

Environmental Leverage

INC.



Turning Liabilities into Leverage

January 2011

The Wastewater Insight

MYSTERY BUG OF THE MONTH



We started this month out with a new

Mystery Bug of the month!

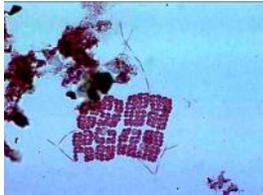
Check out our website for more photos of our new mystery bug!!!!
WWW.EnvironmentalLeverage.com

Inside this issue:

| | |
|--------------------|---|
| What Is It? | 1 |
| Bug of the month | 1 |
| Alum, Ferric, Lime | 4 |
| Upcoming Classes | 4 |
| Last month's Bug | 5 |

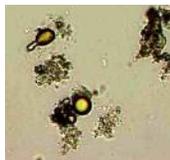
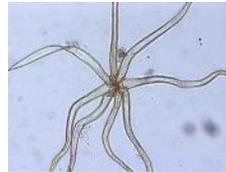
What are those strange things I am looking at under the microscope?

Many times there will be other things besides floc, filaments or higher life forms. What are they and what do they mean? Here are some of the things we see quite often in MLSS samples under the microscope.

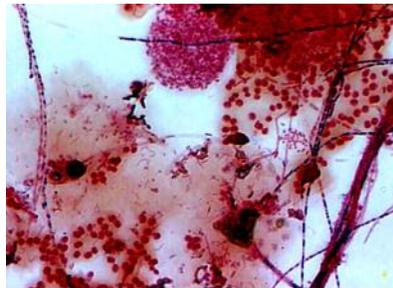


You may see sheets of cells- 1000x Gram stain Merismopedia glauca – basically Algae

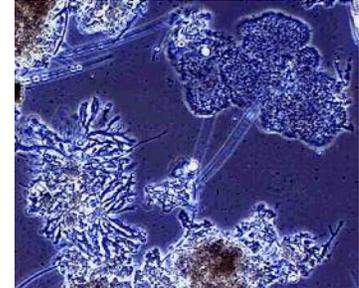
Although this looks like a star fish, in reality it is pollen from a plant



Here are some oil droplets in a sample- check for process side leaks in industry, and oil slicks where traffic is stopped in municipalities



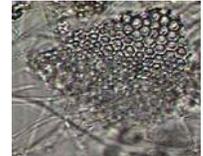
1000x Gram stains- look at how many different ways bacteria can be shaped and produce slime- nutrient deficient system



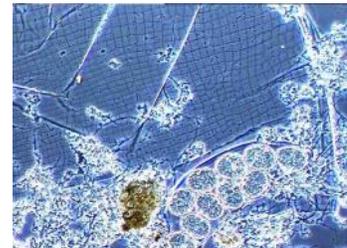
200x Phase contrast Amorphous and fingered zoogloea



Some type of plant debris



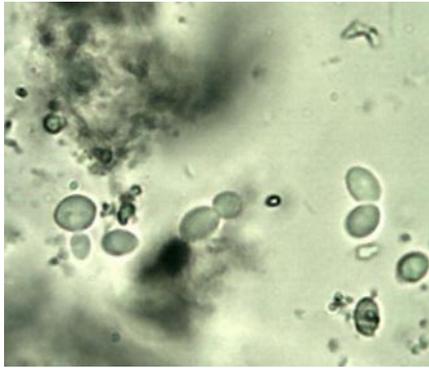
Pollen and debris



Here you can see debris, it looks like a sheet with very fine segments. In the lower right corner, there is a dead water bear with eggs inside

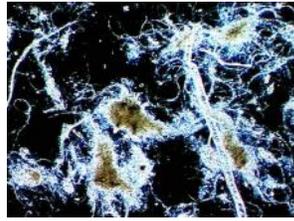


Algae are always easy to pick out. Although it may appear in many sizes or shapes it will be distinctly green!

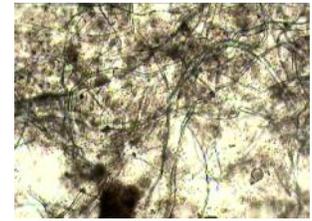


Yeast is easy to pick out when it is budding even without a Gram stain.

