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NOTES AND NEWS

FIRST RECORD OF *ATELECYCLUS UNDECIMDENTATUS* (HERBST, 1783) (DECAPODA, BRACHYURA, ATELECYCLIDAE) ALONG THE DUTCH NORTH SEA COAST

BY

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INTRODUCTION AND METHODS

The genus *Atelecyclus* Leach, 1815 is represented by two extant species, *Atelecyclus rotundatus* (Olivi, 1792), which is known from the Mediterranean and the Atlantic, from South Africa to the Bay of Biscay (Barnard, 1950; Adema, 1991; d'Udekem d'Acoz, 1999; Salva & Feldmann, 2001), and *A. undecimdentatus* (Herbst, 1783), which inhabits the coastal East Atlantic Ocean, ranging from the English Channel southwards to West Africa (Forest, 1957; d'Udekem d'Acoz, 1999; Salva & Feldmann, 2001), with occasional sightings in the Mediterranean Sea (Forest, 1957). Members of the genus *Atelecyclus* can be easily distinguished from other genera in the superfamily Cancroidea Latreille, 1802 in Europe by the rounded, nearly circular carapace, which bears a dense fringe of setae on the margins. The frontal region of the carapace is toothed, and the antero-lateral teeth are well-developed. Distinguishing between the two *Atelecyclus* species primarily depends on carapace length to width ratio; the carapace of *A. rotundatus* is at most slightly wider than long (with an average length to width ratio of 0.98), while the carapace of *A. undecimdentatus* has an average ratio of 0.83 (Forest, 1957). Additionally, *A. rotundatus* has small, acute antero-lateral teeth, whereas *A. undecimdentatus* has more rounded ones. The antero-lateral teeth, however, can be highly variable amongst individuals, and often damaged on stranded animals (MW

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pers. obs.). Therefore, for adult animals, the length to width ratio is the primary characteristic to distinguish the two species (Forest, 1957; Salva & Feldmann, 2001).

During a survey of washed-up brachyurans in Noord-Holland, the Netherlands in 2021, one specimen of *A. undecimdentatus*, previously undocumented on the Dutch North Sea coast, was discovered by the first author. The discovery coincided with a severe storm that caused a mass stranding of numerous brachyuran species, such as *Corystes cassivelaunus* (Pennant, 1777) (Corystidae Samouelle, 1819), *Necora puber* (Linnaeus, 1767) (Polybiidae Ortmann, 1893), *Polybius navigator* (Herbst, 1794) (Polybiidae) and *Pinnotheres pisum* (Linnaeus, 1767) (Pinnotheridae De Haan, 1833). Prior to this find, a few unverified citizen science records on the online platform Waarneming.nl (part of Observation.org) hinted at the presence of *A. undecimdentatus*, with the earliest record dating back to 2015 on the Dutch west coast (fig. 1). However, since the 2021 storm, there has been a significant increase in the number of recorded sightings, suggesting the species has established itself in the Dutch North Sea (Waarneming.nl, 2024).

Here, we present sightings of *A. undecimdentatus* along the Dutch North Sea coast and discuss their potential northward migration. Sightings primarily consist of specimens washed ashore, rarely alive. Additionally, three records of live specimens were obtained from approximately 20 meters depth in the North Sea during research cruises. All sightings were documented on Waarneming.nl and underwent rigorous verification and validation by the first author, with any dubious records or unusable photos being excluded. Of all sightings, 430 were verified and included in the map. Pictured specimens were collected in April 2021 on the Dutch west coast (fig. 1) for scientific documentation and were preserved in 70% ethanol. Measurements of maximum carapace width (CW) and carapace length at the midline (CL) are provided in millimetres. Photographs were taken using a Nikon D.610 camera with a 24/70 mm lens and edited using Adobe Photoshop 2023. Given synonymy is limited to references primarily from scientific papers and reports, and mostly includes contributions of distributional records new at the time of their publication. Preserved specimens have been added to the collection of Naturalis Biodiversity Center (RMNH) in Leiden, the Netherlands, with comparative material also sourced from the RMNH collection.

