

cess of fecundation in plants, and from Martin Barry to Hertwig and Fol on that in animals, has been brought to a temporary climax. The combination of telescope and microscope in the spectroscope has opened out a field of research in astronomy of which Laplace had no conception.

So much has depended, during our century, on the unravelling and disentangling of the imperceptibly small (once considered an unworthy occupation), that a short reference to the history of that optical instrument to which we are so greatly indebted may not be out of place.

25.  
The Micro-  
scope.

The gradual perfection of the microscope is as much indebted to the problems and labours of anatomical workers during the seventeenth and the nineteenth centuries, as anatomy itself reciprocally has been indebted to the microscope. Robert Hooke, in 1660, first gave a useful form to the compound instrument. Leuwenhoek perfected the simple microscope; and during the earlier part of our century no one did more than Amici in Modena and Lister in England<sup>1</sup> to start that great suc-

Fol, O. Hertwig, and others, showed that one of the essential phenomena in fertilisation is the intimate and orderly association of the sperm-nucleus, of paternal origin, with the ovum-nucleus, of maternal origin, the result being the cleavage or segmentation-nucleus. The researches of Strasburger, De Bary, and others, established the same result in regard to plants" (J. A. Thomson, 'The Science of Life,' p. 127, 1899).

<sup>1</sup> The improvements of Amici seem to go back to the year 1812, those of Lister to 1826. The former is usually considered the in-

ventor of the "immersion" system,—that of placing a drop of water between the object or its covering glass and the objective lens. This system has lately been improved by Abbe, who discovered a liquid with the same refractive index as the glass of the objective possesses. According to Hogg ('The Microscope,' 15th ed., 1898, p. 10), the immersion system was suggested by Pritchard in London before Amici hit upon it. The necessary modifications required where the immersion system is used, seem, however, to have been first worked out by the celebrated Paris opticians, MM. Hartnack and Nachet.