rays and start manufacturing their own food, the used-up cotyledons shrivel away. The baby seedling is now launched on its own life.

Seedling Factory

Inside the silent seedling is a factory of astonishing activities. Cells divide, grow, and become differentiated into special life functions, each contributing to the complex balance of biological processes that is the wonder of the most simple plant.

Thousands of different cells work in different ways. For instance, root hairs absorb water and minerals from the soil; xylem cells inside the roots and stems transport this nutritious water to other parts of the plant; phloem cells carry the sugars and starches which have been manufactured in the leaves down to the roots for storage; parenchyma cells in the leaves contain chlorophyll to manufacture foods; guard cells regulate the amount of atmospheric gases taken into or given from the plant; colored epidermis cells of petals lend pink, blue or yellow beauty to a flower; and sperm and egg cells fuse to form the embryo of the future plant which will be severed from the parent next autumn, ready to burst forth the following spring.

Ancient Plant

It was perhaps 200 million years ago that plants of our earth began developing seeds. Before that time, earlier forms of life used different methods of reproducing themselves. The first sparks of life on our planet were single-celled creatures, somewhat similar to our green algae living today. These living cells perpetuated their species in the warm primeval oceans by fission—simply by dividing themselves.

As time went by, the cells began to group themselves in clusters, or in threads and chains, and reproduced by forming cysts or spores—one-celled plants which break off from the parent group to become a separate plant. Other algae developed sex: a male cell swam to mate with a female cell, and their union was the germ of a new life.

For a long time these plants stayed in the ocean, then they began invading the estuaries and shores, anchoring themselves on a rock and surviving in the air when the tides went out. Gradually the mosses and ferns began to creep out of the swamps to put their green fingers over the earth's gray rocks, and evolve another system of reproduction—by millions of microscopic spores held upright in a capsule on a stalk. The ferns, flourishing in the moist soil and growing as high as trees in the dinosaur age, reproduced with an alternation of life cycles. Here the spores do not produce identical plants but grow into tiny heart-shaped plants which cling closely to the damp earth. These gametophytes in turn produce male and female cells which mate in water to form the new plant.

Other primitive plants appeared, simple in structure and reproducing by spores—the strange fungi with no chlorophyll, feeding on dead material; slime molds flowing over the rocks; tough vigorous lichen, a combination of fungus and algae; and the flat, liver-shaped liverworts.

As plants became more complex, they formed more specialized reproductive cells which united to form a many-celled embryo. Developing first without a protective cover, "naked seeds" appeared in gingkos and cone-bearing trees—the pines, spruces and firs.

Then about 100 million years ago, plants began to develop a case or shell protection around the seeds. As eons passed, parts of fruits and nuts evolved as nutritive storage surrounding the embryo.

Today, in uninhabited corners of the earth, plants still carry on unmolested their slow process of evolution. But in other parts of the world, man is speeding up the development of plants and their seeds. With intricate processes of selection, cultivation and hybridization, man is perfecting those storehouse of plants into bigger, juicier tomatoes, fleshy watermelons, succulent corn, rust-resisting wheat—adding to the store of energy nature originally designed for children of the plant, but which are now relished by children of man.

For a seed packet full of delightful spring surprises get the new seed unit of THINGS of science. Delicate lovely nasturtiums, also known as the salad plant, with edible leaves and seed pods to garnish salads; an unusual bean variety with sweet pea-like flowers to decorate the table and beans to eat fresh or dried; an edible gourd that will grow three feet long and a decorative gourd for colorful centerpieces; and new this season, the only early aster plant producing large flowers. Seeds for all these are contained in the unit. For the curious student botanical information is also included. Send 75¢ for THINGS of science unit No. 280 to SCIENCE SERVICE, Washington, D. C. 20036.

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OPTICS

Vision Increased 400% With Tiny 'TV Tubes'

➤ TINY LENSES that look like miniature television tubes can increase working vision up to 400% for millions of professional and technical workers, a New York inventor reported.

Ground from "rare earth" glass, now used only for precision camera lenses and optical systems for space vehicles, the lenses clip on to regular prescription glasses or safety goggles. When not in use, they are flipped up out of the way.

This new optical aid would permit visual detection of dust particles as tiny as one ten-thousandth of an inch, Dr. William Feinbloom, chief of the department of subnormal vision at the Optometric Center of New York, told the National Association of Optometrists meeting in New York.

Eyeglass wearers engaged in especially close work, such as industrial miniaturization, surgical and dental operations, precision assemblies, bookkeeping, proofreading, drafting, small part inspection or space instrumentation will benefit most from the new lenses.

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SURGERY

'Do-It-Yourself' Spare Heart Parts

➤ PATIENTS in St. George's Hospital, just behind Buckingham Palace in London, are growing "spare parts" in their own bodies to replace the diseased main valves in their own hearts.

This "do-it-yourself" heart valve replacement project is being done by Dr. Charles Drew, a surgeon at St. George's, and his team of assistants.

Experimental work on dogs in the same field has proved very promising. Tissue removed from the patient's abdominal wall is placed in a porous plastic mold in the shape of the main heart valve. The mold is inserted in the patient's abdomen for six weeks, when the tissue will be capable of being sewn into his heart for use as a valve.

The heart's main valve has to open and shut some 100,000 times a day, but sometimes it wears out or becomes "gummed up."

Already faulty valves are being replaced by grafts from other persons, plastic grafts or a ball and cup device in stainless steel, rubber or plastic. But Dr. Drew says: "There is no substitute for a patient's own tissue."

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Nature Note

Water Boatman

➤ THE WATER BOATMAN or corixid is a familiar fresh water insect that can dive, swim or fly, but only flops about when it travels on land.

Because he is heavier than the water, the boatman habitually remains near the bottom where his dinner of organic ooze and filamentous algae can be found. However, a tiny bubble of air can be trapped between his wings and back and keep the insect lighter than water. Thus he pops to the surface whenever his hold on a submerged object is released. The boatman uses his powerful hind legs as oars to propel him down again.

The corixid forms an important link in the food chain between the organisms found in the bottom ooze and the predatory aquatic animals that in turn use it for food. The eagerness with which other animals eat boatmen is reflected in the use of dead and dried boatmen in commercial pet foods for birds, fishes, and turtles.

In some countries, people also eat the insect. In the lake region near Mexico City, the eggs, "ahuatle," are gathered and dried for human food. Sometimes they are toasted and sometimes they are added to soups or as a dressing for meat.

They make very interesting aquarium animals as they pop to the surface for fresh air or swim wildly to the bottom to hide. The boatmen produce a shrill chirping sound by rubbing their front legs against their heads.

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