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Seasonal changes in the histological structure of thyroid of the catfish *Clarias magur* (Hamilton, 1822) from Uttar Pradesh, India

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Abstract
Seasonal changes of the thyroid gland structure was examined in the catfish *Clarias magur* collected from Ganga River drainage in Uttar Pradesh, India. The thyroid gland of fish is in the form of a general diffused pattern of the teleostean thyroid. It showed less activity in the winter months and was found the minimum follicular cell height in the month of November to January i.e. 4.66 ± 0.38, 4.18 ± 0.62 and 4.75 ± 0.54 µm respectively. Only one peak of thyroidal activity of *Clarias magur* was observed in the month of August with cell height of 7.90 ± 0.22 µm.

Keywords: *Clarias magur*, thyroid, histology, seasonal

1. Introduction
Fish is not only used for human consumption, but also used as a good source of animal protein, which provides us with cheap and high-quality protein (Anderson and Mitchum, 1974) [1]. Catfish is considered as the cheapest source of protein, calcium, phosphate, iodine and vitamins (Dadzie and Wangila, 1980) [2]. The role of the thyroid gland in vertebrate physiology has been, and is still, the subject of many studies (Gorbman, 1969; Marine, 1913; Dufou *et al*., 2012) [3, 4, 5]. However, the anatomical structure of the thyroid gland has not been reported among fishes and the question of its evolution within this group has been poorly studied. A few studies related to the thyroid structure only in some subgroups without taking into account the diversity of this clade (Chanet & Meunier, 2014) [6]. In a few words, the thyroid is often viewed as a diffuse gland in "lower" vertebrates (i.e. "fishes"), while in "higher" vertebrates (mammals, birds and relatives) this gland presents a compact structure (Porreca, 2010; Fagman and Nilsson, 2010) [7, 8]. There are some views of many researchers that possibly thyroid also contributes to the reproductive physiology of fish, therefore, it appeared that a study on the cyclic activity of thyroid might be useful to understand the reproductive character of the fishes. However, there is no detailed study on the histology of thyroid of catfish *Clarias magur*, which was described by Hamilton (1822) [9] from Gangetic provinces. Therefore, in the present paper histology of thyroid of the catfish and its seasonal changes are provided.

2. Materials and Methods
Live, matured wild specimen of *Clarias magur* were collected from Ganga canal around the border of Unnao & Raibareli Districts of Uttar Pradesh, located on the side of Ganga River during 2009-11. Species identity of the specimens collected was made following Ng and Kottelat (2008) [10]. Live specimens have immersed in 10% neutral formalin & required cuts have been made to allow quick & deep penetration of fixative.
After weighing fish the lower jaws containing ventral aorta and part of gills, were cut & fixed in 10% neutral formalin for thyroidal histology. These parts were decalcified, by using HNo3 in 5% formalin solution. The decalcifying solution was changed every third day until the decalcification completed. Decalcified tissues were processed by paraffin method & were serially sectioned at 6-7 microns, the sections were stained in eosin haematoxylin & also in orange G-acid fuchsin– light green & haematoxylin combination.

3. Results & Discussions
The thyroid gland of *Clarias magur* is not a compact encapsulated mass rather it is in the form

