

BIOCHEMISTRY

Photosynthesis Probed

Mystery of how plants make sugar from water, air and sunlight, the basic food-producing reaction, is half solved. Full solution is expected in less than ten years.

➤ **HALF OF** the great mystery of photosynthesis, conversion of sunlight into food, has been solved.

Scientists now know in great detail how carbon dioxide of the air and water are converted into sugar through action of helping chemicals called enzymes.

How the energy of the sunlight is converted into a form that can be used in this process is still unknown.

A great step in understanding photosynthesis was made at the Oak Ridge National Laboratory, Tenn., when Drs. Edward Tolbert and L. P. Zill, starting three years ago, made progress in obtaining conversion of air-water elements into sugars by living protoplasm outside the cell itself.

The living protoplasm came from cells of one of the large algae. Textbooks always taught that removal of the protoplasm from the cell stopped the photosynthesis.

The Oak Ridge scientists got 15% conversion into sugars in the test tube, a much higher rate than anyone else has reported.

This success, described in Atomic Energy Commission hearings before the House appropriations subcommittee, was reported in a scientific journal last year.

Dr. Tolbert told SCIENCE SERVICE that the energy puzzle would be solved in less than a decade of further research and that artificial photosynthesis would be available scientifically long before there is dollars and cents need for it.

If the world were starving, we could even now, due to knowing how to make sugar in the test tube, produce food on a large scale, he said. This may be needed in another hundred years when world conditions demand it.

The Oak Ridge group is only one of several in the United States that are working on the mysteries of photosynthesis. At present, like several other teams of biochemists, the Oak Ridge work is devoted to the way that some 20 enzymes, which act as catalysts, participate in the sequence of cyclic steps that build the raw materials into the carbohydrates of the plant. The first product made seems to be phosphoglyceric acid.

The energy needed to build the sugars comes from the sun and must be converted from radiant into biochemical energy that can be used in the synthesis. Just how this is done is an unsolved problem.

Science News Letter, June 25, 1955

ENGINEERING

Better Food in Cool Homes

➤ **DINNERS IN** air-conditioned homes have 40% more calories than those in similar non-air-conditioned homes. And air-conditioning saves as much as 22 woman-hours per month in cleaning.

The extra calorie content of meals is not the result of any chemical changes caused in the foods by conditioned air, but stems from better appetites and willingness of cool housewives to prepare better meals.

This information, the result of a study of a special 22-house "village" in Austin, Texas, was reported to the American Society of Refrigerating Engineers meeting in Milwaukee. All the test homes had "residential conditioning," complete air conditioning through air ducts from a central conditioning plant.

Work-hour reductions for the house-cleaner result from the filtered-air features in conditioning units.

Tomorrow's air conditioners will have less gadgets if manufacturers follow the results of this test, which showed consumer preference for simplicity of manual controls.

The study also showed that families choose to keep their homes at 75 to 78 degrees Fahrenheit with even humidity be-

tween 40% and 60%. Families complained vigorously when researchers exposed them to rapid changes in humidity, even when the temperature remained the same.

Families in the test houses showed a definite preference for continuous fan circulation of air, even when the compressor was not needed to cool the air. Some residential conditioning unit manufacturers have attached the fan to the compressor so that it only operates when cool air is being produced.

Connected with air circulation is the problem of where to locate air registers in duct systems that operate with both heating and cooling units. Hot air rises but cool air falls, so where should the ducts be placed for maximum efficiency of both furnace and conditioner? Research at the Austin village may give manufacturers an answer.

Already the Austin study has shown one fact that comforts manufacturer and consumer: operating costs for full-house air conditioning are moderate. Operations, even in hot Austin, have cost half of the 22 families less than \$100 per year.

Science News Letter, June 25, 1955

• RADIO

Saturday, July 2, 1955, 5:00-5:15 p.m., EDT
"Adventures in Science" with Watson Davis, director of Science Service, over CBS Radio Network. Check your local CBS station.

Dr. Fillmore H. Sanford, executive secretary, American Psychological Association, will discuss "What Psychology Does for the World."

NEUROLOGY

Deep Brain Waves Differ From Surface Waves

➤ **BRAIN WAVES** from the surface of the brain are different from those deep inside the brain, Dr. Herbert H. Jasper of Montreal, Can., reported to the American Neurological Association meeting in Chicago.

Exploring the depths of the brain with microelectrodes in patients with brain disease or disorder should, in his opinion, reveal much of interest for more complete understanding of the complexities of brain function.

Brain waves show the electrical activity of the brain. Ordinarily these are obtained through electrodes implanted on the surface of the brain.

When Dr. Jasper put microelectrodes at different depths below the surface he was, he reported, "impressed by the rich variety of electrical activity" not recorded in the surface brain wave records.

A surface wave may reverse its sign, becoming positive deep in the brain although it was negative on the surface.

Sustained rhythmic discharges of electrical activity characteristic of epilepsy may be sustained in the first three layers of the brain without invading the deep layers.

Because of his findings, Dr. Jasper is not now surprised that the electroencephalograph, or brain wave recording machine, is of such "limited" value in revealing significant brain activity.

Science News Letter, June 25, 1955

MEDICINE

Mistake Arthritic Bone Destruction for Cancer

➤ **ARTHRITIS CAN** destroy bones extensively. When seen under X-rays, the destruction may look like cancer.

The bone destruction may be at quite a distant part of the body from the joints that are directly involved in the arthritis, making it even harder to diagnose the condition.

The destruction may be such that one or more bones in a finger may disappear completely. Wrist bones may also be involved. As the finger bones disappear, the bones that are left become telescoped. This results in the "opera glass hand" characteristic of rheumatoid arthritis.

Examples of the arthritic bone destruction were given by Dr. Otto Stein Brocker of New York at meeting of American Rheumatism Association in Atlantic City, N. J.

Science News Letter, June 25, 1955