is a very concrete division of pathological subjects, we are forced to conclude that a great deal remains to be done to provide adequately for the future instruction that I am well assured is to be given in vegetable pathology.

A body of well-organized knowledge on plant diseases presented by teachers charged chiefly or solely with the giving of courses or the conduct of investigations in plant pathology is, I am led to believe, not solely by the course of demand for workers, but as well by the development of our agriculture practice, to be the future of vegetable pathology. In so far as I am aware, the only university whose officials have, as yet, expressed a desire and future purpose to put plant pathology on this foundation for the future is not, as one would expect, endowed by public funds, but by private philanthropy. I am hopeful that this will not long remain the case.

In choosing this subject and in the manner of presenting it, I have been guided, as herein set forth inadequately, by a desire to make plain the disproportion between the demands, in the line of applied botany, made upon many of the most competent graduates in botany and in the preparation they have been given for this work. It is recognized that at no other period of the world's history have the universities of the time been subjected to such stress and expense in equipping for the demands of instruction as have fallen upon those of our own day within the last two decades, more especially within the last one. Under these circumstances, with the achievements of applied physical and chemical science in the minds and on the lips of the inhabitants of both town and country, it is not surprising that the equally important economic achievements in botanical science, and especially in pathology, should have been passed without much consideration by a great number whose interests and training lead them to look elsewhere. What has been stated has been offered in the spirit of friendly suggestion and with no desire to misstate or misapply the facts as they now exist. Should this appear to have been done, it will be my greatest pleasure to make corrections.

It is quite generally recognized at the present day that some of the brilliant hopes of the chemist respecting improvement in plant growth have failed of realization, and that after all the sciences which deal with living things have their problems worthy the most competent and best equipped of our scientists. The chemist will now admit that mere chemical analysis of the plant substances gives no adequate knowledge whereby we may solve the vexing problems of plant nutrition, valuable and helpful as the analysis has been. We as botanists, are justified in the faith that our beloved science is at last to come into possession of her full heritage of problems as well as opportunities. Certainly the unrivaled development of American botany in recent years justifies a faith of this sort.

I have thus with hasty preparation, and, as I am well aware, very imperfectly as to result, taken this much of your valuable time in discussing what appears clearly to me to be the larger possibilities of the future of vegetable pathology.

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SCIENTIFIC BOOKS.

Briefwechsel zwischen J. Berzelius und F. Wöhler im Auftrage der königl. Gesellschaft der Wissenschaften zu Göttingen. Mit einem Commentar von J. von Braun; herausgegeben von O. Wallach. Leipzig, Verlag von Wilhelm Engelmann. 1901. Two vols., 8vo. Vol. I., pp. xxii+717, with portrait of Berzelius; Vol. II., pp. 774, with portrait of Wöhler.

Thanks to the great care with which the

persons addressed preserved the letters received, and to the circumstance that this was the habit of both parties, chemists can now examine the voluminous correspondence maintained by the Swedish master Berzelius and his famous pupil Wöhler, throughout a long period of years (1823–1848). After the death of Berzelius, Wöhler presented the letters received from him to the Royal Academy of Sciences of Sweden with the condition that they should be kept secret until January 1, 1900; and Berzelius' widow sent the letters written to him by Wöhler to the same institution, whence they were afterwards transferred to the University library of Göttingen. The two large volumes reproducing these letters are published under the auspices of the Royal Academy of Sciences of the same town.

The correspondence begins with a letter written by Wöhler from Heidelberg, July 17, 1823, stating that the eminent professor of chemistry at Heidelberg, Leopold Gmelin, had suggested his applying to Berzelius for permission to continue his chemical studies in the laboratory of the distinguished Swede. At that date Wöhler had published four researches that may have been known to Berzelius, the first in 1821, when Wöhler was twenty-one years of age, narrating his discovery of selenium in a Bohemian mineral and in the oil of vitriol manufactured therefrom. Berzelius replied favorably and a few months later Wöhler made the journey to Stockholm, where he passed the winter of 1823–24. The last letter in the work was written by Svanberg to Wöhler on August 8, 1848, and announced the death of Berzelius; the intervening letters depict the intimate relations that existed between the two chemists.

The high opinion formed by Berzelius for his young pupil was fully justified when, within four years of his studentship, Wöhler was able to write to his former master of his brilliant discoveries of aluminium and of urea; the first in a letter dated October 10, 1827, and the second in a letter of February, 1828. To these announcements Berzelius answered with enthusiasm, 'Aluminium and artificial urea, truly very different bodies, following so close to each other, will be the precious gems in the laurel wreath woven for thy brow.'

Besides their personal successes in chemistry the friends wrote to each other of the labors of their contemporaries and friends; the Swede wrote to the German of the discoveries being made by Mosander, who had been nicknamed 'Father Moses,' of the claims of Gay Lussac, of his opinion of Gerhardt, and of various domestic and family matters.

