

*Ficopomatus enigmaticus*

System: Marine

Kingdom	Phylum	Class	Order	Family
Animalia	Annelida	Polychaeta	Canalipalpata	Serpulidae

**Common name**

**Synonym**

*Mercierella enigmatica* , (Fauvel, 1923)

**Similar species**

**Summary**

*Ficopomatus enigmaticus* is a reef building tubeworm, believed to be native to Australia and regions of the Indian Ocean. It has established populations worldwide and is an aggressive species that dominates habitats, significantly altering water conditions and physical environments resulting in changes to native communities. *F. enigmaticus* is also an abundant fouling species. It has caused problems in cooling intakes of power plants and is extremely common in harbours and on ships hulls.



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

**Species Description**

*Ficopomatus enigmaticus* is a serpulid polychaete worm that builds and inhabits white calcareous tubes about 2cm in diameter and up to 10cm long. They form gregarious congregations of large intertwining reef-like aggregates that may exceed 7m in diameter. The tubes are flared at the openings and have collar like rings along their length. They begin white but are stained brown as they age. The worms themselves are usually 20-25 mm in length but may reach 40 mm. They have a crown of 12-20 gray, green or brown extensively branching, ciliated gill plumes which they extrude from the tube opening to filter feed (Cohen, 2005; Bianchi, 2001; Schwindt, 2001). Please see [PaDIL \(Pests and Diseases Image Library\) Species Content Page Marine: Encrusting tube worm \r\nFicopomatus enigmaticus \(Fauvel, 1923\) Annelida: Polychaeta: Serpulidae](#) for high quality diagnostic and overview images.

**Notes**

Formerly known as *Mercierella enigmatica* (Fauvel, 1923)



# GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: *Ficopomatus enigmaticus*

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## Lifecycle Stages

*Ficopomatus enigmaticus* may have two periods of spawning and recruitment. Its first takes place in the summer yielding early cohorts with a 24 month life span and two spawning periods, while late cohorts have a 20 month life span with only one spawning period. Larvae are tochophore and planktotrophic, developing in the plankton and settling to a nucleus substrate or an established colony, after 20-25 days where they form a calcareous tube secreted by the collar gland. Maturation of oocytes takes about 4 months (Obenat, 1994; Cohen, 2005; Muniz, 2005; Bianchi, 2001).

## Uses

In enclosed waters *Ficopomatus enigmaticus* can be beneficial by reducing particulate loads and improving oxygen and nutrient levels making waters less eutrophic. They provide substratum and food to many epibionts and endobionts and shelter to mulluscs, amphipods, crabs, and other polychaetes. Aquatic birds use the reefs as resting sites (JNCC, 1997; Obenat, 1994; Orensanz, 2002).

## Habitat Description

*Ficopomatus enigmaticus* encrusts on various substrates preferring shells of gastropods and bivalves, as well as structures like boats, pontoons, pipes, piers, and docks. It exists in depths up to 3 m, temperate to subtropical climates, oligohaline to iperhaline salinities, and a fairly wide pH ranges. It is highly resistant to pollution but is sensitive to wave intensity. It is most prominent and grows best in estuaries and lagoons with brackish waters and high nutrient content (Bianchi, 2001; JNCC, 1997; Schwindt, 2000).

## Reproduction

Sexual: Iteroparous, with 1 to 2 spawnings and recruitments of small eggs per female. Eggs and sperm are released into water where fertilization occurs. Larvae develop in plankton and settle to a substrate after 20-25 days (Obenat, 1994; Cohen, 2005).

## Nutrition

*Ficopomatus enigmaticus* feeds on suspended detritus and phytoplankton with its crown of ciliated gill plumes, which it extrudes from its tube opening. Cilia move water currents thereby oxygenating blood within, while others capture food particles and pass them down to the mouth (Obena, 1994).



