MarLIN
Marine Information Network
Information on the species and habitats around the coasts and sea of the British Isles

Ross (*Pentapora foliacea*)

MarLIN – Marine Life Information Network
Biology and Sensitivity Key Information Review

Angus Jackson

2016-06-08

A report from:
The Marine Life Information Network, Marine Biological Association of the United Kingdom.

Please note. This MarESA report is a dated version of the online review. Please refer to the website for the most up-to-date version [https://www.marlin.ac.uk/species/detail/1389]. All terms and the MarESA methodology are outlined on the website (https://www.marlin.ac.uk)

This review can be cited as:
Jackson, A. 2016. *Pentapora foliacea* Ross. In Tyler-Walters H. and Hiscock K. (eds) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. DOI https://dx.doi.org/10.17031/marlinsp.1389.1

(page left blank)

Small colony of *Pentapora fascialis*.
Photographer: Keith Hiscock
Copyright: Dr Keith Hiscock

See online review for distribution map

Distribution data supplied by the Ocean Biogeographic Information System (OBIS). To interrogate UK data visit the NBN Atlas.

Researched by	Angus Jackson	**Refereed by**	Dr Peter J. Hayward
Authority	(Ellis & Solander, 1786)		
Other common names	-	**Synonyms**	*Pentapora fascialis* (Pallas 1766), *Lepralia foliacea* (Ellis & Solander, 1786)

Summary

Description

A large, erect bryozoan deep orange in colour. The colony is attached to the substratum by an encrusting base and forms a mass of repeatedly dividing sheets in an open honeycomb structure. The edges of the sheets are wavy and convoluted. *Pentapora foliacea* has a growth rate of approximately 2 cm per year and lives for up to ten years. Colonies can reach up to 40 cm in diameter (more typically up to 20 cm across) and 10 cm in height. When dead, the deep orange colour fades to a pale buff.

Recorded distribution in Britain and Ireland

Common along the South coast of England as far east as Beachy Head. Also the south west, the western extremities of Wales and the Isle of Man. In Ireland present along the south west and north coasts. Scarce records from the Hebrides and St Kilda.

Global distribution

Pentapora foliacea is also recorded from the north coast of Morocco, but Mediterranean records require reassessment based on recent taxonomy (Lombardi *et al.*, 2010).

Habitat

Pentapora foliacea colonies grow on bedrock or large boulders in current swept areas, often surrounded by gravel and scoured by coarse sand. They may colonize coarse gravel and pebbles but do not grow to large colonies.

Depth range

11 - 80

Identifying features

- Colonies erect, forming orange-buff clumps up to about 15 cm across.
- Young zooids elongate-hexagonal, with scattered pores in frontal wall.
- Frontal wall covered with heavy additional calcification, outline becoming rectangular or broadly hexagonal.

Additional information

Sometimes misleadingly called "ross coral". The Species Directory of the British Isles (Howson & Picton, 1997) placed *Pentapora fascialis* in the family Hippoporinidae under the species name *Pentapora foliacea* but Hayward & Ryland (1999) conflated the species and suggested that *P. foliacea* was a junior synonym of *P. fascialis* (Lombardi *et al.*, 2010). Older classification schemes used the species *Lepralia foliacea*, e.g. the Plymouth Marine Fauna (Marine Biological Association 1957) and Bruce *et al.* (1963). But a recent study by Lombardi *et al.* (2010) concluded that *Pentapora foliacea* and *Pentpora fascialis* were distinct species and that *P. foliacea* was the resident species in the North East Atlantic while *P. fascialis* was included in the Mediterranean clade.

Due to the lack of information on these species and the taxonomic confusion in the literature, this review is based on information on both *Pentapora foliacea* and *P. fascialis*.

