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The First Record of *Lagocephalus guentheri* Miranda Ribeiro, 1915 from the Red Sea with Notes on Previous Records of *L. lunaris* (Actinopterygii, Tetraodontiformes, Tetraodontidae)

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Abstract Examination of the holotype and four additional specimens of *Lagocephalus guentheri* Miranda Ribeiro, 1915 revealed that *L. guentheri* is distinguished from the closely-related species *L. spadiceus* (Richardson, 1845) by the shape and color of the caudal fin and from another similar species, *L. gloveri* Abe and Tabeta, 1983, by the color of the pectoral fin. Whereas the type locality is in question, the non-type specimens of *L. guentheri* are from the Gulf of Suez in the Red Sea. Records indicate that this species also occurs along the east coast of South Africa. It is distinguished from the other species of *Lagocephalus* by the following combination of the characters: a rhomboidal- or elliptical-shaped spinule patch that extends posteriorly to the region dorsal to the posterior part of the pectoral fin; the middle part of the caudal fin slightly produced posteriorly; dorsal-fin rays 12–14, anal-fin rays 11–12, pectoral-fin rays 16–19; dorsal half of body light brown with several dusky bands; caudal fin dark brown with the dorsal and ventral white tips, dorsal fin dusky, and pectoral and anal fins pale.

Key words : Tetraodontidae, puffers, *Lagocephalus guentheri*, Red Sea.

Introduction

Puffers of the genus *Lagocephalus* are widely distributed in warm shallow waters of the world. Although the genus *Lagocephalus* is well known (Shipp, 1974; Smith, 1986; Randall, 1995; Matsuura, 1997, 2001; Yamada et al., 2007), classification at the species level in *Lagocephalus* has not yet been studied in depth, causing confusion in the status of several species including *L. cheesemanii* (Clarke, 1897), *L. gloveri* Abe and Tabeta, 1983, *L. guentheri* Miranda Ribeiro, 1915, *L. spadiceus* (Richardson, 1845), and *L. wheeleri* Abe, Tabeta and Kitahama, 1984. Matsuura (2010) reported that *L. wheeleri* is a junior synonym of *L. spadiceus*. During our joint study on the Red Sea puffers, specimens of *L. guentheri* became available to us. The detailed description of this species is given below with notes on its taxonomic status.

Materials and Methods

Specimens used in this study are deposited in the Hebrew University, Jerusalem (HUJ), Muséum National d'Histoire Naturelle (MNHN), Paris, the Natural History Museum, London (BMNH), and the National Museum of Nature and Science, Tokyo (NSMT). Counts and measurements follow Dekkers (1975). Measurements

were made with calipers to the nearest 0.1 mm. In the following description, data in parentheses refer to those of the additional specimens when they are different from those of the holotype.

Lagocephalus guentheri Miranda Ribeiro, 1915

(Figs. 1–2)

Tetrodon lunaris Var. β Günther, 1870, p. 275.
Lagocephalus guntheri Miranda Ribeiro, 1915: Tetrodontidae, p. 5.

Specimens examined. Holotype, BMNH 1848.10.12:1, 175 mm SL (Brazil was said to be the type locality by Miranda Ribeiro, but probably erroneous). NSMT-P 105693 (2 specimens), 165–183 mm SL, Gulf of Suez, Red Sea, 10 m depth, 16 April 2009; HUJ 12897, 117 mm SL, Gulf of Suez, Red Sea, 12 February 1972; HUJ 18034, 151 mm SL, Gulf of Suez, Red Sea, 12 September 1972.

Description. Dorsal-fin rays 14 (12–13); anal-fin rays 12 (11); pectoral-fin rays 19 (16–17). Head length 34.5% SL (30.5–32.6% SL), snout length 17.1% SL (15.4–16.6% SL), snout to dorsal-fin origin 65.4 % SL (63.0–67.5% SL), snout to anal-fin origin 69.4% SL (64.8–66.7% SL), body width at pectoral-fin base 15.9% SL (17.6–20.1% SL), body depth at anal-fin origin 19.7% SL (18.5–20.3% SL), depth of caudal peduncle 5.7% SL (5.4–6.2% SL), length of caudal peduncle 24.6% SL (25.8–26.8% SL), gill-opening length 7.9% SL (7.8–10.7% SL), eye diameter 9.3% SL (8.1–9.5% SL), bony interorbital width 11.5% SL (10.8–13.5% SL), snout to anterior edge of nasal organ 10.9% SL (9.8–11.3% SL), posterior edge of nasal organ to anterior edge of eye 4.9% SL (4.4–5.2% SL), length of dorsal-fin base 10.5% (10.4–11.1% SL), length of anal-fin base 7.4% SL (9.2–10.7% SL), longest dorsal-fin ray 19.0% SL (16.1–19.3% SL), longest anal-fin ray 17.3% SL (16.5–19.0% SL), longest pectoral-fin ray 15.6% SL (16.8–18.5% SL), caudal-fin length 22.9% SL (21.6–24.8% SL).

