REPRODUCTIVE ASPECTS OF *CYPHOCHARAX VOGA* (HENSEL) FROM CUSTÓDIAS LAGOON, RIO GRANDE DO SUL, BRAZIL (CHARACIFORMES, CURIMATIDAE)

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ABSTRACT. The aim of this study was to analyse the reproductive period, fecundity and the size of the first gonadal maturation of *Cyphocharax voga* (Hensel, 1869) of Custódias Lagoon, state of Rio Grande do Sul, Brazil. The specimens (293 males and 247 females) were collected monthly, during the period between October 1994 and September 1995. The reproductive period took place from early winter until the end of spring. The average absolute fecundity was 36608 oocytes. The size of the first gonadal maturation was estimated in 121 and 128 mm for males and females respectively.
KEY WORDS. Curimatidae, *Cyphocharax voga*, fecundity, reproduction

The Curimatidae family has its geographical distribution restricted to the South America. According to VARI (1989), its representatives live in a great variety of fresh water environments distributed from the Pacific Coast of the Isthmus of Panamá to the south of Buenos Aires.

The species of this family, objective of the present study, is *Cyphocharax voga* (Hensel, 1869), popularly known in Rio Grande do Sul as "Biru". Its distribution includes the Paraguay rivers system, low Paraná until the hidrographic systems of the coastal rivers from the south of Brazil, Uruguay and Argentina (VARI 1988).

Studies of the reproduction of some species of Curimatidae can be found in AZEVEDO *et al.* (1938), NOMURA & TAVEIRA (1979), NOMURA & HAYASHI (1980), TAPHORN & LILYSTRON (1983), CARVALHO (1984), MORAES *et al.* (1984) and ROMAGOSA *et al.* (1984). It must be pointed out the works on *C. voga* carried out by HARTZ & BARBIERI (1994) and HARTZ *et al.* (1994) in isolated lagoons of Rio Grande do Sul.

The present study aims to establish, for *C. voga* from Custódias Lagoon, the reproduction period, fecundity and size of the first gonadal maturation.

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MATERIALS AND METHODS

A total of 540 specimens (293 males and 247 females) were collected monthly in Custódias Lagoon, Tramandaí, Rio Grande do Sul (30°01'S, 50°10'W) during the period from October 1994 to September 1995.

The Custódias Lagoon is classified as a shallow lagoon with a mean depth of 1.10m and occupying an area of 9.58 km^2 receiving salt influence via Armazém Lagoon.

The specimens capture was made by four sets of fishing nets. Each set comprised seven nets with distance between knots of 1.2, 2.0, 3.0, 3.5 and 4.0 cm. For each individual captured the total length in millimetres (Lt), the total weight (Wt) in grams, sex and stage of gonadal maturation have been recorded.

The identification of the gonadal maturation stages was carried out taking into account macroscopic aspects like colour, vascularization, flaccidity, size in relation to the abdominal cavity and oocytes visualization. The following maturation stages were defined: I) immature; II) in maturation; III) mature; IV) semi-exhausted and V) exhausted.

The female gonads used for fecundity analysis remained in Gilson's solution (VAZZOLER 1981) until the complete detachment of the ovocytes from the conjunctive tissue could be observed. The material was kept in 70% alcohol and sampled with a Stempell pipette with 2,5ml capacity.

The reproduction period was established according to the methodology proposed by SANTOS (1978). The relative frequency distribution of each gonadal maturation stage have been analysed as well as the monthly mean values of the gonadossomatic index (GSI) during the studied period.

The determination of the size of first gonadal maturation was based in the frequency distribution of adult specimens in classes of total length corresponding to 50% frequency in adult individuals (Lpm) (SANTOS 1978). The resulting curve was fitted to the equation:

$$Fr = 1 - \left(e^{-\infty Lt^{b}}\right)$$

RESULTS AND DISCUSSION

The monthly mean values of the gonadossomatic index were plotted in order to show its variation during the studied period (Fig. 1). The occurrence of sazonality of the reproductive period of the specie can be noticed, as confirmed by chy-squared test.

The reproductive period is long, beginning in winter and lasting to the end of spring. This trend is reinforced by the high frequency of mature individuals during September and October (Fig. 2).

The Curimatidae species seems to have a long reproductive period as a characteristic, since the same results have been found by other authors (AZEVEDO *et al.* 1938; MORAES *et al.* 1984; ROMAGOSA *et al.* 1984; CARVALHO 1984; HARTZ & BARBIERI 1994).

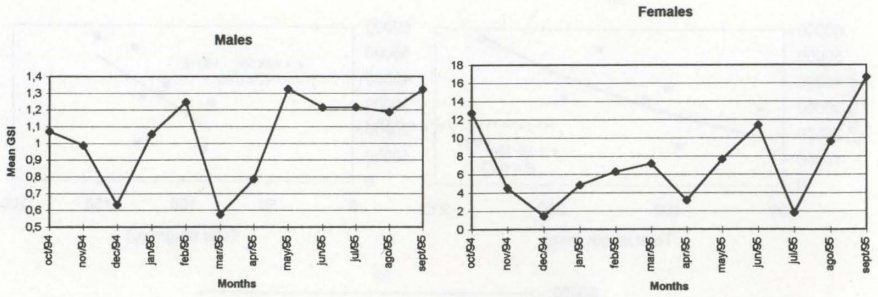

Fig. 1. Monthly variation of the mean values of the gonadossomatic index (GSI) for males and females of *Cyphocharax voga* from october/1994 to september/1995.

