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Click on the link below to view information about the technology that can detect E.Coli
Verticle Microscope

J. M. CANTY
NT VECTOR APPLICATION
Water Quality
On-line Particle Analysis

SCOPE -- The Canty On-Line microscope provides a real time analysis and view of the most difficult items to detect in water purity analysis. The system allows detection and analysis of water born particles by inserting a process microscope directly into the water stream. The Canty equipment items to perform this purity analysis are introduced here.

BACKGROUND -- This note details use of a Canty Microscope to inspect water for the presence of dangerous bacteria such as E. *coli*. This background is extracted from information published on the WEB by John C. Brown. *E. coli* is the abbreviated name of the bacterium in the Family *Enterobacteriaceae* named *Escherichia* (Genus) *coli* (Species). This is one of the many bacteria present in a normal adult intestinal tract. The presence of *E. coli* and other kinds of bacteria within our intestines is necessary for us to develop and operate properly, and for us to remain healthy - *E. coli*, along with other species of bacteria, provide us with many necessary vitamins for example. The bacteria make the vitamins, and we gladly absorb them. We pretty much depend upon *E. coli* in our intestines for our source of Vitamin K and B-complex vitamins.

There are different "strains" of bacteria within a given species. Some of these different strains of bacteria (there may be several within a given species) can be harmful to us. So, it is possible for us to acquire an individual strain of E. coli which mixes with the other E. coli in our intestines. The rare strain of E. coli that is getting a lot of "press" lately because it is indeed a bad bug, is E. coli O157:H7, a member of the EHEC - enterohemorrhagic E. coli group. Enterohemorrhagic means an intestinally-related organism which causes hemorrhaging - and therefore, loss of blood. The image shown as Figure 3 below is a picture of O157:H7 (compliments of David Graham, University of Illinois at Urbana/Champaign).

This virus's genetic information (genes) unfortunately (for us) contained information for the production of a toxin, called Shiga-like toxin (SLT), or is sometimes called, Vero toxin. Consequently, this strain of E.coli, and all of its progeny produce this toxin. The toxin is a protein which causes severe damage to intestinal epithelial cells (the cells that line the wall of the intestine). The damage is so severe that if we acquire this bacterial strain, not only do we lose water and salts, blood vessels are damaged, and bleeding occurs - lots of bleeding - hemorrhaging. This condition is particularly dangerous to small children - may be lethal - children are too small to tolerate much blood and fluid loss. Too, in some cases another syndrome is involved which is called hemolytic uremic syndrome (HUS), which is characterized by kidney failure and loss of red blood cells. Approximately 5% to 10% of little kids progress to this stage of disease - which is very dangerous for them. In severe cases, the disease can cause permanent kidney damage. So, E.coli O157:H7 is a dangerous organism, for sure.

FUNCTION -- The Process Microscope Camera (see attached data sheet 99A7739.doc) can be used to view the flowing process liquid and has the required magnification to display the bacteria cells. Figure 1 shows an image of yeast cells in a relatively dense fluid sample. The water inspection process will have a much lower cell count.

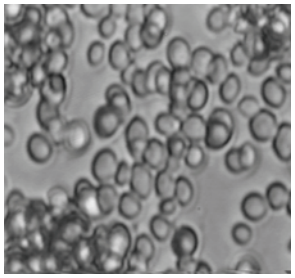

Figure Error! Bookmark not defined. **Yeast Cells imaged by Canty microscope**

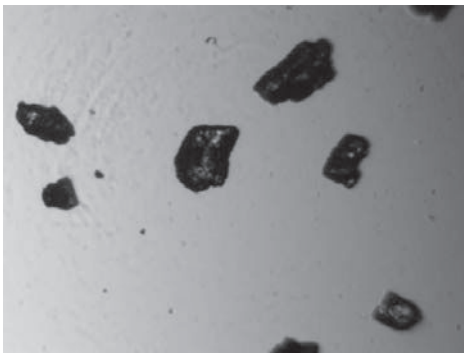

Figure Error! Bookmark not defined. **in-organic solids imaged by Canty microscope**

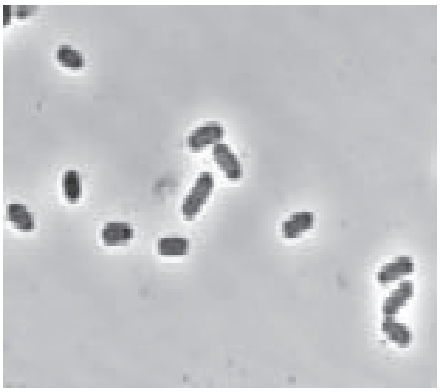

Figure Error! Bookmark not defined. ***E. coli* cells**

The Canty camera video image is fed to the Canty Vector for image analysis. The detected cells are analyzed for size and shape permitting the biological derived particles to be distinguished from in-organic material such as sand.

SUMMARY – The Canty on-line microscope (data sheet # 99A7739) can be used as a sensor to verify water quality when mounted to view processed water flow. The Vision Analysis required is performed by the Vector NT System (data sheet # 99A8035), a computer system with a video digitizer running Canty developed software. For lab applications, the Vertical Imaging Microscope (data sheet # 99A7744) offers a versatile sensor used with either the slide holder or flow cell.