OPTICS

New Microscope

Sharper images are possible and living cells may now be examined through new phase-difference microscope. The use of two rings makes this possible.

➤ LIVING CELLS can be spied upon without killing through use of a phase-difference microscope seized from the Germans as scientific booty of war.

Based on a Dutch idea of a decade ago, the new kind of microscope gives unusual details by use of two rings, one of which speeds up a little the light passing through it. Although the principal American microscope manufacturers had been experimenting successfully with similar devices, two instruments now in this country will help in securing production for research use in about a year.

The phase-difference microscope shows up minute differences in structure not visible before. Scientists are finding it particularly useful in the study of transparent living objects. It brings out details without preliminary staining with dyes, which kills the cells. Identifying minerals in rocks and detecting minute imperfections in gunpowder are other jobs it can do.

One of these microscopes was brought back from Germany by Gustave Guellich of the Technical and Industrial Branch, Office of the Publication Board, Department of Commerce. It is now at the National Bureau of Standards where Dr. Charles P. Saylor is studying how it is made and what it will do.

The other phase-difference microscope was secured by Col. Arthur Brice of the Chemical Warfare Service when he visited the Zeiss Optical Works at Jena, Germany, in the Russian Zone of Occupation. At the same time Col. Brice secured a motion picture, taken with the microscope, of the division of living cells of a grasshopper, giving details never before visible. Under the auspices of the Veterans' Administration, he is now showing the movie and microscope to physicians and other selected groups.

Two rings, one built in the microscope objective and the other used to control the light reaching the specimen, are responsible for the sharp, intensified image. A transparent ring is used between the specimen and the mirror reflecting the light that is to illuminate it. Here all except a ring of light is blacked out and only a hollow cone of light is focused on the specimen to be studied.

The other ring, built into the microscope lens, is inserted where the two lenses forming the objective are cemented together. Used in place of some of the cement, it consists of a ring of metal of transparent film. Light going through this ring is bent a little and speeded up, perhaps a quarter of a wavelength.

Light coming directly from certain parts of the specimen is reinforced by light from other parts that has been bent by the ring, resulting in an image of increased contrast reaching the eye. The particular parts of the object to be reinforced depend upon the refractive index of the ring film in relation to the cement used in the objective.

Before use, the position of the phase-difference ring must be adjusted so it just matches that of the other ring. The microscope, however, can be used with or without the phase-difference apparatus. Although the ring is built into the objective, it cuts down so little light when its sister ring is not in use that the image is changed but slightly.

Microscopes of this type were first described about a decade ago by the Dutch scientist F. Zernike. A number of years passed, however, before two Germans made production commercially possible.

Science News Letter, June 22, 1946

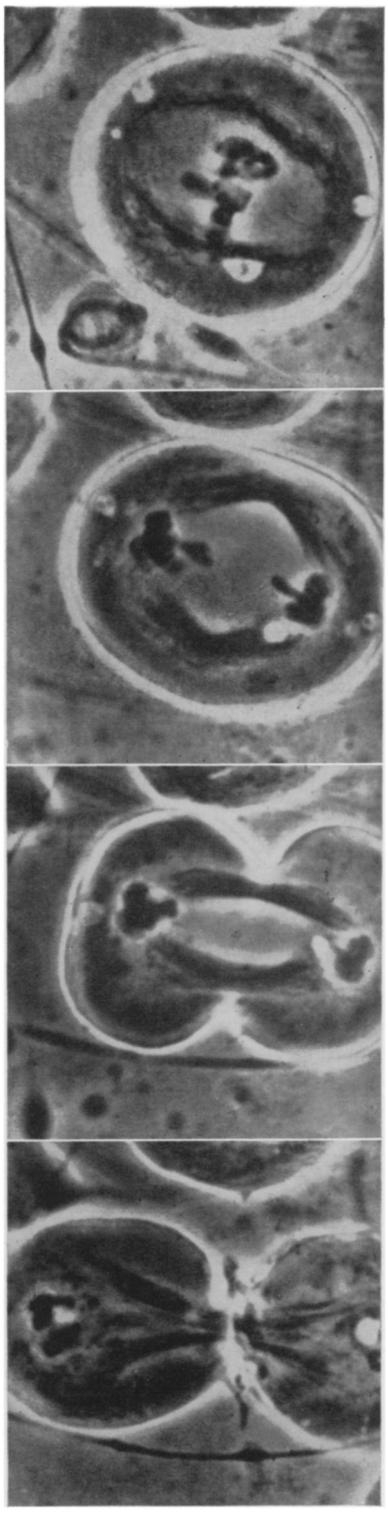
CHEMISTRY

New White Paint Developed During War

➤ INDUSTRY NOW has a new kind of glistening white finish to apply to all sorts of surfaces. It is a heat resistant paint that has properties between those of baked enamel coatings and ordinary paints.

A new silicone resin that becomes hard and durable under the influence of heat, was developed by the Dow Corning Corporation during the course of experimentation upon the unusual war-born compounds made from sand, coal, oil and brine.

Science News Letter, June 22, 1946



CELL DIVISION—All growth takes place by the division of cells. Cell from a grasshopper's body splitting into two parts, each of which will be a complete cell, is shown in this series. Cell division can be traced with the phase-difference microscope without having to kill the cells by staining.