

**A MORPHOMETRIC STUDY OF *CHANNA PUNCTATA* (BLOCH)
(PISCES : CHANNIDAE)**

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INTRODUCTION

The genus *Channa* Scopoli (1777), forms a commercially important group of fishes, comprising of eight species from Indian waters (Jayaram, 1981). Day (1878) described only one species under this genus and eight species under the genus *Ophiocephalus*. Misra (1962) reported four species from India and Pakistan. However, Menon (1974) noticed only six species under this genus from the Gangetic Plain.

The present paper deals with the clinal variation in the species *Channa punctata* (Bloch). While studying the morphology of this species, authors came across a few interesting specimens. The meristic counts of these specimens are almost similar to that of *C. punctata* (Bloch) but differs interestingly in colour pattern being having lateral yellow stripes on either side Day. (1875-78) also observed brilliant orange bands in immature specimens of *C. marulius*. Willey (1908) and Deraniyagala (1929) noticed such stripes in the juveniles of *Channa punctata* (Bloch). However, Hora (1921), Jones (1946) and Misra (1962) overlooked these colour variations among *Channa* species. An endeavour has been made here to ascertain the systematic identity of such morphovariant which are distinctly unique particularly in respect of colour pattern, based on the morphometric evaluation of different characters.

MATERIAL & METHODS :

The present study is based on 103 specimens of *Channa punctata* (24 mm to 200 mm SL) present in the National Zoological collections of E.R.S./Z.S.I., Shillong collected from different localities of North Eastern Region of India. The specimens with lateral yellow stripes were compared with the specimens of different size groups at the intervals of 20 mm SL. A total of 23 characters were mensurated and subjected to statistical analysis by calculating the mean, standard deviation and standard error. The data were pooled together for students 't' test as a result, probability at 95% confidence intervals were determined (after Simpson *et. al.*,

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1960). Further, the numerical interpretations for each character were compared by employing geometrical expression proposed by Dice and Leraas (1936) and adopted by Hubbs and Hubbs (1952). In this method for each character the range, mean, one standard deviation and one standard error on either side of the mean were delineated on the graphs.

RESULTS

1. *Population of 20 to 30 mm SL vs. 31 to 50 mm SL.*

It is seen that except predorsal distance, prepelvic distance, base of anal fin, length of caudal fin in standard length and width of head in length of head in respect of all other characters the two populations have a probability of less than 5%. From the Dice Diagram it would appear that there is a gradual variation in respect of the length of head, preanal, pre-pelvic, pectoral-pelvic, pelvic-anal distance, base of dorsal fin, height of body, length of pectoral fin, length of caudal peduncle in standard length; height of head in length of head and the length of caudal peduncle in height of caudal peduncle (Graphs I, III, IV, VI-VIII, X, XI, XIII, XV-XIX, Dice diagram A & B in each).

2. *Population of 20 to 30 mm SL vs. 51 to 70 mm SL.*

From the data analysed for this population, it can be seen that except the pelvic-anal distance, base of dorsal fin, base of anal fin, length of pelvic fin in standard length; height of head in length of head and the height of dorsal fin in its base in respect of other 17 characters, the two populations have probability of less than 5%. Graphs I-VI, VIII, X-XIV, XVI-XIX and Dice diagram A and C in each, indicate that out of 19 characters 16 characters represent gradual variations.

3. *Population of 20 to 30 mm SL vs. 71 to 90 mm SL.*

The two populations are similar in respect of 17 characters inasmuch as the probability is less than 5%. But differs in respect of base of dorsal fin, base of anal fin, length of caudal fin, length of caudal peduncle, in standard length; height of dorsal fin in its base and length of caudal peduncle in height of caudal peduncle. From the graphs I-VIII, X-XVII and Dice diagram A & D in each, it is seen that the 16 characters vary gradually according to size group. It is also observed that the length of snout and the interorbital width are having maximum variation among these populations.

