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VSEBINA / INDICE GENERALE / CONTENTS 2022(1)

SREDOZEMSKI MORSKI PSI
SQUALI MEDITERRANEI
MEDITERRANEAN SHARKS**Farid HEMIDA, Christian REYNAUD & Christian CAPAPÉ**

Observations on Thresher Shark, *Alopias vulpinus* (Chondrichthyes: Alopiidae) from the Coast of Algeria (Southwestern Mediterranean Sea) 1
Opazovanja morskih lisic, Alopias vulpinus (Chondrichthyes: Alopiidae) ob alžirski obali (jugozahodno Sredozemsko morje)

Elif ÖZGÜR ÖZBEK & Hakan KABASAKAL

Notes on Smoothback Angel Shark, *Squatina oculata* (Squatiniformes: Squatinidae) caught in the Gulf of Antalya 9
Zapis o pegastih sklatih, Squatina oculata (Squatiniformes: Squatinidae), ujetih v Antalijskem zalivu

Alessandro PAGANO & Alessandro DE MADDALENA

Underwater Observations of the Rare Angular Roughshark *Oxynotus centrina* (Chondrichthyes: Squalidae) in the Waters of Santa Tecla (Sicily, Italy) 17
Podvodna opazovanja redkega morskega pršiča, Oxynotus centrina (Chondrichthyes: Squalidae) v vodah Sante Tecle (Sicilija, Italija)

Deniz ERGÜDEN, Deniz AYAS & Hakan KABASAKAL

Morphometric Measurements of Three Young Carcharhinid Species from Northeastern Levant (Mediterranean Sea) 25
Morfometrične meritve mladičev treh vrst morskih psov iz družine Carcharhinidae iz severnovzhodnega Levanta (Sredozemsko morje)

Hakan KABASAKAL

Projections on the Future of Deep-Sea Sharks in the Sea of Marmara, Where Deep Zones Are Threatened by Deoxygenation: a Review 35
Napovedi o prihodnosti globomorskih morskih psov v Marmarskem morju, ogroženem zaradi pomanjkanja kisika: pregled

BIOINVAZIJA

BIOINVASIONE
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Alan DEIDUN, Bruno ZAVA & Maria CORSINI-FOKA

Distribution Extension of *Lutjanus argentimaculatus* (Lutjanidae) and *Psenes pellucidus* (Nomeidae) to the Waters of Malta, Central Mediterranean Sea 49
Širjenje areala vrst Lutjanus argentimaculatus (Lutjanidae) in Psenes pellucidus (Nomeidae) v malteške vode (osrednje Sredozemsko morje)

Sami M. IBRAHIM, Abdulraziq A. ABDULRRAZIQ, Abdulghani ABDULGHANI, Sara A.A. AL MABRUK, David SALVATORI, Bruno ZAVA, Maria CORSINI-FOKA & Alan DEIDUN

First Record of *Enchelycore anatina* (Muraenidae) from Libyan Waters and an Additional Record from Southern Italy (Western Ionian Sea) 59
Prvi zapis o pojavljanju kavljezobe murene Enchelycore anatina (Muraenidae) iz libijskih voda in dodatni zapis za južno Italijo (zahodno Jonsko morje)

Rasha Ali HENEISH & Samir Ibrahim RIZKALLA Morphometric and Meristic Characteristics of a New Record of Bluespot Mullet <i>Crenimugil seheli</i> (Pisces: Mugilidae) in Egyptian Mediterranean waters	67	Deniz ERGÜDEN & Cemal TURAN A Rare Occurrence of <i>Carapus acus</i> (Carapidae) in the Eastern Mediterranean, Turkey <i>Redko pojavljanje strmorinca Carapus acus (Carapidae) v vzhodnem Sredozemskem morju (Turčija)</i>	113
<i>Novi zapis o pojavljanju vrste Crenimugil seheli (Pisces: Mugilidae) v egiptovskih sredozemskih vodah in njene morfometrične in meristične značilnosti</i>			
Yana SOLIMAN, Adib SAAD, Vienna HAMMOUD & Christian CAPAPÉ Heavy Metal Concentrations in Tissues of <i>Siganus rivulatus</i> (Siganidae) from the Syrian Coast (Eastern Mediterranean Sea)	75	Laith JAWAD, Murat ŞIRİN, Miloslav PETRTÝL, Ahmet ÖKTENER, Murat ÇELIK & Audai QASIM Skeletal Abnormalities in Four Fish Species Collected from the Sea of Marmara, Turkey	119
<i>Vsebnost težkih kovin v tkivih marmoriranega morskega kunca Siganus rivulatus (Siganidae) iz sirske obale (vzhodno Sredozemsko morje)</i>		<i>Skeletne anomalije pri štirih vrstah rib iz Marmarskega morja (Turčija)</i>	
IHTIOLOGIJA ITTOLOGIA ICHTHYOLOGY			
Jihade ALAHYENE, Brahim CHIAHOU, Hammou EL HABOUZ & Abdelbasset BEN-BANI Length Based Growth Estimation of the Blue Shark <i>Prionace glauca</i> from the Moroccan Central Atlantic Coast	85	RAZMNÖŽEVALNA EKOLOGIJA ECOLOGIA RIPRODUTTIVA REPRODUCTIVE ECOLOGY	
<i>Dolžinsko-masni odnos in ocena rasti pri sinjem morskem psu (Prionace glauca) iz osrednje atlantske obale Maroka</i>			
Okan AKYOL, Altan LÖK & Funda ERDEM Occurrence of <i>Cubiceps gracilis</i> (Nomeidae) in the Eastern Mediterranean Sea	101	Amaria Latefa BOUZIANI, Khaled RAHMANI, Samira AIT DARNA, Alae Eddine BELMAHI, Sihem ABID KACHOUR & Mohamed BOUDERBALA Gonadal Histology in <i>Diplodus vulgaris</i> from the West Algerian Coast	137
<i>Pojavljanje klateža, Cubiceps gracilis (Nomeidae), v vzhodnem Sredozemskem morju</i>		<i>Histologija gonad pri navadnem šparu (Diplodus vulgaris) iz zahodne alžirske obale</i>	
Farid HEMIDA, Boualem BRAHMI, Christian REYNAUD & Christian CAPAPÉ Occurrence of the Rare Driftfish <i>Cubiceps gracilis</i> (Nomeidae) from the Algerian Coast (Southwestern Mediterranean Sea)	107	Cheikhna Yero GANDEGA, Nassima EL OMRANI, Rezan O. RASHEED, Mohammed RAMDANI & Roger FLOWER The Growth and Reproduction of Two Sparidae, <i>Pagrus caeruleostictus</i> and <i>Pagellus bellottii</i> in Northern Mauritanian Waters (Eastern Tropical Atlantic)	143
<i>Pojavljanje redkega klazeža Cubiceps gracilis (Nomeidae) z alžirske obale (jugozahodno Sredozemsko morje)</i>		<i>Rast in razmnoževanje dveh vrst pagrov, Pagrus caeruleostictus in Pagellus bellottii v severnih mavretanskih vodah (vzhodni tropski Atlantik)</i>	
Nassima EL OMRANI, Hammou EL HABO-UZ, Abdellah BOUHAIMI, Jaouad ABOU OUALID, Abdellatif MOUKRIM, Jamila GOZOULI, Mohammed RAMDANI, Roger FLOWER & Abdelbasset BEN-BANI The Reproductive Biology of the Pouting <i>Trisopterus luscus</i> from the Atlantic Coast of Morocco			
		<i>Reproduktivna biologija francoskega moliča (Trisopterus luscus) iz atlantske obale Maroka</i>	155

