ences, more or less numerous, to station publications where further information can be secured if desired.

It is of course impossible to refer in detail to all the subjects. A reference to a few will probably be of interest. Under *Chrysanthemum* we read that experiment showed it to be possible to keep pollen of the plant for five days and still retain its vitality. It is observed under *Dandelion*, quite extensively used as "greens" in spring, that it has been studied in Minnesota, and directions are given for cultivating it. Geological work is not extensively carried on, only four geologists being employed, and these being engaged in studying soils. Numerous varieties of grasses are discussed, over ten pages being devoted to them. In a short note upon Leguminosæ numerous references are made to investigations upon root-tubercles. Their value in taking nitrogen from the air and storing it in the soil is considered very great, and it is stated that by growing the tubercle-producing plants and plowing them under they form manure for wheat and other crops requiring considerable nitrogenous material. The article upon *Milk* refers to the value of late researches upon bacteria causing fermentation, souring of cream, etc. Those bacteria causing red milk, ropy milk, etc., can be prevented by cleanliness. Those which are useful in butter and cheese making can be utilized. The aroma of butter has been determined to be due to a specific bacterium, and the ferment produced by this is being used to a certain extent in Germany and Denmark. In the ripening of cream there is a conflict of many varieties of bacteria and the problem has been to separate that one which will give the best results. So, too, with cheese-making. The ripening of cheese is due to the action of micro-organisms. The number of these has been found to be from 25 to 165 millions per ounce. The conclusion reached is that in the future "the butter-maker will separate the cream by the centrifugal machine in as fresh a condition as possible and will add to the cream an artificial ferment consisting of a pure culture of the proper bacteria, and then ripen his cream in the normal manner. The result will be uniformity. The cheese-maker will in like manner inoculate fresh milk with an artificial ferment, and thus be able to control his product. Perhaps he will have a large variety of such ferments, each of which will produce for him a definite quality of cheese. To the dairy interest, therefore, the bacteriologist holds out the hope of uniformity. The time will come when the butter-maker may always make good butter and the cheese-maker will be able in all cases to obtain exactly the kind of ripening that he desires."

Under the head of *Phosphates* there is an interesting account of the different kinds, with analyses of those found in South Carolina and Florida. Perhaps the longest article in the volume is upon the weeds of the United States, nearly 20 pages being devoted to them. A list of the weeds with common and scientific names and station publications where referred to occupies thirteen pages. Finally in an appendix there are given a number of tables of analyses, of feeding stuffs, vegetables, fruits, nuts, commercial fertilizers, farm manures and ash constituents of woods. The volume is, upon the whole, one of the most useful which has ever been issued by the Department of Agriculture.

Exchanges.

[Free of charge to all, if of satisfactory character. Address N. D. C. Hodges, 874 Broadway, New York]

To exchange.—Works on entomology, botany and palaeontology for works on Indians and archæology. H. Justin Roddy, Millersville, Pa.

For Sale.—A Zertmayer new model U. S. Army Hospital monocular stand, cost $110. H. C. Wells, 151 Broadway, New York.

For Sale or Exchange.—A "Troughton & Simms" bronzed metal sextant, with double-frame platinum and gold vernier; fitted to bronze standard, with balance weights attached and brass adjusting screws, with full set of tubes, both plain and inverting; an artificial horizon and all fittings necessary for observing and rating chronometers. Also the first 10 volumes of "The Forum" bound in twenty volumes (in cloth), together with two unbound volumes. Address W. S. Leavenworth, Ripon, Wisconsin.

I have Michigan shells of the unio, alalus, gibborus, ligamentinus, occideus, plicatus, pustrilorus, rubignorus, verrucosus, margaratana, marginala, rugosa, for fresh water and sea shells of other localities and varieties, copies of *Scientific American* for shells; also a few minerals to exchange. Chas. Miller, jr., 216 Jefferson st., Grand Rapids, Mich.

For Sale or Exchange.—A large number of state and general government scientific reports, Smithsonian contributions and Bulletins Torrey Club, Botanical Gazette and many others. These were obtained in the purchase of a large scientific library and are duplicates. Write for what you want and offer any sum. Mexican Boundary Survey, Torrey's Botany California, Blume's Orchids of India and Japan, and Hooker's Rododendrons of the Sikkim-Himalaya are in the lot. What offers? R. Ellsworth Call, Louisville, Ky.

Skins, with full data, of Ægialites nivosa, Ereunetes occidentalis, Ammodramus beldingi, A. rostratus, Chamæa fasciata henshawi and others from California, for native or foreign skins with full data. A. W. Anthony, 2042 Albatross Street, San Diego, California.

For Sale.—An entirely new analytical balance, made by one of the most celebrated manufacturers; capacity 100 grammes, sensitive to one-twentieth a milligramme. Never been used. Regular price, $83. Will sell for $50 cash. Address, A. P. Nichols, 41 Summer Street, Haverhill, Mass.

Wants.

WANTED.--Vol. Birds of the Standard or Riverside Nat. Hist. Preferred in parts. F. A. Lucas, U. S. National Museum, Washington, D. C.

WANTED.—Vols. I and II of Proceedings of the Entomological Soc. of Pha. and Vols. III to VI inclusive of Transactions of the American Entomological Soc. C. P. Gillette, Ft. Collins, Colo.

Wanted.—Sachs's Text-book of Botany, 2nd English edition. Dr. Alfred C. Stokes, 527 Monmouth Street, Trenton, New Jersey.

WANTED to exchange for human bones or recent medical text-books, the following books "Metallurgy of Silver," M. Eissler, 1889; "Practical Treatise on Petroleum," by Benj. J. Crewe, 1887; "Cook's Chemical Philosophy," 1885; "Cairn's Chemical Analysis," 1880; "Wagner's Chemical Technology," by Crookes, 1886; "Fresemier's Qual. Chem. Analysis," 1879; "Elementary Treatise on Practical Chemistry and Qual. Analysis.'—Clowes, 1881; bound Vols. 1 to 12 of Dr. Lardner's "Museum of Science and Art" (very rare), 1854; back numbers of "Electrical World," beautiful specimens of Pyrite Incrustations from Cretaceous of New Jersey; Magnetis Iron Ore, Highly Polarized. Address D. T. Marshall, Metuchen, N. J.

WANTED.--Books or information on the microscopical determination of blood and hair. Also reports of cases where hair has played an important part in the identification of an individual. Address Maurice Reiker, 206 N. First Ave., Marshalltwn, Iowa.

A GEOLOGIST thoroughly conversant with the geology of the Southern States desires an engagement. Has complete knowledge of the economic geology of Iron, Coal, Lignite, as well as Clay and Kaolin. Five years' experience with Geological Surveys. Address K., 509 West Sixth Street, Austin, Texas.

WANTED.—Tuckerman's Geneva Lichenum and Carpenter on the Microscope, Wiley's Introduction to the Study of Lichens. State price and other particulars. Richard Lees, Brampton, Ont.