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ON THE OCCURRENCE OF NORWEGIAN SKATE, *DIPTURUS NIDAROSIENSIS* (RAJIDAE) ON THE ALGERIAN COAST (SOUTHWESTERN MEDITERRANEAN SEA)

Farid HEMIDA
École Nationale Supérieure des Sciences de la Mer et de l'Aménagement du Littoral (ENSSMAL), BP 19, Bois des Cars, 16320 Dely Ibrahim, Algiers, Algeria

Christian REYNAUD
Laboratoire Interdisciplinaire en Didactique, Education et Formation, Université de Montpellier, 2, place Marcel Godechot, B.P. 4152, 34092 Montpellier cedex 5, France

Christian CAPAPÉ
Laboratoire d'Ichtyologie, Université de Montpellier, 34095 Montpellier cedex 5, France
e-mail: christian.capape@umontpellier.fr

ABSTRACT

The authors report the capture of several specimens of the Norwegian skate Dipturus nidarosiensis *(Storm, 1881) off the western Algerian coast. These are predominantly large specimens ranging between 141 cm and 164 cm in total length and between 69 cm and 71.5 cm in disc width. It is likely that these specimens originated from the eastern Atlantic and entered the Mediterranean through the Straits of Gibraltar, which would make* D. nidarosiensis *a Herculean species. The relatively high abundance of captures off the Algerian coast suggests that at present, a viable population may be successfully established in the region.*

Keywords: *Dipturus nidarosiensis*, Rajidae, migration, Straits of Gibraltar, Mediterranean Sea

PRESENZA DELLA RAZZA NORVEGESE, *DIPTURUS NIDAROSIENSIS* (RAJIDAE), AL LARGO DELLA COSTA ALGERINA (MEDITERRANEO SUD-OCCIDENTALE)

SINTESI

Gli autori riportano la cattura di diversi esemplari della razza norvegese Dipturus nidarosiensis *(Storm, 1881) al largo delle coste algerine occidentali. Si tratta prevalentemente di esemplari di grandi dimensioni, compresi tra 141 cm e 164 cm di lunghezza totale e tra 69 cm e 71,5 cm di larghezza del disco. È probabile che questi esemplari provengano dall'Atlantico orientale e siano entrati nel Mediterraneo attraverso lo stretto di Gibilterra, il che renderebbe* D. nidarosiensis *una specie erculea. L'abbondanza relativamente elevata di catture al largo della costa algerina suggerisce che attualmente una popolazione vitale si sia stabilita con successo nella regione.*

Parole chiave: *Dipturus nidarosiensis*, Rajidae, migrazione, Stretto di Gibilterra, Mediterraneo

INTRODUCTION

The Norwegian skate, *Dipturus nidarosiensis* (Storm, 1881), is known off the eastern Atlantic coast from Iceland, southern Norway, and Ireland to northern Mauritania and South Africa (Geraci *et al*., 2019). It was first recorded in the Mediterranean Sea off the southeastern coast of Sardinia (Follesa *et al*., 2010), where further captures have been reported (Follesa *et al*., 2012). The species was also found in the Adriatic Sea (Cariani *et al*., 2017) and in the Ionian Sea (Carbonara *et al*., 2019). Massi *et al*. (2017) suggested the presence of the species in the Strait of Sicily, off the Island of Pantelleria, following the discovery of an empty egg case. The occurrence of the species was confirmed by the capture of a male specimen in a trawl survey at a depth of 551 m (Geraci *et al*., 2019). Westward the species is also reported in the Alboran Sea, where specimens were captured between 2013 and 2016 (Ramírez-Amaro *et al*., 2017).

Following Silva *et al*. (2012), rajid species (skates) remain an important component of fish assemblages in several marine areas, including the Algerian coast, where investigations that have been continuously conducted since Dieuzeide *et al*. (1953) (see Hemida, 2005; Refes *et al*., 2010; Capapé *et al*., 2023) have confirmed the presence of about 15 skate species.

While some species have been regularly captured in Algerian marine waters, others appear to be notably rare, caught only sporadically or absent from the fishmongers' stalls (Hemida, 2005). The present paper aims to report unusually high records of *D. nidarosiensis*, a species considered rare and endangered, and classified as near threatened by Stehmann *et al*. (2015). The Norwegian skate had been previously cited from the Algerian coast (Hemida *et al*., 2015), but no specimen was described, making confirmation unavailable. This report confirms the occurrence of the species off the Algerian coast, enhancing and expanding the knowledge of its distribution in the study area and in the wider Mediterranean Sea.

