Kingdom Protista

Contents

Objectives

- Be able to recognize and name the major Protista phyla
- Know the characteristics of each phyla discussed

Introduction

This kingdom has an extremely diverse group of members. Perhaps the only similar feature among all protista is that they are simple, eukaryotic organisms, and many would argue with the characterization as 'simple'. The assemblage includes both heterotrophic (protozoa, slime molds, and water molds) and autotrophic (the algae) protists.

Fungi, plants, and animals are believed to have their ancestral roots in the Kingdom Protista. While there is good evidence that the green algae (Chlorophyta) have given rise to plants, identification of the direct ancestors of the fungi and animals is still uncertain. Some researchers have speculated a link between the fungi and red algae. Many believe the ancestors of animals belong to the flagellated protists, although there is speculation that there may be more than one ancestor.

On the BiologyOne DVD, open the Kingdom Protista simulation in the Diversity section. Here you will observe a variety of protests.

Activity 20.1
Animal-like Protists

Phylum Mastigophora: Members of this phylum use a flagellum for locomotion. Examine *Trypanosoma gambiense*, a blood parasite which causes African Sleeping Sickness. This parasite is carried by the tsetse fly and is injected into a host's circulatory system. The trypanosome can be found among red blood cells.

Phylum Sarcodina: Members of this phylum feed and move with extensions called pseudopodia ("false feet"). The most common organism in this phylum is the amoeba. The amoeba has no definite shape and, in fact, is often described as a "blob of protoplasm." A nucleus, food vacuoles, and the contractile vacuole may all be present. The latter serves as a water pump, maintaining the internal fluid environment.

Other representative members of this phylum include the radiolarians and the forminifera. Both have pseudopods extending from their unique outer shells of silicon and calcium carbonate, respectively.

Phylum Ciliophora: Members of this phylum possess short hair-like projections called cilia which, similarly to pseudopods, aid in locomotion and food catching. A very common organism in this phylum is *Paramecium*.

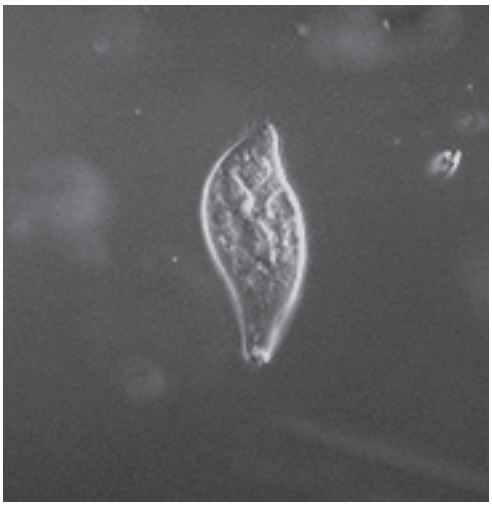
Ciliates contain two nuclei, the macronucleus controls general cellular activity while the micronucleus is involved with sexual reproduction. Similar to the amoebae, the paramecium also has contractile vacuoles. Other examples of a ciliate are the *Stentor,* a funnel-shaped organism and the *Vorticella* that often attaches itself via a small stalk to a substrate.

Phylum Apicomplexa (Sporozoa): These members have no formal means of locomotion; however, they do move by "flexing" themselves. They are all parasitic and have a life cycle which alternates between a sexual stage and a spore-producing asexual stage. The most widely known member of this phylum is the *Plasmodium*, a blood parasite which causes malaria in humans. It is carried by the female *Anopheles* mosquito.

Make your own drawings of these organism you observe in the Results Section.

Paramecium

Peranema



Activity 20.2
Fungal-like Protists

Phylum Myxomycota: The protists in this phylum are commonly known as the plasmodial slime molds. They resemble fungi in that their bodies form thread-like hyphae and produce spores, but they are not true fungi in that they have centrioles and flagellated cells. The plasmodial slime mold (Physarum) is a commonly known example. It is a multinucleated mass of protoplasm.

