one-sided. The brain of the pathologist is his most important instrument in such investigations. It must be trained to work with precision in all of the various directions and fields involved in such study. This is not now generally the case, and our colleges must be awakened to their duty. To most successfully combat a disease, we should know the causes that contribute to it and as much about the causes as possible. We should understand the pathological reaction of the diseased plant. Only in this way shall we be able to remove the causes or protect the plant against them or assist it to recover.

SPRAYING

In the cases of disease due to attack of parasitic organisms, we are often able to protect our crops by spraying. Spraying, like a coat of mail, is a protection against entrance to the tissues by invading organisms. If there are any holes in the coat of mail or if it is made of poor material or is put on after the arrow has pierced the flesh, it may be of no avail. Much of our spraying has holes in it. The tissues are not properly coated during the periods of attack. Much of the new growth is left unprotected during the critical period. The parasite gets in through these places, and we find too late that hasty, careless spraying is of little value.

Improperly made mixtures, or mixtures made of poor materials, are often of no protection and may be as injurious as the disease. Even good Bordeaux mixture can not safely be used on some plants, like peaches, and in some seasons is slightly injurious to apples.

The apparatus for spraying is, as a rule, poorly constructed, clumsy and in great need of general improvement and adaptation to particular conditions. Demand good machinery and pay for it. It is essential to success. Those who know these things must teach, *by demonstration,* those who know imperfectly or do not know at all. Literature is valuable as an aid to demonstration teaching, but can never take the place of it. Too much dependence on literature is one of our great educational mistakes. Send out fewer bulletins and more men.

Briefly, then, we shall improve on the pathology of the last century if we take time to be careful and thorough; study the causes of failure and profit by the results; demand better-trained minds and improved apparatus, and depend in our teaching more upon men and less upon books.

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SCIENTIFIC BOOKS

The Carboniferous of the Appalachian Basin. By John J. Stevenson, Professor of Geology in New York University. Pp. 595.

This is the title of a volume recently issued by Judd & Detweiler, of Washington, D. C. The volume consists of four papers previously published in the *Bulletin of the Geological Society of America* between 1903 and 1907.

The subjects treated in these several papers in order of publication are: "Lower Carboniferous," a paper of 82 pages, presented before the society, July 1, 1902, and published March 28, 1903; "The Pottsville" is next discussed in a paper of 174 pages, presented before the society, January 1, 1904, and published under date of May 28 of the same year; the "Allegheny" and "Conemaugh" formations were discussed in the third paper of 165 pages, presented before the society, December 29, 1905, and published May 28, 1906, while the concluding paper of 174 pages, including an elaborate index, presented before the society December 29, 1906, and published under date of April 19, 1907, deals with the "Monongahela" and "Dunkard" formations, ending with a chapter on "Geographical Changes during Pennsylvanian" time, and some "Paleontologic Notes" upon the fauna and flora of the Pennsylvanian.

The work as a whole is a concise summary with complete marginal references to practically all of the publications and conclusions of previous observers on the Carboniferous rocks of the Appalachian basin. It is by far the most elaborate and comprehensive study ever undertaken of the Appalachian Carboniferous, and it will long remain the chief book of reference for the stratigraphic relations of these great series of deposits, the most important economically on the continent.

Dr. Stevenson was peculiarly qualified for the great task he undertook, having himself spent about forty years of his life in the study of the Carboniferous rocks, and having personally seen more of the Appalachian basin than any other geologist. Then, too, in Dr. Stevenson's library, the most complete of any in publications dealing with the Appalachian Carboniferous, is to be found practically everything that other geologists had written. The study and digestion of this immense mass of data scattered through hundreds of publications was in itself a task of enormous proportions, and the writer has put all of his brother geologists of the present, as well as those of the future, under lasting obligations by the long and arduous "labor of love" involved in the publication of this great work which is destined to remain the chief monument of its distinguished author.

One of the principal causes for friction between the U. S. Geological Survey and the other geologists of the country, not connected with that organization, has been a failure of the United States geologists to recognize properly the work of previous observers in the same area, except occasionally when these observers had made some glaring mistakes. The absence of some such publication as Dr. Stevenson's may have been the principal reason for this apparent want of courtesy and fairness in the recognition of previous work, but hereafter there can remain no "extenuating circumstances" for such neglect so far as the Appalachian Carboniferous is concerned.

Regarding the conclusions of the author upon some mooted questions like the western limits of the Catskill, the identity of certain coal beds of wide extent, the equivalency of the Kanawha Black Flint, and other questions of like nature, there will evidently not be entire concurrence on the part of geologists. The reviewer also thinks that the great apparent thinning of both the Monongahela and Conemaugh formations along their northern and western margins is based upon mistaken identifications, that while there is much thinning of these formations shown toward the northwest, it is not really so great as indicated by the author. These are minor matters, however, and confined to regions where, owing to absence of accurate maps and careful measurements, there is much room for doubt as to identifications.

The author rightly gives proper credit to the monumental work of David White, whose skillful and untiring paleobotanical studies have assisted so much in the solution of the many intricate stratigraphic problems connected with the Pottsville and Kanawha formations, and their great southwestward thickening.

Geologists will look forward anxiously for the appearance of Dr. Stevenson's promised paper upon the origin of coal and his discussion of the many related problems for which the wide study and field work of this eminent teacher and geologist have given exceptional qualifications.

I. C. W.

A General Catalogue of Double Stars within 121° of the North Pole. By S. W. Burnham. Part I., The Catalogue, pp. lv + 274. Part II., Notes to the Catalogue, pp. viii + 828. Published by the Carnegie Institution of Washington. 1906.

We run little risk in saying that this is the most important astronomical publication of the year. Although devoted to a highly technical division of the science, it will surely command the attention of astronomers everywhere and long remain a reference of extraordinary excellence. It has been many years in preparation. In the introduction, the author states that its first form was a manuscript catalogue that he began to construct in Chicago in 1870, soon after receiving his six-