



### Short Communication

## A study of haemogram of mud Eel *Monopterus cuchia* (Ham.) from Eastern Himalayas, India

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### Abstract

*Monopterus cuchia* is a common mud eel distributed all along the North-Eastern India and Bangladesh. The high survival rates of this fish during transportation and marketing, along with its economic value makes it a highly demanding fish in the North-Eastern part of India. *M. cuchia* is known to have high erythrocytes indices. Hence the present work was carried out to study the morphometric index and its co-relation with the erythrocytic parameter of fish *M. cuchia* (Hamilton) from Eastern Himalayas. Blood parameters like haemoglobin content (Hb%), total erythrocyte count (TECX $10^6$  mm<sup>-3</sup>) and packed cell volume (PCV %) were done. Absolute values like mean cell haemoglobin (MCH), mean cell haemoglobin concentration (MCHC) and mean cell volume (MCV) were done from the above blood parameters and data were correlated (r). The results indicates that there is a positive correlation ( $r=+0.85$ ) between length and weight of the fish. When the Hb content was compared with TEC, it was positively correlated ( $r=+0.96$ ). However, there was no correlation of haemoglobin either with length ( $r=+0.08$ ) or weight ( $r=-0.03$ ).

**Keywords:** *Monopterus cuchia*, haemoglobin, Eastern Himalayas, correlation, fish.

### Introduction

*Monopterus cuchia* is a common mud eel distributed all along the North-Eastern India and Bangladesh<sup>1,2</sup>. This fish is known for its high nutritional value and taste. The high survival rates of this fish during transportation and marketing, along with its economic value makes it a highly demanding fish in the North-Eastern part of India. *M. cuchia* is having an accessory respiratory organ which helps the fish to survive with low oxygen content in the environment. Haemoglobin (Hb) pigment responsible for oxygen transport is usually in higher concentration in air breathing fishes<sup>3</sup>. *M. cuchia* is known to have high erythrocytes indices<sup>4</sup>. However, there was no significant literature on the correlation of morphometry with blood parameter of the fish. In addition to haemoglobin, total erythrocyte count, mean cell haemoglobin, mean cell haemoglobin concentration and mean cell volume concentration are other parameters which indicate the overall blood parameters and their correlation in *M. cuchia*. Hence the present work was carried out to study the morphometric index and its correlation with the erythrocytic parameter of fish *M. cuchia* (Hamilton) from Eastern Himalayas.

### Materials and methods

Live fish species of *M. cuchia* were collected from the nearby wetlands of Banderdewa (near Dikrong River) of Arunachal Pradesh (27°14'N Latitude and 93°62' E Longitude). They were brought to the department laboratory with proper care in order

to prevent possible injuries during transportation. Healthy fishes without gill rot or other bodily injuries were selected for the experiment. 6 numbers of fishes were kept in 6 separate aquaria for acclimatization in the laboratory condition. Fishes were fed with commercial fish food and provided with aeration. After acclimatization for a period of one week to the laboratory conditions, blood was drawn from the gill region without sacrificing the fish. EDTA was used as anticoagulant. Then the morphometric index like, length (in cm) and weight (in gm) of fish was recorded with the help of standard instruments. Blood parameters like haemoglobin content (Hb%), total erythrocyte count (TECX $10^6$  mm<sup>-3</sup>) and packed cell volume (PCV%) were done as per standard methods<sup>5</sup>. Absolute values like mean cell haemoglobin (MCH), mean cell haemoglobin concentration (MCHC) and mean cell volume (MCV) were done from the above blood parameters<sup>6</sup>. Data were correlated (r) amongst various parameters studied.

### Results and discussion

The results obtained at the end of experiment are presented in Table-1 and 2. Fishes were ranging from a length of 44.2-61.4 cm and weight 86.6-115.4 gm. The results indicate that there was a positive correlation ( $r=+0.85$ ) between length and weight of the fish. The oxygen carrying capacity of blood is related to somatic index of air breathing fishes<sup>7</sup>. In our study, the somatic index (weight/ length) remains at  $2.02\pm 0.14$ . While studying the growth of *M. cuchia* on different environments, the somatic index was found to be at  $3.33^1$ . However, in the natural

condition the authors observed highest length of 61.4 cm with a weight of 115.4gm (Table-1).