MATERIAL AND METHODS

The specimens of *D. nidarosiensis* were observed at primary fish markets in Algiers, where catches from areas along the Algerian coast, spanning from the Moroccan to the Tunisian border, are landed. Between 2000 and the present, at least one hundred specimens have been captured by trawlers at a depth of 330 m on sandy-muddy bottoms in the western region off Bouzedjar, located at 35°42′′35″ N and 1°22′17″ W (Fig. 1). They were often caught together with the spiny lobster *Palinurus elephas* (Fabricius, 1787), the Norway lobster *Nephrops norvegicus* (Linnaeus, 1758), the angler fish *Lophius piscatorius* Linnaeus, 1758, the slender rockfish *Scorpaena elongata* Cadenat, 1943 (Fig. 2), and occasionally with the cuckoo ray *Leucoraja naevus* (Müller and Henle, 1841). The specimens studied in this paper were carefully examined and identified using field guides to ichthyological fauna. They were photographed and, when possible, measured. Obtaining morphometric measurements was challenging, as the specimens were rapidly sold for local consumption.

RESULTS AND DISCUSSION

The specimens were identified as *D. nidarosiensis* based on the following morphological

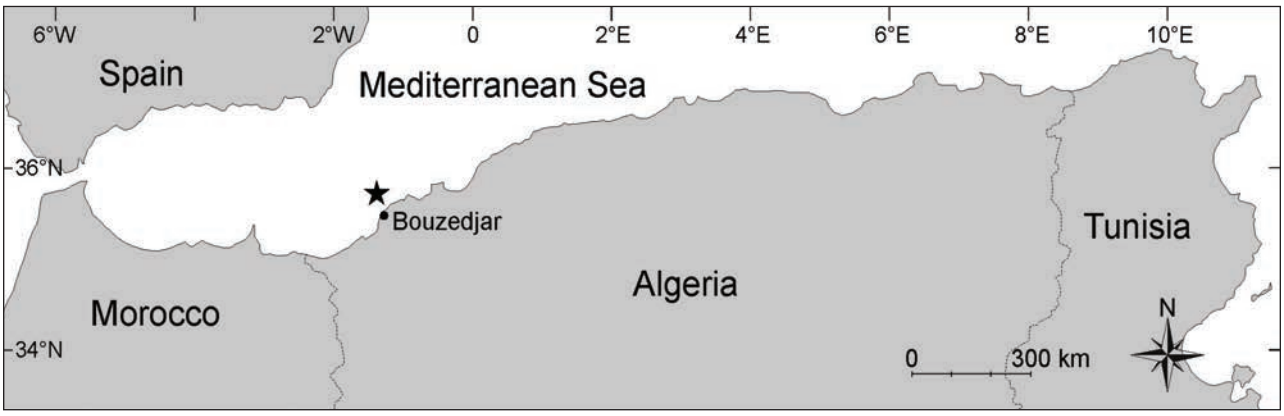

Fig. 1: Map of the Algerian coast indicating the capture site of the Norwegian skate, *Dipturus nidarosiensis****, off Bouzedjar (black star).***
Sl. 1: Zemljevid alžirske obale z označbo lokacije ulova norveške raže, *Dipturus nidarosiensis****, v vodah blizu Bouzedjarja (črna zvezdica).***

Fig. 2: Specimens of *Dipturus nidarosiensis* ***caught together with the spiny lobster*** *Palinurus elephas* ***(1), the Norway lobster*** *Nephrops norvegicus* ***(2), and the angler fish*** *Lophius piscatorius* ***(3) off the Algerian coast (photo by F. Hemida). Sl. 2: Primerki vrste*** *Dipturus nidarosiensis* ***ujeti skupaj z rarogi,*** *Palinurus elephas* ***(1), škampi,*** *Nephrops norvegicus* ***(2) in morskimi žabami,*** *Lophius piscatorius* ***(3) ob alžirski obali (foto: F. Hemida).***

characters: disc broadly rhombic, wider than long, with acute outer corners; snout very long, pointed and pronounced; tail strong and rather short with a median row of 40–50 thorns up to the first dorsal fin, and 1–3 small thorns between the dorsal fins; upper surface smooth with one pair of pre-orbital thorns, one post-orbital thorn; colour greyish-brown dorsally and entirely dark ventrally, with darkly pigmented ampullary pores (Fig. 3). These characteristics are in total accordance with previous descriptions of the species (Stehmann & Bürkel, 1984; Ebert & Stehmann, 2013; Last *et al*., 2016; Geraci *et al*., 2019). They confirm the presence of *D. nidarosiensis* on the Algerian coast, warranting its inclusion in the local ichthyofauna.

