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ANNUAL CYCLE AND BODY COMPOSITION OF FEMALE *Barbus sharpeyi* FROM AL-HAMMAR MARSH,SOUTH IRAQ

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ABSTRACT

Monthly samples of *Barbus sharpeyi* were taken from Al-Hammar Marsh in the South of Iraq. Fish were dissected, dried and analysed chemically for the determination of protein, lipid and ash content of the carcase, liver and the ovaries of each female. The total lipid content of the liver and the carcase increased during autumn and winter (the prespawning period) and this was accompanied by an increase in the gonadosomatic and hepatosomatic indices. There was a period of accumulation of energy reserves and ripening of the ovaries. The total protein content of the liver and carcase increased during autumn and early winter,but there was a depletion from the carcase protein in February and from liver protein in March and February. Depletion from the lipid was used once the spawning took place in March from the carcase and in March and April from the liver.This investigation indicated that there were fluctuations in the composition of body related to the reproductive cycle.

INTRODUCTION

The fish *Barbus sharpeyi* (Gunther) is one of the most commercially important fish in Iraq because of its delicious tests and the high price in comparison to the other species.

The reproductive cycle of this species received very little investigation (Al-Jerian, 1974 ; Al-Hakim, 1976 ; and Yaser, 1988). None of these investigations took into account the seasonal changes in the size of the body components and their chemical composition in relation to the reproductive cycle.

The relationship between body size, the body components and their chemical composition, the sexual cycle and food availability are complicated. The major processes of growth, the accumulation of energy reserves, ripening and spawning will be related to the seasons during which the fish are likely to experience abundant food which will allow high rates of constructive metabolic processes. The seasonal changes in body composition have been studied in several species e.g. *Salmo trutta* (Elliot, 1976), *Oncorhynchus nerka* (Brett et al., 1969) , *Pleuronectes platessa* (Dawson & Grimm, 1980), *Telapia rendali* (Gaulton & Bursell, 1977), *Aphanius dispar* (Muhsin, 1987), *Liza subviridis* (Muhsin, 1988).

Changes in body size, the relative size of body component, and their chemical composition are related to food availability and sexual cycle in *Gasterosteus aculeatus* (Wootton, 1977 and Wootton et al., 1978), and in *Liza subviridis* (Muhsin, 1988), the lipids and the proteins in the carcase and the liver were accumulated and depleted at different seasons of the year, and this accumulation and depletion were related to the reproductive cycle.

This study on the females *Barbus sharpeyi* is to investigate the seasonal changes in size and chemical composition of body components and their relationship with the reproductive cycle. It is a part of a project on the reproductive strategy of this species.

MATERIALS and METHODS

The female *Barbus sharpeyi* used in the study were collected monthly from November to October 1987 from Al-Hammar marsh, south Iraq (Figure 1).

