Ostrea edulis 正體中文

System: Marine

Kingdom	Phylum	Class	Order	Family
Animalia	Mollusca	Bivalvia	Ostreida	Ostreidae

Common name istiride (English, Turkmenistan), stridia (English, Bulgaria), edible oyster (English), ustritsa (English, Russia), hu&#65533;tre comestible (French), eetbare oester (Dutch), Essbare euster (German), European oyster (English), platte oester (Dutch), European flat oyster (English), native oyster (English), hu&#65533;tre plate Europ&#65533;enne (French), ostra Europa (Spanish), common oyster (English), oester (Dutch), stridie (English, Romania)

Synonym *Ostrea taurica* , Krynicki 1837
Ostrea adriatica , Lam-Middendorff 1848

Similar species *Crassostrea virginica*

Summary Ostrea edulis (the European flat oyster) is native to Europe and the Mediterranean. It has been introduced to the northwestern Atlantic Ocean for aquaculture. Usually found in muddy areas, Ostrea edulis has long been harvested for food. Overharvesting of Ostrea edulis in its native range, however, has caused it to be reintroduced to Europe. While in Atlantic waters, Ostrea edulis became infected with the disease bonamiasis (Bonamia ostrae). This disease has caused widespread mortality in the vast majority of Ostrea edulis.

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Species Description
O. edulis is a hermaphroditic (Mirella de Silva *et al*. 2005) bivalve mollusk with a distinct beak that is patterned with delicated foliation. *O. edulis* can grow up 20cm or more and live up to 20 years. *O. edulis* is ovular and has a rough scaly surface with two distinct halves. The two halves of the shell are different shaped; the left shell is concave and attached to the substratum and the right is flat with tough edges and acts as a lid for the left shell. Its right valve is cream-coloured with light brown or blue circular bands. The inner surface of *O. edulis* is smooth and white or bluish-grey and shiny with some dark blue spots. At the narrow ends of the shell are stretch ligaments that hold the shells together. \"A large central muscle serves to close the valve against the pull of the ligament.\" The outer shell is composed of flaky layers which may include laminar and hollow chambers. *O. edulis* contains a creamy beige to pale grey meat that is slightly salty or bland in taste. The meat's texture can be tender or firm. (FIGIS(a), 2006)

Notes
The bacteria *Nocardia crassostreae* infects *O. edulis* and makes it heat sensitive. Oyster herpesvirus infects *O. edulis* and results in larval and seed mortality (Ruesink *et al*. 2005). *O. edulis* is threatened by two introduced species in its native range, *Urosalpinx cinerea* (drill shellfish) and *Crepidula fornicata*. The United Kingdom has listed *O. edulis* as a priority species in the UK Biodiversity Action Plan (ARKive, 2006). Between 1957 and 1959, 16,000 of this species was imported from Conway, North Wales, to St. Andrews and Ellersie, Prince Edward Island (Vercaemer *et al*. 2003).

Lifecycle Stages
Temperature affects *O. edulis*, making the species exist as a series of physiological races. In Spain, one low temperature race occurs where 12º-13ºC is required for spawning. A temperature of 25ºC is required in the Norwegian fjords for spawning and in France, *O. edulis* spawns between 14º-16ºC (FIGIS(a), 2006). Once hatched, larvae (called trocophores at this stage) (Weichtiere, undated) are about 160µm in size and spend 8-10 days in a pelagic state before settlement (FIGIS(a), 2006). In this pelagic state, *O. edulis* goes through 2 metamorphoses. After the first metamorphosis, the trocophore transforms into a veligar with 2 ciliated snail-like protrusions. A second metamorphosis changes the veligar into a bivalve small oyster that uses its byssus threads to cling to a suitable substrate (TCO, undated). Prior to substrate attachment, *O. edulis* explores the substrate with its foot protruded in the front which functions as a tactile sense organ. Matamorphosis can be delayed if a suitable attachment site is not located (Cole, 1938).
Healthy larval growth and survival rates occur at salinities as low as 20% and some can even survive environments with 15% salinity (FIGIS(a), 2006). Johnson *et al* (1999) report that completion of larval development depends upon the proper intake of Omega-3 polyunsaturated fatty acids. *O. edulis* start their lives as males and mature sexually as males between 8-10 months. After this period, they change sex regularly. Temperature can affect the sex of *O. edulis*; if the temperature reaches 16ºC, *O. edulis* becomes a female every 3-4 years. \"If the temperature reaches 20ºC,they will change to females each year.\" Cooler water temperatures force the oysters to revert back to males (ARKive, 2006).