Listed by

NIPS

Further information sources

Search on:

G g G NBN WoRMS

Biology review

Taxonomy

Phylum	Bryozoa	Sea mats, horn wrack & lace corals
Class	Gymnolaemata	
Order	Cheilostomatida	
Family	Bitectiporidae	
Genus	Pentapora	
Authority	(Ellis & Solander, 1786)	
Recent Synonyms	Pentapora fascialis (Pallas 1766)Lepralia foliacea (Ellis & Solander, 1786)	

Biology

Typical abundance	Moderate density
Male size range	
Male size at maturity	
Female size range	Medium-large(21-50cm)
Female size at maturity	
Growth form	Foliose
Growth rate	2cm/year
Body flexibility	None (less than 10 degrees)
Mobility	
Characteristic feeding method	Active suspension feeder, Non-feeding
Diet/food source	
Typically feeds on	
Sociability	
Environmental position	Epibenthic
Dependency	No text entered.
Supports	Substratum A variety of bryozoan species, and other epibionts.
Is the species harmful?	No

Biology information

- Densities in the Bristol Channel have been recorded as up to one large colony per square metre. Populations in the Mediterranean have been recorded at densities of up to 7 colonies per square metre.
- *Pentapora fascialis* grows initially as an encrusting sheet, which seems able to regenerate erect growths (P.J. Hayward pers. comm.).
- Size ranges refer to colony diameter. Colony size is typically up to 20 cm in diameter and large specimens reach 40 cm across. The largest recorded specimen was from the Eddystone Light and had a circumference of over 2 metres and a depth of 30 cm (Hayward & Ryland, 1979). Specimens of *Pentapora fascialis* in the Mediterranean reach larger sizes (80cm diameter, 50 cm in height) in deeper waters (40-80 m).
- Colony shape has been described as 'depressed globular' or 'dome-like' with an elliptical

perimeter (Cocito *et al*., 1998(a)). Growth rates in the Bristol Channel have been estimated at around 2 cm (vertical height) per year through the use of stable oxygen isotope values (Patzold *et al*., 1987.). Another growth rate estimate (from the Mediterranean) indicates growth of over 200% colony surface area in 11 months (Cocito *et al*., 1998). Vertical growth has been recorded at up to 3.5 cm per year (Cocito & Ferdeghini, 1998 cited in Cocito *et al*., 1998).

- The calcified laminae are rather brittle.
- *Pentapora fascialis* characteristically supports several bryozoans including *Amphiblestrum flemingii*, *Callopora dumerilii*, *Membranipora nitida* & *Smittoidea reticulata* (Hayward & Ryland, 1979). Large colonies may shelter 1000's of other animals (Hayward & Ryland, 1979).

Habitat preferences

Physiographic preferences	Offshore seabed, Open coast
Biological zone preferences	Lower circalittoral, Lower infralittoral, Upper circalittoral
Substratum / habitat preferences	Artificial (man-made), Bedrock, Large to very large boulders
Tidal strength preferences	Moderately Strong 1 to 3 knots (0.5-1.5 m/sec.), Strong 3 to 6 knots (1.5-3 m/sec.)
Wave exposure preferences	Exposed, Moderately exposed, Sheltered, Very exposed
Salinity preferences	Full (30-40 psu)
Depth range	11 - 80
Other preferences	No text entered
Migration Pattern	Non-migratory / resident

Habitat Information

Off Lundy in the Bristol Channel, most common below 18 m and abundant between 25 -34 m (Hayward & Ryland, 1979). *Pentapora fascialis* is recorded as settling on artificial substrata in the Ligurian sea (Geraci, 1974 cited in Cocito *et al*., 1998(b)). *Pentapora foliacea* is recorded as being present (off the British Isles) in temperatures between 8 & 14 °C and salinity of 34.5 psu (Patzold *et al*., 1987).

Life history

Adult characteristics

Reproductive type	No information
Reproductive frequency	Annual protracted
Fecundity (number of eggs)	No information
Generation time	Insufficient information
Age at maturity	See additional information
Season	February - October
Life span	5-10 years

Larval characteristics

Larval/propagule type	-
Larval/juvenile development	Lecithotrophic
Duration of larval stage	< 1 day
Larval dispersal potential	No information
Larval settlement period	Insufficient information

Life history information

Pentapora foliacea and *P. fascialis* are closely related. Therefore, information from *P.fascialis* has been used to infer life history characteristics of *P. foliacea* due to the lack of species-specific information and the confusion in taxonomy between the two species.

