Questions and Answers – Bryozoans

What is bryozoa?

Bryozoans are among the invertebrate animals that thrive in dark places where continuously flowing water brings an unlimited supply of particulate food **(Fig 2)**. Free branches of the tubular colonies may become tangled and intertwined, filling the pipeline interior with a dense meshwork that impedes or blocks water flow. Pieces of colonies are eventually carried off by the water until they clog a filter, water sprinkler orifice, or other end-use device. The colonies leave behind dormant, resistant structures attached to the pipeline interior, which are the “seeds” to start new colony growth (T.S.Wood, 2005).

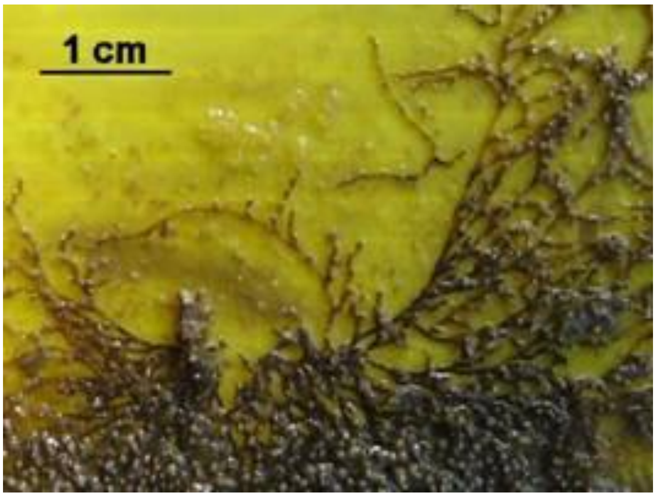

Fig. 2. Colony of the bryozoan, *Plumatella bombayensis*, growing on a plastic substratum in eutrophic waters of Thailand.

How widespread is the bryozoa problem?

Throughout the world, bryozoans grow on filters, fountains, irrigation systems, cooling tower grids, water supply and wastewater facilities (Wood & Marsh 1999). Typically known as “moss” or “algae”, they are seldom recognized as animals **(Fig. 3)**. Fouled surfaces are usually ineffectively cleaned and then returned to service.

Freshwater bryozoans are common in freshwater habitats worldwide. Species such as *Plumatella casmiana* are reported from every continent except Antarctica (Wood &Wood 2000), while others, such as *Plumatella mukaii*, have widely distributed but highly disjunct populations (Wood 2002). It is clear from distribution data that freshwater bryozoans have little difficulty getting around (T.S.Wood, 2005).

Fig. 3. Handful of plumatellid bryozoans (*Plumatella vaihiriae*) from the wall of a secondary clarifier of a municipal wastewater treatment (T.S.Wood, 2005).

How long has bryozoa been a problem in pipelines?

There are historical worldwide reports going back to the 1700's ; more up to date reports from the early 1900's to the present day are widely published. A recent university study in 2011-12 identified 5 bryozoan species in the Northern Mallee Pipeline.

A metal strainer from the Ouyen pumping station, showing biofouling.

Why does bryozoa seem to be worse at certain times of the year?

Although all bryozoans thrive in quiet water, the most rapid and luxuriant growth occurs in low flow conditions. Experimental studies of *Plumatella fungosa* in pipelines showed that germinating statoblasts can take hold most easily in currents of less than 0.2 m/s; colony growth is inhibited at 0.6 m/s and at 0.9 m/s the mound-shaped colonies are swept away (Aprosi 1988). Species that form a flatter colonies, such as *P. emarginata* and *P. reticulata*, tolerate much greater water velocities under natural conditions (T.S.Wood, 2005).

This is evident as the irrigation season progresses. In early spring when water warms (>15C) and low flows begin in the pipeline, the bryozoa thrives and colony growth increases; as the flows increase in late spring to mid-summer the bryozoa is stripped from the pipe walls and ends up in filtration systems. As the flow slows down in autumn the bryozoan colonies begin to reform. Once water temperature is below 15C the bryozoans are dormant.

What is the solution to 'cure' bryozoa?

The first step of effective control is to determine whether bryozoans are generated within the system or entering with the water source (T.S.Wood, 2005). It has been established bryozoans are in the river and in the pipelines. This means we cannot 'cure' bryozoans but only manage the ongoing problem. River flows above 10GL/day (at Wentworth weir) have historically created sufficient river velocity to mobilise bryozoans, if they are present.

There are numerous chemicals and methods available to kill or control bryozoans in the active growing phase; when the bryozoans are dormant there are no-known chemicals that are effective. Some of these chemicals are prohibited by EPA (Bluestone) or produce carcinogenic by-products in untreated river water (Chlorine); others produce excessive salt which may affect customer crops (sodium-hypochlorite).

Low dose (5ppm) hydrogen peroxide for a 2-3 week period has been selected as a treatment during the bryozoan growing stage in early spring and pre-dormant stage in mid-autumn. This will be accompanied with conventional scouring during the summer period.

Hydrogen peroxide breaks down into oxygen and water and has no known by-products; it is already used by on farm irrigators as an acceptable method for maintaining irrigation systems clean. Hydrogen peroxide has been previously used successfully to control bryozoans.

As a comparison, hydrogen peroxide is present in rainwater from 0-30ppm, the higher values achieved during electrical storms. A direct rainfall sample was taken on 14 December 2018 at WMI depot; test strips indicated 2ppm hydrogen peroxide.

Will the hydrogen peroxide treatment work?

Few reliable experimental data are available to guide the practitioner on methods to control bryozoan fouling. Moreover, the wide range of situations where bryozoans are a serious nuisance places a heavy reliance on improvisation (T.S.Wood, 2005).

There is no guarantee the treatment will completely solve the ongoing problem of bryozoans however, it is expected the treatment will reduce the bryozoan population to a more manageable level over time.

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17 December 2018

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