



Terms Introduced in This Chapter

After reading Chapter 5, you should be familiar with the following terms. These terms are defined in Chapter 5 and in the Glossary.

Aerial hyphae	Mycotoxigenesis (pl., <i>mycotoxigeneses</i>)
Algae (sing., <i>alga</i>)	Mycotoxins
Ameba (pl., <i>amebae</i>)	Pellicle
Aseptate hyphae	Phycotoxigenesis (pl., <i>phycotoxigeneses</i>)
Ciliates (sing., <i>ciliate</i>)	Phycotoxins
Ciliophora	Pinocytosis
Conidium (pl., <i>conidia</i>)	Protozoa (sing., <i>protozoan</i>)
Contractile vacuole	Pseudohypha (pl., <i>pseudohyphae</i>)
Cyst	Pseudopodium (pl., <i>pseudopodia</i>)
Cytostome	Sarcodina
Dimorphism	Sarcomastigophora
Flagellates (sing., <i>flagellate</i>)	Septate hyphae
Hyphae (sing., <i>hypha</i>)	Slime mold
Lichen	Sporozoea
Mastigophora	Stigma (eyespot)
Mycelium (pl., <i>mycelia</i>)	Trophozoite
Mycosis (pl., <i>mycoses</i>)	Vegetative hyphae



Insight



Microbes in the News—“Sick Building Syndrome” (Black Mold in Buildings)

During the past few years, there has been quite a bit of publicity about black molds and the so-called sick building syndrome. The following information on these subjects is from the Centers for Disease Control and Prevention (CDC):

“*Stachybotrys chartarum* (also known as *S. atra*) is a greenish-black mold. It can grow on material with a high cellulose and low nitrogen content, such as fiberboard, gypsum board, paper, dust, and lint. Growth occurs when there is moisture from water damage, excessive humidity, water leaks, condensation, water infiltration, or flooding. Constant moisture is required for its growth.” *S. chartarum* is one of a series of fungi that produces trichothecenes mycotoxins. Although *S. chartarum* is less common in buildings and homes than *Cladosporium*, *Penicillium*, *Aspergillus*, and *Alternaria*, it is not rare. “It is not necessary to determine what type of mold you may have [in your home or office]. All molds should be treated the same with respect to potential health risks and removal.”

Health Risks. “The hazards presented by molds that may contain mycotoxins should be considered the same as other common molds which can grow in your house... There are very few case reports that toxic molds (those producing certain mycotoxins) inside homes can cause unique or rare health conditions such as pulmonary hemorrhage [see below] or memory loss. These case reports are rare, and a causal link between the presence of the toxic mold and these conditions has not been proven. A common-sense approach should be used for any mold

contamination existing inside buildings and homes. The common health concerns from molds include hay-fever like allergic symptoms. Certain individuals with chronic respiratory disease (e.g., chronic obstructive pulmonary disorder, asthma) may experience difficulty breathing. Individuals with immune suppression may be at increased risk for infection from molds...For the most part, one should take routine measures to prevent mold growth in the home.”

Although there has been some speculation about a possible link between *Stachybotrys* and acute idiopathic pulmonary hemorrhage (pulmonary hemosiderosis) in infants, the CDC is currently stating that such an association has not been proven. Pulmonary hemosiderosis is bleeding in the lungs. Severe bleeding can cause the coughing up of blood or nose bleeds. Chronic, low-grade bleeding can cause chronic cough and congestion with anemia.

Mold Prevention. “(1) Keep humidity level in the house below 50%. (2) Use an air conditioner or a dehumidifier during humid months. (3) Be sure the home has adequate ventilation, including exhaust fans in kitchens and bathrooms. (4) Use mold inhibitors, which can be added to paint. (5) Clean bathrooms with mold killing products. (6) Do not carpet bathrooms. (7) Remove and replace flooded carpets.”

