

And so it is with this report. It is filled with mathematics in which elliptic functions, long a favorite study of Sir George's, plays an important rôle; but the reader is continually running across such homely illustrations as those a teacher might use in the classroom—the illustrations of bicycle wheels, stepladders, clock hands, reflections in a mirror, plumb lines, balancing on a knife edge, tops, children's hoops, race wheels, motor cars, the motor omnibus, spinning cards through the air, Whitehead torpedoes, the monorail carriage, and the like—just the sort of things that those who have used the problems in the author's calculus have delighted to find for interesting a class.

The report is divided into nine chapters. Chapter I. relates to steady gyroscopic motion, with applications to the problem of the precession of the equinox and to the gyroscope as a stabilizer. Chapter II. continues the applications of the gyroscope, in particular with reference to ships, the Brennan monorail carriage and the Bessemer saloon. Chapter III. relates to the general unsteady motion of the gyroscope, and to the figures resulting therefrom—for example, to the rosette curve described by Klein. Chapter IV. deals with the geometrical representation of the motion of a top, and in particular with the work of Darboux. Chapter V. treats of the algebraic cases of top motion, and in particular of the section problems, a subject continued in Chapter VI. Chapter VII. relates to the spherical pendulum and related topics, Chapter VIII. to such topics as the gyroscope on a whirling arm, and Chapter IX. to the dynamical problems of steady motion and small oscillation.

It is not intended in this brief review to do more than call attention to the general nature of the work. The practical value of the subject has come to be recognized in this war as never before, and it is well that we have in one place the body of theory which students of the subject would otherwise have to search for in many pamphlets, books and periodicals. The report lays no claim to any important discovery, but it may fairly claim to bring together in convenient form the mathematical

theory of the gyroscope as far as it has been developed up to the present time.

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*Monographs on Biochemistry. Soil Conditions and Plant Growth.* By EDWARD J. RUSSELL, D.Sc. (Lond.), Director of the Rothamsted Experimental Station, Harpenden; with diagrams. New Edition. Longmans, Green and Co., 1915. Pp. 150.

This is the third edition called for within three years of the best book on the soil which has yet been written. A new chapter has been added on "The Relationship between the Microorganic Population of the Soil and the Growth of Plants." A number of minor changes and a few of considerable importance have been made in the original text, usually because of recognition of literature non-existent when the text was prepared originally. The versatility of Dr. Russell is astonishing and the wealth of his information is prodigious. And yet he has told his story in some 170 pages without an undue crowding. In fact the book has "charm" and is easily read. The professional chemist, physicist and bacteriologist will find it a mine of information most interestingly woven together, but with frequent references to original authorities. And at the same time the layman can get a purview of the complex system involved in plant production in an understandable story.

Not only is the book the best in its field relatively, but it is very good absolutely. But it is not ideal, and probably most of the experts will feel that its accents should be altered and even that some of the statements should not have been made as they are. For instance, the reviewer should prefer to see the relation between moisture content and the measurable physical properties of the soil given more prominence; and the dynamic as contrasted with the static properties of the soil developed more definitely. One is left with a too hazy idea of the colloidal properties of clay and their importance to the soil, and the purely hypothetical calcium bicarbonate is called upon rather frequently to explain things without

the slightest intimation that its claims to existence are any less valid than any other compound. It is stated that the water in the soil is weakly held, when as a matter of fact the film moisture is held by probably enormous stress and the reader is left in confusion as to just what the author means. It is not the simplest view (page 77) that the mineral particles are coated with a colloidal complex, but that the so-called colloidal properties of the soil are those resulting from the relatively vast surface presented by the "clay" portion of the soil; and it would be more satisfactory to utilize the fact that the solubility of calcium carbonate is increased by increasing the partial pressure due to carbon dioxide than assume the existence of a compound which can not exist at any gas pressures existing in the soil.

But when there is so very much that is admirable it makes one feel ungracious to continue criticisms of details. The book deliberately makes its major appeal to biologists, and the greater part of the text is devoted to the biological properties of the soil. But its most striking feature is the skilful handling of the contrasting views of soil chemists and physicists. While it is probable that others as well as the reviewer will not entirely agree with the author's presentation of recent controversies, every one will undoubtedly recognize the evident intent of fairness and careful effort to summarize correctly. It is very probable that no one could at this time make a better presentation than has Dr. Russell, although we may each hope that some future edition of his book may accord more closely with our several individual views. Fortunately for the development of this branch of applied science, modification of the personal views of most of the prominent workers is commendably frequent and frank. A satisfactory index and a well-selected bibliography are retained in the present edition.

Dr. Russell's monograph is not suited to class-room use of undergraduates in our agricultural colleges, though such undergraduates would undoubtedly profit by reading it. The book will prove a mine of suggestions to the advanced scholar and investigator and should

prove an eloquent testimony for the view that the time has now come when our universities can afford to recognize that some agricultural subjects have developed to a point in dignity of effort and scholarship where they might profitably be included in the curriculum beside older and more familiar academic fields. The advances of the last few years in secondary rural education and in the standard of our American agricultural colleges is worthy cause of gratification. But it is almost a disgrace that our principal universities are utterly failing to train and provide leaders and teachers for what must always be our country's chief field of endeavor; and to recognize that the art of agriculture is passing—rapidly passing in the United States—from the avocation of the artisan to the profession of the highly trained specialist. Dr. Russell's book will not be the least of the instruments to bring about the change.

FRANK K. CAMERON

#### SHARK INTOXICATION<sup>1</sup>

THE flesh of the economically very important Greenland shark (*Somniosus microcephalus*), a shark usually between 6 and 14 feet in length occurring abundantly in the Arctic Ocean and ranging southward to Norway, the Faeroes, Iceland, Cape Cod, Oregon and Japan, has long been known to possess certain poisonous qualities.

It is not known to what extent the poisonous nature of the flesh of this fish is shared by that of other species of sharks, some of which, at least, appear to be quite harmless; but in view of the possibility that in the near future the flesh of some of our more abundant species of selachians may be placed on the market for the purpose of providing a cheap supply of good fresh food, it would seem opportune to call attention to what is known in regard to the undesirable qualities of the flesh of the Greenland shark in order that similar qualities in the flesh of other species, if present, may be immediately detected.

Mr. Ad. S. Jensen, of the zoological museum of the University of Copenhagen, has re-

<sup>1</sup> Published with the permission of the secretary of the Smithsonian Institution.