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Tethyaster subinermis (Philippi, 1837) (Asteroidea; Astropectinidae): New to the British echinoderm fauna

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*The starfish T*ethyaster subinermis *is documented from the south-western parts of British waters, with one specimen caught by trawl at 48° 27.5'N, 009° 35.3'W (208–250 m depth) in 2001 and a further two specimens caught by trawl at 48° 28.32'N, 009° 33.23'W (189–217 m depth) in 2020.*

Key words: Seastar, Celtic Sea, trawl damage, *Pennatulacea*

INTRODUCTION

Tethyaster subinermis (Philippi, 1837) (Class Asteroidea; Order Paxillosida; Family Astropectinidae) is a large starfish that may attain a size of 40–55 cm across (PERRIER, 1896; TORTONESE, 1965; CLARK & DOWNEY, 1992) that was described originally from a specimen caught off Sicily. It is distributed over much of the Mediterranean Sea and in the eastern Atlantic from Angola northwards to the Bay of Biscay (NOBRE, 1930–1931; TORTONESE, 1965; CLARK & DOWNEY, 1992). Although KOEHLER (1924) indicated that it occurred in the Bay of Biscay, up to a latitude of 45–49°N, CLARK & CLARK (1954) considered a northernmost latitude of *ca.* 46°40'N, and it has not previously been identified as occurring in UK seas (MORTENSEN, 1927; MCKENZIE, 1997; SOUTHWARD & CAMPBELL, 2006).

The overall bathymetric range of *T. subinermis* is relatively broad, with MORTENSEN (1927) indicating that it occurred at 60–300 m in the Mediterranean. CLARK & CLARK (1954) originally considered it to have a depth range of 50–1400 m, although CLARK & DOWNEY (1992) later revised this to 50–975 m. Within the Bay of Biscay, LE DANOIS (1948) considered *T. subinermis* to be a characteristic species of the Grande Vasière, the mid-shelf mud grounds in the northern Bay of Biscay, and suggested a depth range of 50–200 m. However, this species does not appear to have been reported from these grounds in subsequent studies (e.g. GLÉMAREC, 1969; MÉRILLET *et al*., 2018). Furthermore, other authors have reported it from the Bay of Biscay in waters of 155–166 m (PERRIER, 1896) and 180–300 m (KOEHLER, 1921, 1924). Similarly, in the Cantabrian Sea, *T. subinermis* has been reported as occurring within a faunal assemblage associated with the shelf-slope transition zone at depths of 400–500 m (SÁNCHEZ *et al*., 2008; SERRANO *et al*., 2011). It has also been reported from the circalittoral zone along the west coast of Brittany (DERRIEN-COURTEL, 2010), although latitude and depth information were not specified.

Tethyaster subinermis is characterised by well-developed marginal plates, with the upper marginal plates without spines, whilst the lower marginal plates (that are of a similar size to the upper marginal plates) have a series of spines. The ratio between the maximum radius (*R,* the distance from the centre of the mouth to the tip of the arm) and the disc radius (*r,* the distance from the centre of the mouth to the inter-radial edge) has been estimated at 3.3–3.9 (TORTONESE, 1965) and 3.6–4.5 (CLARK & DOWNEY, 1992). There is a conspicuous, naked madreporite, although the diameter of the madreporite (10–15% *r*) is smaller than in other members of the genus in Atlantic waters (CLARK & DOWNEY, 1992). The colouration of the upper surface ranges from orange to red, with a paler underside.

RESULTS AND DISCUSSION

In 2020, three specimens of *T. subinermis* (Fig. 1) were captured in a trawl survey of the Celtic Sea (Table 1), two of which were in UK waters (Fig. 2), and the third specimen from French waters. The bottom sea temperature at these sites was 11.3–11.5°C. These specimens conformed with the previous species descriptions (MORTENSEN, 1927; CLARK & DOWNEY, 1992), though the upper marginal plates were observed to sometimes bear a few small spines close to the border with the lower marginal plates (Fig. 1).

