ANNALES

Anali za istrske in mediteranske študije
Annali di Studi istriani e mediterranei
Annals for Istrian and Mediterranean Studies
Series Historia Naturalis, 36, 2026, 1

UDK 5 Annales, Ser. hist. nat., 36, 2026, 1, pp. 1-256, Koper 2026 ISSN1408-533X

UDK 5

ISSN 1408-533X
e-ISSN 2591-1783

ANNALES

Anali za istrske in mediteranske študije
Annali di Studi istriani e mediterranei
Annals for Istrian and Mediterranean Studies

Series Historia Naturalis, 36, 2026, 1

KOPER 2026

Anali za istrske in mediteranske študije - Annali di Studi istriani e mediterranei - Annals for Istrian and Mediterranean Studies

ISSN 1408-533X
e-ISSN 2591-1783

UDK 5

Letnik 36, leto 2026 številka 1

Izdajatelja/*Editori/Published by:*

Zgodovinsko društvo za južno Primorsko - Koper */ Società storica del Litorale - Capodistria*©
Inštitut IRRIS za raziskave, razvoj in strategije družbe, kulture in okolja */ Institute IRRIS for Research, Development and Strategies of Society, Culture and Environment / Istituto IRRIS di ricerca, sviluppo e strategie della società, cultura e ambiente*©

Sedež uredništva/*Sede della redazione/*
Address of Editorial Board:

Nacionalni inštitut za biologijo, Morska biološka postaja Piran / *Istituto nazionale di biologia, Stazione di biologia marina di Pirano / National Institute of Biology, Marine Biology Station Piran*
SI-6330 Piran /*Pirano*, Fornače/*Fornace* 41, tel.: +386 5 671 2900, fax +386 5 671 2901;
e-mail: annalesSHN@nib.si, *internet:* www.zdjp.si

Redakcija te številke je bila zaključena 20. 06. 2026.

Sofinancirajo/*Supporto finanziario/*
Financially supported by: Javna agencija za znanstveno-raziskovalno in inovacijsko dejavnost Republike Slovenije (ARIS)

Annales - Series Historia Naturalis izhaja dvakrat letno.

Naklada/*Tiratura/Circulation:* 300 izvodov/copie/copies

Revija Annales, Series Historia Naturalis je vključena v naslednje podatkovne baze / *La rivista Annales, series Historia Naturalis è inserita nei seguenti data base / Articles appearing in this journal are abstracted and indexed in:* BIOSIS-Zoological Record (UK); Aquatic Sciences and Fisheries Abstracts (ASFA); Elsevier B.V.: SCOPUS (NL); Directory of Open Access Journals (DOAJ).

ANNALES · Ser. hist. nat. · 36 · 2026 · 1

Anali za istrske in mediteranske študije - Annali di Studi istriani e mediterranei - Annals for Istrian and Mediterranean Studies

UDK 5 Letnik 36, Koper 2026, številka 1 ISSN 1408-53 3X
e-ISSN 2591-1783

VSEBINA / *INDICE GENERALE / CONTENTS*

received: 2025-11-10 DOI 10.19233/ASHN.2026.06

FIRST MEDITERRANEAN RECORD OF THE DIAGONAL BUTTERFLYFISH, *CHAETODON FASCIATUS* FORSSKÅL, 1775, REPORTED FROM SYRIAN WATERS

Chirine HUSSEIN & Amir IBRAHIM
Department of Fisheries Resources, High Institute of Marine Research‘ Lattakia University-Syria
e-mail: chirine.suleman.hossein@latakia-univ.edu.sy; Chirine.hussein475@gmail.com

Firas ALSHAWY
Faculty of Veterinary Medicine, AlFurat University-Syria

Mouina BADRAN & Rahaf ABO ASA
Department of Fisheries Resources, High Institute of Marine Research‘ Lattakia University-Syria

ABSTRACT

The present study reports the first occurrence of the diagonal butterflyfish, Chaetodon fasciatus*, in the Mediterranean Sea, based on a specimen recorded in Syrian waters. A single individual (145 mm total length) was caught on 25 October 2025 in the shallow waters off the coast of Latakia. The pathway of introduction of this species, which is native to the Red Sea and the Gulf of Aden, remains unclear and requires further investigation. The increasing number of non-indigenous fish species of Indo-Pacific/Red Sea origin recorded in the region highlights the need for a comprehensive strategy for marine biodiversity conservation.*

Key words: non-indigenous species, Lessepsian migration, *Chaetodon fasciatus*, Mediterranean Sea, Syria

