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EVVIVA SCIENCES

MOLD IDENTIFICATION GUIDE

What is Mold?

Mold is neither a plant nor an animal. Instead, molds are a type of fungus, and there are thousands of known species worldwide. They play critical roles in our natural environment, and they are extremely important for biodegrading natural, organic materials. However, they can also cause significant property damage, food spoilage, and they can produce toxic compounds called mycotoxins. These mycotoxins are part of a mold's natural defense mechanism against other molds and microorganisms, but, unfortunately, they may be harmful to human health. In addition, many molds can cause allergic reactions in susceptible individuals. Molds multiply by producing microscopic spores, which often float around in the air that we breathe or land on a physical surface and begin growing mold filaments. These spores are invisible to the eye, but they are extremely common. In fact, it is nearly impossible to completely eliminate mold spores from an indoor environment.

Conditions for Mold Growth

Molds need a biodegradable, organic food source to grow, and most importantly, molds also need a moisture source. Buildings and houses contain many food sources for mold, including wood, paper, and natural fiber materials. While the presence of such mold food sources are often out of our control, the best way for us to limit mold growth is by regulating building moisture. Moisture sources can include slow leaks in plumbing fixtures, condensation due to high humidity, floods, and other leaks.

How Can We Limit Mold Growth?

It is virtually impossible to completely remove mold spores from an indoor environment, but we can take actions to limit mold growth. Moisture control is the key. If there is a leak, it should be repaired immediately and the damp area should be dried as soon as possible after a watering event (ideally within 48 hours). Keep an eye open for condensation and wet spots in your home, and fix any sources of moisture as soon as possible. Keep your HVAC or other ventilation system drip pans clean, flowing properly, and unobstructed. If there is a moisture generating device (such as steam from a shower), vent the moisture outside. Most importantly, never vent moisture to a crawlspace or attic, as these dark locations are excellent spots for molds to grow when there is moisture. If you have a hygrometer, aim to keep your relative humidity indoors low (less than 60%). Lastly, perform regular inspections of your building and HVAC systems and perform all maintenance as scheduled.

Black or Toxic Mold!

Black mold usually refers to a species known as Stachybotrys chartarum. However, in reality, many different types of molds can have a dark or black appearance, so the color of mold in your home is not enough to make an accurate identification. Therefore, "black mold" is not a scientific term for mold identification. Some but not all strains of Stachybotrys chartarum may produce mycotoxins. In addition, S. chartarum has been linked by some with so-called sick building syndrome, where many of the residents in the same building feel unwell for no apparent reason. However, this link is somewhat controversial and has not been definitively established by scientific studies. More scientific and medical research is needed to better understand whether there is clear evidence that Stachybotrys can have a negative impact on human health. However, the CDC and EPA both list all molds as potentially allergenic.

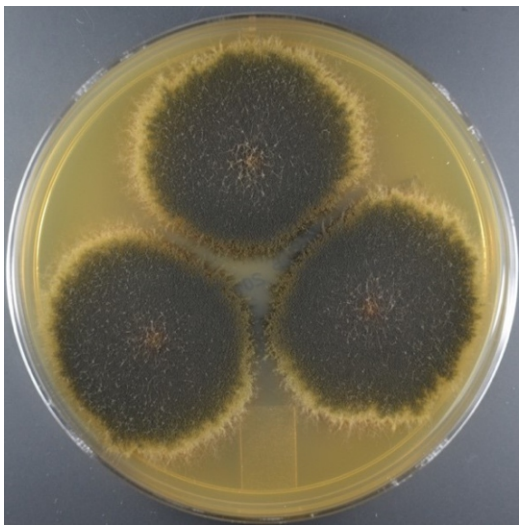
Protect Yourself

Because molds can produce toxins and cause allergic reactions in susceptible individuals, it is important to take precautions when dealing with molds. Do not touch molds with your bare hands, avoid getting molds/spores in your eyes, and avoid inhaling molds/mold spores. It is highly recommended to use personal protective equipment when coming into contact with mold. This may include an N-95 respirator, goggles, and gloves.

Mold Images

The images below show the appearance of many common household molds on petri dishes. Compare the mold growth from your kit with the images below to help identify the mold on your petri plates. Remember that a laboratory test is the most accurate method for mold identification.