The sizes of the three specimens caught in 2020 (based on the distance from the centre of the mouth to the tip of the arm, *R*) were 208–254 mm. The *R* / *r* ratio was 3.66–4.27, and the madreporite was 10.3–13.7% of *r*, with all these values within the expected range (CLARK & DOWNEY, 1992). A single specimen was also caught in UK waters in an earlier survey conducted in 2001, with the dried specimen *ca.* 235 mm *R* (measurements unavailable for the specimen when fresh). Whilst KOEHLER (1924) and LE DANOIS (1948) suggested that *T. subinermis* occurs in the Celtic Sea, no specimens were collected in extensive epibenthic sampling (with 2 m beam trawl) conducted in this area (ELLIS *et al.*, 2013), and the previously most northerly published limits appear to be 46° 47'N (PERRIER, 1896; CLARK & DOWNEY, 1992). Hence, the present examples, up to 48° 28'N, are thought to be the most northerly records for the species,

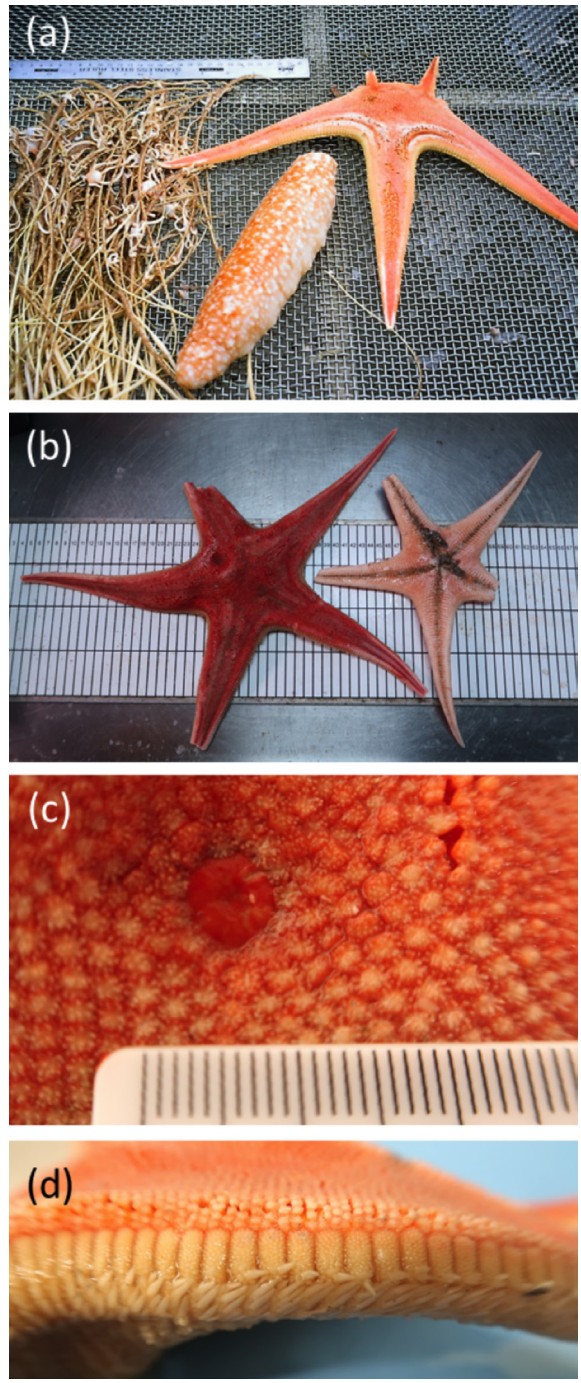

Fig. 1. Tethyaster subinermis *showing (a) specimen caught in 2001 with associated catch of* Funiculina quadrangularis*, (b) dorsal and ventral views of specimens caught in 2020, (c) close up of naked madreporite and (d) close up of upper and lower marginal plates*

Table 1. Details of Tethyaster subinermis *caught in the Celtic Sea and northern Bay of Biscay*

