

Absidia sp. - A zygomycete fungus which is considered common to the indoor environment. Reported to be allergenic. May cause mucorosis in immune compromised individuals. The sites of infection are the lung, nasal sinus, brain, eye, and skin. Infection may have multiple sites. *Absidia cormbifera* has been an invasive infection agent in AIDS and neutropenic patients, as well as, agents of bovine mycotic abortions, and feline subcutaneous abscesses. *Acremonium* species may be confused with *Fusarium* species that primarily produce microconidia in culture. *Fusarium* genera are generally much more rapid growers and produce more aerial mycelium.

Acremonium sp. (*Cephalosporium sp.*) - Reported to be allergenic. Can produce a trichothecene toxin which is toxic if ingested. It was the primary fungus identified in at least two houses where the occupant complaints were nausea, vomiting, and diarrhea. Asexual state of *Emericellopsis sp.*, *Chaetomium sp.*, and *Nectriopsis sp.* It can produce mycetomas, infections of the nails, onychomycosis, corneal ulcers, eumycotic mycetoma, endophthalmitis, meningitis, and endocarditis.

Acrodontium salmoneum - Reported to be a fairly common airborne fungus and is considered to be allergenic. Can produce a trichothecene toxin which is toxic if ingested. It was the primary fungus identified in at least two houses where the occupant complaints were nausea, vomiting, and diarrhea. It can produce mycetomas, infections of the nails, onychomycosis, corneal ulcers, eumycotic mycetoma, endophthalmitis, meningitis, and endocarditis. It is the asexual state of *Emericellopsis sp.*, *Chaetomium sp.*, and *Nectriopsis sp.*

Alternaria sp. - Extremely widespread and ubiquitous. Outdoors it may be isolated from samples of soil, seeds, and plants. It is commonly found in outdoor samples. It is often found in carpets, textiles, and on horizontal surfaces in building interiors. Often found on window frames. The species *Alternaria alternata* is capable of producing tenuazonic acid and other toxic metabolites which may be associated with disease in humans or animals. *Alternaria* produces large spores having sizes between 20 - 200 microns in length and 7 - 18 microns in width, suggesting that the spores from this fungi are deposited in the nose, mouth, and upper respiratory tract. It may be related to bakers asthma. It has been associated with hypersensitivity pneumonitis, sinusitis, dermatomycosis, onychomycosis, subcutaneous phaeohyphomycosis, and invasive infection. Common cause of extrinsic asthma (immediate-type hypersensitivity: type I). Acute symptoms include edema and bronchospasms, chronic cases may develop pulmonary emphysema.

Aphanoascus fulvescens - Extremely widespread in soil, animal skin scrapings, and dung. Is often associated with birds nests and feathers. Should be considered an allergen. This fungus has also been documented in skin infections. No toxic related diseases are of record to date.

Apophysomyces elegans - Extremely widespread in soil and decaying vegetation. Should be considered an allergen. This fungus has also been documented in various zygomycosis including necrotizing fasciitis, osteomyelitis, and

angioinvasion. Most cases are acquired through the traumatic implantation of the fungus. No toxic related diseases are of record to date.

Arthrinium phaeospermum - Widespread saprophyte on dead plant material, particularly swampy grasses. Should be considered an allergen. This fungus has also been documented in various subcutaneous infections. No toxic related diseases are of record to date.

Arthrographis spp. - Extremely widespread in soil and decaying vegetation. *Arthrographis cuboidea* and *A. kalrae* should be considered to be allergens. *A. kalrae* has been documented in onychomycosis and has been recovered from the skin, nails, and respiratory sites but has not been established as an etiological agent. No toxic related diseases are of record to date.

Ascomycete. - One of the major classes of fungal organisms. This class contains the "sac fungi" and yeasts. Some ascomycete spores can be identified by spore morphology, however; some care should be exercised with regard to specific identification. Many ascomycete spores are reported to be allergenic.

Aspergillus sp. - A genus of fungi containing approximately 150 recognized species. Members of this genus have been recovered from a variety of habitats, but are especially common as saprophytes on decaying vegetation, soils, stored food, feed products in tropical and subtropical regions. Some species are parasitic on insects, plants and animals, including man. Species within this genus have reported Aw's (water activities) between 0.75 - 0.82. All of the species contained in this genus should be considered allergenic. Various *Aspergillus* species are a common cause of extrinsic asthma (immediate-type hypersensitivity: type I). Acute symptoms include edema and bronchospasms. Chronic cases may develop pulmonary emphysema. Members of this genus are reported to cause a variety of opportunistic infections of the ears and eyes. Severe pulmonary infections may also occur. Many species produce mycotoxins which may be associated with disease in humans and other animals. Toxin production is dependent on the species or a strain within a species and on the food source for the fungus. Some of these toxins have been found to be carcinogenic in animal species. Several toxins are considered potential human carcinogens.