Alternaria atra



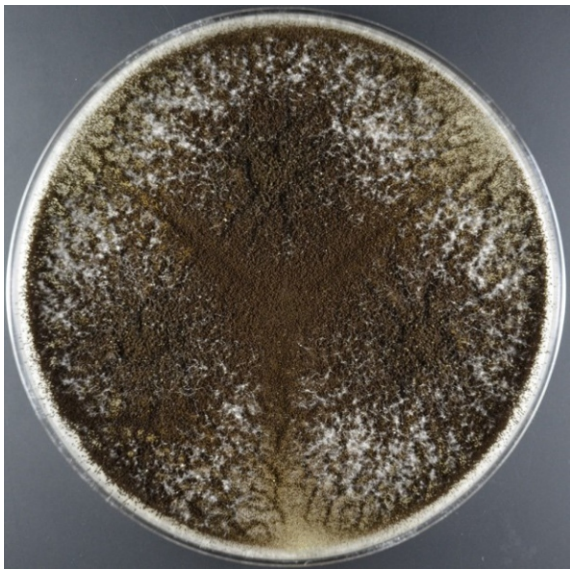
Description: Alternaria spores are one of the most common and potent indoor and outdoor airborne allergens. Additionally, Alternaria sensitization may be an important factor in the onset of asthma. Synergy with Cladosporium or Ulocladium molds may increase the severity of symptoms.

Growth Indoors: Alternaria is often found in window frames and showers around areas of condensation. In addition, it can be found in carpets and areas where house dust collects. It can colonize building supplies, cosmetics, leather, optical instruments, paper, textiles, wood, and even fuel.

Allergenic Potential and Other Possible Health Hazards: Alternaria may be associated with Type I (hay fever, asthma) and Type III (hypersensitivity) allergic reactions. It may also be associated with a condition called phaeohyphomycosis, causing cystic granulomas in the skin and subcutaneous tissue. In immunocompetent patients, Alternaria may colonize the paranasal sinuses, which may lead to chronic hypertrophic sinusitis

Potential Toxins: Alternariol (AOH), Alternariol monomethylether (AME), Tenuazonic acid (TeA), Altenuene (ALT), Altertoxins (ATX)

Aspergillus niger Aspergillus ochraceus



Description: Aspergillus is a genus of molds that has several hundred species worldwide. Some of these species may be harmful to humans, and overall aspergillus is the second most common opportunistic fungal pathogen following Candida. Its natural habitat includes soil and debris from vegetation.

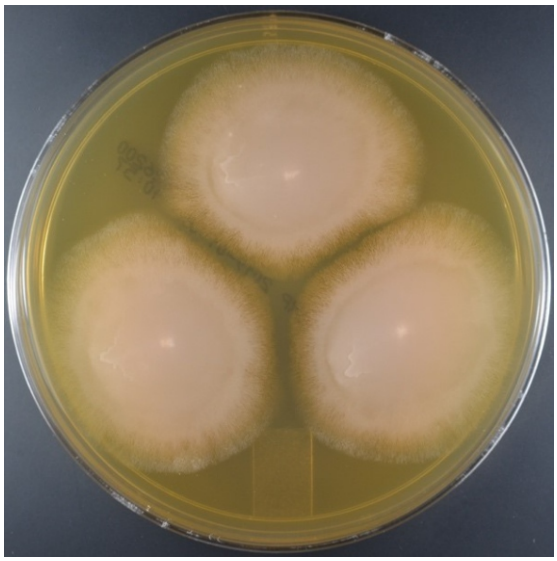
Growth Indoors: Aspergillus grows on a wide range of substrates indoors. It is frequently found in water damaged buildings. Aspergillus especially grows well in warm and damp areas such as bathrooms and near window frames if there is condensation.

Allergenic Potential and Other Possible Health Hazards: Individuals with cystic fibrosis or asthma may be susceptible to allergic bronchopulmonary aspergillosis (ABPA), which results in airway inflammation and damage. Aspergillus may also cause sinus inflammation and infections. Notably, in immunocompromised individuals, aspergillus may be quite invasive, resulting in a condition called invasive aspergillosis. In these conditions, the mold may infect various organs, particularly the lungs (chronic pulmonary aspergillosis).

