

said. "But it must be clearly recognized that this is essentially an artistic task, of creating a consistent picture of the universe and of man that will not only satisfy our new criteria of credibility, but also express the new aspirations and

sensibilities through which we seek to attain the enduring human values."

Mr. Frank predicted that in coming years the discovery of origin of man and man's development of culture will be recognized as the greatest of discoveries.

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BIOLOGY

## Woman Scientist Discovers How Plants Make Cellulose

Under Powerful Microscopes, Dr. Wanda K. Farr Saw And Photographed the Formation From Concentric Rings

**D**ISCOVERY of how the living plant makes cellulose, one of the fundamental materials of our civilization, was reported to the American Association for the Advancement of Science in Columbus.

Dr. Wanda K. Farr, director, Cellulose Laboratory sponsored by the Chemical Foundation at the Boyce Thompson Institute for Plant Research at Yonkers, N. Y., is the discoverer. At the age of 44, she has added to previous achievements this identification of the origin of elusive cellulose in the cotton plant.

Cellulose is the structural stuff out of which all plant "skyscrapers" are built. All of us use it daily because it is the principal stuff out of which nature makes wood, cotton fibers, and almost every other plant structure. This paper you are reading is largely cellulose. And cellulose from cotton or wood is used in the manufacture of rayon, explosives, the transparent stuff your cigarettes are wrapped in, movie film, and hundreds of other things. Even coal, fossil sunshine of past ages, is basically cellulose.

Dr. Farr observed the formation of cellulose particles in colorless disc-like structures within the plant, called plastids. Five years ago tiny cellulose crystals, barely visible egg-shaped particles, four by six hundred-thousandths of an inch, were discovered by Dr. Farr in many kinds of living cells.

This sudden appearance of cellulose crystals in living plant cells was a mystery until the new discovery now reported. Under powerful microscopes, at magnifications of 2200 and 4500 diameters, Dr. Farr was able to both observe and photograph the formation of cellulose particles.

Concentric rings of varying diameter but equal thickness are formed within

the plastids. Then these rings disintegrate into the cellulose particles of uniform size. These travel to the wall of the cells and help build it.

New impetus will be given by Dr. Farr's discovery to the attack on the many difficult problems concerned with the synthesis of carbohydrates in the living cell. This matter of how the living plant uses the energy of the sunshine to build food and other materials out of carbon, oxygen and hydrogen of soil, air and water might be called the green earth's most important manufacturing operation.

For almost a century microscopists have observed the formation of starch, the food reserve of plants, in the plastids of living cells. Starch is one of the most common and most conspicuous constituents of living protoplasm.

But cellulose, important constituent of the plant framework, was found by Dr. Farr to be formed in a way quite different from the manner in which starch is made.

The formation of cellulose was first found by Dr. Farr in the protoplasm or jelly of the large, single-celled, green algae that live in the ocean. In specimens of this plant named *Halicystis*, obtained from Bermuda, she detected the cellulose crystals being formed in its green chloroplasts. This kind of cellulose was not the normal sort, but it was mercerized cellulose, the same as produced industrially by the treatment of ordinary cotton fibers with solutions of strong sodium hydroxide.

Since the discovery of mercerization of cotton by John Mercer in 1844 this shiny cotton has been produced and worn without any inkling that it was being produced naturally in any living plant.

From this first indication of the way cellulose is manufactured in nature, Dr.



DR. WANDA K. FARR

Farr proceeded to investigate the cotton plant and in it identified the normal or unmercerized kind of cellulose in the process of creation.

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PHYSICS

## Manufacture Radium By Atom Smashing

**M**AN-MADE radium has been produced by transmutation of the common element, bismuth, with the University of Michigan cyclotron, Drs. J. M. Cork, J. Halpern, and H. Tatel reported to the American Physical Society at Columbus.

Deuteron particles, that is, ions of heavy hydrogen of atomic mass 2, were driven at high energy by the cyclotron against the heavy element bismuth. Out of the bombardment came Radium E and Radium F, the latter discovered by Madame Marie Curie and known as polonium.

Radium E and Radium F occur in nature, are radioactive and emit alpha particles. These particles, too, were found to be emitted by the man-made radium.

The transmutation of bismuth into Radium E appeared more easily accomplished than the transmutation into polonium. Four atoms of Radium E were created for every one of the polonium, Radium F.

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Attempts to acustom elk and wild pigs to the climate near Moscow is being made at a Soviet research farm.

A new cotton twine developed by a government chemist is pronounced satisfactory for use in postoffices.