Horaglanis abdulkalami, a new hypogean blind catfish (Siluriformes: Clariidae) from Kerala, India

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Abstract

A new species of blind catfish, *Horaglanis abdulkalami*, is described from a dugout well at Irinjalakuda, Thrissur District, Kerala, India. The new species differs from its congeners by the combination of the following characters: gill membrane free at the base of the isthmus, united only half distance towards the tip of the lower jaw from the base; brancheostegal rays 13, dorsal fin with 21 unbranched rays and anal fin with 15 unbranched rays; caudal fin rounded and supported with 28 rays (including the procumbent rays), of this median 6 rays are branched.

Key words: Hypogean, *Horaglanis abdulkalami*, Blind catfish, Irinjalakuda, Kerala, India, Surangas.

Introduction

Kerala is known as land of wetlands and these wetlands and their associated ecotones on the south west coast of India offer ideal habitats for the much undiscovered subterranean fauna of the region. The main sources of ground water in Kerala are dugout wells, bore wells and *surangas* (man-made horizontal caves like tunnel for drinking and irrigation water). The biodiversity of the groundwater aquifers is rich but poorly documented (Reddy, 2002). In India, particularly in Kerala, the study on groundwater (subterranean) fauna is still a least studied subject and only few information are available on the faunal structure, distribution and function of the ground water ecosystem. The present paper describes a new species of hypogean blind catfish which was collected from an old dugout well in the central part of Kerala, India.

The first Indian blind catfish was reported from a dugout well at Kottayam in Kerala State and proposed a new genus and species for it, *Horaglanis krishnai* (Clariidae) Menon, 1951. The fish was red in colour and lacked eyes and pigmentation. During the investigation on the groundwater fauna, Babu and Nayar (2004) reported the second blind subterranean catfish, *H. alikunhii* from the central part of Kerala. A new subfamily, Horaglanidinae, for this genus was created by Jayaram to include this totally blind remarkable catfishes (Jayaram, 2006 & 2010). The present species, *H. abdulkalami*, is the third blind subterranean catfish discovered from old dugout well waters of Kerala, India.

Materials and Methods

Collections were made with 100 ìm hand scoop net and all morphometric data were taken with dial calipers to the nearest 0.02 mm. The pectoral fin measurements were taken by means of low power microscope with calibrated ocular micrometer and its drawings were made with a camera lucida. Definition of the measurements follows the Jayaram (2006). The systematic and taxonomic studies were carried out by using relevant monographs and literatures.

The holotype is deposited in the School of Marine Sciences Museum, Cochin University of Science and Technology (CUSAT), Kerala, India. Paratypes will be deposited in the Western Ghats Regional Station of Zoological Survey of India (ZSI) at Kozhikode, Kerala, India.

Horaglanis abdulkalami sp. nov.

Materials examined

Holotype. MBM/F/16/10, total length (TL) 3.78 cm; Standard length (SL) 3.10cm collected from a dugout well of depth 10.2 meters at Irinjalakuda, Trichur District, Kerala, India (10°20´47½N,

76°12´03½E), 22, January 2008, coll. K. K. Subhash Babu.

Paratypes. Three specimens, (3.2-3.6 cm TL); collection data same as for holotype

Diagnosis

Blind catfish with red-blood colour. Body narrow, elongated, sub-cylindrical, small sized. Dorsal fin soft and supported with 21 un-branched rays. Anal fin soft and supported with15 unbranched rays. Caudal fin is not confluent with dorsal and anal fins. Caudal fin is rounded in shape with 28 supporting fin rays (including the procumbent rays). Pectoral fin rounded, highly vestigial and not visible with naked eyes. On both lateral sides of the head base, near to the pectoral fin, a pair of pseudo-tympanic membranes is present.