Potential Toxins: There are many different species of molds in the Aspergillus genus and they can produce a wide range of potential toxins. Below is a list of some of these:

3-Nitropropionic acid, 5-metoxystermatocystin, Aflatoxin B1, B2, Aflatoxin G1, G2, Aflatoxin M1, M2, Aflatoxin P1, Aflatoxin Q1, Aflatoxins, Aflatrem (alkaloid), Aflatrem (indole alkaloid), Aflavinin, Ascalidol, Aspergillic acid, Aspergillomarasmin, Aspertoxin, Asteltoxin, Austamid, Austdiol, Austins, Austocystins, Avenaciolide, Brevianamide A, Candidulin, Citreoviridin,, Citrinin, Clavatol, Cyclopiazonic acid, Cyclopiazonic acid, Cytochalasin E, Emodin, Fumagillin, Fumigaclavine A, Fumigatin, Fumitremorgens, Fumitremorgin A, Gliotoxin, Griseofulvin, Helvolic acid, Kojic acid, Kotanin, Malformins, Naphtopyrones, Neoaspergillic acid, Nidulin, Nidulotoxin, Nigragillin, Ochratoxin A, Ochratoxin B, Ochratoxin C, Ochratoxins ß, Ochratoxins a, Ochratoxins (A,B,C.a, ß.), Orlandin, Oryzacidin, Paspaline, Patulin, Penicillic acid, Phthioic acid, Secalonic acid A, B, D and F, Sphingofungins, Spinulosin, Sterigmatocystin, Terphenyllin, Terredional, Terreic acid, Terrein, Terretonin, Terretonin, Territrem A, Tryptoquivalines, Verruculogen, Versicolorin A, Viomellein, Viriditoxin, Xanthocillin, Xanthomegnin, ß-nitropropionic acid.

Aureobasidium pullulans



Description: Aureobasidium mold has approximately 15 different species although Aureobasidium pullulans is the most well-known species. Aureobasidium pullulans makes a substance called pullulan, which is a biodegradable polysaccharide that is used for packaging certain foods and medications. On agar petri dishes, it usually appears cream to pink colored initially, but then it turns browner with age. Its natural habitat includes soil, wood, and plant debris.

Growth Indoors: Aureobasidium enjoys growing on painted surfaces including walls and wallpaper. It also enjoys damp areas and is frequently found in grout, bathrooms, shower curtains, and kitchens.

Allergenic Potential and Other Possible Health Hazards: Infections with Aureobasidium are thought to be uncommon. However, there have been reports of this mold growing on skin and nails of individuals. It may be associated with asthma exacerbations, hay fever, and skin irritation. It is one of the causative agents of phaeohyphomycosis, which is a rare infection involving the skin and subcutaneous tissues. It may cause other rare opportunistic infections in susceptible individuals including pulmonary mycosis.

Potential Toxins: to our knowledge, we are not aware of any toxins

Cladosporium cladosporioides

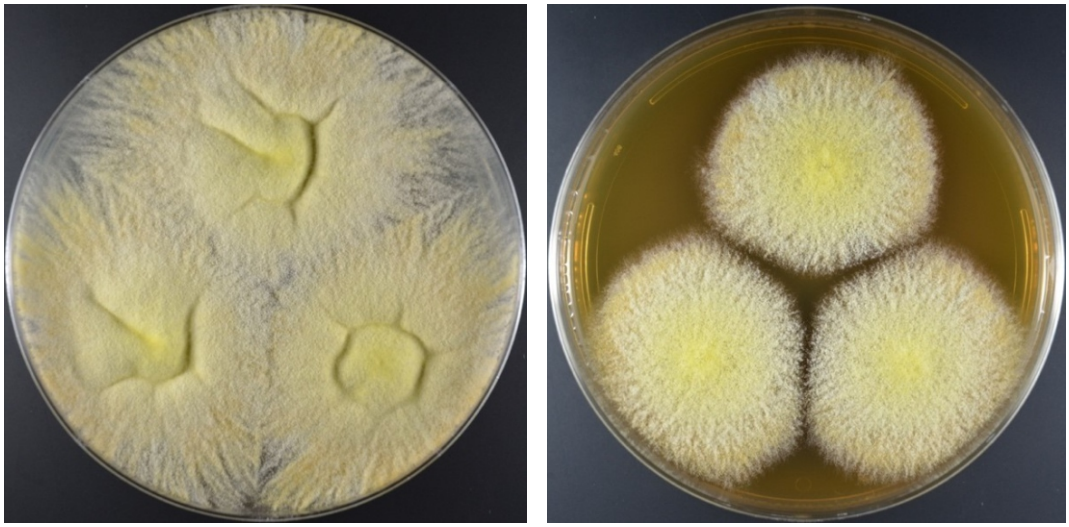
Description: There are several hundred species of Cladosporium. Some of these molds can cause allergic reactions such as asthma exacerbations in susceptible individuals and in rare cases, may result in more serious infections. Many Cladosporium molds are not hazardous to humans. Their natural habitat includes dead vegetation and soil.