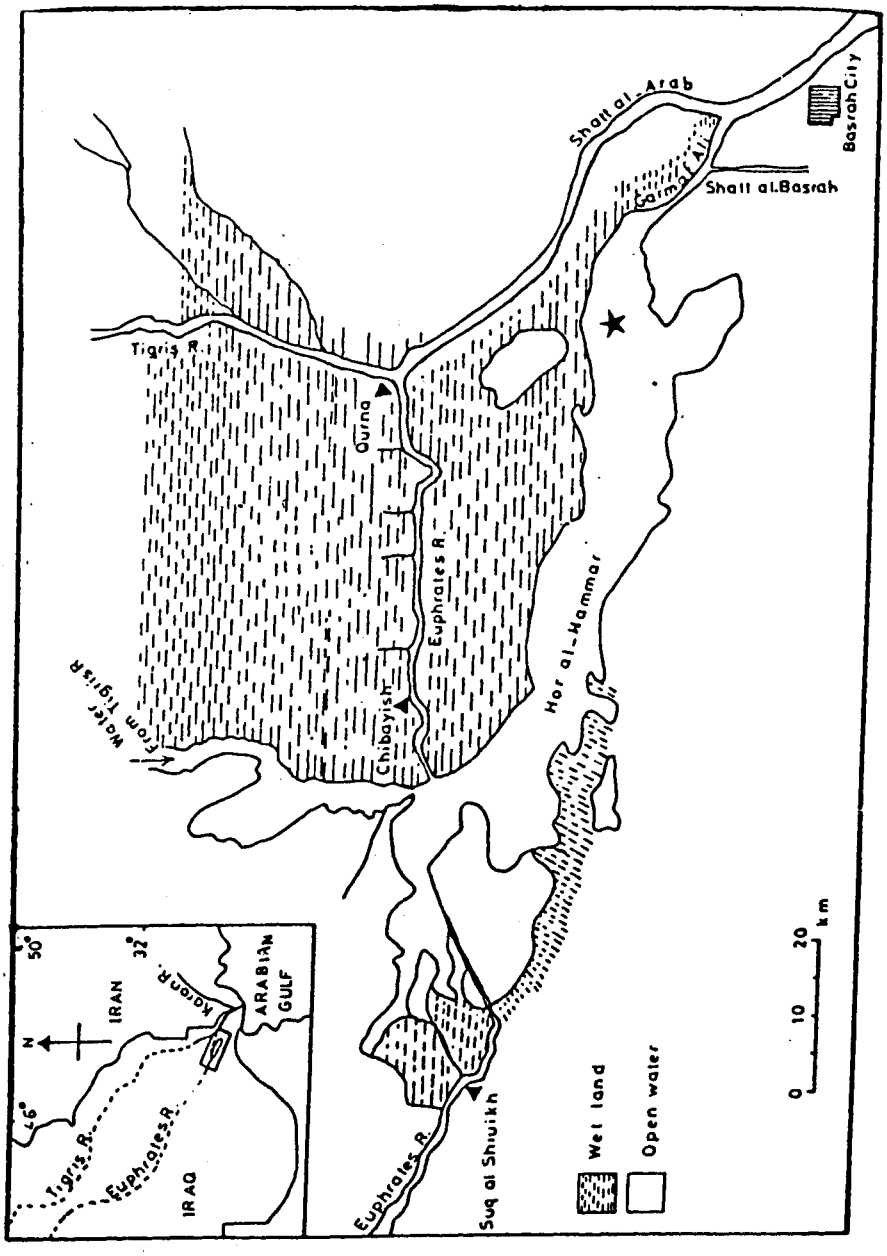

Figure (1) : Sampling area in Al-Hammar Marsh.

From a total of 368 captured fish, only 186 were females (Table 1). Total and standard length of each fish were measured to the nearest 0.5 cm. Every fish was weighed to the nearest 10^{-4} g.

The liver and ovaries were removed and weighed separately as was the carcase. These components were dried to a constant weight at 65-70 °C reweighed and two subsamples of each component per fish were subjected separately to chemical analysis to determine the lipid, ash and protein contents. Lipid contents were obtained by a method based on that of Lambert & Dehnel (1974). Protein was measured by a calorimetric method based on that of Lowery et al. (1951). The ash content was determined by heating 50-100 mg dry tissue at 600 °C for

Table (1) : Sample size and some ecological factors in the study area.

Month	Air Temp.	Water Temp.	S P.P.T.	Light Period	pH	Female Sample Size
1987						
Mar.	26.1	22.5	1.45	11.46	8.3	17
Apr.	28.0	23.5	1.80	12.39	8.5	20
May	30.0	24.5	2.53	13.24	8.5	10
Jun.	30.1	25.1	2.66	14.01	8.6	16
Jul.	32.0	26.0	2.75	13.48	8.6	20
Aug.	33.5	28.0	2.46	13.03	8.6	20
Sep.	30.3	24.2	2.40	13.16	8.4	20
Oct.	24.5	20.5	2.19	11.16	8.3	14
Nov.	18.5	15.2	2.10	10.22	8.2	18
Dec.	17.0	14.5	1.90	10.09	8.3	11
1988						
Jan.	16.0	13.5	1.32	10.15	7.9	7
Feb.	18.0	16.0	1.54	10.53	8.2	13

about 12 h. All length and weights were transformed to logarithmic values before analysis by regression was used in the linear form.

$$\log_e W_c = a+b \log_e L$$

Where : W_c is the weight of the component in grams.
L is the standard length in cm.
a,b are the constants determined by least squares regression.

