

a general statement. It proves that the associative process in vertebrates is dependent upon the cerebral hemisphere. "The assumption of 'centers of association,'" says the author, "is just as erroneous as the assumption of a center of coordination in the heart. Association is, like coordination, a dynamical effect determined by the conductivity of the protoplasm. Associative processes occur everywhere in the hemispheres (and possibly in other parts of the brain), just as coordination occurs wherever the connection between two protoplasmic pieces is sufficient. It is just as anthropomorphic to invent special centers of association as to invent special centers of coordination."

Finally, attention should be called to the stress which in this valuable contribution to the literature of comparative physiology is laid upon the chemical and physical study of protoplasm and its transformations. Ultimately it would appear all physiological investigations resolve themselves into problems of the physics of colloidal substances.

In this imperfect and inadequate review of Professor Loeb's book an attempt has been made to indicate a few of the general tendencies and conclusions which seem of prime importance. There are a large number of interesting experimental studies discussed in the book which have not even been mentioned here. We have taken the liberty to quote freely from the text, and it is hoped that the sentences thus selected to indicate the author's point of view will in no case misrepresent him because of their isolation.

ROBERT MEARN'S YERKES.

CAMBRIDGE, MASS.

Plant Life of Alabama. An account of the distribution, modes of association and adaptations of the flora of Alabama, together with a systematic catalogue of the plants growing in the State. By CHARLES MOHR, Ph.D. Contributions from the U. S. National Herbarium. VI. Washington. 1901. 8vo. Pp. 921. 12 plates and 1 map.

The 'Plant Life of Alabama' is a noteworthy addition to the list of works which treat of State floras. The book consists of two parts; one, of 127 pages, dealing chiefly with

the floristics of the vegetation, the other, of 708 pages, containing a complete catalogue of the flora. The first part will be particularly welcomed by phytogeographers as the first serious analysis of a portion of the vegetative covering of the southeastern United States. The value of this portion lies chiefly in the observations and lists which it contains, as no systematic investigation of the vegetation has yet been made. The absence of recent methods and the lack of detailed formational analysis detract much from this part, though the lapse of time between the completion of the manuscript and its publication would seem to indicate that this is not the fault of the author. It is much to be regretted that the author's death occurred before his book finally appeared.

The author sketches the history of the botanical exploration of Alabama, giving a brief account of the labors of Bartram, Peters, Buckley and others. This is followed by a summary of the general physiographical and climatic features of the State. Physiographically, the area considered falls into five regions, the coastal plain, the region of crystalline rocks, the region of the coal measures, the Coosa Valley and the Tennessee Valley. The author gives a brief discussion of the general principles underlying plant distribution, in which he has unfortunately made use of Merriam's divisions of the North American continent, which are phytogeographically incorrect. The formational treatment is based upon the work of Willkomm and Warming. The accurate classification of formations, however, as hydrophytic, mesophytic or xerophytic, is hardly to be determined otherwise than by actual physiometric investigation of formations, which have been tentatively determined by means of floristic. The formational analysis of the vegetation is neither close nor thorough, consisting for the most part of floristic lists of the various habitats, with very slight consideration of the interrelations of the species which constitute the formation. In some instances (page 65) the difficulty seems to rise from the fact that the acquaintance with the particular vegetation is at second hand.

Under biological and ecological relations, the author treats briefly of the forest flora, in which are included shrubby-plant associations and arboreal-plant associations, evergreen and deciduous, the campestrian flora, the water and swamp flora, including the hydrocharidean, lithophytic, limnæan and palustrian classes, and of the organotopic flora, comprising epiphytic, saprophytic, symbiotic and parasitic plant associations. This is followed by an interesting discussion of introduced plants, which are regarded as naturalized, adventive and fugitive. The more detailed consideration of the vegetation is taken up under plant distribution, in connection with the Carolinian and Louisianian areas. In delimiting the two the author makes use of 'truly zonal plants,' which, except in restricted formations, usually of hydrophytic stamp, are illusive. The Carolinian area falls into the mountain region, the table-lands, the region of the Tennessee Valley and the lower hill country. Under each is given a summary of the physiographical features and climate, and a discussion of the various formations, grouped as xerophile and mesophile forests, and xerophile, mesophile and hydrophytic plant associations. The Louisianian area is likewise divided into several regions, central pine belt, central prairie, maritime pine and coast plain, in which the treatment of the formations is similar.

Notwithstanding the valuable information now made available for the first time in the part just considered, the second part is a more important contribution. It contains an excellent catalogue of the entire flora, in which are enumerated more than 4,500 plants, of which 2,500 are flowering plants and upward of 2,000 cryptogams, numbers which indicate an extreme richness and diversity of vegetation. The large list of fungi, which is contributed by Professor Earle, is a testimony of the energy and industry of a few workers, notably Peters, Atkinson, Underwood and Earle. The algæ are apparently little known as yet, a fact which explains the preponderance of anthropytes in the list. The entries of the flowering plants are models of floristic cataloguing. The bibliography is full, and indications of range,

both State and continental, are given with unusual care. The type locality is indicated wherever known, as is also the disposition of the Alabama exsiccati. Altogether the catalogue is the most complete and painstaking State list so far contributed to American botany. The book closes with a list of the plants cultivated in Alabama, a tabular statement of the plants of the State, and a very satisfactory index.

FREDERIC E. CLEMENTS.

THE UNIVERSITY OF NEBRASKA.

TWO PAPERS ON ANIMAL MECHANICS.

Ueber die Bewegungen in den Handgelenken, von RUDOLF FICK; *Ueber die Bewegungen des Fusses u. s. w.*, von OTTO FISCHER; both in the 26th volume of the *Abhandlungen der Math. phys. Classe der König. Sächsischen Gesellschaft der Wissen.*, Leipzig, 1901.

These papers are alike, but in some respects quite different. In the former Fick discusses the movements of the bones of the wrist as shown by the X-rays, and though mathematics are not avoided, they are rather subordinate to the results of observation. Thus anyone who is sufficiently at home in the anatomy of the hand can follow the author provided only he take pains enough. Fischer's paper is the fourth part of his 'Gang des Menschen' in which the share of the foot in the walk is scientifically and mathematically studied. This puts it beyond the reach of most readers. Without pretending to be able to appreciate it, we think we run little risk, from the reputation of the author, in recommending it to students of this field.

The paper on the wrist is one that, while very valuable, is not of very general interest to readers other than anatomists. Since the introduction of the X-ray, hands, as convenient objects, have been photographed everywhere, and several anatomists have given attention to the movements of the bones. So far as the results obtained from the dead body go, we are not inclined to modify the opinion which we have expressed, namely, that the X-rays have done little more than confirm what was already known of the movements of the wrist. (This must however be understood