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SKELETAL DEFORMITIES IN A FEW FRESHWATER FISHES FROM BHAVANI RIVER, TAMIL NADU

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Deformities in teleosts are occasionally found in natural and/or wild population. Such phenomenon is quite common among the animals kept in zoos for captive propagation (Sennar, 1980; Tutman *et al*., 2000). Several studies have focused on the deformities of the skeletal region, and a wide range of causes has been noticed, including genetic variance (hereditary factors), inbreeding depression, significant ecosystem changes *viz*., temperature, pH, parasitism, nutritional deficiencies and environmental contamination (from pollutants) (Orska, 1962; Koumoun-douros *et al.*, 1997). Numerous reports are available regarding the present study in other species *viz*., *Cirrhinus mrigala* and *Hypothalmichthys molitrix* (Panday & Awasthi, 1994) probably due to inbreeding depression. Similar abnormal features have also been observed among a few endangered fish species, namely, *Salmo trutta* (Poynton, 1987), *Micropterus dolomieni* (Avyle *et. al.*, 1989) and *Oncorhynchus mykiss* (Madsean & Dalsgard, 1999). The present study reports the skeletal deformities found in wild populations of a few freshwater catfishes *Mystus cavasius*, *Ompok bimaculatus* and *Heteropneustes fossilis*, murrel *Channa striatus* and *C. puntatus* and featherback *Notopterus notopterus*.

Between December 2002 and March 2003, fishes were collected from river Bhavani (Bhavanisagar Dam, Erode Dist., Tamil Nadu, India) [as a part of the study of the endangered freshwater fish species for its conservation by induced breeding techniques in captivity] using cast net between 0500 and 0600hr and between 1700 and 1800hr. They were transported to the Centre for Aqaculture Research and Extension (CARE) and stocked in a 5000lt fibre tank. Before the introduction of these species into culture pond, their length and weight were recorded. At the time some of the deformed individuals were noticed occasionally and kept separately. Among the 227 individuals (*M. cavasius* - 59, *O. malabaricus* - 78, *Heteropreustes fossilis* - 20, *C. striatus* - 12, *C. punctatus* - 28, and *N. notopterus* - 30) totally eight were deformed, *viz*., *M. cavasius* - 1 (Image 1[w]), *O. bimaculatus* - 1 (Image 2[w]), *Heteropreustes fossilis* - 1, *C. striatus* - 1 (Plate 3), *C. punctatus* - 3 (Images 4-6[w]), and *N. notopterus* - 1) and the percentage of deformity was calculated. The skeletal deformed individuals of *M. oculatus*, *O. bimaculatus*, and *Heteropreustes fossilis* were examined by radiography using a medical x-ray system (Plate 7a –7c). The deformed fishes were shorter than normal, had curved spinal chord either in vertical or horizontal region but other internal organs were normally developed. The deformity was noticed in the dorsal region (*C. striatus*) and the caudal peduncle region was slightly curved upward and downward in *C. striatus* (Image 3[w]), *M. cavasius* and *O. bimaculatus* and the other two *C. punctatus* (Images 5[w] & 6[w]) were deformed in caudal fin region being bent sideways. Literature shows that abnormalities of the vertebral column are relatively frequent and variable in prevalence and is always higher in the wild than in captivity (Table 1).

Similar reports are available on the prevalence of spinal deformities *e.g*., *Fundulus heteroclitus* (Gabriel, 1944) and *Esox lucicus* (Orska, 1962). Unfavorable environmental factors as well as various degrees of inbreeding have also been attributed to malformation of the vertebral column among cultivated fish species. Skeletal deformities can be environmentally induced in two ways (i) by alteration of biological processes necessary for maintaining the biochemical integrity of bone or (ii) neuromuscular effects, which lead to deformities without chemical change in vertebral composition. Numerous pesticides including organo-chlorines, polychlorinated biphynels and fluorinated herbicides can cause skeletal deformities of various fish species in natural and reared conditions (Wiegand *et al*., 1989; Chattain, 1994). These compounds typically cause fractures, many organic contaminations alter bone metabolism and affect biochemical composition of vertebral column (Mayer *et al*., 1975) but this was not detected in our study. Acid precipitation has also been suggested as a potential cause of skeletal deformities in fishes (Sarkar & Kapoor, 1956; Andrades *et al*., 1996). Metals such as cadmium, zinc, mercury and lead cause skeletal deformities in fish by altering bone metabolism and can also affect the neuromuscular system (Sauer & Watanabe, 1984; Davies *et al*., 1976)

In our study, the deformities seem to have multifactorial (environmental contamination, genetic factors and inbreeding depression) explanations. Conclusively, we were unable to determine the exact source of the deformities. But the several evaluation reports indicate that the detection of such abnormalities can be preferred at very early developmental stage

Table 1. Number of vertebral column (normal and deformed), region of skeletal deformation and percentage of deformity in the freshwater fish species

Species	Number of vertebral column		Region of skeletal deformation	Percentage of deformity
	Normal	Deformed		
Ompok bimaculatus	53	47	Caudal peduncle	1.28
Mystus cavasius	43	36	Caudal peduncle	1.69
Channa punctatus I (Image 4)	38	34	Caudal peduncle	10.70
Channa punctatus II (Image 5)	_	_	Caudal fin (Normal-18 fin rays; Deformed-15 fin rays)	10.70
Channa punctatus III (Image 6)	_	_	Caudal fin (Normal-18 fin rays; Deformed-12 fin rays)	10.70
Channa striatus	57	51	Dorsal region	8.33
Heteropneustes fossilis	61	54	Caudal peduncle	3.84
Notopterus notopterus	69	61	Dorsal region	3.33

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and also expression of some homoeotic genes in the skeletal region, for example, in zebra fish *Brachydanio nerio* (Joly *et al*., 1993). For this reason further detailed research of this phenomenon will concentrate the mechanism of spinal deformation during early embryogenesis.

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OCCURRENCE OF THE SHORT-NOSED FRUIT BAT (*CYNOPTERUS SPHINX* VAHL, 1797) IN THE THAR DESERT OF RAJASTHAN

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The chiropteran fauna of the Rajasthan Thar Desert is mainly known through the works of Prakash (1963), Sinha (1979, 1980) and Gaur (1981), where they recorded a total of 24 species (both Megachiroptera and Microchiroptera). Although the Short-nosed Fruit Bat, *Cynopterus sphinx*, is one of the common chiropteran species in India, it is not commonly encountered in the Indian Thar Desert. In Rajasthan, Advani (1982) reported it from Banswara, Bundi and Jhalawar, whereas, Sinha (1980) reported this species from Banswara and Bundi in a guava orchard. Prater (1971) gives the distribution of this species from peninsular India and Southeast Asia. Prakash (1963) and Bates *et al*. (1994) did not report this species from Thar Desert of Rajasthan.

On 6 February 2003, in one of our intensive tour program to survey the faunal diversity of the Thar Desert, I visited Bhinmal, a Tehsil of Jalore District, which comes under the semi arid part of Thar Desert tract. There I observed 18 Short-nosed Fruit Bats actively feeding on *Zizyphus jujuba* trees, with an assemblage of *Pteropus giganteus*, inside the city at the Government Dak Bungalow Campus. These bats were seen feeding while flying. They picked up ripe berries and sucked the pulp during flight, dropped the seed and returned to the tree for another fruit. The bats repeated this until midnight.

The probable reason for the occurrence of this species in the semi-arid region of Thar Desert might be due to several newly established fruit orchards and the introduced date palm trees which provide a natural roost (CAZRI, Jodhpur unpub. data).

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