

PHYSIOLOGY

# Muscle Sliced Super-Thin

Technique was developed, not in order to stretch the meat ration, but in order to learn more about what happens when muscle receives nerve signal to contract.

► DAD MAY be carving the Sunday roast in pretty thin slices these days to stretch the family meat ration, but scientists at the University of Pennsylvania have found a way of carving muscle meat so thin that more than 100,000 slices would have to be piled on top of each other to make a piece about one inch thick.

The method for cutting the 100,000-per-inch slices of muscle was developed by Dr. A. Glenn Richards, Jr., of the University's zoological laboratory; Dr. Thomas F. Anderson, RCA fellow of the National Research Council; and Dr. Robert T. Hance, of Duquesne University, Pittsburgh.

The super-thin scientific slicing technic was developed not in order to stretch the meat ration but in order to learn more details of what happens inside your muscles when, for example, you stretch your arms. Muscles, like every other part of the body, are made up of tiny cells. These cells can be seen under ordinary microscopes with light illuminating the slide on which lies a sliver of muscle about as thin as a fine hair. The size and shape of the cells can be seen, their nuclei, and minute fibrils and cross bands, but not much more. Scientists would like to see, for example, just what happens inside one of these muscle cells when a message flashed along a nerve orders the muscle to contract. Such knowledge might lead to better methods for treating infantile paralysis, myasthenia gravis and other nerve-muscle diseases.

The electron microscope, which uses an electron stream instead of light and focuses with magnets instead of glass lenses, has already pushed back the barriers of man's limited vision to the point where many objects hitherto invisible can be seen. The influenza virus, for example, so small that it long defied man to see it, much less to conquer it, has been brought within the range of visibility. So Drs. Richards, Anderson and Hance decided this instrument might be used to pierce the many remaining secrets of our body cells, shedding light not only on the cells but the

structures within their nuclei, such as the heredity-bearing chromosomes—perhaps even the genes themselves. Cell division seen under the electron microscope might yield important clues for solution of the cancer problem.

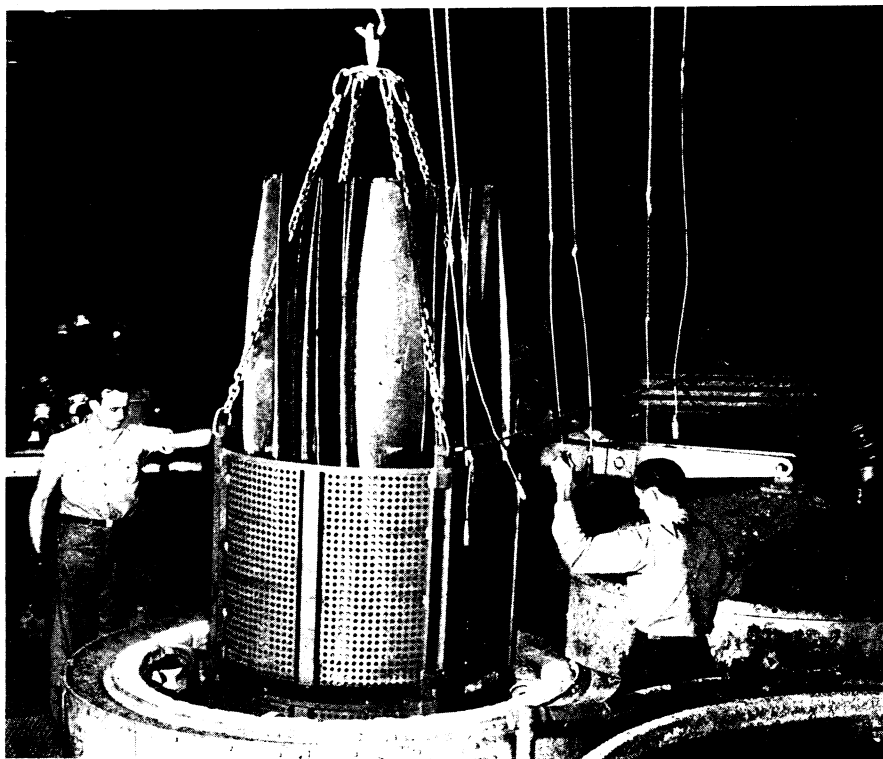
First, however, a method had to be developed for making slices of muscle or other tissue thin enough so that the electrons can penetrate it and make it visible. Details of the method are reported to fellow scientists in the Proceedings of the Society for Experimental Biology and Medicine.

