



The Morphometric And Merestic Characteristics of Bombay Duck (*Harpodon Nehereus*) from Vasista Godavari Estuary

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Abstract

*In India, among the commercially important fishes, Bombay duck (*Harpodon nehereus*) ranks next only to oil sardine and mackerel, The Bombay duck catch forms about 7% of the total, all India landings. 97% of the catches of this fish comes from the coast of Maharashtra and Gujarat. But considerable amount of Bombay duck catches were observed from Vasishta Godavari estuary during 2011-2014. Chinchinada, Narsapuram, Chinamynavani lanka and Anthervedi were identified as main landing centers of Bombay duck. In the present studies seasonal wise changes of landings were observed. Mechanized bods and artisanal crafts were used. Gill nets and logline were observed as main gear.*

Key words: *artisanal crafts*, biological information, Vasista Godavary

Introduction

As we are proceeding in this millennium, finfish and other aquatic products will be in acute short supply as domestic and International demand for both high and low valued species increasing due to raising populations, living standards and disposable incomes. Bombay duck, *Harpodon nehereus* is a key contributor in Indian marine fish landings ranging from 4-5% commonly along North-West and North-East coast (Fig. 1). Bombay duck production was 1, 15,296 tonnes in 2012, contributing nearly 3-4% of the total marine landings of India (CMFRI Annual Report, 2013). Though well relished and considered a delicacy in Western India, its culinary qualities have not been recognized in West Bengal. *H. nehereus* forms a lucrative fishery along Sunderban region of North-East coast of India. Bombay duck is a very soft and highly perishable due to high moisture content in its muscle. It is having good importance and relished by different sections of people as table fish and also valuable as laminated or dried from (Kumar *et al.*, 2012a).

The fishery, biology and population characteristics of the *H. nehereus* from the Saurashtra coast were extensively studied (Balli *et al.*, 2011; Ghosh *et al.*, 2009; Bapat, 1970; Khan, 1985, 1986a, 1986b, 1987 and 1989). Along Hooghly matlah estuarine region of North-East coast of India, food and feeding habits was studied (Pillay, 1951, 1953; Kumar *et al.*, 2012b) and population dynamics was also estimated (Krishnayya, 1968).

Studies on the morphometry and meristic counts are vital for the differentiation of taxonomic units. Studies on variation in morphological characters are critical in order to elucidate patterns observed in phenotypic and genotypic variations among coastal fish populations (Beheregaray and Levy, 2000). There were no studies related with morphometry and meristic counts of Bombay duck, *H. nehereus* stocks along Vasista Godavary estuary Andhra Pradesh India. The present work aims to full fill the research gap, upgrade the biological information of species and also study the factors which influence the stock dynamics.

2 Materials and Methods

2.1 Sampling site and size

The present work aims on some aspects of morphometric and meristic characters of *H. nehereus* for the period of one year (February 2012 to January 2013), to Anthervedhi (Landing Station-2) (16.3333° N 81.7333°E) (Fig. 1). Samples were captured mostly by gill nets and casts present studies; total of 373 specimens of *H. nehereus* was sampled for the 11 months period More than 30 specimens were examined in the department of zoology Andhra University, laboratory during each month. Samples were collected twice in a month and examined usually at fortnightly intervals. Total length and standard length were measured in market itself by using the millimeter scale. Total weight was measured with a

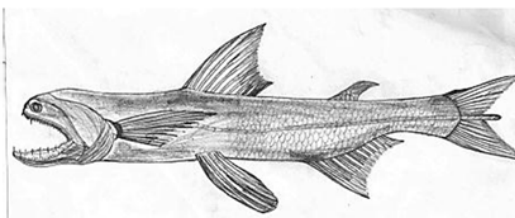
monopan balance for individual fish in grams.

2.2 Sampling method

For study of the morphometric and meristic characters the standard procedure (Lowe-McConnel, 1971) was followed. All linear measurements were rounded to the nearest mm. Among different morphometric characters, standard length, head length, pre-dorsal length, length base of dorsal fin, length base of anal fin, pectoral finlength, dorsal height, pectoral fin height, least depth of caudal peduncle, post orbital length, snout length, eyediameter were measured. Four meristic characters such as dorsal fin rays, pectoral fin rays, pelvic fin rays and anal fin rays were estimated. Total length and head length were used as reference length. Total length was measured from tip of the snout to the tip of the caudal fin. The diameter of the eye was measured in horizontal axis.

