A polychaete (*Magelona mirabilis*)

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

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2007-08-21

A report from:
The Marine Life Information Network, Marine Biological Association of the United Kingdom.

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This review can be cited as:
Rayment, W.J. 2007. *Magelona mirabilis* A polychaete. In Tyler-Walters H. and Hiscock K. (eds) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. DOI https://dx.doi.org/10.17031/marlinsp.1630.1

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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	Will Rayment	**Refereed by**	Mike Kendall
Authority	(Johnston, 1865)		
Other common names	-	**Synonyms**	*Magelona papillicornis* F. Müller, 1858

Summary

Description

A long, threadlike worm divided into 2 distinct sections by an intervening segment different from the others. The body is square in section, about 2.5 mm wide and between 50 and 170 mm long although it is often much smaller in length. The head end bears a pair of long, thick palps and a prostomium flattened like a duck's bill and often wider than the rest of the body. However, the wider segment (chaetiger 8 or 9) is often hard to distinguish, even with the aid of a microscope (M. Kendall, pers. comm.). The palps are deciduous and it is unusual to find specimens where they are present (M. Kendall, pers. comm.). The palps are often cropped by fish. The palps and front portion of the body are a very soft pink, while the rear portion is greenish grey with white blotches.

Recorded distribution in Britain and Ireland

Expected to occur all around the coasts of Britain and Ireland where suitable substrata occur. Recorded patchily from all British and Irish coasts.

Global distribution

Recorded from North Sea coasts, the Baltic Sea, the Atlantic coast of France and the Mediterranean coast of France.

Habitat

Magelona mirabilis typically burrows in fine sand at low water and in the shallow sublittoral. It does not produce a tube. *Magelona mirabilis* is adapted for life in highly unstable sediments, characterized by surf, strong currents and sediment mobility.

Depth range

Mid shore to 32 m depth

Identifying features

- Palps fringed with papillae down one side and inserted ventrally at base of prostomium. However, the palps are rarely present.
- 8 anterior chaetigers bear only hair-like chaetae.
- Chaetiger 9 has greatly developed dorsal lappets almost meeting at the mid-line and paddle shaped chaetae forming a broad fan.
- Remaining chaetigers have smaller, incurved parapodial lappets and relatively few, short, hooded chaetae with double hooks.
- Terminal segment bears 2 small, anal cirri.

Additional information

Magelona papillicornis is not a true synonym. *Magelona papillicornis* has not changed its name and still exists off the coasts of Brazil. However, *Magelona mirabilis* includes the north east Atlantic animals that were once called *Magelona papillicornis* (M. Kendall, pers. comm.). See Jones (1977) for further taxonomic information.

For detailed notes on the identification of European *Magelona* sp., see Fiege *et al.* (2000).

Listed by

Further information sources

Search on:

Biology review

Taxonomy

Phylum	Annelida	Segmented worms e.g. ragworms, tubeworms, fanworms and spoon worms
Class	Polychaeta	Bristleworms, e.g. ragworms, scaleworms, paddleworms, fanworms, tubeworms and spoon worms
Order	Spionida	
Family	Magelonidae	
Genus	Magelona	
Authority	(Johnston, 1865)	
Recent Synonyms	Magelona papillicornis F. Müller, 1858	

Biology

Typical abundance	See additional information
Male size range	5-17cm
Male size at maturity	
Female size range	Medium(11-20 cm)
Female size at maturity	
Growth form	Vermiform segmented
Growth rate	Insufficient information
Body flexibility	High (greater than 45 degrees)
Mobility	
Characteristic feeding method	Surface deposit feeder
Diet/food source	
Typically feeds on	Detritus, microalgae, small animals
Sociability	
Environmental position	Infaunal
Dependency	Independent.
Supports	None
Is the species harmful?	No information

Biology information

Abundance
Occurs at high densities where environmental conditions are suitable. For example, Kuhl (1972) reported *Magelona papillicormis* at densities of 279 individuals per 0.1 m on sandy muddy ground in the Elbe Estuary.

Feeding
Magelona mirabilis feeds by gathering organic material from the sediment surface with its palps. When feeding on poorly sorted material, selectivity may be shown in that magelonids prefer to handle larger particles. Small crustaceans may also be taken as prey, for example, the mucous on the palps may trap a few harpacticoids although this is likely to be incidental (M. Kendall, pers. comm.). In well sorted sand, selectivity may be absent as particles with a high organic content have

already been concentrated by other means (Fauchald & Jumars, 1979).