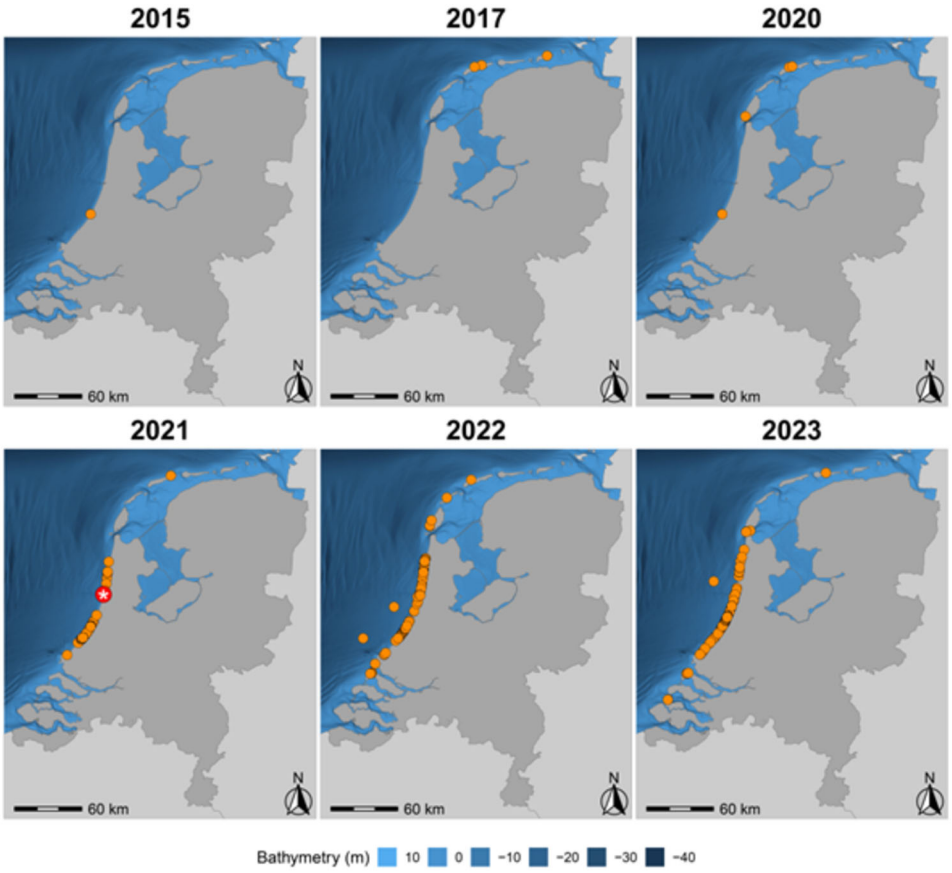

Fig. 1. Map of the Netherlands (highlighted in dark grey) and the adjacent North Sea, showing annual sightings of *Atelecyclus undecimdentatus* (Herbst, 1783) (filled orange circles) between 2015 and 2023 and the collection site of the examined specimen RMNH.CRUS.D.57976 (asterisk encircled in red). Data of sightings for *A. undecimdentatus* are gathered from Waarneming.nl, and bathymetric information is derived from the GEBCO 2023 GRID (GEBCO Compilation Group, 2023).

RESULTS AND DISCUSSION

Descriptive part

Family ATELECYCLIDAE Ortmann, 1893

Genus *Atelecyclus* Leach, 1814

Atelecyclus undecimdentatus (Herbst, 1783)

(figs. 2-3)

Cancer undecimdentatus Herbst, 1783: 181, pl. 10, fig. 60.

Cancer amoenus Herbst, 1799: 64, pl. XLIX, fig. 3.

Atelecyclus cruentatus Desmarest, 1825: 89; Guérin-Ménéville, 1829: pl. 2, fig. 2; Heller, 1863: 132, pl. IV, fig. 5; Bolivar, 1892: 128 (list); A. Milne-Edwards & Bouvier, 1894: 51, pl. V, figs. 1-5;

