them is a scraper-cum-borer type. Retouches are seen on the sides and at the end of the borers. On the flake the positive bulb-of-percussion is very prominent.

FIG. 3

This is perhaps for the first time that the Stone Age Sites have been discovered in Kerala.
Dept. of Archaeology, P. RAJENDRAN.
Deccan College, Poona-6,
July 16, 1974.


VARIATIONS IN CHEMICAL CONSTITUENTS OF BLOOD PLASMA OF CLARIAS BATRACHUS (L.) DURING STARVATION

BILINSKI AND GARDNER showed a more significant increase in the concentration of free fatty acids in blood plasma of rainbow trout in the first two weeks of fasting. In the present study changes in total protein, albumin, globulin, fibrinogen, non-protein nitrogen, iron, calcium, cholesterol, total phosphorus in plasma and glucose in whole blood are recorded at different intervals of starvation.

Fifty fishes of size 20–25 cm were put in a large glass aquarium (90 × 45 × 40) containing tap water. They were fed four days before starting the experiment. Sampling was done after 1, 2, 5, 10, 15, 30, 45, 60, 75 and 110 days of fasting. On each sampling day five fishes were sacrificed. Throughout the period of experiment, temperature of the aquarium water ranged from 20° C to 35° C. Water of the aquarium was changed every day. There was no mortality of fishes during the period of experiment. Blood was collected after severing the caudal peduncle of the fish. For checking coagulation double oxalate anti-coagulant at the concentration of 4 mg/2 ml of the blood was used. After taking the required amount of the whole blood for the analysis of glucose, it was quickly centrifuged at 3,500 rpm for 15 minutes.

The techniques described by Oser were adopted for the estimation of various chemical constituents.

Total protein, albumin, globulin, fibrinogen, total phosphorus, glucose, iron and calcium showed similar pattern of changes during starvation (Fig. 1).

FIG. 1. Variations in chemical constituents in the blood plasma of C. batrachus during starvation.

The maximum values were recorded on the second day of starvation, thereafter values decreased gradually. In non-protein nitrogen a gradual fall
was noted. A large increase in the concentration of cholesterol was noted up to 15th day, thereafter the values decreased gradually.

Variations in chemical constituents were due to haemocencentration and haemodilution. During early days of fasting, the body tissues became more acidic and absorbed water from the blood, and increased the concentration of chemical constituents in the blood. But during later days the mechanism was reversed, where, the release of water from the tissues to the blood resulted in the haemodilution. During starvation stored materials are utilized for basal metabolism and consequently, the concentration of different chemical constituents is diminished.

It can be concluded that during prolonged period of starvation fish acclimatizes itself and its resting metabolism decreases markedly. Initially there is a rapid fall in the concentration of various constituents of the plasma. And as soon as the fish adjusts itself, the decrease becomes gradual and in this way fish endures a prolonged period of starvation.

Grateful acknowledgement is made to Dr. A. Q. Siddiqui for valuable help and advice.

Department of Zoology, Neena Siddiqui. Aligarh Muslim University, Aligarh, June 14, 1974.


**Tissue Specificity of Glycogen Synthesis in Scorpion Heterometrus Fulvipes**

Studies on the physiology and biochemical of arachnids have received cursory attention, and there are very few reports on glycogen synthesis in the scorpion. The distribution of biochemical constituents and incorporation of labelled glucose into glycogen in tissues of the South Indian field scorpion, Heterometrus fulvipes (Koch), showed tissue specific glycogen metabolic potential in this animal. It seems necessary to obtain information about the tissue specificity of glycogen synthesis.

The collection of the scorpions, their maintenance and isotope uptake have already been described. Tissue somatic index = Tissue wet weight (g) × 100

Total animal wet weight (g).

Tissue somatic indices of scorpion show variations. They are in the order, Hepatopancreas < Muscle < Ovary (Table 1). It is evident that hepatopancreas constitutes more than a quarter of the whole body wet weight. This is appreciable since the hepatopancreas, which parallels insect fat body and vertebrate liver, is found to be the important site for biochemical reactions.

In striking contrast to vertebrates, where muscle constitutes about 45% of total body wet weight, the somatic index of muscle of scorpion is only 10.6. From its synthetic ability and carbohydrate content, it has been suggested, that muscle in scorpion does not contribute to the general metabolic pool of the animal. The somatic index of this is only 3.7, but the period in which the experiments were performed (February-early March) is the breeding period for H. fulvipes which is reflected by its high glycogen content and active glycogen synthesis (Table 1). However the tissue somatic index has been shown to vary with the season as well as with the physiological state of the animal.

**Table 1**

<table>
<thead>
<tr>
<th>Tissue</th>
<th>Number of observations made</th>
<th>Tissue somatic index</th>
<th>Unit activity</th>
<th>Tissue activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatopancreas</td>
<td>7</td>
<td>27.90</td>
<td>2000</td>
<td>2740</td>
</tr>
<tr>
<td>Muscle</td>
<td>6</td>
<td>10.61</td>
<td>625</td>
<td>326</td>
</tr>
<tr>
<td>Ovary</td>
<td>6</td>
<td>3.72</td>
<td>748</td>
<td>136</td>
</tr>
</tbody>
</table>

Glycogen synthesis in various tissues was also found to vary (Table 1). Activity was recorded at 18 hours after the administration of U-C14 glucose, and this period was found to be optimum for incorporation. When activity was considered for total glycogen present in gram fresh tissue, hepatopancreas is shown to have the highest synthetic ability followed by ovary and muscle. Even when specific activity was considered, the same trend was observed. However, in order to get a true picture of the glycogen synthetic potential of various tissues, the activities have been expressed for total glycogen present in the whole tissue. This expression is known to give a clear picture of the contribution of a tissue to the whole animal metabolism. Data presented indicate that the activity is in the order, Hepatopancreas < Muscle < Ovary. This is interesting since the activity considered for glycogen present in gram fresh tissue showed that the activity of ovary exceeds the activity of muscle. It appears that although the animal is in vitello-