The Acrasiomycota are the cellular slime molds. These organisms usually exist as free-living amoeba-like organisms feeding on bacteria. When its time for these organisms to reproduce, the individual cells aggregate into a mass called a pseudoplasmodium that will eventually produce spores.

The Oomycota are the water molds. These organisms range from single celled organisms to highly branched filamentous organisms. A large group within this phylum is aquatic, feeding on dead organic material. These organisms can reproduce sexually or asexually.

Observe the micrographs of the fungus-like protists in the Kingdom Protista simulation on the BiologyOne DVD. Make your own drawings of these organisms in the Results Section.

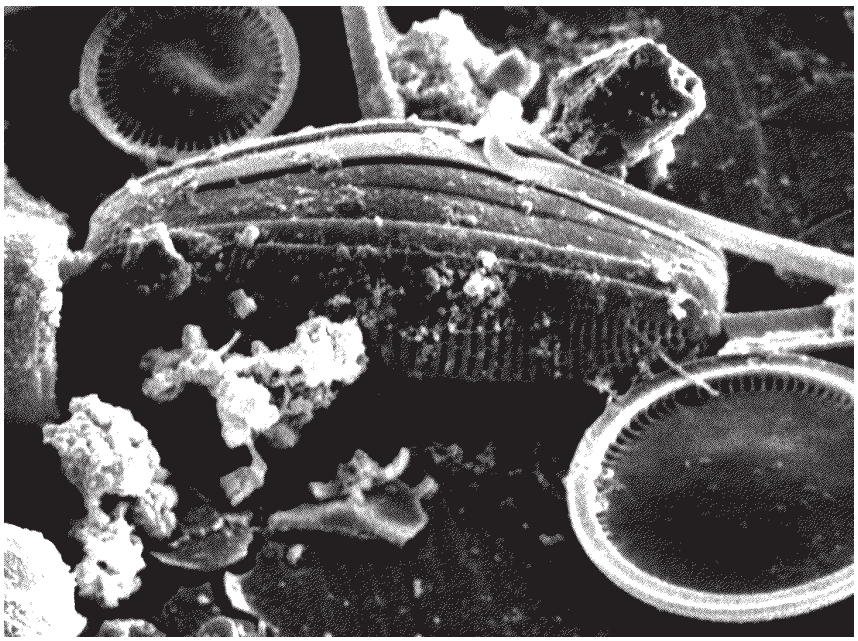
Activity 20.3
Plant-like Protists

Phylum Euglenophyta: Euglenoids are unicellular, photosynthetic flagellates which inhabit fresh water supplies. They have an eyespot which is very light-sensitive, a flagellum for locomotion, and a contractile vacuole. Phylum Chlorophyta: The green algae are the most diverse protists, ranging from single cells to colonies of multicellular filaments.

Phylum Chrysophyta: The diatoms are by far the most widely known members of this phylum. They are photosynthetic and are abundant in both fresh and marine environments. They play a very significant role in aquatic ecology, serving as the “first step” in the food chain. Their shell is made up of silica; therefore, they leave behind a large fossil record. These deposits, called diatomaceous earth, are mined and used in many industrial processes.

Phylum Pyrrophyta: Members in this phylum are commonly called dinoflagellates. They are unicellular and often are armored with cellulose cell walls. Dinoflagellates are responsible for causing the “red tides” seen off the coasts of California and Peru which are often very toxic to marine life.

Assortment of Diatoms



Phylum Rhodophyta: The red algae are multicellular with a body frame that is delicate and feather-like. They prefer warm, marine environments. In addition to containing chlorophyll, they also have red and blue pigments. These pigments allow the red algae to capture sunlight that penetrates the deep depths of the ocean. Although the red color is the most distinctive, this algae may also be purple to green-black.