Mourad CHÉRIF, Rimel BENMESSAOUD & Christian CAPAPÉ

- Growth Patterns and Age Structure of *Mullus surmuletus* (Mullidae) from the Northern Coast of Tunisia (Central Mediterranean Sea) 173
Rastni parametri in starostna struktura progasti bradačev Mullus surmuletus (Mullidae) iz severne tunizijske obale (osrednje Sredozemsko morje)

FLORA
 FLORA
 FLORA

Martina ORLANDO-BONACA, Erik LIPEJ, Romina BONACA & Leon Lojze ZAMUDA

- Improvement of the Ecological Status of the *Cymodocea nodosa* Meadow near the Port of Koper 185
*Izboljšanje ekološkega stanja morskega travnika kolenčaste cimodoceje (*Cymodocea nodosa*) v bližini koprskega pristanišča*

FAVNA
 FAVNA
 FAVNA

Manja ROGELJA, Martin VODOPIVEC & Alenka MALEJ

- Cestum veneris* Lesueur, 1813 (Ctenophora) – a Rare Guest in the Northern Adriatic Sea 197
Cestum veneris Lesueur, 1813 (Ctenophora) – redenk gost v severnem Jadranu

Adla KAHRić, Dalila DELIĆ & Dejan KULIJER

- Notospermus annulatus* (Nemertea: Lineidae), a New Record for Bosnia and Herzegovina 205
Notospermus annulatus (Nemertea: Lineidae), prvi zapis o pojavljanju za Bosno in Hercegovino

Andrea LOMBARDO & Giuliana MARLETTA

- Report of an Interesting *Trapania* (Gastropoda: Nudibranchia: Goniodorididae) Specimen from Central Eastern Sicily 211
Zapis o zanimivem primerku iz rodu Trapania (Gastropoda: Nudibranchia: Goniodorididae) iz osrednje vzhodne Sicilije

Abdelkarim DERBALI & Othman JARBOUI

- Stock Assessment, Cartography and Sexuality of the Wedge Clam *Donax trunculus* in the Gulf of Gabes (Tunisia) 217
Ocena staleža, kartografija in spolnost klinaste školjke Donax trunculus v gabeškem zalivu (Tunizija)

Abdelkarim DERBALI, Aymen HADJ TAIEB & Othman JARBOUI

- Length-Weight Relationships and Density of Bivalve Species in the Shellfish Production Area of Zarzis (Tunisia, Central Mediterranean Sea) 229
Dolžinsko-masni odnos in gostota školjk na gojišču školjk v predelu Zarsisa (Tunizija, osrednje Sredozemsko morje)

Toni KOREN

- The Diversity of Moths (Lepidoptera: Heterocera) of Significant Landscape Donji Kamenjak and Medulin Archipelago, Istria, Croatia 237
Raznolikost nočnih metuljev (Lepidoptera: Heterocera) Pomembne pokrajine Donji Kamenjak in Medulinski arhipelag, Istra, Hrvaška

OCENE IN PEROČILA
 RECENSIONI E RELAZIONI
 REVIEWS AND REPORTS

Ines Mandić Mulec & Nives Ogrinc

- Recenzija knjige: Mikrobična biogeokemijska voda 263
 Kazalo k slikam na ovtiku 265
Index to images on the cover 265

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DISTRIBUTION EXTENSION OF *LUTJANUS ARGENTIMACULATUS* (LUTJANIDAE) AND *PSENES PELLUCIDUS* (NOMEIDAE) TO THE WATERS OF MALTA, CENTRAL MEDITERRANEAN SEA

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ABSTRACT

The recent first findings of the Lessepsian migrant Lutjanus argentimaculatus (Forsskål, 1775) and of the Atlantic range-expanding Psenes pellucidus Lütken, 1880 in the waters of Malta, central Mediterranean, are described. The current distribution in the basin of these two fish species is briefly discussed.

Key words: Non-Indigenous species, Lessepsian migration, range-expanding species, Mediterranean Sea, citizen science

ESPANSIONE DELLA DISTRIBUZIONE DI *LUTJANUS ARGENTIMACULATUS* (LUTJANIDAE) E DI *PSENES PELLUCIDUS* (NOMEIDAE) VERSO LE ACQUE DI MALTA, MEDITERRANEO CENTRALE

SINTESI

Nell'articolo vengono segnalati i primi recenti ritrovamenti nelle acque di Malta, Mediterraneo centrale, del migrante lessepsiano Lutjanus argentimaculatus (Forsskål, 1775) e di Psenes pellucidus Lütken, 1880, una specie di origine atlantica, il cui areale è in espansione. L'attuale distribuzione di queste due specie nel bacino è brevemente discussa.

