

The first record of *Trigonostigma somphongsi* (Meinken, 1958), a critically endangered species, in its natural habitat of Thailand (Cypriniformes Cyprinidae)

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ABSTRACT

A population of a critically endangered *Trigonostigma somphongsi* (Meinken, 1958) has been discovered in a deepwater rice field, floodplain of Bangpakong Basin, Nakhon Nayok Province, central Thailand. The population was the first record of this species in its natural habitat since its description by Meinken in 1958. The species appeared to be a seasonal horizontal migration species, since it migrates to breed in the floodplain during the rainy season between July and November and migrates back into the main channel during the dry season.

KEY WORDS

Trigonostigma somphongsi; Cyprinidae; Bangpakong; Thailand.

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INTRODUCTION

Trigonostigma somphongsi (Meinken, 1958) was placed in the genus *Rasbora* (Bleeker, 1859) (Meinken, 1958) and, subsequently, in the genus *Trigonostigma* Kottelat et Witte, 1999 described by Kottelat & Witte (1999).

The genus *Trigonostigma* is a well defined group comprising 4 species: *T. heteromorpha* (Duncker, 1904), as type species, with its distribution in Malay Peninsula, *T. espei* (Meinken, 1967) found in south eastern and southern part of Thailand, and *T. hengeli* (Meinken, 1956) reported from Sumatra; the fourth species, *T. somphongsi*, differs from the rest of the genus in its dark pattern which occurs as a strait horizontal line that extends from

the base of the caudal fin and ends just after it passed the posterior part of the dorsal fin instead of showing the wedge-like marking of other species in the genus.

Apart from external characters of the body shape and marking, this genus also differs from other Rasborins in its breeding strategy since parents deposit eggs under broad leaves of aquatic plants instead of scattering eggs like most others. In this regard, it is interesting to note the sex ratio screwed towards males in this species observed in this survey.

The type series of *T. somphongsi* was said to come from aquarium trade, sent to Meinken by Somphongs Aquarium, an ornamental fish exporter run by Mr. Somphongs Lekaree with its base in

Thailand. The fish was thus, named after Somphong in honor of his contribution of the type series.

No detail of its habitat was given in the paper; Meinken only mentioned that it was from Southern Thailand (Meinken, 1958). The fish appeared in various hobby publishing during the 70s in both Europe and Asia before completely disappearing for some 20 years. It wasn't until 2006 when three *T. somphongsi* were found among a batch of *Boraras urophthalmodoides* (Kottelat, 1991) by Uta Hanel (Germany). They happened to be one male and two females thus forming the core for a captive breeding population which is still going on in Europe, mainly Germany and England, as well as in Thailand.

However, to date, no fish has ever been observed in its natural habitat, which prompted IUCN to list it as Critically Endangered (Vidthayanon, 2013) and listed it as world's 100 most threatened species (Baillie & Butcher, 2012). Upon our survey of a flood plain in deepwater rice field, flood plains of Bangpakong Basin, Nakhornnayok Province, central Thailand, a population of *T. somphongsi* was discovered. Its habitat and population demography will be described here.

MATERIAL AND METHODS

Surveys were conducted by dragging fine mesh sein, along marginal area of floodplain as well as along the road and rice field. We also snorkeled to observe its habitat and behavior under water. All other species were released on site as quickly as possible after identification.

All *T. somphongsi* (Fig. 1) were kept alive for further study in captivity. Surveys were conducted from September 2012 to November 2013. Locals were interviewed for further information and water quality parameters were measured with methods by APHA et al. (2009).

Study area

Trigonostigma somphongsi was found in a deepwater rice field, in the flood plains of Nakhornnayok River, Bangpakong Basin, Nakhornnayok Province, central Thailand (Fig. 2), one of the main tributaries of Bangpapong River, which empties into the Gulf of Thailand. The head water, to the north, originated in KhaoYai National Park, which

is a part of Dong Phayayen-KhaoYai Forest Complex - UNESCO World Heritage site. The area is characterized by flat land, with numerous water ways. Majority of the land has been turned into agricultural land. The main crop is rice (*Oryza* sp.). Our survey plot was in Pak Phli District, Nakhornnayok Province.

The fish was found in the rice field and in a densely vegetated ditch, which was flooded by a nearby river. The water quality parameters are shown in Table 1. It is interesting to note the drop of the water's pH from 7.98, when it first enters the floodplain, to 3.81 after a few months of inundation. The field was planted with a variety of rice called "Banna 423", developed by the Rice Department of Thailand. This variety is said to be able to grow as fast as 10 centimeters in 24 hours and can grow as long as 5 meters, thus being immune to the flood and forming a dense under-water jungle.

