

done on the theory of fertilization or amphimixis, on the theory of development, and on the theory of species. Worthy of mention along with Kœlreuter were J. and K. F. Gärtner, father and son, who continued experiments on similar lines.

Christian Konrad Sprengel (1750–1816), who loved botany too well to be a successful rector of Spandau, may be said to link Camerarius to Darwin.

In his *Newly Discovered Secret of Nature in the Structure and Fertilisation of Flowers*, Sprengel. he expounded and illustrated three remarkable conclusions: (1) that many of the characteristics of flowers—nectaries, markings, shapes, &c., are to be interpreted as adaptations in relation to the insect visitors which secure fertilization or pollination; (2) that cross-fertilization is the rule, not the exception, there being not a few reasons why it is unlikely, if not impossible, that carpels are pollinated by pollen from the stamens of the same flower; and (3) that a large number of flowers are dichogamous, *i.e.* with stamens and carpels ripening at different times, one of the ways in which self-fertilization is prevented. Subsequent experiments by Andrew Knight, by William Herbert (1837), and especially by K. F. Gärtner (1844), disclosed the fact which Sprengel had missed, that cross-fertilization has better results than self-fertilization as regards the number and vigour of the seeds,—a conclusion which Darwin was not slow to use in support of his theory, that the adaptations ensuring cross-fertilization were the outcome of a process of natural selection.

Pollination is the process by which the pollen is transferred by insects, or by the wind, or otherwise, from the stamens to the stigma. There, stimulated by a sugary secretion, the pollen-grain sends out a tube, the pollen-tube, which grows down the style, and enters the micropyle of the ovule within which the ovum or egg-cell lies. The mingling of elements from the pollen-tube with the ovum is the real act of fertilization, and the first steps in making this clear were taken by Amici. In 1823 he first saw the pollen-tube emerge from the pollen-grain, and by persevering observation