4. *Population of 20 to 30 mm SL vs. 91 to 110 mm SL.*

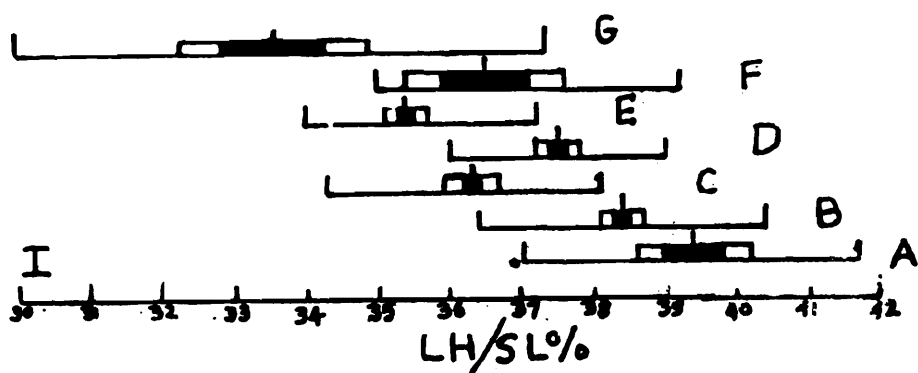
The two populations are similar statistically in respect of 19 characters in the fact that their probability is less than 5%. The other four characters which in the two populations differ are preanal distance in standard length, width of head in its length, height of dorsal fin in its base and length of caudal peduncle in its height. From the graphs (I-III, V-VIII, X-XIII, and XV-XVIII) and Dice diagram (A & E in each), it has been noticed that 15 characters are having gradual variations. The characters showing the maximum variations includes length of pectoral fin in standard length, length of snout, interorbital width and the eye diameter in length of head.