Habitat preferences

Physiographic preferences	Open coast, Strait / sound, Enclosed coast / Embayment
Biological zone preferences	Lower eulittoral, Lower infralittoral, Sublittoral fringe, Upper circalittoral, Upper infralittoral
Substratum / habitat preferences	Coarse clean sand, Fine clean sand
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.)
Wave exposure preferences	Exposed, Moderately exposed, Sheltered, Very exposed
Salinity preferences	Full (30-40 psu), Variable (18-40 psu)
Depth range	Mid shore to 32 m depth
Other preferences	
Migration Pattern	Non-migratory / resident

Habitat Information

-

Life history

Adult characteristics

Reproductive type	Gonochoristic (dioecious)
Reproductive frequency	Annual protracted
Fecundity (number of eggs)	No information
Generation time	1-2 years
Age at maturity	Insufficient information
Season	See additional information
Life span	2-5 years

Larval characteristics

Larval/propagule type	-
Larval/juvenile development	Planktotrophic
Duration of larval stage	No information
Larval dispersal potential	Greater than 10 km
Larval settlement period	Insufficient information

Life history information

Reproductive data concerning *Magelona mirabilis* is scarce (Fiege *et al.*, 2000). The data that is available suggests that the reproductive period in *Magelona mirabilis* varies with geographic location and the breeding season of many polychaetes is known to vary with latitude. Fiege *et al.*

(2000) reported males with sperm masses in St. Andrews, Scotland, in March and females with eggs in Berwick-upon-Tweed in March whilst egg bearing females in Lancieux, France, were recorded in May.

It is generally agreed that *Magelona mirabilis* displays characteristics typical of an r-selected species, i.e. rapid reproduction, short lifespan and high dispersal potential (Krönke, 1990; Niermann *et al.*, 1990), and is characteristic of shallow, disturbed, non-successional habitats (M. Kendall, pers. comm.).

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

Magelona mirabilis is an infaunal species which lives in the top few centimetres of fine sand substrata (Fiege *et al.*, 2000). The majority of the population would be removed along with the substratum, e.g. as a result of channel dredging activities, and therefore intolerance is assessed as high. Recoverability is recorded as high (see additional information below).

Smothering	Low	Immediate	Not sensitive	Low

Magelona mirabilis lives infaunally in fine sand and moves by burrowing. It deposit feeds at the surface by extending contractile palps from its burrow. An additional 5 cm layer of sediment would result in a temporary cessation of feeding activity, and therefore growth and reproduction are likely to be compromised. However, *Magelona mirabilis* would be expected to quickly relocate to its favoured depth, with no mortality, and hence an intolerance of low is recorded. Once the animals have relocated to the surface, feeding activity should return to normal and therefore a recoverability of immediate is recorded.

Increase in suspended sediment	Tolerant*	Not relevant	Not sensitive*	Very low

Magelona mirabilis is unlikely to be perturbed by an increase in suspended sediment as it lives infaunally. It is a deposit feeder, gathering organic particles from the sediment surface with its mobile palps. An increase in suspended sediment may result in greater food availability at the sediment surface, potentially enhancing growth and reproduction of *Magelona mirabilis*. However, the species would only benefit if there was a significant proportion of organic matter in the suspended sediment and if food was previously limiting.

Decrease in suspended sediment	Intermediate	Immediate	Very Low

Magelona mirabilis is a surface deposit feeder and therefore relies on a supply of nutrients at the sediment surface. A decrease in the suspended sediment may result in a decreased rate of deposition on the substratum surface and therefore a reduction in food availability. *Magelona mirabilis* is a short-lived species and a reduction in the amount of suspended sediment is likely to impair growth and may result in the death of some of the population (M. Kendall, pers. comm.). The benchmark states that this change would occur for one month and therefore an intolerance of intermediate has been recorded. As soon as suspended sediment levels increased, feeding activity would return to normal and hence recovery is recorded as immediate.

Dessication	Intermediate	High	Low	Very low

Magelona mirabilis lives infaunally and is therefore likely to be protected from desiccation stress. A proportion of the population lives in the intertidal (Fiege *et al.*, 2000) suggesting the species is tolerant to emersion of its substratum. However, if an individual were removed from the substratum, exposed to the air and was unable to reburrow, for example by bait digging, mortality would be likely to result. Intolerance is therefore assessed as intermediate.

