color it would suggest a 'bud shoot' of a *Cassandra* from an *Andromeda*. The appearance of two generic types in the branches of one shoot is very striking.

On Monday, July 2, a party of thirty-four drove to Enfield Gorge, alighting at the foot of the gorge, while the carriages were taken to the head of the gorge, a little more than two miles distant. The numerous successive falls and cascades were observed, also the geological formations, but especially the vegetation. There were numerous liverworts in the wet rock walls. In one place *Preissia* and *Conocephalus* are abundant and are usually brought into zonal formation by the different moisture conditions which vary according to the surface contour of the perpendicular rock wall. At a short distance *Pellia* usually grows where there is a greater quantity of water dripping down the rock. This year there is more moisture than usual. The dripping water is so abundant that it is killing out the *Preissia* and *Conocephalus* in certain spots and the *Pellia* is coming in and overgrowing them. These features were very easily demonstrated. Higher up on the clay bank at this place *Blasia* is abundant, and on the flat rocks below *Marchantia* was found.

Near the upper end of the gorge was an abundance of the fern, *Pellæa gracilis*, on the moist rocks. The vegetation of the small alluvial plains here and there was rich in forest and shade plants which afforded an excellent opportunity for observation of 'mosaics' and various ecological features.

The interest shown in a meeting in which the out-of-door features occupied so prominent a place suggests the desirability of their annual repetition, although it is by no means to be taken for granted that field excursions might always be organized under such favorable circumstances as those offered by Ithaca and the Cornell botanists.

D. T. MacDougal,
Chairman Section G.

SCIENTIFIC BOOKS.

Der Bau des Fixsternsystems mit besonderer Berueecksichtigung der photometrischen Resultate. Von Dr. Hermann Kobold. Friedrich Vieweg und Sohn. 1906. M. 6.50.

This volume is No. 11 of a series, 'Die Wissenschaft,' whose declared purpose is to place before the public, from time to time, a digest of the progress that has been made in definite departments of scientific research. Designed alike for the instruction of the general reader and for the orientation of the professional student in his own field, Dr. Kobold's work must be regarded as upon the whole an eminently satisfactory achievement. It is, indeed, probable that competent critics will dissent vigorously from some of his conclusions and will regard as far from final his judgment upon much of the conflicting evidence marshaled in the text. But with all due reserve in these respects the book possesses great merit both as a compilation of data relative to the structure of the stellar system and as a summary of current theorizing upon that data.

In some twoscore pages there is passed in brief review the methods of determining such fundamental data as the position, brightness and color of individual stars, stellar spectra, parallaxes, proper motions and the apparent distribution of stars upon the sky. Then follows the backbone of the work, a hundred pages devoted to a critical consideration of the present state of knowledge along these several lines, with particular stress upon problems of stellar motion. The author here defends the thesis, supposed to be original with him, although recently brought into prominence by Kapteyn, that the stellar motions can no longer be regarded as lawless in their arrangement, directed in equal measure toward all parts of the celestial compass. Rather must we consider them as having a definite relation to the Milky Way, the exact nature

of that relation being a large problem for future study, while as an immediate consequence of the altered concept we have doubt cast upon the supposed determinations of the sun's motion in space. At this point, as in most discussions of the kind, we miss a frank recognition of the relativity of all motion, and its corollary that the direction and velocity of the motion to be imputed to the sun is purely a matter of convention and definition, depending upon the choice of an origin to which that motion shall be referred. The author appears to regard the solar motion as something fixed in the order of nature, which should be found always the same, barring accidental errors, from any considerable group of stars used for its determination.

To the non-professional reader, doubtless, the most interesting part of the work will be found in the third section, devoted to the construction of the heavens. Without ignoring the work of others, Easton, Kapteyn, Schiaparelli, Stratonoff, etc., Seeliger's discussion of the distribution of the Durchmusterung stars here plays the principal rôle and is described by the author as 'a complete solution of the problem'; which 'determines the universe as revealed to us in the enumeration of the stars,' etc. The character of the finite and definitely limited universe thus revealed is described as follows:

> Throughout a finite space of spherical form there are distributed bodies of widely varying mass and widely varying physical condition. Amidst gaseous nebulæ of extraordinarily low temperature are placed other bodies strongly condensed and glowing hot. The arrangement of these individual masses is not one of haphazard uniformity, but, as swarms, they are clustered about individual centers which, in loose relation one to another, are arranged in the shape of a great spiral with multiple arms. In the remoter parts of this spiral the hotter and gaseous stars predominate, while near the center of the spiral is the sun and its more closely related stars, which for the most part resemble it in physical condition. Many of these latter share in the motion of the sun along the fundamental plane of the spiral, *i. e.*, the milky way. There are also numerous other groups of stars possessing a common motion in the plane of the galaxy.

The doctrine of a demonstrably limited stellar system thus presented is avowedly based upon statistics of the distribution of stars brighter than the tenth magnitude, and as these stars constitute, both in number and extent, only a small fraction of the visible universe one is tempted to question the soundness of that logic which extends to the larger aggregate, conclusions of an empirical character derived from a minute fraction of the whole. Indeed, conservatism in this respect seems the more required, since, as is conceded by Kobold, the apparent distribution of the fainter stars is quite unlike that of those from which his conclusions are drawn. Even for these brighter stars it is probable that the supposed indication of a limited and finite system is fallacious and arises from the tacit assumption that the fainter stars appear faint only by reason of their greater distance from the earth. It has been recently shown that such is not the case, the stars of the fainter magnitudes being intrinsically less luminous than those of the brighter classes.

At page 215 of the text Dr. Kobold falls into serious error in comparing Kapteyn's empirical formula for the probable parallax of stars of determined proper motion and brightness with Comstock's determination 0.0045″, as the mean parallax of a considerable group of stars of the average magnitude 10.5. According to Kobold, *'Kapteyn's Formel nur 0.0016″ verlangt,'* for this group of stars, while in fact the formula furnishes for this case 0.0042″, in excellent agreement with the observed value. It is only justice to Dr. Kobold to state that no other similar case has come within the reviewer's note.

G. C. C.

SCIENTIFIC JOURNALS AND ARTICLES.

The American Naturalist for August contains articles on 'Volant Adaptations in Vertebrates,' by R. S. Lull; 'External Morphology of the Dugong,' by H. Dexler and L. Freund, and 'Reproduction of *Metridium marginatum* by Fragmental Fission,' by M. L. Hammatt. Dr. Lull notes that volant evolution has occurred seventeen times, seven of these instances being for true flight. Dr.