Uses
O. edulis has been harvested for 6,000 years (Diaz-Almela *et al*. 2004). *O. edulis* when abundant was often eaten by Europeans, however a decline in numbers have made them a delicacy (Weichtiere, undated).

Habitat Description
Ostrea edulis prefers the firm bottoms of mud, rocks, muddy sand, muddy gravel with shells, hard silt, and artificial habitat created with broken shells or \"culch\" (Jackson, 2003). *O.edulis* can be found in muddy areas attached to hard surfaces at depths of 30 ft (9.144 metres) (CZM, undated).

Reproduction
O. edulis is a protatric hermaphrodite that changes sexes twice during one season. They are males early in the spawning season and females later and vice versa. During reproduction, female gametes are released into the palleal cavity where they are fertilized by externally released sperm (FIGIS(a), 2006) which is passed through the gills as part of the normal feeding process (ARKive, 2006). Females produce between 500,000-1,000,000 fertilzed eggs per spawning period. The eggs are incubated for a period of 8-10 days (depending on temperature) and released into the environment (FIGIS(a), 2006). In their native range, *O. edulis* spawns between late June and mid-September. Young oyster spat can be seen from late summer on. (Kennedy & Roberts, 1999).

Nutrition
Ostrea edulis is a filter feeder that eats microalgae or phytoplankton. Autotrophic flagellates and diatoms are also important food for *O. edulis* (Jonsson *et al*. 1999).

General Impacts
The disease *Bonamia ostrae* (bonamiosis) was contracted by *O. edulis* shortly after its introduction to the northwest Atlantic coast. For the last 25 years, *B. ostrae* has caused extensive mortalities among populations of the European flat oyster (Mirella da Silva *et al*. 2005). *O. edulis* was eventually re-introduced to Europe where the disease was transferred to other established populations. Programs have been implemented to limit the spread of this disease (FIGIS(a), 2006).

Management Info
The management of *O. edulis* is vital to controlling the spread of diseases (FIGIS(a), 2006). A disease of concern is the protist *Bonamia ostrae* which causes a 70-80% mortality rate in *O. edulis*. Another protist, *Marteilia refringens* causes 75-100% mortality in *O. edulis*. *Mikrocytos mackini* also affects the oyster (Ruesink *et al*. 2005). When importing *O. edulis*, it should be transported from countries where no disease has been present for the past 2 years. The Office International des Épizooties (OIÉ) set forth guidelines to ensure that no parasites are detected while under an official surveillance program for two years. European zoosanitary directives implemented a zoning system to restrict the spread of diseases. Site selection and density reduction are a major focus in matters concerning management (FIGIS(a), 2006). In the United Kingdom efforts to manage *O. edulis* involve maintaining the abundance of stock at the fisheries while decreasing local densities to limit the spread of disease, especially *Bonamia ostrae* (UKBAP, 1999).

Principal source:

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

Review:

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ALIEN RANGE

[4] AUSTRALIA
[1] FIJI
[1] JAPAN
[1] NAMIBIA
[1] SOUTH AFRICA
[10] UNITED STATES
[4] CANADA
[1] ISRAEL
[1] MAURITIUS
[1] NEW ZEALAND
[1] TONGA

BIBLIOGRAPHY
22 references found for **Ostrea edulis**

Managment information
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 [Accessed 13 January 2009].
Fisheries Global Information System (FIGIS). 2006a. *Ostrea edulis*.
Summary: The artilcle gives information about the biology of *O. edulis*, its history, habitat, life cycle, prevention and management of diseases, and production. It shows how different strategies can be used to manage *O. edulis* so that disease does not spread to other molluscs.
Available from: http://www.fao.org/figis/servlet/static?dom=culturespecies&xml=Ostrea_edulis.xml [Accessed December 20, 2006]
Ruesink, J.L., H. Lenihan, A.Trimble, K. Heiman, F. Micheli, J. Byers, M. Kay. 2005. Introduction of Non-native Oysters: Ecosystem Effects and Restoration Implications. Annu. Rev. Ecol. Evol. Syst. 36:643–89.
Summary: The article discusses the impact that non-native oysters bring to a new location. They often can help to increase the abundance of other associated species, but also can host diseases that could potentially and affect and degrade native populations of similar species.

