not have been prepared, encouraged her father in the days of his blindness and neglect, by saying 'La postérité vous honorera.' And this has come true. Lamarck, who struggled with poverty and other depressing conditions, whose views were laughed to scorn by Cuvier, and neglected by the intellectual leaders of his time, is now receiving honor and recognition. His original and philosophical mind dealt with some of the burning questions of our day, and he is now placed above Cuvier as a thinker, and heralded, by many, as the most colossal figure in the history of the philosophy of organic nature, between Aristotle and Darwin. This fresh interest in Lamarck's views makes Dr. Packard's book especially timely.

A number of new biographical facts are added to the few that have been generally known, and the book is illustrated with four portraits of Lamarck, pictures of his birthplace, the house in which he lived in Paris, etc. In reference to the analysis of his writings the author says: 'As regards the account of Lamarck's speculative and theoretical views, I have, so far as possible, preferred, by abstracts and translations, to let him tell his own story, rather than to comment at much length myself on points about which the ablest thinkers and students differ so much.' This part of the author's task has been especially well done. Nowhere else can one find in a single volume such a comprehensive survey of Lamarck's theoretical writings.

The growth and essential features of his theory of organic evolution are shown by ample quotations. This theory was unfolded in 1800 and fully expounded in 1809 in the well-known 'Philosophie Zoologique.' The various expressions of his views in 1800, 1802, 1803 and 1806, as leading up to the latter work, are well illustrated, and seventy-six pages are devoted to quotations from the 'Philosophie Zoologique.'

Several current misconceptions are corrected, as for example—the earliest expression of Lamarck's views, as far as his published writings show, was in 1800, in the introductory lecture to his course on the invertebrates, not, as commonly believed, in his 'Recherches sur l'Organisation des Corps Vivans,' published in 1802. Incidentally, also, in reference to Buffon, it is shown that his opinions on the variability of species were not separated into three periods, but that from the time he began to express his views on that matter, to the end of his life, he was an advocate of the mutability of species.

Lamarck's work is treated from all sides; in addition to the exposition of his views on organic evolution, there are chapters on his work in botany, geology, invertebrate paleontology, general physiology and biology, zoology, his thoughts on morals and on the relation of science and religion, and on the relation of his evolutionary views to those of Buffon, St. Hilaire and Erasmus Darwin. There is also a fine chapter on Neolamarckism.

Thoroughness and breadth are notable features in this account of Lamarck and his life work.

WILLIAM A. LOCY.

SOCIETIES AND ACADEMIES.

EIGHTH REGULAR MEETING OF THE BOTANICAL SOCIETY OF WASHINGTON.

THE eighth regular meeting of the Botanical Society of Washington was held at the Portner Hotel, May 24, 1902, with President A. F. Woods in the chair. At the conclusion of the business meeting, Dr. B. M. Duggar, chairman of program for the evening, was called upon to preside.

Mr. E. L. Morris called attention to specimens of *Trillium* found near Great Falls of the Potomac River which produced long-petioled simple leaves from the rootstock. While recent manuals state that this is occasionally true for the genus, the speaker had failed to find specimens in any herbaria examined which exhibited this character.

Mr. M. B. Waite stated that the ordinary two weeks' interval had proved too long in spraying apple trees for bitter rot. In experiments the present season in Virginia, the third treatment was made just after the petals had fallen and while the trees were moderately covered with foliage. Two weeks from this time the trees were found to have made

a very rapid growth of six to ten inches, and three or four new full-grown leaves had developed on each twig, which were, of course, unprotected by the spray. In a few cases these leaves had become infected with fungi, probably the bitter rot fungus. At the time of the fourth treatment, these leaves were, of course, thoroughly covered with the mixture and protected from further infection, but it is interesting to know that the two weeks' interval at this period of rapid leaf formation was long enough for leaves to form and become infected with the fungus before they could be protected by the spray. The inference is that the interval between the third and the fourth spraying should in this case be shortened.

Mr. Wm. A. Taylor called attention to some field experiments recently made, to ascertain in a practical way to what extent bees are responsible for the spread of pear blight. In these experiments, which were conducted by Mr. Charles Downing in Kings County, Cal., where blossom blight was very destructive last year, the members of the association of bee keepers agreed to remove their bees to a minimum distance of two miles from the pear orchards for the blooming season. It was found during the blooming season that a considerable number of swarms were left in the area in question, including one lot of thirty or forty swarms that had been overlooked. Certain trees of P. Barry, Clairgeau, and Bartlett pears were covered with mosquito netting before the blossoms opened, to exclude all the larger insects, including bees. When the trees blossomed it was found that the trees of P. Barry and Clairgeau, which blossomed early, when nearby orchards of apricots and peaches were in bloom, were little visited by bees. Both covered and uncovered trees of these varieties, to the number of 3,000, set a full crop of fruit, with no blight infection except on a few late blossoms. The uncovered Bartletts, which blossomed later, beginning just before the peaches and apricots were through blooming, were well covered with bees almost from the start. The blossoms on the uncovered Bartlett trees were badly blighted, and very little fruit set on them except from the first blossoms, which opened before the bees began their visits. On the covered Bartlett trees more fruit set than on any other Barlett trees in the orchard. Some blossom blight appeared on the covered trees, but upon examination some dead bees were found inside the netting, which had been slightly torn by storms.

