of $1,800 for the study of the post-pituitary hormones from Parke, Davis and Company.

Two gifts, amounting to $243,000, have been made to the University of Chicago by the Rockefeller Foundation. The larger gift, of $168,000, is to assist in establishing a department of psychiatry and the second gift, of $75,000, is for support of research in the humanities. With the establishment of the department of psychiatry as a division of medicine, there are represented in the south side medical school all the ordinary branches of medical research. The new psychiatric division will maintain twelve beds in a special unit of the University Clinics, and emphasis will be laid on research in the causes and cure of mental disease. Appointment of a psychiatrist as head of the department will be made before July 1, when the new unit will be established.

A GIFT of £10,000 has been received from J. Albert Thompson for the purpose of establishing a commercial laboratory in the University of Edinburgh. This will provide for the immediate requirements in staff and equipment for a laboratory providing the approved methods of training for students for the commerce degree.

A JOINT expedition representing the museum of the University of Pennsylvania and Columbia University has left for Venezuela where, under the leadership of Dr. M. Vincent Petrullo, four months will be spent in investigating the Goajiros, one of the least-known primitive tribes. Accompanying Dr. Petrullo will be Mrs. Gwyneth Browne Harrington, of Boston; Miss Lydia du Pont, of Wilmington, Del., and Lewis Korn, of Philadelphia, assistants in the South American Section of the University Museum, and Dr. and Mrs. Paul Kirchoff, who will represent Columbia University. The group will stop over for a few days at Curaçao and then proceed to Maracaibo, Venezuela, before journeying into the interior. In addition to the University Museum and Columbia University, the expedition is being sponsored also by the Latin-American Institute, Philadelphia, which has recently been formed in response to a demand for an agency to organize and coordinate research and to disseminate information on the entire field of Middle and South American ethnology, archeology, anthropology and linguistics. The forthcoming investigation of the Goajiros is the first opportunity of the institute to carry out actively the purposes of its foundation.

THE British Mount Everest Committee has arranged to send to Mount Everest this summer a small reconnaissance expedition in preparation for a further attempt on the summit in the early summer of 1936, under the leadership of Hugh Ruttledge. The reconnaissance will be led by E. E. Shipton, and will include H. W. Tilman, Dr. Charles Warren, E. H. L. Wigram, L. V. Bryant (from New Zealand), Michael Spender and one or more members from India of the Himalayan Club not yet finally selected.

DR. SVEN HEDIN, accompanied by members of his expedition, arrived in Stockholm on April 15. The London *Times* reports that he was received at the station by a large and cheering crowd, headed by the Duke of Dalecarlia, grandson of the King. Later in the day a deputation from the Swedish Royal Geographical Society waited on him at his home and presented to him a superbly bound publication and the Austrian Minister handed to him a high Austrian distinction.

DISCUSSION

THE ORIGIN OF THE HIGHER FLOWERING PLANTS

WHEN recently reading Dr. A. C. Seward's "Plant Life through the Ages" (1933) the old puzzle concerning the apparently sudden dominance of Angiosperms in Cretaceous time came before me and led to the development of some ideas which may be worth discussing. It has been commonly assumed by botanists than the first Angiosperms were trees or at all events woody plants. This opinion appears to be strongly fortified by the fossil record, the remains found belonging almost exclusively to arborescent forms. But evidence of this sort is probably not conclusive, for such reasons as the following:

(1) In the existing flora, herbaceous plants are especially prevalent in mesophytic and arid situations, and from their mode of growth, as well as the circumstances of their environment, are extremely unlikely to be preserved as recognizable fossils. The deciduous leaves of trees, which often cover the ground after a storm, are very much more likely to be covered up and preserved.

(2) No one can possibly doubt that herbaceous plants abounded during mid-Tertiary time, much as they do to-day. Yet if we examine Knowlton's "Catalogue of the Mesozoic and Cenozoic Plants of North America" (1919) the extreme poverty of herbaceous genera in the recorded extinct floras is astonishing.

