fessor See proposed to explain many things, among them being "the direct effect of sunlight on a magnetic needle, as in Nipher's experiment of 1913." This was a complete surprise. Evidently this experiment had been tried with success by I suppose Francis E. Nipher, of Washington University, St. Louis, Mo.

It seems to me that such an experiment would be valuable to science in many ways. The question arises as to the quantitative effect produced—if appreciable, then might we not expect or predict a change in all magnets more or less with time—especially as they are exposed to the sunlight? It is well known that magnets lose some of their magnetism during the process of ageing. Might this effect be a contributing cause?

The question as to the effect on small magnets such as in use for the determination of the earth's magnetic elements assumes some importance when considered in this regard.

What might be the effect of the sunlight on the magnet if it were rotated about a horizontal line through its center of mass and perpendicular to its magnetic axis? The theory of magnetization by rotation has been treated in two articles appearing recently in SCIENCE by Barnett.

Aside from the foregoing it would be interesting to note the effect, if any, of radioactive emanations upon a magnetic needle.

There are two well-known cases of the transformation of luminous into electrical energy, the thermopile and the photo-electric cell. However, in neither one is the transformation direct, as would be the case of luminous energy falling upon the magnetic needle.

It would be interesting to see this matter investigated in the light of modern electrical theory and to know of Nipher's experiment and of the results obtained.

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GUMBOTIL, A NEW TERM IN PLEISTOCENE GEOLOGY

THE term gumbo has been used for many years by some geologists in America for a dense, impervious clay, which, when saturated with water, is sticky and tenacious. The name has had no relation to the origin of the material: in many cases it has been applied to alluvial deposits on the flood plains of streams: McGee, Leverett and others have applied it to a gray to drab-colored clay overlying drift, the origin of the gumbo having been attributed to various causes, some having considered it to be, mainly, of fluvio-glacial origin, others to be aqueous, and still others have thought it to be related to loess.

In a recent paper in volume 27 of the Geological Society of America, pages 115 to 117, the writer discussed a gumbo which lies on Kansan drift and which he had studied in considerable detail in southern Iowa. This gumbo is limited in distribution to tabular divides and other remnants of the Kansan drift plain. The view was there expressed that the field evidence suggested strongly that the gumbo is the result, chiefly, of the chemical weathering of Kansan drift. It was stated, also, that detailed chemical analyses of the gumbo and the underlying materials were being made by Dr. J. N. Pearce, of the chemistry department of the University of Iowa, to ascertain whether the analyses would strengthen or weaken the interpretations made from the field evidence. These analyses have now been completed and will soon be published. They seem to show clearly that the gumbo is the weathered product of the drift.

During the present summer, the writer has extended his studies into the western, northwestern and northern parts of Iowa, and at scores of places sections have been examined which show clearly the intimate relations between the gumbo and the underlying Kansan drift. Moreover, it is of interest that in many places a gumbo has been found on the Nebraskan drift, the relations of the gumbo to this drift being similar to those of the super-Kansan gumbo to the Kansan drift. Furthermore, after a somewhat careful study of the gumbo which lies on the Illinoian drift in southeastern Iowa, and which has been discussed by Leverett in Monograph XXXVIII. of the United States Geological Survey,

pages 28 to 33, the conclusion has been reached that here, also, the gumbo is so related to the drift that it is undoubtedly the thoroughly weathered product of the Illinoian drift.

As a result of the field investigations and the chemical studies it is now proposed that the somewhat indefinite term "gumbo" be no longer used for these super-drift clays, but that the name "gumbotil" be used. Gumbotil is, therefore, a gray to dark-colored, thoroughly leached, non-laminated, deoxidized clay, very sticky and breaking with a starch-like fracture when wet, very hard and tenacious when dry, and which is, chiefly, the result of weathering of drift. The name is intended to suggest the nature of the material and its origin, and it is thought best to use a simple rather than a compound word. Field work has already established the fact that in Iowa there are three gumbotils, the Nebraskan gumbotil, the Kansan gumbotil and the Illinoian gumbotil.

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THE EVOLUTION OF HERBS

The article by Edmund W. Sinnott, published last week in Science, *44*: 291, supports conclusions on this subject arrived at from quite a different standpoint.

The idea that trees are primitive forms is involved in the proposition advanced by Henry L. Clarke, in the *American Naturalist, 27*: 769–81, September, 1893, that in their order of blooming the generalized precede the specialized.

My observations were based only on entomophilous flowers, 493 native and 61 introduced.

If we assume that the earliest, least specialized, and primitive plants form the earliest maxima and succeed in regular order, we shall have for indigenous plants the following results according to the time of the maxima:

Trees	April 27–May 8
Woody climbers	June 13–15
Shrubs	June 21–23
Perennial herbs	August 2–6
Annuals and biennials	August 30–September 6

And this seems to be the probable order of their development. The original plants having the most freedom developed large size and occupied the most favorable positions. The less favored could become reduced to shrubs and finally to herbaceous perennials, and occupy many positions which were unfavorable for trees or with which trees did not interfere. The habits of perennial herbs are better understood if we suppose that they had to compete with trees, or rather avoid competition with them, from the first. The annuals developing later were able to find many temporary situations unfavorable for woody plants or perennial herbs. The primitive Angiosperms were probably trees, like Magnoliaceæ, Anonaceæ and Lauraceæ.

Another general characteristic of blooming seasons is that the earliest, most generalized, most primitive plants have the shortest seasons, while the most specialized, most recent, and latest arrivals have the longest seasons. Arranging the vegetative forms according to their average blooming seasons, we have the following order:

	Days
Woody climbers	36.5
Trees	39.4
Shrubs	42.7
Perennial herbs	57.1
Annuals or biennials	75.1
Cosmopolitan	80.4
Introduced	117.3

Except for trees and woody climbers, the order is the same as for the maxima.

Charles Robertson

Carlinville, Ill.,
September 6, 1916

HORSE FLESH AND THE DIET OF EARLY MAN

To the Editor of Science: In Science, for September 22, is published a letter on the "Animal Diet of Early Man," which discusses the subject with reference to possible evidence drawn from tapeworms and their hosts. In this connection, the writer of the letter speaks of the horse as food, as follows:

There is nothing to show that horses were not eaten, unless the rather widespread abhorrence of eating horse flesh at the present time can be con-