VESSEL	DATE	LATITUDE	LONGITUDE	DEPTH	DETAILS	SOURCE
Cirolana	25 March 2001	48° 27.5'N	009° 35.3'W	208–250 m	One specimen (R = 235 mm, dried)	This study
CEFAS Endeavour	22 February 2020	48° 28.32'N	009° 33.23'W	189–217 m	Two specimens (R = 208–254 mm)	This study
CEFAS Endeavour	05 March 2020	48° 01.58'N	007° 37.19'W	191–203 m	One specimen (R = 254 mm)	This study
Hirondelle	20 July 1886	46° 47'N	006° 30'W	166 m	Young specimen	PERRIER (1896)
Hirondelle	26 July 1886	46° 24.7'N	005° 55.5'W	155 m	Specimen 55 cm across	PERRIER (1896)
Caudan	28 August 1895	45° 18'N	005° 23'W	180 m	Very young specimen	KOELER (1896)
Caudan	29 August 1895	45° 52'N	006° 03'W	250 m	Large specimen	KOELER (1896)
Caudan	31 August 1895	46° 40'N	006° 30'W	300 m	Large specimen	KOELER (1896)

and also confirm that the species occurs in British waters. Whilst northward range extensions of southerly species, such as *T. subinermis*, may be expected in relation to increases in sea temperature (HISCOCK *et al.*, 2004), the infrequent records of this species could also be related to encounter rates. The limited sampling of shelf edge habitats, in conjunction with a low catchability of some epifaunal species in trawls (e.g. REISS *et al.*, 2006), particularly those trawls with rockhopper ground gears, may reduce encounter rates of such species in offshore sampling programmes, especially if a species has a low population density at the limits of their biogeographical distribution.

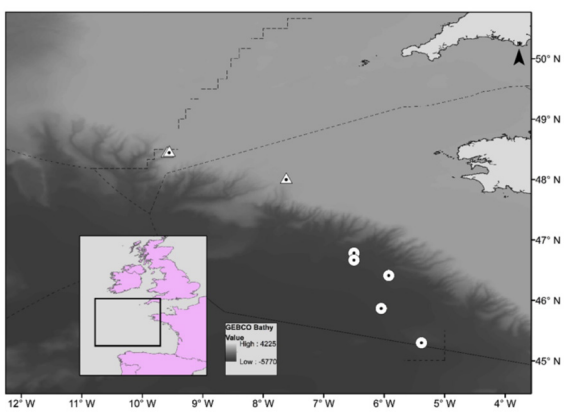

Fig. 2. Capture locations for Tethyaster subinermis *showing contemporary (△) and historic (⊙) samples (see details in Table 1)*

Starfish are prone to arm damage, which in offshore waters is often associated with trawl disturbance (ROGERS *et al.*, 2001). The three individuals caught in 2020 all had up to four of the arms broken, with this damage thought to have occurred during trawl capture. Whilst the specimen caught in 2001 had three intact arms, the two other arms showed signs of regeneration. Whilst anecdotal, the present observations suggest that larger specimens of this species may be particularly prone to trawl damage.

Previous authors have noted that *T. subinermis* occurs on fine sediments (e.g. PERRIER, 1896; TORTONESE, 1965), with LE DANOIS (1948) also indicating that *T. subinermis* occurred on such sediments in an assemblage with the seapens *Virgularia mirabilis* (Müller, 1776) and *Pennatula phosphorea* Linnaeus, 1758. In the present study, one of the catches in which *T. subinermis* was observed also included numerous specimens of the seapen *Funiculina quadrangularis*

(Pallas, 1766) (Fig.1), supporting the hypothesis that *T. subinermis* occurs on seapen habitats.

It may also be noted that TERRIBILE *et al.* (2016) reported similar bathymetric distributions for *T. subinermis* (73–604 m) and *F. quadrangularis* (75–680 m) from trawl surveys around Malta (Mediterranean Sea).

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Zvjezdača Tethyaster subinermis (Philippi, 1837) (Asteroidea; Astropectinidae): Nova vrsta u fauni britanskih bodljikaša

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SAŽETAK

Autori iznose novi nalaz morske zvijezdače *Tethyaster subinermis* iz jugozapadnih dijelova britanskih voda, s jednim primjerkom ulovljenim koćom na 48 ° 27,5 ‘N, 009 ° 35,3’ W (dubine 208–250 m) 2001. godine i dva primjerka koja su ulovljena povlačnom mrežom na 48 ° 28,32’N, 009 ° 33,23’W (dubina 189–217 m) u 2020. godini.

Ključne riječi: zvjezdača, *Tethyaster subinermis,* Keltsko more, oštećenja povlačnih mreža (koća), *Pennatulacea*