Growth Indoors: Cladosporium is often found in high concentrations in water damaged areas of buildings. However, it can also be found on painted surfaces, textiles such as carpets and other fabrics, and fiberglass duct liners.

Allergenic Potential and Other Possible Health Hazards: Cladosporium may exacerbate asthma in some patients and may be associated with hay fever. In rare cases, it may be associated with opportunistic infections including lung infections, eye infections (keratitis), and onychomycosis.

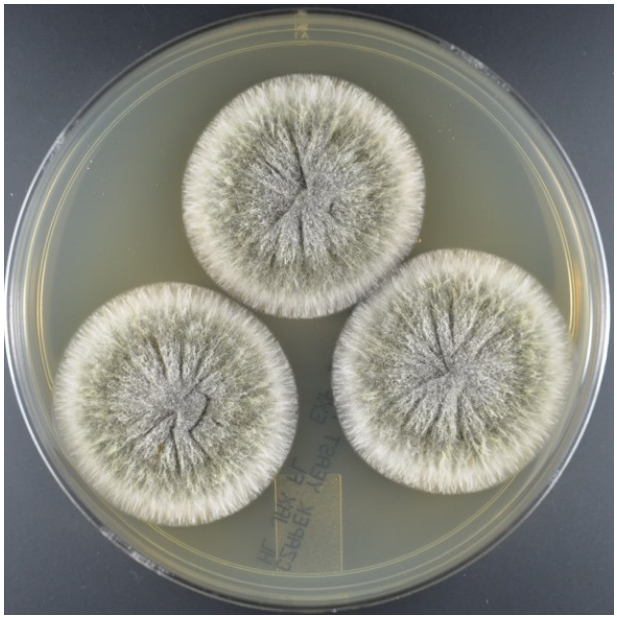
Potential Toxins: Cladosporin, Emodin

Hamigera avelanea



Little is known about the mold genera, Hamigera. Molecules made by this mold may interfere with certain human proteins in the laboratory. Remember that the EPA and CDC both list all molds as potentially allergenic. Therefore, even though very little is known about Hamigera, it is possible that it may cause allergic reactions.

Monodictys levis



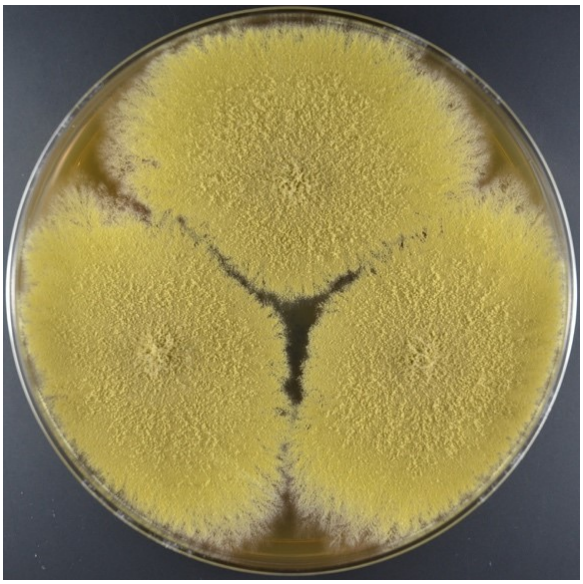
Description: Monodictys are often gray, brown, or even black. In nature, Monodictys has been found growing on twigs, trees, seeds, other plants, dead or alive plant materials, bones, and soils. To our knowledge, there have not been any reports of human infections. However, like all molds, Monodictys may possibly cause allergic reactions in some individuals.

Growth Indoors: In the indoor environment, Monodictys have been found growing on paper, cloth and water-damaged wood. Home and building furnishings and some structural components can be at risk when wet or when the indoor humidity is too high.

Allergenic Potential and Other Possible Health Hazards: May cause potential allergic reactions in some individuals. However, to our knowledge, there have been no reports of human infections from Monodictys.

