

# Saltwater aquarium corals should be handled with care

Known since the 1970s, palytoxin is a highly potent toxin contained in certain soft corals of the genera *Zoanthus* and *Palythoa*<sup>1</sup>, which occur naturally in coral reefs in the Indian Ocean, Red Sea and Indo-Pacific region.

Palytoxin may be produced directly by these soft corals, or be produced by microalgae and then secondarily accumulate in the soft corals through filtration, although the exact mechanism remains unknown.

Palytoxin is also found in various marine organisms (certain species of crabs, sponges, sea anemones, shellfish, parrotfish and tropical mackerel, etc.), which become toxic by bioaccumulation through the food chain.

Lastly, "palytoxin-like" toxins can be transported in sea spray contaminated by certain algal blooms (*Ostreopsis ovata* blooms) and can poison not only bathers in direct contact but also walkers near water containing these algae.

Over the past decade, with the development of techniques for maintaining reef aquariums, enthusiasts have been able to reproduce the fragile ecosystem of a coral reef, with the tropical fish, corals, sponges, shells and sand it typically supports.

Because of their ornamental quality and/or their rapid growth in marine aquariums, the marketing of soft corals to the general public through specialised shops or websites appears to be expanding. This has increased the risk of human exposure to palytoxin.

However, the presence of these soft corals in marine aquariums may also be unintentional or even unknown, as their larvae may have come from the purchase of other coral species or from decorative live rocks containing small animals (crabs, worms, shrimps, etc.) useful for the natural recycling of aquarium waste. They may then become undesirable as a result of their proliferation.

Looking after soft corals of the genera *Zoanthus* and *Palythoa* can expose the handler to palytoxin by several routes simultaneously: by contact, especially of the mucous membranes

(eyes, mouth), but also by inhalation. The symptoms, which occur immediately, are usually mild (skin irritation, abdominal pain, etc.) and improve within a few days with symptomatic treatment. However, the effects can also be severe and lead to sequelae (corneal damage – keratitis requiring a corneal transplant), or can even be life-threatening (severe respiratory difficulties). Cases of poisoning have been described in the United States and Europe [1], and have even made the headlines, such as the dramatic case of mass poisoning in Quebec. Seven members of the same family were poisoned after installing an aquarium containing soft corals, purchased second-hand, in their home [2]. They immediately experienced sneezing, nausea, breathing difficulties, etc., requiring them to go to the hospital emergency department, with one of them having to stay overnight.

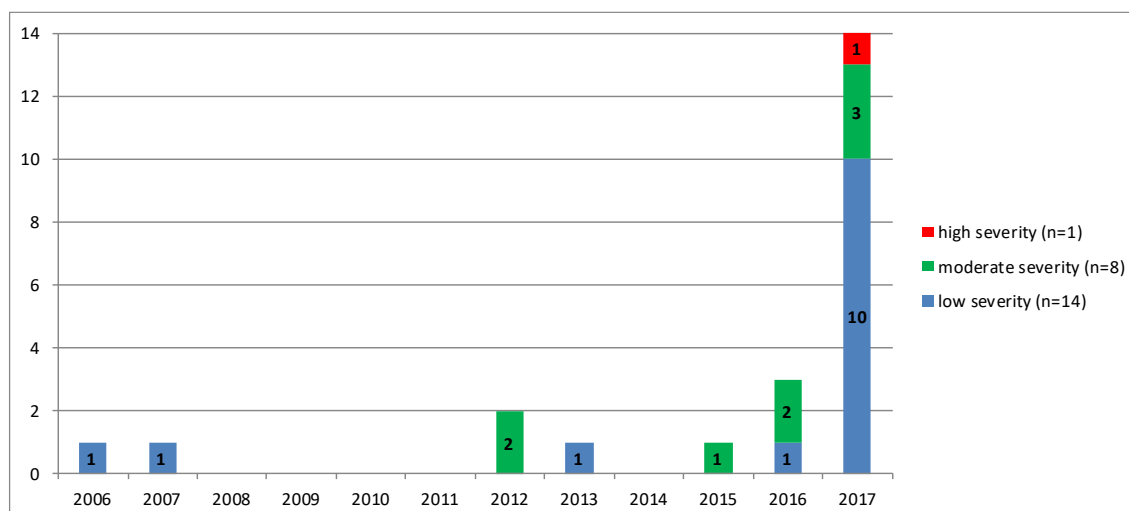
A study of palytoxin exposure cases reported to the network of French Poison Control Centres (PCCs) between January 2000 and December 2017 and involving the handling of aquarium soft corals [3] identified 23 cases, all symptomatic, with non-null causality<sup>2</sup>. While the first case was reported in 2006, 74% of cases were recorded in 2016 and 2017 (see Figure 1), reflecting the increasing availability of these corals on the market.

