

## *Alcyonidium reticulum* sp. nov., a common intertidal bryozoan from south-west Britain

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A description is given of *Alcyonidium reticulum* sp. nov. (Bryozoa: Ctenostomatida), a smooth-surfaced species found encrusting intertidal stones and on *Fucus serratus* in south-west Britain. It is distinguished from two superficially similar congeners, *A. gelatinosum* and *A. mytili*.

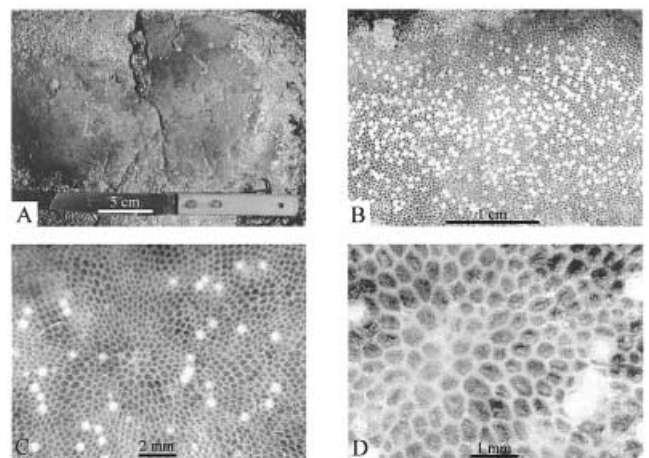
*Alcyonidium* (order Ctenostomatida) is a speciose genus of erect or encrusting, non-calcified bryozoans, widely distributed throughout temperate and polar waters in both hemispheres. The absence of skeleton leads to a paucity of distinctive characters for separating species, and recognition difficulties are compounded by an apparent tendency to cryptic speciation (Thorpe et al., 1978; Thorpe & Ryland, 1979). Characters such as tentacle number (Porter et al., 2000) and reproductive mode (Cadman & Ryland, 1996a,b), together with the dimensions of zooids and habitat preferences, are useful but have not always been included in descriptions. Some of Hayward's (1985) comprehensive accounts of British species have been invalidated by recent discoveries (Cadman & Ryland, 1996a,b; de Putron & Ryland, 1998). One group of species causing particular difficulty is that with smooth-surfaced encrusting colonies, of which Hayward (1985) recognized two: *A. gelatinosum* (L.) (= *A. polyoum*) and *A. mytili* Dalyell, both with larviparous reproduction but separated by habitat, and apparently distinguishable by enzyme electrophoresis (Thorpe et al., 1978). This situation was shown incorrect by the rediscovery of Dalyell's (1848) *A. mytili* in the Firth of Forth and the demonstration that it had oviparous reproduction (Cadman & Ryland, 1996a,b). This posed the question of the identity of the larviparous but little-known or recorded '*A. mytili*' of Hayward and earlier authors, and led us to make a comprehensive 5-y survey of encrusting species of *Alcyonidium* around British shores. We have recognized and distinguished a species, readily separable from *A. gelatinosum*, which is widespread and locally abundant on shores of the Bristol Channel and Milford Haven (de Putron & Ryland, 1998; Porter et al., 2000). This we describe as *A. reticulum* sp. nov. (referring to the pattern of white zooid walls). We are not yet able to determine whether it is the only additional species in western Europe, and are continuing to elucidate its taxonomic relationships using molecular genetic methods, and to study its geographical distribution, reproductive biology and ecology.

A specimen with abundant embryos on a rock from the south shore at Watwick Bay, Milford Haven (OS grid reference SM 817038 51°41.7'N 5°09.1'W), collected by J.S. Ryland and S. de Putron on 13 December 1996, has been designated holotype (BMNH 2000.2.15.1); another rock from the same locality, collected by J.S. Ryland and J.S. Porter, 7 February 1997, bears several paratype colonies (BMNH 2000.2.15.2).

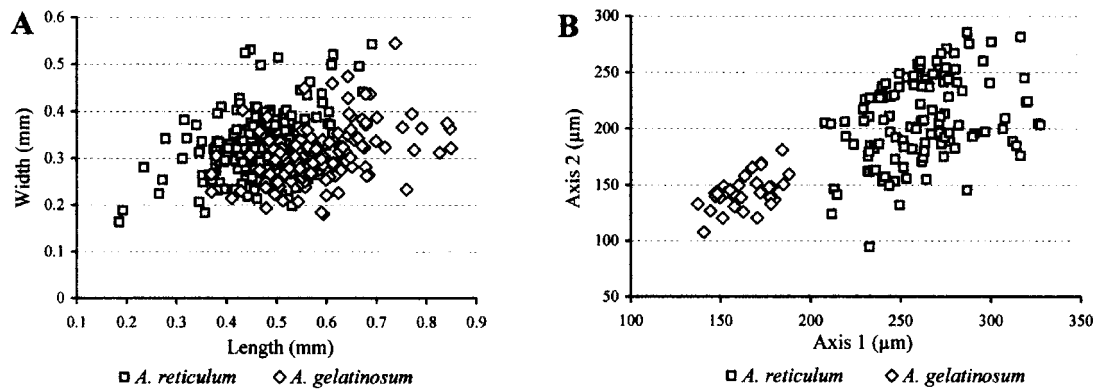
Description of *Alcyonidium reticulum*. Colony forming a unilaminar, opaque whitish, buff or brown crust, which can usually