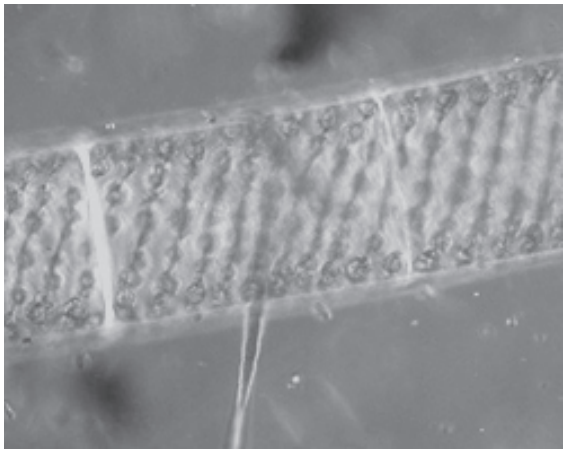
Phylum Phaeophyta: The brown algae are multicellular and macroscopic. This phylum includes the large kelp (Sargassum and Laminaria) which can grow to 60 to 100 meters in length. The rockweed (Fucus), commonly found attached to rocks along coastal shores, is another member of this phylum. The brown algae tend to inhabit cold, marine environments. From an industrial standpoint, brown algae are used for fertilizers, to make ice cream smooth, and used in cosmetics and paints.

Phylum Chlorophyta: This is a very large, very diverse group often referred to as the green algae. While most are aquatic, they can also be found in most damp terrestrial locations, in symbiotic associations with lichens and even on the surface of snow. Members of this group are thought to have given rise to the plant kingdom.

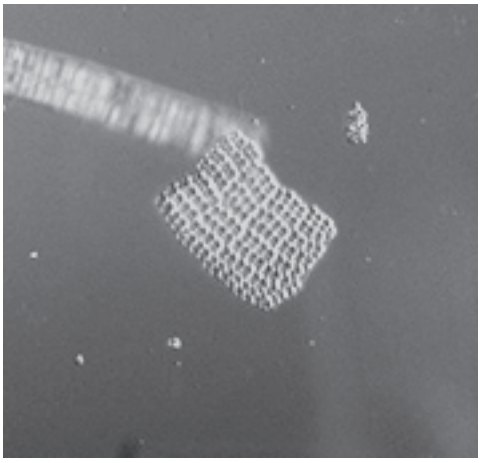
Observe the micrographs of the plant-like protists in the Kingdom Protista simulation on the BiologyOne DVD. Make your own drawings of these organisms in the Results Section.