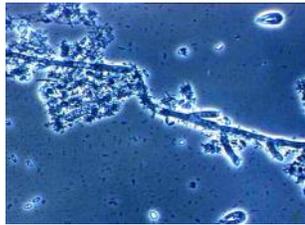
1000x Bright field



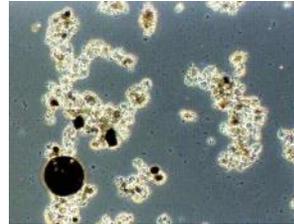
40x Dark field papermill with fiber and fines



400x Digester from municipal with tissue



Fungi have distinct branching and the walls are thicker than filaments



100x Phase contrast Carbon particles



100x Bright field Carbon particles in a refinery- they add PAC



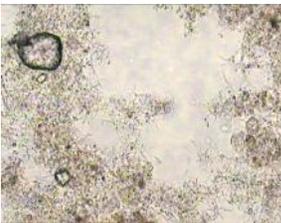
You may see Neisser positive cell clusters, these typically indicate a nutrient deficiency



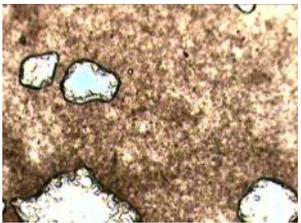
400x Dark anaerobic spots indicating septicity and low DO somewhere in the system, very different from carbon particles

Here you can see tetrad clusters. The cells are rather large and tend to group in fours. They almost always indicate a nutrient deficiency typically nitrogen deficiency. The large object in the center is fiber.

This was from a papermill. They are notorious for having tetrads and nutrient problems due to wide swings in loading.



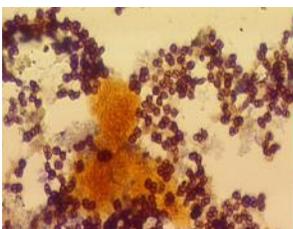
100x Nocardia with trapped air bubbles



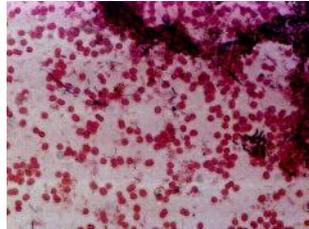
40x air bubbles in mlss



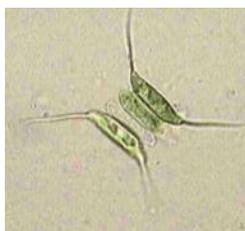
Diatoms can come in many shapes and sizes



1000x Neisser stains of tetrads, very purple



1000x Gram stains tetrads very bright red



400x Scenedesmus

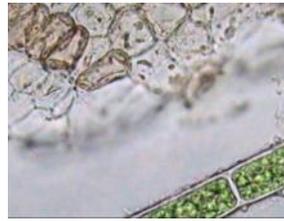
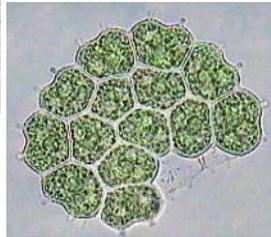


400x algae

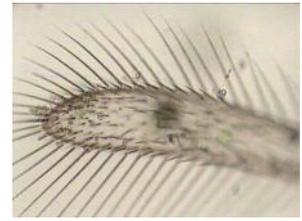


400x Spirulina

400x Algae

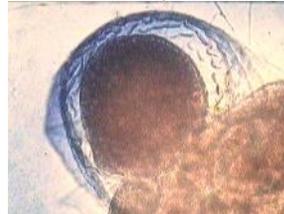


400x Bright Field algae and plant cells



400x animal parts?

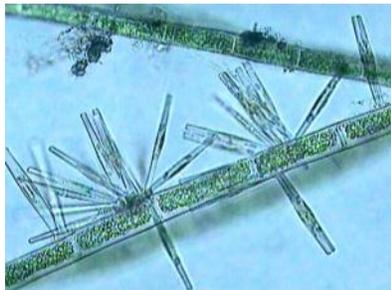
There are many forms for cysts



1000x stained



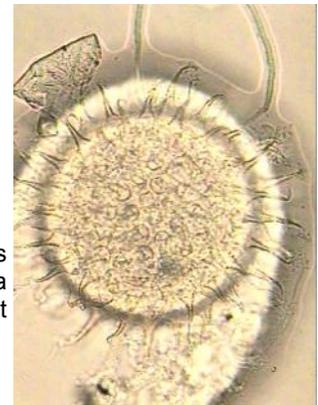
400x bright field



400x Algae, the patterns sometimes can be quite pretty



1000x Here is a cyst



and yet this one is probably pollen from a plant

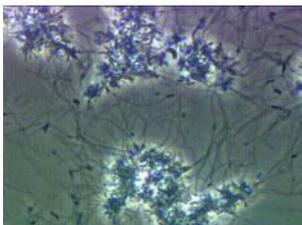


Phase contrast



400x Bright field Algae and a flagellate with green chlorophyll

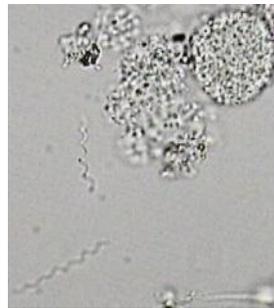
Anytime you find algae, it means you need to do some maintenance. It may be scraping off weirs in a primary, solids in the centerwell in the clarifier or weirs; usually algae has built up.



