

## ***Ascidia aspersa***

**System:** Marine

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Asciidae	Enterogona	Asciidae

**Common name** dirty sea squirt (English), European sea squirt (English), ascidie sale (French), vuilwitte zakpijp (Dutch), Spritz-Ascidie (German), ruwe zakpijp (Dutch)

**Synonym** *Ascidia aculeata*, (Alder, 1863)  
*Ascidia affinis*, (Hancock, 1870)  
*Ascidia albida*, (Alder & Hancock, 1848)  
*Ascidia aspersa*, (Müller, 1776)  
*Ascidia elliptica*, (Alder & Hancock, 1848)  
*Acidia expansa*, (Kiaer, 1893)  
*Ascidia minuta*, (Kiaer, 1893)  
*Ascidia normanni*, (Alder & Hancock, 1870)  
*Ascidia opalina*, (Macgillivray, 1843)  
*Ascidia patula*, (Müller, 1776)  
*Ascidia pedunculata*, (Hoffman, 1829)  
*Ascidia pellucida*, (Alder & Hancock, 1848)  
*Ascidia pustulosa*, (Alder, 1863)  
*Ascidia scabra*, (Müller, 1776)  
*Ascidia sordida*, (Alder & Hancock, 1848)  
*Ascidia triangularis*, (Herdman, 1881)  
*Ascidia truncata*, (Herdman, 1881)  
*Ascidia aspersa*, (Kiaer, 1893)  
*Ascidia cristata*, (Roule, 1884)  
*Phallusia aspersa*, (Traustedt, 1883)  
*Phallusia cristata*, (Risso, 1826)

**Similar species** *Styela clava*, *Ciona intestinalis*, *Molgula spp.*, *Ascidia scabra*

## **Summary**

*Ascidia aspersa* (European sea squirt) is a solitary marine and estuarine tunicate that is native from Norway to the Mediterranean. It is a suspension filter-feeder and was introduced via fouling on the hulls of ships to the northwest coast of the Atlantic, India, Australia and New Zealand. Commonly called the European sea squirt, it has become a moderate to serious threat by displacing native fauna.



[view this species on IUCN Red List](#)

## **Species Description**

*Ascidia aspersa* (European sea squirt) is a marine organism classified as a tunicate. The classification comes from a transparent, thick and rough (Curtis, 2005) cartilaginous tunic that covers the body of the adult organism (de Kluijver, 2004). The surface of the tunicate is rough and finely papillated (de Kluijver, 2004), greyish-black to brown (Curtis, 2005) with two siphons, a terminal brachial siphon, and an atrial siphon located up to one-third the length of the body away from the terminal siphon (de Kluijver, 2004). The brachial siphon is 6-8 lobed, while the atrial siphon is 6 lobed (de Kluijver, 2004). The siphons may be frilled (Curtis, 2005). The intestinal gut is located to the left of the brachial sac with numerous rows of straight stigmata (de Kluijver, 2004).

## Lifecycle Stages

*Ascidia aspersa* (European sea squirt) has a lifespan of 18 months, from mid-summer to the following year's winter (Millar, 1952). In early to mid-summer larval settlement and metamorphosis occurs and takes approximately 24 hours at 20°C (NIMPIS, 2010). Growth is continued through the fall and into the winter, although growth in winter is reduced. Upon reaching a size of 30mm, the male sexual organs begin to fill with sperm and at a much bigger size the female eggs begin to fill the oviducts. At a size of 40mm, both sex organs are fully mature (Millar, 1952). One spawning season occurs, usually one year after larval settlement (Millar, 1952). Under laboratory conditions (Bolton, 1996), there was an observed synchronous response to light in the spawning of ascidians.

## Habitat Description

*Ascidia aspersa* (European sea squirt) is a solitary tunicate but often forms unfused colonies in close association with each other (Curtis, 2005). It can tolerate salinities from 18-40 ppt (NIMPIS, 2010). This species establishes in subtidal and low water depth, with maximum settlement depth of 90m (de Kluijver, 2004). It can establish on soft muds but is commonly found associated with hard substrates, like pier pylons (Currie, 1998), rocks, docks, etc. (Pederson, 2003). *A. aspersa* is found in low energy habitats, like estuaries, harbours and semi-enclosed embayments that protect them from strong currents and tidal forces (NIMPIS, 2010). Establishment is not inhibited by native fauna for substrate sites (Osman, undated). The establishment of *A. aspersa* is increasing as global and ocean water temperatures increase (Stachowicz, 2002).