PRIMA SEGNALAZIONE MEDITERRANEA DEL PESCE FARFALLA FASCIATO, *CHAETODON FASCIATUS* FORSSKÅL, 1775, DALLE ACQUE SIRIANE

SINTESI

Il presente studio riporta la prima segnalazione del pesce farfalla fasciato, Chaetodon fasciatus*, nel mare Mediterraneo, sulla base di un esemplare ritrovato nelle acque siriane. Un singolo individuo (145 mm di lunghezza totale) è stato catturato il 25 ottobre 2025 nelle acque poco profonde al largo della costa di Lattakia. La modalità di introduzione di questa specie, originaria del mar Rosso e del Golfo di Aden, rimane poco chiara e richiede ulteriori indagini. Il numero crescente di specie ittiche non indigene di origine indo-pacifica/mar Rosso registrate nella regione evidenzia la necessità di una strategia globale per la conservazione della biodiversità marina.*

Parole chiave: specie non indigene, migrazione lessepsiana, *Chaetodon fasciatus*, Mediterraneo, Siria

INTRODUCTION

The biological composition of the eastern Mediterranean is being altered through progressive settlement of non-indigenous species, a process that is enhanced by global climate change and anthropogenic activities (Khalil *et al.*, 2025). The primary introduction pathways of alien species include the Suez Canal (Lessepsian migration from the Red Sea), followed by maritime transport, aquaculture, and aquarium release (Zenetos *et al.*, 2016). While establishing populations and colonising their new habitats, newcomers often exhibit invasive behaviour (Cosentino & Caruso, 2025). Species of the family Chaetodontidae (Acanthuriformes), commonly known as the butterflyfish, are distributed in tropical and warm-temperate seas worldwide, but are primarily concentrated in the Indo-West Pacific, extending up to the Gulf of Aden and the Red Sea (Heemstra & Heemstra, 2022; Froese & Pauly, 2025). Members of this family are characterised by a compressed, deep body and a continuous dorsal fin, with a small, terminal, and protrusible mouth adapted for feeding on small invertebrates and coral polyps (Bellwood *et al.*, 2010). Most species display bright coloration, with many exhibiting distinctive patterns such as dark stripes or bands across the body, often accompanied by a dark eye-band and an eyespot on the dorsal fin (Fischer & Bianchi, 1984; Kelley *et al.*, 2013).

Previously, five species of Chaetodontidae, all non-indigenous, were recorded in the Mediterranean Sea. Four of these are native to the Red Sea – *Chaetodon auriga* Forsskål, 1775, *Chaetodon austriacus* Rüppell, 1836, *Chaetodon larvatus* Cuvier, 1831, and *Heniochus intermedius* Steindachner, 1893 (Kovačić *et al.*, 2021; Froese & Pauly, 2025) – while the fifth species, *Chaetodon hoefleri* Steindachner, 1881, naturally occurs in the eastern Atlantic (Ayari-Kliti, 2025). The species examined in the present study, the diagonal butterflyfish, *Chaetodon fasciatus* Forsskål, 1775, also known as the Red Sea raccoon butterflyfish, is a chaetodontid species distributed throughout the Red Sea, including the Gulfs of Suez, Aqaba, and Aden (Lieske & Myers, 1997; Golani & Fricke, 2018).

This study documents the finding of *C. fasciatus* in Syrian waters and represents the first record of the species in the entire Mediterranean Sea.

MATERIAL AND METHODS

On 25 October 2025, an individual of *C. fasciatus* was caught using a hook, at a depth between 5 and 15 m over a rocky substrate, in the waters off the city of Latakia, Syria (35°31′5.97″N, 35°42′48.57″E, Fig. 1). Morphometric measurements of length (to the nearest mm) and weight (to the nearest g) were recorded, and meristic counts were performed. The specimen was then photographed, preserved in 7% formaldehyde, and deposited as a reference sample (HIMR-2025-Chf) at the fisheries laboratory of the High Institute of Marine Research, Lattakia University (Lattakia, Syria). Species identification was conducted following Lieske & Myers (1997), Khalaf & Disi (1997), and Heemstra & Heemstra (2022).

