Sphaerotilus natans (or S. natans) is a long non-motile filament that is straight or smoothly curved. It contains small round or rod-shaped cells which are contained in a tight, transparent sheath. The cells can also appear square when they’re tightly packed in the sheath. Cells that become liberated from the sheath will sometimes move about through the use of a flagella.

S. natans stains Gram and Neisser negative so it can be quite difficult to distinguish visually particularly in comparison to Type 1701. The give away is it’s false branching. S. natans usually doesn’t have any attached growth, but it can occur in some instances if the filament is very slow growing. S. natans can also be found in nutrient deficient waste water; in this case it can grow an exocellular slime coating.

S. natans is favoured by low DO, low nutrient conditions, high quantities of easily degradable compounds like sugar or organic acids in the influent and complete mixing in the aeration tank. This can be caused by RAS lines that are too long or sludge that is held in the clarifiers too long. S. natans hardly ever occurs in modern low loaded nutrient removal plants.

S. natans has a mixed reputation. It is generally known to cause extensive sludge bulking and pipe clogging in waste water treatment plants. It does this by settling on a solid surface by entanglement or by using a kind of adhesive found on the ends of the filament. S. natans filaments can also radiate outwards in between flocs causing bridging which impedes the settling rate of sludge. Rapid growth of S. natans can result in very high SVI.

Recent research has improved the image of S. natans; it is now known that S. natans is able to reduce a very toxic form of chromium present in industrial wastewater.

Control strategies include increasing DO and F/M manipulation, or considering process changes such as an aerobic selector, anoxic or anaerobic zones or running a two step configuration (aerobic/anaerobic or anaerobic/aerobic).

Chlorination can also be used as a temporary control strategy. The cells will easily break apart during chlorination but the sheaths of the filament will remain intact so it is necessary to waste sludge to remove the sheaths from the system.

Have you got interesting bugs? Send us a photo. Find out what is growing in your treatment plant…

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Spirochaetes have no feet; their bodies used like a propeller,
Flagellates have it great; they just wiggle their flagella!