## General Impacts

*Ficopomatus enigmaticus* grows very fast and abundantly and inflicts significant change in ecological and sedimentary dynamics. Referred to as an ecosystem engineer it modifies resources and physical environment. These reefs affect water movement, generate topographic heterogeneity, and ameliorate physical conditions by accumulating sediments. These changes modify distribution abundance of infaunal organisms and food supply dramatically affecting native benthic communities. *F. enigmaticus* increases oxygen and nutrient levels which may be viewed as beneficial, but these changes can have adverse effects on native communities. Changes in geomorphology pose a threat to recreational and aesthetic values of water bodies. Since it faces little competition in relatively confined waters with variable salinity, it is able to flourish in these characteristically highly productive habitats. In the presence of native competitors, abundant populations *F. enigmaticus* is known to deplete resources from and even replace them. (Fornos, 1997; Schwindt, 2004; Orensanz, 2002; JNCC, 1997; Hove, 1978).

## Management Info

**Preventative measures:** As with most marine invasive species prevention of establishment is the best and sometimes only means of management of *Ficopomatus enigmaticus*. De-oxygenation of ballast water tanks using nitrogen gas may prove effective in reducing introductions of *F. enigmaticus* as one study found this treatment to kill 80% of its larvae (Tamburri, 2001). Physical removal of *F. enigmaticus* by scrapping it from ships hulls may reduce new introductions (JNCC, 1997).

**Physical:** The use of freshwater has been employed in the cooling system of Otahuhu Power Station on the Tamaki Estuary, Auckland to combat fouling by *F. enigmaticus* (Read, 1991). Others propose heat treatment as a means of eliminating fouling of cooling systems (Jenner, 2004). Scraping of *F. enigmaticus* from harbour surfaces is a short term solution to fouling (JNCC, 1997).

**Chemical:** *F. enigmaticus* is resistant to anti-marine borer timber preservative CCA. Its susceptibility to other antifouling and biocide treatments has not been documented (Brown, 2001).

**Principal source:** [Cohen, Andrew N. 2005 Guide to the Exotic Species of San Francisco Bay. San Francisco Estuary Institute, Oakland, CA](#)

Fornos J.J.; Forteza V.; Martinez-Taberner A., 1997. Modern polychaete reefs in Western Mediterranean lagoons: *Ficopomatus enigmaticus* (Fauvel) in the Albufera of Menorca, Balearic Islands.

[Joint Nature Conservation Committee \(JNCC\), 1997. Non-native marine species in British waters: a review and directory \(Eds\) N. Clare Eno, Robin A. Clark & William G. Sanderson. United States Geological Survey, 2008. \*Ficopomatus enigmaticus\*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL.](#)

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

**Review:** Expert review underway: Dr. Evangelina Schwindt Grupo de Ecología en Ambientes Costeros Centro Nacional Patagónico (CENPAT-CONICET) Argentina

**Publication date:** 2008-05-22

## ALIEN RANGE

[1] ARGENTINA	[1] ATLANTIC - NORTHEAST
[1] CASPIAN SEA	[1] DENMARK
[1] FRANCE	[1] GERMANY
[1] INDIAN - OCEAN EASTERN	[1] IRELAND
[1] ITALY	[1] JAPAN
[2] MEDITERRANEAN & BLACK SEA	[1] NETHERLANDS
[1] NEW ZEALAND	[1] SOUTH AFRICA
[1] SPAIN	[2] UNITED KINGDOM
[12] UNITED STATES	[1] URUGUAY

## BIBLIOGRAPHY

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### Management information

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**Summary:** A study on the use of deoxygenation of ballast water as a means of anti fouling treatment

[Cohen, Andrew N. 2005 Guide to the Exotic Species of San Francisco Bay. San Francisco Estuary Institute, Oakland, CA, Species Gallery \*Corbula amurensis\* \(Schrenck, 1861\)](#)

**Summary:** *Corbula amurensis* available from: [http://www.exoticsguide.org/species\\_pages/c\\_amurensis.html](http://www.exoticsguide.org/species_pages/c_amurensis.html) [Accessed 23 February 2006]

Guide to the exotic species of San Francisco Bay available from: <http://www.exoticsguide.org>

Jenner, Henk A. and Janssen-Mommen Jake 2004. Exotic cooling water fouling organisms in the Netherlands with emphasis on heat treatment of the Japanese oyster *Crassostera gigas*. In Abstracts: 13th International Conference on Aquatic Invasive Species, September 20-24, 2004. Lynch West County Hotel, Ennis, County Clare, Ireland.

