

Direct evidence of sea anemone predation on Arctic echinoids

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Predator–prey interactions are considered a major evolutionary driver and a key biological factor affecting recent organisms, but little is known about their influence on Arctic benthic life. It is not easy to document predatorial behaviour in

situ in the marine realm, especially in polar seas, and thus usually only indirect evidence is available. Palaeoecologists use several proxies to infer predation on echinoids (Wilson et al. 2015), namely drill holes, repair scars, ejecta deposits

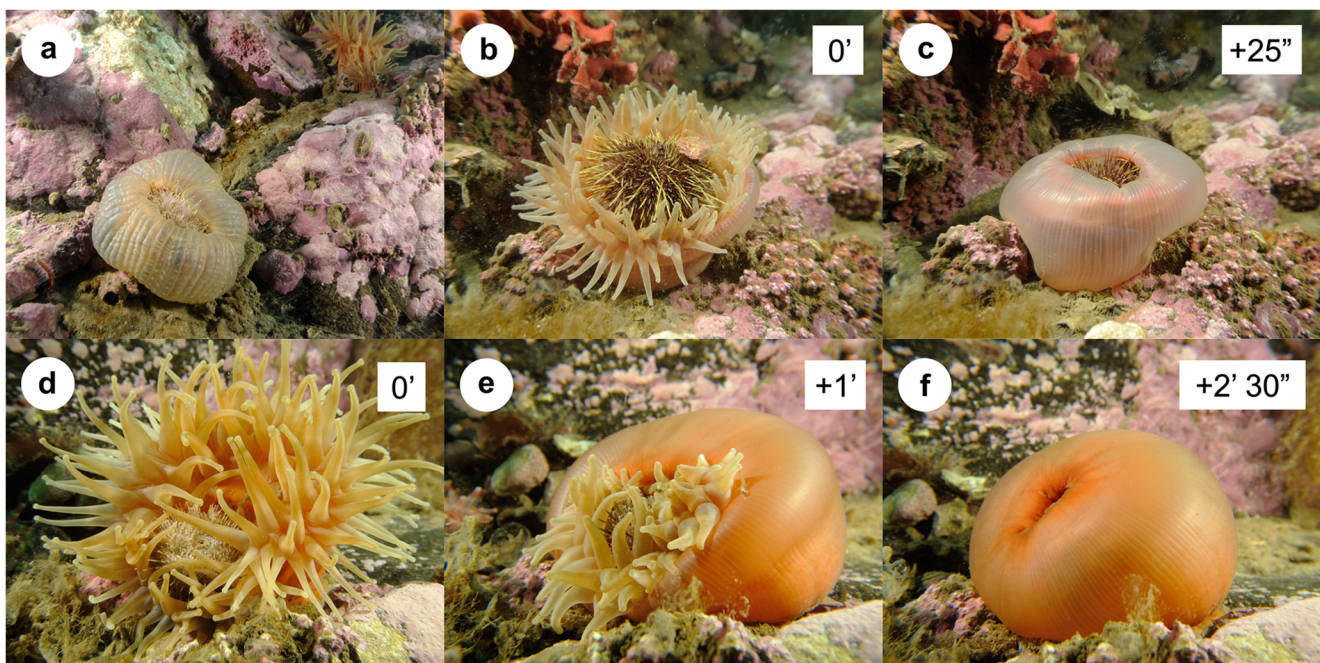


Fig. 1 *Cribrinopsis similis* ingesting *Strongylocentrotus droebachiensis* encountered in situ (a). The two time-sequences (b–c and d–f) of photographic trials demonstrate predatory behaviour. Sea urchins diameter 5–6 cm

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(regurgitates), or bite marks. However, these are not adequate for predators such as sea anemones.

Two actinarians representing different species, *Urticina crassicornis* and *Cribrinopsis similis* (<http://www.iopan.gda.pl/projects/biodaff/actinaria/index.html>), were observed while SCUBA diving in July 2013 and July 2014 on the rocky bottom of an Arctic fjord, Isfjorden (Spitsbergen; 78°11'18.0"N, 15°08'41.1"E), with partially, or almost completely denuded, echinoid tests inside their polyps (Fig. 1a). Around these predators, empty tests were found, which eventually may disintegrate into small fragments (ossicles) that leave no macroscopic sign of predation. To confirm whether echinoids constitute possible prey for the investigated sea anemones, multiple series of underwater photographs were taken at 10–15 m depth. Each time (Fig. 1b–c, d–f) large-sized echinoids (*Strongylocentrotus droebachiensis*) were offered, the sea anemones immediately embraced the prey with their tentacles, closed, and began ingestion (Fig. 1b–f).

Kortsch et al. (2012) reported that green sea urchins in nearby fiords are involved in a long-term predatory interaction with the actinarian *Urticina eques* and ascidian *Halocynthia pyriformis*, resulting in an inverse relationship of abundance as a response to rising seawater temperature. These echinoids are key boreal-Arctic herbivores, which have several natural antagonists apart of actinarians (Scheibling and Hatcher 2001). Given our evidence from Isfjorden and those from

elsewhere (Gulliksen et al. 1980), it is likely that actinarian-echinoid interactions could be much more widespread taxonomically and geographically, and thus of more than regional importance.

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