Longitudinal skin fold extending on the ventrolateral corner of the body from the chin to the ventral part of the caudal peduncle. The lateral line system comprises ventral and lateral elements, the ventral element coursing along the skin fold and the lateral element extending along the mid-lateral side of the body from the region dorsal to the gill opening to the caudal-fin base with the anterior extension coursing from ventral to the eye to the snout region. Two openings in the nasal organ broad. The ventral surface of the head and belly covered with spinules, extending just posterior to the lower jaw to slightly before the anus. Spinules on the back forming a rhomboidal or elliptical patch; starting anteriorly between the nasal organ and the eye with the widest expansion dorsal to the gill opening, tapering posteriorly and ending at the region dorsal to the posterior part of the pectoral fin. The caudal fin slightly lunate and the middle rays slightly produced posteriorly (the posterior protrusion of the middle rays evident in the newly collected specimens: see Fig. 2); the dorsal and ventral tips of the caudal fin produced posteriorly.

Color of the holotype in ethanol. The dorsal side of the body brown, a silver white band coursing longitudinally on the side ventral to the level of the eye from the snout to the caudal-fin base. The ventral side of the body white. The dorsal and caudal fins dusky. The pectoral and anal fins pale.

Color of fresh specimens. The dorsal side of the body brown with several dark bands crossing over the back; the first band between the eyes, the second above the gill opening, the third above the posterior part of the pectoral fin, the fourth encircling the dorsal-fin base, and a couple of small dark markings on the dorsal side of the caudal peduncle. A silver-white band running on the side of the body as found in the holotype. The dorsal fin dusky. The caudal fin dark brown or almost black with the dorsal and ventral white tips. The pectoral and anal fins pale.

Remarks. Günther (1870) recognized this species as a subspecies, *Tetrodon lunaris* var. β and stated that the specimen was obtained from Brazil by J. P. G. Smith. However, no additional specimens have been collected from Brazil or