Microasterias

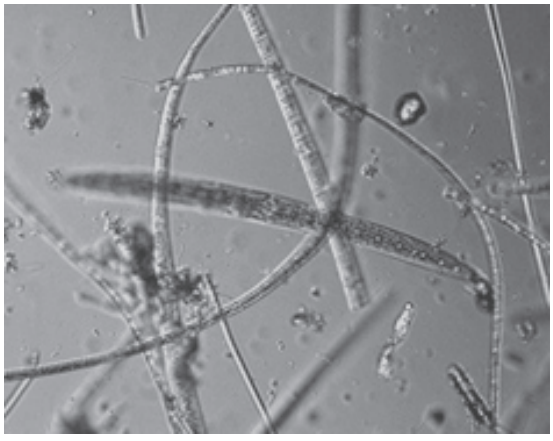
Spyrogyra



Crucigenia



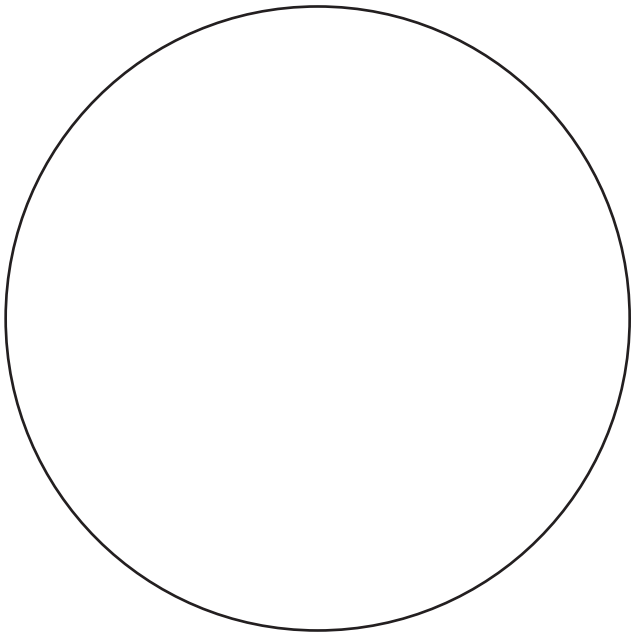
Closterium



Lab Exercise **20** Name _____

Results Section

Activity 20.1
Animal-like Protists



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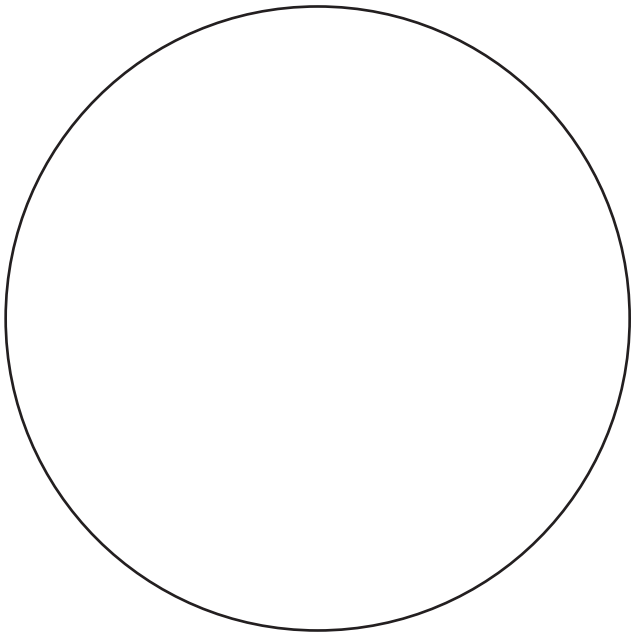

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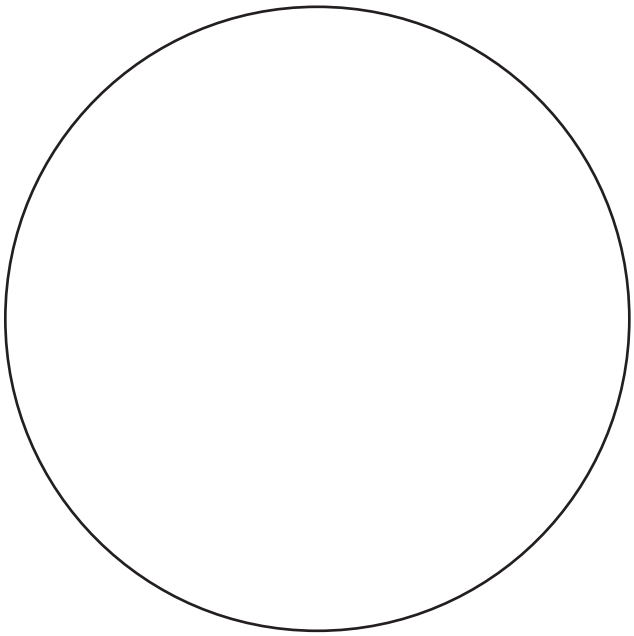