- *Pentapora foliacea* is perennial (Eggleston, 1972a) and probably lives for several years. Stable oxygen isotope values have shown colonies to be at least 3 years old (Patzold *et al*., 1987) and other estimates of growth rate suggest that *Pentapora fascialis* colonies in the Mediterranean are 10 years old or more (Cocito *et al*., 1998(a)).
- In *Pentapora fascialis*, the presence/absence of ovicells is taken to be a reliable indicator of reproductive status and as such is a feature of sexual maturity (Cocito *et al*., 1998(b)). In the Skomer Marine Nature Reserve, *Pentapora foliacea* colonies were reported to have ovicells present in September, indicating a reproduction event in September or late August (Lock *et al*., 2006). Colonies of *Pentapora fascialis* as small as 2.8 cm have been recorded as having ovicells. Reproductive ability is gained at an early stage of colony development (Cocito *et al*., 1998(b)). Larval settling time is inferred from another Cheilostomata bryozoan species, *Bugula neritina* (Keough & Chernoff, 1987). Gautier (1962) records ovicells being present all year round. Cocito *et al*. (1998(b)) note the presence of ovicells in *Pentapora fascialis* in the northwestern Mediterranean from February to October.
- Patzold *et al*. (1987) record the formation of a growth band in *Pentapora foliacea* during times of reduced reproductivity. This growth check line appears during periods of colder water temperatures.

Sensitivity review

This MarLIN sensitivity assessment has been superseded by the MarESA approach to sensitivity assessment. MarLIN assessments used an approach that has now been modified to reflect the most recent conservation imperatives and terminology and are due to be updated by 2016/17.

Physical Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Substratum Loss	High	Moderate	Moderate	High

Pentapora foliacea is permanently attached to the seabed so substratum loss would result in death. Although being quite long-lived (10+ years) *Pentapora fascialis* is noted as having good reproductive and recolonization abilities, quite fast growth rates and gaining reproductive competency at an early stage (Cocito *et al*., 1998(b)). However, as the larval stage is potentially very short lived, dispersal distances may be limited (Keough & Chernoff, 1987). Local position of the adults can strongly affect the spatial pattern of larval settlement (Cocito et al 1998(b)). Following the almost total loss of a small population, Cocito *et al*., 1998(b)) recorded recovery and growth to original colony sizes taking only 3.5 years. In this case, reproductive adults remained nearby. If there are no remaining nearby adult populations then recovery may take much longer and so is assessed as moderate.

Smothering	Intermediate	Moderate	Moderate	Moderate

Pentapora foliacea is permanently attached to the seabed and so would be unable to avoid smothering. Although colonies of this species may reach considerable heights (50 cm in the Mediterranean), the sheet-like-structure is likely to retain any smothering sediment. Smaller colonies may be entirely killed whereas larger colonies that protrude through the smothering layer may lose only part of the colony. Smothering by encrusting epibiotic species may also occur (Cocoito *et al*. (1998(a)) recorded epibionts present on 50 % of the area of study quadrats in the Mediterranean). Epibionts can cause partial mortality of colonies. This effect is size dependent - proportions affected by epibionts is greater in larger colonies. Although being quite long-lived (10+ years) *Pentapora fascialis* is noted as having good reproductive and recolonization abilities, quite fast growth rates and gaining reproductive competency at an early stage (Cocito *et al*., 1998(b)). However, as the larval stage is potentially very short lived, dispersal distances may be limited (Keough & Chernoff, 1987). Local position of the adults can strongly affect the spatial pattern of larval settlement (Cocito et al 1998(b)). Following the almost total loss of a small population, Cocito *et al*., 1998(b)) recorded recovery and growth to original colony sizes taking only 3.5 years. In this case, reproductive adults remained nearby. If there are no remaining nearby adult populations then recovery may take much longer. Some evidence is available regarding the ability of this species to repair damage to colonies by epibiont smothering by regrowth of new zooids and strengthening of the base by thickening of lower zooid walls (Hayward and Ryland, 1979).