RESULTS AND DISCUSSION

The specimen of *C. fasciatus* captured off the coast of Latakia (Fig. 2) measured 145 mm total length and weighed 62.8 g. It exhibited a deep, compressed body, a slightly narrow protrusible snout, large eyes, a continuous dorsal fin, and a rounded caudal fin. The dorsal and anal fins reached the base of the caudal peduncle. The fin formula of the specimen is: D, XII+25; P, 25; A, III+18; C, 16 (ventral fins were deteriorated) The ground colour was predominantly yellow, with a black patch

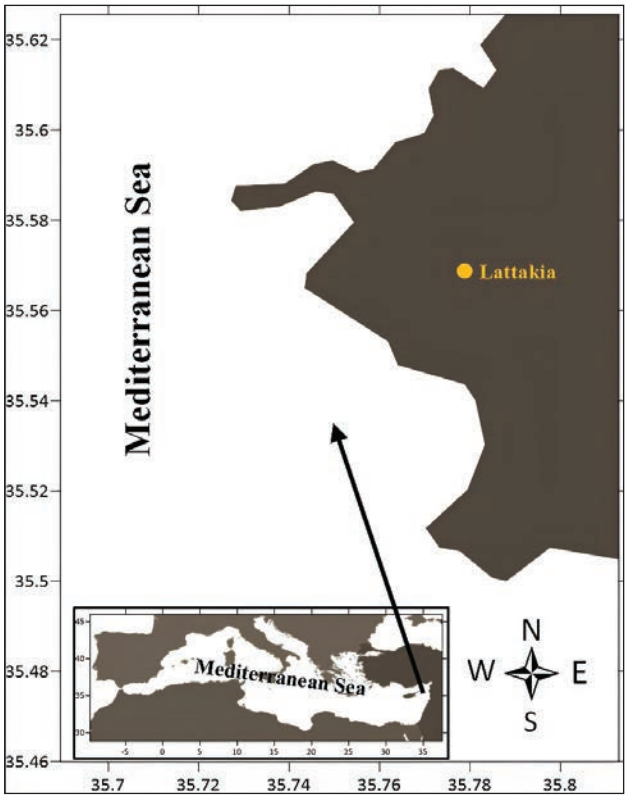

Fig. 1: Map showing the capture site of the *Chaetodon fasciatus* ***specimen collected off the coast of Latakia, Syria.***
Sl. 1: Zemljevid obravnavanega območja z lokaliteto ulova primerka vrste *Chaetodon fasciatus* ***ob obali Latakie, Sirija.***

Fig. 2: Specimen of** Chaetodon fasciatus **caught off the city of Latakia, Syria.
Sl. 2: Primerek vrste** Chaetodon fasciatus**, ujet v vodah ob mestu Latakia, Sirija.

covering the eyes and the anterior of the head, and a white patch above it. Additional markings included a black patch below the anterior portion of the dorsal fin, a dark line at the base of the dorsal fin, dark outer margins of the dorsal and anal fin spines, dark lines along the outer edges of the soft dorsal and anal fins, extending across the caudal fin, dark oblique lines on the body, oriented slightly backward and upward, with the uppermost line wider than the rest. A dark patch seemed to join the seven upper black oblique lines posteriorly. These morphological characteristics, measurements, and proportions (Tab. 1), as well as meristic counts were in agreement with those reported for *C. fasciatus* by Lieske & Myers (1997), Khalaf & Disi (1997), and Heemstra & Heemstra (2022). In particular, the distinctive colour pattern of the specimen from Syrian waters confirmed its identification as *C. fasciatus*, clearly distinguishing it from all other congeners from the Red Sea and the western Indian Ocean (Heemstra & Heemstra, 2022).

The finding of *C. fasciatus* in Syrian waters reported here represents the first record of this species in the Mediterranean Sea (Froese & Pauly, 2025). It is the third species of the family Chaetodontidae recorded in the coastal waters of Syria, after *C. larvatus* (Ali *et al.*, 2017) and *H. intermedius* (Ibrahim *et al.*, 2022; Saad *et al.*, 2022). This finding adds a new non-indigenous record to the already documented 82 fish species of Indo-Pacific/Red Sea origin (Saad *et al.*, 2022), as well as to the 50 non-indigenous fish species from neighbouring seas recorded in Syrian marine waters between 2018 and 2025. The vast majority of these species are believed to have arrived through the Suez Canal (Ibrahim *et al.*, 2025; Ibrahim *et al.*, 2026).

In its natural distribution range, *C. fasciatus* inhabits lagoons, fringing reefs, and coral reef flats at depths of up to approximately 25 m, usually in pairs, but occasionally also in aggregations of up to 15 individuals. Feeding on coral polyps, algae, and benthic invertebrates, *C. fasciatus* can grow to a maximum total length of 250 mm, through commonly reaching 150 mm (Heemstra & Heemstra, 2022; Froese & Pauly 2025).

