

## **ACARICHTHYS HECKELII (MÜLLER & TROSCHERL), AN INTRODUCED CICHLID FISH IN SINGAPORE**

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### **INTRODUCTION**

This article documents the recent presence of *Acarichthys heckelii* (Müller & Troschel) in Singapore. A member of the order Perciformes, and the family Cichlidae, this freshwater fish is native to South America, in the Essequibo River of Guyana and in the Orinoco and the Amazon basins of Brazil, Peru and Columbia (Loiselle, 1994; Eschmeyer, 2007). It inhabits waters that are soft and slightly acidic (pH 6.5–7.2) and grows to about 15 cm long (Axelrod et al., 1986; Boruchowitz, 2006).

*Acarichthys heckelii* is known to be a benthic substrate feeder, sieving through detritus and the substrate to consume invertebrates (Baensch & Riehl, 1993). It practises harem polygyny, spawns in caves, and defends its nest site against conspecifics and other fishes (Loiselle, 1994). The brood is cared for and guarded by both parents, and the young juveniles are gregarious (Loiselle, 1994; pers. obs.). Often referred to as the ‘threadfin acara’ after the free elongated rays at the rear of its dorsal fin, *Acarichthys heckelii*, is internationally a fairly well-known aquarium fish (Baensch & Riehl, 1993; Boruchowitz, 2006; Loiselle, 1994; pers. obs.).

Baker & Lim (2008: 165) first recorded *Acarichthys heckelii* (as *Acarichthys heckelli*) from Singapore, by merely mentioning that it is common and widespread. As they did not discuss the taxon, or list locations where it is found, this information is supplied in the present article.

### **MATERIAL AND METHODS**

Voucher specimens were obtained with fish traps, seine nets and push nets, euthanized on ice, fixed in 10% formalin and then preserved in 75% ethanol. They were deposited at the Zoological Reference Collection, Raffles Museum of Biodiversity Research (ZRC) of the National University of Singapore. Abbreviations used: ex. — number of specimen(s) examined; SL — standard length; TL — total length.

**Material examined:** ZRC 51252, 1 ex.: 83.1 mm SL, Nee Soon Swamp Forest, stream under pipeline, caught in trap, 24 Jan.2008 (Fig. 1); ZRC 51436, 1 juvenile: 47.3 mm SL, stream at Lorong Banir, caught by push net, 11 Feb.2008 (Fig. 2); ZRC 51062, 13 ex.: 25.3–57.9 mm SL, Sungei Seletar near Springleaf Estate, 17 Jul.2007 (Fig. 3); ZRC 51125, 3 ex.: 87.9–99.8 mm SL, Lower Peirce Reservoir, 25 Jul.2007 (Fig. 4); ZRC 51131, 3 ex.: 56.5–93.5 mm SL, Lower Peirce Reservoir, 15–16 Aug.2007; ZRC 51101, 7 ex.: 81.4–95.8 mm SL, Upper Peirce Reservoir, 2 Aug.2007; ZRC 51129, 1 ex.: 82.2 mm SL, Upper Peirce Reservoir, 20 Jun.2007.

**Diagnosis:** See Figs. 1–4. *Acarichthys heckelii* has a laterally compressed oval-shaped body that is brownish above, silvery on the sides, and whitish on the ventrum. The caudal fin is emarginate in small specimens (approximately 50 mm SL and below), becoming truncate with extended rays at the tips in larger individuals. It has a soft dorsal fin with reddish elongated rays protruding beyond the edge in mature individuals (more strongly expressed in males than in females).

There is a narrow black bar below the eye, a vertically elongated blackish blotch over the anterior end of the spinous dorsal fin, and a black spot in the middle of the body midway under the dorsal fin. Large individuals (approximately 90 mm SL and above) are yellow on the anterior part of the body, pelvic fins, anal fin, rear half of the soft dorsal fin, and base of the caudal fin.

**SPECIMEN DETAILS**

Specimens of *Acarichthys heckelii* were collected in the Lower Peirce Reservoir, Upper Peirce Reservoir, Lower Seletar Reservoir, and in the Nee Soon Swamp Forest. We first observed this species in Singapore on 21 Oct.2006 at the



Fig. 1. *Acarichthys heckelii*, ZRC 51252, 83.1 mm SL, Nee Soon Swamp Forest.



Fig. 2. *Acarichthys heckelii*, ZRC 51436, 47.3 mm SL, Lorong Banir.



Fig. 3. *Acarichthys heckelii*, not preserved, ca. 14 mm SL, Sungei Seletar.



Fig. 4. *Acarichthys heckelii*, ZRC 51125, 96.0 mm SL, male, Lower Peirce Reservoir.



Fig. 5. *Geophagus altifrons*, male, MacRitchie Reservoir.

Lower Peirce Reservoir Park. At least five juvenile specimens of about 5 cm TL were caught with hand nets by some children from along the rock-strewn edge of the Reservoir.

Both adult and juvenile specimens were obtained from most locations. This is a clear indication that the species is breeding naturally, and that feral populations are presently well-established. *Acarichthys heckelii* is the only species of cichlid that has been found in the Nee Soon Swamp Forest.

## DISCUSSION

Another introduced geophagine cichlid common to Singapore's reservoirs is *Geophagus altifrons* Heckel (Fig. 5). It has similar habitat requirements as *Acarichthys heckelii* but morphologically differs from it by the following characters: lack of a bar below the eye, body predominantly turquoise and orange, and pelvic and caudal fins with elongate fin rays in mature individuals.

*Acarichthys heckelii* has apparently been imported into Singapore as an ornamental fish since the 1980s (N. Chin, pers. comm.). However, the authors, who have been frequenting retail aquarium shops all over Singapore for almost thirty years, have never seen this species on the market, nor have they encountered any being kept in private collections. The feral local populations seem unlikely to be the result of random disposal or release of unwanted aquarium pets. Owing to the large numbers presently encountered, the introduction may have involved the deliberate release of large consignments of individuals. This appears to be the case for the eight other species of cichlid fishes with established populations in Singapore's water bodies (see Baker & Lim, 2008: 165). The authors have not been able to trace the agent(s) responsible.

The Species Survival Commission of the World Conservation Union (2000) defines an "alien invasive species" as one that "has established itself in natural or semi-natural ecosystems, is an agent of change, and threatens native biological diversity". Although it may be premature to apply this label to *Acarichthys heckelii*, its presence in the Nee Soon Swamp Forest — long considered the last stronghold for most of Singapore's endangered freshwater fish species (Ng & Lim, 1997: 261) — is indeed cause for concern. Its potential impact on the natural habitat and native fauna urgently merits a detailed study.

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