PHYSICS

Microscopes Improved

New portable models will make electron microscope available for wider usefulness in small laboratories and in war industries.

➤ ELECTRON microscopy, newest of research techniques, is hardly more than a decade old, yet even at this knee-pants age in years it is showing decided signs of maturity.

One such sign is the development, by General Electric and Radio Corporation of America respectively, of smaller, simpler, more easily used, and presumably much cheaper instruments. They are described as of ordinary laboratory table height instead of the towering seven feet of the types now in use, not too heavy to trundle around the laboratory on wheels and (best of all) producing their image in such a position that the user can sit in unstrained comfort and make his study at leisure.

The General Electric instrument can be plugged into ordinary 110-volt house current and uses electrostatic lenses to focus the beam of electrons, instead of the electromagnetic type ordinarily used in electron microscope work, whereas the R.C.A. instrument retains the electromagnetic lens and wider range of magnification. Specimens can be photographed outside the vacuum chamber instead of in the vacuum as was the case in former instruments. Time required to obtain the vacuum necessary for electron microscopy has been reduced to a few minutes and operations have otherwise been made as simple as possible, Dr. Simon Ramo of the General Electric Electronics Laboratory explains.

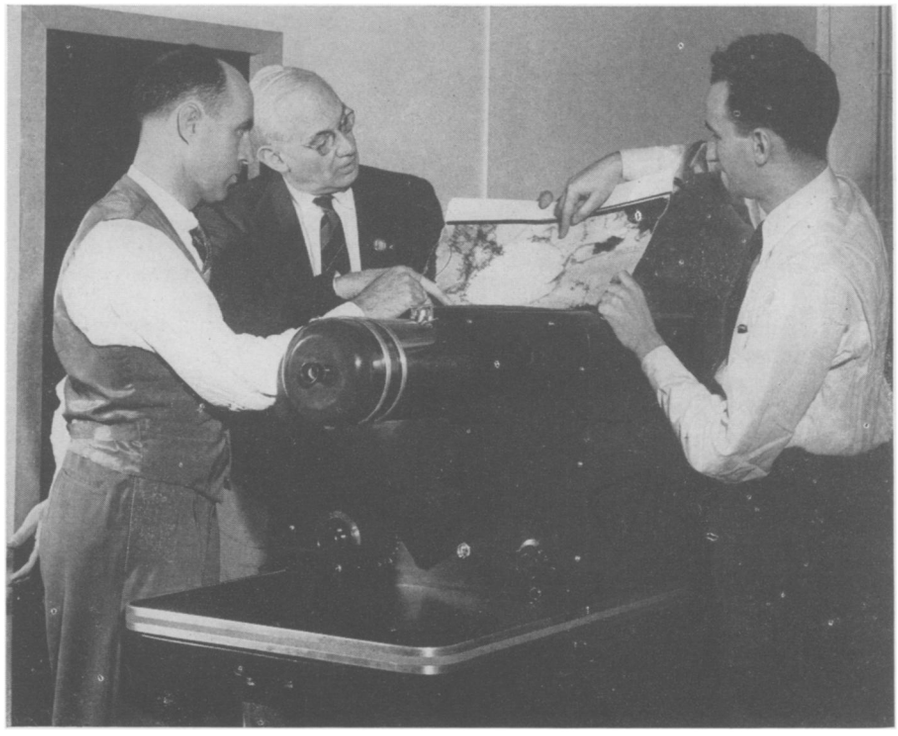
The new simplified model is expected to bring electron microscope work into schools and small colleges after the war, but their use at present will largely be limited to war projects.

Research has been limited by the fact that only about forty of the big expensive models are in operation. This bottleneck will be broken by adoption of the newly developed instrument, scientists assert, and much work awaits their production.

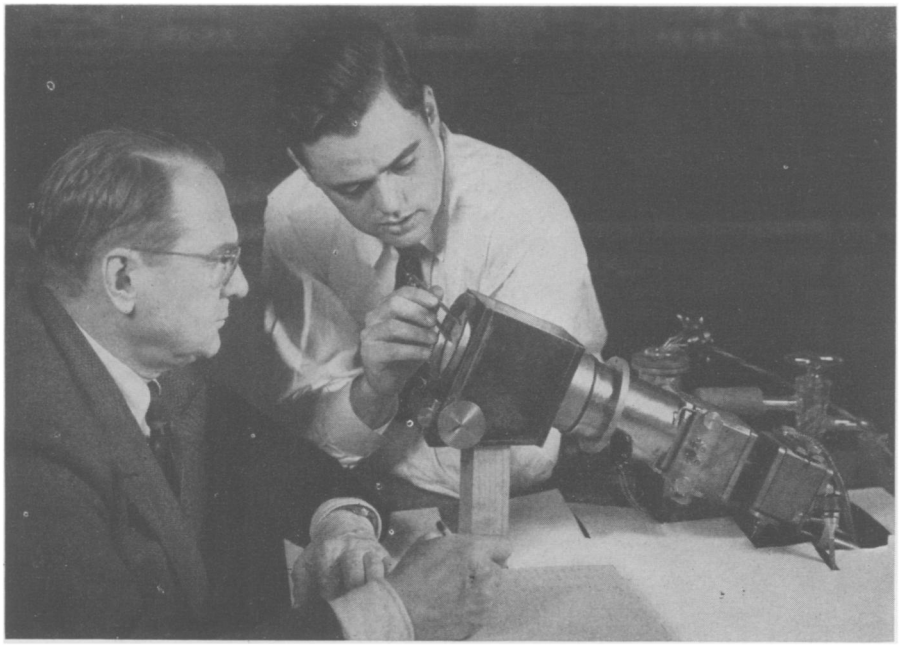
This is reminiscent of the evolution of other laboratory gear that was originally both cumbersome and costly, but is now convenient standard equipment in all well-equipped research and teaching laboratories. A century or so ago, compound microscopes were a couple of feet or more in length; now they are of convenient desk height and so light that they can easily be lifted with one hand. The X-ray apparatus of a generation ago filled whole rooms with its cumbersome complexity and was very temperamental; now every field hospital has its truck-mounted unit that a man with sergeant's chevrons operates as a routine matter. The electron microscope seems to be going through a similar evolution very rapidly.