Increase in suspended sediment	Intermediate	High	Low	Moderate

Siltation has been recorded as causing partial colony mortality in populations of *Pentapora*

fascialis in the Mediterranean. Increases in siltation rate may cause loss of part of a population. Although being quite long-lived (10+ years) *Pentapora fascialis* is noted as having good reproductive and recolonization abilities, quite fast growth rates and gaining reproductive competency at an early stage (Cocito *et al*., 1998(b)). However, as the larval stage is potentially very short lived, dispersal distances may be limited (Keough & Chernoff, 1987). Local position of the adults can strongly affect the spatial pattern of larval settlement (Cocito *et al*., 1998(b)). Following the almost total loss of a small population, Cocito *et al*., 1998(b)) recorded recovery and growth to original colony sizes taking only 3.5 years. In this case, reproductive adults remained nearby. If there are no remaining nearby adult populations then recovery may take much longer. Some evidence is available regarding the ability of this species to repair damage to colonies by siltation by regrowth of new zooids and strengthening of the base by thickening of lower zooid walls (Hayward and Ryland, 1979).

Decrease in suspended sediment

Dessication	High	Moderate	Moderate	Low

The species is entirely subtidal and exposure to desiccating influences is likely to cause death. Although being quite long-lived (10+ years) *Pentapora fascialis* is noted as having good reproductive and recolonization abilities, quite fast growth rates and gaining reproductive competency at an early stage (Cocito *et al*., 1998(b)). However, as the larval stage is potentially very short lived, dispersal distances may be limited (Keough & Chernoff, 1987). Local position of the adults can strongly affect the spatial pattern of larval settlement (Cocito *et al*., 1998(b)). Following the almost total loss of a small population, Cocito *et al*., 1998(b)) recorded recovery and growth to original colony sizes taking only 3.5 years. In this case, reproductive adults remained nearby. If there are no remaining nearby adult populations then recovery may take much longer and so is assessed as moderate.

Increase in emergence regime	High	Moderate	Moderate	Low

The species is entirely subtidal and a period of emergence is likely to cause death. Although being quite long-lived (10+ years) *Pentapora fascialis* is noted as having good reproductive and recolonization abilities, quite fast growth rates and gaining reproductive competency at an early stage (Cocito *et al*., 1998(b)). However, as the larval stage is potentially very short lived, dispersal distances may be limited (Keough & Chernoff, 1987). Local position of the adults can strongly affect the spatial pattern of larval settlement (Cocito *et al*., 1998(b)). Following almost total loss of a small population, Cocito *et al*., 1998(b)) recorded recovery and growth to original colony sizes taking only 3.5 years. In this case, reproductive adults remained nearby. If there are no remaining nearby adult populations then recovery may take much longer.

Decrease in emergence regime

Increase in water flow rate	Low	Very high	Very Low	Low

The species inhabits environments with considerable water flow and is often found in areas scoured by sand. Decreases in water flow rate may interfere with feeding efficiency. Recovery of condition on the resumption of normal conditions should not take too long.

Decrease in water flow rate

Increase in temperature	Intermediate	High	Low	Low

Pentapora foliacea is found in warmer waters as far south the north coast of Morocco. The northernmost limits of the distribution are in the Minch off western Scotland. Once established, colonies are most likely able to withstand occasional lower or higher than normal temperatures, but long term decreases in temperature may cause distribution range to shrink. Although being quite long-lived (10+ years) *Pentapora fascialis* is noted as having good reproductive and recolonization abilities, quite fast growth rates and gaining reproductive competency at an early stage (Cocito *et al*., 1998(b)). However, as the larval stage is potentially very short lived, dispersal distances may be limited (Keough & Chernoff, 1987). Local position of the adults can strongly affect the spatial pattern of larval settlement (Cocito *et al*., 1998(b)). Following the almost total loss of a small population, Cocito *et al*., 1998(b)) recorded recovery and growth to original colony sizes taking only 3.5 years. In this case, reproductive adults remained nearby. If there are no remaining nearby adult populations then recovery may take much longer. Some evidence is available regarding the ability of this species to repair damage to the colony by regrowth of new zooids and strengthening of the base by thickening of lower zooid walls (Hayward and Ryland, 1979).