In the same area, the other fish species were surveyed and reported by Petsut et al. (2013a) and Petsut et al. (2013b). A total of 23 species, 8 families and 4 orders of freshwater fishes were recorded.

The natural aquatic plants in this area was reported by Petsut et al. (2012) with Poaceae as

WATER QUALITY PARAMETERS	RESULT
Water temperature (°C) at 1.00 p.m.	31.0 – 33.5
Transparency (cm)	80 - bottom soil (transparent)
Water depth (cm) in flood season	300 - 30
Water pH	3.81 – 7.98
Soil pH	3.85-4.70
Alkalinity (ml/L as CaCO ₃)	6.37 – 47.00
Ammonia (ml/L Nitrogen)	0.042 - 0.450
Nitrite (ml/L Nitrogen)	0.076 – 0.160
Nitrate (ml/L Nitrogen)	0.461 – 0.680
Hardness (ml/L as CaCO ₃)	35 – 202
Orthophosphate (ml/L Phosphorus)	0.020 – 0.022

Table 1. Water quality parameters in a deepwater rice field, flood plain of Bangpakong Basin, central Thailand.

dominant family. The change of benthic fauna composition and ecological structure of plankton communities in these area was reported by Petsut et al. (2013c) and Petsut et al. (2013d).

RESULTS

During the dry season, i.e. when water has completely receded into the river, in the area where we would have found, later, *T. somphongsi* during the flooding, only *Boraras urophthalmoides* and *Trichopsis vittatus* (Cuvier, 1831) were observed. July represented the first month of inundation. Many species of fishes were found in the floodplain in abundance. In this period we only caught one *T. somphongsi* gravid female.

From September to November, the peak of flooding period, we caught many semi-adult (probably young of the year), but failed to find any full grown adults. We believe that the adults only migrate to breed and then leave the flood plain, back to the main channel. *T. somphongsi* is weakly sexual dimorphic. Females can be distinguished from males by larger size, plumper belly and less intense orange coloration on the body. Twelve semi-adults grew up to be 7 males and 5 females, such a screwed sex ratio towards males was also reported in a captive-bred population, although our sample size is definitely too small to be conclusive.

Trigonostigma somphongsi were found in a mixed school with many other small cyprinids, especially *Rasbora borapetensis* Smith, 1934, *Amblypharyngodon chulabhornae* Vidthayanon et Kottelat, 1990 and *Boraras urophthalmoides* which often form large schools (Fig. 3), sometimes of more than a hundred specimens. These fishes were found swimming in margin of the deepwater rice field and in an area with not so dense aquatic plants. *T. somphongsi* were found to be minority in the school with only a few individuals observed. The school was often led by *R. borapetensis* (the strongest swimmer), then followed by *A. chulabhornae* with *B. urophthalmoides* (smallest species) and *T. somphongsi* at the tail of the school.

Sometimes the school could be observed eating suspended food particles stirred up by researchers from the bottom of the floodplain. At one point, a small crab accidentally stepped on



Figure 1. The female of *T. somphongsi* is larger (left), the male (right) shows more intense colors (in breeding tank).



Figure 2. Habitat of *T. somphongsi* in a deepwater rice field, flood plains of Bangpakong Basin, central Thailand.



Figure 3. *Trigonostigma somphongsi* in its natural habitat can be found in mixed school with many other small cyprinids.

which attracted many of the fish in the area including *T. somphongsi* to come and eat the fresh prey. Surveys by sein mostly yielded only one *T. somphongsi*, if any, among many other individuals of other species; only once during our survey three individuals turned up.

DISCUSSION

Given that the other 3 species in the genus live in peat swamps or lowland streams, it is interesting to find *T. somphongsi* living in a large river and migrating to breed in floodplain during the rainy season. It is highly possible that the range of this species once occupied most of the central plain of Chao Phraya River as well as the floodplain of Mae Klong River, in the west. However, flood control and loss of habitat have reduced its distribution to current area. The species appeared to be naturally low in density in the study area, however the floodplain appears to be large enough to support a healthy population.

Our study showed that the floodplain formed an integral part to the life cycle of this rare species, it is thus recommended that the flooding in this area should be managed so that both human and fishes can both benefit from it.

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