Keller read a paper on 'Alcoholic Fermentation in the light of Chemical Investigation.'

DISCUSSION AND CORRESPONDENCE.

CORRESPONDENCE RELATING TO A STUDY OF AN AREA OF CRYSTALLINE ROCKS IN SOUTHWESTERN NEW ENGLAND.

TO THE EDITOR OF SCIENCE: I have recently resigned my position upon the staff of the United States Geological Survey for reasons which are, I believe, of some interest to geologists throughout the country. I am, therefore, led to request the publication in SCIENCE of the letter in which my resignation was tendered.

American geology has furnished many knotty problems for solution, and workers within the same or neighboring fields have not infrequently and quite naturally come to hold different interpretations of the same facts. In more than a single instance during the present administration of the survey, the geologists of the country have known that such alternate views were held and shortly thereafter have learned that a 'conference' had been held and the problem quite expeditiously 'settled.' The methods by which such forward strides have been taken can hardly fail to interest those who have the advance of science really at heart.

WM. H. HOBBS.

UNIVERSITY OF MICHIGAN,
ANN ARBOR, MICH., Nov. 2, 1906.

DR. C. D. WALCOTT, Director,
U. S. Geological Survey,
Washington, D. C.

Sir: I have the honor to resign my commission as assistant geologist of the United States Geological Survey.

My connection with the geological staff of the survey has now extended over more than a score of years, and this action is taken after much deliberation and as a protest against the arbitrary and overbearing administration of your chief executive, the geologist in charge of geology. Permit me, therefore, to briefly review for your consideration the later developments of my official work in their relation to survey administration.

As you are doubtless fully aware, during almost the entire period of my connection with the survey my investigations have consisted of a virtually independent study of the structural geological problems offered by an area of crystalline rocks in southwestern New England. The history of American geology shows that this region is, perhaps, the most complex and obscure of any that has been studied, and the divergence of views reached by different workers and the obstinacy which in the past has characterized the defense of each, have caused it to be generally known as the 'Battlefield of American Geology.'

My earlier studies within the district followed conventional lines, and I found after repeated trials that the body of data collected could not be brought within a system so as to fit the accepted theories. Urgent requests from the office of the director to prepare my results for publication, I was obliged to meet with the statement that I was not yet ready to publish.

In the continuation of the areal mapping southward I encountered during the season of 1899 the small area of Newark rocks lying within the valley of the Pomeraug River of Connecticut and outlining a basin which was found to be intersected by an intricate network of nearly vertical faults. Believing that in this basin lay the hitherto unsuspected key to the structure of the larger district, much attention was given to a study of the faults in their relation to each other and to topography and hydrography, not alone within the Newark basin itself but in the surrounding crystalline area as well. The results of this study, which are published in the Twenty-first Annual Report of the Director (part 3, pp. 1–162), have, as suspected, afforded a clue for working out the structure of the entire district by showing that the faults so clearly revealed within the Newark basin are also present (though naturally less clearly revealed) within the crystalline uplands.

My colleague, Professor H. E. Gregory, of Yale University, who has studied the area to the east of my district, soon reached the same conclusion and has expressed it in an official report to the survey upon the Farmington

quadrangle. Brief preliminary notices of the new conclusions, which were printed in the *Journal of Geology* and the *American Journal of Science,* aroused the stout opposition of the geologist in charge of geology.

After thoroughly testing the new hypothesis during several field seasons, a monograph of approximately 500 manuscript pages and numerous plates was prepared as my final report upon the structure of the district. This monograph embodies my conclusions and represents the best work of which I am capable. In submitting it I made the request, upon the basis of the novelty of certain of the conclusions reached, that the report be first read by Mr. G. K. Gilbert. I enjoyed no special personal relations with Mr. Gilbert, but placed confidence in him because of his ripe experience, great ability, and scientific temper. Mr. Gilbert kindly consented to undertake this task, and his extensive critique of the monograph, prepared after several days' study of it, while it did not accept as proven the more novel conclusions of the paper, yet was withal so fair a review and so commendatory of the way in which the report had been prepared, that I could not feel other than complimented by it. Mr. Gilbert pointed out, however, that the larger conclusions reached, if well founded, must discredit in some measure the work of other geologists both within and without the district specially studied. For this reason he recommended that the monograph be examined still more carefully by some other member of the staff of the survey, and, if possible, with the author in the field. The monograph was then referred to Mr. Bailey Willis whose report (as stated in correspondence of Mr. Hayes) recommended the publication of the monograph by the survey, but considered that the author's reputation would be better served by the omission from the monograph of certain chapters. The substance of these radical chapters has since been published in slightly abbreviated form as a bulletin of the Geological Society of America ('Lineaments of the Atlantic Border Region,' Vol. 15, 1904, pp. 483–506, pls. 45–47. Also Rept. Eighth Intern. Geographic Congress, 1904, pp. 193–203), and the letters which I have received from prominent geologists both here and abroad indicate that the opinion of this reviewer has not been an altogether general one.

