

through, but smaller at the inner opening than the outer. Having entered by this means he seemed unable to increase the hole by digging from the inside upward and could not return as he came. When one hole was blocked up by stones, he dug from the outside another, but could never leave the basement unless the doors were opened for him.

In regard to "late blooming trees," I had a flowering almond which bloomed in April, then again in October, and again in April. It was a young shrub, and grew vigorously. I concluded that the October blooming was provoked by very mild, moist, showery, spring-like weather, which continued long enough to develop the flower buds, and then hasten the growth of the next set of embryo buds, to a point where they were ready for blooming on the return of good growing weather.

J. McNAIR WRIGHT.

BOOK-REVIEWS.

Handbook of Experiment Station Work. A Popular Digest of the Publications of the Agricultural Experiment Stations in the United States. Bulletin No. 15. Washington, D. C., Office of Experiment Stations, U. S. Department of Agriculture. 1893, 411 p.

As mentioned in its title, this bulletin is a popular digest of the work of the experiment stations of the United States. That such a publication is a useful one and serves a very useful purpose is manifest when it is known that there are fifty-four different stations in the country, some maintained entirely by the general Government, some by the several States. These stations had during the year 1892 no less than \$997,244 at their disposal, and of this sum \$689,542 was from the national treasury. That the stations have done some good work cannot be denied; but that there has been a large amount of duplication without sufficient justifica-

tion, and a large amount of useless expenditure also, cannot be denied. The Secretary of Agriculture in his last annual report very properly protests against the charging against the Department of Agriculture the sum of over \$700,000 annually when the Department has nothing whatever to say in regard to its disbursement. "No detailed account," he says, "as to how the money has been expended, to whom, or for what it has been paid out, is required. Current rumor in some of the States and Territories, so universal, pronounced, accentuated, and vehement as to have secured great credence, indicates that some of the moneys appropriated for experiment stations have been diverted from legitimate public purposes and turned to those of a personal and not patriotic character." He rightly thinks that if the Department is to be charged with the sum it should have the supervision of its expenditure. There are about 500 persons employed in the different stations, and during 1892 alone there were published fifty-five annual reports and 250 bulletins. With such a mass of literature as this to cope with the necessity of some digest is at once evident.

The first regularly organized station was at Wesleyan University, Middletown, Conn., in 1875; but as a result of the law passed by Congress in 1887, giving \$15,000 annually to every station organized, now every State and Territory except Montana and Alaska have stations, some States have two, and several have three sub-stations.

The volume under review was originally designed as a part of the exhibit of the World's Fair at Chicago, but it has only recently been issued. The various subjects are arranged alphabetically, and while not pretending to be a manual or encyclopedia of agriculture it will at the same time serve as a ready means of ascertaining what has been done upon many subjects of importance in agriculture. Under each heading there is given a brief notice of the subject and at the end refer-

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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.

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