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Abnormal development in the ovaries of *Oreochromis niloticus* Linn (Perciformes: Cichlidae) in Nigeria

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Abstract: Five specimens of *Oreochromis niloticus* with abnormal ovaries were encountered in Oba Dam Reservoir, a man-made lake situated in Ibadan, Nigeria. One of those specimens was found to possess two pairs of ovaries and the rest one pair each with very unequal lobes. The fecundity of mature eggs was estimated. The fat, protein and water content of these eggs were determined and compared with those of normal eggs. The result did not suggest any biochemical difference between the eggs from normal and abnormal ovaries.

MATERIAL AND METHODS

The specimens of *O. niloticus* were collected from Oba Dam reservoir, a man-made lake situated within the campus of University of Ibadan, Nigeria. They were captured using a fleet of gill nets, cast net and traps. Sampling period was between November 1980 and October 1983. The total and standard lengths were measured to the nearest mm. Total weight, gutted weight and gonad weight were taken to the nearest mg. The fecundity of ripe females was estimated by the gravimetric method and the egg-size was measured along the longest axis with the aid of a calibrated micrometer eye piece. Protein and fat were determined as described in ADAC (1975), while the percentage of water content was obtained using the formula:

$$P = \frac{100\,(F-D)}{F}$$

where P = percentage of water

F = fresh weight in grams

D = dry weight in grams.

Dried weight figures were obtained after the sample kept in an oven at 50°C had maintained a constant weight.

RESULTS AND DISCUSSION

During the course of morpho-anatomical analysis, the abnormalities in the ovary of some of the specimens were observed (Figs. 1 - 3).

Measurement and analysis of some parameters of the specimens with abnormal ovaries are shown in Tables 1 and 2. There were three specimens of *O. niloticus* with a miniature or reduced left lobe while two other specimens had their left lobe highly distended due to accumulation of eggs. The relative weight of the ovary shows that the ovary contributed between 19.9 and 43.1 per cent to the body weight, while the fecundity of each of the two mature specimens was 8,110 and 10,712.

No fish below a size length of 17.0 cm had abnormal ovaries.

Eggs from nomal and abnormal ovaries were analysed for some of their major components.

The occurrence of unusual distension of either of the lobes of the ovary suggests that the two lobes were equally susceptible to this aberration (Table 1). In this case the specimen had two ovaries; one of normal size with 2 lobes, the other, with one greatly-distended lobe (Fig. 2). This is very rare in *O. niloticus.* A situation whereby between 20% and 43% of the energy is expended on egg production is biologically a waste of gonadial materials and economically

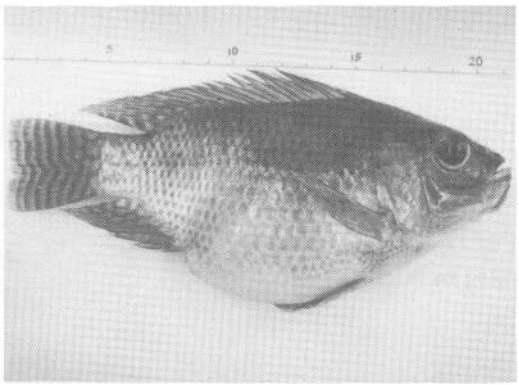

Fig. 1. Form and appearance of the abdomen of *O. niloticus* with abnormal ovary.

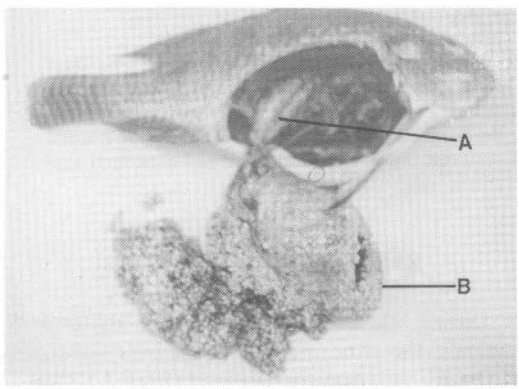

Fig. 2. Specimen of *O. niloticus* with two pairs of ovaries
A. Young mature pair.
B. Older ovary (membrane ruptured).