Description

The live fish was red-blood in colour (Plate. 1a) and it turned into pale yellowish colour and translucent when they preserved in formalin (Plate. 1b). Body soft, elongated, eel type and total length 3.8 cm, its maximum height just behind the head (Fig. 1a). In dorsal view, head profile distinctly wider than trunk. Head with 4 pairs of barbells, one pair each of maxillary, nasal, outer and inner mandibular. Eyes completely absent. Upper and lower jaw armed with villiform teeth. Lower jaw ornamented with numerous small pores (Plate 1f). Gill openings wide extending above the pectoral fin base. Branchial arches rudimentary (Plate 1e). Gill membrane free at the base of the isthmus and united half before to the isthmus base (Plate 1d). Branchiostegal rays 13 (Plate 1d). Dorsal fin soft, elongated with 21 rays arising in advance of the origin of the pelvic fins; anal fin soft with 15 rays originating little behind the origin of pelvics. Both dorsal and anal fins not confluent with caudal fin. Pectoral fin minute, rudimentary, almost rounded in shape, supported by short central axis with nine rays (Fig. 1b). Pelvic fin prominent, large and supported by 6 unbranched rays (Fig. 1c). Caudal fin large, rounded and supported by 28 rays (including the procumbent rays, of this, 6 middle rays are branched at their ends (Fig. 1a). Body of the fish beset with numerous small and medium sized pores (Plate 1 g & h). The morphometric data of *H. abdulkalami* is given in the table 1.

Table 1. Morphometric data of *Horaglanis abdulkalami* sp. nov.

1	Total length	3.78 cm	% of SL
2	Standard length	3.10 cm	——
3	Pre-dorsal length	1.22 cm	39.4
4	Head length	0.54 cm	17.4
5	Caudal fin length	0.42 cm	13.5
6	Dorsal fin length	2.1 cm	67.7
7	Anal fin length	1.26 cm	40.6
8	Pectoral fin length	0.32 mm	10.3
9	Caudal peduncle length	0.22 cm	7.2
10	Body depth	0.3 cm	9.7
11	Pelvic fin length	0.22 cm	7.1
12	Mouth width	0.28 cm	9.0
13	Head width	0.38 cm	12.3
14	Head height	0.25 cm	8.1
15	Number of dorsal fin rays	21	—
16	Number of anal fin rays	15	—
17	Number of caudal fin rays	28	—
18	Number of branchiostegal rays	13	—
19	Nasal barbel length	0.32 cm	10.3
20	Maxillary barbal length	0.52 cm	16.8
21	Inner mandibular babrbel length	0.33 cm	10.6
22	Outer mandibular barbell length	0.50 cm	16.1

Etymology

The species is named in honour of the former president of India, Dr. A. P. J. Abdul Kalam, who ignited young minds towards the real world of Science and Technology.

Relationship

Horaglanis krishnai and *H. alikunhii* reported from dugout wells in Kerala, India were the only known subterranean blind catfishes from India. These belonging to the family Clariidae showed caverinicolous characters like red in colour, thin and elongated shape, complete absence of eyes, rudimentary growth of pectoral fins and well developed pelvic fins (Menon, 1951; Babu and Nayar, 2004). The present species *H. abdulkalami* sp. nov. also shares these the with

earlier known species. However, it also differs from them as shown in the key to the species and in the table 2.

Key to species of *Horaglanis* Menon

1. Head globular; tail fin rounded; gill membrane confluent at the base of the isthmus….....2
- Head elongated; tail fin with pointed tip; gill membrane free up to the anterior end of the lower jaw…….....…. *H. alikunhii* Babu & Nayar
2. Gill membrane confluent at the base of the isthmus; anal fin rays 17; dorsal fin rays 23……..……..….....…..... *H. krishnai* Menon.
- Gill membrane confluent only at the mid region of the isthmus; anal fin rays 15; dorsal fin rays 21 ……..…….....….. *H. abdulkalami* sp. nov.

