Bull. Nat. Inst Oceanogr. & Fish., ARE, 16 (1) 1990: 27 - 32.

A PRELIMINARY INVESTIGATION ON THE FEMALE REPRODUCTIVE SYSTEM OF BAGRUS DOCMAC (FORSK.) A SILUROID CATFISH IN THE NILE.

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ABSTRACT

Specimens of female **Bagrus docmac** (35-71 cm in total length) were collected regularly for 12 months. Their ovaries were studied histologically. Oogensis and the histological appearance of the auxiliary tissues were described. The seasonal variation of the auxiliarly tissue and its relation to the condition of the ovary were studied.

INTRODUCTION

Bagrus docmac is one of the Nile catfishes. This species has atracted a very little attention. Only three investigations were carried out it in Egypt and Sudan as far as the available literature indicates; Bishai, (1970), El-Sedfy, (1977) and El-Sedfy, (1977) and El-Sedfy and El-Bolock (1987). Besides Chilvers and Gee, (1974) and Okach and Dadzie, (1988) who studied this fish in Lake Victoria. The five were mainly interested in the fishery biology of B. docmac as length-weight relation ship, food and feeding habits, growth rate, fecundity and spawning season.

The information about the morphology or histology of the reproductive system of this species is not available. Also, there is no information about the function of the different tissues of either male or female gonads during the annual reproductive cycle.

The present study aims to throw lights on the female reproductive system, specially the structure and possible function of the auxiliary tissue.

MATERIAL AND METHODS

Specimens of B. docmac (35-71 cm in total length) were collected from April 1988 to March 1989, from the Nile, south of Cairo. Fishes were dissected and the ovaries were removed, fixed in aqueous Bouin's solution, then dehydrated through ascending series of ethanol solution (50-100 %), cleared in cedar wood oil and embedded in paraffin wax. Six um thick sections were cut and stained with Mayer's haematoxylin.

RESULTS

The paired ovaries of B. docmac are tubular in shape. The two lobes are fused posteriorly in a Y shape. The fused posterior portion is about 1/3 of the whole organ. The ovary is enclosed in a tunica albuginea of fibrous connective tissue covered by mesothelium. The ovarian wall of mature fishes is usually supported with a large amount of smooth muscle fibers. The ovarian lamellae are supported with fibrous connective tissue.

In the anterior region of the ovary, the ovarian lamellae extend from both lateral sides and project toward the center. The dorsal and ventral sides are free from lamellae and covered with a thin irregular layer of simple squamous epithelium. In the middle and posterior parts, the lamellae extend from lateral sides. Both the dorsal and ventral sides are covered with a branched structure of tissue which vary in shape, thichness and activity with different conditions of the ovary. This branched structure consists of fibrous connective tissue and muscle fibers as an extension of the ovarian wall, also blood capillaries are present. A contineous layer of simple columner cells covers those branches (Fig. 1). The terminals of the simple columner layer are connected with the terminals of the ovarian lamellae (Fig. 2).

Immature ovary:

All specimens less than 45 cm in total length are sexually immature. In a specimen 43 cm in total length collected in June 1988, the ovary had small oocytes lying on the lateral sides enclosed in primitive lamellae and a long, thin and complex branched structure, the auxiliary tissue hanging from the dorsal side (Fig. 3).

Oogensis:

The developmental stages of oocytes in B. docmac are similar to that of most teleosts. The stages from oogonia to mature oocyte are as follows:

1- Chromatin nucleolus stage: in which the oogonia are found in nests, the nucleus is about 1/2 the diameter of the cell, bearing a strongly basophilic nucleolus and strands of ramifying chromatin.

2- Perinucleolus stage: in which the nucleus is characterized by its smooth outline and peripheral arrangement of a number of nucleoli along its inner side. The oocyte diameter not more than 200 um ooplasm is more basophilic than any other stage.

3- Yolk vesicle stage, this stage is characterized by the appearance of the yolk vesicles in the peripheral zone of ooplasm. As the oocyte grows, the vesicles increase in size and number. Fat vesicles do not show their appearance around the nucleus.

4- Yolk stage, in which yolk deposition takes place. The nuclear membrane shows signs of dissolution. The number of nucleoli increases. The follicle consists of cuboidal cells with central nuclei. Zona radiata is very thin, about 1 um and not differentiated.

5- Mature oocyte, in which the yolk globules undergo homogenous. The nucleus is small with a large number of nucleoli. The nuclear membrane disappears. The follicle is now of columner cells, and the zona radiata is still as before.