of different patches around the ventral aorta and afferent branchial arteries and these scattered follicles are seen all over the pharyngeal region. Thus it has the general diffused pattern of the teleostean thyroid. However, ectopic masses of thyroid follicles, if any, were not traced out in the present study. Seasonal changes in the follicular cell height of the thyroid Follicles were marked. It showed less activity in the winter months and was found the minimum in the month of November to January i.e. 4.66 ± 0.38, 4.18 ± 0.62 and 4.75 ± 0.54 µm respectively (Fig. 1). In these months the follicular cells were almost flat with dense colloid without vacuolization in the central area. From February onward, there was an increase in cell height of the follicles and numerous small vacuoles showed their presence in the peripheral region of the colloid during April - May (Fig. 2) and their follicular cell height also increased to 6.10 ± 0.44 µm in May. The increase in the cell height became more pronounced in subsequent months reaching the maximum in the month of July / August i.e. 7.38 ± 0.30 and 7.90 ± 0.22 µm respectively (Fig. 3). The increase was found statistically significant at 5% level (PO.O5) when compared with the resting stage of the ovarian cycle. The follicular cells at this stage became cuboidal with the prominent nucleus. Numerous vesicles were seen in the colloids. From September (6.76 ± 0.28 µm) onwards a slow declination in the epithelial cell height was observed. From October onwards more colloid accumulated within the follicles and the follicular cell height gradually decreased to 4.66 + 0.38 microns in November and reached the minimum in December (4.18 ± 0.62 µm). Evidence for the seasonal activity of teleostean thyroid is primarily derived from histological and cytological studies made throughout the year. The epithelial cell may range from a flat squamous type through cuboidal to columnar and this change in shape is reflecting the activity of the follicle. Reports on the cyclic activity of the thyroid in different species of fishes indicate that the thyroids have either one or two peeks of activity. Fortune (1955) [11] in Phoxinus has reported two peeks - one in April/May and other in August/September (Swift, 1959) [12] in immature *Salmo trutta* has also observed to peaks - one in spring in which the epithelial cell height increased but in another peak during mid-summer, no change in epithelial cell height was observed. Singh (1968) [13] in *Mystus vittatus* and *Esomus danricus* have also reported two peaks, Sathyaneshan (1974) [14], on the basis of iodine uptake, has suggested two peaks of thyroidal activity in *Amphipnous cuchia* and *Puntius sophore*; a high peak in June/ July coincided with their breeding period and a small peak in October, which could not be correlated with any physiological activity. However, Hoar (1939) [15] has reported only one peak in Salmon. Singh *et.al*. (1974) [16] and Pandey & Munshi (1976) [17] have also reported only one peak of thyroidal activity in *Heteropneustes fossils*, which coincided with their breeding phase. In the present study also, only one peak of thyroidal activity was observed in July/August.

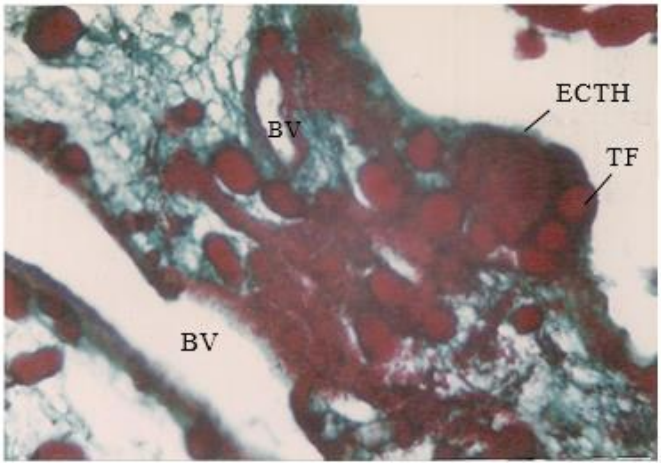

Fig 1: Photomicrograph of part of the section thyroid of female Clarias magur during November. Masson's trichrome. X150. BV-Blood Vessels; C-Colloid; ECTH-Epithelial Cell Heigh; TF-Thyroid Follicles

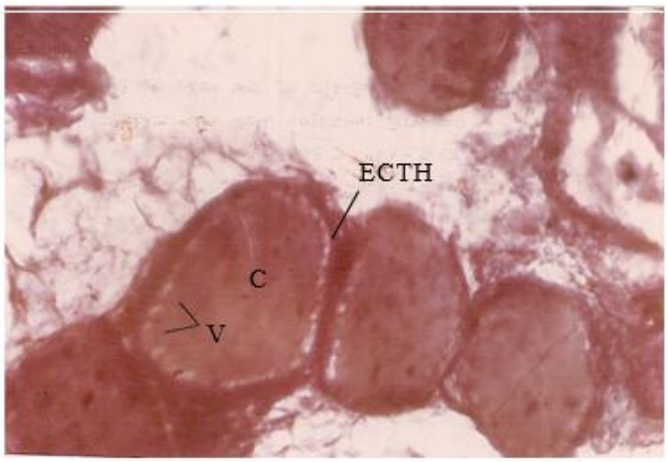

Fig 2: Photomicrograph of the part of the section thyroid during May showing vacuoles near the periphery of the colloid of female Clarias magur. HE Stain. X 280. C. Colloid; ECHT-Epithelial Cell Height; V. vacuoles

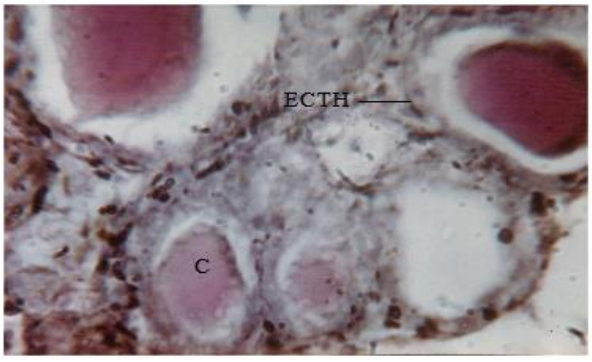

Fig 3: Photomicrograph of the part of section of thyroid during August of female Clarias magur. HE stain X 280. C. Colloid; ECTH- Epithelial Cell Height.