400x Phase contrast Hypomicrobium



1000x Gram stain Hypomicrobium



1000x spirillum and the round cluster at the top is Nitrifiers



These are water bear eggs 400x



Sand crystals 400x Bright field



Sand and dirt crystals 100x Bright field



Cyst for a higher life form



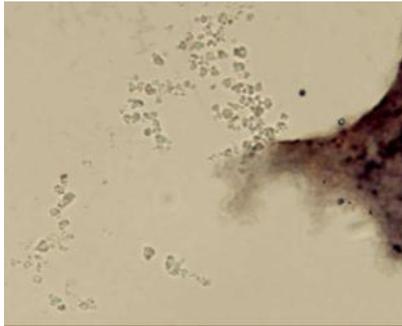
Tons of spirillum



400x Bright Field Pollen

Many plants now use alum and ferric for phosphorus removal. If overdosed, crystals can be found under the microscope.

Alum crystals visible on a Neisser stain



Irregular shaped floc due to overuse of chemicals

Overdosing can add up to significant costs as well as increased sludge volume. Overdosing can also cause a nutrient deficiency. [Ask for our newsletter on Alum, Ferric and Lime.](#)

Each pound of liquid alum produces 0.127 pounds of dry aluminum sludge, with a slight variation depending on the alum concentration. Each pound of liquid as ferric chloride produces 0.2677 pounds of dry iron oxide sludge, with the same slight variation. The lime will combine with the alum sulfates but will have varying degrees of solubility up to 2000 ppm so you may not see it as sludge. The lime combines with the chlorides to form a loosely bound salt, in itself a coagulant. Lime generates one pound of sludge per pound lime added.

Just a reminder- Winter and cold weather can impact your biological treatment plant. Whether you are down in the south or up in the frozen north, winter still impacts your plant. Cold weather can sometimes be a problem for many plants due to permit restrictions and decreased

biological activity. Many plants experience a significant drop in biological activity due to the temperature levels decreasing.



Biological activity drops one log level for each 10-degree drop in temperature. This can significantly impact the amount of BOD loading that the biomass can handle effectively.

There are 5 critical measurements that should be monitored and controlled to effectively run a biological treatment plant efficiently; Temperature, DO, Ammonia, Ortho-phosphate and pH.

• Acceptable environmental parameters for biological activity including:

| <u>PARAMETER</u> | <u>ACCEPTABLE</u> | <u>OPTIMUM</u> |
|--------------------------|-------------------|----------------|
| Dissolved Oxygen | >0.5 mg/l | 1.0 - 2.0 mg/l |
| Temperature | 50 - 95° F | 77 - 95 ° F |
| pH | 6.0 - 9.0 | 7.0 - 7.5 |
| Ammonia Residual | 1.0 - 3.0 mg/l | 2.0 - 3.0 mg/l |
| Ortho-phosphate Residual | 0.5 - 2.0 mg/l | 1.0 - 2.0 mg/l |

Residual should be measured in the final effluent.

Ask for our troubleshooting newsletters on cold weather if you are struggling this season with winter at your plant or additional ways to help your plant survive the cold weather.

MORE NEWS:

First to host a class is Thorn Creek Sanitary

Basin- Chicago Heights

Filamentous Identification the Easy Way!

March 23-24th 2011

Thorn Creek Basin Sanitary District
700 W. End Ave

Chicago Heights, IL 60411

This will be our Two day Advanced
Filamentous Identification Class

March 23 and 24th. Ask for our Brochure. This class does have limited space, so if you have been on our waiting list for classes, be sure to contact us quickly, as the class fills up very fast.

Iowa Water Environment Association's 20th Annual Biosolids Conference

March 16, 2011 2:30-3:15 PM

"Land Application/A Comparison of Food Process BioSolids vs. Municipal BioSolids". Paper to be presented by Tracy Finnegan

Last Month's
MYSTERY BUG OF THE MONTH



Last Month's Bug of the month

This is Fungi. It appears similar to filaments but is significantly larger, and can cause more issues with bulking and dewatering if dominant. Fungi is many times found in digestors that do not aerate or adjust pH. Fungi can be controlled by adjusting pH above 7.

Mystery Bug of the month!

Check out our website for more photos of our new mystery bug!!!!

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