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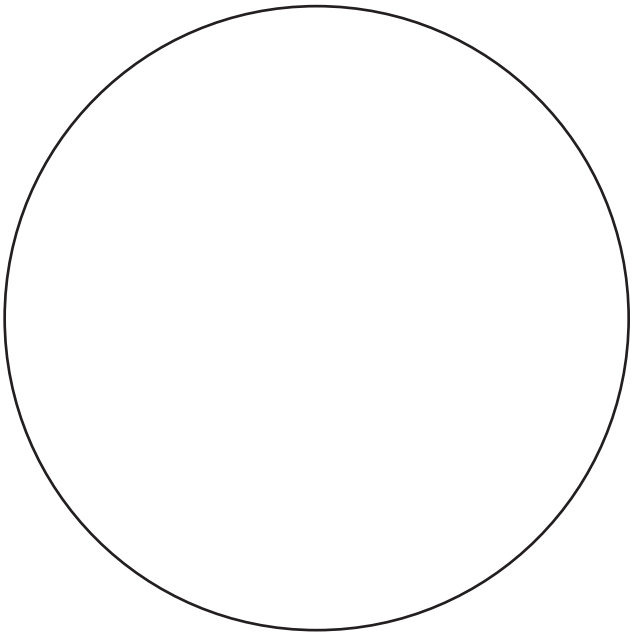

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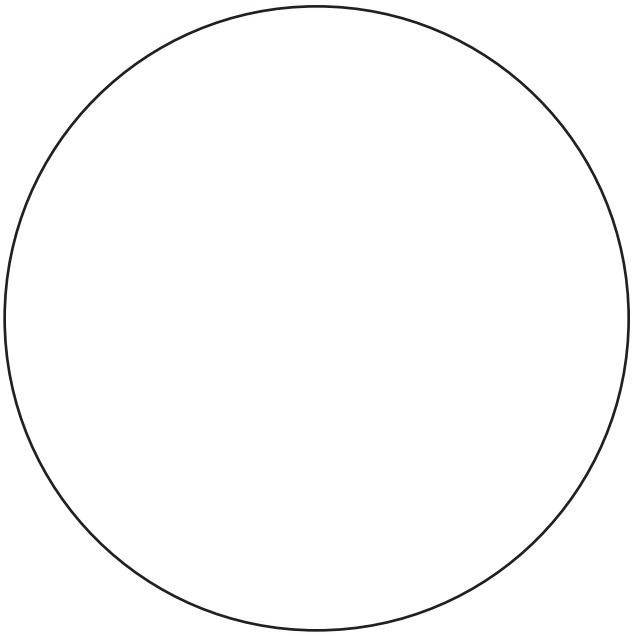

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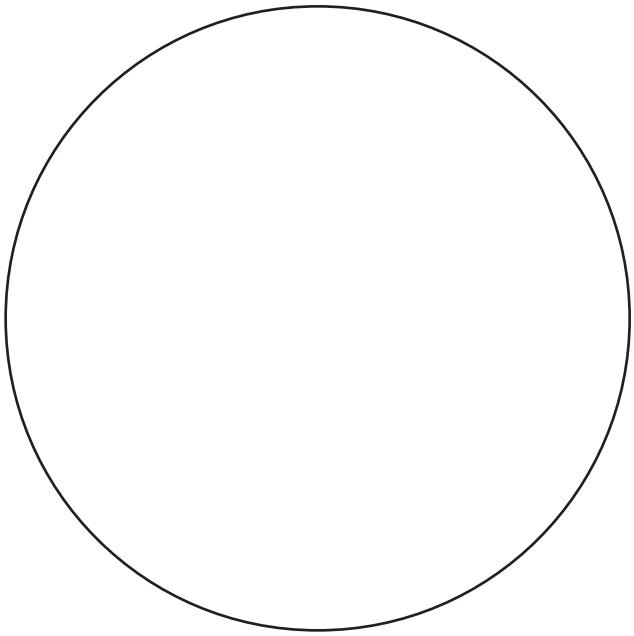