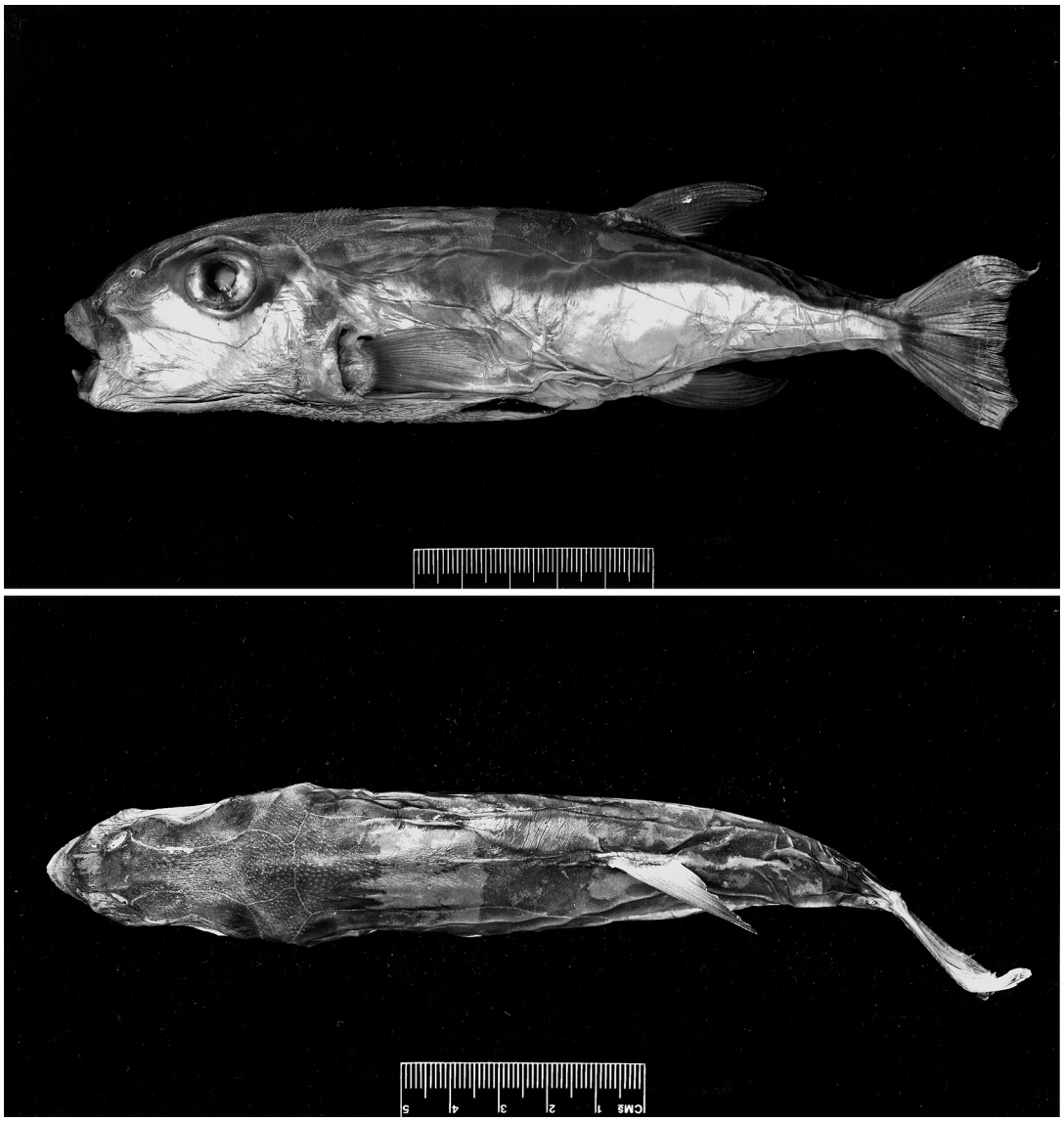

Fig. 1. Holotype of *Lagocephalus guentheri* Miranda Ribeiro, 1915, BMNH 1848.10.12:1, 175 mm SL. Top, lateral view; bottom, dorsal view.

other areas in the Atlantic. This suggests that Günther's statement about the type locality was in error. Based on Günther's description, Miranda Ribeiro (1915) reported this species under the name of *Lagocephalus guntheri* nom. nov., making it a new species of *Lagocephalus*. It is clear that Miranda Ribeiro (1915) named his species after A. Günther. As such, the correct spelling of the species name is "*guentheri*", not "*guntheri*".

Lagocephalus guentheri is similar to *L. spadiceus* and *L. gloveri* in general appearance. However, the caudal fin in *L. guentheri* has a slight posterior extension medially that makes the fin appear to be doubly emarginate whereas the caudal fin is slightly lunate in *L. spadiceus*. The middle part of the caudal fin of *L. guentheri* is produced posteriorly in the freshly dead specimens collected from the Red Sea. However, when these specimens were fixed in formalin and transferred into ethanol, the posterior projection

Fig. 2. *Lagocephalus guentheri*, NSMT-P 105693, 165 mm SL, Gulf of Suez, Red Sea. Top, lateral view; bottom, dorsal view. Photo by Sergey V. Bogorodsky.

of the middle part of the caudal fin became less evident (as compared to the holotype), making it difficult to separate museum specimens of *L. guentheri* from those of *L. spadiceus*. In addition to the shape of the caudal fin, the color of the caudal fin separates the two species: in *L. guentheri* the caudal fin is dark brown or almost black excepting the dorsal and ventral white tips, but in *L. spadiceus* the dorsal two-thirds of the caudal fin are dark yellow and the ventral one-third is white (Fig 3).

Lagocephalus guentheri is similar to *L. gloveri* in the shape of the caudal fin. However, the color of the pectoral fin clearly separates the two species: the pectoral fin of the former is pale whereas it is dusky in the latter (Fig. 4). Smith (1986) reported a species of *Lagocephalus* from South Africa under the name of *L. guentheri* with a question mark. She tentatively recognized it as a senior synonym of *L. gloveri*. However, the illustration of this South African species (plate 143 of Smith, 1986) shows that it is *L. guentheri*.

