seas; continents and oceans and their permanence. Land surfaces; weathering and denudation by wind, rivers and ice; deformations of the surface. The forms of the land; plains, hills of accumulation, valleys, basins, mountains, depressions, caverns. The sea; its movements, coasts and bottom; islands.

The chief deficiency of the book is the scarcity of illustrations and the rough quality of nearly all the few cuts that are introduced. Many are merely diagrams, often with excessive vertical exaggeration. This is to be regretted in a subject where graphic aid of the highest quality is necessary for the adequate presentation of the facts. But as the work is in two volumes of 471 and 696 pages, the omission of illustrations has evidently been a matter of necessity.

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NOTES UPON AGRICULTURE (II.).

MUSCARDINE DISEASE OF CHINCH-BUGS.

ONE of the most serious of insect depredations to wheat and corn is that caused by the chinch-bug, and for years methods of checking it by employing a parasitic fungus have been the subject of research. In Kansas special appropriations have been made by the Legislature to determine the best means of propagating and applying the virus. The latest information upon this subject comes in the shape of a sixty-page bulletin with eight plates (No. 38, March, '95) from the Illinois Experiment Station prepared by Dr. Forbes. The fungus experimented with is *Sporotrichum globuliferum*, Speg., which was cultivated successfully upon a mixture of corn meal and beef broth and afterwards distributed to farmers in the chinch-bug infested portions of the State.

The White Muscardine (Sporotrichium) spreads most rapidly in the field when the weather is moist and the 'catch' is quickest in the low spots in the field and among fallen herbage. Professor Forbes is of the opinion that the disease may be developed without infection by artificially producing the above conditions by trampling down the grain in spots or cutting and stocking small portions as starting points for the infection. It was observed that mites feed upon the Muscardine and in some of the artificial cultures eat up 'the last vestige of the fungus.' The Sporotrichium lives upon many kinds of insects, and a plate is given of the appearance of it upon a leaf skeletonizer (Carnarsia), June Beetle (Lachnosterna), Walnut caterpillar (Datana).

BACTERIOSIS OF RUTABAGA.

THE number of diseases of plants of bacterial origin is rapidly on the increase, or, more strictly writing, the nature of these troubles is in these later days being better understood. A portion of Bulletin 27 of the Iowa Experiment Station is devoted to a disease of rutabagas that Professor Pammel finds, through a long course of bacteriological study, to be caused by a microörganism which he names *Bacillus campestris* n. sp., and figures in details in a plate. This disease is distinguished by its strong odor, the decay usually beginning at the crown of the root, the fibro-vascular zone becomes black, while the softer portions of the root become soft and finally watery. Healthy roots were caused to decay by introducing the Bacilli, previously isolated by cultural methods, into their tissue.

WEED SEEDS IN WINTER WINDS.

IT is well known that winds play an important rôle in the distribution of seeds. Professor Bolley, in the North Dakota Experiment Station Bulletin (No. 17, March, 1895), records that in two square feet of a three-weeks old and three-inch deep snow drift upon an ice pond ten yards from any weeds he found nineteen weed seeds, and and in another drift quite similarly situated thirty-two seeds representing nine kinds

of weeds. While the wind was blowing twenty miles per hour a peck of mixed seeds was poured upon the snow crust, and ten minutes after 191 wheat grains, 53 flax seeds, 43 buckwheat and 91 rag weed seeds were found in a trench thirty rods from where they had been poured upon the crust.

BLACK KNOT OF PLUMS AND CHERRIES.

The Black Knot fungus (*Plowrightia morbosa* Schw.) is an old orchard enemy. Professor Lodeman, in Bulletin 81 (December, '94) Cornell Experiment Station, has given the long bibliography of the subject and shows, by means of cuts, how the spores of the fungus may find their way between the adjoining layers of bark in the forks of the small limbs. At these places the bark is thin and the growing layer (cambium) comes near to the surface, thus facilitating the inoculation. Lodgement is also produced at these angles between stems, and besides it is here that knots are most apt to form. Experiments in spraying knotty trees with Bordeaux mixture gave results that were decidedly encouraging.

RECENT APPLE FAILURES.

In another bulletin (No. 84) from the Cornell Experiment Station—and there are many and fine ones—'The Recent Apple Failures of Western New York' are considered by Professor Bailey. A glance at the cuts shows that failures may be due to imperfect pollination, injudicious application of fungicides, but more particularly to the ravages of the Apple Scab (*Fusicladium dendriticum* Fl.), of which Professor Bailey gives a full page colored plate showing the scab enemy in detail from the appearance of the young distorted fruit to the microscopic structure of the fungus shown in leaf sections. That the scab fungus is the leading cause of apple failures is demonstrated by the fact that thorough spraying to check it productiveness has been obtained. The essentials for success in apple culture, as given by the author as his concise summary, are: "till, feed, prune, spray."

DETASSELING CORN.

The removal of the male flowers from a large or small per cent. of the corn plants in a field has been experimented upon at various stations. Thus in Maryland where two-thirds of the tassels were removed the detasseled rows gave a decrease of nearly 10 per cent. At the Kansas Station by detasseling alternate rows of six varieties in every case there was a reduced yield averaging 22 per cent. Delaware obtained under similar circumstances an increase of 6.6 per cent.

Before us is the bulletin (No. 37 Feb., 1895) upon 'Corn Experiments' of the Illinois Experiment Station in which detasseling receives its share of consideration. "In eighteen out of twenty-three comparisons the yield of corn was greater for the rows (alternate) having the tassels removed. For tassels pulled we have an increase of twenty-seven per cent., and for those cut only six per cent. Removed before expanding gives an increase of eleven per cent. The average increase is thirteen per cent." At the Cornell Station one report (1890) gave an increase of fifty per cent. for detasseling, but the next year there was no difference. The results thus far obtained teach that the end of experimentation in this direction is not yet reached.

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LAGOA SANTA.

Such is the title of a memoir published in 1892 by Professor Eugene Warming, of the University of Copenhagen. It is also styled *Et Bidrag til den biologiske Plantegeografi*, and this sub-title sufficiently explains the aim of the work. Lagoa Santa is a small village about 835 meters above the sea and 200 miles north of Rio de Janeiro,