

Research and Reviews: Journal of Ecology and Environmental Sciences

Range Extension of Endangered Earthworm Eel *Pillaia indica* Yazdani, 1972 (Synbranchiformes: Chaudhuriidae) from West Bengal, India.

Muthukumarasamy Arunachalam^{1*}, Manickam Raja¹, Subramaniam Nandagopal¹, Chinnian Vijayakumar², Punniyam Malaiammal¹, and Showket Ahmad Bhat¹.

¹Sri Paramakalyani Centre for Environmental Sciences, Manonmaniam Sundaranar University, Alwarkurichi - 627 412, Tamil Nadu, India.

²Department of Zoology, St. Andrew's College, Gorakhpur -273 001, Uttar Pradesh, India.

Short Communication

Received: 11/11/2013

Revised: 12/12/2013

Accepted: 15/12/2013

*For Correspondence

Sri Paramakalyani Centre for Environmental Sciences, Manonmaniam Sundaranar University, Alwarkurichi-627 412, Tamil Nadu, India.
Mobile: +91 94431 84735

Keywords: *Pillaia indica*, New record, Biogeographic relict, Darjeeling district, West Bengal.

ABSTRACT

Pillaia indica Yazdani 1972, was described from Khasi hills of Meghalaya state, India and the distributional range is restricted to less than 10 km² and based on that it was concluded that it is a biogeographic relict confined to a very small geographic location. However, in a recent survey we collected 10 specimens from Darjeeling district, West Bengal indicated that this species is widely distributed and the sampling needs skill as these species dwell inside the exposed roots of riparian canopy along the streams.

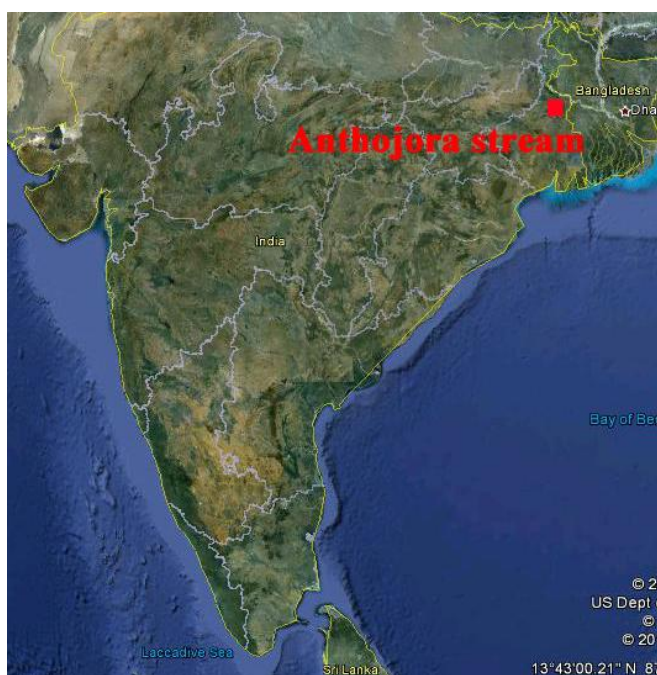
INTRODUCTION

The South Asian Mastacembeloid fish family Chaudhuriidae is popularly called as earthworm eels and this family includes six genera eight species. They are small, living in buried riparian vegetation and in bottom substrate or with substrate mixed with fine sand and clay. They differ externally from the family Mastacembelidae in having only soft fin instead of spines anteriorly in dorsal and anal fins^[3] and the distributional range of this family is from Brahmaputra river basin, India. Described the species *Chaudhuria caudata* as the type species of the genus *Chaudhuria* from Inle Lake, Myitkyina in Myanmar and the distribution of this family extends to peninsular Thailand and Malaysia, Mekong basin in Laos and Cambodia, Borneo and Sumatra^[1,2,3,4].

Currently, the Chaudhuriid genus *Pillaia* Yazdani and the type species *Pillaia indica* was described from two streams one from Sumer (22km north of Shillong, Meghalaya) and another at Umsingh (13km north of Shillong) both in Khasi and Jaintia Hills of present Meghalaya state^[5].^[3] described one more species *Pillaia kachinica* from Myitkyina in the Ayeyarwaddy drainage, northern Myanmar and it differs from *Pillaia indica* in having more dorsal and anal fin rays.^[4] collected *P. indica* again from nearby areas of type locality from Khasi hills. Later^[2] collected 81 specimens from Khasi hills and this leads to a conclusion of the restricted distribution of *Pillaia indica* (> 10 Km²) stating that this species is a biogeographic relict. They further emphasized that the distributional record is so limited though the species of co-occurring members belong to the families of Channidae and Anabantidae were very well distributed from north- eastern part to peninsular India.