Being our record based on a single specimen, it is unclear whether this represents a truly new and recent arrival. It is possible that the species was already present in the area, but remained undetected due to its scarcity, overlooked by fishermen because of its small size and low commercial value, or absent from fishery catches due to its preference for very shallow habitats, which limits encounters with commercial fishing gears.

The lack of natural environmental barriers that could limit migration from the Red Sea to the Mediterranean, combined with increased human commercial activity – especially following the Suez Canal expansion in 2015 – may have played a key role in facilitating the arrival

Tab 1: Morphometric measurements and their proportions (expressed as % of standard length) of *Chaetodon fasciatus* ***caught off Latakia coast, Syria.***
Tab. 1: Morfometrične meritve in deleži (izraženi kot % standardne dolžine) primerka vrste *Chaetodon fasciatus****, ujetega ob obali Latakie, Sirija.***

Characteristics	**Measurement (mm)**	**% SL**
Total length	145	
Standard length (SL)	117	
Body depth	95	81.2
Head length	33	28.2
Eye diameter	10	8.5
Snout length	8	6.8
Dorsal fin length	95	81.2
Pectoral fin length	30	25.6
Pelvic fin length	32	27.3
Caudal fin length	25	21.4
Anal fin length	50	42.7
Caudal peduncle distance	12	10.2
Distance before dorsal fin	47	40.1
Distance before pectoral fin	36	30.7
Distance before anal fin	85	72.6

of new Red Sea fish species in the basin (Ibrahim *et al.*, 2022). Nevertheless, as *C. fasciatus*, like many other chaetodontids, is a popular ornamental marine fish (Froese & Pauly, 2025), accidental aquarium release in the area cannot be ruled out.

As underlined above, the record documented in the present study is based on a single specimen. Therefore, the successful establishment of *C. fasciatus* in the area remains to be confirmed through additional records from nearby regions, which would also help clarify the species' introduction pathway. In any case, the presence of this tropical fish species in Syrian waters provides strong evidence that, due to climate change and sea warming, the eastern Mediterranean region currently exhibits environmental conditions suitable for tropical and warm-water fish species (Ibrahim *et al.*, 2020, 2022). This finding highlights the urgent need for monitoring biodiversity changes in the region to mitigate any negative impacts associated with such ecological shifts.

ACKNOWLEDGEMENTS

The work was supported by the Lattakia University, the High Institute for Marine Research and the High Commission for Scientific Research (Damascus), to whom the authors would like to express their gratitude.

PRVI SREDOZEMSKI ZAPIS O POJAVLJANJU POŠEVNOPROGASTE ŠČETINOZOBKE, *CHAETODON FASCIATUS* FORSSKÅL, 1775, IZ SIRSKIH VODA

Chirine HUSSEIN & Amir IBRAHIM
Department of Fisheries Resources, High Institute of Marine Research‘ Lattakia University-Syria
e-mail: chirine.suleman.hossein@latakia-univ.edu.sy; Chirine.hussein475@gmail.com

Firas ALSHAWY
Faculty of Veterinary Medicine, AlFurat University-Syria

Mouina BADRAN & Rahaf ABO ASA
Department of Fisheries Resources, High Institute of Marine Research‘ Lattakia University-Syria

POVZETEK

Avtorji poročajo o prvem pojavljanju poševnoprogaste ščetinozobke, Chaetodon fasciatus*, v Sredozemskem morju na podlagi primerka, zabeleženega v sirskih vodah. Primerek (skupne dolžine 145 mm) je bil ujet 25. oktobra 2025 v plitvini ob obali Latakie. Način pojava te vrste, ki je samonikla v Rdečem morju in Adenskem zalivu, ostaja nejasna in zahteva nadaljnje raziskave. Naraščajoče število tujerodnih vrst rib indopacifiškega/rdečemorskega izvora, zabeleženih v regiji, narekuje potrebo po celoviti strategiji za ohranjanje morske biotske raznovrstnosti.*

Ključne besede: tujerodne vrste, lesepska selitev, *Chaetodon fasciatus*, Sredozemsko morje, Sirija

REFERENCES

Ali, M., A. Saad, A. Solimn, S. Rafrafi-Nouira & C. Capape (2017): Confirmed occurrence in the Mediterranean Sea of Red Sea orange face butterflyfish *Chaetodon larvatus* (Osteichthyes: Chaetodontidae) and first record from the Syrian coast. Cah. Biol. Mar., 58,367–369.

