HARMFUL ALGAE NEWS

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• France

Pseudo-nitzschia australis on French Atlantic coast - an unusual toxic bloom

The occurrence of the toxic diatom *Pseudo-nitzschia australis* was first suspected in a water sample from Bay of Brest, France, in 1995 (Fig. 1). At this time, and because of very low number of cells, the identification could not be confirmed by Scanning Electron Microscopy (SEM). In autumn 2004, this species was again reported, and in association with *P. multiseries*, suspected to be the source of domoic acid (DA) in king scallops (*Pecten maximus*) from the Bay of Seine (English Channel) [1]. Since 2006, it has been encountered every year at low concentrations in either spring or autumn along the Atlantic coast of Brittany.

This year, it was first observed in early March in the Bay of Douarnenez and bloomed a week later in the "Pertuis Charentais" area with densities exceeding 10^6 cells L^{-1} (Fig. 1). It then for more than a month remained noticeable (from 10^5 to 10^6 cells L^{-1}) in several areas of the Atlantic coast (Fig. 1). At the same time, the monitoring network (REPHY of Ifremer) detected domoic acid far above the EU-regulatory limit of 20 mg DA/Kg tissue in shellfish (up to 10 times the safety threshold), leading to the prohibition of harvesting and sale of scallops during several weeks.

In contrast to other years where toxic blooms were dominated by species of the *Pseudo-nitzschia pseudodelicatissima/cuspidata* complex [2] as defined by Lundholm *et al*. [3], this year was notable for a species of the *Pseudo-nitzschia seriata* complex *sensu* Hasle [4]. An identification key using features observable in Light Microscope (LM) led us to think that it was *Pseudo-nitzschia australis* with asymmetrical lanceolate valves, a width varying from 7.0 to 8.9 µm, apices slightly rostrate and a 23-31% overlap of cells in chains (Fig. 2). SEM examination of valves showed that there was no central

Fig. 1. Map with location of Atlantic areas with Pseudo-nitzschia australis *in spring 2010. 1) Bay of Brest. 2) Bay of Douarnenez. 3) "Pertuis Charentais".*

(Cont'd on p. 2)

Fig. 2. Light micrographs of Pseudo-nitzschia australis. *A) chain in valve view. B) same chain in girdle view showing large overlap of cells. Scale bars = 50 µm.*

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interspace (Fig. 3 A), and that interstriae and fibulae were usually distributed in equal numbers (12–14 in 10 µm). The striae were composed of two rows of poroids (4–5 in 1 µm) (Fig. 3B). Moreover, the valves were heteropolar (Fig. 3C & D). Otherwise, the structure of the girdle revealed the presence of three types of bands with 17–19 band striae in 10 µm (Fig. 3E). The identification of *P. australis* was thus confirmed, excluding the hypothesis of *P. seriata*, the closest congeneric species [5–6]. Molecular analysis (PCR amplification and sequencing) was undertaken on individual chains isolated from field samples. The two resulting ITS (ITS1-5.8S-ITS2) rDNA sequences were compared with other sequences of *Pseudo-nitzschia* available in GenBank. They were identical (100% similarity) with all ITS sequences of *P. australis* of both European and Californian origin (Table 1).

This unexpected outbreak happened after the "Xynthia" storm on the 28 february 2010 which severely affected the coasts of the "Pertuis Charentais". Many reared bivalves from this area were contaminated with high toxicity levels. At present, the degree of contamination of king scallops is unknown due to closure of the harvesting sites. But we can be anxious considering the kinetics of contamination and depuration of these shellfish.

Table 1. List of ITS rDNA sequences of Pseudo-nitzschia australis *available in GenBank and used for a comparison with our two studied isolates.*

Accession number	Strain designation	Origin
AM118029	PLY1St.24D	Scotland
AM118030	PLY1St.27E	Scotland
AM118031	PLY1St.33A	Scotland
AM118032	PLY1St.37A	Scotland
AM118033	PLY1St.37B	Scotland
AM118034	PLY1St.54C	Scotland
AM118035	PLY1St.56B	Scotland
AM118036	PLY1St.68C	Scotland
AY257842	ØM1	Aveiro, Portugal
AY452527	PLYSt19A	Scotland
AY452528	PLYSt54B	Scotland
DQ062661	au43	Monterey Bay, California
EF564717	Pau1	Bay of Seine, France
EU523100	C1	France
EU684233	Delta 2	Portugal

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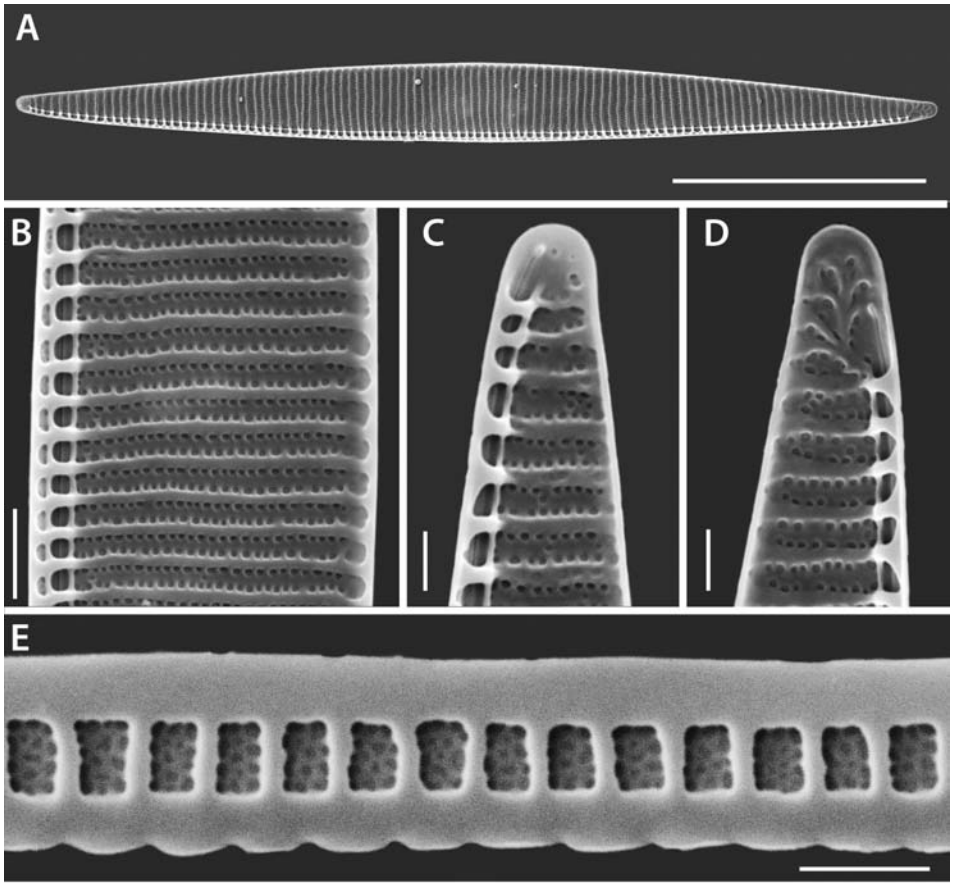

Fig. 3. Scanning electron micrographs of Pseudo-nitzschia australis. *A) Valve illustrating asymmetrical valve outline and absence of central interspace. B) Higher magnification of central part of valves showing the two rows of poroids per striae. C, D) same valve with apices exhibiting the heteropolarity. E) Detail of a girdle band. Scale bars = 20 µm (A), 2 µm (B), 1µm (C-E).*

References

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