UK Biodiversity Action Plan. 1999. *Ostrea edulis*.
Summary: This website addresses the issues affecting the United Kindom regarding *O. edulis*. Included are the current status of this species in the UK along with management associated with potential diseases.
Available from: http://www.ukbap.org.uk/UKPlans.aspx?ID=495 {Accessed January 4, 2007]

General information

ARKive. 2006. Native Oyster (*Ostrea edulis*).
Summary: A good description of *O. eduliis* including information on conservation, biology, habitat, its distribution, and threats to the oyster.
Available from: http://www.arkive.org/species/ARK/invertebrates_marine/Ostrea_edulis/more_info.html [Accessed January 3, 2007]
Carlton, J.T. 1992. Introduced Marine and Estaurine Mollusks of North America: An End-of-the-20th-Century Perspective. Journal of Shellfish Research. 11, 2: 489-505.
Summary: This article discusses how different bivalves found there way to the coasts of North America.
Available from: http://sgnis.org/publicat/papers/jsr11_2.pdf [Accessed December 20, 2006]
Cole, H.A. 1938. The Fate of the Larval Organs in the Metamorphosis of *Ostrea edulis*. Journ. Mar. Biol. Assoc. XXII.
Summary: The article gives a detailed analysis of the metamorphosis of *O. edulis*. It describes the fate of the larval belum, foot, aductor muscles, and eyespots.
Available from: http://sabella.mba.ac.uk/976/01/The_fate_of_the_larval_organs_in_the_metamorphosis_of_Ostrea_edulis.pdf [Accessed January 4 2007]
CZM. Undated. Guide to Marine Invaders in the Gulf of Maine. *Ostrea edulis*, European Flat Oyster.
Summary: Gives very good detail of physical description and habitat preferences. Similar species are also identified in the article.
Available from: http://www.mass.gov/czm/invasives/docs/invaders/o_edulis.pdf [Accessed December 20, 2006]
Diaz-Almela, E., P. Boudry, S. Lawey, F. Bonnehomme, and S. Lap�gue. 2004. Reduced female gene flow in the European flat oyster *Ostrea edulis*.Journal of Heredity. 95, 6: 510-516.
Summary: The article shows varying gene flow from 15 different populations of oysters from Norway, the Black Sea, Atlantic Ocean, and Mediterranean Sea.
Available from: http://jhered.oxfordjournals.org/cgi/reprint/95/6/510 [Accessed December 21, 2006]
Fisheries Global Information System (FIGIS). 2006b. *Ostrea edulis*.
Summary: These links show where *O. edulis* spread throughout the 20th century. It also states whether populations have been established and how they were established.
Gomoiu, M., A. Petranu, E. Kolodkovskaya, V. Gubanov. *Ostrea edulis*.
Summary: Information is given about the common names of *O.edulis*, distribution, habitat, biology. Also given is a list of synonyms and common names.
Available from: http://www.grid.unep.ch/bsein/redbook/txt/ostrea.htm [Accessed December 20, 2006]
ITIS (Integrated Taxonomic Information System), 2007. Online Database *Ostrea edulis*
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=79885 [Accessed December 20, 2006]
Jackson, A., 2003. *Ostrea edulis*. Native oyster. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme [on-line]. Plymouth: Marine Biological Association of the United Kingdom.
Summary: This website gives a brief description of *O. edulis*.
Available from: http://www.marlin.ac.uk/species/Ostreaedulis.htm [Accessed January 8, 2007]
Jonsson, P.R., K.M. Berntsson, C. Andr�, S. W�ngberg. 1999. Larval growth and settlement of the European oyster (*Ostrea edulis*) as a function of food quality measured as fatty acid consumption. Marine Biology. 134: 559-570.
Summary: The study presented includes growth rates and settling success for *O. edulis*. Tests were done to see if fatty acids had any correltation between larval growth and settlement.
Kennedy, R.J., D. Roberts. 1999. A Survey of the Current Status of the Flat Oyster *Ostrea edulis* in Strangford Lough, Northern Ireland, with a View to the Restoration of its Oyster Beds. Biology and Environment: Proceedings of the Royal Irish Academy. 99, 2: 79-88.
Summary: There was a decline in the populations of *O. edulis* at the beginning of the 20th century which also led to the decline of the oyster industry in Strangford Lough, Northern Ireland. A survey was conducted of the populations present at this area to determine how the populations of *O. edulis* could be restored for future harvesting.
Available from: http://www.ria.ie/publications/journals/ProcBI/1999/PB99I2/PDF/99214BI.PDF [Accessed December 20, 2006]
MarBEF Data System. 2004. *Ostrea edulis*.
Summary: This page shows names in the vernacular of *O. edulis*.
Available from: http://www.marbef.org/data/aphia.php?p=taxdetails&id=140658 [Accessed January 4, 2007]
Mirella da Silva, P., J. Fuentes, A. Villalba. 2005. Growth, mortality and disease susceptibility of oyster *Ostrea edulis* families obtained from brood stocks of different geographical origins, through on-growing in the Ria formosa de Arousa (Galicia, NW Spain). Marine Biology 147: 965-977.
Summary: This study shows how populations of *O. edulis* from around the world react with the disease bonamiasis. All foreign *O. edulis* were not adapted to the disease as well as the local species whose growth exceeded those of foreign origin. The mortality of foreign oysters was much higher than the local Galician oysters.
Morton, B., K. Lam., and S. Slack-Smith. 2003. First report of the European flat oyster *Ostrea edulis*, identified genetically, from Oyster Harbour, Albany, south-western Western Australia. CSIRO Publishing. Molluscan Research. 23:199-208.
Summary: Observations of *Ostrea angasi* and *Ostrea edulis* show that they are different species. The discussion explains why there was confusion in Western Australia due to the simalarities of the two species and methods used to distinguish between them. *O. edulis* was also found to transfer the disease bonamiasis easily to *O. angasi* which made them hard to detect from on another.
Available from: http://www.publish.csiro.au/?act=view_file&file_id=MR03005.pdf [Accessed Janaury 4, 2007]