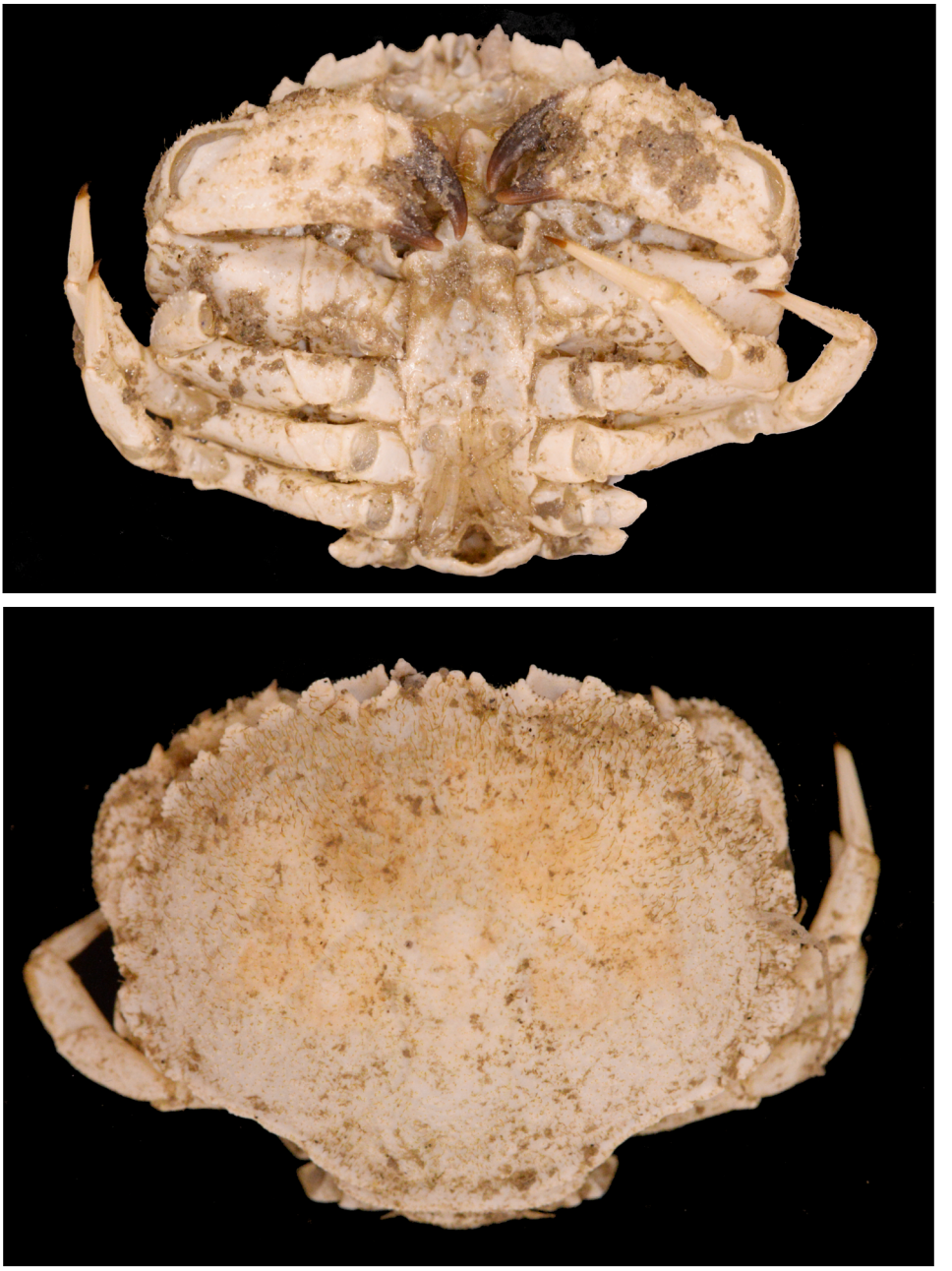

Fig. 2. *Atelecyclus undecimdentatus* (Herbst, 1783); RMNH.CRUS.D.57976; CW = 37.0 mm, Velsen Noord, Noord-Holland, the Netherlands, 10 April 2021. Top figure, specimen in ventral view; bottom picture, same in dorsal view.

Fig. 3. *Atelecyclus undecimdentatus* (Herbst, 1783); RMNH.CRUS.D.57975; CW = 42.0 mm, Katwijk aan Zee, Zuid-Holland, the Netherlands, 11 April 2021. Specimen in dorsal view.

Pesta, 1918: 383, fig. 123; Balss, 1921: 55, fig. 7; Monod, 1933: 500, figs. 11A, 11B; Barnard, 1950: 198; Capart, 1951: 136.

Atelecyclus omoiodon Risso, 1827: 18.

Atelecyclus rotundatus — Miers, 1881: 220; Bonnier, 1887: 38; A. Milne-Edwards & Bouvier, 1900: 61; Rathbun, 1900: 292; Bouvier, 1940: 221, fig. 147, pl. 8, fig. 7; Zariquiey Álvarez, 1946: 149 (not *Atelecyclus rotundatus* (Olivi, 1792)).

Atelecyclus septemdentatus — Caullery, 1896: 403.