Recoverability is recorded as high (see additional information below).

Increase in emergence regime Intermediate High Low Low

A proportion of the population of *Magelona mirabilis* lives in the intertidal zone (Fiege *et al.*, 2000). The species lives infaunally and hence is not likely to suffer from desiccation stress unless displaced. However, *Magelona mirabilis* can only feed when immersed and therefore will experience reduced feeding opportunities. If it burrows to find immersed sediment, the digging will result in the palps being lost (M. Kendall, pers. comm.). Over the course of a year the resultant energetic cost is likely to cause some mortality. An intolerance of intermediate is therefore recorded. Recoverability is recorded as high (see additional information below).

Decrease in emergence regime Tolerant Not relevant Not sensitive High

Magelona mirabilis thrives in the subtidal zone (Fiege *et al.*, 2000) and therefore could potentially benefit from a decreased emergence regime. It is possible that decreased emergence would allow the species to colonize further up the shore.

Increase in water flow rate Intermediate High Low Very low

Magelona mirabilis is adapted to life in areas with strong currents, high wave exposure and unstable sediments (Lackshewitz & Reise, 1998). However, increased water flow rate may remove sediment or change the sediment characteristics in which the species lives, primarily by re-suspending and preventing deposition of finer particles (Hiscock, 1983). *Magelona mirabilis* typically occurs in sandy sediments (Fiege *et al.*, 2000), a substratum which may be eroded by increases in water flow. Additionally, the consequent lack of deposition of particulate matter at the sediment surface would reduce food availability. The resultant energetic cost over one year would be likely to result in some mortality. An intolerance of intermediate is therefore recorded. Recoverability is recorded as high (see additional information below).

Decrease in water flow rate Intermediate High Low Low

Magelona mirabilis is adapted to life in areas with strong currents, high wave exposure and unstable sediments (Lackshewitz & Reise, 1998). Decreased water movement would result in increased deposition of fine suspended sediment (Hiscock, 1983), changing the sediment characteristics of the habitat in which the species lives. Over the course of a year, it is likely that some mortality would occur and an intolerance of intermediate is recorded. Recoverability is assessed as high (see additional information below).

Increase in temperature Not relevant

No information was found concerning the intolerance of *Magelona mirabilis* to an increase in temperature.

Decrease in temperature Intermediate High Low Moderate

The abundance of *Magelona mirabilis* experienced a sharp decline following the severe winter of 1995 / 1996 in the Wadden Sea, the Netherlands (Armonies *et al.*, 2001). Between 1992 and 1995 the average abundance in an area 5 km west of Sylt was 2901 individuals per m and by 1996 / 1997, abundance had fallen to 138 per m (Armonies *et al.*, 2001). The average water temperature in List Harbour, near Sylt, over the severe winter was 0.5 °C which was 2.7 °C and 3.7 °C below the mean water temperatures of the moderate and mild winters of 1996 / 1997 and 1997 / 1998 respectively (Strasser & Günther, 2001). This change in temperature is comparable to the chronic change in the benchmark and therefore an intolerance of intermediate has been recorded. Armonies *et al.* (2001) commented that, following the severe winter, recovery in this species was 'slow'. However, 'slow' was not quantified although the

study suggests that the species had not yet recovered by the 1996 / 1997 sampling.

Increase in turbidity Low Very high Very Low Low

Magelona mirabilis does not require light and therefore is not directly affected by an increase in turbidity. However, increased turbidity may affect primary production in the water column and therefore reduce the availability of diatom food arriving at the sediment surface. In addition, primary production by the micro-phyto benthos on the sediment surface may be reduced, further decreasing food availability. However, *Magelona mirabilis* also feeds on detritus although it is not known what proportion of the diet is this represents (M. Kendall, pers. comm.). It is possible that, over the course of the year, growth and fecundity may be reduced and an intolerance of low is recorded. However, as soon as light levels return to normal, primary production will increase and hence recoverability is recorded as very high.

Decrease in turbidity Tolerant Not relevant Not sensitive High

Magelona mirabilis does not require light and therefore would not be directly affected by a decrease in turbidity. However, decreased turbidity may increase primary production in the water column and by the micro-phyto benthos on the sediment surface. This could potentially increase the amount of food available to *Magelona mirabilis* although this species also feeds on detritus and it is not known what proportion of the diet diatoms represent (M. Kendall, pers. comm.), nor if it is limiting and therefore, tolerant has been recorded.