Aspergillus alliaceus- This species is not commonly reported from nature and is not considered common to indoor environments. It has been isolated from soils in desert areas, grassland or cultivated soils, cacti, onion, and garlic bulbs. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus auricomus- This species was originally isolated from an aqueous solution of potassium iodide. It has also been isolated from cottonseed in Arizona. This species is not considered common to indoor environments. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus caespitosus - This species is not considered common to indoor environments. It has been predominantly isolated from soils but has also been isolated from sugarcane bagasse. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus caesiellus - This species is not considered common to indoor environments. It has been predominantly isolated from soils. This fungus should be considered allergenic. No toxic diseases have been documented to date. This species has been reported as an opportunistic pathogen.

Aspergillus candidus - This species considered common to indoor environments. It occurs predominantly in tropical and subtropical regions in stored foods and feedstuffs such as wheat, corn, barley, sorghum, rice, peanuts, dried macaroni and spaghetti, refrigerated dough products, and flour. It has also been isolated from soils. It has an Aw (water activity) of 0.75 and Conidia (spores) dimensions 2.5-4 microns. This fungus should be considered allergenic. This species has been reported as an opportunistic pathogen including onychomycosis, otomycosis, and invasive aspergillosis. It has also been reported to produce the toxin petulin which may be associated with disease in humans and other animals.

Aspergillus carbonarius - This distinctive species has not been commonly reported. It has been isolated from mud and wood in mangrove swamps, soil, and polluted water. This species is not considered common to indoor environments. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus carneus - This species is not considered common to indoor environments. It has been predominantly isolated from tropical and subtropical soils. This fungus should be considered allergenic. No toxic diseases have been documented to date. This species has been reported as an opportunistic pathogen.

Aspergillus cervinus - This species has not been commonly reported. It has been isolated from tropical rainforest soils in Malaya, Puerto Rico, New Zealand, Wisconsin, and India. This species is not considered common to indoor environments. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus clavatus - This distinctive species is a common soil fungus with widespread distribution in soils in warmer climates. It also is quite widely distributed in some kinds of foods, especially cereals. This species is not considered common to indoor environments, however; it has been frequently associated with the brewing industry. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus deflectus - This species is not considered common to indoor environments. It has been predominantly isolated from tropical and subtropical

soils. This fungus should be considered allergenic. No toxic diseases have been documented to date. This species has been reported as an opportunistic pathogen.

***Aspergillus flavipes* - This species may be recovered from indoor environments. It has been predominantly isolated from tropical and subtropical soils and decaying vegetation, however; it has also been isolated from deteriorated cotton fabric. This fungus should be considered allergenic. No toxic diseases have been documented to date. This species has been reported as an opportunistic pathogen associated with cutaneous aspergillosis and osteomyelitis.**

***Aspergillus flavus* - This species may be recovered from the indoor environment. It has worldwide distribution but is predominantly a tropical to subtropical fungus apparently more common in cultivated than uncultivated soil. It colonizes on decaying vegetation, crop seeds and many other substrates. It grows on moldy corn and peanuts and can also be found in other foods and dairy products. It has been reported in water damaged carpets. It has also been reported as an insect and animal pathogen. This fungus has an Aw (water activity) of 0.78, and conidia (spores) dimensions 3-6 microns or 3-5 microns. This fungus should be considered allergenic. Its presence has been associated with reports of asthma. Approximately 50% of the strains are capable of producing a group of mycotoxins - in the aflatoxin group. Aflatoxins are known animal carcinogen. There is limited evidence to suggest that this toxin is also a human carcinogen. The production of the fungal toxin is dependent on the growth conditions and on the substrate used as a food source. The toxin is poisonous to humans by ingestion and may directly affect the liver. Experiments have indicated that it is teratogenic and mutagenic. This fungus may also result in disease via inhalation and is associated with aspergillosis of the lungs and/or disseminated aspergillosis. This fungus is occasionally identified as the cause of corneal, otomycotic, and nasoorbital infections.**

***Aspergillus foetidus* - This species is not commonly reported from nature and is not considered common to indoor environments. It has been used in several industrial processes including koji for shochu and enzyme production. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.**

***Aspergillus fumigatus* - This species may be recovered from the indoor environment. It has worldwide distribution and grows over a wide range of temperatures. It has been recovered from soils, plants, seeds, sludge, wood chips, compost, cotton, and penguin excreta. It is commonly found outdoors in compost piles with temperatures higher than 40 degrees C, in mild to warm soils and on cereals. This fungus has an Aw (water activity) of 0.82 with an optimum > 0.97. Conidia (spores) have dimensions of 2-3.5 microns. This fungus should be considered allergenic, however; it should be considered as a principle cause for both invasive and allergic aspergillosis. This organisms will particularly affect individuals who are immune compromised. It is considered a true human pathogen. No toxic diseases have been documented to date.**

Aspergillus japonicus - This species is not commonly reported from nature and is not considered common to indoor environments. It has been isolated from subtropical and tropical soils and also submerged organic debris. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus kanagawaensis - This species is not commonly reported from nature and is not considered common to indoor environments. It has been isolated from soils in hemlock and jack pine forest in Wisconsin. Has also been isolated from soils in Japan. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus glaucus - This species may be recovered from the indoor environment. It has widespread distribution in subtropical regions. It has been recovered in nature from soils and on plants. This fungus can grow at low moisture levels and has also been isolated from grains, sugary food products, meat, wool, dried foods, and leather. It has been reported as a common outdoor fungus in the winter. The conidia (spores) for this fungus have dimensions of 5-6.5 microns and is the imperfect stage of the ascomycetous fungus *Eurotium* sp. It is reported to be allergenic. This species is only occasionally pathogenic and has been associated with sinusitis, otitis, cerebral, orofacial, and pulmonary infections. No toxic diseases have been documented to date.

