***Mnemiopsis leidyi*** 简体中文 正體中文

**System:** Marine

| Kingdom | Phylum | Class | Order | Family |
|---|---|---|---|---|
| Animalia | Ctenophora | Tentaculata | Lobata | Mnemiidae |

**Common name** Rippenqualle (German), sea walnut (English), American comb jelly (English), sea gooseberry (English), Venus' girdle (English), comb jelly (English), warty comb jelly (English), comb jellyfish (English)

**Synonym** *Mnemiopsis gardeni* , L.Agassiz 1860
*Mnemiopsis mccradyi* ,, Mayer, 1990

**Similar species** *Mnemiopsis mccradyi*

**Summary** The ctenophore, Mnemiopsis ledyi, is a major carnivorous predator of edible zooplankton (including meroplankton), pelagic fish eggs and larvae and is associated with fishery crashes. Commonly called the comb jelly or sea walnut, it is indigenous to temperate, subtropical estuaries along the Atlantic coast of North and South America. In the early 1980s, it was accidentally introduced via the ballast water of ships to the Black Sea, where it had a catastrophic effect on the entire ecosystem. In the last two decades of the twentieth century, it has invaded the Azov, Marmara, Aegean Seas and recently it was introduced into the Caspian Sea via the ballast water of oil tankers.

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**Species Description**
*Mnemiopsis ledyi* is a comb jelly with a length up to 100mm. The body is laterally compressed, with large lobes arising near the stomodeum, generating 4 deep, noticeable furrows that characterize the genus. It has four rows of small, but numerous, cilated combs which are irridescent by day and may glow green by night (NIMPIS, 2002). The colour is usually transparent or slightly milky, translucent (Shiganova 2003).

**Notes**
*Mnemiopsis* is probably the most-studied ctenophore genus in the world because of its great abundance in estuaries in heavily populated areas of the United States, and because of its explosive population growth after accidental introduction into the Black Sea in the early 1980s. But after the invasion of a new ctenophore of the genus *Mnemiopsis* into the Black Sea, a question regarding which species was invasive arose. L.N. Seravin (1994) made a revision of the genus *Mnemiopsis* with the conclusion that it includes only one polymorphic species of lobate ctenophore-*Mnemiopsis leidyi*, which this new ctenophore belongs to. Richard Harbison also supports this point of view (personal communication in Dumont and Shiganova).

**Lifecycle Stages**
Totally planktonic life history; early tentaculate larvae resembling *Cydippida* ctenophores but metamorphoses into the mature lobate form. No current evidence of resting stages (Costello, 2001).
\r\n\r\nThe embryo acquires a double rows of cilia, a well-developed pair of lateral tentacles, and a large, apical sense-organ. The entodermal part of the gastro-vascular system consists of 6 lateral diverticula from a central chamber; 2 of these lateral branches lead into the bases of the tentacles and the other 4 lead outward toward the 4 double rows of cilia. The ectodermal buccal pouch or stomodeum has become a long, laterally compressed tube, with its broad axis 90* from the tentacular axis of the animal. Until this time the animal swims about quite freely within the egg-envelope at this stage its cilia may be observed beating in a normal manner and its tentacles to elongate or contract in response to stimuli. Soon after this the larva breaks through the egg-envelope and escapes into the water. Here it passes the development stages which are very similar to those of the young Pleurobrachia.
\r\n\r\nThe tentacles acquire numerous lateral filaments and elongate greatly, as in Pleurobrachia. When the animal is 5mm long, the oral lobes begin to develop as two simple outgrowths on both sides of the mouth in the sagittal plane of the animal. At the time when the oral lobes begin to develop, the meridional ventral canals and the paragastric tubes begin to elongate downward. The former give rise to the characteristic loops in the oral lobes. Four meridional vessels extend downward and fuse with the circum-oral vessel. The primary tentacle-bulbs migrate downward to lie close by the sides of the mouth. The auricles appear last of all, after the lobes have developed to some extent. When attaining 10mm long the animal becomes ellipsoidal in outline. The appearance of its lobes and auricles resembles to that in the adult of Bolinopsis. Afterward the deep, lateral furrows extend upward to the level of the apical sense-organ and the animal acquires the characteristic of *Mnemiopsis* ( Mayer, 1912 ). The embrional development takes about 20-24 hours in the Black Sea upper water layer by 23 degrees C. The size of hutched larvae is 0.3-0.4mm.

**Habitat Description**
The native habitat of the ctenophore, *Mnemiopsis*, is in temperate to subtropical estuaries along the Atlantic coast of North and South America (Mayer,1912). *M. leidyi* is tolerant of a wide range of salinity, temperature and water quality conditions over a broad range of inshore habitats. Since its unintentional introduction to the Black Sea, *Mnemiopsis* has spread to adjacent bodies of water, inhabiting waters of salinities ranging from 3% in the Sea of Azov to 39‰ in the eastern Mediterranean, and temperatures ranging from 4oC in winter to 31oC in summer (Dumont and Shiganova).