4. Conclusion

The present studies provide the seasonal changes of the histological structure of thyroid gland in the catfish *Clarias magur* collected from Ganga River drainage in Uttar Pradesh, India. The thyroid gland of the fish is in the form of different patches around the ventral aorta and afferent branchial arteries and these scattered follicles are seen all over the pharyngeal region. Thus it has the general diffused pattern of the teleostean thyroid. It showed less activity in the winter months and was found the minimum follicular cell height in the month of November to January. Only one peak of thyroidal activity of *Clarias magur* was observed in the month of August with cell height of 7.90 ± 0.22 µm.

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6. References

1. Anderson DP, Mitchum DL. Atlas of trout histology textbook, Wyoming game fish department Cheyenne. Wyoming, 1974.
2. Dadzie S, Wangila BBC. Reproductive biology, length-weight relationship and relative condition of ponds raised, Tilapia zilli. J. Fish Biol. 1980; 17:243-253.
3. Gorbmen A. Thyroid function and its control in fishes. Fish Physiology. The Endocrine System. Academic Press Inc. New York & London, 1969; 2.
4. Marine D. The metamorphosis of the endostyle (thyroid gland) of Ammocoetes branchialis [larval land-locked Petromyzon marinus (Jordan) or Petromyzon dorsatus (Wilder)]. J. Exp. Med. 1913; 17(4):379-395.
5. Dufour S, Rousseau K, Kapoor BG. Metamorphosis in Fish. CRC Press & Enfield, N.H: Science Publishers, 2012, 260.
6. Chanet B, Meunier FJ. The anatomy of the thyroid gland among "fishes": phylogenetic implications for the Vertebrata. Cybium. 2014; 38(2):89-116.
7. Porreca I. The zebrafish model to identify new genes involved in thyroid development. Thèse de doctorat Univ. Federico II, Napoli, Italy, 2010, 71.
8. Fagman H, Nilsson M. Morphogenesis of the thyroid gland. Mol. Cell. Endocrinol. 2010; 323(1): 35-54.
9. Hamilton F. An account of the fishes found in the river Ganges and its branches. Edinburgh & London. 1822; i-vii + 1-405, Pls. 1-39.
10. Ng HH, Kottelat M. The identity of Clariasbatrachus (Linnaeus, 1758), with the designation of a neotype (Teleostei: Clariidae). Zoological Journal of Linnean Society, 2008; 153:725-732.
11. Fortune PY. Comparative studies of the thyroid function in teleosts of tropical and temperate habitats, *J. Exp. Biol*. 1955; 32:504-513.
12. Swift DK. Seasonal variations in the activity of the thyroid gland of yearling brown trout (Salmo trulta L.). J Exptl. Biol. 1959; 36:120-125.
13. Singh TP. Seasonal changes in radioiodine uptake and epithelial cell height of the thyroid gland in the freshwater teleost *Esomus dandricus* (Ham) and *Mystus vittatus* under varying condition of illumination. *Z. Zellforsch*. 1968; 87:422-428.
14. Sathyaneshan AO. Heterotropic thyroid function in some teleost fishes. Quart. J Surg. Sci. 1974; 10(384):214-221.
15. Hoar WS. The thyroid gland of the Atlantic Salmon. J Morph. 1939; 65:259-292.
16. Singh BR, Thakur RN, Yadav BN. The interrelationship between the changes in the internal, gonadal and thyroidal tissues of air-breathing fish, *Heteropneustes fossilis* (Bloch) at different periods of the breeding cycle. J Endocrinol. 1974; 61:309-316.
17. Pandey BM, Munshi JSD. Role of the thyroid gland in regulation of metabolic rate in the air-breathing siluroid fish: *H. fossilis* (Bloch). J Endocrinol, 1976; 69:421-425.