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.

Lull will pardon us for saying that there seems no good reason to suppose that the enormous occipital crest of Pteranodon was needed to keep the animal head to wind; were this the case it would have inevitably tripped the creature up when it wore ship. There is a slip of the pen in the statement that in birds 'The scapulæ and coracoids fuse with each other firmly,' since actual fusion only takes place in birds that do not fly, and not in all of these. The specific name of the flying frog is *reinwardtii* not *reinharti*.

We will also put a note to the quotation from Professor Moseley on page 539 and say that the dropping of the wings by the albatross is very likely for steering or balancing and that often one wing only, or the tip of one wing is dropped.

The authors of the article on the dugong note the lack of good figures of this animal, but fail to entirely remedy this defect, as the accompanying figures are few and not very good.

The Museums Journal of Great Britain for July contains the address of the president of the Museums Association, Dr. W. E. Hoyle, given at the Bristol meeting. This was devoted to 'The Education of a Curator,' is both instructive and interesting, and should be widely read. First among the qualifications of a curator Dr. Hoyle places 'general culture, tact and courtesy; an ability to suffer fools gladly.' Evidently the experience of Dr. Hoyle has been similar to that of other curators and he has our sympathy. It is interesting to note the value accorded to an acquaintance with the practical side of museum work, such as planning cases, structure of locks, cataloguing, taxidermy and the preparation of skeletons, since Dr. Hoyle has been so successful as a museum administrator that he is qualified to 'talk by the book.' Reference is made to the small salaries of museum officers, and in this respect matters are probably better in the United States than in Great Britain.

Bird Lore for July-August has articles on 'A Kingbird Family,' 'My Experience With a Blue-headed Vireo,' 'A Bit of Robin History' and 'The Yellow-breasted Chat.' W. W. Cooke contributes the seventeenth paper on 'The Migration of Warblers' and in 'The Audubon Societies' is given a summary of the laws for the protection of birds, or for the abolition of proper protection, likely to come up at the next legislative session in various states.

The Educational Leaflet, No. 21, is devoted to the scarlet tanager.

The Zoological Society Bulletin for July is termed the Reptile Number, being mainly devoted to a consideration of the more important reptiles now on exhibition. Under 'Methods of Exhibiting Reptiles' it is stated that many classes visit the park and that everything possible is done to assist them in obtaining correct information, children being taught that most snakes are harmless and encouraged to handle certain species. African reptiles are unusually well represented in the society's collections. There is a good illustration of the young two-horned African rhinoceros recently received, this being the first brought to this country in the last eight years.

The American Museum Journal for July has for its more important articles a detailed account of 'The Willamette Meteorite,' by E. O. Hovey, a notice of the commencement of work on the new west wing, and the concluding part of Mr. Chapman's 'List of Birds found within Fifty Miles of the American Museum of Natural History, New York City.' This is illustrated and accompanied by a list of the principal papers relating to the birds of the vicinity of New York City. The two parts are published together as Guide Leaflet No. 22.

The collection of woods has been embellished by the addition of copies of the leaves and flowers of the magnolias, the exhibit illustrating the life of the Plains Indians has been installed and a very perfect example of the jaws and head armature of the giant extinct fish *Dinichthys* placed on exhibition. There are many interesting notes on other work of the museum.