The sex ratio was 4 (16 males, 4 females, not specified in three cases) and the ages ranged from 12 to 74 years (median 42 years). While the exposure cases, all accidental, mainly involved private individuals (16 cases), 30% of them concerned professionals (7 cases). Two thirds were exposed by several routes simultaneously (respiratory and/or dermal and/or ocular), causing several simultaneous local and/or diffuse symptoms.

These symptoms were mainly general (fever, fatigue – 17 cases, 74%), neurological (headache, muscle pain – 14 cases), digestive (nausea, vomiting – 11 cases), respiratory (breathing difficulties, coughing – 10 cases), ocular (conjunctivitis, keratitis – 8 cases) and/or dermal (pruritus, irritation – 7 cases).

1. While *Palythoa toxica* is still considered the most toxic, other species, not all of which have been identified, also contain palytoxin. These include *P. caesia*, *P. caribaeorum*, *P. mammosa*, *P. heliodiscus*, *Zoanthus solanderi* and *Z. sociatus*.

2. Causality established according to the method for determining causality in toxicovigilance (Version 7.6 – June 2015), which determines, using five levels (causality excluded I0, unlikely I1, possible I2, likely I3 and very likely I4), the strength of the causal link between exposure to an agent and the occurrence of a symptom, syndrome or disease ([https://tv.toxalert.fr/v7.6/Calcul\\_imputabilite\\_v7.6.html](https://tv.toxalert.fr/v7.6/Calcul_imputabilite_v7.6.html)).



**Figure 1:** Number of cases of palytoxin exposure, according to their level of severity, reported to the network of poison control centres in the context of marine aquarium handling, from 2000 to 2017. (Source: PCCs' information system).

Although almost two-thirds of the cases presented with mild symptoms (14 cases), eight (35%) were more severe, with respiratory difficulties, high blood pressure or persistent fatigue for several days. One person developed corneal damage (keratitis) requiring a transplant.

Of the 23 cases, only four people, all professionals, were wearing some personal protective equipment (PPE), although this was insufficient in relation to the risk of palytoxin poisoning.

A detailed study of the poisoning circumstances found various actions or behaviours posing a risk:

- Some people poured boiling water on the stones on which the soft corals were growing, in order to wash or kill them, resulting in palytoxin being released in micro-droplets; this action is both ineffective and dangerous if suitable PPE is not worn, as the toxin is thermostable and therefore resistant to heat;
- Other people cut corals with their bare hands to make cuttings or to get rid of them, which resulted in direct contact of the toxin with the skin;
- One person scrubbed soft corals directly with an iron brush to kill them, without any protection, while another scraped a coral-covered stone with another stone and then rinsed it with hot water, without wearing gloves;
- Lastly, several people in the vicinity of another person handling corals were poisoned despite not being in contact with them.

Furthermore, based on their statements to the PCCs, 11 people knew nothing about soft corals, seven knew about soft corals but not about palytoxin, three knew about palytoxin but not about its risks, and only two professionals knew about the risks of palytoxin.

