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.

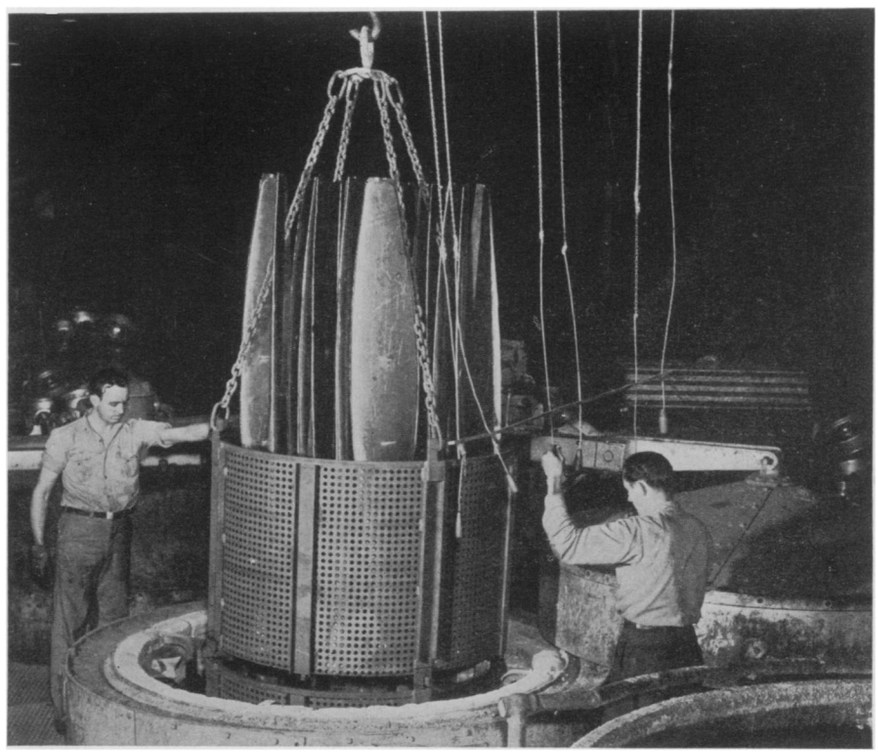
The electron microscope, which uses an electron stream instead of light and focuses with magnets instead of glass lenses, has already pushed back the barriers of man's limited vision to the point where many objects hitherto invisible can be seen. The influenza virus, for example, so small that it long 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.