

As always...

- **PHYSICALLY PRINT OUT this PDF and HANDWRITE (with a black or blue pen) your answers directly on this PDF.** Typed or digitally-written work is not accepted. Do not answer questions on separate paper.
- **Importantly, study guides are NOT GROUP PROJECTS!!!** You, and you alone, are to answer the questions as you read your assigned textbook. You are not to share answers with other students. You are not to copy any answers from any other source, including the internet.
- **Get in the habit of writing LEGIBLY, neatly, and in a medium-sized font.** AP essay readers and I will skip grading anything that cannot be easily read so start perfecting your handwriting, and don't write so large you can't add all the relevant details and key elaborations in the space provided.
- **SCAN physical documents in color and with good resolution. Then, upload your final work as PDFs to Archie.** Avoid uploading dark, shaded, washed-out, sideways, or upside-down scans of homework. Keep completed physical study guides organized in your biology binder to use as future study and review tools.
- **READ FOR UNDERSTANDING and not merely to complete an assignment.** Reading is **CRITICAL** and makes a difference when trying to build a solid understanding of complex topics and when trying to build vocabulary and writing skills. Paraphrasing in your own words is a better strategy than blindly coping the book. **First**, read a section quickly to get an overview of the topic covered. Then, read it a **second** time slowly, paraphrasing each paragraph **out loud** and analyzing every figure. Finally, read it a **third** time as you answer the study guide questions if assigned and start building your memory. Try to write answers out in your own words, when possible, and try to purposefully and accurately use all new terminology introduced.

INDEPENDENT STUDY: KINGDOM FUNGI

Read through this chapter to understand the big picture. Use the questions as a guide to what information is more important. **Your goal is to learn the terms and knowledge needed to understand what is unique about this Eukaryotic group of organisms.**

Fungi and animals diverged into two separate kingdoms over 1 billions years ago. **Molecular evidence indicates that fungi were among the earliest colonizers of land, using their large surface area successfully to absorb water and nutrients. They play a critical role in the environment through mutualistic relationships and nutrient recycling.**

1. a. Though some fungi, like yeasts, are unicellular, most are multicellular. **Both animals and fungi are heterotrophs** . Why do we say all fungi and animals are heterotrophs?

 b. Fungi differ from animals in how they obtain their nutrients. Explain how **fungi acquire nutrients**.

 c. What role do hydrolytic enzymes play in the feeding behavior of fungi?
2. Fungi play numerous roles in ecosystems. Explain the difference between Fungi that act as decomposers, parasites, and mutualists.

Fungi Acting as Decomposers =

Fungi Acting as Parasites =

Fungi Acting as Mutualists =

3. What do we call a single-celled fungus?
4. a. Both **plants and fungi have cell walls**. Plants cell walls are made from molecules including pectin and cellulose. What **material is found in the cell wall of fungi**? (Refer back to Ch.5's discussion on carbohydrates for the answer.)

b. What is the **composition of this polymer** in terms of the **type of monomer, orientation of monomers, and** the type of **linkages** between these monomers. (Refer back to Ch.5's discussion on carbohydrates for the answer.)

c. What **role does the fungal cell wall play** for the fungus?
5. a. Though various species of fungi exist as single-celled organisms or can exist both as multi- and single-celled organisms at different times, most exist as **multicellular filaments** or multicellular filamentous organisms. For Fungi, the form of their filamentous bodies fit their function for sure. The body of a fungus consists of **hyphae**, which make up the **mycelium**. Describe these structures.

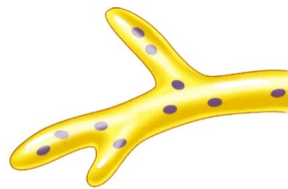
Hyphae (Singular: hypha)

Mycelium (Plural: mycelia)

- b. Using Figure 31.3, label the cellular structures and the **two types of hyphae**.



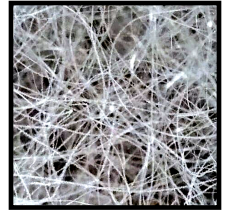
Septate Hypha



Coenocytic Hypha

- c. What are septa?
- d. What do septa allow for in a filamentous fungus?
- e. How are coenocytic hyphae formed?

- f. How does the **body structure of a multicellular filamentous fungus benefit the organism**? Why is this shape such an adaptation?



6. a. **Mycorrhizae are critical to the survival of most vascular plants.** What are **mycorrhizae**? (*Myco* = fungi & *Rhizae* = plant roots in Greek)

- b. Describe how the **symbiotic relationship** between fungi and plant roots work.
What does the **plant gain**?

What does the **fungus gain**?



