

Ostreopsis: a new invader of Basque beaches?

During the summer of 2021, a new and unexpected phenomenon was seen on the beaches of the Basque Country: symptoms reminiscent of a flu-like illness, affecting entire families but also beach professionals such as lifeguards and beach restaurant waiters. Water samples taken by Ifremer showed high concentrations of a microalgae called *Ostreopsis* that is invisible to the naked eye. No serious cases were observed among the 674 cases reported to the Bordeaux poison control centre (PCC). This phenomenon, which could recur in the future, needs to be monitored in order to better protect populations and professionals.



Climate change and human activities are causing changes in the marine environment. This has led to the emergence of new types of poisoning. In 2010, for example, *Physalia* (tropical aquatic organisms from the Cnidaria phylum) invaded the Aquitaine coast, taking advantage of changes in marine currents [1]. Their stings caused extensive dermal symptoms and severe general neuromuscular symptoms in bathers. Similarly, cases of ciguatera (poisoning from eating contaminated fish, see Issue 16 of Vigil'Anses) have now been described in the Mediterranean, linked to the appearance in the region of the toxic alga *Gambierdiscus* spp., due to the opening of the Suez Canal [2]. The causes of the emergence of these poisoning cases are poorly understood and probably involve multiple factors.

In the summer of 2021, a new and unexpected phenomenon occurred on the beaches of the Basque Country. Numerous people contacted the PCC and the Regional Health Agency (ARS) to report symptoms reminiscent of a flu-like illness, affecting entire families but also beach professionals (lifeguards, beach restaurant waiters, etc.). Some people had been swimming, but others had remained on the beach or seafront without being in contact with the water. Such a phenomenon had already occurred in 2013 on the French Mediterranean coast and was due to a toxic microalgae, *Ostreopsis ovata* [3].

While the species *Ostreopsis siamensis* was first observed and described in 1901, in the Gulf of Thailand (Siam), 11 other species have since been described worldwide, including *O. marina*, *O. labens*, *O. heptagona*, *O. monotis* and *O. ovata*.

These microalgae, which are invisible to the naked eye, grow on macroalgae and on the sea bed. They can also contaminate fish and shellfish through bioaccumulation.

Certain conditions such as wind, roughness of the sea, water temperature, light intensity, salinity and tidal currents can favour a huge increase in *Ostreopsis* spp., which results in the formation of blooms. These appear as a brown foam on the surface, which can give the water a metallic taste and is an indication of the suffering of marine organisms (high mortality of grazing gastropods such as limpets).

The unique feature of *Ostreopsis* spp. is that they release toxins in seawater, particularly in these blooms. The toxins then aerosolise in sea spray [4]. A person can therefore be poisoned via inhalation without even putting a foot in the water, or by dermal contact when swimming, or ingestion when eating contaminated products.

These microalgae produce toxins similar to palytoxin, responsible for:

- Neurological signs: tingling, burning and headaches,
- ENT and respiratory signs: runny nose, cough, respiratory discomfort,
- Dermal symptoms resembling hives,
- Cardiac signs: tachycardia, high blood pressure,
- Digestive symptoms: nausea, vomiting, diarrhoea,
- General symptoms: fever, muscle and joint pain.

On 5 August 2021, the local poison control centre received a call about a sudden flu-like illness that had occurred during a swim, suggesting poisoning by *Ostreopsis* spp. An investigation then showed that the first poisoning cases had occurred in July.

The samples taken led to the rapid identification of *Ostreopsis siamensis*.

The poison control centre subsequently compiled all cases brought to the attention of either the PCC or the ARS during the summer of 2021. A total of 830 reports were received and recorded, involving the entire Basque coast. Duplicates between the PCC and the ARS, cases with no symptoms and cases for which the signs could not be attributed to *Ostreopsis* spp. were excluded.

The analysis therefore focused on 674 cases, presented in the rest of this article. The date of exposure was documented for 611 patients, the date of onset of symptoms for 499.

The time curve (Figure 1) shows that the epidemic peak was around 8 August. The latest exposure date was at the end of September. For reasons of readability, the epidemic curve is shown from 1 to 20 August 2021. There were very few cases in July.

The sex ratio was 1.2, indicating a predominance of males, and the median age was 28 years [minimum age six months and maximum age 85 years].

