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Records of Total Albinism in *Heteropneustes fossilis* (Bloch, 1794) from Upper Brahmaputra Valley, Assam, India

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Abstract

The phenomenon of total albinism in fishes is rare, and very few cases of albinism are reported across the globe. In this study, we report total albinism in two wild specimens of stinging catfish *Heteropneustes fossilis*, collected from the Lesia river in the Dhemaji district of Assam, Northeast India. There are only two more such reports of total albinism in this epigeal fish from India, one published in 1966 from Assam and the other in 2023 from West Bengal.

Keywords: Heteropneustidae, Indo-Burma biodiversity hotspot, Lesia river, Siluriformes, stinging catfish

In fishes, albinism is a rare phenomenon, and is caused due to an autosomal recessive allele (Uieda *et al.*, 2007) or due to heavy metal pollution (Oliveira & Foresti, 1996). In total albinism, the entire body of the animal is whitish with reddish eyes (Sazima & Pombal Jr., 1986). Of the 14 recorded cases of albinism in Neotropical fishes, 11 belong to Siluriformes (Nobile *et al.*, 2016), indicating a higher prevalence of the phenomenon in this taxon. A few cases of albinism have been reported from India, including Magur *Clarias batrachus* (Hora, 1926) and freshwater eel *Anguilla bengalensis* (Jones & Pantulu, 1952). Albinism has also been reported in the cave fish *Indoreonectes evezardi* from the Kotumsar Cave, Chhattisgarh (Biswas, 2010), and in different cave fishes from Meghalaya, which includes *Schistura larketensis*, *Schistura papulifera* and *Neolissochilus pnar* (Kosygin *et al.*, 2023). Total albinism in *Heteropneustes fossilis* has previously been reported from Assam (Baruah, 1966), and West Bengal (Das *et al.*, 2023). Here we report on two observations of total albino *H. fossilis* individuals from the Dhemaji district of Assam, India. In cave fishes, albinism or de-pigmentation is a type of adaptation (Barr, 1968), while the present report is from an epigeal environment (river) sans any subterranean selection pressure.

H. fossilis, commonly known as stinging catfish, belongs to the order Siluriformes and family Heteropneustidae. It is locally called *Singee* in Assamese and *Shing* in Bengali. The species is distributed across South and Southeast Asia, including India (Jayaram, 1999; Fernando *et al.*, 2019). Although the species was considered 'Least Concerned' by the IUCN with a 'stable' population trend in 2019, a 'continuing decline in area, extent and/or quality of habitat' has also been noted (Fernando *et al.*, 2019). Its population is declining in the wild largely due to anthropogenic disturbances, habitat loss and over exploitation (Haniffa *et al.*, 2008). The catfish commonly inhabits ponds, wetlands, marshes, ditches and small rivers. The species survives well in wetlands with heavy infestation of water hyacinth and in hypoxic conditions, thanks to its accessory air-breathing organ (Munshi, 1961; Samad *et al.*, 2017; Saha *et al.*, 2022).

The Dhemaji district (Assam, Northeast India) is bordered by the Brahmaputra river in the east and south, the Subansiri river in the west, and the Himalayan foothills of Arunachal Pradesh in the north. The district is criss-crossed by several smaller rivers, including Lesia, Na-Nadi, Gai-Nadi, Sissi, Jiadhal, Boginadi, *etc.* (Fig. 1). Most of these smaller rivers, including the Lesia river, don't retain flow during the lean season (January to March). This also facilitates the growth of aquatic macrophytes, including water hyacinth. The climate of the area is humid (70 – 90%) with high annual rainfall (2600 – 3200 mm). Rainfall generally starts in April and continues until September, July being the rainiest month. The temperature ranges between 5.9°C in winter and 39.9°C in summer. Seasonal floods are common throughout the low-lying areas of the district.

