assuredbio™

November 2010

Monthly Newsletter

American Relative Moldiness Index
Only $124 .99
Call to Order: 865-813-1700

DNA for Indoor Air Quality: Bringing CSI to your home

By Irv Kraut

On television the detective solves the case with DNA analysis. The bad guy is identified and since DNA does not lie, the verdict is guilty! Now, in the real world, some laboratories are using DNA to identify airborne or surface pathogens that for some can trigger asthma attacks, sinusitis or infections.
Specific bacteria and fungi (molds) known to be either pathogenic (may cause disease) or allergenic (may initiate a hyper immune response) may find an ecological niche in an indoor environment often due to water intrusion events, disturbed dust (renovations) or highly elevated humidity conditions.
The presence of these pathogens either carried in the air or settled on surfaces (counter tops, furniture and floors) may be harmless to most or problematic to others. When occupants of an indoor space relate illness or symptoms they associate with where they live or work (they feel better when elsewhere) an analysis of the indoor environment may be warranted. Like in the television program "House" a differential diagnosis should first be obtained (what is most likely the cause of occupant concerns) and then samples can be collected that would answer the questions of "Are there pathogens present that may be linked to a specific complaint."

The identification of pathogens or allergens is not as easy as just collecting a sample of the air or from a specific surface. There must be a method to where the samples are collected (why here and not there?) as well as proper collection techniques (think CSI) and an ability by the chosen laboratory to identify with extreme accuracy the fungi or bacteria that is most likely to influence an occupants health. Thus, the ability of a laboratory to identify pathogens most likely to be present to a >99% certainty incorporates the use of forensic DNA. As both bacteria and fungi (molds) are or where living organisms, they have DNA which can be used by a laboratory to render an identification.
Why DNA and not other traditional laboratory methods such as cultures or microscopic examination?

DNA is the most accurate analysis yet developed, it is fast, it sees species or strains and it is devoid of human error. For individuals suffering from Asthma or Sinusitis the ability to know if an airborne or surface fungi (mold) is of a particular species is most important. Since there are hundreds of thousands of world-wide molds and only a few are known (so far) to be allergenic, being able to pin-point their presence or lack thereof is the reason why one would sample in the first place. If for example samples are collected to prove or disprove the presence of fungi such as *Alternaria alternata* (a known trigger for sinusitis) then knowledge gained by DNA analysis can either provide Peace of Mind (not present in the samples collected) or present and corrective actions are warranted. Not knowing, for many, carries its own modicum of stress. Knowledge prompts action and the ability to solve problems.

Other examples are the presence of surface or airborne *Aspergillus* fungal species, such as *Aspergillus fumigatus* which is a known infectious fungus often associated with invasive hospital infections. This infectious pathogen has a high mortality rate and is most commonly associated with individuals with a suppressed immune system due to surgery, chemotherapy, solid organ transplants and certain cancers. While often associated with hospital infections, this pathogen has been found in properties that have suffered water damage. While healthy adults and children have strong immune systems that clear this pathogen without symptoms or in fact their knowledge, the sick or weak may acquire a fungal infection with significant medical consequences.

Today, an indoor space (home, office, hotel, factories) can be sampled for analysis by DNA. It takes a specialty environmental laboratory (usually licensed by the EPA) and proper collection methods. The DNA swab developed by Assured Bio is one such method. It enables the user to collect a sample from the HVAC return filter and then mail the swab to the lab. Using PCR (DNA) the lab is able to identify three relevant molds (Stachybotrys, Aspergillus and Penicillium) and provide a simple and easy to read laboratory report. This DNA test provides an early warning signal that may be meaningful to the property owners and the investigators.

****

Putting Your Business on Facebook

By Matthew Dinse

With more than 500 million individual users, Facebook is the #1 social networking site in the world. Facebook was created on October 28, 2003 by a Harvard sophomore named Mark Zuckerberg along with his college roommates and fellow computer science students Eduardo Saverin, Dustin Moskovitz and Chris Hughes. The website's membership was initially limited by the founders to Harvard students, but over the years it has opened its doors to the world.

What is Facebook? Facebook is a social website that allows friends & family to connect in a seemingly fun and easy website interface. Facebook allows users to connect with their favorite celebrities, TV shows, or

even products! Users can also enjoy a wide variety of games within the Facebook interface.

Facebook and business go very well together. They offer powerful marketing tools that allow you to directly advertise specifically to your business key demographic. With the average user logging on more than 4 times a day (according to some estimates), it means more opportunities to reach customers.

-When putting your business on Facebook:

-Choose your audience by location, age and interests

-Use simple image and text-based ads and use what works

-Set the daily budget you are comfortable with towards spending towards advertising

-Choose to pay only when people click (CPC) or see your ad (CPM)

-But don't take my word for it alone. Read some of the helpful case studies provided by Facebook!
Facebook Case Studies

Lastly don't forget to visit the Assured Bio Facebook page and say Hi!

