



Received: 23 Aug. 2016
Accepted: 8 Nov. 2016
Editor: R. Causse

Not another first: the ‘first’ Mediterranean record of *Pomacanthus asfur* (Forsskål, 1775) is probably based on a misidentification

by

Julian EVANS & Patrick J. SCHEMBRI* (1)

Résumé. – Un premier signalement erroné : le premier référencement de *Pomacanthus asfur* (Forsskål, 1775) en mer Méditerranéenne est probablement basé sur une erreur d’identification.

Deux espèces de *Pomacanthus* ont été récemment signalées dans les eaux maltaises : *P. maculosus*, enregistré en décembre 2012, et *P. asfur*, en septembre 2015. Ce dernier signalement est le premier pour la mer Méditerranéenne. Cependant, l’examen des images publiées du spécimen ‘*P. asfur*’ suggère qu’il peut avoir été mal déterminé et représenter un autre signalement de *P. maculosus*. Par conséquent, à ce jour, *P. asfur* n’a pas encore été répertorié en mer Méditerranéenne.

Keywords. – Pomacanthidae - *Pomacanthus asfur* - *Pomacanthus maculosus* - Malta - Misidentification - Non-native - Range expansion.

Three species of Pomacanthidae were recorded for the first time from the Mediterranean Sea between 2009 and 2011: *Pomacanthus maculosus* (Forsskål, 1775) (Lebanon, September 2009; Bariche, 2010), *Pomacanthus imperator* (Bloch, 1787) (Israel, November 2009; Golani *et al.*, 2010) and *Holacanthus ciliaris* (Linnaeus, 1758) (Croatia, October 2011; Dulčić and Dragičević, 2013). Of these, only *P. maculosus* has so far managed to establish breeding populations (Salameh *et al.*, 2012) and this species reached the central Mediterranean in 2012 (Malta, December 2012; Evans *et al.*, 2016). Yet another marine angelfish, *Pomacanthus asfur* (Forsskål, 1775), was recently reported from Maltese waters, based on a single adult specimen caught in September 2015 (Deidun and Bonnici, 2016). This would make it the second non-indigenous pomacanthid recorded from the central Mediterranean, and the fourth from the entire basin. However, examination of the published images of this specimen suggests that it may have been misidentified, and more likely represents another record of *P. maculosus*.

RESULTS AND DISCUSSION

The ‘*P. asfur*’ specimen was not preserved and no morphometric measurements or meristic counts were taken (Deidun and Bonnici, 2016); thus, identification can only be based on features that are visible in the photographs of the individual collected. Several such characters can be used to differentiate between adult *P. asfur* and *P. maculosus* (Tab. I). These are clearly visible in images of the two species available on Fishbase (Froese and Pauly, 2016; see Fig. 1A, B), and confirm that the angelfish recorded by Bariche (2010), Salameh *et al.* (2012) and Evans *et al.* (2016; see Fig. 1C) were indeed *P. maculosus*. Although Deidun and Bonnici (2016) indicate that the livery of their specimen is consistent with the diagnostic one cited for adult *P. asfur*, most of the characteristics visible in the published images, including the body colour, presence of markings on the nape and forehead, and the position and extent of the yellow bar (Fig. 1D), indicate that this is a misidentification of *P. maculosus*. Therefore, the pomacanthid caught in Maltese waters in September 2015 represents the second individual of *P. maculosus* recorded from Malta, while to date *P. asfur* has not yet been introduced into the Mediterranean Sea.

This is by no means the first alien species to have been misidentified and there are several examples of other alien fish that were originally misidentified in their first Mediterranean Sea records, including *Apogonichthyoides pharaonis* (Bellotti, 1874), *Arius parkii* (Günther, 1864), *Chaunax suttkusi* Caruso, 1989, *Dussumieria elopsoidea* Bleeker, 1849, *Epinephelus coioides* (Hamilton, 1822), *Hemiramphus far* (Forsskål, 1775), *Hyporhamphus affinis* (Günther, 1866), *Nemipterus randalli* Russell, 1986, *Oxyurichthys petersi* (Klunzinger, 1871), *Pempheris rhomboidea* Cuvier, 1829, *Solea senegalensis* Kaup, 1858, *Sorsogona prionota* (Sauvage, 1873), *Tylosurus chorum* (Rüppell, 1837) and *Upeneus moluccensis* (Bleeker, 1855) (see Golani *et al.*, 2013, and references therein). Consequently, the reliable identification of non-indigenous species has been included amongst the top issues relating to management of marine alien species in Europe (Ojaveer *et al.*, 2014).

