

# New Record of *Monopterus albus* (Zuiew, 1793) in Vellayani Fresh Water Lake, Kerala, Southwest Coast of India

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**Abstract:** The Asian swamp eel is a commercially important, air-breathing, freshwater eel-like fish belonging to the family Synbranchidae. It originating in the waters of East and Southeast Asia and has been identified as an invasive species in the North American Everglades. Vellayani Lake is the largest fresh water lake in Thiruvananthapuram district, and is the second largest fresh water lake in Kerala. About 42 species of freshwater fishes have been documented from the lake by various authors, primarily from the Department of Aquatic Biology and Fisheries, University of Kerala. A report on the occurrence of the Asian swamp eel, *Monopterus albus* (Zuiew, 1793), from this lake is presented in this paper. Morphological study (Talwar and Jhingran, 1991) was used for the fish identification.

**Keywords:** Asian swamp eel, Synbranchidae, *Monopterus albus*

## 1. Introduction

According to Nelson (1994), *Monopterus albus* species of the Synbranchidae family is native to the fresh, brackish, tropical, and subtropical waters of Asia, but is now present in West Africa and North, Central, and South America. It is one of the common fish found mainly in Asia, from India, Southern China to Malaysia and Indonesia. *M. albus* is native to the tropical and subtropical areas of northern India and Burma to China, Asiatic Russia, Japan, and Indo-Malayan Archipelago. This is an important protein source for people in the north eastern part of Thailand. They live in ditches, ponds, streams, and rice paddies. Based on existing literature record, thirteen species are identified under the Family Synbranchidae and with the genus *Monopterus*.

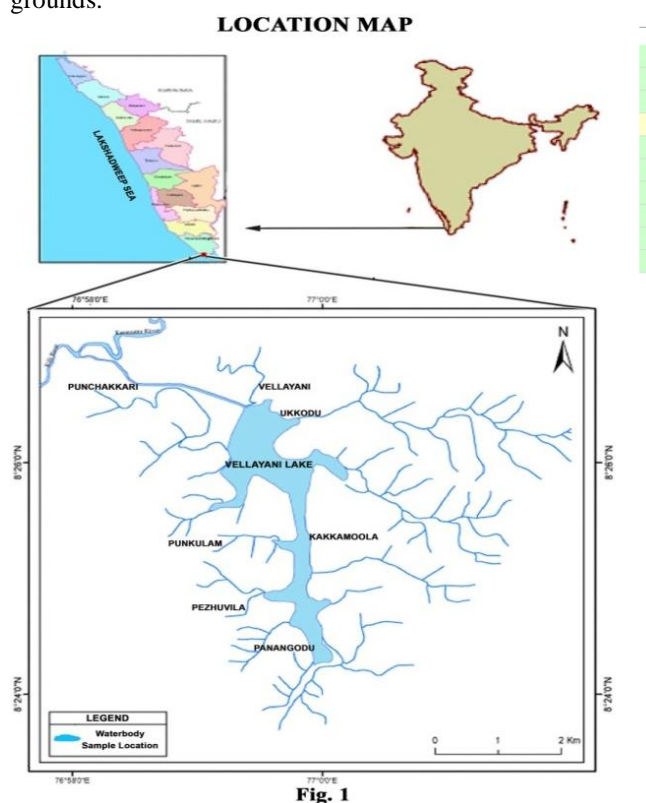
The preferred environment for the Asian swamp eel includes a wide variety of freshwater-like shallow wetlands, stagnant waters, marshes, streams, rivers, ditches, canals, lakes, reservoirs, and ponds. While they prefer fresh water, they are also able to tolerate brackish and saline conditions, as seen in their colonization of American marshlands. Depths of less than 3 m are optimal. *M. albus* also easily tolerates cold temperatures (well below 0 °C) and a wide range of oxygen levels. This fish can obtain up to 25% oxygen from air cutaneously if not using gills underwater. There is no limit for the dispersal of the Asian swamp eel.

