

## SHORT COMMUNICATION

### Filling the gap: a new record of diamondback puffer (*Lagocephalus guentheri* Miranda Riberio, 1915) from the west-eastern Mediterranean Sea, Turkey

Murat Çelik<sup>1\*</sup>, Alan Deidun<sup>2</sup>, Umut Uyan<sup>3</sup>, Ioannis Giovos<sup>4</sup>

<sup>1</sup> Faculty of Fisheries, Muğla Sıtkı Koçman University, 48000, Menteşe, Muğla, TURKEY

<sup>2</sup>Department of Geosciences, University of Malta, Msida MSD 2080 MALTA

<sup>3</sup>Department of Marine Biology, Pukyong National University, (48513) 45, Yongso-ro, Nam-Gu, Busan, KOREA

<sup>4</sup>iSea, Environmental Organization for the Preservation of the Aquatic Ecosystems, Ochi Av., 11, Thessaloniki, GREECE

\*Corresponding author: 8muratcelik@gmail.com

---

#### Abstract

One specimen of the diamondback puffer, *Lagocephalus guentheri* (Miranda Riberio, 1915), was recorded along the Turkish coast, off Gökova Bay, through the angling method on 12 June 2017. The morphological features of this species were examined indirectly by image analyses software. This finding also supports the documented occurrence of the diamondback puffer fish along Turkish coasts.

**Keywords:** TTX, pufferfish, invasion, range expansion, Eastern Mediterranean

**Received:** 03.05.2018, **Accepted:** 29.05.2018

---

To date, the family *Tetraodontidae* has contributed and established the highest number of alien fish species in the Mediterranean Sea, being represented by ten members out of a total of 165 confirmed non-indigenous fish species in the Mediterranean so far (Golani *et al.* 2017). Those are *Lagocephalus guentheri* (Miranda Riberio, 1915); *Lagocephalus suezensis* (Clark et Gohar, 1953); *Lagocephalus sceleratus* (Gmelin, 1789); *Lagocephalus spadiceus* (Richardson, 1845); *Torquigener flavimaculosus* (Hardy et Randall, 1983); *Tylerius spinosissimus* (Regan, 1908); *Sphoeroides spengleri* (Bloch, 1785); *Sphoeroides pachygaster* (Muller et Troschel, 1848); *Sphoeroides marmoratus* (Lowe, 1938); and *Ephippion guttifer* (Bennett, 1831) (Golani *et al.* 2017; Corsini *et al.* 2005; Bilecenoglu *et al.* 2006; Vacchi *et al.* 2007; Matsuura *et al.* 2011). One of these ten species is the diamondback puffer (*Lagocephalus guentheri* Miranda Riberio, 1915), which is, similarly to other *Lagocephalus* species, native to shallow and

warm waters of the Indo-West Pacific region, the Persian Gulf and the Red Sea (Matsuura *et al.* 2011), while it has also been further recorded from the south-western Atlantic, off the coast of Brazil (Van der Elst 1993). More recently, *L. guentheri* was reported from the Mediterranean Sea, first off the coast of Alexandria, Egypt, in 2015 (Farrag *et al.* 2016) and shortly later from the Aegean Sea (Akyol and Aydın 2016), the northeastern Mediterranean coasts of Turkey (Iskenderun Bay) by Ergüden *et al.* (2017) and off the coast of Israel (Karahan *et al.* 2017). We hereby document the fourth confirmed report of the species from the Aegean Sea, bridging an existing distributional gap for the species along the Turkish coast.

On 12 June 2017, a new specimen of *L. guentheri* (Figure 1) was caught by a recreational fisherman from Gökova Bay (37°00'N, 27°58'E) (Figure 2), from an area characterized by a sandy-rocky bottom at a depth of 8-10 m. Since the specimen was released back into the wild, morphometric and meristic counts were not taken directly. Instead, length measurements were estimated from the photos on the basis of the known model and length of the hook used on this occasion. The photographs of the specimen (Figure 1) were transferred to the Digimizer 4.3.1. software for further analyses.



**Figure 1.** Partial dorsal (A) and lateral (B) view of the specimen of *Lagocephalus guentheri*

Morphometric characteristics of the specimen of *L. guentheri* were estimated as in Table 1. All measurements, meristic counts, and colour patterns taken or observed on the specimen were consistent with those for *L. guentheri* as reported by Matsuura *et al.* (2011) and Farrag *et al.* (2016). The colour of the present specimen was yellow-brown with dark bands on the dorsum as follows 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. The lunate caudal fin was dark, with white dorsal and ventral tips. *L. spadiceus* differs from *L. guentheri* in the colouration; dark green on the dorsum without dark bands, yellow on sides and white on ventral. The caudal fin was slightly lunate, the dorsal two-thirds of the caudal fin are dark yellow and the ventral one-third was white.



