NOBANIS - Invasive Alien Species Fact Sheet

Marenzelleria neglecta

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Species description

Scientific names: *Marenzelleria neglecta* (Sikorski and Bick sp. nov.), Spionidae
Synonyms: *Marenzelleria viridis* (earlier this species was addressed as *M. viridis* within Baltic sea area, now it is considered that the real *M. viridis* is present only outside the Baltic (Sikorski and Bick 2004)), *Marenzelleria* cf. *viridis, Marenzelleria type II.*
Note: due to the revision of the genus (Sikorski and Bick 2004), information sources in earlier scientific publications where the species was addressed as *M. viridis* in Baltic were considered valid for *M. neglecta* too.

Common names: red gilled mud worm (GB) – *M. viridis* and *M. neglecta* share the same name in their native area because until 2004 they were considered same species, rogoża amerykańska (PL), marenceliarija (LT)

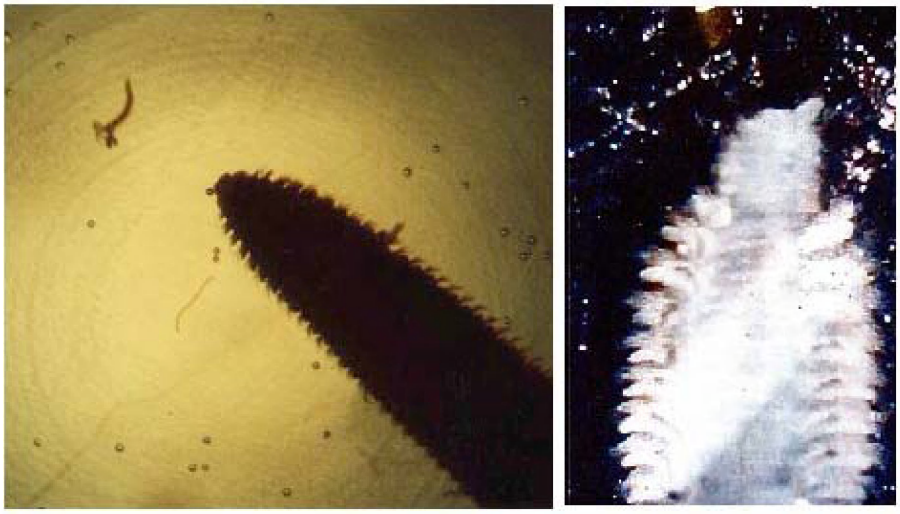

Fig. 1 and 2. *Marenzelleria neglecta* and specimen with regenerating frontal part – an indication it was attacked by a predator, possibly flounder. photos by Viktoras Didžiulis.

Species identification
Marenzelleria neglecta is particularly difficult to distinguish from *M. viridis*. Both species may co-occur (*e.g.* In the Elbe estuary, North sea) and only large worms can be reliably identified - only genetic analysis and autecological investigations may provide solutions to this problem (Bick and Zettler 1997, Sikorski and Bick 2004).

Both *M. viridis* and *M. neglecta* have long worm-like greenish body with rows of short chaeta along both sides but without dorsal scales. The anterior end is with various long appendages with more than one pair of long tentacles or gills on the anterior end starting from the first setiger. There are hooked chaetae in both notopodia and neuropodia beginning far backwards of chaetal segments XX. In I or I-II some chaetae chair are considerably longer than the rest. Numerous small appendages surround anus. *M. neglecta* can be identified by the combination of the length of nuchal organs (up to setiger 4) and the number of branchiate setigers in relation to the total number of setigers (which is about one quarter to one third). For a precise description of all the Marenzelleria species found in Europe please see Sikorski and Bick (2004).

Native range
The world-wide distribution of the genus Marenzelleria is restricted to the northern Hemisphere. The native range of *M. neglecta* is the Atlantic coast of the North-America (Gollasch *et al.* 1999, Sikorski and Bick 2004).

Alien distribution

History of introduction and geographical spread.
First record of *M. neglecta* in the European mainland coast was in the Ems estuary between Germany and The Netherlands in 1983 (Essink and Kleef 1988).

Marenzelleria neglecta gradually invaded nearly all European intertidal and estuarine areas. In 1985 this species was recorded in the German Darb-Zingst bodden chain (Bick and Burkhardt 1989). In subsequent years -1988 it was discovered in Poland (Gruszka 1991), Lithuania (Olenin and Chubarova 1992, Zmudzinski *et al.* 1993) and the Gulf of Riga, near the mouth of the Daugava (Lagzdins and Pallo 1994). In 1990 it reached the Swedish coast (Jansson 1994) and was being observed in Tvärminne, Finland (Norkko *et al.* 1993).

