tiplier which operates a facsimile printer.

Only a few days before at the Penn State College meeting of the American Physical Society, Dr. Hillier, R. F. Baker and Zworykin announced another major improvement in electron microscopes. (See following article.)

Science News Letter, July 11, 1942

PHYSICS

Electron Microscope Now Analyzes Molecular Structure

Adapter Applied to Standard Instrument Converts It To Diffraction Camera; Can Be Used on Same Specimen

See Front Cover

THE ELECTRON microscope can now not only make an enormously magnified picture of a minute object but also peer into its insides and determine its molecular structure. You cannot see the atoms but you can find out where they are.

This of course could be done before by means of another instrument, the diffraction camera, using either X-rays or electrons. But now an "adapter" applied to the standard commercial electron microscope, quickly converts it to a diffraction camera, thus dispensing with the second instrument and with a second source of radiation.

Within a few minutes of each other a picture and a diffraction pattern of the same specimen can be made without remounting it, without removing it from the vacuum, and without tampering with it in any other way. In many fields of investigation this is a great advantage.

How it is done was described by Dr. J. Hillier, R. F. Baker and Dr. V. K. Zworykin of the Research Laboratories of the RCA Manufacturing Company, Camden, N. J., at the meeting of the American Physical Society at State College, Pa.

To pass from microscope to diffraction camera, it is only necessary to shift the position of the specimen in the tube, which is done by gadgets on the outside, and to change the lens. The latter is easy. An electron lens is merely a coil of wire in which an electric current is flowing. When the current stops, it ceases to be a lens. Hence, to switch from the projection lens which makes the picture to the lens which produces the diffraction pattern, it is only necessary to switch the current from one to the other.

The instrument is so arranged that diffraction patterns can be made either by transmitted light or (for opaque objects) by reflected light. For the latter the specimen is turned so that the electrons are reflected at a grazing angle. Provision is also made for rotating the specimen in its own plane, which is useful in making diffraction patterns.

The diffraction pattern produced in this way is a set of concentric circles, some sharp, some diffuse. From dimensions and intensities, the arrangement of the atoms in the material can be determined.

The incorporation of the adapter in the standard instrument does not increase its dimensions nor interfere with its functioning as an electron microscope, the scientists said. But it does considerably widen the usefulness of an already widely useful tool, saves time, expense and labor, and makes it possible to investigate materials that change.

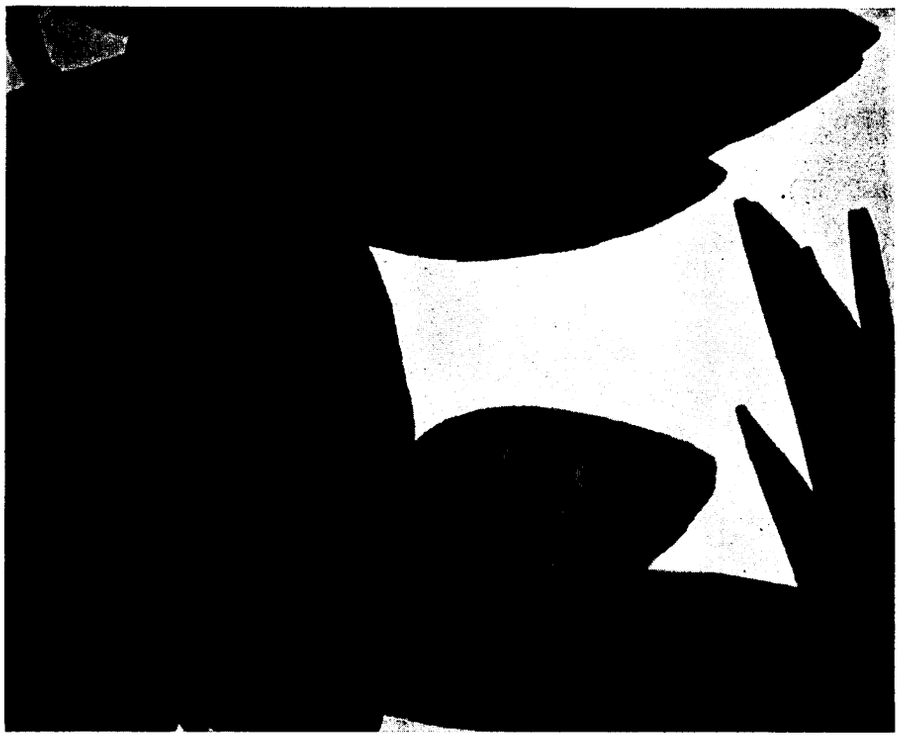
Science News Letter, July 11, 1942

MEDICINE—PHYSICS

Electron Microscope Shows Germ Killers at Work

THE ELECTRON microscope, science's latest weapon for seeing the invisible and peering into the structure of life, now promises to show just what happens to an individual disease germ when it is attacked by a germ-killing agent such as bichloride of mercury.