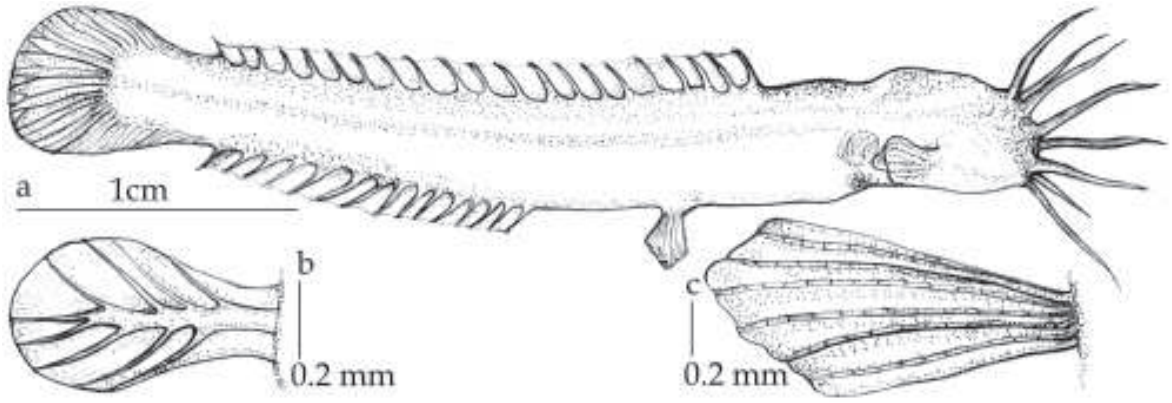

Fig. 1. *Horaglanis abdulkalami* sp. nov.: a. habit, b. Pectoral fin with supporting rays, c. Pelvic fin with supporting rays.

Ecology

Both *H. krishnai* Menon (1951) and *H. alikunhii* Babu and Nayar (2004) were reported from dugout wells in Kerala, India. These are considered to be hypogean fishes, although they are found to occur in wells. It is noteworthy that *Horaglanis alikunhii* was collected from newly constructed well from Parappukara, Kerala, India. They inhabiting in the voids and channels of subterranean soft laterite area where the groundwater table meet, side and bottom of these well lined with soft porous laterite rock. The present species *Horaglanis abdulkalami* sp. nov. was collected from an old well at Irinjalakuda, Kerala, while cleaning by people. This well water was using for drinking and irrigation purposes and pH was 7.2, conductivity was 180ìS and DO was 2mg/l. Other large carnivores fishes were absent in the same well. The bottom of well was soft laterite with small pores and channels.

Endemism

The first Indian blind catfish *Horaglanis krishnai* Menon was recorded from Kottayam District, Kerala, India (Menon, 1951). Later, Babu and Nayar (2004) has reported the second species of the genus as *H. alikunhii* from central part of Kerala. *H. abdulkalami* sp. nov. is the third blind catfish from the Kerala State. So far, no other published reports are available on the occurrence of these remarkable blind catfishes from any other parts of Kerala State or elsewhere. Hence, the genus *Horaglanis* with these species are considered as point endemics in the ground waters of Kerala.

Table 2. Comparison of *Horaglanis abdulkalami* sp. nov. with *H. krishnai* and *H. alikunhii*

Characters	***H. krishnai*** Kottayam, Kerala	***H. alikunhii*** Parapukara,Kerala	***H. abdulkalami*** Irinjalakuda, Kerala
Total length	3.88cm	3.2cm	3.78 cm
Length of the head	0.6 cm	0.55 cm	0.54
Width of the head	0.58	0.35 cm	0.38
Length/width ratio of head	1.03	1.5	1.2
Shape of the head	Globular	Elongated	Globular
Number of dorsal fin rays	23	24	21
Number of anal fin rays	17	17	15
Number of branchiostegal rays	11	-	13
Pectoral fins	Vestigial but visiblewith naked eyes	Highly vestigial and microscopic	Highly vestigial and microscopic
Pelvic fins	Normal	well developed	well developed
Caudal fin shape	Margin rounded	Pointed tip	Margin rounded
Number of caudal fin rays	24	30	28
Colour	Yellowish-white (preserved)	Red (alive)	Red (alive)
Habitat	Well	Subterranean channel of the well	Well

