Star ascidian (*Botryllus schlosseri*)

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

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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/1340]. All terms and the MarESA methodology are outlined on the website (https://www.marlin.ac.uk)

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Colony of *Botryllus schlosseri* on rock.
Photographer: Keith Hiscock
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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	Dr Keith Hiscock	**Refereed by**	This information is not refereed.
Authority	(Pallas, 1766)		
Other common names	-	**Synonyms**	-

Summary

Description

Flat or fleshy colonies with zooids 2-4 mm across arranged in conspicuous star shaped systems, each with a central cloacal opening. Colonies vary greatly in colour including green, violet, brown and yellow.

Recorded distribution in Britain and Ireland

Found all around Britain and Ireland

Global distribution

Present from the Faeroe Islands and west and south Norway to the Mediterranean including the Adriatic and Black Seas. Also present in the western Atlantic from Maine to New Jersey and in Florida.

Habitat

Grows on a variety of stable substrata including algae and artificial substrata. Thrives in sheltered areas including docks. Although mainly found on the lower shore and in shallow depths, Berrill (1950) notes that it has been found at depths of several hundred metres.

Depth range

Intertidal to ca. 200m

Identifying features

- Gelatinous often colourful colonies.
- The zooids arranged as 'stars' 2-4 mm across.

Additional information

No text entered

Listed by

Further information sources

Search on:

Google Google NBN WoRMS

Biology review

Taxonomy

Phylum	Chordata	Sea squirts, fish, reptiles, birds and mammals
Class	Ascidiacea	Sea squirts
Order	Stolidobranchia	
Family	Styelidae	
Genus	Botryllus	
Authority	(Pallas, 1766)	
Recent Synonyms	-	

Biology

Typical abundance	
Male size range	1-20cm
Male size at maturity	
Female size range	Medium(11-20 cm)
Female size at maturity	
Growth form	Cushion
Growth rate	Data deficient
Body flexibility	
Mobility	
Characteristic feeding method	Active suspension feeder, Non-feeding
Diet/food source	
Typically feeds on	Suspended particulates.
Sociability	
Environmental position	Epifaunal
Dependency	Independent.
Supports	None
Is the species harmful?	No information

Biology information

Colonies that encrust algae may completely cover their substratum and appear pendant-like. Provides a source of food for cowries (*Trivia* spp.).

Habitat preferences

Physiographic preferences	Open coast, Offshore seabed, Strait / sound, Sea loch / Sea lough, Ria / Voe, Estuary, Enclosed coast / Embayment
Biological zone preferences	Lower eulittoral, Lower infralittoral, Sublittoral fringe, Upper circalittoral, Upper infralittoral
Substratum / habitat preferences	Bedrock, Cobbles, Large to very large boulders, Small 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.), Very Strong > 6 knots (>3 m/sec.), Very Weak (negligible), Weak < 1 knot (<0.5 m/sec.)
Wave exposure preferences	Exposed, Moderately exposed, Sheltered, Very exposed, Very sheltered
Salinity preferences	Full (30-40 psu), Variable (18-40 psu)
Depth range	Intertidal to ca. 200m
Other preferences	No text entered
Migration Pattern	Non-migratory / resident

Habitat Information

Populations in the western Atlantic may have arrived on shipping and it is likely that, as a fast-growing fouling organism, *Botryllus schlosseri* may spread readily to other parts of the world.

Life history

Adult characteristics

Reproductive type	Permanent (synchronous) hermaphrodite
Reproductive frequency	No information
Fecundity (number of eggs)	2-10
Generation time	<1 year
Age at maturity	c. 50 days
Season	Insufficient information
Life span	<1 year

Larval characteristics

Larval/propagule type	-
Larval/juvenile development	Lecithotrophic
Duration of larval stage	< 1 day
Larval dispersal potential	1 km -10 km
Larval settlement period	

Life history information

Up to eight eggs are produced per zooid. After fertilization and development to a tadpole stage, the tadpole is released and is free swimming for up to 36 hours (Berrill 1950; Berrill, 1975).

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	High	Moderate	High

Botryllus schlosseri is a sessile species dependant on the continued presence of the substratum to which it is attached. Removal of the substratum would remove the species. However, providing that suitable substratum remains after disturbance, settlement and growth from larvae is high.

Smothering	High	High	Moderate	Low

Botryllus schlosseri occurs in areas where high levels of smothering due to siltation may occur but is generally found where silt is unlikely to settle (down-facing or suspended surfaces) suggesting that it is intolerant of smothering. Smothering may prevent feeding and respiratory flows through the colony and the species may not survive burial. However, providing that suitable substratum is available after the smothering event is over, settlement and growth from larvae is high.