First studies along this line will be reported by Dr. Stuart Mudd, of the University of Pennsylvania, and Dr. Thomas F. Anderson, of the RCA Manu-



ELECTRON MICROGRAPH

Each of the large dark masses in this picture is a tiny speck of aluminum oxide no larger than the point of a needle. The electron microscope has magnified these specks 40,000 times. When the microscope is changed over to a diffraction camera, the pattern shown in the picture on the front cover of this week's SCIENCE NEWS LETTER is produced by the same substance.

facturing Company (*Journal of Experimental Medicine,* July).

When a typhoid fever germ is mixed with silver nitrate, the flagella which serve the germ as propellers are completely destroyed, the electron microscope revealed. The protoplasm, which is the very life of the cell, is stained black, but the wall of the cell is apparently unaffected. The entire germ is very much smaller, as if shrunken.

When the typhoid fever germ is mixed with lead acetate, however, the flagella, though darkened, are not destroyed. The germ swells, however, and its protoplasm escapes its wall to form a halo around it.

Differences in action of lead, silver, nickel and mercury salts were also observed on cholera and dysentery germs and on a microorganism called *Fusobacterium.*

Science News Letter, July 11, 1942

ENGINEERING

Automobile of the Future Will Be Lighter and Cheaper

Weight Would Be Reduced as Much as 1,000 Pounds; Eventually Engine May Be Placed in the Rear

WHEN the cessation of hostilities at last permits the manufacture of automobiles to be resumed, the new cars will be smaller, lighter, lower, cheaper and more economical than present ones, and some radical new designs with engine in the rear may be seen.

This is the concensus of engineering opinion as gathered by Frank Jardine, chief engineer of the Castings Division of the Aluminum Company of America (*Society of Automotive Engineers Journal,* July).

The first post-war autos, he warned however, will probably be similar to the 1942 models, and more expensive. Time will be required to develop the drastically changed new models, and meanwhile parts, tools and machinery already on hand will have to be used. Nor may we expect new cars to run off the assembly line the moment hostilities cease. Time is also required to change from war-time to peace-time production.

Here are some of the ideas of automotive engineers regarding the future car. But Mr. Jardine also warns that future events may require some considerable revision of present day ideas.

While everyone was agreed that the new cars would be cheaper, there was much variation as to actual prices. In the low price range, the average was $700 for a car that would do 30 miles on a gallon of gas. The larger cars averaged $2,000 and 20 miles to a gallon of gas. These economies would be required to offset higher gas taxes. Regular fuel would be 80-octane, premium fuel 100-octane.

Weight of the cars would be reduced by as much as 1,000 pounds in some cases without reducing size.

The engineers believed that there would be extensive use of substitute materials developed during the war, with savings in weight and cost and in many instances with mechanical improvement. Increased production of aluminum and magnesium would permit greater use of these light-weight materials. Plastic windshields curved at the corner posts will permit better seeing. Tires will be about the same but may be of synthetic or natural rubber.

Hydraulic drives and brakes, automatic transmissions and overdrive will definitely appear on all but the low-priced models.

Engines will be smaller and lighter in weight. Carburetors will probably not be changed, but superchargers and fuel-injection systems may be developed. Eventually the engine may be placed in the rear.

These are some of the specifications for the future car as dreamed by present-day engineers, but subject to future revision.

Science News Letter, July 11, 1942

ANTHROPOLOGY

Anthropological Bases Lacking for "Race" Claims

RACIAL claims made for propaganda purposes lack any semblance of biological or anthropological basis, Dr. John R. Swanton, veteran anthropologist of the Bureau of American Ethnology, indicates in a new publication of the Smithsonian Institution.

Even the earliest nations, like Egypt and Babylonia, show no absolute uniformity in racial types, says Dr. Swanton. They were at least two distinct physical types in ancient Egypt in addition to the Mediterranean type commonly thought of as representing the Egyptian "race." As for modern Germany, few of the larger nations of history have less title to a mystical national unity, despite the vehemence of Nazi claims.

On the other side of the picture, Dr. Swanton finds racially homogenous groups of people who never achieved common nationality or political organization. It was so to a considerable extent in ancient Greece; even more so among some tribes of recent Indians on this continent. New England and New York Indians were very much alike physically, yet they had widely divergent tribal organizations and even radically different languages.

"In short," says Dr. Swanton, "there is no one universally valid principle identifying a body of people as a tribe, and tribes or tribal groups varied so enormously as to dispose effectually of the idea that there was an immutability about them, either in their origin or later development. Sanctions of supernatural character were claimed in the more developed tribes such as the Natchez, Aztecs and Incas, but these were plainly afterthoughts intended to stabilize a condition brought about by less occult means."

Science News Letter, July 11, 1942

NUTRITION

Dehydrated Beef Now in Production for Lend-Lease

DEHYDRATION, the process that makes one ship do the work of half-a-dozen or more in getting vegetables, eggs and milk overseas, is now at work on meat as well, announces Secretary of Agriculture Claude R. Wickard. Experiments have been under way for some time, and the technique has progressed far enough to justify its use with beef. Experimental work on pork dehydration is still in progress, and is regarded as promising.

The beef is ground before dehydration, so that the product, after "re-hydration," is most suitable for meat loaf, meat pie and croquettes. A coarser grind gives meat suitable for stews. The product is reduced about three-fourths in weight, and about one-half in bulk.

At present production is limited.

Science News Letter, July 11, 1942