7. a. Read the rest of this section and study Figure 31.5. **Fungi produce spores through sexual and asexual life cycles.** Is the **dominant generation of many fungi haploid or diploid**? Explain.

- b. What are the **benefits of spore production**?

- c. Spores are the reproductive cells of fungi. When the hyphae of two haploid fungal mating types are near each other, how do they **signal or communicate**?

- d. What occurs during **plasmogamy**?

- e. After plasmogamy, fungi often form a mycelium known as a **heterokaryon**, which is **dikaryotic**. Explain these terms.

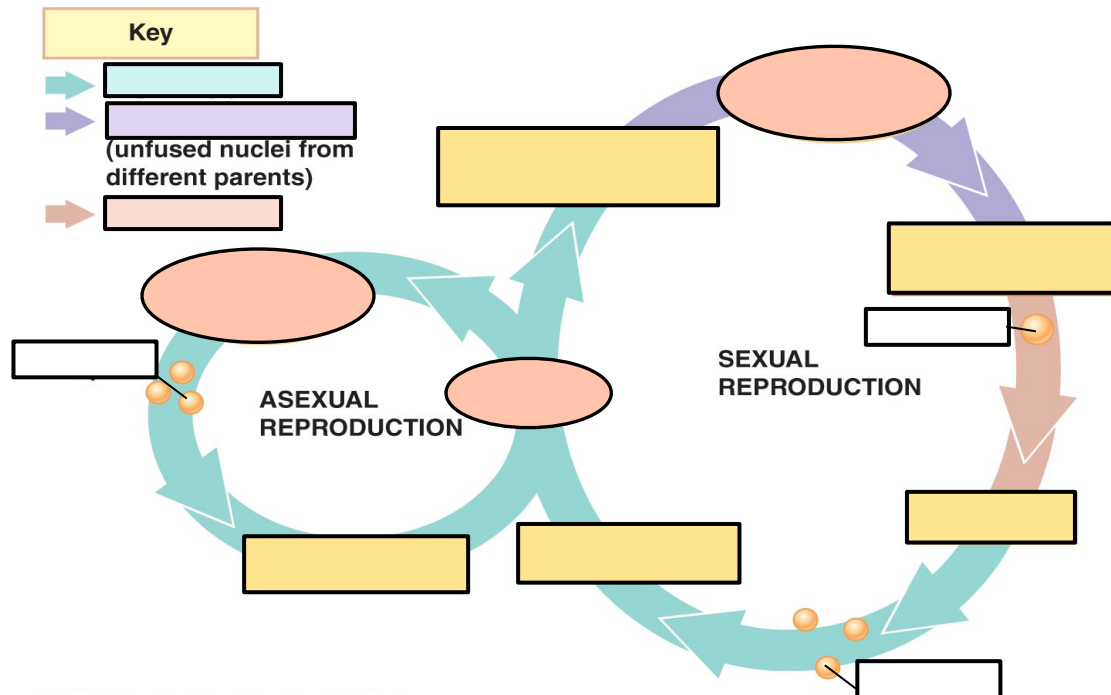
- f. What occurs during **karyogamy**?

- g. How fast after plasmogamy does karyogamy occur?

- h. What type of **cell division follows karyogamy**?

- i. What is the cellular products of this process called?

8. a. Study your answers to question #7. Now, let's see if you can label the generalized **life cycle of multicellular filamentous fungi** from memory.



- b. As you see, there are two ways fungi can make spores (asexual spores and sexual spores. **Are spores haploid or diploid?**
- c. What **type of cell division is used to make the sexual spores?**
- d. What **type of cell division is used to make the asexual spores?**
- e. Spores are released from the fungus. They land elsewhere after being carried away by wind or water, and germinate (divide) to form new mycelia, new organisms. Knowing everything you learned in Ch.12 and Ch.13, **how are the spores produced by the sexual component of the fungal life cycle different from the spores produced by the asexual phase?**
9. a. What are **molds**?
- b. How do molds reproduce?
10. a. What are **yeasts** again?
- b. How do yeasts reproduce?



11. Compare Figure 31.5 with Figure 13.6, which you studied previously. In terms of haploidy versus diploidy, how do the **life cycles of fungi and humans differ?**

*(Check your answer to question #11 by going to the **Ch.31.2 Concept Check Question #1** answers in Appendix A)*

12. **Mushroom are the spore-producing structures of certain types of filamentous fungi.** As reproductive structures, karyogamy, followed by meiosis occurs in the mushroom tissue. If you sampled the DNA of two mushrooms on opposite sides of your yard and find that they are identical, propose two hypotheses (explanations) that could reasonably account for this result given what you have learned about fungal reproductive strategies.

1.

2.