Increase in wave exposure Intermediate High Low Low

Magelona mirabilis is adapted to life in areas with strong currents, high wave exposure and unstable sediments (Lackshewitz & Reise, 1998). However, a further increase in wave action may affect the species in several ways (Hiscock, 1983). Strong wave action is likely to cause damage or withdrawal of delicate feeding structures resulting in loss of feeding opportunities and compromised growth. Furthermore, individuals may be damaged or dislodged by scouring from sand and gravel mobilized by increased wave action. The sediment they live in may be eroded and burrowing would result in the loss of the delicate palps (M. Kendall, pers. comm.). It is likely that some mortality would result from the considerations discussed above and therefore an intolerance of intermediate is recorded. Recoverability is recorded as high (see additional information below).

Decrease in wave exposure Intermediate High Low Low

Magelona mirabilis is adapted to life in areas with strong currents, high wave exposure and unstable sediments (Lackshewitz & Reise, 1998). Decreased wave exposure over the course of a year is likely to result in the establishment of a finer sediment habitat. It is expected that some mortality would occur and therefore intolerance is assessed as intermediate. Recoverability is recorded as high (see additional information below).

Noise Tolerant Not relevant Not sensitive Low

No information was found concerning the intolerance of *Magelona mirabilis* to noise. However, it is unlikely to be affected by noise and vibration at the level of the benchmark.

Visual Presence Tolerant Not relevant Not sensitive High

No information was found concerning the intolerance of *Magelona mirabilis* to visual disturbance. The species has no eyes (Hayward & Ryland, 1995) and therefore would not be expected to respond to visual cues.

Abrasion & physical disturbance Intermediate High Low Low

Magelona mirabilis is a soft bodied organism which exposes its palps at the surface while

feeding. The species lives infaunally in sandy sediment, usually within a few centimetres of the sediment surface. Physical disturbance, such as dredging or dragging an anchor, would be likely to penetrate the upper few centimetres of the sediment and cause physical damage to *Magelona mirabilis*. An intolerance of intermediate is therefore recorded. Recoverability is recorded as high (see additional information below).

Displacement Intermediate High Low Low

Jones (1968) observed burrowing behaviour of *Magelona* sp. in the laboratory. Worms rapidly buried themselves following displacement to the sediment surface. However, this burrowing will result in damage to the palps (M. Kendall, pers. comm.). Furthermore, displacement to the sediment surface would increase the risk of predation by bottom feeding fish, to which *Magelona mirabilis* is particularly vulnerable (Hunt, 1925; Hayward & Ryland, 1995). Some mortality may result and therefore intolerance is assessed as intermediate. Recoverability is recorded as high (see additional information below).

Chemical Pressures

Intolerance Recoverability Sensitivity Confidence

Synthetic compound contamination Not relevant

There is no evidence relating directly to the effects of synthetic chemicals on *Magelona mirabilis*. However, there is evidence from other polychaete species. Collier & Pinn (1998), for example, investigated the effect on the benthos of invermectin, a feed additive treatment for infestations of sea-lice on farmed salmonids. The polychaete *Hediste diversicolor* experienced 100% mortality within 14 days when exposed to 8 mg / m of invermectin in a microcosm. Polychaetes are, however, highly diverse and have different tolerances in different species (M. Kendall, pers. comm.). It is therefore not advisable to make assumptions about one particular polychaete species based on evidence relating to another.

Heavy metal contamination Not relevant Not relevant

Little information was found concerning the intolerance of *Magelona* sp. to heavy metal contamination. However, Boilly & Richard (1978) stated that the presence of *Magelona mirabilis* is indicative of sediments which have been contaminated with iron. Studies on a dredge spoil disposal site in the harbours of Boulogne and Dunkerque in France (Bourgain *et al*., 1988) found higher densities of *Magleona mirabilis* three months after the dumping of dredge spoil than after five months, that is, when the metal contamination of the sediments was higher. No information regarding the effect of other metals on this species was found.