The muscle is hardened in alcohol, formaldehyde and glacial acetic acid. After this it is washed in distilled water and then embedded in a special kind of

wax, called "Carbo-Wax 4000." Then it is ready for cutting into slices so thin they are literally invisible. The scientists had to use a light microscope to see and handle them for mounting under the electron microscope. A new machine had to be designed and built to cut such thin slices. The hygroscopic property of the special wax used, its extreme hardness, and its ready removal with water are its advantages for this work.

Development of this technic was hailed as an outstanding achievement in a report by Dr. Stuart Mudd at a recent demonstration of the RCA electron microscope.

"Sections sufficiently thin for examination in the electron microscope have been prepared. However, certain technical difficulties remain to be overcome. If and when these further difficulties have been solved the whole field of histology and cytology can profitably be resurveyed with the electron microscope; this may well yield useful new information for a hundred years to come," he said. (*Turn to next page*)



**FOR COOKING**—In the top basket, like so many potato chips are aluminum airplane propeller blades, being lowered into a heat treating pit furnace. The bottom basket contains small forged parts—all for warplanes. The work is being done at the Aluminum Company of America, whose production of forgings is reported to be 25 times that of 1938.

The first bit of tissue studied with the new technic was muscle, but not a kind used for food even in these days of meat

rationing. It was a body muscle of the American cockroach.

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lery who have been freed from allergic symptoms through appropriate diet are no longer susceptible to colds.

*Science News Letter, January 16, 1943*

MEDICINE

## New Food Allergy Tests

Discovery promises to point to specific dietary means for relieving troubles ranging from migraine, indigestion and epilepsy to common colds.

► DISCOVERY of a new test for food allergy which promises to show specific dietary means for relieving a large part of the population from troubles ranging from migraine, indigestion and epilepsy to susceptibility to common colds was announced by Dr. Arthur F. Coca, of Oradell, N. J., at the Fifth Annual Forum on Allergy in Cleveland. Dr. Coca received the Forum's gold medal "for outstanding contribution to clinical allergy."

By means of the new, highly accurate test for food allergy, Dr. Coca stated, he is able to define a new category including migraine, indigestion, constipation, sinusitis, dizziness, tiredness, nervousness, epilepsy, high blood pressure, and a number of other symptoms.

The well-known skin tests for allergy are useless in this group, which probably

includes over 80% of the population, Dr. Coca said.

About two-thirds of the sufferers from food allergy can be wholly freed of the listed symptoms by mere avoidance of the foods identified by the new test, in which the culprit food is shown by a specific speed-up of the pulse rate.

In a small series of cases in collaboration with Major Laurence Miscall, M. C., U. S. Army, the Crile operation of sympathectomy, a nerve-cutting operation, was found highly effective in the control of the listed food allergic symptoms.

Food allergy, Dr. Coca has previously reported, is the most important predisposing cause of common colds. This has been confirmed, he said, by Dr. Arthur Locke, of Western Pennsylvania Hospital, Pittsburgh, in a large scale study at Stevens College. Subjects of food al-

MEDICINE

## Same Defense Mechanism Causes Very Different Ills

► TYPHOID FEVER, syphilis, hay fever and a wide variety of other equally different illnesses are produced by the same reaction of the body against invasion, Dr. Milton B. Cohen, of Cleveland, declared at the Fifth Annual Forum on Allergy.

This is a standard method the body has for dealing with foreign substances which enter it, Dr. Cohen explained. He gave it the scientific term of the "dynamic mechanism of allergic reaction."

"During life," Dr. Cohen pointed out, "the body is always changing. Myriads of chemical processes go on quietly and unnoticed."

When the body is attacked by the entrance of bacteria, pollens or serum, which scientists call antigens, no visible change occurs for several days. The body is building a defense during this period by making substances called antibodies. These neutralize or destroy the antigen which entered.

When these antibodies unite with the antigen, Dr. Cohen explained, a poisonous substance is formed. It is this substance which produces the illness. The disease is therefore the result of the body's defense against a foreign substance.

"When the body reacts in this way it is said to be allergic," Dr. Cohen said. "Allergic reactions to non-living substances, such as pollens, dust and sera, produce a common poisonous substance and the same type of illness.

"Allergic reactions to bacteria, however, produce individual types of poisonous substances and different types of illness, depending on the nature of the bacteria."

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*Thermite*, for incendiary bombs, is a mixture of aluminum powder and iron oxide which burns with tremendous heat because of the affinity of the aluminum for the oxygen.

Several hundred acres a week in Panama and Costa Rica are now being cut from jungle and seeded to manila fiber plants, to help supply enough rope for United Nations' war needs.



**MOSQUITO WING**—This is the flying apparatus of the summer pest, photographed by Vincent J. Schaefer, of the General Electric Research Laboratory. His original photograph showed the wing magnified 100 times. The fine fringe along the edge is shown at much greater magnification in the picture on the facing page.