**Reproduction**
*Mnemiopsis leidyi* is a free-spawning, simultaneous hermaphrodite capable of self-fertilization (Costello, 2001). It possesses gonads containing both the ovary and the spermatophore bunches in their gastrodermis. Total numbers of simultaneously forming eggs depends of food availability and on temperature - 2-3000 eggs per day production by adults at high food concentrations is common. The embryo is formed completely within the original egg cover. It has size of about 0.12-0.14mm and acquires its specific form and tentacular structures. When the larva attains mobility the egg cover softens and became flexible. The life span of egg producing individuals may be many months (Costello, 2001).

**Nutrition**
A wide range of zooplanktonic prey; varies with ctenophore development. Early cydippid stages utilize protozoa and microzooplankton, lobate forms feed primarily on crustaceans (often copepods, cladocera) mollusc larvae, eggs, and young fish larvae (Costello, 2001).

**General Impacts**
*Mnemiopsis ledyi* is a major zooplankton predator and is associated with fishery crashes (Costello, 2001). A carnivorous predator on edible zooplankton (including meroplankton), pelagic fish eggs and larvae, *M. leidyi* causes negative impacts right through the foodchain of the areas it has invaded. In the Black Sea and the Sea of Azov, the zooplankton, ichthyoplankton and zooplanktivorous fish stocks all underwent profound changes.
The pelagic ecosystem of the Black Sea was degraded, manifesting as sharply decreased biodiversity, abundance, and biomass of the main components of the pelagic ecosystem-zooplankton (Dumont and Shiganova). Fish stocks in the Black Sea and Sea of Azov have suffered due to predation on eggs and larval stages of food supplies (Shiganova 2003). Effects on the ecosystem in the Caspian Sea were faster and stronger than in the Black Sea. In 2001, repercussions were felt at all trophic levels, including that of the top predator, the Caspian seal (Dumont and Shiganova).
A cascading effect occurred at the higher trophic levels, from a decrease in zooplankton stock and collapsing planktivorous fish, to vanishing predatory fish and dolphins. Similar effects occured at lower trophic levels: from a decrease in zooplankton stock to an increase in phytoplankton, which was released from zooplankton grazing pressure. The majority of these effects were top-down, but a few were also bottom-up. Similar effects, but less pronounced, were recorded in the Sea of Marmara. Effects on Mediterranean food webs have, so far, remained insignificant. Salinity is probably supraoptimal there, and several predators prevent *M.leidyi* from reaching outbreak levels.

**Management Info**
Biological: Eradication may be impossible in practice. A variety of predators (including medusae and fish) consume *M. leidyi* in its native regions. Reduction of *M. leidyi* populations in the Black Sea occurred after one of its predators, the ctenophore *Beroe ovata*, was introduced to the region (Costello, 2001).
\r\nOne of the factors that provoked high level of population development of *M. leidyi* in the Black Sea but was not observed within its natural range-estuarial waters of North America was the absence of a predator feeding on *M. leidyi* and controlling its population size (Purcell *et al*., 2001). In 1997, another invader, the ctenophore *Beroe ovata* Mayer 1912, was found in the northeastern Black Sea. It is a predator feeding on planktivorous comb jellies - especially *M. leidyi* (Konsulov and Kamburskaya, 1998). As with its predecessor, *B. ovata* arrived with ballast waters from the same coastal waters of North America (Seravin et al., 2002). Development of *B. ovata* considerably decreased the population of *M. leidyi* that had deformed the Black Sea ecosystem for over a decade. The reduction of the *M. leidyi* population limited its influence on the ecosystem and consequently we observed a recovery of the main components of the Black Sea pelagic ecosystem – zooplankton (including meroplankton), phytoplankton, dolphins and fish as well as their eggs and larvae (Shiganova et al.,2000a,b; 2001 c).
\r\nConscious of this, and bearing in mind the devastating impact of *M. leidyi* on the fisheries in the Black and Azov Seas in the 1990s, we began a number of initiatives in 2001 with a view to take stock of the situation, review and assess remedial measures and take concrete actions. After deliberation, we proposed the introduction of a potential predator of *M. leidyi* as the only truly viable option. As shown by the example of the Black Sea, the best – and so far only - candidate for this is another ctenophore species, *Beroe ovata*. After the accidental introduction of *Beroe ovata* to the Black Sea, the abundance of *M. leidyi* here immediately dropped to levels so low that no further damage was inflicted. In fact, the ecosystem almost immediately began to recover. It is anticipated that the results of a *Beroe ovata* introduction in the Caspian will be similar. Summer 2003 is now the target date for the implementation of this plan (Dumont and Shiganova, unpublished).