****

The Laboratory Corner
Turkey Tales
By Lyn Pope

I have found over my years in the indoor air quality industry that mycologists can link fungi to almost anything. Such is the case for me this month with the upcoming Thanksgiving holiday. It is the time of year reserved for family, friends, and turkey; the latter is what inspired me to jump into the world of fungi this month. Turkey to nomenclature….logical leap???? Maybe? Did you know that fungi are often named for their appearance? This is true for both scientific nomenclatures as well as the common names that lay people often assign to organisms. Such is the case for *Trametes versicolor* also known as the turkey tail fungus.

T. versicolor is a shelf fungus which is normally found growing on dead or decaying wood. Mycologists use the species name "versicolor" to describe fungi which may be of several colors. As the species name suggests, the turkey tail fungus may grow in brown, white, tan, orange, red, purple or a mix of these colors all at once. Often encountered when stepping over fallen trees in the forest, the name turkey tail fungus comes from its resemblance to the tail of the wild turkey with which it shares the forest.

Turkey Tail Fungus

Turkey Tails

T. versicolor is a nonpoisonous fungus which is normally only eaten by turtles, squirrels, and caterpillars. Others do not appear to find it appetizing due to its leathery nature. It has, however, been used as an herbal remedy in China and Japan in the form of tea for over 30 years. Its popularity as a treatment of some cancers overseas has recently led the National Institute of Health to fund research into its cancer fighting properties. Studies have shown that a unique protein bound polysaccharide (Krestin), isolated from the turkey tail fungus, has anti-cancer activities *in vitro*, *in vivo*, and in clinical trials.

The publication "Anticancer effects and mechanisms of polysaccharide-K (PSK): implications of cancer immunotherapy." by M. Fisher and LX Yang describes the potential benefits linked to Krestin (also known as polysaccharide-Kureha or PSK). Studies around this carbohydrate have found:

-Positive results seen in the adjuvant treatment of gastric, esophageal, colorectal, breast and lung cancers

-Similar action as an immunotherapy or biological response modifier (BRM), meaning that it may have the ability to improve the "host versus tumor response"

-Use in combination with adjuvant or definitive chemotherapy and/or radiotherapy in the treatment of cancer may enable it to defend the host from oxidative stress

-Possible inhibition of carcinogenesis by inhibiting the action of various carcinogens on vulnerable cell lines

-Possible prevention of second malignancies due to the carcinogenic effects of radiotherapy and cytotoxic chemotherapy.

One day this common fungus, named after the tail of our most beloved holiday dish, may be a viable treatment for cancer patients in the U.S.

****

My Favorite Bacteria to Isolate from Environmental Water Samples:
UT-Orange Bacteria
By Merissa McGraw

As many of you may know, Assured Bio Labs is located 20 miles from the home of the Big Orange VOL Nation, the University of Tennessee. Since about half of the staff of Assured Bio graduated from the university, we were really excited one day when I isolated a perfectly UT-orange pigmented bacterium from a *Legionella* water sample. Once the DNA had been extracted and amplified from what we called our "UT bacteria" the sequence data

could be used to identify the real identity of our unique bacteria. The bacteria's identity was *Chryseobacterium indologenes* which is a bacterium commonly found in aquatic environments. Once the identity of our UT bacteria had been uncovered, I set down to find out what made our vivid orange bacteria orange.

Our UT bacteria were isolated on the *Legionella* selective media, GVPC. Growth of the bacteria was visible on the other media used to isolate *Legionella* but only this media gave the brilliant UT orange that all VOLS have come to know and love. This would be a vital clue as to why our UT bacterium is UT-orange. The GVPC medium contains multiple antibiotic and antifungal agents that keep other microorganisms from environmental water samples from overgrowing the bacteria of interest. It has been noted that *Chryseobacterium* isolated from aquatic environments display multi-drug resistance. This tells us why the UT bacterium was able to grow on the GVPC media loaded with antibiotics but why was it only Volunteer orange on this media?

In a study of carotenoid-producing bacteria in Japan, it was noted that *Chryseobacterium indologenes* showed 98% similarity in genetic make-up to an isolated bacterium in the study. Meaning our UT bacterium is a carotenoid-producer. If you noticed that carotenoid looks and sounds very similar to beta-carotene you would be correct in making the connection. Beta-carotene is a carotenoid found in fruits and vegetables, such as carrots and tomatoes, which give them their characteristic orange pigmentation. The antioxidant properties of food carotenoids have long been praised for their potential health benefits against aging, heart disease and cancer. As the description infers, the antioxidant properties of carotenoids protect against oxidants in the environment; sometimes referred to as free radicals or peroxides. In another study based on the ability of certain bacteria to escape the killing effects of the immune system's white blood cells, the bacteria's orange pigmentation played a major role. When bacteria produced the orange pigmentation they were 10 to 10,000 times less likely to be susceptible to the white blood cell oxidants. When this orange pigmentation was not expressed by the bacteria the white blood cells were easily able to remove any sign of bacteremia caused by the bacteria.