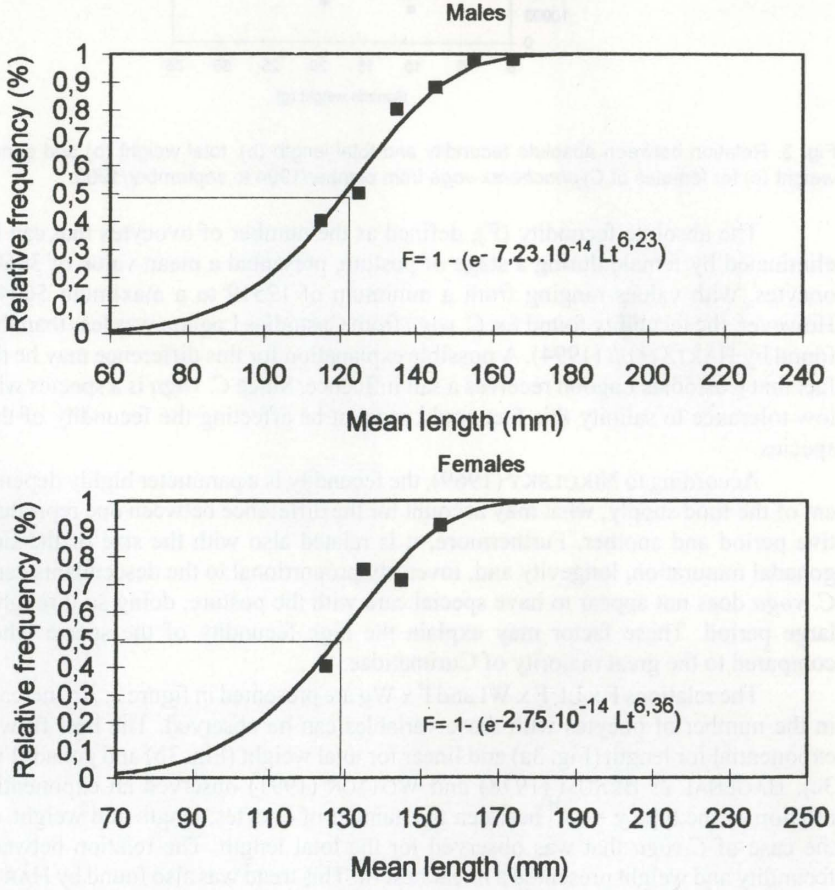

Fig. 2. Monthly distribuition of the relative frequencies of the gonadal maturation stages for males and females of *Cyphocharax voga* of Custódias lagoon during the period from october/1994 to september/1995.

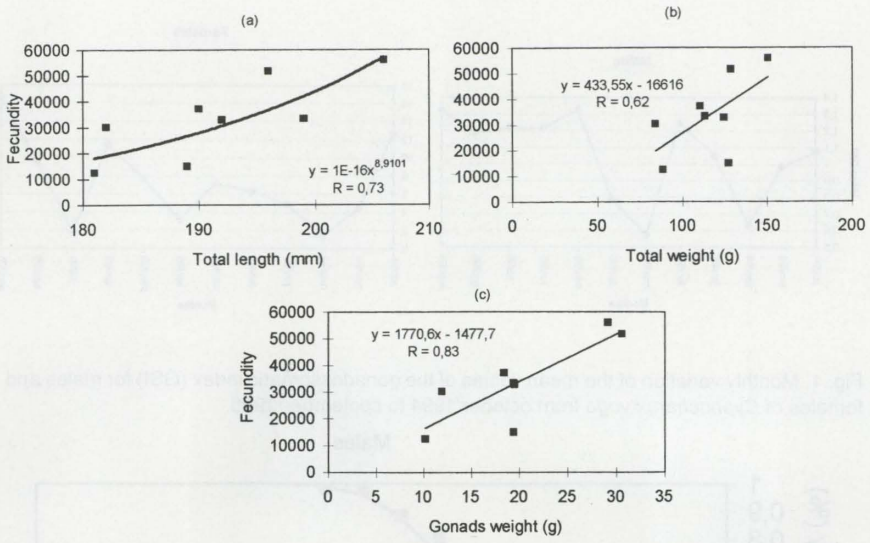

Fig. 3. Relation between absolute fecundity and total length (a), total weight (b) and gonad weight (c) for females of *Cyphocharax voga* from october/1994 to september/1995.

The absolute fecundity (F), defined as the number of ovocytes that can be eliminated by female during a stage of posture, presented a mean value of 36608 oocytes, with values ranging from a minimum of 12519 to a maximum 56040. However, the fecundity found for *C. voga* from Custódias Lagoon was less than that found by HARTZ *et al.* (1994). A possible explanation for this difference may be the fact that Custódias Lagoon receives a salt influence. Since *C. voga* is a species with low tolerance to salinity this fact could account be affecting the fecundity of this species.

