METAL (COPPER, ZINC, IRON AND MANGANESE) CONTENT IN THE EGGS OF *SESARMA BROCKII* DE MAN DURING EMBRYOGENESIS

ABSTRACT

The heavy metal content such as iron, zinc, manganese and copper in the developing eggs of *Sesarma brockii* revealed that iron content in all stages of the eggs was higher than that of the other metals. The iron, zinc and manganese contents in various egg stages were in the order of I < II < III > IV > V, stage but the mean copper content was in the order of 1 > II < III > IV < V stage.

HEAVY metals play a vital role in the respiratory, osmoregulatory and enzymatic processes of the embryo (Martin, 1974; Martin and Ceccaldi, 1976 a). The heavy metals such as iron, copper, manganese, magnesium and cobalt were found to accumulate in the ovary of the crab, *Carcinus maenas* during oogenesis, (Martin and Ceccaldi, 1976 a). Since it was found out that manganese, copper, iron and magnesium are interlinked with many enzymatic reactions (Oser, 1976), concentrations of these metals have been found to fluctuate during embryogenesis (Martin and Ceccaldi, 1976 a, b; Shakuntala, 1977; Ponnuchamy *et al.*, 1979). Among these trace elements, copper is an important element not only in enzyme systems but also in the respiratory system in the form of respiratory pigments in crustaceans (Shakuntala, 1976 a; Wieser, 1976). The concentration of the heavy metals such as iron, copper, zinc and magnese fluctuate during the early stages of brachyuran crabs when there is a higher metabolic activity (Pillai and Subramoniam, 1985). In the present study, an attempt was made to analyse the metals such as copper, zinc, iron and manganese in the eggs of *S. brockii* during embryogenesis.

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Trace metal concentrations in the eggs of *S. brockii* were estimated by wet digestion method. One gm dry weight of the egg sample was digested in a mixture of nitric and perchloric acid (1:3 ratio) until it became almost dry and colorless. It was then dissolved in 10 ml of double distilled water and finally it was made upto 50 ml with double distilled water. Concentration of the trace metals in the sample was estimated by aspirating the dilutions in a Perkin Elmer Atomic Absorption Spectrophotometer (Model 2380) in an air-acetylene flame. Blanks and standards were also treated in the same manner.

The concentration of four metal in different stages of *S. brockii* eggs are shown in Fig. 1.

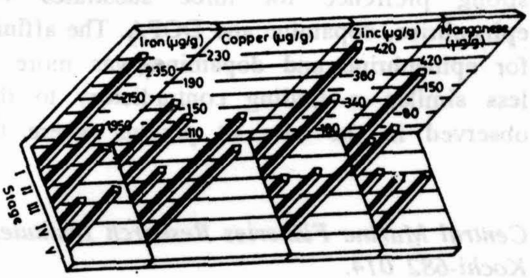

FIG 1. Concentrations of four metals in deferent stages of *S. Brocku*

The iron content in all the egg stages was higher than that of the other metals. The mean iron, zinc and manganese contents in different egg stages were in the order of I < II < III > IV > V but the mean copper content was in the order of I> II < III > IV < V.

The ANOVA showed that all the heavy metal concentrations in the egg were statistically significant (Table 1).

TABLE 1. *Analysis of variance for the data for the heavy metal content in the eggs*

Sources	Sum of Square	D.F.	Mean Square	F
Iron				
Main effect	1081659.29	4	270414.82	11.2510*
Deviation	1081559.24	45	24034.65	
Copper				
Main effect	319795.29	4	79948.82	6.3561*
Deviation	566024.65	45	12578.33	
Zinc				
Main effect	427006.02	4	106751.51	11.2499*
Deviation	427011.19	45	9489.14	
Manganese				
Main effect	316897.62	4	79224.41	331.9454*
Deviation	10740.01	45	238.67	

*Indicate Statistically significant difference from the control value ($p < 0.05$).