During 1990-93 *M neglecta* expanded its area into eastern part of the Gulf of Finland and southern Gulf of Bothnia with Olkiluoto (Finland) being the northernmost observation point (Stigzelius *et al.* 1997). In the northernmost part of the Gulf of Riga and the Väinameri archipelago it was found in 1995.

In the easternmost Gulf of Finland *M. neglecta* was first recorded in 1996 at three stations located near Luga Bay. In 1997, juvenile *M. neglecta* were found at the half of studied stations. In 2000, the polychaete was found along a southern coast of the gulf up to the freshwater Neva Bay. The results of recent surveys showed that this species has already become the most common component of a bottom macrofauna in the eastern Gulf of Finland (Maximov and Panov, 2002).

Genetic differences between populations of *Marenzelleria* in the North Sea and the Baltic Sea as well as differences in reproduction timing indicate that these populations represent two different species with two independent invasions into the two seas (Bastrop *et al.* 1995). The North Sea populations were described as *Marenzelleria* cf. *wireni (type I)*, and the Baltic Sea populations as former *Marenzelleria* cf. *viridis (type II)* – now *M. neglecta* (Sikorski and Bick 2004).

Pathways of introduction

Shipping may influence its spread although its spread is mostly associated with dispersal and development of planktonic larvae which, again, can be transported in ballast waters of ships. So the species was most likely transported as larvae and/or adults in ballast water. This assumption is supported by collection of specimens in a plankton tow in a North American estuary (Maciolek 1984).

Alien status in region

After introduction of *M. neglecta* in the Baltic Sea it has spread very rapidly and the population sizes rapidly increased nearly in all areas where it was introduced (see table 1). In many of these regions this species has become a very common or even dominant element of the local macrozoobenthic assemblages although its distribution is restricted mostly to coastal waters, estuaries and shallow bays (Zettler *et al.* 2002).

Country	Not found	Not established	Rare	local	Common	Very common	Not known
Denmark					X		
Estonia					X		
European part of Russia					X		
Finland					X		
Faroe Islands	X						
Germany					X		
Greenland	X						
Iceland	X						
Latvia					X		
Lithuania					X		
Norway				X			
Poland					X		
Sweden					X		

Table 1. The frequency and establishment of *Marenzelleria neglecta*, please refer also to the information provided for this species at www.nobanis.org/search.asp. Legend for this table: **Not found** –The species is not found in the country; **Not established** - The species has not formed self-reproducing populations (but is found as a casual or incidental species); **Rare** - Few sites where it is found in the country; **Local** - Locally abundant, many individuals in some areas of the country; **Common** - Many sites in the country; **Very common** - Many sites and many individuals; **Not known** – No information was available.

Ecology

Habitat description

M. viridis and *M. neglecta* share habitats in the Atlantic, but diverge in their salinity preferences: *M. viridis* does not occur in salinities below 16 ‰, while *M. neglecta* prefers 0.5 – 10 ‰ (Sikorski and Bick 2004). *Marenzelleria neglecta* is an estuarine species which inhabits sandy and muddy sediments of the Baltic sea. It can cope with low oxygen levels and withstands salinity down to 0.5 ‰ (Fritzsche and von Oertzen 1995, Schiedek 1993). Successful reproduction however cannot take place below 5 ‰ (Bochert *et al.*1994, Norkko *et al.* 1993).
M. neglecta lives in mucous-lined burrows penetrating up to 35 cm into the sediments with a maximum diameter of 2 mm. This spionid is classified as a selective surface deposit-feeder and a suspension-feeder (Dauer *et al.* 1981, Zettler at al. 1994). Fecal-pellet strings are deposited near the openings of the burrows.
In shallower areas (< 10 m) it prefers sand or gravel bottoms with higher abundance in more densely vegetated areas. Deeper down (> 10 m) *M. neglecta* is confined to silty clay substrate.

