Ask Andy

Bacteria Are World's Useful Midgets

Andy sends a complete, 20-volume set of the World Book Encyclopedia to Robert Cumming, age 13, Easton, Conn. for his question:

How Big Are Bacteria?

A dozen bacteria can ride on a speck of dust and a colony of millions can thrive in the smear of a greasy fingerprint. A germ of good topsoil may be the home of ten million becteria. Countless numbers of these midgets of the plant world swim in every thimbleful of river water and millions more crowd in every dewy leaf. We need a special unit to measure the size of tiny living things and the most powerful of microscopes to get a glimpse of them.

Billions of bacteria make their homes in your body. You are host to more of these midget plants than there are people in the world, more varieties of bacteria than there are nations in the world. Once in a while, a hostile bacterium invades your body, causing sickness. The vast majority are your servants. These friendly bacteria aid digestion, fight invaders and perform such vital duties that you could not live without them.

In the teeming world of bacteria there are the whales and the mice. But the majority of the vast horde fall midway between the giants and the midgets. Bacteriologists assume the average-sized bacterium to measure about one 25,000th of an inch—though few bacteria are exactly the average size. This microscopic scale of life calls for its own unit of measurement.

Scientists tend to use the metric system of tens as a standard for their units and the tape measure of the bacteria world is taken from the millimeter, which is one thousandth part of a meter. The micron is one thousandth part of a millimeter—and this tiny unit is the basis of measuring the tiny bacterium. You can get an idea of its size by comparing it with a hair of your head. The hair is about 60 microns in diameter—which is just about as long as a row of sixty average-sized bacteria.

The majority of bacteria measure about one micron in diameter. The average fellow may be five or ten times as wide as some of his small cousins. Some of the giant bacteria are 15 to 25 microns wide. Bacteria come in assorted shapes. Some are round balls, some sausage-shaped, some are long threads and others have fine, trailing streamers. Packed together in bulk, it would take about a trillion bacteria of assorted sizes to fill a thimble. A few of these midgets prey on plant and animal tissues, causing diseases. Others help the vital processes of plant and animal tissues. Countless others toil in the soil, in the air and in the water. Without them life on earth would be impossible.

Without bacteria in the soil, there would be no decay. The land would soon be littered with sewage and corpses. The purest lake would be murky without bacteria to break down its debris into simple chemicals. There would be no nitrates or other chemical foods for the plants. As the plant world perished, we should run out of food and oxygen.

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Andy sends a Hammond's International World Globe to Merlene Norton, age 10, Clayton, Ala. for her question:

What is a Magma?

The ground on which we stand, the lofty mountains and the hidden floors of the sea form a rocky crust which wraps the globe in a sort of orange peel about 30 miles thick. The temperature of the earth's crust is below the melting point of the elements, mixtures and compounds from which these rocks are made—which is why the crust is frozen solid.

In a few cracks and crevices deep in the crust, the temperature soars and the various minerals reach melting point. We get a pool of buried magma. The molten mixture may contain other rocky minerals normally frozen solid on the surface. It may also seethe with foamy bubbles of gas and water vapor. In any case, the temperature of the magma is hot enough to melt rock.

Andy awards each day a full set of the World Book Encyclopedia for the first question he selects to answer. When a second question is answered a large world globe or atlas is awarded. Questions are accepted from teen-age or less-than-teen-age readers. They should be addressed to the Register-Guard, 975 High St., Eugene. Andy prefers that questions be written on postcards, rather than in letter form.

Neither Solid, Liquid, Nor Gas

Future Spaceships May Run on Plasma

WASHINGTON — Engines of future spaceships may be run on plasma, a substance that is neither solid, liquid, nor gas.

A plasma is a substance so hot that its atoms have violently smashed one another to bits. The result is an angry swarm of electrons and positive ions, the remainder of the atoms from which electrons have been stripped away.

Until recently, few people except astronomers realized that most material in the universe, including the stars and many loose particles in space, is in this unfamiliar "fourth state" of matter, the National Geographic Society says. Only in exceptional places, as on earth, does matter settle down into solids, liquids, or gases.

The sun, being a star, is largely plasma. So is the visible path of a bolt of lightning, and so are the earth's ionosphere and the Van Allen radiation belts that present a hazard for astronauts. Man-made plasmas occur in neon and fluorescent lamps, electric arcs, the exhaust of jet and rocket engines, and, terrifyingly, the fireball of a hydrogen bomb.

Recently, scientists of the Republic Aviation Corporation reported success in developing a "plasma pinch" space engine that will spit out bursts of plasma at 100,000 miles per hour. Though the thrust itself is tiny, they believe it can push a vehicle through space. Space ships need little power once they have overcome the earth's gravitational pull.

But the vehicles must produce some force over weeks or months to reach their distant destinations. The Republic plasma pinch engine reportedly can run for a year on a pound of nitrogen. Solar cells convert the energy of the sun into electricity, which turns the nitrogen gas into a plasma and then squeezes the substance with magnetic power to squirt it out at enormous speed.

The plasma may reach a temperature as high as 200,000 degrees Fahrenheit. In contrast the 3,000 degrees of the gas flames on a kitchen stove seem almost chilly. Until recent man could not create temperatures above some 7,000 degrees, though in nature they range into millions of degrees on the hottest stars. Plasma research has led to creation of sustained temperatures up to 40,000 degrees and momentary duplication in the laboratory of the fantastic stellar temperatures.

Control of thermonuclear reactions in superheated plasmas is a major aim of current research. Physicists have already succeeded in solving many of the initial problems. Eventually they hope to build a machine that will make fusion power available for public use, just as fission power is now.

Fission—the breaking up of uranium and other heavy elements—produces vast amounts of energy as does fusion—the joining of hydrogen atoms to make helium atoms. But fusion has important advantages: It produces no radioactive waste, and it uses heavy hydrogen as fuel rather than rare uranium.

With a virtually inexhaustible supply of heavy hydrogen in the oceans, the fuel equivalent of 300 gallons of gasoline might be extracted for as little as 4 cents. In a world of shrinking oil and coal supplies, fushion power could solve man's energy needs for millions of years.

To Your Good Health

Shingles a Virus Infection of a Nerve

By JOSEPH G. MOLNER

Dear Doctor Molner: My husband has had shingles for several months, and although he has not been to a doctor, he has been told by several people that there is nothing to be done but to wait for them to heal. Others have told me about people who have gone to the doctor and were cured in a few weeks.

In this modern day and age, surely something has been discovered to take care of them.—B.O.R.

Shingles is a virus infection of a nerve — and even in these times we know almost nothing about curing virus infections although we can prevent some of them with vaccines.

In shingles, we can do mighty little to cure an attack, except to support general health. This is important. We also can give medication to relieve the pain —and this, too, is important.

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Dear Doctor Molner: How many of the strongest sleeping pills are considered an overdose? My friend says 20 and I say 10.—MRS. R. S.

The things people worry about! But your inquiry raises a useful point. I've been trying for years to explain that the dosage of any drug must be the amount that fits the patient's needs. What's right for one person isn't exactly right for another.

So for some people, one strong sleeping pill would be an overdose; for another, perhaps enough. But 10—let alone 20 would be an overdose for anybody. I don't necessary mean a fatal overdose, since some people might live through such an amount, especially if they received prompt medical care. But either would be extremely dangerous.