Potential Toxins: We are not aware of potential toxins

Paecilomyces variotii



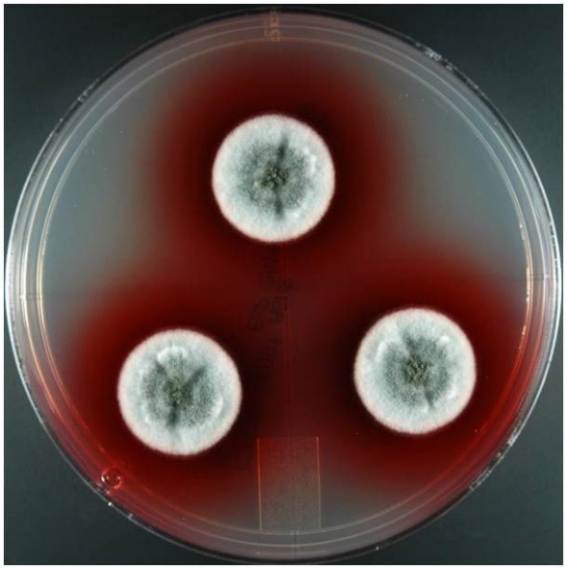
Description: Paecilomyces has been found growing on decaying plant matter, on soils, and even on certain insects. Some species of Paecilomyces grow in very warm temperatures (122°F or higher). In general, Paecilomyces is considered a contaminant, but it may be associated with health issues in certain individuals. Two of the most common species are Paecilomyces lilacinus and Paecilomyces variotii.

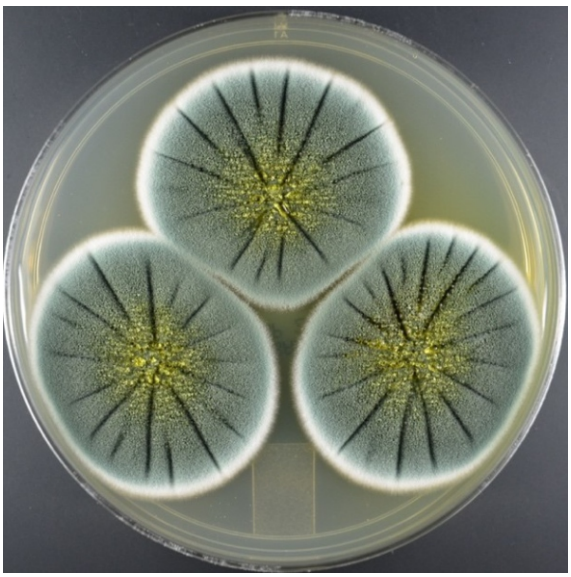
Growth Indoors: Indoors, Paecilomyces has been found to grow on a very wide range of materials. These include, optical lenses, leather, paper, tobacco, polyvinyl chloride (PVC) plastics, certain natural fibers (such as Jute fibers).

Allergenic Potential and Other Possible Health Hazards: Paecilomyces may be associated with Type I allergic reactions such as hay fever and asthma and also Type III hypersensitivity allergic reactions. A species of Paecilomyces known as P. variotii may be associated with a condition known as paecilomycosis. Symptoms can include inflammation of the eyes, skin and lungs. Extended use of contact lenses contaminated with Paecilomyces may be associated with corneal ulcers, keratitis, and endophthalmitis.

Potential Toxins: Byssochlamic acid, Ferrirubin, Fusigen, Indole-3-acetic acid, Paecilotoxins, Patulin.variotin, Viriditoxin.

Penicillium sp.





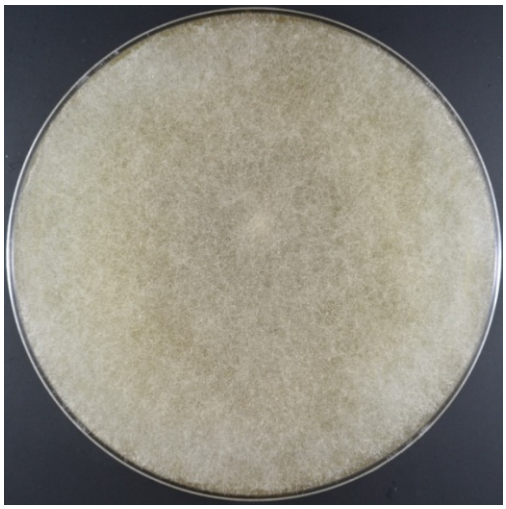
Description: Penicillium is one of the most common types of molds. It has multiple species with a variety of different appearances. These molds can spread quickly throughout a home. They may cause allergic reactions and potentially other infections in susceptible individuals. Some members of the genus produce the famous antibiotic penicillin which is used to treat various bacterial infections. Penicillium often prefer cool and moderate climates and are common in soil and in biodegradable materials. They are among the main causes of food spoilage. Some species of Penicillium can cause damage to machinery, as well as the lubricants and combustible materials used in running and maintaining machines.