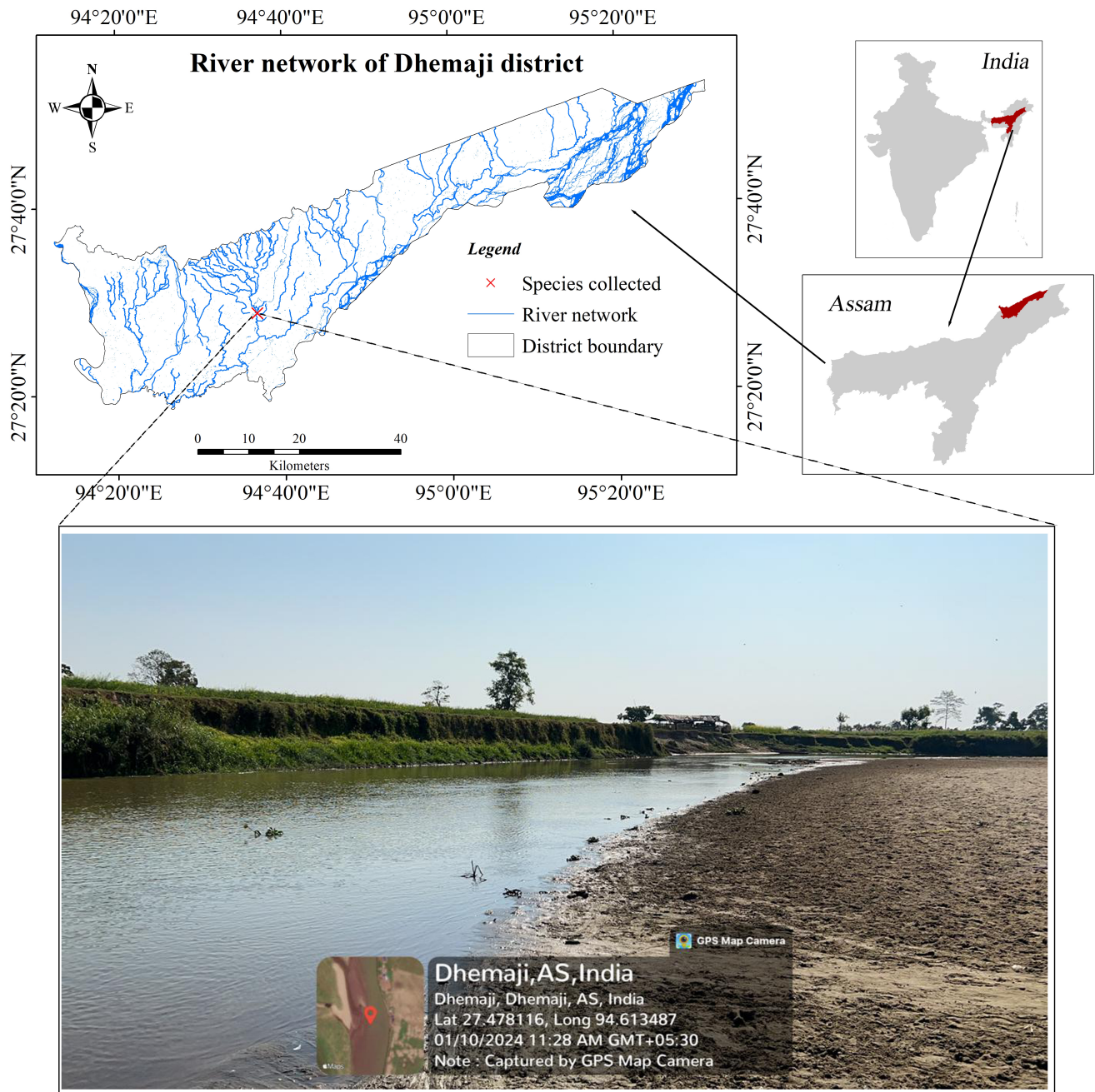


Figure 1. Location and photograph of the river section where the albino specimen of *Heteropneustes fossilis* were collected, Lesia river, Dhemaji district, Assam, India.

Both the albino *H. fossilis* individuals were collected from the Lesia river, a tributary of the Brahmaputra river, within the Amguri area of Dhemaji district, Assam, India (Figure 1). The individuals were caught by the local fishermen during their routine net fishing bouts on 10th January, 2024 at 1100 hrs. The fish were caught in a seine net of dimensions 20 m × 2 m (length × breadth), having a mesh size of 5 mm. The specimens were collected at 27.478°N and 94.613°E, where the depth of the river section ranged from 0.5 m to 2 m. Both individuals were of the same age and length (c. 13 cm). The eyes were devoid of pigmentation, reddish with a white ring. The fins and head were more reddish, and both specimens were totally albino (Figure 2). Since we intended to perform further genetic and behavioural studies, the specimens were not preserved, and other morphometrics were not performed (Figure 3).

