

this first morphological fragment he had already—led by analogy—discovered the intermaxillary bone in the upper human jaw. Later he and Oken independently traced the analogy between the skull and the vertebral column in vertebrate animals, a view which was taken up by eminent anatomists, such as Meckel, Spix, and Geoffroy Saint-Hilaire.¹ The tendency which lay in these attempts, of which the metamorphosis of plants and the vertebral theory of the skull are only prominent examples, is one which was naturally provoked by the opposite tendency which anatomical studies had received through Linnæus and Cuvier. Goethe himself gives a clear explanation of its origin. In a remarkable passage in the history² of his botanical studies, he mentions Shakespeare, Spinoza, and Linnæus as the three masters who had led him to reflect on the great problems of art, of life, and of nature. Now, he says, the influence of Linnæus lay principally in the opposition which he provoked.

¹ A good account of the part which the vertebral theory of the skull played in comparative anatomy will be found in Whewell's *History*, vol. iii. p. 369, &c. But see against this Huxley in 'Life of Owen' (vol. ii. p. 304): "The hypothesis that the skull consists of modified vertebræ, advocated by Goethe and Oken, and the subject of many elaborate works, was so little reconcilable with the mode of its development that, as early as 1842, Vogt threw well-founded doubts upon it. 'All efforts to interpret the skull in this way,' said he, 'are vain.'"

² See the Weimar edition of his *Scientific Works*, vol. ii. The passage given in the text is from an earlier account contained in two numbers of the 'Morphologische

Hefte' (1817), reprinted *loc. cit.*, p. 389, &c. How Goethe continually hovered between the theory of types and that of development is seen in the following passage (1831, *W. W.*, vol. vi. p. 120): "Das Wechselhafte der Pflanzengestalten, dem ich längst auf seinem eigenthümlichen Gange gefolgt, erweckte nun bei mir immermehr die Vorstellung: die uns umgebenden Pflanzenformen seien nicht ursprünglich determinirt und festgestellt, ihnen sei vielmehr, bei einer eigensinnigen, generischen und specifischen Hartnäckigkeit, eine glückliche Mobilität und Biagsamkeit verliehen, um in so viele Bedingungen, die über dem Erdkreis auf sie einwirken, sich zu fügen und darnach bilden und umbilden zu können."