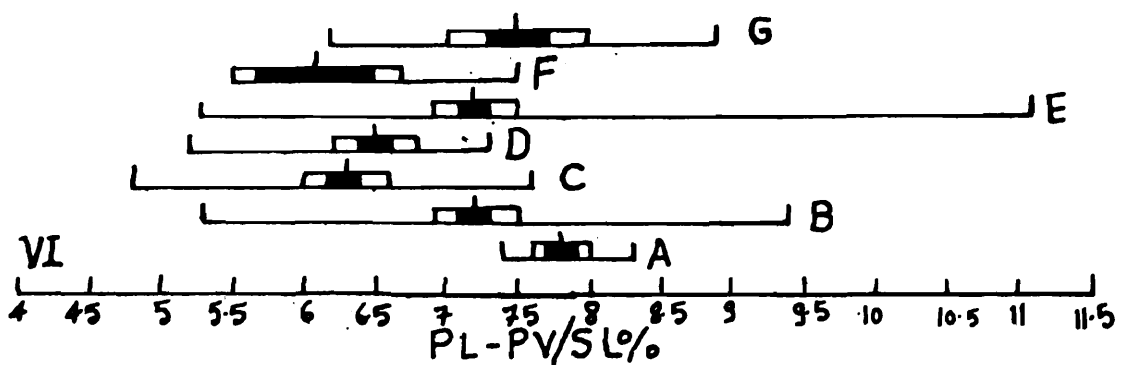
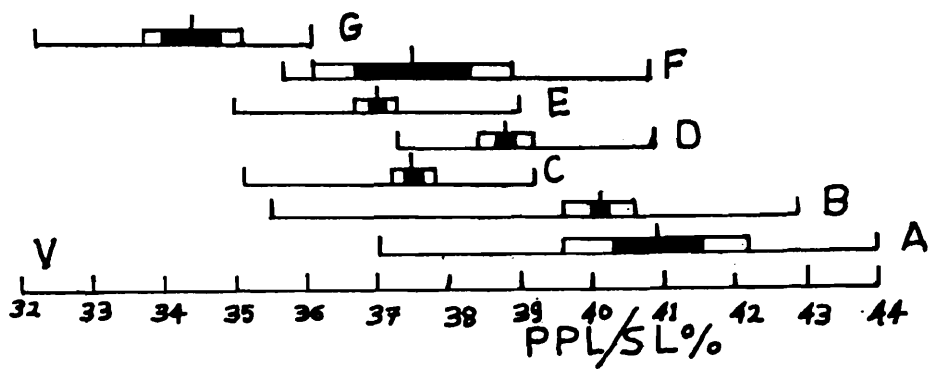
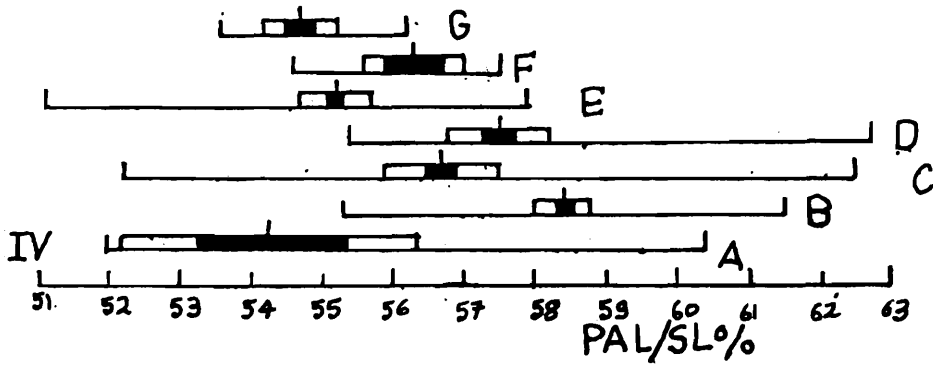
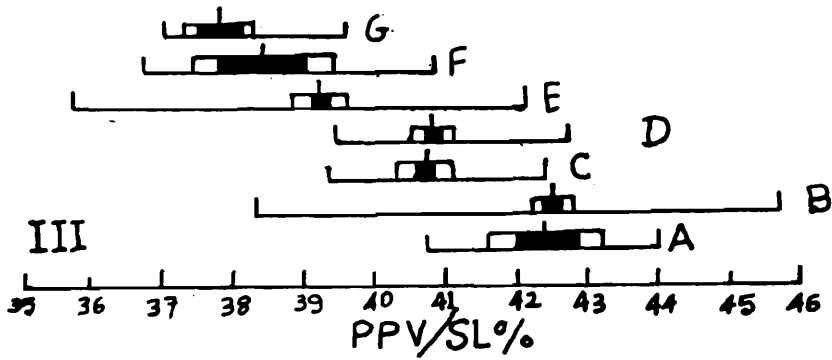