Decrease in temperature

Increase in turbidity	Tolerant	Not relevant	Not sensitive	High

The species has very low or no ability for visual perception and is unlikely to be sensitive to changes in turbidity.

Decrease in turbidity

Increase in wave exposure	Intermediate	High	Low	Moderate

The species can occur in fairly exposed conditions. However, extreme wave action, as in storms, has been noted to cause widespread destruction of colonies (Cocito *et al*., 1998(a)). Therefore, increases in wave exposure may cause damage to colonies. Although being quite long-lived (10+ years) *Pentapora fascialis* is noted as having good reproductive and recolonization abilities, quite fast growth rates and gaining reproductive competency at an early stage (Cocito *et al*., 1998(b)). However, as the larval stage is potentially very short lived, dispersal distances may be limited (Keough & Chernoff, 1987). Local position of the adults can strongly affect the spatial pattern of larval settlement (Cocito *et al*., 1998(b)). Following the almost total loss of a small population, Cocito *et al*. (1998(b)) recorded recovery and growth to original colony sizes taking only 3.5 years. In this case, reproductive adults remained nearby. If there are no remaining nearby adult populations then recovery may take much longer. Some evidence is available regarding the ability of this species to repair damage to the colony by regrowth of new zooids and strengthening of the base by thickening of lower zooid walls (Hayward and Ryland, 1979).

Decrease in wave exposure

Noise	Tolerant	Not relevant	Not sensitive	Low

It is unlikely that *Pentapora fascialis* has a particular intolerance to noise vibrations.

Visual Presence	Tolerant	Not relevant	Not sensitive	High

The species has very low or no ability for visual perception and is unlikely to be sensitive to changes in visual perception.

Abrasion & physical disturbance	High	Moderate	Moderate	High

The 'leaves' of a *Pentapora foliacea* colony are highly calcified and brittle. Physical abrasion can easily cause damage. *Pentapora foliacea* is noted as being tolerant of regular medium intensity disturbances (such as winter storms) but low frequency, high intensity disturbances such as freak storms cause mortality, particularly in shallower waters (Cocito *et al*., 1998(b)). The effects of diver frequentation have been monitored for *Pentapora fascialis* populations in the Mediterranean (Sala *et al*., 1996). Areas with heavy diving activity have greatly reduced densities of *Pentapora fascialis* and remaining colonies are frequently smaller and highly damaged. Colonies only survive in more protected locations such as under overhangs. In addition, *Pentapora* foliacea was reported to be damaged by scallop dredges and mobile fishing gear, pots and creels (Bullimore, 1985; DWT, 1993; Eno et al., 1996). Mobile gears also result in modification of the substratum, including removal of shell debris, cobbles and rocks, and the movement of boulders (Bullimore, 1985; Jennings & Kaiser, 1998). Therefore, intolerance has been assessed as high.

Although being quite long-lived (10+ years) *Pentapora fascialis* is noted as having good reproductive and recolonization abilities, quite fast growth rates and gaining reproductive competency at an early stage (Cocito *et al*., 1998b). However, as the larval stage is potentially very short lived, dispersal distances may be limited (Keough & Chernoff, 1987). Local position of the adults can strongly affect the spatial pattern of larval settlement (Cocito *et al*., 1998b). Following almost total loss of a small population, Cocito *et al*., 1998b) recorded recovery and growth to original colony sizes taking only 3.5 years. In this case, reproductive adults remained nearby. If there are no remaining nearby adult populations then recovery may take much longer.

Displacement	High	Moderate	Moderate	High

The colonies of *Pentapora fascialis* are permanently attached to the substratum. If displaced, the colony in not able to reform the attachment and death occurs. No information is available regarding the reproduction or dispersal abilities of this species so no assessment of recoverability can be made. However, the species may be quite long lived (10+ years) and slow growing (2 cm per year). Following loss of a population, growth to original colony sizes, after recolonization, may take some years.

