



ASCOSPORES - One of the major classes of fungal organisms. Ascospores are ubiquitous in nature and are commonly found in the outdoor environment. 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. They are identified on tape lifts and non-viable analysis by the fact that they have no attachment scars and are sometimes enclosed in sheaths with or without sacs. Some fungi that belong to the ascomycete family are the sexual forms of *Penicillium/Aspergillus*, *Chaetomium* and *Pleospora*. This group contains possible allergens, mycotoxin producers and opportunistic human pathogens. Rain and high humidity may rupture the ascus, discharging the spores, which is why during these weather conditions there is a great increase in counts.

ASPERGILLUS/PENICILLIUM - These spores are easily aerosolized and can cause a variety of symptoms including allergic reactions. Most symptoms occur if the individual is immune-compromised in some way (HIV, cancer, etc). Both *Penicillium* and *Aspergillus* spores share similar morphology on non-viable analysis and therefore are lumped together into the same group. Only through the visualization of reproductive structures can the genera be distinguished. Also included in this group are the spores of the genera *Trichoderma*, *Acremonium*, *Verticillium* and *Paecilomyces*. Small, round spores of this group lack the necessary distinguishing characteristics when seen on non-viable examination.

BASIDIOSPORES - One of the major classes of fungal organisms. This class contains the mushrooms, shelf fungi, puffballs, and a variety of other macro fungi. They are agents of wood rot, which may destroy the structure wood of buildings, and have the potential to produce a variety of toxins. Members of this family produce type I and III fungal hypersensitivity reactions. It is extremely difficult to identify 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. Spores disseminate during rain or in times of high humidity. These are rarely reported as opportunistic pathogens.

CHAETOMIUM SPECIES - It is considered part of the ascomycete group because its spores are released from a sac called an ascus. 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. Several species have been reported to play a major role in decomposition of cellulose made materials. These fungi are able to dissolve the cellulose fibers in cotton and paper, and thus cause these materials to disintegrate. The process is especially rapid under moist conditions. *Chaetomium* can produce type I fungal hypersensitivity and has caused onychomycosis (nail infections). *Chaetomium* species can also produce mycotoxins, one of which being chaetomin.

CLADOSPORIUM SPECIES - The most commonly identified outdoor fungus. The outdoor numbers are reduced in the winter and are often high in the summer. Often found indoors in numbers less than outdoor numbers. It is a common allergen. 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. Often found in dirty refrigerators and especially in reservoirs where condensation is collected, on moist window frames it can easily be seen covering the whole painted area with a velvety olive green layer. It can cause mycosis. Common cause of extrinsic asthma (immediate-



type hypersensitivity: type I). Acute symptoms include edema and bronchospasms, chronic cases may develop pulmonary emphysema. Some species produce a mycotoxin, an epicladosporic acid that acts in an immunosuppressive manner. Illnesses caused by this genus can include phaeohyphomycosis, chromoblastomycosis, hay fever and common allergies.

FUSARIUM SPECIES - A common soil fungus. Fusarium is frequently isolated from plants and grains. It is often found in humidifiers. It requires wet conditions to grow and is a type I allergen. Several species in this genus can produce potent trichothecene toxins. The trichothecene (scirpene) toxin targets the following systems: circulatory, alimentary, skin, and nervous. It 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. Frequently involved in eye, skin and nail infections. Fusarium is the most common cause of mycotic keratitis and has been isolated from patients with a variety of infections.

STACHYBOTRYS SPECIES - This organism is rarely found in outdoor samples. It is usually difficult to find in indoor air samples unless it is physically disturbed because the spores are in a gelatinous mass. It grows well on wet media, preferably containing cellulose. It proliferates in the indoor environment, growing on wallpaper, gypsum board, and textiles. It has worldwide distribution and has been reported to cause dermatitis, cough, rhinitis, and headache, although no definitive reports of human infections have been verified. It has the ability to cause type I hypersensitivity and some species produce the following mycotoxins: satratoxin, verrucarins and roridins. As a general rule air cultures for Stachybotrys yields unpredictable results, mainly due to the fact that this fungus is usually accompanied by other fungi such as Aspergillus and Penicillium that normally are better aerosolized than Stachybotrys. 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 high cellulose content and 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. Appropriate media for the growth of this organism will have high cellulose content and low nitrogen content. The spores will die readily after release. The dead spores are still allergenic and toxic. Percutaneous absorption has caused mild symptoms.