In the present study, the metal content of the eggs of *S. brockii*, can be represented in the following order Cu > Mn> Zn > Fe. The fluctuation in the metal levels in the eggs is not only due to the metabolic activity and utilization by the embryo but also due to their differential uptake of water through the egg membrane (Pillai and Subramoniam, 1985). Most enzymatic and respiratory functions are accomplished with organic molecules that have active cations containing one or more metallic ions (Williams and Sova, 1966). The common metals like iron, copper, zinc and manganese are being utilised in the enzyme activities and therefore fluctuate markedly due to high metabolic activity corresponding to the stages of embryogenesis (Martin and Ceccaldi, 1976a,b; Oser, 1976). Metal contents in the present study did reveal a decreased level in stage II when compared to stage I except there was an increase in copper and zinc contents in the eggs (stage II) of *C. irroratus*. In stage III all the metals decreased indicating the utilization of these metals for enzymatic and metabolic activities as reported by Pillai and Subramoniam (1985). In the III stage egg of *P. hydrodromus*, as in the present study, there was a decrease in the metals iron, copper and zinc.

In the present study, all the metals markedly increased in the IV and V stages of the egg except copper. In *P. hydrodromus* also, the content of metal like iron, zinc and manganese increased in the last stage, *i.e.*, stage IV (Pillai and Subramoniam, 1985). A tremendous increase in the metal content was also reported in the last stage (IV stage) eggs of freshwater prawn *C. nilotica* (Ponnuchamy *et al.*, 1979). Bryan (1968) observed the increased levels of copper and zinc in the later stage eggs of the crab *C. irroratus* and the prawn *Pandalus montagus* respectively. This is in agreement with the present study. In the prawns *C. nilotica* and *Palaemon lamaerrei*, copper content increased from the freshly laid eggs to last stage (Ponnuchamy *et al.*, 1979; Shakuntala, 1976b) which also supports the present observation. The increased level of metal in IV and V egg stages in the present investigation may be due to the fact that there was an incresed permeability than in the early stages (Martin, 1974), thus causing an increase in the metal content in the later stage of embryonic development. Bryan (1968) recorded an appreciable amount of copper and a high concentration of zinc in the decapod crustacean eggs which might be due to adsorption on the surface of the embryos. Similarly, the increased level of copper was due to the absorption of this important element for the formation of haemocyanin in the embryos of *P. lamerrei* and *C. nilotica* (Shakuntala, 1976b; Ponnuchamy *et. al.*, 1979). Thus, these observations extend evidence for an increased content of metals in the eggs of IV and V stages of *S. brockii* as in the present study.

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OCCURRENCE OF *CIRRHIMURAENA PLAYFAIRII* (GUNTHER) (ANGUILLIFORMES : OPHICHTHIDAE) FROM THE YANAM WATERS OF THE COROMANDEL COAST OF INDIA

ABSTRACT

Cirrhimuraena playfairii **(Gunther) is reported for the first time from the Indian coastal waters at Yanam (Union territory of Pondicherry), along the Coromandel coast. This fringed lip eel was earlier known only from the African coasts of the Indo-Pacific.**

DURING the suvey of Yanam (Union Territory of Pondicherry) by a Zoological Survey of India team, during april 1995, 10 specimens, (230 — 335 mm TL) were collected from Bheemnagar and Kanakalapeta landings from off the Godavary estuary. The specimens have been registered (F. 4426 & F. 4420) and deposited in the Reserve Collections of the Southern Regional Station. Measurements are expressed as 'times' in total length (TL) and head length (HL); the mean value is provided along with the range in paraenthesis.

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Cirrhimuraena playfairii (Gunther)
(Figs. 1 & 2)

Ophichthys playfairii Gunther, *1870 : 76 (Zanzibar)*

Cirrhimuraena playfairii : Smith, SFSA *No 1099*

Jenkinsiella playfairii : Smith, 1957 : 840; 1962 : 449

Head pointed, 11.38 (10.95 — 11.99) in TL, 3.72 (3.60 — 3.86) in trunk; depth 43.30 (35.64 — 53.49) in TL, 14.00 (11.92 — 16.08)