volcanic ash deposited upon the northern portion of the island of St. Vincent and the ash-filling of the gorges of the Wallibou and Rabaka Dry Rivers, the devastation wrought in the forests and on the plantations within a radius of about five miles from the crater and the phenomena of primary eruptions observed in the crater and of secondary eruptions observed in the Wallibou and Rabaka ash-beds. The nature of the exploding eruption cloud was discussed and it was shown how the heavily dust-laden steam cloud kept close to the surface of the ground under the influence of gravity while its initial velocity was furnished by the horizontal component of the explosion.

About eighty lantern slides were used in illustrating the speaker's remarks.

EDMUND OTIS HOVEY,
Secretary.

THE ELISHA MITCHELL SCIENTIFIC SOCIETY OF THE UNIVERSITY OF NORTH CAROLINA.

THE 155th meeting was held in the Chemical Lecture Room, Tuesday, October 11, 7:30 P.M. The following papers were given: 'The Construction of a Double Six,' by Professor Archibald Henderson; 'The Geological History of Currituck Banks,' by Professor Collier Cobb.

ALVIN S. WHEELER,
Recording Secretary.

DISCUSSION AND CORRESPONDENCE.

SOIL MANAGEMENT.*

"The three papers here printed have been refused departmental publication by the Chief of the Bureau of Soils."

In glancing at this note on the title page of this pamphlet of 168 pages, the reader is naturally struck with the query, why the U. S. Department of Agriculture should decline to publish the results of the work of such a man as King, working under its auspices. Has the salt indeed lost its savor? Both American and European scientists have been accustomed for many years to regard with confidence and respect the work and publications of the man upon whom, by common consent, the mantle of Wollny has fallen since the premature death of the soil physicist of Germany. It is certainly worth the while of every worker in agricultural science to see and judge for himself whether a star has been eclipsed or blotted out from the scientific firmament, and if so, from what cause.

We are, at the outset, somewhat reassured as to the totality of the conjectured eclipse, by finding that the three rejected bulletins are but a portion of a series of six forming the report of King, as head of the Division of Soil Management, for the years 1902 and 1903. Since three out of the six have been accepted by the department for publication, it is evident that King's right hand has not wholly lost its cunning during these two years. What, then, is the matter with Bulletins D, E and F, here presented to us by the author at his personal expense and risk, and as he expressly states, in their original form?

As it happens, the rest of the series, bulletins B, C and G, have not yet reached publication by the bureau of soils. We must, therefore, rely upon the intrinsic evidence contained in the three now before us, to settle the reason for their rejection.

In his preface the author reticently says that the 'adequate discussion was withheld in order to avoid, as far as possible, antagonizing the published views of the Bureau' (of Soils); and hence the three papers are published without general comments. It is to the conclusions deducible from the facts given, then, that we must look for the substance of these papers, and for the possible cause of their falling under condemnation.

Bulletin E, the first in the pamphlet and the most important of the three, treats of the results obtained in the fertilization with stable manure, in different multiple proportions, of eight different types of soils. The experiments were conducted on eight two-acre plots, located respectively near Goldsboro, N. C., Upper Marlboro, Md., Lancaster, Pa., and Janesville, Wis., and representing two groups

* 'Investigations in Soil Management,' being three of six papers on the influence of soil management upon the water-soluble salts in soils, and the yield crops, by F. H. King, Madison, Wisconsin. Published by the author, with permission of the Secretary of Agriculture.

of four each, 'strongly contrasted in their native productive capacities, in order that strongly marked differences might be dealt with.' The dressings of barnyard manure used were at the rate of five, ten and fifteen tons per acre. The crops grown were potatoes and corn, with a series of unmanured check-plots between, in each case.

The crops from each series of plots were weighed, mostly both in the green and in the dry condition; and concurrently, the kinds and amounts of soluble salts extractable by water from the soils of each of the plots before and at different intervals after the application of the manure, were determined according to the delicate methods used in the investigations of aqueous soil extracts.* Moreover, the amounts of the several substances contained in the soil extracts, present in the sap of the plants themselves, were likewise determined, in order to ascertain the relations between the soil solutions and the substances taken up by the crops.

