much, for the results are definite and given in the briefest and yet the most comprehensive manner.

When engineers publish results of experiments, they express the conditions for, and the results of, their experiments by means of mathematical formulæ as much as possible, and the tendency among botanists is to the same practice, for with the great amount of literature that is published annually, the putting the gist of the matter into the most concise and comprehensive form is becoming indispensable.

On the fertilization and development of the embryo in Senecio aureus. By D. M. Mottier.

Distribution of the North American cactaceæ. By John M. Coulter.

Marchantia polymorpha, not a typical or representative liverwort. By L. M. Underwood.

How a tendril coils. By D. T. MacDougal.

Forestry exhibit of Indiana at the Columbian Exposition. By Stanley Coulter.

Notes on certain plants of southwestern Indiana. By John S. Wright.

This report is based upon about two weeks of field work done during the latter part of September, 1892, in the extreme southwestern part of the state, by D. T. MacDougal and J. S. Wright. This region is known as the "pocket" and owing to its peculiar peninsular position has an overlap of a northern and a southern flora.

Notes were made upon the distribution and condition of nearly 200 forms.

Report was made upon a depauperate form of *Bidens cernua* L., found on the Wabash banks.

Among the forest trees special notes were made upon distribution, size, &c., of *Celtis mississippiensis* Bosc.; *Carya olivæformis* Nutt; *Quercus lyrata* Walt.; *Diospyros virginiana* L., and *Taxodium distichum* Richard.

EPIDERMIS AND SPINES OF CACTACEÆ. By E. B. ULINE.

Before entering upon the revision of Cactaceæ now in preparation under President Coulter's direction at Indiana University, a series of investigations on the minute structure of such material as was then available was made during the winter and spring terms of 1892. It was our purpose not only to learn of the general morphological nature of the family, but also to discover, if possible, any new diagnostic characters that might be of service in the revision. I have therefore selected for presentation only such peculiarities of structure as may prove of most use in specific determination.

Though nearly a year had passed since the collection of the material, it was still green and in good condition, with tissues fresh and distended as in growing specimens—thus making it highly favorable for study. Sixty-five species were examined, represented generically in the following proportions: Mamillaria, 17; Echinocactus, 16; Cereus, 21; Opuntia, 11.

The most striking feature at first sight is the entire absence of true foliage. Naturally, my first inquiry was for some specialized organ or region which should represent, and perform the functions of the missing foliage. The even distribution of stomata and chlorophyll over the entire surface declares the plant itself to be one gigantic and curious leaf so far as function is concerned. However, regarding leaves as devices for increasing surface exposure (expansion of surface formed by the ultimate branching of the fibro-vascular system), I was led to look to the wart-like mamillæ of the genus Mamillaria, and to the tubercles and ribs of Cereus, Echinocactus and certain species of Opuntia as the homologues of leaves. Transverse sections of the tubercles of *Mamillaria macromeris* show fibro-vascular branching similar to that of the leaf,—the chief difference lying in the cylindrical nature of the one as distinct from the flat surface of the other. This conclusion is verified by the position of the flowers and branches, which in nearly all cases proceed from the axils of the tubercles and mamillæ. The genus Opuntia alone is described as having leaves.