The predicted mean weight of female was 25 cm. Standard length *B. sharpeyi* was used for comparisons of the mean values of the chemical composition, with the standard error and 95% confidence intervals (Barker , 1979). The annual cycle of the physical and chemical factors of the area were recorded (Table 1).

RESULTS

The Chemical Composition

Protein

a. Gonad
The mean total protein content increased during autumn and winter reaching the peak in winter (January). It decreased during the spawning season and summer reaching the minimum in July (Figure 2).

b. Carcase
The mean total protein content was high in autumn and early winter. It decreased during February and increased again in spring and summer (Figure 2).

c. Liver
The mean total protein content increased during autumn and early winter. It decreased during February and March. It increased again during spring and early summer reaching the peak in May. It decreased during the rest of summer (Figure 2).

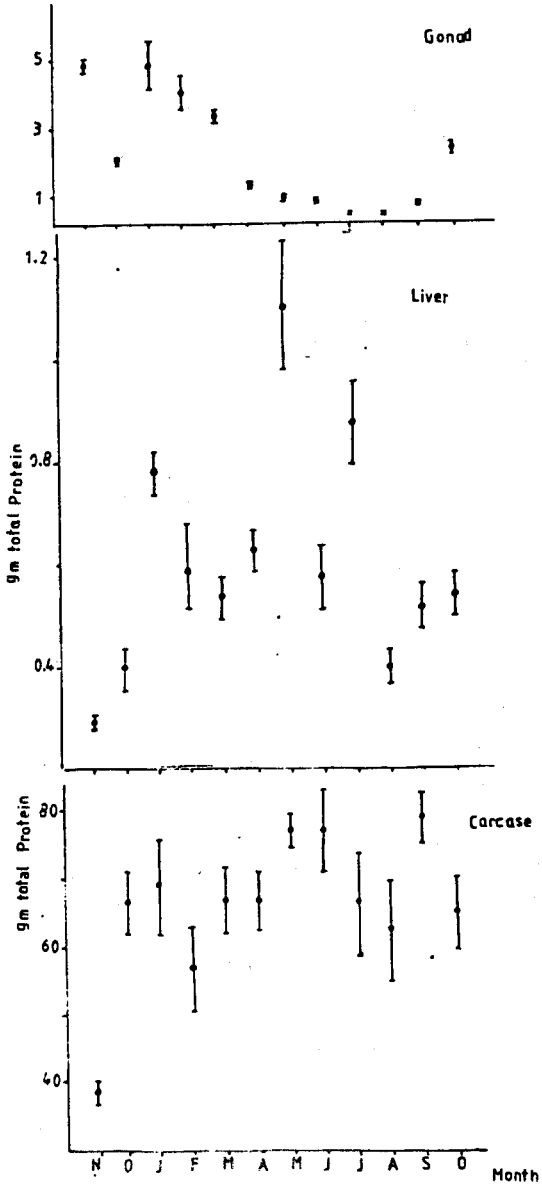

Figure (2) : The predicted mean total protein content of Gonad, liver and carcase with 95% confidence intervals in female *B. sharpeyi* of 25 cm standard length.

Lipid

a. Gonad
The mean total lipid content increased during autumn and winter reaching the peak in February. It decreased significantly during the spawning season and summer reaching the minimum in August (Figure 3).

b. Carcase
The mean total lipid content was high in autumn and late winter. There was sharp decrease in March. It was high again in the rest of spring and summer (Figure 3)

c. Liver
The mean total lipid content increased during winter. It decreased during March and April and increased during summer and decreased in autumn (Figure 3).