Aspergillus nidulans - This species is not considered common to indoor environments. It has been frequently isolated from tropical and subtropical soils but less frequently from other areas. This fungus has an Aw (water activity) of 0.78 with conidia (spores) having dimensions of 2-4 microns. It is reported to be allergenic. This species has been reported in a variety of animal and human infections including invasive and systemic disease including aspergillosis of the lungs and/or disseminated aspergillosis. It can produce the mycotoxin sterigmatocystin that has been shown to produce liver and kidney damage in lab animals.

Aspergillus niger - This species is considered common to indoor environments. It is widespread in the soil and on plants and is also considered a common contaminant of foods. It has a musty odor. It is commonly found in the environment on textiles, in soils, grains, fruits and vegetables isolated from tropical and subtropical soils but less frequently from other areas. This fungus has an Aw (water activity) of 0.77 with an optimum > 0.97. Conidia (spores) have dimensions of 3.5 - 5 microns or 4 to 5 microns. It is reported to be allergenic. It is common in secondary organisms following bacterial otitis and is more commonly being implicated in pulmonary disease in immunocompromised hosts. It has also been reported to cause skin infections.

Aspergillus niveus - This species is not considered common to indoor environments. It has been predominantly isolated from soils and appears to be

widely distributed. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus ochraceus - This species is considered common to indoor environments. It is widespread in cultivated soils, but has also been documented in uncultivated soils, grains, and salted food products. It is not usually associated with decaying vegetation. This fungus has an Aw (water activity) of 0.77 with conidia (spores) having dimensions of 2.5 - 3 microns. It is reported to be allergenic. It has not been reported as causing any invasive disease to date. This fungus can also produce ochratoxin A, which may produce ochratoxicosis in humans. This is also known as Balkan nephropathy, a disorder that affects the kidneys. The toxin is produced at optimum growth conditions at 25 degrees C and high moisture conditions. The ochratoxin may also be produced by other *Aspergillus* sp. and *Penicillium* sp. Other toxins which can be produced by this fungus include penicillic acid, xanthomegnin and viomellein. These are all reported to be kidney and liver toxins.

Aspergillus oryzae - This species may be considered common to some indoor environments. It has been predominantly isolated from soils, vegetative plant parts, seeds, and cotton fabrics. It is also used in food fermentations, in the production of saki, shoyu, miso, and soy sauce, and as a source of industrial enzymes. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus ostianus - This species is not considered common to indoor environments. It has been isolated from animal feed, chicory seed, and gram seed storage. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus paradoxus - This species is considered a very uncommon species that is not considered typical of indoor environments. It has been isolated from opossum dung and soil. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus parasiticus - This species is not considered common to indoor environments. It has been isolated from cultivated soils. Lack of reported isolations may be due in part to the failure of investigators to differentiate *A. parasiticus* from *A. flavus*. It has been isolated more frequently from seeds, other plants, and insects. This fungus should be considered allergenic. No invasive diseases have been documented to date. Some strains are capable of producing a group of mycotoxins - in the aflatoxin group. Aflatoxins are known animal carcinogen. There is limited evidence to suggest that this toxin is a human carcinogen. The toxin is poisonous to humans by ingestion. Experiments have indicated that it is teratogenic and mutagenic. It is toxic to the liver. The production of the fungal toxin is dependent on the growth conditions and on the substrate used as a food source.

Aspergillus penicilloides - This species is not generally considered common to indoor environments, however; this may be related to its xerophilic nature (can grow in areas with low water activity) and that it grows very poorly on usual laboratory media. Therefore, it may often be overlooked in typical investigations. Reports in the literature are quite rare, however, if suitable media are used, the species can be recovered in large numbers from a variety of dried foods, house dust, spices, and cereals. This fungus should be considered allergenic. It has also been reported as an opportunistic pathogen. No toxic diseases have been documented to date.

Aspergillus puniceus - This species is not commonly reported from nature and is not considered common to indoor environments. It has been isolated from soils. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus restrictus - This species is not generally considered common to indoor environments, however; this may be related to its slow growing nature. Therefore, it may often be overlooked in typical investigations. It has been isolated from a variety of substrates including soil, cotton goods and fruit juices, and from air. This fungus should be considered allergenic. It has also been reported as an opportunistic pathogen and associated with endocarditis, onychomycosis, and pulmonary aspergillosis. No toxic diseases have been documented to date.

