A new record of the brassy chub, *Kyphosus vaigiensis* (Actinoptygii: Perciformes: Kyphosidae), from the Mediterranean Sea

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**Abstract**

One individual of the brassy chub, *Kyphosus vaigiensis* (Quoy et Gaimard, 1825) (41.5 cm TL, 1.27 kg TW), was caught off Annaba, on the eastern coasts of Algeria in December 2013. This circumtropical fish is found for the first time on the south-western Mediterranean coasts. The chronology of its records in the Mediterranean supports the hypothesis of its Atlantic origin.

**Keywords**

alien species, first record, *Kyphosus vaigiensis*, Mediterranean, Algeria

**Introduction**

The taxonomy of sea chubs (Kyphosidae, *Kyphosus*) was confused for a long time (Orsi Relini 2017). The perciform family Kyphosidae currently accommodates 12 species in two genera: *Neoscopris* Smith, 1931 and *Kyphosus* Lacepède, 1801 (see Knudsen and Clements 2013, 2016; Knudsen et al. 2019). Their morphology is uniform with only subtle variations among species (Humann 1994). The genus *Kyphosus* is represented by 11 species widely distributed in the Atlantic, Indian, and the Pacific oceans (Sakai and Nakabo 1995, 2014, 2016; Knudsen and Clements 2013). All of them are herbivorous fishes and occur in shallow waters (0–10 m depth) in tropical and temperate rocky reefs (Topp 1970).

In the Mediterranean, two species of Kyphosidae have been reported: the beaked chub, *Kyphosus sectatrix* (Linnaeus, 1758), and the brassy chub, *Kyphosus vaigiensis* (Quoy et Gaimard, 1825). The former is more common in subtropical to temperate seas, but can also be encountered in more tropical areas (Knudsen and Clements 2013). It was listed in the Mediterranean fish fauna (Tortonese 1975, 1986) based on old records (1846–1903) of a few individuals at Trieste, Palermo, and Genoa in Italy (Orsi Relini et al. 2011). Since then, it has been reported several times in the western and central Mediterranean, often under invalid names such as *Kyphosus saltatrix* (Linnaeus, 1758) (see Kiparissis et al. 2012; Lelong 2012; Elbarasisi et al. 2013) or *Kyphosus sectator* (Linnaeus, 1758) (see Hemida et al. 2004; Francour and Mouine 2008). Initially thought to be restricted to the Indo-Pacific, *K. vaigiensis* is a circumtropical species distributed along the Indian, Atlantic, and Pacific oceans, the Red Sea, and the Mediterranean (Knudsen and Clements 2013, 2016; Bahón et al. 2017; Evans et al. 2020). Not native to the Mediterranean, it was first reported three times under the species name *Kyphosus incisor* (Cuvier, 1831): twice in the vicinity of Almunécar (Granada, Spain) in the western Mediterranean Sea in June 1998 (Azzurro et al. 2013) and May 2013 (Peña-Rivas and Azzurro in Bilecenoglu et al. 2013) and along the Ligurian coast (Camogli, Italy) in July 2009 (Orsi Relini et al. 2011). Ligas et al. (2011)
had confused it with an individual of *Kyphosus saltatrix* (see Knudsen and Clements 2013; Mannino et al. 2015) found in August 2009 not far from the port of Livorno in Italy. Additional occurrences were reported thereafter in Sicily (Mannino et al. 2015), Malta (Vella et al. 2016), Israel (Goren et al. 2016), Cyprus (Michailidis and Rousou in Gerovasileiou et al. 2017), and Turkey (Kiyağa et al. 2019). With the exception of Orsi Relini et al. (2011) who found 2 individuals of this species (only one of which was measured), all the other authors report only one specimen.

*Kyphosus vaigiensis* is an inshore species found over hard bottoms. It can also occur offshore under floating objects or following ships (Nelson 1994). It feeds mainly on algae, including sargassum (Carpenter 2002). Silvano and Güth (2006) highlight the omnivory of this species in a Brazilian subtropical reef. Some data on the biology of its reproduction on the Colombian coasts are given by Rueda et al. (2015), but its biology and ecology are in general poorly known (Silvano and Güth 2006).

The present note describes a new record of *K. vaigiensis* in the Mediterranean. This species is reported for the first time on the coasts of North Africa.

