

of the rocks in different parts that such "deceptive conformities" can be detected.

It must, indeed, be repeated and emphasised that the whole succession of the marine fossil-bearing rocks in western Europe—the most favourable region in the world—had been clearly ascertained before the idea of organic evolution was accepted by geologists. Fossils were appropriately termed "medals of creation" and were merely used as time-markers in cases where the superposition of the layers was obscured. In spite of earlier discussions, it was only after the publication of Darwin's epoch-making work in 1859 that the meaning of the order in which fossils were known to occur became evident. Group after group was studied from the new point of view, and the study is still in progress. The result is complete confidence in the "evolutionary stages" of all groups of organisms as guides to the relative geological age of rocks which contain them in any part of the world.

This result is important because a large proportion of the land and freshwater deposits of the latest or Tertiary epoch are comparatively limited in extent and thickness, and completely isolated on continental areas which have scarcely been affected by movements since they accumulated. These contain the remains of the ordinary land mammals from their beginning until the present day; and the mammals exhibit the most striking evidence of descent from a common ancestry of any forms of life. At first, especially in North America, it is perhaps true that confidence in the general principles of evolution led to some reasoning in a circle. When collections were made in the terri-

ories of hostile Indians there was not much opportunity for detailed field observations. In later years, however, circumstances have improved and experience has been gained, and not only in North America but also in other countries fossil mammals have been collected from beds which have been definitely observed to repose one on another.

Furthermore, there has been much certain correlation by the deposits of one isolated area, as shown by the fossils, overlapping in time the deposits of another isolated area. In illustration of this, Prof. Osborn has published the accompanying diagram (Fig. 1), which explains itself. The general evolution of the horses and camels in North America has thus been revealed, not by assuming the relative age of the beds of different areas in which their fossil remains occur, but by actual correlations made by geologists in the field. Similarly, the relative ages of the primitive ancestors of the elephants in Egypt have been ascertained by examination of perfectly clear geological sections. So many observations of this kind have now been made in various parts of the world, that palæontologists have no longer any hesitation in determining the age of an isolated Tertiary deposit by the state of evolution of the fossil mammals which it contains. They are perfectly justified in doing so, in view of the definite geological evidence which is forthcoming in so great a multitude of cases.

The evolution of life as revealed by fossils is not, therefore, a phantom arising from excess of zeal in pursuing a fascinating idea. It is as strictly the outcome of purely inductive science as any other great generalisation.

Obituary.

MR. W. P. HIERN, F.R.S.

WILLIAM PHILIP HIERN, whose death took place at the Castle, Barnstaple, on November 29, was best known for his work on systematic botany. The son of J. G. Hiern, he was born at Stafford on January 19, 1839, and entered St. John's College, Cambridge, in 1857, where he graduated B.A. as ninth wrangler in 1861, proceeded to M.A. in 1864, and was a fellow of his college from 1865 until 1868. In 1868 he incorporated as M.A. at Christ Church, Oxford, about which time he became interested in botany, and in 1873 published in the *Transactions of the Cambridge Philosophical Society* a monograph of the Ebenaceæ. He then went to the Royal Botanic Gardens, Kew, where he worked out the Meliaceæ and Sapindaceæ for Hooker's "Flora of British India," and was responsible for the greater part of volume 3 of the "Flora of Tropical Africa" in 1877, the Umbelliferae, Araliaceæ, Rubiaceæ, Valerianaceæ and Ebenaceæ of which he worked out alone, and the Compositæ with Prof. D. Oliver.

A law suit, which had been commenced in 1873 by the King of Portugal against the executors of Dr. Friedrich Welwitsch, who had made botanical collections in Angola on behalf of the Portuguese Government, terminated in a compromise in 1875, and Hiern was appointed by the Court to separate a set and to copy the field notes on behalf of the British Museum. This he proceeded to do, and between 1896 and 1900 published in four parts a "Catalogue of the African Plants

collected by Dr. Friedrich Welwitsch in 1853-1861." This completed the account of the dicotyledons, and the remainder of the catalogue was published by members of the British Museum staff. In the *Journal of Botany* for 1895, pp. 139-141, he published a note on the "Plants of Welwitsch's Apontamentos." In conjunction with C. Ficalho he worked out a collection of African plants on which a report, entitled "On Central African Plants collected by Major Serpa Pinto," was published in the *Transactions of the Linnean Society* in 1881.

Having completed his work on the Welwitsch collection, Hiern again went to Kew, where he elaborated the account of the Scrophulariaceæ of South Africa, which in 1904 occupied pp. 121-420 of volume 4, part 2, of the "Flora Capensis," after which he found himself unable to undertake further work on African botany, which was offered to him at Kew. He then retired to Barnstaple and kept the botanical records for Devon, and published in the Botanical Exchange Club Report, 1918, p. 414, a "Clavis to Devonian Sedges," based on the structure of the stems and leaves. During this period he devoted his attention to public affairs and became a Justice of the Peace and County Alderman for Devon.

Mr. Hiern was elected a fellow of the Royal Society in 1903 and of the Linnean Society in 1873; he was also a corresponding member of the Royal Academy of Lisbon. He was a widower, and his only son died some years ago. C. H. W.