## 2. Materials and Methods

### 2.1 Study Area

The Vellayani Freshwater Lake (8° 24' 09"- 8° 26' 30" N and 76° 59' 08"- 76° 59' 47" E) Thiruvananthapuram District in Kerala (Fig.1), is located 19 km away from Thiruvananthapuram city. The Lake is situated 29 meters above mean sea level with a length of 3.15 km and width of 1km. The depth of the lake varies from 2 to 6 m. The lake is a rich repository of flora and fauna which support the livelihood of local people around it. The livelihood of about

100 traditional fishermen depends on the fish resources of the lake. Vellayani Lake is an important wetland in south India used by waterfowls, both as feeding and breeding grounds.



**Figure 1:** Map of the Vellayani Freshwater Lake

### 2.2 Sample Collection

The specimens of this species were collected was obtained from the areas of lake fringes and water channels among the banana fields adjoining the near shore areas of the lake and brought to the Laboratory for taxonomic identification. Previously published descriptions of species and morphometric data were used to make comparison with the newly collected species. Specimens were identified based on

the keys provided by Talwar, and Jhingran, (1991). The identified specimen is preserved at the Laboratory of the Fatima Mata National College, Kollam, under the University of Kerala.

### 3. Results and Discussions

During the study period, three specimens of *Monopterus albus* (Fig.2) were got from the areas of lake fringes and water channels among the banana fields adjoining the near shore areas of the lake. *Monopterus* is characterized by specializations of the dorsal gill arch skeleton; upper lip jowl-like, without a separate or swollen fold; gills, if present, reduced to single rows of filaments on the first three arches; gill membrane attached internally to the isthmus and other modifications of the branchial circulatory system and skeleton (Rosen and Greenwood, 1976).

#### Scientific Classification

Kingdom	: Animalia
Phylum	: Chordata
Subphylum	: Vertebrata
Superclass	: Osteichthyes
Class	: Actinopterygii
Order	: Synbranchiformes
Family	: Synbranchidae
Genus	: <i>Monopterus</i>
Species	: <i>Monopterus albus</i>

**Common name:** Asian swamp eel, swamp eel, rice eel, or white rice field eel

As a swamp eel, it has a tapering tail and blunt snout. The mouth is large and protractile. Both upper and lower jaws have tiny teeth for eating fishes, worms, crustaceans, and other small aquatic animals. Its gill membranes are fused, but one v-shaped gill is located beneath the head. Such a shape prevents reverse flow. It lacks pectoral and pelvic fins. The dorsal, anal, and caudal fins are rudimentary. These fins serve to protect the swamp eel against rolling, and assist in sudden turns and stops. Its body and head are dark. Dorsal coloring is dark olive or brown and ventral is light. This coloration camouflages the aquatic predator.

Bricking (2002) stated that *M. albus* lives in muddy ponds, swamps, canals, and rice fields, where it burrows in moist earth in the dry season, surviving for long periods without water. They are nocturnal generalized predators (carnivores) that devour fishes, worms, crustaceans, and other small aquatic animals.

According to Bricking (2002), in Asia, *M. albus* are considered a food fish, and a delicacy. They are also found in markets as food in the United States, as well as in pet supply stores, although they are not as well known.

Bricking (2002) also reported that, the impacts of *M. albus* are uncertain, however, they are likely to affect the population size of their prey, as well as the availability of food sources for larger fish, turtles, frogs and wading birds. *M. albus* consumes crayfish, tadpoles, small fish, and worms. They can eat some larger prey as well, by grabbing them with their mouths, and spinning until they are torn in

half. *M. albus* may also play a role in altering the habitat beneath ponds and marshy regions where they burrow nests to wait out dry seasons. In 1999, Nico had revealed the declines in native centrarchids from some areas of the United States have been attributed to this species.