Aspergillus sclerotiorum - This species is not considered common to indoor environments. It has been isolated from tropical and subtropical soils. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus sojae - This species is not considered common to indoor environments. To date, it has only been isolated from koji fermentations. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus sparsis - This species is not considered common to both outdoor or indoor environments. It has been isolated from soil. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus sydowi - This species has worldwide distribution. Its primary habitat is the soil, but it has been recovered from a variety of other substrates. Found in warmer soil and in grains, straw, cotton, and decomposing vegetation. It appears to be less common in foods than *A. versicolor*. This fungus should be considered allergenic. This fungus is associated with aspergillosis of the lungs and/or disseminated aspergillosis otomycosis (ear infection) and onychomycosis

(infection of finger or toe nails). This fungus can produce the toxins patulin and citrinin which may be associated with disease in humans and other animals.

Aspergillus tamarii - This species is not considered common to both outdoor or indoor environments. It was originally isolated from tamari sauce. It is fairly common soil fungus and has been isolated from seeds of various crops and other substrates. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus terreus - This fungus has worldwide distribution in soils, but is more abundant in tropical and subtropical regions rather than temperate regions. It is also common in cultivated soils and forests than grasslands. It is common in stored crops and has been isolated from other foodstuffs. It should be considered allergenic. Invasive bronchopulmonary aspergillosis, onychomycosis, cutaneous, ophthalmic, and disseminated mycosis have been documented. No toxic or invasive diseases have been documented to date.

Aspergillus unguis - This species is not considered common but have been isolated from a variety of substrates including man, shoe leather, and sesame seeds. This fungus should be considered allergenic. No toxic or invasive diseases have been documented to date.

Aspergillus ustus - This species is not considered common in habitats other than tropical or subtropical soils. This fungus should be considered allergenic. This species is only occasionally pathogenic and has been associated with otitis media, burns, and disseminated infections. No toxic diseases have been documented to date.

Aspergillus versicolor - This is a widely distributed fungus commonly found in soil, hay, cotton, dairy products, dried cereals, nuts, and especially spices. It is often considered to be one of the most widely distributed species of *Aspergillus*. This fungus should be considered allergenic. This species is pathogenic and has been associated with onychomycosis and invasive aspergillosis. It can produce a mycotoxin sterigmatocystin and cyclopiaxonic acid. These toxins can cause diarrhea and upset stomach. It is also reported to be a kidney and liver carcinogen.

Aspergillus wentii - This species is considered common with its main distribution in tropical or subtropical soils. It has also been isolated from plant litter and seeds. This fungus should be considered allergenic. This species is only occasionally pathogenic and has been associated with otitis media, burns, and disseminated infections. No toxic diseases have been documented to date.

Aureobasidium pullulans- A cosmopolitan fungus with the main habitat apparently on the aerial parts of plants. Frequently found in moist environments. This fungus should be considered allergenic. This species has been associated with dermatitis, peritonitis, pulmonary infection, and invasive disease in AIDS patients. Probably acquired by traumatic implantation. May be recovered as a contaminant from human cutaneous sites. No toxic diseases have been documented to date.

Basidiomycetes - One of the major classes of fungal organisms. This class contains the mushrooms, shelf fungi, puffballs, and a variety of other macrofungi. It is extremely difficult to identify a specific genera of mushrooms by using standard culture plate techniques. Some basidiomycete spores can be identified by spore morphology, however; some care should be exercised with regard to specific identification. Many basidiomycete spores are reported to be allergenic.

Basidiobolus - Has been isolated from decaying plants, soil, and from the fecal materials of frogs, reptiles, fish, and bats. The relationship of these organisms to human occupied spaces potentially suggests a common presence of this genera of fungi in the indoor environments. Should be considered allergenic. *Basidiobolus ranarum* rarely causes disease, but has principally been involved with trunk and extremity infection of children in tropical countries. No toxic diseases have been documented to date.

Beauveria - Widespread in the soil with various species being parasites of insects, the most notable being *Beauveria bassiana* which affects the silkworm. Not considered to be common to indoor environments. Should be considered allergenic. Reported to cause mycotic keratitis and occasional pulmonary infections. No toxic diseases have been documented to date.

Bipolaris sp. - A widespread fungus that is most frequently associated with grasses, plant material, decaying food, and soil. It is common to both indoor and outdoor environments. Older obsolete names include *Drechslera* and *Helminthosporium*. This fungus produces large spores which would be expected to be deposited in the upper respiratory tract. Various species of this fungus can produce the mycotoxin - sterigmatocystin which has been shown to produce liver and kidney damage when ingested by laboratory animals.

Bipolaris australiensis - A widespread fungus that is most frequently associated with grasses, plant material, and soil. Should be considered allergenic. Has also been reported as an infrequent agent of phaeohyphomycosis, particularly fungal sinusitis. It can occasionally cause a corneal infection of the eye.

Bipolaris cynodontis. - A widespread fungus that is most frequently associated with bermuda grass. Recoveries have been made from human sinuses and eyes, however; its exact role as an etiological agent remains unclear.

Bipolaris hawaiiensis - A widespread fungus that is most frequently associated with grasses, plant material, and soil. Should be considered allergenic. Common etiologic agent in fungal sinusitis. Also reported cases of pulmonary and cerebral disease, meningoencephalitis, and endophthalmitis. This organism appears to be extremely aggressive in some settings, possibly neutrotropic.