While Ojaveer *et al.* (2014) highlight the problem of loss of taxonomic expertise, new records can also present fertile ground for misidentifications, especially when there is an incentive for hasty publication to claim the first record for a country or region. We therefore urge authors to exer-

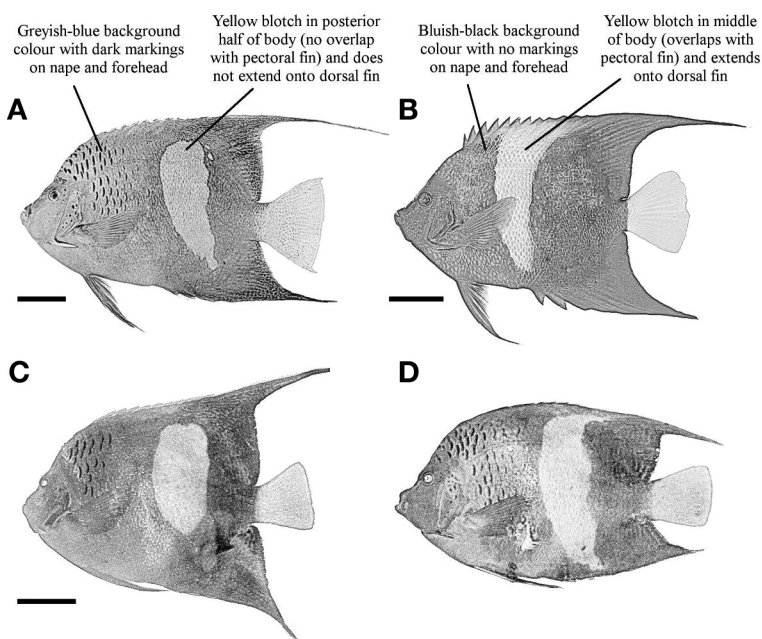
Table I. – Distinguishing features of *Pomacanthus asfur* and *P. maculosus* that can be used to identify these species on the basis of photographs (based on Sommer *et al.*, 1996; Allen *et al.*, 1998).

Feature	<i>Pomacanthus asfur</i>	<i>Pomacanthus maculosus</i>
Background body colour	Head black, anterior part of body dark blue, posterior part bluish-black	Greyish violet-blue, head and anterior part slightly lighter than posterior part
Scales on forehead and nape	Uniformly dark, do not form any obvious markings on body	Lighter scales with dark edges, resulting in series of dark curved markings
Position of yellow blotch/bar	Middle of body (anterior part overlaps pectoral fin), extends onto dorsal fin	Posterior half of body (no overlap with pectoral fin), does not extend onto dorsal fin
Caudal fin colour	Solid bright yellow	Translucent yellowish-grey

(1) Department of Biology, University of Malta, Msida MSD2080, Malta. [julian.evans@um.edu.mt]

* Corresponding author [patrick.j.schembri@um.edu.mt]

Figure 1. – Images of specimens of *Pomacanthus* showing main identification features; images are purposely drawn to the same scale. **A:** *P. maculosus*, based on photograph of specimen from Bahrain by J.E. Randall, available on FishBase; **B:** *P. asfur*, based on photograph of specimen from Sudan by J.E. Randall, available on Fishbase; **C:** *P. maculosus*, based on photograph of specimen from Malta by S. Farrugia (see Evans *et al.*, 2016); **D:** Specimen from Malta identified as *P. asfur* by Deidun and Bonnici (2016), based on photograph by C. Bonnici. The characteristics of the two specimens from Malta, including the body colour, presence of markings on the nape and forehead, and the position and extent of the yellow bar, match those of *P. maculosus*. Scale bars: 50 mm. For specimen (D), no indication of size was provided by Deidun and Bonnici (2016).



cise caution and check their identifications carefully, since once a new record is published and the species is included in databases, it is difficult to correct the error. For instance, we have recently highlighted that records of the alga *Asparagopsis armata*, the crab *Callinectes sapidus*, and the rabbitfish *Siganus rivulatus* Forsskål & Niebuhr, 1775 from Malta were all made in error (see Schembri *et al.*, 2012; Evans and Schembri, 2015; Evans *et al.*, 2015), yet all three species still appear as occurring in Malta in the EASIN database (Katsanevakis *et al.*, 2012). Such inventories are often used as the main source of information on the spatial distribution, introduction and dispersal pathways, and on impacts of non-indigenous species, as well as for analyses of species traits related to the ecology of successful establishment and invasiveness; however, the utility of databases for such studies is entirely dependent on the quality of the underlying data. The inclusion of erroneous identifications will lead to misleading results when workers use the information from databases at face value.