## Reproduction

*Ascidia aspersa* (European sea squirt) is hemaphroditic, containing both male and female sex organs, although the male sex organs develop first (Millar, 1952). In spring to early summer both male and female gametes are released into the water column where fertilisation takes place (NIMPIS, 2010). Chemotaxis interactions occur between sperm and egg, with homospecific chemical signalling of the egg, increasing sperm activity in the water column (Bolton, 1996). Larva go through a brief free-swimming stage and then quickly metamorphose into a juvenile and begin settlement (NIMPIS, 2010).

## Nutrition

*Ascidia aspersa* (European sea squirt) is a filter-feeding organism (Currie, 1998) with a brachial siphon that regulates inflowing water and an atrial siphon that controls water release (de Kluijver, 2004).

## General Impacts

*Ascidia aspersa* (European sea squirt) has several impacts on the environment, mainly in the form of affecting the native fauna. The tunicate can form large populations and subsequent high amounts of biomass (Pederson et al. 2003), which redirects energy pathways to decomposers and not to higher trophic communities because it lacks many predators (Currie, 1998). It also directly competes with other native filter-feeding fauna of economic importance like scallops, mussels and oysters (Currie, 1998).

## Management Info

**Chemical:** Copper based anti-fouling paints have minimal affect on *Ascidia aspersa* (European sea squirt). The use of copper compounds is not cost effective under broad applications and is nonspecific, so open sea applications is both illegal and not recommended (McEnnulty et al. 2001).

## Pathway

*Ascidia aspersa* (European sea squirt) could have been accidentally introduced through aquaculture materials (Carlton, 2003). Ship ballast water is also considered a potential pathway for *Ascidia aspersa* (European sea squirt) introduction into the New England area (Carlton, 2003). *Ascidia aspersa* (European sea squirt) was first detected in New England in the 1980s, introduced by hull fouling (Carlton, 2003).

**Principal source:** de Kluijver, M.J., & Ingalsuo S.S., Feb. 4, 2004, Macrofauna of the North Sea-Tunicata, Zoological Museum, University of Amsterdam;  
Currie, D.R., McArthur, M.A., & Cohen, B.F., Sept. 1998, Exotic Marine Pests in the Port of Geelong, Victoria, Marine and Freshwater Resources Institute, Report no. 8.;  
Hewitt, C.L., Martin, R.B., Sliwa, C., McEnnulty, F.R., Murphy, N.E., Jones, T. & Cooper, S., editors, 2002, National Introduced Marine Pest Information System (NIMPIS), [online database].

**Compiler:** National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG)

**Review:** Expert review underway: Dr. Richard Osman, Senior Scientist Smithsonian Environmental Research Center., Edgewater, Maryland, USA

**Publication date:** 2010-03-10

## ALIEN RANGE

[4] AUSTRALIA  
[1] NEW ZEALAND

[1] INDIA  
[8] UNITED STATES

## BIBLIOGRAPHY

20 references found for ***Ascidia aspersa***

### Management information

Carlton, J.T., 2003, Community assembly and historical biogeography in the North Atlantic Ocean: the potential role of human-mediated dispersal vectors, *Hydrobiologia*, 503, pp.1-8.

**Summary:** This article gave accounts of how *A. aspersa* was introduced into North America and what common dispersal mechanisms and how the rate of introductions are influenced through history.

[Centre for Environment, Fisheries & Aquaculture Science \(CEFAS\), 2008. Decision support tools-Identifying potentially invasive non-native marine and freshwater species: fish, invertebrates, amphibians.](#)

**Summary:** The electronic tool kits made available on the Cefas page for free download are Crown Copyright (2007-2008). As such, these are freeware and may be freely distributed provided this notice is retained. No warranty, expressed or implied, is made and users should satisfy themselves as to the applicability of the results in any given circumstance. Toolkits available include 1) FISK- Freshwater Fish Invasiveness Scoring Kit (English and Spanish language version); 2) MFISK- Marine Fish Invasiveness Scoring Kit; 3) MI-ISK- Marine invertebrate Invasiveness Scoring Kit; 4) FI-ISK- Freshwater Invertebrate Invasiveness Scoring Kit and AmphISK- Amphibian Invasiveness Scoring Kit. These tool kits were developed by Cefas, with new VisualBasic and computational programming by Lorenzo Vilizzi, David Cooper, Andy South and Gordon H. Copp, based on VisualBasic code in the original Weed Risk Assessment (WRA) tool kit of P.C. Pheloung, P.A. Williams & S.R. Halloy (1999).