It is not easy for the outsider to detect anything reprehensible in this well-considered plan of operations. It seems to be admirably conceived for the determination of the relation of the soil solutions to plant nutrition and crop production under normal, practical conditions. The details given regarding the actual carrying out of the experiments are equally unexceptionable, except as concerns some points in respect to which, apparently, there was interference of some sort with the plan; *e. g.*, in the matter of making chemical analyses of the stable manure used at the several localities. But however regrettable, this and some other omissions, apparently imposed by superior authority, do not vitiate, to any material extent, the conclusions arrived at by King.

The plan and methods of experimentation being thus unexceptionable so far as any one examining the record given can judge, the only question remaining is whether the conclusions deduced from the experimental results are justified, and whether these are in conflict with practical or scientific experience, or with common sense. Of these conclusions it will be best to give the chief ones in the words of the author.

After giving, on page 5, a table showing the percentage relations of crop yield under different fertilizations, he says: 'It will be seen that in the case of the poorer soils there is a percentage difference of 46 between the yields of the fifteen-ton subplots and those to which nothing has been added; but a difference of only eighteen on the stronger soils.' Recalculating these results on the next page so as to show their relations more clearly, he adds: 'These results show that both relatively and absolutely, adding fertilizers to the poorer soils has had a greater effect than the same treatment with stronger soils.' Farther on, after giving a table of the several yields of water-free shelled corn, he says: "It is here seen that on the four poorer soils, there is a systematic difference in the yield of water-free shelled corn, closely related to the fertilizers applied to the soil. The group of four stronger soils do not show, throughout, this systematic relation." Photographic views of the corn on the growing plots show these differences clearly in the growth of the plants.

The only criticism that could be, perhaps, made of the work leading to these conclusions from an outside point of view, is that they are so clearly and thoroughly in accord with all former experience, both practical and experimental, that they are largely foreseen.

Then follows the record and discussion of corresponding experiments with potatoes, which yield practically the same results and conclusions.

Then are given the results of analyses of leachings of the same soils upon which these crops had been grown. The results are presented in a table, from which "it is very clear that the effect of different amounts of stable manure applied to these soils * * * has been such upon the recovery of the water-soluble salts as to enable the same treatment to remove different amounts from different fertilizations. * * * There is a clear quantitative relation, too, between the yields and the salts recovered, these (the former) increasing where the essential ingredients of plant food are higher."

* Bulletin No. 22, Bureau of Soils.

King also details the experiments made with small (four-pound) samples of soils mixed with much larger amounts of the same manure, the leachings of which after 65 days, gave, in general, results corresponding to those obtained from the field tests; and he discusses in detail the apparent effects upon the solubilities of the several ingredients of plant food, and the influence upon the formation and reduction of nitrates; showing that there is no direct ratio between the amount of manure added and the nitrates found in the different soils. He determines and discusses, likewise, the relation of the salts added to the soils in the manure to those recovered by leaching, all vouched for by full analytical data.

Finally, King shows the effects upon the plants of different doses of manure, with respect to the water-soluble salts recoverable from the plants themselves. In both cases the influence of manuring is mainly seen to be a direct one, as has, in fact, already been shown by Godlewski. "It is thus shown that the crops on the manured ground have recovered 29 per cent. more potash from the four stronger soils, and 40 per cent. more from the poorer soils, where the fifteen tons of manure had been applied." Lime and magnesia, on the contrary, were diminished where the potash was increased.

What may be considered the final summing-up of this bulletin is given by King in the following paragraph on page 60, the last but one:

> The observations here presented, both upon the soils and upon the plants which had grown upon them make it clear that when farmyard manure is applied to fields it has the effect not only of increasing the yields, but at the same time of increasing the amounts of water-soluble salts which can be recovered from the soils themselves and from the plants which have grown upon them.

I have thought it necessary to present to the readers of SCIENCE somewhat in detail the contents of this bulletin E, in order to show what kind of work it is to which the bureau of soils refuses its *imprimatur*. To the unofficial mind—the *beschränkte Unterthanenverstand*—it appears as an admirable piece of work, in a line but little touched by agricultural investigators thus far, and manifestly likely to lead to important new lights, as well as to definite quantitative corroboration of old ones. As to bulletins D and F, respectively, on 'The Absorption of Water-soluble Salts by Different Soil Types' and on 'The Movement of Water-soluble Salts in Soils,' they are in a measure complementary to bulletin E, affording most interesting side-lights upon the general subject of the latter; they are altogether of similar high scientific grade. They also figure among the 'rejected papers.'