What does all of this mean for our UT-orange bacteria? Well, since most antibiotics work by attacking the outer membrane of bacteria and the orange pigmentation in the bacteremia study above was responsible for the increased resistance against the white blood cells' ability to disrupt the cell membrane and in turn kill the invading bacteria, we can easily make the connection that the UT-orange pigmentation of our UT bacteria is achieved due to the bacteria's need to protectively shield itself from the antibiotics found in the GVPC medium. Since the orange pigmentation or the gene for orange pigmentation was only turned on when the bacteria were introduced to the high concentrations of antibiotics in the GVPC medium we can assume that the UT-orange color acts as a protective shield against cell death. Therefore our UT-orange bacteria are orange because of this shielding phenomenon.

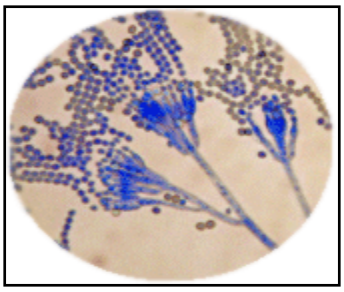
With this idea of bacteria turning orange, I cannot help but think of the old wise tale if you eat a lot of carrots you will eventually turn orange. In the case of our bacteria this wise tale is fact. Growing on media or "eating media" rich in oxidants will turn you UT-orange.

****

Spore of the Month
by Jing Wu
Penicillium

Penicillium is a genus of ascomycetous fungi. Colonies usually growing rapidly in shades of green, sometimes white, mostly consisting of a dense felt of conidiophores. This organism causes spoilage of food, colonizes leather objects and is an indicator organism for dampness in buildings. Some species have the ability to produce mycotoxins. Penicillium may cause hypersensitivity pnuemonitis, asthma, and allergic alveolitis in susceptible individuals.

P. chrysogenum is widely distributed in nature but has earned most notoriety from its production of penicillin. It can be isolated from soil, air, building materials, paints, painted walls, house dust. It is considered a good indicator of water intrusion. Although this species is highly allergenic and can produce mycotoxins, it has rarely been reported as a cause of human disease.



P. chrysogenum

P. glabrum is a commonly occurring indoor fungus which is found on walls, wallpaper, paints and growing in compost and aggressively on computer diskettes in high humidity.

P. glabrum

P. crustosum is a common food contaminant, particularly in seeds, nuts and apples. It pro-

duces potent neurotoxins that can cause muscular tremors in individuals eating contaminated foods.

P. crustosum

P. purpurogenum is found worldwide distributed in soils. It may also be found on foods and plants. This species tends to grow in acidic environments. The mycotoxin – rubratoxin can be produced when growth occurs on foods. P. purpurogenum is not currently known as a pathogen, but it has caused a few pulmonary infections in humans and a systemic infection in a dog.

P. purpurogenum

****

Laboratory Contact Information
865-813-1700……...Phone
865-813-1705……..….Fax
866-547-1727…..Toll Free
Twitter: www.twitter.com/assuredbio

E-mail: info@assuredbio.com
www.assuredbio.com

Thanksgiving Word Search

ALGONQUIN
AMERICA
CANOE
COLONY
COOK
CORN
ENGLAND
FALL
FAMILY
FEAST
FREEDOM
GRAVY
HARVEST
INDIANS
JOHN CARVER
LONGHOUSE
MAIZE
MASSASOIT
MAYFLOWER
MILES STANDISH
NEW WORLD
PATUXET
PIE
PILGRIMS
PLYMOUTH
PUMPKIN
PURITANS
SAIL
SAMOSET
SETTLERS
SICKNESS
SQUANTO
SQUASH
STUFFING
THANKSGIVING
TREATY
TURKEY
VOYAGE
YAMS

G O L S S X J M D D L C Q Z I S
A N U P Q B H F S O Z O B A X R
S M I X F U S N L S K L G D U M
T E E Q A J A G E Q E O N A C H
U U T R M T U N I U Q N O G L A
F N H T I D Q I T S R Y K C M R
F I T R L C S V M O S P I C A V
I K U Y Y E A I C D N A L P I E
N P O R M Z R G L L A T O F Z S
G M M L E G I S I R I U N Z E T
T U Y F L V N K A O D X G L R U
E P L I E A R N S W N E H U M R
S N P Z T A F A X W I T O V O K
O A G B R E S H C E H Q U U D E
M M I L E S S T A N D I S H E Y
A V O Y A G E Z R Y H Z E G E A
S U J M T N M A Y F L O W E R M
G R A V Y S D X W Q U I J C F S