Bipolaris spicifera - A widespread fungus that is most frequently associated with grasses and plant material, and soil. Should be considered allergenic. Common etiologic agent in fungal sinusitis. Also been reported as an agent of phaeohyphomycosis, particularly fungal sinusitis. Disease also includes endocarditis, keratitis, osteomyelitis, peritonitis, and meningoencephalitis. This is the most common *Bipolaris* species implicated in human disease.

Blastomyces sp. - *Blastomyces dermatitidis*- Rare environmental isolates have been found in moist soil with high organic content. Important human pathogen. It is a thermally dimorphic fungus which has filamentous fungus when grown at 25 degrees C and a yeast form at 37 degrees C. Causes Blastomycosis in humans and animals involving pulmonary invasion, followed by cutaneous, osteoarticular and genitourinary disease. No toxic diseases have been documented to date.

Blastoschizomyces sp. - *Blastoschizomyces capitatus* found in the soil, beach sand, as a normal flora of the skin, respiratory and digestive tracts of humans. Invasive and disseminated infections have been reported in immunocompromised patients. Cases of encephalitis and osteomyelitis have also been reported. No toxic diseases have been documented to date.

Botrytis sp. - It is parasitic on plants, vegetables, and soft fruits but may also be found in soil. Reported to be allergenic. No toxic or invasive diseases have been documented to date.

C

Candida sp. - This genus contains a variety of organisms that have been isolated from the environment, as well as human skin and mucous membranes.

Candida albicans - Found in animals and in man. Has been isolated from the skin and mucosa of man, but has also been recovered from leaves, flowers, water, and soil. Reported to be allergenic. A common cause of superficial infection, oral and vaginal infection, sepsis, and disseminated disease. Cells from the organism are usually not airborne and are considered to be a normal component of the flora of mouth and other mucous membranes in the body. Thrush and other diseases caused by *Candida albicans* usually occur after prolonged treatment with antibiotics or steroids. No toxic diseases have been documented to date.

Candida ciferrii - Found in soils. Considered to be allergenic. A common cause of superficial infection isolated from ears, skin, nails, and eyes. No toxic diseases have been documented to date.

Candida glabrata - Found associated with man, mammals, birds, fruit juices, and insects. Considered to be allergenic. Implicated in sepsis, persistent urinary tract infections, and refractory vaginitis. A major emerging pathogen in nosocomial disease. No toxic diseases have been documented to date.

Candida guilliermondii - Found associated with man and other mammals, brewery products, vegetation, and insects. Considered to be allergenic. Implicated in sepsis, urinary tract infections, respiratory specimens, brain abscesses, skin and nail cultures. No toxic diseases have been documented to date.

Candida kefyr - Found in grains, dairy products, man and other mammals. Considered to be allergenic. Rare cause of human mycoses. May cause blood sepsis, invasive disease, and vaginitis, and urinary tract infections. No toxic diseases have been documented to date.

Candida krusei - Found in air samples, dairy products, soil, man and other mammals. Considered to be allergenic. Involved in sepsis and disseminated, invasive disease, including endocarditis, peritonitis, vaginitis, and urinary tract infections. No toxic diseases have been documented to date.

Candida lambica - Found in dairy products, fruit juice, water, birds, and man. Considered to be allergenic.

Candida lipolytica - Found in man and other mammals, corn, olives, and hydrocarbons. Considered to be allergenic. Implicated in sepsis, thrombophlebitis, and chronic sinusitis. No toxic diseases have been documented to date.

Candida lusitanae - Found in man and other mammals, birds, citrus fruits, and pears. Considered to be allergenic. Implicated in sepsis, especially in immunocompromised patients with underlying malignancy, and urinary tract infection. No toxic diseases have been documented to date.

Candida parapsilosis - Found in man and other mammals, tea, fruit juices, and water. Considered to be allergenic. Implicated in sepsis. Associated with burn infections and endocarditis. No toxic diseases have been documented to date.

Candida rugosa - Found in dairy products, feces, seawater, and insects. Considered to be allergenic. Implicated in sepsis. Implicated in fungemia, burn infection, and glandular infections in cattle. No toxic diseases have been documented to date.

Candida tropicalis - Found in humans and other mammals, fruit, and water. Considered to be allergenic. Considered a true pathogen of immunocompromised hosts. Implicated in sepsis, wound infections, neonatal infections, and disseminated deep tissue infections. No toxic diseases have been documented to date.

Candida zeylanoides - Found in humans, soil, meat, fish, and water. Considered to be allergenic. Implicated in sepsis, endocarditis, fungal arthritis, skin and nail infections. No toxic diseases have been documented to date.

Cephalosporium sp. - See *Acremonium sp.*

Chaetomium sp. - Large ascomycetous fungus producing perithecia. It is found on a variety of substrates containing cellulose including paper and plant compost. It can be readily found on the damp or water damaged paper in sheetrock.

Chaetomium atrobrunneum - This fungus is found in the soil, air, and on plant debris. Should be considered as allergenic. Has been implicated in fatal systemic mycoses. The thermophilic, neurotropic nature of this organisms suggests it is a potentially aggressive pathogen. No toxic diseases have been documented to date.

