

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.

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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

with the proviso that more was known than was found in most anatomical text-books.) But in these studies the living hand has been used, and although our contention still in the main holds good, it is to be admitted that *à priori* we really did not know how closely the movements made on a dead body reproduced the conditions which were the result of motions from within. The work has been very thorough, much attention being given to individual bones. Some of the views strike us as quite original. Thus we do not remember to have seen, in any of the monographs on this subject the position of the carpal bones in palmar and dorsal flexion shown directly from either the front or the back as in the usual view of the wrist. The objection which naturally presents itself, when such a course is proposed, is that the foreshortening of the flexed bones and the hiding of more or less of one row under the other would make the figure worthless, but this objection has by skill in technique been well met. The illustrations are admirable, and are made still more practical by being almost always accompanied by an outline drawing.

The results in the main are these: In lateral motions of the hand we may accept the theory of two oblique axes crossing each other at about the middle of the wrist with the proximal and distal angles larger than the lateral ones; but in flexion and extension we must assume a single transverse axis. A point emphasized is that the mid-carpal joint is a very important one. This is not new to anatomists, but we doubt if it is very familiar to the average student of anatomy. The work in short is both an interesting and a valuable one.

THOMAS DWIGHT.

The Teaching of Mathematics in the Higher Schools of Prussia. By J. W. A. YOUNG, Ph.D., Assistant Professor in the University of Chicago. New York, Longmans, Green & Co. 1900. Pp. xiv + 141.

The feeling that German schools have something well worth the American teacher's attention is not at all new. It has been said and written for a century, and within a few years it has given rise to the publication of several

works of genuine merit, not to speak of numerous books and articles of no merit whatever. Of the former class this one by Professor Young is unique in that it is the first to devote itself entirely to the mathematical phase of education. Furthermore, it is somewhat unique in being a well-balanced, practical book for practical and well-balanced teachers. It tells one what one wishes to know. Not many Americans have been able critically to examine the subject of mathematics in Prussia. Here is a book that answers just the questions the intelligent teacher would ask if he were there, that gives him courage to face the issues of the present, and that should make him confident of the future. And it does all this, not by preaching American or German supremacy, but by intelligently pointing out the superior features of German education and by showing us our lines for improvement.

The real interest in the book is not so much in the carefully selected general information, for this it is not difficult to find in standard works like those of Baumeister and Russell, but in the consideration of the two questions: Are the Prussian schools doing better work in mathematics than the American? If so, how is this accomplished?

When we consider that we give about ten per cent. more time to mathematics than they do, that they recognize less home study than we, and that their children leave even the classical gymnasium knowing more of mathematics than do our high-school graduates in scientific courses, there can be only one answer to the first question.

The reasons for this state of facts are, briefly, the following: (1) The teachers in the gymnasias are men, and they enter the profession as a life work. (2) These men are university graduates, with at least two additional years of professional training. They have been rigidly examined, not by school teachers whose political pulls have given them place, but by university professors, specialists in their various subjects, appointed by the state. And in addition to all this, they have had at least one year of probationary teaching. Their examinations for the elementary classes include the calculus, and those for the high school grades

require independence of thought in the higher geometry, in analysis, and in analytic mechanics, with a good knowledge of the literature of these subjects. (3) The teacher's position is one of honor, recognized in cases of superior excellence by the title of 'Professor,' bestowed by the government, a title with us 'defamed by every charlatan and soiled by much ignoble use.' (4) The teacher has fewer classes per week than the American teacher, and when out of class instead of being set to watch a 'study hall' he has time for recreation and study. (5) Considering the purchasing power of the money, the teacher comes, after a reasonable time, to receive a somewhat better salary than is offered in America, and hence a relatively stronger set of men enter the profession. (6) His countrymen appreciate that the teacher "can do his best only in an atmosphere of financial and mental tranquility. He must himself be continually growing, and if he is embarrassed by financial cares and harrassed by struggles to improve his material position, his growth is retarded and the quality of his work inevitably deteriorates." He is, therefore, accountable to no local authorities; political 'pulls' have no meaning to him; his superiors in law are his educational superiors as well. He works with the assurance that a pension awaits him when the 'rainy day' comes, and yet he is urged to progress by such manifold inducements that he does not stagnate. (7) The school year is longer than in America, the twenty-minute class periods of our lower grades are unknown, and hence the instruction means more when it is being given and is more consecutive than with us. (8) The teacher teaches; he does not merely hear a recitation. Text-books mean little; home study is not a serious matter; but the class period is a time for serious study, rapid work, heuristic teaching and general inspiration. Space does not permit of speaking of other reasons, or of the results of the system as shown by examination tests.

Professor Young does not, however, claim that Germany is all good and America all bad. Neither does he claim that we can adopt their system. He is eminently judicial in his conclusions, pointing out what we can safely use,

and where we can unquestionably improve. On the whole, the book is one of the best balanced works on German education that have appeared, and as such is recommended to every American teacher of mathematics.

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SCIENTIFIC JOURNALS AND ARTICLES.

THE *Botanical Gazette* for November contains the following leading articles: G. T. Moore has published with three plates his second paper entitled 'New or Little-Known Unicellular Algæ,' giving a detailed account of the life history of *Eremosphæra viridis*, and coming to the conclusion that for the present, at least, the genus should be classed with the *Protococcoideæ*; and also describing as a new genus a form which has been confused heretofore with *Eremosphæra*, and naming it *Excentrosphæra*. T. C. Frye has published with one plate an account of the development of the pollen in certain *Asclepiadaceæ*, his investigation having been suggested by the record that in certain members of this family there is no tetrad division. The development of the sporangium was found to be of the general type, the primary sporogenous cells passing over directly into pollen mother cells; these latter divide in the usual tetrad manner, but subsequently through mutual adjustment the four spores are arranged in a linear series. Miss F. Grace Smith has published the results of a large number of observations upon the distribution of red color in vegetative parts in the New England flora. A general conclusion is reached that the statistical observations obtained fit no one theory of color in all particulars. Mr. George A. Shull has published with illustrations the results of observations upon 'Some Plant Abnormalities.' He records instances of fasciation in *Eriogon Canadense* and *Echium vulgare*; abnormal foliage leaves in *Pelargonium* and *Hicoria*; and abnormal floral organs in *Lathyrus odoratus*, as well as in certain species of *Clematis*. Under the head of 'Briefer Articles,' E. B. Copeland has discussed Meissner's paper on evergreen needles, answering certain