Chemical Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Synthetic compound contamination				Not relevant

Insufficient information

Heavy metal contamination Not relevant

Insufficient information

Hydrocarbon contamination Not relevant

Insufficient information

Radionuclide contamination Not relevant

Insufficient information

Changes in nutrient levels Not relevant

Insufficient information

Increase in salinity	High	Moderate	Moderate	Moderate

The species only inhabits fully saline waters (Patzold *et al*., 1987) and exposure to salinity conditions outside of this range would probably result in death. Although being quite long-lived (10+ years) *Pentapora fascialis* is noted as having good reproductive and recolonization abilities, quite fast growth rates and gaining reproductive competency at an early stage (Cocito *et al*., 1998(b)). However, as the larval stage is potentially very short lived, dispersal distances may be limited (Keough & Chernoff, 1987). Local position of the adults can strongly affect the spatial pattern of larval settlement (Cocito *et al*., 1998(b)). Following the almost total loss of a small population, Cocito *et al*., 1998(b)) recorded recovery and growth to original colony sizes taking only 3.5 years. In this case, reproductive adults remained nearby. If there are no remaining nearby adult populations, as is likely with changes in salinity, then recovery may take much longer.

Decrease in salinity

Changes in oxygenation	Intermediate	High	Low	Low

There is no information regarding the tolerance of *Pentapora fascialis* to changes in oxygen concentration. However, Cole *et al*., (1999) suggest possible adverse effects on marine species below 4 mg/l and probable adverse effects below 2mg/l. Although being quite long-lived (10+ years) *Pentapora fascialis* is noted as having good reproductive and recolonization abilities, quite fast growth rates and gaining reproductive competency at an early stage (Cocito *et al*., 1998(b)). However, as the larval stage is potentially very short lived, dispersal distances may be limited (Keough & Chernoff, 1987). Local position of the adults can strongly affect the spatial pattern of larval settlement (Cocito *et al*., 1998(b)). Following almost total loss of a small population, Cocito *et al*., 1998(b)) recorded recovery and growth to original colony sizes taking only 3.5 years. In this case, reproductive adults remained nearby. If there are no

remaining nearby adult populations then recovery may take much longer. Some evidence is available regarding the ability of this species to repair damage to the colony by regrowth of new zooids and strengthening of the base by thickening of lower zooid walls (Hayward and Ryland, 1979).

Biological Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Introduction of microbial pathogens/parasites				Not relevant

Insufficient information

Introduction of non-native species				Not relevant

Insufficient information

Extraction of this species	Not relevant	Not relevant	Not relevant	High

The species has no commercial value (Sala *et al.*, 1996) and is highly unlikely to be extracted.

Extraction of other species	Tolerant	Not relevant	Not sensitive	Very low

Pentapora fascialis has no known obligate relationships. Extraction of other species is not likely to have any effect on *Pentapora fascialis* colonies.

Additional information

Importance review

Policy/legislation

Northern Ireland Priority Species ☑

Status

National (GB) importance	Not rare/scarce	**Global red list (IUCN) category**	-

Non-native

Native	-		
Origin	-	**Date Arrived**	-

Importance information

On rocky, current swept seabeds, the species is often a conspicuous and dominant component of the assemblage (Hayward & Ryland, 1979.). *Pentapora foliacea* is recorded as acting as host for a variety of other bryozoan species and shelter for quite high densities of other fauna (Hayward & Ryland, 1979)

Bibliography

Bruce, J.R., Colman, J.S. & Jones, N.S., 1963. *Marine fauna of the Isle of Man.* Liverpool: Liverpool University Press.

Cocito, S., Ferdeghini, F., & Sgorbini, S., 1998b. *Pentapora fascialis* (Pallas) [Cheilostomata: Ascophora] colonization of one sublittoral rocky site after sea-storm in the northwest Mediterranean. *Hydrobiologia*, **375/376**, 59-66.