The decision support tools are available from:

<http://cefas.defra.gov.uk/our-science/ecosystems-and-biodiversity/non-native-species/decision-support-tools.aspx> [Accessed 13 October 2011]

The guidance document is available from [http://www.cefas.co.uk/media/118009/fisk\\_guide\\_v2.pdf](http://www.cefas.co.uk/media/118009/fisk_guide_v2.pdf) [Accessed 13 January 2009].

[Connecticut Aquatic Nuisance Species Working Group, 2005. Connecticut Aquatic Nuisance Species Management Plan.](#)

**Summary:** A brief management plan guideline that does not give any real options in management, but calls for further research into management plans and how to address the lack of control on establishment.

Available from: <http://www.ctiwr.uconn.edu/ProjANS/SubmittedMaterial2005/Material200601/ANS%20Plan%20Final%20Draft121905.pdf> [Accessed on 12 February 2007].

[McEnnulty, F.R., Jones, T.E., & Bax, N.J., June 2001. Copper Compounds, Web-Based Rapid response Toolbox, Web-publication, \[online\].](#)

**Summary:** Chemical control using copper based paints along with the side effects and restrictions.

Available from: <http://www.marine.csiro.au/crmp/NIMPIS/controlDetail.asp?ID=87> [Accessed on 12 February 2007].

### General information

[Berrill, N.J., undated. The Identification and Validity of Certain Species of Ascidians, Journal of the Marine Biological Association of the United Kingdom, pp.159-175.](#)

**Summary:** The article here describes the differences between *Ascidia aspersa* and *Ascidia scabra*.

Available from: [http://sabella.mba.ac.uk/579/01/The\\_identification\\_and\\_validity\\_of\\_certain\\_species\\_of\\_ascidians.pdf](http://sabella.mba.ac.uk/579/01/The_identification_and_validity_of_certain_species_of_ascidians.pdf) [Accessed on 12 February 2007].

[Bolton, T.F., & Havenhand, J.N., June, 1996. Chemical Mediation of Sperm Activity and Longevity in the Solitary Ascidians \*Ciona intestinalis\* and \*Ascidia aspersa\*, \*Biol. Bull.\*, 190, pp. 329-335.](#)

**Summary:** An article describing the chemical interaction of sperm and egg of *A. aspersa*, as well as competitive factors in external fertilization.

Available from: <http://www.biolbull.org/cgi/reprint/190/3/329.pdf> [Accessed on 12 february 2007].

Global Invasive Species Database (GISD) 2026. Species profile *Ascidia aspersa*. Available from:

<https://www.iucngisd.org/gisd/species.php?sc=1126> [Accessed 03 February 2026]

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[Costello, M.J., Bouchet, P., Boxshall, G., Emblow, C., Vanden Berghe, E., 2004. European Register of Marine Species, \[online database\].](#)

**Summary:** This database was cited as a reference to the common names associated with *Ascidia aspersa*.

Available from: <http://www.marbef.org/data/aphia.php?p=taxdetails&id=103718> [Accessed on 6 February 2007].

Currie, D.R., McArthur, M.A., & Cohen, B.F., Sept. 1998, Exotic Marine Pests in the Port of Geelong, Victoria, Marine and Freshwater Resources Institute, Report no. 8.

**Summary:** An excellent article on the physical description and habitat qualities of *A. aspersa*. It also mentions regions that it is both native and introduced, and discusses some ecological impacts.

[Curtis, L., 2005. \*Ascidia aspersa\*. A sea squirt. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme \[online\]. Plymouth: Marine Biological Association of the United Kingdom.](#)

**Summary:** This website gave a brief physical description, along with some habitat tolerances and the native distribution.

Available from: <http://www.marlin.ac.uk/species/Ascidiaaspersa.htm> [Accessed on 12 February 2007].

de Kluijver, M.J., & Ingalsuo S.S., Feb. 4, 2004, Macrofauna of the North Sea-Tunicata, Zoological Museum, University of Amsterdam

**Summary:** This site offers a detailed physical description of *Ascidia aspersa*.

[ITIS \(Integrated Taxonomic Information System\), 2005. Online Database \*Ascidia aspersa\*](#)

**Summary:** An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals.

Available from: [http://www.itis.gov/servlet/SingleRpt/SingleRpt?search\\_topic=TSN&search\\_value=159213](http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=159213) [Accessed 6 February 2007]

[Millar, R.H., 1952. The Annual Growth and Reproductive Cycle in Four Ascidians, \*Journal of the Marine Biological Association of the United Kingdom\*, vol. 31, no. 1, pp. 41-61.](#)

**Summary:** This journal article gave the most detailed account of the reproductive cycles of *Ascidia aspersa*.

Available from: [http://sabella.mba.ac.uk/1498/01/The\\_annual\\_growth\\_and\\_reproductive\\_cycle\\_in\\_four\\_ascidians.pdf](http://sabella.mba.ac.uk/1498/01/The_annual_growth_and_reproductive_cycle_in_four_ascidians.pdf) [Accessed on 12 February 2007].