Parole chiave: Specie non-indigene, migrazione Lessepsiana, specie di origine atlantica in espansione, Mediterraneo, citizen science

INTRODUCTION

In the Mediterranean Sea, most of the Non-Indigenous Species (NIS) of fishes are of Indo-Pacific origin, introduced via the Suez Canal (Lessepsian migrants); other species, of diverse origins, have entered into the basin via human-mediated activities (ship-transport, mariculture, aquarium trade) (Golani *et al.*, 2021). Furthermore, a number of fishes of Atlantic origin, named range-expanding, newcomers, neonative species, entered naturally

into the basin through the Strait of Gibraltar (Evans *et al.*, 2020).

Four species of Lutjanidae have been detected in the Mediterranean, *Lutjanus argentimaculatus* (Forsskål, 1775), *Lutjanus fulviflamma* (Forsskål, 1775), and *Lutjanus sebae* (Cuvier, 1816), all native to the Red Sea and the Indo-West Pacific (Vella *et al.*, 2015; Deidun & Piraino, 2017; Golani & Fricke, 2018; Akyol, 2019) and *Lutjanus jocu* (Bloch & Schneider, 1801) originating from the western and eastern Atlantic (Vacchi *et al.*, 2010).

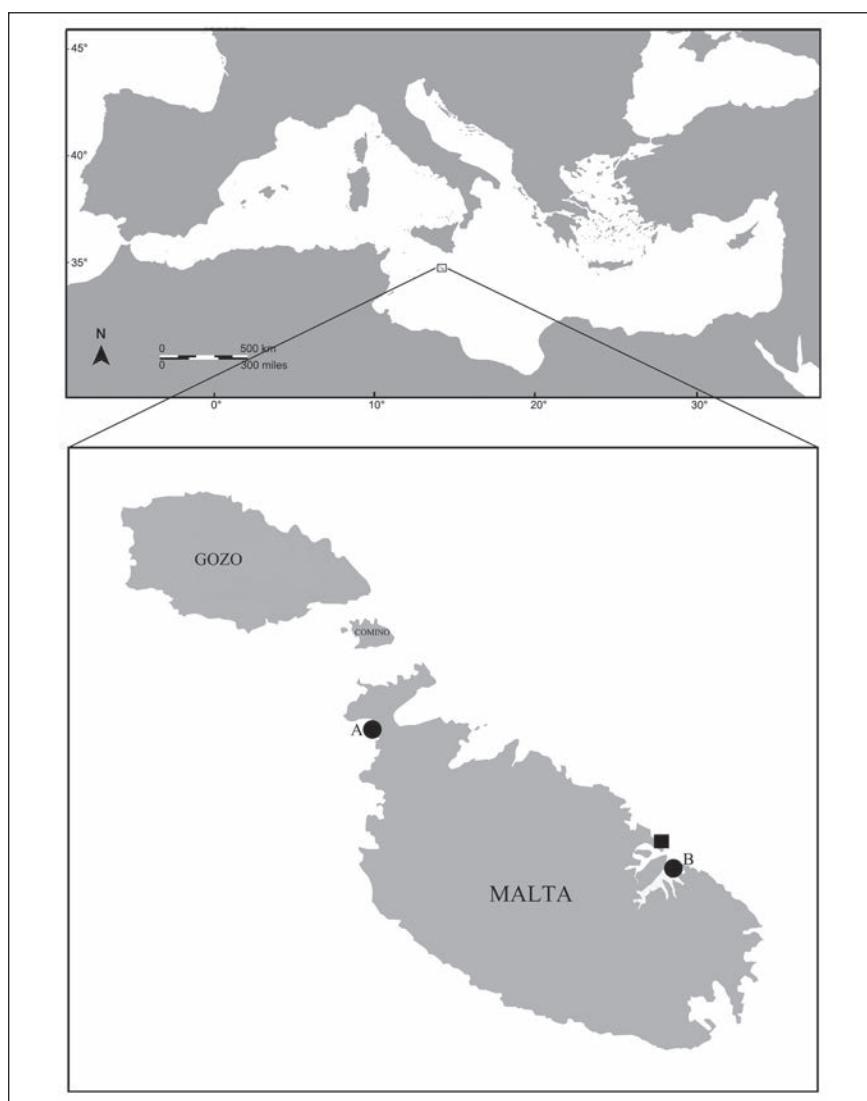


Fig. 1: Maps of the Mediterranean Sea and the Malta Archipelago, showing the finding locations of *Lutjanus argentimaculatus* at Sliema (square), and *Psenes pellucidus* at Anchor Bay (A) and Grand Harbour, Valletta (B), in Malta Island (circle).
Sl. 1: Zemljevid Sredozemskega morja in malteškega arhipelaga z označenimi lokalitetami na Malti, kjer sta bili najdeni vrsti *Lutjanus argentimaculatus* na lokaliteti Sliema (kvadrat) in *Psenes pellucidus* na lokalitetah Anchor Bay (A) in Grand Harbour, Valletta (B) (krog).



Fig. 2: *Lutjanus argentimaculatus* spearfished in Malta (photo: R. Mizzi).

Sl. 2: *Lutjanus argentimaculatus* ulovljen s podvodno puško na Malti (foto: R. Mizzi).

According to Kovačić et al. (2021), the family Nomeidae is represented in the Mediterranean by *Cubiceps capensis* (Smith, 1845), *Cubiceps gracilis* (Lowe, 1843) and *Psenes pellucidus* Lütken, 1880, all circumglobal species in warm and temperate seas. Among the above named nomeids, the latter one, *P. pellucidus*, is generally considered as a recent, naturally range-expanding species from the Atlantic (Evans et al., 2020; Golani et al., 2021).

The first findings of the Indo-Pacific NIS *L. argentimaculatus* and of the Atlantic range-expanding *P. pellucidus* in the waters of the island of Malta are described and the distribution of their records in the Mediterranean is briefly discussed.

MATERIAL AND METHODS

Photographic material and capture data of fishes were obtained from the "Spot the Alien" platform, a citizen science campaign implemented since 2017 by the Oceanography Malta Research Group within the Department of Geosciences at the University of Malta.

On 12 January 2021 a specimen of the Man-grove red snapper *Lutjanus argentimaculatus*, 43.0 cm of total length, weighing 1.63 kg, was speared at Sliema (Malta) ($35.911958^{\circ}\text{N}$, $14.509129^{\circ}\text{E}$) at 12 m of depth (Fig. 1). The sample was not preserved.