Another sign of approaching maturity is the nascent formation of a society of users of the instrument. Microscopists long ago formed their professional associations, so did roentgenologists in our fathers' time. One of the features of the recent National Chemical Exposition in Chicago was a get-together of electron microscopists. They did not immediately elect officers and adopt a constitution; but there is little doubt that the near future will see the formal emergence of an American Society of Electron Microscopists.

Such societies promote the professional interests of their membership in a number of ways. They hold meetings once or twice a year, where papers are presented and discussed, to bring out results of work done since the last meeting. They edit an official journal, in which research results are published. (Such a journal was strongly "talked up" at the Chicago meeting.) Perhaps most important of all, little knots of their members cut sessions at the annual meetings, get together around a table somewhere, and talk shop until the air is blue. That's the busman's holiday raised to the *n*th degree—and it's the grandest fun in the



MOBILE, small and operating on ordinary house current, the new General Electric model of the electron microscope shown in the picture is 10 times as powerful as the best light microscopes. Examining an electron micrograph taken under the new instrument are (left to right) Dr. C. H. Bachman, co-designer; William C. White, head of the GE electronics laboratory; and Dr. Simon Ramo, co-designer.



"VEST POCKET SIZE"—RCA has now produced this portable model of the Zworykin electron microscope, instrument which has made visible the secrets of the submicroscopic world. Its convenient size and low price will make it available to small laboratories and of much wider usefulness in the war effort.

world if you know the field. To this, it would seem, the scientists who work with the world's newest super-eye, the electron microscope, are surely coming.

Science News Letter, December 12, 1942

ENGINEERING

Small Battleship Plan

Designs for vessel with half a big battleship's fire power on only a third of its displacement are circulated for criticism.

➤ BATTLESHIPS, reasserting themselves in the latest phase of the Solomon Islands fighting, as well as in the covering force at the landing in North Africa, seem to be coming out of the eclipse into which aircraft carriers were forcing them a few months ago. In an effort to gain some of the advantages of their heavy gun-power and strong armor protection without tying up so much naval investment in so few giant units as those composing present-day fleets, two young naval architects, W. E. Strope of the Navy's Bureau of Ships and S. J. Dwyer of the Federal Shipbuilding and Dry Dock Company, have offered for discussion, through the Society of Naval Architects and Marine Engineers, a set of plans for a capital ship of relatively small displacement that still carries armor of standard thickness and guns of full battleship-battery caliber.

The standard displacement chosen, 15,000 tons, is only one-third that of the new Iowa class, but is still about as great as that of any pre-dreadnaught battleship. Armor of main belt, conning tower and battery position is 14 to 18 inches thick. Two armored decks and careful subdivision of the hull provide protection against bombing and torpedo attacks. There are two turrets, each mounting either three 14-inch or two 16-inch guns.

This provision of half a big battleship's fire power on only a third of its displacement had to be paid for with something; in this case speed and secondary armament are sacrificed. Speed is held down to the World War I battleship's 21 knots. Secondary batteries consist of only six 5-inch dual-purpose guns and four multiple pompoms. It is expected that additional anti-aircraft fire will be provided by accompanying destroyers or cruisers.

On the whole, the design is conservative, even conventional. However, there is one radical departure, in the arrangements for venting smoke. Instead of the bomb-inviting smokestack amidships, there are smoke conduits running along the sides, behind the armor belt, and opening through tandem stub stacks on the after deck. Even for this, however, there is precedent in the sidewise sweep of the uptakes on present-day aircraft carriers.

The designers do not undertake to discuss possible tactical uses of ships of this type in detail. However, they do suggest their possible usefulness in protecting large convoys against the attacks of heavy cruisers and even of battleships. They suggest also that they would be well adapted for the naval defense of South American countries that now have to choose between fast but ill-armored, lightly armed cruisers and unnecessarily big and costly battleships.

In this latter possible role they have some resemblance to the coast-defense ships built by the Scandinavian powers, which carry moderately heavy armor protection and heavy cruiser-caliber guns on about half a cruiser's displacement. They represent a decided advance over the German "compromise ship," the pocket battleship, which was a hybrid between cruiser and battleship in everything: gun caliber, armor, speed, internal protection. As weighed in the crucial balance of actual combat, the pocket battleship proved wanting. By choosing full strength at some points and accepting handicaps elsewhere, the small-displacement battleship might very well make a better showing.

Science News Letter, December 12, 1942

The use of *hybrid seed* added 300 million bushels to the nation's 1942 corn crop, the U. S. Department of Agriculture estimates.

The *Latin American republics,* extending 8,000 miles south and east of the United States, cover an area almost three times as large as the continental United States.