**Figure 2.** The capture location of *Lagocephalus guentheri* in this study

**Table 1.** Measurements of *Lagocephalus guentheri* compared with previous records

<b>Measurement (mm) and Proportions</b>	Present study n=1	Ergüden <i>et al.</i> (2017) n=1	Akyol and Aydın (2016) n=1	Matsuura <i>et al.</i> (2011) n=1(n=4)
Standart length (SL)	122	289	114	175
Total length (TL)	149	337	134	-
Maximum body depth	35 (42.74 %SL)	84 (29.0 %SL)	35 (30.7 %SL)	-
Pre-dorsal fin length	88 (72.1 %SL)	177 (61.2 %SL)	71 (62.3 %SL)	-
Pre-pectoral fin length	49 (40.2 %SL)	89 (30.8 %SL)	36 (31.6 %SL)	-
Pre-anal fin length	91 (74.6 %SL)	176 (60.9 %SL)	73 (64.0 %SL)	-
Head length (HL)	44 (36.1 %SL)	79 (27.3 %SL)	33 (28.9 %SL)	34.5 %SL (30.5-32.6 % SL)
Eye diameter	10 (22.7% HL)	18 (22.8 % HL)	1 (30.3 % HL)	9.3 %SL (8.1-9.5 %SL)
<b>Meristic characteristics</b>				
Dorsal fin ray	12	13	12	14 (12-13)
Anal fin ray	-	11	11	12 (11)
Pectoral fin ray	17	19	16	19 (16-17)
Caudal fin ray	-	17	-	-

Due to the difficulty in distinguishing *L. spadiceus* from *L. guentheri*, the latter being frequently misreported and/or misidentified, Matsuura *et al.* (2011) recommended the re-assessment of previous records of the two species. Zenetos

*et al.* (2017) synonymized *L. spadiceus* with *L. guentheri*; however, the evidence emerging from the genetic analyses classifies the two as discrete species (Matsuura and Satoh 2017; Vella *et al.* 2017).

Akyol and Aydın (2016) suggested that *L. guentheri* had been transported into the Mediterranean from the Red Sea through ship ballast water, although a passive entry of the species through the Suez Canal cannot be ruled out. In recent years, a spread of Tetraodontidae species across the Mediterranean has been observed (Farrag *et al.* 2016; Lisa *et al.* 2018) and *L. guentheri* seems to expand within the basin by following a similar expansion pattern as most Lessepsian migrants, including congeneric species (Galil *et al.* 2015).

*L. guentheri*, like all *Tetraodontidae*, makes a known socio-economic impact such as on fisheries (Farrag *et al.* 2016) and is a hazard to health as it contains tetrodotoxin (TTX) and saxitoxin, mainly concentrated in the skin, gonads, intestines and liver (Kosker *et al.* 2016). This species is not explicitly targeted within the Mediterranean (Matsuura *et al.* 2011), although it is becoming a frequent occurrence within the bycatch in artisanal and trawl fishing in some countries (Carpenter *et al.* 1997; Kalogirou 2013). Given that the landing and selling of pufferfishes in Turkey is prohibited by the Ministry of Food, Agriculture and Livestock (Anonymous 2016) as well as in all EU countries, it is important to continue monitoring the expansion of this species which, according to Filiz *et al.* (2017), has a high dispersal and establishment potential and an adverse impact on the biodiversity and the ecosystem services of invaded marine areas.

### **Acknowledgments**

The authors would like to thank the recreational fisherman Selim Köse for providing the material and Dr. Baran Yoğurtçuoğlu for his contribution.

## ***Lagocephalus guentheri* Miranda Riberio, 1915 için Türkiye Doğu Akdeniz'in Batı'sından yeni bir kayıt**

### **Öz**

12 Haziran 2017 tarihinde bir adet *Lagocephalus guentheri* (Miranda Riberio, 1915) bireyi Türkiye'nin güneybatısında bulunan Gökova Körfezi'nde, amatör balıkçılık yöntemiyle yakalanmıştır. Yakalanan bireyin morfolojik özellikleri dolaylı yöntemlerle, fotoğraf analiz programı aracılığıyla incelenmiştir. Bu bulgu aynı zamanda türün Türkiye kıyılarında kayda geçen varlığını desteklemektedir.