be peeled off; variable in size, several cm<sup>2</sup> in the absence of dense settlement (Figure 1A). Autozooids rectangular–polygonal, flat or slightly convex, smooth surfaced, translucent when young; older zooids with distinct white margin and conspicuous walls, particularly during autumn–winter (Figure 1); generally in the range 0.3–0.5 × 0.2–0.4 mm (Figure 2A). Orifice subterminal, no oral papilla. Modal tentacle number 17 (–18), range 15–18; intertentacular organ (a ciliated funnel, between the adneurial tentacles, associated with sperm ingress) never present; polypides generally absent during the breeding season. Larviparous, with large oocytes and subspherical embryos present during autumn–winter, 200–300 µm diameter (Figure 2B) in clusters of 3–4; white to pink (Figure 1B–D), Munsell colour 2.5R 7/8 *in situ*, 2.5R 7/6 (Munsell Color Company, undated) when removed. On stones, shells, or *Fucus serratus* intertidally, usually on fairly sheltered shores; possibly also subtidal.

In the study area *A. reticulum* has been recorded by us from Milford Haven (Cleddau Bridge, Angle, West Angle, Dale and Watwick), Lydstep Haven, Tenby, Gower Peninsula (Port Eynon, Oxwich, Mumbles), Welsh side of Bristol Channel (Sully Island), Severn Estuary (Aust), and Somerset side of Bristol Channel (Watchet, Gore Point). The localities recorded from the upper



**Figure 1.** *Alcyonidium reticulum* sp. nov. (A) Large colony on boulder, low water of spring tides, Gore Point, Somerset, 6 October 1994; (B) a colony with embryos, locality as (A), 25 October 1995; (C) part of colony with embryos, Sully Island, Glamorgan, 5 December 1994; (D) enlarged centre portion of (C), showing the early astogeny.



**Figure 2.** Size differences between zooids and embryos of *Alcyonidium reticulum* sp. nov. and *A. gelatinosum*. (A) Zooid dimensions based on 50 measurements of *A. reticulum* from each of: Cleddau Bridge (8 March 1997), Dale, Watwick (11 March 1997) and Sully Island (5 December 1994); 50 measurements of *A. gelatinosum* from each of: Dale (11 March 1997), Padstow (18 February 1996), Menai Bridge (3 December 1996) and Helford River (19 February 1996). (B) Dimensions of embryos: 35 measurements of *A. reticulum* from Watwick; 119 measurements of *A. gelatinosum* from Dale (both 11 March 1997).

Bristol Channel by Boyden et al. (1977) under *A. polyoum* probably refer exclusively to this species.

Sympatric species of superficially similar appearance are *Alcyonidium gelatinosum* and *A. mytili*. *A. gelatinosum* is most commonly associated with *Fucus serratus*, where it may co-occur with *A. reticulum*. *Alcyonidium gelatinosum* colonies cannot easily be peeled off the *Fucus* thallus; it is further distinguished by its significantly longer zooids (generally 0.5–0.8 × 0.2–0.4 mm; Figure 2A); larger number of tentacles (mode 19–20, range 18–21; Porter et al., 2000); oocytes and embryos being coloured pale-buff (Munsell 7.5YR 8/4 *in situ*, 10.0YR 7/2 after removal) and significantly smaller (125–175 µm diameter; Figure 2B), spherical, in clusters of 6–7; and by having a different reproductive season (de Putron & Ryland, 1998), at least in south-west Wales. In Pembrokeshire, *A. reticulum* colonies contain conspicuous oocytes or embryos mainly between October and March, whereas in *A. gelatinosum* it is from April to August (de Putron & Ryland, 1998), though we have recorded them at Padstow during February. The fewer, larger embryos of *A. reticulum* are perhaps a consequence of the winter breeding and settlement season.

*Alcyonidium mytili* is found on shells (not exclusively *Mytilus edulis*), stones, and the stipes of *Laminaria hyperborea*, at extreme low water springs or subtidally, on shores with moderate wave action or subject to strong tidal currents; its colonies are very thin and translucent when young, thicker and opaque when older, often with distinct oral papillae. We have observed obvious, regularly spaced, exhalant ‘chimneys’ (see Banta et al., 1974; Cadman & Ryland, 1976b; Ryland, 2000), which do not seem to be present in either *A. gelatinosum* or *A. reticulum*; modal tentacle number 16, range 15–17 for 99.9% of lophophores (Cadman & Ryland, 1996b); an intertentacular organ present during autumn–winter months (Cadman & Ryland, 1996a); oviparous, the oocytes neither large nor conspicuous. Neither *A. gelatinosum* nor *A. mytili* develops conspicuous white walls, and their polypides do not degenerate throughout winter.

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