On 13 February 2022 a small specimen of the Bluefin driftfish *Psenes pellucidus*, approximately 50 mm in total length (TL) (specimen A), was collected at Anchor Bay, Malta ($35.959923^{\circ}\text{N}$, $14.340031^{\circ}\text{E}$) (Fig. 1) from the shore with a hand-net, next to a specimen of *Pelagia noctiluca*. The sample was photographed alive and released, while another similar individual (about 100 mm in length) was only observed. On 12 March 2022, a second small specimen (specimen B), about 40 mm in total length, was collected at the Grand Harbour, Valletta, Malta ($35.893415^{\circ}\text{N}$, $14.525980^{\circ}\text{E}$) (Fig. 1) from the shore through rod-fishing, using common shrimps as bait, at an estimated depth of 4-5 m. The specimen was photographed, but not collected. It is to be stressed that a large-scale bloom of jellyfish, primarily consisting of salps, *P. noctiluca* and of ctenophores, has been observed in the waters of Malta since December 2021 (AD, personal observation).

RESULTS

Lutjanus argentimaculatus (Forsskål, 1775)

The specimen was identified as *L. argentimaculatus* following Allen (1985) and Anderson & Allen (2001), on the basis of the available photo (Fig. 2): body moderately deep, pointed snout and terminal mouth, a notch in the lower margin of the oper-

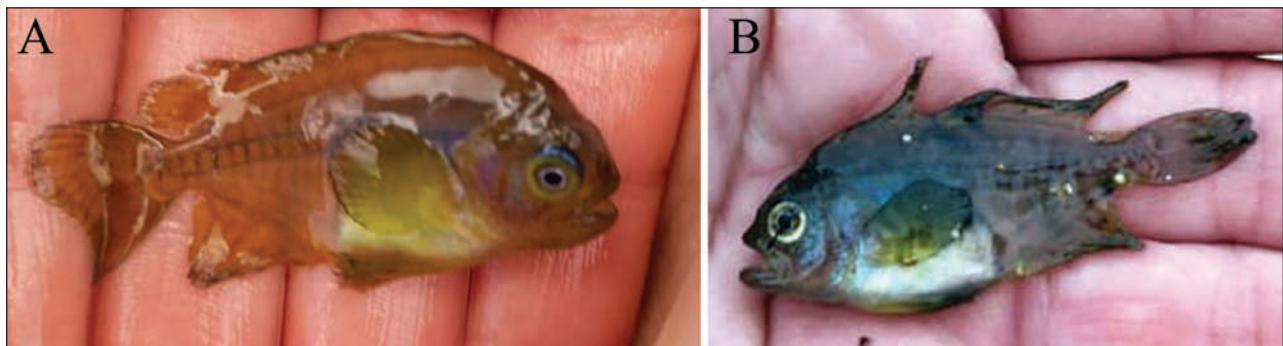


Fig. 3: Juveniles of *Psenes pellucidus* from Malta. A: live specimen collected in February 2022 (photo: A. Misfud), B: specimen collected in March 2022 (photo: M. Etienne).
Sl. 3: Mladostni primerki vrste *Psenes pellucidus* iz Malte. A: živi primerek, ulovljen februarja 2022 (foto: A. Misfud), B: ujeti primerek iz marca 2022 (foto: M. Etienne).

culum, scale rows on back parallel to lateral line, apart the last rows rising obliquely posteriorly under the end of soft dorsal, caudal fin nearly truncate. Colour: body reddish, darker on back and sides, lighter on belly; silver shadings are visible; dorsal and anal fins dusky brownish, caudal fin dusky brownish with the outer margin paler, pectoral and pelvic fins reddish.

Psenes pellucidus Lütken, 1880

The fishes were identified as juveniles of *P. pellucidus* on the basis of the photos available (Fig. 3A, B), following Lütken (1880), Haedrich (1967), Ahlstrom et al. (1976), Costa (1999), Lamkin (2005), Fahay (2007), Hata & Motomura (2017), Cabebe & Motomura (2019) and Bray (2020). The body of the *P. pellucidus* juveniles (Fig. 3A, B) appears moderately high and compressed with a flabby consistence; the head shows a concavity over the eye; two dorsal fins, the origin of the first over the posterior end of the gill opening, the origin of the second over the end of the upper margin of the pectoral fin; the posterior end of the dorsal fin base is located just above the posterior end of the anal fin base; the pectoral fin has round margin, the upper origin of its base is under the posterior end of the gill opening; the caudal fin is lightly emarginated, with rounded lobes; the pelvic fin origin is under the pectoral fin base. Anal fin appears high. The mouth is small, with the upper jaw ending about below the middle of the lower margin of the eye. As observed by the persons who collected the specimens, the fishes were almost transparent, acquiring, during photography, a reddish translucent coloration in specimen A, alive (Fig. 3A) and a bluish-violet translucent colouration in specimen B, dead (Fig. 3B). The ventral part, between pectoral and

pelvic fins, appears whitish, not translucent; a bluish curved shadow from the upper gill opening to the origin of anal fin is visible in the live specimen (Fig. 3A); the pectoral fin is prevalently golden; the outer margin of dorsal, anal, pelvic and caudal fins appears darker than the remaining fin; the iris appears silvery around the crystalline, with a posterior darker shadow, then golden with a lunate dark blue band at the superior margin (Fig. 3A). From Fig. 3A it was possible to obtain a limited number of approximate ratios: head length 34.9, pectoral fin length 28.5, body depth 43.4, caudal peduncle height 7.4, eye diameter 10.8, maxillary length 13.1, all expressed as % of standard length.

DISCUSSION

The description of the *Lutjanus argentimaculatus* specimen from Malta was in agreement with that provided by Allen (1985) and Anderson & Allen (2001) for the species.

The mangrove red snapper *L. argentimaculatus* is a large fish of a common size to 80 cm (maximum 120 cm), with a wide Indo-West Pacific distribution extending from the Red Sea and eastern Africa to Australia and Samoa (Allen, 1985; Sonin et al., 2019; Golani et al., 2021). It was first recorded in the Mediterranean by Mouneimné (1979) from Lebanon, considered to have been introduced via the Suez Canal (Lessepsian migrant) (Golani & Fricke, 2018). A second record was reported again from Lebanon, in 2014 (Crocetta & Bariche, 2016), after a time interval lasting about four decades and widely discussed in Sonin et al. (2019). From 2018 to date, other findings in the eastern Mediterranean followed: east Aegean, Turkey (Akyol, 2019), Israel (Sonin et al., 2019), southwest Aegean, Greece (Tiralongo et al., 2019) and Cyprus (Langeneck et al., 2022).