Ash

a. Gonad
The mean total ash content increased during autumn and early winter. It decreased during late winter and summer reaching the minimum in July (Figure 4).

b. Carcase
The mean total ash content showed no significant difference during the annual cycle except the low value in November (Figure 4).

c. Liver
The mean total ash content increased during winter reaching the peak in February. It decreased in March. It was high in summer and lower in autumn (Figure 4).

Hepatosomatic & Gonadosomatic indices (L.S.I. & G.S.I.)

The mean hepatosomatic index (L.S.I.) increased during winter and decreased in spring. There were no

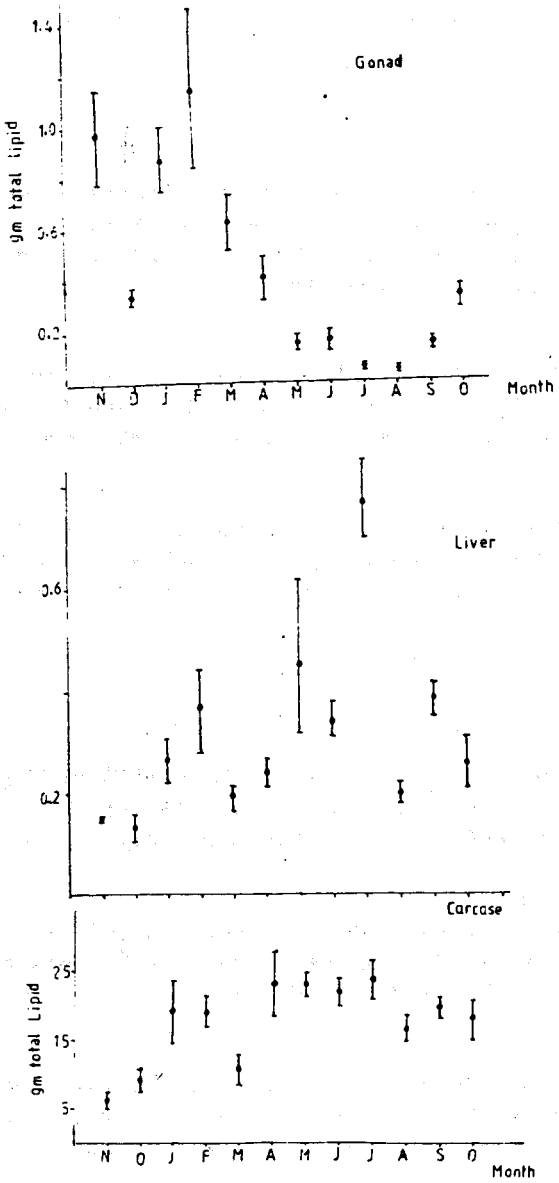

Figure (3) : The predicted mean total lipid content of Gonad, liver and carcase with 95% confidence intervals in female *B. sharpeyi* of 25 cm standard length.