In a recent fish survey in Anthojora stream (Fig.1) in Darjeeling district, West Bengal, we collected 10 specimens of this earthworm eel which are on close examination showed to be *Pillaia indica* and herein, we report the range extension of *Pillaia indica* from Khasi hills Meghalaya to West Bengal.

Figure 1: Map (square) of the collection site of *Pillaia indica* Anthojora stream, near Gajoldoba reservoir, Baikunthapur, Darjeeling district, West Bengal, India.



MATERIALS AND METHODS

Fishes were collected from Anthojora stream near Gajoldoba reservoir Baikunthapur, Darjeeling district of West Bengal state during November 2012 using rectangular hand nets and drag nets. All fishes were preserved in 10% formalin and all the specimens were deposited in Manonmaniam Sundaranar University Museum of Natural History (MSUMNH), Alwarkurichi, Tamil Nadu, India and few specimens were preserved in Collections of M. Arunachalam, (CMA). *Pillaia indica* MSUMNH C17, 8 ex. 37.6-70.0 mm SL; CMA 26, 2 ex, 42.2-47.5 mm SL., India, West Bengal, Anthojora stream near Gajoldoba Reservoir, Baikunthapur, Darjeeling district (26° 51' 1.3" N, 86° 23' 57.7" E), 27th Nov. 2012. Collectors: M. Arunachalam, M. Raja, C. Vijayakumar and S. Nandagopal. Measurements were taken to the nearest 0.1mm using digital caliper. Counts and measurements were made on the left side of specimens wherever possible using a PC based binocular stereozoom microscope (Optika- SZ61TR) with transmitted light. Methods of counts and measurements were followed [6]. Head characters are expressed as proportion of Head Length (%HL), Head length and body characters are expressed as proportion of standard length (%SL). Number in parenthesis following meristic data denote numbers of specimen examined.

RESULTS AND DISCUSSION

The measurements are presented in (Table 1). Elongated, eel like with a anteriorly depressed head, sides of the body compressed (Fig. 2). Eyes minute, fairly prominent, dorsolaterally placed. Snout short, subconical with a very indistinct rostral appendages bearing anterior tubular nostrils. Median snout thickening not projecting from premaxilla. Gill opening wide, extending dorsally to the level of pectoral fin origin. Gill membranes free from each other and from isthmus.

Upper and lower lip folds well developed, joining at vertical from about middle of eye (Fig. 3). Mouth wide and horizontal. Teeth on jaws arranged in narrow bands, small sharply pointed and curved inwards. Body without scales. Lateral line originates at head and extending middle of side to posterior half of body. Pectoral fin originates at the end of the gill opening with 7 (10) rays. Pelvic fins absent. Dorsal, anal and caudal fin confluent with each other and forming a single fin. Dorsal fins with 34 (5)- 35 (5) rays, anal fins with 34 (7)- 35(3) rays, caudal fins with 5+5 (10) rays. Caudal fin tapering to a blunt tip, with a small projection of dorsal and anal fins. Branchyostegal rays 6 (10).

In life, overall head and body brownish, pectoral, dorsal, anal caudal fins with dull white. In alcohol preservation upper part of the body light to dark purplish brown. The lower part of the body below lateral line dull white with light brown. A dark blotch at the joining of upper and lower lips and an indistinct dark stripe along the lower margin of preopercle. Pectoral, dorsal, anal and caudal fins with dull white.

The habitat is a fourth order (Fig. 4), low gradient and secondary forested stream and the major substrate types are pebbles and sand and both the banks are unstable. Banks have moderate understory and midstory

canopy. The stream is 20-30m wide and the depth about 0.4-0.9 cm. At the time of collection water flow is moderate with a flow rate of 5.0-13.0 cm/s. This stream is 50km away from the Siliguri town near by Gajoldoba Reservoir and is a secondary growth forest. Species co-occur with *Pillaia indica* are *Acanthocobitis botia*, *Akysis* sp., *Amblyceps* sp., *Badis* sp., *Barilius barila*, *Barilius bendelisis*, *Danio rerio*, *Devario aequipinnatus*, *Heteropneustes fossilis*, *Lepidocephalichthys* sp., *Psilorhynchus* sp., *Schistura* sp. *Somileptus gongota* and *Xenentodon cancila*.

Figure 2: *Pillaia indica* (colouration in life immediately after capture) collected from Anthojora stream near Gajoldoba reservoir Baikunthapur, Darjeeling district, West Bengal, India.



