PHYSICS-CHEMISTRY

New Super Microscope

A British scientist has constructed a reflecting microscope which "sees" the living chemistry of cells with mirrors and the invisible light of infra-red rays.

➤ A SUPER microscope that "sees" the chemistry of living things, hailed as a "revolutionary" advance with applications so vast they may not be "fully explored in our lifetime," was reported to the British Association for the Advancement of Science, meeting in Newcastle, England.

This super microscope, called the reflecting microscope because it "sees" with mirrors instead of lenses, was constructed by Dr. C. R. Burch of Bristol, England. Research with it in fields ranging from cancer-fighting to manufacture of synthetic fabrics like nylon was reported by Dr. Robert Barer of Oxford University.

Exciting feature of the new microscope to scientists is that with it they can use the invisible light of infra-red rays for spectral analysis and identification of chemicals. The infra-red absorption spectrum of a chemical compound is so characteristic that chemists often call it the "fingerprint of the molecule."

With the new reflecting microscope they can now detect the presence of a chemical, such as penicillin or a vitamin or a cancer-causer, inside a living cell by its spectral "fingerprint." In addition they can find what part of the cell it is in, and how it may be changed structurally by other chemicals in the cell.

Fibers of muscles and nerves and also of fabrics, such as terylene, the English nylon-like material, are being studied with this new microscope. Changes are being detected in the fiber chemicals, according to whether the fiber is stretched or unstretched.

The structures of a minute crystal of a mold chemical related to pencillin and of a crystal of the anti-pernicious anemia vitamin B_{12} are showing themselves through spectral analysis of their mirror-magnified images.

Instead of lenses, such as ordinary refracting microscopes have, the reflecting microscope made by Dr. Burch is equipped with a small spherical convex mirror and a large aspherical concave mirror to do the magnifying job. The mirrors are made of speculum metal coated with a very thin reflecting layer of aluminum. Reflecting microscopes have been made in several countries but some of them are equipped with lenses as well as mirrors and some do not have aspherical mirrors.

The clearance between the object to be viewed and the small mirror of the Burch microscope is about an inch and a half, or some 13 times the working distance on a lens microscope with a similar numerical aperture. This makes for much easier manipulation and permits examination and dissection under high magnification of organs such as the liver, spleen, kidney and brain of a living anesthetized animal.

Microscopes, however, are no longer regarded as merely super magnifying glasses, Dr. Barer pointed out.

"Indeed, with the reflecting microscope we may not always want to look at the ordinary appearance of the object at all," he declared.

"It is quite possible that in future work with this instrument we may be content to learn about the chemistry of the object by observing the behavior of a spot of light on a cathode-ray tube screen. This is indeed a far cry from the careful visual observation of preserved and stained specimens on which so much knowledge of cell structure is based."

No reflecting microscopes have yet been built in the United States, so far as is known. Scientists at the National Bureau of Standards, however, are enthusiastic about the possibilities of "seeing" new things with this type microscope and foresee a "rush of energetic research workers" into the field.

Science News Letter, September 10, 1949

AGRICULTURE

Cucumber Grafts on Squash Grow Faster, Double Yield

➤CUCUMBER vines grafted on squash vines grew much faster than did cucumber vines growing on their own roots. The yield of cucumbers from grafted vines was doubled.

These results of a number of field experiments are announced by Drs. Dontcho Kostoff and Manol Stoyloff, of the Bulgarian Academy of Sciences.

Primary objective of the experiments was to find a way to grow cucumbers without irrigation. The squash vines, with their stouter growth and deeper-thrusting roots, were able to tap moisture levels in the soil which the weaker roots of cucumber vines could not reach.

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WILD BLACK EYED SUSAN CULTIVATED—The yellow daisy held by Dr. Albert F. Blakeslee, director of the Genetic Experiment Station at Smith College, measures seven inches across. Research assistant, Mary Alton of Burlington, Ontario, holds in her left hand one of the wild field flowers for comparison. In her right hand is the double daisy, a globe of yellow petals, developed from the same wild flower. These specimens were developed by treating the yellow daisy with colchicene which doubles the chromosomes and tends to enlarge the flower's size and deepen its color. Selection and cross-breeding have resulted in several new garden varieties.