**Summary:** Report on the effectiveness of heat treatment on *Crassostera gigas* in the Netherlands.

[Joint Nature Conservation Committee \(JNCC\), 1997. Non-native marine species in British waters: a review and directory \(Eds\) N. Clare Eno, Robin A. Clark & William G. Sanderson](#)

**Summary:** Available from: [http://www.jncc.gov.uk/pdf/pub02\\_nonnativereviewdirectory.pdf](http://www.jncc.gov.uk/pdf/pub02_nonnativereviewdirectory.pdf) [Accessed 30 January 2008]

[Joint Nature Conservation Committee \(JNCC\), undated. Non-native species. \*Ficopomatus enigmaticus\*](#)

**Summary:** Available from: <http://www.jncc.gov.uk/page-1700> [Accessed 30 January 2008]

[Tamburri, M.N., Wasson, K. and Matsuda, M. 2001. Ballast water deoxygenation can prevent species introductions while reducing ship corrosion. In Abstracts: Second International Conference on Marine Bioinvasions, March 9-11, 2001. New Orleans, LA](#)

**Summary:** Deoxygenation of water could be used to kill larvae and adults of invasive species in ballast water.

Available from: <http://massbay.mit.edu/resources/pdf/MarinePDF/2001/MBI2001abs10.pdf> [Accessed 25 February 2008]

[Wilson, R. & Cox, D. following Hutchings \*et al.\* 2003 \(see Acknowledgements tab\) 2008. Encrusting tube worm \(\*Ficopomatus enigmaticus\*\) Pest and Diseases Image Library.](#)

**Summary:** PaDIL (Pests and Diseases Image Library) is a Commonwealth Government initiative, developed and built by Museum Victoria's Online Publishing Team, with support provided by DAFF (Department of Agriculture, Fisheries and Forestry) and PHA (Plant Health Australia), a non-profit public company. Project partners also include Museum Victoria, the Western Australian Department of Agriculture and the Queensland University of Technology. The aim of the project is:

1) Production of high quality images showing primarily exotic targeted organisms of plant health concern to Australia.

2) Assist with plant health diagnostics in all areas, from initial to high level. 3) Capacity building for diagnostics in plant health, including linkage developments between training and research organisations.

4) Create and use educational tools for training undergraduates/postgraduates. 5) Engender public awareness about plant health concerns in Australia. PaDIL is available from :

<http://www.padil.gov.au/aboutOverview.aspx>, this page is available from:

<http://www.padil.gov.au/viewPestDiagnosticImages.aspx?id=1046> [Accessed 28 May 2008]

### General information

[Baltic Sea Alien Species Database, 2007. \*Ficopomatus enigmaticus\*](#)

**Summary:** Available from: [http://www.corpi.ku.lt/nemo/alien\\_species\\_directory.html](http://www.corpi.ku.lt/nemo/alien_species_directory.html) [Accessed 30 January 2008]  
Bianchia, C. N. and C. Morri., 2001. The Battle is not to the Strong: Serpulid Reefs in the Lagoon of Orbetello (Tuscany, Italy). *Estuarine, Coastal and Shelf Science* Volume 53, Issue 2, August 2001, Pages 215-220

**Summary:** A study of *Ficopomatus enigmaticus* in Orbetello Lagoon, Tuscany, Italy containing good ecological data.

[CONABIO. 2008. Sistema de informaci?n sobre especies invasoras en M?xico. Especies invasoras - Otros invertebrados. Comisi?n Nacional para el Conocimiento y Uso de la Biodiversidad. Fecha de acceso.](#)

