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CORPUSCLES OF STANNIUS OF A FRESHWATER CATFISH,
CLARIAS BATRACHUS

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RESUMO - O presente artigo estuda o número, localização e estrutura citológica dos corpúsculos de Stannius do bagre de água doce **Clarias batrachus**. Ocorre apenas um tipo celular e as células são eosina +, AF + e PAS +.

ABSTRACT - The present paper deals with the study of the number location and cytoarchitecture of corpuscles of Stannius of a freshwater catfish, **Clarias batrachus**. There is only one cell type and the cells are eosin +. AF + and PAS +.

INTRODUCTION

Corpuscles of Stannius (CS) are unique to holostei and teleostei because they are absent in other vertebrates. Fontaine (1964) reported hypercalcemia after Stanniectomy. Since then a number of workers (see review by Pang et al., 1980) have worked on the role of this tissue in calcium homeostasis which has led them to infer that they are important in the hypocalcemic regulation in bony fishes. The hypocalcemic factor(s) released from the CS reported thus far are - hypocalcin (Pang et al., 1974) and teleocalcin (Ma & Copp, 1978). Later on Milet et al. (1980) have reported that although CS extract administration induces hypocalcemia in eel but the same increases bone resorption in the rat. The bone resorption in rat according to them is due to parathyrine, a hypercalcemic factor from CS. Recently, CS extract - induced hypocalcemia has also been reported from non-piscine vertebrates by Leung and Fenwick (1978 - in rat), Srivastav & Swarup (1980 - in parrot) and Pandey et al. (1982 - in anurans). These facts suggest the involvement of CS in serum calcium regulation.

In this communication, light microscopic structure of CS of a freshwater catfish, **Clarias batrachus**, has been described.

MATERIAL AND METHODS

Live specimens of *Clarias batrachus* were obtained from local Ramgarh lake. The kidneys were dissected out and after recording the visual observations as to the number and disposition of CS, pieces of kidneys containing CS were fixed in Bouin's fluid and Zenker's formol. After processing with the routine paraffin methods, serial sections of 4-6 μm thickness were cut and stained with hematoxylin/eosin (H/E), aldehyde fuchsin (AF) and periodic acid Schiff's reagent counterstained with hematoxylin (PAS/H)

OBSERVATIONS

CS of *Clarias batrachus* are cream-coloured, oval, round or irregular bodies. They are scattered ventrally or ventrolaterally in the posterior two thirds of the kidney. They are either superficially attached to the kidney or embedded in the kidney (partially or completely) (Fig. 1, 2). They exhibit individual variations in their number - ranging between two and ten. CS are unevenly distributed in the kidneys.

Each CS is enveloped by a thin connective tissue sheath from which a number of septa extend into the gland. Based on the arrangement their septa and cells, four principal architectural patterns can be distinguished:

First type - in this, cells are arranged in the form of cords. The cords when cut in transverse plane present a follicular appearance (Fig. 3)

Second type - here the connective tissue septa divide the CS into several incompletely delimited lobes. When such incomplete septa are cut in transverse plane. they appear as islands scattered among the cells of the CS (Fig. 4)

Third type - in this, the septa are better developed and the union of ramifying connective tissue causes some groups of cells to become separated from the rest, forming smaller lobes (Fig. 5)

Fourth type - the CS of this type are composed of aggregates of small lobes. Each lobe consists of a number of complete or incomplete lobules.

The corpuscular cells are without distinct boundaries but they have distinct nuclei and homogenous cytoplasm (Figs. 3, 4, 5). Their cytoplasm are eosin - (Fig. 5) AF - (Fig. 3 and PAS-positive (Fig. 4). The cells are all alike and show equal response to H/E, AF and PAS/H.

DISCUSSION

The corpuscles of Stannius are lodged in the mesonephric kidney of the majority of bony fishes. Their number va