Ayari-Kliti, R. (2025): Evidence on the presence of the butterflyfish *Chaetodon hoefleri* Steindachner, 1881 (Perciformes: Chaetodontidae) in the Mediterranean Sea. INSTM Bull. Mar. Freshw. Sci., 50, 6–10.

Bellwood, D., S. Klanten, P. Cowman, M. Pratchett, N. Konow & L. Van Herwerden (2010): Evolutionary history of the butterflyfishes (f: Chaetodontidae) and the rise of coral feeding fishes. J. Evol. Biol., 23, 335–349.

Cosentino, C. & A .Caruso (2025): The Progressive Colonization of the Invasive Species *Amphistegina lobifera* on Pantelleria Island (Central Mediterranean, Sicily Channel). Biology, 14(9), 1282.

Fischer, W. & G. Bianchi (1984): FAO species identification sheets for fishery purposes: Western Indian Ocean (Fishing Area 51). Vol. 1: Introductory material. Bony fishes, families: Acanthuridae to Clupeidae. FAO, Rome, Italy,

Froese, R. & D. Pauly (2025): FishBase. World Wide Web electronic publication. www.fishbase.org, version (04/2025) (Accessed on 20-10-2025)

Golani, D. & R. Fricke (2018): Checklist of the Red Sea Fishes with delineation of the Gulf of Suez, Gulf of Aqaba, endemism and Lessepsian migrants. Zootaxa, 4509, 1–215.

Heemstra, P.C. & E. Heemstra (2022): Family Chaetodontidae. In: Heemstra P.C., E. Heemstra, D. Ebert, W. Holleman & J.E. Randall (eds.), Coastal Fishes of the Western Indian Ocean. Vol. 3 Text and Plates. South African Institute for Aquatic Biodiversity, Private bag 1015, Makhanda, South Africa, pp. 443–469 and Plates 154 to 158.

Ibrahim, A., F. Alshawy & C. Hussein (2020): Confirmation records and new distribution of the red cornet fish *Fistularia petimba* Lacepède, 1803 (Actinopterygii: Fistulariidae) in the Syrian Marine Waters (Eastern Mediterranean). Species, 21(67),95-100.

Ibrahim, A., C. Hussein, F. Alshawy, M. Badran, W. Ghanem, A. Ahmad & A. Saleh (2022): First Record of the Red Sea Bannerfish *Heniochus intermedius* Steindachner, 1893, (Chaetodontidae) in the Syrian Marine Waters (Eastern Mediterranean). Species, 23(72),459–463.

Ibrahim, A., C. Hussein, F. Alshawy & A.A. Ahmad (2025): Marine Fishes (Teleostei/Osteichthyes) of Syria (Eastern Mediterranean): An Updated Checklist. Annales, Ser. Hist. Nat., 35(2), 269–284.

Kelley, J.L., J.L. Fitzpatrick & S. Merilaita (2013): Spots and stripes: ecology and colour pattern evolution in butterflyfishes. Proc Biol Sci., 280(1757), 20122730. doi: 10.1098/rspb.2012.2730.

Khalaf, M.A. & A.M. Disi (1997): Fishes of the Gulf of Aqaba. Marine Science Station, Aqaba, Jordan, 252 pp.

Khalil, M.T., A.B. Mostafa & M.M. El-Naggar (2025): Climate Change and Lessepsian Migration to the Mediterranean Sea. In: Khalil, M.T., Emam, W.W.M., Negm, A. (eds): Climate Changes Impacts on Aquatic Environment. Earth and Environmental Sciences Library. Springer, Cham. https://doi.org/10.1007/978-3-031-74897-4_4.

Kovačić, M., L. Lipej, J. Dulčić, S.P. Iglesias & M. Goren (2021): Evidence-based checklist of the Mediterranean Sea fishes. Zootaxa, 4998(1), 1–115.

Lieske, E. & R.F. Myers (1997): Coral reef fishes: Caribbean, Indian ocean and Pacific ocean including the Red Sea. Princeton, New Jersey, 400 pp.

Saad, A., M. Masri, A. Soliman, & L. Khrema (2022): First occurrence of *Heniochus intermedius* Steindachner, 1893 in the Syrian marine waters (Levantine Basin). Asian Journal of Fisheries and Aquatic Research, 19(5), 14–18.

Zenetos, A., G. Apostolopoulos & F. Crocetta (2016): Aquaria kept marine fish species possibly released in the Mediterranean Sea: first confirmation of intentional release in the wild. Acta Ichthyol. Pisc., 46, 255–262.