**Pathway**
In the early 1980s, *Mnemiopsis leidyi* was accidentally introduced via the ballast water of ships to the Black Sea where it had a catastrophic effect on the entire ecosystem. It was also introduced into the Caspian Sea via the ballast water of oil tankers.

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**Pubblication date:** 2005-05-30

## ALIEN RANGE

**[1]** AZERBAIJAN
**[1]** CASPIAN SEA
**[1]** GREECE
**[1]** KAZAKHSTAN
**[1]** ROMANIA
**[1]** SYRIAN ARAB REPUBLIC
**[1]** TURKMENISTAN
**[1]** BULGARIA
**[1]** GEORGIA
**[1]** IRAN, ISLAMIC REPUBLIC OF
**[4]** MEDITERRANEAN & BLACK SEA
**[2]** RUSSIAN FEDERATION
**[2]** TURKEY
**[1]** UKRAINE

**Red List assessed species 1: EN = 1;**

Pusa caspica **EN**

## BIBLIOGRAPHY

**25** references found for **Mnemiopsis leidyi**

**Managment information**

Caspian Environmental program
**Summary:** Details about an April 2001 workshop convened to combat the threat of a comb jellyfish invasion of the Caspian Sea.

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].

Dumont, H., Shiganova, T. (unpublished). The Invasion of the Black, Mediterranean and Caspian Seas by the American Ctenophore, Mnemiopsis leidyi Agassiz: a Multidisciplinary Perspective . A NATO ARW Workshop.
**Summary:** Proceedings of the Advanced Research Workshop (ARW) held on June 24-26, in Baku, Azerbaijan. The final conclusion of the workshop may be summarised as follows: all available wisdom strongly suggests to introduce Beroe to the Caspian as soon as possible, preferably in September 2002, and immediately thereafter initiate studies on Peprilus or fish with a similar feeding regime, as a medium-term possible final remedy.

Hayes, K., Sliwa, C., Migus, S., McEnnulty, F., Dunstan, P. 2005. National priority pests: Part II Ranking of Australian marine pests. An independent report undertaken for the Department of Environment and Heritage by CSIRO Marine Research.
**Summary:** This report is the final report of a two year study designed to identify and rank introduced marine species found within Australian waters (potential domestic target species) and those that are not found within Australian waters (potential international target species).
Available from: http://www.marine.csiro.au/crimp/reports/PrioritypestsFinalreport.pdf [Accessed 25 May 2005]

Knowler, D., 2005. Reassessing the costs of biological invasion: *Mnemiopsis leidyi* in the Black sea Ecological Economics Volume 52, Issue 2 , 25 January 2005, Pages 187-199

Knowler, D. Reassessing the costs of biological invasion: *Mnemiopsis leidyi* in the Black Sea. Ecological Economics 52(2): 187-199, 2005.

**General information**

Dumont, H. J. 2000. Endemism in the Ponto-Caspian fauna, with special emphasis on the Onychopoda (Ccrustacea).. Advances in Ecological Research 31.

GESAMP, 1997. Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection. Opportunistic settlers and the problem of the ctenophore Mnemiopsis leidyi invasion in the Black Sea. Rep.Stud.GESAMP. (58):84 p.