The Maltese record of the Lessepsian migrant *L. argentimaculatus* described in the present paper is the first for the central Mediterranean Sea and could constitute a first indication that the species, already established in the eastern basin (Sonin et al., 2019), is expanding its population westward. The quick succession of new Mediterranean records of the species in recent years suggests that this expansion is happening rapidly.

Concerning *Psenes pellucidus*, the description of the young specimens from Malta agreed with that of similarly-sized specimens described for example in Costa (1999), Hata & Motomura (2017) and Cabebe & Motomura (2019). The approximate ratios obtained for our specimen were comparable to the correspondent ratios for *P. pellucidus* given by Hata & Motomura (2017), except for that of body depth. The transparency and the lack of bands and spots of our young *P. pellucidus* allowed to differentiate them from the early stages of other *Psenes* species, unrecorded in the Mediterranean, such as *P. maculatus* Lütken, 1880, *P. cyanophrys* Valenciennes, 1833 and *P. arafurensis* Günther, 1889 (Fahay, 2007; Myoung et al., 2001; Cabebe & Motomura, 2019). Furthermore, our samples were distinguishable from the juvenile stages of the Mediterranean Centrolophidae *Centrolophus niger* (Gmelin, 1789), *Schedophilus ovalis* (Cuvier, 1833) and *Schedophilus medusophagus* (Cocco, 1839), because these latter have a single dorsal fin, their young stages are pigmented with dark spots or bands, and *Schedophilus* species have denticulate preoperculum (Tortonese, 1959; Ahlstrom et al., 1976; Aboussouan, 1983; Costa, 1999; Fahay, 2007; Akyol, 2008; Milana et al., 2011; Dulčić et al., 2012; Raftari-Nouira et al., 2015). The *P. pellucidus* samples from Malta were also distinguishable from juveniles of the other nomeids known in the Mediterranean, *C. gracilis* and *C. capensis*, having these latter a more elongated body (Fahay, 2007).

The Bluefin driftfish *P. pellucidus* reaches a length of 60–80 cm and is widely distributed in the temperate and warm waters of the Atlantic, Indian and western Pacific oceans (Golani et al., 2021). It is an oceanic species with epipelagic or mesopelagic juveniles, often associated with jellyfish and floating objects, while large adults are prevalently demersal on the continental slope (Golani et al., 2021). In the Mediterranean, *P. pellucidus* was first recorded in Algeria (Dieuzeide & Roland, 1955) and, as mentioned above, it is considered a range-expanding species introduced via the Strait of Gibraltar (Evans et al. 2020; Golani et al., 2021). Subsequent records were reported in the western and central basin, from Morocco (Maurin, 1962, 1968), Spain (Riera et al., 1995), France (Quignard & Tommasini, 2000), Italy, in the Strait of Messina since 1992 and later (Costa & Fanara, 1994; Berdar et al., 1995; Spalletta et al.,

1995; Costa, 1999; Navarra et al., 2007; Orsi-Relini, 2010), and Sardinia (Follesa et al., 2006), as well as from Tunisia (Ghanem et al., 2016). Although it is a fish not frequently caught in the basin, *P. pellucidus* is considered as established in northeastern Sicilian waters (Sperone et al., 2015); in particular, the collection of juveniles of this species is probably correlated to the abundance of ctenophores and cnidarians along the coasts of the Strait of Messina (Navarra et al., 2007) as in the case for juvenile fishes of other medusivorous species in the same area (Battaglia et al., 2014).

The first record of *P. pellucidus* from Malta is currently the easternmost one for the whole Mediterranean and could anticipate that the species is facing a further extension of its distribution toward the eastern part of the basin. It is known that the diet of *P. pellucidus*, at least during its juvenile stages, includes the jellyfish *Pelagia noctiluca* (Navarra et al., 2007). The current winter bloom of *Pelagia noctiluca* observed in Malta could have played a role in the dispersal of juveniles *P. pellucidus* to the waters of the island, as hypothesized in the case of the juvenile specimen found in Tunisian waters (Ghanem et al., 2016).

The findings from this study further reinforce the significance of the Strait of Sicily, east of which the Malta archipelago is located, as an ecological corridor for the east-west and west-east dispersion of exotic species and Atlantic range-expanding species within the Mediterranean basin respectively, i.e., as a biogeographical crossroads between the two parts of the basin (Guidetti et al., 2010; Deidun et al., 2011, 2021a, b; Azzurro et al., 2014).

Constant monitoring of biodiversity in this region is fundamental for the anticipation of new arrivals from east toward the west and vice versa, so as to alert and inform environmental managers and policy-makers of the possible expansion of their populations in the contiguous areas.

Citizen science is giving an important contribution to the enhancement of knowledge on marine biodiversity and for the monitoring of species (native, NIS and neonative species) distributions. Fully in agreement with Karachle et al. (2020), it is nevertheless essential to verify species identification through the scientific examination of samples reported by citizens in platforms and social media, given that the submission by the public of photographic material or videos, the quality of which is often poor, is clearly insufficient to enable the correct taxonomic identification of species and could lead to approximate or incorrect conclusions on their occurrence in the basin. There is no doubt that social media and new technologies are powerful instruments for the rapid exchange of information

and photos on biota, but there is a dire need to improve the collaboration between citizen scientists and scientists (Roy *et al.*, 2018). This collaboration, for example, could lead scientists to provide clear guidance to the public on how to correctly position samples pursuant to taking good-quality photos as well as on sound specimen preservation.

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ŠIRJENJE AREALA VRST *LUTJANUS ARGENTIMACULATUS* (LUTJANIDAE) IN *PSENES PELLUCIDUS* (NOMEIDAE) V MALTEŠKE VODE (OSREDNJE SREDOZEMSKO MORJE)

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POVZETEK

Avtorji poročajo o recentnem prvem zapisu o pojavljanju lesepske selivke *Lutjanus argentinamaculatus* (Forsskål, 1775) in širjenju areala atlantske vrste *Psenes pellucidus* Lütken, 1880 v malteške vode (osrednje Sredozemsko morje). Nadalje na kratko razpravljajo o sedanji razširjenosti obeh vrst.

