eyebrows and the iris of the eye itself are really made of the black grains of silver.

The tiny white highlight on the eye is bright because only a few grains of silver-bromide crystals at that point changed to silver in the developing. Dark regions exist where more crystals changed.

Just as you watched the eye in picture three, concentrate on the eye highlight in the last picture. There it is. The bright area in the center of the picture and the multitude of silver grains all around it are now completely apparent. Instead of a photograph you might well think you are looking at a sprinkling of coal dust instead.

Actually, of course, one could obtain the whole original picture by the supertask of laying down at just the right place tiny microscopic specks of dust; many of them where you wanted black and few for white areas. The job is naturally almost a physical impossibility yet one brief exposure to light for only a fraction of a second accomplishes the same thing. How big are the silver-bromide particles that do this superhuman job? Some of them are so small that only the most powerful microscopes will show them. Others loom large under a microscope and may be as big as one six-thousandth of an inch across!

For some of the extra fast supersensitive films for use in the new candid camera, the grain size is still smaller so that more enlargement will be permissible before the grain structure is noticeable.

In positive film for projecting motion pictures where the enlargement is even greater the grain size is much less than one twenty-thousandth of an inch.

Anywhere from half a billion to five billion particles are embedded in the gelatin on a square inch of surface.

Science News Letter, October 3, 1936

CHEMISTRY

Through Special Technique Enzyme Is Viewed at Work

Action of Catalase Is Observed for First Time and Confirmation Obtained That It Actually Enters Reactions

FOR THE first time in the history of physiological chemistry, an enzyme, one of those chemical substances important in the processes of digestion and fermentation, has actually been observed at work, and experimental proof has been provided for the theory that enzymes enter into chemical reactions, as well as stimulate them. This has been accomplished by Dr. Kurt G. Stern, Visiting Lecturer in Physiological Chemistry at Yale University, who, by a special technique that seems equivalent to slow motion photography, caught the enzyme at its lightning-swift work.

Used Colored Enzyme

The enzyme which opened the door for scientists to a new approach in the study of digestion was catalase, selected because it is the only colored enzyme found in sufficient quantities for experimental purposes and therefore amenable to spectroscopic study. Other enzymes are either colorless or found in minute quantities, but catalase is found in all living cells. The liver cells are especially rich in the substance.

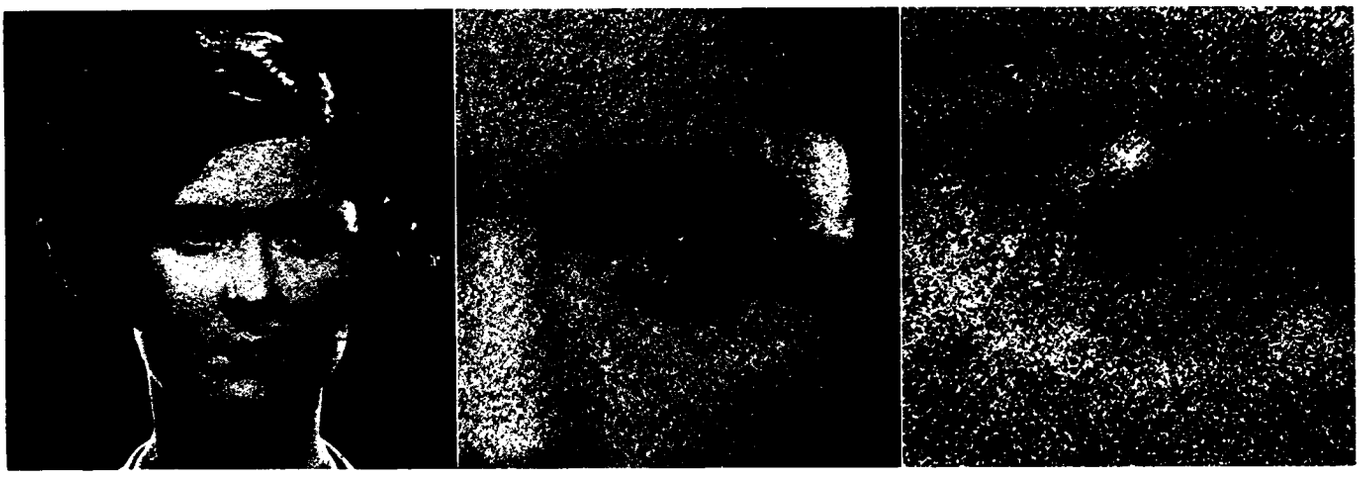
Dr. Stern's first research work on this enzyme was to isolate it and determine its constitution. It was known that it is composed of a colorless protein and a pigment which gives it its color. This pigment, separated from the protein, was purified to a crystalline form and found to be identical with the pigment, or hemin group, of the blood which gets its color from hemoglobin. He was able to transform this enzyme into hemoglobin, by merely exchanging the protein of the enzyme for the globin or protein of the blood pigment, thereby showing the identity of the two hemins.