Chaetomium globosum - This fungus is found in the soil, air and on plant debris. Should be considered as allergenic. Is considered an agent of onychomycosis, peritonitis, and cutaneous lesions. Has been implicated in fatal systemic mycoses. No toxic diseases have been documented to date.

Chaetomium strumarium - This fungus is common in warm soil and on plant debris. Should be considered as allergenic. Has been implicated in fatal brain abscesses in drug abusers. No toxic diseases have been documented to date.

Chrysosporium spp. - Widespread, common in the soil and on plants. Rare agents of onychomycosis, skin lesions, endocarditis, and uncommon agents of the pulmonary mycosis *adiaspiromycosis*. No toxic diseases have been documented to date.

Cladophialophora spp. - Widespread, common in the soil and on plant debris. *C. bantiana* has been reported as a neurotropic agent causing cerebral phaeohyphomycosis in the form of brain abscesses. Skin lesions have also been reported. The organisms has also been recovered from pulmonary sites. *C. boppii* has been associated with skin lesions and a possible cause of chromoblastomycosis. *C. carrionii* is almost exclusively associated with chromoblastomycosis, which is generally restricted to subtropical areas. Most patients have had long-term soil exposure with repeated trauma and tissue injuries to the feet and legs. No toxic diseases have been documented to date.

Cladosporium sp. (*Hormodendrum sp.*) - Aw (water activity) in the range of 0.84 to 0.88. Most commonly identified outdoor fungus. The outdoor numbers are reduced in the winter. The numbers are often high in the summer. Often found indoors in numbers less than outdoor numbers. It is a common allergen. Indoor

Cladosporium sp. may be different than the species identified outdoors. It is commonly found on the surface of fiberglass duct liner in the interior of supply ducts. A wide variety of plants are food sources for this fungus. It is found on dead plants, woody plants, food, straw, soil, paint and textiles. It can cause mycosis. Produces greater than 10 antigens. Antigens in commercial extracts are of variable quality and may degrade within weeks of preparation. Common cause of extrinsic asthma (immediate-type hypersensitivity: type I). Acute symptoms include edema and bronchospasms, chronic cases may develop pulmonary emphysema.

Cladosporium cladosporioides - Widespread distribution. Together with *C. herbarum* compose the most common species on dead organic matter and in the air. It is found on dead plants, woody plants, food, straw, soil, paint and textiles. Reported allergen. Has been implicated in pulmonary and cutaneous infections, possible sinus infection, mixed disseminated infections. No toxic diseases have been documented to date.

Cladosporium herbarum - Widespread distribution. Together with *C. cladosporioides* compose the most common species on dead organic matter and in the air. It is found on dead plants, woody plants, food, straw, soil, paint, and textiles. Reported allergen. Has been implicated in cutaneous infections and keratitis. No toxic diseases have been documented to date.

Cladosporium macrocarpum - Common species on dead organic matter and in the air. It is found on dead plants, woody plants, food, straw, soil, paint, and textiles. Reported allergen. No toxic or invasive diseases have been documented to date.

Cladosporium sphaerospermum - Worldwide distribution. Considered a secondary invader of plants, textiles, food and is common to the soil, and air. Reported allergen. Implicated in skin lesions, corneal ulcer, and onychomycosis.

Cladosporium fulvum (*Fulvia fulva*) - Conidia (spores) dimensions 12-47 x 4-10 microns. It is found on the leaves of tomatoes.

Cryptostroma corticale - Conidia (spores) dimensions 4-6.5 x 3.5-4 microns. Found on the bark of maple and sycamore trees and on stored logs.

Conidobolus sp. - Can cause a chronic inflammatory disease of the nasal mucosa (entomophthoromycosis).

Cunninghamella sp. - Can cause disseminated and pulmonary infections in immune compromised hosts.

Curvularia sp. - Reported to be allergenic. It may cause corneal infections, mycetoma and infections in immune compromised hosts.

D

Dreschlera sp. - Conidia (spores) dimensions 40-120 x 17-28 microns. Found on grasses, grains and decaying food. It can occasionally cause a corneal infection of the eye.

E

Emericella nidulans - A ubiquitous soil fungus. Most often isolated from tropical and subtropical climates. Perfect stage of ***Aspergillus nidulans***. This fungus should be considered allergenic. No toxic or invasive diseases have been reported to date.

Emericella quadrilineata- A ubiquitous soil fungus. Most often isolated from tropical and subtropical climates. Perfect stage of *Aspergillus tetrazonus*. This fungus should be considered allergenic. No toxic or invasive diseases have been reported to date.

Emericella rugulosa- A relatively uncommon species most commonly isolated from soil. Perfect stage of *Aspergillus rugulovalvus*. This fungus should be considered allergenic. No toxic or invasive diseases have been reported to date.

Epicoccum sp. - Conidia (spores) dimensions 15-25 microns. A common allergen. It is found in plants, soil, grains, textiles, and paper products.

Epidermophyton sp. - Can cause infections of skin and nails.

Eurotium amstelodami - This fungus is frequently encountered in tropical and subtropical regions. It is frequently reported from soils and dried or concentrated food products. It is the perfect stage of *Aspergillus amstelodami*. This fungus should be considered allergenic. No toxic or invasive diseases have been reported to date.