**Summary:** **English:**

The species list sheet for the Mexican information system on invasive species currently provides information related to Scientific names, family, group and common names, as well as habitat, status of invasion in Mexico, pathways of introduction and links to other specialised websites. Some of the higher risk species already have a direct link to the alert page. It is important to notice that these lists are constantly being updated, please refer to the main page (<http://www.conabio.gob.mx/invasoras/index.php/Portada>), under the section Novedades for information on updates. Invasive species - Aquatic invertebrates is available from:

[http://www.conabio.gob.mx/invasoras/index.php/Especies\\_invasoras\\_-\\_Otros\\_invertebrados](http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Otros_invertebrados) [Accessed 30 July 2008]

**Spanish:**

La lista de especies del Sistema de informaci?n sobre especies invasoras de m?xico cuenta actualmente con informaci?n acerca de nombre cient?fico, familia, grupo y nombre com?n, as? como h?bitat, estado de la invasi?n en M?xico, rutas de introducci?n y ligas a otros sitios especializados. Algunas de las especies de mayor riesgo ya tienen una liga directa a la p?gina de alertas. Es importante resaltar que estas listas se encuentran en constante proceso de actualizaci?n, por favor consulte la portada (<http://www.conabio.gob.mx/invasoras/index.php/Portada>), en la secci?n novedades, para conocer los cambios.

Especies invasoras - Otros invertebrados is available from:

[http://www.conabio.gob.mx/invasoras/index.php/Especies\\_invasoras\\_-\\_Otros\\_invertebrados](http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Otros_invertebrados) [Accessed 30 July 2008]

Eijiro, Nishi., 2003. Distribution of *Ficopomatus enigmaticus* (Polychaeta: Serpulidae) in Sagami Bay, Tokyo Bay and Boso Peninsula. *Natural History Report of Kanagawa Vol.;No.24;Page.43-48* (2003)

**Summary:** Abstract including a few Japanese locations of *F. enigmaticus*

Fornos J.J.; Forteza V.; Martinez-Taberner A., 1997. Modern polychaete reefs in Western Mediterranean lagoons: *Ficopomatus enigmaticus* (Fauvel) in the Albufera of Menorca, Balearic Islands. *Palaeogeography, Palaeoclimatology, Palaeoecology* 128 (1997) 175-186.

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**Summary:** Comprehensive review of the *Ficopomatus* genus and recorded distributions

[IFREMER \(French Research Institute for Exploitation of the Sea\), 2006. Dynamics and Health of Coastal and Estuarine Ecosystems.. \*Ficopomatus enigmaticus\*](#)

**Summary:** Available from: <http://www.ifremer.fr/delec-en/projets/ficopomatus/ficopoma.htm> [Accessed 30 January 2008]

[ITIS \(Integrated Taxonomic Information System\), 2008. \*Ficopomatus enigmaticus\* \(Fauvel, 1923\)](#)

**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=68350](http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=68350) [Accessed 25 February 2008]

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**Summary:** Study concerning *Ficopomatus enigmaticus* and its invasion of and effects on Mar Chiquita, Argentina  
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**Summary:** A study of life cycle and population structure of the polychaete *Ficopomatus enigmaticus* (Serpulidae) in Mar Chiquita Coastal Lagoon, Argentina

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**Summary:** Study concerning *Ficopomatus enigmaticus* and its invasion of and effects on Mar Chiquita, Argentina [The North European and Baltic Network on Invasive Alien Species \(NOBANIS\), Undated. Ficopomatus enigmaticus \(Serpulidae, Annelids\)](#)

**Summary:** The North European and Baltic Network on Invasive Alien Species (NOBANIS) is a gateway to information on alien and invasive species in North and Central Europe. The participating countries are Denmark, Estonia, Finland, Faroe Islands, Germany, Greenland, Iceland, Latvia, Lithuania, Norway, Poland, European part of Russia, Sweden.

NOBANIS is available from: [www.nobanis.org](http://www.nobanis.org), this page is available from:

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**Summary:** Available from: <http://nas.er.usgs.gov/queries/FactSheet.asp?SpeciesID=1171> [Accessed 30 January 2008]