## **Domain Bacteria**

The members of the domain **Bacteria** are unicellular and prokaryotic. Their cells have thick, rigid cell walls that surround a cell membrane. The cell walls contain a substance known as peptidoglycan. The domain Bacteria corresponds to the kingdom **Eubacteria.** These bacteria are ecologically diverse, ranging from free-living soil organisms to deadly parasites. Some photosynthesize, while others do not. Some need oxygen to survive, while others are killed by oxygen.

## **Domain Archaea**

Also unicellular and prokaryotic, members of the domain **Archaea** live in some of the most extreme environments you can imagine—volcanic hot springs, brine pools, and black organic mud totally devoid of oxygen. Indeed, many of these bacteria can survive only in the absence of oxygen. Their cell walls lack peptidoglycan, and their cell membranes contain unusual lipids that are not found in any other organism. The domain Archaea corresponds to the kingdom **Archaebacteria**.

CHECKPOINT What characteristics distinguish members of the domain Bacteria from members of the domain Archaea?

▼ Figure 18–12 ○ Organisms are grouped in three domains. There is a simple relationship between the three domains and the six kingdoms. This table summarizes key evidence used in classifying organisms into these major taxonomic groups.

Classification of Living Things						
DOMAIN	Bacteria	Archaea	Eukarya			
KINGDOM	Eubacteria	Archaebacteria	Protista	Fungi	Plantae	Animalia
CELL TYPE	Prokaryote	Prokaryote	Eukaryote	Eukaryote	Eukaryote	Eukaryote
CELL STRUCTURES	Cell walls with peptidoglycan	Cell walls without peptidoglycan	Cell walls of cellulose in some; some have chloroplasts	Cell walls of chitin	Cell walls of cellulose; chloroplasts	No cell walls or chloroplasts
NUMBER OF CELLS	Unicellular	Unicellular	Most unicellular; some colonial; some multicellular	Most multicellular; some unicellular	Multicellular	Multicellular
MODE OF NUTRITION	Autotroph or heterotroph	Autotroph or heterotroph	Autotroph or heterotroph	Heterotroph	Autotroph	Heterotroph
EXAMPLES	Streptococcus, Escherichia coli	Methanogens, halophiles	Amoeba, Paramecium, slime molds, giant kelp	Mushrooms, yeasts	Mosses, ferns, flowering plants	Sponges, worms, insects, fishes, mammals

# **Domain Bacteria**

### **Build Science Skills**

**Classifying** Have students assume that they are biologists and that they have just discovered an unclassified species. The organism makes its own food, has no nucleus, and has peptidoglycan in its cell walls. Ask: **In which domain should you classify this species?** (*Bacteria*) **In which kingdom does it belong?** (*Eubacteria*) **12** 

# **Domain Archaea**

### Build Science Skills

**Inferring** Point out that Archaea are the most ancient organisms on Earth and they exist in extreme environments. Ask: What explains the ability of Archaea to live in extreme environments? (The early Earth had extreme environments, and this was when Archaea first evolved.)

### **Use Visuals**

Figure 18–12 Check students' comprehension of the table. Ask: How many cells do Archaea have? (Archaea are unicellular.) What makes **Fungi different from Protists?** (Fungi have cell walls of chitin.) What sets Animalia apart from all other kingdoms of organisms? (Animals do not have cell walls or chloroplasts.) Which kingdom contains some species that share characteristics with Plantae? Explain. (Protista; some species of Protista are multicellular autotrophs, have cell walls composed of cellulose, and have chloroplasts.) **L1 L2** 

#### Answers to . . .

Снескроімт) Eukarya, Bacteria, and Archaea

Archaea live in extreme environments, whereas members of domain Bacteria are ecologically diverse. Also, the cell walls of Bacteria contain peptidoglycan, while those of Archaea do not.