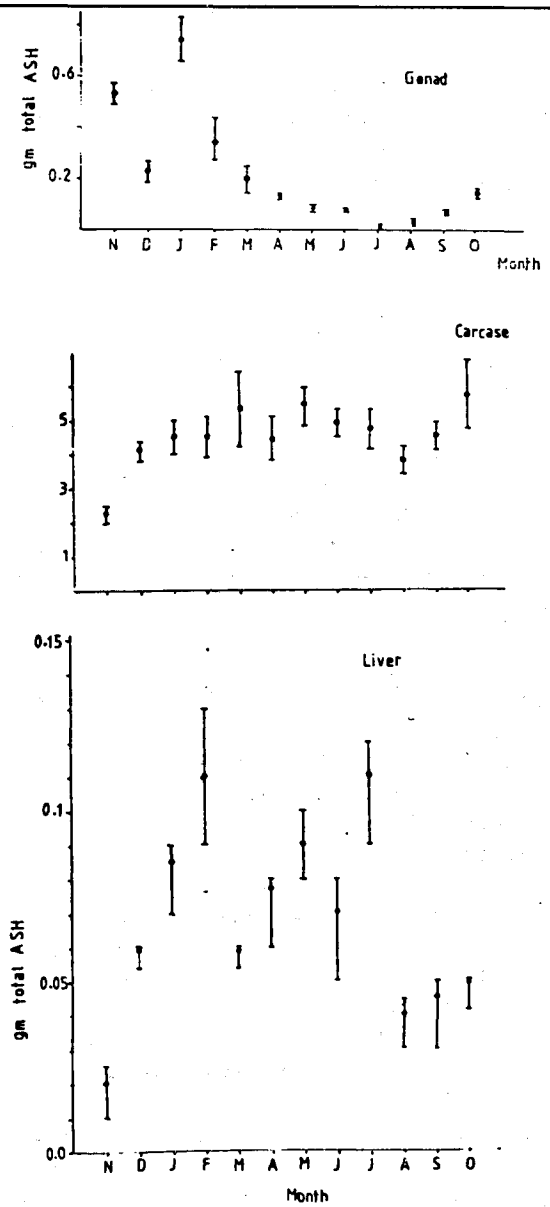

Figure (4) : The predicted mean total ash content of Gonad,liver and carcase with 95% confidence intervals in female *B. sharpeyi* of 25 cm standard length.

significant differences during the rest of the annual cycle. The mean gonadsomatic index (G.S.I.) increased during autumn and winter reaching the peak in February and March. Then it decreased sharply during March and April (the spawning season) (Figure 5).

DISCUSSION

The gonadosomatic and hepatosomatic indices increased during autumn and early winter, the pre-spawning period. This increase was accompanied by the increase in the total lipid and protein content in the liver, carcase and the ovaries. This indicates that *Barbus sharpeyi* in Al-Hammar marsh enjoyed an adequate food sup during these months so that accumulation of energy reserves and ripening of the ovaries may occur rapidly during this period, especially in winter. On the other hand there was a depletion from the carcase protein in February, and from the liver protein in February and March. This may indicate the high demand of energy during these months and it could mean that proteins from these components were used as source of energy and to support the maturation of the ovary during this important period. This importance of protein for gonadal maturation is also noticed in the minnow *Phoxinus ploxinus* L. (Muhsin, 1982), and in *Liza subviridis* (Muhsin, 1988). In *Gasterosteus aculeatus* , the winter and the breeding season were periods of depletion from the carcase and liver (Wootton et al., 1978). Love (1970) argued that the ripening of the gonad is usually achieved at the expense of body protein. Dawson & Grimm (1980) found that 33% of the protein and only 14% of the lipid in the body of *Pleuronectes platessa* were used during gonadal maturation of the females.

During the spawning season (March & April), the gonadosomatic index of *B. sharpeyi* decreased sharply due to the spawning of mature eggs. It was noticed that once the spawning tookplace in March, a depletion from the lipid of the carcase and liver was needed for maintenance