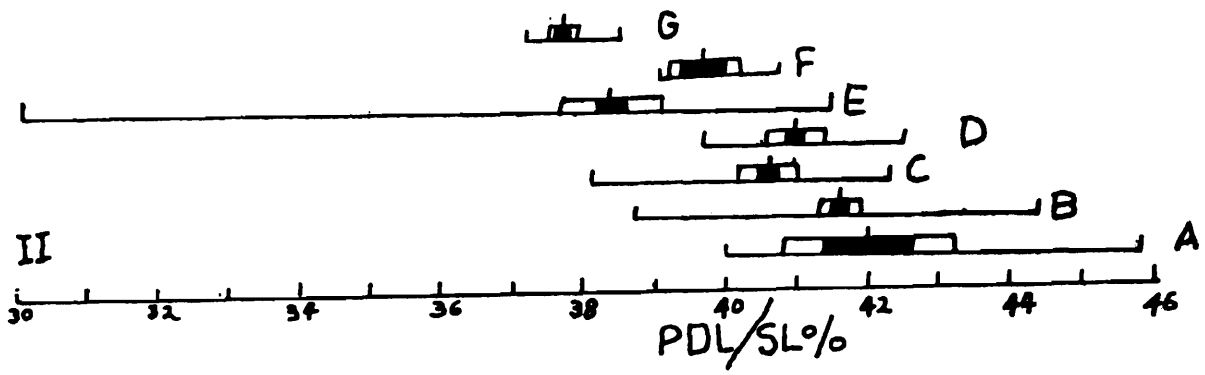
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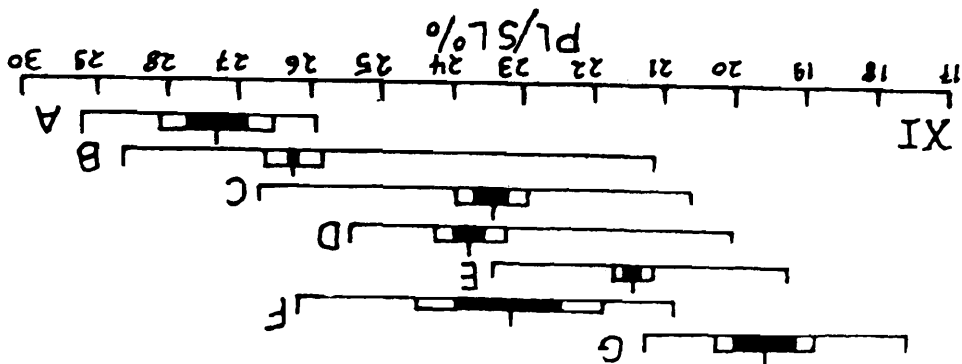
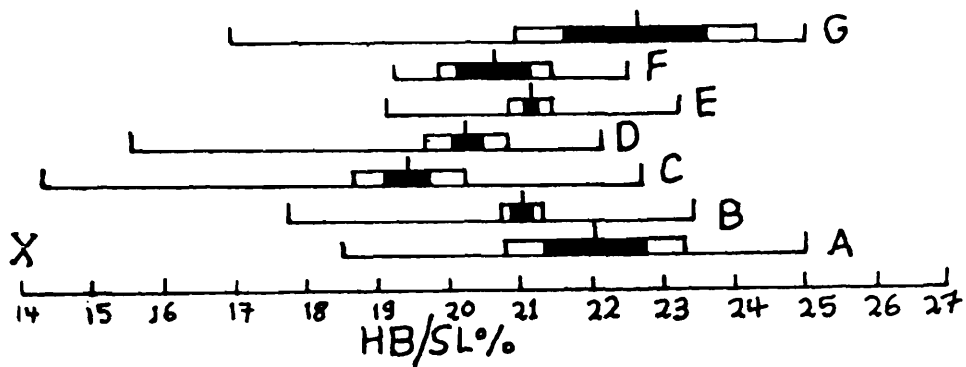