Auxiliary tissue:

The appearance of the branched auxiliary tissue shows marked variation with different maturity stages of the ovary as follows:

1- Early mature ovary: The branches are short, thin and consist of primary and secondary branches. The former ones are supported with fibrous connective tissue and muscle fibers as well as blood capillaries, while no muscle fibers are present in the latter tissue. The columner cells have a moderate, height (about 12 um) with a large centrally located nucleus. Mitotic figers are also frequent in such cases (Fig. 4).

2- Pre-spawning period: In which the primary and secondary branches increase in number, thickness and height due to the increasing amount of fibrous connective tissue and muscle fibres. Also, the amount of blood cells is gradually increased in the secondary branches (Fig. 5). By the end of this period, the muscle fibers are dominant in the primary branches while the secondary ones become engaged with blood cells. The columner epithelial cells are short (10 um) in height with high mitotic activity (Fig. 6).

3- Spawning period: According to the spent specimens incountered during this study, the spawning season of B. docmac is long, April through September, and may extend to the end of October. During this period, both primary and secondary branches increase in size and amount of blood cells increases in the secondary branches. The muscle fibers in the primary branches become stretched and the whole structure seems to apply a pressure on the oocytes (Fig. 7). B. docmac is a partial spawner, therefore partially spent females are frequent during the spawning season. In this case, empty follicles, unspawned yolky oocytes and a vast amount of perinucleolus stage oocytes are present. The auxiliarly branches tissue occupy a considrable area of the ovary and show certain signs of degeneration (Fig. 8).

4- Post-spawning period: During this period some stages of regression are observed. A) The amount of blood cells in the secondary branches undergo reduction and a few blood capillaries are present. B). Mitotic activity is completely absent, and the outline of the columnar cells become markedly detected. C) The size of the primary and secondary branches are gradually reduced (Fig. 9).

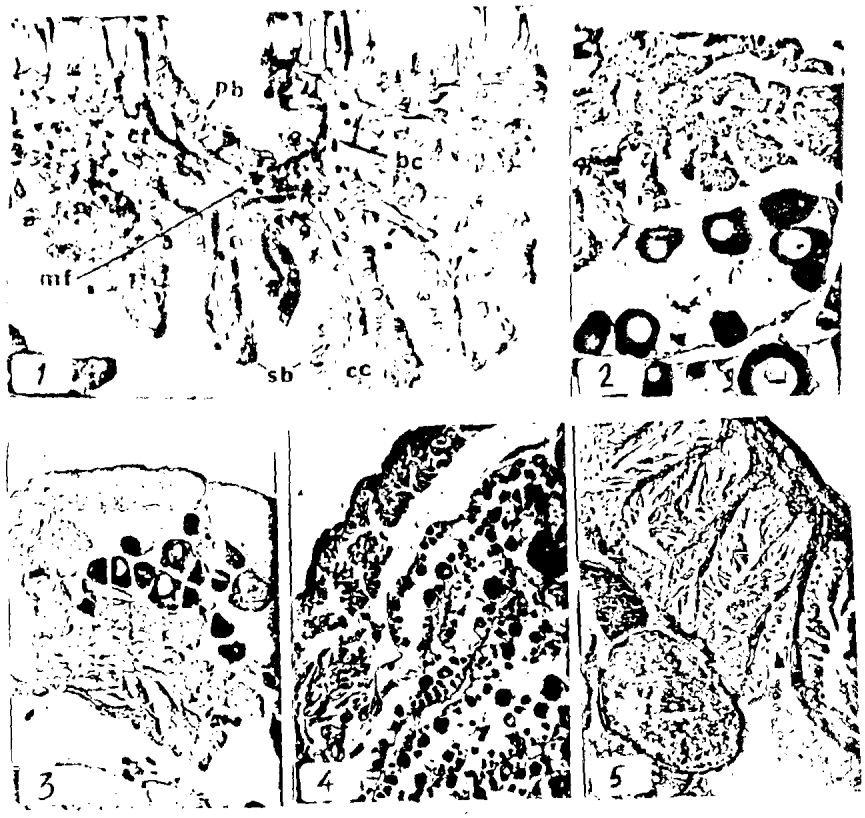

FIG. 1. Part from the auxiliary tissue showing primary branch (Pb), secondary branch (Sb), fibrous connective tissue (ct), muscle fibers (mf), blood caoillary (Bc) and columner cells (cc). 400X.

FIG. 2. Part from the ovary in the resting period (December) showing the connection between auxiliary tissue and ovarian lamella (arrow) 150 X.

