

# Species identity of *Gambusia* (Pisces: Poeciliidae) introduced to Slovenia

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**Abstract.** On the basis of morphology of the gonopodium and fin ray counts it was determined that the introduced mosquitofish in Slovenia belong to the species *Gambusia holbrooki* Girard, 1859 rather than *G. affinis* (Baird & Girard, 1858). This finding is in accordance with European literature sources but not with Slovene literature, where both taxa are lumped together.

Keywords: Mosquitofish, *Gambusia affinis*, *Gambusia holbrooki*, Slovenia, identification, gonopodium morphology, Invasive Alien Species.

**Izveček. VRSTNA PRIPADNOST GAMBUZIJE (PISCES: POECILIIDAE), VNEŠENE V SLOVENIJO** - Na podlagi morfologije gonopodija in števila plavutnic smo ugotovili, da tujerodna vrsta gambuzije, ki se pojavlja v Sloveniji, pripada vrsti *Gambusia holbrooki* Girard, 1859 in ne vrsti *G. affinis* (Baird & Girard, 1858). To je tudi v skladu s podatki iz drugih evropskih držav, medtem ko sta se v slovenski ihtiološki literaturi oba taksona obravnavala kot ena vrsta.

Ključne besede: gambuzija, *Gambusia affinis*, *Gambusia holbrooki*, določitev, morfologija gonopodija, invazivna tujerodna vrsta

## Introduction

The genus *Gambusia* consists of 45-52 species (Rauchenberger 1989; Eli 2004) two of which are commonly introduced for mosquito control: *Gambusia affinis* (Baird & Girard, 1858) and *G. holbrooki* Girard, 1859. The taxonomic status of these two taxa has been subject of debate until Wooten et al. (1988) argued that they had diverged to a sufficient degree to be treated as separate species. The Slovene populations are usually referred to as *G. affinis* (e.g. Povž & Šumer 2005) but until now no research was carried out to identify which of the two

taxa occurs in Slovenia. However, it is generally assumed that only *G. holbrooki* has been introduced into the Mediterranean region in Europe (Arnold 1990). The purpose of this article is to clarify the identity of *Gambusia* in Slovenia.

## Materials and methods

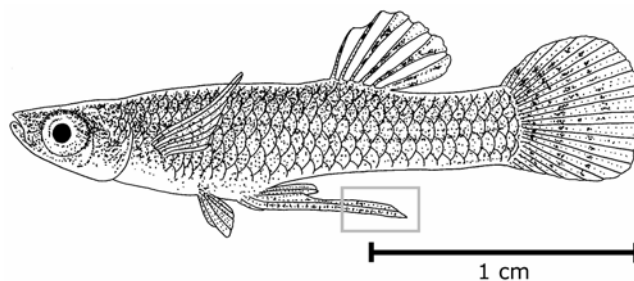
The gonopodiums of preserved adult male *Gambusia* were viewed under a light microscope and compared with the illustration by Rauchenberger (1989) and the description by Rosen & Bailey (1963). Fin rays of dorsal and anal fins of both adult males and females were counted in specimens from localities where gonopodium morphology varied between individuals. Fin rays were counted as suggested by Walters and Freeman (2000).

Most specimens included in this study originate from the collection of B. Marčeta: Fontanigge, channel between salt pan and airport: 7 males; River Rižana, north of discharge channel: 3 males; Bertoki, ditches between Rižana and Aro Rivers: 5 males and 4 females; Škocjan Inlet: 12 males; Fiesa, larger lake: 12 males; Badaševica, old riverbed that discharges in Škocjan Inlet: 1 male; Skocjan Inlet, Laguna: 1 male. In addition 3 adult males were studied from Koper, ditches near the parking place at the market and three males from Fiesa, smaller lake. These samples cover the entire range of the species in Slovenia. For comparison an adult male from animal trade was included as well (collection P. Veenvliet).

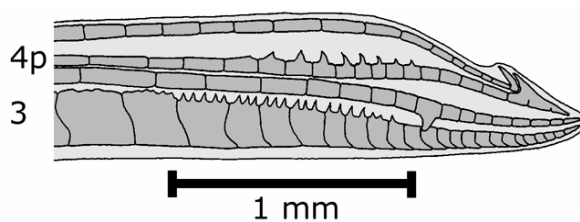
## Results

Specimens from all Slovene localities except one have a gonopodium morphology which corresponds with *G. holbrooki* (fig. 1): multiple small spines on the third finray and relatively large hooks on the posterior branch of the fourth finray. One of the five males from Bertoki has a gonopodium morphology that corresponds with *G. affinis*. This particular male has 8 dorsal fin rays, which appears to correspond with *G. holbrooki*. It is also the largest male specimen in the collection. The other 4 males have a gonopodium morphology corresponding with *G. holbrooki* but one has 7 dorsal fin rays which corresponds with *G. affinis*. All 4 adult females have 11 anal fin rays, which corresponds with *G. holbrooki*. However, two of these

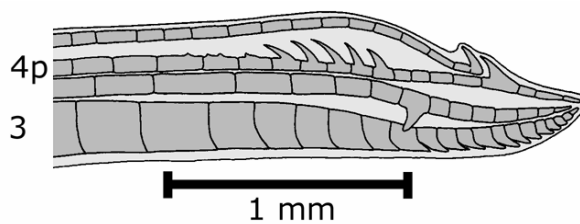
females have 7 dorsal fin rays and two females have 8 dorsal fin rays. The single male from animal trade has a gonopodium morphology which corresponds with *G. affinis* (fig. 2): the small spines on the third finray are absent while the hooks on the posterior branch of the fourth finray are relatively large.



**Figure 1:** Habitus of a male *Gambusia*. The grey square indicates the tip of the gonopodium, which is shown in figs. 1 and 2. Illustration by Paul Veenvliet.



**Figure 2:** Gonopodium of *Gambusia holbrooki* from Slovenia (Fiesa lake). Numbers refer to finrays: 3 = third finray, 4p = posterior branch of the fourth finray. Illustration by Paul Veenvliet.



**Figure 3:** Gonopodium of *Gambusia affinis* from aquarium trade. Numbers as in fig. 2. Illustration by Paul Veenvliet.

## Conclusion and discussion

Based on gonopodium characters it is appropriate to refer to Slovene *Gambusia* as *G. holbrooki* and not *G. affinis*. However, gonopodium morphology of one specimen, as well as the variable dorsal fin ray count from other specimens from the same locality may indicate that *G. affinis* is also introduced and has subsequently hybridised with *G. holbrooki*. Alternatively, it is possible that the large male is aberrant and there is within-species variation in the number of dorsal fin rays. Since the four other males from this locality all have a gonopodium morphology that corresponds to *G. holbrooki* it seems appropriate to also refer to this population as belonging to *G. holbrooki* until further research is carried out.

## Acknowledgements

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