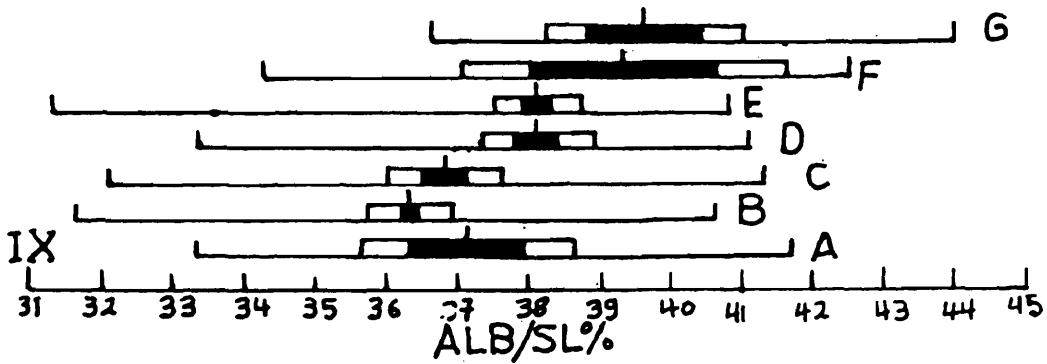
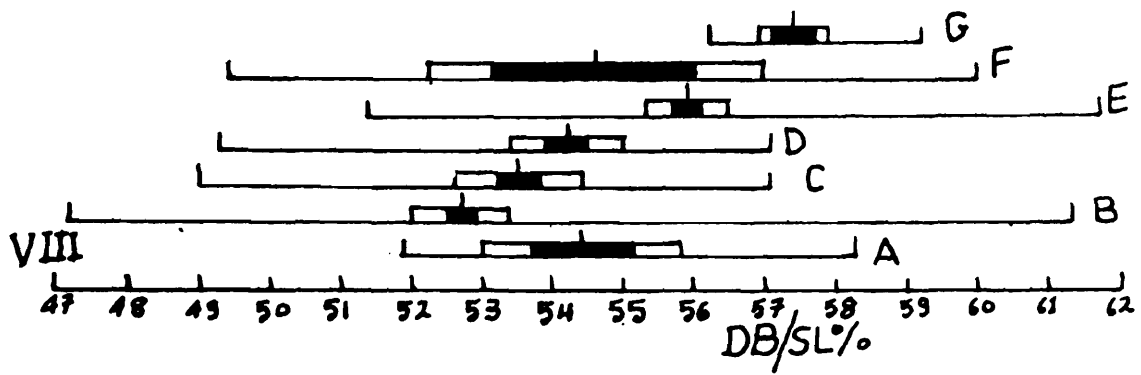
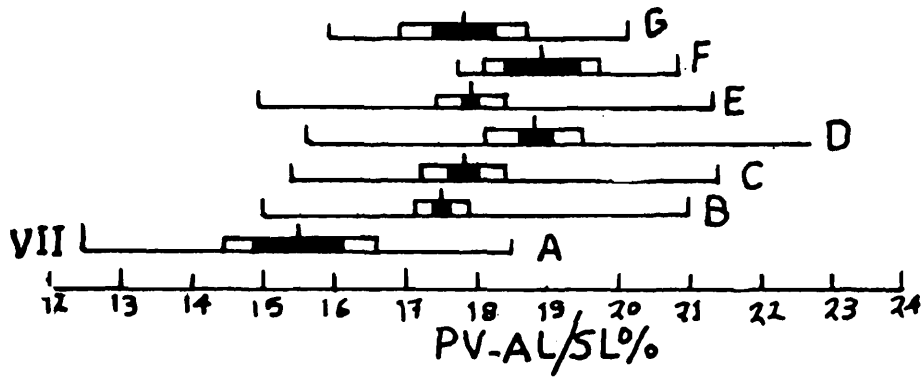
ABBREVIATION USED IN THE GRAPH :

