

exception; for instance, a plane can be deformed while one line of it is fixed; again, most people would agree, after reflection, that a spherical cap is fixed when its circular rim is fixed; but our power of correct intuition is very limited, and the theorem can (apparently) only be proved by an analytical definition of deformation, and the theory of differential equations.

Other chapters of the work, equally interesting, but more familiar, are those on curves in space, curves on surfaces other than geodesics, surfaces with plane or spherical lines of curvature (including Weingarten surfaces), triply orthogonal systems, and congruences of curves. The last of these is admittedly only a brief introduction, and the others, of course, can be supplemented from original papers. As to the latter, sufficient references are given to start the student on his researches; and most, if not all, of the leading names appear to have been included, though one cannot help missing Casey in connection with cyclides, and Kummer is not alluded to, though Hamilton is, when the author is discussing systems of rays.

It should be added that there are numerous sets of excellent examples, many of them based upon original papers. It is a pity that in the latter case references have not been given. Finally, the choice of symbols is very judicious, and a list of those which have special meanings is given on pp. xix-xxiii. Dr. Forsyth may be congratulated on producing a work of great interest and value, which is perhaps the best treatise that he has ever composed.

G. B. M.

OUR BOOKSHELF.

Festschrift zum sechzigsten Geburtstage des Herrn Geheimen Hofrats Prof. Dr. Johann Wilhelm Spengel in Giessen. Herausgegeben von A. Brauer, L. Döderlein, L. Dollo, H. Ludwig, E. L. Mark, M. Weber, und A. Weismann. *Erster Band.* Pp. viii+609+32 plates. Price 75 marks. *Zweiter Band.* Pp. vi.+863+41 plates. Price 100 marks. *Dritter Band.* Pp. v+572+18 plates. Price 50 marks. (Jena: Gustav Fischer, 1912.)

THE Editor of the *Zoologische Jahrbücher* has received a bulky tribute of esteem in the three-volume *Festschrift* that supplements this year's issue of that journal. In the first volume the twenty-four essays are chiefly of systematic character. Even a list of these would occupy too much space, and we can merely draw attention to some of the more interesting points. A Pantopod-larva from Kiel leads Richters to suggest a crustacean origin for the group. Friese and v. Wagner continue their admirable studies on bees by a con-

tribution to our knowledge of arctic-, alpine-, and steppe-forms of humble-bees. M. M. Metcalf describes an *Opalina* the nuclei of which fail to complete their mitosis. Many other papers of interest to systematists occur in this section. The second volume is chiefly anatomical, and the most important paper is probably that by Julin on the development of *Pyrosoma*. The other papers are largely descriptive and of interest mainly to the anatomist. The third section of the work is composed of general papers and of physiological ones. The most elaborate of these is the very detailed study of muscular contraction and movement in Lamellibranchs carried out by Polimanti at Naples; but there is also a very careful study of the ciliary apparatus in the eyes of vertebrates by C. Hess, another on the spermatophores of crustacea by E. A. Andrews, and an interesting account of the insect larvæ which use their hind gut as an organ of propulsion. Upon the whole, however, it must be confessed that this *Festschrift*, in spite of its great bulk and beautiful plates, is a dull work.

Oil-Finding: an Introduction to the Geological Study of Petroleum. By E. H. Cunningham Craig. With an Introduction by Sir Boverton Redwood, Bart. Pp. xi+195. (London: Edward Arnold, 1912.) Price 8s. 6d. net.

MR CUNNINGHAM CRAIG has attempted to meet the demand, resulting from the widespread modern interest in petroleum, for a simple text-book of the art of oil finding, and has at least produced a book which is striking and interesting. The opening sentences at once arrest attention, for, unlike his predecessors who have regarded the origin of petroleum as an interesting academic question, having little bearing on its present distribution or the search for productive areas, he starts off with the assertion that it absorbs and includes nearly every other question as to the occurrence, distribution, and winning of oil. His first care, therefore, is to deal with this question in no uncertain tones; for him petroleum is produced by a metamorphosis from the accumulated débris of land vegetation, which has become buried by sediment and undergone a transformation analagous to, though differing from, that which has given rise to beds of coal; and the association of salt with petroleum, so constant that it has been regarded by most other writers as causal, becomes for him a mere accidental coincidence.

Having dealt with the origin of petroleum, the author proceeds to describe the geological structures which have been found most suitable for the accumulation of workable deposits, and concludes with a description of the methods of geological survey as it should be carried out in the examination of oil fields which, though avowedly intended for beginners, contains several hints that are not infrequently overlooked by practised geologists. Though the book contains not a few assertions with which we cannot agree, it is both interesting and useful, when its avowed purpose is borne in mind.