According to NIKOLSKY (1969), the fecundity is a parameter highly dependent of the food supply, what may account for the difference between one reproductive period and another. Furthermore, it is related also with the size of the first gonadal maturation, longevity and, inversely proportional to the descendants care. *C. voga* does not appear to have special care with the posture, doing so through a large period. These factor may explain the high fecundity of the specie when compared to the great majority of Curimatidae.

The relations F x Lt, F x Wt and F x Wg are presented in figure 3. An increase in the number of oocytes with these variables can be observed. The best fit was exponential for length (Fig. 3a) and linear for total weight (Fig. 3b) and gonad (Fig. 3c). BAGENAL & BRAUM (1978) and WOTTON (1991) observed an exponential relation of the type $y = ax^b$ between the number of oocytes, length and weight. In the case of *C.voga* that was observed for the total length. The relation between fecundity and weight presented a linear best fit. This trend was also found by HARTZ *et al.* (1994). According to these authors a small variation in size for the analysed fish could result in a linear trend. Although the variation in length for the analysed females was small (181 to 206 mm) the potencial trend was found. ROMAGOSA *et*

al. (1984) have found a large variation in fecundity for *Curimatus gilberti* (Quoy & Gaimard, 1824) sample of same length or weight; WOTTON (1991) considered this variation as a consequence of the interaction of genetic and ambiental factors. In spite of the variation encountered it is possible to observe that the fecundity of *C. voga* is more related to the gonads weight. The same result has been found by CARVALHO (1984) for *Curimata (Potamorhina) pristigaster* (COPE 1878), ROMAGOSA *et al.* (1984) for *C. gilberti* and by HARTZ *et al.* (1994) for *C. voga*.

Using figure 4, an estimate for the first gonadal maturation of 121 millimetres for males and 128 millimetres for females has been made. From 170 and 180 millimetres all males and females respectively, are ready for reproduction.

The sizes of the first gonadal maturation (Lpm) found for males and females of *C. voga* in Custódias Lagoon were smaller than those found by HARTZ *et al.* (1994) in Emboaba Lagoon. Possibly, this parameter, as well as the total length of the individuals, could be affected by the salinity, since individuals in physiological stress, would be allocating more energy to their survival.

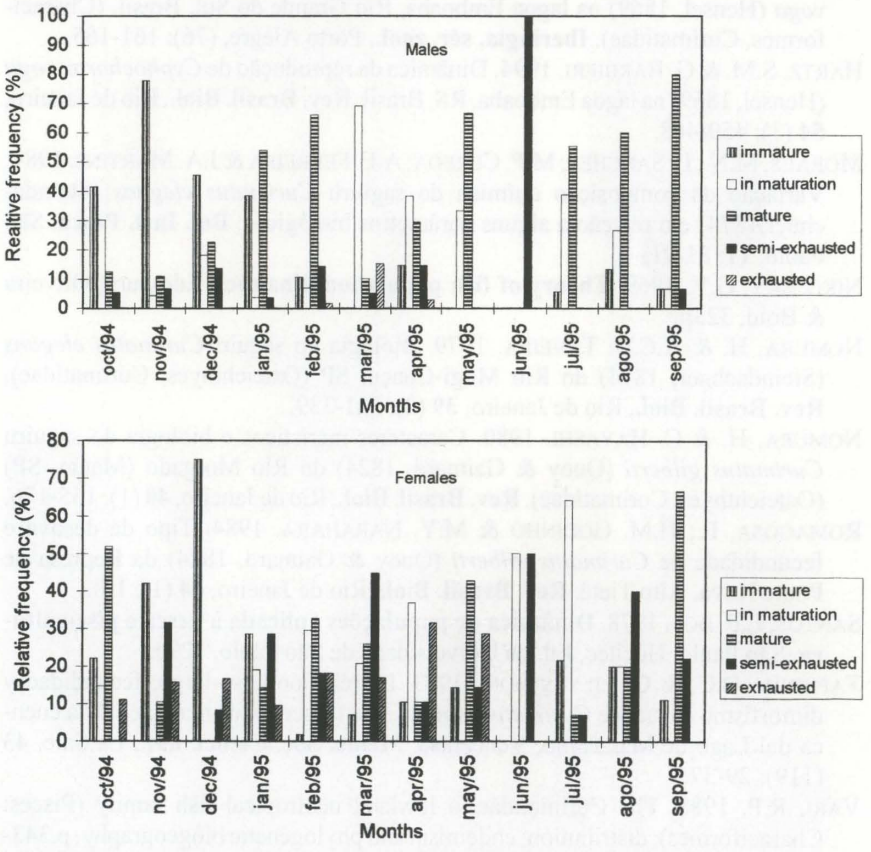

Fig. 4. Distribuition of the relative frequencies of adult males and females of *Cyphocharax voga*, by total length classes, during the period from october/1994 to september/1995.

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