Cocito, S., Sgarbini, S. & Bianchi, C.N., 1998a. Aspects of the biology of the bryozoan *Pentapora fascialis* in the northwestern Mediterranean. *Marine Biology*, **131**, 73-82.

Eggleston, D., 1972a. Patterns of reproduction in marine Ectoprocta off the Isle of Man. *Journal of Natural History*, **6**, 31-38.

Gautier, Y.V., 1962. Recherches ecologiques sur les bryozoares chilostomes en Mediterranee occidentale. *Recueil des travaux de la station marine d'Endoume*, **38**, 165-166.

Hayward, P., Nelson-Smith, T. & Shields, C. 1996. *Collins pocket guide. Sea shore of Britain and northern Europe.* London: HarperCollins.

Hayward, P.J. & Ryland, J.S. 1979. *British ascophoran bryozoans.* London: Academic Press.

Hayward, P.J. & Ryland, J.S. 1999. *Cheilostomatous Bryozoa. Part II Hippothooidea - Celleporoidea.* London: Academic Press.[Synopses of the British Fauna, no. 14. (2nd edition)]

Howson, C.M. & Picton, B.E., 1997. *The species directory of the marine fauna and flora of the British Isles and surrounding seas.* Belfast: Ulster Museum. [Ulster Museum publication, no. 276.]

JNCC (Joint Nature Conservation Committee), 1999. *Marine Environment Resource Mapping And Information Database (MERMAID): Marine Nature Conservation Review Survey Database.* [on-line] http://www.jncc.gov.uk/mermaid

Keough, M.J. & Chernoff, H., 1987. Dispersal and population variation in the bryozoan *Bugula neritina*. *Ecology*, **68**, 199 - 210.

Lock, K., Burton, M., Luddington, L. & Newman, P., 2006. Skomer Marine Nature Reserve project status report 2005/06. CCW Regional Report CCW/WW/05/9., Countryside Council for Wales.

Lombardi, C., Taylor, P.D. & Cocito, S., 2010. Systematics of the Miocene–Recent bryozoan genus *Pentapora* (Cheilostomata). *Zoological Journal of the Linnean Society*, **160** (1), 17-39. DOI: 10.1111/j.1096-3642.2009.00594.x

MBA (Marine Biological Association), 1957. *Plymouth Marine Fauna.* Plymouth: Marine Biological Association of the United Kingdom.

Patzold, J., Ristedt, H. & Wefer, G., 1987. Rate of growth and longevity of a large colony of *Pentapora foliacea* (Bryozoa) recorded in their oxygen isotope profiles. *Marine Biology*, **96**, 535-538.

Picton, B.E. & Costello, M.J., 1998. *BioMar* biotope viewer: a guide to marine habitats, fauna and flora of Britain and Ireland. [CD-ROM] *Environmental Sciences Unit, Trinity College, Dublin.*

Sala, E., Garrabon, J. & Zabala, M., 1996. Effects of diver frequentation on Mediterranean sublittoral populations of the bryozoan *Pentapora fascialis*. *Marine Biology*, **126**, 451-459.

Datasets

Centre for Environmental Data and Recording, 2018. Ulster Museum Marine Surveys of Northern Ireland Coastal Waters. Occurrence dataset https://www.nmni.com/CEDaR/CEDaR-Centre-for-Environmental-Data-and-Recording.aspx accessed via NBNAtlas.org on 2018-09-25.

Dorset Environmental Records Centre, 2018. Ross Coral Mapping Project - NBN South West Pilot Project Case Studies. Occurrence dataset:https://doi.org/10.15468/mnlzxc accessed via GBIF.org on 2018-09-25.

Manx Biological Recording Partnership, 2018. Isle of Man historical wildlife records 1990 to 1994. Occurrence dataset:https://doi.org/10.15468/aru16v accessed via GBIF.org on 2018-10-01.

NBN (National Biodiversity Network) Atlas. Available from: https://www.nbnatlas.org.

OBIS (Ocean Biogeographic Information System), 2019. Global map of species distribution using gridded data. Available from: Ocean Biogeographic Information System. www.iobis.org. Accessed: 2019-03-21