Lastly, no regulations on labelling or the mention of possible dangers when purchasing these soft corals have been identified to date. No palytoxin-producing or -releasing corals appear on the French list of hazardous non-domestic species [4].

Given the health risks involved, it seems necessary to ensure that the public and professionals are aware of the presence of soft corals of the genera *Zoanthus* and *Palythoa* in their aquariums, and are therefore sufficiently informed of the risks of palytoxin exposure when handling them and of the protective measures to be taken. This is especially important for professionals in the aquarium sector, who may be required to handle these corals in a number of situations (when receiving imported corals, selling to the public, cleaning aquariums in shops or homes).

To ensure that aquarium keeping remains a real pleasure for amateurs and that professionals in the aquarium sector can work in complete safety, collective and individual preventive measures, developed following the study of cases reported to the PCC network and various organisations (INRS, OATA [5], etc.) are proposed in the box below!

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- Learn about the soft corals you buy and how dangerous they can be;
- Be aware of which actions are safe and how to avoid handling errors;
- Wherever possible, handle soft corals in the aquarium underwater and while fully submerged;
- Switch off aquarium pumps and skimmers when tending to soft coral;
- Handle soft corals in well ventilated areas;
- If soft corals need to be moved, transport them in plastic bags or containers filled with water;
- Wear suitable personal protective equipment (PPE) when handling them (gloves, mask covering nose and mouth, goggles and plastic apron);
- Do not boil or pour hot water on soft corals;
- Do not put them in the microwave;
- Wash and dry hands thoroughly after handling soft corals;
- Clean equipment and surfaces with bleach;
- Avoid handling corals in the presence of other people; anyone wishing to remain nearby should wear PPE, even when not handling soft corals;
- Keep your usual medication on hand if you suffer from asthma;
- If you have difficulty breathing, phone the emergency services (dial 15 in France) immediately;
- In the event of eye splashes: rinse eyes with tap water for about 10 minutes and seek medical advice or contact a poison control centre;
- In the event of skin contact, rinse skin with tap water and seek medical advice or call a Poison Control Centre.

## References

[1] Pelin M, Brovedani V, Sosa S, Tubaro A. Palytoxin-containing aquarium soft corals as an emerging sanitary problem. *Mar Drugs* 2016; 14.

[2] <http://www.cbc.ca/news/canada/ottawa/toxic-coral-blamed-for-sickening-gatineau-family-1.4633810>

[3] T. Calon, S. Sinno-Tellier, L. De Haro. Palytoxin exposure induced by soft corals in aquariums: Cases report of French PCC network from 2000 to 2017. Internal request by the Toxicovigilance Coordination Committee, April 2018, 32 p.

[http://www.centres-antipoison.net/cctv/CCTV\\_Rapport\\_Palytoxine\\_Vf.pdf](http://www.centres-antipoison.net/cctv/CCTV_Rapport_Palytoxine_Vf.pdf)

[4] Ministerial Order of 10 August 2004 laying down the conditions for authorising the keeping of animals of certain non-domestic species in establishments for the breeding, sale, hire, transit or presentation to the public of non-domestic animal species.

[5] Recommendations to marine reef aquarists on how to prevent palytoxin poisoning. OATA – Ornamental Aquatic Trade Association Ltd. United Kingdom, 2p, April 2018. (<https://ornamentalfish.org/wp-content/uploads/OATA-palytoxin-guidance-to-marine-reef-aquarists-April-2018.pdf>) in collaboration with several partners (Health Protection Scotland, UK; Tropical Marine Centre, UK).

### TO FIND OUT MORE, VISIT:

[Palytoxin exposure induced by soft corals in aquariums: Cases report of French PCC network from 2000 to 2017](http://www.centres-antipoison.net/cctv/CCTV_Rapport_Palytoxine_Vf.pdf)