In his revision on the Atlantic puffers, Shipp (1974) considered *L. guentheri* a junior synonym of *L. laevigatus* (Linnaeus, 1766), although they are clearly separated by the spinules on the back: the former has a spinule patch on the back whereas the latter completely lacks it. Abe (1987) re-described the holotype of *L. guentheri* and confirmed that no additional specimens had been collected from the Atlantic since its original description.

Randall (1995) reported on the difference of the spinule patch on the back between *L. guentheri* and *L. spadiceus* (Richardson, 1845). However, Matsuura (2010) showed that there is great

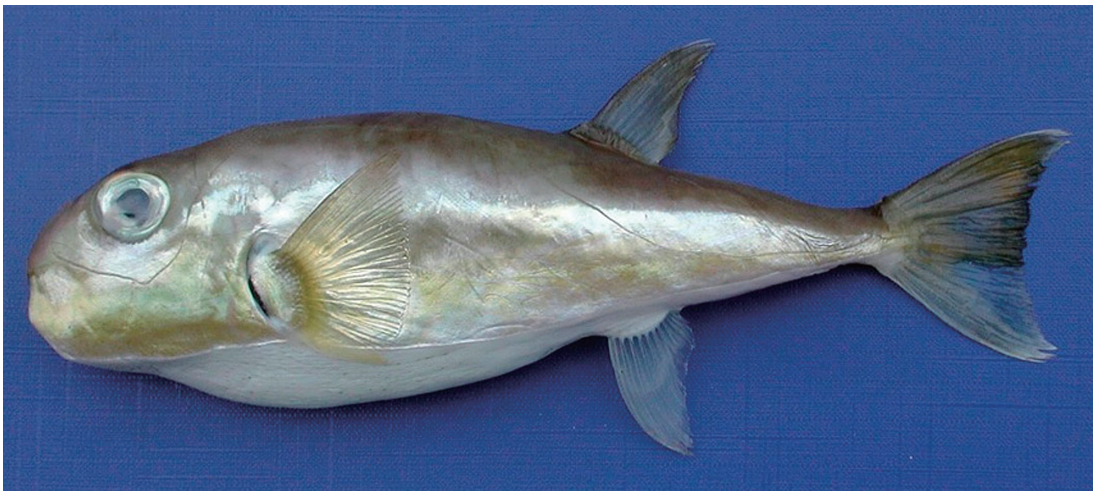

Fig. 3. *Lagocephalus spadiceus*, NSMT-P 70951, 150 mm SL, Nha Trang,Vietnam. Photo by K. Matsuura.

Fig. 4. *Lagocephalus gloveri*, NSMT-P 95160, 169 mm SL, Van Gia, 60 km north of Nha Trang, Vietnam. Photo by K. Matsuura.

variation in the spinule patch on the back in *L. spadiceus*: in some specimens the spinule patch is elliptical with a short or long posterior extension but in other specimens it is rhomboidal. Thus, the spinule patch on the back cannot separate the two species. De Beaufort and Briggs (1962) stated that *L. spadiceus* is distributed in the Red Sea. However, they did not provide any detailed locality from the Red Sea nor did they list voucher specimens. Clark and Gohar (1953) provided an illustration of a species of *Lagocephalus* under the name *L. lunaris* (fig. 7) collected from the Red Sea but the spinule distribution on the back in this figure shows that it does not reach the dorsal-fin origin but ends in the region dorsal to the posterior tip of the pectoral fin. This clearly indicates that their identification was wrong; their puffer should be either of *L. guentheri* or *L. spadiceus*. Further studies are needed to confirm whether *L. spadiceus* occurs in the Red Sea.

Previous authors reported *Lagocephalus lu-*

naris from the Red Sea (e.g., Clark and Gohar, 1953; Dor, 1984; Goren and Dor, 1994; Golani and Bogorodsky, 2010). We tried to collect or observe specimens of *L. lunaris* in the Red Sea, but no specimens have been found. We also searched for puffer specimens identified as *L. lunaris* in natural history museums in Europe. Upon our request Romain Causse examined and photographed the specimens of the Paris museum (NMNH 5672 and NMNH 2001-2757) originally identified as *L. lunaris*. The spinule patch on the back of these specimens does not reach the dorsal-fin origin, clearly showing that they are not *L. lunaris* but either *L. guentheri* or *L. spadiceus*. Thus, there are neither literature records nor voucher specimens to confirm the occurrence of *L. lunariss* from the Red Sea.

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