The exact function of catalase has not been determined, and until recently it was generally assumed that its only function was to break down hydrogen peroxide into water and gaseous oxygen. Since hydrogen peroxide could not be found in the tissues of higher animals and plants, Dr. Stern looked for other substances which might be attacked by this enzyme and thereby provide a clue to its real function. He found that a substance derived from hydrogen peroxide, monoethyl hydrogen peroxide, is also attacked by the enzyme but is broken down much more slowly than the simple hydrogen peroxide.

Monoethyl hydrogen peroxide, when attacked by catalase, does not yield a gaseous product but breaks down into acetaldehyde and (*Turn to page* 222)

LITTLE GRAINS

Like fruit in the gelatin dessert, microscopic specks of light sensitive metal imbedded in the gelatin layer of film make possible the light and shade of the photograph. From left to right are successive stages of enlargement of the view shown on the facing page.



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other compounds thus far unidentified. This formation of acetaldehyde from a simple organic peroxide is of physiological interest as is the entire reaction inasmuch as all attempts to demonstrate the presence of hydrogen peroxide, supposed to be the substrate for catalase, have failed. The fact that a substituted organic peroxide may serve as a substrate for this enzyme which is sufficiently concentrated in the liver of mammals to bring about such a catalysis, opens a new approach to the problem.

Dr. Stern placed the enzyme in a spectroscope and found that its spectrum disappears upon adding the peroxide, and a new spectrum is formed. This was the spectrum due to the chemical combination between the two substances. Simultaneously with the destruction of the peroxide, the spectrum of the free enzyme reappeared. It was thus possible for the first time to observe directly the entire cycle of an enzymatic process.

Dr. Stern's study shows the enzyme working as follows:

The enzyme operates by providing a new path of reaction which leads over an intermediate compound composed of the enzyme and substrate molecules. This compound is unstable but has a mean span of life sufficient to allow for direct observation.

The knowledge of the exact cause of the combination between the enzyme and the substance to be decomposed might provide insight into the finer mechanism of enzyme action. For that purpose Dr. Stern has recently developed a method which permits the photographic recording of such reactions. By the use of a photo-electric cell and a radio tube, the rapid reactions between a catalyst and its substrate are indicated on a photographic film. This photo-electric method permits the recording of chemical reactions which are too fast to be followed by the human eye.

Science News Letter, October 3, 1936

GEOLOGY

Museums Sometimes Fooled By False Meteorites

SOME chunks of iron and stone, even if they are neatly labeled "meteorite" and in a museum, did not come from the sky. The Society for Research on Meteorites received a communication from John Davis Buddhue of Pasadena, Calif., telling of studies upon ordinary earthly rocks or accidental masses of metal that have acquired places in museums and remained undetected for years. One Chinese "meteorite" is really a block of limestone. A Scotch one came from an iron furnace and one found in Baluchistan is really only a mass of fused ash from a burning haystack. There are other supposed meteorites, however, that have the scientists puzzled.

Science News Letter, October 3, 1936

One-fourth of the babies prematurely born in United States hospitals die before leaving the hospital.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF MARCH 3, 1933

Of SCIENCE NEWS LETTER published weekly at Washington, D. C., for Oct. 1, 1936

Washington } ss.
District of Columbia }

Before me, a Notary Public in and for the District of Columbia aforesaid, personally appeared Watson Davis, who, having been duly sworn according to law, deposes and says that he is the Editor of the SCIENCE NEWS LETTER and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Editor, Watson Davis, 2101 Constitution Ave., Washington, D. C.

2. That the owner is:

Science Service, Inc., 2101 Constitution Ave., Washington, D. C., a non-profit corporation without stock, operating as the Institution for the Popularization of Science.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

Watson Davis,
Editor

Sworn to and subscribed before me this 24th day of September, 1936.

[SEAL]

Charles L. Wade

(My commission expires March 26, 1938.)