The clew to that rejection evidently lies in 'the published views of the Bureau of Soils,' which King for the time being does not desire to antagonize by discussion, as stated in the preface. What those views are is not specified; but it is easy to see that the results of King's work are wholly incompatible with the remarkable utterances of 'Bulletin 22,' now well known to all interested in agricultural science. Essentially, that bulletin promulgates the doctrine that while fertilizers 'do sometimes, and even frequently,' seem to increase production, yet since, according to data given therein, the aqueous soil solution is always of the same composition in all soils, it follows that all soils contain sufficient available plant food to maintain productiveness indefinitely; and that the moisture supply is the one controlling condition, climate permitting.

Such being the official, orthodox doctrine, it becomes clear why especially bulletin 'E,' showing pointedly the very reverse of the official doctrine to be true, could not receive the official approval and *imprimatur*. And that a man of King's standing and reputation could not, under such circumstances, do otherwise than tender his resignation, to take effect after his report had been completed and submitted, is obvious. This having been done, the Bureau of Soils is now rid of a contumacious, insubordinate person, who refuses to subscribe to his chief's scientific dicta as set forth in Bulletin 22; which, it is well known, has not received the assent of a single scientist of weight, and has been controverted and repudiated both in America and Europe by all who have taken any notice of it.

But worse than the ill-founded hypotheses of the head of one of the most important bureaus of the Department of Agriculture, which, moreover, receives and spends one of the largest appropriations in the budget of that department, is the return to medievalism indicated in the case before us. It is not only that of a deliberate attempt to suppress the truth, but it indicates on the part of the morally responsible head of that bureau a more than child-like confidence in the permanent success of the obscurantist régime such as is practiced and defended by Pobyedonostseff. Yet it is doubtful that even the latter, or the puissant head of the Russian Empire himself, would undertake to pass the censor's black brush over inductive scientific papers like these of King.

It is impossible to conceive that in the twentieth century, and especially in a country claiming to be progressive *par excellence,* such a régime should be allowed to continue for any length of time. King has uttered his '*e pur si muove*' by the publication of his rejected papers; it now behooves the scientific men of the country to voice their emphatic protest against the dictation of official orthodox science of any kind, from headquarters at Washington.

E. W. Hilgard.

Berkeley, Calif.,
September 29, 1904.

'THE METRIC FALLACY,' ONCE MORE.

To the Editor of Science: It is not uncommon for professors of linguistic science to be asked the question, 'What do you think will be the common language of the civilized world when the different peoples adopt one?' Despite the impossibility of direct knowledge on such a subject, conjecture is easy. Probably the most plausible of such conjectures is that the Teutonic and Romance languages will continue the present process of intermingling indefinitely until a common language becomes the result, difference of language diminishing into mere difference of dialect. It may be fair to assume that the English language, now the one most widely in use, will be the most important of the different components of the future language of civilization, though we have to admit the possibility that the Anglo-Saxon may give place within a few centuries to some progressive competitor, such as the Japanese. Supposing an international language thus to become developed by common consent due to common interests, international business both political and commercial will be facilitated. But even approximate uniformity of thought, of custom, of interest, has never yet received practical demonstration as a human possibility. If the future should develop a single universal language, it must be universal only in the sense of being a recognized standard from which many local offshoots will grow. No other view seems consistent with the continued existence of a reasonable degree of personal liberty.

Now, assume that a similar question is asked about the future coinage, weights and measures of the civilized world. The present chaos is bad enough, but far from being so bad as it was a century ago. The tendency has been unmistakably toward unification, but with the goal still far away. Any one who imagines that either the metric system or the British system, as formulated to-day, will meet all the requirements of both science and commerce a century or two hence, may be happy in his optimism, but he can not be credited with much appreciation of what experience has hitherto shown to be the processes of natural evolution.

In a recent communication (Science, September 16, p. 373) Mr. F. A. Halsey, writing in response to my criticisms of the attack upon the advocates of the metric system by Messrs. Halsey and Dale, says, "My purpose in writing this letter is to point out that Professor Stevens's admissions are of far greater importance than he seems to suspect." He considers me to have 'admitted pretty much all' that the antimetric contestants have contended for; but he admits that two important differences still exist. One is that I regard the change to the metric system as worth the cost, while he and Mr. Dale think it is not. The other is that I regard the change feasible, while he and Mr. Dale think it impossible. These two statements certainly indicate a considerable gulf between us, whatever may have