to know. There are some sins of omission and commission, however. Among the former may be mentioned the fact that the alternating-current dynamo is not touched upon, or very briefly. No instructions are given as to what should be done in case, when a dynamo arrives, it is found to be connected for running in the opposite way to which the foundations, etc., necessitate its turning. Instructions for reversing the connections of a series machine when it fails to start up or under compounds would also be of use. The writer has had on many occasions to travel several hundred miles to remedy these simple troubles. A warning about the necessity and method of keeping armatures and fields free from moisture when lying boxed up, might also be added with benefit. Among the latter may be mentioned the direction to lay an armature on waste (page 22), as the latter is often full of pieces of iron, etc., which might ruin the insulation. Sand-paper is preferable to emery for polishing of commutators, as the latter frequently contains particles of iron. The remedy proposed on page 30 for a shunt dynamo which will not pick up is impracticable.

Altogether, this is a very useful and clear little book.

R. A. F.

Electrical Experiments. By G. E. BONNEY. New York, Whittaker & Co.

THIS book is a collection of simple experiments with magnets, induction coils, influence machines, and plating baths Mr. Bonney is already favorably known through his books on the making of induction coils, electroplating, etc., and this volume is quite up to the others

Manual of Irrigation Engineering. By H. M. WILSON, C.E. New York, J. Wiley & Sons. 1893. 351 p. 8°. $4.

WHILE text-books and elementary treatises on the general subject are threatening to flood the market and the profession, the promise of an overplus of good treatises on special branches of engineering, by competent specialists, is by no means serious. Good works of the latter class are always welcome to the average practitioner, and this seems to be one of the kind which is likely to prove both useful and welcome. It is written by an author who has had experience in America, Europe, and India, and contains the fruits of both original investigation and discreet compilation. The book is prepared mainly with reference to the needs of the engineer having charge of work of this kind in the western portion of the United States, and includes accounts of the current methods there in use, as well as of such systems observed abroad as are most likely to prove useful in this country. The collection and distribution of water, but not its application to crops and to its minor uses, constitute the subject chosen for treatment. Much new material is here published, especially relating to earth-dams and elevation of water by pumping. The author makes application, in a very sensible manner, of the principle, too little recognized by writers on engineering subjects, that, while no hesitation should ever be felt in regard to the use of mathematics in the development of the subject in hand, its use should always be confined to the minimum quantity, and the most elementary methods, consistent with the effective accomplishment of the purpose in view. The average reader, even though a professional and a practitioner, does not purchase his library with the view of admiring the scholarship, the pedantry, or even the genius of authors.

The importance of this subject may be realized when it is stated, as by this writer, that 25,000,000 of acres are made fruitful in India alone by irrigation; in Egypt there are about 6,000,000, and in Europe about 5,000,000 acres. In the United States, where this process of conquering nature has but just begun, are now about 4,000,000 acres of irrigated lands. Thus, about 40,000,000 acres of soil are made to produce crops: land which would otherwise have remained desert.

The book is well and freely illustrated, and its typography is that always seen in the technical works of its publishers. It is

CALENDAR OF SOCIETIES.

Biological Society, Washington.

Mar. 11.—Frank Baker, Recent Discoveries in the Nervous System; Vernon Bailey, The Burrow of the Five-Toed Kangaroo-Rat; E. M. Hasbrouck, The Breeding of the Bald Eagle near Mount Vernon (with exhibition of eggs).

New York Academy of Sciences, Biological Section.

Feb. 13.—A paper on the "Functions of the Internal Ear" was presented by Dr. F. S. Lee, based upon study of dog-fish. The results of experiments were given, showing that the semi-circular canals are sensory organs for dynamical (rotational) equilibrium, otolithic parts for statical (resting) equilibrium. Each canal appreciates movement in its own plane, and by a definite functional combination of canals all possible rotational movements are mediated. This theory explains compensating movements of eyes, fins, and trunk. The method of experiment was that of sectioning the branches of the acoustic nerve and stimulation (by rotational movements) of the swimming fish. In a paper by Bashford Dean, on the Marine Laboratories of Europe, a series of views were shown of the stations of Naples, Banyuls, Roscoff, Plymouth, Arcachon, the Helder, and St. Andrew's. H. F. Osborn described the foot of Artionyx, the new member of the order Ancylopoda Cope. It is distinguished from Chalicotherium by the character of aucle and pes, which present a marked resemblance to the Artiodactyla, while Chalicotherium represents these structures as found in Perissodactyla. Both genera are ungulate in aucle joint, but the phalanges terminate in claws, and, in view of the double parallelism between these two forms and the two subdivisions of Ungulates, it was suggested to divide the Ancylopoda into the Artionychia and Perissonychia.

Society of Natural History, Boston.

Mar. 15.—H. C. Ernst, Cultures of a New Pathogenic Bacillus, Illustrating Methods of Isolation; Warren Upham, Deflected Glacial Striæ in Somerville, Notes on the Tertiary Strata of the Fishing Banks Between Cape Cod and Newfoundland.

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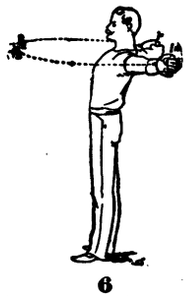

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