ITIS (Integrated Taxonomic Information System), 2005. Online Database *Mnemiopsis leidyi*
**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.cbif.gc.ca/pls/itisca/taxastep?king=every&p_action=containing&taxa=Mnemiopsis+leidyi&p_format=&p_ifx=plglt&p_lang=
[Accessed March 2005]
Ivanov V.P., Kamakin A.M., Ushivtzev V.B., Shiganova T. A., Zhukova O., Aladin N., Wilson S.I, Harbison R and Dumont H.J. 2000 Invasion of the Caspian Sea by the Comb Jellyfish Mnemiopsis leidyi (Ctenophora). Biological Invasions 2: 255-258.
Kremer, P. 1979. Predation by the ctenophore *Mnemiopsis leidyi* in Narragansett Bat, Rhode Island. Estuaries 2.
Methodology for the Mnemiopsis Monitoring in the Caspian Sea
**Summary:** A Report on methodology for monitoring Mnemiopsis and other gelatinous macroplankton in the Caspian Sea prepared for the Caspian Environment Program, Baku, Azebaijan in December-2001.
National Introduced Marine Pest Information System (NIMPIS), 2002. *Mnemiopsis leidyi* species summary. National Introduced Marine Pest Information System (Eds: Hewitt C.L., Martin R.B., Sliwa C., McEnnulty, F.R., Murphy, N.E., Jones T. & Cooper, S.). Available at http://crimp.marine.csiro.au/nimpis [accessed 20/08/2003].
Purcell J. E., Shiganova T.A., Decker M. B., Houde E.D. 2001. The ctenophore *Mnemiopsis leidyi* in native and exotic habitats: U. S. estuaries versus the Black Sea basin // Hydrobiologia. 451. 2001. Eds. J.E.Purcel, W.M.Graham & H.J.Dumont:, Kluwer Acad. Pub., P.145-176 .
Shiganova T.A. 1993. Ctenophore *Mnemiopsis leidyi* and ichthyoplankton in the Sea of Marmara in October of 1992. Oceanology 33: 900-903.
Shiganova T.A. 1997. *Mnemiopsis leidyi* abundance in the Black Sea and its impact on the pelagic community. In Sensivity of the North, Baltic Sea and Black Sea to antropogenic and climatic changes Sp.Volume. ?d. E. Ozsoy and A.Mikaelyan. Kluwer Acad. Pub.p.117-130.
Shiganova T.A. 1998. Invasion of the Black Sea by the ctenophore *Mnemiopsis leidyi* and recent changes in pelagic community structure. Fisheries Oceanography ÿGlobec Special Issue Ed.Steeve Coombs.p.305-310
Shiganova T.A., A.M.Kamakin, O. P Zhukova, V. B. Ushivtzev V.B., 2001 Result of investigation of new invader Mnemiopsis sp. into the Caspian Sea and its initial effect on the pelagic ecosystem. Oceanology.?. 41. ? 4. P. 542-549
Shiganova Tamara & Panov Vadim, 2002. Invasive species *Mnemiopsis leidyi*
**Summary:** Information about *Mnemiopsis leidyi* prepared for the Group on Aquatic Alien Species (GAAS). This group is supported by the Russian government s Biodiversity Program, as part of the Project Development of scientific and methodological basis for organization of biodiversity monitoring and recommendations for prevention and control of alien species introductions in water systems: Lake Ladoga - Neva River-Neva Bay - eastern Gulf of Finland and lower Volga River - north Caspian Sea . Includes: Systematic position, Images, Invasion history, Worldwide distribution, Donor areas, Recipient areas, Biology, Environmental impacts and References.
Shiganova T. A., Mirzoyan Z. A., Studenikina E. A., Volovik S. P., Siokou-Frangou I., Zervoudaki S., Christou E. D., Skirta A. Y., and Dumont H. Population development of the invader ctenophore Mnemiopsis leidyi in the Black Sea and other seas of the Mediterranean basin.// Marine Biol.. 2001?. 139 P.431-445.
Shiganova T.A.,U.Niermann, A.C.Gugu, A.Kideys, V.S.Khoroshilov 1998. Changes of species diversity and their abundance in the main components of pelagic community after *Mnemiopsis leidyi* invasion . ÿ NATO Scientific Affairs Division ÿ Kluwer Academic Publishers ed. L.Ivanov and T.Oguz.p.171-188
Shiganova, T., Bulgakova, Y., Volovik, S., Mirzoyan Z,. and Dudkin, S., 1998. The new invader *Beroe ovata* Mayer 1912 and its effect on the ecosystem in the northeastern Black Sea. Hydrobiologia 451: 187ÿ197, 2001.
**Summary:** The abundance, biomass and distribution of the ctenophore, *Beroe ovata* Mayer 1912 were assessed along with several parameters associated with composition, respiration and feeding. Digestion time of B. ovata feeding on other ctenophores ranged from 4ÿ5.5 h for Mnemiopsis leidyi A. Agassiz to 7ÿ8 h for Pleurobrachia pileus (O. F. MÿIler). Daily ration was estimated as 20ÿ80% of wet weight based on field observations of feeding frequency coupled with digestion time. Calculations indicate that the measured population of B. ovata ingested up to 10% of the M. leidyi population daily. A marked decrease in M. leidyi density was recorded. The abundance of zooplank-ton increased about 5-fold and ichthyoplankton about 20-fold compared with the same season in previous years following the M. leidyi invasion.
Sorokin, Y. 2001. The Black Sea. Backhuys Publishers.
Studenikina, E. I., S. P. Volovik, I. A. Miryozan & G. I. Luts, 1991. The ctenophore *Mnemiopsis leidyi* in the Sea of Azov. Oceanology 3: 722-725.
Vinogradov, M. E., E. A. Shushkina, E. I. Musaeva & P. Y. Sorokin, 1989. Ctenophore *Mnemiopsis leidyi* (A.Agassiz) (Ctenophora: Lobata) - new settlers in the Black Sea. Oceanology 29: 293-298.