Mold Removal. “Mold growing in homes and buildings, whether it is *S. chartarum* or other molds, indicates that there is a problem with water or moisture. This is the first problem to be addressed. Mold can be cleaned off surfaces with a weak bleach solution. Mold under carpets typically requires that the carpets be removed. Once mold starts to grow in insulation or wallboard, the only way to deal with the problem is by removal and replacement. [The CDC does] not believe that one needs to take any different precautions with *S. chartarum* than with other molds. In areas where flooding has occurred, prompt cleaning of walls and other flood-damaged items with water mixed with chlorine bleach, diluted 10 parts water to 1 part bleach, is necessary to remove mold growth. Never mix bleach with ammonia. Moldy items should be discarded.”



Increase Your Knowledge

1. To learn more about medical, veterinary, and agricultural aspects of fungi, visit the web site, www.doctorfungus.org.
2. To learn more about parasitic protozoa, visit the parasitology web site that is operated by the Centers for Disease Control and Prevention: www.dpd.cdc.gov/dpdx



Critical Thinking

1. In the 5-Kingdom System of classification, algae and protozoa are combined in the Kingdom Protista. However, many taxonomists argue that algae and protozoa are so different from each other that they should not be classified together in the same kingdom. Pick one side of this argument and be prepared to defend your position.
2. Certain microscopic pond water organisms (e.g., *Euglena* and *Volvox*) are considered by some taxonomists to be algae and by others to be protozoa. Take a position and be prepared to defend it.
3. Be prepared to explain the differences between algal and fungal cells.

Additional Chapter 5 Self-Assessment Exercises

(Note: Don't peek at the answers before you attempt to solve these self-assessment exercises.)

Matching Questions

- | | | |
|----------------|-----------|--|
| A. algae | _____ 1. | Yeasts and molds are examples of _____. |
| B. fungi | _____ 2. | All _____ are photosynthetic. |
| C. lichens | _____ 3. | _____ are classified by their means of locomotion. |
| D. protozoa | _____ 4. | The cell walls of _____ contain chitin. |
| E. slime molds | _____ 5. | The cell walls of _____ contain cellulose. |
| | _____ 6. | _____ rarely cause infectious diseases, but cause a variety of microbial intoxications. |
| | _____ 7. | _____ are examples of a symbiotic relationship known as mutualism. |
| | _____ 8. | _____ cause diseases such as African sleeping sickness, babesiosis, cryptosporidiosis, malaria, and toxoplasmosis. |
| | _____ 9. | Diseases caused by _____ are called mycoses. |
| | _____ 10. | Toxins produced by _____ are called phycotoxins. |

True/False Questions

- | | |
|-----------|--|
| _____ 1. | Slime molds possess characteristics of both fungi and protozoa. |
| _____ 2. | Protozoa in the category known as Mastigophora move by means of cilia. |
| _____ 3. | A dimorphic fungus would exist as a mold inside the human body. |
| _____ 4. | The organism that causes a “red tide” is an alga. |
| _____ 5. | <i>Volvox</i> is a multicellular alga. |
| _____ 6. | A stigma is an organelle that pumps water out of the cell. |
| _____ 7. | Sexual spores are also known as conidia. |
| _____ 8. | Classification of fungi is based on the type of conidia that they produce. |
| _____ 9. | Protozoa that move by means of pseudopodia are in a category known as Sarcodina. |
| _____ 10. | Fungi can cause both infectious diseases and microbial intoxications. |



Answers to the Chapter 5 Self-Assessment Exercises in the Text

1. D
2. D
3. B
4. C
5. D
6. C
7. D
8. A
9. D
10. D



Answers to the Additional Chapter 5 Self-Assessment Exercises

Matching Questions

1. B
2. A (C is also an acceptable answer, because lichens contain algae)
3. D
4. B
5. A
6. A
7. C
8. D
9. B
10. A

True/False Questions

1. True
2. False (they move by means of flagella)
3. False (a dimorphic fungus would exist as a yeast inside the human body)
4. True
5. True
6. False (a stigma or “eyespot” is a photosensing organelle)
7. False (asexual spores are also known as conidia)
8. False (classification of fungi is based on the type of sexual spores that they produce)
9. True
10. True