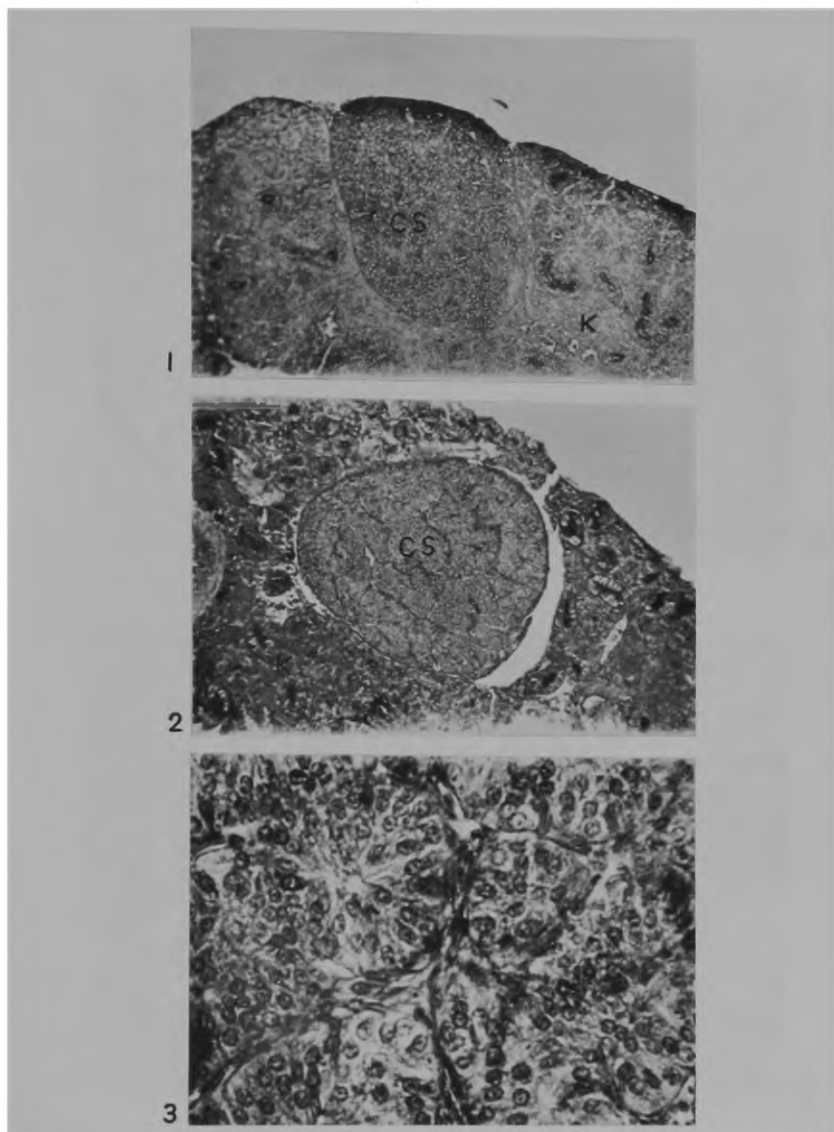


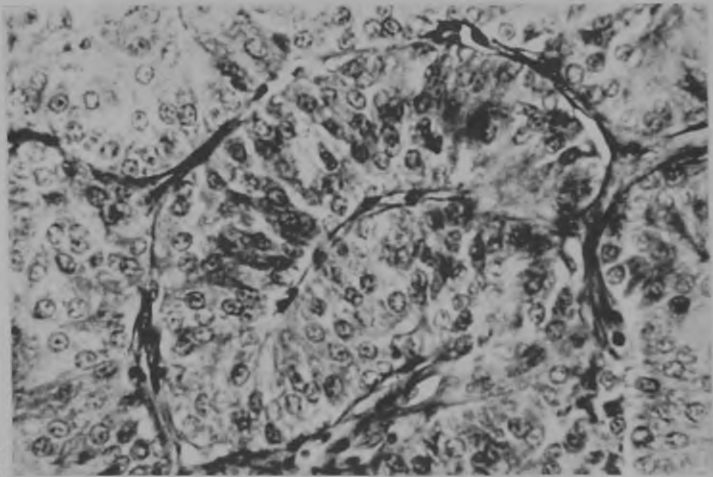
Fig. 1 - Photomicrograph of kidney (K) showing partially embedded corpuscles of Stannius (CS) Aldehyde Fuchsin X 70.

Fig. 2 - Photomicrograph of kidney (K) displaying completely embedded corpuscles of Stannius (CS) Aldehyde Fuchsin X 70.

Fig. 3 - Photomicrograph of cross section of corpuscles of Stannius of *Clarias batrachus* showing cell cords arranged in form of follicles. Aldehyde Fuchsin X 650.



4



5

Fig 4 - Photomicrograph of cross section of corpuscles of Stannius of *Clarias batrachus* displaying incompletely delimited lobes of cells. Periodic Acid Schiff's/Hematoxylin X 500.