*(Check your answer to question #12 by going to the **Ch.31.2 Concept Check Question #2** answers in Appendix A)*

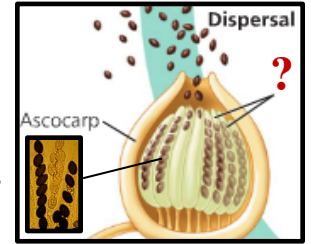
13. Kingdom Animalia and Kingdom Fungi share a more recent ancestor than do these two kingdoms and Kingdom Plantae. It is thought that a single-celled, flagellated protist is the ancestor of animals and fungi. **When did animals and fungi diverge from their common ancestor into two separate lineages of eukaryotes?**
14. a. Evidence points to plants, fungi, and animals evolving in water from different ancestral protists. When do scientists think **fungi colonized land?**
- b. When is it estimated **plants colonized land?**
15. a. If fungi colonized land before plants, where might fungi have lived ~500-450 million years ago?
- b. How did those **early terrestrial fungi obtain their nutrients compared to today's fungi?** How would the food sources of these early terrestrial fungi have differed from the food sources they feed on today?

*(Check your answer to question #15 by going to the **Ch.31.3 Concept Check Question #3** answers in Appendix A)*

16. **Fungi and plants developed their mutualistic symbiotic relationship early on in the colonization of land. Describe the importance of mycorrhizae in the colonization of land by plants and fungi?** What evidence supports the antiquity of mycorrhizal association?

*(Check your answer to question #16 by going to the **Ch.31.3 Concept Check Question #2** answers in Appendix A)*

17. a. Regarding the fungus in the **phylum Ascomycota**, what is the name of the **structure where the sexual spores are produced**, often within fruiting bodies called **ascocarps**?



b. In Ch.16, you will learn how researchers Beadle and Tatum used the bread mold ascomycete *Neurospora crassa*, in their research to try to figure out what cells use genes for. **Review Figure 31.18, in order to understand the Ascomycete life cycle.**

c. In nature, many ascomycetes are **important decomposers**. Others are **mutualists or parasites**, the later acting as some most devastating plant pathogens around. What are **two beneficial symbiotic relationships** formed by ascomycete species and non-fungi organisms?

1.

2.



18 a. What are 6 common **categories/types of basidiomycetes**?

1.

4.

2.

5.

3.

6.

b. What is the **common name for the basidiocarp structure where the sexual spores are produced in Basidiomycetes**?



c. How is the **theme “form fits function” exemplified by the structure of the mushroom** in basidiomycetes. In other words, how does the design of the mushroom maximize its success in doing its job; **how is the mushroom an adaptation, increasing the success of the organism in either surviving &/or reproducing.**

d. What are **“fairy rings”**? Explain how they grow...



19. **Fungi play key roles in nutrient cycling, ecological interactions, and human welfare.** Fungi are heterotrophs and have **three modes of nutrition**. **Explain** each mode of nutrition, and **describe** a fungus that exhibits it. F.Y.I. - Explain and describe do not mean “list.” Provide the details.

1. What do **Decomposers** do?

What is the **benefit to life of having decomposers** in all ecosystems?

What would be the **consequence to life if decomposers ceased to exist**? Explain...

Description of **Example of Decomposer** =

2. What **kinds of organisms do certain fungi form Mutual Associations with** in nature?

While the fungi benefit the other mutualistic species in various ways, what general **benefit do fungi gain through instances of Mutualism**?

Description of Example of **Fungus-Plant Mutualism** (Be sure to also state how **EACH** of the two organism **benefits** from the relationship) =

Description of Example of **Fungus-Animal Mutualism** (Be sure to also state how **EACH** of the two organism **benefits** from the relationship) =

Description of Example of **Fungus-Photosynthetic Microorganism** Mutualism (Be sure to also state how **EACH** of the two organism **benefits** from the relationship) =

3. What occurs in **Parasitism**?

Description of **Example of Fungal Parasitism** in plants =

20. Infection in animals by fungal parasites are called **mycosis**. Describe two examples of animal fungal infections.

1.

2.

21. Describe six ways in which humans benefit from activities of fungi.

1.

2.

3.

4.

5.

6.

22. Proceed to the TEST YOUR UNDERSTANDING section at the end of the chapter. **Study your Ch.31 study guide first!** Then, do your best to try to answer these from memory first in order to test how well you grasped the material before. If you are unsure, return to the relevant section of your chapter and restudy any pertinent material to refresh your memory. *(Check some of your answers by going to the Ch.31 Test Your Understanding answers in Appendix A)*

1. _____ 3. _____ 4. _____

5. *Label your graph correctly.*

Interpretation =