NIWA (National Institute of Water and Atmospheric Research) Science. 2007. Bluff oysters. National Centre for Fisheries and Aquaculture.
Summary: Gives a description of the bluff oyster and how it is farmed. Also gives information on how *O. edulis* and the bluff oyster have been affected by the disease *Bonamia*.
Available from: http://www.niwascience.co.nz/ncfa/aquaspecies/bluff [Accessed December 21, 2006]

Ray, G.L. 2005. Invasive Marine and Estuarine Animals of the Pacific Northwest and Alaska. ANSRP Technical Notes Collection (ERDC TN-ANSRP-05-6). U.S. Army Engineer Research and Development Center, Vicksburg, MS.
Summary: The article describes the impacts that invasive species have on the areas of the Pacific Northwest and Alaska. It tells how certain species can be non-native and not cause any threat to the ecosystem, but it also tells of how just a few species can disrupt an environment.

The Common Oyster (*Ostrea edulis*). *Ostrea edulis*.
Summary: Very informative piece providing details of the development of *O. edulis*, diet, and their importance to humans as a food resource.
Available from: http://www.weichtiere.at/Mollusks/Muscheln/auster.html [Accessed December 21, 2006]

Vercaemer, B., K. Spence, E. Kenchington, A. Mallet and J. Harding. 2003. Assessment of genetic diversity of the European oyster (*O. edulis*) in Nova Scotia using microsattelite markers. Can. Tech. Rep. Fish Aquat. Sci. 2453: v + 30 p.
Summary: The article tells how *O. edulis* arrived in Nova Scotia and why there has been a loss of genetic diversity within the populations. The hatchery stocks have been the most affected with genetic erosion, however the populations as a whole still maintain a high diversity on the Canadian coast.
Available from:
http://www.dfo-mpo.gc.ca/science/aquaculture/acrdp-pcrda/margulf/tech_reports/Final%20Technical%20Report%20MG-01-06-013.pdf
[Accessed January 4, 2007]