Thus the family Ranunculaceae is represented only by a supposed *Thalictrum,* so doubtful that it was not given a specific name. Since then I have found buttercup seeds in the Florinant shales (Miocene), but of the many species of Ranunculaceae which must have been the ancestors of the present flora, there is hardly a trace. The same may be said of numerous other families.

(3) The evolution of the modern flower must have been closely connected with the development of the flower-visiting insects, especially the bees and their relatives. Now the earliest known bees are from the Oligocene (Baltic amber) and the oldest sphecoid wasp is from the Green River Eocene. These Hymenoptera are by no means primitive types, but are essentially similar to those now living. They certainly had Mesozoic ancestors which have not been found.

(4) To this day, bees abound especially in dry regions, such as Arizona, Turkestan, Algeria or the karroo of South Africa. There may be found a prodigious number of species, together with a rich flora to which the bees are adapted. These can, however, be a rather varied flora without a variety of bees, as shown by the Pribilof Islands, which have only one kind of bee (*Bombus kincaidi*).

Thus it appears probable that the developing angiosperms, together with their developing insect visitors, occupied mainly upland and relatively dry regions, and if so, would rarely chance to appear as fossils. The soft, non-deciduous leaves would rarely be scattered on lake shores, and still more rarely would the remains, if preserved, be recognizable. The bees, if present, would be more likely to be recognizable, but they have not been found on the Mesozoic, although they must have existed.

If we assume that the early angiosperms were not woody, but herbaceous, and were at the same time largely confined to uplands or dry regions, it is easy to understand why they do not appear in the fossil record, or rather, are represented by few and more or less doubtful fragments.

I wrote briefly to Dr. Seward on this subject and he at once referred me to the most illuminating discussion in Chapter V of Mrs. Arber's work "The Gramineae" (1934). Here the problem of herbaceous vs. arborescent origins is discussed in the broadest and most lucid way, and it is shown that the assumption that woody types came first is by no means necessarily valid. Zoological evidence is added to the botanical, and the chapter is so full of original ideas that a brief summary is impossible.

Supposing it to be true that a rich herbaceous flora of angiosperms existed during the earlier part of the Mesozoic, how can its existence be demonstrated? Just as rich early fish-faunas have been revealed by the study of scales and otoliths, so it may well be that floras will be proved to have existed by the discovery of small seeds and pollen, and very likely also of calyces or sepals. No adequate search has been made for such objects in the rocks which might contain them. R. P. Wodehouse (1933) has described and illustrated the pollen of the oil shales of the Green River Eocene, and has shown that many species, belonging to thirty-four genera, could be recognized. He states, however, that herbaceous plants, apart from a few aquatics, are not represented. This statement must be qualified by another, that only about a third of the pollen species present has been described and identified. Wodehouse says, "The absence of terrestrial herbs is entirely in keeping with the theory put forward by E. W. Sinnott, that the herbaceous type was developed in temperate regions during Eocene time in response to a progressive refrigeration. At this period terrestrial types were only beginning to be developed." Any one who has considered the slowness of plant evolution, and the small amount of change in the insect fauna since early Tertiary times, can not readily believe that the great and varied herbaceaus flora of to-day had such a recent origin. A really full and adequate discussion of the problem might well require a book, but I venture to suggest that enough has been adduced to justify a minute examination of Jurassic, Triassic and even Permian lake-bed deposits, wherever they are suitably fine-grained, in the hope of finding small seeds or other remains, and perhaps especially pollen, representing an herbaceous flora of angiosperms.

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THE MOTION OF GLACIERS

AFTER reading Dr. Chamberlin's objection (SCIENCE, December 7, 1934) to my contribution (SCIENCE, November 2, 1934) on "The Motion of Glaciers" he and I had an oral discussion of the topic. This reply (which will have been seen by Dr. Chamberlin before it is sent to the editor) will endeavor to make clear our differences. From it the reader should without further notices be able to come to his own conclusions in regard to the merit of the several contentions. It is of course to be realized that there is not space in SCIENCE for a complete review of the problem. The monograph by Hess which prompted the first notice covers that ground fully if not comprehensively.

From our discussion it developed that Dr. Chamberlin was of the impression that my piece was in some sense unfair. This because I used as tenets of the shear theorists formulations which originated with