Ključne vrste: tujerodne vrste, lesepska selitev, vrste, ki širijo areal, Sredozemsko morje, ljubiteljska znanost

REFERENCES

- Aboussouan, A. (1983):** Contribution a l'étude des larves pélagiques du sous-ordre des Stromateoidei (Pisces, Perciformes). *Cybium*, 7(4), 1-24.
- Ahlstrom, E.H., J.L. Butler & B.Y. Sumida (1976):** Pelagic stromateoid fishes (Pisces, Perciformes) of the eastern Pacific: kinds, distributions, and early life histories and observations on five of these from the northwest Atlantic. *Bull. Mar. Sci.*, 26, 285-402.
- Akyol, O. (2008):** New record of the juvenile blackfish, *Centrolophus niger* (Centrolophidae), from the Aegean Sea (Izmir Bay, Turkey). *Cybium*, 32(1), 91-92.
- Akyol, O. (2019):** The first record of a mangrove red snapper, *Lutjanus argentimaculatus* (Actinopterygii: Perciformes: Lutjanidae), from the Aegean Sea (Gulf of Izmir, Turkey). *Acta Ichthyol. Piscat.*, 49, 209-211. <https://doi.org/10.3750/AIEP/02572>.
- Allen, G.R. (1985):** FAO species catalogue Snappers of the world. An annotated and illustrated catalogue of lutjanid species known to date. FAO Fish Synop. 125, Vol. 6, 208 pp.
- Anderson, W.D. Jr. & G.R. Allen (2001):** Lutjanidae. Jobfishes. In: Carpenter, K.E. & V. Niem (eds.): FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific. Vol. 5. Bony fishes part 3 (Menidae to Pomacentridae). FAO, Rome, pp. 2840-2918.
- Azzurro, E., J. Ben Souissi, W. Boughedir, L. Castriota, A. Deidun, M. Falautano, R. Ghanem, M. Zammit-Mangion & F. Andaloro (2014):** The Sicily Strait: a transnational observatory for monitoring the advance of non-indigenous species. *Biol. Mar. Mediterr.*, 120(14), 105-106.
- Battaglia, P., S. Musolino, V. Esposito, G. Amendolia, P. Consoli, F. Andaloro & T. Romeo (2014):** Feeding habits of juvenile fishes belonging to three medusivorous species (Centrolophidae and Nomeidae) from the Strait of Messina (central Mediterranean Sea). *Mar. Biol. Res.*, 10(9), 927-933. <http://dx.doi.org/10.1080/17451000.2013.863357>.
- Berdar, A., D. Capecchi, F. Costa, D. Giordano, G. Mento & B. Spalletta (1995):** Pesci parassiti e pseudoparassiti dei mari italiani. *Riv. Parassitologia*, 12, 454-465.
- Bray, D.J. (2020):** *Psenes pellucidus*. In: Fishes of Australia. <https://fishesofaustralia.net.au/home/species/1207> (accessed 05 March 2022).
- Cabebe, R.A. & H. Motomura (2019):** Nomeid fishes (Perciformes) from Kagoshima Prefecture, southern Kyushu, Japan. *Nature of Kagoshim*, 46, 117-124.
- Costa, F. (1999):** Pesci del Mediterraneo: Stadi larvali e giovanili. Grafo editor, Messina, 285 pp.
- Costa, F. & P. Fanara (1994):** Prima segnalazione nelle acque italiane di *Psenes pellucidus* Lütken 1880 (Pisces: Nomeidae). *Ann. Ist. Mag. "Felice Bisazza"*, anno accademico 1993-94.
- Crocetta, F. & M. Bariche (2016):** Citizen scientists contribute to better knowledge of the Mediterranean marine biota: records of five alien and a native species from Lebanon. In: Dailianis, T., O. Akyol, N. Babali, M. Bariche, F. Crocetta, V. Gerovasileiou, R. Ghanem, M. Gökoğlu, T. Hasiotis, A. Izquierdo-Muñoz, D. Julian, S. Katsanevakis, L. Lipej, E. Mancini, C. Mytilineou, K. Ounifi Ben Amor, A. Özgül, M. Ragkousis, E. Rubio-Portillo, G. Servello, M. Sini, C. Stamouli, A. Sterioti, S. Teker, F. Tiralongo & D. Trkov: New Mediterranean Biodiversity Records (July 2016). *Medit. Mar. Sci.*, 17(2), 608-626. <https://doi.org/10.12681/mms.1734>.
- Deidun, A. & S. Piraino (2017):** First record of an adult-sized red emperor snapper, *Lutjanus sebae* (Cuvier, 1816), in the Mediterranean Sea. In: Gerovasileiou, V., E.H.Kh. Akel, O. Akyol, G. Alongi, F. Azevedo, N. Babali, R. Bakiu, M. Bariche, A. Bennoui, L. Castriota, C.C. Chintiroglou, F. Crocetta, A. Deidun, S. Galinou-Mitsoudi, I. Giovos, M. Gökoğlu, A. Golemaj, L. Hadjioannou, J. Hartingerova, G. Insacco, S. Katsanevakis, P. Kleitou, J. Korun, L. Lipej, M. Malegue, N. Michailidis, A. Mouzai Tifoura, P. Ovalis, S. Petović, S. Piraino, S.I. Rizkalla, M. Rousou, I. Savva, H. Şen, A. Spinelli, K.G. Vougioukalou, E. Xharahi, B. Zava & A. Zenetos: New Mediterranean Biodiversity Records (July 2017). *Medit. Mar. Sci.*, 18(2), 355-384. <http://dx.doi.org/10.12681/mms.2068>.
- Deidun, A., L. Castriota & A. Shaun (2011):** A tale of two Atlantic fish migrants: records of the lesser amberjack *Seriola fasciata* and the African hind *Cephalopholis taeniops* from the Maltese Islands. *J. Black Sea/Mediterr. Environ.*, 17(3), 223-233.
- Deidun, A., G. Insacco, J. Galdies, P. Balistreri & B. Zava (2021a):** Tapping into hard-to-get information: the contribution of citizen science campaigns for updating knowledge on range-expanding, introduced and rare native marine species in the Malta-Sicily Channel. *BioInvasions Rec.*, 10(2), 257-269. <https://doi.org/10.3391/bir.2021.10.2.03>.
- Deidun, A., B. Zava, M. Corsini-Foka, J. Galdies, A. Di Natale & B.B. Collette (2021b):** First record of *Ablennes hians* (Valenciennes, 1846) (Belonidae) in the central Mediterranean waters (western Ionian Sea). *Annales, Ser. Hist. Nat.*, 31(1), 9-16. <https://doi.org/10.19233/ASHN.2021.02>
- Dieuzeide, R. & J. Roland (1955):** Sur un Stromateidae nouveau du genre *Cubiceps*. Bulletin des travaux publiés par la Station d'aquaculture et de pêche de Castiglione (n.s.) 7, 341-368.
- Dulčić, J., D. Skaramuca, B. Dragičević, R. Grgičević, V. Bukvić & B. Skaramuca (2012):** On the additional occurrences of the imperial blackfish, *Schedophilus ovalis* (Cuvier, 1833) (Centrolophidae) in the Adriatic Sea. *Annales, Ser. Hist. Nat.*, 22(1), 63-68.

