

## 17—Cells

**A** <sup>1</sup>The **cell** is the basic unit of structure and function of all living things. <sup>2</sup>Cells work together to keep organisms alive. <sup>3</sup>Some organisms, like bacteria, are only as big as a single cell. <sup>4</sup>Other organisms, animals, and humans are made up of many different kinds of cells. <sup>5</sup>Most cells, both plant and animal, range in size between 1 and 100 micrometers and are visible only with a microscope.

**B** <sup>6</sup>Robert Hooke, an English scientist, was the first to see actual cells. <sup>7</sup>In 1665, Hooke invented a microscope that helped him view and sketch the cells that made up a thinly sliced piece of cork. <sup>8</sup>The cork seemed to be made of little boxes, so he called them cells.

**C** <sup>9</sup>In 1673, another scientist, Anton van Leeuwenhoek, began studying single-celled living organisms. <sup>10</sup>Leeuwenhoek was the first to observe living single-celled bacteria and paramecia in great detail.



Cork cells as seen through a microscope.

**D** <sup>11</sup>By the 1600s, better microscopes were being made, and scientists were able to combine their studies of cells. <sup>12</sup>Their ideas were put together into a **theory**, which is an idea that is supported by data. <sup>13</sup>Two German scientists, Matthias Schleiden and Theodor Schwann, can be credited for The Cell Theory. <sup>14</sup>Together, they recognized and stated that all living things are made of cells.

**E** <sup>15</sup>About 15 years later, German scientist Rudolf Virchow concluded that cells didn't form on their own. <sup>16</sup>Scientists had thought that cells formed from air or nothing! <sup>17</sup>Virchow believed that cells divided from an existing cell to form new cells. <sup>18</sup>Discoveries and observations by many

**histologists** (scientists who study cells) led to one of the major theories in science – **The Cell Theory**.

The Cell Theory states that:

- <sup>19</sup>All living things are made of one or more cells.
- <sup>20</sup>Cells are the basic units of living things.
- <sup>21</sup>All cells come from other cells.

**F** <sup>22</sup>All cells fall into one of two major classifications: prokaryotes and eukaryotes. <sup>23</sup>**Prokaryotes** were on Earth first and for billions of years were the only form of life. <sup>24</sup>They are single-celled organisms with no defined **nucleus** that can live on their own. <sup>25</sup>The nucleus is the largest, most visible part of a cell and is the control center of the cell's activities. <sup>26</sup>Bacteria and pond scum make up most of the prokaryotes classification.

**G** <sup>27</sup>**Eukaryotes** are more advanced than prokaryotes because each of their cells has a true nucleus inside a membrane. <sup>28</sup>In eukaryotic organisms, the nucleus is the largest, most visible part of the cell and is the control center of the cell's activities. <sup>29</sup>The **membrane** gives the cell its shape and helps control water and other substances that move in and out of the cell. <sup>30</sup>Eukaryotic organisms are usually multi-cellular organisms. <sup>31</sup>Plant and animal cells fall into this classification.

**H** <sup>32</sup>Although plant and animal cells are similar inside, there are major differences. <sup>33</sup>Plant cells can make their own food, but animal cells cannot. <sup>34</sup>Plants use a process called photosynthesis, which converts sunlight, water, and carbon dioxide into food energy (sugars and starches), oxygen, and water.

**I** <sup>35</sup>Another major difference is that while many animals have skeletal structures to provide support for their shape, plants rely only on cell walls for their form. <sup>36</sup>A cell wall is a nonliving, stiff outer covering that gives plant cells support and structure. <sup>37</sup>Without cell walls, flowers, plants, bushes, and trees would just flop over in a spongy mess!