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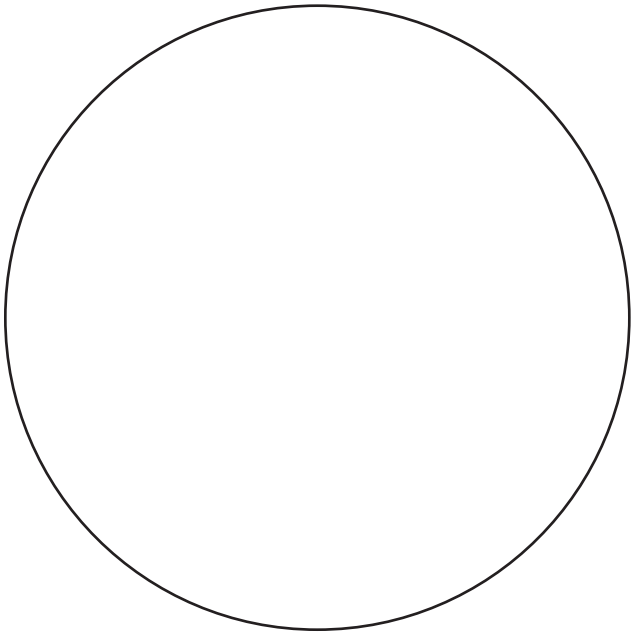

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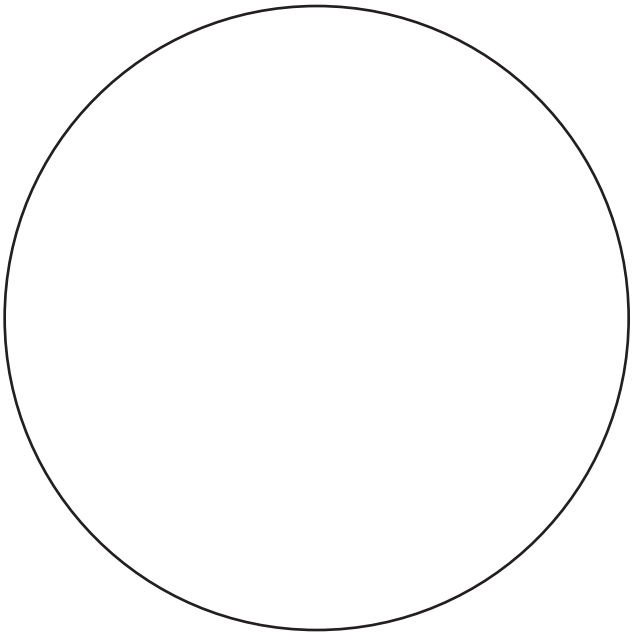

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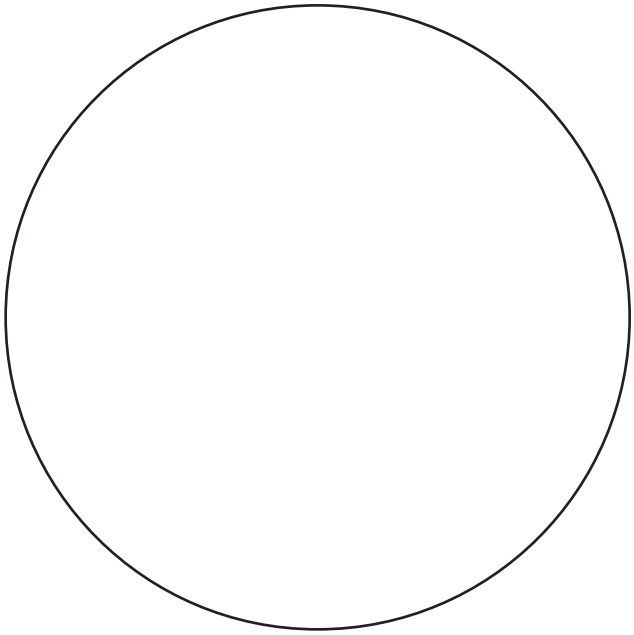

