Facing the Light

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CREATION MAGAZINE 36(4) 2014
www.creation.com

Plants need light and water to survive—but you probably already knew that. Did you know that plants are actually 'drawn' to light and water? This is called tropism, and is an amazing display of God's design in nature.

Tropism is the scientific name for how plants move towards the things most essential for their survival. Tropism comes from the Greek word *tropos*, which means 'turning'.

Plants will move to reach the things that God provided to sustain them. When a seed germinates, the roots will always grow down and the stem will always grow up, toward the light. The plant can sense the pull placed upon it due to gravity, and will direct root growth in the direction of that pull. (This is known as geotropism.) If the roots or stem meet resistance, they will move around the object in their path.

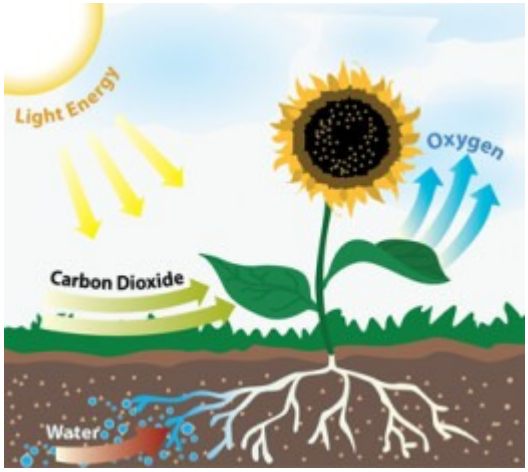
Plants also move towards the most direct source of sunlight. If the light falls upon one side of the shoot, the other side will grow faster to bend the leaves towards the light (phototropism). Grow some radish seedlings near a window and they will bend towards the light coming in the window. Turn the pot around and they will bend back the other way in a few hours.

Flat leaves - by design

Not only do plants grow toward the light, but they grow their leaves in such a way as to get the most benefit from the light that comes down to them. One of these ways is to grow leaves that are flat. If the leaves were curly, they would not get as much sun, because part of the leaf would be in the shade. Now growing a flat leaf might sound easy, but really it is very complicated, because it needs to grow faster on the edges than in the middle. That growth has to be controlled minute by minute and cell by cell. You can see it happening if you watch a new seedling growing—it starts curled up, and gradually uncurls into a straight stem and flat leaves. This uses the same growing rules as the ones that make the plant bend toward the light, as mentioned earlier.

Another thing about plants and sunlight is how important they are to you and me. You probably know that your body (and every other living thing) needs energy to live, but it would be no use walking around with a petrol (gasoline) tank on your back, or solar panels on your head. The energy you need comes from your food, especially plants such as fruit and vegetables, and animals that eat plants, such as cows and chickens.

Plants: solar-powered food factories



Where does the energy that we get out of these foods come from in the first place? It comes from sunlight, which is captured by the plants, usually in their leaves, in a very complicated process called photosynthesis. (‘Photo’ has to do with light, as in ‘phototropism’ mentioned earlier, and ‘synthesis’ has to do with putting things together, so photosynthesis has to do with using light to put chemicals together to store energy.) This is why plants try to grow towards the light.

The main chemicals used in photosynthesis are water and carbon dioxide. The water comes up through the trunk or stem from the ground, and the carbon dioxide comes from the air. When a particle of sunlight (called a ‘photon’) lands on a leaf, it is captured by the chemicals in the leaf. The leaf has tiny machinery that stores the energy of four photons at a time. Only with four is the energy enough to break the strong bonds in a water molecule (H_2O). Then the hydrogen (H) and oxygen (O) from the water molecule can combine with the carbon dioxide to form starch and sugars, which are full of

stored energy. That's why there are sweet sugars in fruit, and starches in potatoes. Animals and people can use this energy when they eat plant food.

Plants and people: both created by Jesus
If God had not designed these intricate systems, life would not be possible. Many things cause darkness in the world, and if the plants could not move toward the light, or capture the energy in it, they would not survive, and neither would we. It is all part of God's clever design for our world.

We are much like plants in some respects: We grow, we reproduce, we breathe, we need water and we are made up of cells. Like plants, we need physical light, but we also need a spiritual light. This comes from our Creator and Saviour, Jesus Christ. Worldly things can cast a shadow in our relationship with Jesus, but if we grow towards the 'light' Jesus provides, we can overcome any darkness, and grow strong in character and faith.

Proverbs 16:15 tells us, "In the light of a king's face there is life, and his favour is like the clouds that bring the spring rain." The King is the Creator God, and sharing the way plants are designed is a wonderful way to tell people about His creation and salvation. John 8:12 records Jesus saying, "I am the light of the world. Whoever follows me will not walk in darkness, but will have the light of life."

Experiments
Here's a fun way to see phototropism in action:

- Take a house plant and place it in a dark place for twenty-four hours.
- Next, place the plant on a stand next to a window.
- Twenty-four hours later observe which way the leaves of the plant are facing.

The leaves will be facing the light.

Also, you could plant a seed, such as a bean seed, and watch it grow from curled up to straight. Plant another one, but keep it in the dark, and see what happens. Why does that happen (or not happen)?