Discussion

The genus *Horaglanis* was created by Menon (1951) to include a remarkable Siluroid fish collected from a well at Kottayam, Kerala. The unique character of this fish was the complete absence of eyes and red-blood colour. The *Ugitglanis* Gianferrari from Somalia and *Horaglanis* Menon from India are the only known genera of the family Clariidae in which the eyes are totally absent. Both these genera are similar in the elongated shape of the body, disposition of dorsal and anal fins terminating at the base of the caudal region. *Horaglanis* is distinguished from *Ugitoglanis* in having relatively shorter dorsal and anal fins furthermore; the gill membranes are united with isthmus. Apart from the *Horaglanis*, there are a few catfishes which showing red-blood colour in its live condition. They are *Phereatobius cisternaram* Goeldi 1905 and *P. dracunculus* Shibata, Cunha and Pinna, 2004 from Brazil and *Silurichthys sanguineus* Robert 1989 from Kapuas drainage in Western Borneo, Indonesia (Cunha and Pinna, 2004). The underground water may have low oxygen concentration (Grahm, 1997; Trajano, 2001). As noticed by Peter and Joseph (2000) the cutaneous respiration exists in many fishes particularly those are living in the underground waters. So, the high vascularised integuments for cutaneous respiration may be the reason for red colour in *Horaglanis abdulkalami* sp. nov. The psedotympanic area near to the base of the pectoral fin also reported in *Phreatobius cisternarum* from Brazil. Probably this is the sensitive area where the fish can receive sound and other impulses from water and this is the unique character of these blind subterranean catfishes.

Horagalanis alikunhii was reported from a new dugout well at Trichur, Kerala, India (Babu and Nayar, 2004). It is noteworthy that *H. alikunhii* was collected from a narrow crevice on the side wall of the well through which water was flowing. *H. abdulkalami* sp. nov. was also collected from an old well while cleaning by people. This indicates its subterranean mode of life and that it might have reached the well through the interconnected cavities or channels in the

laterite rocks. However, the *H. abdulkalami* sp. nov. differs from the above mentioned species of the genus *Horaglanis* in having lesser number of dorsal fin rays and anal fin rays and caudal fin rays. Moreover, the gill membrane free at the base of the isthmus but united half way from base of the isthmus to tip of the lower jaw. In *H. krishnai* the gill membrane is united at the base of the isthmus where as in *H. alikunhii* the gill membrane is united at the anterior end near the lower jaw. Recently, Vincent and Thomas (2011) has reported a catfish, *Kryptoglanis shajii* from the subterranean waters of Kerala, but that fish is different from the present species having well developed pectoral fins, oblique structure of mouth, presence of eyes, pigmented skin and total absence of dorsal fin.

Acknowledgements

The author is expressing sincere thanks to the Head of the Department of Marine Biology, Microbiology and Biochemistry, School of Marine Sciences, Cochin University of Science and Technology (CUSAT) for providing necessary facilities. Post-doc fellowship from Cochin University is here with acknowledged. Thanks are also due to Prof. Dr. C. K. G. Nayar and Dr. M. Remesh for their encouragements and logistic supports. Author is also grateful to Sophisticated Testing Instrumentation Centre (STIC), Cochin University campus for SEM preparation.