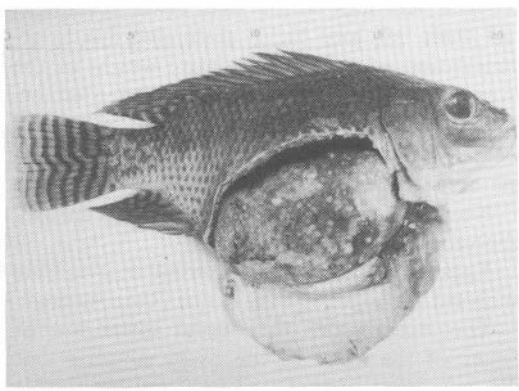

Fig. 3. Specimen of *O. niloticus*, showing the abnormal ovary lobe.

undesirable for a fish farmer whose interest is in the production of fish protein.

The similarity in sizes of eggs in a particular ovary is an indication that the eggs developed synchronously. The cause of such a massive development of eggs in a mouth brooder such as *O. niloticus* is not yet known, but it could be inferred from the available data that such a condition could be consequent to a break-down in hormonal and nervous coordinations during the breeding period.

Lagler *et al.* (1962) had earlier reported that if a proportionately large quantity of eggs were not shed during any spawning period, the ovary might be unable to reabsorb them. The mouth of the oviduct could be plugged by a mass of fibrous tissues and future passage of eggs barred. This, they said, might be a probable reason why some individual fish became egg-bound; however, I did not detect such fibrous tissue in the common duct of the lobes of the ovary.

Analyses of protein, fat and water content of the eggs (to show if they were biochemically different from eggs from normal ovaries in their food components) did not suggest any appreciable differences. Fat content of eggs from abnormal ovaries was however lower. The implication of this is that there could be inadequate stored fat which could be oxidized to provide the energy necessary for growth during embryonic development should these eggs be viable. Lipids are known to retain potential energy for the organism in a readily utilizable form which can be used for the many complex metabolic reactions that must have a source of endergonic energy (Kay 1966).

Further investigations into the causes of lavish production of eggs in *O. niloticus* will make a very useful and exciting contribution to the study of reproductive biology of the mouth brooding cichlids.

I am very grateful to S. O. Fagade, Head of the Hydrobiology and Fisheries Unit, University of Ibadan, for making facilities available and to M. Kolade of the Department of Works of the same university for assistance in specimen collection.

RESUMEN

Se examinó cinco especímenes del pez *Oreochromis niloticus* del Lago Oba, Nigeria. Una hembra tenía dos pares de ovarios, el resto un par con lóbulos marcadamente desiguales. No hay diferencias bioquímicas entre los huevos de ovarios normales y anormales.

Cases of inequality in size of the lobe of each ovary are occasionally encountered in

TABLE 1

Measurement of some parameters of the specimens with abnormal ovaries

	Total length (cm)	Total body weight (g)	Gonad Weight Right Lobe (g)	Gonad Weight Left Lobe (g)	Gonad wt/body wt (%)	Gonad Developmental Stage	Egg size in (mm)	Fecundity
	22.5	320.8	125.8	4.7	40.7	5	1.8	10,712
	20.0	131.0	7.5	18.6	19.8	3	1.0	–
	18.1	133.1	39.7	10.3	37.6	3	1.2	–
	21.4	264.8	84.3	15.8	37.8	4	1.4	–
	17.3*	114.5	11.2	38.1	43.1	5	2.1	8,110
Mean	19.9	192.8	53.7	17.5	35.8	–	1.5	–
SD	2.12	93.6	50.7	12.68	9.2	–	0.44	–

* Specimen with two pairs of ovaries.

TABLE 2

Proteins, fat and water content of eggs of O. niloticus. *Figures in parenthesis are the values obtained for eggs from abnormal ovaries*

Food Component	Range	Mean	Std. Dev.
Total Protein (%)	41.1-63.7 (52.3-58.4)	55.3 (55.4)	3.7 (2.4)
Fat content (%)	59.1-82.5 (35.3-53.6)	63.0 (46.3)	10.5 (9.7)
Water content (%)	37.6-46.7 (38.1-45.4)	41.8 (40.9)	3.0 (2.8)

Oreochromis niloticus. However, incidence of abnormalities in the shape and size of their gonads are found very rarely.

O. niloticus is a mouth brooder and the number of eggs contained in a brood must be limited. McBay (1961) estimated the number of eggs or fry in the mouth of a female *O. niloticus* as ranging between 64 and 655. The highest number of eggs in a brood recorded for large females of 500g weight was 5,000 (Rothbard 1979). It is therefore a waste of gonadial material and also abnormal for any *O. niloticus* species to lay more eggs than can be brooded.

In the course of investigation of the gonads of *O. niloticus*, a number of abnormalities were observed. The main purpose of this paper is to describe the morpho-anotomical abnormalities found in the gonads of *O. niloticus*.

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