Mr. Downing estimates the financial loss on his Bartlett pears last season due to blossom blight at $10,000, and his loss on the same variety this year from the same cause at 1,000 tons of fruit on 9,000 trees. He concludes that so long as there are blight-infected pear trees in his locality the crop of Bartletts will be destroyed if the bees have access to them. The fact that the covered trees set fair crops of fruit appears to indicate that cross-pollination of Bartletts was not necessary in that locality this season.

In the discussion of pear blight in California, Mr. Waite stated that the blight bacteria were usually carried from the gummy exudation of hold-over cases by flies and wasps, flies being the principal agents in the transportation of the virus. After the first blossoms have been infected in this manner, the regular flower-visiting insects, of which the common honey bee and the sweat bees, belonging to the genera *Halictus* and *Andrena* are examples, carry the disease from one blossom to another. These flower-visiting insects are very efficient in transporting the disease, and other things being equal, the later a pear blooms the more complete its infection. If our pomaceous fruit blossoms continued to open during the summer, the destruction by pear blight would doubtless be almost complete. Ordinarily the closing of the blooming period terminates the multiplication and distribution of the disease.

Mr. M. A. Carleton discussed 'The Spread of Smut and Bunt in Wheat as affected by Dry Seasons and the Earliness of Varieties.' It has been pretty well known for some time that smut and bunt in cereals are much more prevalent in dry seasons and in dry regions. Experiments and observations made by the U. S. Department of Agriculture have also shown that these fungi, when attacking wheat particularly, are more likely to appear in early

varieties than in those that mature later. Thus it is very common for Japanese wheats to be infested with smut when introduced into this country, and Japanese varieties are always quite early in ripening. Now, as the tendency of dryness and heat is to produce early ripening of plants, it appears that there may be some relation between these parallel facts, and the question is a very interesting one as to why these conditions exist. As a rule the smut is propagated by germinating in the ground with the grain itself, infecting the young plant at that time and growing up through the plant as the plant grows, finally breaking out at the surface in the wheat head. One of two things therefore it seems may be true, either that the abnormal condition of the plant produced by its infection with the smut causes the plant to ripen earlier, or, on the other hand, that the early maturity of the plant allows the smut to work its way to the surface before the plant has grown entirely beyond it. Many observations seem to show that the latter is true, although it is by no means established. The tendency in dry seasons and in early ripening is always to produce more fruit or grain and less of the vegetative portion of the plant. As the smut finally produces its spores at the surface in the head, this condition would naturally favor the maturity of the smut. On the other hand, in later ripening sorts and in moister regions or seasons of greater moisture, the growth of the plant being more rapid and the maturity of the fruit occurring later, the plant is enabled in a sense to outgrow the development of the smut.

A portion of the evening was devoted to a symposium on 'Environment as a Factor in Natural Selection,' the discussion being led by Messrs. W. J. Spillman and H. J. Webber. In the discussion Professor Spillman stated that environment is not only a factor in natural selection; it is the whole of it. It is more than this, for it is a factor in variation. As stated, therefore, the subject covers the whole field of natural selection. It is probable that natural selection has been overworked, and particular attention is called to the fact that much, perhaps most, variation is neither useful nor harmful, and therefore not amenable to the influence of natural selection. If this is true a great deal of what we see in living organisms is not due to natural selection, but merely to fortuitous variation, perhaps to mutations, as De Vries would have us believe.

It is really change of environment that is important in natural selection. These changes are frequently favorable in that they remove a condition which made selection more strict. Examples of these are common in the case of organisms transplanted to a new habitat, where their natural enemies are absent. Under such conditions variations become permissible that were not possible under the old conditions, and what was before an unimportant species may assume a very important place in the economy of nature.

Mr. Webber stated that while the majority of variations induced directly by the influence of environment are not inherited; nevertheless, the influence of environment serves to destroy those individuals which do not vary in the direction of adapting themselves to the environment. It is only those individuals, therefore, which possess desirable variations that are able to produce seed for the next generation. The action of the environment in the next generation would be exactly the same, those plants only which vary in the direction of fitting themselves to the environment being able to survive and produce seed. In this way natural selection would eliminate such variations as were unfitted to the environment, so that only those plants best fitted would propagate. This action continued through several years would eventually result in rendering hereditary the characters fitted to the environment.

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DISCUSSION AND CORRESPONDENCE.

WHAT IS NATURE STUDY?

THERE seem to be many conflicting definitions in attempts to answer the above question. Here are two examples: "Nature study, as used in this paper, is understood to be the work in elementary science taught below the high school—in botany, zoology, physics, chemistry and geology. We should aim to define re-