Eurotium chevalieri - This fungus is frequently encountered in tropical and subtropical regions. It is frequently reported from soils and dried or concentrated food products, leather goods, cotton, seeds, and other dried products. The fungus is considered to be a xerophile. It is the perfect stage of *Aspergillus chevalieri*. This fungus should be considered allergenic. No toxic or invasive diseases have been reported to date.

Eurotium rubrum - This fungus is frequently encountered in tropical and subtropical regions. It is frequently reported from soils and dried or concentrated food products, leather goods, cotton, seeds, and other dried products. The fungus is considered to be a xerophile. It is the perfect stage of *Aspergillus*

rubrobrunneus. This fungus should be considered allergenic. No toxic or invasive diseases have been reported to date.

F

Fusarium solani - Aw (water activity) 0.90. Macroconidia (spores) dimensions 27-52 x 4.4-6.8; Microconidia dimensions 8-16 x 2-4 microns. Found in plants and soils. Can produce trichothecene toxins which may be associated with disease in humans and animals.

Fusarium sp. - Aw (water activity) 0.90. A common soil fungus. It is found on a wide range of plants. It is often found in humidifiers. Several species in this genus can produce potent trichothecene toxins (5, 27). The trichothecene (scirpene) toxin targets the following systems: circulatory, alimentary, skin, and nervous. Produces vomitoxin on grains during unusually damp growing conditions. Symptoms may occur either through ingestion of contaminated grains or possibly inhalation of spores. The genera can produce hemorrhagic syndrome in humans (alimentary toxic aleukia). This is characterized by nausea, vomiting, diarrhea, dermatitis, and extensive internal bleeding. Reported to be allergenic. Frequently involved in eye, skin and nail infections.

G

Geotrichum sp. - Aw (water activity) 0.90. Conidia (spores) dimensions 6-12 x 3-6 microns. Aw (water activity) 0.90. A common contaminant of grains, fruits, dairy products, paper, textiles, soil and water, and often present as part of the normal human flora. The species *Geotrichum candidum* can cause a secondary infection (geotrichosis) in association with tuberculosis. This rare disease can cause lesions of the skin, bronchi, mouth, lung, and intestine.

Gliocladium sp. - A fungus which is structurally similar to *Penicillium sp.* It is reported to be allergenic.

H

Helminthosporium sp. - Reported to be allergenic.

Histoplasma sp. - A fungus which has filamentous growth at 25 degrees C and yeast growth at 37 degrees C. It is reported to be a human pathogen. It may be associated with birds.

Humicula sp. - Grow on products with a high cellulose content. These fungi are also found in soil and on plant debris.

Hyaline Mycelia - Sterile mycelia which is white or transparent. No fruiting structures are produced by the mycelia. Visual identification of these organisms is

not possible. Often associated with allergic symptoms.
I-L, still under construction

M

Microsporium sp. - Causes ringworm in humans.

Monilia sp. - Reported to be allergenic. This fungus produces soft rot of tree fruits. Other members produce a red bread mold. It is infrequently involved in corneal eye infections.

Mucor sp. - Often found in soil, dead plant material, horse dung, fruits, and fruit juice. It is also found in leather, meat, dairy products, animal hair, and jute. A Zygomycetes fungus which may be allergenic (skin and bronchial tests) (7, 17). This organism and other Zygomycetes will grow rapidly on most fungal media. May cause mucorosis in immune compromised individuals. The sites of infection are the lung, nasal sinus, brain, eye, and skin. Infection may have multiple sites.

N

Nigrospora sp. - Reported to be allergenic.

O, still under construction

P

Paecilomyces sp. - Commonly found in soil and dust, less frequently in air. *P. variotii* can cause paecilomycosis. Linked to wood-trimmers disease and humidifier associated illnesses. They are reported to be allergenic. Some members of this genus are reported to cause pneumonia. It may produce arsine gas if growing on arsenic substrate. This can occur on wallpapers covered with paris green.

Papulospora sp. - This fungi is found in soil, textiles, decaying plants, manure, and paper.

Penicillium sp. - Aw (water activity) 0.78 - 0.88. A wide number of organisms have placed in this genera. Identification to species is difficult. Often found in aerosol samples. Commonly found in soil, food, cellulose, and grains (17, 5). It is also found in paint and compost piles. It may cause hypersensitivity pneumonitis and allergic alveolitis in susceptible individuals. It is reported to be allergenic (skin) (7, 17). It is commonly found in carpet, wallpaper, and in interior fiberglass duct insulation (NC). Some species can produce mycotoxins. Common cause of extrinsic asthma (immediate-type hypersensitivity: type I). Acute symptoms include edema and bronchospasms, chronic cases may develop pulmonary emphysema.

Periconia sp. - No information available, more to come.

Phoma sp. - A common indoor air allergen. It is similar to the early stages of growth of *Chaetomium sp.* The species are isolated from soil and associated plants (particularly potatoes). Produces pink and purple spots on painted walls (3, 17). It may have antigens which cross-react with those of *Alternaria sp.* It will grow on butter, paint, cement, and rubber. It may cause phaeohyphomycosis, a systematic or subcutaneous disease.

