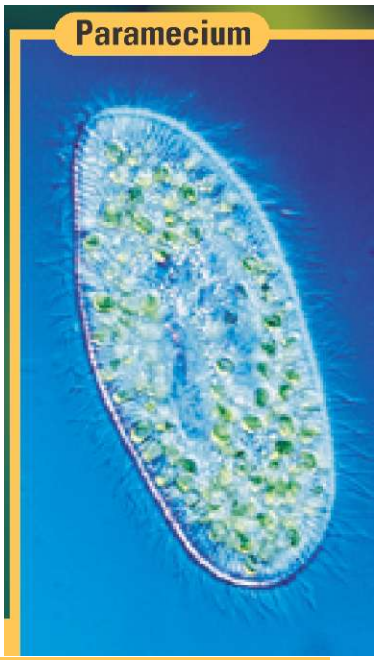
Going Solo

Billions of cells are swimming, crawling, or just drifting along through life. One-celled organisms tend to move around a lot. One type of seafaring bacterium uses air sacs to float up to the ocean's surface. Another bacterium produces a layer of slime to slither along—just like a snail. So why do one-celled organisms move? For the same reasons most other animals move: to escape danger, and to find food. Sometimes they need to travel from a hostile environment to a place where they will be able to survive. And if they don't move fast, they'll die. There is a great variety of one-celled organisms, and one way to study this diversity is to look at the many different ways they can get from one place to another.

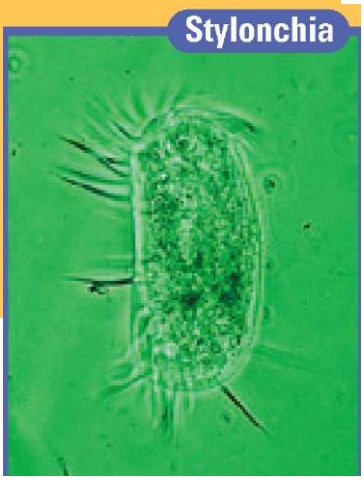


Wagging the Tail

From a microscopic point of view, the fluids some one-celled organisms travel in are as thick as molasses, and just about as easy to swim in. Many use the tadpole approach, wiggling their tail, or flagellum, as if repeatedly cracking a whip. This is how *Euglena* (below) moves forward. The single-celled chrysomonad wriggles to move backwards. An alga, *Chlamydomonas nivalis* (above), uses its two flagella-like arms to swim "breaststroke" style. If it has to make a getaway, its "arms" coordinate their movements like a tail, propelling the alga quickly away from predators.

Keeping Time

Some organisms, such as *Paramecium* (above), are covered with short "hairs" called cilia (which is Latin for "eyelashes"). These cilia beat like the oars of a small Viking ship, at a rate of about 20 beats per second. The cilia don't beat exactly in time with each other, creating a ripple effect that causes the cell to spiral forward like a slow, hairy football. In one type of cell, the complex protozoan *Stylonchia* (right), the cilia fuse together into stumpy little legs, called cirri. The cell can use cirri to "walk" over surfaces or even jump in emergencies.



The Twist

Some bacteria, such as *E. coli,* have a bunch of flagella. They spin at the base like the blades of a propeller. The corkscrew tails are attached to a tiny "wheel" powered by a structure inside the cell. When rotating counterclockwise, the flagella spiral out behind the cell, smoothly pushing it along. The bacteria can switch to a clockwise rotation, which flings the flagella every which way.

E. coli

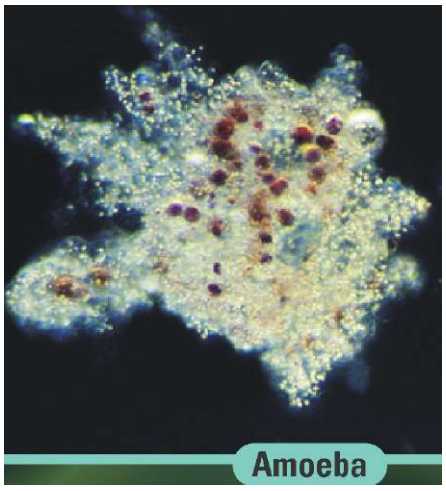
Lung cilia

Doing the Wave

Even when a cell equipped with cilia doesn't move, its cilia continue to undulate like a crowd doing the wave at a baseball game. This action moves liquid near the cell's surface and allows the cell to feed itself by washing particles into its mouth. Some human cells have cilia that move fluid around the brain. The cilia in your lung cells work to keep your lungs clean. Billions of cilia pass particles of dust and mucus from the lungs up to the throat, where they can be swallowed and later disposed. Cigarette smoking damages cilia, so smokers' lungs stay dirty.

Putting a Best Foot Forward

Some single-celled organisms use pseudopodia ("fake feet") to crawl. An amoeba will rearrange itself and protrude on one side. This blob will swell and extend forward. Then it grabs hold of the surface beneath it and pulls the rest of the cell after it. The fake foot then gets reabsorbed into the rest of the amoeba.



Amoeba

Activity

OBSERVE AND SKETCH See how flagella work! Hold a piece of string or rope in your hand and flick your wrist several times. Watch the rope movements closely, then sketch the wave patterns on a piece of paper. Can you break up an average wave movement in a series of sketches? Now, make a flip book showing how a flagellum moves an organism forward. Take a pad of paper and draw an oval-shaped bacterium with a flagellum at the edge of the page. In the same spot on the next page, draw the bacterium with the flagellum in a different position, based on your sketches of the wave patterns you made earlier with string. On the third page, draw the same bacterium but moved slightly to the right, with the flagellum at another stage of its motion. Continue drawing like this 15 to 20 pages. Flip the book pages rapidly and watch your bacterium go!