Reproduction and life cycle

Gametogenesis of *M. neglecta* starts in spring. Fecundity of animals depends on salinity, temperature, age and body size. Development of gametes starts in mid-May. The individuals reach maturity in September after about 20 weeks. Animals spawn in autumn and sometimes larval abundance jumps up to 21x106 ind./m3 near the coast. The pelagic larvae can be found mainly from September to November, but may also occur up to March (Bochert 1997, Sikorski and Bick 2004). Larval development largely depends on water temperature and lasts about 4 to 12 weeks. The larvae have initially one and later two pairs of black eyes and, in the 2nd segment, a ciliated pit. Neuropodial setae develop once the 7-setiger stage is reached. Palps appear at the 10-setiger stage. Metamorphosis into the juvenile benthic stage takes place at the earliest when the 15-setiger stage has been reached. Successful larval development from egg to juvenile is not possible below salinities of 5 psu, but colonization of oligohaline regions can be accomplished by larvae with more than 4 setigers or by swimming juveniles. Reproductive features of the Baltic *M. neglecta* differs from *M. wireni* (and *M. viridis)* populations from the North Sea and North America. The two types reproduces at different time – M. wireni reproduces in spring while *M. neglecta* in autumn. Both types show differences in larval development, gametal development and sex ratio of mature worms (Bochert *et al.* 1994, Bochert 1997, Bastrop *et al.* 1995).

Dispersal and spread

In Lithuania abundance of this spionide in some stations may be as high as 3760 ind./m^2 in sea and 400 ind./m^2 in nearly fresh waters of the Curonian lagoon (MRC 2005a, MRC 2005b). As compared to the Lithuanian and Latvian side of the Gulf of Riga, the abundances of *M. neglecta* in the Estonian coastal zone are relatively low, usually not exceeding 100 ind/m^2 (Kotta 2005, Kotta *et al.* 2004). In the Eastern Gulf of Finland the maximal abundance of 560 ind./m^2 and biomass 6,42 g/m^2 was observed in the Luga Bay with average abundance of 360 ind./m^2 (Maximov and Panov 2002).

Impact

Affected habitats and indigenous organisms

Tracer experiments show, that the irrigation burrowing of this polychaete has a high impact on fluid-

exchange rates between bottom water and sediments, especially in muddy sediments. The burrow walls make good substrates for aerobic degradation of organic matter (HELCOM 1996).

The polychaete being a deep burrowing deposit feeder introduced a new functional group in the northern Baltic. Studies proved that *M. neglecta* negatively influence the native polychaete species *Nereis diversicolor* and the amphipod *Monoporeia affinis* affecting composition of local benthic communities (Kotta *et al.* 2001, Kotta *et al.* 2004, Kotta and Olafsson 2003). Recent studies also demonstrate an inverse abundance and biomass relationship between the *M. neglecta (*as well as *M. viridis)* and the previously most abundant native polychaete *N. diversicolor*, indicating that competition occurs between the two species (Kotta *et al.* 2004, Essink *et al.* 2005). However this negative effect is likely to decrease with the increasing density of adult specimens of the native bivalve *Macoma balthica*. Competitive superiority of *M. balthica* over *M. neglecta* is likely due to more efficient feeding regime of the bivalve (Kotta 2005, Kotta *et al.* 2004).

Other known effects are the increased benthic production, and higher burrowing activity improves oxygen circulation in the sediment. The species caused changes in diet of benthic fish (Kotta pers. comm. 2005).

Genetic effects
Not known.

Human health effects
None.

Economic and societal effects (positive/negative)
The species is a potential food source for demersal fish (Essink and Kleef 1993).

Management approaches

Prevention methods
None known.

Eradication, control and monitoring efforts
This species is being indirectly addressed within frameworks of most national Baltic Sea environment monitoring programmes that include macrozoobenthos monitoring activities. At the moment there are no monitoring projects directly considering this invasive species. Therefore knowledge about invasive species is sporadic and not sufficient.

Information and awareness
No public campaigns have been organized specifically regarding the invasion of *M neglecta.* However a large number of discussions and scientific publications emerged when it was first noticed and later when its spread and adaptations to new environments within the Baltic Sea was observed. It was addressed in the 3rd Periodic Assessment of the State of the Marine Environment of the Baltic Sea.

Knowledge and research
History and invasion patterns of *M. viridis* are quite well covered by scientific studies (Zettler *et al.*

2002), it is likely their results are representative regarding *M. neglecta* too.

Recommendations or comments from experts and local communities
Nothing can be done in relation to this species because it is well adopted and well spread in its new environment. However the impacts of *M. neglecta* on local communities are usually estimated during routine monitoring activities of environment state of the Baltic and related water bodies. Being a potential food item for fish as well as increasing oxygen flow into the substrate it penetrates *M. neglecta* still may posses at least a few positive characteristics as an introduced species.

References and other resources

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Links
Non-native marine species in British waters: a review and directory
3rd Periodic Assessment of the State of the Marine Environment of the Baltic Sea
Pages of Baltic alien invertebrates

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