Growth Indoors: The blue colored mold on old bread, fruits, vegetables, and other foods in a household is often penicillium. However, this mold can grow on a wide range of materials in a building or home including house dust, fabrics, leather, wallpaper, and even wallpaper glue.

Allergenic Potential and Other Possible Health Hazards: Penicillium has been known to produce a wide range of materials, which may be potential toxins (see list below). They may also be associated with Type I and Type III allergic reactions in some individuals. Penicillium have also been associated with a condition known as Penicilliosis in immunocompromised individuals that may result in fever, skin lesions and anemia.

Potential Toxins: Citrinin, Citreoviridin, Cyclopiazonic acid, Fumitremorgen B, Grisiofulvin, Janthitrems, Mycophenolic acid, Paxilline, Penitrem A, Penicillic acid, Ochratoxins, Roquefortine C, Secalonic acid D, Verruculogen, Verrucosidin, Viomellein, Viridicatumtoxin, Xanthomegnin.

Rhizopus microspores



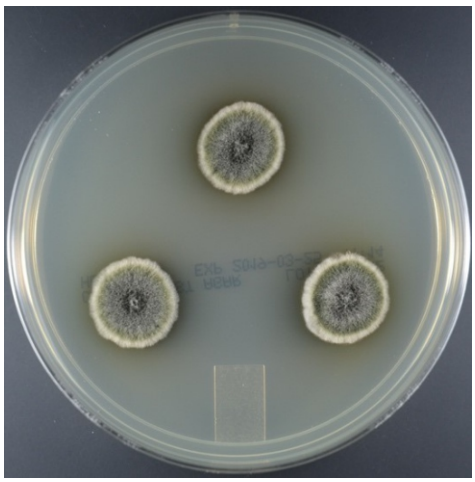
Description: Rhizopus is a filamentous fungus that is often found in soil and decaying organic matter including old fruits, breads, vegetables, and even on animal feces. They are usually considered a contaminant, but they may be associated with certain rare infections.

Growth Indoors: Stored fruits and vegetables

Allergenic Potential and Other Possible Health Hazards: Rhizopus may be associated with Type I (hay fever, asthma) and Type III (hypersensitivity) allergic reactions. They are also the causal agent in a rare condition known as zygomycosis in immunocompromised or malnourished individuals, which may affect the face and oropharyngeal cavity.

Potential Toxins: The species, Rhizopus oryzae, is known to produce agroclavine, which might be toxic to mammals.

Stachybotrys (often referred to as black mold or toxic mold)



Description: Stachybotrys chartarum is often referred to as black mold or toxic mold. However, please remember that many molds can have a black or dark appearance. Stachybotrys chartarum is called toxic mold because some strains make various potential mycotoxins, which may cause breathing issues, asthma exacerbations, sinus inflammation, and other issues. Stachybotrys may be characterized by a musty smell and can be found in damp areas including air conditioning pipes and vents. Its natural habitat is decaying plant materials and soil.

Growth Indoors: Stachybotrys can be found in water damaged building materials including ceiling tiles, gypsum board, insulation backing, sheet rock, wall paper. In addition, it can be found growing on paper and textiles particularly when moisture is present.

Allergenic Potential and Other Possible Health Hazards: Stachybotrys may be associated with Type I allergic reactions such as hay fever and asthma. Stachybotrys may also play a role in the sick building syndrome, where people in the same building have symptoms of illness or feel unwell for an unclear reason. This fungus is known for its ability to produce mycotoxins. Exposure may occur through inhalation, ingestion, or skin contact.

Potential Toxins: Cyclosporins, Macrocyclic trichothecenes (roridin E, satratoxin F, G & H, sporidesmin G, trichoverrol, verrucarin J), Stachybotryolactone.

Talaromyces tabacinus

Description: Talaromyces tabacinus is a fairly newly identified type of mold isolated from a tobacco plant. It is named for its tobacco host, and it is a member of the fungal family known as Trichocomaceae. Because it is a newly discovered type of mold, we know relatively little about this fungus.

Molds can have many different appearances. We hope this guide was helpful, but ordering a lab test is the most accurate way to identify the type of mold!