PHOTOGRAPHY

Grains In Photographic Image Look Like Masses of Seaweed

Electron Microscope Enables Photographic Experts To See For First Time What Photograph Looks Like

AFTER working with photography for years, scientists at the Kodak Research Laboratories have just found out how the developed silver bromide grains that make up the photographic image really look.

They used to think that if they could magnify them enough, the grains would appear like lumps of coke. Now, thanks to the electron microscope, which is as much more powerful than the ordinary microscope as that instrument is superior to a hand lens, they find that each grain is like a mass of seaweed. If you take a piece of ordinary sewing thread, roll it between your fingers into a small, loose ball, you have a good model of a single grain.

These results were announced by Dr. C. E. K. Mees, vice-president and director of research of the Eastman Kodak Company. They are revealed in photographs, with magnification of 25,000 diameters, made with a type of electron microscope developed by Dr. E. F. Burton, professor of physics of the University of Toronto and a pioneer in the electron microscope field. The Kodak Laboratory's installation was built by C. E. Hall, a student of Dr. Burton's, who is now on the Laboratory staff.

Dr. Mees was unwilling to predict what these results may lead to, but knowing what the grains look like, it will be possible to understand better the mechanism by which they are formed, and control it better. Already they have a clue to the different behavior of different developers.

Hydroquinone, for example, gives relatively coarse threads, while metol gives threads that are much finer. These seem to build up from one spot on the original crystal of silver bromide. With developers like paraphenylene-diamine, and also with physical development, the silver bromide dissolves and precipitates elsewhere, so the result is a fluffy mass rather than a thread.

After the work was begun, the Eastman scientists found that earlier in the year a German named Ardenne, also with the electron microscope, had made an independent discovery of the thread-like character of the silver bromide grains, but no details of this work have yet been obtained.

Science News Letter, December 7, 1940

PHYSICS

Electron Accelerator Whirls Atomic Particles

SCIENCE'S newest weapon for producing intense bombardments with fragments of atoms, a device called the induction electron accelerator, was described by Dr. D. W. Kerst of the General Electric Research Laboratory at Schenectady, N. Y., who spoke before the meeting of the American Physical Society.

The electron accelerator consists of a doughnut-shaped glass vessel with the air pumped out of it. It contains an iron core, and is surrounded by a magnet consisting of thousands of segments of iron.

A stream of electrons introduced into the glass vacuum chamber is whirled in the magnetic field at ever-increasing velocities until the particles are finally moving at almost the speed of light—186,000 miles a second. In reaching this speed, the electrons make 200,000 revolutions, traveling a distance of approximately 60 miles and building up an energy of 2,300,000 volts.

The present small apparatus, less than a foot in diameter, produces radiation energy equivalent in intensity to that given off by ten milligrams of radium. Larger models can be expected to give more energy.

Science News Letter, December 7, 1940

ASTRONOMY

Gathering of Gas by Star Does Not Keep It Shining

STARS seem unable to keep going by a scavenging process.

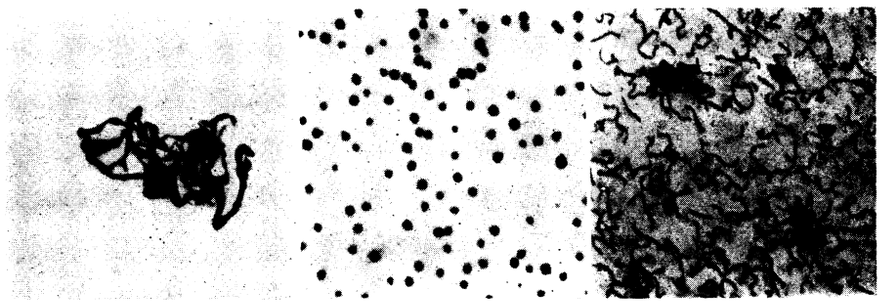
Modern astronomical theories hold that the stars get their energy by a conversion of hydrogen into helium. However, a bright star uses up hydrogen so fast that some means at present unknown must keep up the supply.

One theory to explain the supply called upon the very tenuous cloud of gas between the stars, suggesting that, as they moved along, they swept up enough hydrogen to meet the needs.

Calculations made by Dr. Robert d'Escourt Atkinson, of Rutgers University, indicate, however, that this will not do. In a recent report to the Royal Astronomical Society in London, he shows that if a star became more massive by sweeping up these gases, it would also send out radiation more rapidly, and its life would not be lengthened. Consequently, some other explanation must be found for the source of the star's fuel.

Science News Letter, December 7, 1940

A chemically etched *nail* developed by the U. S. Forest Products Laboratory has much greater holding power in soft wood than a plain nail.



PHOTOGRAPHIC GRAINS

These three photographs, taken in the Eastman Kodak Company's Research Laboratory with a magnificction of 25,000 diameters, show the actual appearance of a photographic grain. The thread making up the grain is about 5 atoms thick. At the left is a silver bromide crystal which has been developed with one of the usual chemicals. In the middle is a Lippmann emulsion, made by precipitating completely colloidal silver bromide. In the third view, this has been developed chemically, and each tiny crystal has lengthened into a thread.