

A FIRST RECORD OF
MARENZELLERIA VIRIDIS (VERRILL, 1873)
(POLYCHAETA, SPIONIDAE)
IN THE SCHELDE ESTUARY (BELGIUM)

by

Tom YSEBAERT, Patrick MEIRE, Marjan DE BLOCK,
Nico DE REGGE & Jan SOORS (1)

SUMMARY. — In the Schelde estuary a first record (two specimens) of the spionid *Marenzelleria viridis* (Polychaeta, Spionidae) was made on 23th October 1996 at Doel, near the Dutch-Belgian border. *M. viridis* originates from the east coast of North America. In Europe, first observations of this species date from the 1980s. Nowadays, the species is proliferating rapidly and in some areas it is the dominating macrobenthic species (e.g. Ems estuary, Baltic Sea). The new observation of *M. viridis* in the Schelde estuary is the most southern limit reported for this species in Europe.

INTRODUCTION

Several marine, estuarine and freshwater macroinvertebrate species have been introduced or immigrated to European waters during the past 100 years (e.g. the bivalves *Ensis directus*, *Petricola pholadiformis*, *Corbicula fluminalis* and *C. fluminea*, and the crustaceans *Eriocheir sinensis*, *Rhithropanopeus harrisi*, *Corophium curvispinum*, *Gammarus tigrinus*).

A recent immigrant in European brackish waters is the spionid *Marenzelleria viridis* (Verrill, 1873). This spionid originates from estuaries along the east coast of North America, where it is found

(1) All authors : Institute of Nature Conservation, Kliniekstraat 25, 1070-Brussel, Belgium.

from Newfoundland to South Carolina (GEORGE, 1966 ; MACIOLEK, 1984). The first observation of *M. viridis* in Europe dates from 1982 in the Forth Estuary (Scotland, McLUSKY *et al.*, 1993). On the European mainland the first observation was done in 1983 in the Ems estuary (The Netherlands, ESSINK & KLEEF, 1988), after which the species spread to several estuaries around the North Sea and Wadden Sea (see ESSINK & KLEEF, 1988, 1993). In the Baltic Sea the species was first observed in Germany in 1985 by BICK & BURCKHARDT (1989), and also here a rapid spread over the whole Baltic Sea was observed (see ESSINK & KLEEF, 1993 ; ZETTLER *et al.*, 1995 ; ZETTLER, 1996).

M. viridis is a typically spionid like worm, with a bell-shaped prostomium, and with branchiae beginning on the first setiger, being absent from the last half or third of body. It is a very robust species with size reported up to 140 mm long (GEORGE, 1966). For more details see MACIOLEK (1984), and ATKINS *et al.* (1987). *M. viridis* typically inhabits the meso- and oligohaline stretches of estuaries, lagoons and coastal basins, and it can be considered to be a genuine brackish water species, extremely tolerant to lowered salinities (GEORGE, 1966 ; ESSINK & KLEEF, 1993 ; ZETTLER *et al.*, 1995 ; BOCHERT *et al.*, 1996a, 1996b ; ZMUDZINSKI, 1996). The worms live in vertical, mucus-lined burrows up to 35 cm deep, predominating in sandy sediments (ATKINS *et al.*, 1987 ; ESSINK & KLEEF, 1993 ; ZETTLER *et al.*, 1995), but also found in muddy sediments (GRUSZKA, 1991).

This short note reports the first observation of *M. viridis* in the Schelde estuary near the Dutch/Belgian border, being the most southern observation of this species in Europe.

MATERIAL AND METHODS

The Schelde estuary, a macrotidal coastal plain estuary, is situated at the border between the Netherlands and Belgium. It measures 160 km between the mouth in Vlissingen and Gent, where it is artificially stemmed by a weir. The study area is situated in the Belgian part of the estuary, near the Dutch-Belgian border (Fig. 1). In this part of the estuary a mean tidal amplitude of ± 5.0 m is observed.

On 16 and 23 October 1996 53 locations were sampled in the study area. All locations were situated subtidally, and samples were taken from a ship with a 'Van Veen' grab sampler (0.105 m²). One grab was taken at each location, and directly sieved on a sieve with mesh size 1 mm. One sediment core (\varnothing 2 cm) was collected for granulometry