Pithomyces sp. - Grows on dead grass in pastures. Causes facial eczema in ruminants.

Q, still under construction

R

Rhizomucor sp. - The Zygomycetous fungus is reported to be allergenic. It may cause mucorosis in immune compromised individuals. It occupies a biological niche similar to *Mucor sp.* It is often linked to occupational allergy. The sites of infection are the lung, nasal sinus, brain, eye, and skin. Infection may have multiple sites.

Rhizopus sp. - The Zygomycetous fungus is reported to be allergenic. It may cause mucorosis in immune compromised individuals. It occupies a biological niche similar to *Mucor sp.* It is often linked to occupational allergy. The sites of infection are the lung, nasal sinus, brain, eye, and skin. Infection may have multiple sites.

Rhodotorula sp. - A reddish yeast typically found in moist environments such as carpeting, cooling coils, and drain pans. In some countries it is the most common yeast genus identified in indoor air. This yeast has been reported to be allergenic. Positive skin tests have been reported. It has colonized in terminally ill patients.

S

Saccharomyces sp. - Reported to be allergenic. Baker's Yeast.

Scopulariopsis sp. - It may produce arsine gas if growing on arsenic substrate. This can occur on wallpapers covered with paris green. It has been found growing on a wide variety of materials including house dust. It is associated with type III allergy.

Serpula lacrymans - Common cause of extrinsic asthma (immediate-type hypersensitivity: type I). Acute symptoms include edema and bronchospasms; chronic cases may develop pulmonary emphysema.

Sporobolomyces sp. - Reported to be allergenic.

Sporothrix sp. - Can cause sporotrichosis. Usually only in populations which are immune compromised.

Sporotrichum sp. - Reported to be allergenic. See also *Sporothrix sp.* as there is some taxonomic confusion between these two genera. This genera does not cause sporotrichosis.

Stachybotrys sp. - Aw (water activity) - 0.94, optimum Aw (water activity) - >0.98. Several strains of this fungus (*S. atra*, *S. chartarum* and *S. alternans* are synonymous) may produce a trichothecene mycotoxin- Satratoxin H - which is poisonous by inhalation. The toxins are present on the fungal spores. This is a slow growing fungus on media. It does not compete well with other rapidly growing fungi. The dark colored fungi grows on building material with a high cellulose content and a low nitrogen content. Areas with relative humidity above 55% and are subject to temperature fluctuations are ideal for toxin production. Individuals with chronic exposure to the toxin produced by this fungus reported cold and flu symptoms, sore throats, diarrhea, headaches, fatigue, dermatitis, intermittent local hair loss, and generalized malaise. The toxins produced by this fungus will suppress the immune system affecting the lymphoid tissue and the bone marrow. Animals injected with the toxin from this fungus exhibited the following symptoms: necrosis and hemorrhage within the brain, thymus, spleen, intestine, lung, heart, lymph node, liver, and kidney. The mycotoxin is also reported to be a liver and kidney carcinogen. Affects by absorption of the toxin in the human lung are known as pneumomycosis. This organism is rarely found in outdoor samples. It is usually difficult to find in indoor air samples unless it is physically disturbed. The spores are in a gelatinous mass. Appropriate media for the growth of this organism will have a high cellulose content and a low nitrogen content. The spores will die readily after release. The dead spores are still allergenic and toxic. Percutaneous absorption has caused mild symptoms.

Stemphylium sp. - Reported to be allergenic. Isolated from dead plants and cellulose materials.

Syncephalastrum sp. - Can cause a respiratory infection characterized by a solid fungal ball.

T

Trichoderma sp. - It is commonly found in soil, dead trees, pine needles, paper, and unglazed ceramics. It often will grow on other fungi. It produces antibiotics which are toxic to humans. It has been reported to be allergenic (7, 17). It readily degrades cellulose.

Trichophyton sp. - Can cause ring worm, athlete's foot, skin, nail, beard, and scalp (5, 6). Reported to be allergenic. Found on soil and skin.

Trichothecium sp. - Aw (water activity) 0.90. Conidia (spores) dimensions 12-23 x 8-10 microns. Found in decomposing vegetation, soil, corn seeds, and in flour. The species *Trichothecium roseum* can produce a trichothecene toxin which may be associated with disease in humans and other animals. Reported to be allergenic.

Tritirachium sp. - Reported to be allergenic.

U

Ulocladium sp. - Has an Aw (water activity) of 0.89. Isolated from dead plants and cellulose materials. Found on textiles.

V

Verticillium sp. - Conidia (spores) dimensions 2.3-10 x 1-2.6 microns. Found in decaying vegetation, on straw, soil, and arthropods. A rare cause of corneal infections.

W

Wallemia sp. - Has an Aw (water activity) of 0.75. Conidia (spores) dimensions 2.5-3.5 microns. Found in sugary foods, salted meats, dairy products, textiles, soil, hay, and fruits.

X, still under construction

Y

Yeast - Various yeasts are commonly identified on air samples. Some yeasts are reported to be allergenic. They may cause problems if a person has had previous exposure and developed hypersensitivity. Yeasts may be allergenic to susceptible individuals when present in sufficient concentrations.

Z, still under construction