McPherson, *et. al* (2000) investigated that the Asian swamp eel has versatile motility and is even capable of moving over dry land for short distances. This behavior is used for relocation according to resource availability. In the absence of water and food, the Asian swamp eel is able to survive long periods of drought by burrowing in moist earth. If its home becomes unsuitable, *M. albus* simply crawls ashore and makes its way to a more suitable home by slithering over the land in a snake-like fashion. These characteristics enhance its ability to disperse widely.

According to Fuller, *et. al.* (2010), they exhibit a great deal of parental care, indicative of physiological survivorship. Large males construct bubble nests at the mouth of burrows and guard the eggs and young. Additionally, eel populations are dependent upon resource abundance, making their survivorship partially ecological.

According to Bricking (2002), The Asian swamp eels were first introduced to the Hawaiian Islands around 1900 by Asian immigrants as a food fish, and purposely released into the wild. Mc Pherson, *et. al.* (2000) revealed that as early as 1990, Asian swamp eels were introduced to several ponds at a nature center near Atlanta, Georgia, within the Chattahoochee River drainage basin; individuals have since migrated to an adjacent marsh of the Chattahoochee River. Reinert, *et. al.* (2006) reported that as a general predator, the Asian swamp eel has disrupted the ecological balance of the Everglades. According to Daerr (2000), one or more of the populations are believed to be the result of an intentional or accidental release of the creature from a home aquarium or fish farm. Some populations may have been the result of an attempt by a few local residents to establish the eels as a food source. According to another researcher McPherson, *et. al.* (2000), Asian swamp eels pose a threat to the homeostasis of Everglades National Park by disrupting the natural interactions between native species and their environment. The species has an incredible ability to survive in adverse conditions, and the Everglade food web presents not known natural predators. Swamp eels survive even in the dry season when other non-native species normally die. Reinert, *et. al.* (2006) reported that to combat Asian swamp eel resilience, the American Fisheries Society is investigating methods for control, containment, and possible eradication.

### 4. Conclusion

The Asian swamp eel *M. albus* is native to India. During the research, the fish got from the fringes of Vellayani Freshwater Lake, which is an important wetland in south India used by waterfowls, both as feeding and breeding grounds. This is the new record for this lake. The livelihood of about 100 traditional fishermen depends on the fish resources of the lake. In Asia, *M. albus* are considered a food fish, and a delicacy. But it has been identified as an invasive species in the North American Everglades. Asian

swamp eels pose a threat to America by disrupting the natural interactions between native species and their environment. To prevent the introduction of invasive species, need for legislation to the aquarium traders as a precautionary principle. Awareness about the ecological implications of these species, to the local people especially, aquarium hobbyists and fish breeders is one of the best way to prevent the invasion of unwanted species.

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## Author Profile



**Reenamole .G .R** received the B.Sc. degree in Zoology from H.H. M.S.P.B.N.S.S.College for Women, Neeramankara. B.Ed in Natural Science has taken from Govt. Anchal College, Kollam. M.Sc. degree in Zoology took from Mahatma Gandhi College, Thiruvananthapuram. M. Phil in Aquatic Biology and Fisheries from the Department of Aquatic Biology & Fisheries in the University of Kerala, Kariavattom in 2012. All the degrees were received from the University of Kerala, Thiruvananthapuram, India. She has published 14 research papers and designed a text book of "Vellayani Fish Census- a Field Guide and Report" (Author: Dr. A. Biju Kumar & Dr. Pramod Kiran R.B) published by Dept. of Aquatic Biology and Fisheries, University of Kerala and Supported by Agency of Development of Aquaculture, Kerala (ADAK) 2013. She had worked as a Project Fellow in Central Marine Fisheries Research Institute in Vizhinjam, Thiruvananthapuram, Kerala, India. Now she has gained Ph.D in Zoology from Zoology Research Centre, Department of Zoology, Fatima Mata National College, Kollam, University of Kerala, India.