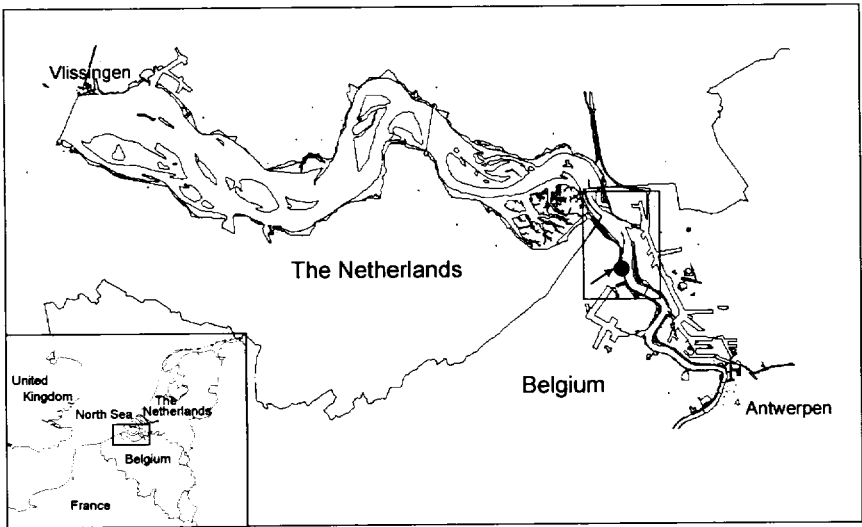


FIG. 1. — Map of the Schelde estuary with indication of the study area and the location (51° 18' N, 4° 16' W) where *Marenzelleria viridis* was found.

analysis. Position and depth were noticed at each location. At the time of sampling, the salinity of the surface water was approximately 11-12.5 p.s.u., the temperature $\pm 15^{\circ}\text{C}$, and oxygen content 4-5 mg/l.

In the laboratory, all samples were stained with Rose Bengal and all individuals were identified to species or genus level (except *Oligochaeta*) and counted.

RESULTS AND DISCUSSION

Two spionid worms were discovered in the Van Veen grab of location 48 (5118 N ; 416 W ; Fig. 1) and were identified as belonging to the genus *Marenzelleria*. By using the detailed description of the genus *Marenzelleria* by MACIOLEK (1984) and ATKINS *et al.* (1987) and by comparing with specimens sent by K. Essink from the Ems estuary, the two specimens were further identified as *Marenzelleria viridis* (Verrill, 1873). The two specimens found were broken, being approximately 40 and 25 mm long.

Other macrobenthic species found at this location were *Boccardia redeki*, *Heteromastus filiformis* and *Oligochaeta*. The sampling location 48 was situated at a depth of ± 5 m and was characterized by very fine sand (median grain size 74 μm ; fraction $< 63 \mu\text{m} = 44\%$).

In recent sampling programs in the Schelde estuary, no other observations on the occurrence of *M. viridis* were done (personal observations ; J. Craeymeersch, pers. comm.). However, already in October 1995 two specimens and in March 1996 four specimens were observed at the Hinderplaat, a sandflat in the southwestern part of the Netherlands, in front of the coast of Voorne, south of the 'Maasvlakte' (harbour of Rotterdam) (J. Craeymeersch, pers. comm.).

As *M. viridis* is colonizing large areas in many European marine and estuarine habitats, it has become a well studied species. Several studies deal with the question of how this species is colonizing Europe, and recent work, based on population genetic analysis, strongly supports the hypothesis that the Baltic Sea and the North Sea were colonized more or less at the same time by sibling species of the genus *Marenzelleria* found on the Atlantic coast of North America (BASTROP *et al.*, 1995 ; RÖHNER *et al.*, 1996). Based on the spread at its present rate, a further colonization of *M. viridis* in European brackish waters can be expected within the near future. The observation in the Schelde estuary seems to be a proof of that. At present, the observation of *M. viridis* in the Schelde estuary is geographically the most southern observation in Europe.

The introduction of 'alien' species into an ecosystem can have a serious impact on the indigenous community. In the Baltic *M. viridis* is in many areas the most common macrozoobenthos representative (NORKKO, 1993 ; ZETTLER *et al.*, 1995), and often has displaced the indigenous chironomids and oligochaetes in the oligohaline regions (ZETTLER *et al.*, 1995 ; ZMUDZINSKI, 1996). In the Dollard region of the Ems estuary *M. viridis* has become one of the dominating macrobenthic species (ESSINK & KLEEF, 1993). In our study area in the Schelde estuary, which is the upstream mesohaline part of the estuary, the intertidal benthic macrofauna is at present dominated by *Corophium volutator*, *Nereis diversicolor* and oligochaetes (YSEBAERT *et al.*, 1993). Subtidally, the study area is dominated by *Boccardia redeki*, *Heteromastus filiformis* and oligochaetes. Towards the oligohaline part of the estuary, the benthic macrofauna gets totally dominated by oligochaetes (YSEBAERT *et al.*, 1993). These benthic communities of the meso/oligohaline zone are very much alike as in the other estuaries along the NW-European coast and the Baltic, and the future will learn if *M. viridis* succeeds in colonizing the Schelde estuary as well.