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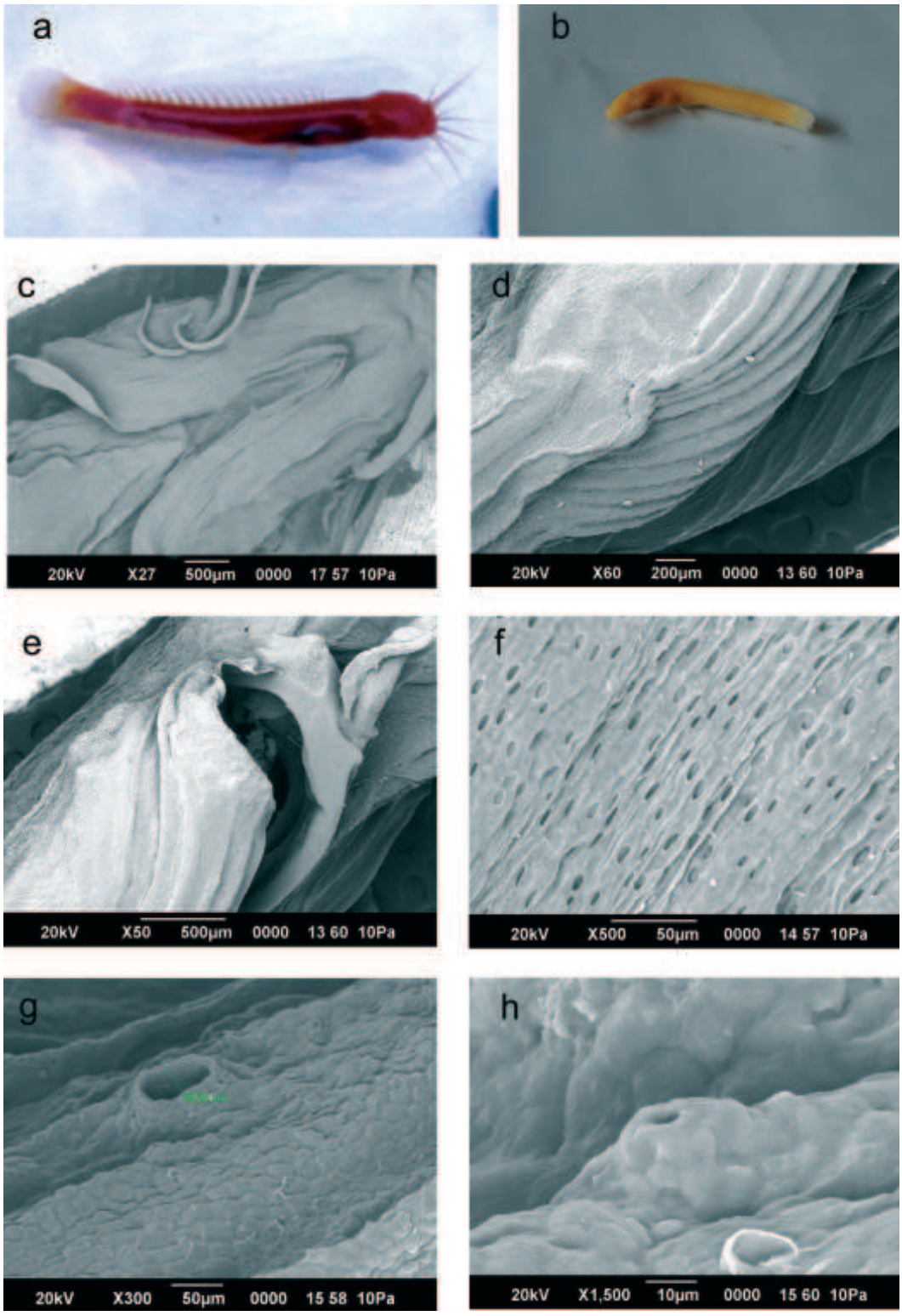

Plate 1. *Horaglanis abdulkalami* **sp. nov.: a.** alive specimen; **b.** Preserved specimen, **c.** Head showing the gill membrane and isthmus (SEM), **d.** Branchiostegal rays (SEM), **e.** Rudiments of gill arches (SEM), **f.** Ventral portion of lower jaw showing the pores (SEM), **g.** Large body pores (SEM), **h.** Small body pores (SEM).