- Evans, J., E. Arndt & P.J. Schembri (2020):** Atlantic fishes in the Mediterranean: using biological traits to assess the origin of newcomer fishes. Mar. Ecol. Prog. Ser., 643, 133-143. <https://doi.org/10.3354/meps13353>.
- Fahay, M.P. (2007):** Early Stages of Fishes in the Western North Atlantic Ocean (Davis Strait, Southern Greenland and Flemish Cap to Cape Hatteras). Volume 2. Scorpaeniformes through Tetraodontiformes. pp. 1008-1657. NAFO (North Atlantic Fisheries Organization). Available at: [https://www.nafo.int/Library/Fahay-Early-Stages-of-Fishes-PDFs](https://www.nafo.int/Library/Fahay-Early-Stages-of-Fishes/Early-Stages-of-Fishes-PDFs).
- Follesa, M.C., S. Cabiddu, A. Sabatini & A. Cau (2006):** First record of *Psenes pellucidus* (Perciformes, Actinopterygii) in the Sardinian waters (Central Western Mediterranean). Acta Ichthyol. Piscat., 36(1), 77-79. <https://doi.org/10.3750/AIP2006.36.1.11>.
- Ghanem, R., M. Rifi, J. Ben Souissi & E. Azzurro (2016):** On the occurrence of the bluefin driftfish *Psenes pellucidus* Lütken 1880 (Perciformes, Nomeidae) in Tunisian waters (Mediterranean Sea). J. Appl. Ichthyol., 32, 359-361. <https://doi.org/10.1111/jai.12996>.
- 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), 1-215. <https://doi.org/10.11646/zootaxa.4509.1.1>.
- Golani, D., E. Azzurro, J. Dulčić, E. Massutí & L. Orsi-Relini (2021):** Atlas of exotic fishes in the Mediterranean Sea. Briand, F. (ed.), 2nd Edition. CIESM Publishers, Paris, Monaco, 365 pp.
- Guidetti, P., F. Giardina & E. Azzurro (2010):** A new record of *Cephalopholis taeniops* in the Mediterranean Sea, with considerations on the Sicily Channel as a biogeographical crossroad of exotic fish. Mar. Biodivers. Rec., 3, e13. <https://doi.org/10.1017/s1755267210000023>.
- Haedrich, R.L. (1967):** The stromateoid fishes: systematics and a classification. Bull. Mus. Comp. Zool., 135, 31-139.
- Hata, H. & H. Motomura (2017):** First record of *Psenes pellucidus* (Perciformes: Nomeidae) from Saitama City, Nagasaki Prefecture, southern Japan. Trans. Nagasaki Biol. Soc., 80, 7-9. [In Japanese]
- Karachle, P.K., E. Gavriil & M. Dritsas (2020):** First record of two alien fishes from Saronikos Gulf: *Chaetodipterus faber* (Broussonet, 1782) and *Acanthurus cfr gahhm* (Forsskål, 1775). In: Bariche, M., S. Al-Mabruk, M. Ateş, A. Büyükk, F. Crocetta, M. Dritsas, D. Edde, A. Fortič, E. Gavriil, V. Gerovasileiou, M. Gökoğlu, F. Huseyinoglu, P. Karachle, P. Kleitou, T. Terbiyik Kurt, J. Langeneck, C. Lardicci, L. Lipej, C. Pavloudi, M. Pinna, J. Rizgalla, M. Rüştü Özen, F. Sedano, E. Taşkin, G. Yıldız & F. Zangaro: New Alien Mediterranean Biodiversity Records 2020. Mediterr. Mar. Sci., 21(1), 129-145. <https://doi.org/10.12681/mms.21987>.
- 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. <https://doi.org/10.11646/zootaxa.4998.1.1>.
- Lamkin, J.T. (2005):** Nomeidae. In: W. J. Richards (ed.): Early Stages of Atlantic Fishes. An Identification Guide for the Western Central North Atlantic. Vol. 2. Taylor & Francis Group, USA, pp. 2255-2272.
- Langeneck, J., V. Minasidis, N. Doumpas, I. Giouvatos, A. Kaminas, P. Kleitou, F. Tiralongo & F. Crocetta (2022):** Citizen Science helps in tracking the range expansions of non-indigenous and neo-native species in Greece and Cyprus (Eastern Mediterranean Sea). J. Mar. Sci. Eng., 10, 256. <https://doi.org/10.3390/jmse10020256>.
- Lütken, C.F. (1880):** Spolia Atlantica. Bidrag til Kundskab om Formforandringer hos Fiske under deres Vaext og Udvikling, saerligt hos nogle af Atlanterhavets Højsøfiske. K. danske Vidensk. Selsk. Skrift., (S) Nat. Math. Afd., 12(6), 409-613.
- Maurin, C. (1962):** Etude des fonds chalutables de la Méditerranée occidentale (Ecologie et PLche). Résultats des campagnes des navires océanographiques «Président-Théodore-Tissier» 1957 et 1960 et «Thalassa» 1960 et 1961. Revue des Travaux de l’Institut des Pêches maritimes, 26(2), 163-218.
- Maurin, C. (1968):** Ecologie ichthyologique des fonds chalutables atlantiques (de la baie ibéro-marocaine à la Mauritanie) et de la Méditerranée occidentale. Revue des Travaux de l’Institut des Pêches maritimes 1, 1-147.
- Milana, V., A. Fusari, A.R. Rossi & L. Sola (2011):** Molecular and morphological identification of an uncommon centrolophid fish. Cent. Eur. J. Biol., 6(3), 440-445. <https://doi.org/10.2478/s11535-011-0016-x>.
- Mouneimné, N. (1979):** Poissons nouveaux pour les côtes Libanaises. Cybium, 3(6), 105-110.
- Myoung, J.-G., S.-H. Cho, J.M. Kim & Y.U. Kim (2001):** First Record of the two Driftfish, *Psenes maculatus*, and *Psenes cyanophrys* (Nomeidae: Perciformes), from Korea. Korean J. Ichthyol., 13(3), 195-200.
- Navarra, E., M. Cavaliero, A. Morabito & A. Di Natale (2007):** *Psenes pellucidus* Lütken, 1880 (Pisces: Nomeidae): segnalazione di una cattura nello Stretto di Messina e del suo mantenimento in acquario. Biol. Mar. Mediterr., 14, 404-405.
- Orsi Relini, L. (2010):** Non native marine fish in Italian waters. In: Golani, D. & B. Appelbaum-Golani (eds.): Fish Invasions of the Mediterranean Sea: Change and Renewal. Pensoft Publishers, Sofia-Moscow, pp. 267-292.
- Quignard, J.P. & J.A. Tomasini (2000):** Mediterranean fish biodiversity. Biol. Mar. Mediterr., 7(3), 1-66.