Before the presented observations, there are two reports of total albinism in *H. fossilis* from India. Baruah (1966) reported albinism in the *H. fossilis* from a pond in a fish farm of Assam. Another specimen was reported by Das *et al.* (2023) from West Bengal, India, who termed their specimen as 'Golden Stinging Catfish'; the term 'golden' appears to be a misnomer. Genetic variation in pigmentation is common under domestic conditions and in selective breeding. Albinism has also been attributed to environmental toxins such as heavy metal pollution (Oliveira & Foresti, 1996). It is reported that albino fish exhibit behavioural differences, such as lesser aggressiveness and poor shoaling behaviour, compared to normally pigmented individuals (Slavík *et al.*, 2016). The present report may encourage further research on the albino variant, focusing on genetics, behavioural and reproductive ecology *vis-à-vis* the normally pigmented individuals.

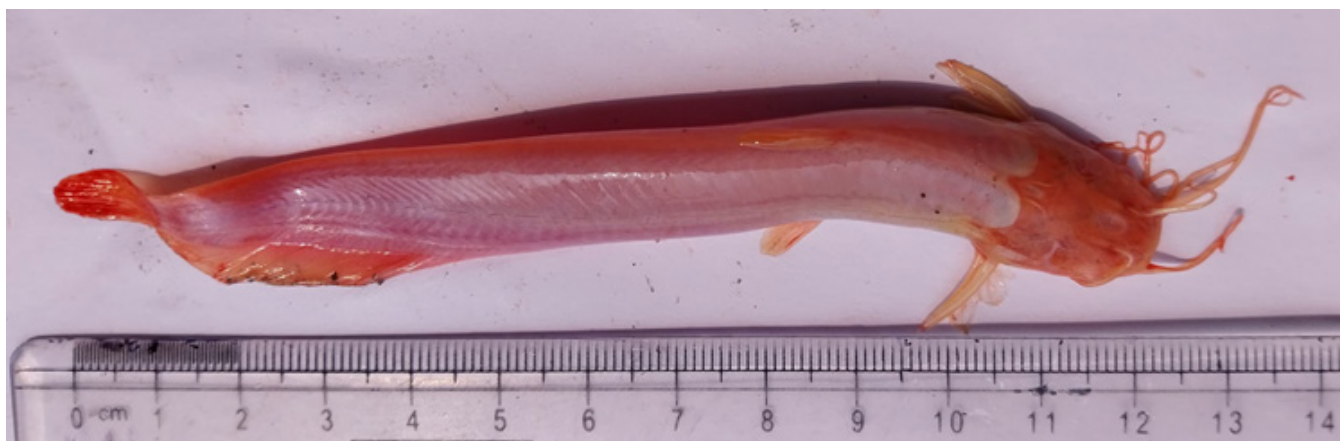


Figure 2. Photograph of the total albino *Heteropneustes fossilis* individual from the Lesia river, Dhemaji, Assam, India.



Figure 3. The two total albino *Heteropneustes fossilis* individuals were kept in an aquarium along with normally pigmented individuals in the Department of Zoology, Dhemaji College, Dhemaji, Assam, India.

The state of Assam has over 1,00,000 ha of floodplain wetlands, including ox-bow lakes, marshes, fens, *etc.* There are over 79 such wetlands in Dhemaji district covering an area of over 119 ha (CICFRI, 2000). Local fishermen look for the catfish in wetlands and smaller rivers. With the beginning of monsoon showers in April, mature individuals start migrating in search of new suitable habitats for spawning, thereby becoming vulnerable to capture. During the monsoon, passive gears, including gill nets, are commonly used for the catch, while dewatering is common in winter months. Extensive and excess

catch for food, gradual decline in habitat quality and area, building dams on rivers, *etc.* are some of the major threats to the wild populations of the species (Haniffa *et al.*, 2008; Fernando *et al.*, 2019). The catfish is a delicacy for the local communities and tribes, including Mising, Sonowal-Kachari, Deori and others, and is highly priced (between INR 500 – INR 1000 per kg). Being a good source of protein, iron and calcium (Hasan *et al.*, 2022), the fish has ethnomedicinal importance. The indigenous people of Assam believe that consumption of the catfish is beneficial for pregnant and lactating women, and for the treatment of anaemia and general weakness.

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CONFLICT OF INTEREST

The authors declare no conflict of interests.

DATA AVAILABILITY

Data will be made available upon reasonable request.

AUTHORS' CONTRIBUTION

PS and DH conducted the field study, and collected the specimens. ASC prepared the maps (Figure 1). PS, JC, SP and MKM maintained and studied the specimen. PS and MKM wrote the manuscript; MKM revised the submission. All authors read and approved the manuscript.

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