

US EPA Benthic HABs Discussion Group

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Time: February 08, 2022, 10:00am – 11:30 am PST

Webinar registration:

https://zoom.us/webinar/register/WN_t5PYEKJcTjSeHeCqG86BCw



Agenda

1) Introduction and announcements

- Upcoming meetings, recent papers, other news, etc.

2) Triantafyllos Kaloudis, Athens Water Supply and Sewerage Company, Greece

Seasonal geosmin production from benthic cyanobacteria in a freshwater canal, with implications for drinking water supplies

Abstract: We present and discuss seasonal episodes of geosmin occurrence in the drinking water supplies of Athens, Greece, attributed to benthic cyanobacteria in a part of a canal transferring surface water to treatment plants (WTPs). The first episode occurred in March 2019 and was noticed after two consumers complained about an unfavorable “earthy” odor in drinking water. Results showed that geosmin was not produced in any of the water reservoirs but in a part of the canal transferring water to all four WTPs. Mixed communities of benthic cyanobacteria, among them *Gloeotrichia* spp. were identified as possible geosmin producers in benthic mats on the walls of the canal. Cyanotoxin analysis (LC-MS/MS, PPIA) and molecular methods for toxin genes (qPCR) proved the absence of cyanotoxins/genes (microcystins, anatoxin-a, cylindrospermopsin, saxitoxins) in samples from the canal. However, MC producers were present in benthic mats, as was shown by increasing concentrations of MCs over time in water samples containing benthic material. A “snapshot” metagenomic analysis of multiple sites in the canal showed the presence of mixtures of microorganisms, among them cyanobacteria species that are known geosmin or MC producers. Since geosmin at such low concentrations is not effectively removed by common disinfection (chlorination) and flocculation followed by rapid sand filtration, efforts were made to remove the benthic mats from the canal by mechanical scrubbing and copper sulfate dosing. None of those measures was effective in completely removing geosmin producers, although cell lysis was evident during copper dosing, resulting in geosmin spikes, that caused peaks in consumers complaints. The episodes re-occurred in 2020 and 2021 (March-September) but with less impact on consumer complaints. Combined canal wall brushing, and hydrogen peroxide dosing is planned for 2022 to control benthic HABs and geosmin production. We present data and results from these seasonal episodes with the aim to raise awareness on the possible impacts of benthic cyanobacteria on drinking water supplies and to encourage collaborative research for their management and control.

3) Sze Tee, research assistant, University of Auckland, New Zealand

Growth or toxicity: Genetic divergence, flexibility and secondary metabolism distinguishing toxic and non-toxic members of a widespread freshwater cyanobacterial genus

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Abstract: Benthic cyanobacterial *Microcoleus* spp. are known for their widespread geographic distribution, and can form thick benthic mats that are sometimes extremely toxic, due to the production of the potent neurotoxin, anatoxin-a. The mats often comprise anatoxin-producing (toxic) and non-anatoxin-producing (non-toxic) strains, with toxicity determined by their relative abundance. To examine the fundamental genomic differences between toxic and non-toxic strains, we sequenced eleven *Microcoleus* enrichment cultures and compared these to twenty-eight metagenome-derived *Microcoleus* genomes and three non-axenic culture-based assemblies. Overall, our findings highlight the plasticity of *Microcoleus* genomes, and suggest a trade-off between toxin production and genetic flexibility.

Benthic HAB Workgroup Facilitators

See [webpage](#) for content and recordings of previous meetings. Contact us if you would like to be added to our list serve and receive communications.

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