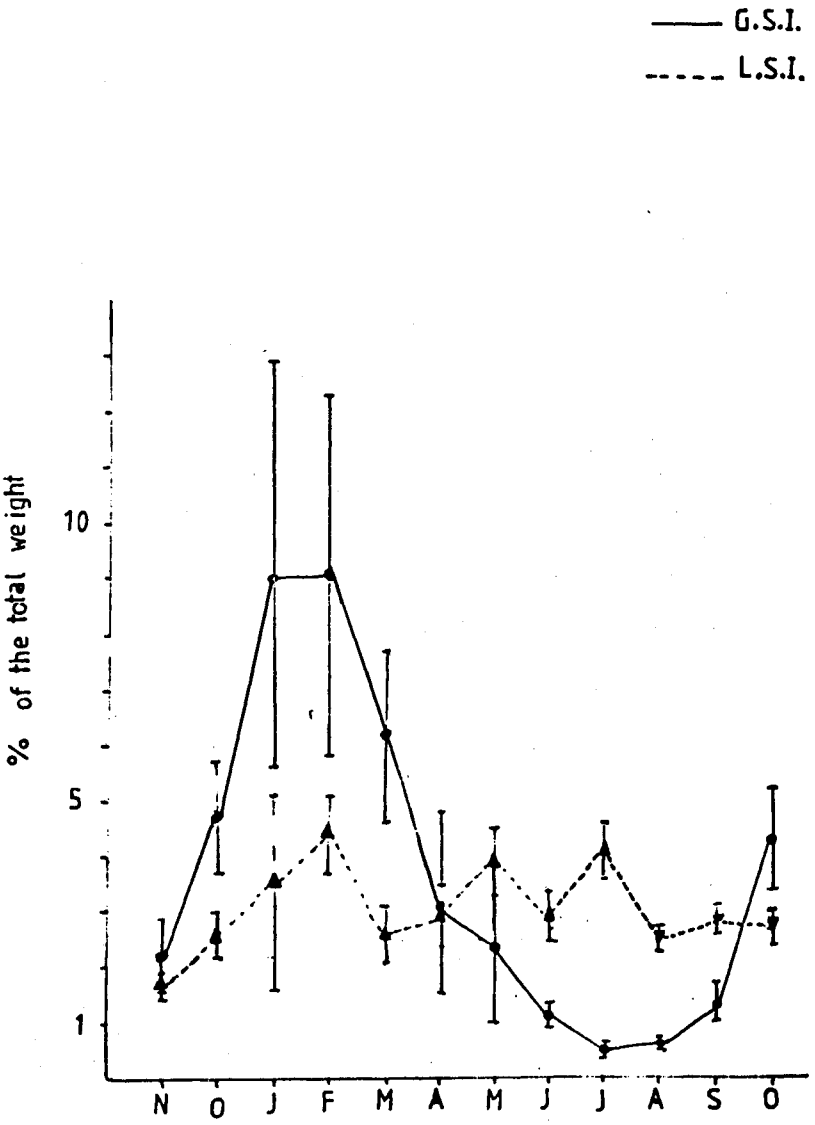

Figure (5) : The mean gonadosomatic and hepatosomatic indices with 95% confidence intervals for female *B. sharpeyi* during the yearly cycle.

and spawning activities. This depletion in the carcase was only in March , while in the liver it was in March and April. The ecological factors in the study area shows high changes in the temperature and light period with slight changes in the salinity and pH values. The spawning period was accompanied with the high increase in water temperature and photoperiod during March and April. The importance of these two factors is very obvious for spawning in many species.

A great deal of informations are still needed for this species like the fecundity and feeding habits especially during the spawning period, the possible changes in the abundance of its food, and their relationships to the changes in the body composition. These informations are of importance to throw the light on the reason of obvious decrease in the population of this species.

It can be concluded from this investigation that the composition of the body components were related to the reproductive cycle of *B. sharpeyi*.

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الدورة السنوية والتركيب الجسمي لانثى البني B. sharpeyi في هور الحمار ، جنوب العراق

المستخلص

تم اخذ عينات شهرية من اسماك البني B. sharpeyi من هور الحمار جنوب العراق . وقد تم تشريح الاسماك وتجفيفها وتحليلها كيمياويا لتقدير كميات البروتين والدهن والرماد في الجسم والكبد ومبايض الانثى.

لوحظ ازدياد كمية الدهون في الكبد واللحم خلال موسم الخريف والشتاء (فترة ماقبل التناسل). وقد ترافقت هذه الزيادة مع ازدياد الدالة الجنسية والكبدية .

هنالك فترة لتراكم وخزن للطاقة ولنضوج المبايض. لقد ازداد المحتوى البروتيني خل فترة الخريف وبداية الشتاء ولكن جرى استنزاف من بروتين اللحم خلال شهر شباط ومن بروتين الكبد خلال شهري شباط واذار. اما الاستنزاف من الدهون فلم يستخدم الا عندما بدأت العمليات التناسلية في اذار ، حيث استخدمت دهون اللحم خلال فترة اذار بينما استخدمت الدهون من الكبد خلال فترة اذار ونيسان.

ان هذه الدراسة تؤكد ان هنالك تغيرات في التركيب الكيمياوي لاعضاء جسم البني وان هذه التغيرات مرتبطة بدورة التناسل.