The recent investigation of earthquakes has brought a wholly unexpected verification of the general correctness of the views expressed in the above paper (see my paper, entitled 'Some Principles of Seismic Geology,' with an introduction by Eduard Suess, president of the Academy of Sciences, Vienna, *Beiträge zur Geophysik,* Leipzig, Vol. 8, heft 2, 1906).

After the examination by Mr. Willis the monograph was referred by the geologist in charge of geology to Mr. George Otis Smith, who had been born in a remote corner of New England and was, therefore, presumably the one best qualified to discuss the geology of that complicated region. When placed beside the report of Mr. Gilbert, the report of Mr. Smith emphasized by its sweeping statements the latter's youth and his more recent graduation from college. The monograph had revealed to him absolutely nothing of value, unless perhaps what had already been published; and in no measured terms the methods of the author were condemned. Prompt action upon this report was taken by Mr. Hayes in refusing the publication of the monograph. At the same time an order was sent me to at once complete the manuscript and illustrations for the Litchfield folio (which covers a portion of the area), the correctness or error of which would then be adjudicated through conference in the field.

When the folio had been prepared I found that in place of a committee made up of non-partisan geologists, my work was to be judged by Messrs. Hayes and Smith, who throughout had not concealed their unfavorable opinion of the work. Messrs. A. C. Spencer and Joseph Barrell were, however, present at the conference (in April, 1905) as guests, the former upon invitation of Mr. Hayes, the latter upon my own initiative.

The Newark basin of the Pomeraug Valley having afforded the key to the structure, it was first gone over, and I believe the expressions of Messrs. Barrell, Spencer and Smith warrant me in saying that the observations of

the two days were to them a revelation of how intricate and extensive the fault system of the valley was, and how well it had been interpreted by my maps. Mr. Smith expressed the view that the faults which I had mapped were only a part of those present. Mr. Hayes merely remarked at last, 'Well, that is very convincing.' So soon, however, as the examination was transferred to the crystalline areas of the district, I found on the part of the two official reviewing authorities utter unwillingness to give any attention to the new methods which had been derived for locating faults; and in those cases where older methods were insufficient to prove the presence of the supposed fault it was assumed not to be present. The manuscript of the Litchfield folio was upon the basis of the conference accepted after emasculation, but the geologist in charge of geology would not permit the question of publication of my monograph to be reopened.

I submit to you, sir, that a geologist employed by a government bureau is entitled not only to the small pecuniary remuneration which he receives, but to the scientific fruits of his labor as well. If he is incompetent or insufficiently trained, he should be discharged; otherwise the ripe fruit of his labors for the securing of which the public money has been expended, should be made available for study. It is even possible that brother geologists may have as much interest in the opinion of the person who best knows the facts, together with the evidence upon which his conclusions are based, as in the opinion of the reviewing authorities.

The creation of the office of geologist in charge of geology by your administration has in effect introduced a public censor for all American geological work. It is to-day practically impossible to publish a large geological monograph upon any portion of the national domain without first securing the consent of the authorities of the geological survey. The United States Geological Survey has now already become responsible for a body of official dogma—largely the personal geological opinions of the geologist in charge of geology. The realization of this fact by European geologists has latterly brought the survey into some ridicule and fixed upon it the name of the 'Great American Trust,' a term by which I heard it more than once called during the past year. I maintain that such a policy is unique among geological surveys and as undemocratic as it is unscientific. So far as my knowledge extends these 'Standard Oil' methods of which I complain are not to be found in European bureaus of geology, where it is the practise to assume no responsibility for opinions expressed by staff members. Where different views have been reached by experienced workers within the same or neighboring fields, the scientific public is there given the chance to decide upon the merits of the controversy. The United States Geological Survey alone officially decides which opinion is 'right' and suppresses the others.