Atelecyclus undecimdentatus — Monod, 1956: 148, figs. 184-186; Forest, 1957: 469, fig. 1; Longhurst, 1958: 87; Forest & Gantès, 1960: 350; Nunes-Ruivo, 1961: 3 (list); Bourdon, 1965: 25; Maurin, 1968: 486, 489, fig. 4; Pastore, 1972: 112; Lagardère, 1973: 84 (in table); Anadón, 1981: 155 (in table); Manning & Holthuis, 1981: 69; García Raso, 1984: 107 (in table); d'Udekem d'Acoz, 1986: 5; García Socias & Gracia, 1988: 53; González-Gordillo et al., 1990: 420 (list); d'Udekem d'Acoz, 1999: 212; Salva & Feldmann, 2001: 49, fig. 28; Low & Ng, 2012: 85; Marco-Herrero et al., 2015: 246 (in table); Hayward & Ryland, 2017: 424, fig. 8.59b; García-de-Lomas et al., 2019: 5 (in table).

Athelecyclus undecimdentatus — Pastore, 1972: 108 (list).

Material examined.— RMNH.CRUS.D.57976: 1 female (37.0 × 31.0 mm), Velsen Noord, Noord-Holland, the Netherlands, 10 April 2021, washed ashore; leg. & det. M. Willems. — RMNH.CRUS.D.57975: 2 females (31.0 × 24.0 mm moult, 29.0 × 23.0 mm moult), 1 male (42.0 × 31.0 mm moult), Katwijk aan Zee, Zuid-Holland, the Netherlands, 11 April 2021, washed ashore; leg. & det. M. Scherrenberg.

Comparative material.— RMNH.CRUS.D.28025 (*Atelecyclus undecimdentatus*): 1 female (34.0 × 28.0 mm), Algarve, Troia, Rio Sado, Portugal, 29 April 1971, across Setubal; leg. excursion RMNH no. 2. — RMNH.CRUS.D.39927 (*Atelecyclus undecimdentatus*): 6 females (34.0 × 25.0 mm, 39.0 × 30.0 mm, 32.0 × 24.0 mm moult, 36.0 × 28.0 mm, 41.0 × 30.0 mm, 41.0 × 30.0 mm moult), 3 males (45.0 × 33.0 mm, 43.0 × 32.0 mm moult, 35.0 × 27.0 mm), 1 unknown (35.0 × 27.0 mm carapace only), Sta. MAU.106, Mauritania, off Banc d'Arguin, 20°31′N 17°02′W, depth 15 m, shell gravel, many small bivalves, Branchiostoma, crabs (*Atelecyclus*), polychaetes, Van Veen grab (4×), 19 June 1988, det. C.H.J.M. Fransen.

Remarks

The specimen and moults found match with the original description and figures by Herbst (1783), as well as with the examined comparative material. The carapace is broader than long (length to width ratio between 0.73-0.83) and slightly granulated (fig. 3). The carapace regions are slightly defined by shallow grooves, only the gastric and cardiac regions are clearly defined (fig. 3). The front holds three rostral teeth, two fissures are present in each orbit (fig. 3). The antero-lateral margins of the carapace bear 10 teeth, granulated and of unequal sizes (figs. 2-3). The postero-lateral margins on the carapace are thickened and granulated. The ventral side of the carapace is covered in light brown setae, which are visible in dorsal view (fig. 3). The pleon is long and narrow on both sexes. The chelipeds are short and broad. The front of the merus is covered with rows of granules. The top of the propodus possesses a few sharp spines and a row of thick setae. The colour of the dactylus and the immovable finger of the propodus are noticeably darker (fig. 2). The ambulatory legs are covered in long setae and the dactylus ends in a brown, sharp point. The colour of freshly stranded specimens is white to brown, with areas of light red to pink.

Increased sightings of *A. undecimdentatus* along the Dutch North Sea coast suggest the expansion into more northern waters beyond its original range. This shift may be driven by increasing North Atlantic water temperatures, which have risen by about 0.3°C per decade over the last decades (Dye et al., 2013; Amorim et al., 2023). Rising sea water temperatures have been linked to changing benthic communities (Emeis et al., 2015). For example, the angular crab, *Goneplax rhomboides* (Linnaeus, 1758) (Goneplacidae MacLeay, 1839), originally known from warmer Eastern Atlantic waters and the Mediterranean Sea, has been increasingly documented in the southern North Sea since 2000 (Neumann et al., 2013). However, the ecological implications of these northward migrations remain uncertain and warrant further investigation, particularly regarding potential impacts on food availability and habitat competition.

Knowledge on stranding of invertebrates on the Dutch coast of the North Sea is limited. Most existing knowledge relies on citizen science records, which has some limitations. Charismatic or bigger organisms will be reported more often

than small or seemingly common organisms. The quality of the data depends on the experience of the observers and validators on these platforms. Nevertheless, these observations can be valuable indicators of range expansion of crabs and other organisms.

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