**Anahtar kelimeler:** TTX, balon balığı, istila, yayılım alanı, Doğu Akdeniz

## References

- Akyol, O., Aydın, İ. (2016) A new record of *Lagocephalus guentheri* (Tetraodontiformes: Tetraodontidae) from the north-eastern Aegean Sea. *Zoology in the Middle East* 62:3, 271-273.
- Anonymous. (2016) 4/1 Numbered Communiqué on the Arrangement of Commercial Marine Fleet (No: 2016/35). Ministry of Food, Agriculture and Livestock. (in Turkish)
- Bilecenoglu, M., Kaya, M., Akalin, S. (2006) Range expansion of silver stripe blaasop, *Lagocephalus sceleratus* (Gmelin, 1789), to the northern Aegean Sea. *Aquatic Invasions* 1(4): 289–291.
- Carpenter, K.E., Krupp, F., Jones, D.A., Zajonz, U. (1997) Living Marine Resources of Kuwait, Eastern Saudi Arabia, Bahrain, Qatar, and the United Arab Emirates. FAO, Rome, Italy.
- Corsini, M., Margies, P., Kondilatos, G., Economidis, P.S. (2005) Lessepsian migration of fishes to the Aegean Sea: First record of *Tylerius spinosissimus* (Tetraodontidae) from the Mediterranean, and six more fish records from Rhodes. *Cybium* 29(4): 347-354.
- Ergüden, D., Kabaklı, F., Uyan, A., Doğdu, S., Karan, S., Gurlek, M., Turan, C. (2017) New record of diamondback puffer *Lagocephalus guentheri* Miranda Ribeiro, 1915 from the North-Eastern Mediterranean, Turkey. *Natural and Engineering Sciences* 2(3) Supplement: 60-66.
- Farrag, M.M.S., El-Haweet, A.K., Akel, E.H.Kh., Moustafa, M.A. (2016) Occurrence of puffer fishes (Tetraodontidae) in the eastern Mediterranean, Egyptian coast – filling in the gap. *BioInvasions Records* 5: 47-54.
- Filiz, H., Yapıcı, S., Bilge, G. (2017) The factors increasing of invasiveness potential of five pufferfishes in the eastern Mediterranean, Turkey. *Natural and Engineering Sciences* 2(3): 22-30.
- Galil, B.S., Boero, F., Campbell, M.L., Carlton, J.T., Cook, E., Fraschetti, S., Gollasch, S., Hewitt, C.L., Jelmert, A., Macpherson, E., Marchini, A., McKenzie, C., Minchin, D., Occhipinti-Ambrogi, A., Ojaveer, H. (2015) ‘Double trouble’: the expansion of the Suez Canal and marine bioinvasions in the Mediterranean Sea. *Biological Invasions* 17(4): 973-976.
- Golani, D., Orsi-Relini, L., Massuti, E., Quignard, J.P. (2017) Updated CIESM Atlas of Exotic Species in the Mediterranean Vol 1: Fishes. CIESM.

Kalogirou, S. (2013) Ecological characteristics of the invasive pufferfish *Lagocephalus sceleratus* (Gmelin, 1789) in the eastern Mediterranean Sea – a case study from Rhodes. *Mediterranean Marine Science* 14: 251-260.

Karahan, A., Douek, J., Paz, G., Stern, N., Kideys, A.E., Shaish, L., Goren, M., Rinkevich, B. (2017) Employing DNA barcoding as taxonomy and conservation tools for fish species censuses at the southeastern Mediterranean, a hot-spot area for biological invasion. *Journal for Nature Conservation* 36: 1-9.

Lisa, G., Laura, G., Andrea, M., Enrica, R., Francesca, S., Alessandra, G., Andrea, A. (2018) Toxic invasive pufferfish (Tetraodontidae family) along Italian coasts: assessment of an emerging public health risk. *Food Control*. 91:330-338

Matsuura, K., Golani, D., Bogorodsky, V. (2011) The first record of *Lagocephalus guentheri* Miranda Ribeiro, 1915 from the Red Sea with notes on previous records of *L. lunaris* (Actinopterygii, Tetraodontiformes, Tetraodontidae). *Bulletin of the National Museum of Nature and Science, Series A* 37: 163-169.

Matsuura, K., Satoh, T.P. (2017) Redescription of *Lagocephalus cheesemanii* (Clarke 1897), a senior synonym of *Lagocephalus gloveri* Abe and Tabeta 1983, based on morphological and genetic comparisons (Actinopterygii: Tetraodontiformes: Tetraodontidae). *Ichthyological Research* 64: 104–110.

Vacchi, M., Bussotti, S., Miglietta, A.M., Guidetti, P. (2007) Presence of the Guinean puffer *Sphoeroides marmoratus* (Lowe, 1838) in the Mediterranean Sea. *Journal of Fish Biology* 71(4): 1215-1219.

Van der Elst, R. (1993) A guide to the common sea fishes of southern Africa. (3rd Ed.). Struik Publishers, Cape Town. 398 pp.

Vella, A., Vella, N., Karakulak, F.S., Oray, I. (2017) DNA barcoding of Tetraodontidae species from the Mediterranean Sea: filling knowledge gaps for improved taxonomic accuracy. *Genetics of Aquatic Organisms* 1: 71-79.

Zenetos A, Çinar ME, Crocetta F, Golani D, Rosso A, Servello G, Shenjar N, Turon X, Verlaque M (2017) Uncertainties and validation of alien species catalogues: The Mediterranean as an example. *Estuarine, Coastal and Shelf Science* 191: 171-187.