REFERENCES

- ALLEN G.R., STEENE R. & ALLEN M., 1998. – A Guide to Angelfishes and Butterflyfishes. 250 p. Perth, Australia: Odyssey Publishing / Tropical Reef Research.
- BARICHE M., 2010. – First record of the angelfish *Pomacanthus maculosus* (Teleostei: Pomacanthidae) in the Mediterranean. *Aqua Int. J. Ichthyol.*, 16(1): 31-33.
- DEIDUN A. & BONNICI C., 2016. – Yet another first for Malta... First record of the Arabian angelfish *Pomacanthus asfur* (Forsskål, 1775) from the Mediterranean. In: New Mediterranean Marine Biodiversity Records (March 2016). *Medit. Mer. Sci.*, 17(1): 230-252.
- DULČIĆ J. & DRAGIČEVIĆ B., 2013. – *Holacanthus ciliaris* (Linnaeus, 1758) (Teleostei: Pomacanthidae), first record from the Mediterranean Sea. *J. Appl. Ichthyol.*, 29: 465-467.
- EVANS J. & SCHEMBRI P.J., 2015. – Re-assessing the occurrence of alien blue crabs: first formal record of *Portunus segnis* from Malta. In: New Mediterranean Marine Biodiversity Records (October 2015). *Medit. Mer. Sci.*, 16(3): 682-702.
- EVANS J., BARBARA J. & SCHEMBRI P.J., 2015. – Updated review of marine alien species and other 'newcomers' recorded from the Maltese Islands (Central Mediterranean). *Medit. Mar. Sci.*, 16(1): 225-244.
- EVANS J., ZAMMIT E. & SCHEMBRI P.J., 2016. – First record of the yellowbar angelfish *Pomacanthus maculosus* in the central Mediterranean (Maltese Islands). *J. Appl. Ichthyol.*, 32: 1226-1228.
- FROESE R. & PAULY D., 2016. – Fishbase. <http://www.fishbase.org>, version Jan. 2016. Accessed 26 Apr. 2016.
- GOLANI D., SALAMEH P. & SONIN O., 2010. – First record of the Emperor angelfish, *Pomacanthus imperator* (Teleostei: Pomacanthidae) and the second record of the spotbase burrfish *Cyclichthys spilostylus* (Teleostei: Diodontidae) in the Mediterranean. *Aquat. Invasions*, 5(Suppl. 1): S41-S43.
- GOLANI D., ORSI-RELINI L., MASSUTI E., QUIGNARD J.P., DULČIĆ J. & AZZURRO E., 2013. – CIESM Atlas of Exotic Fishes in the Mediterranean. Check-list of exotic species. Available from: <http://www.ciesm.org/atlas/appendix1.html>. Accessed 14 Oct. 2016.
- KATSANEVAKIS S., BOGUCARSKIS K., GATTO F., VANDEKERKHOVE J., DERIU I. & CARDOSO A.C., 2012. – Building the European Alien Species Information Network (EASIN): a novel approach for the exploration of distributed alien species data. *BioInvasions Rec.*, 1: 235-245.
- OJAVEER H., GALIL B.S., GOLLASCH S., MARCHINI A., MINCHIN D., OCCHIPINTI-AMBROGI A. & OLENIN S., 2014. – Identifying the top issues of marine invasive alien species in Europe. *Manage. Biol. Invasion.*, 5(2): 81-84.
- SALAMEH P., SONIN O., EDELIST D. & GOLANI D., 2012. – The first substantiated record of the yellowbar angelfish, *Pomacanthus maculosus* (Actinopterygii: Perciformes: Pomacanthidae) in the Mediterranean. *Acta Ichthyol. Piscat.*, 42(1): 73-74.
- SCHEMBRI P.J., DEIDUN A. & FALZON M.A., 2012. – One *Siganus* or two? On the occurrence of *Siganus luridus* and *Siganus rivulatus* in the Maltese Islands. *Mar. Biodivers. Rec.*, 5: e71.
- SOMMER C., SCHNEIDER W. & POUTIERS J.M., 1996. – FAO Species Identification Field Guide for Fishery Purposes. The Living Marine Resources of Somalia. 376 p. Rome, Italy: FAO.