In 72% of the cases, the people had been poisoned while swimming. Just 2% of the patients had only been exposed by the respiratory route via sea spray. In all other cases, the skin had been in contact with contaminated water.

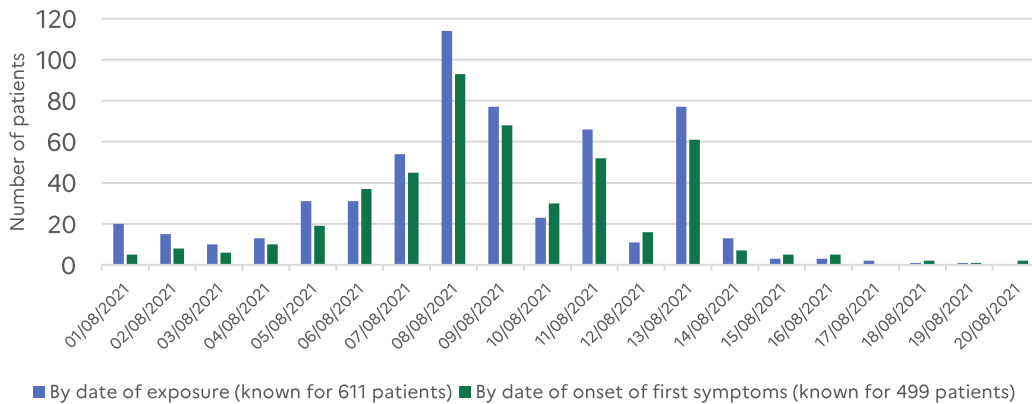


Figure 1: Number of cases by date of exposure and/or date of onset of symptoms from 01/08/21 - 20/08/21 (i.e. 453 out of 611 over the total study period). Source: SICAP.

The clinical signs observed and listed below coincide with those described in the literature for palytoxin (as one person may have several symptoms, the total of the percentages exceeds 100%): oropharyngeal pain (67%), rhinitis (66%), cough (64%), respiratory discomfort (32%), fever above 38°C (26%), headaches (11%), dermal signs (9%), neuromuscular signs (<5%).

The time to onset of symptoms was short, within six hours in almost three quarters of cases.

Given the pandemic context of the summer of 2021 and the similarity of the symptoms to those of COVID-19, 149 patients underwent a COVID-19 test as recommended by the poison control centre. All were negative except for one, who was therefore excluded from the study.

All patients recovered within two (acute exposure) to seven days (subacute exposure). There were no fatalities or serious cases.

Patients who developed more severe forms were those with a medical history of ENT or lung disorders (asthma, chronic bronchitis, etc.), allergy, cardiovascular problems (hypertension, arrhythmia, stroke, etc.) or diabetes.

Some poisoning victims consulted their doctors or went to the hospital emergency department. While some of these consultations were reported to the poison control centres and have been included in this investigation (108 patients (16%) saw a general practitioner, 28 patients (4%) contacted the *SOS Médecins* service and 14 patients (2%) a hospital emergency doctor), many were not. The figures shown therefore underestimate the actual number of people affected.

This episode underlines the importance, in the event of seawater contamination by *Ostreopsis* spp., of paying particular attention to beach professionals (surfing school staff, lifeguards, beach restaurant staff), as well as to beachfront residents, as these individuals are subject to repeated or chronic exposure.

This is the first toxic epidemic of this magnitude in France linked to *Ostreopsis* spp., and the first on the Atlantic coast. Analysing the reports as they came in, in terms of the location and severity, enabled more targeted public information to be issued and regular on-site water sampling to be carried out.

These analyses were coordinated by the French Research Institute for Exploitation of the Sea (Ifremer) and were used to monitor the episode's geographical and temporal evolution.

A coordinated prevention strategy involving all the local, regional and national stakeholders is being put in place for the coming years. It will need to be based on the early detection of *Ostreopsis* spp. through iterative sampling of several beaches, with a view to communicating precautionary measures in the event of a bloom, in particular to recommend that vulnerable people stay away during this period.

Lastly, ANSES, which has already published work on this subject, received a formal request to assess the human health risks of *Ostreopsis* spp. blooms on the Basque coast and establish specific recommendations.

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