the great revolution of ideas which the seventeenth century witnessed was much assisted by the invention of the telescope and founded upon its revelations, the change of thought during the nineteenth century has been connected more with the revelations of the microscope. The great movement of ideas started by Galileo, and continued through Kepler, Newton, and Laplace, was accompanied by the perfection of the telescope. The invention of the microscope enabled Nehemiah Grew and Malpighi to begin half a century later their embryological studies, and to inaugurate a line of research which, in our days, through a long series of observations [1] from Amici to Strasburger on the pro-

24. Morphology on a minute scale.

[1] These observations begin with the year 1830, when Amici, to whom great improvements in the microscope are due, "traced the pollen grain from its lighting on the carpel tip down into the recesses of the ovule" (Geddes and Thomson, 'The Evolution of Sex,' p. 140), and removed all doubts and uncertainty by his observations on orchids in 1845 and 1846. "Here he demonstrated the whole series of processes, from the pollen dust on the stigma to the formation of the embryo" (Sachs, 'Gesch. d. Botanik,' p. 469). About the same time (1843) Martin Barry "observed the presence of the sperm within the ovum in the rabbit ovum" (Geddes and Thomson, *loc. cit.*, p. 142). It took, however, a quarter of a century, from the first discovery of Amici, before the process of fertilisation described by him was accepted by embryologists as typical for both plants and animals. Bischoff, the great authority in Germany, after confirming the entrance of the sperm-cell into the ovum, maintained by Barry in 1843, and by Newport (with frogs) in 1851 and 1853, expresses his "infinite astonishment," adding that "Dr Barry is certainly the first who has seen a spermatozoon in the interior of any ovum, and notably in the ovum of a mammal, and that to him belongs the glory of this discovery" (Theod. Bischoff, 'Bestätigung des von Dr Newport bei den Batrachiern und Dr Barry bei den Kaninchen behaupteten Eindringens der Spermatozoiden in das Ei,' 1854, p. 9). For the history of scientific thought it is significant to see how little, even in the middle of the century, discoveries referring to the phenomena of plant life or structure were known or utilised by students of animal life. A mutually fructifying influence seems to date like so many other advances from the publication, in 1859, of the 'Origin of Species.' "The distinctively modern era in the history of fertilisation dates from about 1875, when the brilliant researches of Auerbach, Van Beneden, Bütschli,