

## THE NEW MICROSCOPES.

A DISCUSSION BY

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It is, to speak conservatively, of extreme interest to review the recent progress made by the scientist in his endeavor to penetrate the unseen world of the minute and disease-causing organisms, in particular a world of viruses—suspected, yet lying just beyond the scope of human vision and the power of the microscope to reveal; for the laboratory research worker, the doctor, the technician long have been familiar with the effects of these unseen enemies they have been called upon to treat and to cope with in man, animal, and plant, and while their knowledge of the infinitesimal has been growing steadily, they were, until very recently, unable to make the slight step "beyond" which would enable them to "see." But today, Science is exploring—looking for the first time upon totally new worlds through the eyes of totally new types of microscopes, microscopes new in principle of construction and in principle of illumination.

## THE ELECTRON MICROSCOPE.

One of these new instruments, the Electron Microscope, has received considerable attention and is now being used extensively in both industrial and medical research. Based on the principles of geometric electron optics, this microscope utilizes electrons as a source of illumination instead of the light source of the ordinary light microscope.

Electrons, practically speaking, are the smallest, lightest particles of matter and electricity. Like light, they behave like corpuscles guided by waves. Unlike light, however, they travel in a straight line in a vacuum where, subject to the action of electric and magnetic fields, their behavior coincides with the laws and principles set down by Sir William Hamilton who, more than a century ago, demonstrated the existence of a close analogy between the path of a light ray through refracting media and that of a particle through conservative fields of force.

We know that these negatively-charged particles, the electrons, revolving about in their various orbits in the atom, serve to maintain the balance of the atom while the nucleus exerts the "positive" force which holds it together; and we also know that when this balance is upset, due to gain or loss of electrons, we think of the atom as "charged," since it is this circumstance which causes the tiny particle to attract or