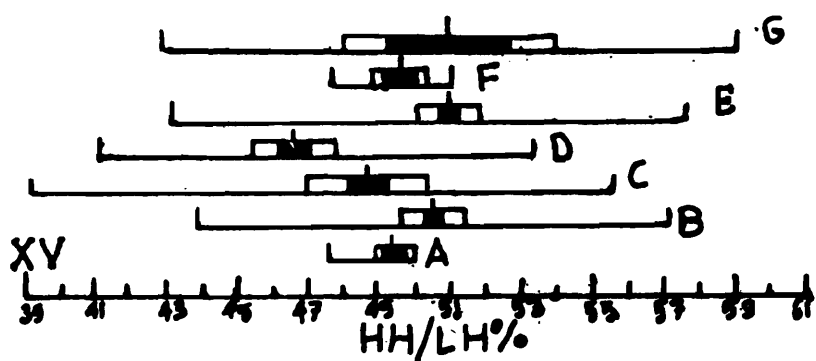
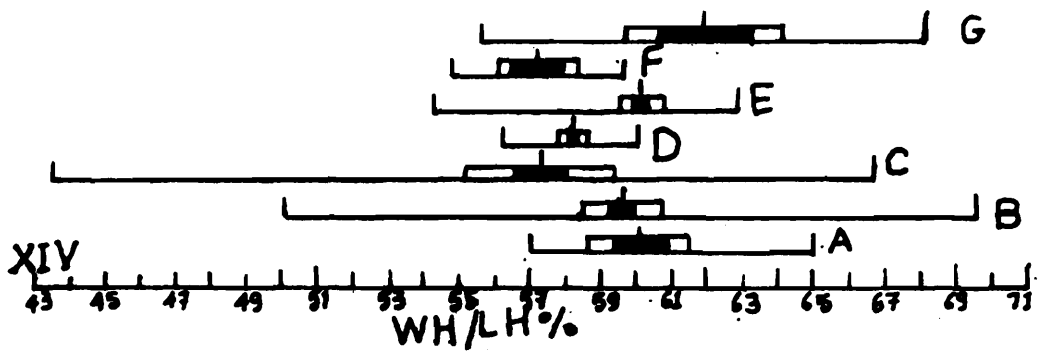
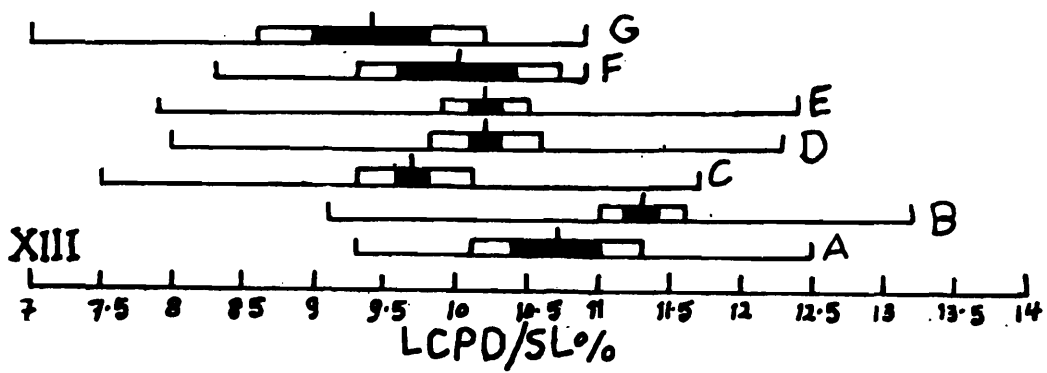
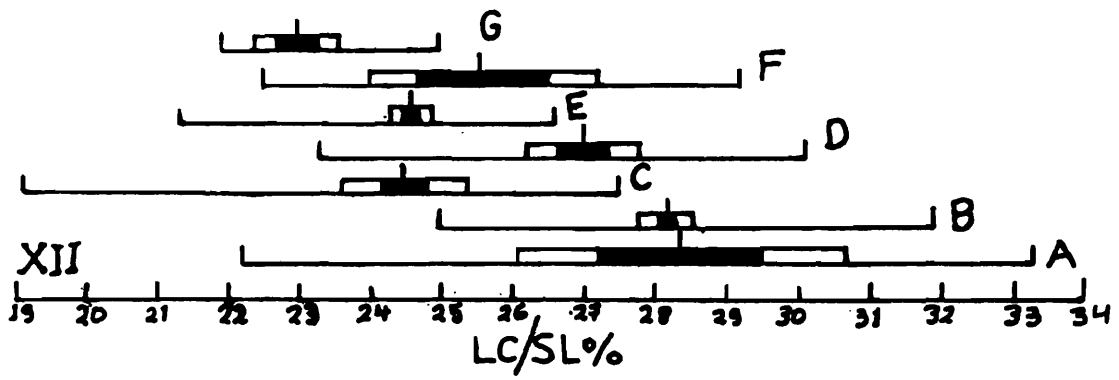
ALB=base of anal fin; ALH=height of anal fin : DH=height of dorsal fin; DB=base of dorsal fin; ED=eye diameter; HB=height of body; HCPD=least height of caudal peduncle; HH=height of head; IOW=interorbital width; LC=length of caudal fin; LCPD=length of caudal peduncle; LH=length of head; LS=length of snout; PAL=preanal distance; PDL=predorsal distance; PL=length of pectoral fin; PL-PV=pectoral-pelvic distance; PPL=prepectoral distance; PPV=prepelvic distance; PV=length of pelvic fin; PV-AL=pelvic-anal distance; PV-AN=pelvic-anal distance; SL=standard length, WH=width of head.