Table 1: Morphometric data of *Pillaia indica* from Anthojora stream near Gajoldoba reservoir Baikunthapur, Darjeeling district West Bengal (N=10)

		Range (N=10)	Mean±SD
1	Standard length	37.6-70.0	
	% of SL		
2	Snout to dorsal fin origin	55.6-60.3	58.8±1.3
3	Snout to anal fin origin	56.2-59.6	58.1±1.0
4	Pre-anus length	51.5-56.2	55.0±1.1
5	Anus to anal fin origin	3.8-4.8	3.1±0.8
6	Dorsal fin base length	40.2-43.7	41.9±1.3
7	Anal fin base length	39.4-42.1	40.6±1.0
8	Caudal fin length	8.5-9.6	6.3±1.2
9	Pectoral fin length	2.9-3.3	2.5±0.5
10	Pre-pectoral length	14.9-17.2	15.9±0.7
11	Maximum body depth	6.3-7.7	7.0±0.5
12	Maximum body width	4.2-6.4	5.8±0.6
13	Head length	15.1-17.6	16.2±0.7
	% of HL		
14	Head depth at pupil	23.2-29.2	26.2±0.7
15	Maximum head depth	31.1-38.2	34.3±1.2
16	Maximum head width	31.7-37.2	34.8±1.5
17	Snout length	24.8-29.3	27.0±1.1
18	Pre-nasal length	21.6-26.3	23.7±1.3
19	Eye diameter	4.4-6.5	5.1±1.0
20	Inter-orbital distance	8.9-11.0	9.8±1.8
21	Inter-nasal length	13.9-17.4	16.0±1.0
22	Post-orbital head length	65.1-70.1	67.2±1.6
23	Upper jaw length	26.5-30.4	28.3±1.2

Figure 3: Drawings of (a) lateral and (b) mouth views of the species of *Pillaia indica* collected from Anthojora stream near Gajoldoba reservoir Baikunthapur, Darjeeling district, West Bengal, India.

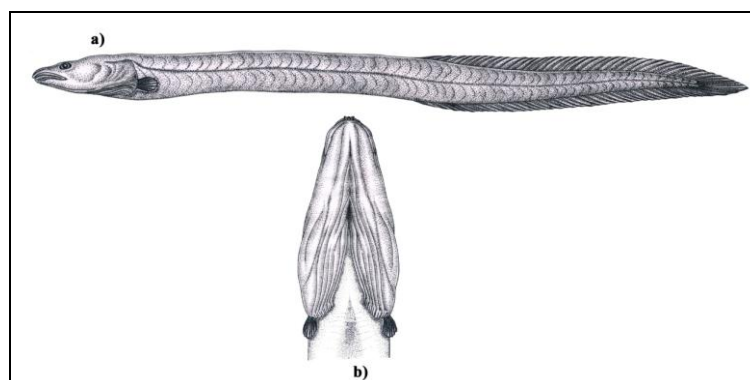


Figure 4: Collection site of *Pillaia indica* Anthojora stream, near Gajoldoba reservoir Baikunthapur, Darjeeling district, West Bengal, India.



Pillaia indica is not a biogeographic relict as the collection of this species is often difficult as this species are confined to areas with exposed riparian roots with medium to low flow areas and the substrate types along the riparian margin would be essentially mud or fine sand. Sampling of this species can be done using a hand held dip net with a square frame and can be caught by holding the net at an angle to the bank where the exposed riparian roots were disturbed and washed with hands. We employed this method for catching *Amblyceps* along with *Pillaia indica*. This shows that these species occupy similar niches of riparian roots with fine sand area with low to moderate water velocity. In most of the streams/ rivers in Darjeeling district are highly disturbed by agricultural development resulting in the removal of riparian canopy which is the major habitat type for earthworm eels. This may be the reason for the restricted distribution of this species and there may be more streams to be explored in north eastern part of India.

ACKNOWLEDGEMENT

We acknowledge the help of Mr. SS Mariappan, Drawing Master, Panchayat Union Middle School, Pothukudi, Tamil Nadu, India for line drawings.

REFERENCES

1. Yazdani GM. Fishes of Khasi Hills, Meghalaya (India), with observation on their distributional pattern. J Bombay Nat History Soc. 1977; 74: 17-28.
2. Pardhasaradhi A. JRB. Alfred. A note on the biogeographical relictiness of *Pillaia indica* Yazdani (Pillaiidae [sic]: Mastacembeloidei). J Bombay Nat History Soc. 1981; 78: 175-177.
3. Kullander SR. Britz, F Fang. *Pillaia kachinica*, a new Chaudhuriidae fish from Myanmar, with observations on the genus *Garo* (Teleostei: Chaudhuriidae). Ichthyol Expl Freshwaters. 2000; 11 (4): 327-334.
4. Annandale N. Fish and fisheries of the Inle Lake. Records of Indian Museum. 1918; 14, 33-64.
5. Yazdani GM. A new genus and species of fish from India. J Bombay Nat History Soc. 1972; 69: 134-135.
6. Kottelat M, KKP Lim. Diagnoses of two new genera and three new species of earthworm eels from the Malay Peninsula and Borneo (Teleostei: Chaudhuriidae). Ichthyol Expl Freshwaters. 1994; 5: 181-190.