[NIMPIS, 2010. \*Ascidia aspersa\* general information. National Introduced Marine Pest Information System.](#)

**Summary:** Available from: <http://adl.brs.gov.au/marinepests/index.cfm?fa=main.spDetailsDB&sp=6000005711#generallInfo> [Accessed March 10 2010]

[Osman, R.W. & Whitlatch, R.B. 1999. Ecological interactions of invading ascidians within epifaunal communities of Southern New England. In Abstracts: First National Conference on Marine Bioinvasions, January 24-27, 1999. Massachusetts Institute of Technology, Cambridge, MA](#)

**Summary:** Study into the ecology of four invading ascidians.

Available from: [http://massbay.mit.edu/publications/marinebioinvasions/mbi1\\_abstracts.pdf](http://massbay.mit.edu/publications/marinebioinvasions/mbi1_abstracts.pdf) [Accessed 8 February 2008]

Osman, R.W. & Whitlatch, R.B., undated, Ecological factors controlling the successful invasion of three species of ascidians into marine subtidal habitats of New England, CSA Illumina.

**Summary:** Only the abstract for this article was available through CSA Illumina journal database, a date is probably available for this article, but unable to locate with link information. The abstract was brief but gave introduced locations in the United States and listed key predator species.

[Pederson, J., & Adams, C., April 12, 2003, MIT Sea Grant, Center for Coastal Resources, \*Ascidia aspersa\*.](#)

**Summary:** A site giving basic information on the description and distribution of the tunicate and other marine organisms.

Available from: [http://massbay.mit.edu/exoticspecies/exoticmaps/descriptions\\_intro.html](http://massbay.mit.edu/exoticspecies/exoticmaps/descriptions_intro.html) [Accessed on 12 February 2007].

Pederson, J., Bullock, R., Carlton, J., Dijkstra, J., Dobroski, N., Dyrynda, P., Fisher, R., Harris, L., Hobbs, N., Lambert, G., Lazo-Wasem, E., Mathieson, A., Miglietta, M-P., Smith, J., Smith III, J., & Tyrrell, M., August 3-9, 2003, Marine Invaders in the Northeast, Rapid Assessment Survey of Non-native and Native Marine Species of Floating Dock Communities.

**Summary:** This report gives details on distribution of *Ascidia aspersa* in the New England area of the United States.

[Salem Sound Coastwatch, undated, MA Executive Office of Environmental Affairs, Office of Coastal Zone Management, U.S. Fish and Wildlife Service.](#)

**Summary:** A factsheet put out by the US Fish and Wildlife describing the habitat, distribution, physical description, and commonly confused species and the differences between them.

Available from: [http://www.mass.gov/czm/invasives/docs/invaders/a\\_aspersa.pdf](http://www.mass.gov/czm/invasives/docs/invaders/a_aspersa.pdf) [Accessed on 12 February 2007].

[Stachowicz, J.J., Terwin, J.R., Whitlatch, R.B., & Osman, R.W., Nov. 26, 2002, Linking climate change and biological invasions: Ocean warming facilitates nonindigenous species invasions, \*PNAS\*, vol. 99, no. 24, pp. 15497-15500.](#)

**Summary:** An interesting article relating the effects of global warming to recent increases in establishment of invasive marine organisms. Referenced for the general impacts *Ascidia aspersa* has on recently invaded areas.

Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1403333/> [Accessed 12 February 2007]

[Whitlatch, R.B. and Osman, R.W. 1999. Geographical distributions and organism-habitat associations of shallow-water introduced marine fauna in New England. In Abstracts: First National Conference on Marine Bioinvasions, January 24-27, 1999. Massachusetts Institute of Technology, Cambridge, MA](#)

**Summary:** Report into the distribution of some invasive benthic species in New England, USA

Available from: [http://massbay.mit.edu/publications/marinebioinvasions/mbi1\\_abstracts.pdf](http://massbay.mit.edu/publications/marinebioinvasions/mbi1_abstracts.pdf) [Accessed 8 February 2008]