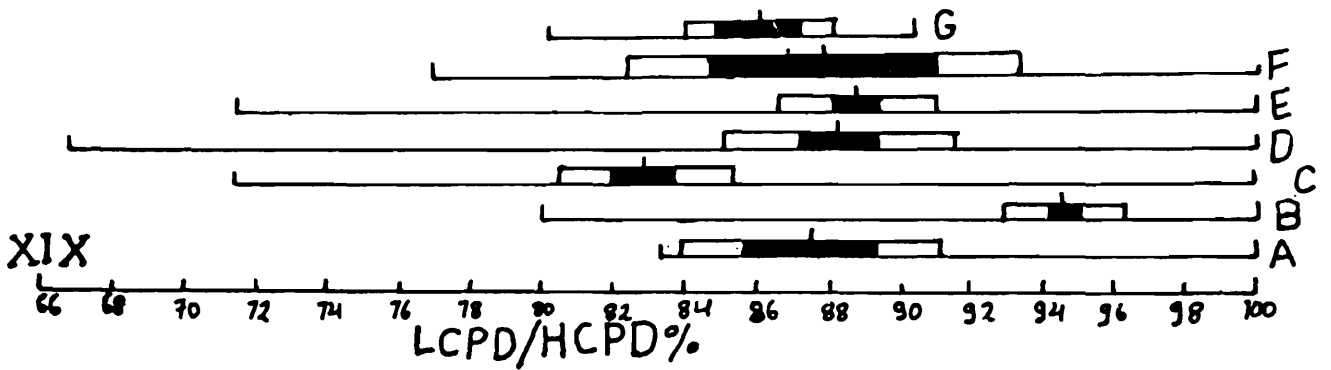
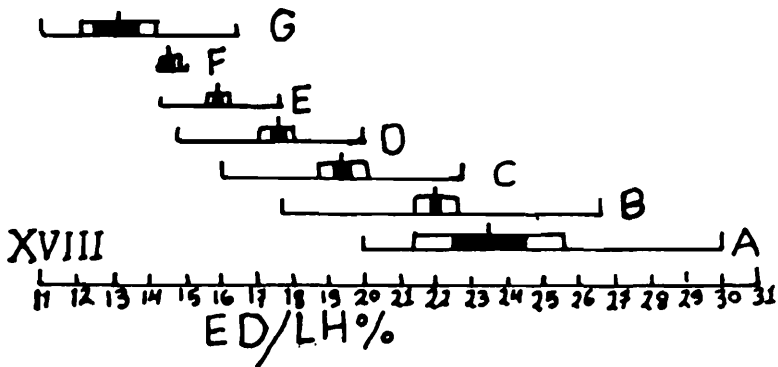
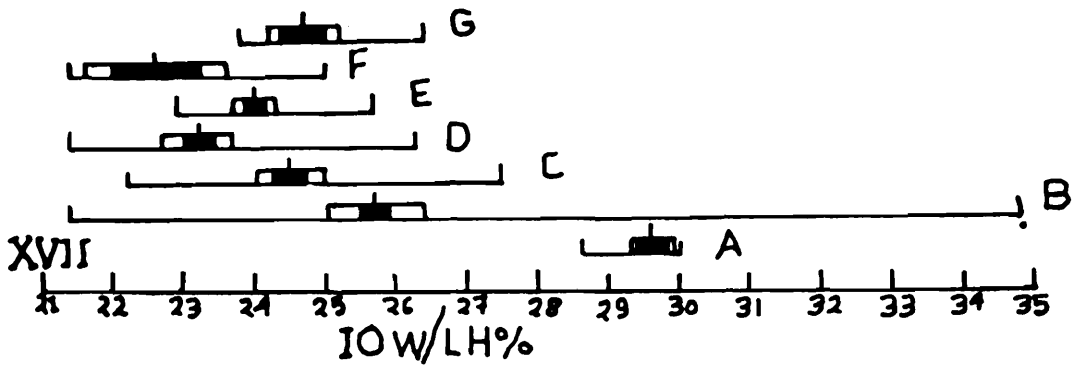
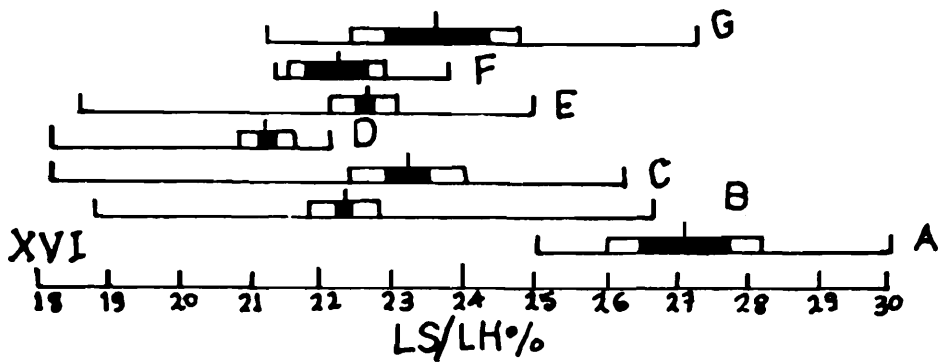
GRAPH I-XIX, Dice diagram showing the clinal variations and intergradation in respect of 19 characters in the different size group of *Channa punctata* (Bloch). In each diagram, the horizontal base line indicates the extreme range; the vertical line in the middle represents the arithmetic mean; the solid area on either side of the mean is the extent of one standard error. The hollow area delimits one standard deviation on either side of the mean; A=population of 20-30 mm SL; B=population of 31-50 mm SL; C=population of 51-70 mm SL; D=population of 71-90 mm SL; E=population of 91-110 mm SL; F=population of 111-130 mm SL; and G=population of 170-200 mm SL.