3 Results and Discussion

Harpadon nehereus (Hamilton, 1822)



Harpadon nehereus (Hamilton, 1822)

Osmerus nehereus Hamilton, 1822

Class : Actinopterygii
 Order : Aulopiformes
 Family : Synodontidae
 Genus : *Harpadon*
 Species : *nehereus*

Fin Formula :-

Dorsal -I	Dorsal -II	Pectoral	Pelvic	Anal	Caudal
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12/0	-	11	9	14	19
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TL	SL	HL	Sn.L	E.D	HOB	PDL	P.D.SC	LL.SC	LL.V.SC
23	18.5	4.0	0.4	0.6	3.9	5.0	-	-	-

Description: Body elongate and compressed, eyes very small covered by adipose membrane. Mouth very wide, armed with slender, recurved and deperessible teeth. Pectoral fins long, pelvic fins very long. Colour is uniform light grey, speckled with black, translucent when alive, fins dark. Lateral line having scales upto the caudal fin end.

Common name: Bombay duck.

Regional name: Kukkasavida

Habit and habitat: Marine, brackish.

Economic importance: Highly commercial.

Status and Conservation: Not evaluated in IUCN Red list.

Distribution: Indo-West Pacific.

Studies on the morphometric and meristic characters of fishes provide substantial information with regard to the exact nature of stocks and their geographical distributions. Morphometric differences are seen with in the species and even within different sexes of species due to interactive genetic and environmental effects. The Knowledge of exact genetically and environmental controlling characters are essential for the identification of species of a genus and the populations with in a species. Current study reveals that the biometry values *H.nehereus* showed a proportional positive increase with total length of fish.

The present study revealed the highest correlation of standard length on total length in case of both male ($r = 0.965$) and female ($r = 0.961$) and also observed the highest correlation of post orbital length on head length in case of both male ($r = 0.948$) and female ($r = 0.957$). The lowest value of the correlation for the male was noticed in the case of height of pelvic fin ($r = 0.771$) on total length and snout length ($r = 0.642$) on percentage of head length. In female lowest correlation value was

observed in case of length base of anal fin ($r = 0.597$) on total length and snout length ($r = 0.572$) on percentage of head length. Morphometric analysis of the present study revealed that the correlation values were greater in male than female when calculating the percentage on total length and head length. Only the post orbital length giving the more value in case of female ($r = 0.957$) when compare to male ($r = 0.948$). Nikolsky (1963) stated that the males and females often differ in the length and shapes of fins. Phenotypic plasticity during present investigation occurred due to the environmental factors because fishes were procured from different water bodies of Vasistha Godavari estuary at Anthervedhi.

Johal *et al.*, (1994), classified three categories of morphometric characters based on percentage range difference i.e. genetically controlled characters (<10% range difference), intermediate (10.1% to 14-99% range difference) and environmentally controlled characters (>15% percentage difference). In current study, in male



parameters like post orbital length (15.24%) and snout length (15.04%) are environmentally controlled and the other parameters like standard length (10.09%), pre-dorsal length (12.18%), height of pelvic fin (13.39%) and height of pectoral fin (12.10%) were controlled by intermediate factors, but in case of female pre-dorsal length (10.37%) and post orbital length (12.37%) were controlled by intermediate factors. Other than these parameters, all the remaining parameters in both male and female were controlled by genetic factors (hereditary).

Meristic characters of *H. nehereus* in the current study includes dorsal fin with 10-13 soft rays, pelvic fin with 9 soft rays, pectoral fin with 10-12 soft rays and the anal fin with 13-15 soft rays. The variations in the number of meristic characters have been documented by many workers (Abdurahiman *et al.*, 2004), who opined that the environmental factors particularly that the temperature influences meristic characters in the process of their growth in fishes. The variations can also be exhibited by various stocks found in different geographical areas (Sarker *et al.*, 2004). The present study agreed with the previous work (Bapat *et al.*, 1970). The meristic counts in both of the sexes were found to be quite similar resembling the earlier work.

Acknowledgements:

The authors are grateful to the Head, Department of Zoology, Andhra University for providing necessary facilities to carry out the research work.

