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THE RED TIDE BLOOM EFFECTS ON HUMAN HEALTH AND WELFARE

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The oceans, a vast canvas of life, are home to an intricate world of microorganisms, among which the phytoplankton thrive. Within this diverse community, dinoflagellates, seemingly innocuous microscopic organisms, play a pivotal role. However, beneath their calm facade lies a phenomenon known as the infamous “red tide” blooms. These blooms, caused by the rapid multiplication of dinoflagellates, paint the water crimson, an

eerie and captivating spectacle that signals both wonder and danger. . But do you know that these dinoflagellate blooms have impacts on marine ecosystems and the concerning implications for human health as well as coastal communities? Let’s unravel the mysteries surrounding these vivid blooms that cause disease to human health and welfare. Figure 1 shows the red tides phenomenon spotted in the waters of Teluk Bahang,



Figure 1: Red Tides phenomenon spotted in waters off Teluk Bahang, Pulau Penang.(Source: Sinar Harian, 2023)

Pulau Pinang. Recently, streaks of pink have appeared on the shore of Teluk Bahang, Pulau Pinang. The Teluk Bahang Fisherman’s Association Chairman, Johari Mohamad, came across a streak of pink with many dead fishes on the surface. According to the Director of Centre for Marine and Coastal Studies (CEMACS) Universiti Sains Malaysia, Professor Datuk Dr Aileen Tan Shau Hwai, this phenomenon caused by *Noctiluca scintillans* known as sea sparkle or a bioluminescent algae, a species of dinoflagellate. Figure 2 shows the *Noctiluca scintillans*.

Its blooms can cause various detrimental effects on marine ecosystems and, consequently, impact human welfare. Firstly, these blooms can lead to a decline in fish populations. *Noctiluca scintillans* feed on the phytoplankton, including fish larvae and eggs, potentially reducing the availability of food for juvenile fishes. These can cause a decrease in fish populations, impacting fisheries and the livelihoods of coastal communities reliant on fishing.

During the bloom of *N. scintillans*, the dinoflagellates feed on phytoplankton, including certain toxic algae. While *Noctiluca* itself is not toxic, it can act as a vector or carrier of toxins produced by other algae within its cellular vacuoles or through other mechanisms. These toxins can accumulate in the tissues of filter-feeding shellfish like clams, mussels, and oysters, which consume the

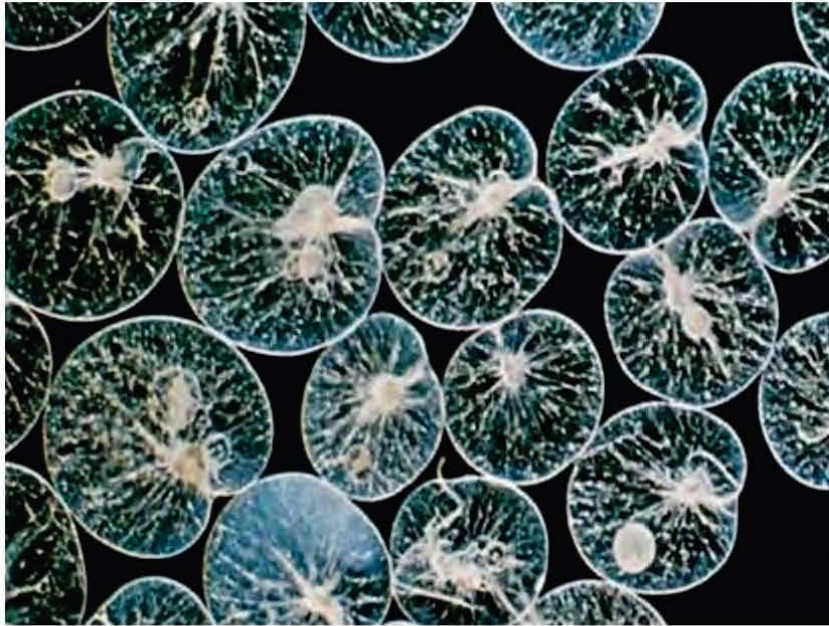


Figure 2: *Noctiluca scintillans*
(Source: Encyclopedia Britannica, 2017)

N. scintillans along with other plankton. Later, the consumption of these contaminated shellfish by human will make them experience the various forms of shellfish poisoning, such as paralytic shellfish poisoning (PSP), diarrhetic shellfish poisoning (DSP), amnesic shellfish poisoning (ASP), or neurotoxic shellfish poisoning (NSP). Symptom of stomach ache resulted from the ingestion of shellfish that have accumulated toxins produced by other algae within the food chain. *Noctiluca scintillans*, through its role in the food web and interactions with other algae, contribute indirectly to the occurrence of shellfish poisoning events by serving as a transport mechanism for algal toxins concentration in the shellfish.

Moreover, the bioluminescent nature of these blooms might attract tourists, drawing them

to witness the mesmerizing spectacle. Figure 3 shows the phenomenon of red tides blooming. However, the bloom itself can lead to unpleasant odors when the organisms wash up on beaches, negatively impacting tourism and local



Figure 3: Red tide blooms in coastal water near San Diego, CA, United States in 2001. (Source: Encyclopedia of Toxicology, 2014)

economies that rely on coastal attractions. Finally, understanding these complex ecological relationships and monitoring the presence of *N. scintillans* and other algae on coastal waters is crucial for preventing shellfish poisoning and ensuring the safety of seafood consumption. Efforts to monitor, forecast, and manage these blooms are essential to safeguard human health and protect coastal communities reliant on shellfish harvesting and consumption.

References

