

teaching of Zoology in any of the Indian Universities will greatly appreciate the value of this memoir. The specimens of animals collected on the seashore by parties of students are not often used to the best advantage for want of adequate and ready literature for the identification and study of the forms. This *Bulletin* will prove to be a valuable guide both to the casual collector and advanced students of Zoology in their study of the shore fauna.

B. S. B.

Ramalinga Reddy Sastyabdapurti Commemoration Volume: Part I—Sciences. (Andhra University, Waltair). Pp. vii + 234. Price Rs. 10 or 14sh., postage extra.

The articles that were presented to Sir C. R. Reddy by scientists from different parts of India on the occasion of his *Sastyabdapurti* are published by the Andhra University in a collected form. This volume contains two papers dealing with physics, fifteen papers dealing with chemistry and chemical technology, one dealing with surgery and three dealing with mathematics. A photograph of the bust of Dr. C. R. Reddy which was made by Mr. D. P. Roy Chowdary and unveiled by H. E. Sir Arthur Hope and three portrait sketches of him prepared by Mr. K. Ram Mohan Sastri are also reproduced in this volume.

The volume opens with a paper by Sir C. V. Raman and Dr. N. S. Nagendra Nath in which is given a self-contained theoretical exposition of the new type of X-ray reflections. This subject has recently been investigated in great detail at Bangalore and is now attracting the attention of several prominent physicists. This is followed by an article in which Dr. I. Ramakrishna Rao describes the many interesting properties of water and shows how they can be accounted for by considering the complex structure of this liquid. In the next two papers, Dr. H. K. Sen and Dr. J. C. Ghosh deal respectively with the planning of Scientific and Technical Research in India and the War and its Repercussions on the Chemical Industries in India. Nitrogen fixation, photosensitization, chemistry of medicinal oils, of the constituents of lichens, of the bitter principles of some fruits, etc., are amongst the subjects dealt with in some of the other papers. A brief account of the evolution of aseptic surgery since the time

of Pasteur and Lister has been given by Prof. M. G. Kini. The last three papers of the volume, which are devoted to mathematics, respectively deal with some fundamental limits in analysis, Liouville's theorem and a theorem of Estermann in the additive Prime Number Theory.

A perusal of the names of the authors that have contributed to this volume shows that many distinguished men and specialists from all over India are amongst them. The subjects dealt with, cover a wide range of interests and this is a clear indication of an active era of original scientific work having started in this country. It is gratifying to note that the sale proceeds will be utilized for the benefit of the Andhra University. The volume will be a welcome addition to one's library both as a compendium of useful work and as a reminder of the esteem in which an eminent educationist like Dr. C. R. Reddy is held by the several contributors to the volume. The printing is good. The get-up is rather simple but could have been more attractive. S. B.

Punjab Irrigation Research Institute: Report for the Year ending April 1939. (The Punjab Irrigation Research Institute, Lahore), 1940. Pp. 189.

The Research Institute, during the year under report, undertook a number of investigations of engineering interest.

Soil profiles of the Punjab Alluvium were examined and in no case a rising water table was found to pierce the soil crust which generally overlies a sand stratum. In an unirrigated area, the top five feet of crust was found to have the greatest variation in salt and even when salt had very large vertical movement, it was found to have very little lateral movement.

In the case of earth roads, moisture largely contributed to the preservation of road surfaces and prevention of dust nuisance. Salt in the soil is an important constituent determining the moisture content of a soil, the hygroscopicity of a soil increasing with increasing salt concentrations. Sodium chloride has been found to be valuable in promoting moisture retention, while sodium sulphate, even in small quantities, has been found to disrupt the surface. Cohesion in dry soils depends on the clay content and the fineness of particles. The effect of exchangeable bases on soil cohesion

was found to be a maximum when the soil was dry and the order of cohesion for the dry soil followed the order of dissociation for the ions, *i.e.*, $Li > Na > K > Mg > Ca$.

An apparatus for measuring the capillary force of sand was devised which also serves for a rough and ready determination of the mean diameter of sand. Experiments have not indicated that the discharge of a tube-well is proportional to the area of the strainer, but there appears to be an optimum size of the shrouding material with respect to the grade of the water-bearing sand. An attempt has been made to detect cavities under weirs by means of an apparatus causing vibration by impact, the amplitude of vibration being naturally greater for unsound work.

A mud plaster, non-erodable under rainfall or flowing water has been got at, by the addition of 5 per cent. cement by weight to the Punjab soil generally containing about 15 per cent. of clay. Lining of some minors and water courses on two large farms with mud plaster, has considerably reduced leakage.

Factors contributing to the formation of Thur were studied during the year and several areas were taken for reclamation. Data were collected regarding the discharge of open wells, water requirements of crops and cost of this form of irrigation. It has been shown that generally a farmer gets a higher profit per acre on the introduction of tube-well irrigation than in the case of open well irrigation.

Frictional drag exerted by different grades of sand bed on the flow of water in a channel, and movement of silt in a tilting flume are being studied. Examination of the hydraulic observations on the Mississippi river published by the U.S. Waterways Experimental Station, Vicksburg, has shown that the slope-discharge-silt formula of the Irrigation Research Institute agreed well with the observed values.

Experiments on a model of the river downstream of Panjnad weir with a view to control erosion indicated that a two T-head spurs properly disposed would arrest erosion. Work is also in progress on

models of the River Chenab in connection with problems connected with river training and silt entry into canals. Silt surveys of the Upper Bari Doab Canal, the Lower Chenab Canal and the Western Jumna Canal were also undertaken.

After a small shower of rain or after irrigation, a rise in water-table much greater than can be accounted for, takes place. A study is being made to determine the cause of this phenomenon, probably the result of negative pressures developed in water films surrounding soil particles. A survey of wheat soils with reference to yield and the chemical constituents of the soil indicates that soils having a high yield of wheat have a low manganese and high available phosphate content.

The Research Institute has been engaged during the year on a variety of useful and important engineering problems.

C. GOPALAKRISHNAN.

The Indian Cotton Textile Industry (1941 Annual). (Gandhi & Co., Calcutta), 1941. Pp. 150. Price Rs. 3 or 9sh.

The 1941 Annual of the Indian Cotton Textile Industry has been published by Messrs. Gandhi & Co., and is a handy and useful reference book for all that are engaged in the cotton textile industry. As in the previous year, the statistical figures for imports and exports of cotton, yarn and cloth are incomplete as their official publication is withheld owing to war conditions. The various details are arranged in a systematic and clear manner as in previous issues of the Annual.

A more detailed survey of the working of the Handloom Weaving Industry in various Provinces and States might, perhaps, have been much appreciated, particularly in view of the fact that the Handloom Weaving Industry occupies such an important part in the economics of the Indian cotton industry and is passing through a period of acute depression for want of adequate supply of yarn and other raw materials at reasonable prices.

B. K. MURTHY.