References

Abdurahiman KP, Harishnayak T, Zacharia PU, Mohamed KS. 2004.

Length-weight relationship of commercially important marine fishes and shell fishes of the southern coast of Karnataka, India. World Fish Centre Quarterly, 27(1): 9-10

Balli JJ, Chakraborty SK, Jaiswar AK. 2011. Population dynamics of bombay duck *Harpadontidaeneherus* (Ham. 1822) (Teleostomi/Harpadontidae) from Mumbai water, India. Indian Journal of Geo-Marine Science, 40(1): 67-70

Bapat SV. 1970. The Bombay duck, *Harpodon nehereus* (Ham). Bulletin CMFRI, 21: 1-66

Beheregaray LB, Levy JA. 2000. Population genetics of the silverside *Odontesthesargentinensis* (Teleostei, Atherinopsidae): evidence for speciation in an estuary of southern Brazil. Copeia, 441-447

CMFRI Annual Report, 2013. Central Marine Fisheries Research Institute, Cochin, Kerala, India
Ghosh S, Pillai NGK, Dhokia HK. 2009. Fishery and population dynamics of *Harpadonnehereus* (Ham.) off the Saurashtra coast. Indian Journal of Fisheries, 56(1): 13-19

Johal MS, Tandon KK, Sandhu GS. 1994. Mahseer in lacustrine water, Gobindsagar reservoir. In: Mahseer –the Game Fish (garhwal) (Nautiyal P, ed). 65-85, JagdambePrakashan, Dehradun, India

Khan MZ. 1987. A note on the Dol net fishery off Jaffrabad (Gujarat) with special reference to Bombay duck, from 1979-'80 to 1981-'82. Indian Journal of Fisheries, 34(2): 188-192



- Khan MZ. 1986a. Dol net fishery off Nawabunder (Gujarat). Fishery Technology, 23: 92-99
- Khan MZ. 1986b. Mortality and stock size estimates of the Bombay duck, *Harpodon nehereus* (Ham.) off Nawabunder (Gujarat). Indian Journal of Fisheries, 33(3): 354-358
- Khan MZ. 1985. Observations on the fishery of Bombay duck, *Harpodon nehereus* (Ham.) along the Saurashstra coast. Indian Journal of Fisheries, 32 (4): 431-438
- Khan MZ. 1989. Population dynamics of the Bombay duck, *Harpodon nehereus* (Ham.) off Saurashstra coast. Indian Journal of Fisheries, 36 (2): 93-101
- Krishnayya CH. 1968. Age and growth of *Harpodon nehereus* (Ham) and its fishery in the Hooghly estuarine system. Journal of Zoological Society of India, 20(1&2): 129-147
- Kumar VV, Reddy AD, Balakrishna C, et al. 2012a. Ecological parameters suitable for Bombayduck fishery, *Harpodon nehereus* along Sunderban area of West Bengal, India. Environment and Ecology, 30(3B): 860-864
- Kumar VV, Reddy AD, Balakrishna C, et al. 2012b. Analysis of Diet composition, feeding dynamics and proximate composition of Bombayduck, *Harpodon nehereus* along Sunderban area of West Bengal, India. Achieves in Applied Science Research, 4(2): 1175-1182
- Lowe-McConnel RH. 1971. Identification of Freshwater fishes. In: Methods for Assessment of Fish Production in Freshwater (Ricker WE, ed). 450-489, Black well Scientific Publication, Edinburg, Oxford, UK
- Nikolsky GV. 1963. The Ecology of Fishes. Academic Press, New York, USA
- Pillay TVR. 1951. A preliminary note on the food and feeding habits of the Bombay duck, *Harpodon nehereus* (Ham.) in the river Matlah. Science and Culture, 17: 261-262
- Pillay TVR. 1953. The food and feeding habits of the Bombay duck, *Harpodon nehereus* (Ham.) in the river Matlah (Bengal). Proceedings of National Institute of Science in India, 19: 427-435
- Sarker Y, Jaiswar AK, Chakraborty SK, et al. 2004. Morphometry and length weight relationship of *Megalaspiscordyla* (Linnaeus, 1758) from Mumbai coast. Indian Journal of Fisheries, 51(4): 481-486
- Snedecor GW, Cochran WG. 1967. Statistical Methods. Oxford and IBH Publishing Co., Calcutta, India