The Norwegian skates captured off the Algerian coast consisted mainly of large specimens, including both males and females. The total lengths of the 20 specimens randomly selected for observation ranged between 1410 mm and 1640 mm, with disc widths ranging between 690 mm and 715 mm. This suggests that a viable population of *D. nidarosiensis* may have successfully established itself in Algerian marine waters, though, admittedly, no juvenile specimens were observed, and the captures were rather restricted to the western region (Fig. 4). According to the survey conducted by Geraci *et al*. (2019) *D. nidarosiensis* currently inhabits the Mediterranean Sea. However, the species has not been recorded to date in the eastern basin, possibly due to warmer waters in that

Fig. 3: Specimens of *Dipturus nidarosiensis* ***caught off the Algerian coast, scale bar = 200 mm (photo by F. Hemida). Sl. 3: Primerki vrste*** *Dipturus nidarosiensis*, ***ujeti ob alžirski obali, merilo = 200 mm (foto: F. Hemida).***

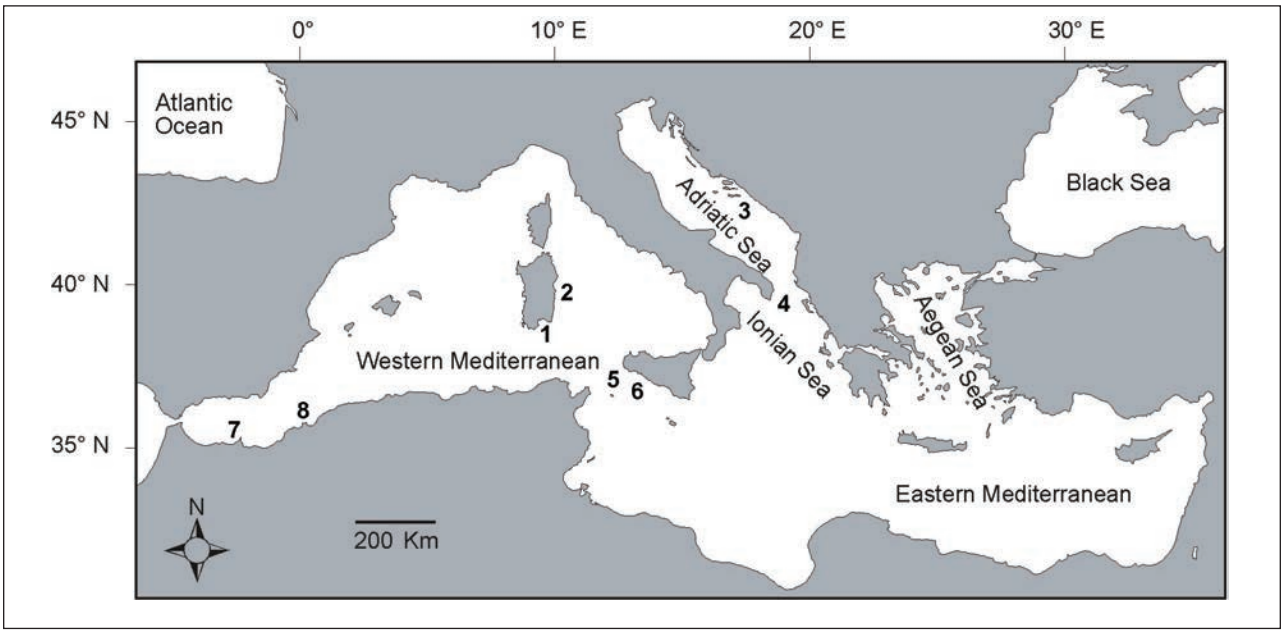

Fig. 4: Map of the Mediterranean Sea indicating the locations of records of *Dipturus nidarosiensis*. ***South-eastern coast of Sardinia: 1. Follesa*** *et al.* ***(2010), 2. Follesa*** *et al.* ***(2012). Adriatic Sea: 3. Cariani*** *et al.* ***(2017). Ionian Sea: 4. Carbonara*** *et al.* ***(2019). Strait of Sicily, off the Island of Pantelleria: 5. Massi*** *et al.* ***(2017), 6. Geraci*** *et al.* ***(2019). Alboran Sea: 7. Ramírez-Amaro*** *et al.* ***(2017). Algerian coast off Bouzedjar: 8. this study.***