On the other hand, Wöhler had many things of interest to communicate; he wrote of his joint investigations begun with Liebig in 1830, and in the same year of his marriage. In 1832 the letters are full of incidents; Liebig discovers chloroform and chloral, Faraday discovers voltaic induction, Wöhler's wife died (in 1834 he married a second time), Liebig received a visit from Wöhler in Giessen and they began to investigate bitter almond oil.

Events then marched rapidly; in 1835 Berzelius visited Paris, and Wöhler journeyed to London, after which the two met in Bonn and traveled together to Cassel. This meeting was a source of great pleasure to both the friends, who now pledged themselves in brotherhood (*bruderschaft*); they met but once again in life, at Göttingen in 1845.

In 1836 Wöhler received a call to Göttingen, Berzelius married and was made a baron; in 1837 Bunsen investigated cacodyl, and the unfortunate quarrel between Berzelius and Liebig began with an attack by the latter.

Among the innumerable items of value in these 1,500 pages, one may be cited of special interest to American chemists. In June, 1833, Wöhler wrote to Berzelius that a young American, a pupil of Silliman, had been studying with him for some months, and in December of the same year he again mentions him, this time by his name, Booth, and says he wishes to continue his studies under Berzelius if he (Booth) can obtain permission. In this connection Wöhler writes handsomely of the American's ability, industry and absolute trustworthiness. Those who remember the late Professor James Curtis Booth, for forty years melter and refiner in the United States Mint of Philadelphia, and in 1883, 1884 and

1885 President of the American Chemical Society, will be pleased to note the accurate forecast of his character made by Wöhler fifty years before. Booth, however, did not go to Sweden, as Berzelius replied he was too old to take charge of any students.

The reviewer can give but a birdseye survey of the extraordinary value of these volumes as contributions to the history of chemistry. An index of proper names adds to their usefulness.

HENRY CARRINGTON BOLTON.

Reports of the Cambridge Anthropological Expedition to Torres Straits, Volume II. *Physiology and Psychology.* Part I. 'Introduction and Vision.' Cambridge, The University Press. 1901. 4to. Pp. 140.

The inclusion of psychological tests in the anthropological survey of the status of primitive peoples is a noteworthy tendency of recent investigation, and one worthy of the highest commendation. No more interesting contribution of this nature has been made than the one just published by the Cambridge expedition, the general director of which is Mr. A. C. Haddon. The psychological observations are due to W. H. R. Rivers. While many of the observations are rather undeveloped in type and made under unfavorable conditions, yet the whole research embodies a considerable amount of material that is suggestive even where it fails to be conclusive. Mr. Rivers is entitled to great credit for the inauguration and the successful completion of this series of tests.

The direction of such an enterprise involves great tact, a constant watchfulness for sources of error, encounter with difficulties of language and the explanation of what was wanted. The men had to be given tobacco and the children sweets as rewards of merit for having their eyesight tested, while at the same time an appeal to their vanity was very efficacious. The story was circulated that the black man could see and hear better than the white man, and that the white man had come to see whether this was so and would record the results in a big book for all to read. An overzealous native, in impressing the necessity of truthfulness in answering the questions asked, had hinted that Queen Victoria would send a man-of-war to punish those who told lies, and so frightened off a group of subjects altogether. But on the whole, Mr. Rivers presents satisfactory evidences that the natives understood what was desired and were able to give proper attention to the test.

Only a few of the more significant results can here be presented in outline. Visual acuity was tested in several ways, the best being by the use of the letter E in various positions (Snellen's Haken). This character was presented in various sizes and arrangements and the subject required to hold a sample character, which he had in his hand, in the position of a given character exhibited at a standard distance. The smallest size of the character distinguishable at the standard distance would thus be a measure of the visual efficiency according to the usual procedure. In one group of natives there were two thirds who had vision between two and three times what is commonly supposed to be normal European vision. This conclusion must be somewhat modified in view of the difficulty of obtaining precisely comparable European standards and in limiting the subjects to those presenting no decided refractive defects. Yet the balance of evidence is in favor of a slight superiority of the vision among 'Naturvölker' as compared with 'Culturvölker.' Bringing this into relation with the widely circulated reports of the marvelous visual powers of savages, Mr. Rivers decidedly agrees with those who interpret such proficiency as, in the main, a psychological one. It is because the savage in his limited world knows what to look for, that he is able to recognize objects at a greater distance; and when the European attains an equal familiarity with the environment he is likewise able to observe what previously passed his closest scrutiny. Mr. Rivers cites a case in point from Ranke who was astonished that the Indians (of South America) 'could tell the sex of a deer at a distance which would have implied vision at an extremely small angle if the distinction had depended on seeing the antlers,' but who found that he could make the like distinction