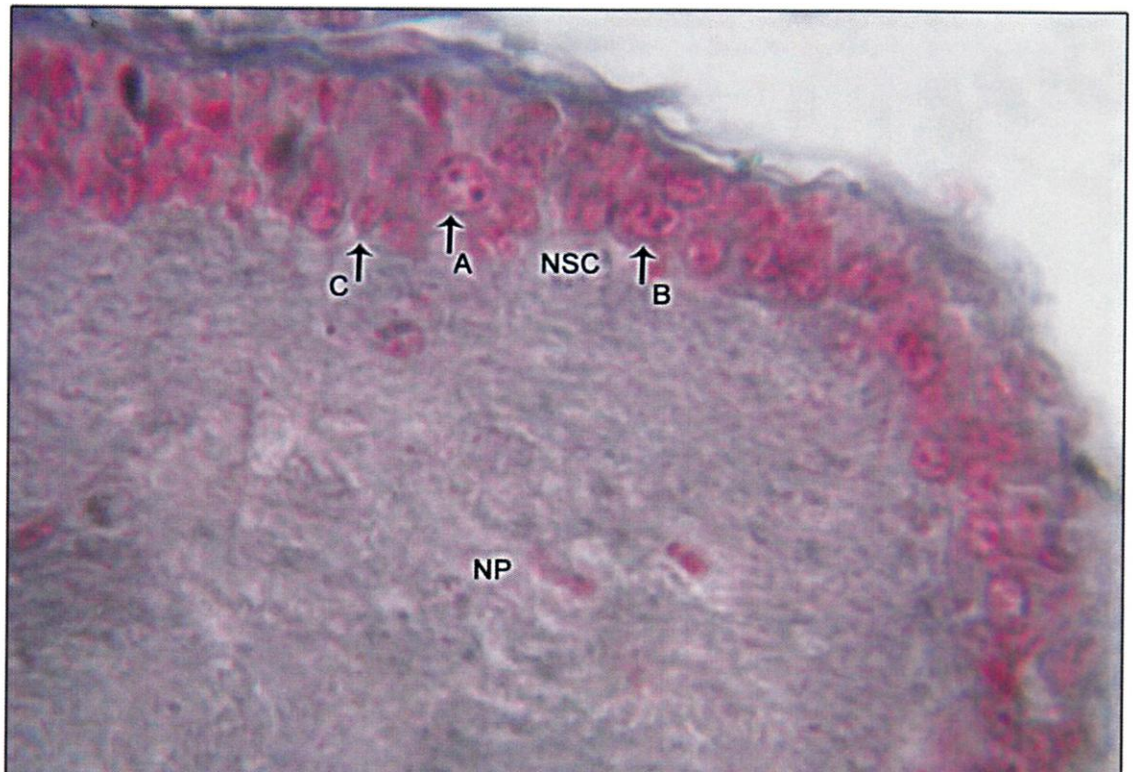

Fig .7: Nervous system of ***Bellamya bengalensis***

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