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REFERENCES

- ATKINS, S.M., JONES, A.M. & GARWOOD, P.R. (1987). The ecology and reproductive cycle of a population of *Marenzelleria viridis* (Annelida : Polychaeta : Spionidae) in the Tay estuary. *Proc. Royal Soc. Edinburgh* **92B** : 311-322.
- BASTROP, R., RÖHNER, M. & JURSS, K. (1995). Are there two species of the polychaete genus *Marenzelleria* in Europe? *Mar. Biol.* **121** : 509-516.
- BICK, A. & BURCKHARDT, R. 1989. Erstnachweis von *Marenzelleria viridis* (Polychaeta, Spionidae) für den Ostseeraum, mit einem Bestimmungsschlüssel der Spioniden der Ostsee. *Mitt. Zool. Mus. Berl.* **65** : 237-247.
- BOCHERT, R., FRITZSCHE, D. & BURCKHARDT, R. (1996a). Influence of salinity and temperature on growth and survival of the planktonic larvae of *Marenzelleria viridis* (Polychaeta, Spionidae). *Journal of Plankton Research* **18** : 1239-1251.
- BOCHERT, R., ZETTLER, M.L. & BOCHERT, A. (1996b). Variation in the reproductive status, larval occurrence and recruitment in an estuarine population of *Marenzelleria viridis* (Polychaeta : Spionidae). *Ophelia* **45** : 127-142.
- ESSINK, K. & KLEEF, H.L. (1988). *Marenzelleria viridis* (Verrill, 1873) (Polychaeta : Spionidae): A new record from the Ems estuary (The Netherlands / Federal Republic of Germany). *Zool. Bijdr. Leiden* **38** : 1-13.
- ESSINK, K. & KLEEF, H.L. (1993). Distribution and life cycle of the North American spionid polychaete *Marenzelleria viridis* (Verrill, 1873) in the Ems estuary. *Neth. J. Aquat. Ecol.* **27** : 237-246.
- GEORGE, J.D. (1966). Reproduction and early development of the spionid polychaete, *Scolecopelides viridis* (Verrill). *Biol. Bull.* **130** : 76-93.
- GRUSZKA, P. (1991). *Marenzelleria viridis* (Verrill, 1873) (Polychaeta : Spionidae) — a new component of shallow water benthic community in southern Baltic. *Acta Ichthyol. Pisc.* **21** : 57-65.
- MACIOLEK, N.J. (1984). New records and species of *Marenzelleria* Mesnil and *Scolecopelides* Ehlers (Polychaeta ; Spionidae) from Northeastern North America. In : HUTCHINGS ; P.A. (ed.), *Proc. First Internat. Polychaete Conf.*, Sydney, The Linnean Society of New South Wales : 43-62.

- McLUSKY, D.S., HULL, S.C. & ELLIOT, M. (1993). Variations in the intertidal and subtidal macrofauna and sediments along a salinity gradient in the upper Forth Estuary. *Neth. J. Aquat. Ecol.* **27** : 101-109.
- NORKKO, A., BONSDORFF, E. & BOSTRÖM, C. (1993). Observations of the polychaete *Marenzelleria viridis* (Verrill) on a shallow sandy bottom on the south coast of Finland. *Mem. Soc. Fauna Flora fenn.* **69** : 112-113.
- RÖHNER, M., BASTROP, R. & JÜRSS, K. (1996). Colonization of Europe by two American genetic types of species of the genus *Marenzelleria* (Polychaeta : Spionidae). An electrophoretic analysis of allozymes. *Marine Biology* **127** : 277-287.
- YSEBAERT, T., MEIRE, P., MAES, D. & BUIJS, J. (1993). The benthic macrofauna along the estuarine gradient of the Schelde estuary. *Neth. J. Aquat. Ecol.* **27** : 327-341.
- ZETTLER, M.L., BICK, A. & BOCHERT, R. (1995). Distribution and population dynamics of *Marenzelleria viridis* (Polychaeta, Spionidae) in a coastal water of the southern Baltic. *Arch. Fish. Mar. Res.* **42** : 209-224.
- ZETTLER, M.L. (1996). Successful establishment of the spionid polychaete, *Marenzelleria viridis* (Verrill, 1873), in the Darss-Zingst estuary (southern Baltic) and its influence on the indigenous macrozoobenthos. *Arch. Fish. Mar. Res.* **43** : 273-284.
- ZMUDZINSKI, L. (1996). The effect of the introduction of the American species *Marenzelleria viridis* (Polychaeta : Spionidae) on the benthic ecosystem of Vistula Lagoon. In : DWORSCHAK, P.C., STACHOWITSCH, M. & OTT, J.A. (eds.), *Proc. 29th European Marine Biology Symposium, Vienna. P.S.Z.N. Marine Ecology* **17** : 221-226.