Increase in suspended sediment	High	High	Moderate	Moderate

Botryllus schlosseri occurs in areas where high levels of siltation and smothering may occur but is generally found where silt is unlikely to settle (down-facing or suspended surfaces) suggesting that it is intolerant of siltation. Silt may clog feeding and respiratory flows through the colony. However, providing that suitable substratum is available, settlement and growth from larvae is high.

Decrease in suspended sediment

Dessication	Intermediate	High	Low	Moderate

Botryllus schlosseri occurs only in shaded areas on the lower shore in the intertidal where the atmosphere remains damp. Exposure to air and sunshine (for instance if boulders with colonies are overturned) would be likely to destroy colonies. However, providing that suitable substratum is available after a desiccation event, settlement and growth from larvae is high.

Increase in emergence regime	Intermediate	High	Low	Moderate

Botryllus schlosseri occurs only in shaded areas on the lower shore in the intertidal where the atmosphere remains damp. Increased exposure to air would be likely to destroy colonies. However, providing that suitable substratum is available after a emergence event, settlement and growth from larvae is high.

Decrease in emergence regime

Increase in water flow rate	Intermediate	High	Low	Low

Water flow rate is important for maintaining colonies free of silt where they occur in sheltered areas. If water flow rate is decreased in such areas, and siltation occurs, colonies are likely to

be adversely affected. However, once a high water flow rate is regained, settlement and growth from larvae is high.

Decrease in water flow rate

Increase in temperature	Low	Very high	Very Low	Moderate

*Botryllus schlosseri*occurs from sub-arctic to warm temperate conditions and most likely tolerates a wide range of temperatures. Recolonization of suitable substrata would be rapid following once temperatures return to normal.

Decrease in temperature

Increase in turbidity	Low	Immediate	Not sensitive	Low

*Botryllus schlosseri*occurs in areas where high levels of turbidity occur although, as a passive suspension feeder, it may be susceptible to clogging (see siltation above). Increased turbidity may decrease phytoplankton productivity which may indirectly decrease food availability. Recolonization of suitable substrata would be rapid once turbidity returned to normal.

Decrease in turbidity

Increase in wave exposure	Intermediate	Moderate	Moderate	Low

Increase in wave exposure or storm events would remove predominantly the plants on which *Botryllus schlosseri* grows and therefore incidentally *Botryllus schlosseri*. Speed of recovery would depend on regrowth rates of the plant substrata.

Decrease in wave exposure

Noise	Tolerant	Not relevant	Not sensitive	High

Botryllus schlosseri has no organs for detecting noise.

Visual Presence	Tolerant	Not relevant	Not sensitive	Moderate

Botryllus schlosseri has no organs for visual perception.

Abrasion & physical disturbance	Intermediate	High	Low	Low

Abrasion from sand is likely to be tolerated and *Botryllus schlosseri* occurs attached to algae on surf beaches. However, abrasion caused by mobile hard substrata, and anchor or dredge, is likely to remove colonies. Recolonization of suitable substrata would be rapid following cessation of abrasion.

Displacement	High	Moderate	Moderate	Low

Botryllus schlosseri is permanently attached to the substratum and displacement is likely to have the same effect as substratum loss. Speed of recolonization would depend on the presence of suitable substrata.

Chemical Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Synthetic compound contamination		Not relevant		Not relevant

Recolonization following cessation of exposure to a damaging non-persistent chemical is likely to be rapid.

Heavy metal contamination		Not relevant	Not relevant

Recolonization following cessation of exposure to a damaging non-persistent chemical is likely to be rapid.

Hydrocarbon contamination Not relevant Not relevant

Recolonization following cessation of exposure to a damaging non-persistent hydrocarbon is likely to be rapid.

Radionuclide contamination Not relevant Not relevant

No recorded adverse effects of radionuclides on *Botryllus schlosseri* or similar species have been found.

Changes in nutrient levels Low High Low Very low

No recorded adverse effects of nutrients on *Botryllus schlosseri* or similar species were found.

Increase in salinity Intermediate High Low Moderate

Botryllus schlosseri lives in enclosed waters including docks and in estuaries where salinity is variable. However, its absence from low salinity conditions in upper estuaries and lagoons suggests that colonies will be intolerant of low salinities. Recolonization following cessation of exposure to low salinity is likely to be rapid.

Decrease in salinity

Changes in oxygenation Intermediate High Low Very low

Botryllus schlosseri lives in habitats where periods of calm conditions may result in short term reduced oxygen levels. However, no studies relevant to de-oxygenation effects have been found.

Biological Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Introduction of microbial pathogens/parasites		High		Very low

No information was found concerning pathogens or parasites in *Botryllus schlosseri*.

Introduction of non-native species	Tolerant*	Not relevant	Not sensitive*	Low

Some non-native species (*Sargassum muticum*) provide additional substrata for colonization.

Extraction of this species	Not relevant	Not relevant	Not relevant	High

This species is not targeted for extraction.