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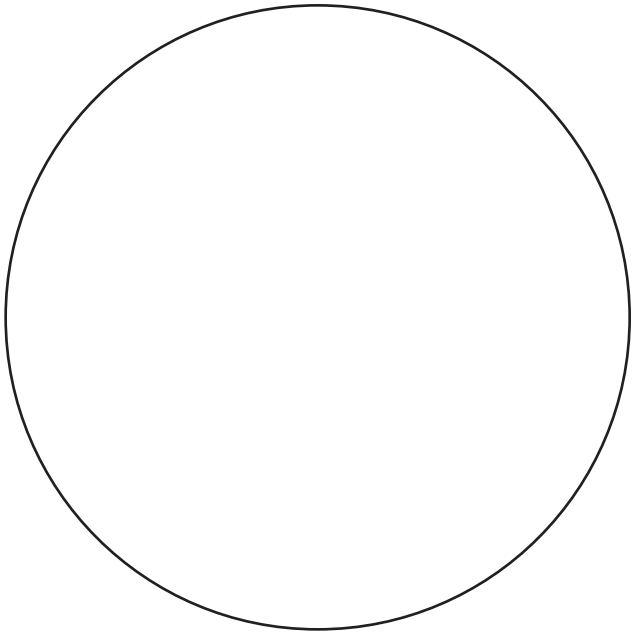

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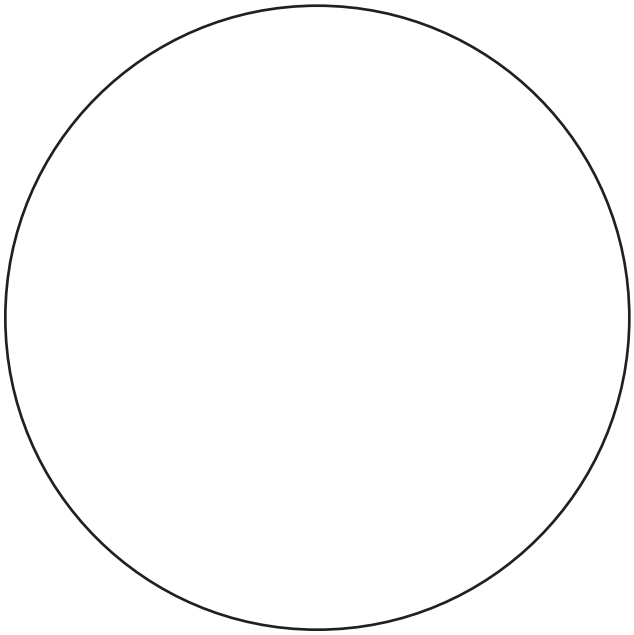

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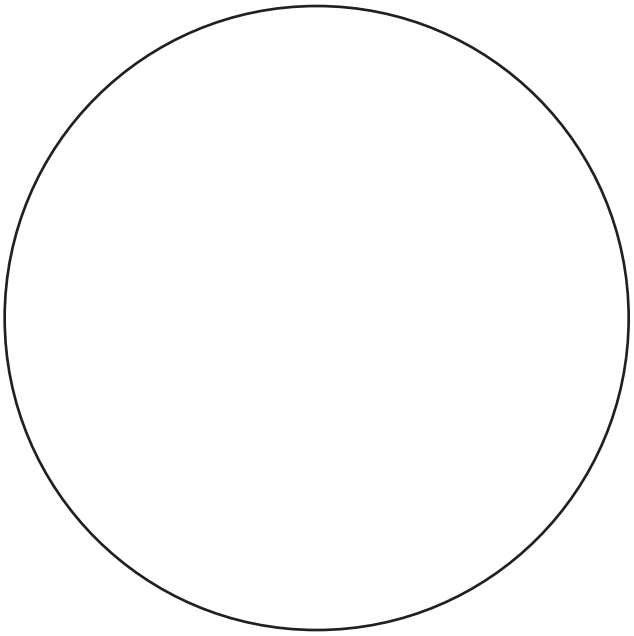

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