Hydrocarbon contamination Not relevant

Suchanek (1993) reviewed the effects of oil spills on marine invertebrates and concluded that, in general, on soft sediment habitats, infaunal polychaetes, bivalves and amphipods were particularly affected. However, no information was found concerning the intolerance of *Magelona mirabilis* to hydrocarbon contamination.
Evidence exists for other polychaete species. For example, Levell (1976) found that single spills of crude oil and oil / dispersant (BP 11 00X) mixtures caused a 25 - 50 % reduction in the abundance of *Arenicola marina* in addition to a reduction in feeding activity. Up to four repeated spillages (over a ten month period) resulted in complete eradication of the affected population either due to death or migration out of the sediment. It was also noted that recolonization was reduced although not completely prevented. In contrast, observations on *Aphelochaeta marioni* following the *Amoco Cadiz* oil spill in March, 1978 saw an increase in the abundance of this species after the spill (Dauvin, 1982, 2000).

Polychaetes are, however, highly diverse and have different tolerances in different species (M. Kendall, pers. comm.). It is therefore not advisable to make assumptions about one particular polychaete species based on evidence relating to another.

Radionuclide contamination Not relevant

No information was found concerning the intolerance of *Magelona mirabilis* to radionuclide contamination.

Changes in nutrient levels Intermediate High Low Low

As a surface deposit feeder, *Magelona mirabilis* relies on a supply of organic matter at the sediment surface. Increased nutrient levels in the water column would be expected to result in increased deposition of organic matter at the sediment surface, and therefore moderate nutrient enrichment may be beneficial to *Magelona mirabilis*. Indeed, Kröncke (1990) postulated that the increase in certain species, including *Magelona* sp., on the Dogger Bank between 1951 and 1987 may be due to eutrophication. However, Niermann (1996) noted that *Magelona* sp. decreased in abundance following a nutrient enrichment event in the North Sea, probably because the species were adapted to living in sediments with low or moderate amounts of organic carbon. Intolerance is therefore assessed as intermediate. Recovery is recorded as high (see additional information below).

Increase in salinity Tolerant Not relevant Not sensitive High

Magelona mirabilis occurs on the open coast where sea water is at full salinity (Fiege *et al.*, 2000) and is therefore probably relatively tolerant of increases in salinity. No information was found concerning the intolerance of the species to hypersaline conditions.

Decrease in salinity Not relevant

Magelona mirabilis occurs in the Baltic Sea (Fiege *et al.*, 2000), where salinity is typically lower than in the open ocean. It is likely that some populations of *Magelona mirabilis* are adapted to reduced salinity habitats however no information on the effects of an overall decrease in salinity were found.

Changes in oxygenation Tolerant Not relevant Not sensitive High

Niermann *et al.* (1990) reported the changes in a fine sand community from the German Bight in an area with regular seasonal hypoxia. In 1983, oxygen tension fell to exceptionally low levels; < 3 mg O_2/dm^3 in large areas and < 1 mg O_2/dm^3 in some places. Species richness was reduced by 30-50% following this event and overall biomass was reduced. Niermann *et al.* (1990) reported that *Magelona* sp. remained abundant during the period of hypoxia, and, in fact, decreased slightly in abundance on resumption of normoxia. The benchmark level of hypoxia is 2 mg O_2/l for one week. The evidence suggests that *Magelona mirabilis* would survive this and so is assessed as not sensitive.

Biological Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Introduction of microbial pathogens/parasites			Not relevant	

No information was found concerning the infection of *Magelona mirabilis* by microbial pathogens.

Introduction of non-native species Not relevant

There is no evidence to suggest that *Magelona mirabilis* is susceptible to displacement by non-

native species.

Extraction of this species Not relevant Not relevant Not relevant Not relevant

There is no evidence that *Magelona mirabilis* is extracted deliberately.

Extraction of other species Not relevant

No information was found concerning the effects of extraction of other species on *Magelona mirabilis*. The species is potentially at risk from fishing activities on sandy substrata, e.g. beam trawling for flatfish, and extraction of sand by the aggregate industry (Eno, 1991).

Additional information

It is generally agreed that *Magelona mirabilis* displays characteristics typical of an r-selected species, i.e. rapid reproduction, short life span and high dispersal potential (Kröncke, 1990; Niermann *et al.*, 1990). The larval dispersal phase would potentially allow the species to colonize remote habitats.
It is expected that populations of *Magelona mirabilis* would recover within 2 or 3 years and certainly within 5 years. Recoverability is therefore assessed as high.

Importance review

Policy/legislation

- no data -

Status

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

Non-native

Native	-		
Origin	-	**Date Arrived**	-

Importance information

It is possible that *Magelona mirabilis* contributes to the energy budget of flatfish nursery grounds along with spionids and tellinids (M. Kendall, pers. comm.).

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