**Methods**

On 18 December 2013, one individual of *K. vaigiensis* was recorded from the Gulf of Annaba (Fig. 1). Caught using a trammel net, it was found at a fishmonger among a batch of salemas, *Sarpa salpa* (Linnaeus, 1758). It was photographed, weighed, and identified based on both meristic and morphometric characters. These were taken following standard procedures used in other descriptions of sea chubs (Carpenter 2002; Sakai and Nakabo 2004; Orsi-Relini et al. 2011; Azzurro et al. 2013). The specimen was fixed in formalin and deposited in the fish collection of the Marine Bioresources Laboratory at the Annaba University, Algeria. Since this report in 2013, a survey has been conducted with fishermen in the region to find out if other individuals of *K. vaigiensis* have been seen. This survey was carried out based on photographs.

**Results**

The meristic and morphometric data of the fished specimen (Fig. 2) are listed in Table 1. They agree with the different descriptions of *K. vaigiensis* given by other authors (Sgano 1981; Carpenter and Niem 2001; Carpenter 2002; Orsi Relini et al. 2011; Azzurro et al. 2013; Sakai and Nakabo 2014, 2016). Morphologically, its body is oval shaped and moderately deep. The head is short with a small and horizontal mouth whose maxilla is slipping under edge of preorbital bone. Head profile in front of eye is gently convex (instead of a bump in *K. sectatrix*). Each jaw is provided with a regular row of close-set incisor-like, round-tipped teeth. Their bases set horizontally, resembling a radially striated bony plate inside mouth. Scales are ctenoid, small and rough to touch, covering most of the head. Color is dorsally grey to silvery on the belly. Series of longitudinal yellow-golden stripes across the body. On head, there are two brassy horizontal bands separated by a silver stripe under the eye. Fins and opercular membrane are dark.

![Figure 1](Image)

**Figure 1.** Map pointing out the capture locality of *Kyphosus vaigiensis* on Algerian coasts and chronology of the other records in the Mediterranean: 1 = Azzurro et al. (2013) (31 cm TL, 0.45 kg TW), 2 = Orsi Relini et al. (2011) (48 cm TL, 1.80 kg TW), 3 = Bilecenoglu et al. (2013) (46 cm TL, 1.64 kg TW), 4 = Ligas et al. (2011) (49.5 cm TL, 1.65 kg TW), 5 = Mannino et al. (2015) (47.5 cm TL), 6 = presently reported finding (45.1 cm TL, 1.27 kg TW), 7 = Vella et al. (2016) (15.7 cm TL, 0.49 g EW), 8 = Goren et al. (2016) (42.0 cm SL), 9 = Michailidis and Rousou in Gerovasileiou et al. (2017) (27.2 cm TL, 403 g TW), 10 = Kiyağa et al. (2019) (53.1 cm TL, 2.27 kg TW).
Discussion

The morphology of the caught specimen, as well as its chromatic, meristic, and metric characteristics, confirm that it represents *K. vaigiensis*, as described in the literature (Tortonese 1975, 1986; Sgano 1981; Carpenter 2002; Knudsen and Clements 2013; Carpenter and De Angelis 2016; Sakai and Nakabo 2016) and by the authors of other records of this species in the Mediterranean (Ligas et al. 2011; Orsi Relini et al. 2011; Azzurro et al. 2013; Mannino et al. 2015; Goren et al. 2016; Vella et al. 2016; Michailidis and Rousou in Gerovasileiou et al. 2017; Kiyağa et al. 2019). In particular, Azzurro et al. (2013) insist on the morphological characters which differentiate *K. vaigiensis* from its congener *K. sectatrix*, two very similar species who cohabit in the Mediterranean: anal fin with 12 or 13 soft rays (11, rarely 10 or 12 in *K. sectatrix*), 19 to 22 gill rakers on the lower limb of first gill arch (16 to 19, rarely 19 in *K. sectatrix*) and the gently convex head profile in front of eye (a distinct bump in *K. sectatrix*).

Among the fifteen fishermen we surveyed, two confirmed that they had encountered this fish once. A single individual in the first case (date not specified) and two in the second (in 2019), both of size not exceeding 30 cm. However, given the morphologic similarity between the two species *K. vaigiensis* and *K. sectatrix*, it was not possible to confirm which of the two species it was.

This additional record of *K. vaigiensis* from the Mediterranean confirms its spread along the North-African coast. None of the ichthyological inventories carried out on the Algerian coasts had mentioned it (Dieuzeide et al. 1954; Djabali et al. 1993; Derbal and Kara 2001). This species is the tenth non-indigenous marine fish recorded in Algeria, but the first of circumtropical origin. All the other alien species that arrived are Lessepsian migrants of Indian or Indo-Pacific origin (Kara and Bourehail 2020).