**Table-1:** Somatic indices of Mud eel *Monopteros cuchia*.

<i>M. cuchia</i> sample	Length (cm)	Weight (gm)	Somatic Index
1	44.2	86.6	1.95
2	45.5	97.2	2.13
3	46.1	97.5	2.1
4	49.2	108.0	2.19
5	49.5	106.9	2.15
6	61.4	115.4	1.87
Range	44.2-61.4	86.6-115.4	1.87-2.19
Mean	49.31	101.93	2.02
Sd	6.28	10.19	0.14
Correlation	r=0.084		

When blood parameter like haemoglobin was estimated, all the six fishes were found to contain around 21gm% (20.93±0.2). This is the highest haemoglobin content among the air breathing fishes reported so far<sup>3</sup>. However, earlier researchers have observed haemoglobin content of 18gm % from the same species<sup>2</sup>. This prominent difference may be due to the different

environmental conditions. The fish haemoglobin is normally tetrameric and undergoes physiological and biological changes due to spatial and temporal oxygen variation<sup>8</sup>. When the Haemoglobin content was compared with TEC, it was positively correlated (r=+0.96). However, no significant correlation of haemoglobin either with length (r = +0.08) or weight (r= -0.03) is observed during the experiment.

In all the experimental animals, the packed cell volume is also found to be in the higher side (56.28±1.95), which is in response to Hb and TEC level. Even though the mean corpuscular haemoglobin concentration is in line with other aerial breathing fish, the value of MCH and MCV brings attention to its special physiological status with MCV as high as more than 200. It indicates the average volume of red blood cells which is macrocytic type. Because of high haemoglobin content with normal TEC level, the mean cell volume is high. Since *M. cuchia* remains in hypoxic condition, where oxygen tension is high, this may be the reason behind the high haemoglobin content. Previous studies also indicate the presence of high Hb content which reflects to the oxygen deficiency in the aquatic medium<sup>9</sup>.

The accessory respiratory organ of *M. cuchia* is a secondary modification of gills<sup>10</sup>. Due to increase in environmental temperature, the dissolved oxygen level decreases, this affects the Hb concentration<sup>11</sup>. Decrease in organic phosphate concentration leads to low ATP and GTP, which is observed in hypoxic conditions, thereby increase in oxygen affinity leading to high Hb content<sup>12</sup>. Difference in the Hb concentration of air breathing and water breathing fishes are also related to the effect of CO<sub>2</sub> and Hb<sup>13</sup>.

**Table-2:** Haematological indices of Mud eel *Monopteros cuchia*.

<i>M. cuchia</i> sample	Hb(%)	TEC (TECx10 <sup>6</sup> mm <sup>-3</sup> )	PCV (%)	MCH(pg)	MCHC (%)	MCV(μ <sup>3</sup> )
1	21.0	2.80	56.28	75.00	37.31	201.00
2	21.2	3.10	52.58	68.38	40.31	169.91
3	20.6	2.56	57.30	80.46	35.95	223.82
4	20.8	2.73	56.21	76.19	37.00	205.89
5	21.0	2.92	58.12	71.91	36.13	199.04
6	21.0	2.85	57.23	73.68	36.69	200.80
Range	20.6-21.2	2.56-3.1	52.58-58.12	68.38-80.46	35.95-40.31	169.91-223.82
Mean	20.93	2.82	56.28	74.27	37.23	200.07
Sd	0.2	0.18	1.95	4.07	1.59	17.37
Correlation	r=0.96					

Earlier studies suggest that the oxygen holding capacity of air breathing teleosts is higher than non-migratory water breathing fishes<sup>14</sup>. This was further observed while comparing Hb concentration of *Anabas scandans* and *Mystus vittatus*<sup>15</sup>. Hence, this fish *Monopterusuchia* which is distributed in beels and swamps needs special research attention. People use it as diet for its high nutritional value of iron content. As it is a rapidly vanishing species all along the Eastern Himalaya, it needs special conservation measures.

## Conclusion

The results during the experiment indicated that there was a positive correlation between length and weight of the fish. When the Hb content was compared with TEC, it was found to be positively correlated. However, there was no correlation of haemoglobin either with length or weight of the fish. The packed cell volume is also found to be in the higher side, which is in response to Hb and TEC level. In spite of mean corpuscular haemoglobin concentration bearing similarity with other aerial breathing fish, the value of MCH and MCV is very high. These variations may be indicative of the effect of different environment of the fishes of North-Eastern region of India.

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