If we grant for the sake of argument that such an un-American policy is defensible, it is obvious that the geological censor must be a geologist not only fair minded and progressive, but of unusually wide experience and of great familiarity with the currents of geological thought in other countries. The man who holds the position of grand vizier to the head of the geological survey unfortunately possesses none of these qualifications. He is a hustling business manager of the sledge-hammer type who has transformed the survey of Powell—which in a notable manner advanced the geological thought of the world and brought golden opinions from all sorts of people—into a great mining bureau with an auxiliary map establishment for 'coloring in' the national domain. Notably ignorant of the trend of modern European geological thought—and apparently wholly oblivious to it—his stubbornness in holding an opinion once expressed has become a byword in the survey. His replies to official communications are in many instances characterized by brutal abruptness and often affect the recipient like a blow in the face. I do not consider it necessary to furnish examples, since wholly characteristic ones can be found in the published correspondence with a prominent geologist.[1]

As I shall elsewhere attempt to show, the

[1] SCIENCE, October 26, 1906.

wall of prejudice which surrounds the office of the geologist in charge of geology and makes of it a sort of national quarantine station for new ideas, is a direct and natural result of the overgrown kindergarten establishment of the survey—the department of geologic folios. The great extravagance of this enterprise almost precludes changes in the completed folios, and a ready-made pattern of geological work seems absolutely essential to its successful completion. The letters of the geologist in charge of geology in reference to new views upon areas for which folios have been published, contain expressions like, 'This folio is put forward as the final and most satisfactory results to be reached in this region,' and 'The Geological Survey can not afford to entirely reverse itself.' Should it develop that fundamental geological problems have not all been solved, it is conceivable that when the numerous map areas of the geologic atlas are tied together a century or more hence, serious difficulties will be encountered in matching borders prepared at widely different dates.

Reverting now to the conclusions which I have reached regarding the structure of southwestern New England, I may add that during the past year I have found some opportunity to note while in Europe the conclusions which are now being reached by geologists respecting other regions of crystalline rocks. In Calabria, the Vogesen, in southern Norway and especially in Scotland, essentially the same conclusions have been reached by the official geologists of those countries respecting the relative importance of fold and fault structures. I am informed by the director of the Geological Survey of Great Britain that a report will soon appear treating of the crystalline area of Scotland, within which area a definite system of faults has been found to be superimposed upon the flexures everywhere present in the district. These faults are nearly vertical, are comprised in several parallel series, and are so numerous that though the map is covered with them, a small proportion only can be represented.

I trust I have made the reasons for tendering my resignation sufficiently clear. The proper function of a great national geological survey I conceive to be something more than to report upon mining regions and to bring together some tons of geological card catalogues printed in diluted English, otherwise designated as folios. My resignation from the survey will permit me to freely express this view and raise my voice against what I consider a most pernicious influence upon American geology.

I am, sir, very respectfully,

Wm. H. Hobbs.

SPECIAL ARTICLES.

A STATISTICAL STUDY OF AMERICAN MEN OF SCIENCE: THE SELECTION OF A GROUP OF ONE THOUSAND SCIENTIFIC MEN.

The psychologist, like the student of other sciences, can view his subject from different standpoints and pursue it by various methods. He may get what knowledge he can of mental processes by introspection, or he may use objective methods. He may confine himself to the 'inner life,' or he may study the individual in all his psychophysical relations. He may give verbal descriptions, or he may make measurements. He may describe static mental life, or he may study the lower animals and human beings from a dynamic and genetic point of view. He may attempt to determine facts and laws that hold for mental life in general, or he may attend to individual differences. He may ignore the practical applications of his science, or he may investigate them. Psychology has until recently concerned itself chiefly with the first of these various alternatives. But its recent progress and future development seem to the present writer to depend particularly on the second. In this case, our two main methods, which can often be combined, are experiment and measurement in the laboratory, and the inductive and statistical study of groups of individuals. In recent years great progress has been made in both directions. Experimental psychology has become a science coordinate with the other great sciences, and statistics have been extended to include sociological and moral phenomena.