Fig 5 - Photomicrograph of cross section of corpuscles of Stannius of *Clarias batrachus* showing lobes of cells formed by the union of ramifying connective tissue septa. Hematoxylin/Eosin X 500.

ries from species to species viz. 6-8 in *Salmo trutta* (Bauchot, 1953), 4 in *Oncorhynchus gorboscha* (Ford, 1959), 5-6 in *Oncorhynchus tshawytscha* and *O. kisutch* (Nadkarni & Gorbman, 1966), 3-7 in *Clarias lazera* (Rizkalla, 1969), 4-10 in *Salmo salar* (Heyl, 1970), 2-6 in *Xenentodon cancila* (Gupta & Shrivastava, 1971), 2-3 in *Labeo rohita* and *Cirrhinus mrigala* (Belsare, 1973), 2-4 in *Heteropneustes fossilis* and *Mystus vittatus* (Belsare, 1973; Ahmad & Swarup, 1979), 1-2 in *Rasbora daniconius* and *Pseudoechencis sulcatus* (Belsare 1973, Gill & Punetha, 1977) 1 in *Horaichthys setani* (Belsare, 1973), 332 in *Amia calva* (Youson et al., 1976), 1-3 in *Notopterus notopterus* (Swarup & Ahmad, 1978) and 4-5 in toad fish (Bhattacharya & Butler, 1978). In the present study there are 2-10 corpuscles scattered ventrally or ventrolaterally in the posterior two thirds of the kidney. Garrett's (1942) observation that adult catfishes normally have single CS is in contradiction to the above statement.

According to Bauchot (1953) the most primitive position of CS is an anterior one about the midway of the length of kidney and, the most evolved, a posterior one, much nearer the vent, although there are exceptions, as in the salmonids and *Solea* where the location of CS is not consistent with the systematic position of the fishes. Garrett (1942) is of the opinion that large number of corpuscles is a primitive condition and the presence of two corpuscles is an advanced condition. But Belsare (1973) after studying the number and position of the corpuscles in ten species of teleosts belonging to four different orders concluded "the variation in the number and position of CS seems to be an embryological speciality rather than it has any evolutionary or taxonomic significance" Ahmad & Swarup (1979) also observed that there exists no correlation between the number and position of CS of *Mystus vittatus* and its taxonomic position. The variation in number (2-10) and distribution (i.e. on the ventral/ventrolateral surface of the posterior two thirds of the kidneys) of CS in *Clarias batrachus* is also in contrast to the suggestions made by Garrett (1942) and Bauchot (1953) correlating the corpuscular number and position to the phylogeny of the fish.

Krishnamurthy & Bern (1969) have classified the CS of teleosts into 4 types on the basis of the arrangement of cells and the nature of connective tissue septa in the 28 species they studied. Accordingly Johnson (1972) reported type IV CS in *Mugil cephalus*; Swarup & Ahmad (1978) types II and III in *Notopterus notopterus*; Bhattacharya & Butler (1978) type II in the toadfish. In the present study all the four structural arrangements have been observed which are in agreement with those reported from *Heteropneustes fossilis* (Subhedar & Prasada Rao, 1976) and *Mystus vittatus* (Ahmad & Swarup, 1979) Subhedar & Prasada Rao (1976) are of opinion that types I - IV described by various authors are not characteristic features for a species as they observed in *Heteropneustes fossilis* that the same section of CS exhibits differences in architectural pattern.

The CS of *C. batrachus* displays only one cell type (PAS + ve and AF + ve). Similar reports have been made by Ford (1959), Belsare (1973), Gill & Punetha (1977), Swarup & Ahmad (1978) and Ahmad & Swarup (1979). On the other hand a number of workers (Nadkarni & Gorbman, 1966; Krishnamurthy & Bern, 1969; Lopez, 1969; Bhattacharya & Butler, 1978; Srivastav, 1982) have observed two cell types in the CS (PAS + ve, AF + ve and PAS - ve, AF - ve).

The ultrastructural studies also reveal two cell types (Krishnamurthy & Bern, 1969; Wendelaar Bonga & Greven, 1975; Meats et al., 1978; Wendelaar Bonga et al., 1980). Of these two types, cells with a type-1 like structure are present in all the fishes studied so far (Krishnamurthy & Bern, 1969; Hiroi, 1970; Tomasulo et al., 1970; Carpenter & Heyl, 1974; Wendelaar Bonga & Greven, 1975; Youson & Butler, 1978; Bhattacharya & Butler, 1978; Meats et al., 1978; Wendelaar Bonga et al., 1980).

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