FIG. 3. Part from immature ovary in July showing, primitive lamella (arrow) and small oocytes. 160 X.

FIG. 4. Part from early mature ovary in December showing auxiliary tissue and long ovarian lamellae. 50 X.

FIG. 5. Part from the ovary at the beginning of prespawning period in March showing auxiliary tissue and small yolky oocyte. 35 X.

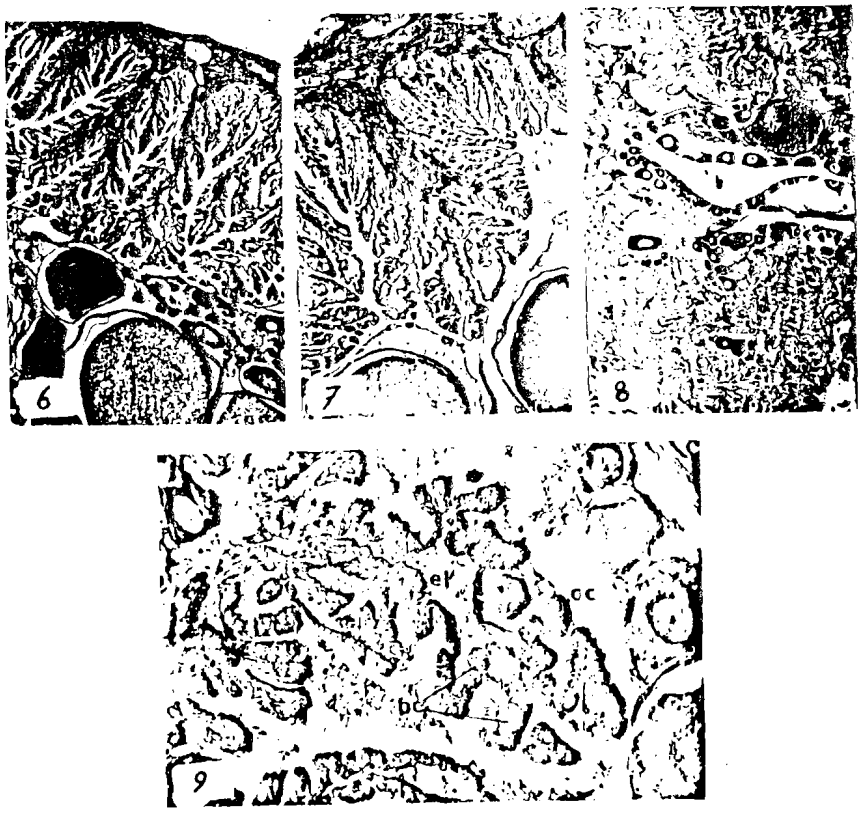

FIG. 6. Part from the ovary at the late prespawning period showing auxiliary tissue. 35 X.

FIG. 7. Part from the ovary in spawning condition (July) showing large amount of blood cells in the secondary branches of the auxiliary tissue. 35 X.

FIG. 8. Part from a partially spent ovary in August showing regression and degeneration of the auxiliary tissue and many new occytes of the new crop. 86 X.

FIG. 9. Part from the ovary in postspawning period showing degeneration of auxiliary tissue, empty lumen (el), blood capillary (bc) and columner cells (cc). 350 X.

DISCUSSION

Based on the present investigations, female B. docmac less than 50 cm in total length is sexually immature. Also this species is fractional spawner as partially spent females are frequent during the spawning season. El-Sedfy and El-Bolock (1987) found that B. docmac attains its first sexual maturity at the third year of life, about 50 cm in total length, and stated that this species is not a fractional spawner.

Concerning the occurrence of the auxiliary tissue, it is clear that this tissue is present in immature ovaries of the fishes less than 45 cm in total length and also in the ovaries of sexually mature fishes more than 50 cm in total length. It is present only in the middle and posterior portions of the ovary and absent in the anterior portion, also not present in both lateral sides in which the ovarian lamellae are present. Also the relation between the condition of the auxiliary tissue and the condition of the ovary is clear. With regard to the variation in the composition, size and degree of activity of the auxiliary tissue with different condition of the ovary, this tissue may be of multifunction; such as transportation of nutritive materials in developing ovary, applying pressure on the oocytes in case of spawning, absorbtion of the remains of degenerating follicles and atretic oocytes, and it may act as an endocrine gland for secretion of sex hormones. Also this tissue may have a role in creation of the ovarian lamellae. However, the subject is not yet clear. Further histochemical biochemical and ultrstructural studies are needed to clearify the concept of the auxiliary tissue in Bagrus docmac.

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