Extraction of other species	High	Moderate	Moderate	Low

Extraction of algae on which *Botryllus schlosseri* grows will remove the *Botryllus schlosseri*. Colonization of new algal substrata will be high once algae have grown.

Additional information

No text entered

Importance review

Policy/legislation

- no data -

Status

National (GB) importance	-	**Global red list (IUCN) category**	-

Non-native

Native	-		
Origin	-	**Date Arrived**	Not relevant

Importance information

-none-

Bibliography

Berrill, N.J., 1950. *The Tunicata with an account of the British species.* London: Ray Society.

Berrill, N.J., 1975. Chordata: Tunicata. In *Reproduction of marine Invertebrates*, vol. II, (ed. A.C. Geise & J.S. Pearse), pp. 241-282. New York: Academic Press.

Chadwick-Furman, N.E., & Weissman, I.L., 1995. Life histories and senescence of *Botryllus schlosseri* (Chordata: Ascidiacea) in Monterey Bay. *Biological Bulletin, Marine Biological Laboratory, Woods Hole*, **189**, 36-41.

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.]

Rumohr, H. & Kujawski, T., 2000. The impact of trawl fishery on the epifauna of the southern North Sea. *ICES Journal of Marine Science*, **57**, 1389-1394.

Datasets

Bristol Regional Environmental Records Centre, 2017. BRERC species records recorded over 15 years ago. Occurrence dataset: https://doi.org/10.15468/h1ln5p accessed via GBIF.org on 2018-09-25.

Centre for Environmental Data and Recording, 2018. IBIS Project Data. Occurrence dataset: https://www.nmni.com/CEDaR/CEDaR-Centre-for-Environmental-Data-and-Recording.aspx accessed via NBNAtlas.org on 2018-09-25.

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.

Cofnod – North Wales Environmental Information Service, 2018. Miscellaneous records held on the Cofnod database. Occurrence dataset: https://doi.org/10.15468/hcgqsi accessed via GBIF.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.

Environmental Records Information Centre North East, 2018. ERIC NE Combined dataset to 2017. Occurrence dataset: http://www.ericnortheast.org.uk/home.html accessed via NBNAtlas.org on 2018-09-38

Fenwick, 2018. Aphotomarine. Occurrence dataset http://www.aphotomarine.com/index.html Accessed via NBNAtlas.org on 2018-10-01

Fife Nature Records Centre, 2018. St Andrews BioBlitz 2014. Occurrence dataset: https://doi.org/10.15468/erweal accessed via GBIF.org on 2018-09-27.

Fife Nature Records Centre, 2018. St Andrews BioBlitz 2015. Occurrence dataset: https://doi.org/10.15468/xtrbvy accessed via GBIF.org on 2018-09-27.

Fife Nature Records Centre, 2018. St Andrews BioBlitz 2016. Occurrence dataset: https://doi.org/10.15468/146yiz accessed via GBIF.org on 2018-09-27.

Kent Wildlife Trust, 2018. Biological survey of the intertidal chalk reefs between Folkestone Warren and Kingsdown, Kent 2009-2011. Occurrence dataset: https://www.kentwildlifetrust.org.uk/ accessed via NBNAtlas.org on 2018-10-01.

Kent Wildlife Trust, 2018. Kent Wildlife Trust Shoresearch Intertidal Survey 2004 onwards. Occurrence dataset: https://www.kentwildlifetrust.org.uk/ accessed via NBNAtlas.org on 2018-10-01.

Manx Biological Recording Partnership, 2017. Isle of Man wildlife records from 01/01/2000 to 13/02/2017. Occurrence dataset: https://doi.org/10.15468/mopwow accessed via GBIF.org on 2018-10-01.

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.

Manx Biological Recording Partnership, 2018. Isle of Man historical wildlife records 1995 to 1999. Occurrence dataset: https://doi.org/10.15468/lo2tge accessed via GBIF.org on 2018-10-01.

Merseyside BioBank., 2018. Merseyside BioBank (unverified). Occurrence dataset: https://doi.org/10.15468/iou2ld accessed via GBIF.org on 2018-10-01.

National Trust, 2017. National Trust Species Records. Occurrence dataset: https://doi.org/10.15468/opc6g1 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

Outer Hebrides Biological Recording, 2018. Invertebrates (except insects), Outer Hebrides. Occurrence dataset: https://doi.org/10.15468/hpavud accessed via GBIF.org on 2018-10-01.

South East Wales Biodiversity Records Centre, 2018. SEWBReC Marine and other Aquatic Invertebrates (South East Wales).

Occurrence dataset:https://doi.org/10.15468/zxy1n6 accessed via GBIF.org on 2018-10-02.

Yorkshire Wildlife Trust, 2018. Yorkshire Wildlife Trust Shoresearch. Occurrence dataset: https://doi.org/10.15468/1nw3ch accessed via GBIF.org on 2018-10-02.