The introduction of *K. vaigiensis* in the Mediterranean could be attributed to the natural expansion of its range.

Table 1. Morphometric and meristic characters of *Kyphosus vaigiensis* captured off Annaba coast (eastern Algeria) in December 2013.

| Morphometric characters [cm] | Value |
|----------------------------|-------|
| Total length               | 41.5  |
| Fork length                | 38.0  |
| Standard length            | 31.0  |
| Head length                | 9.2   |
| Head depth at end of operculum | 13.0 |
| Head depth at end of orbit | 9.5   |
| Head width at operculum    | 6.2   |
| Eye diameter               | 2.0   |
| Pre-orbital length         | 3.0   |
| Post-orbital length        | 4.3   |
| Body width at dorsal origin| 6.1   |
| Body width at anal origin  | 5.0   |
| Body height                | 15.5  |
| Pre-dorsal length          | 11.2  |
| Pre-anal length            | 21.0  |
| Caudal peduncle depth      | 3.5   |
| Caudal peduncle length     | 4.0   |
| Dorsal fin base length     | 16    |
| Pectoral fin length        | 6.5   |
| Pectoral fin base length   | 2.0   |
| Pelvic fin length          | 6.0   |
| Pelvic fin base length     | 2.0   |
| Anal fin base length       | 9.6   |
| Caudal fin height (vertically extended) | 16.0 |
| Caudal fin length          | 9.0   |
| Internasal space           | 2.4   |
| Inter-orbital distance     | 4.2   |
| Upper jaw length           | 3.0   |
| Lower jaw length           | 1.8   |
| 6° dorsal fin spine (longest) | 3.7 |
| 4° dorsal fin ray (longest) | 2.9  |
| Total weight [g]           | 1270  |

| Meristic characters         | Value |
|----------------------------|-------|
| Dorsal fin spines and soft rays | XI + 13 |
| Anal fin spines and soft rays | III + 12 |
| Pectoral fin rays           | 17    |
| Pelvic fin spines and soft rays | 1 + 5 |
| Caudal fin rays             | 18    |
| Pored scales in lateral line | 60    |
| Scales rows above lateral line | 11  |
| Scales rows below lateral line | 17   |
| Gill rakers on first arch (upper limb + lower limb) | 10 + 19 |
| Incisor-like teeth on upper jaws | 31   |
| Incisor-like teeth on lower jaws | 32   |
(Zenetas et al. 2012). Its adults can travel long distances (Azzurro et al. 2013) and its juveniles are pelagic and found associated with floating objects (Knudsen and Clements 2016). Thereby, it would have arrived actively or passively through the Suez Canal or the Strait of Gibraltar. However, the chronology of its occurrences which shows a clear spatial progression from west to east and a recent entry (after 2015) into the eastern Mediterranean supports the hypothesis of its Atlantic origin. Otherwise, Annaba being a port city, receiving hundreds of ships per year from all regions of the world (around 10 000 visit Algerian ports each year; Cheniti et al. 2018), its coasts are exposed to the introduction of exotic species. Thus, the recorded *K. vaigiensis* individual would have arrived by ships’ ballast water from one of its natural geographic ranges. Indeed, sea chubs are often observed around ships in subtropical waters waiting for the dumping of garbage (Orsi Relini et al. 2011) and are commonly referred to as “rudderfish” (Evans et al. 2020). This behavior exposes them to being “embarked” on board the boats. Thus, their presence in the Mediterranean can also be considered as human-mediated as proposed by Lo Brutto (2017).

Until now, records of *K. vaigiensis* in Mediterranean are limited to one or two isolated individuals. As *K. sectatrix* (see Francour and Mouine 2008), it can be considered a neocolonizer species sensu Quignard and Tomasini (2000). However, in the current context of seawater warming, the ability of *K. vaigiensis* to travel over large distances and its thermophilic character could in the future facilitate its establishment in the Mediterranean. In this situation, its coexistence with the indigenous sparid *Sarpa salpa*, the only herbivorous fish species in the Mediterranean, would reproduce the interaction scenario between *Sarpa salpa*, *Sigamut luridus* (Rüppell, 1829), and *Siganus rivulatus* Forsskål et Niebuhr, 1775 which happened in the eastern Mediterranean.

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