Rafrati-Nouira, S., D. Golani, O. El Kamel-Moutalibi, M. Boumaïza, C. Reynaud & C. Capapé (2015): First record of Imperial blackfish, *Schedophilus ovalis* (Actinopterygii: Perciformes: Centrolophidae), from the Tunisian coast, Central Mediterranean. Acta Ichthyol. Piscat., 45(2), 203-206. <https://doi.org/10.3750/AIP2015.45.2.11>.

Riera, F., A.M. Grau, E. Pastor & S. Pou (1995): Faunistical and demographical observation in Balearic ichthyofauna. Meridionalization or subtropicalization phenomena. In: Actes du Colloque Scientifique (Okeanos) "La Méditerranée: Variabilités climatiques, environnement et biodiversité". Montpellier, France, 5-7 Avril 1995, pp. 213-220.

Roy, H., Q. Groom, T. Adriaens, G. Agnello, M. Antic, A.-S. Archambeau, S. Bacher, A. Bonn, P. Brown, G. Brundu, B. C. López, M. Cleary, D. Cogălniceanu, M. de Groot, T. De Sousa, A. Deidun, F. Essl, F. Živa Pečnikar, A. Gazda, E. Gervasini, M. Glavendekic, G. Gigot, S. D. Jelaska, J. M. Jeschke, D. Kaminski, P. K. Karachle, T. Komives, K. Lapin, F. Lucy, E. Marchante, D. Marisavljevic, R. Marja, L. Martín Torrijos, A. Martinou, D. Matosevic, C. Mifsud, J. Motiejūnaitė, H. Ojaveer, N. Pasalic, L. Pekárik, E. Per, J. Pergl, V. Pesic, M. Pocock, L. Reino, C. Ries, L. Rozyłowicz, S. Schade, S. Sigurðsson, O. Steinitz, N. Stern, A. Teofilovski, J. Thorsson, R. Tomov, E. Tricarico, T. Trichkova, K. Tsiamis, J. van Valkenburg, N. Vella, L. Verbrugge, G. Vétek, C. Villaverde, J. Witzell, A. Zenetos & A. C. Cardoso (2018): Increasing understanding of alien species through citizen science (Alien-CS). Research Ideas and Outcomes RIO, 4, e31412. <https://doi.org/10.3897/rio.4.e31412>.

Sonin, O., D. Edelist & D. Golani (2019): The occurrence of the Lessepsian migrant *Lutjanus argentimaculatus* in the Mediterranean, (Actinopterygii: Perciformes: Lutjanidae) first record from the coast of Israel. Acta Adriat., 60(1), 99-102.

Spalletta, B., G. Mento, F. Costa, G. Ammendolia, D. Giordano, D. Capecchi & A. Berdar (1995): Importanza dello spiaggiamento nella raccolta di specie ittiche rare ed endemiche dello Stretto di Messina (cenni di parassitosi). Riv. Parassitologia, 12/56(2), 279-297.

Sperone, E., G. Giglio, M. Abate, S. Giglio, E. Madeo, A. Giglio, S. Golia, I. Sangermano, G. Mauro, V. Circosta, M. Aceto, F. Forestieri & S. Tripepi (2015): Contribution to the knowledge of the animal xenodiversity along Calabrian coasts (southern Italy, central Mediterranean). Acta Adriat., 56(2), 245-258.

Tiralongo, F., I. Giovos, N. Doumpas, J. Lange-neck, P. Kleitou & F. Crocetta (2019): Is the mangrove red snapper *Lutjanus argentimaculatus* (Forsskål, 1775) established in the eastern Mediterranean Sea? First records from Greece through a citizen science project. BiolInvasions Rec., 8(4), 911-916. <https://doi.org/10.3391/bir.2019.8.4.19>.

Tortonese, E. (1959): Revisione dei Centrolophidae (Pisces Perciformes) del Mare Ligure (1). Ann. Mus. civ. Stor. nat. Giacomo Doria, 71, 57-82.

Vacchi, M., P.N. Psomadakis, N. Repetto & M. Würtz (2010): First record of the dog snapper *Lutjanus jocu* in the Mediterranean Sea. J. Fish Biol., 76, 723-728. <https://doi.org/10.1111/j.1095-8649.2009.02505.x>.

Vella, A., N. Vella & S. Agius Darmanin (2015): First record of *Lutjanus fulviflamma* (Osteichthyes: Lutjanidae) in the Mediterranean Sea. J. Black Sea/Mediterr. Environ., 21(3), 307-315.