Sl. 4: Zemljevid Sredozemskega morja prikazuje lokacije zapisov o pojavljanju vrste *Dipturus nidarosiensis*. ***Jugovzhodna obala Sardinije: 1. Follesa*** *et al.* ***(2010), 2. Follesa*** *et al.* ***(2012). Jadransko morje: 3. Cariani*** *et al.* ***(2017). Jonsko morje: 4. Carbonara*** *et al.* ***(2019). Sicilijanska ožina, ob otoku Pantelleria: 5. Massi*** *et al.* ***(2017), 6. Geraci*** *et al.* ***(2019). Alboransko morje: 7. Ramírez-Amaro*** *et al.* ***(2017). Alžirska obala ob Bouzedjarju: 8. Ta študija.***

region compared to the western basin. This distribution pattern could also explain the higher frequency of captures in the areas closer to the Straits of Gibraltar, such as the Alboran Sea and the western Algerian coast, and only sporadic catches in the Italian seas, for instance (Geraci *et al*., 2019).

Golani *et al*. (2021) noted that the exotic species found in the Mediterranean Sea are either Lessepsian migrants (*sensu* Por, 1971), *i.e*., originating from the warm or warm-to-temperate waters of the Red Sea, or Herculean migrants (*sensu* Golani *et al*., 2000), i.e., having an origin in the eastern tropical Atlantic. Since the occurrence of *D. nidarosiensis* in the Mediterranean Sea is likely the consequence of migrations from the eastern Atlantic coast through the Strait of Gibraltar, the species could be classified as a Herculean migrant. However, the main question is whether to consider it as an exotic species deserving of inclusion in Golani *et al*. (2021).

Geraci *et al*. (2019) reported that *D. nidarosiensis* is the deepest living skate species, with recorded depths ranging from 600 to 1400 m in the Mediterranean Sea according to Cannas *et al*. (2010) and over 1000 m in the northeastern Atlantic (Stehmann & Bürkel, 1984). The scarcity of sightings of this species may be attributed to the limited commercial fishing and bottom trawl surveys carried out in these deep areas (Geraci *et al*., 2019). Following Geraci *et al*. (2019), trawl surveys at depths exceeding 1000 m will be necessary to increase the captures of *D. nidarosiensis* and generally gain a more comprehensive knowledge of this and other deep-sea elasmobranch species.

O POJAVLJANJU NORVEŠKE RAŽE, *DIPTURUS NIDAROSIENSIS* (RAJIDAE), OB ALŽIRSKI OBALI (JUGOZAHODNO SREDOZEMSKO MORJE)

Farid HEMIDA
École Nationale Supérieure des Sciences de la Mer et de l'Aménagement du Littoral (ENSSMAL), BP 19, Bois des Cars, 16320 Dely Ibrahim, Algiers, Algeria

Christian REYNAUD
Laboratoire Interdisciplinaire en Didactique, Education et Formation, Université de Montpellier, 2, place Marcel Godechot, B.P. 4152, 34092 Montpellier cedex 5, France

Christian CAPAPÉ
Laboratoire d'Ichtyologie, Université de Montpellier, 34095 Montpellier cedex 5, France
e-mail: christian.capape@umontpellier.fr

POVZETEK

Avtorji poročajo o ulovu več primerkov norveške raže Dipturus nidarosiensis *(Storm, 1881) ob alžirski obali. Večinoma so bili veliki primerki, ki so merili med 141 cm in 164 cm totalne dolžine in med 69 cm in 71,5 cm v premeru diska. Primerki verjetno izvirajo iz vzhodnega Atlantika in so prišli v Sredozemsko morje skozi Gibraltarsko ožino, zato gre za Herkulove migrante. Relativno veliko število ulovov kaže, da se je na obravnavanem območju ustalila populacija te vrste, ki je sposobna preživetja.*

Ključne besede: *Dipturus nidarosiensis*, Rajidae, selitev, gibraltarska ožina, Sredozemsko morje

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