5. *Population of 20 to 30 mm SL vs. 111 to 130 mm SL.*

From the data analysed, it is seen that these two populations differ in 11 characters having the probability of 10%-99%. In respect of other 12 characters they are similar. From the Dice diagram it would appear that there is a gradual variations in respect of 15 characters according to size group (Graph I-VI, VIII, IX-XII, XIV, XVI-XVIII and Dice diagram A & F in each). The eye diameter, length of snout and the interorbital width exhibit the maximum variation.

6. *Population of 20 to 30 mm SL vs. 170-200-mm SL.*

It is found that except preanal distance, pectoral-pelvic distance and height of body in standard length; width of head, height of head in length of head and length of caudal peduncle in its height, in respect of other 17 characters these two populations are having probability of less than 5%.

The graphs (I-III, V, VII-IX, XI-XIV, XVI-XVIII) and Dice diagram (A & G in each), indicate a gradual variation in respect of 14 characters and the maximum variations are noticed in respect of prepelvic distance, prepectoral distance, length of pectoral fin, eye diameter and the interorbital width.

DISCUSSION

The comparative statistical analysis of morphometric characters mensurated from seven different size groups of a species under the genus *Channa*, clearly indicates that despite certain morphological variations all the specimens studied belong to the same species. Generally, the specific status of various species under this genus is determined, based on the meristic characters such as the number of dorsal fin rays, pectoral fin rays, anal fin rays, lateral line scales and the predorsal scales. So much so, the present species under study belong to *Channa punctata* (Bloch) since all the specimens examined have constantly 28-30 dorsal fin rays, 16-17 pectoral fin rays, 19-23 anal fin rays, 37-40 lateral line scales and 12-13 predorsal scales irrespective of their size groups.

However, the statistical evaluation of 23 morphometric characters reveals that the first group (20-30 mm SL) varies significantly in respect of various characters from the other size groups. Further, the first group can be considered as a separate species if compared with only the size range of 111-130 mm SL as out of 23 morphometric characters 11 characters indicate the probability of 10%-99%. But it is a well known fact that the biological conclusion can not simply be determined in terms of numerical interpretation. Thus the numerical data delineated on the graphs would perhaps indicate that the significance of variations in respect of different morphometric character analysed are not species specific but a sort of intraspecific variations. These variations are clinal as revealed from the Dice diagram. However, the magnitude of variation itself varies in different characters since the divergence is more in respect of eye diameter, interorbital width and the length of snout as compared to other characters (Graphs XVI, XVIII, XVIII).

Morphologically, the specimens belonging to the size group (20-30 mm SL) are distinct in as much as they have lateral golden stripes extending from the snout, through eyes to middle of the caudal peduncle. Whereas the specimen above 30 mm SL do not have any such stripe. However, Day (1875-78) observed brilliant

orange band in *C. marulius*, Willey (1908) notified two lateral and one median stripe in younger specimens (21-26 mm) from Ceylon. Deraniyagala (1929) also reported similar number of stripes in the young (13 mm) from the same place. We have observed only two lateral stripes in the preserved specimens of 24-27 mm. SL. Perhaps the number of stripes also varies with the age.

In view of the foregoing discussion, it is concluded that all the specimens of different size groups from which morphometric data have been analysed belong to same species i.e. *Channa punctata* (Bloch). The morphological uniqueness specially in respect of the colour pattern may not be a good criterion for distinguishing the species of the genus. The morphometric variations in respect of various characters are intraspecific associated with the age and growth.

SUMMARY

The specimens of different size groups of *Channa punctata* (Bloch) have been studied in respect of 23 morphometric characters. The morphometric data were subjected to statistical analysis and the range of variation in respect of 19 characters as exhibited by each size group has been delineated on the graph. It is seen that these variations are clinal, associated with the age and growth as revealed from the Dice Diagram. It is also observed that the specimens with the lateral yellow stripes on either side are the larval forms of *C. punctata*, and the morphometric variations in respect of various characters are intraspecific.

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